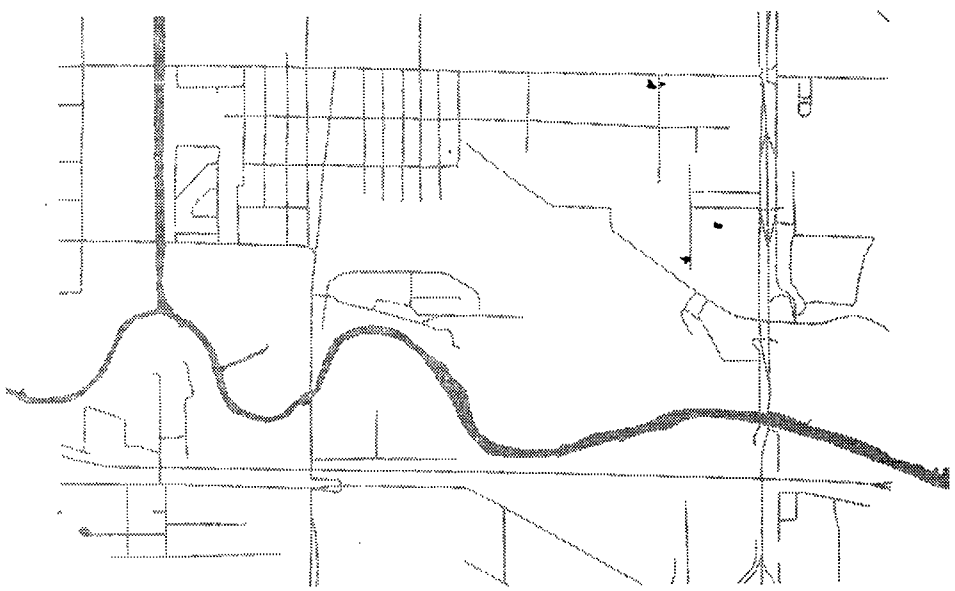
Current Conditions Report for the DuPont East Chicago Facility

Volume 2: Book 1



Prepared for

DUPONT E.I. du Pont de Nemours and Company

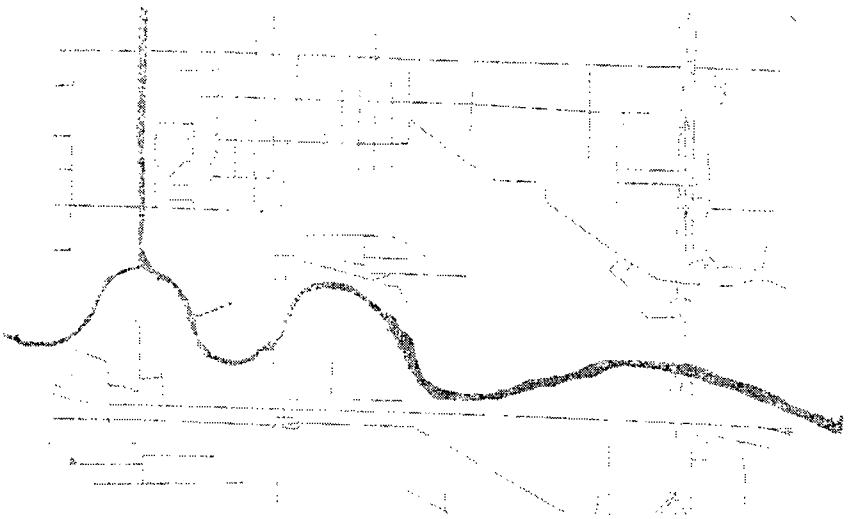
Prepared by

CH2MHILL

US EPA RECORDS CENTER REGION 5
1003357

Current Conditions Report for the DuPont East Chicago Facility

Volume 2: Book 1



Prepared for

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Barley Mill Plaza, Building 27
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October 1997

Appendixes

Where to Find CCR Items Listed in Attachment II of the Order within this CCR Document

Facility Information

Physical and Environmental Quality Conditions

- Site Topography and Easements
  - Site Topography (Plate 1)
  - Property Maps, Easements, and Rights-of-Way
- Meteorology/Wind Directional Information
- Geologic and Soil Information
  - U.S. Department of Agriculture Soil Survey for Lake County
  - Phase II Soil Boring Logs (MW4 through MW20)
  - Phase III Cone Penetrometer Testing (CPT) Stratigraphic Logs
- Monitoring Network Information
  - Monitoring Sites Installed by U.S.G.S.
  - Summary of DuPont Monitoring Well Construction Information
  - Technical Memorandum No. 1: Phase II Groundwater Assessment Field Work Implementation
  - Phase III Monitoring Wells and Piezometers
  - Re-surveying of Monitoring Well Elevations
- Groundwater/Surface Water Hydraulic Information
  - Pre-1990 Groundwater Level Data
  - Phase II Groundwater/Surface Water Level Data
  - Phase III Groundwater Level Data
  - Phase III Hydraulic Conductivity Information
  - Spring Flow Data
  - U.S.G.S. Water Level Information
- Environmental Quality Information
  - Phase I Groundwater Data
  - Soil Quality Data Collected for IDEM
  - Phase II Quality Assurance Project Plan
  - Phase II Groundwater and Surface Water Quality Data and Associated Data Validation
  - Spring Quality Data

  - Sewer Sample Results and Comparision to Nearby Spring and Nearby Groundwater Quality
  - Phase III Quality Assurance Project Plan
  - Phase III Unsaturated Soil and Groundwater Quality Data
  - Phase III Supplemental Groundwater Quality Data (Pumping Test Data)
  - U.S.G.S. Groundwater Quality Data
  - Property Transfer Study—Conoco Area
  - Constituent Distribution Diagrams

Production and Waste Management Information

- Summary of Raw Materials, Products, and Waste Streams by Manufacturing Process
- Relevant Information from the Phase I Groundwater Assessment Report
  - Phase I Waste Management Unit Information
  - Appendix A. Information Sources and Document Reference List
  - Appendix B. Detailed Production History
  - Appendix C. Process Flow Sheets for Chemicals with Productions for Longer Than 25 Years
  - Appendix D. Miscellaneous Process Flow Sheets
  - Appendix E. Waste Management Flow Charts
- Line Shutdown and Facility Dismantlement
  - List of Facilities Dismantled
  - Procedures for Dismantlement
- Identification of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs)
- Flue Dust Information

Offsite Information

Agency Contacts, Adjacent Property Owners, and Nearby Wells

- Agency Contacts Familiar with Environmental Issues at the Facility
- Adjacent Property Owners
- Wells within One Mile of the DuPont East Chicago Facility

Ecological Information

- Natural Areas Located Nearby
- Ecological Habitats and Species within the Region Identified by Others
  - List of Endangered, Threatened and Rare (ETR) Species
  - List of Native Plants and Exotics
  - Morton Arboretum Information

Neighborhood Information

- Potentially Sensitive Receptors
- Riley Park Area Information
  - Riley Park Water Quality Results
  - Riley Park Sewer Survey
  - Riley Park Well and Basement Sump Survey Results
- East Branch of the Grand Calumet System
  - 100-Year Flood Plain
  - Streamflow

Where to Find CCR Items Listed in Section I of Attachment II of the AOC within this CCR Document
(Page 1 of 2)

CCR Items Listed In Section I of Attachment II of the Order	Text Chapter ID	Table (T) or Figure (F) No.	Appendix ID
A. Facility Background			
1. Maps			
General geographic location	1, 2	F1-1, F2-1	--
Property line; adjacent property	2	F2-3	Property Maps, Easements, Rights-of-Way; and Adjacent Property Owners
Topography and surface drainage	2	F2-6, F2-9	Site Topography (Plate 1) and East Branch of the Grand Calumet System for 100-Yr Flood Plain
Tanks, buildings, utilities, paved areas, easements, rights-of-way	2	F2-9	Property Maps, Easements, and Rights-of-Way and Phase I Waste Management Unit Information for Tanks
Solid or hazardous waste treatment, storage, or disposal areas	3	T3-3 F3-6	Identification of SWMUs and AOCs, Phase I Waste Management Unit Information, and Appendix E—Waste Management Flow Charts
Product and waste USTs or piping	--	F3-9	Identification of SWMUs and AOCs
Surrounding land uses	2	F2-4, F2-5	--
Wells at and within 1 mile of the facility	2	F2-17	Monitoring Network Information and Wells within One Mile of the DuPont East Chicago Facility
Wind rose and meteorology	2	--	Meteorology (Wind Directional Information)
2. History of Ownership	3	--	--
3. Spill Information	3	T3-3, T3-4; F3-8, F3-9	Phase I Waste Management Unit Information and Identification of SWMUs and AOCs
4. Permits, Enforcement Actions and Responses, List of Studies	3, 4	Permits: T3-5 Actions: T3-6 Studies: T4-1	--
5. Description of Habitat Types	2, 5	T5-2	Ecological Habitats and Species within the Region
6. Description of Plants and Animals	2, 5	T5-2	Ecological Habitats and Species within the Region

Where to Find CCR Items Listed in Section I of Attachment II of the AOC within this CCR Document
(Page 2 of 2)

CCR Items Listed In Section I of Attachment II of the Order	Text Chapter ID	Table (T) or Figure (F) No.	Appendix ID
B. Preliminary Assessment of Nature and Extent			
1. Summary of Source Areas of Contamination	3	--	Phase I Waste Management Unit Information
Location of units/areas	3	F3-6, F3-7, F3-8, F3-9	--
Quantity of wastes	--	--	Phase I Waste Management Unit Information
Type of hazardous waste or constituents	--	--	Phase I Waste Management Unit Information
Areas where additional information is necessary	4	--	--
Results of RFA and summary of suggested actions	--	--	--
2. Preliminary Assessment of Degree and Extent of Contamination			
Description of extent of contamination for each medium	4	--	Environmental Quality Information
Map of sampling locations/source areas/plumes	4	F4-2 through 4-7b	Constituent Distribution Diagrams
General assessment of data quality	4	T4-2	--
Previous Investigations List and Agency Contacts	4	T4-1	Agency Contacts Familiar with Environmental Issues
3. Preliminary Assessment and Description of Potential Pathways			
Migration pathways	5	F5-4a, F5-4b, F5-5	--
Physical property of contaminants	5	T5-1	--
Assessments of offsite migration of contamination	5	--	Riley Park Area Information
4. Description of Potential Impacts on Human Health and Environment	5	--	Neighborhood Information
C. Interim / Stabilization Measures			
Objectives of ISMs: Mitigation	3	T3-8	Line Shutdown and Facility Dismantlement
Design, construction, operation and maintenance requirements	--	--	--
Schedule for design, construction and monitoring	--	--	--
Schedule for progress reports	--	--	--
Data to support future interim measures	--	--	--

-- = Not applicable or none.

Site Topography and Easements

Site Topography (Plate 1)

Property Maps, Easements, and Rights-of-Way

Site Topography (Plate 1)

REAL ESTATE MAP 3916 SHEET 1

CONVEYANCES

PROPERTY NO.				DEEDED	DATE	ACRES IN	ACRES OUT	RECORDING
1502			X	THE GRASSELLI CHEMICAL CO. - Including easements and riparian rights.	10/31/36	444.021		555/310
1502			X	THE GRASSELLI CHEMICAL CO. - Corrective deed.	3/17/42			656/168
1502		X		CHICAGO, SOUTH SHORE, SOUTH BEND R.R.	5/29/42		2.822	
1502		X		INDIANA TOLL ROAD COMMISSION.	3/12/56		3.0	
						444.021	5.822	
				DECEMBER 16, 1974 NET TOTAL ACREAGE		438.199		

EASEMENTS & AGREEMENTS

PROP NO.				GRANTED	DESCRIPTION	DATE	RECORDING
1502 LEASE 6424	A		X	INDIANA HARBOR BELT R.R. CO.	R/W for 6" sewer across R.R. tracks	8/22/44	
1502	B	X		TEXAS PIPELINE CO.	60' R/W for 16" pipeline (Texas pipeline co. conveyed to Wolverine pipeline co. - 6/18/70.	6/30/53	593/607
1502	C	X		NORTHERN INDIANA PUBLIC SERVICE CO.	150' R/W for electric lines	9/14/53	598/310
1502	C	X		NORTHERN INDIANA P.S. CO.	Amends grant of 9/14/53 to install 30" gas pipeline in 150' R/W.	2/26/58	
1502	D	X		WABASH PIPELINE CO.	50' R/W for 2-12" pipelines.	6/4/59	
1502 LEASE 6329	E		X	CHICAGO SOUTH SHORE AND SOUTH BEND RAILROAD.	R/W for 2 acid pipelines under tracks.	12/30/59	
1502 LEASE 6416	E		X	INDIANA HARBOR BELT R.R. CO.	R/W for 2 acid pipelines (granted to Cities Service Oil Co. - 10/1/59 - assigned to DuPont.)	5/25/50	
1502 LEASE 6419	E		X	ELGIN, JOLIET AND EASTERN R.R. CO.	R/W for 2 acid pipelines (granted to Cities Service Oil Co. 10/19/59 - assigned to DuPont.)	5/25/60	
1502	F	X		N.I.P.S. CO.	5' R/W for gas pipeline	12/2/65	
1502	G	X		UNION CARBIDE CORP. - LINDE DIVISION.	R/W for 6" N-pipeline and 10'X20' metering station.	10/16/69	
1502 LEASE 6150	H	X		ILLIANA TRANSIT WAREHOUSE CORP.	Leases 6.038 A for warehouse.	3/16/70	
1502	I	X		TO EXPLORER PIPELINE CO.	R/W for 6 pipelines and valve station.	10/4/71	
1502	J		X	U.S. CORPS OF ENGINEERS	Permit for 2 discharge pipes in river.	6/11/73	
1502 LEASE 6330	K	X		PURDUE UNIVERSITY	Leases 4A'- for environmental sampling station.	1/16/74	

NOTES:

1. The survey of this property was made by C.K. WALLACE on April 4, 1927 and was revised by same said person on May 2, 1928, July 23, 1928 and January 21, 1930.
2. This drawing was traced from the original plat of survey of the property of E.I. Dupont de Nemours and Company in sections 33 and 34, township 37 north, range 9 west of the 2 prime meridian, all in Lake County, Indiana.

PROPERTY MAP
EAST CHICAGO PLANT
EAST CHICAGO, IND.

200 0 200 400 FT.

DECEMBER 16, 1974

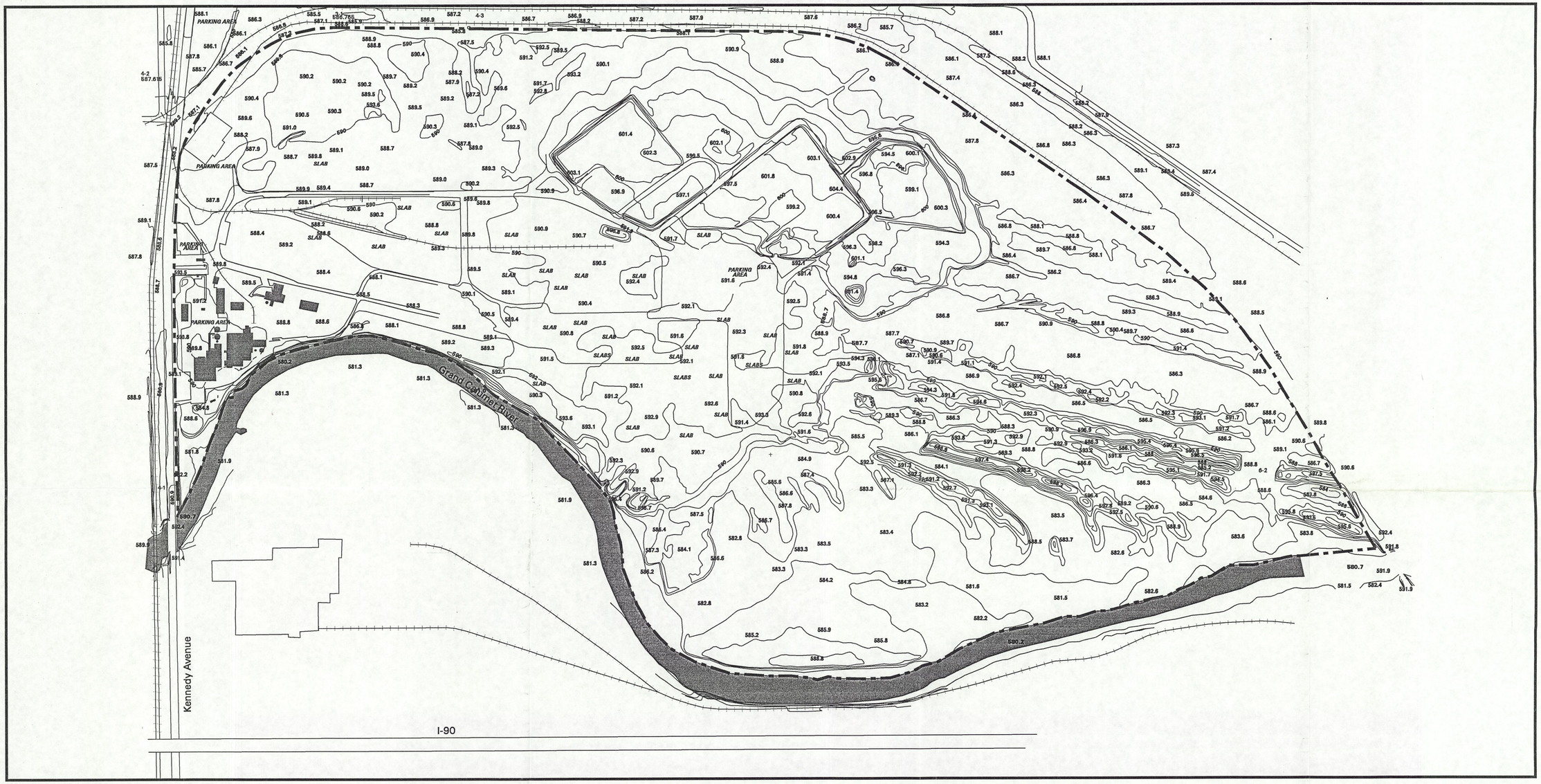
THIS DRAWING HAS BEEN FURNISHED BY E. I. DU PONT DE NEMOURS & CO. THE INFORMATION AND KNOW-HOW THEREON MAY NOT BE USED NOR THE DRAWING REPRODUCED WITHOUT THE WRITTEN PERMISSION OF DU PONT. ALL REPRODUCTIONS IN WHOLE OR IN PART, INCLUDING VENDOR'S SHOP DRAWINGS, SHALL BEAR OR REFER TO THIS STAMP.

DESIGN DIVISION
APPROVED BY J. A. Santos 1/14/75
APPROVED BY

This map was drawn, by MANN-TALLEY, INC., with information provided by Dupont's Real Estate Division.

REAL ESTATE MAP 3916 SHEET 1

DATE _____ LATEST REV. SEE SHEET



Legend

DuPont Property Line

Contours - 2 ft Interval

N

Scale 1:3600
1 inch = 300 feet

Sources:
CH2M HILL

G:\projects\dupont\mxd\plate1.aml
"October 20, 1997"

Plate 1
Site Topography

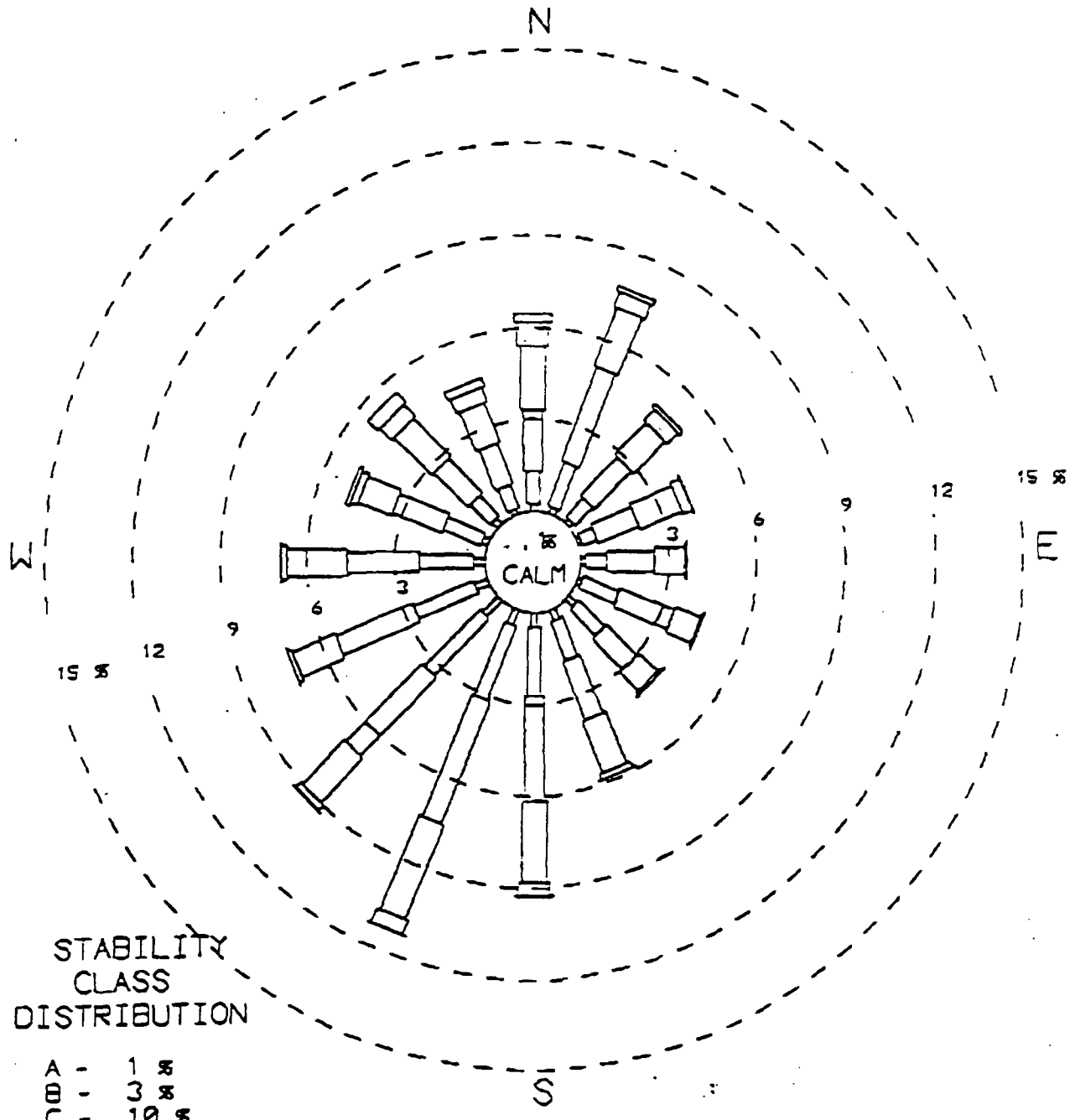
DuPont East Chicago Current Conditions Report

CH2MHILL

Property Maps, Easements, and Rights-of-Way

Meteorology (Wind Directional Diagrams)

The windrose for Lake Calumet Years 1983–87 indicates that the wind directions were most frequent from the south-southwest. Wind speeds indicate near-neutral atmospheric stability roughly 72 percent of the time.



STABILITY CLASS DISTRIBUTION

A - 1 %
B - 3 %
C - 10 %
D - 72 %
E - 13 %
F - 2 %

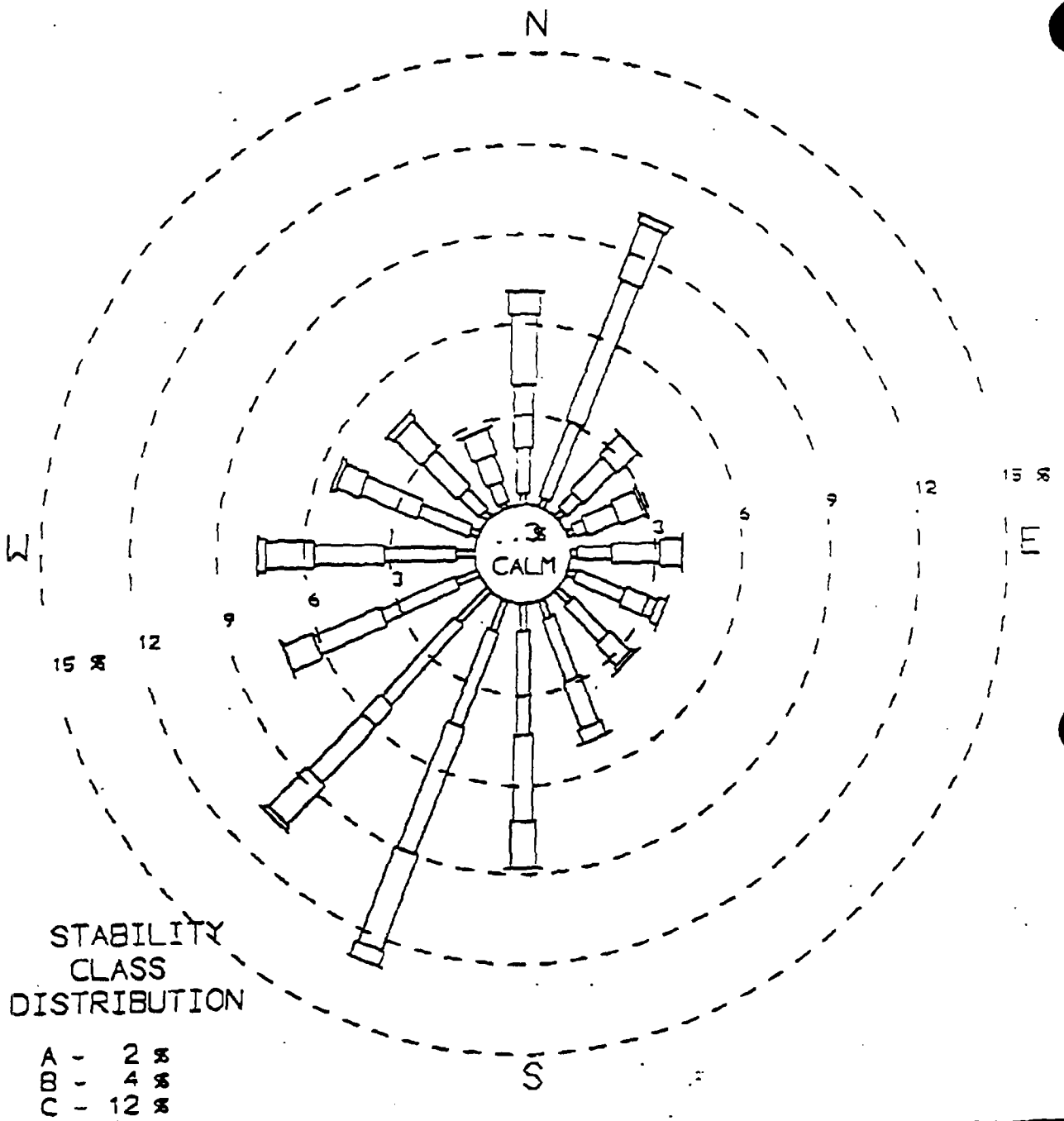
1-3 (5 %) 4-6 (23 %) 7-10 (37 %) 11-16 (29 %) 17-21 (5 %) 22-99 (2 %)

WIND SPEED SCALE (KNOTS)

NOTE - WIND DIRECTION IS THE DIRECTION WIND IS BLOWING FROM

Lake Calumet
Summary Windrose
1983-1987

Figure A-2



STABILITY CLASS DISTRIBUTION

A - 2 %
B - 4 %
C - 12 %
D - 64 %
E - 16 %
F - 2 %

1-3 (9 %) 4-6 (22 %) 7-10 (36 %) 11-16 (28 %) 17-21 (3 %) 22-99 (0 %)

WIND SPEED SCALE (KNOTS)

NOTE - WIND DIRECTION IS THE DIRECTION WIND IS BLOWING FROM

Lake Calumet
Annual Windrose
1986

Figure A-4

Geologic and Soil Information

U.S. Department of Agriculture Soil Survey for Lake County

Phase II Soil Boring Logs (MW4 through MW20)

Phase III Cone Penetrometer Testing (CPT) Stratigraphic Logs

U.S. Department of Agriculture Soil Survey for Lake County (excerpts)

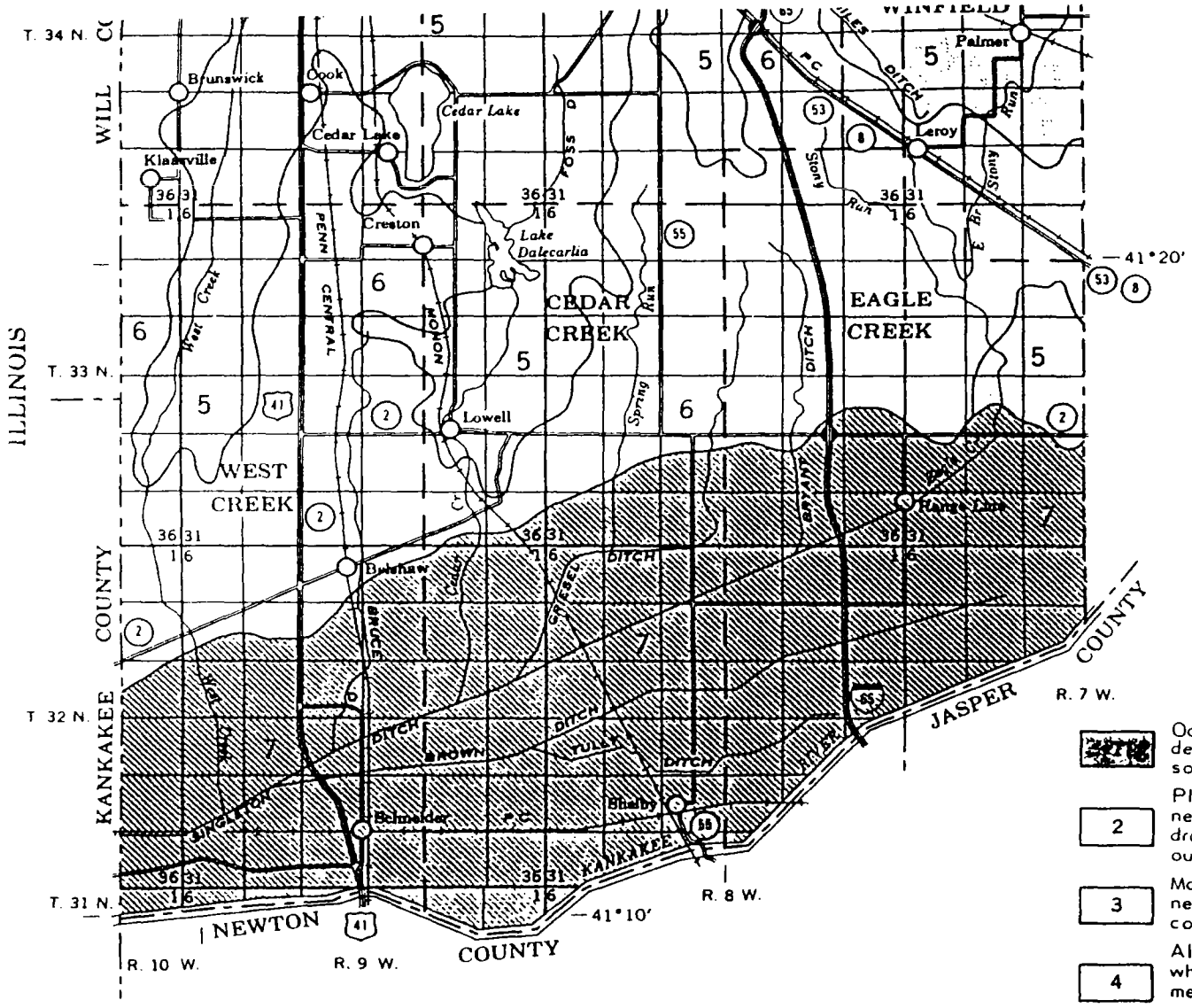
SOIL SURVEY OF

Lake County, Indiana

United States Department of Agriculture
Soil Conservation Service

In cooperation with
Purdue University
Agricultural Experiment Station

Issued July 1972



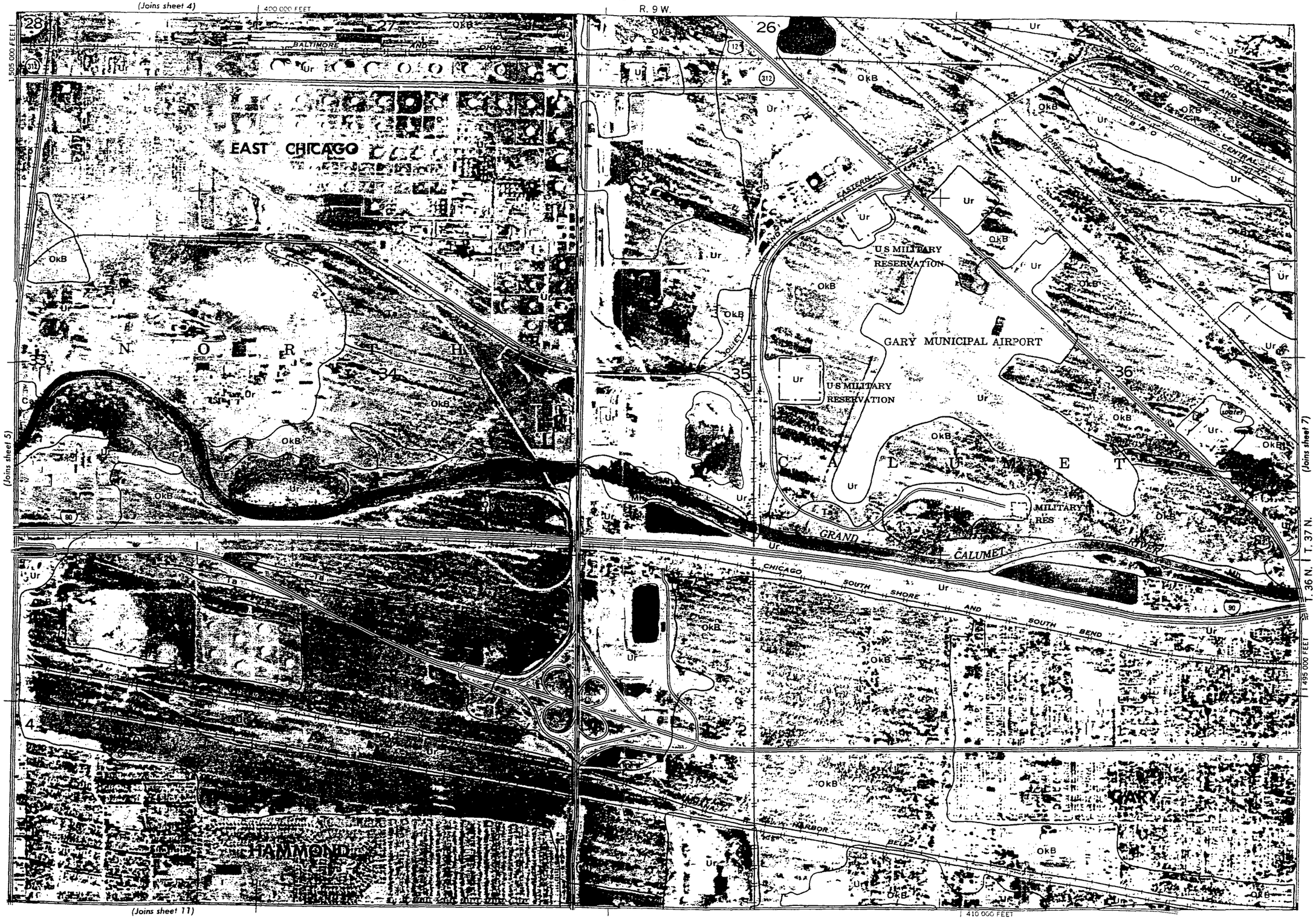
SOIL ASSOCIATIONS

- Oakville-Tawas association Steep to nearly level and depressional, excessively drained and very poorly drained soils that formed in coarse-textured and organic materials
- 2 — Plainfield-Watseka association Moderately sloping to nearly level, excessively drained and somewhat poorly drained soils that formed in coarse-textured glacial outwash
- 3 — Maumee-Bono-Warners association: Depressional and nearly level, very poorly drained soils that formed in coarse-textured to fine-textured lake sediments
- 4 — Alida-Del Rey-Whitaker association: Nearly level, somewhat poorly drained, moderately coarse textured and medium-textured soils that formed in glacial outwash and lake sediments
- 5 — Morley-Blount-Pewamo association Steep to nearly level, moderately well drained to poorly drained soils that formed in moderately fine textured glacial till
- 6 — Elliott-Markham-Pewamo association: Nearly level and gently sloping, well-drained to poorly drained soils that formed in moderately fine textured glacial till
- 7 — Rensselaer-Gilford association: Depressional and nearly level, poorly drained and very poorly drained soils that formed in moderately fine textured to moderately coarse textured glacial outwash

This map is for general planning. It shows only the major soils and does not contain sufficient detail for operational planning.

Published 1971

LAKE COUNTY, INDIANA — SHEET NUMBER 6



LAKE COUNTY, INDIANA NO. 6

LAKE COUNTY, INDIANA NO. 4

LAKE COUNTY, INDIANA NO. 5

LAKE COUNTY, INDIANA — SHEET NUMBER 5

380 000 FEET

R. 10 W. | R. 9 W.

(Joins sheet 3)

505 000 FEET

ILLINOIS

COOK COUNTY

T. 36 N. | T. 37 N.

495 000 FEET

(Joins sheet 6)

(Joins sheet 10)

Phase II Soil Boring Logs (MW4 through MW20)

(excepts from Phase II Groundwater Assessment Report [CH2M HILL 1991])

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South Boundary of Site
ELEVATION ~ 587.46' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA with Knock-out Plugs
WATER LEVEL AND DATE START 5/25/90 FINISH 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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						Blind drilled: log completed using cuttings and drilling progress observations HNu BG = .2 ppm TOX = 0 LEL 0% 0_2 20.8% BH = "Borehole"
		GRB			Red Bricks, Misc. Fill	Fill, red bricks, etc. 0800 HNu BH = BG TOX BE = BG
5						0810 HNu BH = BG LEL = BG
		GRB			V. FINE GRAINED SILTY SAND, grey, wet, med. dense, SM	0831 HNu BH = BG HNu cuttings = BG TOX BH = BG TOX cuttings = BG
10						
		GRB			V. FINE GRAINED, POORLY GRADED SAND, wet, grey, tr. silt, dense, SP	
15						
		GRB			FINE GRAINED, POORLY GRADED SAND, tr. silt, saturated, grey, dense (like a slurry when it comes out of a hole), SP	Slight rotten egg odor from cuttings TOX BH, breathing = BG
20						0846 HNu BH = BG TOX BH = BG TOX breathing = BG
25						0900 Augers to 30 feet, HNu stopped working
30		GRB			AS ABOVE	End of boring @ 30' Clay not intercepted

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-5 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southern Boundary of Site
ELEVATION ~ 587.79' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 140 lb. hammer
WATER LEVEL AND DATE START 5/21/90 FINISH 5/22/90 LOGGER M.K.Dwyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						
5	4-6	S1	1.4	1-1-1-1 (2)	4.6-5 SANDY GRAVEL, GP, red brown, wet, very loose, soft; 5-6 SILTY CLAY, CL, greyish-black, wet, very loose, soft (unders)	HNu = 0 ppm (hole) Explo = 0% LEL 20.8% O_2 H_2S = 0 ppm HNu = 0 ppm (sample)
10	9-11	S2	1.3	1-1-1-1 (2)	CLAYEY SILT & F.G. SAND, ML, medium grey, moist, very loose, soft, Alt. layers of silt and sand (6" spacing)	HNu = 0 ppm (sample) HNu = 0 ppm (hole) Explo = 0% LEL 20.8% O_2 H_2S = 0 ppm
15	14-16	S3	1.8	3-2-2-2 (4)	FINE GRAINED SAND, SP, grey-brown, well-sorted, wet, very loose, soft, no structure, homogeneous, angular, red cinder fragments	HNu = 0 ppm (sample) End for day 5/21/90
20	19-21	S4	1.8	2-2-2-4 (4)	FINE GRAINED SAND, SP, grey-brown, well sorted, wet, very loose, soft, homogeneous	Begin 5/22/90 HNu = 0 ppm (sample) HNu = 0 ppm (hole) Explo = 20.8% O_2 0% LEL H_2S = 0 ppm
25	24-26	S5	1.9	6-6-6-7 (12)	FINE GRAINED SAND, some medium sand, trace coarse sand, SW, grey-brown, poorly sorted, wet, medium, stiff, trace org. fragments	HNu = 0 ppm (sample)
30	29-31	S6	2.0	4-4-4-6	29-30.6 AS ABOVE, SW	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-5 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southern Boundary of Site
ELEVATION ~587.79' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 140 lb. hammer
WATER LEVEL AND DATE START 5/21/90 FINISH 5/22/90 LOGGER M.K.Dwyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31	S6	2.0	(8)	AS ABOVE 30.6-31 CL, grey, moist, loose, medium	HNu = 0 ppm (sample) HNu = 0 ppm (hole) Explo = 0 LEL 20.8% O_2 H_2S = 0 ppm
35	34-36	S7	1.6	6-6-7-10 (13)	AS ABOVE, CL	HNu = 0 ppm 12:20 pm
					End of boring at 36'	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-6 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South Portion of Site, N. of Woods
ELEVATION ~ 586.77' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers
WATER LEVEL AND DATE Surface START 5/24/90 FINISH 5/24/90 LOGGER M.K.Dwyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			0-8' ORGANIC PEAT	Blind drilled: log completed using cuttings & drilling progress observations HNu = 0 ppm LEL HNu = 0 ppm (soil) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
5						
		GRB			LIGHT BROWN FINE SAND, SP, wet, very loose, soft	
10						
15						
20		GRB			AS ABOVE, SP	HNu = 0 ppm (hole) HNu = 0 ppm (soil) Explo = 20.8% 0_2 > 0% LEL H_2S = 0 ppm
		GRB			FINE SAND, becoming siltier towards bottom of hole @ 26', SW-SM	
25						Clay observed on augers at depth 28'
		GRB			SILTY CLAY, grey-black, CL-ML	HNu = 0 ppm (soil)
30					End of boring at 29'5"	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-7 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southeast Corner of Site

ELEVATION ~ 582.82' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers

WATER LEVEL AND DATE START 5/29/90 FINISH 5/29/90 LOGGER M.K.Dwyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			0-2' ORGANIC PEAT	Blind drilled: log completed using cuttings and drilling progress observations HNu = 0.2 ppm (background) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm HNu = 0 ppm (soil)
		GRB			SP, wet, very loose, soft, well-sorted, homogeneous	
5						
10						
15						
20		GRB			FINE GRAINED SAND, SP, medium-brown, trace silt	
25						
		GRB			SILTY CLAY, grey, CL-ML	Clay observed on augers at 27' HNu = 2-3 ppm (in hole) HNu > 1 ppm (breathing zone) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
30					End boring at 29.5'	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-8 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northeast Portion of Site
ELEVATION ~ 587.79' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 10 1/2" bit
WATER LEVEL AND DATE START 5/30/90 FINISH 5/30/90 LOGGER M.K.Dwyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			FINE GRAINED SAND, SP, medium, brown, wet, very loose, soft, well-sorted, homogeneous	Blind drilled: log completed using cuttings and drilling progress observations HNu = 0.5 ppm (hole) HNu = 0 ppm (soil) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
5						
10						
15						
20						HNu = 0.8 ppm (hole) HNu = 0 ppm (soil) Explo - 20.8% 0_2 0% LEL H_2S = 0 ppm
25		GRB			FINE SAND, becoming siltier, SP (trace silt) @ 26-27'	
30		GRB			SILTY SAND, grey, SM End of boring at 29.5'	No clay intercepted

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-9 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northeast Portion of Site
ELEVATION ~ 587.16' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 10 1/2" bit
WATER LEVEL AND DATE START 5/30/90 FINISH 5/30/90 LOGGER M.K.Dwyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	0-1	GRB			ORGANIC PEAT, grey-black	Blind drilled: log completed using cuttings and drilling progress observations
		GRB			FINE GRAINED SAND, SP, medium brown, wet, very loose, soft, well-sorted, homogeneous	HNu = 0 ppm (hole, soil) Explo = 20.8% 0_2, 0% LEL H_2S = 0 ppm
5						
10						
15		GRB			AS ABOVE, SP	HNu = 0 ppm (hole, soil) Explo = 20.8% 0_2, 0% LEL H_2S = 0 ppm Collect soil sample @ 15-20'
20						
25						
		GRB			28' SILTY SAND, grey, SM	No clay intercepted
30					End of boring at 29.5'	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-10 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northern Boundary of Site
ELEVATION ~ 587.84' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 10 1/2" bit
WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER M.K.Dwyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	0-1	GRB			0-10' FILL	Blind drilled: log completed using cuttings and drilling progress observations
		GRB			Dark brown cinders and gravel in sand/silt matrix	HNu = 0 ppm (hole, fill)
						Explo = 20.8% θ_2 0% LEL
						H_2S = 0 ppm
5						
10		GRB			FINE GRAINED SAND, SP, medium brown, well-sorted, wet, very loose, soft, homogeneous (comprised of well-rounded quartz), trace coarse sand	HNu = 0.6 ppm (at 15')
15						
20		GRB			AS ABOVE, SP	
25						No silt
						HNu = 0.8 ppm (at 28')
						Explo = 20.8% 0% LEL
30						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-10 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northern Boundary of Site

ELEVATION ~ 587.84' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 10 1/2" bit

WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER M.K.Dwyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		GRB			FINE GRAINED SAND, SP, medium brown, well-sorted, trace of sand	
		GRB			SILTY CLAY, grey-black, CL-ML	HNu = 0.2 ppm (hole)
35					End of boring at 34'	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-11 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northwest Corner of Site
ELEVATION ~ 587.62' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV 6 1/4" ID Hollow Stem Augers
WATER LEVEL AND DATE -5' START 6/12/90 FINISH 6/13/90 LOGGER L. Weyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			TOPSOIL, dark grey-brown, fine sand, wet below 5'	Blind drilled: log completed using cuttings and drilling progress observations
						▽ approximate
10		GRB			Poorly graded fine to med. SAND, SP	
20		GRB			AS ABOVE, SP	
30						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-11 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northwest Corner of Site
ELEVATION ~ 587.62' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV 6 1/4" ID Hollow Stem Augers
WATER LEVEL AND DATE ~5' START 6/12/90 FINISH 6/13/90 LOGGER L. Weyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		GRB			AS ABOVE SP	Clay observed on augers at depth of 31'
		GRB			Silty CLAY, grey, CL-ML	
35					End boring @ 34'	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-12 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION North of Guard Shacks Along Kennedy Ave.

ELEVATION ~ 587.70' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA

WATER LEVEL AND DATE START 5/29/90 FINISH 5/29/90 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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			FILL, coarse, angular, gravel & pebbles, black, saturated	HNu BG = 1 ppm LEL = 0 TOX = 0 = H_2S 0_2 = 20.8 No split spoon samples. Cuttings logged knock-out plugs used due to sand blow-in 0905 HNu Borehole = BG TOX = BG LEL = BG 0_2 = BG
5		GRB			V. FINE-GRAINED, POORLY GRADED SAND, trace silt, dk. brown to black, wet, loose to med. dense, SP	0910 HNu breathing = BG TOX = BG LEL = BG 0_2 = BG
		GRB			Lighter in color with depth (grey to dk. grey)	
10						
						0920 HNu breathing = BG TOX = BG LEL = BG 0_2 = BG
15						
		GRB			SAND, trace SILT, SP, grey, wet, med. dense	0930 HNu breathing = BG LEL = BG 0_2 = BG 0935 HNu borehole = BG HNu breathing = BG
20						
25						Driller thinks he may have hit clay at 29'. We will drill to 32', knock out plug to set well, pull back if p[illegible]sible.
30		GRB			CLAY, grey, wet, soft, v. plastic, tr. sand, CL	Confirmed when augers pulled up Clay at 29'

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-13 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southwest Corner of Site Near Settling Pit
ELEVATION ~ 586.46' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile Drill B61, 6 1/4" HSA with Center Plug
WATER LEVEL AND DATE START 5/22/90 FINISH 5/22/90 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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						HNu BG = 0.5 ppm LEL = 22% TOX = 0
	3-5	1	1.2	5-4-3-2	FILL, cobbles, silty sand, silt, red brick?	HNu sample = BG 0820 HNu borehole = BG
5						0832 HNU BH = BG LEL = <1 0_2 = 22% TOX = 0
	8-10	2	1.0	1/24"	PEAT, dk. brown to black, moist to wet, OL	HNu sample = BG TOX = 0
10						
	13-15	3	1.8	0-3/24"	AS ABOVE, 1 sand seam 10" from bottom of sample, v. poorly graded, v. fine sand, tr. silt, SP, lt. grey, wet, OL	Sample rod sank 6" without being pushed HNu sample = BG
15						
	18-20	4	1.4	1-5-8-9	V. FINE SILTY SAND, poorly graded, wet, dense, dk. brown, SM	0900 HNu BH = BG 0925 HNu sample = BG
20						
	23-25	5	0.5	3-1-5-6	NO RECOVERY — pushed spoon with hydraulics to get sample 2nd attempt. AS ABOVE, SM	HNu sample = BG Using hydraulics to push spoon down
25						
	28-30	6	2.0	2-2-4-6	1' AS ABOVE, SM, grain size of sand 28-29' 1' CLAY, v. plastic, tr. sand, wet, soft, grain size of clay 29-30', CL End of boring @ 30'	1040 HNu sample = BG No evidence of product above clay
30						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-14 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Sourthern Boundary of Site
ELEVATION ~ 588.38' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT 6 1/4" HSA and Mobile Drill B-61 Truck Mount
WATER LEVEL AND DATE START 5/23/90 FINISH 5/23/90 LOGGER M.K.Dwyer 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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						HNu = 0 ppm Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
	3-5	S1	0.9	1-1-2-1 (3)	FINE GRAINED SAND, SP, light brown, well-sorted, wet (added water to hole), very loose, soft, homogeneous	
5						
	8-10	S2	1.2	1-/12-6-10 (7)	FINE GRAINED SAND, trace medium sand, SP; light brown, well-sorted, wet, loose, medium, homogeneous, trace organics	HNu = 0 ppm (hole) Explo = 20.8% 0% LEL H_2S = 0 ppm HNu = 0 ppm (sample)
10						
	13-15	S3	1.4	3-17-20-29 (37)	V. FINE GRAINED, poorly graded SILTY SAND, SM, lt. brown to buff with layers of black, organic ? material	
15						
						HNu borehole = BG TOX borehole = BG LEL borehole = BG HNu borehole = BG TOX borehole = 0 LEL borehole = 0
20						
						Blind drilled
25						
		S4		2-8-12-20	V. FINE GRAINED SAND AND SILT, poorly graded, SM, lt. brown to buff or tan	
30						End boring @ 30'

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-15 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southern Boundary of Site North of River
ELEVATION ~ 590.45' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT 6 1/4" HSA with Knock-out Plugs
WATER LEVEL AND DATE START 5/24/90 FINISH 5/24/90 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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			SANDY SILT, dk. brown to black, dry, slightly dense, ML	0925 HNu BG = 1 ppm with rig running Blind drilled: log completed using cuttings and drilling progress observations
		GRB			AS ABOVE, tr. black clay, ML	
5		GRB			SAND WITH SILT, sand v. fine, buff, dry, loose to med. dense, SW	
		GRB		Color change	8' SILTY, V. FINE SAND, wet, SM, tan to orange, med. dense 10' SILTY SAND, dk. brown, wet, med. dense, sand v. fine, SM, tr. clay	HNu BH = BG LEL = 0% Some "balls" as cuttings
10						
						13' HNu BH = BG
15						
		GRB			V. FINE, POORLY GRADED SAND, SP dk. brown, tr. silt, wet	HNu BH = BG TOX BH = 0 Saturated, sloppy cuttings
20					More light brown to tan with depth	
25						
		GRB			AS ABOVE, SP	Had drillers stop at 30'. No clay encountered.
30						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-16 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southwest Boundary of Zinc Area
ELEVATION ~ 588.61' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA
WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER P. Newman

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			SAND WITH SOME SILT, SM, fine, dark brown to black, dry, loose SAND WITH SILT, SM, fine beds of light brown & brown/black, dry	Blind drilled: log completed using cuttings and drilling progress observations No HNu deflections
		GRB			SAND WITH SILT, SP, fine, light brown to yellow	Saturation @ 6' no HNu deflections
5						
10		GRB			SAND WITH SILT, SP, fine, light grey	
15						
20		GRB			AS ABOVE, SP	No HNU deflections
25		GRB			AS ABOVE, SP	
30		GRB			AS ABOVE, SP	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-16 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southwest Boundary of Zinc Area

ELEVATION ~ 588.61' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA

WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER P. Newman

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30					AS ABOVE, SP	Clay not encountered
					End soil boring @ 32'	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-17 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southeast Boundary of Zinc Area
ELEVATION ~ 588.96' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT 6 1/4" HSA with Mobile Drill B-61 Truck Mount Rig
WATER LEVEL AND DATE START 5/30/90 FINISH 5/30/90 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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						0730 HNu BG = 0.7 ppm TOX BG = 0 ppm = H_2S
		GRB			FILL, silty sand, pebbles (angular)	LEL = 0% O_2 = 20.8% Breathing Borehole 0735 TOX = BG HNu = BG LEL = BG O_2 = 20.8
5		GRB			5' SAND, moist, buff, med. gr., poorly graded, trace black discoloration, SP	Blind drilled: log completed using cuttings and drilling progress observations
		GRB			SAND, AS ABOVE, except orange to tan, wet, v. fine gr. to fine gr., tr. to little silt, SP	BH, Breathing 0740 TOX = BG HNu = BG LEL = BG O_2 = 20.8%
10						0745, borehole, breathing TOX = BG HNu = BG LEL = BG O_2 = 20.8%
15		GRB			AS ABOVE, SP (cuttings)	0750, borehole, breathing TOX = BG HNu = BG LEL = BG O_2 = 20.8%
20						
25						0755 borehole, breathing TOX = BG HNu = BG LEL = BG O_2 = 20.8%
		GRB			AS ABOVE, SP	Possibly "different" drilling here. Not s 0810 BG reading from borehole all parameters
30						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-17 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southeast Boundary of Zinc Area

ELEVATION ~ 588.96' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT 6 1/4" HSA with Mobile Drill B-61 Truck Mount Rig

WATER LEVEL AND DATE _____ START 5/30/90 FINISH 5/30/90 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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30					AS ABOVE, SP	Clay? Harder drilling
					CLAY, grey, CL	Clay visible on augers from approximately 32' depth
					End boring @ 33'	
35						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-18 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South of Landfill

ELEVATION ~ 590.02' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT ATV Rig CME 55, 6 1/4" HSA

WATER LEVEL AND DATE START 6/13/90 FINISH 6/13/90 LOGGER L. Weyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			SAND with some silt, fine-med. grained, SP, grey-brown	Blind drilled: log completed using cuttings and drilling progress observations
15		GRB			AS ABOVE, SP	
30		GRB			AS ABOVE, SP	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-18 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South of Landfill
ELEVATION ~ 590.02' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME 55, 6 1/4" HSA
WATER LEVEL AND DATE START 6/13/90 FINISH 6/13/90 LOGGER L. Weyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		GRB			AS ABOVE, SP	Clay visible on augers at 32'
		GRB			CLAY, grey, wet, soft	
					End boring @ 33'	
35						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-19 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South of Insecticide Area
ELEVATION ~ 589.26' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA, 10 1/2" bit
WATER LEVEL AND DATE ~ 5' START 5/31/90 FINISH 5/31/90 LOGGER P. Newman

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						Start drilling @ 13:30 Blind drilled: log completed using cuttings and drillings progress observations
		GRB			SILT WITH SAND, ML, dark brown to black, soft, dry	No HNu deflection
		GRB			SAND WITH SILT, SM, fine, dark brown with seams of light brown	
5						
		GRB			AS ABOVE, SP, yellow to light brown, wet	Saturation @ 5' No HNu deflection
10		GRB			AS ABOVE, SP, dark brown, flowing, increased silt content	
15		GRB			AS ABOVE, SP	
20		GRB			AS ABOVE, SP	
25		GRB			AS ABOVE, SP	No HNu deflection
30		GRB			AS ABOVE, SP	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-19 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South of Insecticide Area

ELEVATION ~ 589.26' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA, 10 1/2" bit

WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER P. Newman

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30					AS ABOVE, SP	HNu = 0 ppm (hole) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm No clay intercepted
					End of boring @ 33'	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-20 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Process Area
ELEVATION ~590.20' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile Rig CME55
WATER LEVEL AND DATE ~5' START 6/11/90 FINISH 6/12/90 LOGGER L. Weyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			Coarse dark grey gravel, fill	HNu BG (~0.2 ppm) Blind drilled: log completed using cuttings and drilling progress observations
5		GRB			FILL, black, wet	
10		GRB			Fine to medium wet SAND, dark grey-brown, SP	HNu = BG
25		GRB			AS ABOVE, SP	
30						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-20 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Process Area

ELEVATION ~ 590.20' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT Mobile Rig CME55

WATER LEVEL AND DATE ~5' START 6/11/90 FINISH 6/12/90 LOGGER L. Weyer

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, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		GRB			AS ABOVE, SP	HNu = BG
		GRB			CLAY, grey, wet, CL	Trace clay on drill bit at 32'
					End boring @ 33'	
35						

Phase III Cone Penetrometer Testing (CPT) Stratigraphic Logs

(conducted by Conoco, Inc., under contract to DuPont Environmental Remediation Services [DERS], 1991 and 1992)

Received from
DuPont 9/26/88

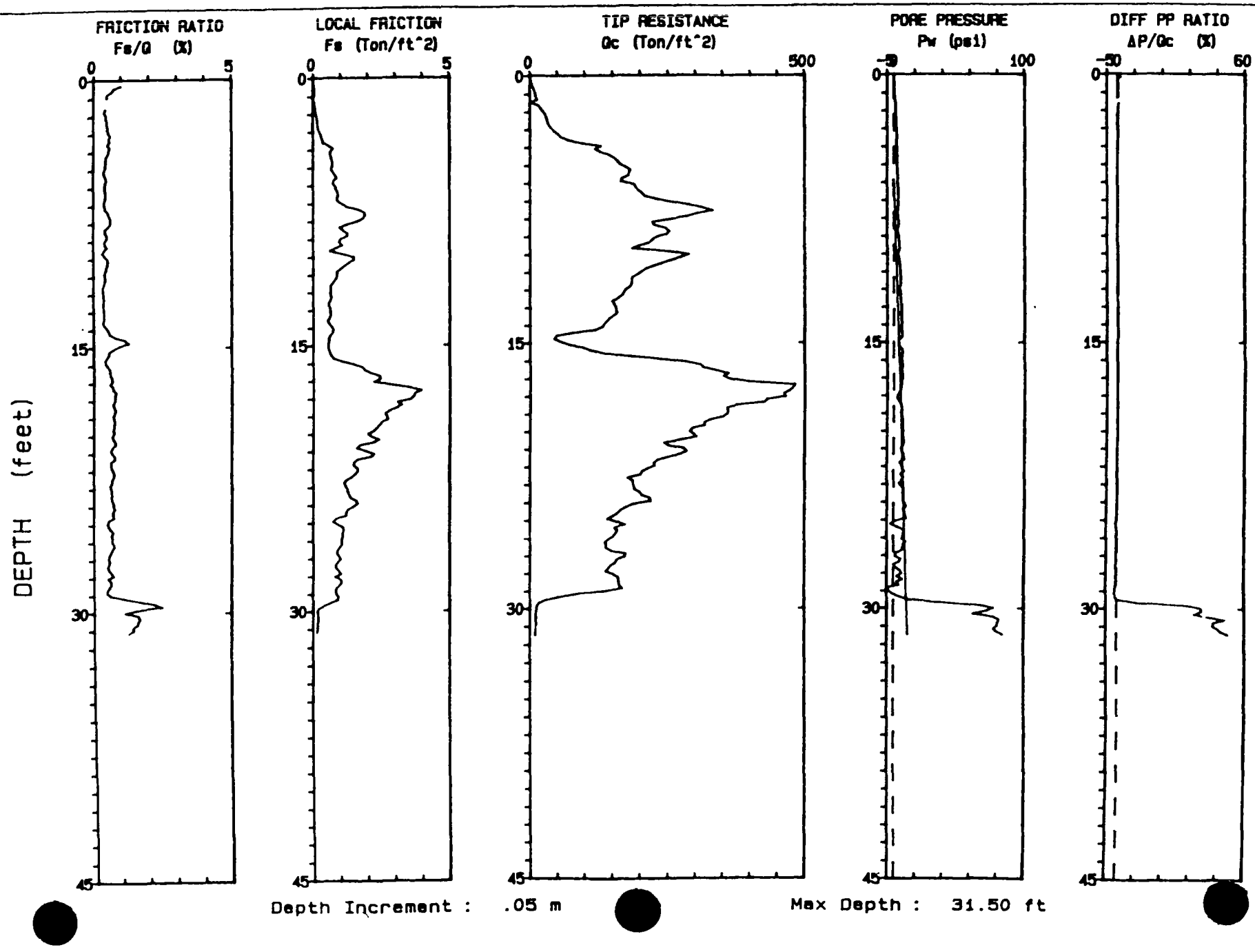
EAST CHICAGO STRATIGRAPHY DATA

Field Assessment Group
Environmental Services Division
Research and Engineering

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-20-91 09:44 FILE cptsd Pg 1 / 1

LOCATION : SD CONE USED : 293 HOLE NO. : 1



SOUNDING DATA IN FILE cptsd 11-20-91 09:44

OPERATOR : CALVIN SELLS LOCATION : SD

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.04		-9.1			0.2
0.05	0.2	1	1	[illegible]	0.53	0.2	2.30	2.30	2.8
0.10	0.3	2	2	0.02	1.13	0.0	0.07	0.07	2.8
0.15	0.5	4	4	0.03	0.75	0.2	0.33	0.33	2.2
0.20	0.7	6	6	0.04	0.59	0.3	0.41	0.41	1.9
0.25	0.8	8	8	0.04	0.54	0.3	0.27	0.27	2.0
0.30	1.0	10	10	0.05	0.52	0.4	0.28	0.26	1.4
0.35	1.1	11	11	-0.01	-0.08	0.6	0.40	0.40	1.1
0.40	1.3	14	14	0.04	0.30	0.7	0.33	0.33	0.9
0.45	1.5	-0	-0	0.05	-20.50	1.3	-36.77	-36.77	0.2
0.50	1.6	16	16	0.07	0.45	1.3	0.59	0.59	0.2
0.55	1.8	20	20	0.08	0.40	1.3	0.49	0.49	0.2
0.60	2.0	24	24	0.11	0.46	1.3	0.38	0.38	0.2
[illegible]65	2.1	28	28	0.13	0.45	1.6	0.40	0.40	0.2
[illegible]70	2.3	30	30	0.15	0.48	1.6	0.38	0.38	0.2
0.75	2.5	32	32	0.16	0.51	1.9	0.43	0.43	0.2
0.80	2.6	33	33	0.18	0.54	1.9	0.42	0.42	0.2
0.85	2.8	36	36	0.19	0.54	2.0	0.39	0.39	0.2
0.90	3.0	40	40	0.22	0.54	2.0	0.36	0.36	0.2
0.95	3.1	45	45	0.28	0.61	2.0	0.32	0.32	0.2
1.00	3.3	52	52	0.30	0.57	2.1	0.29	0.29	0.2
1.05	3.4	58	58	0.34	0.58	2.3	0.28	0.28	0.2
1.10	3.6	70	70	0.36	0.52	2.3	0.24	0.24	0.2
1.15	3.8	95	95	0.57	0.60	2.0	0.15	0.15	0.2
1.20	3.9	130	130	0.74	0.57	2.0	0.11	0.11	0.2
1.25	4.1	119	119	0.64	0.54	2.6	0.16	0.16	0.2
1.30	4.3	129	129	0.62	0.48	2.6	0.14	0.14	0.2
1.35	4.4	145	145	0.66	0.46	2.5	0.13	0.13	0.2
1.40	4.6	154	154	0.69	0.45	2.6	0.12	0.12	0.2
1.45	4.8	160	160	0.72	0.45	2.6	0.12	0.12	0.2
1.50	4.9	164	164	0.71	0.43	2.8	0.12	0.12	0.2
1.55	5.1	174	174	0.66	0.38	2.7	0.11	0.11	0.2
1.60	5.2	183	183	0.74	0.41	2.8	0.11	0.11	0.2
1.65	5.4	181	181	0.82	0.45	2.9	0.12	0.12	0.2
1.70	5.6	179	179	0.87	0.49	3.0	0.12	0.12	0.2
1.75	5.7	167	167	0.76	0.45	3.2	0.14	0.14	0.2
1.80	5.9	166	166	0.73	0.44	3.3	0.14	0.14	0.2
1.85	6.1	190	190	0.83	0.43	3.2	0.12	0.12	0.2
[illegible].90	6.2	194	194	0.86	0.44	3.4	0.12	0.12	0.2
[illegible]95	6.4	197	197	0.89	0.45	3.4	0.12	0.12	0.2
2.00	6.6	204	204	0.92	0.45	3.4	0.12	0.11	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCL[redacted]N I deg
2.05	6.7	209	209	0.87	0.41	3.5	0.12	0.11	0.2
2.10	6.9	228	228	0.90	0.39	3.7	0.12	0.11	0.2
2.15	7.1	256	256	1.09	0.43	3.3	0.09	0.08	0.2
2.20	7.2	287	287	1.25	0.44	3.6	0.09	0.08	0.2
2.25	7.4	313	313	1.68	0.54	3.3	0.08	0.06	0.2
2.30	7.5	333	333	1.90	0.57	3.3	0.07	0.06	0.2
2.35	7.7	305	305	1.90	0.63	2.9	0.07	0.05	0.2
2.40	7.9	286	286	1.83	0.64	3.1	0.08	0.06	0.2
2.45	8.0	253	253	1.60	0.63	3.0	0.09	0.06	0.2
2.50	8.2	222	222	1.23	0.56	3.8	0.12	0.09	0.3
2.55	8.4	225	226	0.96	0.43	3.9	0.12	0.09	0.3
2.60	8.5	246	246	1.10	0.45	3.6	0.10	0.07	0.3
2.65	8.7	253	253	1.27	0.50	2.5	0.07	0.04	0.3
2.70	8.9	249	249	1.24	0.50	3.3	0.10	0.06	0.3
2.75	9.0	230	230	1.00	0.43	3.9	0.12	0.08	0.3
2.80	9.2	222	222	0.95	0.43	4.0	0.13	0.09	0.3
2.85	9.4	217	217	1.08	0.50	4.2	0.14	0.09	0.3
2.90	9.5	199	199	0.82	0.41	4.4	0.16	0.11	0.3
2.95	9.7	186	186	0.60	0.32	4.6	0.18	0.12	0.3
3.00	9.8	253	253	1.04	0.41	3.9	0.11	0.07	0.3
3.05	10.0	289	289	1.49	0.52	2.9	0.07	0.03	0.3
3.10	10.2	273	273	1.49	0.55	3.5	0.09	0.05	0.3
3.15	10.3	255	255	1.31	0.51	3.9	0.11	0.06	[redacted]
3.20	10.5	239	239	1.15	0.48	4.4	0.13	0.08	[redacted]
3.25	10.7	223	223	1.02	0.46	4.6	0.15	0.08	0.3
3.30	10.8	209	209	0.87	0.42	4.7	0.16	0.09	0.3
3.35	11.0	202	202	0.87	0.43	4.9	0.18	0.10	0.3
3.40	11.2	194	194	0.85	0.44	4.9	0.18	0.10	0.3
3.45	11.3	185	186	0.79	0.43	5.1	0.20	0.11	0.3
3.50	11.5	185	185	0.71	0.38	5.2	0.20	0.11	0.3
3.55	11.6	185	185	0.63	0.34	5.2	0.20	0.11	0.3
3.60	11.8	182	182	0.65	0.36	5.2	0.21	0.11	0.3
3.65	12.0	174	174	0.64	0.37	3.9	0.16	0.06	0.3
3.70	12.1	171	171	0.64	0.37	5.1	0.22	0.11	0.3
3.75	12.3	168	168	0.67	0.40	5.2	0.22	0.11	0.3
3.80	12.5	161	161	0.63	0.39	5.2	0.23	0.11	0.3
3.85	12.6	150	151	0.56	0.37	5.5	0.26	0.13	0.3
3.90	12.8	154	155	0.58	0.38	5.6	0.26	0.12	0.3
3.95	13.0	156	156	0.62	0.40	5.6	0.26	0.12	0.3
4.00	13.1	157	157	0.62	0.39	5.7	0.26	0.12	0.3
4.05	13.3	159	160	0.63	0.40	5.9	0.26	0.12	0.3
4.10	13.5	152	153	0.59	0.39	5.8	0.27	0.12	0.3
4.15	13.6	144	144	0.51	0.36	6.0	0.30	0.13	0.3
4.20	13.8	139	139	0.58	0.42	5.9	0.31	0.13	0.3
4.25	13.9	135	135	0.68	0.50	6.2	0.33	0.15	0.3
4.30	14.1	131	131	0.74	0.57	6.0	0.33	0.14	0.3
4.35	14.3	118	119	0.72	0.61	5.9	0.36	0.14	0.3
4.40	14.4	76	76	0.62	0.82	6.2	0.59	0.25	[redacted]
4.45	14.6	48	48	0.56	1.17	6.5	0.97	0.42	[redacted]
4.50	14.8	44	44	0.57	1.29	6.0	0.97	0.36	0.3

[redacted]TH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	56	56	0.54	0.97	3.5	0.45	-0.04	0.3
4.60	15.1	72	72	0.53	0.74	3.9	0.39	-0.00	0.3
4.65	15.3	98	98	0.57	0.58	3.9	0.29	-0.00	0.3
4.70	15.4	111	111	0.62	0.56	6.7	0.43	0.17	0.3
4.75	15.6	137	137	0.67	0.49	6.8	0.36	0.14	0.3
4.80	15.7	180	180	-0.77	0.43	6.5	0.26	0.09	0.3
4.85	15.9	234	234	1.05	0.45	6.2	0.19	0.06	0.3
4.90	16.1	282	282	1.50	0.53	6.4	0.16	0.05	0.4
4.95	16.2	311	311	1.82	0.59	6.4	0.15	0.05	0.4
5.00	16.4	315	315	1.89	0.60	6.5	0.15	0.05	0.4
5.05	16.6	339	339	2.12	0.63	6.0	0.13	0.03	0.4
5.10	16.7	361	361	2.44	0.68	6.5	0.13	0.04	0.4
5.15	16.9	352	353	2.46	0.70	6.5	0.13	0.04	0.4
5.20	17.1	365	365	2.23	0.61	6.7	0.13	0.04	0.4
5.25	17.2	400	400	2.79	0.70	5.5	0.10	0.01	0.4
5.30	17.4	484	484	3.51	0.72	5.8	0.09	0.01	0.4
5.35	17.6	480	480	3.97	0.83	5.5	0.08	0.01	0.4
5.40	17.7	473	473	3.74	0.79	4.9	0.08	-0.00	0.4
5.45	17.9	463	463	3.68	0.79	3.8	0.06	-0.02	0.4
5.50	18.0	466	466	3.58	0.77	2.6	0.04	-0.04	0.4
5.55	18.2	431	431	3.08	0.71	2.6	0.04	-0.04	0.4
5.60	18.4	427	427	3.24	0.76	4.2	0.07	-0.02	0.4
[redacted]65	18.5	377	378	3.06	0.81	5.7	0.11	0.01	0.4
[redacted]70	18.7	358	358	2.80	0.78	6.0	0.12	0.01	0.4
5.75	18.9	360	361	2.64	0.73	6.4	0.13	0.02	0.4
5.80	19.0	359	359	2.70	0.75	6.1	0.12	0.01	0.4
5.85	19.2	351	351	2.74	0.78	6.3	0.13	0.01	0.6
5.90	19.4	328	328	2.51	0.77	6.8	0.15	0.02	0.4
5.95	19.5	316	316	2.42	0.77	7.2	0.16	0.03	0.5
6.00	19.7	317	317	2.33	0.74	6.9	0.16	0.02	0.5
6.05	19.8	294	294	2.22	0.76	6.7	0.17	0.02	1.4
6.10	20.0	290	290	2.01	0.69	7.4	0.18	0.03	0.6
6.15	20.2	297	297	2.14	0.72	7.2	0.17	0.03	0.7
6.20	20.3	303	303	2.42	0.80	7.1	0.17	0.02	0.5
6.25	20.5	274	274	2.21	0.81	7.5	0.20	0.03	0.4
6.30	20.7	243	243	1.70	0.70	7.9	0.23	0.05	0.5
6.35	20.8	251	251	1.60	0.64	7.3	0.21	0.03	0.5
6.40	21.0	279	279	1.93	0.69	5.8	0.15	-0.02	0.5
6.45	21.2	285	285	2.23	0.78	6.1	0.15	-0.01	0.5
6.50	21.3	273	273	2.13	0.78	7.5	0.20	0.02	0.4
6.55	21.5	250	250	1.62	0.65	7.6	0.22	0.03	0.5
6.60	21.7	231	231	1.50	0.65	8.3	0.26	0.05	0.5
6.65	21.8	225	225	1.50	0.67	4.8	0.15	-0.06	0.5
6.70	22.0	226	226	1.64	0.73	6.3	0.20	-0.02	0.5
6.75	22.1	213	213	1.64	0.77	6.9	0.23	-0.00	0.4
6.80	22.3	204	204	1.55	0.76	8.1	0.29	0.04	0.6
6.85	22.5	201	201	1.41	0.70	5.4	0.19	-0.06	0.5
[redacted]90	22.6	178	178	1.22	0.68	7.5	0.30	0.01	0.5
[redacted]95	22.8	187	187	1.13	0.60	6.6	0.25	-0.03	0.5
7.00	23.0	187	187	1.19	0.63	4.0	0.16	-0.13	0.6

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLI[redacted]N I deg
7.05	23.1	189	189	1.25	0.66	5.7	0.22	-0.06	0.6
7.10	23.3	190	190	1.27	0.67	7.8	0.30	0.01	0.5
7.15	23.5	200	200	1.32	0.66	7.1	0.26	-0.01	0.5
7.20	23.6	204	204	1.38	0.68	7.2	0.25	-0.02	0.5
7.25	23.8	218	218	1.59	0.73	7.8	0.26	0.00	0.5
7.30	23.9	220	220	1.64	0.75	7.2	0.24	-0.02	0.5
7.35	24.1	188	188	1.48	0.79	8.8	0.34	0.04	0.5
7.40	24.3	174	174	1.27	0.73	9.5	0.39	0.07	0.5
7.45	24.4	166	166	1.21	0.73	7.5	0.33	-0.02	0.5
7.50	24.6	160	160	1.21	0.76	8.4	0.38	0.02	0.5
7.55	24.8	151	151	0.86	0.57	9.1	0.44	0.05	0.5
7.60	24.9	141	141	0.73	0.52	9.9	0.51	0.09	0.5
7.65	25.1	160	160	0.89	0.56	1.3	0.06	-0.31	0.5
7.70	25.3	174	174	1.10	0.63	-2.4	-0.10	-0.44	0.5
7.75	25.4	154	155	1.13	0.73	2.6	0.12	-0.27	0.5
7.80	25.6	160	160	1.08	0.68	8.0	0.36	-0.02	0.5
7.85	25.8	156	156	1.10	0.71	8.0	0.37	-0.03	0.5
7.90	25.9	152	152	1.06	0.70	7.6	0.36	-0.05	0.5
7.95	26.1	144	145	1.06	0.73	6.9	0.34	-0.09	0.5
8.00	26.2	137	137	1.04	0.75	9.1	0.48	0.02	0.6
8.05	26.4	139	139	0.96	0.69	7.3	0.38	-0.08	0.6
8.10	26.6	139	139	0.88	0.63	6.5	0.34	-0.12	0.6
8.15	26.7	149	150	0.86	0.58	6.5	0.31	-0.12	[redacted]
8.20	26.9	175	175	0.97	0.55	1.4	0.06	-0.31	[redacted]
8.25	27.1	173	173	1.01	0.58	1.0	0.04	-0.34	0.6
8.30	27.2	158	158	0.89	0.56	5.5	0.25	-0.17	0.6
8.35	27.4	156	156	0.81	0.52	4.3	0.20	-0.23	0.6
8.40	27.6	147	147	0.84	0.57	-0.3	-0.01	-0.47	0.6
8.45	27.7	143	143	0.95	0.67	1.6	0.08	-0.39	0.6
8.50	27.9	138	138	1.03	0.75	5.2	0.27	-0.22	0.6
8.55	28.1	152	152	0.81	0.54	6.2	0.30	-0.16	0.6
8.60	28.2	161	161	1.03	0.64	2.6	0.12	-0.31	0.6
8.65	28.4	162	162	1.06	0.66	7.2	0.32	-0.11	0.6
8.70	28.5	163	163	0.96	0.59	2.3	0.10	-0.33	0.6
8.75	28.7	164	164	0.85	0.52	4.2	0.18	-0.25	0.6
8.80	28.9	169	169	0.83	0.49	-4.5	-0.19	-0.61	0.6
8.85	29.0	135	135	0.86	0.63	-3.9	-0.21	-0.74	0.6
8.90	29.2	83	83	0.95	1.14	-0.7	-0.06	-0.93	0.6
8.95	29.4	53	53	0.91	1.71	4.2	0.57	-0.80	0.6
9.00	29.5	28	29	0.62	2.17	11.2	2.84	0.27	0.6
9.05	29.7	16	16	0.40	2.57	32.6	14.87	10.19	0.6
9.10	29.9	12	13	0.19	1.58	66.4	38.94	32.89	0.6
9.15	30.0	12	13	0.14	1.17	76.8	46.16	39.92	0.6
9.20	30.2	11	12	0.18	1.55	71.6	45.45	38.82	0.6
9.25	30.3	10	11	0.17	1.73	61.2	43.76	36.23	0.6
9.30	30.5	11	12	0.18	1.66	76.8	51.44	44.34	0.7
9.35	30.7	10	12	0.16	1.53	81.4	55.84	48.53	0.7
9.40	30.8	11	12	0.16	1.50	86.1	54.10	46.85	[redacted]
9.45	31.0	11	12	0.16	1.50	79.6	53.76	46.46	[redacted]
9.50	31.2	10	12	0.13	1.27	76.8	52.92	45.42	0.7

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	10	11	?	?	79.0	56.46	48.62	0.7
9.60	31.5	10	11	?	?	83.9	59.74	51.89	0.7

WRITE NUMBER OF RODS USED __

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:SD
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-20-91 09:44
Cone Used :293
Water table (feet) : 2.296588

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
0.30	1	5.17	0.03	0.58	0.04	sensitive fine grained	UNDFND	UNDFD	2	.5
0.60	2	14.17	0.06	0.40	0.11	sandy silt to clayey silt	UNDFND	UNDFD	5	1.4
0.95	3	34.86	0.19	0.54	0.18	silty sand to sandy silt	60-70	42-44	11	UNDEFINED
1.25	4	87.33	0.49	0.56	0.23	sand to silty sand	80-90	46-48	21	UNDEFINED
1.55	5	154.33	0.68	0.44	0.27	sand	)90	)48	30	UNDEFINED
1.85	6	177.67	0.79	0.45	0.32	sand	)90	)48	34	UNDEFINED
2.15	7	214.67	0.92	0.43	0.36	sand	)90	)48	41	UNDEFINED
2.45	8	296.17	1.69	0.57	0.40	sand	)90	)48	)50	UNDEFINED
2.75	9	237.50	1.13	0.48	0.45	sand	)90	46-48	45	UNDEFINED
3.05	10	227.67	1.00	0.44	0.49	sand	)90	46-48	44	UNDEFINED
3.35	11	233.50	1.12	0.48	0.53	sand	)90	46-48	45	UNDEFINED
3.65	12	184.17	0.71	0.39	0.57	sand	)90	44-46	35	UNDEFINED
3.95	13	160.00	0.62	0.39	0.62	sand	80-90	44-46	31	UNDEFINED
4.25	14	147.67	0.60	0.41	0.66	sand	80-90	44-46	28	UNDEFINED
4.55	15	78.83	0.62	0.79	0.70	sand to silty sand	60-70	40-42	19	UNDEFINED
4.85	16	138.67	0.70	0.51	0.75	sand	80-90	42-44	27	UNDEFINED
5.15	17	326.67	2.04	0.62	0.79	gravelly sand to sand	)90	46-48	)50	UNDEFINED
5.45	18	444.17	3.32	0.75	0.83	gravelly sand to sand	)90	46-48	)50	UNDEFINED
5.75	19	403.17	3.07	0.76	0.88	gravelly sand to sand	)90	46-48	)50	UNDEFINED
6.05	20	327.50	2.49	0.76	0.92	sand	)90	46-48	)50	UNDEFINED
6.40	21	276.71	2.00	0.72	0.97	sand	)90	44-46	)50	UNDEFINED
6.70	22	248.33	1.77	0.71	1.01	sand	)90	44-46	48	UNDEFINED
7.00	23	195.00	1.36	0.70	1.06	sand	80-90	42-44	37	UNDEFINED
7.35	24	201.29	1.42	0.70	1.10	sand	80-90	42-44	39	UNDEFINED
7.65	25	158.67	1.03	0.65	1.15	sand	70-80	42-44	30	UNDEFINED
7.95	26	156.67	1.09	0.69	1.19	sand	70-80	42-44	30	UNDEFINED
8.25	27	152.00	0.95	0.63	1.23	sand	70-80	40-42	29	UNDEFINED
8.55	28	149.00	0.89	0.60	1.28	sand	70-80	40-42	29	UNDEFINED
8.85	29	159.00	0.93	0.59	1.32	sand	70-80	40-42	30	UNDEFINED
9.15	30	34.00	0.54	1.57	1.36	sandy silt to clayey silt	UNDFND	UNDFD	13	3.1
9.45	31	10.67	0.17	1.58	1.41	clayey silt to silty clay	UNDFND	UNDFD	5	.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 165 ■ sounding

Baseline

Qc	Fs	Pw	Inc
-261	-7.05	-8.5	0.1

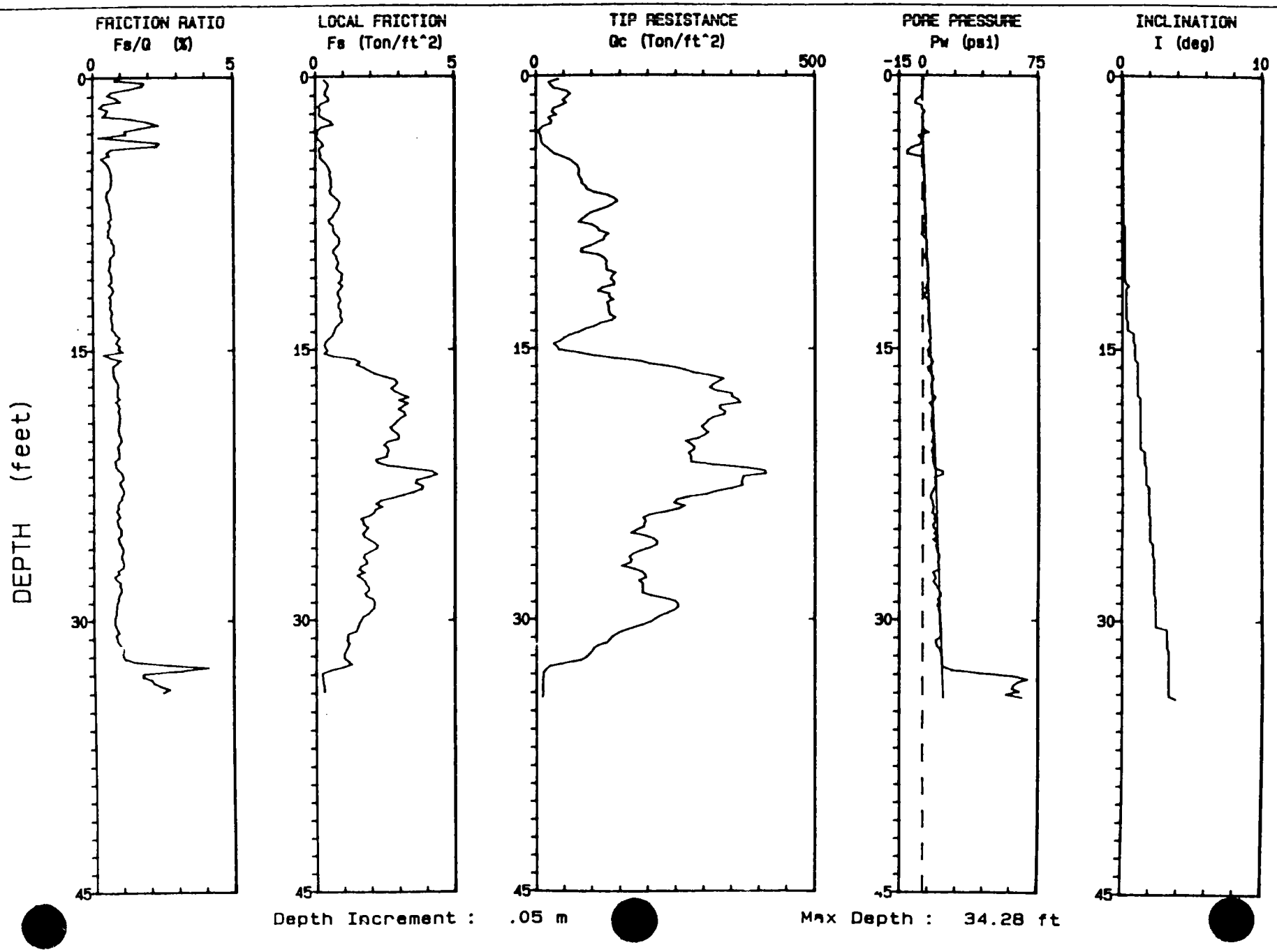
Dep	
Qc	0
Fs	-0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

Conoco, Inc.

OPERATOR : MIKE KASL | CPT Date : 01-21-91 08:37 | FILE CPTA3 Pg 1 / 1

LOCATION : A-3 | CONE USED : 293 | HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 34.28 ft

SOUNDING DATA IN FILE CPTA3 01-21-91 08:37

OPERATOR : MIKE KASL LOCATION : A-3

CONE ID : 293 JOB No. : 1

C[redacted]co, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-299		-2.01		-3.6			0.0
0.05	0.2	40	40	0.32	0.81	1.0	0.18	0.18	0.1
0.10	0.3	23	23	0.43	1.84	-0.3	-0.09	-0.09	0.1
0.15	0.5	27	27	0.48	1.76	0.3	0.07	0.07	0.1
0.20	0.7	32	32	0.[illegible]	1.32	0.1	0.02	0.02	0.1
0.25	0.8	55	55	0.36	0.66	-0.6	-0.08	-0.08	0.1
0.30	1.0	62	62	0.34	0.55	0.0	0.00	0.00	0.1
0.35	1.1	56	56	0.47	0.84	-1.5	-0.19	-0.19	0.1
0.40	1.3	48	48	0.49	1.02	-3.9	-0.59	-0.59	0.1
0.45	1.5	55	55	0.20	0.37	-4.8	-0.63	-0.63	0.1
0.50	1.6	44	44	0.11	0.25	-0.5	-0.08	-0.08	0.1
0.55	1.8	31	31	0.17	0.55	-0.3	-0.07	-0.07	0.1
0.60	2.0	29	29	0.14	0.49	1.6	0.40	0.40	0.1
0.65	2.1	37	37	0.14	0.38	-0.1	-0.02	-0.02	0.1
0.70	2.3	22	22	0.31	1.45	-0.1	-0.04	-0.04	0.1
0.75	2.5	28	28	0.56	2.02	0.4	0.10	0.10	0.1
[redacted]	2.6	27	27	0.64	2.37	0.2	0.04	0.04	0.1
	2.8	12	12	0.21	1.72	0.1	0.05	0.05	0.1
0.90	3.0	6	6	0.07	1.27	1.0	1.23	1.23	0.1
0.95	3.1	5	5	0.06	1.10	4.3	5.89	5.89	0.1
1.00	3.3	9	9	0.02	0.26	-2.5	-1.99	-1.99	0.1
1.05	3.4	9	9	0.12	1.36	-1.0	-0.78	-0.78	0.1
1.10	3.6	10	10	0.24	2.39	-0.3	-0.20	-0.20	0.1
1.15	3.8	13	13	0.30	2.42	-1.5	-0.85	-0.85	0.1
1.20	3.9	21	20	0.14	0.68	-7.1	-2.48	-2.48	0.1
1.25	4.1	27	27	0.14	0.51	-9.7	-2.62	-2.62	0.1
1.30	4.3	33	33	0.20	0.60	-9.7	-2.10	-2.10	0.1
1.35	4.4	48	48	0.15	0.32	-0.7	-0.10	-0.10	0.1
1.40	4.6	61	61	0.28	0.46	0.8	0.09	0.09	0.1
1.45	4.8	68	68	0.38	0.55	0.3	0.03	0.03	0.1
1.50	4.9	75	75	0.46	0.61	1.0	0.09	0.09	0.1
1.55	5.1	78	78	0.51	0.65	1.0	0.10	0.10	0.1
1.60	5.2	78	78	0.54	0.69	1.0	0.09	0.09	0.1
1.65	5.4	77	77	0.53	0.69	1.2	0.11	0.11	0.1
1.70	5.6	80	80	0.56	0.69	1.3	0.11	0.11	0.1
1.75	5.7	83	83	0.57	0.69	1.4	0.12	0.12	0.1
1.80	5.9	83	83	0.57	0.69	1.5	0.13	0.13	0.1
1.85	6.1	90	90	0.58	0.64	1.6	0.13	0.13	0.1
1.90	6.2	93	93	0.52	0.56	1.7	0.13	0.12	0.1
1.95	6.4	106	106	0.55	0.52	1.6	0.11	0.10	0.1
2.00	6.6	130	130	0.68	0.53	1.0	0.06	0.04	0.1

[redacted]

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	141	141	0.78	0.55	1.6	0.08	0.07	[redacted]
2.10	6.9	146	146	0.89	0.61	1.5	0.08	0.06	0.1
2.15	7.1	138	138	0.86	0.62	1.6	0.08	0.06	0.1
2.20	7.2	129	129	0.82	0.63	1.7	0.09	0.07	0.1
2.25	7.4	114	114	0.76	0.66	2.0	0.12	0.09	0.1
2.30	7.5	98	98	0.66	0.68	2.1	0.15	0.11	0.1
2.35	7.7	91	91	0.63	0.69	2.2	0.18	0.12	0.1
2.40	7.9	83	83	0.48	0.59	2.3	0.20	0.13	0.1
2.45	8.0	77	77	0.51	0.66	2.5	0.24	0.16	0.1
2.50	8.2	101	101	0.64	0.64	1.3	0.09	0.03	0.2
2.55	8.4	111	111	0.64	0.57	0.2	0.02	-0.05	0.2
2.60	8.5	114	114	0.66	0.58	2.5	0.16	0.09	0.2
2.65	8.7	131	131	0.73	0.55	-0.7	-0.04	-0.10	0.2
2.70	8.9	123	123	0.86	0.70	1.3	0.08	0.01	0.2
2.75	9.0	122	122	0.86	0.71	2.9	0.17	0.10	0.2
2.80	9.2	109	109	0.86	0.79	2.9	0.19	0.10	0.2
2.85	9.4	98	98	0.76	0.78	2.8	0.21	0.10	0.2
2.90	9.5	82	82	0.65	0.80	2.9	0.25	0.12	0.2
2.95	9.7	81	81	0.64	0.80	2.6	0.23	0.09	0.2
3.00	9.8	113	113	0.74	0.66	2.2	0.14	0.03	0.2
3.05	10.0	123	123	0.76	0.62	2.2	0.13	0.03	0.2
3.10	10.2	127	127	0.82	0.64	3.2	0.18	0.08	0.2
3.15	10.3	126	126	0.79	0.62	3.5	0.20	0.09	0.2
3.20	10.5	127	127	0.74	0.58	3.6	0.20	0.09	0.2
3.25	10.7	127	127	0.83	0.66	3.6	0.20	0.09	[redacted]
3.30	10.8	143	143	0.97	0.68	3.6	0.18	0.08	[redacted]
3.35	11.0	137	137	0.93	0.68	3.6	0.19	0.08	0.2
3.40	11.2	134	134	0.94	0.70	3.6	0.19	0.07	0.2
3.45	11.3	140	140	0.81	0.58	3.6	0.18	0.07	0.3
3.50	11.5	140	140	0.98	0.70	2.9	0.15	0.03	0.5
3.55	11.6	118	118	0.89	0.76	2.0	0.12	-0.02	0.3
3.60	11.8	111	111	0.78	0.70	3.6	0.23	0.07	0.3
3.65	12.0	132	132	0.79	0.60	1.0	0.05	-0.09	0.3
3.70	12.1	131	131	0.86	0.65	1.3	0.07	-0.07	0.3
3.75	12.3	139	139	0.89	0.64	3.6	0.19	0.05	0.3
3.80	12.5	127	127	0.82	0.64	3.9	0.22	0.06	0.3
3.85	12.6	130	130	0.80	0.61	4.1	0.23	0.07	0.3
3.90	12.8	130	130	0.89	0.68	3.6	0.20	0.04	0.3
3.95	13.0	131	131	0.91	0.69	4.2	0.23	0.07	0.3
4.00	13.1	133	133	0.87	0.65	4.2	0.23	0.06	0.3
4.05	13.3	142	142	0.94	0.66	4.2	0.21	0.06	0.3
4.10	13.5	136	136	0.95	0.70	3.6	0.19	0.02	0.4
4.15	13.6	115	115	0.82	0.71	4.2	0.26	0.05	0.4
4.20	13.8	105	105	0.71	0.67	4.5	0.31	0.08	0.4
4.25	13.9	88	88	0.68	0.77	4.7	0.38	0.10	0.4
4.30	14.1	77	77	0.64	0.83	4.8	0.45	0.12	0.8
4.35	14.3	60	60	0.58	0.96	4.9	0.59	0.16	0.8
4.40	14.4	50	50	0.45	0.91	5.5	0.80	0.27	0.8
4.45	14.6	44	44	0.36	0.82	3.7	0.61	-0.00	0.8
4.50	14.8	31	32	0.30	0.95	5.2	1.20	0.34	0.9 [redacted]

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
[illegible]55	14.9	38	38	0.35	0.93	4.7	0.90	0.16	0.9
4.60	15.1	40	40	0.43	1.08	3.1	0.56	-0.14	0.9
4.65	15.3	76	76	0.29	0.39	3.6	0.35	-0.03	0.9
4.70	15.4	100	100	0.61	0.61	3.6	0.26	-0.03	0.9
4.75	15.6	140	140	1.39	0.99	5.7	0.29	0.08	0.9
4.80	15.7	186	186	1.60	0.86	6.6	0.25	0.09	1.1
4.85	15.9	204	204	1.47	0.72	6.0	0.21	0.06	1.1
4.90	16.1	243	243	1.74	0.71	3.1	0.09	-0.04	1.1
4.95	16.2	266	266	1.93	0.73	3.7	0.10	-0.02	1.1
5.00	16.4	282	282	2.12	0.75	5.2	0.13	0.02	1.1
5.05	16.6	315	315	2.46	0.78	6.4	0.15	0.04	1.1
5.10	16.7	337	337	2.85	0.85	7.0	0.15	0.05	1.1
5.15	16.9	326	326	2.94	0.90	5.9	0.13	0.03	1.1
5.20	17.1	317	317	2.86	0.90	5.3	0.12	0.01	1.1
5.25	17.2	311	311	2.71	0.87	5.6	0.13	0.02	1.1
5.30	17.4	321	321	2.84	0.89	6.0	0.13	0.02	1.1
5.35	17.6	352	352	3.07	0.87	5.9	0.12	0.02	1.1
5.40	17.7	351	351	3.36	0.96	8.2	0.17	0.06	1.3
5.45	17.9	362	362	2.98	0.82	7.4	0.15	0.05	1.3
5.50	18.0	367	367	3.32	0.90	4.2	0.08	-0.02	1.3
5.55	18.2	329	329	3.14	0.95	6.0	0.13	0.02	1.3
5.60	18.4	329	329	2.96	0.90	6.5	0.14	0.02	1.3
5.65	18.5	339	339	3.18	0.94	6.2	0.13	0.02	1.3
5.70	18.7	338	339	3.24	0.96	6.2	0.13	0.02	1.3
5.75	18.9	317	318	3.05	0.96	5.8	0.13	0.01	1.3
[illegible]00	19.0	308	308	2.92	0.95	5.2	0.12	-0.01	1.3
[illegible]85	19.2	304	304	2.83	0.93	5.5	0.13	-0.01	1.3
5.90	19.4	296	296	2.68	0.91	5.9	0.14	0.00	1.3
5.95	19.5	301	301	2.76	0.92	5.9	0.14	0.00	1.3
6.00	19.7	309	309	2.91	0.94	7.1	0.17	0.03	1.3
6.05	19.8	301	301	3.00	1.00	6.8	0.16	0.02	1.3
6.10	20.0	290	290	2.96	1.02	6.5	0.16	0.01	1.3
6.15	20.2	267	267	2.57	0.96	5.6	0.15	-0.01	1.3
6.20	20.3	277	277	2.45	0.89	7.5	0.19	0.03	1.3
6.25	20.5	284	284	2.59	0.91	6.3	0.16	0.00	1.3
6.30	20.7	282	282	2.62	0.93	5.5	0.14	-0.02	1.6
6.35	20.8	272	272	2.57	0.95	6.4	0.17	0.00	1.6
6.40	21.0	277	277	2.56	0.92	6.4	0.17	-0.00	1.6
6.45	21.2	277	277	2.15	0.78	6.2	0.16	-0.01	1.6
6.50	21.3	277	277	2.23	0.80	6.6	0.17	-0.00	1.6
6.55	21.5	318	319	2.59	0.81	7.4	0.17	0.02	1.7
6.60	21.7	377	377	3.40	0.90	7.9	0.15	0.02	1.7
6.65	21.8	412	412	4.20	1.02	12.7	0.22	0.10	1.7
6.70	22.0	413	413	4.39	1.06	13.0	0.23	0.11	1.7
6.75	22.1	371	371	4.07	1.10	7.5	0.15	0.01	1.7
6.80	22.3	370	370	3.63	0.98	8.2	0.16	0.02	1.7
6.85	22.5	368	368	3.59	0.97	7.9	0.15	0.01	1.7
6.90	22.6	371	371	3.86	1.04	8.5	0.16	0.02	1.9
6.95	22.8	352	352	3.83	1.09	6.8	0.14	-0.01	1.9
7.00	23.0	323	324	3.53	1.09	5.9	0.13	-0.03	1.9

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	307	307	3.15	1.03	4.8	0.11	-0.06	[illegible]
7.10	23.3	270	270	2.76	1.02	4.9	0.13	-0.07	1.9
7.15	23.5	251	251	2.33	0.93	6.1	0.18	-0.04	1.9
7.20	23.6	246	246	2.16	0.88	6.2	0.18	-0.04	1.9
7.25	23.8	266	266	2.39	0.90	6.9	0.19	-0.02	1.9
7.30	23.9	255	256	2.14	0.84	6.5	0.18	-0.04	1.9
7.35	24.1	232	232	2.09	0.90	6.1	0.19	-0.05	1.9
7.40	24.3	202	202	1.94	0.96	8.1	0.29	0.01	2.0
7.45	24.4	191	191	1.62	0.85	7.5	0.28	-0.02	2.0
7.50	24.6	196	196	1.71	0.87	8.3	0.30	0.01	2.0
7.55	24.8	193	193	1.73	0.90	6.5	0.24	-0.06	2.0
7.60	24.9	192	192	1.90	0.99	7.0	0.26	-0.05	2.0
7.65	25.1	180	180	1.79	1.00	8.8	0.35	0.02	2.0
7.70	25.3	169	169	1.69	1.00	7.5	0.32	-0.04	2.0
7.75	25.4	196	196	1.74	0.89	9.8	0.36	0.05	2.0
7.80	25.6	211	211	1.94	0.92	6.5	0.22	-0.07	2.0
7.85	25.8	217	217	2.11	0.97	9.4	0.31	0.03	2.2
7.90	25.9	216	216	2.23	1.03	8.8	0.29	0.01	2.2
7.95	26.1	204	204	2.19	1.07	9.0	0.32	0.01	2.2
8.00	26.2	186	186	1.97	1.06	9.6	0.37	0.03	2.2
8.05	26.4	173	173	1.76	1.02	10.7	0.45	0.08	2.2
8.10	26.6	166	166	1.71	1.03	10.8	0.47	0.08	2.3
8.15	26.7	170	170	1.83	1.07	10.1	0.43	0.05	2.3
8.20	26.9	168	168	1.85	1.10	10.1	0.43	0.05	2.3
8.25	27.1	152	152	1.61	1.06	10.4	0.49	0.06	2.3
8.30	27.2	174	175	1.55	0.89	10.8	0.45	0.07	[illegible]
8.35	27.4	189	189	1.76	0.93	6.5	0.25	-0.11	[illegible]
8.40	27.6	195	195	1.48	0.76	7.7	0.28	-0.06	2.3
8.45	27.7	197	198	1.64	0.83	8.5	0.31	-0.03	2.3
8.50	27.9	183	183	1.78	0.97	6.7	0.26	-0.11	2.3
8.55	28.1	191	191	1.82	0.95	8.5	0.32	-0.04	2.3
8.60	28.2	190	190	1.92	1.01	9.5	0.36	-0.01	2.3
8.65	28.4	191	191	1.92	1.01	10.7	0.40	0.04	2.3
8.70	28.5	190	191	1.78	0.93	11.7	0.44	0.07	2.3
8.75	28.7	205	205	1.83	0.90	11.7	0.41	0.07	2.4
8.80	28.9	230	230	2.07	0.90	9.7	0.30	-0.01	2.4
8.85	29.0	250	250	2.13	0.85	11.0	0.32	0.03	2.4
8.90	29.2	254	254	2.12	0.83	9.4	0.27	-0.02	2.4
8.95	29.4	254	254	2.10	0.83	10.1	0.29	0.00	2.4
9.00	29.5	247	247	1.99	0.81	10.8	0.31	0.02	2.4
9.05	29.7	235	235	1.90	0.81	11.3	0.35	0.03	2.4
9.10	29.9	221	221	1.70	0.77	11.5	0.37	0.04	2.4
9.15	30.0	213	213	1.64	0.77	11.4	0.39	0.03	2.4
9.20	30.2	205	205	1.58	0.77	11.4	0.40	0.03	2.4
9.25	30.3	191	191	1.54	0.80	11.5	0.43	0.04	2.4
9.30	30.5	173	173	1.50	0.87	12.0	0.50	0.06	3.2
9.35	30.7	157	158	1.45	0.92	11.7	0.54	0.05	3.2
9.40	30.8	144	144	1.15	0.80	11.9	0.60	0.06	3.2
9.45	31.0	136	136	1.15	0.84	12.0	0.64	0.06	3.2
9.50	31.2	131	131	1.13	0.86	8.2	0.45	-0.15	3.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	127	127	1.20	0.95	8.8	0.50	-0.12	3.2
9.60	31.5	111	112	1.16	1.04	9.5	0.61	-0.10	3.2
9.65	31.7	103	103	1.11	1.08	11.4	0.79	0.02	3.3
9.70	31.8	100	101	1.05	1.04	12.0	0.86	0.06	3.3
9.75	32.0	95	95	1.01	1.06	12.3	0.94	0.08	3.3
9.80	32.2	90	90	1.02	1.13	12.9	1.03	0.13	3.3
9.85	32.3	79	79	1.18	1.50	12.7	1.16	0.12	3.3
9.90	32.5	49	49	1.30	2.67	12.7	1.88	0.18	3.3
9.95	32.6	24	24	0.99	4.17	14.0	4.26	0.75	3.3
10.00	32.8	17	17	0.54	3.27	19.2	8.32	3.30	3.3
10.05	33.0	13	14	0.23	1.68	36.8	19.73	13.47	3.3
10.10	33.1	13	13	0.23	1.79	60.1	34.39	27.68	3.3
10.15	33.3	12	13	0.25	2.07	68.7	41.56	34.41	3.3
10.20	33.5	12	13	0.26	2.21	62.4	38.05	30.81	3.3
10.25	33.6	12	12	0.29	2.51	59.4	36.72	29.33	3.3
10.30	33.8	11	12	0.30	2.64	58.4	37.20	29.54	3.3
10.35	34.0	12	13	0.30	2.51	63.1	38.17	30.85	3.3
10.40	34.1	12	13	?	?	54.7	32.98	25.64	3.3
10.45	34.3	11	12	?	?	64.8	41.61	33.75	3.8

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :MIKE KASL
On Site Loc:A-3
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :01-21-91 08:37
Cone Used :293
Water table (feet) : 3.296588

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
0.30	1	39.83	0.39	0.98	0.04	silty sand to sandy silt	80-90	)48	13	UNDEFINED
0.60	2	43.83	0.26	0.60	0.11	silty sand to sandy silt	70-80	46-48	14	UNDEFINED
0.95	3	19.57	0.28	1.45	0.18	sandy silt to clayey silt	UNDFND	UNDFD	7	1.9
1.25	4	14.83	0.16	1.08	0.23	sandy silt to clayey silt	UNDFND	UNDFD	6	1.4
1.55	5	60.50	0.33	0.55	0.27	sand to silty sand	70-80	44-46	14	UNDEFINED
1.85	6	81.83	0.56	0.68	0.32	sand to silty sand	70-80	44-46	20	UNDEFINED
2.15	7	125.67	0.71	0.57	0.36	sand	80-90	46-48	24	UNDEFINED
2.45	8	98.67	0.64	0.65	0.40	sand to silty sand	70-80	44-46	24	UNDEFINED
2.75	9	117.00	0.73	0.63	0.45	sand	80-90	44-46	22	UNDEFINED
3.05	10	101.00	0.73	0.73	0.49	sand to silty sand	70-80	44-46	24	UNDEFINED
3.35	11	131.17	0.85	0.65	0.53	sand	80-90	44-46	25	UNDEFINED
3.65	12	129.17	0.86	0.67	0.57	sand	80-90	44-46	25	UNDEFINED
3.95	13	131.33	0.86	0.66	0.62	sand	80-90	44-46	25	UNDEFINED
4.25	14	119.83	0.83	0.69	0.66	sand to silty sand	70-80	42-44	29	UNDEFINED
4.55	15	50.00	0.45	0.89	0.70	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
4.85	16	124.33	0.96	0.78	0.75	sand to silty sand	70-80	42-44	30	UNDEFINED
5.15	17	294.83	2.34	0.79	0.79	sand	)90	46-48	)50	UNDEFINED
5.45	18	335.67	2.97	0.88	0.83	sand	)90	46-48	)50	UNDEFINED
5.75	19	336.50	3.15	0.94	0.88	sand	)90	46-48	)50	UNDEFINED
6.05	20	303.17	2.85	0.94	0.92	sand	)90	46-48	)50	UNDEFINED
6.40	21	278.43	2.62	0.94	0.97	sand	)90	44-46	)50	UNDEFINED
6.70	22	345.67	3.16	0.91	1.01	sand	)90	46-48	)50	UNDEFINED
7.00	23	359.17	3.75	1.04	1.06	sand	)90	46-48	)50	UNDEFINED
7.35	24	261.00	2.43	0.93	1.10	sand	)90	44-46	)50	UNDEFINED
7.65	25	192.33	1.78	0.93	1.15	sand	80-90	42-44	37	UNDEFINED
7.95	26	202.17	1.98	0.98	1.19	sand	80-90	42-44	39	UNDEFINED
8.25	27	169.17	1.79	1.06	1.23	sand	70-80	42-44	32	UNDEFINED
8.55	28	188.17	1.67	0.89	1.28	sand	80-90	42-44	36	UNDEFINED
8.85	29	209.33	1.94	0.93	1.32	sand	80-90	42-44	40	UNDEFINED
9.15	30	237.33	1.91	0.80	1.36	sand	80-90	42-44	45	UNDEFINED
9.45	31	167.67	1.40	0.83	1.41	sand	70-80	40-42	32	UNDEFINED
9.75	32	111.17	1.11	1.00	1.45	sand to silty sand	60-70	38-40	27	UNDEFINED
10.05	33	45.33	0.88	1.93	1.49	sandy silt to clayey silt	UNDFND	UNDFD	17	4.2
10.35	34	12.00	0.27	2.26	1.54	clayey silt to silty clay	UNDFND	UNDFD	6	.9

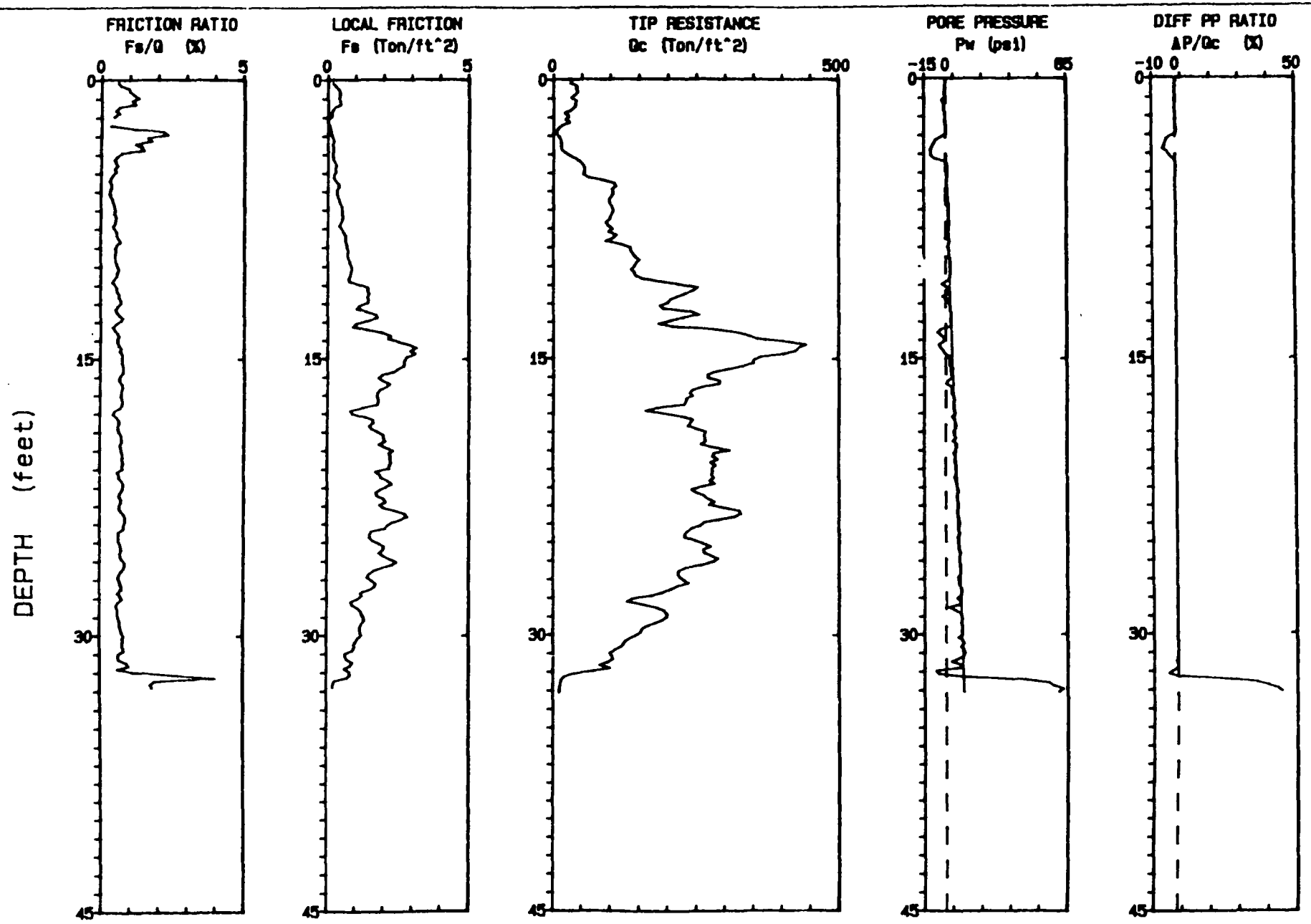
Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Conoco, Inc.

OPERATOR : MIKE KASL | CPT Date : 01-25-91 08:07 | FILE CPT-A9 Pg 1 / 1

LOCATION : A-9 | CONE USED : 293 | HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 33.14 ft

SOUNDING DATA IN FILE CPT-A9 01-25-91 08:07

OPERATOR : MIKE KASL LOCATION : A-9

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-298		-1.96		-3.4			0.1
0.05	0.2	30	30	0.18	0.62	0.0	0.00	0.00	0.0
0.10	0.3	42	42	0.29	0.70	-0.2	-0.04	-0.04	0.1
0.15	0.5	40	40	0.39	0.96	-0.4	-0.08	-0.08	0.0
0.20	0.7	43	43	0.44	1.02	-0.5	-0.09	-0.09	0.0
0.25	0.8	38	38	0.44	1.16	-0.5	-0.10	-0.10	0.0
0.30	1.0	31	31	0.41	1.32	-0.3	-0.07	-0.07	0.0
0.35	1.1	40	40	0.43	1.07	-2.8	-0.50	-0.50	0.0
0.40	1.3	38	38	0.45	1.19	-1.2	-0.22	-0.22	0.0
0.45	1.5	37	37	0.23	0.62	-1.2	-0.24	-0.24	0.0
0.50	1.6	30	30	0.15	0.49	-1.2	-0.28	-0.28	0.0
0.55	1.8	19	19	0.12	0.63	-0.5	-0.19	-0.19	0.0
0.60	2.0	27	27	0.12	0.44	-0.2	-0.07	-0.07	0.0
0.65	2.1	21	21	-0.01	-0.03	-0.2	-0.08	-0.08	0.0
0.70	2.3	28	28	-0.01	-0.05	-0.5	-0.13	-0.13	0.0
0.75	2.5	15	15	0.05	0.31	0.1	0.07	0.07	0.0
0.80	2.6	8	8	0.09	1.06	0.4	0.35	0.35	0.0
0.85	2.8	5	5	0.11	2.06	0.4	0.60	0.60	0.0
0.90	3.0	6	6	0.14	2.33	0.4	0.50	0.50	0.0
0.95	3.1	11	11	0.18	1.68	-3.1	-2.04	-2.04	0.0
1.00	3.3	13	13	0.23	1.76	-6.8	-3.80	-3.80	0.0
1.05	3.4	14	14	0.17	1.27	-8.0	-4.21	-4.21	0.0
1.10	3.6	14	14	0.20	1.49	-9.3	-4.89	-4.89	0.0
1.15	3.8	14	14	0.21	1.47	-10.6	-5.29	-5.29	0.0
1.20	3.9	21	21	0.15	0.71	-10.3	-3.51	-3.51	0.0
1.25	4.1	30	30	0.17	0.57	-10.5	-2.54	-2.54	0.0
1.30	4.3	41	41	0.19	0.47	-7.8	-1.37	-1.37	0.0
1.35	4.4	48	48	0.25	0.52	-0.2	-0.03	-0.03	0.0
1.40	4.6	53	54	0.31	0.57	1.1	0.15	0.15	0.0
1.45	4.8	55	55	0.26	0.47	1.2	0.16	0.16	0.0
1.50	4.9	55	55	0.29	0.53	1.3	0.17	0.17	0.0
1.55	5.1	53	53	0.22	0.42	1.4	0.19	0.19	0.0
1.60	5.2	61	61	0.21	0.35	1.4	0.17	0.17	0.0
1.65	5.4	87	87	0.27	0.31	1.1	0.09	0.09	0.0
1.70	5.6	107	107	0.39	0.37	0.6	0.04	0.04	0.0
1.75	5.7	110	110	0.40	0.36	0.9	0.06	0.06	0.0
1.80	5.9	103	103	0.34	0.33	1.5	0.11	0.11	0.0
1.85	6.1	105	105	0.33	0.32	1.5	0.11	0.11	0.0
1.90	6.2	103	103	0.35	0.34	1.7	0.12	0.11	0.0
1.95	6.4	99	99	0.40	0.41	1.7	0.13	0.12	0.0
2.00	6.6	98	98	0.43	0.45	1.8	0.14	0.12	0.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
[illegible]05	6.7	100	100	0.48	0.48	2.1	0.15	0.13	0.0
2.10	6.9	103	103	0.50	0.48	2.1	0.14	0.12	0.0
2.15	7.1	105	105	0.52	0.50	2.1	0.14	0.11	0.0
2.20	7.2	103	103	0.50	0.48	2.1	0.15	0.11	0.0
2.25	7.4	100	100	0.54	0.54	2.3	0.17	0.13	0.0
2.30	7.5	98	99	0.52	0.53	2.4	0.17	0.13	0.1
2.35	7.7	92	92	0.47	0.51	2.4	0.19	0.13	0.1
2.40	7.9	96	96	0.41	0.43	2.6	0.20	0.14	0.0
2.45	8.0	104	104	0.51	0.49	2.5	0.17	0.11	0.0
2.50	8.2	97	97	0.56	0.58	1.9	0.14	0.07	0.0
2.55	8.4	111	111	0.64	0.58	2.5	0.17	0.10	0.0
2.60	8.5	105	105	0.66	0.63	2.4	0.16	0.09	0.0
2.65	8.7	92	92	0.65	0.71	3.2	0.25	0.16	0.0
2.70	8.9	119	119	[illegible]	0.58	2.5	0.15	0.08	0.0
2.75	9.0	135	135	0.70	0.52	1.3	0.07	-0.00	0.0
2.80	9.2	136	136	0.74	0.54	2.7	0.14	0.07	0.0
2.85	9.4	140	140	0.73	0.52	2.4	0.12	0.05	0.0
2.90	9.5	143	143	0.73	0.51	3.0	0.15	0.08	0.0
2.95	9.7	150	150	0.78	0.52	3.2	0.15	0.08	0.0
3.00	9.8	144	144	0.79	0.55	3.4	0.17	0.09	0.0
3.05	10.0	141	141	0.85	0.60	3.4	0.17	0.09	0.0
3.10	10.2	136	136	0.87	0.64	3.4	0.18	0.08	0.0
3.15	10.3	141	141	0.83	0.59	3.4	0.17	0.08	0.0
3.20	10.5	143	143	0.81	0.57	3.4	0.17	0.07	0.0
3.25	10.7	155	155	0.75	0.48	3.0	0.14	0.04	0.1
[illegible]30	10.8	185	185	0.77	0.42	0.8	0.03	-0.05	0.1
[illegible]35	11.0	219	219	1.11	0.51	-2.7	-0.09	-0.16	0.1
3.40	11.2	252	252	1.45	0.58	1.0	0.03	-0.03	0.1
3.45	11.3	245	245	1.43	0.58	2.7	0.08	0.01	0.1
3.50	11.5	230	230	1.50	0.65	3.1	0.10	0.02	0.1
3.55	11.6	216	216	1.42	0.66	-2.2	-0.07	-0.15	0.1
3.60	11.8	204	204	1.47	0.72	1.4	0.05	-0.04	0.1
3.65	12.0	199	199	1.45	0.73	2.0	0.07	-0.02	0.1
3.70	12.1	186	186	1.15	0.62	3.0	0.11	0.01	0.1
3.75	12.3	192	192	1.05	0.55	3.4	0.13	0.03	0.1
3.80	12.5	241	241	1.39	0.58	3.4	0.10	0.02	0.1
3.85	12.6	254	254	1.73	0.68	3.7	0.10	0.02	0.1
3.90	12.8	226	226	1.77	0.79	3.7	0.12	0.02	0.1
3.95	13.0	204	204	1.46	0.72	3.4	0.12	0.01	0.1
4.00	13.1	183	183	1.00	0.55	3.7	0.15	0.03	0.1
4.05	13.3	208	208	0.90	0.44	4.0	0.14	0.03	0.1
4.10	13.5	284	284	1.39	0.49	-3.8	-0.10	-0.18	0.1
4.15	13.6	326	326	1.96	0.60	-5.7	-0.13	-0.20	0.1
4.20	13.8	342	342	2.25	0.66	-3.0	-0.06	-0.13	0.1
4.25	13.9	357	357	2.16	0.60	-0.9	-0.02	-0.09	0.1
4.30	14.1	413	413	2.52	0.61	-1.3	-0.02	-0.08	0.1
4.35	14.3	443	443	2.91	0.66	-4.9	-0.08	-0.14	0.1
4.40	14.4	429	428	3.19	0.74	-3.5	-0.06	-0.12	0.1
4.45	14.6	424	424	2.93	0.69	-1.7	-0.03	-0.09	0.1
4.50	14.8	404	404	3.15	0.78	-0.5	-0.01	-0.08	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	361	361	2.81	0.78	2.7	0.05	-0.02	[illegible]
4.60	15.1	350	350	2.75	0.78	3.0	0.06	-0.02	0.1
4.65	15.3	350	350	2.73	0.78	2.9	0.06	-0.02	0.1
4.70	15.4	333	333	2.73	0.82	2.9	0.06	-0.03	0.1
4.75	15.6	307	307	2.51	0.82	3.4	0.08	-0.02	0.1
4.80	15.7	282	282	2.33	0.82	3.7	0.10	-0.01	0.1
4.85	15.9	269	269	1.94	0.72	3.8	0.10	-0.01	0.2
4.90	16.1	270	270	1.81	0.67	4.7	0.12	0.01	0.2
4.95	16.2	291	291	1.98	0.68	1.2	0.03	-0.08	0.2
5.00	16.4	290	290	2.23	0.77	0.0	0.00	-0.11	0.2
5.05	16.6	261	261	2.10	0.80	3.4	0.09	-0.03	0.2
5.10	16.7	244	244	1.86	0.76	4.7	0.14	0.00	0.2
5.15	16.9	238	238	1.79	0.75	3.8	0.12	-0.03	0.2
5.20	17.1	243	243	1.76	0.72	5.3	0.16	0.02	0.2
5.25	17.2	232	232	1.80	0.78	6.0	0.19	0.04	0.2
5.30	17.4	231	231	1.82	0.79	6.0	0.19	0.03	0.2
5.35	17.6	228	229	1.77	0.77	5.8	0.18	0.03	0.2
5.40	17.7	183	183	1.28	0.70	5.5	0.22	0.02	0.2
5.45	17.9	161	161	0.81	0.50	6.3	0.28	0.05	0.3
5.50	18.0	196	196	0.90	0.46	6.6	0.24	0.05	0.3
5.55	18.2	228	228	1.33	0.58	4.4	0.14	-0.03	0.3
5.60	18.4	244	244	1.63	0.67	6.2	0.18	0.03	0.3
5.65	18.5	240	240	1.65	0.69	6.7	0.20	0.04	0.3
5.70	18.7	235	235	1.49	0.63	7.5	0.23	0.06	0.3
5.75	18.9	249	250	1.59	0.64	6.6	0.19	0.03	[illegible]
5.80	19.0	267	267	1.81	0.68	5.4	0.15	-0.01	[illegible]
5.85	19.2	264	264	2.01	0.76	6.0	0.16	0.01	0.3
5.90	19.4	265	265	2.01	0.76	7.0	0.19	0.03	0.3
5.95	19.5	267	267	2.08	0.78	5.0	0.14	-0.02	0.3
6.00	19.7	258	258	1.84	0.71	7.7	0.21	0.05	0.3
6.05	19.8	277	278	2.05	0.74	7.9	0.20	0.05	0.3
6.10	20.0	309	309	2.35	0.76	6.9	0.16	0.02	0.3
6.15	20.2	281	281	2.22	0.79	5.6	0.14	-0.01	0.3
6.20	20.3	278	278	2.25	0.81	6.6	0.17	0.01	0.3
6.25	20.5	288	288	2.25	0.78	6.5	0.16	0.01	0.7
6.30	20.7	275	275	2.28	0.83	6.3	0.17	-0.00	0.7
6.35	20.8	284	284	2.22	0.78	7.3	0.18	0.02	0.7
6.40	21.0	278	279	2.22	0.80	7.0	0.18	0.01	0.7
6.45	21.2	279	280	1.73	0.62	7.3	0.19	0.02	0.7
6.50	21.3	277	277	1.89	0.68	7.3	0.19	0.02	0.7
6.55	21.5	281	281	1.93	0.69	6.0	0.15	-0.02	0.7
6.60	21.7	273	273	2.16	0.79	6.6	0.17	-0.00	0.7
6.65	21.8	282	282	2.30	0.82	7.4	0.19	0.01	0.7
6.70	22.0	259	259	2.10	0.81	7.6	0.21	0.02	0.7
6.75	22.1	241	241	1.87	0.78	8.4	0.25	0.04	0.7
6.80	22.3	249	249	1.73	0.70	8.6	0.25	0.04	0.7
6.85	22.5	264	264	1.77	0.67	7.6	0.21	0.01	0.7
6.90	22.6	270	270	2.02	0.75	7.9	0.21	0.02	0.7
6.95	22.8	282	282	2.09	0.74	8.3	0.21	0.03	0.7
7.00	23.0	273	273	1.87	0.69	8.6	0.23	0.03	0.7

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
[illegible]	23.1	297	297	2.01	0.68	8.8	0.21	0.03	0.7
7.10	23.3	326	326	2.42	0.74	7.9	0.18	0.01	0.7
7.15	23.5	328	328	2.76	0.84	7.9	0.17	0.01	0.7
7.20	23.6	318	318	2.85	0.90	8.6	0.19	0.02	0.7
7.25	23.8	291	291	2.62	0.90	9.2	0.23	0.04	0.8
7.30	23.9	263	263	2.31	0.88	9.6	0.26	0.05	0.9
7.35	24.1	257	257	2.14	0.83	9.6	0.27	0.05	0.9
7.40	24.3	242	242	2.05	0.85	8.6	0.26	0.02	0.9
7.45	24.4	234	234	1.57	0.67	9.1	0.28	0.03	0.9
7.50	24.6	229	229	1.52	0.67	9.3	0.29	0.04	0.9
7.55	24.8	229	229	1.50	0.65	7.9	0.25	-0.01	0.9
7.60	24.9	248	248	1.62	0.65	8.5	0.25	0.01	1.0
7.65	25.1	261	261	1.85	0.71	8.3	0.23	0.00	1.0
7.70	25.3	275	275	2.03	0.74	8.7	0.23	0.01	1.0
7.75	25.4	262	263	1.99	0.76	8.9	0.25	0.01	1.0
7.80	25.6	263	263	1.85	0.70	10.2	0.28	0.05	1.0
7.85	25.8	277	278	2.01	0.72	9.5	0.25	0.03	1.0
7.90	25.9	288	288	2.24	0.78	9.2	0.23	0.02	1.0
7.95	26.1	280	280	2.47	0.88	9.2	0.24	0.01	1.0
8.00	26.2	260	260	2.31	0.89	10.0	0.28	0.03	1.0
8.05	26.4	231	231	1.93	0.84	10.3	0.33	0.05	1.0
8.10	26.6	219	219	1.64	0.75	10.2	0.33	0.04	1.0
8.15	26.7	218	219	1.49	0.68	10.2	0.34	0.04	1.0
8.20	26.9	221	221	1.42	0.64	8.5	0.28	-0.02	1.0
8.25	27.1	229	230	1.59	0.69	9.1	0.29	0.00	1.5
[illegible]	27.2	237	237	1.75	0.74	8.9	0.27	-0.01	1.2
[illegible]	27.4	217	217	1.70	0.78	9.9	0.33	0.02	1.2
8.40	27.6	204	205	1.54	0.75	10.8	0.38	0.05	1.3
8.45	27.7	191	191	1.18	0.62	10.9	0.41	0.06	1.3
8.50	27.9	172	172	1.24	0.72	10.4	0.44	0.04	1.3
8.55	28.1	138	138	1.08	0.78	7.5	0.39	-0.11	1.4
8.60	28.2	129	129	0.84	0.65	9.8	0.55	0.01	1.4
8.65	28.4	156	156	0.89	0.57	10.1	0.46	0.02	1.4
8.70	28.5	181	181	1.11	0.62	1.4	0.06	-0.33	1.4
8.75	28.7	194	194	1.22	0.63	6.2	0.23	-0.13	1.4
8.80	28.9	199	199	1.25	0.63	10.2	0.37	0.01	1.4
8.85	29.0	199	199	1.31	0.66	10.9	0.39	0.03	1.8
8.90	29.2	192	192	1.34	0.70	11.2	0.42	0.04	1.8
8.95	29.4	179	180	1.25	0.70	10.5	0.42	0.02	1.8
9.00	29.5	164	165	1.20	0.73	11.2	0.49	0.04	1.8
9.05	29.7	155	155	1.18	0.76	11.4	0.53	0.05	1.8
9.10	29.9	153	154	1.21	0.79	11.2	0.52	0.04	1.8
9.15	30.0	146	146	1.24	0.85	11.5	0.57	0.05	1.8
9.20	30.2	136	137	1.11	0.81	8.6	0.45	-0.10	1.8
9.25	30.3	127	127	1.04	0.82	11.9	0.67	0.08	1.8
9.30	30.5	123	123	0.98	0.80	12.3	0.72	0.10	1.8
9.35	30.7	118	118	0.97	0.82	10.0	0.61	-0.04	1.8
9.40	30.8	108	108	0.91	0.84	12.2	0.81	0.10	1.8
9.45	31.0	99	99	0.65	0.65	13.1	0.95	0.17	1.8
9.50	31.2	103	103	0.66	0.64	12.3	0.87	0.10	1.8

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	322	322	2.34	0.73	4.0	0.09	-0.07	0.1
7.10	23.3	309	309	2.23	0.72	4.2	0.10	-0.08	0.1
7.15	23.5	301	301	2.23	0.74	4.4	0.10	-0.08	0.1
7.20	23.6	300	300	2.42	0.81	4.5	0.11	-0.07	0.1
7.25	23.8	270	270	2.32	0.86	4.6	0.12	-0.08	0.2
7.30	23.9	241	241	1.95	0.81	4.8	0.14	-0.09	0.1
7.35	24.1	230	230	1.71	0.74	5.0	0.16	-0.09	0.2
7.40	24.3	218	218	1.53	0.70	5.1	0.17	-0.09	0.2
7.45	24.4	228	228	1.60	0.70	5.1	0.16	-0.09	0.2
7.50	24.6	224	224	1.66	0.74	4.9	0.16	-0.10	0.2
7.55	24.8	191	191	1.31	0.69	4.8	0.18	-0.12	0.2
7.60	24.9	186	186	1.19	0.64	5.0	0.19	-0.12	0.1
7.65	25.1	217	217	1.18	0.54	5.0	0.17	-0.11	0.2
7.70	25.3	205	205	1.28	0.62	4.9	0.17	-0.12	0.2
7.75	25.4	166	166	1.08	0.65	5.1	0.22	-0.14	0.2
7.80	25.6	167	167	1.06	0.63	5.4	0.23	-0.13	0.2
7.85	25.8	170	170	1.16	0.68	5.4	0.23	-0.13	0.2
7.90	25.9	164	164	1.22	0.74	5.5	0.24	-0.14	0.2
7.95	26.1	151	151	1.05	0.70	5.7	0.27	-0.14	0.2
8.00	26.2	135	135	0.91	0.68	6.1	0.33	-0.14	0.2
8.05	26.4	142	142	0.85	0.60	6.3	0.32	-0.13	0.2
8.10	26.6	162	162	0.88	0.54	5.6	0.25	-0.15	0.
8.15	26.7	206	206	1.23	0.60	5.7	0.20	-0.11	0.2
8.20	26.9	219	219	1.54	0.70	5.0	0.16	-0.13	0.2
8.25	27.1	206	206	1.56	0.76	5.4	0.19	-0.13	0.2
8.30	27.2	211	211	1.40	0.66	5.7	0.19	-0.12	0.2
8.35	27.4	229	229	1.61	0.70	6.3	0.20	-0.09	0.2
8.40	27.6	235	235	1.75	0.75	6.3	0.19	-0.09	0.2
8.45	27.7	218	218	1.70	0.78	6.4	0.21	-0.10	0.2
8.50	27.9	205	205	1.54	0.75	6.9	0.24	-0.09	0.2
8.55	28.1	195	196	1.43	0.73	6.9	0.25	-0.10	0.2
8.60	28.2	179	179	1.25	0.70	7.0	0.28	-0.11	0.2
8.65	28.4	169	169	0.88	0.52	7.1	0.30	-0.11	0.2
8.70	28.5	169	170	0.93	0.55	6.4	0.27	-0.14	0.2
8.75	28.7	175	175	1.07	0.61	7.0	0.29	-0.12	0.2
8.80	28.9	179	179	1.20	0.67	7.2	0.29	-0.11	0.2
8.85	29.0	182	182	1.23	0.68	7.4	0.29	-0.10	0.2
8.90	29.2	174	174	1.28	0.74	7.6	0.31	-0.10	0.2
8.95	29.4	166	166	1.17	0.70	7.8	0.34	-0.10	0.2
9.00	29.5	157	157	1.09	0.69	8.0	0.37	-0.10	0.2
9.05	29.7	175	175	1.09	0.62	7.9	0.32	-0.10	0.2
9.10	29.9	185	185	1.18	0.64	6.7	0.26	-0.14	0.2
9.15	30.0	191	191	1.26	0.66	6.0	0.23	-0.17	0.2
9.20	30.2	179	179	1.31	0.73	6.3	0.25	-0.17	0.2
9.25	30.3	163	163	1.13	0.69	6.3	0.28	-0.18	0.2
9.30	30.5	157	157	1.00	0.64	6.6	0.30	-0.18	0.2
9.35	30.7	175	175	0.95	0.55	6.9	0.29	-0.15	0.2
9.40	30.8	194	194	0.84	0.43	4.4	0.16	-0.24	0.2
9.45	31.0	195	195	0.94	0.48	3.2	0.12	-0.28	0.2
9.50	31.2	198	198	1.04	0.52	2.6	0.09	-0.30	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
.55	31.3	105	105	0.71	0.68	8.5	0.59	-0.17	1.8
9.60	31.5	97	97	0.93	0.95	3.7	0.27	-0.54	1.8
9.65	31.7	82	82	0.84	1.02	9.9	0.87	-0.10	1.8
9.70	31.8	100	101	0.63	0.63	11.5	0.82	0.02	1.8
9.75	32.0	71	71	0.82	1.15	-7.3	-0.74	-1.87	1.8
9.80	32.2	33	33	0.84	2.57	-5.4	-1.19	-3.68	1.8
9.85	32.3	18	18	0.73	4.10	12.5	5.06	0.45	1.8
9.90	32.5	14	14	0.27	1.99	55.5	29.60	23.50	1.8
9.95	32.6	13	14	0.23	1.77	72.3	40.30	33.88	1.8
10.00	32.8	12	13	0.22	1.85	75.9	44.96	38.09	1.8
10.05	33.0	12	13	?	?	82.5	51.18	43.94	1.8
10.10	33.1	11	12	?	?	79.5	50.68	43.20	1.8

WRITE NUMBER OF RODS USED __

CONOCO INC

Operator :MIKE KASL
On Site Loc:A-9
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :01-25-91 08:07
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	37.33	0.36	0.96	0.04	silty sand to sandy silt	80-90	)48	12	UNDEFINED
0.60	2	31.83	0.25	0.79	0.11	silty sand to sandy silt	60-70	44-46	10	UNDEFINED
0.95	3	13.43	0.08	0.59	0.18	sandy silt to clayey silt	UNDFND	UNDFD	5	1.3
1.25	4	17.67	0.19	1.07	0.23	sandy silt to clayey silt	UNDFND	UNDFD	7	1.7
1.55	5	50.83	0.25	0.50	0.27	sand to silty sand	60-70	42-44	12	UNDEFINED
1.85	6	95.50	0.32	0.34	0.32	sand	80-90	44-46	18	UNDEFINED
2.15	7	101.33	0.45	0.44	0.36	sand	80-90	44-46	19	UNDEFINED
2.45	8	98.83	0.49	0.50	0.40	sand to silty sand	70-80	44-46	24	UNDEFINED
2.75	9	109.83	0.65	0.59	0.45	sand to silty sand	80-90	44-46	26	UNDEFINED
3.05	10	142.33	0.77	0.54	0.49	sand	80-90	44-46	27	UNDEFINED
3.35	11	163.17	0.86	0.53	0.53	sand	80-90	44-46	31	UNDEFINED
3.65	12	224.33	1.45	0.65	0.57	sand	)90	46-48	43	UNDEFINED
3.95	13	217.17	1.42	0.66	0.62	sand	)90	46-48	42	UNDEFINED
4.25	14	283.33	1.61	0.57	0.66	sand	)90	46-48	)50	UNDEFINED
4.55	15	412.33	2.92	0.71	0.70	gravelly sand to sand	)90	)48	)50	UNDEFINED
4.85	16	315.17	2.50	0.79	0.75	sand	)90	46-48	)50	UNDEFINED
5.15	17	265.67	1.96	0.74	0.79	sand	)90	46-48	)50	UNDEFINED
5.45	18	213.00	1.54	0.72	0.83	sand	)90	44-46	41	UNDEFINED
5.75	19	232.00	1.43	0.62	0.88	sand	)90	44-46	44	UNDEFINED
6.05	20	266.33	1.97	0.74	0.92	sand	)90	44-46	)50	UNDEFINED
6.40	21	284.71	2.26	0.79	0.97	sand	)90	44-46	)50	UNDEFINED
6.70	22	275.17	2.02	0.73	1.01	sand	)90	44-46	)50	UNDEFINED
7.00	23	263.17	1.89	0.72	1.06	sand	)90	44-46	)50	UNDEFINED
7.35	24	297.14	2.44	0.82	1.10	sand	)90	44-46	)50	UNDEFINED
7.65	25	240.50	1.69	0.70	1.15	sand	80-90	44-46	46	UNDEFINED
7.95	26	274.17	2.10	0.77	1.19	sand	)90	44-46	)50	UNDEFINED
8.25	27	229.67	1.73	0.75	1.23	sand	80-90	42-44	44	UNDEFINED
8.55	28	193.17	1.41	0.73	1.28	sand	80-90	42-44	37	UNDEFINED
8.85	29	176.33	1.10	0.63	1.32	sand	70-80	42-44	34	UNDEFINED
9.15	30	164.83	1.24	0.75	1.36	sand	70-80	40-42	32	UNDEFINED
9.45	31	118.50	0.94	0.80	1.41	sand to silty sand	60-70	40-42	28	UNDEFINED
9.75	32	93.00	0.77	0.82	1.45	sand to silty sand	50-60	38-40	22	UNDEFINED
10.05	33	17.00	-5460.95	-32123.25	1.49	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

A-9

File space: 190 ■ sounding

Initial Baseline

Qc	Fs	Pw	Inc
[illegible]8	-1.96	-3.9	0.1

Dep	
Qc	0
Fs	0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: A-15 Start Time: 1439 End Time: 1655

Site: Dupont Town: East Chicago State: In

Unit: 1 Operators: KMSL, Danielson, _____, _____

Proj. Consultant: Tobin Company: Dees

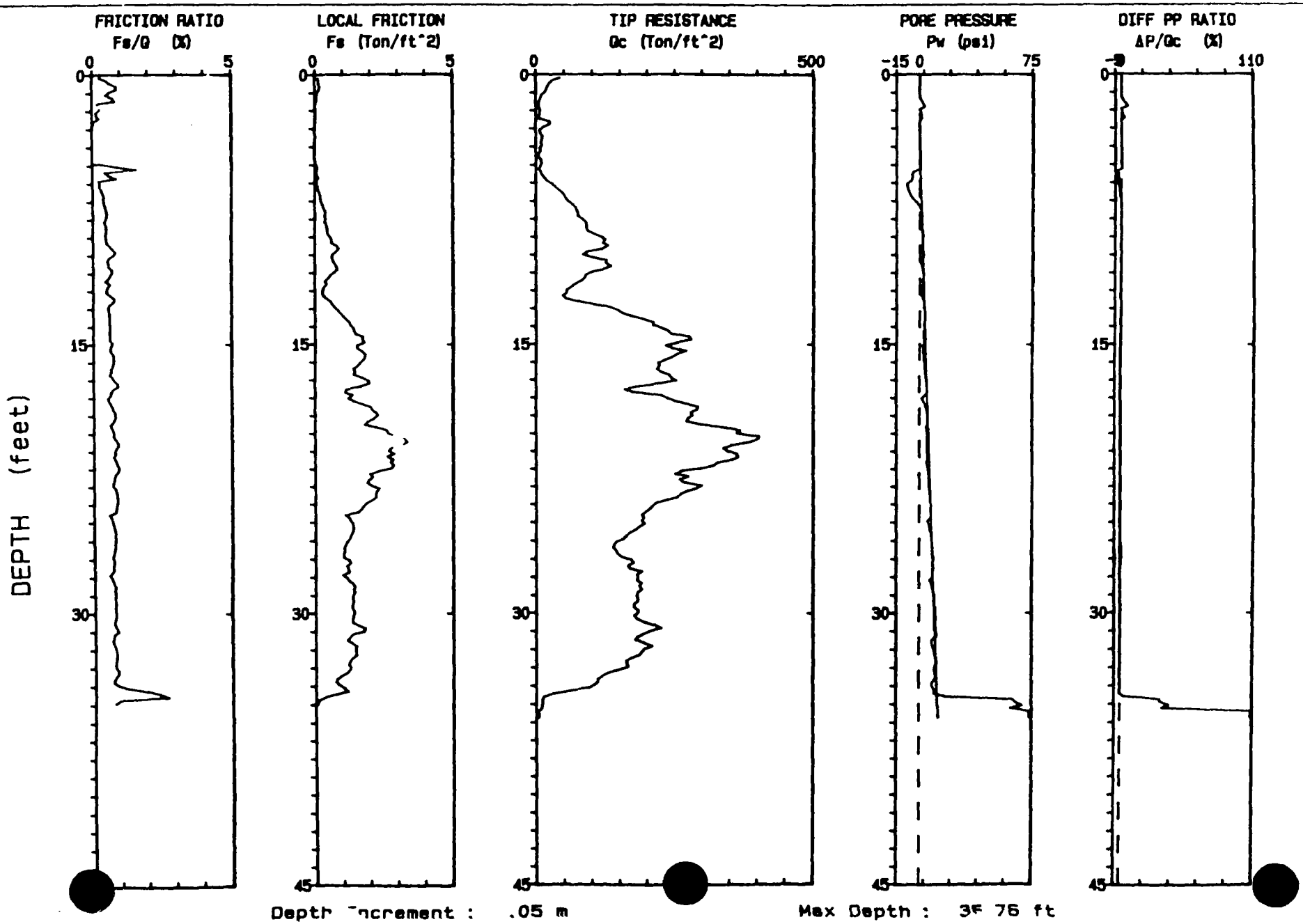
Date	Start Time	End Time	Location	File	Cone Strat.	Soil	ML Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
1/25/92	1445	1550	A-15		CPTA15	✓				1	2	F	
1-25-92	1536	1548	A-15				125		6'	2	2	"	MILKY
1-25-92	1600	1642	A-15				150		33'	2	2	"	Clean

amr/cws725

Conoco, Inc.

OPERATOR : JIM DANIELSON CPT Date : 01-25-92 14:43 FILE CPTA15 Pg 1 / 1

LOCATION : A-15 CONE USED : 293 HOLE NO. : 1



SOUNDING DATA IN FILE CPTA15 01-25-92 14:43

OPERATOR : JIM DANIELSON LOCATION : A-15

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
0.05	0.2	42	42	0.12	0.29	0.0	0.00	0.00	0.0
0.10	0.3	29	29	0.15	0.52	0.0	0.00	0.00	0.1
0.15	0.5	23	23	0.15	0.65	0.0	0.00	0.00	0.0
0.20	0.7	20	20	0.18	0.90	-0.1	-0.04	-0.04	0.0
0.25	0.8	18	18	0.16	0.89	-0.1	-0.04	-0.04	0.0
0.30	1.0	16	16	0.10	0.63	-0.1	-0.04	-0.04	0.0
0.35	1.1	10	10	0.05	0.50	-0.1	-0.07	-0.07	0.0
0.40	1.3	8	8	0.06	0.75	0.4	0.36	0.36	0.0
0.45	1.5	6	6	0.05	0.83	1.2	1.44	1.44	0.0
0.50	1.6	5	5	0.01	0.20	2.4	3.46	3.46	0.0
0.55	1.8	5	5	0.00	0.00	3.6	5.18	5.18	0.0
0.60	2.0	7	7	0.02	0.29	-0.3	-0.31	-0.31	0.0
0.65	2.1	7	7	0.01	0.14	0.6	0.62	0.62	0.0
0.70	2.3	6	6	0.01	0.17	1.0	1.20	1.20	0.0
0.75	2.5	4	4	0.01	0.25	1.6	2.88	2.88	0.0
0.80	2.6	25	25	0.01	0.04	0.0	0.00	0.00	0.0
0.85	2.8	25	25	0.01	0.04	-0.3	-0.09	-0.09	
0.90	3.0	13	13	0.00	0.00	-0.3	-0.17	-0.17	
0.95	3.1	7	7	-0.02	-0.29	-0.4	-0.41	-0.41	0.0
1.00	3.3	7	7	0.00	0.00	-0.3	-0.31	-0.31	0.0
1.05	3.4	12	12	0.01	0.08	-0.3	-0.18	-0.18	0.0
1.10	3.6	11	11	-0.01	-0.09	-0.1	-0.07	-0.07	0.1
1.15	3.8	9	9	-0.03	-0.33	-0.1	-0.08	-0.08	0.1
1.20	3.9	11	11	-0.02	-0.18	0.0	0.00	0.00	0.1
1.25	4.1	7	7	-0.03	-0.43	0.0	0.00	0.00	0.1
1.30	4.3	8	8	-0.01	-0.13	0.0	0.00	0.00	0.0
1.35	4.4	5	5	-0.03	-0.60	0.0	0.00	0.00	0.1
1.40	4.6	5	5	-0.02	-0.40	0.3	0.43	0.43	0.1
1.45	4.8	9	9	-0.02	-0.22	0.3	0.24	0.24	0.1
1.50	4.9	10	10	0.01	0.10	0.3	0.22	0.22	0.1
1.55	5.1	8	8	0.07	0.88	0.5	0.45	0.45	0.1
1.60	5.2	5	5	0.08	1.60	0.6	0.86	0.86	0.1
1.65	5.4	9	9	0.04	0.44	-3.9	-3.12	-3.12	0.0
1.70	5.6	12	12	0.07	0.58	-4.7	-2.82	-2.82	0.1
1.75	5.7	16	16	0.14	0.88	-4.8	-2.16	-2.16	0.1
1.80	5.9	21	21	0.05	0.24	-5.5	-1.89	-1.89	0.0
1.85	6.1	29	29	0.08	0.28	-8.4	-2.09	-2.09	0.1
1.90	6.2	34	34	0.09	0.26	-8.0	-1.69	-1.71	0.1
1.95	6.4	40	40	0.13	0.32	-7.5	-1.35	-1.38	0.1
2.00	6.6	47	47	0.17	0.36	-6.7	-1.03	-1.06	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	51	51	0.21	0.41	-5.6	-0.79	-0.83	0.1
2.10	6.9	54	54	0.21	0.39	-4.2	-0.56	-0.61	0.1
2.15	7.1	59	59	0.24	0.41	-2.6	-0.32	-0.37	0.1
2.20	7.2	66	66	0.29	0.44	-1.0	-0.11	-0.16	0.1
2.25	7.4	71	71	0.33	0.46	0.2	0.02	-0.04	0.1
2.30	7.5	73	73	0.37	0.51	1.0	0.10	0.04	0.1
2.35	7.7	75	75	0.38	0.51	1.5	0.14	0.08	0.1
2.40	7.9	75	75	0.37	0.49	1.7	0.16	0.09	0.1
2.45	8.0	84	84	0.38	0.45	1.6	0.14	0.06	0.1
2.50	8.2	90	90	0.37	0.41	1.7	0.14	0.06	0.1
2.55	8.4	91	91	0.43	0.47	1.9	0.15	0.07	0.1
2.60	8.5	91	91	0.45	0.49	1.3	0.10	0.03	0.1
2.65	8.7	94	94	0.46	0.49	1.9	0.15	0.06	0.1
2.70	8.9	105	105	0.48	0.46	2.2	0.15	0.07	0.1
2.75	9.0	118	118	0.57	0.48	2.2	0.13	0.06	0.1
2.80	9.2	124	124	0.61	0.49	2.2	0.13	0.05	0.1
2.85	9.4	120	120	0.60	0.50	2.3	0.14	0.05	0.1
2.90	9.5	129	129	0.80	0.62	2.0	0.11	0.03	0.1
2.95	9.7	120	120	0.86	0.72	2.3	0.14	0.04	0.1
3.00	9.8	92	92	0.76	0.83	2.4	0.19	0.06	0.1
3.05	10.0	84	84	0.63	0.75	2.7	0.23	0.09	0.1
3.10	10.2	103	103	0.61	0.59	2.1	0.15	0.02	0.1
3.15	10.3	126	126	0.66	0.52	0.2	0.01	-0.09	0.1
3.20	10.5	125	125	0.71	0.57	1.0	0.06	-0.05	0.1
3.25	10.7	135	135	0.77	0.57	1.7	0.09	-0.02	0.1
3.30	10.8	121	121	0.81	0.67	2.3	0.14	0.01	0.1
3.35	11.0	99	99	0.69	0.70	2.6	0.19	0.03	0.4
3.40	11.2	89	89	0.55	0.62	2.9	0.23	0.06	0.4
3.45	11.3	87	87	0.48	0.55	2.6	0.22	0.03	0.4
3.50	11.5	81	81	0.36	0.44	2.0	0.18	-0.03	0.4
3.55	11.6	69	69	0.43	0.62	2.6	0.27	0.02	0.4
3.60	11.8	62	62	0.33	0.53	1.5	0.17	-0.11	0.4
3.65	12.0	54	54	0.27	0.50	2.3	0.31	-0.03	0.4
3.70	12.1	54	54	0.26	0.48	2.3	0.31	-0.04	0.4
3.75	12.3	47	47	0.30	0.64	1.4	0.21	-0.20	0.4
3.80	12.5	53	53	0.42	0.79	2.4	0.33	-0.05	0.4
3.85	12.6	76	76	0.57	0.75	3.3	0.31	0.04	0.4
3.90	12.8	105	105	0.63	0.60	3.2	0.22	0.02	0.4
3.95	13.0	134	134	0.73	0.54	2.6	0.14	-0.02	0.4
4.00	13.1	147	147	0.84	0.57	3.5	0.17	0.02	0.4
4.05	13.3	155	155	0.93	0.60	3.8	0.18	0.03	0.4
4.10	13.5	170	170	1.02	0.60	3.8	0.16	0.03	0.4
4.15	13.6	193	193	1.14	0.59	3.6	0.13	0.01	0.4
4.20	13.8	211	211	1.25	0.59	3.4	0.12	0.00	0.4
4.25	13.9	211	211	1.29	0.61	2.9	0.10	-0.02	0.4
4.30	14.1	226	226	1.39	0.62	3.6	0.11	0.00	0.5
4.35	14.3	239	239	1.43	0.60	2.6	0.08	-0.03	0.4
4.40	14.4	244	244	1.48	0.61	2.6	0.08	-0.03	0.5
4.45	14.6	277	277	1.75	0.63	2.6	0.07	-0.03	0.5
4.50	14.8	281	281	1.72	0.61	2.9	0.07	-0.02	0.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	255	255	1.79	0.70	3.2	0.09	-0.02	[redacted]
4.60	15.1	234	234	1.52	0.65	2.2	0.07	-0.05	0.5
4.65	15.3	247	247	1.53	0.62	2.7	0.08	-0.04	0.5
4.70	15.4	272	272	1.70	0.63	2.5	0.07	-0.04	0.5
4.75	15.6	254	254	1.84	0.72	2.6	0.07	-0.04	0.5
4.80	15.7	245	245	1.82	0.74	2.9	0.09	-0.04	0.5
4.85	15.9	233	233	1.75	0.75	2.9	0.09	-0.04	0.5
4.90	16.1	220	220	1.63	0.74	3.6	0.12	-0.02	0.5
4.95	16.2	222	222	1.55	0.70	3.6	0.12	-0.03	0.5
5.00	16.4	218	218	1.40	0.64	3.7	0.12	-0.03	0.5
5.05	16.6	225	225	1.45	0.64	4.2	0.13	-0.01	0.5
5.10	16.7	241	241	1.42	0.59	4.3	0.13	-0.01	0.5
5.15	16.9	245	245	1.73	0.71	4.4	0.13	-0.01	0.5
5.20	17.1	254	254	1.96	0.77	4.5	0.13	-0.01	0.5
5.25	17.2	224	224	1.99	0.89	4.9	0.16	0.00	0.5
5.30	17.4	186	186	1.67	0.90	5.1	0.20	0.01	0.5
5.35	17.6	159	159	1.12	0.70	5.4	0.24	0.02	0.5
5.40	17.7	173	173	1.08	0.62	5.5	0.23	0.02	0.7
5.45	17.9	226	226	1.37	0.61	3.6	0.11	-0.05	0.7
5.50	18.0	238	238	1.20	0.50	1.6	0.05	-0.11	0.7
5.55	18.2	253	253	1.40	0.55	2.6	0.07	-0.08	0.7
5.60	18.4	272	272	1.71	0.63	3.6	0.10	-0.05	0.7
5.65	18.5	294	294	2.03	0.69	4.2	0.10	-0.03	0.7
5.70	18.7	291	291	2.10	0.72	4.9	0.12	-0.01	0.7
5.75	13.9	280	280	2.33	0.80	5.5	0.14	-0.00	[redacted]
5.80	19.0	283	283	2.29	0.81	5.6	0.14	-0.00	[redacted]
5.85	19.2	275	275	2.12	0.77	5.6	0.15	-0.00	0.7
5.90	19.4	272	272	1.92	0.71	5.8	0.15	0.00	0.7
5.95	19.5	299	299	1.81	0.61	5.8	0.14	-0.00	0.7
6.00	19.7	346	346	2.26	0.65	4.4	0.09	-0.03	0.8
6.05	19.8	370	370	2.62	0.71	4.9	0.10	-0.02	0.8
6.10	20.0	363	363	2.68	0.74	5.2	0.10	-0.02	0.8
6.15	20.2	404	404	2.94	0.73	5.5	0.10	-0.01	1.3
6.20	20.3	402	402	3.27	0.81	5.2	0.09	-0.02	1.1
6.25	20.5	385	385	3.37	0.88	5.3	0.10	-0.02	1.1
6.30	20.7	355	355	3.19	0.90	5.2	0.11	-0.02	1.2
6.35	20.8	339	339	2.78	0.82	5.4	0.11	-0.02	1.2
6.40	21.0	347	347	2.68	0.77	5.5	0.11	-0.02	1.2
6.45	21.2	364	364	2.88	0.79	5.5	0.11	-0.02	1.2
6.50	21.3	366	366	2.63	0.72	5.5	0.11	-0.02	1.2
6.55	21.5	356	356	2.85	0.80	5.9	0.12	-0.02	1.2
6.60	21.7	328	328	2.76	0.84	4.6	0.10	-0.05	1.2
6.65	21.8	321	321	2.86	0.89	5.4	0.12	-0.03	1.2
6.70	22.0	301	301	2.78	0.92	5.8	0.14	-0.03	1.5
6.75	22.1	264	264	2.33	0.88	6.2	0.17	-0.02	1.5
6.80	22.3	251	251	2.00	0.80	6.5	0.19	-0.02	1.5
6.85	22.5	276	276	2.09	0.76	6.8	0.18	-0.01	1.5
6.90	22.6	260	260	1.96	0.75	6.3	0.17	-0.02	1.5
6.95	22.8	267	267	1.90	0.71	6.8	0.18	-0.01	1.7
7.00	23.0	300	300	2.07	0.69	6.5	0.16	-0.02	[redacted]

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Po)/Qc %	INCLINATION I deg
7.05	23.1	290	290	2.32	0.80	6.8	0.17	-0.01	1.7
7.10	23.3	272	272	2.24	0.82	7.3	0.19	-0.01	1.7
7.15	23.5	262	262	2.20	0.84	7.5	0.21	-0.00	1.7
7.20	23.6	255	255	2.21	0.87	7.8	0.22	0.01	1.7
7.25	23.8	236	236	2.05	0.87	7.9	0.24	0.01	1.7
7.30	23.9	217	217	1.87	0.86	8.0	0.27	0.01	1.9
7.35	24.1	210	210	1.75	0.83	8.1	0.28	0.01	1.9
7.40	24.3	204	204	1.68	0.82	8.1	0.29	0.01	1.9
7.45	24.4	197	197	1.57	0.80	8.1	0.30	0.00	1.9
7.50	24.6	190	190	1.08	0.57	8.3	0.31	0.01	1.9
7.55	24.8	194	194	1.23	0.63	8.4	0.31	0.01	1.9
7.60	24.9	190	190	1.28	0.67	5.5	0.21	-0.10	2.2
7.65	25.1	196	196	1.37	0.70	6.4	0.24	-0.07	2.2
7.70	25.3	186	186	1.39	0.75	7.1	0.27	-0.05	2.2
7.75	25.4	179	179	1.39	0.78	7.5	0.30	-0.04	2.2
7.80	25.6	169	169	1.35	0.80	8.0	0.34	-0.02	2.2
7.85	25.8	162	162	1.28	0.79	8.4	0.37	-0.01	2.2
7.90	25.9	156	156	1.25	0.80	8.8	0.41	0.01	2.3
7.95	26.1	143	143	1.14	0.80	9.0	0.45	0.02	2.3
8.00	26.2	139	139	1.08	0.78	9.3	0.48	0.03	2.3
8.05	26.4	138	138	1.04	0.75	9.4	0.49	0.03	2.3
8.10	26.6	143	143	1.06	0.74	9.6	0.48	0.04	2.3
8.15	26.7	146	146	1.03	0.71	9.7	0.48	0.04	2.3
8.20	26.9	154	154	1.03	0.67	10.0	0.47	0.05	2.3
8.25	27.1	171	171	1.24	0.73	10.0	0.42	0.04	2.3
8.30	27.2	176	176	1.29	0.73	9.6	0.39	0.02	2.7
8.35	27.4	165	165	1.14	0.69	9.8	0.43	0.02	2.6
8.40	27.6	168	168	1.19	0.71	10.1	0.43	0.03	2.6
8.45	27.7	191	191	1.23	0.64	9.7	0.37	0.01	2.6
8.50	27.9	182	182	0.99	0.54	9.7	0.38	0.01	2.7
8.55	28.1	183	183	1.16	0.63	9.7	0.38	0.01	2.7
8.60	28.2	182	182	1.23	0.68	7.1	0.28	-0.10	2.7
8.65	28.4	190	190	1.37	0.72	8.3	0.31	-0.05	2.7
8.70	28.5	186	186	1.45	0.78	9.1	0.35	-0.02	2.7
8.75	28.7	190	190	1.41	0.74	9.7	0.37	-0.00	2.7
8.80	28.9	183	183	1.42	0.78	10.1	0.40	0.01	2.7
8.85	29.0	181	181	1.36	0.75	10.7	0.43	0.03	2.7
8.90	29.2	183	183	1.35	0.74	11.0	0.43	0.04	2.7
8.95	29.4	183	183	1.39	0.76	10.6	0.42	0.02	2.7
9.00	29.5	176	176	1.36	0.77	10.7	0.44	0.03	2.7
9.05	29.7	176	176	1.33	0.76	11.2	0.46	0.04	2.7
9.10	29.9	184	184	1.41	0.77	11.4	0.45	0.04	2.7
9.15	30.0	183	183	1.43	0.78	11.3	0.44	0.04	3.0
9.20	30.2	176	176	1.38	0.78	11.4	0.47	0.04	3.0
9.25	30.3	182	182	1.34	0.74	11.6	0.46	0.04	3.0
9.30	30.5	194	194	1.34	0.69	11.4	0.42	0.03	3.1
9.35	30.7	214	214	1.57	0.73	11.4	0.38	0.02	3.1
9.40	30.8	226	226	1.82	0.81	11.6	0.37	0.03	3.1
9.45	31.0	205	205	1.77	0.86	11.7	0.41	0.03	3.1
9.50	31.2	193	193	1.35	0.70	12.0	0.45	0.04	3.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	182	182	1.24	0.68	12.0	0.47	0.04	3.4
9.60	31.5	178	178	1.16	0.65	8.9	0.36	-0.09	3.5
9.65	31.7	195	195	1.32	0.68	8.6	0.32	-0.08	3.5
9.70	31.8	209	209	1.49	0.71	9.5	0.33	-0.06	3.5
9.75	32.0	195	195	1.47	0.75	10.2	0.38	-0.04	3.5
9.80	32.2	190	190	1.48	0.78	11.0	0.42	-0.01	3.5
9.85	32.3	186	186	1.49	0.80	11.4	0.44	0.00	3.5
9.90	32.5	172	172	1.34	0.78	11.7	0.49	0.01	3.5
9.95	32.6	162	162	1.25	0.77	12.0	0.53	0.02	3.5
10.00	32.8	162	162	1.21	0.75	12.3	0.55	0.03	3.5
10.05	33.0	165	165	1.26	0.76	11.4	0.50	-0.01	3.5
10.10	33.1	147	147	1.23	0.84	10.7	0.52	-0.05	3.5
10.15	33.3	130	130	1.10	0.85	11.4	0.63	-0.02	3.5
10.20	33.5	118	118	0.90	0.76	13.0	0.73	0.01	3.5
10.25	33.6	110	110	0.76	0.69	13.3	0.81	0.02	3.5
10.30	33.8	110	110	0.73	0.66	9.7	0.63	-0.15	3.5
10.35	34.0	104	104	0.86	0.83	8.4	0.58	-0.26	3.5
10.40	34.1	94	94	1.06	1.13	9.7	0.74	-0.19	3.5
10.45	34.3	60	60	1.17	1.95	10.8	1.30	-0.17	3.5
10.50	34.4	31	31	0.74	2.39	10.6	2.46	-0.40	3.5
10.55	34.6	13	13	0.35	3.69	18.4	10.19	3.34	3.5
10.60	34.8	11	12	0.10	0.91	63.0	41.24	33.09	3.5
10.65	34.9	11	12	0.08	0.73	65.1	48.61	34.42	3.5
10.70	35.1	10	11	-0.01	-0.10	69.2	49.82	40.76	3.5
10.75	35.3	10	11	-0.01	-0.10	61.5	44.28	35.17	3.5
10.80	35.4	4	5	-0.01	-0.25	74.2	133.56	110.65	3.6
10.85	35.6	4	5	?	?	73.9	133.02	109.98	3.6
10.90	35.8	4	5	?	?	73.9	133.02	109.85	3.6

CONOCO INC

Operator :JIM DANIELSON
On Site Loc:A-15
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :01-25-92 14:43
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	24.67	0.14	0.58	0.04	silty sand to sandy silt	70-80	)48	8	UNDEFINED
0.60	2	6.83	0.03	0.46	0.11	sensitive fine grained	UNDFND	UNDFD	3	.6
0.95	3	12.43	0.00	0.03	0.18	sandy silt to clayey silt	UNDFND	UNDFD	5	1.2
1.25	4	9.50	-0.01	-0.14	0.23	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.55	5	7.50	0.00	0.00	0.27	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.85	6	15.33	0.06	0.50	0.32	sandy silt to clayey silt	UNDFND	UNDFD	6	1.4
2.15	7	47.50	0.17	0.37	0.36	sand to silty sand	60-70	42-44	11	UNDEFINED
2.45	8	74.00	0.35	0.48	0.40	sand to silty sand	70-80	42-44	18	UNDEFINED
2.75	9	98.17	0.46	0.47	0.45	sand to silty sand	70-80	44-46	24	UNDEFINED
3.05	10	111.50	0.71	0.64	0.49	sand to silty sand	80-90	44-46	27	UNDEFINED
3.35	11	118.17	0.71	0.60	0.53	sand	80-90	44-46	23	UNDEFINED
3.65	12	73.67	0.40	0.55	0.57	sand to silty sand	60-70	42-44	18	UNDEFINED
3.95	13	78.17	0.49	0.63	0.62	sand to silty sand	60-70	42-44	19	UNDEFINED
4.25	14	181.17	1.08	0.60	0.66	sand	80-90	44-46	35	UNDEFINED
4.55	15	253.67	1.59	0.63	0.70	sand	)90	46-48	49	UNDEFINED
4.85	16	247.50	1.69	0.68	0.75	sand	)90	46-48	47	UNDEFINED
5.15	17	228.50	1.53	0.67	0.79	sand	)90	44-46	44	UNDEFINED
5.45	18	203.67	1.53	0.75	0.83	sand	80-90	44-46	39	UNDEFINED
5.75	19	271.33	1.78	0.66	0.88	sand	)90	44-46	)50	UNDEFINED
6.05	20	307.50	2.17	0.71	0.92	sand	)90	46-48	)50	UNDEFINED
6.40	21	370.71	2.99	0.81	0.97	sand	)90	46-48	)50	UNDEFINED
6.70	22	339.33	2.79	0.82	1.01	sand	)90	46-48	)50	UNDEFINED
7.00	23	269.67	2.06	0.76	1.06	sand	)90	44-46	)50	UNDEFINED
7.35	24	249.00	2.09	0.84	1.10	sand	)90	44-46	48	UNDEFINED
7.65	25	195.17	1.37	0.70	1.15	sand	80-90	42-44	37	UNDEFINED
7.95	26	165.83	1.30	0.78	1.19	sand	70-80	42-44	32	UNDEFINED
8.25	27	148.50	1.08	0.73	1.23	sand	70-80	40-42	28	UNDEFINED
8.55	28	177.50	1.17	0.66	1.28	sand	70-80	42-44	34	UNDEFINED
8.85	29	185.33	1.37	0.74	1.32	sand	80-90	42-44	36	UNDEFINED
9.15	30	180.83	1.38	0.76	1.36	sand	70-80	42-44	35	UNDEFINED
9.45	31	199.50	1.54	0.77	1.41	sand	80-90	42-44	38	UNDEFINED
9.75	32	192.00	1.34	0.70	1.45	sand	80-90	42-44	37	UNDEFINED
10.05	33	172.83	1.34	0.77	1.49	sand	70-80	40-42	33	UNDEFINED
10.35	34	119.83	0.93	0.78	1.54	sand to silty sand	60-70	38-40	29	UNDEFINED
10.65	35	36.67	0.58	1.59	1.58	sandy silt to clayey silt	UNDFND	UNDFD	14	3.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: B-7, Start Time: 0915, End Time: 1158

Site: Dupont, Town: East Chicago, State: Id

Unit: 1, Operators: KASL, Danielson, ____, ____

Proj. Consultant: Tubin, Company: Ders

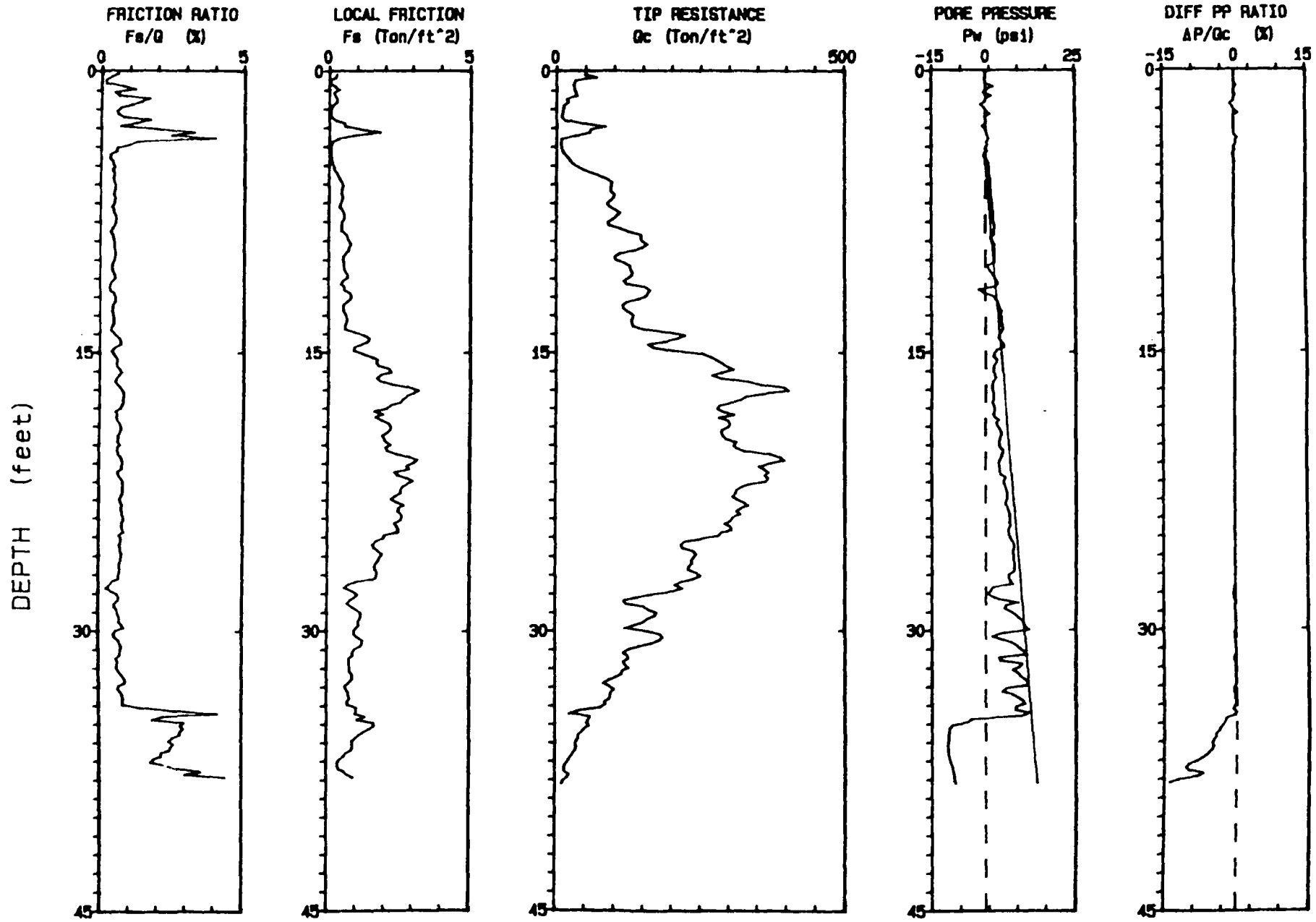
Date	Start Time	End Time	Location	File	Cone Strat.	Soil	mL Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
1/24	0921	0943	B-7	CPT-87	✓				38.2	1	2	F	
1-24-92	1020	1100	"				125		4.5'	2			LIGHT BROWN
1-24-92	1115	1156	"				125		32'	2			CLEAR

amr/cws725

Conoco, Inc.

OPERATOR : MIKE KASL | CPT Date : 01-24-91 09:21 | FILE CPT-B7 Pg 1 / 1

LOCATION : B-7 | CONE USED : 293 | HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 38.22 ft

SOUNDING DATA IN FILE CPT-B7 01-24-91 09:21

OPERATOR : MIKE KASL LOCATION : B-7

ZONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-298		-1.98		-3.8			0.0
0.05	0.2	49	49	0.27	0.54	0.1	0.01	0.01	0.1
0.10	0.3	69	69	0.23	0.33	-0.1	-0.01	-0.01	0.0
0.15	0.5	32	32	0.04	0.12	-0.1	-0.02	-0.02	0.0
0.20	0.7	30	30	0.04	0.12	-0.1	-0.01	-0.01	0.0
0.25	0.8	29	29	0.23	0.78	2.2	0.54	0.54	0.0
0.30	1.0	30	30	0.36	1.19	0.4	0.09	0.09	0.0
0.35	1.1	33	33	0.15	0.46	-0.7	-0.16	-0.16	0.0
0.40	1.3	35	35	0.22	0.63	1.7	0.34	0.34	0.0
0.45	1.5	17	17	0.29	1.73	0.1	0.03	0.03	0.0
0.50	1.6	20	20	0.28	1.41	-0.1	-0.02	-0.02	0.0
0.55	1.8	13	13	0.14	1.03	-1.4	-0.73	-0.73	0.0
0.60	2.0	12	12	0.08	0.67	-0.3	-0.22	-0.22	0.0
0.65	2.1	11	11	0.06	0.57	0.3	0.19	0.19	0.0
0.70	2.3	10	10	0.06	0.54	1.4	0.99	0.99	0.0
0.75	2.5	10	10	0.08	0.74	-0.3	-0.18	-0.18	0.0
0.80	2.6	15	15	0.26	1.73	0.1	0.05	0.05	0.0
0.85	2.8	44	44	0.54	1.23	0.1	0.02	0.02	0.0
0.90	3.0	84	84	0.56	0.67	-1.0	-0.09	-0.09	0.0
0.95	3.1	58	58	1.13	1.96	0.1	0.02	0.02	0.0
1.00	3.3	56	56	1.83	3.27	0.2	0.02	0.02	0.0
1.05	3.4	36	36	0.89	2.50	0.5	0.11	0.11	0.0
1.10	3.6	8	9	0.32	3.74	0.9	0.78	0.78	0.0
1.15	3.8	8	8	0.10	1.34	0.4	0.37	0.37	0.0
1.20	3.9	8	8	0.08	1.03	0.4	0.34	0.34	0.0
1.25	4.1	9	9	0.05	0.55	-0.0	-0.03	-0.03	0.0
1.30	4.3	11	11	0.06	0.56	0.3	0.19	0.19	0.0
1.35	4.4	15	15	0.05	0.37	-0.5	-0.24	-0.24	0.0
1.40	4.6	20	20	0.06	0.31	-0.5	-0.17	-0.17	0.0
1.45	4.8	23	23	0.09	0.41	0.5	0.16	0.16	0.0
1.50	4.9	28	28	0.12	0.43	0.9	0.24	0.24	0.0
1.55	5.1	37	37	0.18	0.48	1.0	0.19	0.19	0.0
1.60	5.2	47	47	0.19	0.40	1.1	0.16	0.16	0.0
1.65	5.4	61	61	0.29	0.48	1.0	0.12	0.12	0.0
1.70	5.6	76	76	0.35	0.46	1.2	0.12	0.12	0.0
1.75	5.7	87	87	0.39	0.45	1.3	0.10	0.10	0.0
1.80	5.9	96	96	0.46	0.48	1.3	0.10	0.10	0.0
1.85	6.1	94	94	0.50	0.53	1.3	0.10	0.10	0.0
1.90	6.2	94	94	0.47	0.50	1.4	0.11	0.10	0.0
1.95	6.4	94	94	0.44	0.47	1.5	0.12	0.11	0.0
2.00	6.6	100	100	0.45	0.46	1.5	0.11	0.09	

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	98	98	0.49	0.50	1.6	0.12	0.10	0.0
2.10	6.9	93	93	0.46	0.50	1.8	0.14	0.11	0.0
2.15	7.1	87	87	0.41	0.48	1.9	0.16	0.12	0.0
2.20	7.2	91	91	0.37	0.40	2.0	0.16	0.12	0.0
2.25	7.4	101	101	0.46	0.45	2.0	0.14	0.10	0.0
2.30	7.5	110	110	0.53	0.48	2.1	0.14	0.10	0.0
2.35	7.7	103	103	0.56	0.55	2.1	0.15	0.10	0.0
2.40	7.9	97	97	0.54	0.55	2.2	0.17	0.11	0.0
2.45	8.0	88	88	0.46	0.53	2.3	0.19	0.12	0.0
2.50	8.2	90	90	0.44	0.49	2.6	0.21	0.13	0.0
2.55	8.4	110	110	0.46	0.42	2.6	0.17	0.10	0.0
2.60	8.5	124	124	0.45	0.36	2.5	0.15	0.09	0.0
2.65	8.7	146	146	0.63	0.43	2.5	0.12	0.07	0.0
2.70	8.9	146	146	0.67	0.46	1.3	0.06	0.00	0.0
2.75	9.0	148	148	0.72	0.49	2.0	0.10	0.04	0.0
2.80	9.2	158	158	0.80	0.51	2.5	0.11	0.05	0.0
2.85	9.4	149	149	0.74	0.50	2.3	0.11	0.04	0.0
2.90	9.5	135	135	0.71	0.53	2.5	0.14	0.06	0.0
2.95	9.7	109	109	0.60	0.55	2.5	0.17	0.06	0.0
3.00	9.8	100	100	0.51	0.51	2.6	0.19	0.07	0.0
3.05	10.0	102	102	0.50	0.50	2.6	0.19	0.07	0.0
3.10	10.2	118	118	0.52	0.44	2.6	0.16	0.05	0.0
3.15	10.3	127	127	0.53	0.41	0.6	0.03	-0.07	0.0
3.20	10.5	128	128	0.54	0.42	0.8	0.05	-0.06	0.0
3.25	10.7	131	131	0.60	0.46	1.5	0.09	-0.02	0.0
3.30	10.8	131	131	0.67	0.51	2.2	0.12	0.01	0.0
3.35	11.0	125	125	0.68	0.54	2.5	0.15	0.02	0.0
3.40	11.2	116	116	0.51	0.44	3.2	0.20	0.06	0.0
3.45	11.3	121	121	0.44	0.37	3.6	0.21	0.08	0.0
3.50	11.5	153	154	0.55	0.36	2.8	0.13	0.02	0.0
3.55	11.6	162	162	0.54	0.33	-2.0	-0.09	-0.20	0.0
3.60	11.8	158	158	0.75	0.47	-0.7	-0.03	-0.15	0.0
3.65	12.0	155	155	0.81	0.52	2.0	0.09	-0.03	0.0
3.70	12.1	143	143	0.78	0.55	2.8	0.14	0.01	0.0
3.75	12.3	122	122	0.65	0.53	3.5	0.21	0.05	0.0
3.80	12.5	114	114	0.52	0.46	3.8	0.24	0.07	0.0
3.85	12.6	116	116	0.52	0.45	4.1	0.26	0.08	0.0
3.90	12.8	122	122	0.53	0.44	4.5	0.26	0.09	0.0
3.95	13.0	132	133	0.61	0.46	4.2	0.23	0.07	0.0
4.00	13.1	132	132	0.65	0.50	4.5	0.25	0.08	0.0
4.05	13.3	129	129	0.65	0.50	4.5	0.25	0.08	0.0
4.10	13.5	130	130	0.62	0.48	4.5	0.25	0.07	0.0
4.15	13.6	133	133	0.57	0.42	4.8	0.26	0.08	0.0
4.20	13.8	151	151	0.58	0.39	5.0	0.24	0.08	0.0
4.25	13.9	195	195	0.92	0.47	4.5	0.17	0.04	0.0
4.30	14.1	223	223	1.27	0.57	3.9	0.12	0.01	0.0
4.35	14.3	210	211	1.47	0.70	3.8	0.13	0.01	0.0
4.40	14.4	188	188	1.41	0.75	4.2	0.16	0.02	0.0
4.45	14.6	158	158	1.18	0.74	5.0	0.23	0.06	0.0
4.50	14.8	168	168	0.91	0.54	5.2	0.23	0.06	0.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I
4.55	14.9	202	202	0.88	0.44	3.0	0.11	-0.03	0.0
4.60	15.1	253	253	1.22	0.48	2.3	0.07	-0.05	0.0
4.65	15.3	268	268	1.52	0.57	2.1	0.06	-0.05	0.0
4.70	15.4	278	278	1.74	0.63	3.2	0.08	-0.02	0.0
4.75	15.6	288	288	1.71	0.59	3.0	0.08	-0.03	0.0
4.80	15.7	296	296	1.80	0.61	2.3	0.06	-0.05	0.0
4.85	15.9	308	308	2.18	0.71	2.2	0.05	-0.05	0.0
4.90	16.1	288	288	2.25	0.78	2.2	0.05	-0.05	0.0
4.95	16.2	270	270	1.86	0.69	2.5	0.07	-0.05	0.0
5.00	16.4	286	286	1.73	0.60	2.8	0.07	-0.04	0.0
5.05	16.6	332	332	1.84	0.55	2.1	0.05	-0.05	0.0
5.10	16.7	355	355	2.24	0.63	1.8	0.04	-0.06	0.0
5.15	16.9	397	397	2.88	0.73	1.7	0.03	-0.05	0.0
5.20	17.1	404	404	3.23	0.80	1.9	0.03	-0.05	0.0
5.25	17.2	361	361	3.07	0.85	2.2	0.04	-0.05	0.0
5.30	17.4	329	329	2.80	0.85	2.2	0.05	-0.06	0.0
5.35	17.6	321	321	2.63	0.82	2.2	0.05	-0.06	0.0
5.40	17.7	303	303	2.55	0.84	1.9	0.04	-0.07	0.0
5.45	17.9	282	282	2.22	0.79	2.2	0.06	-0.08	0.0
5.50	18.0	279	279	2.07	0.74	2.5	0.07	-0.07	0.0
5.55	18.2	290	290	1.62	0.56	2.6	0.06	-0.07	0.0
5.60	18.4	310	310	1.95	0.63	2.1	0.05	-0.07	0.0
5.65	18.5	282	282	1.67	0.59	2.5	0.06	-0.08	0.0
5.70	18.7	299	299	1.90	0.64	3.8	0.09	-0.04	0.0
5.75	18.9	302	302	2.16	0.72	3.0	0.07	-0.06	0.0
5.80	19.0	299	299	2.25	0.76	3.4	0.08	-0.05	0.0
5.85	19.2	287	287	2.22	0.77	4.1	0.10	-0.04	0.0
5.90	19.4	287	288	2.10	0.73	4.5	0.11	-0.03	0.0
5.95	19.5	290	290	1.93	0.66	4.5	0.11	-0.03	0.0
6.00	19.7	296	296	2.00	0.67	4.2	0.10	-0.04	0.0
6.05	19.8	314	315	2.06	0.66	3.8	0.09	-0.05	0.0
6.10	20.0	308	308	2.25	0.73	3.8	0.09	-0.05	0.0
6.15	20.2	313	313	2.04	0.65	4.0	0.09	-0.05	0.0
6.20	20.3	327	327	2.10	0.64	5.0	0.11	-0.03	0.0
6.25	20.5	372	372	2.43	0.65	4.8	0.09	-0.03	0.0
6.30	20.7	389	389	2.90	0.75	4.5	0.08	-0.03	0.0
6.35	20.8	397	397	3.20	0.81	4.1	0.07	-0.04	0.0
6.40	21.0	373	373	3.09	0.83	3.7	0.07	-0.05	0.0
6.45	21.2	353	353	2.81	0.80	3.8	0.08	-0.06	0.0
6.50	21.3	362	362	2.92	0.81	4.0	0.08	-0.05	0.0
6.55	21.5	370	370	2.38	0.64	4.0	0.08	-0.05	0.0
6.60	21.7	363	363	2.48	0.68	4.2	0.08	-0.05	0.0
6.65	21.8	369	369	2.81	0.76	5.6	0.11	-0.02	0.0
6.70	22.0	364	364	3.06	0.84	5.1	0.10	-0.04	0.0
6.75	22.1	335	335	2.83	0.85	5.1	0.11	-0.04	0.0
6.80	22.3	320	320	2.62	0.82	5.5	0.12	-0.03	0.0
6.85	22.5	313	314	2.57	0.82	5.8	0.13	-0.03	0.0
6.90	22.6	311	312	2.57	0.83	6.1	0.14	-0.02	0.0
6.95	22.8	306	306	2.40	0.79	6.1	0.14	-0.03	0.0
7.00	23.0	314	314	2.24	0.71	6.1	0.14	-0.03	0.0

DEPTH eters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	326	326	2.44	0.75	5.8	0.13	-0.04	0.0
7.10	23.3	334	334	2.72	0.81	5.6	0.12	-0.04	0.0
7.15	23.5	322	322	2.52	0.78	6.1	0.14	-0.03	0.0
7.20	23.6	313	313	2.49	0.80	6.4	0.15	-0.03	0.0
7.25	23.8	320	320	2.60	0.81	6.7	0.15	-0.02	0.0
7.30	23.9	306	306	2.62	0.86	6.8	0.16	-0.02	0.0
7.35	24.1	303	303	2.58	0.85	6.9	0.16	-0.02	0.0
7.40	24.3	292	293	2.37	0.81	6.8	0.17	-0.03	0.0
7.45	24.4	303	303	2.46	0.81	7.1	0.17	-0.02	0.0
7.50	24.6	305	305	2.51	0.82	6.5	0.15	-0.04	0.0
7.55	24.8	286	286	2.50	0.88	6.4	0.16	-0.04	0.0
7.60	24.9	282	282	2.00	0.71	6.6	0.17	-0.04	0.0
7.65	25.1	254	254	1.98	0.78	6.8	0.19	-0.04	0.1
7.70	25.3	221	221	1.72	0.78	7.4	0.24	-0.03	0.1
7.75	25.4	215	216	1.58	0.73	7.9	0.26	-0.02	0.1
7.80	25.6	219	219	1.63	0.74	8.0	0.26	-0.01	0.1
7.85	25.8	238	238	1.79	0.75	7.7	0.23	-0.03	0.1
7.90	25.9	243	244	1.94	0.80	7.7	0.23	-0.03	0.1
7.95	26.1	238	238	1.86	0.78	7.9	0.24	-0.02	0.1
8.00	26.2	234	234	1.80	0.77	7.8	0.24	-0.03	0.1
8.05	26.4	235	236	1.72	0.73	8.1	0.25	-0.02	0.1
8.10	26.6	230	230	1.65	0.72	8.1	0.25	-0.03	0.2
8.15	26.7	229	230	1.69	0.74	8.1	0.25	-0.03	0.2
8.20	26.9	244	244	1.77	0.73	7.8	0.23	-0.04	0.2
8.25	27.1	250	250	1.74	0.70	6.4	0.19	-0.08	0.2
8.30	27.2	238	238	1.69	0.71	6.4	0.19	-0.08	0.2
8.35	27.4	216	216	1.00	0.46	6.9	0.23	-0.08	0.2
8.40	27.6	205	205	0.72	0.35	7.6	0.27	-0.06	0.2
8.45	27.7	219	219	0.59	0.27	1.9	0.06	-0.25	0.2
8.50	27.9	202	202	0.90	0.45	1.3	0.05	-0.29	0.2
8.55	28.1	166	166	1.08	0.65	0.5	0.02	-0.39	0.2
8.60	28.2	139	139	0.99	0.71	2.0	0.11	-0.39	0.2
8.65	28.4	117	117	0.81	0.69	3.8	0.24	-0.36	0.2
8.70	28.5	121	121	0.70	0.57	9.3	0.55	-0.03	0.2
8.75	28.7	153	153	0.86	0.56	5.5	0.26	-0.20	0.2
8.80	28.9	160	160	1.04	0.65	5.2	0.23	-0.21	0.2
8.85	29.0	174	174	1.18	0.68	7.1	0.29	-0.12	0.2
8.90	29.2	171	171	1.19	0.70	8.4	0.35	-0.07	0.2
8.95	29.4	158	158	1.16	0.73	9.4	0.43	-0.03	0.2
9.00	29.5	151	151	1.09	0.72	10.4	0.49	0.01	0.2
9.05	29.7	137	137	1.12	0.82	10.8	0.57	0.03	0.2
9.10	29.9	119	119	1.04	0.88	11.4	0.69	0.06	0.2
9.15	30.0	157	157	0.95	0.60	12.3	0.57	0.09	0.2
9.20	30.2	181	181	0.96	0.53	5.1	0.20	-0.21	0.2
9.25	30.3	185	185	1.08	0.59	1.7	0.07	-0.34	0.2
9.30	30.5	179	179	1.27	0.71	4.0	0.16	-0.27	0.2
9.35	30.7	165	165	1.25	0.76	7.2	0.31	-0.15	0.2
9.40	30.8	143	143	1.16	0.81	8.7	0.44	-0.10	0.2
9.45	31.0	125	125	0.97	0.78	9.7	0.56	-0.06	0.2
9.50	31.2	116	116	0.89	0.77	10.9	0.68	0.00	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCL[illegible]ON [illegible]g
9.55	31.3	124	124	0.91	0.73	11.7	0.68	0.04	0.2
9.60	31.5	125	125	0.77	0.62	3.7	0.21	-0.42	0.2
9.65	31.7	117	117	0.78	0.67	4.1	0.25	-0.43	0.2
9.70	31.8	120	120	0.79	0.66	10.4	0.62	-0.05	0.6
9.75	32.0	126	126	0.80	0.64	9.7	0.56	-0.09	0.6
9.80	32.2	115	115	0.80	0.70	7.6	0.48	-0.23	0.6
9.85	32.3	113	113	0.90	0.80	9.2	0.59	-0.14	0.6
9.90	32.5	103	103	0.90	0.87	9.8	0.68	-0.11	0.6
9.95	32.6	92	92	0.87	0.94	11.0	0.87	-0.04	0.6
10.00	32.8	82	82	0.75	0.92	12.0	1.06	0.03	0.6
10.05	33.0	92	92	0.63	0.69	11.7	0.91	-0.00	0.6
10.10	33.1	101	101	0.68	0.67	5.8	0.42	-0.42	0.6
10.15	33.3	96	96	0.75	0.79	4.8	0.36	-0.53	0.6
10.20	33.5	94	95	0.78	0.83	7.7	0.59	-0.32	0.7
10.25	33.6	94	94	0.81	0.87	9.3	0.71	-0.21	0.7
10.30	33.8	85	85	0.72	0.85	10.7	0.91	-0.11	0.7
10.35	34.0	86	86	0.73	0.85	11.0	0.93	-0.09	0.7
10.40	34.1	76	76	1.07	1.41	8.5	0.80	-0.35	0.7
10.45	34.3	40	40	1.04	2.58	8.4	1.51	-0.69	0.7
10.50	34.4	24	24	1.00	4.24	12.6	3.85	0.10	0.7
10.55	34.6	60	60	1.35	2.26	10.1	1.22	-0.27	0.7
10.60	34.8	57	56	1.07	1.89	-4.0	-0.51	-2.09	0.7
10.65	34.9	55	55	1.65	3.00	-5.3	-0.69	-2.33	[illegible]
10.70	35.1	58	57	1.67	2.90	-9.5	-1.19	-2.76	[illegible]
10.75	35.3	51	51	1.52	3.01	-10.1	-1.44	-3.23	0.8
10.80	35.4	46	46	1.32	2.85	-10.2	-1.58	-3.55	0.8
10.85	35.6	40	40	1.14	2.86	-10.5	-1.89	-4.19	0.8
10.90	35.8	40	40	1.04	2.60	-10.5	-1.88	-4.19	0.8
10.95	35.9	36	36	0.89	2.47	-10.5	-2.11	-4.71	0.8
11.00	36.1	34	34	0.89	2.64	-10.6	-2.26	-5.02	0.8
11.05	36.3	36	36	0.91	2.55	-10.7	-2.16	-4.79	0.8
11.10	36.4	35	35	0.87	2.48	-10.5	-2.14	-4.84	0.6
11.15	36.6	31	31	0.68	2.18	-10.5	-2.42	-5.47	0.8
11.20	36.7	28	28	0.61	2.14	-10.3	-2.61	-5.98	0.8
11.25	36.9	24	24	0.46	1.93	-10.0	-3.83	-7.10	0.8
11.30	37.1	21	21	0.38	1.80	-9.8	-3.33	-7.89	0.8
11.35	37.2	17	17	0.40	2.40	-9.5	-4.07	-9.86	0.8
11.40	37.4	16	16	0.43	2.63	-9.3	-4.11	-10.11	0.6
11.45	37.6	17	17	0.61	3.66	-9.2	-3.94	-9.79	0.8
11.50	37.7	24	23	0.73	3.09	-8.9	-2.70	-6.89	0.9
11.55	37.9	21	21	0.93	4.46	-8.9	-3.04	-7.78	1.0
11.60	38.1	14	14	?	?	-8.8	-4.48	-11.52	1.0
11.65	38.2	12	12	?	?	-8.4	-5.01	-13.35	1.0

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :MIKE KASL
On Site Loc:B-7
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :01-24-91 09:21
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	39.83	0.20	0.49	0.04	silty sand to sandy silt	80-90	>48	13	UNDEFINED
0.60	2	21.67	0.19	0.89	0.11	sandy silt to clayey silt	UNDFND	UNDFD	8	2.1
0.95	3	33.14	0.38	1.16	0.18	silty sand to sandy silt	50-60	4c-44	11	UNDEFINED
1.25	4	20.83	0.54	2.62	0.23	clayey silt to silty clay	UNDFND	UNDFD	10	2.0
1.55	5	22.33	0.09	0.42	0.27	silty sand to sandy silt	40-50	40-42	7	UNDEFINED
1.85	6	76.83	0.36	0.47	0.32	sand to silty sand	70-80	44-46	18	UNDEFINED
2.15	7	94.33	0.45	0.48	0.36	sand to silty sand	70-80	44-46	23	UNDEFINED
2.45	8	98.33	0.49	0.49	0.40	sand to silty sand	70-80	44-46	24	UNDEFINED
2.75	9	127.33	0.56	0.44	0.45	sand	80-90	44-46	24	UNDEFINED
3.05	10	125.50	0.64	0.51	0.49	sand	80-90	44-46	24	UNDEFINED
3.35	11	126.67	0.59	0.47	0.53	sand	80-90	44-46	24	UNDEFINED
3.65	12	144.17	0.60	0.42	0.57	sand	80-90	44-46	28	UNDEFINED
3.95	13	124.83	0.60	0.48	0.62	sand	70-80	44-46	24	UNDEFINED
4.25	14	145.00	0.67	0.46	0.66	sand	80-90	44-46	28	UNDEFINED
4.55	15	191.50	1.19	0.62	0.70	sand	>90	44-46	37	UNDEFINED
4.85	16	281.83	1.70	0.60	0.75	sand	>90	46-48	>50	UNDEFINED
5.15	17	321.33	2.13	0.66	0.79	sand	>90	46-48	>50	UNDEFINED
5.45	18	333.33	2.75	0.82	0.83	sand	>90	46-48	>50	UNDEFINED
5.75	19	293.67	1.89	0.65	0.88	sand	>90	46-48	>50	UNDEFINED
6.05	20	295.50	2.09	0.71	0.92	sand	>90	44-46	>50	UNDEFINED
6.40	21	354.14	2.57	0.73	0.97	sand	>90	46-48	>50	UNDEFINED
6.70	22	363.50	2.74	0.75	1.01	sand	>90	46-48	>50	UNDEFINED
7.00	23	316.50	2.54	0.80	1.06	sand	>90	44-46	>50	UNDEFINED
7.35	24	317.71	2.57	0.81	1.10	sand	>90	44-46	>50	UNDEFINED
7.65	25	287.00	2.30	0.80	1.15	sand	>90	44-46	>50	UNDEFINED
7.95	26	229.00	1.75	0.77	1.19	sand	80-90	42-44	44	UNDEFINED
8.25	27	237.00	1.73	0.73	1.23	sand	80-90	42-44	45	UNDEFINED
8.55	28	207.67	1.00	0.48	1.28	sand	80-90	42-44	40	UNDEFINED
8.85	29	144.00	0.93	0.65	1.32	sand	70-80	40-42	28	UNDEFINED
9.15	30	148.83	1.09	0.73	1.36	sand	70-80	40-42	29	UNDEFINED
9.45	31	163.00	1.12	0.68	1.41	sand	70-80	40-42	31	UNDEFINED
9.75	32	121.33	0.82	0.68	1.45	sand to silty sand	60-70	40-4c	29	UNDEFINED
10.05	33	99.50	0.81	0.81	1.49	sand to silty sand	60-70	38-40	24	UNDEFINED
10.35	34	92.67	0.75	0.80	1.54	sand to silty sand	50-60	38-40	22	UNDEFINED
10.65	35	52.00	1.20	2.30	1.58	sandy silt to clayey silt	UNDFND	UNDFD	20	4.9
10.95	36	45.17	1.26	2.80	1.62	sandy silt to clayey silt	UNDFND	UNDFD	17	4.3
11.25	37	31.33	0.74	2.35	1.67	sandy silt to clayey silt	UNDFND	UNDFD	12	2.8
11.55	38	19.33	0.58	3.00	1.71	clayey silt to silty clay	UNDFND	UNDFD	9	1.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

CONOCO INC

Operator :MIKE KASL On Site Loc:B-7

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

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

CPI 6-1

File space: 203 ■ sounding

tial Baseline

Qc	Fs	Pw	Inc
-298	-1.97	-4.2	0.0

Dep

Qc -0

Fs 0.00

Pw 0.0

Inc 0.0

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Location: B-20, Start Time: 1345, End Time: _____

Site: DuPONT, Town: E. CHICAGO, State: IND

Unit: 1, Operators: SEIS, KASL, WILSON, _____

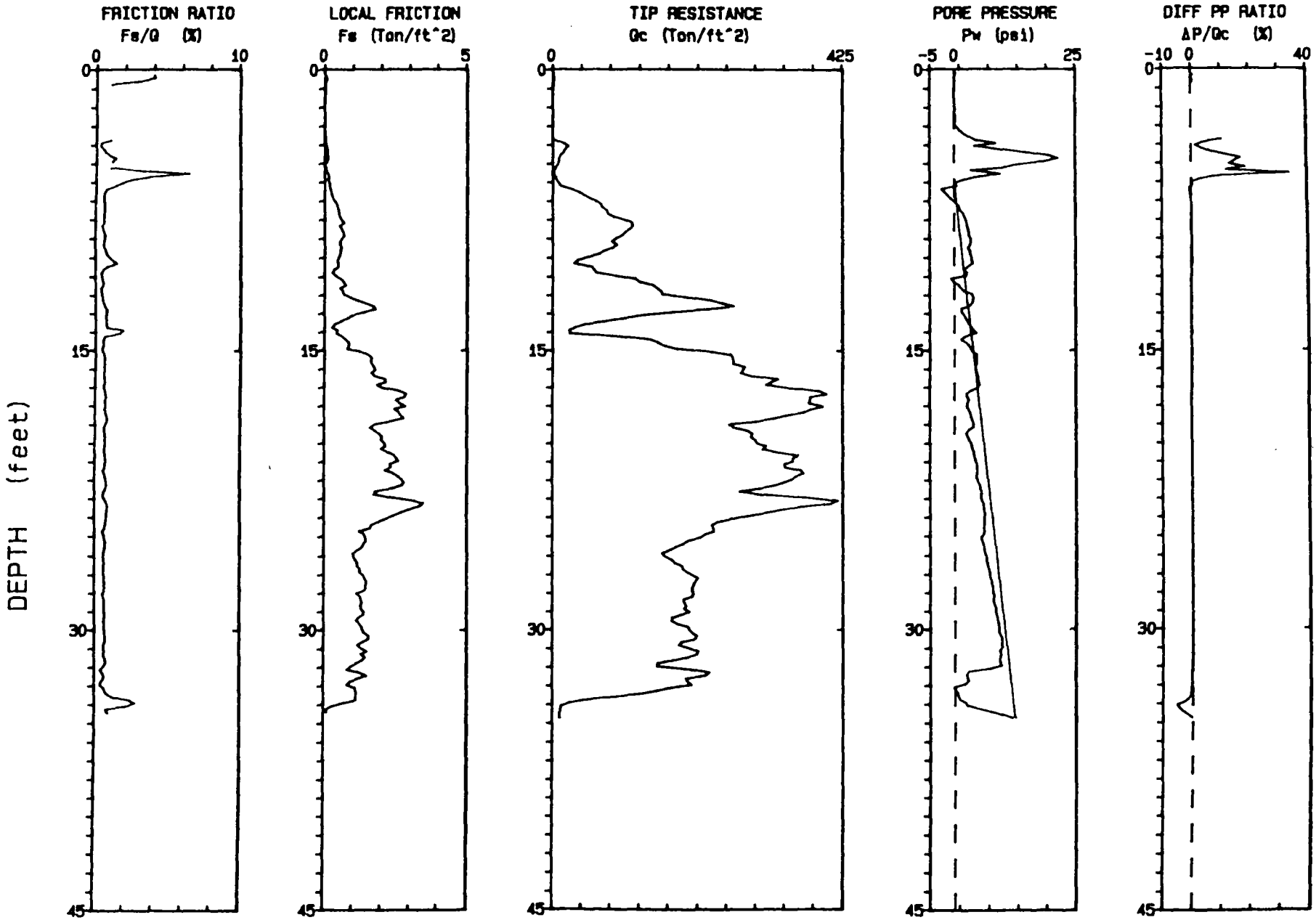
Proj. Consultant: LOUNSBURY, Company: DEP

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-19-91	1350	1410	B-20	CPB20	✓				34.8		2	F	CLAY AT 33.6

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-19-91 13:58 FILE CPTB20 Pg 1 / 1

LOCATION : B-20 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 34.78 ft

SOUNDING DATA IN FILE CPTB20 11-19-91 13:58

OPERATOR : CALVIN SELLS LOCATION : B-20

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.04		-9.8			0.1
0.05	0.2	0	0	0.01	9.00	0.3	25.86	25.86	0.1
0.10	0.3	1	1	0.04	6.07	0.1	0.99	0.99	0.1
0.15	0.5	2	2	0.08	4.56	0.0	0.09	0.09	0.1
0.20	0.7	1	1	0.03	2.75	0.1	0.72	0.72	2.6
0.25	0.8	1	1	0.01	0.69	0.0	0.00	0.00	1.7
0.30	1.0	0	0	0.02	4.80	0.0	0.00	0.00	1.3
0.35	1.1	0	0	0.01	3.78	0.0	0.00	0.00	1.0
0.40	1.3	0	0	0.02	4.80	-0.1	-1.38	-1.38	0.7
0.45	1.5	0	0	0.00	0.18	0.0	0.00	0.00	0.5
0.50	1.6	0	0	0.01	2.25	0.1	1.29	1.29	0.1
0.55	1.8	0	0	0.00	0.20	0.1	1.03	1.03	
0.60	2.0	0	0	-0.01	-1.50	0.0	0.34	0.34	
0.65	2.1	0	0	-0.00	-0.73	0.2	2.51	2.51	0.1
0.70	2.3	-0	-0	-0.00	2.00	0.0	0.00	0.00	3.6
0.75	2.5	-0	-0	-0.00	2.20	0.2	-6.90	-6.90	0.2
0.80	2.6	-0	-0	-0.01	2.80	0.2	-5.52	-5.52	0.1
0.85	2.8	0	0	-0.00	-9.00	0.2	27.58	27.58	0.1
0.90	3.0	-0	-0	-0.00	5.50	0.1	-10.34	-10.34	0.1
0.95	3.1	-0	-0	-0.00	0.60	0.7	-22.06	-22.06	0.1
1.00	3.3	-0	-0	0.00	-0.25	1.3	-56.02	-56.02	0.1
1.05	3.4	0	0	0.01	?	2.1	?	?	0.1
1.10	3.6	0	1	0.03	5.73	3.1	47.95	47.95	0.1
1.15	3.8	3	3	0.03	1.17	4.3	11.24	11.24	0.1
1.20	3.9	16	16	0.05	0.30	8.5	3.73	3.73	0.1
1.25	4.1	23	24	0.07	0.29	4.1	1.27	1.27	0.1
1.30	4.3	18	18	0.09	0.48	9.1	3.64	3.64	0.1
1.35	4.4	16	16	0.10	0.63	14.5	6.49	6.49	0.1
1.40	4.6	12	12	0.11	0.94	19.5	11.74	11.74	0.1
1.45	4.8	9	9	0.12	1.35	21.5	16.85	16.85	0.1
1.50	4.9	9	9	0.10	1.21	18.8	15.81	15.81	0.1
1.55	5.1	7	7	0.00	0.06	13.0	13.21	13.21	0.1
1.60	5.2	4	5	0.04	0.96	10.4	17.10	17.10	0.1
1.65	5.4	2	2	0.06	3.10	3.3	13.13	13.13	0.1
1.70	5.6	2	2	0.13	5.83	9.5	31.03	31.03	0.1
1.75	5.7	4	4	0.15	3.77	5.1	9.58	9.58	0.1
1.80	5.9	5	5	0.12	2.37	1.9	2.60	2.60	
1.85	6.1	9	9	0.16	1.70	-0.0	-0.03	-0.03	
1.90	6.2	12	12	0.16	1.29	0.5	0.28	0.24	0.1
1.95	6.4	28	28	0.20	0.72	-2.7	-0.69	-0.73	0.1
2.00	6.6	39	39	0.23	0.59	-2.0	-0.36	-0.40	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	47	47	0.26	0.55	-1.3	-0.19	-0.24	0.1
2.10	6.9	55	55	0.30	0.55	-0.7	-0.09	-0.13	0.1
2.15	7.1	64	64	0.37	0.58	0.0	0.00	-0.05	0.1
2.20	7.2	71	71	0.43	0.60	0.7	0.07	0.02	0.1
2.25	7.4	73	73	0.46	0.63	1.0	0.10	0.04	0.1
2.30	7.5	79	79	0.50	0.63	1.3	0.12	0.06	0.1
2.35	7.7	81	81	0.49	0.60	1.9	0.17	0.11	0.1
2.40	7.9	89	90	0.52	0.58	2.1	0.17	0.11	0.1
2.45	8.0	106	106	0.59	0.56	2.4	0.16	0.10	0.1
2.50	8.2	116	116	0.69	0.59	2.6	0.16	0.10	0.1
2.55	8.4	118	118	0.52	0.45	2.7	0.17	0.10	0.1
2.60	8.5	114	114	0.59	0.52	2.9	0.18	0.12	0.1
2.65	8.7	106	106	0.65	0.62	3.0	0.20	0.12	0.1
2.70	8.9	102	102	0.69	0.68	3.1	0.22	0.13	0.1
2.75	9.0	93	93	0.60	0.64	3.3	0.25	0.15	0.1
2.80	9.2	87	87	0.53	0.61	3.3	0.28	0.16	0.1
2.85	9.4	94	94	0.54	0.58	3.3	0.25	0.14	0.1
2.90	9.5	88	88	0.57	0.65	2.8	0.23	0.11	0.1
2.95	9.7	75	75	0.54	0.72	3.2	0.30	0.15	0.1
3.00	9.8	68	68	0.53	0.78	3.3	0.35	0.18	0.1
3.05	10.0	50	50	0.48	0.96	3.6	0.52	0.27	0.1
3.10	10.2	36	36	0.44	1.24	3.6	0.74	0.38	0.1
3.15	10.3	31	31	0.46	1.48	3.9	0.90	0.48	0.1
3.20	10.5	58	58	0.48	0.82	2.9	0.36	0.12	0.1
3.25	10.7	61	61	0.33	0.55	2.0	0.23	-0.00	0.1
3.30	10.8	64	64	0.27	0.42	2.6	0.30	0.06	0.1
3.35	11.0	93	93	0.39	0.42	2.4	0.18	0.02	0.1
3.40	11.2	121	121	0.57	0.48	-0.7	-0.04	-0.17	0.1
3.45	11.3	127	127	0.67	0.53	-0.1	-0.00	-0.13	0.1
3.50	11.5	147	147	0.74	0.51	0.9	0.04	-0.07	0.1
3.55	11.6	153	153	0.54	0.35	1.3	0.06	-0.05	0.1
3.60	11.8	159	159	0.63	0.40	2.0	0.09	-0.02	0.1
3.65	12.0	161	161	0.68	0.42	3.6	0.16	0.05	0.1
3.70	12.1	193	193	0.90	0.46	3.9	0.15	0.05	0.1
3.75	12.3	230	230	1.11	0.48	3.9	0.12	0.04	0.1
3.80	12.5	249	249	1.42	0.57	3.8	0.11	0.03	0.1
3.85	12.6	266	266	1.73	0.65	3.2	0.09	0.01	0.1
3.90	12.8	229	229	1.80	0.78	1.3	0.04	-0.05	0.1
3.95	13.0	175	176	1.39	0.79	1.5	0.06	-0.06	0.1
4.00	13.1	131	131	0.97	0.74	2.0	0.11	-0.06	0.1
4.05	13.3	106	106	0.80	0.75	2.3	0.16	-0.05	0.1
4.10	13.5	78	78	0.57	0.73	2.7	0.24	-0.05	0.1
4.15	13.6	47	47	0.35	0.74	3.0	0.46	-0.04	0.1
4.20	13.8	32	33	0.26	0.80	3.5	0.79	0.04	0.1
4.25	13.9	24	24	0.45	1.89	4.0	1.22	0.19	0.1
4.30	14.1	25	25	0.42	1.68	4.6	1.32	0.31	0.1
4.35	14.3	99	100	0.62	0.62	2.3	0.16	-0.09	0.1
4.40	14.4	144	144	0.76	0.53	1.4	0.07	-0.11	0.1
4.45	14.6	155	155	0.86	0.55	2.3	0.11	-0.07	0.1
4.50	14.8	163	163	0.86	0.53	2.9	0.13	-0.04	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	181	181	0.80	0.44	3.3	0.13	-0.02	0.1
4.60	15.1	232	232	1.24	0.53	3.6	0.11	-0.01	0.1
4.65	15.3	261	261	1.52	0.58	4.6	0.13	0.02	0.1
4.70	15.4	264	264	1.66	0.63	4.6	0.12	0.01	0.1
4.75	15.6	265	265	1.62	0.61	4.5	0.12	0.01	0.1
4.80	15.7	265	265	1.66	0.63	4.6	0.12	0.01	0.1
4.85	15.9	282	282	1.73	0.62	4.3	0.11	0.00	0.1
4.90	16.1	279	279	1.79	0.64	4.4	0.11	0.00	0.1
4.95	16.2	276	276	1.64	0.59	4.6	0.12	0.00	0.1
5.00	16.4	291	291	1.75	0.60	4.8	0.12	0.01	0.1
5.05	16.6	332	332	2.14	0.65	4.9	0.11	0.01	0.1
5.10	16.7	321	321	2.16	0.67	5.0	0.11	0.01	0.1
5.15	16.9	313	313	1.85	0.59	5.2	0.12	0.01	0.1
5.20	17.1	348	348	2.04	0.59	4.8	0.10	0.00	0.1
5.25	17.2	392	392	2.63	0.67	3.6	0.07	-0.02	0.1
5.30	17.4	403	403	2.88	0.72	2.4	0.04	-0.04	0.1
5.35	17.6	378	378	2.82	0.75	2.6	0.05	-0.05	0.1
5.40	17.7	378	378	2.52	0.67	3.0	0.06	-0.04	0.1
5.45	17.9	376	376	2.64	0.70	2.7	0.05	-0.05	0.1
5.50	18.0	398	398	2.86	0.72	2.6	0.05	-0.05	0.1
5.55	18.2	379	379	2.47	0.65	2.8	0.05	-0.05	[illegible]
5.60	18.4	368	368	2.62	0.71	3.1	0.06	-0.04	[illegible]
5.65	18.5	343	343	2.69	0.78	3.3	0.07	-0.04	0.1
5.70	18.7	325	325	2.78	0.85	3.5	0.08	-0.04	0.1
5.75	18.9	299	299	2.34	0.78	3.7	0.09	-0.04	0.1
5.80	19.0	258	258	1.78	0.69	3.9	0.11	-0.05	0.1
5.85	19.2	265	265	1.59	0.60	3.9	0.11	-0.05	0.1
5.90	19.4	286	286	1.76	0.61	2.9	0.07	-0.07	0.1
5.95	19.5	293	293	1.94	0.66	2.4	0.06	-0.08	0.1
6.00	19.7	291	291	2.04	0.70	2.7	0.07	-0.08	0.1
6.05	19.8	298	298	2.00	0.67	3.0	0.07	-0.07	0.1
6.10	20.0	300	301	2.13	0.71	3.3	0.08	-0.07	0.1
6.15	20.2	313	313	2.16	0.69	3.5	0.08	-0.06	0.1
6.20	20.3	308	308	2.01	0.65	3.6	0.09	-0.06	0.1
6.25	20.5	328	328	2.23	0.68	3.9	0.09	-0.05	0.1
6.30	20.7	361	361	2.45	0.68	4.0	0.08	-0.05	0.1
6.35	20.8	353	353	2.54	0.72	4.2	0.08	-0.05	0.1
6.40	21.0	353	353	2.60	0.74	4.3	0.09	-0.04	0.1
6.45	21.2	340	340	2.31	0.68	4.6	0.10	-0.04	0.1
6.50	21.3	341	341	2.34	0.69	4.6	0.10	-0.04	0.1
6.55	21.5	365	365	2.13	0.58	4.7	0.09	-0.04	0.1
6.60	21.7	369	369	2.42	0.65	4.7	0.09	-0.04	0.1
6.65	21.8	357	357	2.60	0.73	4.5	0.09	-0.05	0.1
6.70	22.0	352	352	2.73	0.78	4.6	0.09	-0.05	0.1
6.75	22.1	339	339	2.81	0.83	4.8	0.10	-0.05	0.1
6.80	22.3	326	326	2.75	0.85	5.2	0.11	-0.04	[illegible]
6.85	22.5	303	303	2.40	0.79	5.2	0.12	-0.04	[illegible]
6.90	22.6	274	274	1.78	0.65	5.5	0.15	-0.04	0.1
6.95	22.8	305	305	1.74	0.57	5.5	0.13	-0.04	0.1
7.00	23.0	375	375	2.34	0.62	5.4	0.10	-0.[illegible]	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	419	419	3.17	0.76	5.6	0.10	-0.03	0.1
7.10	23.3	409	409	3.50	0.86	5.9	0.10	-0.03	0.1
7.15	23.5	368	368	3.32	0.90	6.0	0.12	-0.03	0.2
7.20	23.6	336	336	2.95	0.88	6.1	0.13	-0.03	0.1
7.25	23.8	314	314	2.68	0.85	6.2	0.14	-0.03	0.2
7.30	23.9	288	288	2.43	0.85	6.2	0.16	-0.04	0.2
7.35	24.1	261	261	2.15	0.82	6.0	0.17	-0.05	0.2
7.40	24.3	241	241	1.89	0.78	6.1	0.18	-0.05	0.2
7.45	24.4	232	232	1.64	0.71	6.1	0.19	-0.06	0.2
7.50	24.6	235	235	1.60	0.68	6.0	0.19	-0.06	0.2
7.55	24.8	236	236	1.22	0.52	6.1	0.19	-0.06	0.2
7.60	24.9	223	223	1.40	0.63	6.0	0.19	-0.07	0.2
7.65	25.1	216	216	1.45	0.67	5.4	0.18	-0.10	0.2
7.70	25.3	198	198	1.47	0.74	5.6	0.20	-0.10	0.2
7.75	25.4	191	191	1.38	0.72	5.9	0.22	-0.10	0.4
7.80	25.6	180	180	1.33	0.74	6.0	0.24	-0.10	0.3
7.85	25.8	171	171	1.17	0.69	6.0	0.25	-0.11	0.4
7.90	25.9	160	160	1.01	0.63	6.2	0.28	-0.11	0.3
7.95	26.1	164	164	1.03	0.63	6.5	0.28	-0.10	0.2
8.00	26.2	175	175	1.10	0.63	6.5	0.27	-0.09	0.3
8.05	26.4	179	179	1.16	0.65	6.7	0.27	-0.09	0.2
8.10	26.6	190	190	1.17	0.62	6.8	0.26	-0.08	0.2
8.15	26.7	191	191	1.25	0.66	7.0	0.27	-0.07	0.2
8.20	26.9	198	198	1.25	0.63	7.2	0.26	-0.07	0.2
8.25	27.1	206	206	1.38	0.67	7.2	0.25	-0.07	0.2
8.30	27.2	213	213	1.42	0.67	7.4	0.25	-0.06	0.2
8.35	27.4	209	210	1.50	0.71	7.5	0.26	-0.06	0.2
8.40	27.6	206	206	1.47	0.71	7.6	0.27	-0.06	0.2
8.45	27.7	204	204	1.46	0.72	7.8	0.27	-0.06	0.2
8.50	27.9	204	204	1.41	0.69	7.8	0.28	-0.06	0.2
8.55	28.1	206	207	1.14	0.55	7.9	0.28	-0.06	0.2
8.60	28.2	204	204	1.26	0.62	8.1	0.29	-0.05	0.2
8.65	28.4	191	191	1.29	0.67	7.9	0.30	-0.07	0.2
8.70	28.5	193	193	1.33	0.69	8.0	0.30	-0.06	0.2
8.75	28.7	196	196	1.28	0.65	8.2	0.30	-0.06	0.2
8.80	28.9	193	193	1.30	0.67	8.5	0.32	-0.05	0.2
8.85	29.0	201	201	1.39	0.69	8.5	0.30	-0.05	0.2
8.90	29.2	189	189	1.39	0.74	8.5	0.32	-0.06	0.2
8.95	29.4	175	175	1.22	0.70	8.7	0.36	-0.06	0.2
9.00	29.5	174	174	1.14	0.65	8.8	0.36	-0.06	0.2
9.05	29.7	182	182	1.24	0.68	9.0	0.36	-0.05	0.2
9.10	29.9	199	200	1.31	0.65	9.1	0.33	-0.04	0.2
9.15	30.0	200	200	1.35	0.68	9.1	0.33	-0.05	0.2
9.20	30.2	205	205	1.40	0.68	9.1	0.32	-0.05	0.2
9.25	30.3	211	211	1.57	0.74	9.5	0.32	-0.04	0.2
9.30	30.5	209	209	1.57	0.75	9.8	0.34	-0.03	0.2
9.35	30.7	189	189	1.36	0.72	9.8	0.37	-0.03	0.2
9.40	30.8	185	185	1.18	0.64	9.8	0.38	-0.04	0.2
9.45	31.0	201	201	1.31	0.65	9.8	0.35	-0.04	0.2
9.50	31.2	213	213	1.52	0.71	9.2	0.31	-0.06	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
9.55	31.3	211	211	1.30	0.62	9.5	0.32	-0.05	0.2
9.60	31.5	199	199	1.44	0.72	9.4	0.34	-0.06	0.2
9.65	31.7	177	177	1.33	0.75	9.2	0.37	-0.08	0.2
9.70	31.8	153	153	1.14	0.75	9.4	0.44	-0.08	0.2
9.75	32.0	153	153	0.94	0.61	9.6	0.45	-0.08	0.2
9.80	32.2	202	202	0.81	0.40	7.2	0.25	-0.15	0.2
9.85	32.3	230	230	1.26	0.55	2.8	0.09	-0.27	0.2
9.90	32.5	224	224	1.51	0.67	2.3	0.07	-0.29	0.2
9.95	32.6	195	195	1.21	0.62	2.6	0.10	-0.33	0.2
10.00	32.8	198	198	0.91	0.46	2.9	0.11	-0.32	0.2
10.05	33.0	204	204	0.80	0.39	2.0	0.07	-0.34	0.2
10.10	33.1	172	172	1.11	0.64	-0.3	-0.01	-0.51	0.2
10.15	33.3	153	153	1.13	0.74	0.0	0.00	-0.56	0.3
10.20	33.5	130	130	1.13	0.86	0.6	0.03	-0.62	0.3
10.25	33.6	90	90	1.12	1.25	0.7	0.06	-0.90	0.3
10.30	33.8	47	47	1.13	2.43	1.0	0.15	-1.71	0.3
10.35	34.0	25	25	0.69	2.72	2.2	0.63	-2.82	0.3
10.40	34.1	13	13	0.29	2.14	2.6	1.42	-5.15	0.3
10.45	34.3	12	12	0.09	0.74	4.8	2.86	-4.46	0.3
10.50	34.4	11	11	0.10	0.91	7.5	4.86	-3.13	0.3
10.55	34.6	11	11	?	?	9.8	6.62	-1.77	[illegible]
10.60	34.8	11	11	?	?	11.8	7.98	-0.45	[illegible]

WRITE NUMBER OF RODS USED __

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:B-20
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-19-91 13:58
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.83	0.03	3.80	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.00	0.00	0.00	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	0.00	-0.00	0.00	0.18	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	7.00	0.03	0.45	0.23	sensitive fine grained	UNDFND	UNDFD	3	.6
1.55	5	11.83	0.09	0.73	0.27	sandy silt to clayey silt	UNDFND	UNDFD	5	1.1
1.85	6	4.33	0.11	2.54	[illegible]	clay	UNDFND	UNDFD	4	.3
2.15	7	40.83	0.25	0.[illegible]	0.36	silty sand to sandy silt	50-60	40-42	13	UNDEFINED
2.45	8	83.17	0.50	0.60	0.40	sand to silty sand	70-80	44-46	20	UNDEFINED
2.75	9	108.17	0.62	0.58	0.45	sand to silty sand	80-90	44-46	26	UNDEFINED
3.05	10	77.00	0.53	0.69	0.49	sand to silty sand	60-70	42-44	18	UNDEFINED
3.35	11	57.17	0.39	0.69	0.53	sand to silty sand	50-60	40-42	14	UNDEFINED
3.65	12	144.67	0.64	0.44	0.57	sand	80-90	44-46	28	UNDEFINED
3.95	13	223.67	1.39	0.62	0.62	sand	>90	46-48	43	UNDEFINED
4.25	14	69.67	0.57	0.81	0.66	sand to silty sand	60-70	40-42	17	UNDEFINED
4.55	15	127.83	0.72	0.56	0.70	sand	70-80	42-44	24	UNDEFINED
4.85	16	261.50	1.57	0.60	0.75	sand	>90	46-48	>50	UNDEFINED
5.15	17	302.00	1.89	0.63	0.79	sand	>90	46-48	>50	UNDEFINED
5.45	18	379.17	2.59	0.68	0.83	gravelly sand to sand	>90	46-48	>50	UNDEFINED
5.75	19	352.00	2.63	0.75	0.88	sand	>90	46-48	>50	UNDEFINED
6.05	20	281.83	1.85	0.66	0.92	sand	>90	44-46	>50	UNDEFINED
6.40	21	330.86	2.30	0.70	0.97	sand	>90	46-48	>50	UNDEFINED
6.70	22	354.00	2.42	0.68	1.01	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.00	23	320.33	2.30	0.72	1.06	sand	>90	44-46	>50	UNDEFINED
7.35	24	342.14	2.89	0.84	1.10	sand	>90	44-46	>50	UNDEFINED
7.65	25	230.50	1.53	0.67	1.15	sand	80-90	44-46	44	UNDEFINED
7.95	26	177.33	1.23	0.69	1.19	sand	80-90	42-44	34	UNDEFINED
8.25	27	189.83	1.22	0.64	1.23	sand	80-90	42-44	36	UNDEFINED
8.55	28	207.00	1.40	0.68	1.28	sand	80-90	42-44	40	UNDEFINED
8.85	29	196.33	1.31	0.67	1.32	sand	80-90	42-44	38	UNDEFINED
9.15	30	186.50	1.27	0.68	1.36	sand	80-90	42-44	36	UNDEFINED
9.45	31	200.00	1.40	0.70	1.41	sand	80-90	42-44	38	UNDEFINED
9.75	32	184.33	1.28	0.69	1.45	sand	70-80	42-44	35	UNDEFINED
10.05	33	208.83	1.08	0.52	1.49	sand	80-90	42-44	40	UNDEFINED
10.35	34	102.83	1.05	1.02	1.54	sand to silty sand	60-70	38-40	25	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 190 ■ sounding

Initial Baseline

Qc	Fs	Pw	Inc
-261	-7.05	-8.9	0.1

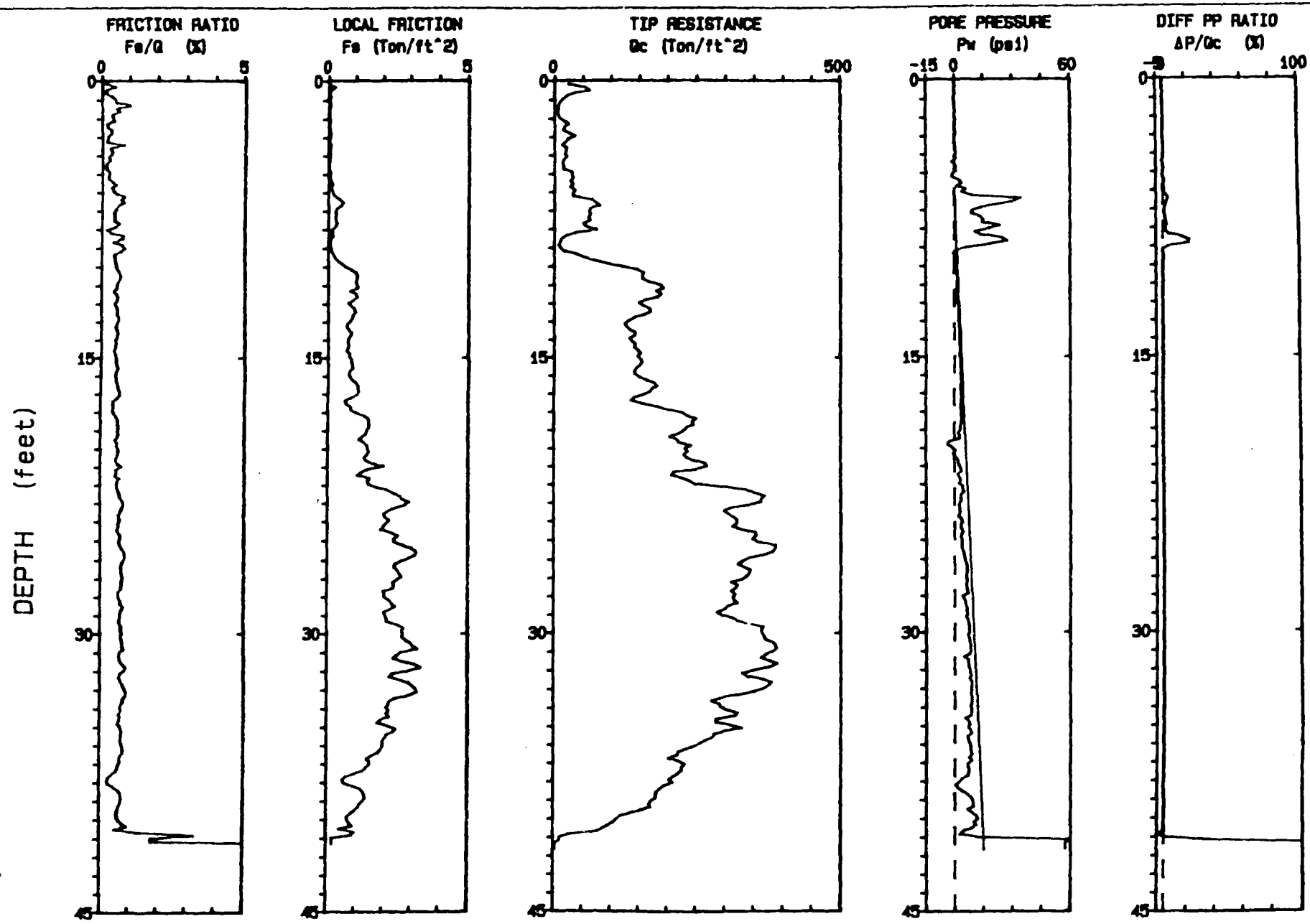
	Dep
Qc	0
Fs	0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

Conoco, Inc.

OPERATOR : JIM DANIELSON CPT Date : 02-06-92 08:02 FILE CPTC16 Pg 1 / 1

LOCATION : C-16 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 41.67 ft

SOUNDING DATA IN FILE CPTC16 02-06-92 08:02

OPERATOR : JIM DANIELSON LOCATION : C-16

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
Baseline		-262		-7.07		-5.0			0.
0.05	0.2	24	24	0.03	0.11	0.2	0.06	0.06	0.
0.10	0.3	54	54	0.25	0.46	0.5	0.06	0.06	0.
0.15	0.5	62	62	0.09	0.15	0.1	0.01	0.01	0.
0.20	0.7	33	33	0.03	0.11	0.4	0.09	0.09	0.
0.25	0.8	21	21	0.07	0.33	-0.0	-0.01	-0.01	0.
0.30	1.0	13	13	0.06	0.43	-0.5	-0.31	-0.31	0.
0.35	1.1	8	8	0.04	0.43	-0.1	-0.11	-0.11	0.
0.40	1.3	6	6	0.06	1.07	0.0	0.05	0.05	0.
0.45	1.5	6	6	0.03	0.52	0.1	0.12	0.12	0.
0.50	1.6	5	5	0.03	0.51	0.4	0.62	0.62	0.
0.55	1.8	6	6	0.02	0.42	0.2	0.20	0.20	0.
0.60	2.0	8	8	0.03	0.40	0.3	0.30	0.30	0.
0.65	2.1	17	17	0.07	0.39	0.3	0.12	0.12	0.
0.70	2.3	25	25	0.04	0.17	0.4	0.11	0.11	0.
0.75	2.5	17	17	0.03	0.21	0.2	0.11	0.11	0.
0.80	2.6	15	15	0.05	0.35	0.2	0.12	0.12	0.
0.85	2.8	25	25	0.08	0.32	0.3	0.10	0.10	0.
0.90	3.0	36	36	0.07	0.18	0.4	0.08	0.08	0.
0.95	3.1	24	24	0.04	0.16	-0.1	-0.02	-0.02	0.
1.00	3.3	19	19	0.03	0.14	0.1	0.03	0.03	0.
1.05	3.4	13	13	0.10	0.77	0.1	0.05	0.05	0.
1.10	3.6	22	22	0.06	0.28	0.4	0.14	0.14	0.
1.15	3.8	20	20	0.07	0.34	0.3	0.12	0.12	0.
1.20	3.9	18	18	0.06	0.35	0.8	0.31	0.31	0.
1.25	4.1	22	22	0.05	0.25	0.1	0.02	0.02	0.
1.30	4.3	15	15	0.04	0.28	0.7	0.32	0.32	0.
1.35	4.4	14	14	0.02	0.15	-1.4	-0.73	-0.73	0.
1.40	4.6	16	16	0.02	0.12	0.5	0.24	0.24	0.
1.45	4.8	15	15	0.02	0.15	0.6	0.31	0.31	0.
1.50	4.9	31	31	0.08	0.26	0.7	0.16	0.16	0.
1.55	5.1	31	31	0.07	0.23	-1.3	-0.30	-0.30	0.
1.60	5.2	32	32	0.07	0.23	-1.4	-0.32	-0.32	0.
1.65	5.4	28	28	0.10	0.34	2.5	0.63	0.63	0.
1.70	5.6	32	32	0.15	0.48	3.8	0.86	0.86	0.
1.75	5.7	27	27	0.09	0.35	1.3	0.36	0.36	0.
1.80	5.9	36	36	0.14	0.39	6.1	1.21	1.21	0.
1.85	6.1	33	33	0.16	0.48	3.9	0.85	0.85	0.
1.90	6.2	33	33	0.26	0.77	9.0	1.97	1.95	0.
1.95	6.4	66	67	0.45	0.68	35.1	3.81	3.79	0.
2.00	6.6	71	72	0.55	0.77	31.6	3.19	3.17	0.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	80	80	0.46	0.57	22.7	2.05	2.03	0.1
2.10	6.9	62	62	0.31	0.51	14.0	1.63	1.59	0.1
2.15	7.1	61	61	0.26	0.43	9.2	1.08	1.03	0.1
2.20	7.2	63	63	0.27	0.43	9.0	1.03	0.97	0.1
2.25	7.4	60	60	0.26	0.44	13.7	1.64	1.57	0.1
2.30	7.5	63	63	0.28	0.45	15.4	1.75	1.68	0.1
2.35	7.7	51	51	0.32	0.63	14.6	2.06	1.96	0.1
2.40	7.9	56	57	0.27	0.48	24.0	3.08	2.98	0.1
2.45	8.0	74	74	0.14	0.18	18.0	1.75	1.66	0.3
2.50	8.2	39	40	0.12	0.32	10.6	1.98	1.81	0.2
2.55	8.4	21	21	0.16	0.78	13.7	4.79	4.45	0.2
2.60	8.5	12	12	0.09	0.74	25.2	15.42	14.77	0.2
2.65	8.7	10	10	0.04	0.44	28.0	20.20	19.38	0.2
2.70	8.9	7	8	0.05	0.65	19.7	19.33	18.15	0.2
2.75	9.0	11	11	0.09	0.81	7.8	4.99	4.17	0.2
2.80	9.2	17	17	0.12	0.74	0.9	0.40	-0.16	0.1
2.85	9.4	40	40	0.18	0.45	-0.7	-0.12	-0.38	0.2
2.90	9.5	53	53	0.25	0.48	1.5	0.21	0.00	0.2
2.95	9.7	69	69	0.34	0.50	1.6	0.16	0.00	0.3
3.00	9.8	93	93	0.47	0.51	1.5	0.12	-0.01	0.2
3.05	10.0	119	119	0.62	0.52	1.5	0.09	-0.01	0.1
3.10	10.2	146	146	0.85	0.58	1.4	0.07	-0.02	0.1
3.15	10.3	157	157	1.00	0.63	1.6	0.07	-0.01	0.1
3.20	10.5	155	155	1.06	0.68	1.6	0.08	-0.01	0.1
3.25	10.7	156	156	1.05	0.67	1.7	0.08	-0.01	0.2
3.30	10.8	166	166	1.00	0.60	1.9	0.06	-0.01	0.2
3.35	11.0	187	187	1.05	0.56	1.6	0.06	-0.02	0.2
3.40	11.2	192	192	1.07	0.56	1.5	0.06	-0.02	0.2
3.45	11.3	179	179	0.78	0.44	1.7	0.07	-0.02	0.2
3.50	11.5	188	188	1.00	0.53	1.9	0.07	-0.02	0.1
3.55	11.6	182	182	1.06	0.58	1.8	0.07	-0.02	0.2
3.60	11.8	160	160	0.91	0.57	1.8	0.08	-0.03	0.2
3.65	12.0	149	149	0.72	0.49	2.0	0.10	-0.03	0.1
3.70	12.1	157	157	0.83	0.53	2.2	0.10	-0.02	0.1
3.75	12.3	168	168	0.95	0.57	2.2	0.09	-0.02	0.1
3.80	12.5	169	169	0.99	0.59	2.3	0.10	-0.02	0.2
3.85	12.6	158	158	0.89	0.56	2.3	0.10	-0.03	0.1
3.90	12.8	140	140	0.87	0.62	2.4	0.12	-0.03	0.1
3.95	13.0	131	131	0.80	0.61	2.4	0.13	-0.03	0.1
4.00	13.1	124	124	0.68	0.55	2.5	0.15	-0.03	0.1
4.05	13.3	127	127	0.66	0.52	2.7	0.15	-0.03	0.2
4.10	13.5	133	133	0.75	0.57	2.7	0.15	-0.02	0.2
4.15	13.6	143	143	0.85	0.59	2.7	0.14	-0.03	0.1
4.20	13.8	141	141	0.81	0.57	2.7	0.14	-0.03	0.2
4.25	13.9	132	132	0.72	0.55	2.8	0.16	-0.03	0.2
4.30	14.1	137	138	0.70	0.51	2.8	0.15	-0.03	0.2
4.35	14.3	143	143	0.74	0.52	2.8	0.14	-0.04	0.2
4.40	14.4	141	141	0.72	0.51	3.1	0.16	-0.03	0.2
4.45	14.6	147	147	0.66	0.45	3.1	0.15	-0.03	0.2
4.50	14.8	152	152	0.77	0.51	3.1	0.15	-0.03	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
4.55	14.9	147	147	0.78	0.53	2.5	0.12	-0.07	[redacted]
4.60	15.1	152	152	0.84	0.55	3.0	0.14	-0.04	0.2
4.65	15.3	154	154	0.85	0.55	3.2	0.15	-0.04	0.2
4.70	15.4	151	151	0.87	0.58	3.2	0.15	-0.04	0.2
4.75	15.6	145	145	0.88	0.61	3.4	0.17	-0.04	0.2
4.80	15.7	141	141	0.77	0.55	3.5	0.18	-0.03	0.2
4.85	15.9	141	141	0.75	0.53	3.4	0.17	-0.04	0.2
4.90	16.1	149	149	0.79	0.53	3.5	0.17	-0.04	0.2
4.95	16.2	161	161	0.88	0.55	3.6	0.16	-0.04	0.2
5.00	16.4	176	176	1.01	0.57	3.8	0.16	-0.03	0.2
5.05	16.6	181	181	1.08	0.60	3.3	0.13	-0.05	0.2
5.10	16.7	172	173	1.08	0.62	3.4	0.14	-0.05	0.2
5.15	16.9	168	168	1.12	0.67	3.5	0.15	-0.05	0.2
5.20	17.1	157	157	1.06	0.67	3.5	0.16	-0.06	0.2
5.25	17.2	141	141	0.84	0.59	3.8	0.19	-0.05	0.2
5.30	17.4	135	135	0.61	0.45	3.9	0.21	-0.05	0.2
5.35	17.6	155	155	0.66	0.43	3.8	0.18	-0.06	0.2
5.40	17.7	181	181	0.83	0.46	3.1	0.12	-0.08	0.2
5.45	17.9	201	201	0.83	0.41	3.4	0.12	-0.06	0.2
5.50	18.0	226	226	1.02	0.45	3.9	0.13	-0.04	0.2
5.55	18.2	234	234	1.30	0.55	3.5	0.11	-0.05	0.2
5.60	18.4	250	250	1.46	0.58	4.0	0.11	-0.04	0.2
5.65	18.5	243	243	1.47	0.60	4.0	0.12	-0.04	0.2
5.70	18.7	246	246	1.50	0.61	3.8	0.11	-0.05	0.2
5.75	18.9	233	233	1.48	0.64	3.2	0.10	-0.07	[redacted]
5.80	19.0	228	228	1.40	0.62	3.4	0.11	-0.07	[redacted]
5.85	19.2	220	220	1.38	0.63	2.2	0.07	-0.11	0.2
5.90	19.4	203	203	1.25	0.61	2.6	0.09	-0.11	0.2
5.95	19.5	216	216	1.12	0.52	2.8	0.10	-0.10	0.2
6.00	19.7	219	219	1.31	0.60	-3.0	-0.10	-0.29	0.2
6.05	19.8	241	241	1.41	0.59	-3.7	-0.11	-0.29	0.2
6.10	20.0	230	230	1.44	0.63	-1.3	-0.04	-0.23	0.2
6.15	20.2	235	235	1.47	0.62	0.6	0.02	-0.17	0.2
6.20	20.3	228	228	1.41	0.62	-0.6	-0.02	-0.21	0.2
6.25	20.5	233	233	1.31	0.56	0.4	0.01	-0.18	0.2
6.30	20.7	246	246	1.37	0.56	1.9	0.06	-0.13	0.2
6.35	20.8	266	266	1.65	0.62	1.9	0.05	-0.12	0.2
6.40	21.0	269	269	2.04	0.76	2.4	0.06	-0.11	0.2
6.45	21.2	250	250	1.42	0.57	3.3	0.10	-0.09	0.2
6.50	21.3	209	209	1.20	0.57	3.9	0.13	-0.09	0.2
6.55	21.5	207	207	1.06	0.51	1.4	0.05	-0.18	0.2
6.60	21.7	225	225	1.52	0.68	2.5	0.08	-0.14	0.2
6.65	21.8	239	239	1.43	0.60	3.4	0.10	-0.10	0.2
6.70	22.0	249	249	1.47	0.59	2.5	0.07	-0.13	0.2
6.75	22.1	302	303	1.79	0.59	4.3	0.10	-0.06	0.2
6.80	22.3	338	338	2.17	0.64	4.3	0.09	-0.06	0.2
6.85	22.5	350	350	2.38	0.68	5.0	0.10	-0.04	0.2
6.90	22.6	369	369	2.62	0.71	3.4	0.07	-0.07	0.2
6.95	22.8	362	362	2.69	0.74	3.2	0.06	-0.08	0.2
7.00	23.0	361	361	2.93	0.81	3.3	0.07	-0.08	[redacted]

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	340	340	2.76	0.81	2.4	0.05	-0.11	0.2
7.10	23.3	310	310	2.40	0.77	2.6	0.06	-0.11	0.2
7.15	23.5	298	298	2.18	0.73	3.1	0.07	-0.11	0.2
7.20	23.6	306	306	2.02	0.66	2.6	0.06	-0.12	0.2
7.25	23.8	314	314	2.07	0.66	1.9	0.04	-0.13	0.2
7.30	23.9	321	321	2.23	0.69	3.7	0.08	-0.09	0.3
7.35	24.1	320	320	2.10	0.66	4.2	0.09	-0.08	0.3
7.40	24.3	313	313	2.00	0.64	3.2	0.07	-0.11	0.3
7.45	24.4	328	328	1.90	0.58	3.7	0.08	-0.09	0.3
7.50	24.6	353	353	2.30	0.65	4.6	0.09	-0.07	0.3
7.55	24.8	354	354	2.55	0.72	3.8	0.08	-0.09	0.3
7.60	24.9	348	348	2.38	0.69	3.5	0.07	-0.10	0.3
7.65	25.1	356	356	2.41	0.68	3.9	0.08	-0.09	0.3
7.70	25.3	387	387	2.74	0.71	4.0	0.08	-0.06	0.3
7.75	25.4	387	387	3.01	0.78	3.8	0.07	-0.08	0.3
7.80	25.6	382	382	3.21	0.84	4.4	0.08	-0.06	0.3
7.85	25.8	368	368	3.17	0.86	5.1	0.10	-0.07	0.3
7.90	25.9	342	342	2.94	0.86	5.3	0.11	-0.07	0.3
7.95	26.1	330	330	2.64	0.80	5.6	0.12	-0.07	0.3
8.00	26.2	322	323	2.43	0.75	6.3	0.14	-0.05	0.4
8.05	26.4	333	333	2.41	0.72	6.3	0.14	-0.05	0.4
8.10	26.6	344	344	2.53	0.74	6.7	0.14	-0.05	0.4
8.15	26.7	342	342	2.58	0.76	6.7	0.14	-0.05	0.4
8.20	26.9	337	337	2.68	0.80	6.2	0.13	-0.05	0.4
8.25	27.1	330	330	2.51	0.76	6.3	0.14	-0.06	0.4
8.30	27.2	310	310	2.36	0.76	6.7	0.16	-0.06	0.4
8.35	27.4	322	323	2.40	0.74	6.5	0.15	-0.06	0.4
8.40	27.6	319	319	2.37	0.74	6.5	0.15	-0.06	0.4
8.45	27.7	311	311	2.01	0.65	6.9	0.16	-0.06	0.4
8.50	27.9	319	319	2.06	0.65	7.2	0.16	-0.05	0.4
8.55	28.1	314	314	2.07	0.66	4.2	0.10	-0.12	0.4
8.60	28.2	315	315	2.26	0.72	5.0	0.11	-0.11	0.3
8.65	28.4	322	322	2.32	0.72	5.7	0.13	-0.09	0.4
8.70	28.5	305	305	2.45	0.80	6.1	0.15	-0.09	0.4
8.75	28.7	300	300	2.28	0.76	6.6	0.16	-0.08	0.4
8.80	28.9	286	286	2.03	0.71	6.5	0.16	-0.09	0.4
8.85	29.0	295	295	2.09	0.71	7.0	0.17	-0.07	0.4
8.90	29.2	315	315	2.14	0.68	6.4	0.15	-0.08	0.4
8.95	29.4	323	323	2.14	0.66	7.0	0.16	-0.07	0.4
9.00	29.5	344	345	2.51	0.73	7.4	0.15	-0.06	0.4
9.05	29.7	367	367	2.76	0.75	7.9	0.15	-0.05	0.4
9.10	29.9	362	362	2.68	0.74	7.7	0.15	-0.05	0.4
9.15	30.0	365	365	2.73	0.75	8.0	0.16	-0.05	0.4
9.20	30.2	368	368	2.69	0.73	7.0	0.14	-0.07	0.4
9.25	30.3	370	370	2.83	0.77	8.0	0.16	-0.05	0.4
9.30	30.5	384	385	2.99	0.78	8.2	0.15	-0.04	0.4
9.35	30.7	388	388	3.09	0.80	8.5	0.16	-0.04	0.4
9.40	30.8	389	389	3.27	0.84	8.4	0.16	-0.04	0.4
9.45	31.0	381	381	2.65	0.70	8.7	0.17	-0.04	0.4
9.50	31.2	370	370	2.50	0.68	8.3	0.16	-0.05	0.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATI I deg
9.55	31.3	362	362	2.39	0.66	4.9	0.10	-0.12	0.4
9.60	31.5	378	378	2.72	0.72	7.3	0.14	-0.07	0.4
9.65	31.7	391	391	3.14	0.80	7.4	0.14	-0.07	0.4
9.70	31.8	377	377	3.40	0.90	7.6	0.15	-0.07	0.4
9.75	32.0	353	353	2.97	0.84	6.8	0.16	-0.07	0.4
9.80	32.2	330	330	2.36	0.71	8.0	0.17	-0.07	0.4
9.85	32.3	338	338	2.24	0.66	8.7	0.19	-0.06	0.4
9.90	32.5	366	366	2.63	0.72	8.0	0.16	-0.07	0.4
9.95	32.6	381	381	2.94	0.77	9.0	0.17	-0.05	0.4
10.00	32.8	376	376	3.06	0.81	9.3	0.18	-0.04	0.4
10.05	33.0	367	367	3.18	0.87	9.0	0.18	-0.05	0.4
10.10	33.1	352	352	3.23	0.92	9.0	0.18	-0.06	0.4
10.15	33.3	326	326	2.98	0.91	9.0	0.20	-0.06	0.4
10.20	33.5	294	294	2.45	0.83	6.9	0.22	-0.07	0.4
10.25	33.6	276	276	2.25	0.81	9.0	0.23	-0.08	0.4
10.30	33.8	290	290	2.21	0.76	9.0	0.22	-0.08	0.4
10.35	34.0	293	293	2.13	0.73	8.3	0.20	-0.09	0.4
10.40	34.1	302	302	2.22	0.74	9.0	0.21	-0.08	0.4
10.45	34.3	323	323	2.13	0.66	9.1	0.20	-0.07	0.4
10.50	34.4	316	316	2.24	0.71	9.0	0.20	-0.08	0.4
10.55	34.6	285	285	1.94	0.68	5.6	0.14	-0.17	0.4
10.60	34.8	285	286	1.81	0.63	7.3	0.18	-0.13	0.4
10.65	34.9	310	310	2.18	0.70	7.7	0.18	-0.11	0.4
10.70	35.1	330	330	2.49	0.75	7.1	0.15	-0.13	0.4
10.75	35.3	300	300	2.39	0.80	8.3	0.20	-0.10	0.4
10.80	35.4	281	282	2.15	0.76	9.0	0.23	-0.10	0.4
10.85	35.6	279	279	2.09	0.75	6.7	0.17	-0.16	0.4
10.90	35.8	268	268	2.00	0.75	7.2	0.19	-0.15	0.4
10.95	35.9	258	258	2.01	0.78	7.6	0.21	-0.15	0.4
11.00	36.1	246	246	2.00	0.81	8.4	0.25	-0.13	0.4
11.05	36.3	232	233	1.93	0.83	8.3	0.26	-0.15	0.4
11.10	36.4	219	219	1.83	0.83	8.4	0.27	-0.16	0.4
11.15	36.6	217	217	1.61	0.74	9.1	0.30	-0.14	0.4
11.20	36.7	202	202	1.43	0.71	7.5	0.27	-0.20	0.4
11.25	36.9	221	221	1.54	0.70	9.0	0.29	-0.14	0.5
11.30	37.1	231	231	1.52	0.66	7.0	0.22	-0.20	0.5
11.35	37.2	226	226	1.41	0.62	7.0	0.22	-0.21	0.5
11.40	37.4	225	225	1.28	0.57	7.6	0.24	-0.19	0.5
11.45	37.6	220	220	0.96	0.44	7.4	0.24	-0.21	0.5
11.50	37.7	212	212	0.67	0.31	7.2	0.24	-0.22	0.5
11.55	37.9	204	204	0.57	0.28	3.8	0.13	-0.35	0.5
11.60	38.1	210	210	0.64	0.31	2.3	0.08	-0.40	0.5
11.65	38.2	194	194	0.97	0.50	0.2	0.01	-0.51	0.5
11.70	38.4	188	188	1.22	0.65	1.7	0.07	-0.47	0.5
11.75	38.5	181	181	1.33	0.73	3.8	0.15	-0.41	0.5
11.80	38.7	180	180	1.37	0.76	6.7	0.27	-0.30	0.5
11.85	38.9	180	180	1.40	0.78	8.6	0.35	-0.22	0.5
11.90	39.0	172	172	1.30	0.76	9.6	0.40	-0.20	0.5
11.95	39.2	169	169	1.20	0.71	9.7	0.41	-0.20	0.5
12.00	39.4	171	171	1.15	0.68	9.9	0.42	-0.19	0.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
12.05	39.5	156	156	1.01	0.65	6.7	0.31	-0.36	0.5
12.10	39.7	136	136	0.86	0.63	9.0	0.47	-0.30	0.5
12.15	39.9	118	119	0.73	0.61	11.4	0.69	-0.20	0.5
12.20	40.0	110	110	0.76	0.69	12.2	0.80	-0.16	0.5
12.25	40.2	105	105	0.84	0.80	10.2	0.70	-0.31	0.5
12.30	40.4	97	98	0.94	0.96	11.3	0.83	-0.26	0.5
12.35	40.5	87	87	0.47	0.54	9.0	0.74	-0.49	0.5
12.40	40.7	78	78	1.02	1.31	4.4	0.41	-0.98	0.5
12.45	40.8	28	28	0.93	3.29	2.4	0.62	-3.22	0.6
12.50	41.0	11	12	0.20	1.78	12.7	7.95	-1.55	0.6
12.55	41.2	11	12	0.20	1.80	61.4	39.86	29.98	0.6
12.60	41.3	3	4	0.20	6.04	57.6	125.04	91.82	0.6
12.65	41.5	3	4	?	?	57.6	125.17	91.80	0.6
12.70	41.7	3	4	-	?	57.7	122.17	89.48	0.6

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :JIM DANIELSON
On Site Loc:C-16
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :02-06-92 08:02
Cone Used :243
Water table (feet) : 2.296588

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
0.30	1	34.50	0.09	0.26	0.04	silty sand to sandy silt	80-90	>46	11	UNDEFINED
0.60	2	6.50	0.04	0.54	0.11	sensitive fine grained	UNDFND	UNDFD	3	.6
0.95	3	22.71	0.05	0.24	0.18	silty sand to sandy silt	40-50	40-42	7	UNDEFINED
1.25	4	19.00	0.06	0.32	0.23	silty sand to sandy silt	40-50	40-42	6	UNDEFINED
1.55	5	20.33	0.04	0.20	0.27	silty sand to sandy silt	<40	38-40	6	UNDEFINED
1.85	6	31.33	0.12	0.38	0.32	silty sand to sandy silt	40-50	40-42	10	UNDEFINED
2.15	7	62.17	0.38	0.61	0.36	sand to silty sand	60-70	42-44	15	UNDEFINED
2.45	8	61.17	0.26	0.42	0.40	sand to silty sand	60-70	42-44	15	UNDEFINED
2.75	9	16.67	0.09	0.55	0.45	sandy silt to clayey silt	UNDFND	UNDFD	6	1.6
3.05	10	65.17	0.33	0.51	0.49	sand to silty sand	60-70	42-44	16	UNDEFINED
3.35	11	161.17	1.02	0.62	0.53	sand	80-90	44-46	31	UNDEFINED
3.65	12	175.00	0.91	0.53	0.57	sand	>90	44-46	34	UNDEFINED
3.95	13	153.83	0.89	0.58	0.62	sand	80-90	44-46	29	UNDEFINED
4.25	14	133.33	0.75	0.56	0.66	sand	80-90	44-46	26	UNDEFINED
4.55	15	144.50	0.73	0.50	0.70	sand	80-90	44-46	28	UNDEFINED
4.85	16	147.33	0.83	0.56	0.75	sand	80-90	44-46	28	UNDEFINED
5.15	17	167.83	0.99	0.59	0.79	sand	80-90	44-46	32	UNDEFINED
5.45	18	161.67	0.80	0.50	0.83	sand	80-90	42-44	31	UNDEFINED
5.75	19	238.67	1.37	0.57	0.88	sand	>90	44-46	46	UNDEFINED
6.05	20	221.17	1.31	0.59	0.92	sand	>90	44-46	42	UNDEFINED
6.40	21	243.86	1.53	0.63	0.97	sand	>90	44-46	47	UNDEFINED
6.70	22	229.83	1.35	0.59	1.01	sand	>90	44-46	44	UNDEFINED
7.00	23	347.00	2.43	0.70	1.06	sand	>90	46-48	>50	UNDEFINED
7.35	24	315.57	2.25	0.71	1.10	sand	>90	44-46	>50	UNDEFINED
7.65	25	342.00	2.26	0.66	1.15	gravelly sand to sand	>90	44-46	>50	UNDEFINED
7.95	26	366.00	2.95	0.81	1.19	sand	>90	44-46	>50	UNDEFINED
8.25	27	334.67	2.52	0.75	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	315.83	2.21	0.70	1.28	sand	>90	44-46	>50	UNDEFINED
8.85	29	303.83	2.24	0.74	1.32	sand	>90	44-46	>50	UNDEFINED
9.15	30	346.00	2.49	0.72	1.36	sand	>90	44-46	>50	UNDEFINED
9.45	31	380.00	2.92	0.77	1.41	gravelly sand to sand	>90	44-46	>50	UNDEFINED
9.75	32	371.83	2.85	0.77	1.45	sand	>90	44-46	>50	UNDEFINED
10.05	33	359.67	2.74	0.76	1.49	sand	>90	44-46	>50	UNDEFINED
10.35	34	385.17	2.54	0.83	1.54	sand	>90	44-46	>50	UNDEFINED
10.65	35	303.83	2.09	0.69	1.58	sand	>90	42-44	>50	UNDEFINED
10.95	36	286.00	2.19	0.77	1.62	sand	80-90	42-44	>50	UNDEFINED
11.25	37	222.83	1.72	0.77	1.67	sand	60-90	42-44	43	UNDEFINED
11.55	38	219.67	1.07	0.49	1.71	sand	80-90	42-44	42	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04)

CONOCO INC

Operator :JIM DANIELSON On Site Loc:C-16

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	186.83	1.15	0.61	1.75	sand	70-80	40-42	36	UNDEFINED
12.15	40	153.67	1.04	0.68	1.79	sand	70-80	40-42	29	UNDEFINED
12.45	41	84.17	0.83	0.98	1.84	sand to silty sand	50-60	36-38	20	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

CPTC 16

File space: 206 ■ sounding

Initial Baseline

Qc	Fs	Pw	Inc
-262	-7.08	-8.6	1.1

	Dep
Qc	-0
Fs	-0.00
Pw	0.1
Inc	0.3

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: D-18, Start Time: 1433, End Time: 1525

Site: DuPont, Town: E. Chicago, State: Ind.

Unit: 1, Operators: Sells, Kasl, Wilson

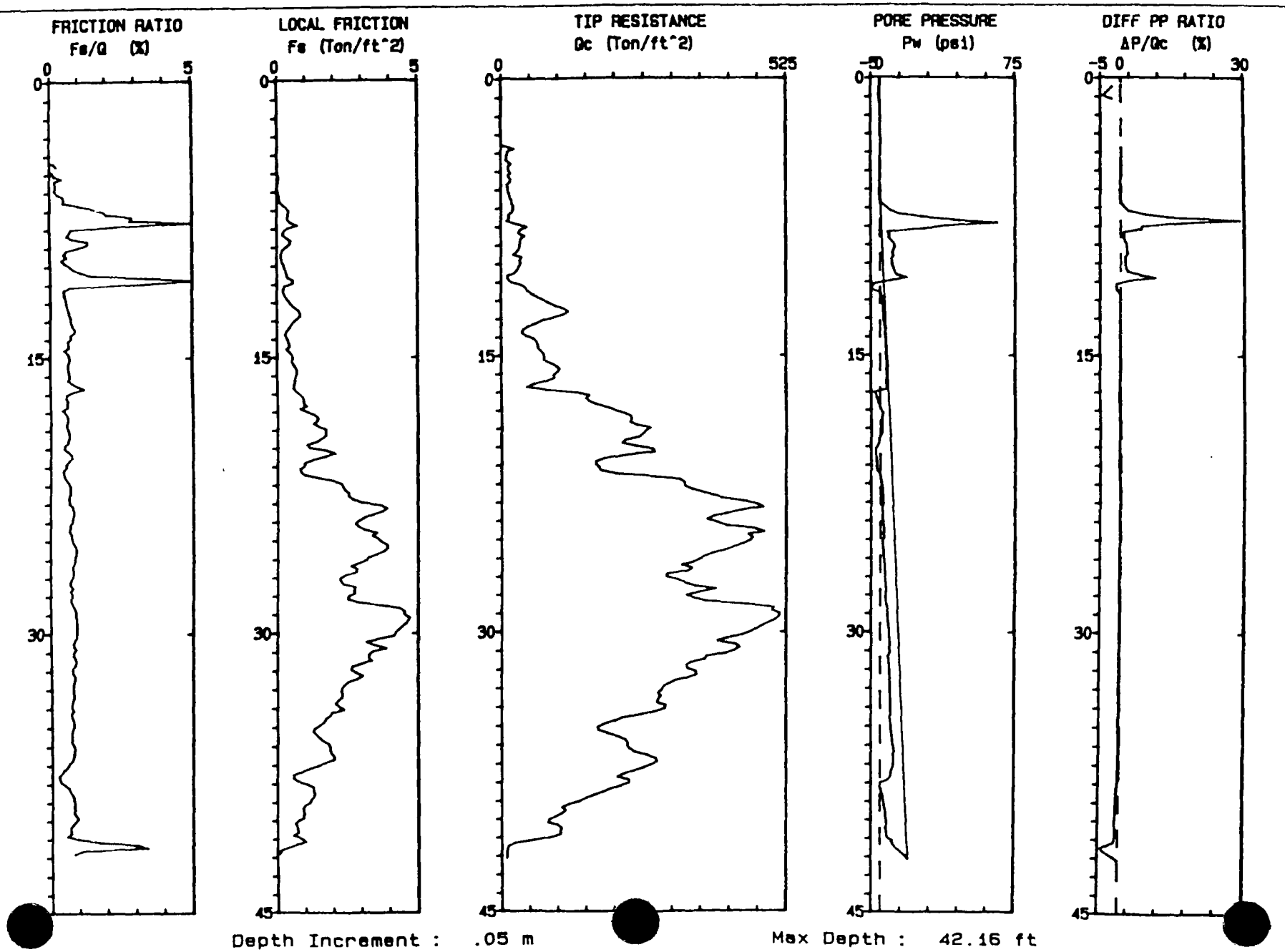
Proj. Consultant: Lounsbury, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-19-91	1442	1505	D-18	CPTD18	✓				42.2	1	2	F	CLAY AT 41.2
													T-STORMS moving in

amr/cws725

Conoco, Inc.

OPERATOR : CALVIN SELLS
CPT Date : 11-19-91 14:45
FILE CPTD18 Pg 1 / 1
LOCATION : D-18
CONE USED : 293
HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 42.16 ft

SOUNDING DATA IN FILE CPTD18 11-19-91 14:45

OPERATOR : CALVIN SELLS LOCATION : D-18

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-260		-7.04		-9.5			0.3
0.05	0.2	-0	-0	-0.01	3.20	0.0	-0.69	-0.69	0.2
0.10	0.3	0	0	-0.01	-5.67	-0.3	-16.09	-16.09	0.2
0.15	0.5	1	1	-0.01	-2.50	-0.3	-4.02	-4.02	0.2
0.20	0.7	1	1	-0.01	-1.50	-0.4	-6.32	-6.32	0.2
0.25	0.8	1	1	-0.01	-1.31	-0.5	-5.39	-5.39	0.2
0.30	1.0	1	1	-0.01	-1.21	-0.6	-7.63	-7.63	0.2
0.35	1.1	1	1	-0.01	-1.25	-0.3	-3.02	-3.02	0.2
0.40	1.3	0	0	-0.01	-1.73	-0.3	-4.07	-4.07	0.2
0.45	1.5	0	0	-0.01	?	0.0	?	?	0.2
0.50	1.6	-0	-0	-0.01	5.33	0.1	-3.45	-3.45	0.2
0.55	1.8	-0	-0	-0.01	5.00	0.0	-2.30	-2.30	0.2
0.60	2.0	-0	-0	-0.01	3.75	0.0	-1.72	-1.72	0.2
0.65	2.1	-0	-0	-0.00	0.89	0.2	-3.83	-3.83	0.2
0.70	2.3	-1	-1	-0.01	1.14	0.1	-1.23	-1.23	0.2
0.75	2.5	-1	-1	0.00	0.00	0.2	-2.96	-2.96	0.2
0.80	2.6	-1	-1	0.00	0.00	0.3	-4.02	-4.02	0.2
0.85	2.8	-0	-0	0.00	0.00	0.3	-6.90	-6.90	0.2
0.90	3.0	-0	-0	0.00	0.00	0.3	-55.16	-55.16	0.2
0.95	3.1	0	0	0.00	0.00	0.3	58.61	58.61	0.2
1.00	3.3	-0	-0	-0.00	0.50	0.4	-31.03	-31.03	0.2
1.05	3.4	-0	-0	-0.00	1.00	0.4	-20.69	-20.69	0.3
1.10	3.6	0	0	0.02	49.00	0.4	62.06	62.06	0.2
1.15	3.8	23	23	0.03	0.15	0.0	0.01	0.01	0.2
1.20	3.9	12	12	-0.00	-0.03	0.1	0.09	0.09	0.2
1.25	4.1	11	11	-0.01	-0.06	-0.0	-0.03	-0.03	0.2
1.30	4.3	10	10	0.00	0.00	0.1	0.09	0.09	0.2
1.35	4.4	9	9	0.01	0.14	0.0	0.00	0.00	0.2
1.40	4.6	18	18	0.04	0.21	0.3	0.11	0.11	0.2
1.45	4.8	13	13	-0.01	-0.05	0.4	0.25	0.25	0.2
1.50	4.9	13	13	0.01	0.07	0.2	0.09	0.09	0.2
1.55	5.1	17	17	0.02	0.12	-0.1	-0.06	-0.06	0.2
1.60	5.2	12	12	0.05	0.38	0.2	0.13	0.13	0.3
1.65	5.4	17	17	0.03	0.20	0.1	0.04	0.04	0.3
1.70	5.6	16	16	0.03	0.21	-0.3	-0.13	-0.13	0.3
1.75	5.7	10	10	0.02	0.20	-0.2	-0.16	-0.16	0.3
1.80	5.9	12	12	0.02	0.17	0.0	0.03	0.03	0.2
1.85	6.1	12	12	0.03	0.23	-0.6	-0.37	-0.37	0.2
1.90	6.2	15	15	0.07	0.45	-0.3	-0.13	-0.17	0.2
1.95	6.4	16	16	0.08	0.47	-0.2	-0.07	-0.13	0.2
2.00	6.6	19	19	0.09	0.46	0.1	0.04	-0.04	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	20	20	0.20	1.03	0.7	0.24	0.13	0.2
2.10	6.9	22	22	0.33	1.50	2.0	0.66	0.54	0.2
2.15	7.1	22	22	0.42	1.89	4.0	1.30	1.16	0.3
2.20	7.2	20	20	0.41	2.09	5.9	2.16	1.98	0.3
2.25	7.4	13	13	0.38	2.94	10.9	6.05	5.73	0.3
2.30	7.5	14	14	0.40	2.86	23.2	11.93	11.60	0.3
2.35	7.7	10	11	0.50	4.78	41.2	28.26	27.78	0.3
2.40	7.9	31	31	0.73	2.38	65.5	15.43	15.25	0.2
2.45	8.0	48	49	0.36	0.75	34.5	5.16	5.03	0.2
2.50	8.2	35	36	0.24	0.69	25.1	5.12	4.93	0.2
2.55	8.4	32	32	0.19	0.60	4.0	0.90	0.68	0.3
2.60	8.5	43	43	0.33	0.76	5.2	0.88	0.70	0.3
2.65	8.7	36	36	0.49	1.37	4.9	0.98	0.75	0.3
2.70	8.9	35	35	0.47	1.35	6.5	1.35	1.10	0.3
2.75	9.0	34	34	0.34	1.00	7.9	1.67	1.39	0.3
2.80	9.2	33	33	0.19	0.57	8.1	1.75	1.46	0.3
2.85	9.4	29	29	0.14	0.47	7.3	1.80	1.45	0.3
2.90	9.5	22	22	0.13	0.59	6.9	2.27	1.78	0.3
2.95	9.7	38	38	0.15	0.39	7.5	1.42	1.12	0.3
3.00	9.8	35	35	0.18	0.52	6.2	1.29	0.95	0.3
3.05	10.0	36	36	0.25	0.69	6.8	1.34	1.00	[redacted]
3.10	10.2	33	33	0.27	0.82	6.9	1.51	1.13	[redacted]
3.15	10.3	30	30	0.32	1.07	7.8	1.91	1.46	0.3
3.20	10.5	25	25	0.35	1.40	8.2	2.34	1.79	0.3
3.25	10.7	11	11	0.37	3.48	9.5	6.36	5.82	0.3
3.30	10.8	11	11	0.56	5.04	15.1	9.75	8.42	0.3
3.35	11.0	16	16	0.56	3.40	6.9	3.04	2.10	0.3
3.40	11.2	37	37	0.26	0.71	-3.3	-0.63	-1.06	0.3
3.45	11.3	45	45	0.21	0.46	-4.8	-0.78	-1.14	0.3
3.50	11.5	48	48	0.23	0.48	-4.2	-0.62	-0.97	0.3
3.55	11.6	56	56	0.28	0.49	0.3	0.04	-0.27	0.3
3.60	11.8	66	66	0.35	0.53	0.7	0.07	-0.20	0.3
3.65	12.0	77	77	0.43	0.56	1.0	0.09	-0.15	0.3
3.70	12.1	88	88	0.50	0.57	1.3	0.11	-0.11	0.3
3.75	12.3	99	99	0.60	0.61	1.7	0.12	-0.08	0.3
3.80	12.5	115	115	0.75	0.65	1.7	0.10	-0.07	0.3
3.85	12.6	125	125	0.82	0.65	1.9	0.11	-0.05	0.3
3.90	12.8	116	116	0.83	0.72	2.0	0.12	-0.06	0.3
3.95	13.0	96	96	0.70	0.72	2.0	0.15	-0.07	0.3
4.00	13.1	75	75	0.57	0.76	2.1	0.21	-0.09	0.3
4.05	13.3	64	64	0.51	0.80	2.3	0.26	-0.09	0.3
4.10	13.5	49	49	0.43	0.88	2.4	0.35	-0.12	0.3
4.15	13.6	40	40	0.35	0.86	2.6	0.46	-0.13	0.3
4.20	13.8	38	39	0.28	0.72	2.6	0.48	-0.15	0.3
4.25	13.9	46	46	0.34	0.73	3.0	0.46	-0.07	0.3
4.30	14.1	61	61	0.38	0.62	3.0	0.35	-0.06	[redacted]
4.35	14.3	66	66	0.42	0.64	3.2	0.35	-0.04	[redacted]
4.40	14.4	68	68	0.45	0.66	3.2	0.34	-0.04	0.2
4.45	14.6	68	68	0.33	0.48	3.3	0.35	-0.04	0.3
4.50	14.8	73	73	0.44	0.60	3.4	0.34	-0.03	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	79	80	0.54	0.68	3.1	0.28	-0.07	0.3
4.60	15.1	79	79	0.56	0.71	3.3	0.30	-0.06	0.3
4.65	15.3	79	79	0.53	0.67	3.5	0.32	-0.04	0.3
4.70	15.4	92	92	0.58	0.63	3.6	0.28	-0.03	0.3
4.75	15.6	103	103	0.66	0.65	3.7	0.26	-0.03	0.3
4.80	15.7	109	109	0.72	0.66	3.7	0.24	-0.03	0.3
4.85	15.9	105	105	0.71	0.68	3.9	0.26	-0.03	0.3
4.90	16.1	97	97	0.68	0.70	3.9	0.29	-0.03	0.3
4.95	16.2	99	99	0.63	0.63	4.0	0.29	-0.03	0.3
5.00	16.4	84	84	0.[illegible]	0.77	3.6	0.31	-0.07	0.3
5.05	16.6	61	61	0.59	0.97	3.6	0.43	-0.11	0.3
5.10	16.7	47	47	0.58	1.26	3.8	0.59	-0.12	0.3
5.15	16.9	84	84	0.66	0.78	4.3	0.36	-0.04	0.3
5.20	17.1	141	141	0.80	0.57	-3.3	-0.17	-0.41	0.3
5.25	17.2	164	164	0.91	0.56	-2.4	-0.10	-0.32	0.3
5.30	17.4	157	157	0.95	0.61	-1.8	-0.08	-0.31	0.3
5.35	17.6	164	164	0.94	0.58	-1.2	-0.05	-0.27	0.3
5.40	17.7	177	177	1.05	0.59	-0.7	-0.03	-0.23	0.3
5.45	17.9	195	195	0.81	0.41	-0.2	-0.01	-0.20	0.3
5.50	18.0	211	211	1.09	0.52	0.4	0.01	-0.16	0.3
5.55	18.2	229	229	1.34	0.59	1.7	0.05	-0.11	0.3
5.60	18.4	240	240	1.45	0.61	1.1	0.03	-0.13	0.3
5.65	18.5	241	241	1.43	0.60	1.0	0.03	-0.13	0.3
5.70	18.7	238	238	1.29	0.54	1.0	0.03	-0.14	0.3
5.75	18.9	250	250	1.48	0.59	1.0	0.03	-0.13	0.3
5.80	19.0	275	275	1.74	0.63	1.0	0.03	-0.12	0.3
5.85	19.2	266	266	1.75	0.66	1.0	0.03	-0.13	0.3
5.90	19.4	261	261	1.75	0.67	0.7	0.02	-0.14	0.3
5.95	19.5	255	255	1.60	0.63	-0.3	-0.01	-0.17	0.3
6.00	19.7	229	229	1.41	0.62	-0.7	-0.02	-0.21	0.3
6.05	19.8	223	223	1.07	0.48	-0.6	-0.02	-0.21	0.3
6.10	20.0	249	249	1.14	0.46	-1.5	-0.04	-0.22	0.3
6.15	20.2	281	281	1.73	0.62	-2.6	-0.07	-0.22	0.3
6.20	20.3	283	283	2.07	0.73	-2.6	-0.07	-0.22	0.3
6.25	20.5	230	230	1.73	0.75	-2.4	-0.08	-0.27	0.3
6.30	20.7	192	191	1.27	0.66	-2.2	-0.08	-0.32	0.3
6.35	20.8	175	175	0.97	0.56	-2.1	-0.09	-0.35	0.3
6.40	21.0	175	175	0.98	0.56	-2.0	-0.08	-0.35	0.4
6.45	21.2	181	181	0.81	0.44	-2.2	-0.09	-0.35	0.4
6.50	21.3	185	185	0.83	0.45	-1.9	-0.07	-0.33	0.4
6.55	21.5	210	210	0.99	0.47	-0.2	-0.01	-0.24	0.4
6.60	21.7	278	278	1.47	0.53	0.1	0.00	-0.17	0.4
6.65	21.8	330	330	2.01	0.61	0.4	0.01	-0.14	0.4
6.70	22.0	338	338	2.32	0.69	0.7	0.01	-0.13	0.4
6.75	22.1	338	338	2.36	0.70	1.0	0.02	-0.13	0.4
6.80	22.3	349	349	2.43	0.70	1.2	0.02	-0.12	0.4
6.85	22.5	369	369	2.56	0.69	1.3	0.03	-0.11	0.4
6.90	22.6	388	388	2.55	0.66	1.4	0.03	-0.11	0.5
6.95	22.8	408	408	2.69	0.66	1.6	0.03	-0.10	0.5
7.00	23.0	445	445	2.99	0.67	1.6	0.03	-0.09	0.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	473	473	3.72	0.79	1.6	0.02	-0.09	0.5
7.10	23.3	484	484	3.92	0.81	1.3	0.02	-0.09	0.5
7.15	23.5	446	446	3.76	0.84	1.3	0.02	-0.10	0.5
7.20	23.6	417	417	3.45	0.83	1.4	0.02	-0.11	0.5
7.25	23.8	392	392	3.12	0.80	1.4	0.03	-0.12	0.5
7.30	23.9	379	379	2.93	0.77	1.4	0.03	-0.12	0.5
7.35	24.1	397	397	2.78	0.70	1.6	0.03	-0.11	0.5
7.40	24.3	416	416	2.90	0.70	1.8	0.03	-0.11	0.5
7.45	24.4	469	469	3.11	0.66	2.0	0.03	-0.09	0.5
7.50	24.6	485	485	3.56	0.74	2.1	0.03	-0.09	0.5
7.55	24.8	455	455	3.39	0.75	1.8	0.03	-0.10	0.5
7.60	24.9	463	463	3.62	0.78	2.1	0.03	-0.10	0.5
7.65	25.1	460	460	3.72	0.81	1.5	0.02	-0.1[illegible]	0.6
7.70	25.3	446	446	3.93	0.88	1.4	0.02	-0.11	0.5
7.75	25.4	428	428	3.94	0.92	1.5	0.03	-0.12	0.5
7.80	25.6	412	412	3.81	0.92	1.7	0.03	-0.12	0.6
7.85	25.8	391	391	3.54	0.91	1.8	0.03	-0.12	0.5
7.90	25.9	376	376	3.26	0.87	2.0	0.04	-0.13	0.6
7.95	26.1	367	367	3.18	0.87	2.1	0.04	-0.13	0.6
8.00	26.2	354	354	2.90	0.82	2.2	0.05	-0.13	0.9
8.05	26.4	332	332	2.61	0.79	2.5	0.05	-0.14	[illegible]
8.10	26.6	352	352	2.84	0.81	2.5	0.05	-0.13	[illegible]
8.15	26.7	344	344	2.83	0.82	2.5	0.05	-0.13	0.6
8.20	26.9	304	304	2.42	0.80	2.6	0.06	-0.15	0.7
8.25	27.1	305	305	2.24	0.73	2.7	0.06	-0.15	0.7
8.30	27.2	327	327	2.26	0.69	2.8	0.06	-0.14	0.6
8.35	27.4	340	340	2.35	0.69	3.0	0.06	-0.13	0.7
8.40	27.6	358	358	2.79	0.78	3.2	0.06	-0.12	0.6
8.45	27.7	396	396	2.73	0.69	3.3	0.06	-0.11	0.6
8.50	27.9	367	367	2.77	0.75	3.4	0.07	-0.12	0.6
8.55	28.1	341	341	2.54	0.75	2.8	0.06	-0.14	0.7
8.60	28.2	355	355	2.51	0.71	2.9	0.06	-0.14	0.7
8.65	28.4	377	377	2.85	0.75	3.1	0.06	-0.13	0.6
8.70	28.5	450	450	3.70	0.82	3.4	0.05	-0.10	0.7
8.75	28.7	503	503	4.38	0.87	3.9	0.06	-0.09	0.7
8.80	28.9	500	500	4.54	0.91	4.2	0.06	-0.08	0.7
8.85	29.0	514	514	4.53	0.88	4.4	0.06	-0.08	0.7
8.90	29.2	513	514	4.72	0.92	4.3	0.06	-0.08	0.7
8.95	29.4	506	506	4.64	0.92	4.4	0.06	-0.08	0.7
9.00	29.5	493	493	4.57	0.93	4.5	0.07	-0.08	0.7
9.05	29.7	481	481	4.44	0.92	4.7	0.07	-0.08	0.7
9.10	29.9	470	470	4.31	0.92	4.9	0.07	-0.08	0.7
9.15	30.0	460	461	4.20	0.91	5.0	0.08	-0.08	0.7
9.20	30.2	445	445	4.14	0.93	5.0	0.08	-0.09	0.7
9.25	30.3	415	415	3.56	0.86	5.2	0.09	-0.09	0.7
9.30	30.5	398	398	3.18	0.80	5.3	0.10	-0.10	[illegible]
9.35	30.7	432	433	3.51	0.81	5.4	0.09	-0.09	[illegible]
9.40	30.8	440	440	3.89	0.88	5.3	0.09	-0.09	0.8
9.45	31.0	430	430	3.39	0.79	5.5	0.09	-0.09	0.8
9.50	31.2	412	412	3.27	0.79	5.6	0.10	-0.09	0.8

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	378	378	3.26	0.86	4.3	0.08	-0.13	0.8
9.60	31.5	375	375	3.36	0.90	4.8	0.09	-0.12	0.9
9.65	31.7	349	349	3.01	0.86	4.9	0.10	-0.13	0.8
9.70	31.8	341	341	2.66	0.78	5.1	0.11	-0.13	0.8
9.75	32.0	345	345	2.63	0.76	5.1	0.11	-0.13	1.0
9.80	32.2	359	359	2.82	0.79	5.1	0.10	-0.12	1.0
9.85	32.3	360	361	3.07	0.85	5.3	0.11	-0.12	0.9
9.90	32.5	344	344	2.87	0.83	5.4	0.11	-0.13	0.9
9.95	32.6	321	321	2.55	0.79	5.5	0.12	-0.14	0.9
10.00	32.8	309	309	2.41	0.78	5.6	0.13	-0.14	0.8
10.05	33.0	299	299	2.31	0.77	5.6	0.13	-0.15	0.8
10.10	33.1	296	296	2.28	0.77	5.6	0.14	-0.15	1.0
10.15	33.3	289	289	2.33	0.81	5.6	0.14	-0.15	0.9
10.20	33.5	295	295	2.30	0.78	5.8	0.14	-0.15	0.9
10.25	33.6	289	289	2.15	0.74	5.8	0.14	-0.15	0.8
10.30	33.8	286	286	2.05	0.72	5.8	0.15	-0.16	0.8
10.35	34.0	304	304	2.20	0.72	5.9	0.14	-0.15	0.9
10.40	34.1	302	302	2.39	0.79	5.8	0.14	-0.15	0.9
10.45	34.3	283	283	1.94	0.69	5.9	0.15	-0.16	0.9
10.50	34.4	260	260	1.88	0.72	5.9	0.16	-0.18	0.9
10.55	34.6	223	223	1.72	0.77	5.6	0.18	-0.22	1.0
10.60	34.8	210	211	1.67	0.79	5.9	0.20	-0.22	1.0
10.65	34.9	191	191	1.50	0.79	6.1	0.23	-0.24	0.9
10.70	35.1	178	178	1.31	0.74	6.1	0.25	-0.26	1.0
10.75	35.3	180	180	1.26	0.70	6.2	0.25	-0.26	0.9
10.80	35.4	197	197	1.38	0.70	6.6	0.24	-0.22	1.0
10.85	35.6	216	216	1.50	0.70	6.8	0.23	-0.20	1.0
10.90	35.8	230	230	1.63	0.71	6.9	0.22	-0.19	1.0
10.95	35.9	234	234	1.82	0.78	7.1	0.22	-0.18	0.9
11.00	36.1	233	233	1.90	0.82	7.4	0.23	-0.17	1.0
11.05	36.3	238	238	1.89	0.79	7.6	0.23	-0.16	1.0
11.10	36.4	248	248	1.93	0.78	8.0	0.23	-0.15	1.0
11.15	36.6	268	268	2.03	0.76	7.5	0.20	-0.15	1.0
11.20	36.7	286	286	2.04	0.71	7.8	0.20	-0.14	1.0
11.25	36.9	288	288	1.70	0.59	7.8	0.20	-0.14	1.0
11.30	37.1	277	277	1.46	0.53	7.6	0.20	-0.15	1.0
11.35	37.2	264	264	1.09	0.41	7.2	0.20	-0.17	1.0
11.40	37.4	245	245	0.82	0.33	6.5	0.19	-0.21	1.0
11.45	37.6	226	226	0.55	0.24	5.9	0.19	-0.25	1.0
11.50	37.7	214	214	0.57	0.26	5.8	0.20	-0.27	1.0
11.55	37.9	236	236	0.71	0.30	4.3	0.13	-0.29	1.1
11.60	38.1	237	237	1.07	0.45	-0.3	-0.01	-0.43	1.1
11.65	38.2	220	220	1.29	0.59	-0.2	-0.01	-0.46	1.1
11.70	38.4	202	202	1.28	0.63	0.4	0.02	-0.48	1.1
11.75	38.5	188	188	1.33	0.71	0.9	0.04	-0.50	1.1
11.80	38.7	171	171	1.30	0.76	1.3	0.06	-0.54	1.1
11.85	38.9	157	157	1.20	0.76	1.6	0.08	-0.58	1.1
11.90	39.0	144	144	1.17	0.82	2.0	0.10	-0.62	1.1
11.95	39.2	125	125	0.97	0.77	2.2	0.13	-0.70	1.1
12.00	39.4	112	112	0.90	0.81	2.4	0.15	-0.77	1.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
12.05	39.5	119	119	0.93	0.78	2.8	0.17	-0.71	1.1
12.10	39.7	112	112	0.95	0.85	2.9	0.19	-0.75	1.1
12.15	39.9	100	100	0.94	0.94	3.0	0.22	-0.84	1.1
12.20	40.0	89	89	0.75	0.84	3.3	0.27	-0.93	1.1
12.25	40.2	86	86	0.64	0.74	3.6	0.30	-0.93	1.1
12.30	40.4	105	105	0.69	0.66	3.7	0.25	-0.77	1.1
12.35	40.5	112	112	0.72	0.65	3.1	0.20	-0.76	1.1
12.40	40.7	110	110	0.74	0.68	3.6	0.23	-0.75	1.1
12.45	40.8	110	110	0.57	0.52	3.7	0.24	-0.75	1.1
12.50	41.0	93	93	0.86	0.92	4.0	0.31	-0.86	1.2
12.55	41.2	60	60	1.01	1.69	6.8	0.83	-1.01	1.2
12.60	41.3	23	23	0.70	3.02	6.9	2.16	-2.60	1.2
12.65	41.5	12	12	0.41	3.32	8.2	4.81	-4.20	1.2
12.70	41.7	10	10	0.11	1.06	10.2	7.14	-3.71	1.2
12.75	41.8	10	10	0.08	0.83	12.1	8.56	-2.39	1.2
12.80	42.0	10	10	?	?	14.0	10.60	-1.18	1.2
12.85	42.2	9	9	?	?	15.6	12.69	-0.00	1.2

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:D-18
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-19-91 14:45
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.67	-0.01	-1.50	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.17	-0.01	-6.00	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	-0.43	-0.00	0.33	0.18	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	7.67	0.01	0.09	0.23	sensitive fine grained	UNDFND	UNDFD	4	.7
1.55	5	13.33	0.01	0.09	0.27	sandy silt to clayey silt	UNDFND	UNDFD	5	1.2
1.85	6	13.17	0.03	0.23	0.32	sandy silt to clayey silt	UNDFND	UNDFD	5	1.2
2.15	7	19.00	0.20	1.04	0.36	sandy silt to clayey silt	UNDFND	UNDFD	7	1.8
2.45	8	22.67	0.46	2.04	0.40	sandy silt to clayey silt	UNDFND	UNDFD	9	2.2
2.75	9	35.83	0.34	0.96	0.45	silty sand to sandy silt	40-50	40-42	11	UNDEFINED
3.05	10	32.17	0.17	0.54	0.49	silty sand to sandy silt	40-50	38-40	10	UNDEFINED
3.35	11	21.00	0.41	1.93	0.53	sandy silt to clayey silt	UNDFND	UNDFD	8	2.0
3.65	12	54.83	0.29	0.53	0.57	sand to silty sand	50-60	40-42	13	UNDEFINED
3.95	13	106.50	0.70	0.66	0.62	sand to silty sand	70-80	42-44	26	UNDEFINED
4.25	14	52.00	0.41	0.79	0.66	silty sand to sandy silt	50-60	38-40	17	UNDEFINED
4.55	15	69.17	0.43	0.62	0.70	sand to silty sand	60-70	40-42	17	UNDEFINED
4.85	16	94.50	0.63	0.66	0.75	sand to silty sand	60-70	42-44	23	UNDEFINED
5.15	17	78.67	0.63	0.80	0.79	sand to silty sand	60-70	40-42	19	UNDEFINED
5.45	18	166.33	0.91	0.55	0.83	sand	80-90	44-46	32	UNDEFINED
5.75	19	234.83	1.35	0.57	0.88	sand	>90	44-46	45	UNDEFINED
6.05	20	251.50	1.55	0.62	0.92	sand	>90	44-46	48	UNDEFINED
6.40	21	226.43	1.41	0.62	0.97	sand	>90	44-46	43	UNDEFINED
6.70	22	253.67	1.40	0.55	1.01	sand	>90	44-46	49	UNDEFINED
7.00	23	382.83	2.60	0.68	1.06	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.35	24	426.86	3.38	0.79	1.10	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.65	25	458.00	3.38	0.74	1.15	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.95	26	483.33	3.61	0.90	1.19	sand	>90	46-48	>50	UNDEFINED
8.25	27	331.83	2.64	0.80	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	354.83	2.57	0.73	1.28	sand	>90	44-46	>50	UNDEFINED
8.85	29	449.83	3.75	0.83	1.32	gravelly sand to sand	>90	46-48	>50	UNDEFINED
9.15	30	487.17	4.48	0.92	1.36	gravelly sand to sand	>90	46-48	>50	UNDEFINED
9.45	31	426.67	3.61	0.85	1.41	gravelly sand to sand	>90	44-46	>50	UNDEFINED
9.75	32	366.67	3.03	0.83	1.45	sand	>90	44-46	>50	UNDEFINED
10.05	33	332.00	2.67	0.80	1.49	sand	>90	44-46	>50	UNDEFINED
10.35	34	293.17	2.22	0.76	1.54	sand	>90	42-44	>50	UNDEFINED
10.65	35	244.83	1.85	0.76	1.58	sand	80-90	42-44	47	UNDEFINED
10.95	36	205.83	1.48	0.72	1.62	sand	80-90	42-44	39	UNDEFINED
11.25	37	260.17	1.91	0.74	1.67	sand	80-90	42-44	50	UNDEFINED
11.55	38	243.67	0.87	0.36	1.71	sand	80-90	42-44	47	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

CONOCO INC

Operator :CALVIN SELLS On Site Loc:D-18 Page No.

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	195.83	1.25	0.64	1.75	sand	70-80	40-42	38	UNDEFINED
12.15	40	118.67	0.98	0.82	1.79	sand to silty sand	60-70	38-40	28	UNDEFINED
12.45	41	102.00	0.69	0.67	1.84	sand to silty sand	50-60	38-40	24	UNDEFINED
12.80	42	31.14	-4680.69	-15029.74	1.88	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 176 # sounding

Initial Baseline

Qc	Fs	Pw	Inc
-261	-7.04	-9.1	0.1

Dep	
Qc	0
Fs	0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: E-04, Start Time: 1429, End Time: 1510

Site: DuPont, Town: E. Chicago, State: IND

Unit: 1, Operators: Sells, Kasl, Dawson,

Proj. Consultant: Louisbury, Company: DERS

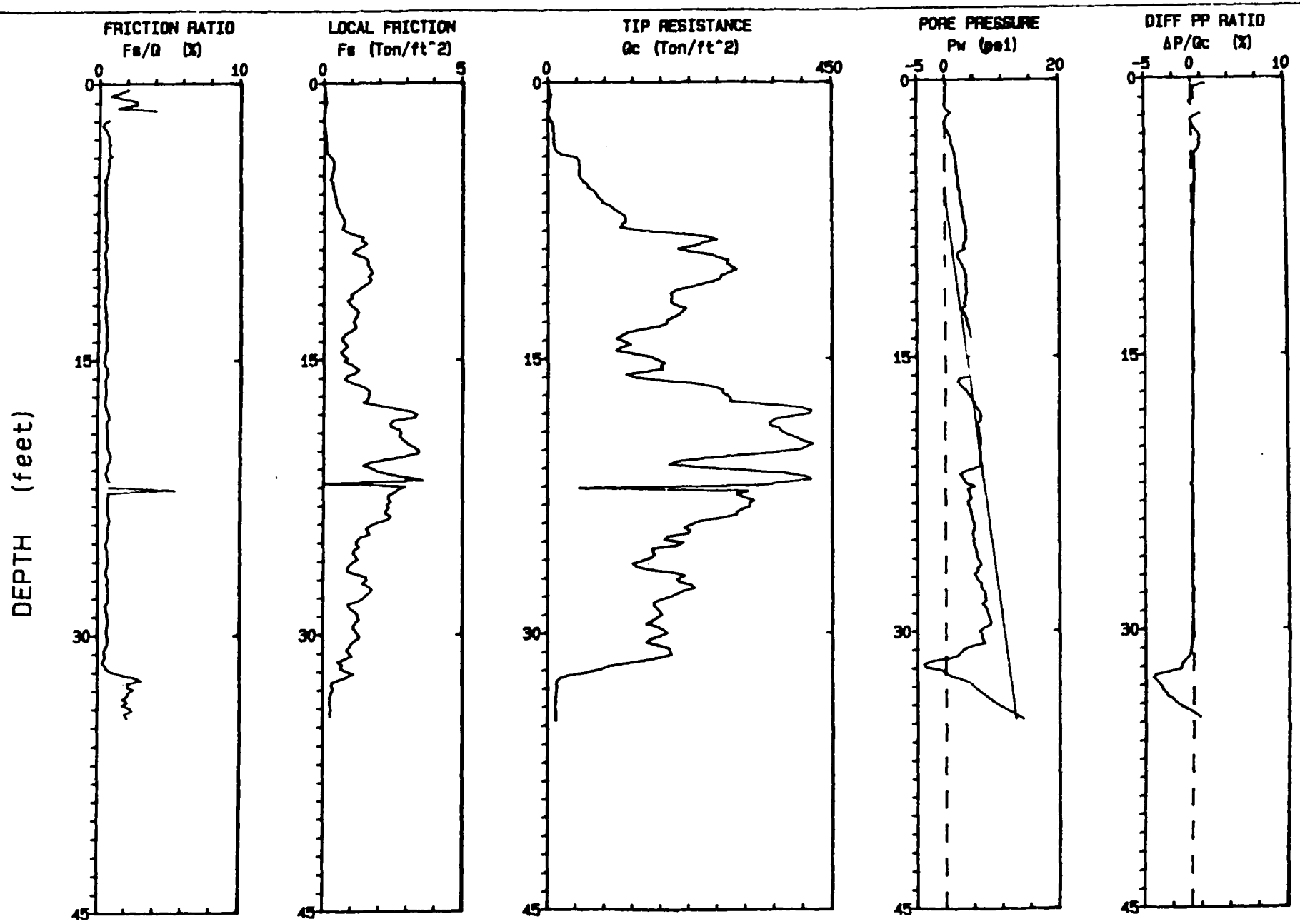
Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-20-91	1440		E-04	CRTE4	✓				34.8		2	F	CLAY AT 32.5

mr/cws725

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-20-91 14:38 FILE CPTE4 Pg 1 / 1

LOCATION : E-04 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 34.78 ft

SOUNDING DATA IN FILE CPTE4 11-20-91 14:38

PERATOR : CALVIN SELLS LOCATION : E-04

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.05		-8.9			0.1
0.05	0.2	-0	-0	0.02	-39.00	0.3	-51.71	-51.71	0.2
0.10	0.3	1	1	0.02	3.67	0.2	2.53	2.53	0.1
0.15	0.5	2	2	0.03	1.51	0.1	0.44	0.44	0.1
0.20	0.7	5	5	0.04	0.95	0.1	0.19	0.19	0.1
0.25	0.8	4	4	0.07	1.70	0.1	0.18	0.18	0.1
0.30	1.0	3	3	0.08	2.73	0.1	0.26	0.26	0.1
0.35	1.1	3	3	0.08	2.93	0.1	0.30	0.30	0.1
0.40	1.3	3	3	0.04	1.43	-0.1	-0.30	-0.30	0.1
0.45	1.5	1	1	0.04	2.64	0.0	0.21	0.21	0.1
0.50	1.6	0	0	0.01	3.14	0.5	11.82	11.82	0.1
0.55	1.8	0	0	0.02	5.14	1.1	26.60	26.60	
0.60	2.0	3	3	0.02	0.53	0.4	0.99	0.99	
0.65	2.1	6	6	0.02	0.28	0.2	0.21	0.21	0.1
0.70	2.3	8	8	0.02	0.22	-0.1	-0.09	-0.09	0.1
0.75	2.5	9	9	0.04	0.47	0.0	0.03	0.03	0.1
0.80	2.6	9	9	0.05	0.56	0.2	0.14	0.14	0.1
0.85	2.8	9	9	0.06	0.62	0.4	0.35	0.35	0.1
0.90	3.0	9	9	0.06	0.61	0.7	0.55	0.55	0.1
0.95	3.1	9	9	0.06	0.68	1.0	0.79	0.79	0.1
1.00	3.3	9	9	0.07	0.71	1.1	0.87	0.87	0.1
1.05	3.4	10	10	0.07	0.74	1.1	0.80	0.80	0.1
1.10	3.6	11	11	0.08	0.74	1.3	0.84	0.84	0.1
1.15	3.8	14	14	0.10	0.75	1.5	0.76	0.76	0.1
1.20	3.9	21	21	0.19	0.90	1.7	0.59	0.59	0.1
1.25	4.1	45	45	0.30	0.67	1.8	0.28	0.28	0.1
1.30	4.3	49	49	0.35	0.72	1.9	0.27	0.27	0.1
1.35	4.4	49	49	0.35	0.72	2.0	0.29	0.29	0.1
1.40	4.6	51	51	0.35	0.70	2.1	0.29	0.29	0.1
1.45	4.8	50	50	0.34	0.68	2.1	0.30	0.30	0.1
1.50	4.9	50	50	0.31	0.61	2.2	0.32	0.32	0.1
1.55	5.1	50	50	0.29	0.59	2.2	0.32	0.32	0.1
1.60	5.2	53	53	0.24	0.46	2.4	0.33	0.33	0.1
1.65	5.4	56	56	0.30	0.54	2.4	0.31	0.31	0.1
1.70	5.6	63	63	0.32	0.51	2.4	0.27	0.27	0.1
1.75	5.7	64	64	0.32	0.49	2.4	0.27	0.27	0.1
1.80	5.9	72	72	0.36	0.50	2.5	0.25	0.25	
1.85	6.1	76	76	0.38	0.50	2.7	0.25	0.25	
1.90	6.2	79	79	0.42	0.53	2.7	0.25	0.24	0.1
1.95	6.4	85	85	0.42	0.50	2.7	0.23	0.22	0.1
2.00	6.6	87	87	0.44	0.51	2.9	0.24	0.22	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	100	100	0.51	0.51	2.9	0.21	0.19	0.1
2.10	6.9	105	105	0.54	0.51	3.1	0.21	0.18	0.1
2.15	7.1	113	113	0.60	0.53	3.1	0.20	0.17	0.1
2.20	7.2	121	121	0.67	0.55	3.2	0.19	0.16	0.1
2.25	7.4	124	124	0.72	0.58	3.3	0.19	0.16	0.1
2.30	7.5	124	124	0.75	0.61	3.4	0.20	0.16	0.1
2.35	7.7	118	118	0.71	0.60	3.4	0.21	0.16	0.1
2.40	7.9	115	115	0.65	0.56	3.6	0.23	0.18	0.1
2.45	8.0	148	148	0.80	0.54	3.7	0.18	0.14	0.1
2.50	8.2	207	207	1.08	0.52	3.7	0.13	0.10	0.1
2.55	8.4	252	252	1.41	0.56	3.7	0.11	0.08	0.1
2.60	8.5	269	269	1.35	0.50	3.7	0.10	0.07	0.1
2.65	8.7	248	248	1.53	0.61	3.7	0.11	0.07	0.1
2.70	8.9	236	236	1.41	0.60	3.4	0.10	0.07	0.1
2.75	9.0	208	208	1.14	0.55	3.3	0.12	0.07	0.1
2.80	9.2	225	225	1.04	0.46	3.5	0.11	0.07	0.1
2.85	9.4	260	260	1.26	0.49	2.4	0.07	0.03	0.1
2.90	9.5	273	273	1.52	0.56	2.2	0.06	0.02	0.1
2.95	9.7	288	288	1.60	0.56	2.4	0.06	0.02	0.1
3.00	9.8	286	286	1.58	0.55	2.7	0.07	0.03	0.1
3.05	10.0	293	293	1.64	0.56	3.0	0.07	0.03	0.1
3.10	10.2	301	301	1.72	0.57	3.2	0.08	0.03	0.1
3.15	10.3	291	291	1.73	0.59	3.4	0.08	0.04	0.1
3.20	10.5	276	276	1.60	0.58	3.5	0.09	0.04	0.1
3.25	10.7	274	274	1.68	0.61	3.7	0.10	0.04	0.1
3.30	10.8	264	264	1.64	0.62	3.7	0.10	0.04	0.1
3.35	11.0	244	244	1.46	0.60	3.7	0.11	0.05	0.1
3.40	11.2	226	226	1.31	0.58	3.7	0.12	0.05	0.1
3.45	11.3	203	203	1.13	0.56	3.7	0.13	0.05	0.1
3.50	11.5	196	196	0.98	0.50	3.8	0.14	0.05	0.1
3.55	11.6	198	198	1.03	0.52	3.8	0.14	0.05	0.1
3.60	11.8	197	197	0.85	0.43	3.6	0.13	0.04	0.1
3.65	12.0	197	197	0.93	0.47	3.6	0.13	0.04	0.1
3.70	12.1	205	205	1.04	0.51	3.4	0.12	0.03	0.1
3.75	12.3	221	221	1.19	0.54	3.6	0.12	0.03	0.1
3.80	12.5	216	216	1.24	0.57	3.0	0.10	0.01	0.1
3.85	12.6	209	209	1.20	0.57	3.2	0.11	0.01	0.1
3.90	12.8	199	199	1.10	0.55	3.5	0.12	0.02	0.1
3.95	13.0	190	190	1.06	0.56	3.7	0.14	0.03	0.1
4.00	13.1	189	189	1.12	0.59	3.8	0.14	0.03	0.1
4.05	13.3	177	177	1.13	0.64	4.0	0.16	0.03	0.1
4.10	13.5	150	150	0.98	0.66	4.1	0.20	0.04	0.1
4.15	13.6	127	127	0.78	0.62	4.3	0.25	0.06	0.1
4.20	13.8	118	118	0.68	0.58	4.4	0.27	0.07	0.1
4.25	13.9	109	109	0.64	0.58	4.5	0.30	0.07	0.1
4.30	14.1	122	122	0.76	0.63	4.8	0.28	0.08	0.1
4.35	14.3	132	132	0.85	0.64	4.4	0.24	0.04	0.1
4.40	14.4	115	116	0.73	0.63	4.3	0.27	0.04	0.1
4.45	14.6	109	109	0.61	0.56	4.5	0.30	0.06	0.1
4.50	14.8	137	137	0.69	0.50	5.0	0.26	0.06	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	164	164	0.85	0.52	4.4	0.19	0.02	0.1
4.60	15.1	175	175	0.73	0.41	4.0	0.16	0.00	0.1
4.65	15.3	186	186	0.98	0.53	4.3	0.17	0.01	0.1
4.70	15.4	180	180	1.13	0.63	4.5	0.18	0.02	0.1
4.75	15.6	183	183	1.25	0.68	4.7	0.19	0.02	0.1
4.80	15.7	154	154	1.11	0.72	5.0	0.23	0.04	0.1
4.85	15.9	124	124	0.83	0.66	5.1	0.30	0.05	0.1
4.90	16.1	140	140	0.74	0.53	5.0	0.26	0.03	0.1
4.95	16.2	186	186	0.95	0.51	2.5	0.10	-0.08	0.1
5.00	16.4	235	235	1.25	0.53	2.2	0.07	-0.07	0.1
5.05	16.6	263	263	1.49	0.57	2.6	0.07	-0.05	0.1
5.10	16.7	279	279	1.64	0.59	3.1	0.08	-0.04	0.1
5.15	16.9	278	278	1.62	0.58	3.7	0.09	-0.03	0.1
5.20	17.1	286	286	1.61	0.56	4.0	0.10	-0.02	0.1
5.25	17.2	291	291	1.57	0.54	4.4	0.11	-0.01	0.1
5.30	17.4	290	290	1.42	0.49	4.7	0.12	-0.00	0.1
5.35	17.6	349	349	2.00	0.57	5.2	0.11	0.00	0.1
5.40	17.7	401	401	2.62	0.65	5.3	0.10	0.00	0.1
5.45	17.9	419	419	3.16	0.75	5.7	0.10	0.01	0.1
5.50	18.0	416	416	3.37	0.81	6.1	0.11	0.02	0.1
5.55	18.2	386	386	3.29	0.85	6.3	0.12	0.02	0.1
5.60	18.4	361	361	2.49	0.69	6.3	0.13	0.02	0.1
5.65	18.5	353	353	2.40	0.68	6.3	0.13	0.02	0.1
5.70	18.7	354	354	2.43	0.69	5.6	0.11	0.00	0.1
5.75	18.9	369	369	2.73	0.74	5.9	0.11	0.01	0.1
5.80	19.0	372	372	2.81	0.76	5.9	0.11	0.01	0.1
5.85	19.2	382	382	2.73	0.72	6.0	0.11	0.01	0.1
5.90	19.4	396	396	2.84	0.72	6.2	0.11	0.01	0.1
5.95	19.5	405	405	2.97	0.73	6.3	0.11	0.01	0.1
6.00	19.7	422	422	3.08	0.73	6.2	0.11	0.01	0.1
6.05	19.8	412	412	3.30	0.80	6.3	0.11	0.01	0.2
6.10	20.0	401	401	3.46	0.86	6.1	0.11	0.00	0.2
6.15	20.2	364	364	3.44	0.94	6.2	0.12	0.00	0.1
6.20	20.3	304	304	2.91	0.96	6.3	0.15	0.00	0.1
6.25	20.5	248	248	2.22	0.90	6.2	0.18	-0.00	0.1
6.30	20.7	205	205	1.69	0.83	6.2	0.22	-0.01	0.1
6.35	20.8	194	194	1.42	0.73	6.2	0.23	-0.01	0.1
6.40	21.0	240	240	1.74	0.73	6.5	0.19	-0.00	0.1
6.45	21.2	315	315	1.95	0.62	5.2	0.12	-0.03	0.1
6.50	21.3	380	380	2.42	0.64	3.4	0.07	-0.06	0.1
6.55	21.5	411	411	3.00	0.73	2.6	0.05	-0.07	0.1
6.60	21.7	419	419	3.58	0.86	3.0	0.05	-0.06	0.2
6.65	21.8	377	377	-0.00	-0.00	3.4	0.06	-0.07	0.1
6.70	22.0	338	338	2.97	0.88	3.7	0.08	-0.07	0.1
6.75	22.1	49	49	2.70	5.54	5.2	0.77	-0.25	0.1
6.80	22.3	320	320	2.55	0.80	4.0	0.09	-0.07	0.1
6.85	22.5	301	301	2.35	0.78	4.2	0.10	-0.07	0.1
6.90	22.6	311	311	2.33	0.75	4.3	0.10	-0.07	0.2
6.95	22.8	328	328	2.40	0.73	4.5	0.10	-0.06	0.2
7.00	23.0	321	321	2.28	0.71	3.9	0.09	-0.08	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	180	180	0.80	0.44	2.2	0.09	-0.35	0.2
9.60	31.5	155	155	0.52	0.33	0.5	0.02	-0.49	0.2
9.65	31.7	126	126	0.68	0.54	-2.8	-0.16	-0.80	0.2
9.70	31.8	96	96	0.61	0.63	-3.9	-0.29	-1.13	0.2
9.75	32.0	85	85	0.80	0.95	-3.5	-0.30	-1.26	0.2
9.80	32.2	64	64	1.11	1.73	-0.5	-0.06	-1.33	0.2
9.85	32.3	33	33	0.87	2.62	-0.2	-0.04	-2.53	0.2
9.90	32.5	19	19	0.59	3.05	1.1	0.41	-3.87	0.2
9.95	32.6	15	15	0.32	2.09	2.8	1.31	-4.14	0.2
10.00	32.8	14	14	0.30	2.10	4.0	2.04	-3.83	0.2
10.05	33.0	14	14	0.35	2.50	4.7	2.44	-3.62	0.2
10.10	33.1	14	14	0.30	2.13	5.2	2.75	-3.33	0.2
10.15	33.3	13	13	0.27	2.11	6.0	3.32	-3.21	0.2
10.20	33.5	13	13	0.23	1.85	6.7	3.81	-2.95	0.2
10.25	33.6	12	12	0.25	2.09	7.4	4.37	-2.68	0.2
10.30	33.8	13	13	0.23	1.86	8.2	4.73	-2.17	0.2
10.35	34.0	12	13	0.27	2.20	8.9	5.14	-1.83	0.2
10.40	34.1	12	13	0.29	2.30	9.8	5.65	-1.36	0.2
10.45	34.3	13	13	0.25	2.03	10.7	6.14	-0.89	0.2
10.50	34.4	13	13	0.27	2.08	11.8	6.44	-0.26	0.2
10.55	34.6	13	13	?	?	12.8	6.96	0.24	0.2
10.60	34.8	13	13	?	?	13.7	7.84	0.73	0.2

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:E-04
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-20-91 14:38
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	2.50	0.04	1.73	0.04	sensitive fine grained	UNDFND	UNDFD	1	.2
0.60	2	1.67	0.04	2.10	0.11	sensitive fine grained	UNDFND	UNDFD	1	.1
0.95	3	8.43	0.04	0.53	0.18	sensitive fine grained	UNDFND	UNDFD	4	.8
1.25	4	18.33	0.13	0.74	0.23	sandy silt to clayey silt	UNDFND	UNDFD	7	1.8
1.55	5	49.83	0.33	0.67	0.27	silty sand to sandy silt	60-70	42-44	16	UNDEFINED
1.85	6	64.00	0.32	0.50	0.32	sand to silty sand	70-80	44-46	15	UNDEFINED
2.15	7	94.83	0.49	0.51	0.36	sand to silty sand	70-80	44-46	23	UNDEFINED
2.45	8	125.00	0.72	0.57	0.40	sand	80-90	44-46	24	UNDEFINED
2.75	9	236.67	1.32	0.56	0.45	sand	>90	46-48	45	UNDEFINED
3.05	10	270.83	1.44	0.53	0.49	sand	>90	>48	>50	UNDEFINED
3.35	11	275.00	1.64	0.60	0.53	sand	>90	46-48	>50	UNDEFINED
3.65	12	203.83	1.04	0.51	0.57	sand	>90	46-48	39	UNDEFINED
3.95	13	206.67	1.14	0.55	0.62	sand	>90	46-48	40	UNDEFINED
4.25	14	145.00	0.89	0.61	0.66	sand	80-90	44-46	28	UNDEFINED
4.55	15	129.83	0.75	0.58	0.70	sand	70-80	42-44	25	UNDEFINED
4.85	16	167.00	1.01	0.60	0.75	sand	80-90	44-46	32	UNDEFINED
5.15	17	230.17	1.28	0.56	0.79	sand	>90	44-46	44	UNDEFINED
5.45	18	339.33	2.06	0.61	0.83	gravelly sand to sand	>90	46-48	>50	UNDEFINED
5.75	19	373.17	2.78	0.75	0.88	gravelly sand to sand	>90	46-48	>50	UNDEFINED
6.05	20	398.17	2.95	0.74	0.92	gravelly sand to sand	>90	46-48	>50	UNDEFINED
6.40	21	279.43	2.41	0.86	0.97	sand	>90	44-46	>50	UNDEFINED
6.70	22	373.33	2.32	0.62	1.01	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.00	23	271.67	2.43	0.90	1.06	sand	>90	44-46	>50	UNDEFINED
7.35	24	281.86	2.17	0.77	1.10	sand	>90	44-46	>50	UNDEFINED
7.65	25	210.67	1.41	0.67	1.15	sand	80-90	42-44	40	UNDEFINED
7.95	26	170.50	1.14	0.67	1.19	sand	70-80	42-44	33	UNDEFINED
8.25	27	178.33	1.16	0.65	1.23	sand	80-90	42-44	34	UNDEFINED
8.55	28	215.50	1.57	0.73	1.28	sand	80-90	42-44	41	UNDEFINED
8.85	29	175.50	1.09	0.62	1.32	sand	70-80	42-44	34	UNDEFINED
9.15	30	174.67	1.18	0.67	1.36	sand	70-80	42-44	33	UNDEFINED
9.45	31	177.17	1.03	0.58	1.41	sand	70-80	40-42	34	UNDEFINED
9.75	32	140.00	0.74	0.53	1.45	sand	70-80	40-42	27	UNDEFINED
10.05	33	26.50	0.59	2.23	1.49	sandy silt to clayey silt	UNDFND	UNDFD	10	2.4
10.35	34	12.83	0.26	2.01	1.54	clayey silt to silty clay	UNDFND	UNDFD	6	1.0

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 117 # sounding

Initial Baseline

Qc	Fs	Pw	Inc
-261	-7.06	-8.7	0.1

Dep	
Qc	0
Fs	-0.00
Pw	-0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: E 7, Start Time: 14:20, End Time: 15:50

Site: DuPont, Town: EAST CHICAGO, State: IND.

Unit: 1, Operators: WILSON, KASL

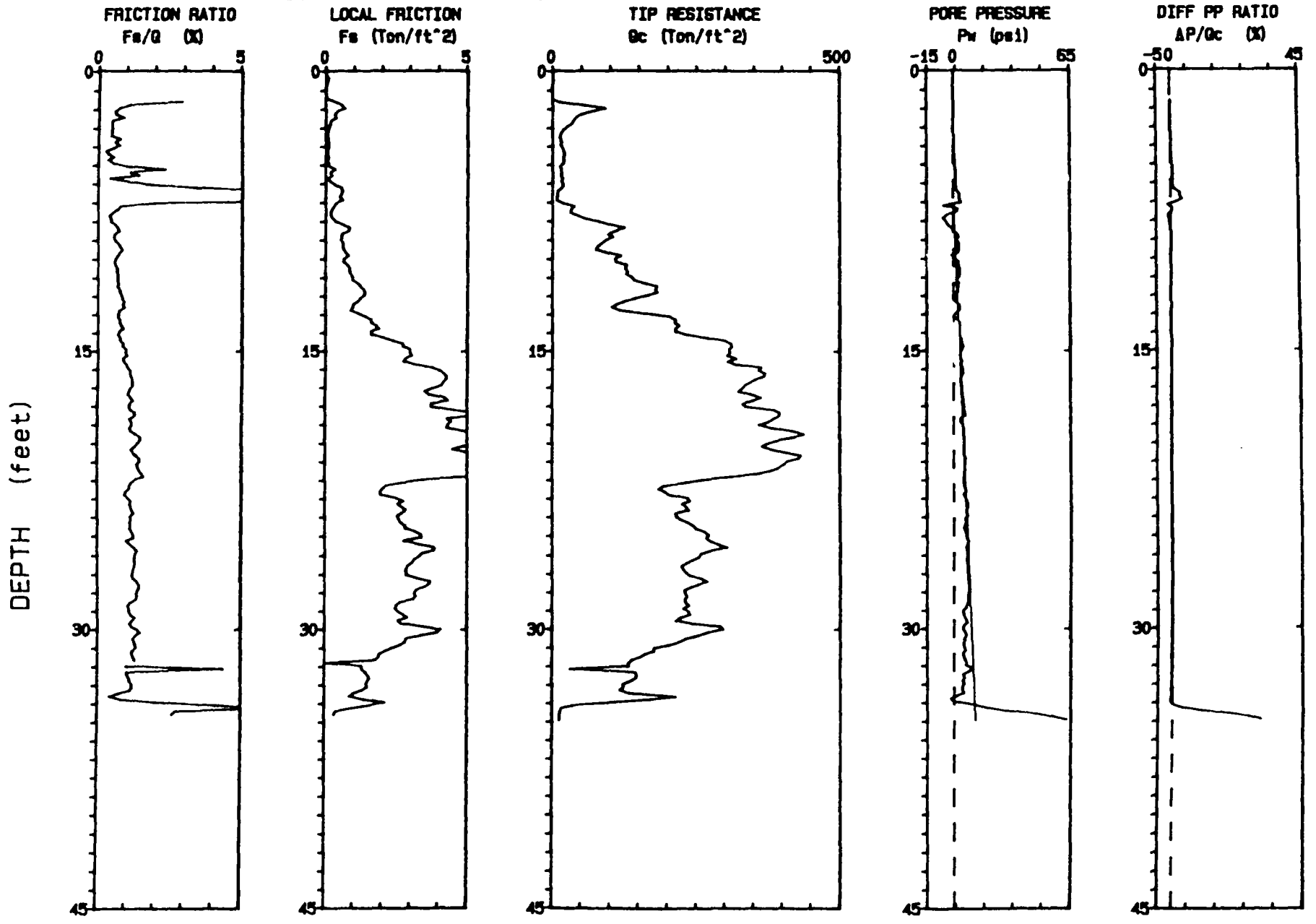
Proj. Consultant: _____, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11/16/91	14:20	15:30	E7	CPTE7	✓				34.9	1			C/Ayeb 34.1

Conoco, Inc.

Operator : DENNIS WILSON | CPT Date : 11-16-91 14:06 | File No. CPTE7 | Pg 1 / 1

Location : CPT-E7 | Cone Used : 384 | Hole No. 1



Depth Increment : .05 m

Max Depth : 34.94 ft

SOUNDING DATA IN FILE CPTE7 11-16-91 14:06

OPERATOR : DENNIS WILSON LOCATION : CPT-E7

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-295		-2.04		-5.5			0.0
0.05	0.2	-0	-0	0.01	-4.00	0.0	-0.57	-0.57	0.1
0.10	0.3	-0	-0	0.09	-31.14	-0.0	0.99	0.99	1.3
0.15	0.5	2	2	0.07	3.84	-0.0	-0.16	-0.16	0.3
0.20	0.7	-0	-0	0.03	-10.71	-0.0	0.99	0.99	0.2
0.25	0.8	-0	-0	-0.00	0.64	-0.1	0.94	0.94	0.2
0.30	1.0	-0	-0	-0.00	1.00	0.0	-1.15	-1.15	0.3
0.35	1.1	-0	-0	-0.00	1.33	-0.0	1.15	1.15	0.1
0.40	1.3	-0	-0	0.02	-5.00	-0.0	0.77	0.77	0.1
0.45	1.5	-0	-0	0.09	%-202.00	-0.0	6.90	6.90	0.1
0.50	1.6	13	13	0.38	2.88	0.0	0.01	0.01	0.1
0.55	1.8	52	52	0.57	1.09	0.2	0.03	0.03	0.1
0.60	2.0	92	93	0.67	0.72	0.2	0.02	0.02	
0.65	2.1	70	70	0.40	0.57	0.2	0.02	0.02	
0.70	2.3	50	50	0.30	0.60	0.1	0.02	0.02	0.1
0.75	2.5	41	41	0.36	0.86	0.2	0.03	0.03	0.0
0.80	2.6	36	36	0.17	0.49	0.0	0.00	0.00	0.0
0.85	2.8	33	33	0.15	0.47	0.2	0.04	0.04	0.0
0.90	3.0	25	25	0.12	0.48	-0.0	-0.01	-0.01	0.0
0.95	3.1	19	19	0.09	0.48	-0.2	-0.06	-0.06	0.0
1.00	3.3	15	15	0.07	0.46	-0.0	-0.02	-0.02	0.0
1.05	3.4	13	13	0.06	0.43	0.3	0.15	0.15	0.0
1.10	3.6	13	13	0.10	0.79	0.3	0.15	0.15	0.0
1.15	3.8	15	15	0.09	0.57	0.3	0.13	0.13	0.0
1.20	3.9	14	14	0.10	0.72	0.3	0.14	0.14	0.0
1.25	4.1	17	17	0.09	0.52	0.6	0.26	0.26	0.0
1.30	4.3	19	19	0.05	0.28	0.5	0.20	0.20	0.0
1.35	4.4	21	21	0.07	0.35	0.6	0.20	0.20	0.0
1.40	4.6	19	19	0.10	0.51	0.6	0.23	0.23	0.0
1.45	4.8	20	20	0.07	0.35	0.9	0.31	0.31	0.0
1.50	4.9	19	19	0.10	0.52	0.9	0.35	0.35	0.0
1.55	5.1	13	13	0.13	1.00	0.9	0.52	0.52	0.1
1.60	5.2	15	15	0.35	2.31	1.0	0.48	0.48	0.1
1.65	5.4	15	15	0.17	1.11	1.2	0.58	0.58	0.0
1.70	5.6	14	14	0.20	1.50	1.2	0.66	0.66	0.0
1.75	5.7	17	17	0.07	0.41	1.3	0.52	0.52	0.0
1.80	5.9	15	15	0.16	1.09	1.3	0.65	0.65	0.0
1.85	6.1	19	19	0.33	1.73	1.5	0.58	0.58	
1.90	6.2	16	16	0.55	3.39	1.6	0.70	0.70	
1.95	6.4	9	9	0.60	6.38	1.9	1.48	1.48	0.0
2.00	6.6	8	8	0.56	6.81	3.5	3.06	3.06	0.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	8	8	0.51	6.48	3.5	3.21	3.21	0.0
2.10	6.9	7	7	0.61	8.40	3.7	3.71	3.71	0.0
2.15	7.1	18	18	0.38	2.08	4.2	1.65	1.65	0.0
2.20	7.2	38	38	0.30	0.80	-5.8	-1.09	-1.09	0.0
2.25	7.4	32	32	0.22	0.70	2.4	0.54	0.53	0.0
2.30	7.5	31	31	0.16	0.50	1.7	0.39	0.36	0.0
2.35	7.7	43	43	0.17	0.40	-4.0	-0.67	-0.70	0.0
2.40	7.9	56	55	0.25	0.45	-5.9	-0.76	-0.80	0.0
2.45	8.0	81	81	0.37	0.46	-4.3	-0.38	-0.41	0.0
2.50	8.2	100	100	0.61	0.60	-3.3	-0.24	-0.27	0.0
2.55	8.4	125	125	0.86	0.69	-1.4	-0.08	-0.11	0.0
2.60	8.5	112	112	0.83	0.74	0.3	0.02	-0.02	0.0
2.65	8.7	97	97	0.57	0.59	2.2	0.16	0.11	0.0
2.70	8.9	105	105	0.57	0.54	2.8	0.19	0.14	0.0
2.75	9.0	92	92	0.55	0.60	1.6	0.12	0.06	0.0
2.80	9.2	85	85	0.60	0.71	2.9	0.24	0.17	0.0
2.85	9.4	78	78	0.60	0.76	2.9	0.26	0.18	0.0
2.90	9.5	75	75	0.63	0.84	3.1	0.29	0.20	0.0
2.95	9.7	94	94	0.71	0.76	2.9	0.22	0.14	0.0
3.00	9.8	119	119	0.82	0.69	-1.0	-0.06	-0.13	0.0
3.05	10.0	109	109	0.66	0.61	0.6	0.04	-0.04	0.0
3.10	10.2	110	110	0.63	0.57	2.9	0.19	0.10	0.0
3.15	10.3	129	129	0.78	0.60	2.9	0.16	0.08	0.0
3.20	10.5	127	127	0.86	0.68	3.2	0.18	0.10	0.0
3.25	10.7	130	130	0.86	0.66	3.3	0.18	0.10	0.0
3.30	10.8	128	128	0.90	0.70	3.6	0.20	0.11	0.0
3.35	11.0	137	137	0.95	0.69	3.1	0.16	0.08	0.0
3.40	11.2	142	142	0.96	0.68	1.7	0.09	0.00	0.0
3.45	11.3	159	159	1.13	0.71	2.8	0.13	0.05	0.0
3.50	11.5	181	181	1.23	0.68	2.8	0.11	0.04	0.0
3.55	11.6	178	178	1.34	0.75	2.5	0.10	0.02	0.0
3.60	11.8	181	181	1.40	0.78	2.5	0.10	0.02	0.0
3.65	12.0	165	165	1.38	0.84	-0.1	-0.00	-0.09	0.0
3.70	12.1	144	144	1.23	0.86	1.8	0.09	-0.02	0.0
3.75	12.3	126	126	1.15	0.92	0.6	0.03	-0.09	0.5
3.80	12.5	112	113	0.98	0.87	2.9	0.18	0.04	0.4
3.85	12.6	103	103	0.96	0.93	3.5	0.25	0.08	0.4
3.90	12.8	116	116	0.89	0.76	3.2	0.20	0.05	0.4
3.95	13.0	160	160	1.15	0.72	1.2	0.06	-0.06	0.4
4.00	13.1	203	203	1.40	0.69	-0.2	-0.01	-0.10	0.3
4.05	13.3	213	213	1.60	0.75	1.9	0.06	-0.02	0.3
4.10	13.5	212	212	1.62	0.76	3.3	0.11	0.02	0.3
4.15	13.6	219	219	1.78	0.81	3.6	0.12	0.03	0.3
4.20	13.8	213	213	1.88	0.88	3.3	0.11	0.02	0.3
4.25	13.9	213	213	1.60	0.75	3.5	0.12	0.02	0.3
4.30	14.1	231	231	1.62	0.70	3.5	0.11	0.02	0.3
4.35	14.3	264	264	2.03	0.77	3.9	0.11	0.02	0.3
4.40	14.4	299	299	2.38	0.79	4.3	0.10	0.03	0.3
4.45	14.6	309	309	2.72	0.88	4.5	0.11	0.03	0.3
4.50	14.8	311	311	2.74	0.88	5.3	0.12	0.05	0.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCL[illegible]ION I deg
4.55	14.9	306	306	2.99	0.98	4.6	0.11	0.03	0.3
4.60	15.1	308	308	2.98	0.97	3.8	0.09	0.01	0.3
4.65	15.3	303	304	3.07	1.01	3.4	0.08	-0.00	0.3
4.70	15.4	319	319	2.80	0.88	3.8	0.09	0.01	0.3
4.75	15.6	304	304	2.75	0.91	4.6	0.11	0.02	0.3
4.80	15.7	318	318	3.16	0.99	3.8	0.09	0.00	0.4
4.85	15.9	363	363	3.78	1.04	4.8	0.09	0.02	0.3
4.90	16.1	359	359	4.05	1.13	5.1	0.10	0.03	0.3
4.95	16.2	370	370	4.20	1.13	5.4	0.11	0.03	0.4
5.00	16.4	368	368	4.30	1.17	4.2	0.08	0.00	0.5
5.05	16.6	353	353	4.28	1.21	3.8	0.08	-0.01	0.5
5.10	16.7	344	344	4.18	1.22	4.0	0.08	-0.00	0.7
5.15	16.9	334	335	4.11	1.23	4.4	0.09	0.00	0.6
5.20	17.1	329	329	3.76	1.14	4.5	0.10	0.01	0.6
5.25	17.2	323	323	3.52	1.09	4.7	0.11	0.01	0.9
5.30	17.4	346	346	3.67	1.06	4.9	0.10	0.01	0.9
5.35	17.6	363	363	4.23	1.17	5.0	0.10	0.01	0.7
5.40	17.7	350	350	4.35	1.24	5.6	0.11	0.02	0.9
5.45	17.9	331	331	3.76	1.13	5.5	0.12	0.02	0.9
5.50	18.0	336	336	3.76	1.12	5.7	0.12	0.02	0.9
5.55	18.2	386	386	4.48	1.16	5.8	0.11	0.02	0.8
5.60	18.4	395	396	5.23	1.32	6.3	0.12	0.03	[illegible]
5.65	18.5	395	395	5.18	1.31	6.7	0.12	0.03	[illegible]
5.70	18.7	384	384	4.30	1.12	3.8	0.07	-0.02	1.0
5.75	18.9	376	376	4.45	1.18	3.8	0.07	-0.02	1.1
5.80	19.0	359	359	4.33	1.21	5.0	0.10	-0.00	1.1
5.85	19.2	382	382	4.29	1.12	5.5	0.10	0.01	1.3
5.90	19.4	419	419	4.91	1.17	5.6	0.10	0.01	1.2
5.95	19.5	439	439	5.91	1.34	5.8	0.10	0.01	1.3
6.00	19.7	422	422	6.33	1.50	5.8	0.10	0.01	1.3
6.05	19.8	393	393	5.95	1.51	5.7	0.10	0.00	1.2
6.10	20.0	374	374	5.35	1.43	5.8	0.11	0.00	1.2
6.15	20.2	364	365	4.87	1.34	5.9	0.12	0.01	1.2
6.20	20.3	381	381	4.49	1.18	5.9	0.11	0.00	1.2
6.25	20.5	404	404	5.00	1.24	5.5	0.10	-0.01	1.5
6.30	20.7	433	433	5.82	1.34	5.9	0.10	0.00	1.2
6.35	20.8	429	429	6.28	1.46	6.6	0.11	0.01	1.4
6.40	21.0	409	409	6.06	1.48	6.5	0.11	0.01	1.6
6.45	21.2	403	403	5.63	1.40	6.2	0.11	0.00	1.2
6.50	21.3	394	395	5.57	1.41	6.2	0.11	0.00	1.4
6.55	21.5	381	381	5.58	1.47	6.4	0.12	0.00	1.8
6.60	21.7	359	359	5.58	1.55	5.9	0.12	-0.01	1.0
6.65	21.8	310	310	5.00	1.61	5.6	0.13	-0.02	1.4
6.70	22.0	260	260	3.49	1.34	5.5	0.15	-0.03	2.2
6.75	22.1	229	229	2.74	1.20	5.5	0.17	-0.03	1.5
6.80	22.3	192	192	2.14	1.12	5.7	0.21	-0.03	1.5
6.85	22.5	183	183	2.01	1.10	6.4	0.25	-0.01	2.0
6.90	22.6	195	195	1.92	0.99	7.0	0.26	0.01	[illegible]
6.95	22.8	203	203	1.94	0.95	5.5	0.19	-0.05	[illegible]
7.00	23.0	235	235	2.49	1.06	6.5	0.20	-0.01	2.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	238	238	2.77	1.16	7.3	0.22	0.01	2.1
7.10	23.3	224	224	2.56	1.14	7.9	0.25	0.03	2.1
7.15	23.5	232	232	2.71	1.17	8.0	0.25	0.03	2.1
7.20	23.6	236	236	2.85	1.21	6.8	0.21	-0.01	1.6
7.25	23.8	212	212	2.72	1.28	7.1	0.24	-0.00	2.2
7.30	23.9	214	214	2.53	1.18	7.7	0.26	0.02	2.2
7.35	24.1	221	221	2.60	1.18	6.2	0.20	-0.04	2.1
7.40	24.3	234	234	2.66	1.14	7.1	0.22	-0.01	2.1
7.45	24.4	244	244	2.81	1.15	6.1	0.18	-0.04	2.1
7.50	24.6	249	249	2.83	1.14	5.5	0.16	-0.06	2.1
7.55	24.8	264	264	3.17	1.20	6.5	0.18	-0.03	2.1
7.60	24.9	271	271	3.41	1.26	7.1	0.19	-0.02	2.1
7.65	25.1	267	267	3.43	1.29	7.4	0.20	-0.01	2.2
7.70	25.3	274	274	2.77	1.01	8.1	0.21	0.01	2.2
7.75	25.4	286	286	3.25	1.14	7.7	0.19	-0.01	2.2
7.80	25.6	303	303	3.87	1.28	6.8	0.16	-0.03	2.3
7.85	25.8	275	275	3.85	1.40	7.2	0.19	-0.02	2.3
7.90	25.9	257	257	3.44	1.34	7.6	0.21	-0.01	2.3
7.95	26.1	254	254	3.32	1.31	7.7	0.22	-0.01	2.3
8.00	26.2	242	242	3.15	1.30	7.1	0.21	-0.03	2.5
8.05	26.4	232	232	3.06	1.32	7.5	0.23	-0.03	2.5
8.10	26.6	223	223	2.91	1.31	8.0	0.26	-0.01	2.5
8.15	26.7	226	226	2.85	1.26	8.1	0.26	-0.01	2.5
8.20	26.9	231	231	2.86	1.24	7.9	0.25	-0.02	2.4
8.25	27.1	238	238	2.88	1.21	8.1	0.24	-0.02	2.7
8.30	27.2	258	258	3.27	1.27	7.9	0.22	-0.02	2.7
8.35	27.4	268	268	3.72	1.39	8.4	0.23	-0.01	2.7
8.40	27.6	254	255	3.68	1.45	8.5	0.24	-0.01	2.7
8.45	27.7	239	239	3.49	1.46	8.7	0.26	-0.01	2.8
8.50	27.9	228	229	3.23	1.41	8.8	0.28	-0.01	2.8
8.55	28.1	230	230	3.15	1.37	8.4	0.26	-0.02	2.8
8.60	28.2	233	233	3.22	1.38	8.1	0.25	-0.03	2.8
8.65	28.4	229	229	3.12	1.36	8.0	0.25	-0.04	2.8
8.70	28.5	231	231	2.64	1.15	8.2	0.26	-0.03	2.8
8.75	28.7	237	237	2.51	1.06	7.4	0.23	-0.06	2.8
8.80	28.9	227	227	2.47	1.09	6.8	0.21	-0.08	2.8
8.85	29.0	235	235	2.59	1.10	4.8	0.15	-0.14	2.8
8.90	29.2	238	238	2.77	1.17	5.2	0.16	-0.13	3.4
8.95	29.4	222	223	2.89	1.30	5.8	0.19	-0.12	3.3
9.00	29.5	213	214	2.56	1.20	6.9	0.23	-0.09	3.4
9.05	29.7	242	242	2.69	1.11	7.5	0.22	-0.07	3.4
9.10	29.9	292	292	3.48	1.19	5.5	0.14	-0.11	3.4
9.15	30.0	297	297	4.10	1.38	4.9	0.12	-0.12	3.4
9.20	30.2	268	268	3.96	1.48	6.1	0.16	-0.10	3.4
9.25	30.3	252	252	3.39	1.35	7.1	0.20	-0.08	3.4
9.30	30.5	231	232	2.85	1.23	6.2	0.19	-0.12	3.4
9.35	30.7	220	220	2.83	1.29	5.6	0.18	-0.15	3.4
9.40	30.8	200	200	2.66	1.33	5.1	0.19	-0.18	3.4
9.45	31.0	175	176	2.35	1.34	5.7	0.23	-0.19	3.8
9.50	31.2	175	175	2.10	1.20	6.4	0.27	-0.16	4.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCL[illegible]IO I deg
9.55	31.3	160	160	1.91	1.19	4.8	0.22	-0.25	4.0
9.60	31.5	152	152	1.88	1.24	5.3	0.25	-0.25	4.0
9.65	31.7	137	137	1.78	1.30	6.0	0.32	-0.24	4.0
9.70	31.8	132	132	-0.00	-0.00	7.1	0.39	-0.20	4.0
9.75	32.0	132	132	1.32	1.00	6.8	0.37	-0.22	4.0
9.80	32.2	30	30	1.32	4.44	10.7	2.59	-0.03	4.0
9.85	32.3	144	144	1.45	1.01	8.1	0.41	-0.14	4.1
9.90	32.5	147	147	1.53	1.04	5.1	0.25	-0.28	4.1
9.95	32.6	145	145	1.59	1.10	5.8	0.29	-0.26	4.1
10.00	32.8	135	135	1.51	1.11	4.7	0.25	-0.34	4.1
10.05	33.0	123	123	1.47	1.19	5.5	0.32	-0.33	4.1
10.10	33.1	123	123	1.48	1.20	4.6	0.27	-0.39	4.1
10.15	33.3	117	117	1.31	1.12	4.4	0.27	-0.43	4.1
10.20	33.5	133	133	1.02	0.77	5.5	0.30	-0.32	3.6
10.25	33.6	214	214	0.88	0.41	1.9	0.06	-0.32	3.7
10.30	33.8	171	171	1.37	0.80	-2.0	-0.08	-0.57	4.6
10.35	34.0	109	109	2.13	1.95	-0.3	-0.02	-0.79	4.3
10.40	34.1	38	38	1.56	4.16	12.0	2.30	0.06	4.3
10.45	34.3	16	16	0.92	5.73	18.1	8.14	2.86	4.3
10.50	34.4	14	14	0.38	2.73	28.9	14.79	8.75	4.3
10.55	34.6	13	14	0.34	2.62	45.8	25.14	18.62	4.3
10.60	34.8	12	13	?	?	55.5	32.23	25.30	[illegible]
10.65	34.9	12	13	?	?	62.9	37.64	30.45	

WRITE NUMBER OF RODS USED ___

Conoco Inc.

Operator :DENNIS WILSON
On Site Loc:CPT-E7
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-16-91 14:06
Cone Used :364
Water table (meters) : 1.2

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
0.25	0.82	0.40	0.04	10.00	0.03	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.50	1.64	2.60	0.10	3.77	0.09	clay	UNDFND	UNDFD	2	8	UNDF
0.75	2.46	61.00	0.46	0.75	0.15	sand to silty sand	70-80	46-48	15	38	)0.5
1.00	3.28	25.60	0.12	0.47	0.22	silty sand to sandy silt	40-50	40-42	8	18	.19
1.25	4.10	14.40	0.09	0.61	0.28	sandy silt to clayey silt	UNDFND	UNDFD	6	11	UNDF
1.50	4.92	19.60	0.08	0.40	0.32	silty sand to sandy silt	(40	38-40	6	11	.11
1.75	5.74	14.80	0.18	1.24	0.36	sandy silt to clayey silt	UNDFND	UNDFD	6	10	UNDF
2.00	6.56	13.40	0.44	3.28	0.39	silty clay to clay	UNDFND	UNDFD	9	14	UNDF
2.25	7.38	20.60	0.40	1.96	0.43	sandy silt to clayey silt	UNDFND	UNDFD	8	12	UNDF
2.50	8.20	62.20	0.31	0.50	0.46	sand to silty sand	60-70	42-44	15	22	.23
2.75	9.02	106.20	0.68	0.64	0.50	sand to silty sand	70-80	44-46	25	36	)0.5
3.00	9.84	90.20	0.67	0.75	0.54	sand to silty sand	70-80	42-44	22	30	.33
3.25	10.66	121.00	0.76	0.63	0.57	sand	80-90	44-46	23	31	.35
3.50	11.48	149.40	1.03	0.69	0.61	sand	80-90	44-46	29	37	)0.5
3.75	12.30	158.80	1.30	0.82	0.64	sand	80-90	44-46	30	38	)0.5
4.00	13.12	138.80	1.08	0.78	0.68	sand	80-90	44-46	27	33	.39
4.25	13.94	214.00	1.70	0.79	0.72	sand	)90	44-46	41	49	)0.5
4.50	14.76	282.80	2.30	0.81	0.75	sand	)90	46-48	)50	)50	)0.5
4.75	15.58	308.00	2.92	0.95	0.79	sand	)90	46-48	)50	)50	)0.5
5.00	16.40	355.60	3.90	1.10	0.82	sand	)90	46-48	)50	)50	)0.5
5.25	17.22	336.60	3.97	1.18	0.86	sand	)90	46-48	)50	)50	)0.5
5.50	18.04	345.20	3.95	1.15	0.89	sand	)90	46-48	)50	)50	)0.5
5.75	18.86	387.20	4.73	1.22	0.93	sand	)90	46-48	)50	)50	)0.5
6.00	19.69	404.20	5.15	1.28	0.97	sand	)90	46-48	)50	)50	)0.5
6.25	20.51	383.20	5.13	1.34	1.00	sand	)90	46-48	)50	)50	)0.5
6.50	21.33	413.60	5.87	1.42	1.04	sand	)90	46-48	)50	)50	)0.5
6.75	22.15	307.80	4.48	1.45	1.07	sand to silty sand	)90	44-46	)50	)50	)0.5
7.00	22.97	201.60	2.10	1.04	1.11	sand	80-90	42-44	39	37	)0.5
7.25	23.79	228.40	2.72	1.19	1.15	sand	80-90	44-46	44	41	)0.5
7.50	24.61	232.40	2.69	1.16	1.18	sand	80-90	42-44	45	41	)0.5
7.75	25.43	272.40	3.21	1.18	1.22	sand	)90	44-46	)50	48	)0.5
8.00	26.25	266.20	3.53	1.32	1.25	sand	)90	44-46	)50	46	)0.5
8.25	27.07	238.00	2.91	1.27	1.29	sand	80-90	42-44	44	39	)0.5
8.50	27.89	249.40	3.48	1.39	1.33	sand to silty sand	80-90	42-44	)50	)50	)0.5
8.75	28.71	232.00	2.93	1.26	1.36	sand	80-90	42-44	44	39	)0.5
9.00	29.53	227.00	2.66	1.17	1.40	sand	80-90	42-44	43	37	)0.5
9.25	30.35	270.20	3.52	1.30	1.43	sand	80-90	42-44	)50	44	)0.5
9.50	31.17	200.20	2.56	1.28	1.47	sand to silty sand	80-90	42-44	48	40	)0.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ++++

Conoco Inc.

Operator :DENNIS WILSON On Site Loc:CPT-E7 Page No.

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
9.75	31.99	142.60	1.38	0.97	1.51	sand to silty sand	70-80	40-42	34	28	.31
10.00	32.81	120.20	1.48	1.23	1.54	sand to silty sand	60-70	38-40	29	23	.25
10.25	33.63	142.00	1.23	0.87	1.58	sand to silty sand	70-80	40-42	34	27	.30
10.50	34.45	69.60	1.27	1.83	1.61	silty sand to sandy silt	40-50	36-38	22	18	.18

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPT'[illegible]TR1 (v 3.04) ****

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: E-10, Start Time: 08:20, End Time: 08:29

Site: DuPONT, Town: EAST CHICAGO, State: IND.

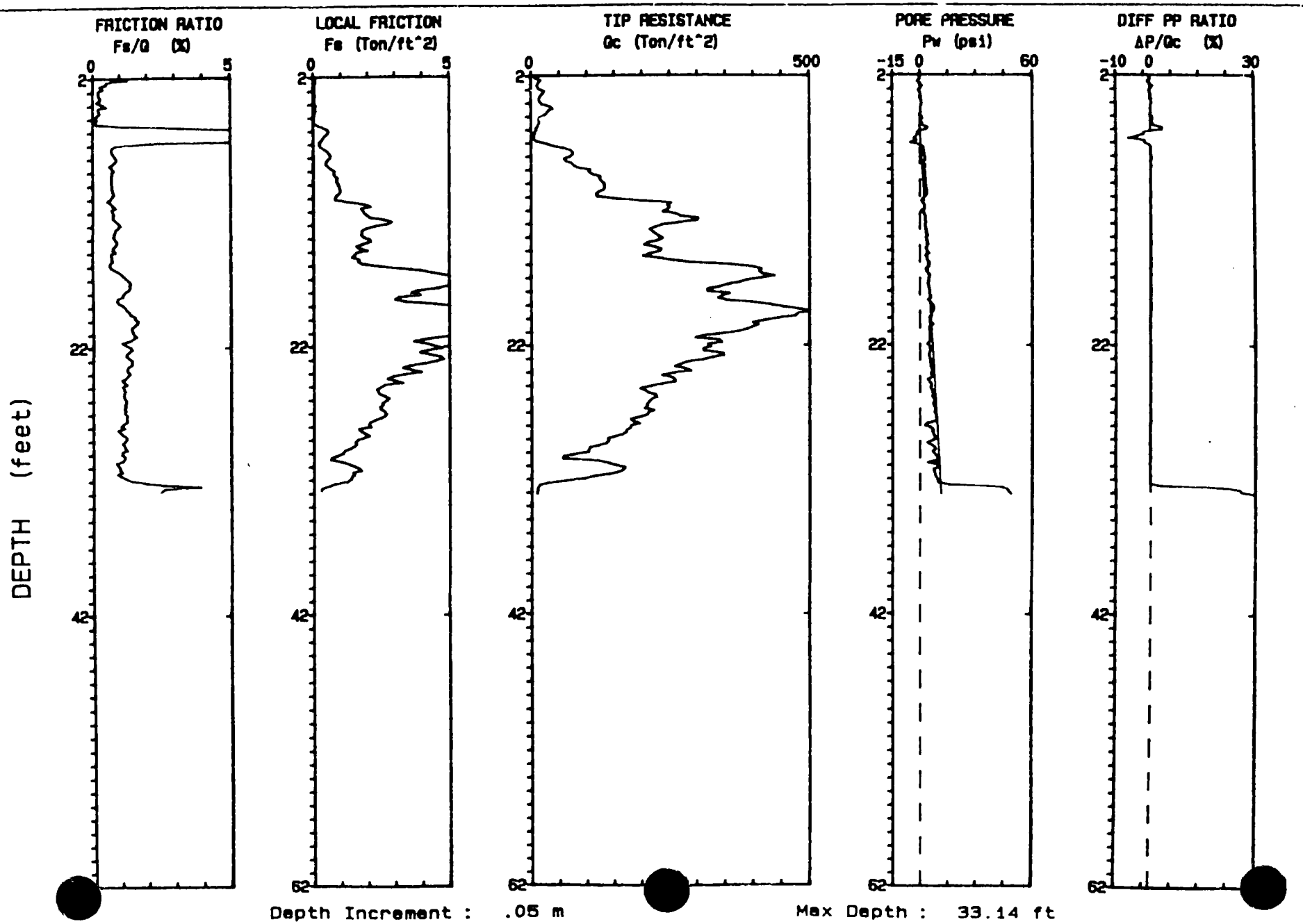
Unit: 1, Operators: Wilson, KASL, _____, _____

Proj. Consultant: _____, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1 Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-17-91	08:39	08:45	E-10	CPTE10	✓				33.1	1	2		Clay @ 32.5'

Conoco, Inc.

Operator : DENNIS WILSON
CPT Date : 11-17-91 08:36
File No. CPTE10 Pg 1 / 1
Location : E-10
Cone Used : 364
Hole No. 1



Depth Increment : .05 m

Max Depth : 33.14 ft

(E-10)

File space: 206 M sounding

Initial Baseline

Qc	Fs	Pw	Inc
-295	-1.98	-5.9	0.1

Dep

Qc -0
0 1000

Fs 0.00
0 10

Pw 0.0
0 500

Inc 0.1
0 10

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

SOUNDING DATA IN FILE CPTE10 11-17-91 08:36

OPERATOR : DENNIS WILSON LOCATION : E-10

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
Baseline		-295		-2.01		-5.0			0.3
0.65	2.1	7	7	0.09	1.29	-0.2	-0.24	-0.24	0.3
0.70	2.3	18	18	0.09	0.48	-0.2	-0.09	-0.09	0.3
0.75	2.5	14	13	0.07	0.48	-1.5	-0.82	-0.82	0.3
0.80	2.6	11	11	0.03	0.25	-0.2	-0.15	-0.15	0.3
0.85	2.8	11	11	0.04	0.34	1.2	0.79	0.79	0.3
0.90	3.0	14	14	0.03	0.23	0.7	0.34	0.34	0.3
0.95	3.1	24	24	0.05	0.20	-0.9	-0.28	-0.28	0.6
1.00	3.3	22	22	0.05	0.24	-0.1	-0.05	-0.05	0.3
1.05	3.4	18	18	0.05	0.30	0.5	0.19	0.19	0.3
1.10	3.6	15	15	0.04	0.24	0.5	0.26	0.26	0.3
1.15	3.8	14	14	0.02	0.15	0.8	0.38	0.38	0.3
1.20	3.9	16	16	0.06	0.37	0.8	0.37	0.37	0.3
1.25	4.1	20	20	0.10	0.49	1.1	0.39	0.39	0.3
1.30	4.3	34	34	0.07	0.21	0.8	0.16	0.16	0.3
1.35	4.4	39	39	0.09	0.22	0.4	0.07	0.07	0.3
1.40	4.6	31	31	0.08	0.24	0.5	0.11	0.11	0.3
1.45	4.8	28	28	0.04	0.15	0.7	0.18	0.18	0.3
1.50	4.9	24	24	0.03	0.12	-0.2	-0.07	-0.07	0.3
1.55	5.1	14	14	0.02	0.15	1.1	0.57	0.57	0.3
1.60	5.2	13	13	0.01	0.05	1.4	0.78	0.78	0.3
1.65	5.4	15	15	0.02	0.13	0.2	0.10	0.10	0.3
1.70	5.6	13	13	0.15	1.10	1.4	0.74	0.74	0.5
1.75	5.7	11	11	0.35	3.25	1.6	1.11	1.11	0.5
1.80	5.9	9	9	0.51	5.85	4.3	3.57	3.57	0.5
1.85	6.1	8	8	0.57	6.72	3.7	3.15	3.15	0.5
1.90	6.2	6	6	0.52	8.62	-1.5	-1.86	-1.86	0.5
1.95	6.4	5	4	0.41	9.08	-1.3	-2.82	-2.82	0.5
2.00	6.6	4	4	0.35	8.75	-1.9	-3.34	-3.34	0.5
2.05	6.7	4	4	0.30	7.49	-3.3	-5.87	-5.87	0.5
2.10	6.9	10	10	0.22	2.09	-1.9	-1.31	-1.31	0.5
2.15	7.1	26	25	0.22	0.85	-5.4	-1.53	-1.53	0.5
2.20	7.2	38	38	0.27	0.70	-0.2	-0.04	-0.04	0.5
2.25	7.4	56	56	0.39	0.69	2.1	0.27	0.26	0.5
2.30	7.5	70	70	0.51	0.72	2.2	0.22	0.21	0.5
2.35	7.7	75	75	0.59	0.78	2.4	0.23	0.21	0.5
2.40	7.9	75	75	0.63	0.84	2.4	0.23	0.21	0.5
2.45	8.0	69	69	0.62	0.90	2.7	0.28	0.24	0.5
2.50	8.2	59	59	0.51	0.86	3.0	0.37	0.32	0.5
2.55	8.4	62	62	0.47	0.75	3.0	0.34	0.28	0.5
2.60	8.5	73	73	0.46	0.63	1.4	0.13	0.08	0.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.65	8.7	77	77	0.55	0.71	3.0	0.28	0.22	0.5
2.70	8.9	84	84	0.66	0.79	3.1	0.27	0.21	0.5
2.75	9.0	107	107	0.78	0.73	2.4	0.16	0.11	0.5
2.80	9.2	104	104	0.75	0.73	2.7	0.19	0.13	0.5
2.85	9.4	111	111	0.79	0.71	3.0	0.20	0.14	0.5
2.90	9.5	125	125	0.89	0.72	2.7	0.16	0.10	0.5
2.95	9.7	124	124	0.88	0.70	3.1	0.18	0.12	0.5
3.00	9.8	127	128	0.88	0.69	3.3	0.18	0.12	0.5
3.05	10.0	132	132	0.94	0.71	3.1	0.17	0.10	0.5
3.10	10.2	133	133	0.95	0.71	3.4	0.18	0.11	0.5
3.15	10.3	133	133	0.98	0.73	3.4	0.19	0.11	0.5
3.20	10.5	130	130	1.00	0.77	3.7	0.20	0.12	0.5
3.25	10.7	121	121	0.96	0.79	3.7	0.22	0.13	0.5
3.30	10.8	117	117	0.85	0.72	3.8	0.24	0.14	0.5
3.35	11.0	120	120	0.79	0.66	3.4	0.20	0.11	0.5
3.40	11.2	150	150	0.82	0.55	2.1	0.10	0.02	0.5
3.45	11.3	200	200	1.35	0.67	0.8	0.03	-0.04	0.5
3.50	11.5	254	254	1.90	0.75	1.1	0.03	-0.02	0.5
3.55	11.6	247	247	2.11	0.86	2.4	0.07	0.01	0.8
3.60	11.8	251	251	1.76	0.70	2.6	0.07	0.02	0.8
3.65	12.0	247	247	1.84	0.74	2.4	0.07	0.01	0.8
3.70	12.1	238	238	1.88	0.79	0.8	0.03	-0.04	0.8
3.75	12.3	263	263	1.98	0.75	2.0	0.06	-0.00	0.8
3.80	12.5	271	272	2.09	0.77	3.0	0.08	0.02	0.8
3.85	12.6	303	303	2.60	0.86	3.1	0.07	0.02	0.8
3.90	12.8	300	300	2.90	0.97	3.0	0.07	0.01	0.8
3.95	13.0	267	267	2.76	1.04	3.4	0.09	0.02	0.8
4.00	13.1	236	237	2.28	0.97	3.1	0.09	0.02	0.8
4.05	13.3	225	226	1.95	0.87	3.1	0.10	0.01	0.8
4.10	13.5	214	214	1.79	0.83	3.4	0.11	0.02	0.8
4.15	13.6	219	219	1.79	0.82	3.5	0.12	0.03	0.8
4.20	13.8	225	225	1.77	0.79	4.0	0.13	0.04	0.8
4.25	13.9	231	231	1.87	0.81	4.4	0.14	0.04	1.3
4.30	14.1	238	238	2.09	0.88	3.4	0.10	0.01	1.1
4.35	14.3	231	231	2.11	0.91	3.9	0.12	0.03	1.1
4.40	14.4	212	212	1.84	0.87	4.3	0.15	0.04	1.1
4.45	14.6	204	204	1.58	0.78	4.7	0.16	0.05	1.1
4.50	14.8	223	223	1.69	0.76	3.9	0.13	0.02	1.1
4.55	14.9	236	236	1.99	0.85	3.4	0.10	0.00	1.1
4.60	15.1	232	232	1.57	0.68	4.2	0.13	0.02	1.1
4.65	15.3	215	215	1.50	0.70	5.0	0.17	0.05	1.1
4.70	15.4	202	202	1.42	0.70	3.1	0.11	-0.02	1.3
4.75	15.6	230	230	1.69	0.73	4.1	0.13	0.02	1.4
4.80	15.7	255	255	1.67	0.66	4.0	0.11	0.01	1.4
4.85	15.9	287	287	1.81	0.63	5.0	0.13	0.03	1.4
4.90	16.1	362	363	2.42	0.67	5.3	0.11	0.03	1.4
4.95	16.2	400	400	3.20	0.80	5.1	0.09	0.02	1.4
5.00	16.4	415	415	3.98	0.96	3.3	0.06	-0.01	1.4
5.05	16.6	411	411	4.38	1.07	3.5	0.06	-0.01	1.4
5.10	16.7	416	416	4.85	1.17	4.6	0.08	0.01	1.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
5.15	16.9	438	438	5.48	1.25	5.6	0.09	0.02	1.4
5.20	17.1	415	415	5.66	1.36	5.0	0.09	0.01	1.4
5.25	17.2	389	389	5.52	1.42	5.0	0.09	0.01	1.4
5.30	17.4	376	376	5.20	1.38	4.6	0.09	0.00	1.4
5.35	17.6	354	354	4.95	1.40	4.5	0.09	0.00	1.4
5.40	17.7	340	340	4.58	1.35	4.8	0.10	0.00	1.4
5.45	17.9	319	319	3.84	1.20	5.2	0.12	0.01	1.6
5.50	18.0	319	319	3.62	1.13	5.5	0.12	0.02	1.8
5.55	18.2	359	359	3.96	1.10	5.4	0.11	0.01	1.7
5.60	18.4	345	345	3.15	0.91	5.8	0.12	0.02	1.9
5.65	18.5	338	338	3.01	0.89	5.9	0.12	0.02	1.9
5.70	18.7	352	352	3.40	0.96	4.5	0.09	-0.01	1.8
5.75	18.9	403	403	4.43	1.10	5.7	0.10	0.01	1.8
5.80	19.0	432	432	5.10	1.20	7.0	0.12	0.03	2.1
5.85	19.2	453	453	5.70	1.26	7.6	0.12	0.04	1.8
5.90	19.4	483	483	6.54	1.35	7.6	0.11	0.03	2.0
5.95	19.5	507	507	7.15	1.41	7.3	0.10	0.03	2.0
6.00	19.7	480	480	7.51	1.56	6.2	0.09	0.01	2.0
6.05	19.8	476	476	7.50	1.58	6.5	0.10	0.02	2.1
6.10	20.0	445	445	7.50	1.69	5.1	0.08	-0.01	2.0
6.15	20.2	422	422	6.96	1.65	5.7	0.10	0.00	2.1
6.20	20.3	399	400	6.22	1.56	5.3	0.09	-0.01	1.9
6.25	20.5	410	411	5.96	1.45	7.3	0.13	0.03	[illegible]
6.30	20.7	400	400	5.82	1.46	5.2	0.09	-0.01	[illegible]
6.35	20.8	390	390	5.80	1.49	5.1	0.09	-0.02	2.0
6.40	21.0	375	376	5.78	1.54	5.4	0.10	-0.01	2.4
6.45	21.2	348	348	5.61	1.61	5.7	0.12	-0.01	2.4
6.50	21.3	312	312	4.73	1.51	5.5	0.13	-0.02	2.5
6.55	21.5	297	297	4.08	1.37	5.2	0.13	-0.02	2.3
6.60	21.7	341	341	3.69	1.08	6.0	0.13	-0.01	2.6
6.65	21.8	345	345	4.22	1.22	5.0	0.10	-0.03	2.2
6.70	22.0	319	319	4.47	1.40	4.0	0.09	-0.05	2.1
6.75	22.1	325	325	4.76	1.47	5.2	0.11	-0.03	2.4
6.80	22.3	311	311	4.24	1.36	5.6	0.13	-0.02	2.3
6.85	22.5	312	313	3.92	1.25	5.7	0.13	-0.02	2.1
6.90	22.6	347	347	4.33	1.25	5.2	0.11	-0.03	2.1
6.95	22.8	348	349	4.68	1.34	4.8	0.10	-0.04	2.2
7.00	23.0	327	327	4.80	1.47	5.2	0.12	-0.03	2.7
7.05	23.1	311	312	4.54	1.46	5.7	0.13	-0.03	2.4
7.10	23.3	281	281	4.10	1.46	5.8	0.15	-0.03	2.4
7.15	23.5	270	270	3.55	1.31	5.8	0.15	-0.03	2.5
7.20	23.6	259	259	3.29	1.27	6.0	0.17	-0.03	2.5
7.25	23.8	278	278	3.62	1.30	6.4	0.17	-0.02	2.8
7.30	23.9	289	289	4.00	1.39	7.3	0.18	0.00	2.5
7.35	24.1	259	259	3.42	1.32	6.2	0.17	-0.03	2.5
7.40	24.3	236	236	2.90	1.23	6.2	0.19	-0.04	2.7
7.45	24.4	255	255	2.72	1.07	7.2	0.20	-0.01	2.5
7.50	24.6	260	260	3.02	1.16	4.1	0.11	-0.10	[illegible]
7.55	24.8	261	261	3.30	1.26	5.2	0.14	-0.07	[illegible]
7.60	24.9	238	238	2.61	1.10	6.0	0.18	-0.05	2.6

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
7.65	25.1	216	216	2.46	1.14	6.4	0.21	-0.05	2.6
7.70	25.3	196	196	2.32	1.19	5.8	0.21	-0.07	3.0
7.75	25.4	206	206	2.39	1.16	6.9	0.24	-0.04	2.9
7.80	25.6	212	212	2.42	1.14	7.1	0.24	-0.03	2.9
7.85	25.8	225	225	2.61	1.16	7.3	0.23	-0.02	3.1
7.90	25.9	227	227	2.76	1.23	6.9	0.22	-0.04	3.0
7.95	26.1	217	217	2.70	1.25	7.9	0.26	-0.01	3.0
8.00	26.2	213	213	2.55	1.20	8.4	0.28	0.01	3.1
8.05	26.4	210	211	2.55	1.21	7.2	0.25	-0.04	3.1
8.10	26.6	209	209	2.45	1.17	7.6	0.26	-0.03	3.1
8.15	26.7	205	205	2.49	1.22	8.3	0.29	-0.01	3.1
8.20	26.9	222	223	2.62	1.18	8.5	0.28	-0.00	3.1
8.25	27.1	211	211	2.69	1.27	7.9	0.27	-0.02	3.1
8.30	27.2	210	210	2.64	1.26	8.8	0.30	0.01	3.1
8.35	27.4	198	198	2.49	1.26	8.9	0.32	0.00	3.1
8.40	27.6	179	179	2.26	1.26	9.2	0.37	0.02	3.2
8.45	27.7	184	184	2.07	1.12	9.2	0.36	0.01	3.2
8.50	27.9	196	196	2.03	1.04	4.0	0.15	-0.18	3.3
8.55	28.1	188	188	2.11	1.17	2.7	0.11	-0.25	3.3
8.60	28.2	179	179	1.65	0.93	5.9	0.24	-0.13	3.3
8.65	28.4	172	172	1.74	1.01	7.4	0.31	-0.07	2.9
8.70	28.5	171	171	1.89	1.11	6.9	0.29	-0.10	3.5
8.75	28.7	164	165	2.05	1.25	7.6	0.33	-0.07	3.5
8.80	28.9	150	150	1.89	1.26	8.2	0.40	-0.06	3.5
8.85	29.0	137	137	1.62	1.18	8.9	0.47	-0.03	3.5
8.90	29.2	139	139	1.52	1.09	6.9	0.36	-0.13	3.8
8.95	29.4	135	135	1.57	1.16	4.0	0.21	-0.30	3.9
9.00	29.5	121	122	1.46	1.20	6.3	0.37	-0.20	3.9
9.05	29.7	105	105	1.33	1.26	8.2	0.56	-0.11	3.9
9.10	29.9	103	103	1.11	1.08	8.5	0.60	-0.09	3.9
9.15	30.0	102	102	1.07	1.06	6.9	0.49	-0.21	3.9
9.20	30.2	76	76	0.89	1.17	8.2	0.78	-0.16	3.9
9.25	30.3	56	56	0.65	1.17	9.2	1.18	-0.11	3.9
9.30	30.5	56	56	0.61	1.09	10.7	1.38	0.00	3.9
9.35	30.7	119	119	1.01	0.85	9.5	0.58	-0.04	3.9
9.40	30.8	139	139	1.28	0.92	4.3	0.22	-0.31	3.9
9.45	31.0	152	152	1.49	0.98	9.6	0.46	-0.03	4.0
9.50	31.2	170	170	1.68	0.99	10.8	0.46	0.02	4.0
9.55	31.3	167	167	1.77	1.06	7.6	0.33	-0.12	4.0
9.60	31.5	160	160	1.44	0.90	7.9	0.35	-0.12	4.0
9.65	31.7	142	143	1.48	1.04	8.2	0.42	-0.12	4.1
9.70	31.8	114	114	1.39	1.22	8.3	0.53	-0.15	3.6
9.75	32.0	96	96	1.36	1.42	9.4	0.71	-0.10	3.6
9.80	32.2	64	65	1.23	1.91	9.8	1.09	-0.11	3.6
9.85	32.3	30	30	0.77	2.55	10.3	2.46	-0.15	3.6
9.90	32.5	14	14	0.55	4.07	16.0	8.49	2.69	3.6
9.95	32.6	11	12	0.29	2.65	44.0	29.14	21.85	4.2
10.00	32.8	10	11	0.25	2.40	47.3	32.97	25.23	4.1
10.05	33.0	10	10	?	?	48.0	36.12	27.71	4.1
10.10	33.1	9	10	?	?	49.2	39.71	30.65	4.1

WRITE NUMBER OF RODS USED __

Conoco Inc.

Operator :DENNIS WILSON
On Site Loc:E-10
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-17-91 08:36
Cone Used :364
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	SPT N1	CSR
0.85	2.79	12.20	0.06	0.52	0.10	sandy silt to clayey silt	UNDFND	UNDFD	5	15	UNDF
1.10	3.61	18.60	0.04	0.24	0.24	silty sand to sandy silt	(40	38-40	6	12	.13
1.35	4.43	24.60	0.07	0.28	0.30	silty sand to sandy silt	40-50	40-42	8	15	.15
1.60	5.25	22.00	0.04	0.16	0.33	silty sand to sandy silt	(40	38-40	7	12	.13
1.85	6.07	11.20	0.32	2.86	0.37	silty clay to clay	UNDFND	UNDFD	7	12	UNDF
2.10	6.89	5.80	0.36	6.21	0.41	clay	UNDFND	UNDFD	6	9	UNDF
2.35	7.71	53.00	0.40	0.75	0.44	silty sand to sandy silt	60-70	40-42	17	26	.28
2.60	8.53	67.60	0.54	0.80	0.48	sand to silty sand	60-70	42-44	16	24	.25
2.85	9.35	96.60	0.71	0.73	0.51	sand to silty sand	70-80	42-44	23	33	.39
3.10	10.17	128.20	0.91	0.71	0.55	sand	80-90	44-46	25	34	.41
3.35	10.99	124.20	0.92	0.74	0.59	sand to silty sand	80-90	44-46	30	39	)0.5
3.60	11.81	220.40	1.59	0.72	0.62	sand	)90	46-48	42	)50	)0.5
3.85	12.63	264.40	2.08	0.79	0.66	sand	)90	46-48	)50	)50	)0.5
4.10	13.45	248.40	2.34	0.94	0.69	sand	)90	46-48	48	)50	)0.5
4.35	14.27	228.80	1.93	0.84	0.73	sand	)90	44-46	44	)50	)0.5
4.60	15.09	221.40	1.73	0.78	0.77	sand	)90	44-46	42	49	)0.5
4.85	15.91	237.80	1.62	0.68	0.80	sand	)90	44-46	46	)50	)0.5
5.10	16.73	400.80	3.77	0.94	0.84	sand	)90	46-48	)50	)50	)0.5
5.35	17.55	394.40	5.36	1.36	0.87	sand	)90	46-48	)50	)50	)0.5
5.60	18.37	336.40	3.83	1.14	0.91	sand	)90	46-48	)50	)50	)0.5
5.85	19.19	395.60	4.34	1.10	0.95	sand	)90	46-48	)50	)50	)0.5
6.10	20.01	478.20	7.24	1.51	0.98	sand	)90	46-48	)50	)50	)0.5
6.35	20.83	404.20	6.15	1.52	1.02	sand to silty sand	)90	46-48	)50	)50	)0.5
6.60	21.65	334.60	4.78	1.43	1.05	sand	)90	44-46	)50	)50	)0.5
6.85	22.47	322.40	4.32	1.34	1.09	sand	)90	44-46	)50	)50	)0.5
7.10	23.29	322.80	4.49	1.39	1.12	sand	)90	44-46	)50	)50	)0.5
7.35	24.11	271.00	3.58	1.32	1.16	sand	)90	44-46	)50	49	)0.5
7.60	24.93	250.00	2.91	1.16	1.20	sand	)90	44-46	48	44	)0.5
7.85	25.75	211.00	2.44	1.16	1.23	sand	80-90	42-44	40	37	)0.5
8.10	26.57	215.20	2.61	1.21	1.27	sand	80-90	42-44	41	37	)0.5
8.35	27.40	209.20	2.59	1.24	1.30	sand	80-90	42-44	40	36	)0.5
8.60	28.22	183.60	2.02	1.10	1.34	sand	70-80	42-44	35	31	.35
8.85	29.04	158.80	1.84	1.16	1.38	sand to silty sand	70-80	40-42	38	33	.39
9.10	29.86	120.60	1.40	1.16	1.41	sand to silty sand	60-70	40-42	29	25	.26
9.35	30.68	81.80	0.85	1.03	1.45	sand to silty sand	50-60	38-40	20	16	.17
9.60	31.50	157.60	1.53	0.97	1.48	sand	70-80	40-42	30	25	.27
9.85	32.32	89.20	1.25	1.40	1.52	silty sand to sandy silt	50-60	38-40	28	23	.25
10.10	33.14	10.80	-13106.98	%-121360.95	1.56	undefined	UNDFND	UNDFD	UDF	UDF	UNDF

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

*** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04)

Conoco Inc.

Operator :DENNIS WILSON On Site Loc:E-10

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIELD ACTIVITY LOG SHEET

CONOCO

Page 1 of 1

Location: F-01, Start Time: 0846, End Time: 0925

Site: DuPont, Town: E CHICAGO, State: IND

Unit: 1, Operators: SGILS, KASL, D. WILSON,

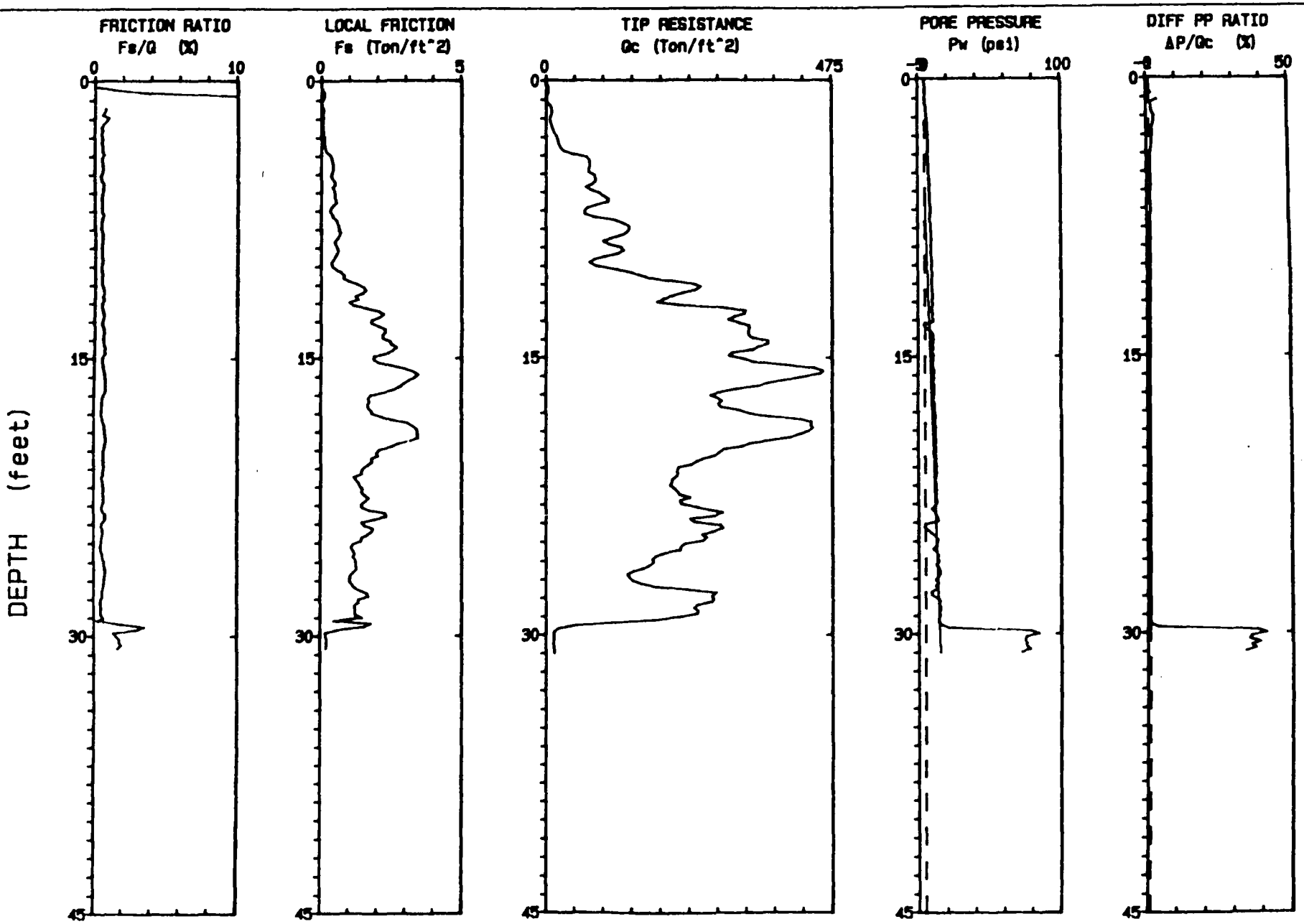
Proj. Consultant: Lounsbery, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-21	0855	0915	F-01	CPTF1	✓				31.0'		2	F	Clay at 29.5

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-21-91 06:53 FILE cptf1 Pg 1 / 1

LOCATION : f-01 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 31.00 ft

SOUNDING DATA IN FILE cptf1 11-21-91 06:53

PERATOR : CALVIN SELLS LOCATION : f-01

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.03		-9.5			0.2
0.05	0.2	2	2	0.00	0.00	-0.2	-0.55	-0.55	0.2
0.10	0.3	4	4	0.01	0.17	0.0	0.00	0.00	0.2
0.15	0.5	3	3	0.04	1.09	0.1	0.13	0.13	0.2
0.20	0.7	3	3	0.11	3.97	-0.0	-0.11	-0.11	0.3
0.25	0.8	1	1	0.10	16.00	0.1	1.61	1.61	0.3
0.30	1.0	0	0	0.05	?	0.3	?	?	0.5
0.35	1.1	1	1	-0.03	-2.13	0.4	2.70	2.70	0.3
0.40	1.3	7	7	0.00	0.01	0.3	0.36	0.36	0.3
0.45	1.5	9	9	0.07	0.72	1.0	0.76	0.76	0.2
0.50	1.6	10	10	0.07	0.71	1.1	0.82	0.82	0.2
0.55	1.8	9	9	0.05	0.57	1.2	0.93	0.93	[illegible]
0.60	2.0	7	7	0.07	0.92	1.6	1.60	1.60	[illegible]
0.65	2.1	7	8	0.06	0.74	1.6	1.55	1.55	[illegible]
0.70	2.3	8	8	0.05	0.56	2.0	1.74	1.74	0.2
0.75	2.5	10	10	0.05	0.50	2.0	1.48	1.48	0.2
0.80	2.6	12	12	0.07	0.59	2.0	1.23	1.23	0.2
0.85	2.8	14	14	0.07	0.52	2.0	1.00	1.00	0.3
0.90	3.0	17	17	0.09	0.51	2.3	0.98	0.98	0.3
0.95	3.1	19	19	0.10	0.51	2.3	0.89	0.89	0.3
1.00	3.3	20	20	0.10	0.50	2.4	0.86	0.86	0.3
1.05	3.4	22	22	0.12	0.55	2.5	0.80	0.80	0.3
1.10	3.6	25	25	0.14	0.57	2.6	0.75	0.75	0.3
1.15	3.8	30	30	0.17	0.57	2.6	0.63	0.63	0.3
1.20	3.9	45	45	0.30	0.67	2.5	0.40	0.40	0.3
1.25	4.1	68	68	0.37	0.54	2.3	0.24	0.24	0.3
1.30	4.3	72	72	0.39	0.55	2.6	0.26	0.26	0.3
1.35	4.4	73	73	0.42	0.58	2.7	0.27	0.27	0.3
1.40	4.6	73	73	0.42	0.58	2.9	0.29	0.29	0.3
1.45	4.8	71	71	0.43	0.60	3.0	0.30	0.30	0.3
1.50	4.9	71	71	0.40	0.56	3.0	0.30	0.30	0.3
1.55	5.1	81	81	0.36	0.44	3.0	0.26	0.26	0.3
1.60	5.2	82	82	0.41	0.50	3.2	0.28	0.28	0.3
1.65	5.4	82	82	0.47	0.57	3.1	0.27	0.27	0.3
1.70	5.6	77	78	0.49	0.63	3.4	0.32	0.32	0.3
1.75	5.7	66	66	0.41	0.62	3.6	0.39	0.39	0.3
1.80	5.9	74	74	0.46	0.62	3.5	0.34	0.34	[illegible]
1.85	6.1	89	89	0.49	0.55	3.5	0.28	0.28	[illegible]
1.90	6.2	96	97	0.48	0.50	3.6	0.27	0.26	[illegible]
1.95	6.4	104	104	0.52	0.51	3.6	0.25	0.24	0.3
2.00	6.6	103	103	0.55	0.53	3.6	0.25	0.24	0.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	83	83	0.43	0.52	3.9	0.34	0.32	0.3
2.10	6.9	68	68	0.35	0.52	4.2	0.44	0.41	0.3
2.15	7.1	64	64	0.32	0.50	4.2	0.47	0.42	0.3
2.20	7.2	64	64	0.40	0.61	4.3	0.48	0.42	0.3
2.25	7.4	79	80	0.44	0.56	4.2	0.38	0.33	0.3
2.30	7.5	114	114	0.57	0.50	3.6	0.23	0.19	0.3
2.35	7.7	127	127	0.60	0.48	4.0	0.23	0.19	0.3
2.40	7.9	137	137	0.64	0.47	4.1	0.22	0.18	0.3
2.45	8.0	137	137	0.64	0.47	4.3	0.22	0.18	0.3
2.50	8.2	134	134	0.69	0.51	4.3	0.23	0.18	0.3
2.55	8.4	126	126	0.64	0.51	4.4	0.25	0.20	0.3
2.60	8.5	109	109	0.58	0.53	4.7	0.31	0.24	0.3
2.65	8.7	94	94	0.47	0.50	4.9	0.37	0.29	0.3
2.70	8.9	104	104	0.52	0.50	4.8	0.33	0.25	0.3
2.75	9.0	125	125	0.58	0.47	4.4	0.25	0.18	0.3
2.80	9.2	129	130	0.61	0.47	4.6	0.26	0.18	0.3
2.85	9.4	120	120	0.56	0.47	4.6	0.28	0.19	0.3
2.90	9.5	98	98	0.49	0.50	4.6	0.34	0.23	0.3
2.95	9.7	80	80	0.43	0.54	5.2	0.47	0.33	0.4
3.00	9.8	72	72	0.37	0.51	5.4	0.55	0.38	0.4
3.05	10.0	83	83	0.40	0.48	5.4	0.46	0.32	0.3
3.10	10.2	113	113	0.54	0.48	5.2	0.33	0.22	0.3
3.15	10.3	136	136	0.71	0.52	5.2	0.28	0.18	0.3
3.20	10.5	154	154	0.83	0.54	5.4	0.25	0.16	0.3
3.25	10.7	170	170	0.78	0.46	5.3	0.22	0.14	0.4
3.30	10.8	203	203	0.98	0.48	5.2	0.19	0.11	0.4
3.35	11.0	244	244	1.28	0.52	5.0	0.15	0.08	0.4
3.40	11.2	256	256	1.52	0.59	5.1	0.14	0.08	0.3
3.45	11.3	248	248	1.60	0.65	5.2	0.15	0.09	0.4
3.50	11.5	227	227	1.50	0.66	5.6	0.18	0.10	0.4
3.55	11.6	209	209	1.22	0.58	5.7	0.20	0.11	0.4
3.60	11.8	195	195	1.33	0.68	5.9	0.22	0.12	0.4
3.65	12.0	183	183	1.01	0.55	5.3	0.21	0.11	0.4
3.70	12.1	214	214	1.15	0.54	6.0	0.20	0.11	0.4
3.75	12.3	291	292	1.58	0.54	5.6	0.14	0.07	0.4
3.80	12.5	332	332	2.05	0.62	5.3	0.12	0.06	0.4
3.85	12.6	330	330	2.24	0.68	5.6	0.12	0.06	0.4
3.90	12.8	312	312	2.09	0.67	5.6	0.13	0.06	0.4
3.95	13.0	302	302	1.81	0.60	5.8	0.14	0.07	0.4
4.00	13.1	319	319	1.80	0.56	5.8	0.13	0.06	0.4
4.05	13.3	337	337	2.02	0.60	-1.4	-0.03	-0.10	0.4
4.10	13.5	337	337	2.29	0.68	0.4	0.01	-0.06	0.5
4.15	13.6	336	336	2.28	0.68	3.9	0.08	0.01	0.5
4.20	13.8	336	336	2.18	0.65	5.6	0.12	0.05	0.5
4.25	13.9	342	343	2.20	0.64	5.9	0.12	0.05	0.5
4.30	14.1	369	369	2.45	0.66	6.2	0.12	0.05	0.5
4.35	14.3	369	370	2.51	0.68	5.8	0.11	0.04	0.5
4.40	14.4	352	353	2.70	0.77	5.8	0.12	0.04	0.5
4.45	14.6	344	344	2.57	0.75	6.0	0.13	0.05	0.6
4.50	14.8	308	308	2.38	0.77	5.0	0.12	0.03	0.6

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATI I deg
4.55	14.9	303	303	1.88	0.62	6.2	0.15	0.06	0.5
4.60	15.1	328	328	1.87	0.57	6.0	0.13	0.05	0.6
4.65	15.3	343	343	2.01	0.59	6.0	0.13	0.04	0.6
4.70	15.4	395	395	2.46	0.62	5.4	0.10	0.02	0.5
4.75	15.6	446	446	2.96	0.66	5.8	0.09	0.03	1.3
4.80	15.7	461	461	3.31	0.72	6.7	0.10	0.04	0.8
4.85	15.9	456	456	3.46	0.76	6.7	0.11	0.04	0.6
4.90	16.1	426	426	3.34	0.78	6.3	0.11	0.03	0.5
4.95	16.2	397	397	3.12	0.79	6.4	0.12	0.04	0.6
5.00	16.4	370	370	2.94	0.80	5.9	0.12	0.03	1.3
5.05	16.6	351	351	2.82	0.80	6.7	0.14	0.04	0.7
5.10	16.7	315	315	2.59	0.82	6.7	0.15	0.05	1.0
5.15	16.9	290	290	2.20	0.76	7.0	0.17	0.06	0.9
5.20	17.1	272	272	1.76	0.65	6.5	0.17	0.05	1.1
5.25	17.2	284	284	1.69	0.59	6.8	0.17	0.05	0.6
5.30	17.4	292	292	1.73	0.59	6.0	0.15	0.03	1.1
5.35	17.6	286	286	1.66	0.58	7.3	0.18	0.06	0.6
5.40	17.7	291	291	1.69	0.58	7.4	0.18	0.06	1.4
5.45	17.9	321	321	1.80	0.56	7.3	0.16	0.05	1.5
5.50	18.0	336	336	1.84	0.55	7.1	0.15	0.04	0.9
5.55	18.2	364	364	2.16	0.59	7.4	0.15	0.04	1.2
5.60	18.4	424	424	2.49	0.59	7.5	0.13	0.04	0.6
5.65	18.5	442	442	3.07	0.69	7.1	0.12	0.03	0.7
5.70	18.7	440	440	3.25	0.74	7.3	0.12	0.03	0.6
5.75	18.9	444	444	3.40	0.77	7.8	0.13	0.04	0.7
5.80	19.0	435	435	3.43	0.79	7.7	0.13	0.03	0.7
5.85	19.2	421	421	3.44	0.82	7.6	0.13	0.03	0.7
5.90	19.4	406	406	3.46	0.85	7.4	0.13	0.03	0.7
5.95	19.5	373	373	3.18	0.85	7.9	0.15	0.04	0.7
6.00	19.7	339	339	2.73	0.81	7.9	0.17	0.04	0.7
6.05	19.8	326	326	2.51	0.77	7.8	0.17	0.04	0.7
6.10	20.0	295	295	2.07	0.70	7.8	0.19	0.04	0.7
6.15	20.2	288	288	1.98	0.69	7.9	0.20	0.04	1.0
6.20	20.3	281	281	2.03	0.72	7.4	0.19	0.03	0.8
6.25	20.5	262	262	1.80	0.69	8.0	0.22	0.05	0.9
6.30	20.7	249	249	1.83	0.74	7.5	0.22	0.03	0.6
6.35	20.8	240	240	1.68	0.70	7.7	0.23	0.04	1.0
6.40	21.0	218	218	1.52	0.70	8.4	0.28	0.06	0.8
6.45	21.2	216	216	1.43	0.66	7.8	0.26	0.04	1.0
6.50	21.3	217	217	1.44	0.66	8.5	0.28	0.06	0.8
6.55	21.5	215	215	1.16	0.54	8.0	0.27	0.04	0.7
6.60	21.7	208	208	1.26	0.60	7.4	0.26	0.02	0.7
6.65	21.8	207	207	1.35	0.65	7.1	0.25	0.01	0.8
6.70	22.0	205	205	1.40	0.69	8.0	0.28	0.04	0.8
6.75	22.1	212	212	1.50	0.70	8.3	0.28	0.04	0.7
6.80	22.3	217	217	1.45	0.67	8.1	0.27	0.04	0.7
6.85	22.5	221	221	1.56	0.71	8.4	0.27	0.04	0.7
6.90	22.6	239	239	1.72	0.72	7.8	0.23	0.02	0.7
6.95	22.8	221	221	1.60	0.73	8.4	0.27	0.04	0.7
7.00	23.0	224	224	1.46	0.65	8.6	0.28	0.04	0.7

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	247	247	1.45	0.59	7.4	0.22	0.00	0.7
7.10	23.3	270	270	1.72	0.64	4.3	0.11	-0.09	0.7
7.15	23.5	293	293	2.30	0.78	6.8	0.17	-0.02	0.7
7.20	23.6	280	280	2.33	0.83	7.8	0.20	0.01	0.7
7.25	23.8	238	238	1.93	0.81	9.0	0.27	0.04	0.7
7.30	23.9	245	245	1.45	0.59	9.5	0.28	0.05	0.7
7.35	24.1	289	289	1.54	0.53	0.0	0.00	-0.19	0.7
7.40	24.3	294	294	1.87	0.64	-0.8	-0.02	-0.21	0.8
7.45	24.4	278	278	1.83	0.66	2.0	0.05	-0.16	0.8
7.50	24.6	258	258	1.66	0.64	4.6	0.13	-0.09	0.8
7.55	24.8	266	266	1.45	0.54	7.5	0.20	-0.02	0.8
7.60	24.9	260	260	1.43	0.55	9.4	0.26	0.03	0.8
7.65	25.1	230	230	1.14	0.49	8.5	0.27	0.01	0.8
7.70	25.3	223	223	1.08	0.49	6.5	0.28	0.01	0.8
7.75	25.4	222	222	1.16	0.52	5.6	0.18	-0.09	0.8
7.80	25.6	196	196	1.22	0.62	8.2	0.30	-0.01	0.8
7.85	25.8	181	181	1.16	0.64	9.5	0.38	0.04	0.9
7.90	25.9	175	176	1.23	0.70	8.6	0.35	-0.00	0.9
7.95	26.1	177	177	1.25	0.71	9.8	0.40	0.05	0.9
8.00	26.2	170	170	1.26	0.74	7.5	0.32	-0.05	0.9
8.05	26.4	160	160	1.28	0.80	9.5	0.43	0.03	0.9
8.10	26.6	143	143	1.16	0.81	10.4	0.52	0.08	0.9
8.15	26.7	134	134	1.06	0.80	10.7	0.57	0.09	0.9
8.20	26.9	138	139	1.03	0.75	9.5	0.49	0.02	0.9
8.25	27.1	143	143	1.04	0.73	7.3	0.37	-0.09	0.9
8.30	27.2	158	158	1.12	0.71	9.7	0.44	0.02	0.9
8.35	27.4	180	181	1.20	0.66	7.5	0.30	-0.07	0.9
8.40	27.6	233	233	1.41	0.61	9.1	0.28	-0.01	0.9
8.45	27.7	283	283	1.67	0.59	4.2	0.11	-0.13	0.9
8.50	27.9	274	274	1.71	0.63	4.3	0.11	-0.14	0.9
8.55	28.1	278	278	1.37	0.49	7.6	0.20	-0.05	0.9
8.60	28.2	274	274	1.35	0.49	10.7	0.28	0.03	1.0
8.65	28.4	250	250	1.20	0.48	9.8	0.28	0.00	1.0
8.70	28.5	244	244	1.22	0.50	10.8	0.32	0.03	1.0
8.75	28.7	251	251	1.22	0.49	10.8	0.31	0.03	1.0
8.80	28.9	250	250	1.22	0.49	10.1	0.29	0.01	1.0
8.85	29.0	221	221	1.49	0.67	10.8	0.35	0.03	1.0
8.90	29.2	179	180	0.45	0.25	9.7	0.39	-0.01	1.0
8.95	29.4	107	107	1.81	1.70	9.5	0.64	-0.04	1.0
9.00	29.5	44	44	1.56	3.52	12.1	1.98	0.32	1.0
9.05	29.7	20	20	0.61	3.09	17.3	6.29	2.56	1.1
9.10	29.9	13	15	0.18	1.37	77.9	41.92	36.37	1.1
9.15	30.0	13	14	0.20	1.52	84.1	46.86	41.07	1.1
9.20	30.2	13	14	0.23	1.78	74.6	41.43	35.62	1.1
9.25	30.3	13	14	0.23	1.82	73.3	41.41	35.46	1.1
9.30	30.5	12	13	0.23	1.88	74.9	43.76	37.57	1.1
9.35	30.7	13	14	0.22	1.76	74.6	42.13	36.10	1.1
9.40	30.8	13	14	?	?	77.4	42.28	36.41	1.1
9.45	31.0	13	14	?	?	70.9	39.68	33.63	1.1

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:f-01
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-21-91 06:53
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	2.17	0.05	2.36	0.04	clay	UNDFND	UNDFD	2	.2
0.60	2	7.17	0.04	0.56	0.11	sensitive fine grained	UNDFND	UNDFD	3	.7
0.95	3	12.43	0.07	0.56	0.18	sandy silt to clayey silt	UNDFND	UNDFD	5	1.3
1.25	4	35.00	0.20	0.57	0.23	silty sand to sandy silt	50-60	42-44	11	UNDEFINED
1.55	5	73.50	0.40	0.55	0.27	sand to silty sand	70-80	44-46	18	UNDEFINED
1.85	6	78.33	0.45	0.58	0.32	sand to silty sand	70-80	44-46	19	UNDEFINED
2.15	7	86.33	0.44	0.51	0.36	sand to silty sand	70-80	44-4[illegible]	21	UNDEFINED
2.45	8	109.67	0.55	0.50	0.40	sand	80-90	44-46	21	UNDEFINED
2.75	9	115.33	0.58	0.50	0.45	sand	80-90	44-46	22	UNDEFINED
3.05	10	97.00	0.48	0.49	0.49	sand to silty sand	70-80	44-46	23	UNDEFINED
3.35	11	170.00	0.85	0.50	0.53	sand	)90	44-46	33	UNDEFINED
3.65	12	219.67	1.36	0.62	0.57	sand	)90	46-48	42	UNDEFINED
3.95	13	296.83	1.82	0.61	0.62	sand	)90	46-48	)50	UNDEFINED
4.25	14	334.50	2.13	0.64	0.66	gravelly sand to sand	)90	46-48	)50	UNDEFINED
4.55	15	340.83	2.42	0.71	0.70	sand	)90	46-48	)50	UNDEFINED
4.85	16	404.83	2.68	0.66	0.75	gravelly sand to sand	)90	)48	)50	UNDEFINED
5.15	17	358.17	2.84	0.79	0.79	sand	)90	46-48	)50	UNDEFINED
5.45	18	291.00	1.72	0.59	0.83	sand	)90	46-48	)50	UNDEFINED
5.75	19	408.33	2.70	0.66	0.88	gravelly sand to sand	)90	46-48	)50	UNDEFINED
6.05	20	383.33	3.13	0.82	0.92	sand	)90	46-48	)50	UNDEFINED
6.40	21	261.86	1.84	0.70	0.97	sand	)90	44-46	)50	UNDEFINED
6.70	22	211.33	1.34	0.63	1.01	sand	80-90	44-46	40	UNDEFINED
7.00	23	222.33	1.55	0.70	1.06	sand	80-90	44-46	43	UNDEFINED
7.35	24	266.00	1.82	0.68	1.10	sand	)90	44-46	)50	UNDEFINED
7.65	25	264.33	1.56	0.59	1.15	sand	)90	44-46	)50	UNDEFINED
7.95	26	195.67	1.18	0.60	1.19	sand	80-90	42-44	37	UNDEFINED
8.25	27	148.00	1.14	0.77	1.23	sand	70-80	40-42	28	UNDEFINED
8.55	28	234.33	1.41	0.60	1.28	sand	80-90	42-44	45	UNDEFINED
8.85	29	248.33	1.28	0.52	1.32	sand	80-90	42-44	48	UNDEFINED
9.15	30	62.67	0.80	1.28	1.36	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
9.45	31	12.83	-10922.51	-85110.51	1.41	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 253 ▪ sounding

Initial Baseline

Qc	Fs	Pw	Inc
-261	-7.07	-8.6	0.1

	Dep
Qc	0
Fs	0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: F-11, Start Time: 0939, End Time: 1020

Site: DuPont, Town: S. Chicago, State: Ind.

Unit: 1, Operators: Seiis, D Wilson, Kast

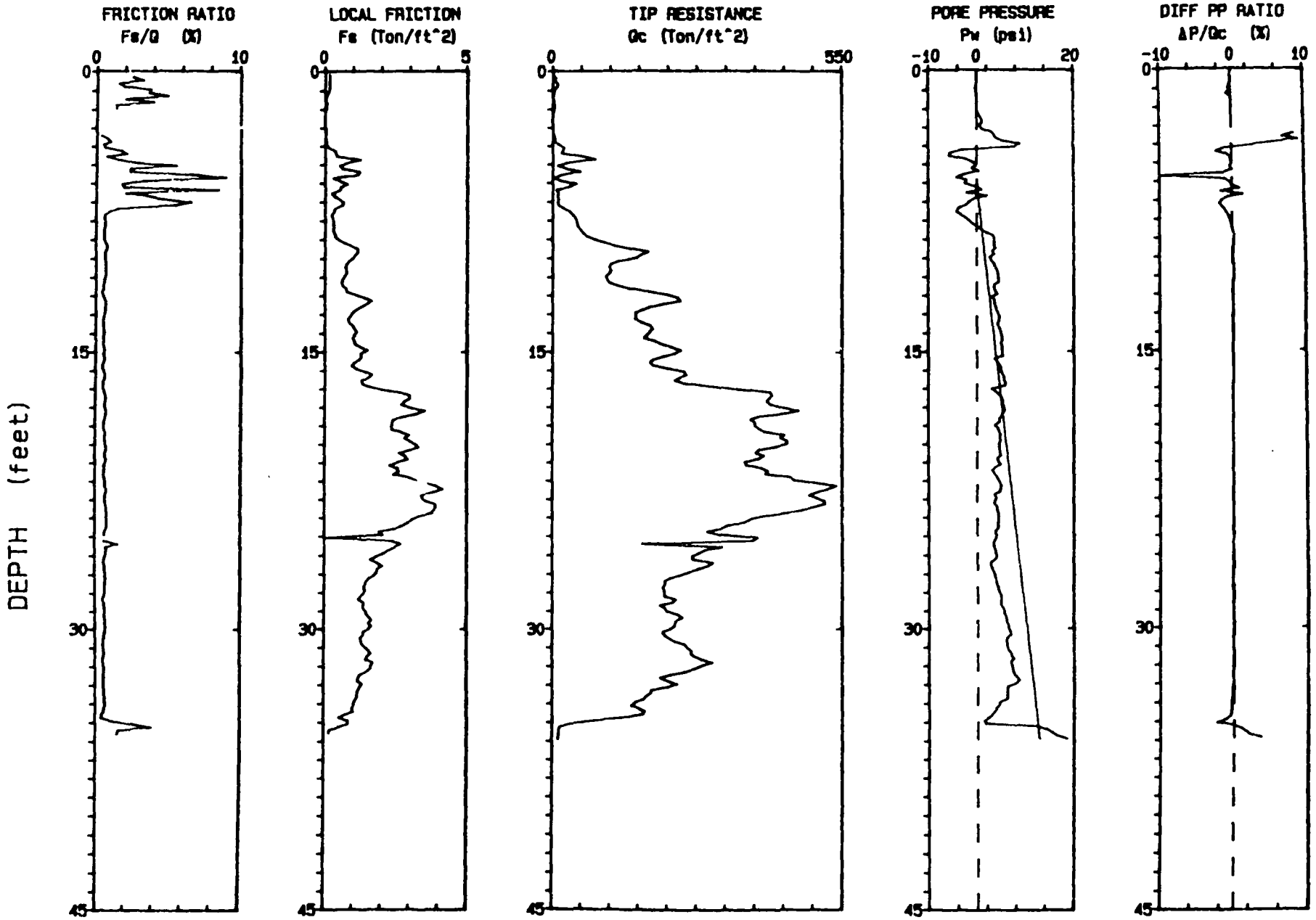
Proj. Consultant: Lounsbury, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-21-91	0943	1010	F-11	clrf11	✓				35.9	1	2	F	Clay at 35.3

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-21-91 09:46 FILE CPTF11 Pg 1 / 1

LOCATION : F-11 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 35.93 ft

SOUNDING DATA IN FILE CPTF11 11-21-91 09:46

OPERATOR : CALVIN SELLS LOCATION : F-11

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-260		-7.06		-8.8			0.1
0.05	0.2	-0	-0	0.15	-72.20	0.0	-0.69	-0.69	0.1
0.10	0.3	6	6	0.15	2.75	-0.1	-0.19	-0.19	0.1
0.15	0.5	5	5	0.16	2.90	0.0	0.05	0.05	0.6
0.20	0.7	10	10	0.15	1.48	0.0	0.01	0.01	1.0
0.25	0.8	9	9	0.17	1.94	-0.2	-0.17	-0.17	1.7
0.30	1.0	4	4	0.15	3.86	-0.2	-0.37	-0.37	1.4
0.35	1.1	3	3	0.11	3.48	-0.1	-0.18	-0.18	0.9
0.40	1.3	1	1	0.05	3.87	-0.1	-0.34	-0.34	0.7
0.45	1.5	1	1	0.02	1.32	0.0	0.00	0.00	0.5
0.50	1.6	1	1	0.04	3.38	0.0	0.12	0.12	0.1
0.55	1.8	3	3	0.04	1.39	0.0	0.11	0.11	[illegible]
0.60	2.0	3	3	0.04	1.13	0.0	0.09	0.09	[illegible]
0.65	2.1	1	1	-0.00	-0.42	0.0	0.27	0.27	0.1
0.70	2.3	0	0	-0.01	-1.36	0.4	5.64	5.64	0.1
0.75	2.5	-0	-0	-0.01	3.14	0.8	-18.72	-18.72	0.1
0.80	2.6	-1	-0	-0.01	2.25	1.0	-14.08	-14.08	0.1
0.85	2.8	-0	-0	-0.01	17.00	1.0	%-172.38	%-172.38	0.
0.90	3.0	0	0	0.01	3.83	0.6	16.09	16.09	0.1
0.95	3.1	0	0	0.02	11.20	1.0	33.10	33.10	0.1
1.00	3.3	0	0	0.02	17.67	3.0	167.78	167.78	0.1
1.05	3.4	3	3	0.01	0.31	3.6	9.59	9.59	0.1
1.10	3.6	4	4	0.03	0.71	3.9	6.55	6.55	0.1
1.15	3.8	4	4	0.04	1.02	5.2	9.27	[illegible]	0.1
1.20	3.9	12	12	0.06	0.56	9.1	5.68	5.68	0.1
1.25	4.1	22	23	0.13	0.59	7.9	2.52	2.52	0.1
1.30	4.3	20	20	0.35	1.78	-3.2	-1.18	-1.18	0.1
1.35	4.4	18	18	0.38	2.17	-5.7	-2.33	-2.33	0.1
1.40	4.6	58	58	0.42	0.72	-5.8	-0.72	-0.72	0.1
1.45	4.8	82	82	1.25	1.54	-2.4	-0.21	-0.21	2.9
1.50	4.9	29	29	0.78	2.71	-0.9	-0.23	-0.23	4.9
1.55	5.1	9	9	0.50	5.58	0.0	0.02	0.02	5.2
1.60	5.2	27	27	0.63	2.30	-1.0	-0.25	-0.25	5.3
1.65	5.4	53	53	1.23	2.33	0.5	0.07	0.07	6.2
1.70	5.6	17	17	1.14	6.72	-2.6	-1.10	-1.10	6.4
1.75	5.7	3	3	0.27	9.81	-4.2	-11.10	-11.10	6.5
1.80	5.9	15	15	0.51	3.37	-2.2	-1.06	-1.06	[illegible]
1.85	6.1	45	45	0.79	1.78	-2.6	-0.42	-0.42	[illegible]
1.90	6.2	29	29	0.55	1.94	-0.2	-0.04	-0.06	[illegible]
1.95	6.4	6	6	0.51	9.27	1.0	1.35	1.17	6.7
2.00	6.6	11	11	0.22	2.02	-2.2	-1.48	-1.62	6.7

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	9	9	0.34	3.88	2.2	1.82	1.59	6.6
2.10	6.9	11	11	0.50	4.73	-0.6	-0.42	-0.66	6.3
2.15	7.1	10	10	0.66	6.49	-1.6	-1.12	-1.42	6.4
2.20	7.2	11	11	0.61	5.67	-2.2	-1.45	-1.78	6.4
2.25	7.4	22	22	0.34	1.56	-3.8	-1.25	-1.43	6.2
2.30	7.5	34	34	0.31	0.93	-4.3	-0.90	-1.04	6.2
2.35	7.7	38	38	0.23	0.61	-3.5	-0.65	-0.79	6.3
2.40	7.9	43	43	0.25	0.59	-2.5	-0.43	-0.56	6.4
2.45	8.0	46	46	0.29	0.64	-1.6	-0.25	-0.38	6.4
2.50	8.2	47	47	0.29	0.62	-0.9	-0.14	-0.28	6.4
2.55	8.4	49	49	0.30	0.62	0.1	0.01	-0.14	6.5
2.60	8.5	54	54	0.29	0.55	1.0	0.14	-0.01	6.4
2.65	8.7	59	59	0.34	0.58	2.1	0.25	0.11	6.5
2.70	8.9	66	67	0.37	0.56	3.5	0.37	0.24	6.5
2.75	9.0	81	81	0.47	0.58	3.6	0.32	0.21	6.5
2.80	9.2	99	99	0.68	0.69	3.6	0.26	0.17	6.5
2.85	9.4	118	118	0.94	0.80	3.6	0.22	0.14	6.5
2.90	9.5	147	147	1.15	0.78	3.9	0.19	0.12	6.6
2.95	9.7	183	183	1.16	0.64	3.2	0.12	0.06	6.7
3.00	9.8	169	169	1.06	0.62	3.6	0.15	0.08	6.7
3.05	10.0	160	160	0.98	0.61	2.7	0.12	0.04	6.7
3.10	10.2	126	126	0.84	0.66	3.0	0.17	0.07	6.7
3.15	10.3	111	111	0.75	0.68	3.6	0.24	0.12	6.7
3.20	10.5	108	109	0.73	0.67	3.8	0.25	0.12	6.7
3.25	10.7	112	112	0.76	0.68	4.1	0.27	0.14	6.8
3.30	10.8	108	108	0.77	0.71	4.3	0.28	0.15	6.8
3.35	11.0	101	101	0.68	0.67	4.4	0.31	0.16	6.8
3.40	11.2	104	104	0.61	0.59	4.4	0.31	0.15	6.9
3.45	11.3	108	108	0.59	0.55	4.6	0.31	0.15	6.9
3.50	11.5	125	125	0.62	0.50	3.6	0.21	0.07	6.9
3.55	11.6	148	148	0.76	0.52	3.6	0.18	0.06	7.0
3.60	11.8	186	186	0.77	0.41	3.9	0.15	0.06	7.0
3.65	12.0	220	220	1.10	0.50	4.3	0.14	0.06	7.0
3.70	12.1	240	240	1.42	0.59	3.2	0.09	0.02	7.0
3.75	12.3	244	244	1.65	0.68	3.6	0.11	0.03	7.0
3.80	12.5	213	213	1.50	0.70	3.6	0.12	0.03	7.0
3.85	12.6	187	187	1.27	0.68	3.9	0.15	0.04	7.0
3.90	12.8	171	171	1.07	0.63	4.0	0.17	0.05	7.0
3.95	13.0	158	158	0.96	0.60	4.3	0.19	0.06	7.1
4.00	13.1	159	159	0.89	0.56	4.6	0.21	0.07	7.1
4.05	13.3	158	158	0.81	0.51	4.7	0.22	0.07	7.1
4.10	13.5	169	169	0.86	0.51	4.5	0.19	0.05	7.1
4.15	13.6	187	187	0.99	0.53	4.3	0.16	0.04	7.1
4.20	13.8	192	192	1.06	0.55	4.6	0.17	0.05	7.1
4.25	13.9	186	186	1.13	0.61	4.9	0.19	0.06	7.1
4.30	14.1	180	180	1.04	0.57	5.0	0.20	0.06	7.1
4.35	14.3	174	174	0.97	0.56	5.2	0.22	0.07	7.1
4.40	14.4	195	195	1.04	0.53	5.2	0.19	0.06	7.3
4.45	14.6	207	207	1.06	0.51	5.0	0.17	0.04	7.3
4.50	14.8	227	227	1.29	0.57	5.2	0.17	0.05	7.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	245	245	1.52	0.62	5.2	0.15	0.04	7.4
4.60	15.1	234	234	1.27	0.54	5.3	0.16	0.04	7.3
4.65	15.3	214	214	1.30	0.61	5.4	0.18	0.05	7.3
4.70	15.4	193	193	1.22	0.63	3.6	0.14	-0.02	7.4
4.75	15.6	185	185	1.04	0.56	4.2	0.16	0.00	7.4
4.80	15.7	192	193	0.94	0.49	4.6	0.17	0.02	7.4
4.85	15.9	218	218	1.09	0.50	4.9	0.16	0.02	7.4
4.90	16.1	251	251	1.42	0.57	5.0	0.14	0.02	7.4
4.95	16.2	255	255	1.66	0.65	5.2	0.15	0.02	7.4
5.00	16.4	243	243	1.56	0.64	5.6	0.16	0.03	7.4
5.05	16.6	233	233	1.29	0.55	5.6	0.17	0.03	7.4
5.10	16.7	252	252	1.34	0.53	6.0	0.17	0.04	7.4
5.15	16.9	301	301	1.55	0.51	5.9	0.14	0.03	7.4
5.20	17.1	354	354	2.02	0.57	3.0	0.06	-0.04	7.4
5.25	17.2	415	415	2.65	0.64	3.9	0.07	-0.02	7.5
5.30	17.4	419	419	3.01	0.72	4.6	0.08	-0.01	7.5
5.35	17.6	413	413	3.02	0.73	5.2	0.09	0.00	7.6
5.40	17.7	408	408	2.83	0.69	5.3	0.09	0.00	7.6
5.45	17.9	415	415	2.71	0.65	5.4	0.09	0.00	7.6
5.50	18.0	440	440	3.03	0.69	5.6	0.09	0.01	7.6
5.55	18.2	470	470	3.56	0.76	5.8	0.09	0.01	[illegible]
5.60	18.4	444	444	3.27	0.74	5.4	0.09	0.00	[illegible]
5.65	18.5	394	394	2.82	0.72	5.1	0.09	-0.00	7.7
5.70	18.7	376	376	2.42	0.64	4.5	0.09	-0.02	7.7
5.75	18.9	385	385	2.40	0.62	4.6	0.09	-0.02	7.7
5.80	19.0	385	386	2.36	0.61	3.6	0.07	-0.04	7.8
5.85	19.2	393	393	2.36	0.60	4.3	0.08	-0.02	7.8
5.90	19.4	405	405	2.71	0.67	4.5	0.08	-0.02	7.8
5.95	19.5	442	442	2.99	0.68	4.9	0.08	-0.02	7.8
6.00	19.7	434	435	2.83	0.65	4.7	0.08	-0.02	7.8
6.05	19.8	447	447	3.03	0.68	4.9	0.08	-0.02	7.9
6.10	20.0	447	447	3.21	0.72	4.6	0.07	-0.02	7.9
6.15	20.2	426	426	3.33	0.78	4.5	0.08	-0.03	7.9
6.20	20.3	393	393	3.01	0.77	4.6	0.08	-0.03	7.9
6.25	20.5	386	386	2.64	0.68	4.7	0.09	-0.03	7.9
6.30	20.7	403	403	2.85	0.71	4.9	0.09	-0.03	7.9
6.35	20.8	393	394	2.95	0.75	4.1	0.08	-0.04	7.9
6.40	21.0	365	365	2.62	0.72	4.4	0.09	-0.04	7.9
6.45	21.2	369	369	2.29	0.62	4.9	0.09	-0.03	7.9
6.50	21.3	398	398	2.59	0.65	3.7	0.07	-0.05	8.0
6.55	21.5	410	410	2.63	0.64	3.1	0.05	-0.06	8.0
6.60	21.7	406	406	2.44	0.60	3.6	0.06	-0.06	8.0
6.65	21.8	454	454	3.00	0.66	4.0	0.06	-0.05	8.0
6.70	22.0	459	459	3.25	0.71	4.3	0.07	-0.04	8.0
6.75	22.1	502	502	3.61	0.72	4.7	0.07	-0.03	8.0
6.80	22.3	541	541	3.95	0.73	5.0	0.07	-0.03	8.0
6.85	22.5	526	526	4.20	0.80	4.9	0.07	-0.03	[illegible]
6.90	22.6	506	506	3.84	0.76	4.8	0.07	-0.03	[illegible]
6.95	22.8	488	488	3.41	0.70	3.6	0.05	-0.05	8.0
7.00	23.0	503	503	3.47	0.69	4.0	0.06	-0.05	8.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION ! deg
7.05	23.1	518	518	3.62	0.70	3.7	0.05	-0.05	8.0
7.10	23.3	519	519	3.92	0.76	3.6	0.05	-0.05	8.0
7.15	23.5	498	498	3.93	0.79	4.0	0.06	-0.05	8.0
7.20	23.6	473	473	3.85	0.81	4.1	0.06	-0.05	8.0
7.25	23.8	443	444	3.77	0.85	4.3	0.07	-0.06	8.0
7.30	23.9	401	401	3.32	0.83	4.4	0.08	-0.06	8.0
7.35	24.1	376	376	3.10	0.82	4.4	0.08	-0.06	8.1
7.40	24.3	364	364	2.95	0.81	4.4	0.09	-0.07	8.0
7.45	24.4	333	333	2.77	0.83	4.3	0.09	-0.08	8.1
7.50	24.6	322	322	2.49	0.77	4.4	0.10	-0.08	8.1
7.55	24.8	294	294	1.93	0.66	3.8	0.09	-0.11	8.2
7.60	24.9	318	318	2.08	0.65	3.9	0.09	-0.10	8.0
7.65	25.1	392	392	0.00	0.00	3.9	0.07	-0.08	8.2
7.70	25.3	382	382	2.41	0.63	3.6	0.07	-0.09	8.3
7.75	25.4	169	169	2.71	1.60	3.3	0.14	-0.22	8.3
7.80	25.6	323	323	2.49	0.77	3.4	0.08	-0.11	8.2
7.85	25.8	290	290	2.25	0.77	3.7	0.09	-0.13	8.3
7.90	25.9	279	279	2.09	0.75	3.8	0.10	-0.12	8.3
7.95	26.1	266	266	1.84	0.69	4.1	0.11	-0.12	8.4
8.00	26.2	267	267	1.63	0.61	3.8	0.10	-0.13	8.3
8.05	26.4	306	306	1.87	0.61	2.9	0.07	-0.14	8.4
8.10	26.6	297	297	2.06	0.69	2.7	0.06	-0.15	8.4
8.15	26.7	279	279	1.88	0.67	3.0	0.08	-0.15	8.4
8.20	26.9	260	260	1.86	0.72	3.3	0.09	-0.16	8.4
8.25	27.1	243	243	1.76	0.73	3.6	0.11	-0.16	8.4
8.30	27.2	224	224	1.59	0.71	3.7	0.12	-0.18	8.4
8.35	27.4	214	214	1.48	0.69	3.9	0.13	-0.18	8.4
8.40	27.6	215	215	1.45	0.68	4.0	0.14	-0.18	8.4
8.45	27.7	211	211	1.40	0.67	4.3	0.15	-0.18	8.5
8.50	27.9	213	214	1.46	0.69	4.4	0.15	-0.17	8.6
8.55	28.1	214	214	1.40	0.65	4.7	0.16	-0.16	8.6
8.60	28.2	214	214	1.29	0.61	4.9	0.16	-0.16	8.6
8.65	28.4	235	235	1.20	0.51	5.0	0.15	-0.14	8.6
8.70	28.5	229	229	1.41	0.62	4.9	0.15	-0.15	8.6
8.75	28.7	205	205	1.38	0.68	4.9	0.17	-0.17	8.6
8.80	28.9	215	215	1.38	0.64	5.3	0.18	-0.15	8.6
8.85	29.0	219	219	1.48	0.67	5.6	0.18	-0.14	8.6
8.90	29.2	239	239	1.51	0.63	5.6	0.17	-0.13	8.6
8.95	29.4	249	250	1.61	0.64	6.0	0.17	-0.12	8.6
9.00	29.5	237	237	1.68	0.71	6.1	0.19	-0.12	8.6
9.05	29.7	234	234	1.57	0.67	6.2	0.19	-0.12	8.6
9.10	29.9	233	233	1.68	0.72	6.4	0.20	-0.12	8.6
9.15	30.0	224	224	1.59	0.71	6.5	0.21	-0.12	8.6
9.20	30.2	209	210	1.40	0.67	6.9	0.24	-0.12	9.0
9.25	30.3	214	215	1.37	0.64	7.0	0.24	-0.12	9.0
9.30	30.5	222	222	1.27	0.57	6.2	0.20	-0.14	9.0
9.35	30.7	233	233	1.31	0.57	6.0	0.19	-0.15	9.0
9.40	30.8	253	253	1.35	0.54	6.2	0.18	-0.13	9.0
9.45	31.0	258	258	1.48	0.57	6.2	0.17	-0.13	9.0
9.50	31.2	265	265	1.59	0.60	6.5	0.18	-0.12	9.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	265	266	1.67	0.63	7.0	0.19	-0.11	9.0
9.60	31.5	271	271	1.54	0.57	7.1	0.19	-0.10	9.0
9.65	31.7	284	284	1.48	0.52	7.6	0.19	-0.09	9.1
9.70	31.8	305	305	1.74	0.57	6.9	0.16	-0.10	9.1
9.75	32.0	286	286	1.66	0.58	7.2	0.18	-0.10	9.1
9.80	32.2	272	272	1.66	0.61	7.3	0.19	-0.11	9.1
9.85	32.3	253	253	1.50	0.59	7.5	0.21	-0.11	9.1
9.90	32.5	224	224	1.27	0.57	7.8	0.25	-0.12	9.1
9.95	32.6	206	206	1.21	0.59	8.3	0.29	-0.11	9.1
10.00	32.8	220	220	1.19	0.54	8.8	0.29	-0.09	9.1
10.05	33.0	239	239	1.36	0.57	8.1	0.24	-0.11	9.1
10.10	33.1	220	220	1.28	0.58	6.2	0.20	-0.18	9.1
10.15	33.3	189	189	1.22	0.65	6.2	0.23	-0.21	9.1
10.20	33.5	188	188	1.16	0.62	6.2	0.24	-0.22	9.1
10.25	33.6	179	179	1.18	0.66	6.2	0.25	-0.23	9.1
10.30	33.8	174	174	1.12	0.65	6.2	0.26	-0.24	9.3
10.35	34.0	160	161	1.06	0.66	4.7	0.21	-0.33	9.3
10.40	34.1	151	151	1.06	0.70	4.5	0.21	-0.37	9.4
10.45	34.3	166	166	1.00	0.60	3.9	0.17	-0.36	9.5
10.50	34.4	178	178	1.04	0.59	3.5	0.14	-0.36	9.6
10.55	34.6	173	173	0.76	0.44	3.0	0.13	-0.39	
10.60	34.8	131	131	0.55	0.42	2.3	0.13	-0.56	
10.65	34.9	76	76	0.87	1.14	1.3	0.12	-1.07	9.6
10.70	35.1	33	33	0.85	2.59	1.7	0.37	-2.40	9.6
10.75	35.3	14	14	0.54	3.98	12.6	6.64	-0.05	9.6
10.80	35.4	12	13	0.19	1.56	14.5	8.41	1.02	9.6
10.85	35.6	12	12	0.18	1.55	15.6	9.72	1.75	9.7
10.90	35.8	12	12	?	?	16.6	10.39	2.34	9.7
10.95	35.9	11	11	?	?	18.6	12.17	3.70	9.6

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:F-11
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-21-91 09:46
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	5.67	0.16	2.74	0.04	clay	UNDFND	UNDFD	5	.5
0.60	2	2.00	0.05	2.50	0.11	clay	UNDFND	UNDFD	2	.1
0.95	3	0.00	-0.00	0.00	0.18	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	7.50	0.05	0.64	0.23	sensitive fine grained	UNDFND	UNDFD	4	.7
1.55	5	36.00	0.61	1.70	0.27	sandy silt to clayey silt	UNDFND	UNDFD	14	3.5
1.85	6	26.67	0.76	2.86	0.32	clayey silt to silty clay	UNDFND	UNDFD	13	2.6
2.15	7	12.67	0.46	3.66	0.36	silty clay to clay	UNDFND	UNDFD	8	1.2
2.45	8	32.33	0.34	1.05	0.40	silty sand to sandy silt	40-50	40-42	10	UNDEFINED
2.75	9	59.33	0.34	0.58	0.45	sand to silty sand	60-70	42-44	14	UNDEFINED
3.05	10	146.00	0.99	0.68	0.49	sand	80-90	44-46	28	UNDEFINED
3.35	11	111.00	0.75	0.68	0.53	sand to silty sand	70-80	44-46	27	UNDEFINED
3.65	12	148.50	0.74	0.50	0.57	sand	80-90	44-46	28	UNDEFINED
3.95	13	202.17	1.31	0.65	0.62	sand	)90	46-48	39	UNDEFINED
4.25	14	175.17	0.96	0.55	0.66	sand	80-90	44-46	34	UNDEFINED
4.55	15	204.67	1.15	0.56	0.70	sand	)90	44-46	39	UNDEFINED
4.85	16	206.00	1.14	0.56	0.75	sand	)90	44-46	39	UNDEFINED
5.15	17	255.83	1.47	0.57	0.79	sand	)90	46-48	49	UNDEFINED
5.45	18	404.00	2.71	0.67	0.83	gravelly sand to sand	)90	46-48	)50	UNDEFINED
5.75	19	418.17	2.92	0.70	0.88	gravelly sand to sand	)90	46-48	)50	UNDEFINED
6.05	20	417.67	2.71	0.65	0.92	gravelly sand to sand	)90	46-48	)50	UNDEFINED
6.40	21	401.86	2.94	0.73	0.97	gravelly sand to sand	)90	46-48	)50	UNDEFINED
6.70	22	416.00	2.70	0.65	1.01	gravelly sand to sand	)90	46-48	)50	UNDEFINED
7.00	23	511.00	3.75	0.73	1.06	gravelly sand to sand	)90	46-48	)50	UNDEFINED
7.35	24	461.14	3.64	0.79	1.10	gravelly sand to sand	)90	46-48	)50	UNDEFINED
7.65	25	337.17	2.04	0.60	1.15	gravelly sand to sand	)90	44-46	)50	UNDEFINED
7.95	26	284.83	2.30	0.81	1.19	sand	)90	44-46	)50	UNDEFINED
8.25	27	275.33	1.84	0.67	1.23	sand	)90	44-46	)50	UNDEFINED
8.55	28	215.17	1.46	0.68	1.28	sand	80-90	42-44	41	UNDEFINED
8.85	29	219.50	1.36	0.62	1.32	sand	80-90	42-44	42	UNDEFINED
9.15	30	236.00	1.61	0.68	1.36	sand	80-90	42-44	45	UNDEFINED
9.45	31	231.50	1.36	0.59	1.41	sand	80-90	42-44	44	UNDEFINED
9.75	32	279.33	1.61	0.58	1.45	sand	)90	42-44	)50	UNDEFINED
10.05	33	235.67	1.36	0.58	1.49	sand	80-90	42-44	45	UNDEFINED
10.35	34	185.00	1.17	0.63	1.54	sand	70-80	40-42	35	UNDEFINED
10.65	35	145.83	0.88	0.60	1.58	sand	70-80	40-42	28	UNDEFINED
10.95	36	15.67	-10922.37	-69717.28	1.62	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 241 ■ sounding

Initial Baseline

Qc	Fs	Pw	Inc
-261	-7.04	-8.7	0.1

	Dep
Qc	0
Fs	-0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: F-13, Start Time: 09:38, End Time: 10:01

Site: DuPonT, Town: E. Ch.iCAGo, State: IN D.

Unit: 1, Operators: Wilson, Kasl

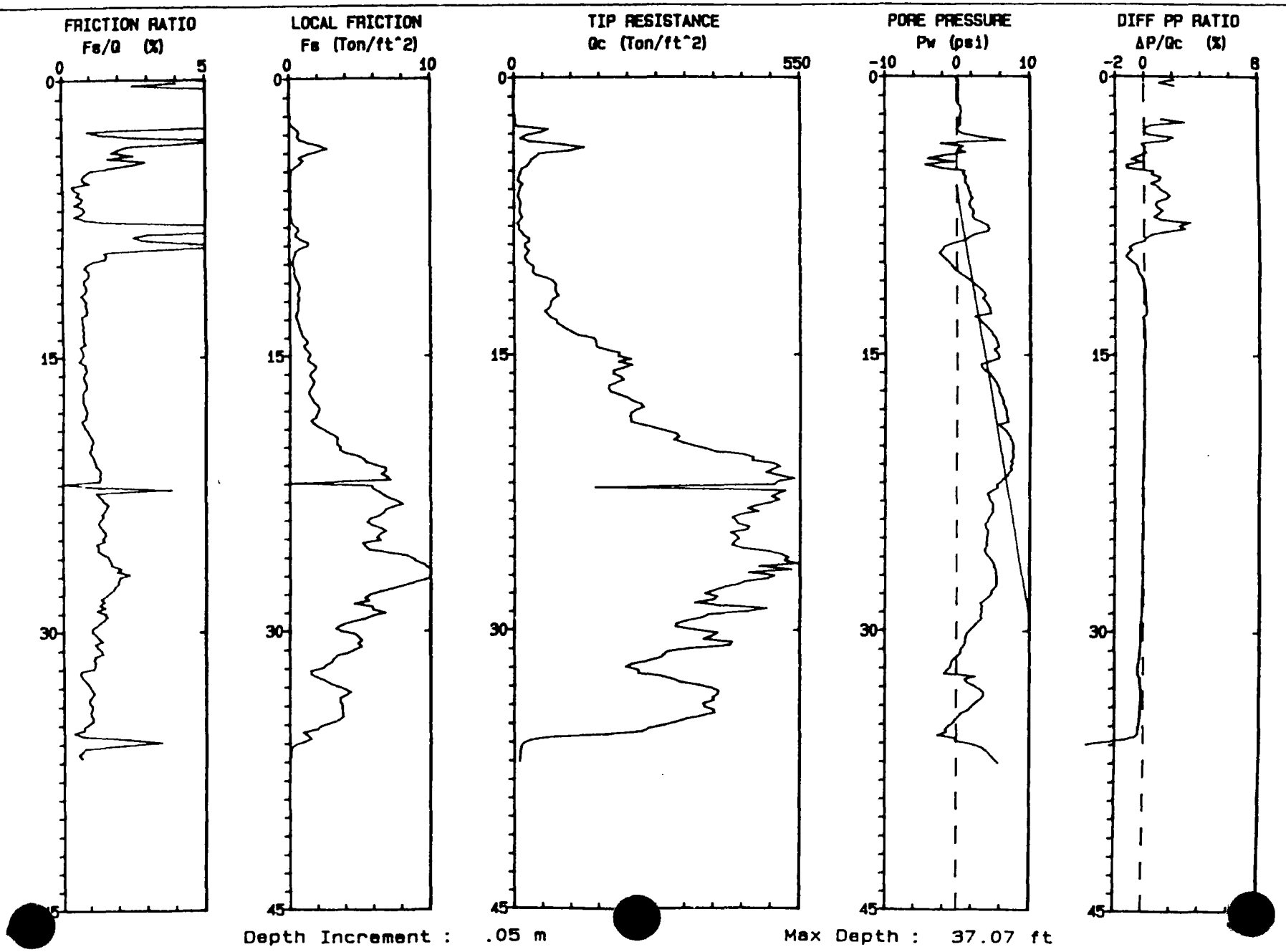
Proj. Consultant: _____, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11/17/91	09:30	10:01	F-13	CPTF13	✓				37.1	1	2		Clay at 36.1'
													had To Push at
													36'

mr/cws725

Conoco, Inc.

Operator : DENNIS WILSON
CPT Date : 11-17-91 09:36
File No. CPTF13 Pg 1 / 1
Location : F-13
Cone Used : 364
Hole No. 1



Depth Increment : .05 m

Max Depth : 37.07 ft

File space: 193 m sounding

F-13

Initial Baseline

Qc	Fs	Pw	Inc
-295	-2.00	-5.2	1.5

Dep

Qc -0
0 1000

Fs -0.01
0 10

Pw -0.0
0 500

Inc 0.2
0 10

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

Conoco Inc.

Operator :DENNIS WILSON
On Site Loc:F-13
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-17-91 09:36
Cone Used :364
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	SPT N1	CSR
0.25	0.82	0.60	0.03	5.00	0.03	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.50	1.64	-0.60	0.00	0.00	0.09	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.75	2.46	0.80	0.02	2.50	0.15	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
1.00	3.28	32.00	0.58	1.81	0.22	sandy silt to clayey silt	UNDFND	UNDFD	12	27	UNDF
1.25	4.10	83.60	1.88	2.25	0.28	silty sand to sandy silt	70-80	44-46	27	)50	)0.5
1.50	4.92	29.20	0.61	2.08	0.32	sandy silt to clayey silt	UNDFND	UNDFD	11	20	UNDF
1.75	5.74	11.20	0.08	0.68	0.36	sandy silt to clayey silt	UNDFND	UNDFD	4	7	UNDF
2.00	6.56	9.20	0.05	0.57	0.39	sandy silt to clayey silt	UNDFND	UNDFD	4	6	UNDF
2.25	7.38	11.40	0.07	0.61	0.43	sandy silt to clayey silt	UNDFND	UNDFD	4	7	UNDF
2.50	8.20	10.40	0.38	3.65	0.46	clay	UNDFND	UNDFD	10	15	UNDF
2.75	9.02	22.80	0.89	3.91	0.50	silty clay to clay	UNDFND	UNDFD	15	21	UNDF
3.00	9.84	24.20	0.44	1.81	0.54	sandy silt to clayey silt	UNDFND	UNDFD	9	13	UNDF
3.25	10.66	35.60	0.33	0.91	0.57	silty sand to sandy silt	40-50	38-40	11	15	.16
3.50	11.48	75.00	0.63	0.84	0.61	sand to silty sand	60-70	40-42	18	23	.24
3.75	12.30	76.60	0.62	0.81	0.64	sand to silty sand	60-70	40-42	18	23	.24
4.00	13.12	68.20	0.53	0.78	0.68	sand to silty sand	60-70	40-42	16	20	.21
4.25	13.94	103.00	0.80	0.77	0.72	sand to silty sand	70-80	42-44	25	30	.32
4.50	14.76	162.20	1.17	0.72	0.75	sand	80-90	44-46	31	36	)0.5
4.75	15.58	211.80	1.51	0.71	0.79	sand	)90	44-46	41	46	)0.5
5.00	16.40	202.40	1.63	0.80	0.82	sand	80-90	44-46	39	43	)0.5
5.25	17.22	190.80	1.50	0.78	0.86	sand	80-90	44-46	37	40	)0.5
5.50	18.04	236.40	1.92	0.81	0.89	sand	)90	44-46	45	48	)0.5
5.75	18.86	230.80	1.82	0.79	0.93	sand	)90	44-46	44	46	)0.5
6.00	19.69	301.40	3.06	1.02	0.97	sand	)90	44-46	)50	)50	)0.5
6.25	20.51	375.20	3.92	1.05	1.00	sand	)90	46-48	)50	)50	)0.5
6.50	21.33	486.80	6.14	1.26	1.04	sand	)90	46-48	)50	)50	)0.5
6.75	22.15	510.00	5.35	1.05	1.07	sand	)90	46-48	)50	)50	)0.5
7.00	22.97	440.00	6.81	1.55	1.11	sand to silty sand	)90	46-48	)50	)50	)0.5
7.25	23.79	463.40	7.06	1.52	1.15	sand	)90	46-48	)50	)50	)0.5
7.50	24.61	436.60	6.10	1.40	1.18	sand	)90	46-48	)50	)50	)0.5
7.75	25.43	425.00	5.96	1.40	1.22	sand	)90	46-48	)50	)50	)0.5
8.00	26.25	499.60	7.78	1.56	1.25	sand	)90	46-48	)50	)50	)0.5
8.25	27.07	502.20	10.21	2.03	1.29	sand to silty sand	)90	46-48	)50	)50	)0.5
8.50	27.89	430.80	8.04	1.87	1.33	sand to silty sand	)90	46-48	)50	)50	)0.5
8.75	28.71	378.40	5.46	1.44	1.36	sand	)90	44-46	)50	)50	)0.5
9.00	29.53	401.80	5.70	1.42	1.40	sand	)90	44-46	)50	)50	)0.5
9.25	30.35	350.80	4.06	1.16	1.43	sand	)90	44-46	)50	)50	)0.5
9.50	31.17	368.20	4.84	1.32	1.47	sand	)90	44-46	)50	)50	)0.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04)

Conoco Inc.

Operator :DENNIS WILSON On Site Loc:F-13

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
9.75	31.99	255.60	2.88	1.13	1.51	sand	80-90	42-44	49	40	)0.5
10.00	32.81	279.00	2.05	0.74	1.54	sand	80-90	42-44	)50	44	)0.5
10.25	33.63	382.40	3.87	1.01	1.58	sand	)90	44-46	)50	)50	)0.5
10.50	34.45	378.80	3.75	0.99	1.61	sand	)90	44-46	)50	)50	)0.5
10.75	35.27	313.20	2.89	0.92	1.65	sand	)90	42-44	)50	47	)0.5
11.00	36.09	109.60	1.03	0.94	1.68	sand to silty sand	60-70	38-40	26	20	.21
11.25	36.91	11.40	-6553.54	-57487.18	1.72	undefined	UNDFND	UNDFD	UDF	UDF	UNDF

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

SOUNDING DATA IN FILE CPTF13 11-17-91 09:36

OPERATOR : DENNIS WILSON LOCATION : F-13

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-295		-2.00		-5.8			0.0
0.05	0.2	1	1	0.04	2.87	0.3	1.45	1.45	0.0
0.10	0.3	2	2	0.05	2.75	0.3	1.02	1.02	0.1
0.15	0.5	1	1	0.05	3.56	0.3	1.32	1.32	0.1
0.20	0.7	0	0	0.01	28.00	0.3	44.82	44.82	0.2
0.25	0.8	-1	-1	-0.00	0.50	0.2	-2.46	-2.46	0.0
0.30	1.0	-1	-1	-0.00	0.50	0.2	-2.46	-2.46	0.0
0.35	1.1	-0	-0	-0.00	0.70	0.2	-4.14	-4.14	0.0
0.40	1.3	-1	-1	-0.00	0.47	0.3	-2.99	-2.99	0.0
0.45	1.5	-1	-1	-0.00	0.53	0.2	-2.76	-2.76	0.0
0.50	1.6	0	0	-0.00	-7.00	0.6	99.98	99.98	0.1
0.55	1.8	-0	-0	-0.01	15.50	0.6	-49.99	-49.99	0.1
0.60	2.0	0	0	-0.04	?	0.6	?	?	0.1
0.65	2.1	0	0	0.06	26.00	0.4	13.10	13.10	0.0
0.70	2.3	3	3	0.00	0.18	0.5	1.39	1.39	0.0
0.75	2.5	1	1	0.09	5.77	0.4	1.97	1.97	0.0
0.80	2.6	8	8	0.34	4.27	0.5	0.44	0.44	0.0
0.85	2.8	66	66	0.60	0.91	-0.0	-0.00	-0.00	0.0
0.90	3.0	51	51	0.68	1.35	0.1	0.02	0.02	0.0
0.95	3.1	23	23	0.55	2.37	1.0	0.30	0.30	0.0
1.00	3.3	12	12	0.73	5.90	3.4	2.00	2.00	0.0
1.05	3.4	30	30	1.32	4.45	6.7	1.61	1.61	0.1
1.10	3.6	94	94	2.19	2.33	-2.3	-0.18	-0.18	0.1
1.15	3.8	136	136	2.73	2.00	0.9	0.05	0.05	0.1
1.20	3.9	110	110	1.95	1.77	0.2	0.02	0.02	0.1
1.25	4.1	48	48	1.21	2.53	1.2	0.18	0.18	0.0
1.30	4.3	42	42	0.69	1.64	-2.0	-0.34	-0.34	0.0
1.35	4.4	33	33	0.97	2.96	-4.0	-0.88	-0.88	0.0
1.40	4.6	30	30	0.76	2.53	-0.4	-0.10	-0.10	0.0
1.45	4.8	26	26	0.47	1.82	-4.4	-1.21	-1.21	0.0
1.50	4.9	15	15	0.15	1.00	-2.4	-1.19	-1.19	0.0
1.55	5.1	12	12	0.10	0.86	1.1	0.64	0.64	0.0
1.60	5.2	11	11	0.08	0.72	0.9	0.60	0.60	0.0
1.65	5.4	8	8	0.06	0.81	1.3	1.14	1.14	0.0
1.70	5.6	8	8	0.08	0.98	1.2	1.13	1.13	0.0
1.75	5.7	17	17	0.06	0.36	1.2	0.51	0.51	0.0
1.80	5.9	12	12	0.05	0.41	1.6	0.97	0.97	0.0
1.85	6.1	10	10	0.06	0.57	1.6	1.15	1.15	0.0
1.90	6.2	8	8	0.04	0.53	1.8	1.38	1.51	0.0
1.95	6.4	7	7	0.05	0.69	1.9	1.87	1.72	0.0
2.00	6.6	9	10	0.06	0.60	2.2	1.64	1.48	0.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
2.05	6.7	12	12	0.05	0.44	1.8	1.11	0.94	0.0
2.10	6.9	12	12	0.09	0.77	1.7	1.05	0.83	0.0
2.15	7.1	11	11	0.09	0.83	1.9	1.22	0.94	0.1
2.20	7.2	10	10	0.07	0.62	2.3	1.57	1.23	0.2
2.25	7.4	12	12	0.05	0.42	2.3	1.32	0.99	0.2
2.30	7.5	16	16	0.13	0.82	2.2	1.02	0.73	0.2
2.35	7.7	11	11	0.18	1.55	2.5	1.60	1.15	0.2
2.40	7.9	6	6	0.32	5.07	3.5	4.08	3.18	0.2
2.45	8.0	10	11	0.60	5.69	4.3	2.97	2.39	0.2
2.50	8.2	9	9	0.67	7.33	4.5	3.53	2.80	0.2
2.55	8.4	15	15	0.46	3.13	4.3	2.08	1.59	0.2
2.60	8.5	19	19	0.48	2.52	2.5	0.97	0.56	0.2
2.65	8.7	29	29	0.83	2.89	1.7	0.42	0.14	0.2
2.70	8.9	30	30	1.35	4.54	1.2	0.30	0.01	0.2
2.75	9.0	21	21	1.34	6.34	-0.7	-0.25	-0.68	0.2
2.80	9.2	22	22	0.76	3.43	-1.7	-0.54	-0.98	0.2
2.85	9.4	29	28	0.44	1.56	-2.0	-0.50	-0.86	0.2
2.90	9.5	26	26	0.41	1.55	-2.4	-0.64	-1.05	0.2
2.95	9.7	21	21	0.33	1.60	-2.0	-0.70	-1.24	0.2
3.00	9.8	23	23	0.25	1.09	-1.5	-0.48	-1.00	0.2
3.05	10.0	27	26	0.24	0.91	-1.0	-0.28	-0.74	0.2
3.10	10.2	37	37	0.30	0.82	-0.7	-0.14	-0.49	0.2
3.15	10.3	37	37	0.35	0.94	-0.4	-0.07	-0.43	0.2
3.20	10.5	35	35	0.34	0.98	0.0	0.00	-0.40	0.2
3.25	10.7	42	42	0.39	0.94	0.6	0.10	-0.24	0.2
3.30	10.8	62	62	0.50	0.82	1.2	0.14	-0.10	0.2
3.35	11.0	74	74	0.59	0.80	1.8	0.18	-0.03	0.2
3.40	11.2	80	80	0.69	0.86	2.3	0.21	0.01	0.2
3.45	11.3	80	80	0.71	0.89	2.9	0.26	0.06	0.2
3.50	11.5	79	79	0.66	0.84	3.4	0.31	0.09	0.2
3.55	11.6	82	82	0.56	0.69	3.8	0.34	0.12	0.2
3.60	11.8	86	86	0.68	0.80	4.0	0.34	0.13	0.2
3.65	12.0	74	74	0.65	0.87	3.6	0.35	0.10	0.2
3.70	12.1	71	71	0.60	0.85	4.0	0.40	0.13	0.2
3.75	12.3	70	70	0.62	0.89	4.3	0.44	0.16	0.2
3.80	12.5	67	67	0.61	0.91	4.5	0.48	0.18	0.2
3.85	12.6	58	58	0.52	0.89	4.6	0.57	0.21	0.2
3.90	12.8	64	64	0.45	0.70	4.8	0.54	0.21	0.2
3.95	13.0	70	70	0.50	0.72	2.5	0.26	-0.05	0.2
4.00	13.1	82	82	0.59	0.72	3.2	0.28	0.01	0.2
4.05	13.3	83	83	0.65	0.79	3.5	0.31	0.03	0.2
4.10	13.5	93	93	0.69	0.75	4.0	0.31	0.06	0.2
4.15	13.6	102	102	0.81	0.80	4.4	0.31	0.08	0.2
4.20	13.8	113	114	0.86	0.75	4.8	0.30	0.09	0.
4.25	13.9	124	124	0.98	0.79	5.0	0.29	0.09	0.2
4.30	14.1	154	154	1.19	0.77	5.4	0.25	0.09	0.
4.35	14.3	159	159	1.32	0.83	5.5	0.25	0.09	0.
4.40	14.4	159	159	0.99	0.62	5.6	0.25	0.09	0.
4.45	14.6	160	160	1.07	0.67	5.8	0.26	0.09	0.2
4.50	14.8	179	179	1.30	0.73	5.1	0.21	0.06	0.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	204	204	1.49	0.73	5.5	0.19	0.06	0.2
4.60	15.1	201	201	1.31	0.65	5.8	0.21	0.07	0.2
4.65	15.3	225	225	1.27	0.57	5.8	0.19	0.06	0.2
4.70	15.4	201	201	1.60	0.80	4.5	0.16	0.02	0.2
4.75	15.6	228	228	1.88	0.82	3.3	0.10	-0.03	0.2
4.80	15.7	211	211	1.82	0.87	3.4	0.12	-0.03	0.2
4.85	15.9	192	192	1.54	0.80	3.8	0.14	-0.02	0.2
4.90	16.1	191	191	1.42	0.74	4.5	0.17	0.00	0.2
4.95	16.2	206	206	1.59	0.77	4.8	0.17	0.01	0.2
5.00	16.4	212	212	1.76	0.83	5.1	0.17	0.02	0.2
5.05	16.6	197	197	1.70	0.86	5.4	0.20	0.03	0.2
5.10	16.7	183	183	1.56	0.85	5.6	0.22	0.04	0.2
5.15	16.9	183	183	1.39	0.76	5.8	0.23	0.04	0.5
5.20	17.1	187	187	1.34	0.72	5.8	0.22	0.04	0.5
5.25	17.2	204	204	1.49	0.73	6.0	0.21	0.04	0.5
5.30	17.4	220	220	1.62	0.74	6.2	0.20	0.04	0.5
5.35	17.6	230	230	1.75	0.76	6.4	0.20	0.05	0.5
5.40	17.7	246	246	2.01	0.81	6.4	0.19	0.04	0.5
5.45	17.9	251	251	2.15	0.86	6.6	0.19	0.04	0.5
5.50	18.0	235	235	2.08	0.88	6.8	0.21	0.05	0.5
5.55	18.2	226	226	1.93	0.85	6.8	0.22	0.05	0.5
5.60	18.4	224	224	1.90	0.85	6.9	0.22	0.05	[illegible]
5.65	18.5	226	226	1.53	0.68	7.0	0.22	0.05	[illegible]
5.70	18.7	226	227	1.72	0.76	7.1	0.23	0.05	[illegible]
5.75	18.9	252	252	2.03	0.81	5.8	0.17	0.01	0.5
5.80	19.0	270	270	2.43	0.90	6.3	0.17	0.02	0.5
5.85	19.2	294	294	2.79	0.95	6.8	0.17	0.03	0.5
5.90	19.4	315	315	3.22	1.02	7.1	0.16	0.03	0.5
5.95	19.5	319	319	3.46	1.08	7.4	0.17	0.03	0.5
6.00	19.7	309	309	3.42	1.11	7.5	0.17	0.04	0.5
6.05	19.8	326	326	3.40	1.05	7.7	0.17	0.04	0.5
6.10	20.0	348	349	3.66	1.05	7.8	0.16	0.04	0.5
6.15	20.2	370	370	3.61	0.98	7.8	0.15	0.03	0.5
6.20	20.3	389	389	4.02	1.03	7.7	0.14	0.03	0.5
6.25	20.5	443	443	4.93	1.11	7.8	0.13	0.02	0.5
6.30	20.7	462	463	5.33	1.15	7.8	0.12	0.02	0.5
6.35	20.8	459	460	5.49	1.20	7.5	0.12	0.02	0.9
6.40	21.0	501	501	6.10	1.22	7.7	0.11	0.02	1.0
6.45	21.2	514	514	6.88	1.34	7.4	0.10	0.01	1.0
6.50	21.3	498	498	6.89	1.38	7.6	0.11	0.01	1.0
6.55	21.5	486	486	6.55	1.35	7.2	0.11	0.01	1.0
6.60	21.7	512	512	7.01	1.37	7.0	0.10	0.00	1.0
6.65	21.8	541	541	7.23	1.34	6.4	0.09	-0.01	1.0
6.70	22.0	509	509	0.05	0.01	6.1	0.09	-0.01	1.0
6.75	22.1	502	503	5.92	1.18	5.5	0.08	-0.02	1.0
6.80	22.3	156	156	6.00	3.85	5.7	0.26	-0.06	1.0
6.85	22.5	525	525	6.43	1.23	4.9	0.07	-0.03	[illegible]
6.90	22.6	510	510	6.74	1.32	4.2	0.06	-0.04	[illegible]
6.95	22.8	496	496	7.14	1.44	4.5	0.06	-0.04	[illegible]
7.00	23.0	513	514	7.74	1.51	4.5	0.06	-0.04	1.2

EPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	494	495	8.09	1.64	4.9	0.07	-0.04	1.3
7.10	23.3	467	467	7.33	1.57	5.0	0.08	-0.04	1.2
7.15	23.5	450	450	6.84	1.52	4.9	0.08	-0.04	1.4
7.20	23.6	471	471	6.69	1.42	5.0	0.08	-0.04	1.0
7.25	23.8	435	435	6.35	1.46	4.7	0.08	-0.05	1.2
7.30	23.9	420	420	5.72	1.36	4.4	0.08	-0.06	1.3
7.35	24.1	428	428	5.52	1.29	4.3	0.07	-0.06	1.2
7.40	24.3	432	432	5.85	1.35	3.9	0.07	-0.07	1.4
7.45	24.4	454	454	6.53	1.44	4.0	0.06	-0.06	1.3
7.50	24.6	449	449	6.88	1.53	4.3	0.07	-0.06	1.3
7.55	24.8	417	417	6.46	1.55	4.3	0.07	-0.07	1.3
7.60	24.9	429	429	6.24	1.45	4.2	0.07	-0.07	1.4
7.65	25.1	434	434	6.50	1.50	4.2	0.07	-0.07	1.5
7.70	25.3	425	425	5.18	1.22	4.1	0.07	-0.07	1.6
7.75	25.4	420	420	5.40	1.29	4.2	0.07	-0.07	1.3
7.80	25.6	440	440	5.62	1.28	3.9	0.06	-0.07	1.6
7.85	25.8	491	491	6.99	1.42	3.9	0.06	-0.07	1.5
7.90	25.9	517	517	8.41	1.63	4.2	0.06	-0.06	1.5
7.95	26.1	529	529	8.83	1.67	4.6	0.06	-0.06	1.5
8.00	26.2	521	522	9.07	1.74	4.9	0.07	-0.05	1.5
8.05	26.4	549	549	9.60	1.75	5.2	0.07	-0.05	1.5
8.10	26.6	471	471	9.82	2.08	5.2	0.08	-0.06	1.5
8.15	26.7	536	536	10.53	1.96	5.5	0.07	-0.05	1.6
8.20	26.9	452	452	10.78	2.39	5.5	0.09	-0.06	1.6
8.25	27.1	503	503	10.32	2.05	5.5	0.08	-0.05	1.6
8.30	27.2	489	489	9.67	1.98	5.5	0.08	-0.05	1.6
8.35	27.4	445	445	8.80	1.98	5.5	0.09	-0.06	1.6
8.40	27.6	432	432	8.03	1.86	5.5	0.09	-0.06	1.6
8.45	27.7	403	403	7.29	1.81	5.2	0.09	-0.07	1.6
8.50	27.9	385	385	6.42	1.67	4.8	0.09	-0.09	1.7
8.55	28.1	368	368	5.73	1.55	4.8	0.09	-0.09	1.8
8.60	28.2	392	392	5.37	1.37	4.4	0.08	-0.10	1.6
8.65	28.4	386	386	5.65	1.46	3.9	0.07	-0.11	1.9
8.70	28.5	349	349	4.61	1.32	3.3	0.07	-0.13	1.7
8.75	28.7	397	397	5.94	1.50	3.5	0.06	-0.11	2.0
8.80	28.9	488	488	5.97	1.22	3.4	0.05	-0.10	1.9
8.85	29.0	451	451	6.84	1.52	3.5	0.06	-0.10	1.9
8.90	29.2	375	375	5.92	1.58	3.3	0.06	-0.13	2.0
8.95	29.4	362	363	5.36	1.48	3.5	0.07	-0.13	2.1
9.00	29.5	333	333	4.42	1.33	3.0	0.07	-0.15	2.0
9.05	29.7	314	314	3.74	1.19	2.6	0.06	-0.17	2.0
9.10	29.9	313	313	3.27	1.05	2.2	0.05	-0.19	2.1
9.15	30.0	350	350	3.67	1.05	1.8	0.04	-0.18	2.1
9.20	30.2	394	394	4.70	1.19	1.4	0.03	-0.17	2.1
9.25	30.3	383	383	4.94	1.29	1.3	0.02	-0.17	2.1
9.30	30.5	366	366	5.19	1.42	1.2	0.02	-0.18	2.1
9.35	30.7	422	422	4.90	1.16	1.2	0.02	-0.16	2.1
9.40	30.8	418	418	5.18	1.24	1.0	0.02	-0.17	2.1
9.45	31.0	339	339	4.69	1.38	0.6	0.01	-0.22	2.1
9.50	31.2	296	296	4.25	1.44	0.6	0.01	-0.25	2.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCL[illegible]ON I deg
9.55	31.3	290	290	3.34	1.15	0.3	0.01	-0.27	2.1
9.60	31.5	283	283	3.12	1.10	-0.3	-0.01	-0.29	2.1
9.65	31.7	261	261	2.99	1.14	-0.7	-0.02	-0.33	2.1
9.70	31.8	228	228	2.60	1.14	-0.8	-0.02	-0.38	2.1
9.75	32.0	216	216	2.35	1.09	-0.9	-0.03	-0.40	2.1
9.80	32.2	241	241	1.49	0.62	-1.4	-0.04	-0.38	2.1
9.85	32.3	241	241	1.50	0.62	-1.8	-0.05	-0.39	2.7
9.90	32.5	285	285	1.95	0.69	2.6	0.07	-0.22	2.8
9.95	32.6	307	307	2.46	0.80	1.1	0.03	-0.24	2.8
10.00	32.8	321	321	2.87	0.89	1.5	0.03	-0.23	2.8
10.05	33.0	355	355	3.40	0.96	2.4	0.05	-0.19	2.8
10.10	33.1	383	383	3.96	1.04	3.1	0.06	-0.16	2.8
10.15	33.3	396	396	4.37	1.10	3.7	0.07	-0.15	2.9
10.20	33.5	394	394	4.03	1.02	3.8	0.07	-0.15	2.9
10.25	33.6	384	384	3.59	0.94	3.5	0.07	-0.16	2.9
10.30	33.8	386	386	3.60	0.93	2.9	0.05	-0.17	2.9
10.35	34.0	366	366	3.75	1.02	2.4	0.05	-0.19	2.9
10.40	34.1	368	368	3.77	1.03	2.0	0.04	-0.20	2.9
10.45	34.3	386	386	3.78	0.98	1.6	0.03	-0.20	2.9
10.50	34.4	388	388	3.83	0.99	0.6	0.01	-0.22	2.9
10.55	34.6	365	365	3.85	1.06	0.3	0.01	-0.24	2.9
10.60	34.8	333	333	3.55	1.06	-0.2	-0.00	-0.27	2.9
10.65	34.9	314	314	2.85	0.91	-0.5	-0.01	-0.30	[illegible]
10.70	35.1	291	291	2.20	0.76	-1.1	-0.03	-0.34	[illegible]
10.75	35.3	263	263	1.98	0.75	-1.5	-0.04	-0.39	2.9
10.80	35.4	249	249	0.95	0.38	-1.5	-0.04	-0.41	2.9
10.85	35.6	183	183	1.27	0.70	-2.7	-0.11	-0.61	2.9
10.90	35.8	69	69	1.53	2.20	-0.1	-0.01	-1.34	3.2
10.95	35.9	30	30	1.04	3.48	-0.1	-0.01	-3.13	3.2
11.00	36.1	17	17	0.37	2.19	2.3	0.98	-4.56	3.4
11.05	36.3	13	13	0.10	0.77	3.5	1.91	-5.18	3.4
11.10	36.4	12	12	0.08	0.65	4.1	2.46	-5.42	3.4
11.15	36.6	11	11	0.06	0.59	4.5	2.95	-5.74	3.4
11.20	36.7	11	11	0.07	0.61	4.9	3.38	-5.65	3.4
11.25	36.9	10	10	?	?	5.3	3.73	-5.67	3.4
11.30	37.1	10	10	?	?	5.8	4.29	-5.66	3.4

WRITE NUMBER OF RODS USED ___

FIELD ACTIVITY LOG SHEET

CONOCO

ıge 1 of 1

ocation: ~~DuPont~~ G-06, Start Time: 0745, End Time: 0845

te: DuPont, Town: E. Chicago, State: IND

nit: 1, Operators: Sellis, Fass, Wilson,

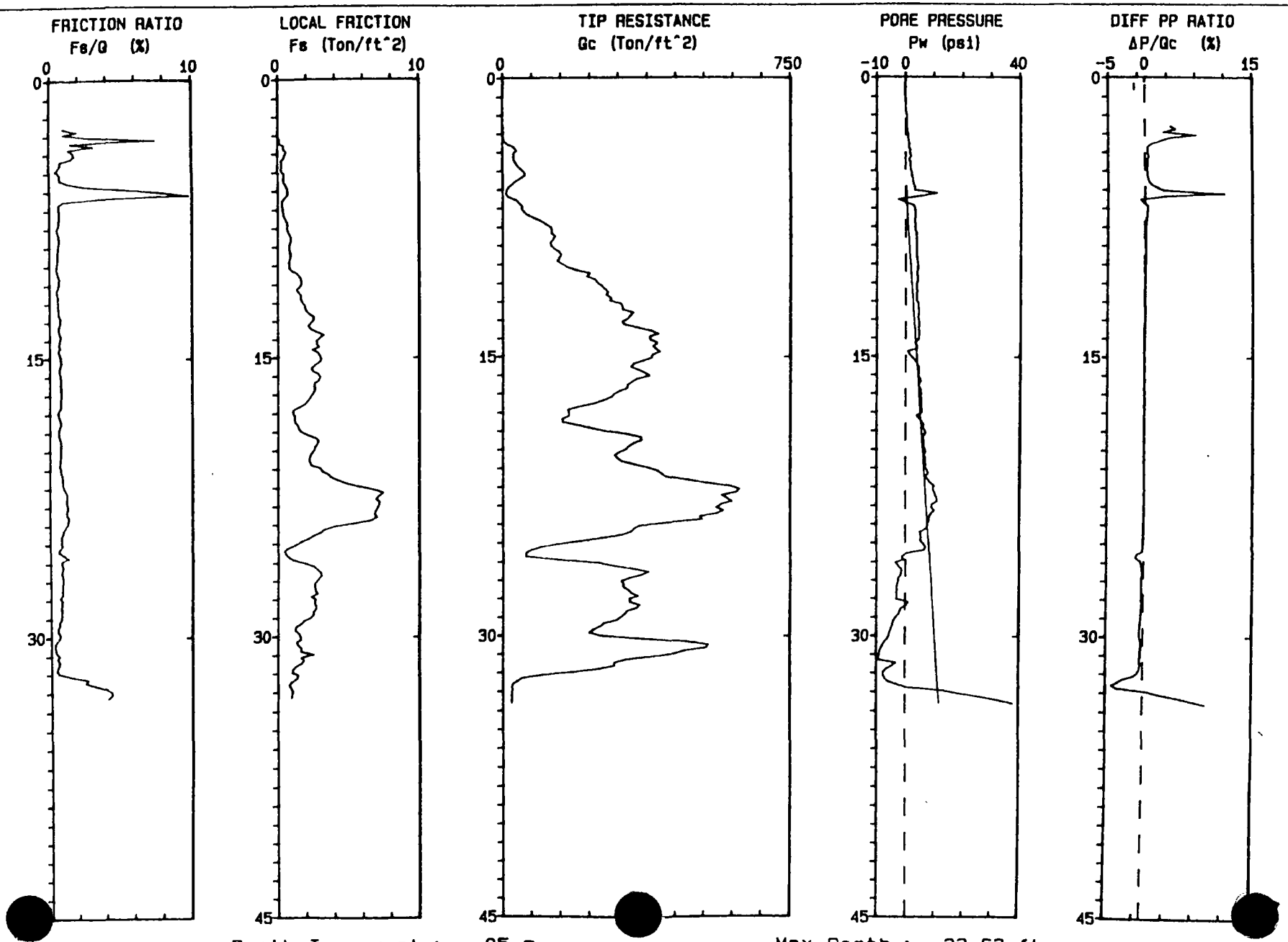
oj. Consultant: Lounsbury, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-19-91	0750	0820	G-06	CPT G6	✓				33.6		2	F	Clay At 52.8

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-19-91 08:01 FILE CPTG6 Pg 1 / 1

LOCATION : G-06 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 33.63 ft

SOUNDING DATA IN FILE CPTG6 11-19-91 08:01

OPERATOR : CALVIN SELLS LOCATION : G-06

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.04		-8.9			0.2
0.05	0.2	0	-0	0.00	?	-0.1	?	?	0.1
0.10	0.3	1	1	0.00	0.08	-0.2	-2.59	-2.59	0.1
0.15	0.5	1	1	0.00	0.00	-0.2	-1.97	-1.97	0.1
0.20	0.7	1	1	0.00	0.00	-0.2	-2.39	-2.39	0.1
0.25	0.8	0	0	0.00	3.00	-0.2	-10.34	-10.34	0.1
0.30	1.0	0	0	0.01	16.00	-0.2	-31.03	-31.03	0.1
0.35	1.1	-0	-0	0.01	-17.00	0.1	-24.13	-24.13	0.1
0.40	1.3	-0	-0	0.01	-17.00	0.2	-27.58	-27.58	0.1
0.45	1.5	-0	-0	0.01	-17.00	0.1	-24.13	-24.13	0.1
0.50	1.6	-0	-0	0.01	-17.00	0.1	-24.13	-24.13	0.1
0.55	1.8	-0	-0	0.01	-17.00	0.1	-24.13	-24.13	0.1
0.60	2.0	-0	-0	0.01	-8.50	0.3	-22.41	-22.41	0.1
0.65	2.1	-0	-0	0.01	-16.00	0.5	-79.29	-79.29	0.2
0.70	2.3	-0	-0	0.01	-17.00	0.5	-79.29	-79.29	0.1
0.75	2.5	-0	-0	0.01	-17.00	0.5	-82.74	-82.74	0.1
0.80	2.6	1	1	0.01	2.36	0.5	6.16	6.16	0.1
0.85	2.8	1	1	0.02	1.62	0.6	3.85	3.85	0.1
0.90	3.0	2	2	0.02	1.05	0.7	2.59	2.59	0.1
0.95	3.1	1	1	0.03	2.17	1.0	5.75	5.75	0.1
1.00	3.3	2	2	0.15	7.44	0.9	3.02	3.02	0.1
1.05	3.4	4	4	0.06	1.45	1.1	1.85	1.85	0.2
1.10	3.6	13	13	0.41	3.04	1.4	0.78	0.78	0.1
1.15	3.8	31	31	0.43	1.38	1.2	0.27	0.27	0.1
1.20	3.9	36	36	0.62	1.71	1.7	0.33	0.33	0.1
1.25	4.1	29	29	0.52	1.83	1.6	0.41	0.41	0.1
1.30	4.3	28	28	0.42	1.46	2.1	0.53	0.53	0.1
1.35	4.4	29	29	0.23	0.81	1.3	0.34	0.34	0.1
1.40	4.6	33	33	0.26	0.78	1.7	0.38	0.38	0.1
1.45	4.8	39	39	0.26	0.67	1.7	0.31	0.31	0.1
1.50	4.9	47	47	0.22	0.47	1.9	0.28	0.28	0.1
1.55	5.1	56	56	0.40	0.72	2.1	0.27	0.27	0.2
1.60	5.2	58	58	0.43	0.74	2.1	0.26	0.26	0.2
1.65	5.4	46	46	0.35	0.76	2.4	0.37	0.37	0.2
1.70	5.6	33	33	0.42	1.25	2.5	0.55	0.55	0.2
1.75	5.7	24	24	0.57	2.34	2.8	0.83	0.83	0.2
1.80	5.9	14	14	0.67	4.80	3.1	1.59	1.59	0.2
1.85	6.1	9	9	0.69	7.81	3.2	2.56	2.56	0.2
1.90	6.2	7	8	0.69	9.39	10.9	10.66	10.59	0.2
1.95	6.4	13	13	0.48	3.75	5.0	2.85	2.77	0.2
2.00	6.6	33	33	0.31	0.93	-2.7	-0.60	-0.65	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	42	42	0.27	0.63	-0.2	-0.03	-0.08	0.2
2.10	6.9	49	49	0.32	0.66	2.8	0.41	0.36	0.2
2.15	7.1	49	49	0.34	0.69	3.2	0.46	0.40	0.2
2.20	7.2	55	55	0.38	0.69	3.3	0.44	0.37	0.2
2.25	7.4	64	64	0.44	0.68	3.4	0.38	0.32	0.2
2.30	7.5	81	81	0.54	0.67	3.3	0.29	0.23	0.2
2.35	7.7	99	99	0.65	0.65	3.2	0.23	0.18	0.2
2.40	7.9	111	111	0.71	0.64	3.3	0.21	0.16	0.2
2.45	8.0	124	124	0.65	0.52	3.3	0.19	0.14	0.2
2.50	8.2	128	128	0.73	0.57	3.4	0.19	0.14	0.2
2.55	8.4	127	127	0.82	0.64	3.7	0.21	0.15	0.2
2.60	8.5	136	136	0.94	0.69	3.7	0.19	0.14	0.2
2.65	8.7	131	131	0.92	0.70	3.7	0.20	0.14	0.2
2.70	8.9	123	123	0.83	0.67	3.7	0.22	0.15	0.2
2.75	9.0	125	125	0.79	0.63	3.7	0.21	0.14	0.2
2.80	9.2	133	133	0.81	0.61	3.8	0.21	0.13	0.2
2.85	9.4	147	147	0.88	0.60	3.8	0.19	0.12	0.2
2.90	9.5	152	152	0.91	0.60	3.8	0.18	0.11	0.2
2.95	9.7	148	148	0.86	0.58	3.9	0.19	0.12	0.2
3.00	9.8	142	142	0.78	0.55	4.1	0.21	0.12	0.2
3.05	10.0	154	154	0.82	0.53	4.2	0.19	0.12	0.2
3.10	10.2	168	168	0.81	0.49	4.2	0.18	0.10	[illegible]
3.15	10.3	190	191	1.06	0.56	4.2	0.16	0.09	[illegible]
3.20	10.5	226	226	1.41	0.62	3.9	0.12	0.06	0.2
3.25	10.7	218	218	1.57	0.72	4.1	0.14	0.07	0.2
3.30	10.8	240	240	1.65	0.69	4.3	0.13	0.07	0.2
3.35	11.0	245	245	1.67	0.68	4.1	0.12	0.06	0.2
3.40	11.2	256	256	1.59	0.62	3.8	0.11	0.04	0.2
3.45	11.3	264	264	1.30	0.49	3.7	0.10	0.04	0.2
3.50	11.5	274	274	1.47	0.54	4.1	0.11	0.05	0.2
3.55	11.6	269	269	1.63	0.61	3.7	0.10	0.04	0.2
3.60	11.8	281	281	1.62	0.58	3.9	0.10	0.04	0.2
3.65	12.0	279	279	1.71	0.61	3.7	0.10	0.03	0.2
3.70	12.1	307	308	1.87	0.61	4.4	0.10	0.04	0.2
3.75	12.3	311	312	1.93	0.62	4.4	0.10	0.04	0.2
3.80	12.5	312	312	1.99	0.64	4.6	0.11	0.04	0.2
3.85	12.6	340	340	2.22	0.65	4.8	0.10	0.04	0.2
3.90	12.8	331	331	2.54	0.77	4.4	0.10	0.03	0.2
3.95	13.0	324	324	2.51	0.78	4.4	0.10	0.03	0.2
4.00	13.1	310	310	2.33	0.75	4.6	0.11	0.04	0.2
4.05	13.3	315	315	2.12	0.67	4.9	0.11	0.04	0.2
4.10	13.5	350	350	2.28	0.65	4.5	0.09	0.03	0.2
4.15	13.6	386	386	2.67	0.69	4.6	0.09	0.03	0.2
4.20	13.8	406	406	3.24	0.80	4.7	0.08	0.02	0.2
4.25	13.9	381	381	2.95	0.77	4.7	0.09	0.02	0.2
4.30	14.1	382	383	2.70	0.70	4.5	0.08	0.02	0.1
4.35	14.3	403	403	2.71	0.67	3.4	0.06	-0.00	[illegible]
4.40	14.4	390	390	2.87	0.74	3.7	0.07	0.00	[illegible]
4.45	14.6	397	397	2.42	0.61	4.1	0.07	0.01	0.1
4.50	14.8	409	409	2.82	0.69	0.6	0.01	-0.06	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	389	389	2.96	0.76	1.4	0.03	-0.04	0.1
4.60	15.1	385	385	3.05	0.79	2.4	0.05	-0.03	0.1
4.65	15.3	363	363	2.94	0.81	3.4	0.07	-0.01	0.1
4.70	15.4	338	338	2.60	0.77	4.0	0.09	-0.00	0.2
4.75	15.6	332	333	2.37	0.71	4.5	0.10	0.01	0.2
4.80	15.7	352	352	2.41	0.66	4.7	0.10	0.01	0.1
4.85	15.9	370	371	2.83	0.77	4.7	0.09	0.01	0.1
4.90	16.1	382	382	2.98	0.78	4.4	0.08	0.00	0.1
4.95	16.2	347	347	2.88	0.83	5.1	0.11	0.01	0.1
5.00	16.4	335	335	2.58	0.77	5.3	0.11	0.02	0.1
5.05	16.6	323	323	2.53	0.78	4.6	0.10	0.00	0.1
5.10	16.7	322	322	2.61	0.81	5.0	0.11	0.01	0.1
5.15	16.9	302	302	2.51	0.83	5.4	0.13	0.02	0.1
5.20	17.1	288	288	2.37	0.82	5.4	0.14	0.02	0.1
5.25	17.2	280	281	2.24	0.80	5.3	0.14	0.01	0.1
5.30	17.4	260	260	2.07	0.80	5.6	0.16	0.02	0.1
5.35	17.6	235	235	1.87	0.79	5.4	0.17	0.01	0.1
5.40	17.7	197	197	1.47	0.75	5.6	0.20	0.02	0.1
5.45	17.9	168	168	1.03	0.61	5.7	0.25	0.03	0.1
5.50	18.0	172	172	1.05	0.61	5.7	0.24	0.02	0.1
5.55	18.2	170	170	1.18	0.69	3.8	0.16	-0.06	0.1
5.60	18.4	153	153	1.16	0.75	4.7	0.22	-0.03	0.1
.65	18.5	154	154	1.21	0.78	5.7	0.27	0.01	0.1
5.70	18.7	193	193	1.41	0.73	6.3	0.23	0.03	0.1
5.75	18.9	227	227	1.46	0.64	6.1	0.19	0.02	0.1
5.80	19.0	263	263	1.61	0.61	6.7	0.18	0.03	0.2
5.85	19.2	322	322	2.05	0.64	7.0	0.16	0.03	0.2
5.90	19.4	360	361	2.64	0.73	5.9	0.12	0.00	0.1
5.95	19.5	362	362	2.87	0.79	6.2	0.12	0.01	0.2
6.00	19.7	340	340	2.76	0.81	6.4	0.13	0.01	0.2
6.05	19.8	327	328	2.60	0.79	6.3	0.14	0.01	0.2
6.10	20.0	319	319	2.54	0.80	6.7	0.15	0.01	0.2
6.15	20.2	303	303	2.37	0.78	7.0	0.17	0.02	0.2
6.20	20.3	290	290	2.26	0.78	6.3	0.16	0.00	0.2
6.25	20.5	298	298	2.19	0.74	7.0	0.17	0.02	0.2
6.30	20.7	311	312	2.24	0.72	6.7	0.15	0.01	0.2
6.35	20.8	343	343	2.37	0.69	7.1	0.15	0.01	0.2
6.40	21.0	375	375	3.00	0.80	7.0	0.13	0.01	0.2
6.45	21.2	404	404	3.14	0.78	7.6	0.14	0.02	0.2
6.50	21.3	414	414	3.56	0.86	8.0	0.14	0.02	0.2
6.55	21.5	425	426	3.79	0.89	6.8	0.12	0.00	0.2
6.60	21.7	477	477	4.28	0.90	7.9	0.12	0.02	0.2
6.65	21.8	528	528	4.88	0.92	8.7	0.12	0.03	0.2
6.70	22.0	594	594	5.82	0.98	10.2	0.12	0.04	0.2
6.75	22.1	620	620	6.90	1.11	9.6	0.11	0.03	0.2
6.80	22.3	611	611	7.48	1.23	10.2	0.12	0.04	0.2
6.85	22.5	572	572	7.15	1.25	10.6	0.13	0.04	0.2
6.90	22.6	586	586	6.92	1.18	11.0	0.14	0.05	0.2
6.95	22.8	598	598	7.23	1.21	11.2	0.13	0.05	0.2
7.00	23.0	569	570	7.14	1.25	9.3	0.12	0.03	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	557	557	7.04	1.27	9.1	0.12	0.02	0.2
7.10	23.3	577	577	6.89	1.19	10.2	0.13	0.03	0.2
7.15	23.5	561	561	6.84	1.22	9.1	0.12	0.02	0.2
7.20	23.6	513	513	6.99	1.36	8.3	0.12	0.01	0.2
7.25	23.8	519	519	6.62	1.28	8.3	0.12	0.01	0.2
7.30	23.9	430	430	5.47	1.27	7.9	0.13	0.00	0.2
7.35	24.1	356	356	3.99	1.12	7.6	0.15	-0.00	0.2
7.40	24.3	340	341	3.28	0.96	7.1	0.15	-0.02	0.2
7.45	24.4	332	332	2.99	0.90	5.1	0.11	-0.06	0.5
7.50	24.6	307	307	2.47	0.81	5.3	0.12	-0.06	0.3
7.55	24.8	261	261	2.15	0.83	5.4	0.15	-0.07	1.4
7.60	24.9	203	203	1.64	0.81	5.3	0.19	-0.10	0.2
7.65	25.1	145	146	1.25	0.86	6.4	0.32	-0.09	0.9
7.70	25.3	98	98	0.66	0.70	7.1	0.52	-0.09	3.4
7.75	25.4	73	74	0.44	0.60	6.6	0.65	-0.17	8.1
7.80	25.6	58	58	0.53	0.92	0.2	0.02	-1.04	0.5
7.85	25.8	58	58	0.75	1.28	-1.4	-0.17	-1.22	0.2
7.90	25.9	142	142	1.12	0.79	-0.6	-0.04	-0.48	0.2
7.95	26.1	247	247	1.97	0.80	-3.6	-0.11	-0.36	0.2
8.00	26.2	286	286	2.55	0.89	-2.5	-0.06	-0.28	0.2
8.05	26.4	339	339	2.77	0.82	-1.5	-0.03	-0.22	0.2
8.10	26.6	386	380	3.02	0.79	-1.4	-0.03	-0.20	[illegible]
8.15	26.7	362	362	3.07	0.85	-1.5	-0.03	-0.21	[illegible]
8.20	26.9	330	330	2.86	0.86	-2.4	-0.05	-0.25	0.2
8.25	27.1	307	307	2.67	0.87	-2.5	-0.06	-0.27	0.2
8.30	27.2	313	312	2.53	0.81	-2.6	-0.06	-0.28	0.2
8.35	27.4	312	312	2.59	0.83	-3.1	-0.07	-0.28	0.2
8.40	27.6	326	326	2.62	0.80	-2.9	-0.06	-0.27	0.2
8.45	27.7	334	334	2.79	0.84	-3.1	-0.07	-0.27	0.2
8.50	27.9	351	351	2.32	0.66	-2.9	-0.06	-0.25	0.2
8.55	28.1	329	329	2.66	0.81	-3.2	-0.07	-0.28	0.2
8.60	28.2	330	330	2.54	0.77	1.1	0.02	-0.18	0.2
8.65	28.4	356	356	2.66	0.75	0.5	0.01	-0.19	0.2
8.70	28.5	348	348	2.67	0.77	-1.5	-0.03	-0.23	0.2
8.75	28.7	322	322	2.47	0.77	-2.0	-0.04	-0.26	0.2
8.80	28.9	317	317	2.48	0.78	-2.2	-0.05	-0.28	0.2
8.85	29.0	306	306	2.26	0.74	-3.4	-0.08	-0.31	0.3
8.90	29.2	295	294	1.81	0.61	-4.1	-0.10	-0.35	0.3
8.95	29.4	261	261	1.60	0.62	-4.4	-0.12	-0.40	0.3
9.00	29.5	253	253	1.25	0.49	-4.7	-0.13	-0.42	0.3
9.05	29.7	234	234	1.16	0.49	-5.2	-0.16	-0.47	0.3
9.10	29.9	223	223	1.46	0.65	-5.6	-0.18	-0.51	0.3
9.15	30.0	253	253	1.57	0.62	-5.8	-0.16	-0.46	0.3
9.20	30.2	357	357	1.62	0.45	-6.4	-0.13	-0.34	0.3
9.25	30.3	476	476	1.29	0.27	-7.3	-0.11	-0.27	0.3
9.30	30.5	537	537	1.42	0.26	-8.0	-0.11	-0.25	0.3
9.35	30.7	533	533	1.64	0.31	-8.5	-0.11	-0.26	[illegible]
9.40	30.8	474	474	1.59	0.34	-9.0	-0.14	-0.30	[illegible]
9.45	31.0	447	446	2.50	0.56	-9.0	-0.14	-0.32	0.3
9.50	31.2	381	381	1.63	0.43	-9.3	-0.18	-0.38	0.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	315	315	1.82	0.58	-9.3	-0.21	-0.46	0.3
9.60	31.5	288	288	1.63	0.56	-3.1	-0.08	-0.35	0.3
9.65	31.7	290	290	1.25	0.43	-4.7	-0.12	-0.39	0.3
9.70	31.8	248	248	1.00	0.40	-6.7	-0.19	-0.52	0.3
9.75	32.0	184	184	0.99	0.54	-7.6	-0.30	-0.74	0.3
9.80	32.2	105	105	1.43	1.36	-7.7	-0.53	-1.30	0.3
9.85	32.3	50	50	1.31	2.60	-7.1	-1.01	-2.65	0.3
9.90	32.5	37	37	0.91	2.45	-6.1	-1.18	-3.40	0.3
9.95	32.6	25	25	0.78	3.12	-3.1	-0.90	-4.21	0.3
10.00	32.8	23	23	0.90	3.92	0.3	0.10	-3.54	0.3
10.05	33.0	24	24	1.03	4.33	13.5	4.10	0.56	0.3
10.10	33.1	23	24	0.99	4.22	18.8	5.77	2.18	0.3
10.15	33.3	23	23	0.93	4.04	26.6	8.33	4.64	0.3
10.20	33.5	23	23	?	?	32.8	10.49	6.69	0.3
10.25	33.6	22	22	?	?	38.2	12.71	8.73	0.3

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:G-06
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-19-91 08:01
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Ec - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.50	0.00	0.33	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.00	0.01	0.00	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	0.71	0.02	3.20	0.18	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	19.17	0.37	1.90	0.23	sandy silt to clayey silt	UNDFND	UNDFD	7	1.8
1.55	5	38.67	0.30	0.77	0.27	silty sand to sandy silt	50-60	42-44	12	UNDEFINED
1.85	6	30.67	0.52	1.70	0.32	sandy silt to clayey silt	UNDFND	UNDFD	12	3.0
2.15	7	32.17	0.40	1.25	0.36	silty sand to sandy silt	40-50	40-42	10	UNDEFINED
2.45	8	89.00	0.56	0.63	0.40	sand to silty sand	70-80	44-46	21	UNDEFINED
2.75	9	128.33	0.84	0.65	0.45	sand	80-90	44-46	25	UNDEFINED
3.05	10	146.00	0.84	0.58	0.49	sand	80-90	44-46	28	UNDEFINED
3.35	11	214.50	1.36	0.63	0.53	sand	>90	46-48	41	UNDEFINED
3.65	12	270.50	1.55	0.57	0.57	sand	>90	46-48	>50	UNDEFINED
3.95	13	320.83	2.18	0.68	0.62	sand	>90	46-48	>50	UNDEFINED
4.25	14	358.00	2.60	0.73	0.66	gravelly sand to sand	>90	>48	>50	UNDEFINED
4.55	15	395.00	2.75	0.70	0.70	gravelly sand to sand	>90	>48	>50	UNDEFINED
4.85	16	356.67	2.70	0.76	0.75	sand	>90	46-48	>50	UNDEFINED
5.15	17	335.17	2.68	0.80	0.79	sand	>90	46-48	>50	UNDEFINED
5.45	18	238.00	1.84	0.77	0.83	sand	>90	44-46	46	UNDEFI
5.75	19	178.17	1.24	0.70	0.88	sand	80-90	44-46	34	UNDEFINED
6.05	20	329.00	2.42	0.74	0.92	sand	>90	46-48	>50	UNDEFINED
6.40	21	319.86	2.42	0.76	0.97	sand	>90	46-48	>50	UNDEFINED
6.70	22	473.67	4.25	0.90	1.01	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.00	23	592.67	7.14	1.20	1.06	sand	>90	>48	>50	UNDEFINED
7.35	24	501.86	6.26	1.25	1.10	sand	>90	46-48	>50	UNDEFINED
7.65	25	264.67	2.30	0.87	1.15	sand	>90	44-46	>50	UNDEFINED
7.95	26	112.67	0.91	0.81	1.19	sand to silty sand	60-70	40-42	27	UNDEFINED
8.25	27	334.00	2.82	0.85	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	327.50	2.58	0.79	1.28	sand	>90	44-46	>50	UNDEFINED
8.85	29	329.83	2.51	0.76	1.32	sand	>90	44-46	>50	UNDEFINED
9.15	30	253.17	1.47	0.58	1.36	sand	80-90	42-44	45	UNDEFINED
9.45	31	470.67	1.68	0.36	1.41	gravelly sand to sand	>90	46-48	>50	UNDEFINED
9.75	32	284.33	1.39	0.49	1.45	gravelly sand to sand	>90	42-44	45	UNDEFINED
10.05	33	44.00	1.06	2.41	1.49	sandy silt to clayey silt	UNDFND	UNDFD	17	4.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 252 # sounding

Initial Baseline

Qc	Fs	Pw	Inc
-261	-7.04	-8.1	0.1

Dep

Qc -0

Fs 0.00

Pw -0.1

Inc 0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: [redacted] G-16, Start Time: 10:40, End Time: 11:20

Site: DuPont, Town: EAST CHICAGO, State: IND

Unit: 1, Operators: D. Wilson, M. Kasl, _____, _____

Proj. Consultant: _____, Company: DERS

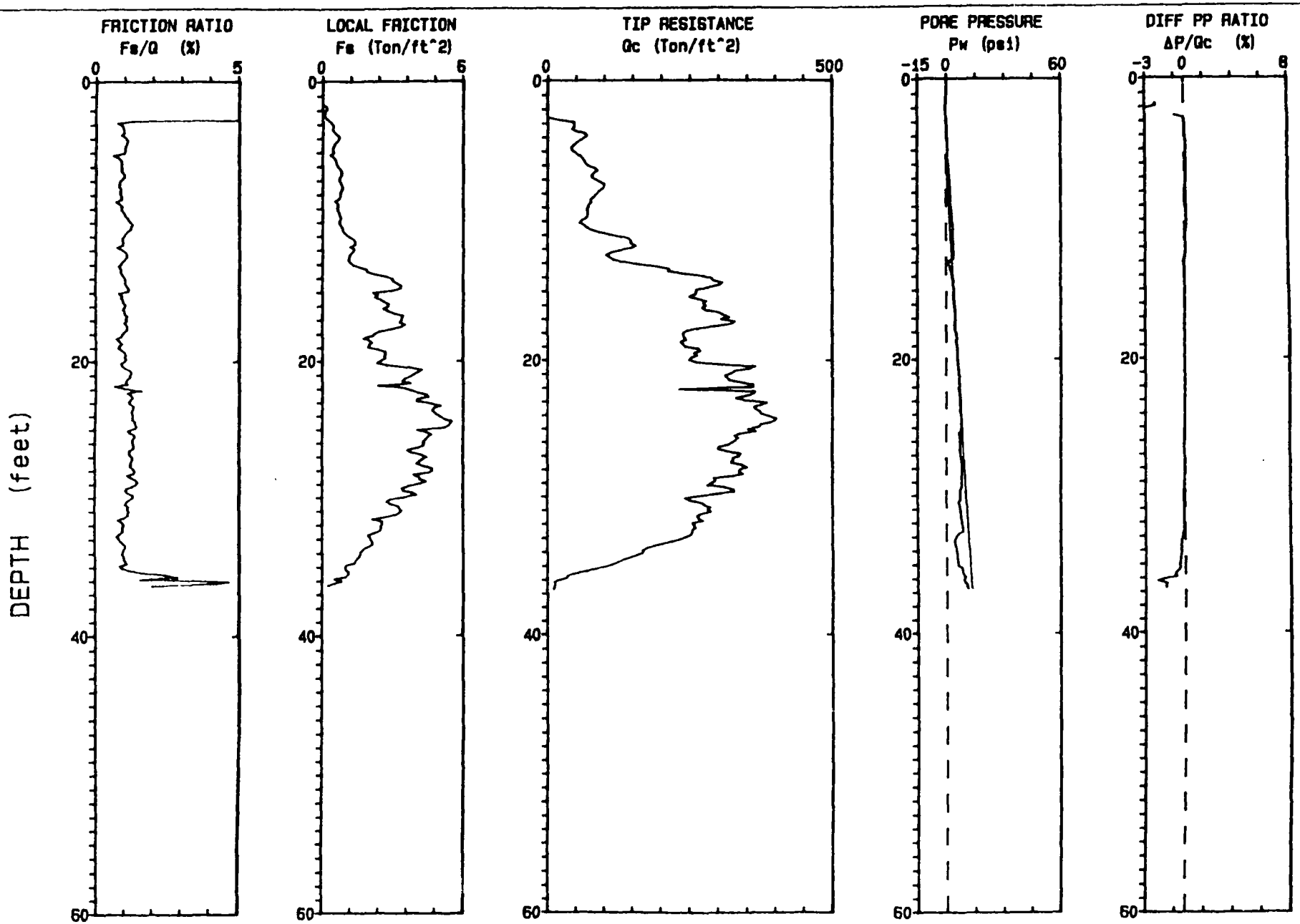
Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11/17/91	10:40	11:20	G-16	CPTG16	✓				36.7	1	2		CLAY at 36.1'

Conoco, Inc.

Operator : DENNIS WILSON
Location : G-16

CPT Date : 11-17-91 10:48
Cone Used : 364

File No. CPTG16 Pg 1 / 1
Hole No. 1



Depth Increment : .05 m

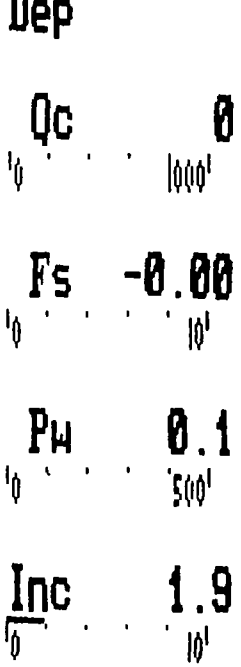
Max Depth : 36.75 ft

G-16

File space: 180 m sounding

Initial Baseline

Qc	Fs	Pw	Inc
-295	-1.99	-5.7	1.6



F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

SOUNDING DATA IN FILE CPTG16 11-17-91 10:48

OPERATOR : DENNIS WILSON LOCATION : G-16

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-296		-1.99		-5.5			0.1
0.05	0.2	-0	-0	0.00	-0.67	0.1	-4.60	-4.60	0.0
0.10	0.3	-0	-0	0.00	0.00	0.1	-1.48	-1.48	0.0
0.15	0.5	-0	-0	-0.00	0.50	0.1	-12.07	-12.07	0.0
0.20	0.7	-0	-0	0.00	0.00	0.1	-5.17	-5.17	0.0
0.25	0.8	-0	-0	0.00	0.00	0.1	-2.76	-2.76	0.0
0.30	1.0	-0	-0	0.00	0.00	0.1	-2.76	-2.76	0.0
0.35	1.1	-0	-0	0.00	0.00	0.1	-6.90	-6.90	0.1
0.40	1.3	-0	-0	-0.00	0.20	0.0	-1.38	-1.38	0.1
0.45	1.5	-0	-0	0.00	0.00	0.1	-3.45	-3.45	0.1
0.50	1.6	0	0	0.01	1.78	-0.3	-6.13	-6.13	0.5
0.55	1.8	1	1	0.17	33.33	-0.3	-4.60	-4.60	0.2
0.60	2.0	1	1	0.20	13.91	-0.3	-1.78	-1.78	0.4
0.65	2.1	1	1	0.12	17.88	-0.4	-3.88	-3.88	0.7
0.70	2.3	0	0	0.10	32.43	-0.1	-2.96	-2.96	0.0
0.75	2.5	0	0	0.06	27.60	-0.2	-6.21	-6.21	0.0
0.80	2.6	1	1	0.17	14.32	-0.1	-0.74	-0.74	0.0
0.85	2.8	20	20	0.27	1.39	-0.1	-0.02	-0.02	0.0
0.90	3.0	47	47	0.36	0.78	-0.2	-0.03	-0.03	0.0
0.95	3.1	47	47	0.43	0.90	0.0	0.00	0.00	0.0
1.00	3.3	47	47	0.45	0.95	0.2	0.03	0.03	0.0
1.05	3.4	43	43	0.42	0.98	0.3	0.05	0.05	0.0
1.10	3.6	51	51	0.50	0.98	0.3	0.05	0.05	0.0
1.15	3.8	66	66	0.60	0.92	0.3	0.04	0.04	0.0
1.20	3.9	70	70	0.72	1.02	0.3	0.03	0.03	0.0
1.25	4.1	64	64	0.70	1.09	0.4	0.05	0.05	0.0
1.30	4.3	57	57	0.63	1.11	0.6	0.07	0.07	0.0
1.35	4.4	50	50	0.54	1.09	0.7	0.09	0.09	0.0
1.40	4.6	46	46	0.48	1.04	0.7	0.11	0.11	0.0
1.45	4.8	42	42	0.43	1.01	0.8	0.13	0.13	0.0
1.50	4.9	43	43	0.44	1.02	1.0	0.16	0.16	0.0
1.55	5.1	48	48	0.48	1.00	1.0	0.15	0.15	0.0
1.60	5.2	53	53	0.33	0.63	1.0	0.13	0.13	0.0
1.65	5.4	59	59	0.47	0.79	1.0	0.12	0.12	0.0
1.70	5.6	63	63	0.56	0.90	0.5	0.05	0.05	0.0
1.75	5.7	66	66	0.60	0.92	0.9	0.10	0.10	0.0
1.80	5.9	67	67	0.61	0.92	1.0	0.11	0.11	0.0
1.85	6.1	72	72	0.65	0.89	1.2	0.12	0.12	0.0
1.90	6.2	83	83	0.74	0.89	1.3	0.11	0.10	0.0
1.95	6.4	88	88	0.81	0.92	1.3	0.11	0.10	0.0
2.00	6.6	82	82	0.82	0.99	1.5	0.13	0.11	0.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	78	78	0.78	1.00	1.6	0.14	0.12	0.0
2.10	6.9	78	78	0.72	0.93	1.6	0.15	0.12	0.0
2.15	7.1	85	85	0.71	0.83	1.7	0.14	0.11	0.0
2.20	7.2	93	93	0.77	0.82	1.8	0.14	0.10	0.0
2.25	7.4	101	101	0.82	0.82	1.8	0.13	0.09	0.0
2.30	7.5	100	100	0.86	0.86	1.9	0.14	0.09	0.0
2.35	7.7	96	96	0.83	0.87	2.0	0.15	0.09	0.0
2.40	7.9	91	91	0.77	0.84	2.0	0.16	0.09	0.0
2.45	8.0	87	87	0.76	0.88	2.0	0.16	0.09	0.0
2.50	8.2	83	84	0.75	0.90	2.2	0.19	0.11	0.0
2.55	8.4	79	79	0.71	0.90	2.3	0.21	0.12	0.0
2.60	8.5	76	76	0.54	0.72	2.3	0.22	0.12	0.0
2.65	8.7	77	77	0.64	0.83	2.4	0.22	0.12	0.0
2.70	8.9	73	73	0.67	0.92	2.0	0.19	0.07	0.0
2.75	9.0	71	71	0.64	0.91	2.3	0.23	0.10	0.0
2.80	9.2	69	69	0.63	0.92	2.3	0.24	0.10	0.0
2.85	9.4	70	70	0.69	0.98	2.6	0.27	0.12	0.0
2.90	9.5	70	70	0.71	1.01	2.7	0.28	0.12	0.0
2.95	9.7	70	70	0.77	1.10	2.8	0.29	0.13	0.0
3.00	9.8	67	67	0.77	1.14	2.9	0.31	0.14	0.0
3.05	10.0	59	59	0.71	1.21	2.9	0.36	0.15	0.0
3.10	10.2	56	56	0.73	1.29	3.1	0.40	0.17	[illegible]
3.15	10.3	64	64	0.80	1.25	3.2	0.37	0.16	[illegible]
3.20	10.5	69	69	0.85	1.23	3.5	0.36	0.16	0.0
3.25	10.7	76	76	0.86	1.13	3.6	0.34	0.15	0.0
3.30	10.8	91	91	0.95	1.05	3.6	0.28	0.12	0.0
3.35	11.0	108	108	1.07	0.99	3.4	0.22	0.08	0.0
3.40	11.2	128	128	1.20	0.93	3.4	0.19	0.07	0.5
3.45	11.3	144	144	1.35	0.94	3.6	0.18	0.06	0.4
3.50	11.5	147	147	1.41	0.96	3.6	0.18	0.06	0.4
3.55	11.6	148	149	1.40	0.94	3.8	0.18	0.07	0.4
3.60	11.8	156	156	1.19	0.77	3.7	0.17	0.06	0.4
3.65	12.0	149	149	1.35	0.90	3.6	0.17	0.05	0.4
3.70	12.1	127	127	1.31	1.03	3.4	0.19	0.04	0.4
3.75	12.3	111	111	1.21	1.09	3.6	0.24	0.06	0.4
3.80	12.5	103	103	1.14	1.10	3.9	0.27	0.08	0.4
3.85	12.6	109	109	1.13	1.04	3.6	0.24	0.05	0.4
3.90	12.8	116	116	1.11	0.96	3.7	0.23	0.05	0.4
3.95	13.0	132	132	1.19	0.90	1.5	0.08	-0.08	0.4
4.00	13.1	158	158	1.30	0.82	1.1	0.05	-0.09	0.4
4.05	13.3	196	196	1.67	0.86	1.6	0.06	-0.06	0.4
4.10	13.5	214	214	1.89	0.89	1.9	0.06	-0.04	0.4
4.15	13.6	213	213	1.91	0.89	2.3	0.08	-0.03	0.4
4.20	13.8	238	238	2.23	0.93	2.9	0.09	-0.01	0.4
4.25	13.9	274	274	2.75	1.00	3.0	0.08	-0.01	0.4
4.30	14.1	289	289	3.00	1.04	3.3	0.08	-0.00	0.4
4.35	14.3	292	292	3.03	1.04	3.6	0.09	0.00	0.4
4.40	14.4	307	307	3.20	1.04	3.9	0.09	0.01	[illegible]
4.45	14.6	303	303	3.36	1.11	3.7	0.09	-0.00	[illegible]
4.50	14.8	284	284	3.34	1.18	3.8	0.10	0.00	0.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	262	262	3.03	1.16	3.9	0.11	0.00	0.4
4.60	15.1	260	260	2.15	0.83	4.0	0.11	0.00	0.4
4.65	15.3	260	260	2.35	0.91	3.5	0.10	-0.01	0.4
4.70	15.4	249	249	2.22	0.89	3.6	0.10	-0.01	0.4
4.75	15.6	263	263	2.48	0.94	3.6	0.10	-0.01	0.4
4.80	15.7	279	279	2.66	0.95	3.9	0.10	-0.01	0.4
4.85	15.9	274	274	2.83	1.03	4.1	0.11	-0.00	0.4
4.90	16.1	278	278	2.81	1.01	4.2	0.11	-0.00	0.4
4.95	16.2	272	272	2.61	0.96	4.3	0.11	-0.00	0.4
5.00	16.4	278	278	2.79	1.00	4.6	0.12	0.00	0.4
5.05	16.6	302	302	3.05	1.01	4.6	0.11	0.00	0.4
5.10	16.7	308	308	3.43	1.11	4.7	0.11	0.00	1.4
5.15	16.9	319	319	3.39	1.06	4.9	0.11	0.00	1.1
5.20	17.1	305	305	3.36	1.10	4.8	0.11	0.00	1.2
5.25	17.2	329	329	3.30	1.00	4.9	0.11	0.00	1.2
5.30	17.4	324	324	3.53	1.09	4.5	0.10	-0.01	1.2
5.35	17.6	299	299	3.34	1.12	4.5	0.11	-0.01	1.2
5.40	17.7	265	265	2.94	1.11	4.6	0.13	-0.01	1.2
5.45	17.9	246	246	2.45	1.00	4.8	0.14	-0.01	1.3
5.50	18.0	239	239	2.24	0.94	4.9	0.15	-0.01	1.3
5.55	18.2	238	238	2.14	0.90	5.2	0.16	-0.00	1.3
5.60	18.4	240	240	1.74	0.72	5.5	0.16	0.00	1.3
5.65	18.5	243	243	1.98	0.82	5.5	0.16	0.00	1.3
5.70	18.7	234	234	2.10	0.90	4.9	0.15	-0.02	1.4
5.75	18.9	238	238	1.98	0.83	5.5	0.17	-0.00	1.4
5.80	19.0	242	242	1.93	0.80	5.5	0.16	-0.00	1.4
5.85	19.2	266	266	2.36	0.89	5.6	0.15	-0.00	1.4
5.90	19.4	269	269	2.69	1.00	5.8	0.16	0.00	1.4
5.95	19.5	258	258	2.70	1.05	5.8	0.16	0.00	1.4
6.00	19.7	263	263	2.66	1.01	5.8	0.16	-0.00	1.4
6.05	19.8	253	253	2.68	1.06	5.8	0.17	-0.00	1.4
6.10	20.0	249	249	2.51	1.01	5.9	0.17	-0.01	1.4
6.15	20.2	262	262	2.33	0.89	6.1	0.17	-0.00	1.4
6.20	20.3	299	299	2.74	0.92	6.2	0.15	-0.00	1.4
6.25	20.5	365	365	3.71	1.02	6.2	0.12	-0.00	1.4
6.30	20.7	355	355	4.25	1.20	6.5	0.13	0.00	2.0
6.35	20.8	329	329	4.11	1.25	6.5	0.14	0.00	1.8
6.40	21.0	323	323	3.92	1.21	6.7	0.15	0.00	1.8
6.45	21.2	312	312	3.77	1.21	6.8	0.16	0.01	1.8
6.50	21.3	315	315	3.51	1.11	6.8	0.16	0.01	1.8
6.55	21.5	319	319	3.40	1.07	6.6	0.15	-0.00	1.8
6.60	21.7	342	342	3.75	1.10	6.6	0.14	-0.00	2.4
6.65	21.8	361	361	2.35	0.65	6.8	0.14	0.00	2.2
6.70	22.0	361	361	3.50	0.97	7.0	0.14	0.00	2.2
6.75	22.1	231	231	3.73	1.61	6.3	0.20	-0.02	2.3
6.80	22.3	365	365	4.05	1.11	6.5	0.13	-0.01	2.3
6.85	22.5	362	362	4.45	1.23	6.9	0.14	-0.01	2.3
6.90	22.6	347	348	4.53	1.30	7.0	0.14	-0.00	2.3
6.95	22.8	331	331	4.06	1.23	7.2	0.16	-0.00	2.3
7.00	23.0	345	345	4.04	1.17	7.2	0.15	-0.00	2.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	386	386	4.67	1.21	7.2	0.13	-0.00	2.4
7.10	23.3	377	377	5.05	1.34	7.2	0.14	-0.01	2.4
7.15	23.5	362	362	4.77	1.32	7.4	0.15	-0.00	2.4
7.20	23.6	365	365	4.69	1.29	7.4	0.15	-0.00	2.4
7.25	23.8	373	373	4.78	1.28	7.3	0.14	-0.01	2.4
7.30	23.9	375	375	4.91	1.31	7.5	0.14	-0.01	2.4
7.35	24.1	388	388	5.06	1.30	7.8	0.14	-0.00	2.4
7.40	24.3	402	403	5.23	1.30	7.8	0.14	-0.00	2.4
7.45	24.4	401	401	5.57	1.39	7.8	0.14	-0.00	2.4
7.50	24.6	391	391	5.51	1.41	7.8	0.14	-0.00	2.4
7.55	24.8	374	374	5.40	1.44	7.8	0.15	-0.01	2.4
7.60	24.9	372	372	5.20	1.40	8.0	0.15	-0.00	2.4
7.65	25.1	352	352	4.04	1.15	7.8	0.16	-0.01	2.5
7.70	25.3	366	366	4.45	1.22	7.8	0.15	-0.01	2.9
7.75	25.4	338	338	4.66	1.38	6.6	0.14	-0.04	2.8
7.80	25.6	328	328	4.52	1.38	6.9	0.15	-0.03	2.8
7.85	25.8	335	336	4.43	1.32	7.1	0.15	-0.03	2.8
7.90	25.9	330	330	4.32	1.31	7.1	0.15	-0.03	2.8
7.95	26.1	324	325	4.34	1.34	7.1	0.16	-0.03	2.8
8.00	26.2	317	317	4.31	1.36	7.2	0.16	-0.04	2.8
8.05	26.4	301	301	4.08	1.36	7.3	0.17	-0.04	2.8
8.10	26.6	300	300	3.64	1.22	7.4	0.18	-0.04	2.8
8.15	26.7	317	318	3.78	1.19	7.3	0.17	-0.04	[illegible]
8.20	26.9	340	340	4.21	1.24	7.4	0.16	-0.04	[illegible]
8.25	27.1	337	337	4.46	1.32	7.5	0.16	-0.03	2.8
8.30	27.2	326	326	4.28	1.32	7.7	0.17	-0.03	2.8
8.35	27.4	326	326	4.14	1.27	7.9	0.17	-0.03	2.8
8.40	27.6	322	322	4.04	1.25	7.9	0.18	-0.03	2.8
8.45	27.7	341	341	4.27	1.25	8.1	0.17	-0.03	2.8
8.50	27.9	350	350	4.67	1.34	8.1	0.17	-0.03	2.8
8.55	28.1	338	338	4.70	1.39	8.1	0.17	-0.03	2.8
8.60	28.2	336	337	4.57	1.36	8.2	0.18	-0.03	2.8
8.65	28.4	343	344	3.89	1.13	8.2	0.17	-0.03	2.8
8.70	28.5	326	326	4.11	1.26	8.2	0.18	-0.04	2.8
8.75	28.7	292	292	4.19	1.44	7.8	0.19	-0.06	4.1
8.80	28.9	295	295	4.43	1.50	8.1	0.20	-0.04	4.1
8.85	29.0	289	289	4.17	1.44	8.1	0.20	-0.05	4.1
8.90	29.2	281	281	3.67	1.31	8.1	0.21	-0.05	4.1
8.95	29.4	311	311	3.39	1.09	8.2	0.19	-0.04	4.1
9.00	29.5	327	327	3.45	1.06	7.5	0.17	-0.06	4.2
9.05	29.7	328	328	3.81	1.16	7.1	0.16	-0.07	4.2
9.10	29.9	300	300	4.04	1.35	7.2	0.17	-0.08	4.2
9.15	30.0	265	266	3.52	1.33	7.2	0.19	-0.09	4.2
9.20	30.2	242	243	2.92	1.21	7.3	0.22	-0.09	4.2
9.25	30.3	251	252	2.76	1.10	7.5	0.21	-0.09	4.2
9.30	30.5	273	273	2.91	1.07	6.4	0.17	-0.11	4.2
9.35	30.7	277	278	3.26	1.17	6.5	0.17	-0.11	4.2
9.40	30.8	286	286	3.31	1.16	6.8	0.17	-0.10	[illegible]
9.45	31.0	282	282	3.37	1.19	7.0	0.18	-0.10	[illegible]
9.50	31.2	287	287	3.28	1.15	7.2	0.18	-0.09	4.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	270	271	3.14	1.16	7.4	0.20	-0.09	4.2
9.60	31.5	263	263	2.69	1.02	7.5	0.21	-0.10	4.2
9.65	31.7	266	266	2.13	0.80	7.6	0.21	-0.10	4.2
9.70	31.8	274	274	2.59	0.95	7.8	0.21	-0.09	4.2
9.75	32.0	255	256	2.57	1.01	8.0	0.23	-0.09	4.7
9.80	32.2	258	258	2.51	0.97	8.2	0.23	-0.09	4.7
9.85	32.3	261	261	2.52	0.97	8.5	0.23	-0.08	4.7
9.90	32.5	255	255	2.47	0.97	8.5	0.24	-0.06	4.8
9.95	32.6	255	255	2.24	0.88	8.8	0.25	-0.08	4.8
10.00	32.8	253	253	1.95	0.77	6.7	0.19	-0.14	4.8
10.05	33.0	245	245	2.04	0.84	5.5	0.16	-0.18	4.8
10.10	33.1	234	234	2.10	0.90	4.9	0.15	-0.21	4.8
10.15	33.3	220	220	2.14	0.97	4.2	0.14	-0.25	4.9
10.20	33.5	205	205	2.16	1.06	4.3	0.15	-0.27	4.9
10.25	33.6	188	188	2.00	1.06	4.6	0.17	-0.28	5.3
10.30	33.8	175	175	1.76	1.01	4.9	0.20	-0.29	5.3
10.35	34.0	168	168	1.65	0.98	5.0	0.21	-0.31	5.3
10.40	34.1	167	167	1.62	0.97	5.2	0.22	-0.30	5.3
10.45	34.3	158	158	1.58	1.00	5.5	0.25	-0.31	5.3
10.50	34.4	147	147	1.48	1.01	5.5	0.27	-0.33	5.3
10.55	34.6	135	135	1.42	1.05	5.6	0.30	-0.36	5.3
10.60	34.8	124	124	1.37	1.10	5.7	0.33	-0.39	5.3
[illegible]65	34.9	114	114	1.00	0.87	5.9	0.37	-0.42	5.3
[illegible]70	35.1	103	103	0.97	0.94	6.0	0.42	-0.46	5.4
10.75	35.3	85	85	1.01	1.19	8.1	0.69	-0.38	5.8
10.80	35.4	69	69	1.14	1.65	8.3	0.87	-0.46	5.8
10.85	35.6	46	46	1.13	2.49	8.5	1.34	-0.68	5.8
10.90	35.8	35	35	1.01	2.91	9.1	1.90	-0.78	5.8
10.95	35.9	33	33	0.52	1.59	10.0	2.21	-0.64	5.8
11.00	36.1	18	18	0.84	4.64	9.1	3.62	-1.56	5.8
11.05	36.3	13	13	0.55	4.34	9.4	5.37	-2.07	6.0
11.10	36.4	13	13	0.26	1.94	10.7	5.76	-1.34	6.0
11.15	36.6	12	12	?	?	10.9	6.47	-1.36	6.0
11.20	36.7	11	12	?	?	11.1	7.06	-1.38	6.0

WRITE NUMBER OF RODS USED ___

Conoco Inc.

Operator :DENNIS WILSON
On Site Loc:G-16
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-17-91 10:48
Cone Used :364
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	SPT N1	CSR
0.25	0.82	0.00	0.00	0.00	0.03	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.50	1.64	0.00	0.00	0.00	0.09	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.75	2.46	0.60	0.13	21.67	0.15	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
1.00	3.28	32.40	0.34	1.04	0.22	silty sand to sandy silt	50-60	42-44	10	23	.24
1.25	4.10	58.80	0.59	1.00	0.28	silty sand to sandy silt	60-70	44-46	19	36	)0.5
1.50	4.92	47.60	0.50	1.06	0.32	silty sand to sandy silt	60-70	42-44	15	27	.29
1.75	5.74	57.80	0.49	0.84	0.36	silty sand to sandy silt	60-70	42-44	18	31	.36
2.00	6.56	78.40	0.73	0.93	0.39	sand to silty sand	70-80	44-46	19	30	.34
2.25	7.38	87.00	0.76	0.87	0.43	sand to silty sand	70-80	44-46	21	32	.38
2.50	8.20	91.40	0.79	0.87	0.46	sand to silty sand	70-80	44-46	22	33	.38
2.75	9.02	75.20	0.64	0.85	0.50	sand to silty sand	60-70	42-44	18	26	.28
3.00	9.84	69.20	0.71	1.03	0.54	sand to silty sand	60-70	42-44	17	23	.24
3.25	10.66	64.80	0.79	1.22	0.57	silty sand to sandy silt	60-70	40-42	21	28	.30
3.50	11.48	123.60	1.20	0.97	0.61	sand to silty sand	70-80	44-46	30	38	)0.5
3.75	12.30	138.20	1.29	0.93	0.64	sand to silty sand	80-90	44-46	33	42	)0.5
4.00	13.12	123.60	1.17	0.95	0.68	sand to silty sand	70-80	42-44	30	36	)0.5
4.25	13.94	227.00	2.09	0.92	0.72	sand	)90	44-46	43	)50	)0.5
4.50	14.76	295.00	3.19	1.08	0.75	sand	)90	46-48	)50	)50	)0.5
4.75	15.58	256.80	2.45	0.95	0.79	sand	)90	46-48	50	)50	)
5.00	16.40	276.20	2.74	0.99	0.82	sand	)90	46-48	)50	)50	)
5.25	17.22	312.60	3.31	1.06	0.86	sand	)90	46-48	)50	)50	)0.5
5.50	18.04	274.60	2.90	1.06	0.89	sand	)90	44-46	)50	)50	)0.5
5.75	18.86	238.60	1.99	0.83	0.93	sand	)90	44-46	46	48	)0.5
6.00	19.69	259.60	2.47	0.95	0.97	sand	)90	44-46	50	)50	)0.5
6.25	20.51	285.60	2.79	0.98	1.00	sand	)90	44-46	)50	)50	)0.5
6.50	21.33	326.80	3.91	1.20	1.04	sand	)90	44-46	)50	)50	)0.5
6.75	22.15	322.80	3.35	1.04	1.07	sand	)90	44-46	)50	)50	)0.5
7.00	22.97	350.00	4.23	1.21	1.11	sand	)90	44-46	)50	)50	)0.5
7.25	23.79	372.60	4.79	1.29	1.15	sand	)90	46-48	)50	)50	)0.5
7.50	24.61	391.40	5.26	1.34	1.18	sand	)90	46-48	)50	)50	)0.5
7.75	25.43	360.40	4.75	1.32	1.22	sand	)90	44-46	)50	)50	)0.5
8.00	26.25	326.80	4.38	1.34	1.25	sand	)90	44-46	)50	)50	)0.5
8.25	27.07	319.00	4.03	1.26	1.29	sand	)90	44-46	)50	)50	)0.5
8.50	27.89	333.00	4.28	1.29	1.33	sand	)90	44-46	)50	)50	)0.5
8.75	28.71	327.00	4.29	1.31	1.36	sand	)90	44-46	)50	)50	)0.5
9.00	29.53	300.60	3.82	1.27	1.40	sand	)90	44-46	)50	49	)0.5
9.25	30.35	277.20	3.41	1.23	1.43	sand	)90	42-44	)50	45	)0.5
9.50	31.17	281.00	3.23	1.15	1.47	sand	)90	42-44	)50	45	)0.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Conoco Inc.

Operator :DENNIS WILSON On Site Loc:G-16

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
9.75	31.99	265.60	2.62	0.99	1.51	sand	80-90	42-44	)50	42	)0.5
10.00	32.81	256.40	2.34	0.91	1.54	sand	80-90	42-44	49	40	)0.5
10.25	33.63	218.40	2.09	0.96	1.58	sand	80-90	42-44	42	34	.42
10.50	34.45	163.00	1.62	0.99	1.61	sand	70-80	40-42	31	25	.26
10.75	35.27	112.20	1.15	1.03	1.65	sand to silty sand	60-70	38-40	27	21	.22
11.00	36.09	40.20	0.93	2.31	1.68	sandy silt to clayey silt	UNDFND	UNDFD	15	12	UNDF

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: H-04, Start Time: 1540, End Time: 1630

Site: DUPONT, Town: E. Chicago, State: Ind.

Unit: 1, Operators: Sells, Kasl, D. Wilson,

Proj. Consultant: Lounsbury, Company: DERS

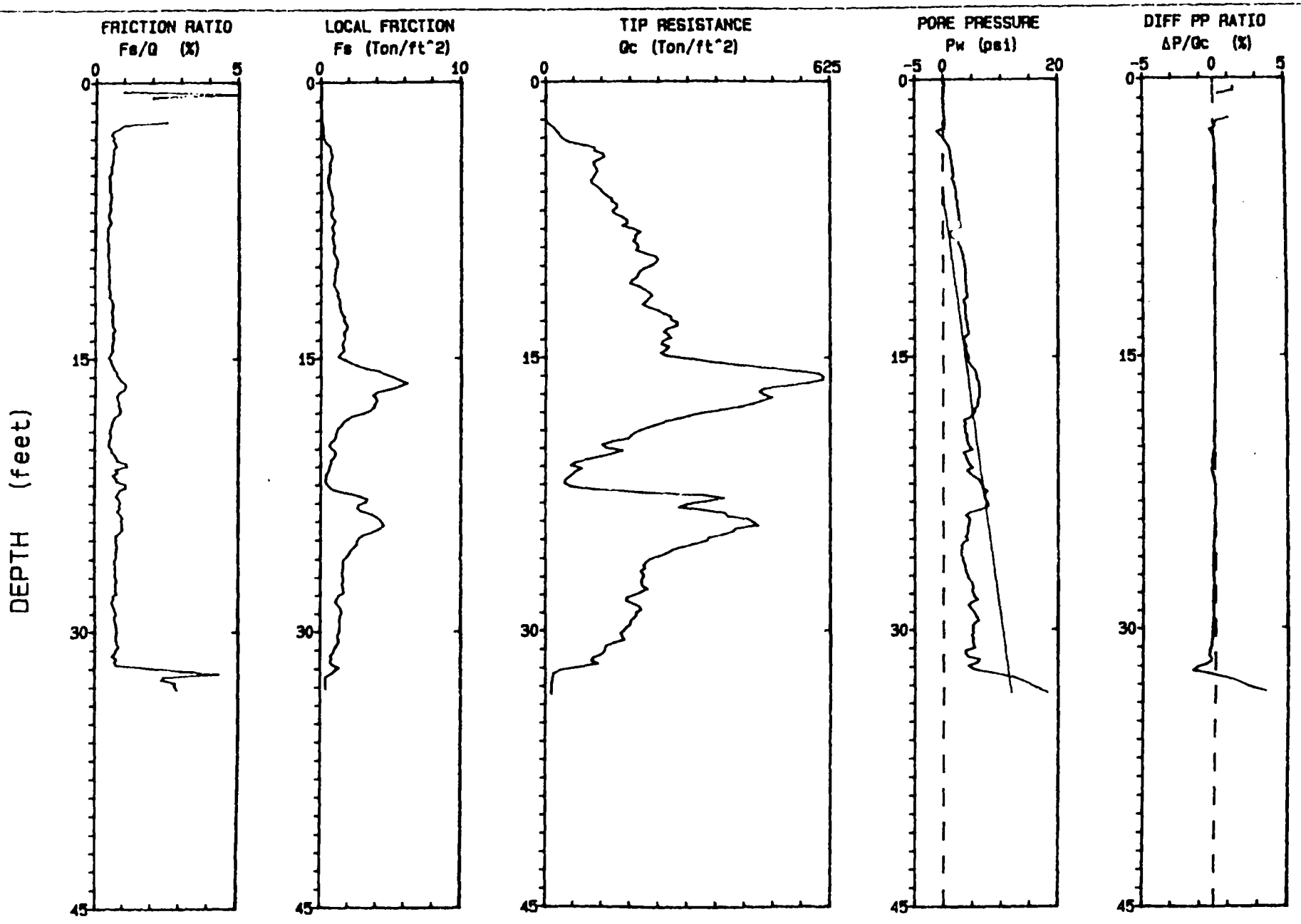
Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-20-91	1545	1615	H-04	CPTH4	✓				33.5	1	2	F	CLAY AT 32.2

amr/cws725

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-20-91 15:51 FILE CPTH4 Pg 1 / 1

LOCATION : H-04 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 33.46 ft

SOUNDING DATA IN FILE CPTH4 11-20-91 15:51

PERATOR : CALVIN SELLS LOCATION : H-04

CONE ID : 293 JOB No. : 1

; Geneq, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	B P RATIO Pw/Qc %	DIFF B P RATIO (Pw-Po)/Qc %	INCLINATION I deg
Baseline		-340		-7.00		-9.1			0.1
0.05	0.2	-0	-0	0.00	-2.22	0.3	-58.61	-58.61	0.2
0.10	0.3	0	0	0.00	?	0.3	-	?	0.2
0.15	0.5	1	1	0.01	0.81	0.3	1.29	1.29	0.2
0.20	0.7	1	1	0.05	5.00	0.3	3.75	3.75	0.2
0.25	0.8	2	2	0.04	1.65	0.1	0.36	0.36	0.2
0.30	1.0	0	0	0.35	42.00	0.0	3.45	3.45	0.1
0.35	1.1	0	0	0.02	5.00	0.2	3.45	3.45	0.1
0.40	1.3	0	0	0.01	10.00	0.1	10.34	10.34	0.1
0.45	1.5	0	0	0.01	6.33	0.0	1.15	1.15	0.2
0.50	1.6	0	0	0.00	?	0.1	?	?	0.1
0.55	1.8	-0	-0	0.01	-10.00	0.1	-20.69	-20.69	0.1
0.60	2.0	-0	-0	0.01	-21.00	0.2	-34.48	-34.48	0.1
0.65	2.1	0	0	0.25	2.12	0.3	1.10	1.12	0.2
0.70	2.3	9	9	0.09	1.02	0.3	0.21	0.21	0.2
0.75	2.5	19	19	0.15	2.35	0.3	0.13	0.13	0.1
0.80	2.6	24	24	0.15	0.62	0.3	0.10	0.12	0.1
0.85	2.8	29	31	0.16	0.56	-1.2	-0.31	-0.31	0.1
0.90	3.0	32	33	0.21	0.64	-0.7	-0.15	-0.15	0.2
0.95	3.1	39	39	0.24	0.63	-0.1	-0.01	-0.01	0.2
1.00	3.3	52	52	0.36	0.70	0.3	0.04	0.04	0.2
1.05	3.4	64	64	0.42	0.72	0.7	0.05	0.26	0.2
1.10	3.6	109	109	0.68	0.63	1.0	0.06	0.06	0.1
1.15	3.8	109	109	0.70	0.65	1.2	0.08	0.08	0.1
1.20	3.9	128	128	0.79	0.62	1.3	0.07	0.07	0.2
1.25	4.1	132	132	0.81	0.61	1.3	0.07	0.07	0.2
1.30	4.3	119	119	0.72	0.62	1.3	0.08	0.08	0.2
1.35	4.4	106	106	0.63	0.60	1.5	0.10	0.10	0.2
1.40	4.6	108	108	0.59	0.55	1.5	0.10	0.12	0.1
1.45	4.8	113	113	0.68	0.55	1.7	0.11	0.11	0.1
1.50	4.9	115	115	0.68	0.55	1.7	0.11	0.11	0.1
1.55	5.1	111	112	0.53	0.47	1.8	0.11	0.11	0.1
1.60	5.2	107	107	0.53	0.49	1.9	0.13	0.13	0.1
1.65	5.4	101	101	0.51	0.51	1.6	0.11	0.11	0.1
1.70	5.6	104	104	0.53	0.51	1.9	0.13	0.13	0.1
1.75	5.7	114	114	0.58	0.51	2.0	0.12	0.12	0.1
1.80	5.9	122	122	0.68	0.51	2.2	0.13	0.13	0.1
1.85	6.1	127	127	0.69	0.54	2.3	0.13	0.13	0.1
1.90	6.2	136	136	0.76	0.56	2.3	0.12	0.12	0.1
1.95	6.4	147	147	0.81	0.55	2.3	0.11	0.11	0.1
2.00	6.6	148	148	0.76	0.51	2.5	0.12	0.11	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	159	156	0.82	0.52	2.6	0.12	0.10	0.1
2.10	6.9	159	159	0.86	2.54	2.6	0.12	0.10	0.1
2.15	7.1	149	149	0.75	0.51	2.6	0.13	0.11	0.1
2.20	7.2	153	153	0.72	0.47	2.7	0.13	0.11	0.1
2.25	7.4	165	165	0.82	0.49	2.5	0.12	0.10	0.1
2.30	7.5	180	180	1.00	0.56	2.0	0.11	0.09	0.1
2.35	7.7	162	162	0.94	0.58	2.9	0.13	0.09	0.1
2.40	7.9	171	171	0.79	0.45	3.1	0.13	0.10	0.1
2.45	8.0	167	167	0.84	0.43	3.1	0.11	0.05	0.1
2.50	8.2	211	211	0.96	0.46	1.6	0.08	0.02	0.1
2.55	8.4	200	200	0.86	0.43	1.1	0.04	0.00	0.1
2.60	8.5	200	200	0.85	0.43	1.4	0.25	0.01	0.1
2.65	8.7	194	194	0.89	0.46	2.5	0.09	0.05	0.1
2.70	8.9	203	204	0.97	0.48	2.7	0.10	0.05	0.1
2.75	9.2	205	205	0.95	0.46	2.9	0.10	0.06	0.1
2.80	9.2	201	201	0.90	0.45	3.2	0.11	0.07	0.1
2.85	9.4	221	221	0.97	0.44	3.3	0.11	0.06	0.1
2.90	9.5	244	244	1.11	0.46	3.5	0.10	0.06	0.1
2.95	9.7	249	249	1.19	0.48	3.5	0.10	0.06	0.1
3.00	9.8	245	245	1.22	0.50	3.6	0.14	0.06	0.1
3.05	10.0	233	233	1.19	0.51	3.7	0.11	0.06	0.1
3.10	10.2	217	217	1.07	0.50	3.8	0.13	0.07	0.1
3.15	10.3	208	208	1.02	0.49	3.9	0.13	0.07	0.1
3.20	10.5	205	205	0.99	0.49	3.9	0.14	0.07	0.1
3.25	10.7	201	201	1.01	0.50	3.9	0.14	0.07	0.1
3.30	10.8	191	191	0.98	0.51	3.9	0.15	0.07	0.1
3.35	11.0	186	186	0.92	0.49	3.9	0.15	0.07	0.1
3.40	11.2	200	200	1.01	0.48	4.0	0.14	0.06	0.1
3.45	11.3	219	222	1.15	0.52	4.0	0.13	0.06	0.1
3.50	11.5	229	230	1.26	0.55	4.0	0.13	0.05	0.1
3.55	11.6	235	235	1.19	0.51	4.2	0.13	0.06	0.1
3.60	11.8	226	228	1.32	0.56	4.2	0.13	0.05	0.1
3.65	12.0	222	222	1.37	0.62	3.5	0.11	0.03	0.1
3.70	12.1	214	214	1.36	0.63	3.7	0.13	0.04	0.1
3.75	12.3	228	228	1.41	0.62	3.9	0.12	0.04	0.1
3.80	12.5	251	251	1.44	0.57	3.9	0.11	0.03	0.1
3.85	12.6	261	261	1.59	0.61	3.8	0.10	0.03	0.1
3.90	12.8	277	277	1.71	0.62	3.9	0.10	0.03	0.1
3.95	13.0	277	277	1.67	0.60	3.9	0.10	0.02	0.1
4.00	13.1	291	291	1.81	0.62	4.1	0.10	0.03	0.1
4.05	13.3	289	289	1.90	0.66	4.2	0.11	0.03	0.1
4.10	13.5	270	270	1.87	0.69	4.2	0.11	0.03	0.1
4.15	13.6	261	261	1.65	0.63	4.4	0.12	0.03	0.1
4.20	13.8	271	271	1.68	0.62	4.5	0.12	0.03	0.1
4.25	13.9	277	277	1.82	0.65	3.9	0.10	0.01	0.1
4.30	14.1	259	259	1.68	0.69	3.5	0.10	-0.00	0.1
4.35	14.3	256	256	1.54	0.60	3.7	0.10	0.00	0.1
4.40	14.4	272	272	1.65	0.61	4.0	0.11	0.01	0.1
4.45	14.6	266	266	1.65	0.62	3.9	0.11	0.01	0.1
4.50	14.8	254	254	1.41	0.56	4.0	0.11	0.01	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Po)/Qc %	INCLINATION I deg
4.55	14.9	266	266	1.23	0.46	4.3	0.12	0.01	0.1
4.60	15.1	320	320	1.70	0.53	4.5	0.10	0.01	0.1
4.65	15.3	362	362	2.08	0.57	4.3	0.09	0.01	0.1
4.70	15.4	415	415	2.60	0.63	4.7	0.03	0.01	0.1
4.75	15.6	481	481	3.27	0.62	5.2	0.05	0.01	0.1
4.80	15.7	547	547	4.18	0.76	5.5	0.07	0.02	0.1
4.85	15.9	600	600	4.62	0.77	5.7	0.07	0.02	0.1
4.90	16.1	611	611	5.26	0.86	5.8	0.07	0.02	0.1
4.95	16.2	610	611	5.65	0.93	5.9	0.07	0.02	0.1
5.00	16.4	580	580	6.18	1.07	6.2	0.08	0.02	0.1
5.05	16.6	538	538	5.69	1.07	6.3	0.09	0.02	0.1
5.10	16.7	479	479	4.89	1.02	6.3	0.09	0.03	0.1
5.15	16.9	469	469	4.32	0.86	6.3	0.10	0.03	0.1
5.20	17.1	480	480	3.73	3.78	6.3	0.09	0.02	0.1
5.25	17.2	499	499	3.95	0.79	6.4	0.09	0.02	0.1
5.30	17.4	477	477	4.03	0.84	6.1	0.09	0.02	0.1
5.35	17.6	458	458	3.87	0.84	6.1	0.10	0.02	0.1
5.40	17.7	438	438	3.83	0.89	6.1	0.10	0.02	0.1
5.45	17.9	394	394	3.56	0.91	5.6	0.10	0.01	0.2
5.50	18.0	348	348	3.07	0.88	5.3	0.10	0.01	0.1
5.55	18.2	318	318	2.37	0.72	5.1	0.12	-0.00	0.1
5.60	18.4	294	294	1.96	0.67	4.8	0.12	-0.01	0.1
5.65	18.5	267	267	1.65	0.62	4.5	0.09	-0.05	0.4
5.70	18.7	248	248	1.51	0.61	3.5	0.11	-0.05	0.5
5.75	18.9	228	228	1.29	0.57	3.7	0.13	-0.06	0.7
5.80	19.0	210	210	1.14	0.54	3.8	0.13	-0.06	0.4
5.85	19.2	197	197	1.07	0.54	3.8	0.14	-0.07	1.0
5.90	19.4	189	189	1.06	0.56	4.2	0.16	-0.06	3.2
5.95	19.5	183	184	0.94	0.51	4.1	0.16	-0.07	2.3
6.00	19.7	147	147	0.72	0.50	4.2	0.21	-0.06	0.3
6.05	19.8	125	125	0.62	0.50	4.4	0.26	-0.06	0.2
6.10	20.0	135	135	0.79	0.58	4.6	0.25	-0.05	0.2
6.15	20.2	172	172	1.04	0.61	5.1	0.21	-0.04	0.1
6.20	20.3	152	152	1.09	0.72	3.8	0.16	-0.10	0.1
6.25	20.5	122	122	0.94	0.77	3.9	0.23	-0.14	0.1
6.30	20.7	93	93	0.74	0.79	4.1	0.31	-0.17	0.1
6.35	20.8	66	66	0.74	1.12	4.3	0.45	-0.23	0.1
6.40	21.0	56	56	0.64	1.15	4.6	0.60	-0.24	0.1
6.45	21.2	82	82	0.61	0.75	5.2	0.45	-0.12	0.1
6.50	21.3	68	68	0.55	0.81	4.2	0.45	-0.25	0.1
6.55	21.5	60	60	0.39	0.66	4.8	0.56	-0.23	0.1
6.60	21.7	52	53	0.39	0.75	5.3	0.73	-0.22	0.1
6.65	21.8	44	44	0.35	0.79	6.2	1.02	-0.10	0.1
6.70	22.0	41	41	0.45	1.11	6.5	1.15	-0.07	0.1
6.75	22.1	55	56	0.61	1.11	6.9	0.90	-0.21	0.1
6.80	22.3	104	105	0.92	0.88	6.9	0.47	-0.01	0.1
6.85	22.5	213	213	1.77	0.83	7.8	0.26	0.02	0.1
6.90	22.6	354	354	2.73	0.77	7.2	0.15	-0.00	0.1
6.95	22.8	393	393	3.39	0.86	7.3	0.13	0.00	0.2
7.00	23.0	352	353	3.26	0.93	7.5	0.15	0.20	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Po)/Qc %	INCLINATION I deg
7.05	23.1	309	309	2.74	0.89	7.6	0.18	0.01	0.2
7.10	23.3	293	293	2.66	0.91	7.8	0.19	0.01	0.2
7.15	23.5	348	348	3.05	0.88	5.6	0.14	-0.02	0.2
7.20	23.6	395	395	3.60	0.91	4.7	0.09	-0.05	0.2
7.25	23.8	400	400	3.99	1.00	3.9	0.07	-0.07	0.2
7.30	23.9	445	445	4.27	0.96	4.6	0.07	-0.05	0.2
7.35	24.1	457	457	4.44	0.98	4.6	0.07	-0.05	0.2
7.40	24.3	466	465	4.59	0.98	4.5	0.07	-0.05	0.2
7.45	24.4	416	416	4.23	1.01	4.2	0.07	-0.06	0.2
7.50	24.6	412	412	3.74	0.91	4.3	0.08	-0.07	0.2
7.55	24.8	394	394	3.07	0.78	4.2	0.08	-0.07	0.2
7.60	24.9	358	358	2.73	0.77	3.9	0.08	-0.06	0.2
7.65	25.1	355	355	2.63	0.74	4.3	0.09	-0.06	0.2
7.70	25.3	331	331	2.61	0.79	3.5	0.08	-0.10	0.3
7.75	25.4	301	301	2.38	0.79	3.2	0.06	-0.12	0.3
7.80	25.6	282	282	2.15	0.77	3.3	0.08	-0.12	0.3
7.85	25.8	278	278	2.05	0.76	3.1	0.06	-0.13	0.3
7.90	25.9	251	250	1.93	0.77	3.1	0.09	-0.16	0.3
7.95	26.1	238	238	1.66	0.72	3.4	0.11	-0.17	0.3
8.00	26.2	223	223	1.59	0.72	3.4	0.11	-0.17	0.3
8.05	26.4	217	217	1.60	0.74	3.7	0.13	-0.17	0.3
8.10	26.6	220	220	1.58	0.72	3.6	0.13	-0.17	0.3
8.15	26.7	211	212	1.55	0.73	3.9	0.13	-0.17	0.3
8.20	26.9	217	217	1.56	0.72	4.1	0.14	-0.16	0.3
8.25	27.1	217	217	1.65	0.76	4.3	0.14	-0.16	0.3
8.30	27.2	213	213	1.66	0.78	4.5	0.15	-0.16	0.2
8.35	27.4	213	213	1.56	0.73	4.9	0.17	-0.15	0.2
8.40	27.6	215	215	1.61	0.75	5.1	0.17	-0.14	0.3
8.45	27.7	226	226	1.68	0.74	5.2	0.17	-0.13	0.3
8.50	27.9	212	212	1.67	0.79	5.0	0.17	-0.15	0.2
8.55	28.1	198	198	1.26	0.64	5.3	0.19	-0.15	0.3
8.60	28.2	181	181	1.18	0.65	5.5	0.22	-0.16	0.2
8.65	28.4	179	180	1.06	0.59	6.1	0.24	-0.14	0.2
8.70	28.5	194	194	1.22	0.63	4.9	0.18	-0.18	0.1
8.75	28.7	209	209	1.41	0.67	4.4	0.15	-0.19	0.2
8.80	28.9	213	213	1.52	0.71	4.6	0.16	-0.17	0.1
8.85	29.0	202	202	1.55	0.77	5.3	0.19	-0.17	0.1
8.90	29.2	201	201	1.43	0.71	5.6	0.20	-0.16	0.2
8.95	29.4	194	194	1.34	0.69	5.9	0.22	-0.16	0.2
9.00	29.5	189	190	1.36	0.72	6.2	0.24	-0.15	0.2
9.05	29.7	189	189	1.40	0.74	5.4	0.20	-0.19	0.2
9.10	29.9	180	180	1.37	0.76	5.1	0.20	-0.21	0.2
9.15	30.0	174	174	1.36	0.78	5.2	0.21	-0.21	0.2
9.20	30.2	167	167	1.25	0.75	5.2	0.22	-0.23	0.2
9.25	30.3	171	171	1.24	0.73	4.9	0.21	-0.24	0.2
9.30	30.5	175	175	1.34	0.77	5.2	0.21	-0.22	0.2
9.35	30.7	156	156	1.23	0.79	5.1	0.24	-0.25	0.2
9.40	30.8	133	133	1.09	0.82	5.2	0.28	-0.30	0.2
9.45	31.0	133	133	0.98	0.74	5.5	0.30	-0.29	0.2
9.50	31.2	131	131	0.92	0.70	3.9	0.21	-0.38	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	123	123	0.73	0.60	3.9	0.23	-0.41	0.2
9.60	31.5	106	105	0.80	0.76	4.3	0.29	-0.46	0.2
9.65	31.7	102	102	0.70	0.69	6.4	0.46	-0.33	0.2
9.70	31.8	118	118	0.87	0.74	5.9	0.36	-0.32	0.2
9.75	32.0	77	77	1.38	1.80	4.3	0.40	-0.65	0.2
9.80	32.2	35	35	1.06	3.05	5.1	1.06	-1.26	0.1
9.85	32.3	18	19	0.78	4.34	7.4	2.91	-1.54	0.2
9.90	32.5	16	16	0.38	2.42	10.4	4.73	-0.47	0.2
9.95	32.6	16	16	0.37	2.36	13.4	5.70	2.39	0.1
10.00	32.8	14	15	0.39	2.69	13.8	6.51	1.09	0.2
10.05	33.0	14	15	0.39	2.78	15.0	7.46	1.65	0.2
10.10	33.1	14	14	0.40	2.82	15.9	8.11	2.13	0.1
10.15	33.3	14	14	?	?	16.9	6.96	2.71	0.2
10.20	33.5	13	13	?	?	16.2	12.16	3.54	0.1

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:H-04
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-20-91 15:51
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.67	0.02	3.22	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.20	0.01	3.00	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	21.65	0.15	2.69	0.12	sandy silt to clayey silt	UNDFND	UNDFD	8	0.1
1.25	4	102.33	0.66	0.64	0.23	sand to silty sand	80-90	46-48	25	UNDEFINED
1.55	5	112.00	0.63	0.56	0.27	sand	80-90	46-48	21	UNDEFINED
1.85	6	112.50	0.58	0.51	0.32	sand	80-90	46-48	22	UNDEFINED
2.15	7	149.67	0.79	0.53	0.36	sand	>90	46-48	29	UNDEFINED
2.45	8	175.17	0.85	0.49	0.40	sand	>90	46-48	34	UNDEFINED
2.75	9	202.17	0.91	0.45	0.45	sand	>90	46-48	39	UNDEFINED
3.05	10	232.17	1.10	0.47	0.49	sand	>90	46-48	44	UNDEFINED
3.35	11	201.33	1.00	0.49	0.53	sand	>90	46-48	39	UNDEFINED
3.65	12	223.50	1.22	0.54	0.57	sand	>90	46-48	43	UNDEFINED
3.95	13	251.33	1.53	0.61	0.62	sand	>90	46-48	48	UNDEFINED
4.25	14	276.50	1.75	0.63	0.66	sand	>90	46-48	>50	UNDEFINED
4.55	15	262.17	1.51	0.58	0.70	sand	>90	46-48	>50	UNDEFINED
4.85	16	454.17	3.06	0.68	0.75	gravelly sand to sand	>90	>48	>50	UNDEFINED
5.15	17	546.50	5.38	0.97	0.79	gravelly sand to sand	>90	>48	>50	UNDEFINED
5.45	18	456.33	3.84	0.84	0.83	gravelly sand to sand	>90	>46	>50	UNDEFINED
5.75	19	283.63	1.96	0.69	2.88	sand	>90	46-48	>50	UNDEFINED
6.05	20	172.17	0.93	0.52	0.91	sand	80-90	42-44	34	UNDEFINED
6.40	21	113.71	0.85	0.75	0.97	sand to silty sand	70-80	40-42	27	UNDEFINED
6.70	22	37.83	0.46	0.79	1.01	sand to silty sand	50-60	38-40	14	UNDEFINED
7.00	23	245.17	2.11	0.86	1.06	sand	>90	44-46	47	UNDEFINED
7.30	24	378.89	3.51	0.92	1.10	sand	>90	46-48	>50	UNDEFINED
7.65	25	400.83	3.50	0.87	1.15	sand	>90	46-48	>50	UNDEFINED
7.95	26	277.00	2.13	0.77	1.19	sand	>90	44-46	>50	UNDEFINED
8.25	27	217.33	1.59	0.73	1.22	sand	80-90	42-44	42	UNDEFINED
8.55	28	212.83	1.57	0.74	1.28	sand	80-90	42-44	41	UNDEFINED
8.85	29	196.33	1.32	0.67	1.32	sand	80-90	42-44	38	UNDEFINED
9.15	30	187.83	1.38	0.73	1.36	sand	80-90	42-44	36	UNDEFINED
9.45	31	155.83	1.19	0.76	1.41	sand	70-80	40-42	30	UNDEFINED
9.75	32	109.50	0.90	0.82	1.45	sand to silty sand	60-70	38-40	25	UNDEFINED
10.05	33	15.83	0.55	2.98	1.49	clayey silt to silty clay	UNDFND	UNDFD	9	1.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 105 z sounding

Initial Baseline

Dc	Fs	Fw	Inc
-261	-7.08	-6.9	0.2

Dep	
Dc	0
Fs	0.20
Fw	-0.0
Inc	0.2

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

CONOCO

Page 1 of 1

Location: H-09, Start Time: 0850, End Time: 0945

Site: DuPont, Town: E. Chicago, State: Ind

Unit: 1, Operators: SGIIS, Kost, Wilson,

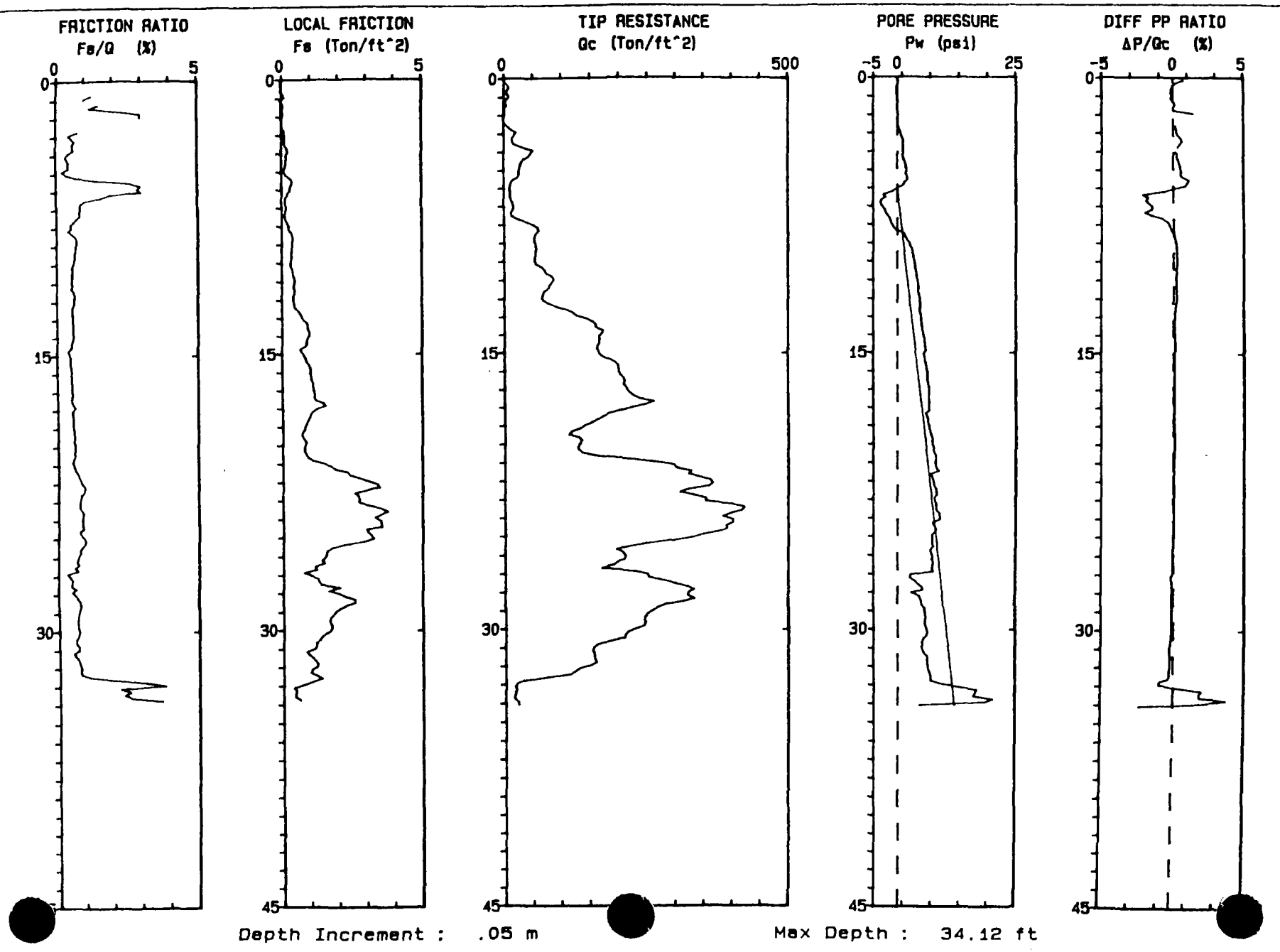
Proj. Consultant: Lounsbury, Company: DCIS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-19	0858	0925	H-09	CR119	✓				34.1		2	F	Clay at 32.8

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-19-91 09:07 FILE CPTH9 Pg 1 / 1

LOCATION : H-09 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 34.12 ft

SOUNDING DATA IN FILE CPTH9 11-19-91 09:07

OPERATOR : CALVIN SELLS LOCATION : H-09

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-260		-7.05		-9.0			0.1
0.05	0.2	2	2	-0.05	-2.24	0.2	0.69	0.69	0.4
0.10	0.3	6	6	-0.04	-0.65	0.1	0.10	0.10	2.1
0.15	0.5	8	9	-0.03	-0.42	-0.1	-0.11	-0.11	1.8
0.20	0.7	5	5	-0.04	-0.77	-0.1	-0.17	-0.17	1.6
0.25	0.8	4	4	0.05	1.24	-0.1	-0.11	-0.11	3.0
0.30	1.0	9	9	0.09	1.00	-0.1	-0.08	-0.08	1.7
0.35	1.1	4	4	-0.05	-1.10	-0.1	-0.20	-0.20	1.1
0.40	1.3	2	2	0.03	1.28	0.0	0.00	0.00	0.5
0.45	1.5	5	5	0.06	1.23	0.1	0.13	0.13	0.3
0.50	1.6	1	1	0.02	1.53	0.0	0.00	0.00	0.3
0.55	1.8	1	1	0.03	6.67	-0.0	-0.29	-0.29	0.3
0.60	2.0	1	1	0.03	4.38	0.2	1.72	1.72	0.3
0.65	2.1	-1	-1	0.00	0.00	0.2	-2.07	-2.07	0.3
0.70	2.3	-1	-1	0.00	0.00	0.1	-1.61	-1.61	0.3
0.75	2.5	-0	-0	0.00	0.00	0.1	-2.59	-2.59	0.3
0.80	2.6	6	6	-0.01	-0.13	0.1	0.14	0.14	0.2
0.85	2.8	12	12	0.09	0.72	0.3	0.20	0.20	0.2
0.90	3.0	21	21	0.09	0.42	0.6	0.19	0.19	0.3
0.95	3.1	18	18	0.10	0.52	0.7	0.29	0.29	0.2
1.00	3.3	14	14	0.09	0.63	1.0	0.53	0.53	0.2
1.05	3.4	14	14	0.08	0.57	1.2	0.60	0.60	0.2
1.10	3.6	18	18	0.11	0.62	1.2	0.50	0.50	0.2
1.15	3.8	31	31	0.19	0.61	1.2	0.27	0.27	0.2
1.20	3.9	51	51	0.22	0.44	1.2	0.16	0.16	0.2
1.25	4.1	47	47	0.16	0.35	1.2	0.18	0.18	0.3
1.30	4.3	43	43	0.17	0.40	1.2	0.21	0.21	0.3
1.35	4.4	34	34	0.15	0.44	1.4	0.29	0.29	0.3
1.40	4.6	30	30	0.13	0.43	1.6	0.39	0.39	0.3
1.45	4.8	28	28	0.12	0.41	1.8	0.47	0.47	0.3
1.50	4.9	27	27	0.06	0.23	1.9	0.50	0.50	0.3
1.55	5.1	25	25	0.09	0.35	2.0	0.58	0.58	0.3
1.60	5.2	26	26	0.18	0.72	1.8	0.52	0.52	0.3
1.65	5.4	23	23	0.32	1.40	2.1	0.68	0.68	0.3
1.70	5.6	14	14	0.37	2.76	2.2	1.15	1.15	0.3
1.75	5.7	11	11	0.33	3.06	1.5	0.97	0.97	0.3
1.80	5.9	10	10	0.29	2.96	1.2	0.88	0.88	0.3
1.85	6.1	9	9	0.27	3.01	-0.1	-0.05	-0.05	0.3
1.90	6.2	10	10	0.19	1.86	-1.0	-0.71	-0.76	0.3
1.95	6.4	10	10	0.16	1.54	-2.9	-2.09	-2.20	0.3
2.00	6.6	11	11	0.11	1.00	-2.5	-1.64	-1.78	0.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	14	14	0.12	0.80	-3.5	-1.76	-1.91	0.4
2.10	6.9	16	15	0.13	0.83	-3.4	-1.59	-1.75	0.4
2.15	7.1	17	17	0.14	0.80	-3.1	-1.31	-1.49	0.4
2.20	7.2	15	15	0.12	0.78	-2.7	-1.31	-1.55	0.4
2.25	7.4	11	11	0.09	0.78	-2.5	-1.57	-1.93	0.4
2.30	7.5	13	13	0.09	0.68	-2.1	-1.15	-1.51	0.5
2.35	7.7	22	22	0.13	0.57	-1.6	-0.53	-0.76	0.5
2.40	7.9	37	37	0.18	0.48	-1.4	-0.28	-0.43	0.5
2.45	8.0	51	51	0.25	0.49	-1.1	-0.16	-0.28	0.5
2.50	8.2	59	59	0.23	0.39	-0.7	-0.09	-0.20	0.5
2.55	8.4	60	60	0.32	0.53	-0.2	-0.02	-0.14	0.5
2.60	8.5	55	55	0.36	0.65	1.3	0.17	0.03	0.5
2.65	8.7	53	53	0.38	0.71	1.7	0.24	0.08	0.5
2.70	8.9	52	52	0.37	0.71	2.0	0.28	0.11	0.5
2.75	9.0	54	54	0.37	0.68	2.5	0.33	0.16	0.5
2.80	9.2	55	56	0.37	0.67	2.7	0.35	0.18	0.5
2.85	9.4	56	56	0.37	0.65	3.0	0.38	0.20	0.5
2.90	9.5	56	56	0.35	0.63	3.2	0.41	0.22	0.5
2.95	9.7	55	55	0.35	0.64	3.4	0.44	0.24	0.5
3.00	9.8	54	54	0.33	0.62	3.4	0.45	0.23	0.5
3.05	10.0	54	54	0.31	0.57	3.7	0.49	0.26	0.5
3.10	10.2	56	56	0.30	0.54	3.8	0.49	0.26	[illegible]
3.15	10.3	65	65	0.35	0.54	3.8	0.43	0.22	[illegible]
3.20	10.5	71	71	0.38	0.53	3.9	0.40	0.20	0.5
3.25	10.7	73	73	0.39	0.54	4.1	0.41	0.21	0.5
3.30	10.8	83	83	0.43	0.52	4.1	0.36	0.18	0.5
3.35	11.0	87	87	0.45	0.52	4.2	0.35	0.17	0.5
3.40	11.2	83	83	0.44	0.54	4.4	0.38	0.19	0.5
3.45	11.3	79	79	0.39	0.49	4.4	0.41	0.20	0.5
3.50	11.5	77	77	0.44	0.57	4.5	0.42	0.20	0.6
3.55	11.6	69	69	0.44	0.63	4.3	0.45	0.20	0.6
3.60	11.8	66	66	0.41	0.63	4.5	0.49	0.21	0.6
3.65	12.0	65	65	0.40	0.61	4.7	0.52	0.23	0.6
3.70	12.1	69	69	0.41	0.59	4.8	0.51	0.23	0.6
3.75	12.3	78	78	0.43	0.55	5.0	0.46	0.21	0.6
3.80	12.5	91	91	0.47	0.51	4.8	0.38	0.16	0.6
3.85	12.6	110	110	0.58	0.53	4.8	0.31	0.13	0.6
3.90	12.8	120	120	0.65	0.54	4.8	0.29	0.11	0.6
3.95	13.0	127	127	0.70	0.55	5.0	0.28	0.12	0.7
4.00	13.1	144	145	0.76	0.53	5.0	0.25	0.10	0.7
4.05	13.3	154	154	0.88	0.57	5.1	0.24	0.09	0.7
4.10	13.5	160	160	0.90	0.56	5.1	0.23	0.08	0.7
4.15	13.6	160	160	0.90	0.56	5.2	0.24	0.09	0.7
4.20	13.8	172	172	0.96	0.56	5.3	0.22	0.08	0.8
4.25	13.9	171	171	0.97	0.57	5.4	0.23	0.08	0.8
4.30	14.1	165	165	0.90	0.55	5.5	0.24	0.09	0.8
4.35	14.3	166	166	0.85	0.51	5.7	0.25	0.09	[illegible]
4.40	14.4	166	166	0.85	0.51	5.7	0.25	0.09	[illegible]
4.45	14.6	163	163	0.81	0.50	5.8	0.25	0.09	0.9
4.50	14.8	161	161	0.62	0.38	5.9	0.26	0.09	0.9

EPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	165	165	0.70	0.42	6.0	0.26	0.09	0.9
4.60	15.1	167	167	0.77	0.46	5.5	0.24	0.07	1.0
4.65	15.3	173	173	0.82	0.48	5.7	0.24	0.07	1.0
4.70	15.4	186	186	0.85	0.46	5.8	0.22	0.07	1.0
4.75	15.6	195	195	0.93	0.48	6.0	0.22	0.07	1.0
4.80	15.7	200	200	0.99	0.49	6.1	0.22	0.07	1.0
4.85	15.9	200	200	1.01	0.50	6.2	0.22	0.07	1.0
4.90	16.1	200	200	0.99	0.50	6.4	0.23	0.07	1.1
4.95	16.2	203	203	1.02	0.50	6.4	0.23	0.07	1.1
5.00	16.4	209	209	1.03	0.49	6.4	0.22	0.07	1.1
5.05	16.6	211	211	1.08	0.51	6.4	0.22	0.06	1.1
5.10	16.7	208	208	1.08	0.52	6.5	0.23	0.07	1.1
5.15	16.9	213	213	1.10	0.52	6.7	0.23	0.07	1.2
5.20	17.1	215	215	1.12	0.52	6.7	0.23	0.07	1.2
5.25	17.2	219	219	1.16	0.53	6.7	0.22	0.06	1.2
5.30	17.4	226	226	1.13	0.50	6.7	0.21	0.06	1.2
5.35	17.6	237	237	1.19	0.50	6.7	0.20	0.05	1.2
5.40	17.7	262	262	1.45	0.55	6.8	0.19	0.05	1.2
5.45	17.9	247	247	1.54	0.62	6.7	0.19	0.05	1.2
5.50	18.0	222	222	1.20	0.54	6.7	0.22	0.05	1.3
5.55	18.2	203	203	1.05	0.52	6.8	0.24	0.05	1.3
5.60	18.4	182	182	0.98	0.54	5.9	0.23	0.02	1.3
5.65	18.5	172	172	0.94	0.55	6.3	0.27	0.04	1.3
5.70	18.7	162	162	0.88	0.54	6.4	0.28	0.04	1.3
5.75	18.9	152	152	0.83	0.55	6.5	0.31	0.05	1.3
5.80	19.0	140	140	0.78	0.56	6.7	0.35	0.06	1.3
5.85	19.2	131	131	0.76	0.58	6.8	0.38	0.06	1.3
5.90	19.4	116	116	0.67	0.58	7.0	0.43	0.07	1.4
5.95	19.5	112	112	0.67	0.59	7.1	0.46	0.08	1.4
6.00	19.7	130	130	0.73	0.56	7.4	0.41	0.08	1.4
6.05	19.8	135	135	0.82	0.60	7.4	0.39	0.07	1.4
6.10	20.0	131	131	0.80	0.61	7.4	0.41	0.07	1.4
6.15	20.2	128	129	0.78	0.61	7.6	0.43	0.08	1.4
6.20	20.3	130	130	0.77	0.59	7.7	0.43	0.08	1.4
6.25	20.5	137	138	0.83	0.61	7.9	0.42	0.09	1.4
6.30	20.7	162	162	0.89	0.55	8.2	0.36	0.08	1.4
6.35	20.8	213	213	1.07	0.50	8.3	0.28	0.06	1.5
6.40	21.0	259	259	1.42	0.55	8.0	0.22	0.04	1.5
6.45	21.2	298	298	1.72	0.58	8.1	0.20	0.04	1.5
6.50	21.3	302	302	1.88	0.62	8.3	0.20	0.04	1.5
6.55	21.5	328	329	2.31	0.70	8.8	0.19	0.05	1.5
6.60	21.7	323	323	2.40	0.75	7.8	0.16	0.01	1.5
6.65	21.8	343	343	2.75	0.80	7.4	0.16	0.01	1.5
6.70	22.0	362	362	3.04	0.84	7.5	0.15	0.01	1.5
6.75	22.1	366	366	3.41	0.93	7.7	0.15	0.01	1.5
6.80	22.3	359	359	3.46	0.96	7.8	0.16	0.02	1.5
6.85	22.5	323	324	2.98	0.92	6.2	0.18	0.02	1.6
6.90	22.6	307	308	2.56	0.83	8.3	0.19	0.03	1.6
6.95	22.8	331	331	2.72	0.82	8.3	0.18	0.02	1.6
7.00	23.0	354	354	2.74	0.78	7.8	0.16	0.01	1.6

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION X deg
7.05	23.1	354	354	2.72	0.77	8.0	0.16	0.01	1.6
7.10	23.3	402	402	3.05	0.76	8.3	0.15	0.02	1.7
7.15	23.5	424	424	3.51	0.83	8.2	0.14	0.01	1.7
7.20	23.6	419	419	3.77	0.90	8.3	0.14	0.01	1.7
7.25	23.8	398	398	3.51	0.88	8.9	0.16	0.02	1.7
7.30	23.9	384	384	3.29	0.86	9.0	0.17	0.02	1.7
7.35	24.1	403	403	3.51	0.87	9.0	0.16	0.02	1.8
7.40	24.3	402	402	3.52	0.88	7.4	0.13	-0.01	1.8
7.45	24.4	390	390	3.55	0.91	7.7	0.14	-0.01	1.8
7.50	24.6	392	392	2.96	0.76	8.2	0.15	0.00	1.9
7.55	24.8	377	377	3.04	0.81	8.0	0.15	-0.00	1.9
7.60	24.9	349	349	3.16	0.90	7.3	0.15	-0.02	1.8
7.65	25.1	330	330	3.26	0.99	7.3	0.16	-0.02	1.9
7.70	25.3	294	294	2.89	0.99	7.3	0.18	-0.03	1.6
7.75	25.4	248	248	2.21	0.89	7.3	0.21	-0.03	1.9
7.80	25.6	216	216	1.74	0.81	7.5	0.25	-0.03	1.9
7.85	25.8	195	195	1.56	0.80	6.9	0.26	-0.06	2.0
7.90	25.9	208	208	1.55	0.74	7.1	0.25	-0.05	2.0
7.95	26.1	212	213	1.50	0.71	7.5	0.25	-0.04	1.8
8.00	26.2	210	210	1.38	0.66	7.2	0.25	-0.05	2.1
8.05	26.4	198	199	1.47	0.74	7.6	0.27	-0.05	1.9
8.10	26.6	190	190	1.13	0.59	7.4	0.28	-0.06	[illegible]
8.15	26.7	169	169	1.18	0.70	7.3	0.31	-0.07	[illegible]
8.20	26.9	228	228	0.72	0.32	7.5	0.24	-0.05	2.0
8.25	27.1	251	251	1.02	0.40	2.7	0.08	-0.18	2.1
8.30	27.2	252	252	1.24	0.49	2.5	0.07	-0.19	2.1
8.35	27.4	275	275	1.29	0.47	3.5	0.09	-0.15	2.1
8.40	27.6	299	299	1.35	0.45	4.2	0.10	-0.12	2.1
8.45	27.7	321	321	2.04	0.64	5.1	0.11	-0.10	2.1
8.50	27.9	333	333	1.64	0.49	5.4	0.12	-0.09	2.1
8.55	28.1	322	322	2.00	0.62	2.8	0.06	-0.15	2.2
8.60	28.2	322	322	2.24	0.70	4.6	0.10	-0.11	2.2
8.65	28.4	334	334	2.60	0.78	4.9	0.11	-0.10	2.2
8.70	28.5	312	312	2.58	0.83	5.1	0.12	-0.11	2.2
8.75	28.7	283	283	2.25	0.80	5.2	0.13	-0.12	2.2
8.80	28.9	268	268	2.03	0.76	5.7	0.15	-0.11	2.2
8.85	29.0	259	259	1.86	0.72	5.7	0.16	-0.12	2.2
8.90	29.2	249	250	1.77	0.71	5.8	0.17	-0.12	2.3
8.95	29.4	246	246	1.67	0.68	6.0	0.17	-0.12	2.4
9.00	29.5	244	244	1.63	0.67	5.8	0.17	-0.13	2.4
9.05	29.7	246	246	1.70	0.69	5.7	0.17	-0.13	2.4
9.10	29.9	243	243	1.73	0.71	5.9	0.18	-0.13	2.5
9.15	30.0	228	228	1.68	0.74	6.2	0.20	-0.13	2.5
9.20	30.2	215	215	1.53	0.71	6.3	0.21	-0.14	2.5
9.25	30.3	210	210	1.37	0.65	6.1	0.21	-0.15	2.5
9.30	30.5	209	209	1.28	0.61	5.4	0.19	-0.18	2.6
9.35	30.7	187	187	1.18	0.63	5.1	0.20	-0.21	[illegible]
9.40	30.8	163	163	1.18	0.72	5.1	0.23	-0.25	[illegible]
9.45	31.0	155	155	1.12	0.72	5.1	0.24	-0.27	2.6
9.50	31.2	153	153	0.80	0.52	5.4	0.25	-0.26	2.6

EPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	156	156	0.90	0.58	5.7	0.26	-0.24	2.6
9.60	31.5	156	156	1.05	0.68	6.4	0.30	-0.21	2.6
9.65	31.7	158	158	1.15	0.73	6.3	0.29	-0.22	2.6
9.70	31.8	161	161	1.23	0.76	6.4	0.29	-0.21	2.6
9.75	32.0	150	150	1.20	0.80	6.4	0.31	-0.23	2.7
9.80	32.2	130	130	1.01	0.78	6.5	0.36	-0.27	2.7
9.85	32.3	122	122	0.96	0.79	6.8	0.40	-0.27	2.7
9.90	32.5	113	113	1.22	1.07	7.0	0.45	-0.28	2.7
9.95	32.6	75	76	1.37	1.82	7.0	0.67	-0.43	2.7
10.00	32.8	33	33	1.04	3.11	7.0	1.51	-0.99	2.7
10.05	33.0	19	19	0.72	3.81	9.0	3.42	-1.01	2.8
10.10	33.1	16	16	0.35	2.26	12.7	5.86	0.46	2.8
10.15	33.3	18	19	0.46	2.50	16.8	6.58	1.94	2.8
10.20	33.5	18	18	0.42	2.36	16.5	6.75	1.89	2.8
10.25	33.6	16	16	0.42	2.66	16.1	7.30	1.87	2.9
10.30	33.8	16	17	0.59	3.63	20.4	9.00	3.69	2.9
10.35	34.0	22	23	?	?	18.6	5.99	2.10	2.9
10.40	34.1	23	23	?	?	4.5	1.39	-2.40	2.9

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:H-09
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-19-91 09:07
Cone Used :293
Water table (feet) : 2.296588

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
0.30	1	5.67	-0.00	-0.06	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	2.33	0.02	0.86	0.11	sensitive fine grained	UNDFND	UNDFD	1	.2
0.95	3	7.86	0.04	0.49	0.18	sensitive fine grained	UNDFND	UNDFD	4	.7
1.25	4	29.17	0.14	0.49	0.23	silty sand to sandy silt	50-60	42-44	9	UNDEFINED
1.55	5	31.17	0.12	0.39	0.27	silty sand to sandy silt	50-60	40-42	10	UNDEFINED
1.85	6	15.50	0.29	1.89	0.32	clayey silt to silty clay	UNDFND	UNDFD	7	1.5
2.15	7	13.00	0.14	1.09	0.36	sandy silt to clayey silt	UNDFND	UNDFD	5	1.2
2.45	8	24.83	0.14	0.58	0.40	silty sand to sandy silt	(40	38-40	8	UNDEFINED
2.75	9	55.50	0.34	0.61	0.45	sand to silty sand	60-70	40-42	13	UNDEFINED
3.05	10	55.00	0.35	0.63	0.49	sand to silty sand	50-60	40-42	13	UNDEFINED
3.35	11	72.50	0.38	0.53	0.53	sand to silty sand	60-70	42-44	17	UNDEFINED
3.65	12	73.17	0.42	0.57	0.57	sand to silty sand	60-70	42-44	18	UNDEFINED
3.95	13	99.17	0.54	0.54	0.62	sand to silty sand	70-80	42-44	24	UNDEFINED
4.25	14	160.17	0.89	0.56	0.66	sand	80-90	44-46	31	UNDEFINED
4.55	15	164.33	0.79	0.48	0.70	sand	80-90	44-46	31	UNDEFINED
4.85	16	186.83	0.89	0.48	0.75	sand	80-90	44-46	36	UNDEFINED
5.15	17	207.33	1.05	0.51	0.79	sand	)90	44-46	40	UNDEFINED
5.45	18	234.33	1.26	0.54	0.83	sand	)90	44-46	45	UNDEFI
5.75	19	182.17	0.98	0.54	0.88	sand	80-90	44-46	35	UNDEFI
6.05	20	127.33	0.74	0.58	0.92	sand	70-80	42-44	24	UNDEFINED
6.40	21	165.71	0.94	0.57	0.97	sand	80-90	42-44	32	UNDEFINED
6.70	22	326.00	2.35	0.72	1.01	sand	)90	44-46	)50	UNDEFINED
7.00	23	340.00	2.98	0.88	1.06	sand	)90	44-46	)50	UNDEFINED
7.35	24	397.71	3.34	0.84	1.10	sand	)90	46-48	)50	UNDEFINED
7.65	25	373.33	3.25	0.87	1.15	sand	)90	46-48	)50	UNDEFINED
7.95	26	228.83	1.91	0.83	1.19	sand	80-90	42-44	44	UNDEFINED
8.25	27	207.67	1.15	0.55	1.23	sand	80-90	42-44	48	UNDEFINED
8.55	28	300.33	1.59	0.53	1.28	gravelly sand to sand	)90	44-46	48	UNDEFINED
8.85	29	296.33	2.26	0.76	1.32	sand	)90	44-46	)50	UNDEFINED
9.15	30	242.67	1.70	0.70	1.36	sand	80-90	42-44	46	UNDEFINED
9.45	31	189.83	1.28	0.67	1.41	sand	80-90	42-44	36	UNDEFINED
9.75	32	155.67	1.05	0.68	1.45	sand	70-80	40-42	30	UNDEFINED
10.05	33	82.00	1.05	1.28	1.49	silty sand to sandy silt	50-60	38-40	26	UNDEFINED
10.35	34	17.67	-5460.96	-30911.10	1.54	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - 911 sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 240 ■ sounding

al Baseline

Qc	Fs	Pw	Inc
-26i	-7.05	-8.5	0.1

Dep	
Qc	0
Fs	0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: H-12, Start Time: 0950, End Time: 1030

Site: DuPont, Town: E. Chicago, State: IND.

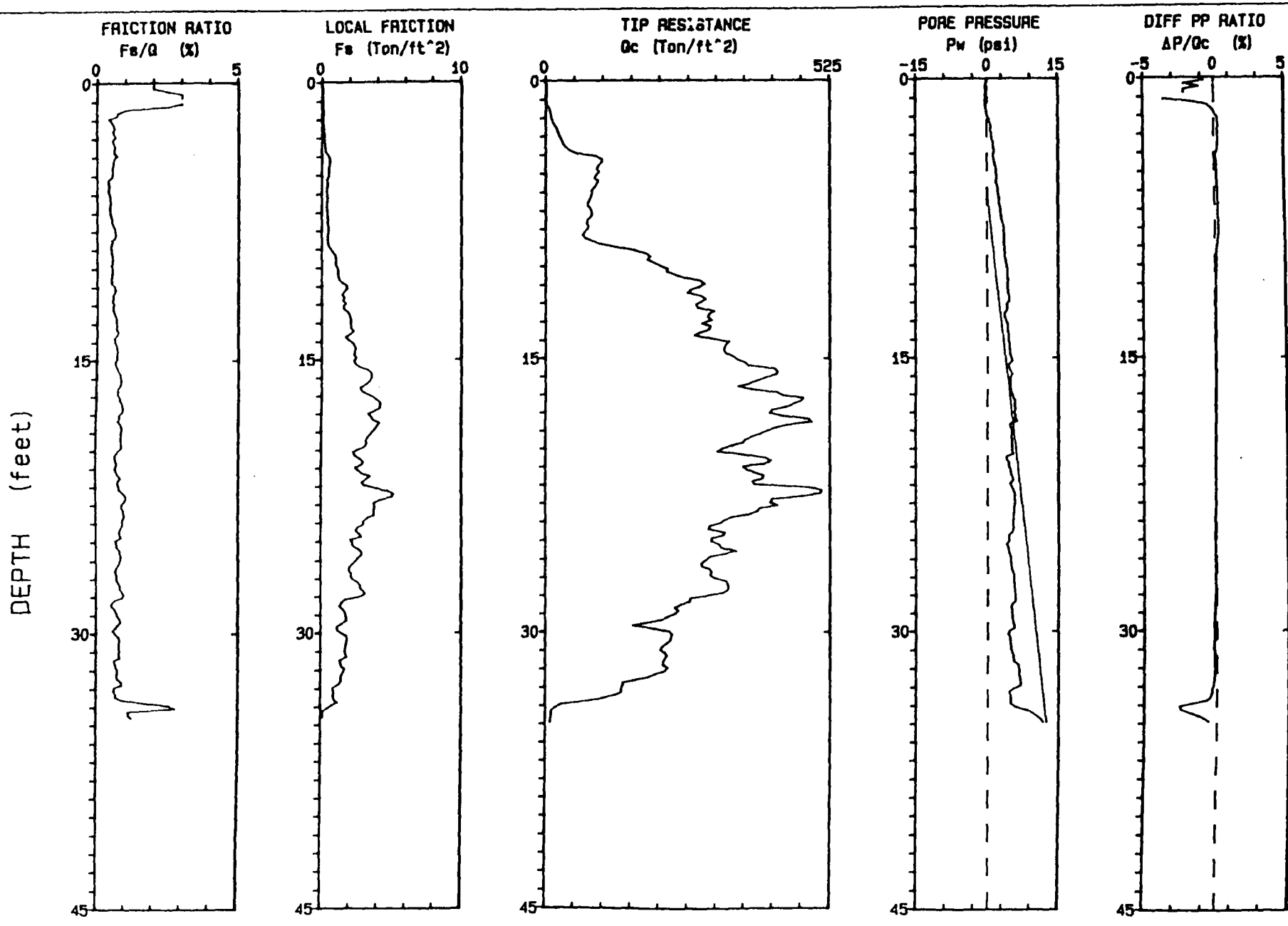
Unit: 1, Operators: Sellis, Kasl, Wilson,

Proj. Consultant: Lounsbury, Company: DERI

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-1991	0957	1025	H-12	CPTH12	✓	*✓			34.9		2	F	CLAY AT 33.8' *Sample for ICP from Rock Tip 0-5'

Conoco, Inc.

OPERATOR : CALVIN SELLS
CPT Date : 11-19-91 10:01
FILE CPTH12 Pg 1 / 1
LOCATION : H-12
CONE USED : 293
HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 34.94 ft

SOUNDING DATA IN FILE CPTH12 11-19-91 10:01

OPERATOR : CALVIN SELLS LOCATION : H-12

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.05		-8.8			0.1
0.05	0.2	1	1	0.02	2.44	-0.1	-1.08	-1.08	0.1
0.10	0.3	1	1	0.02	2.29	-0.3	-2.64	-2.64	0.1
0.15	0.5	2	2	0.05	3.24	-0.3	-1.30	-1.30	0.1
0.20	0.7	1	1	0.03	2.09	-0.3	-1.52	-1.52	0.2
0.25	0.8	1	1	0.03	4.67	-0.3	-3.68	-3.68	0.2
0.30	1.0	0	0	0.02	5.50	-0.3	-9.19	-9.19	0.1
0.35	1.1	1	1	0.03	4.65	-0.5	-4.66	-4.66	0.6
0.40	1.3	2	2	0.05	2.79	-0.4	-1.44	-1.44	0.4
0.45	1.5	5	5	0.05	0.97	-0.3	-0.43	-0.43	0.0
0.50	1.6	7	7	0.05	0.66	-0.2	-0.23	-0.23	0.1
0.55	1.8	9	9	0.06	0.63	0.0	0.02	0.02	0.1
0.60	2.0	10	10	0.04	0.36	0.1	0.10	0.10	
0.65	2.1	12	12	0.06	0.53	0.4	0.22	0.22	
0.70	2.3	14	14	0.09	0.62	0.5	0.29	0.29	0.1
0.75	2.5	18	18	0.11	0.63	0.7	0.26	0.26	0.1
0.80	2.6	20	20	0.11	0.56	0.9	0.33	0.33	0.1
0.85	2.8	22	22	0.13	0.60	0.7	0.23	0.23	0.1
0.90	3.0	24	24	0.15	0.64	1.0	0.31	0.31	0.1
0.95	3.1	27	27	0.14	0.51	1.0	0.27	0.27	0.1
1.00	3.3	30	30	0.17	0.58	1.1	0.26	0.26	0.1
1.05	3.4	32	32	0.20	0.62	1.3	0.28	0.28	0.1
1.10	3.6	37	37	0.22	0.61	1.3	0.26	0.26	0.1
1.15	3.8	43	43	0.25	0.58	1.4	0.24	0.24	0.1
1.20	3.9	56	56	0.40	0.71	1.6	0.21	0.21	0.1
1.25	4.1	93	93	0.54	0.58	1.3	0.10	0.10	0.1
1.30	4.3	103	103	0.57	0.55	1.4	0.10	0.10	0.1
1.35	4.4	103	103	0.56	0.54	1.6	0.11	0.11	0.1
1.40	4.6	97	97	0.50	0.51	1.6	0.12	0.12	0.1
1.45	4.8	93	93	0.49	0.53	1.9	0.15	0.15	0.1
1.50	4.9	97	97	0.51	0.52	1.9	0.14	0.14	0.1
1.55	5.1	92	92	0.46	0.50	2.0	0.15	0.15	0.1
1.60	5.2	88	88	0.32	0.36	2.1	0.17	0.17	0.1
1.65	5.4	96	96	0.38	0.40	2.1	0.16	0.16	0.1
1.70	5.6	93	93	0.38	0.41	2.0	0.15	0.15	0.1
1.75	5.7	89	89	0.34	0.39	2.2	0.18	0.18	0.1
1.80	5.9	84	84	0.33	0.39	2.3	0.20	0.20	0.1
1.85	6.1	84	85	0.37	0.43	2.3	0.20	0.20	
1.90	6.2	82	82	0.37	0.45	2.5	0.22	0.21	
1.95	6.4	80	80	0.36	0.45	2.6	0.24	0.22	0.1
2.00	6.6	77	77	0.33	0.43	2.6	0.25	0.23	0.1

EPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	76	76	0.32	0.42	2.7	0.26	0.23	0.1
2.10	6.9	81	81	0.35	0.43	2.8	0.25	0.22	0.1
2.15	7.1	84	84	0.38	0.45	2.9	0.25	0.21	0.1
2.20	7.2	84	84	0.40	0.47	2.9	0.25	0.21	0.1
2.25	7.4	81	81	0.42	0.52	3.0	0.27	0.22	0.1
2.30	7.5	75	75	0.38	0.51	3.1	0.30	0.24	0.1
2.35	7.7	74	74	0.41	0.55	3.3	0.32	0.25	0.1
2.40	7.9	78	78	0.47	0.60	3.4	0.31	0.24	0.1
2.45	8.0	75	75	0.47	0.62	3.5	0.33	0.25	0.1
2.50	8.2	70	70	0.46	0.66	3.5	0.36	0.27	0.1
2.55	8.4	66	67	0.41	0.62	3.6	0.39	0.28	0.1
2.60	8.5	71	71	0.36	0.51	3.6	0.37	0.26	0.1
2.65	8.7	87	87	0.42	0.48	3.6	0.30	0.21	0.1
2.70	8.9	102	103	0.46	0.45	3.6	0.25	0.17	0.1
2.75	9.0	132	132	0.63	0.48	3.7	0.20	0.13	0.1
2.80	9.2	163	163	0.79	0.48	3.6	0.16	0.10	0.1
2.85	9.4	184	184	0.97	0.53	3.8	0.15	0.09	0.1
2.90	9.5	192	192	1.04	0.54	3.7	0.14	0.08	0.1
2.95	9.7	186	187	0.98	0.53	3.9	0.15	0.09	0.1
3.00	9.8	199	199	0.96	0.48	4.0	0.15	0.09	0.1
3.05	10.0	212	212	1.08	0.51	4.2	0.14	0.08	0.1
3.10	10.2	224	224	1.16	0.52	4.3	0.14	0.08	0.1
3.15	10.3	223	223	1.14	0.51	4.3	0.14	0.08	0.1
3.20	10.5	239	239	1.17	0.49	4.3	0.13	0.07	0.1
3.25	10.7	257	257	1.23	0.48	4.3	0.12	0.07	0.1
3.30	10.8	285	285	1.42	0.50	4.5	0.11	0.06	0.1
3.35	11.0	293	293	1.72	0.59	4.4	0.11	0.06	0.1
3.40	11.2	283	283	1.79	0.63	4.4	0.11	0.06	0.1
3.45	11.3	266	266	1.59	0.60	4.4	0.12	0.06	0.1
3.50	11.5	261	261	1.41	0.54	4.4	0.12	0.06	0.1
3.55	11.6	296	296	1.59	0.55	4.6	0.12	0.05	0.1
3.60	11.8	295	295	1.52	0.52	4.7	0.11	0.05	0.1
3.65	12.0	285	285	1.69	0.59	4.7	0.12	0.05	0.1
3.70	12.1	276	276	1.49	0.54	4.1	0.11	0.04	0.1
3.75	12.3	280	280	1.56	0.56	4.3	0.11	0.04	0.1
3.80	12.5	312	312	1.87	0.60	4.2	0.10	0.03	0.1
3.85	12.6	302	302	1.97	0.65	3.5	0.08	0.02	0.1
3.90	12.8	299	299	2.05	0.68	3.6	0.09	0.02	0.1
3.95	13.0	306	306	2.08	0.68	3.9	0.09	0.02	0.1
4.00	13.1	287	287	2.04	0.71	4.2	0.11	0.03	0.1
4.05	13.3	304	304	2.04	0.67	4.4	0.10	0.03	0.1
4.10	13.5	302	302	2.27	0.75	4.3	0.10	0.03	0.1
4.15	13.6	283	283	2.01	0.71	4.4	0.11	0.03	0.1
4.20	13.8	273	273	1.67	0.61	4.5	0.12	0.03	0.1
4.25	13.9	305	305	1.88	0.62	4.5	0.11	0.03	0.1
4.30	14.1	339	339	2.23	0.66	4.5	0.10	0.02	0.1
4.35	14.3	332	332	2.34	0.70	4.7	0.10	0.02	0.1
4.40	14.4	330	330	2.40	0.73	4.7	0.10	0.02	0.1
4.45	14.6	329	329	2.33	0.71	4.8	0.11	0.02	0.1
4.50	14.8	334	334	2.30	0.69	4.9	0.11	0.02	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	347	347	2.46	0.71	4.9	0.10	0.02	0.1
4.60	15.1	355	355	2.28	0.64	5.2	0.10	0.03	0.1
4.65	15.3	369	369	2.40	0.65	5.2	0.10	0.02	0.1
4.70	15.4	375	375	2.69	0.72	4.4	0.08	0.01	0.1
4.75	15.6	423	423	3.22	0.76	4.6	0.08	0.01	0.1
4.80	15.7	429	429	3.51	0.82	4.9	0.08	0.01	0.1
4.85	15.9	427	428	3.55	0.83	5.3	0.09	0.02	0.1
4.90	16.1	407	407	3.53	0.87	4.9	0.09	0.01	0.1
4.95	16.2	391	392	3.39	0.86	4.7	0.09	0.01	0.1
5.00	16.4	377	377	3.16	0.84	4.8	0.09	0.01	0.1
5.05	16.6	355	355	2.70	0.76	4.8	0.10	0.00	0.1
5.10	16.7	380	380	2.80	0.74	4.9	0.09	0.01	0.1
5.15	16.9	427	428	3.13	0.73	5.0	0.08	0.00	0.1
5.20	17.1	440	440	3.55	0.81	5.3	0.09	0.01	0.1
5.25	17.2	477	477	3.88	0.81	5.4	0.08	0.01	0.1
5.30	17.4	472	473	4.17	0.88	5.9	0.09	0.01	0.1
5.35	17.6	458	458	4.18	0.91	5.8	0.09	0.01	0.1
5.40	17.7	444	445	4.16	0.94	5.8	0.09	0.01	0.1
5.45	17.9	418	419	3.77	0.90	6.0	0.10	0.01	0.1
5.50	18.0	414	414	3.29	0.80	5.6	0.10	0.01	0.2
5.55	18.2	440	440	3.54	0.80	6.0	0.10	0.01	0.2
5.60	18.4	487	487	3.64	0.75	5.6	0.09	0.01	[illegible]
5.65	18.5	493	493	4.15	0.84	6.3	0.09	0.01	[illegible]
5.70	18.7	446	446	3.98	0.89	4.7	0.06	-0.01	0.2
5.75	18.9	425	425	3.85	0.91	4.8	0.08	-0.01	0.2
5.80	19.0	409	409	3.61	0.88	5.1	0.09	-0.01	0.2
5.85	19.2	396	396	3.43	0.87	5.2	0.09	-0.01	0.5
5.90	19.4	380	380	3.25	0.85	5.1	0.16	-0.01	0.3
5.95	19.5	368	368	3.16	0.86	5.2	0.10	-0.01	0.5
6.00	19.7	365	365	3.21	0.88	5.1	0.10	-0.02	0.3
6.05	19.8	345	345	3.10	0.90	5.2	0.11	-0.02	0.2
6.10	20.0	326	326	2.56	0.79	5.2	0.12	-0.02	0.3
6.15	20.2	316	316	2.22	0.70	5.2	0.12	-0.02	0.3
6.20	20.3	367	367	2.37	0.65	5.5	0.11	-0.01	0.3
6.25	20.5	407	407	2.69	0.66	4.8	0.07	-0.04	0.2
6.30	20.7	416	418	2.98	0.71	4.1	0.07	-0.04	0.2
6.35	20.8	405	405	2.82	0.70	4.5	0.08	-0.03	0.3
6.40	21.0	364	364	2.39	0.66	4.4	0.09	-0.04	0.3
6.45	21.2	371	371	2.60	0.70	4.7	0.09	-0.04	0.3
6.50	21.3	384	384	2.90	0.76	4.9	0.09	-0.03	0.3
6.55	21.5	403	403	3.46	0.86	5.0	0.09	-0.03	0.3
6.60	21.7	402	402	3.14	0.78	5.4	0.10	-0.02	0.3
6.65	21.8	382	382	2.85	0.75	5.5	0.10	-0.02	0.3
6.70	22.0	386	386	3.04	0.79	4.7	0.09	-0.04	0.3
6.75	22.1	490	490	3.91	0.80	5.0	0.07	-0.03	0.3
6.80	22.3	510	510	4.70	0.92	5.4	0.08	-0.02	0.3
6.85	22.5	508	508	5.17	1.02	5.7	0.08	-0.02	[illegible]
6.90	22.6	474	474	5.02	1.06	5.8	0.09	-0.02	[illegible]
6.95	22.8	417	417	4.14	0.99	5.7	0.10	-0.03	[illegible]
7.00	23.0	415	415	3.71	0.89	5.9	0.10	-0.03	0.3

EPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	430	430	3.80	0.88	5.7	0.09	-0.03	0.3
7.10	23.3	395	395	3.75	0.95	5.5	0.10	-0.04	0.4
7.15	23.5	391	391	3.73	0.96	5.6	0.10	-0.04	0.3
7.20	23.6	378	378	3.77	1.00	5.5	0.11	-0.04	0.3
7.25	23.8	345	345	3.25	0.94	5.5	0.11	-0.05	0.4
7.30	23.9	330	330	2.97	0.90	5.5	0.12	-0.05	0.3
7.35	24.1	322	322	2.96	0.92	5.4	0.12	-0.05	0.4
7.40	24.3	302	302	2.56	0.85	5.4	0.13	-0.06	0.7
7.45	24.4	300	300	2.40	0.80	5.4	0.13	-0.06	0.4
7.50	24.6	332	332	2.72	0.82	5.2	0.11	-0.06	0.4
7.55	24.8	327	327	2.86	0.88	4.4	0.10	-0.06	0.4
7.60	24.9	305	305	2.04	0.67	4.5	0.11	-0.09	0.4
7.65	25.1	305	305	2.19	0.72	4.6	0.11	-0.09	0.5
7.70	25.3	321	321	2.22	0.69	4.0	0.09	-0.10	0.4
7.75	25.4	325	325	2.64	0.81	4.3	0.10	-0.09	0.5
7.80	25.6	353	353	2.89	0.82	4.4	0.09	-0.08	0.3
7.85	25.8	329	329	2.85	0.87	4.6	0.10	-0.09	0.5
7.90	25.9	303	303	2.56	0.85	4.9	0.12	-0.09	0.3
7.95	26.1	294	294	2.39	0.81	4.9	0.12	-0.09	0.5
8.00	26.2	286	286	2.16	0.76	5.0	0.13	-0.09	0.5
8.05	26.4	287	287	1.98	0.69	5.0	0.13	-0.09	0.5
8.10	26.6	302	302	1.95	0.65	5.0	0.12	-0.09	0.5
8.15	26.7	307	307	2.15	0.70	5.3	0.12	-0.09	0.6
8.20	26.9	302	302	2.12	0.70	5.6	0.13	-0.08	0.5
8.25	27.1	311	311	2.26	0.73	5.6	0.13	-0.08	0.6
8.30	27.2	334	334	2.57	0.77	5.6	0.12	-0.08	0.6
8.35	27.4	336	336	2.76	0.82	5.7	0.12	-0.08	0.5
8.40	27.6	338	338	2.76	0.82	5.7	0.12	-0.08	0.6
8.45	27.7	337	337	3.02	0.90	5.7	0.12	-0.08	0.6
8.50	27.9	328	328	3.13	0.95	5.8	0.13	-0.08	0.6
8.55	28.1	297	297	2.69	0.91	5.9	0.14	-0.09	0.6
8.60	28.2	264	265	1.69	0.64	5.9	0.16	-0.10	0.6
8.65	28.4	265	265	1.42	0.54	6.0	0.16	-0.10	0.6
8.70	28.5	248	248	1.29	0.52	5.2	0.15	-0.13	0.6
8.75	28.7	237	237	1.51	0.64	5.0	0.15	-0.15	0.7
8.80	28.9	245	246	1.68	0.68	5.2	0.15	-0.14	0.6
8.85	29.0	239	239	1.74	0.73	5.1	0.15	-0.15	0.7
8.90	29.2	226	226	1.81	0.80	5.2	0.17	-0.15	0.6
8.95	29.4	213	213	1.81	0.85	5.3	0.18	-0.16	0.7
9.00	29.5	186	186	1.41	0.76	5.4	0.21	-0.18	0.7
9.05	29.7	159	159	1.07	0.67	5.6	0.25	-0.21	0.6
9.10	29.9	200	200	1.12	0.56	5.8	0.21	-0.16	0.7
9.15	30.0	228	228	1.45	0.64	4.6	0.15	-0.18	0.7
9.20	30.2	234	234	1.79	0.76	4.3	0.13	-0.19	0.7
9.25	30.3	231	231	1.86	0.80	4.7	0.14	-0.18	0.7
9.30	30.5	229	229	1.82	0.80	4.8	0.15	-0.18	0.7
9.35	30.7	222	222	1.78	0.80	4.9	0.16	-0.19	0.7
9.40	30.8	214	215	1.70	0.79	5.0	0.17	-0.19	0.7
9.45	31.0	211	212	1.67	0.79	5.0	0.17	-0.20	0.7
9.50	31.2	220	220	1.72	0.78	5.3	0.17	-0.18	0.7

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	224	224	1.84	0.82	5.4	0.17	-0.18	0.7
9.60	31.5	220	220	1.34	0.61	5.5	0.16	-0.18	0.7
9.65	31.7	216	216	1.39	0.64	5.6	0.19	-0.18	0.7
9.70	31.8	216	216	1.47	0.68	6.6	0.22	-0.15	0.7
9.75	32.0	225	225	1.69	0.75	6.7	0.22	-0.14	0.7
9.80	32.2	220	220	1.57	0.71	6.9	0.22	-0.14	0.7
9.85	32.3	201	201	1.43	0.71	6.6	0.24	-0.16	0.7
9.90	32.5	188	188	1.39	0.74	6.9	0.26	-0.18	0.7
9.95	32.6	165	165	1.42	0.86	7.0	0.30	-0.20	0.7
10.00	32.8	142	142	1.26	0.89	7.1	0.36	-0.23	0.7
10.05	33.0	140	140	0.87	0.62	7.1	0.37	-0.24	0.7
10.10	33.1	138	138	0.83	0.60	5.4	0.26	-0.33	0.7
10.15	33.3	139	139	0.92	0.66	4.6	0.24	-0.37	0.7
10.20	33.5	127	127	0.83	0.65	4.8	0.27	-0.40	0.7
10.25	33.6	106	106	0.93	0.88	4.9	0.33	-0.48	0.7
10.30	33.8	73	73	1.19	1.62	4.9	0.48	-0.70	0.7
10.35	34.0	30	30	0.76	2.50	4.9	1.17	-1.70	0.7
10.40	34.1	17	17	0.47	2.76	6.0	2.54	-2.59	0.7
10.45	34.3	11	11	0.12	1.14	8.4	5.55	-2.49	0.7
10.50	34.4	10	10	0.11	1.09	9.6	6.74	-1.88	0.7
10.55	34.6	10	10	0.12	1.25	10.5	7.77	-1.43	0.7
10.60	34.8	9	10	?	?	11.3	8.67	-0.87	[redacted]
10.65	34.9	9	9	?	?	11.8	9.55	-0.55	[redacted]

WRITE NUMBER OF RODS USED __

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:H-12
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-19-91 10:01
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	1.00	0.03	2.83	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	5.67	0.05	0.82	0.11	sensitive fine grained	UNDFND	UNDFD	3	.3
0.95	3	19.57	0.11	0.57	0.18	sandy silt to clayey silt	UNDFND	UNDFD	7	1.9
1.25	4	48.50	0.30	0.61	0.23	silty sand to sandy silt	60-70	44-46	15	UNDEFINED
1.55	5	97.50	0.51	0.53	0.27	sand to silty sand	80-90	46-48	23	UNDEFINED
1.85	6	89.00	0.35	0.40	0.32	sand to silty sand	70-80	44-46	21	UNDEFINED
2.15	7	80.00	0.35	0.44	0.36	sand to silty sand	70-80	44-46	19	UNDEFINED
2.45	8	77.83	0.43	0.55	0.40	sand to silty sand	70-80	42-44	19	UNDEFINED
2.75	9	88.00	0.46	0.52	0.45	sand to silty sand	70-80	44-46	21	UNDEFINED
3.05	10	189.33	0.97	0.51	0.49	sand	>90	46-48	36	UNDEFINED
3.35	11	253.50	1.31	0.52	0.53	sand	>90	46-48	49	UNDEFINED
3.65	12	279.33	1.60	0.57	0.57	sand	>90	46-48	>50	UNDEFINED
3.95	13	295.83	1.84	0.62	0.62	sand	>90	46-48	>50	UNDEFINED
4.25	14	292.33	1.98	0.68	0.66	sand	>90	46-48	>50	UNDEFINED
4.55	15	335.17	2.34	0.70	0.70	sand	>90	46-48	>50	UNDEFINED
4.85	16	396.33	2.94	0.74	0.75	gravelly sand to sand	>90	46-48	>50	UNDEFINED
5.15	17	389.50	3.12	0.80	0.79	gravelly sand to sand	>90	46-48	>50	UNDEFINED
5.45	18	451.50	3.95	0.88	0.83	gravelly sand to sand	>90	>48	>50	UNDEFINED
5.75	19	450.83	3.74	0.83	0.88	gravelly sand to sand	>90	46-48	>50	UNDEFINED
6.05	20	377.17	3.29	0.87	0.92	sand	>90	46-48	>50	UNDEFINED
6.40	21	371.86	2.58	0.69	0.97	gravelly sand to sand	>90	46-48	>50	UNDEFINED
6.70	22	388.00	3.00	0.77	1.01	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.00	23	469.00	4.44	0.95	1.06	sand	>90	46-48	>50	UNDEFINED
7.35	24	370.14	3.46	0.94	1.10	sand	>90	46-48	>50	UNDEFINED
7.65	25	311.83	2.46	0.79	1.15	sand	>90	44-46	>50	UNDEFINED
7.95	26	320.83	2.59	0.81	1.19	sand	>90	44-46	>50	UNDEFINED
8.25	27	299.17	2.10	0.70	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	328.33	2.82	0.86	1.28	sand	>90	44-46	>50	UNDEFINED
8.85	29	249.67	1.55	0.62	1.32	sand	80-90	42-44	48	UNDEFINED
9.15	30	202.00	1.45	0.72	1.36	sand	80-90	42-44	39	UNDEFINED
9.45	31	223.50	1.77	0.79	1.41	sand	80-90	42-44	43	UNDEFINED
9.75	32	220.17	1.57	0.71	1.45	sand	80-90	42-44	42	UNDEFINED
10.05	33	176.00	1.32	0.75	1.49	sand	70-80	40-42	34	UNDEFINED
10.35	34	102.17	0.91	0.89	1.54	sand to silty sand	60-70	38-40	24	UNDEFINED
10.65	35	11.00	-10922.53	-99295.73	1.58	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

++++ Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ++++

File space: 228 ■ sounding

Initial Baseline

Qc	Fs	Pw	Inc
-26:	-7.04	-8.5	0.1

Dep	
Qc	0
Fs	0.00
Pw	-0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

CONOCO

Location: H-21, Start Time: 1325, End Time: 1420

Site: DuPont, Town: E. Chicago, State: Ind

Unit: 1, Operators: Sells, D. Wilson, Kasl, ____

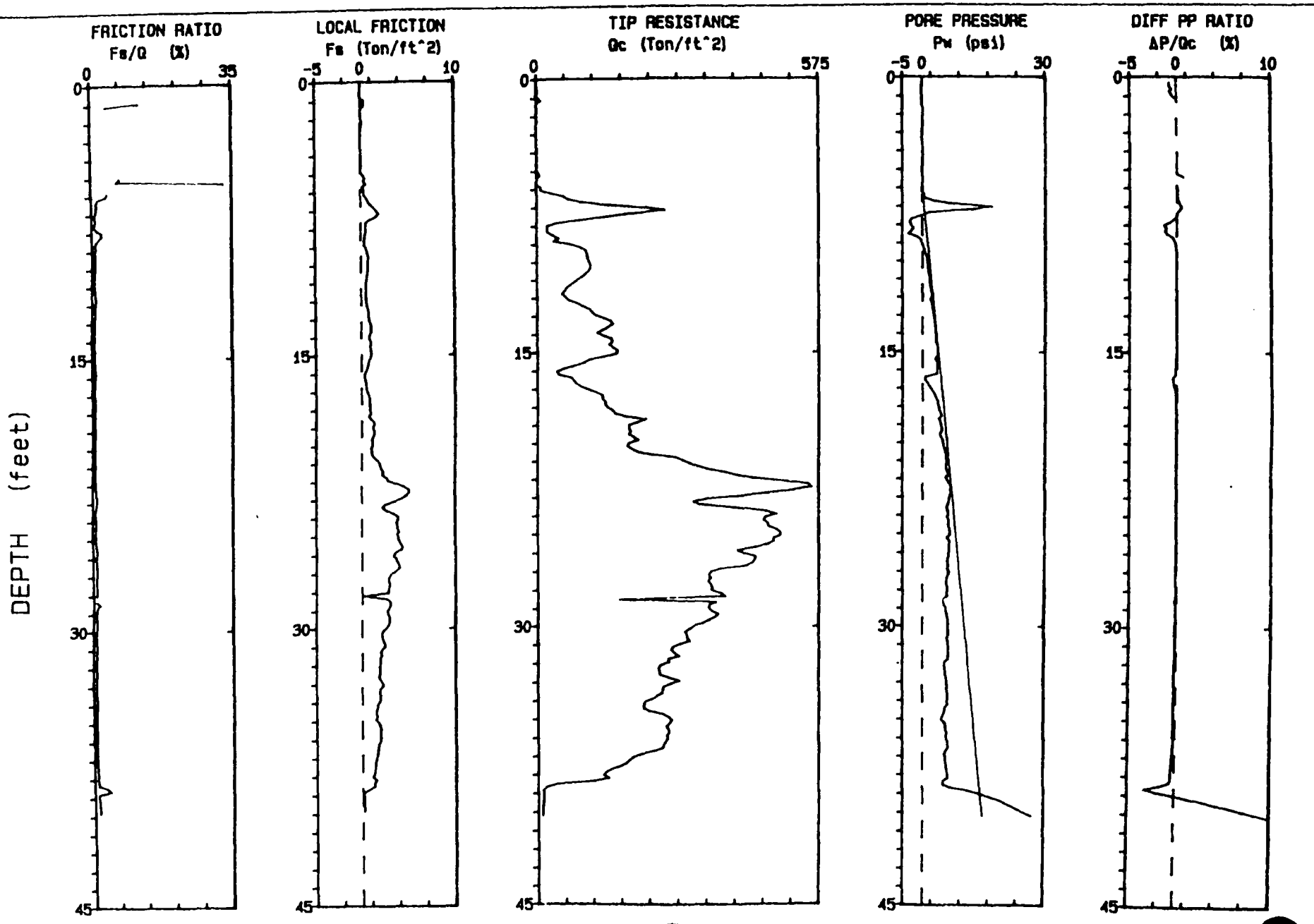
Proj. Consultant: Lounsbury, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-20-91	1335	1410	H-21	CPTH21	✓				40.2		2	F	Clay at 38.5
													Pushed down to 8'
													Rock

nr/cws725

Conoco, Inc.

OPERATOR : CALVIN SELLS
CPT Date : 11-20-91 13:37
FILE CPTH21 Pg 1 / 1
LOCATION : H-21
CONE USED : 293
HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 40.19 ft

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
2.05	6.7	90	90	1.07	1.20	2.4	0.19	0.17	3.8
2.10	6.9	143	143	1.39	0.97	5.3	0.32	0.30	3.8
2.15	7.1	224	224	1.67	0.75	17.1	0.55	0.54	3.6
2.20	7.2	263	263	1.91	0.73	12.3	0.34	0.32	3.8
2.25	7.4	191	191	1.65	0.86	1.4	0.05	0.03	3.4
2.30	7.5	142	142	0.88	0.63	-0.2	-0.01	-0.04	3.5
2.35	7.7	99	99	0.43	0.53	-2.5	-0.23	-0.28	3.7
2.40	7.9	41	41	0.54	1.32	-3.3	-0.58	-0.72	3.7
2.45	8.0	20	20	0.50	2.48	-2.9	-1.02	-1.32	3.6
2.50	8.2	21	21	0.53	2.53	-2.2	-0.75	-1.07	3.6
2.55	8.4	22	22	0.40	1.79	-2.8	-0.90	-1.33	3.6
2.60	8.5	33	33	0.38	1.15	-3.5	-0.76	-1.00	3.6
2.65	8.7	45	45	0.31	0.69	-1.2	-0.19	-0.37	3.6
2.70	8.9	35	35	0.33	0.96	-2.2	-0.84	-0.29	3.6
2.75	9.0	69	69	0.44	0.63	-0.2	-0.02	-0.15	3.6
2.80	9.2	89	89	0.58	0.65	2.1	2.21	-0.16	3.6
2.85	9.4	100	100	0.65	0.65	0.4	0.03	-0.07	3.6
2.90	9.5	103	103	0.73	0.71	0.6	0.04	-0.06	3.6
2.95	9.7	104	104	0.77	0.74	0.6	0.05	-0.05	3.6
3.00	9.9	105	105	0.75	0.72	1.1	0.07	-0.04	3.6
3.05	10.0	108	108	0.74	0.69	1.1	0.07	-0.04	3.6
3.10	10.2	111	111	0.73	0.65	1.3	0.08	-0.03	3.6
3.15	10.3	111	111	0.73	0.66	1.4	0.09	-0.03	3.6
3.20	10.5	108	108	0.68	0.63	1.4	0.09	-0.03	3.6
3.25	10.7	101	101	0.62	0.61	1.5	0.11	-0.03	3.6
3.30	10.8	94	94	0.59	0.63	1.7	0.13	-0.00	3.6
3.35	11.0	85	85	0.54	0.63	1.6	0.15	-0.03	3.6
3.40	11.2	77	77	0.50	0.65	1.8	0.17	-0.04	3.5
3.45	11.3	68	68	0.50	0.74	1.9	0.20	-0.04	3.5
3.50	11.5	61	61	0.54	0.88	2.0	0.23	-0.04	3.5
3.55	11.6	57	57	0.52	0.92	2.1	0.27	-0.04	3.5
3.60	11.8	52	52	0.47	0.90	2.3	0.32	-0.03	3.6
3.65	12.0	59	59	0.48	0.82	2.4	0.29	-0.02	3.6
3.70	12.1	65	65	0.52	0.80	1.9	0.21	-0.08	3.6
3.75	12.3	81	81	0.57	0.70	2.1	0.19	-0.05	3.6
3.80	12.5	94	94	0.69	0.73	2.4	0.18	-0.03	3.6
3.85	12.6	108	108	0.78	0.72	2.4	0.16	-0.03	3.6
3.90	12.8	113	113	0.79	0.69	2.6	0.17	-0.02	3.6
3.95	13.0	120	120	0.80	0.67	2.7	0.16	-0.02	3.6
4.00	13.1	137	137	0.85	0.62	2.9	0.15	-0.01	3.6
4.05	13.3	151	151	0.98	0.65	3.0	0.14	-0.01	3.7
4.10	13.5	157	157	1.05	0.67	3.1	0.14	-0.01	3.7
4.15	13.6	147	147	1.04	0.71	3.1	0.15	-0.01	3.6
4.20	13.8	135	135	1.01	0.75	3.2	0.17	-0.01	3.5
4.25	13.9	124	124	0.87	0.70	3.2	0.19	-0.01	3.6
4.30	14.1	137	137	0.86	0.63	3.5	0.18	0.00	3.5
4.35	14.3	154	154	1.03	0.67	3.4	0.16	-0.01	3.5
4.40	14.4	156	156	1.01	0.64	3.4	0.16	-0.01	3.5
4.45	14.6	149	149	0.97	0.65	3.5	0.17	-0.01	3.5
4.50	14.8	157	157	0.98	0.62	3.7	0.17	-0.00	3.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	166	166	1.05	0.63	3.7	0.16	-0.01	3.5
4.60	15.1	163	163	0.98	0.60	3.7	0.16	-0.01	3.5
4.65	15.3	138	138	0.85	0.62	3.7	0.19	-0.02	3.5
4.70	15.4	109	108	0.75	0.70	3.8	0.20	-0.07	3.5
4.75	15.6	96	96	0.69	0.72	3.6	0.27	-0.04	3.5
4.80	15.7	77	77	0.58	0.76	3.6	0.34	-0.05	3.3
4.85	15.9	54	54	0.44	0.81	3.6	0.48	-0.29	3.3
4.90	16.1	40	40	0.31	0.77	3.6	0.65	-0.12	3.5
4.95	16.2	45	45	0.31	0.68	3.6	0.58	-0.13	3.5
5.00	16.4	71	71	0.40	0.56	0.7	0.07	-0.39	3.6
5.05	16.6	76	76	0.48	0.64	0.6	0.05	-0.38	3.6
5.10	16.7	81	81	0.48	0.60	1.2	0.11	-0.30	3.6
5.15	16.9	91	91	0.54	0.60	1.6	0.13	-0.24	3.7
5.20	17.1	107	107	0.65	0.60	2.2	0.15	-0.17	3.5
5.25	17.2	122	122	0.75	0.62	2.5	0.15	-0.14	3.4
5.30	17.4	135	135	0.86	0.64	3.0	0.16	-0.10	3.5
5.35	17.6	134	134	0.88	0.65	3.2	0.17	-0.09	3.5
5.40	17.7	140	140	0.87	0.62	3.7	0.19	-0.07	3.5
5.45	17.9	142	142	0.91	0.65	3.7	0.19	-0.07	3.5
5.50	18.0	145	145	0.87	0.60	4.0	0.20	-0.06	3.5
5.55	18.2	156	156	0.99	0.63	4.1	0.19	-0.05	3.5
5.60	18.4	160	160	0.73	0.47	4.4	0.20	-0.04	3.5
5.65	18.5	168	168	0.97	0.54	4.7	0.19	-0.03	3.5
5.70	18.7	224	224	1.33	0.59	4.0	0.13	-0.05	3.3
5.75	18.9	206	206	1.35	0.65	4.3	0.15	-0.04	3.5
5.80	19.0	189	189	1.16	0.61	4.5	0.17	-0.04	3.5
5.85	19.2	188	188	1.37	0.73	4.7	0.18	-0.04	3.5
5.90	19.4	192	192	1.35	0.71	4.8	0.18	-0.04	3.5
5.95	19.5	188	188	1.21	0.64	4.2	0.16	-0.06	3.4
6.00	19.7	198	198	1.06	0.54	4.5	0.16	-0.05	3.5
6.05	19.8	208	208	1.15	0.56	4.9	0.17	-0.04	3.5
6.10	20.0	186	186	1.11	0.59	5.0	0.19	-0.04	3.5
6.15	20.2	185	185	1.01	0.55	5.1	0.20	-0.04	3.4
6.20	20.3	194	194	1.06	0.55	5.4	0.20	-0.03	3.5
6.25	20.5	206	207	1.08	0.52	5.6	0.19	-0.02	3.4
6.30	20.7	231	231	1.28	0.56	5.7	0.18	-0.02	3.5
6.35	20.8	264	264	1.69	0.59	5.8	0.15	-0.02	3.4
6.40	21.0	296	296	1.92	0.65	5.9	0.14	-0.01	3.3
6.45	21.2	312	312	2.02	0.64	6.0	0.14	-0.01	3.4
6.50	21.3	329	329	2.15	0.65	5.9	0.13	-0.02	3.4
6.55	21.5	348	348	2.33	0.67	5.6	0.12	-0.02	3.4
6.60	21.7	382	382	2.20	0.58	5.2	0.12	-0.01	3.4
6.65	21.8	408	408	2.67	0.66	5.4	0.11	-0.01	3.4
6.70	22.0	441	441	2.86	0.65	5.7	0.09	-0.02	3.4
6.75	22.1	509	509	3.71	0.73	6.2	0.09	-0.01	3.4
6.80	22.3	556	556	4.54	0.82	6.6	0.09	-0.01	3.4
6.85	22.5	562	562	5.11	0.91	7.1	0.09	-0.00	3.4
6.90	22.6	526	527	5.12	0.97	6.9	0.09	-0.00	3.5
6.95	22.8	472	473	4.84	1.02	6.9	0.11	-0.00	3.5
7.00	23.0	416	416	4.32	1.04	6.7	0.12	-0.01	3.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.25	23.1	348	348	3.44	0.99	5.5	0.13	-0.02	3.3
7.10	23.3	319	320	2.52	0.79	6.4	0.14	-0.02	3.6
7.15	23.5	330	330	2.16	0.66	6.2	0.14	-0.03	3.6
7.20	23.6	403	403	2.55	0.63	5.9	0.11	-0.03	3.3
7.25	23.8	465	465	3.39	0.73	6.2	0.10	-0.03	3.4
7.30	23.9	490	490	3.86	0.79	6.4	0.09	-0.02	3.3
7.35	24.1	466	465	3.86	0.83	6.1	0.09	-0.03	3.1
7.40	24.3	462	462	3.75	0.81	6.4	0.10	-0.02	4.4
7.45	24.4	471	471	3.81	0.81	6.4	0.10	-0.02	3.1
7.50	24.6	472	472	3.80	0.81	6.4	0.10	-0.02	3.3
7.55	24.8	468	468	4.01	0.82	6.7	0.10	-0.02	3.3
7.60	24.9	497	492	3.81	0.77	6.5	0.10	-0.02	3.2
7.65	25.1	498	498	3.92	0.79	6.6	0.10	-0.03	3.7
7.70	25.3	463	463	3.97	0.86	6.0	0.09	-0.03	3.4
7.75	25.4	483	483	4.31	0.67	6.7	0.10	-0.03	3.5
7.80	25.6	470	470	4.34	0.92	6.5	0.10	-0.03	3.4
7.85	25.8	446	446	4.19	0.94	6.4	0.10	-0.03	3.7
7.90	25.9	408	408	3.55	0.87	6.3	0.12	-0.04	3.6
7.95	26.1	422	422	3.36	0.80	6.4	0.11	-0.04	3.7
8.00	26.2	445	446	3.71	0.83	6.4	0.10	-0.04	4.0
8.05	26.4	445	445	3.79	0.85	6.1	0.10	-0.04	3.7
8.10	26.6	440	441	3.98	0.90	6.1	0.10	-0.05	3.5
8.15	26.7	428	428	4.02	0.94	6.3	0.11	-0.04	4.1
8.20	26.9	375	375	3.61	0.96	6.1	0.12	-0.06	3.7
8.25	27.1	354	354	3.05	0.86	6.5	0.13	-0.05	3.4
8.30	27.2	350	350	3.56	0.82	6.3	0.13	-0.06	3.5
8.35	27.4	355	355	2.87	0.81	6.0	0.12	-0.07	3.5
8.40	27.6	349	349	2.99	0.86	5.9	0.13	-0.07	3.6
8.45	27.7	355	355	2.94	0.83	5.9	0.13	-0.07	3.9
8.50	27.9	353	353	2.95	0.90	6.2	0.13	-0.06	3.6
8.55	28.1	356	356	2.84	0.80	6.0	0.12	-0.07	3.7
8.60	28.2	376	376	-0.02	-0.01	5.9	0.11	-0.07	3.9
8.65	28.4	384	384	2.70	0.70	6.1	0.11	-0.07	3.9
8.70	28.5	168	168	3.07	1.83	4.7	0.20	-0.22	3.9
8.75	28.7	366	366	3.07	0.84	5.8	0.12	-0.09	3.6
8.80	28.9	351	351	2.95	0.84	5.3	0.11	-0.09	3.6
8.85	29.0	350	350	2.71	0.77	5.8	0.12	-0.08	3.8
8.90	29.2	357	358	2.79	0.78	5.7	0.11	-0.09	3.5
8.95	29.4	370	371	2.56	0.68	6.0	0.12	-0.08	3.9
9.00	29.5	364	364	2.99	0.82	5.1	0.12	-0.08	3.6
9.05	29.7	351	352	2.96	0.84	5.3	0.13	-0.08	3.5
9.10	29.9	338	339	2.81	0.83	5.3	0.13	-0.09	4.0
9.15	30.0	320	320	2.62	0.82	5.3	0.14	-0.09	3.5
9.20	30.2	312	312	2.26	0.73	5.3	0.15	-0.09	4.0
9.25	30.3	302	302	2.15	0.71	5.4	0.15	-0.10	3.9
9.30	30.5	306	306	2.22	0.73	5.4	0.15	-0.10	3.9
9.35	30.7	307	307	2.32	0.75	5.1	0.14	-0.11	4.0
9.40	30.8	312	312	2.49	0.80	5.1	0.14	-0.11	3.8
9.45	31.0	291	291	2.46	0.85	5.2	0.15	-0.11	3.9
9.50	31.2	276	276	2.16	0.78	5.2	0.17	-0.12	4.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Po)/Qc %	INCLINATION I deg
9.55	31.3	273	273	1.99	0.73	6.3	0.17	-0.12	3.7
9.60	31.5	281	281	2.12	0.75	6.3	0.16	-0.12	3.8
9.65	31.7	290	290	1.90	0.66	6.3	0.16	-0.12	4.3
9.70	31.8	267	267	1.97	0.74	6.3	0.17	-0.13	3.8
9.75	32.0	269	269	1.94	0.72	5.4	0.14	-0.16	3.9
9.80	32.2	251	251	1.99	0.75	5.4	0.15	-0.17	3.9
9.85	32.3	247	247	1.90	0.77	5.5	0.16	-0.17	3.9
9.90	32.5	250	250	1.91	0.76	5.6	0.16	-0.17	3.9
9.95	32.6	250	251	1.79	0.71	5.6	0.16	-0.17	4.0
10.00	32.8	269	269	1.98	0.73	5.9	0.15	-0.15	3.9
10.05	33.0	291	291	2.25	0.77	6.0	0.15	-0.14	3.9
10.10	33.1	273	273	2.31	0.85	6.1	0.16	-0.15	4.0
10.15	33.3	258	258	1.94	0.75	6.2	0.17	-0.16	4.0
10.20	33.5	257	257	1.91	0.75	6.3	0.17	-0.16	4.0
10.25	33.6	255	255	1.96	0.77	6.1	0.17	-0.16	4.0
10.30	33.8	243	243	1.94	0.80	6.2	0.18	-0.17	4.1
10.35	34.0	236	236	1.90	0.80	6.2	0.19	-0.18	4.1
10.40	34.1	219	219	1.65	0.75	6.0	0.20	-0.20	4.1
10.45	34.3	218	218	1.64	0.75	6.2	0.20	-0.20	4.1
10.50	34.4	217	217	1.52	0.70	5.5	0.18	-0.23	4.1
10.55	34.6	228	228	1.46	0.64	5.4	0.17	-0.22	[redacted]
10.60	34.8	257	257	1.62	0.63	5.2	0.14	-0.20	[redacted]
10.65	34.9	269	270	1.41	0.52	4.7	0.13	-0.21	4.2
10.70	35.1	276	276	1.75	0.63	4.7	0.12	-0.21	4.2
10.75	35.3	271	272	1.91	0.70	5.6	0.15	-0.19	4.3
10.80	35.4	264	264	2.04	0.78	5.7	0.16	-0.19	4.2
10.85	35.6	269	269	2.00	0.74	5.7	0.15	-0.19	4.4
10.90	35.8	270	270	1.98	0.73	6.1	0.19	-0.18	4.4
10.95	35.9	266	266	2.03	0.76	5.8	0.16	-0.19	4.4
11.00	36.1	267	267	1.98	0.74	6.0	0.16	-0.19	4.4
11.05	36.3	263	263	1.83	0.70	6.2	0.17	-0.19	4.4
11.10	36.4	256	256	1.69	0.66	5.2	0.17	-0.19	4.4
11.15	36.6	257	257	1.64	0.64	5.3	0.19	-0.20	4.4
11.20	36.7	241	241	1.62	0.68	5.7	0.17	-0.23	4.4
11.25	36.9	214	214	1.58	0.74	5.4	0.18	-0.27	4.4
11.30	37.1	197	197	1.46	0.74	5.6	0.21	-0.29	4.4
11.35	37.2	189	189	1.37	0.72	5.6	0.21	-0.30	4.4
11.40	37.4	182	182	1.38	0.76	5.8	0.23	-0.31	4.4
11.45	37.6	171	171	1.33	0.78	5.9	0.25	-0.33	4.4
11.50	37.7	153	153	1.32	0.86	6.0	0.28	-0.36	4.4
11.55	37.9	141	141	1.24	0.87	6.1	0.31	-0.39	4.4
11.60	38.1	136	136	1.08	0.79	6.3	0.33	-0.40	4.5
11.65	38.2	147	148	1.51	1.02	6.3	0.31	-0.37	4.5
11.70	38.4	118	118	1.26	1.07	5.1	0.31	-0.55	4.5
11.75	38.5	40	40	1.33	3.33	5.0	0.90	-1.63	4.3
11.80	38.7	17	17	0.73	4.31	6.6	2.83	-3.21	[redacted]
11.85	38.9	11	11	0.11	0.98	11.1	7.20	-8.04	[redacted]
11.90	39.0	11	11	0.10	0.96	14.1	9.46	-8.12	4.3
11.95	39.2	11	11	0.12	1.14	16.5	11.06	1.44	4.3
12.00	39.4	10	10	0.12	1.21	18.5	13.25	2.96	4.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
12.05	39.5	10	10	0.12	1.22	20.3	14.52	4.14	4.3
12.10	39.7	9	10	0.11	1.20	22.0	16.68	5.60	4.3
12.15	39.9	9	10	0.12	1.33	23.6	17.38	6.80	4.3
12.20	40.0	9	10	?	*	25.2	19.23	7.99	4.3
12.25	40.2	9	10	?	?	27.1	20.86	9.46	4.3

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:H-21
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-20-91 13:37
Cone Used :293
Water table (feet) : 2.296558

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	1.83	0.06	3.18	0.04	clay	UNDFND	UNDFD	2	.1
0.60	2	1.17	0.11	9.86	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.90	3	0.00	0.07	0.00	0.15	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.20	4	0.00	0.02	0.00	0.23	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.50	5	1.00	0.00	0.00	0.27	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.80	6	4.17	0.36	9.12	0.32	undefined	UNDFND	UNDFD	UDF	UNDEFINED
2.10	7	100.50	1.00	0.99	0.36	sand to silty sand	80-90	44-46	24	UNDEFINED
2.40	8	124.33	0.99	0.80	0.40	sand to silty sand	80-90	44-46	30	UNDEFINED
2.70	9	37.50	0.40	1.06	0.45	silty sand to sandy silt	50-60	40-42	12	UNDEFINED
3.00	10	101.50	0.70	0.69	0.49	sand to silty sand	70-80	44-46	24	UNDEFINED
3.30	11	101.67	0.65	0.64	0.53	sand to silty sand	70-80	42-44	24	UNDEFINED
3.60	12	62.33	0.50	0.80	0.57	sand to silty sand	60-70	40-42	15	UNDEFINED
3.90	13	96.83	0.69	0.71	0.61	sand to silty sand	70-80	42-44	23	UNDEFINED
4.20	14	141.83	0.97	0.68	0.66	sand	80-90	44-46	27	UNDEFINED
4.50	15	153.17	0.98	0.64	0.70	sand	80-90	44-46	29	UNDEFINED
4.80	16	106.00	0.72	0.67	0.75	sand to silty sand	70-80	42-44	25	UNDEFINED
5.10	17	67.33	0.42	0.62	0.79	sand to silty sand	50-60	40-42	16	UNDEFINED
5.40	18	129.67	0.82	0.63	0.83	sand	70-80	42-44	25	UNDEFINED
5.70	19	178.50	1.04	0.58	0.88	sand	80-90	44-46	34	UNDEFINED
6.00	20	193.83	1.22	0.63	0.92	sand	80-90	44-46	37	UNDEFINED
6.40	21	226.29	1.31	0.58	0.97	sand	>90	44-46	43	UNDEFINED
6.70	22	370.00	2.37	0.64	1.01	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.00	23	506.83	4.61	0.91	1.06	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.30	24	483.14	3.11	0.77	1.10	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.60	25	461.33	3.85	0.80	1.15	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.90	26	452.00	3.94	0.87	1.19	gravelly sand to sand	>90	46-48	>50	UNDEFINED
8.20	27	414.67	3.69	0.89	1.23	sand	>90	46-48	>50	UNDEFINED
8.50	28	353.83	2.90	0.82	1.28	sand	>90	44-46	>50	UNDEFINED
8.80	29	332.50	2.41	0.73	1.32	sand	>90	44-46	>50	UNDEFINED
9.10	30	350.00	2.86	0.82	1.36	sand	>90	44-46	>50	UNDEFINED
9.40	31	305.00	2.32	0.76	1.41	sand	>90	44-46	>50	UNDEFINED
9.70	32	276.00	2.01	0.73	1.45	sand	>90	42-44	>50	UNDEFINED
10.00	33	259.67	1.95	0.75	1.49	sand	80-90	42-44	50	UNDEFINED
10.30	34	253.67	1.99	0.79	1.54	sand	80-90	42-44	49	UNDEFINED
10.60	35	234.67	1.55	0.66	1.58	sand	80-90	42-44	45	UNDEFINED
10.90	36	249.33	1.95	0.72	1.62	sand	80-90	42-44	>50	UNDEFINED
11.20	37	250.00	1.72	0.69	1.67	sand	80-90	42-44	48	UNDEFINED
11.50	38	172.17	1.35	0.78	1.71	sand	70-80	40-42	33	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

*** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTRI (v 3.04) ***

CONOCO INC

Operator :CALVIN SELLS On Site Loc:H-21

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
11.85	39	78.17	1.00	1.28	1.75	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
12.15	40	10.00	0.11	1.15	1.79	clayey silt to silty clay	UNDFND	UNDFD	5	.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 129 a sounding

tial Baseline
Qc Fs Dw Inc
-261 -7.05 -3.9 0.1

Dec

Ic 0

Fs 0.00

Dw 0.0

Inc 0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

CONOCO

Page 1 of 1

Location: I-14, Start Time: 11:10, End Time: 12:28

Site: DuPont, Town: EAST CHICAGO, State: IND.

Unit: 1, Operators: KASL, WILSON, _____, _____

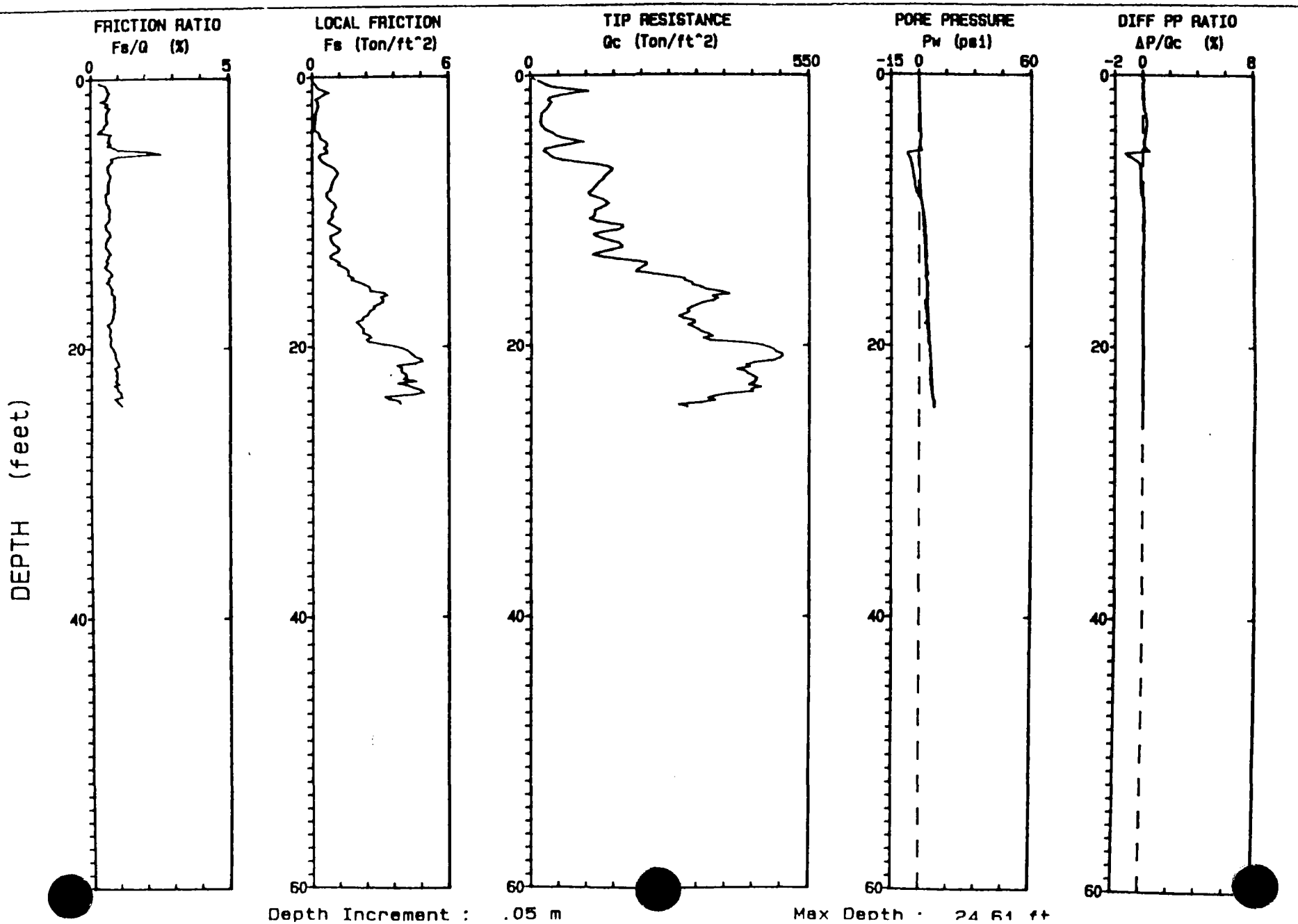
Proj. Consultant: _____, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11/16/91	11:10	11:31	I-14	CPTI14	✓				24.6'	1	2 1 & 3		try with reduced
	11:44	12:28	I-14	I14-2	✓				38.2'	1	2		clay at 36.1

mr/cws725

Conoco, Inc.

Operator : DENNIS WILSON
CPT Date : 11-16-91 11:11
File No. CPTI14 Pg 1 / 1
Location : CPTI14
Cone Used : 364
Hole No. 1



Depth Increment : .05 m
Max Depth : 24.61 ft

Conoco Inc.

Operator :DENNIS WILSON
On Site Loc:CPTI14
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-16-91 11:11
Cone Used :364
Water table (meters) : 1.2

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
0.25	0.82	22.20	0.12	0.54	0.03	silty sand to sandy silt	70-80	)48	7	41	)0.5
0.50	1.64	73.00	0.44	0.61	0.09	sand to silty sand	)90	)48	17	)50	)0.5
0.75	2.46	36.40	0.23	0.63	0.15	silty sand to sandy silt	60-70	44-46	12	30	.33
1.00	3.28	22.40	0.13	0.60	0.22	silty sand to sandy silt	40-50	40-42	7	16	.16
1.25	4.10	25.40	0.13	0.50	0.28	silty sand to sandy silt	40-50	40-42	8	16	.16
1.50	4.92	69.40	0.47	0.68	0.32	sand to silty sand	70-80	44-46	17	30	.33
1.75	5.74	43.40	0.57	1.32	0.36	silty sand to sandy silt	50-60	40-42	14	23	.25
2.00	6.56	75.20	0.51	0.67	0.39	sand to silty sand	70-80	42-44	18	29	.32
2.25	7.38	156.80	1.07	0.68	0.43	sand	)90	46-48	30	46	)0.5
2.50	8.20	137.80	0.89	0.65	0.46	sand	80-90	44-46	26	39	)0.5
2.75	9.02	121.80	0.69	0.57	0.50	sand	80-90	44-46	23	33	.41
3.00	9.84	147.00	0.95	0.65	0.54	sand	80-90	44-46	28	39	)0.5
3.25	10.66	124.80	0.83	0.67	0.57	sand	80-90	44-46	24	32	.37
3.50	11.48	165.40	1.01	0.61	0.61	sand	80-90	44-46	32	41	)0.5
3.75	12.30	140.40	0.86	0.61	0.64	sand	80-90	44-46	27	34	.42
4.00	13.12	167.40	1.07	0.64	0.68	sand	80-90	44-46	32	39	)0.5
4.25	13.94	172.60	0.98	0.57	0.72	sand	80-90	44-46	33	40	)0.5
4.50	14.76	222.80	1.54	0.69	0.75	sand	)90	44-46	43	50	)0.5
4.75	15.58	305.20	2.07	0.68	0.79	sand	)90	46-48	)50	)50	)0.5
5.00	16.40	364.60	2.92	0.80	0.82	sand	)90	46-48	)50	)50	)0.5
5.25	17.22	345.60	2.91	0.84	0.86	sand	)90	46-48	)50	)50	)0.5
5.50	18.04	305.80	2.37	0.77	0.89	sand	)90	46-48	)50	)50	)0.5
5.75	18.86	323.80	2.11	0.65	0.93	sand	)90	46-48	)50	)50	)0.5
6.00	19.69	350.40	2.43	0.69	0.97	gravelly sand to sand	)90	46-48	)50	)50	)0.5
6.25	20.51	465.00	3.81	0.82	1.00	gravelly sand to sand	)90	46-48	)50	)50	)0.5
6.50	21.33	483.20	4.62	0.96	1.04	sand	)90	46-48	)50	)50	)0.5
6.75	22.15	425.40	3.93	0.92	1.07	sand	)90	46-48	)50	)50	)0.5
7.00	22.97	442.60	4.14	0.93	1.11	sand	)90	46-48	)50	)50	)0.5
7.25	23.79	420.20	4.39	1.04	1.15	sand	)90	46-48	)50	)50	)0.5
7.50	24.61	332.40	-13104.99	-3942.53	1.18	undefined	UNDFND	UNDFD	UDF	UDF	UNDF

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

SOUNDING DATA IN FILE CPTI14 11-16-91 11:11

OPERATOR : DENNIS WILSON LOCATION : CPTI14

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.04		-8.5			0.2
0.05	0.2	4	4	-0.00	-0.06	0.0	0.07	0.07	0.3
0.10	0.3	13	13	0.04	0.30	0.2	0.12	0.12	0.2
0.15	0.5	22	22	0.12	0.55	0.2	0.07	0.07	0.1
0.20	0.7	30	30	0.18	0.61	0.0	0.00	0.00	0.1
0.25	0.8	42	42	0.26	0.61	0.2	0.03	0.03	0.1
0.30	1.0	75	75	0.51	0.68	0.1	0.01	0.01	0.1
0.35	1.1	115	115	0.74	0.65	0.3	0.02	0.02	0.1
0.40	1.3	80	80	0.49	0.61	0.3	0.03	0.03	0.1
0.45	1.5	57	57	0.33	0.58	0.3	0.04	0.04	0.1
0.50	1.6	38	38	0.14	0.36	0.2	0.05	0.05	0.1
0.55	1.8	35	35	0.22	0.64	0.3	0.06	0.06	0.1
0.60	2.0	42	42	0.23	0.55	0.3	0.05	0.05	[illegible]
0.65	2.1	38	38	0.27	0.71	0.2	0.04	0.04	[illegible]
0.70	2.3	35	35	0.23	0.66	0.3	0.06	0.06	0.1
0.75	2.5	32	32	0.19	0.59	0.3	0.07	0.07	0.1
0.80	2.6	27	27	0.16	0.58	0.4	0.11	0.11	0.1
0.85	2.8	22	22	0.13	0.57	0.6	0.18	0.18	0.1
0.90	3.0	22	22	0.13	0.58	0.6	0.21	0.21	0.1
0.95	3.1	21	21	0.13	0.61	0.6	0.22	0.22	0.1
1.00	3.3	20	20	0.12	0.61	0.7	0.23	0.23	0.1
1.05	3.4	20	20	0.10	0.53	0.7	0.24	0.24	0.1
1.10	3.6	20	20	0.10	0.50	0.8	0.27	0.27	0.1
1.15	3.8	24	24	0.09	0.39	0.8	0.25	0.25	0.1
1.20	3.9	28	28	0.08	0.29	0.9	0.24	0.24	0.1
1.25	4.1	35	35	0.27	0.78	1.0	0.20	0.20	0.1
1.30	4.3	46	46	0.32	0.70	1.0	0.16	0.16	0.1
1.35	4.4	51	51	0.35	0.70	1.2	0.17	0.17	0.1
1.40	4.6	62	62	0.40	0.65	1.3	0.15	0.15	0.1
1.45	4.8	83	83	0.60	0.73	1.2	0.10	0.10	0.1
1.50	4.9	105	105	0.68	0.65	0.6	0.04	0.04	0.1
1.55	5.1	77	77	0.66	0.85	0.5	0.05	0.05	0.1
1.60	5.2	50	50	0.52	1.04	0.7	0.09	0.09	0.1
1.65	5.4	30	30	0.65	2.18	1.0	0.24	0.24	0.1
1.70	5.6	26	26	0.67	2.59	1.6	0.45	0.45	0.1
1.75	5.7	34	34	0.36	1.06	-6.0	-1.27	-1.27	0.1
1.80	5.9	39	39	0.29	0.75	-5.9	-1.09	-1.09	0.1
1.85	6.1	46	46	0.37	0.80	-4.9	-0.76	-0.76	[illegible]
1.90	6.2	64	64	0.46	0.71	-4.6	-0.51	-0.51	[illegible]
1.95	6.4	96	96	0.61	0.64	-4.2	-0.32	-0.32	0.1
2.00	6.6	131	131	0.80	0.61	-3.8	-0.21	-0.21	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	155	155	0.98	0.63	-3.6	-0.17	-0.17	0.1
2.10	6.9	163	163	1.07	0.66	-3.3	-0.14	-0.14	0.1
2.15	7.1	161	161	1.15	0.72	-3.1	-0.14	-0.14	0.1
2.20	7.2	156	156	1.12	0.72	-2.9	-0.14	-0.14	0.1
2.25	7.4	149	149	1.05	0.71	-2.7	-0.13	-0.13	0.1
2.30	7.5	146	146	0.97	0.66	-2.6	-0.13	-0.13	0.1
2.35	7.7	144	144	0.92	0.64	-2.2	-0.11	-0.11	0.1
2.40	7.9	137	137	0.89	0.65	-2.0	-0.10	-0.10	0.1
2.45	8.0	133	133	0.86	0.64	-2.0	-0.11	-0.11	0.1
2.50	8.2	129	129	0.83	0.64	-1.8	-0.10	-0.10	0.1
2.55	8.4	125	125	0.81	0.65	-1.6	-0.09	-0.09	0.1
2.60	8.5	121	120	0.65	0.54	-1.3	-0.08	-0.08	0.1
2.65	8.7	115	115	0.65	0.57	-1.1	-0.07	-0.07	0.1
2.70	8.9	118	118	0.64	0.55	0.1	0.01	0.01	0.1
2.75	9.0	130	130	0.72	0.55	0.6	0.03	0.03	0.1
2.80	9.2	143	143	0.82	0.57	0.8	0.04	0.04	0.1
2.85	9.4	150	150	0.95	0.63	1.2	0.06	0.06	0.1
2.90	9.5	155	155	1.00	0.65	1.4	0.07	0.07	0.1
2.95	9.7	148	148	1.04	0.70	1.8	0.09	0.09	0.1
3.00	9.8	139	139	0.96	0.70	1.9	0.10	0.10	0.1
3.05	10.0	128	128	0.88	0.69	2.1	0.12	0.12	0.1
3.10	10.2	127	127	0.85	0.67	2.3	0.13	0.13	0.1
3.15	10.3	127	127	0.88	0.69	2.6	0.15	0.15	0.1
3.20	10.5	125	125	0.84	0.67	2.6	0.15	0.15	0.1
3.25	10.7	117	117	0.72	0.62	2.9	0.18	0.18	0.1
3.30	10.8	130	130	0.68	0.52	3.1	0.17	0.17	0.1
3.35	11.0	157	157	0.87	0.56	3.2	0.15	0.15	0.1
3.40	11.2	183	183	1.04	0.57	3.3	0.13	0.13	0.1
3.45	11.3	183	183	1.23	0.68	3.3	0.13	0.13	0.1
3.50	11.5	174	174	1.22	0.70	3.3	0.13	0.13	0.1
3.55	11.6	142	142	1.04	0.74	3.3	0.17	0.17	0.1
3.60	11.8	124	124	0.79	0.64	3.3	0.19	0.19	0.1
3.65	12.0	131	131	0.79	0.61	3.5	0.20	0.20	0.1
3.70	12.1	145	145	0.81	0.56	3.6	0.18	0.18	8.1
3.75	12.3	160	160	0.87	0.54	3.6	0.16	0.16	0.3
3.80	12.5	176	176	0.95	0.54	3.8	0.16	0.16	0.1
3.85	12.6	180	180	1.11	0.62	3.8	0.15	0.15	1.7
3.90	12.8	181	181	1.19	0.66	3.7	0.15	0.15	0.2
3.95	13.0	160	160	1.16	0.72	4.0	0.18	0.18	2.2
4.00	13.1	140	140	0.92	0.66	4.0	0.21	0.21	4.2
4.05	13.3	123	123	0.77	0.63	4.1	0.24	0.24	8.8
4.10	13.5	138	138	0.79	0.57	4.4	0.23	0.23	4.9
4.15	13.6	168	168	1.03	0.62	4.0	0.17	0.17	0.2
4.20	13.8	204	204	1.19	0.58	3.9	0.14	0.14	0.1
4.25	13.9	230	230	1.14	0.49	3.7	0.12	0.12	0.1
4.30	14.1	229	229	1.36	0.59	4.5	0.14	0.14	0.1
4.35	14.3	221	221	1.54	0.70	4.2	0.14	0.14	0.1
4.40	14.4	213	213	1.61	0.75	4.2	0.14	0.14	0.1
4.45	14.6	209	209	1.59	0.76	4.6	0.16	0.16	0.1
4.50	14.8	242	242	1.59	0.66	4.9	0.15	0.15	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	273	273	1.80	0.66	3.5	0.09	0.09	0.1
4.60	15.1	305	305	1.73	0.57	3.8	0.09	0.09	0.1
4.65	15.3	306	306	2.04	0.66	4.2	0.10	0.10	0.1
4.70	15.4	320	320	2.27	0.71	4.7	0.11	0.11	0.1
4.75	15.6	322	322	2.49	0.77	4.9	0.11	0.11	0.1
4.80	15.7	339	339	2.53	0.75	4.6	0.10	0.10	0.1
4.85	15.9	350	350	2.57	0.73	4.3	0.09	0.09	0.1
4.90	16.1	378	378	3.17	0.84	4.5	0.09	0.09	0.1
4.95	16.2	395	395	3.32	0.84	4.5	0.08	0.08	0.1
5.00	16.4	361	361	3.03	0.84	4.6	0.09	0.09	0.1
5.05	16.6	372	372	3.14	0.84	4.5	0.09	0.09	0.1
5.10	16.7	364	364	3.10	0.85	3.3	0.07	0.07	0.1
5.15	16.9	341	341	2.91	0.85	3.3	0.07	0.07	0.1
5.20	17.1	331	331	2.70	0.81	3.4	0.07	0.07	0.1
5.25	17.2	320	320	2.72	0.85	3.6	0.08	0.08	0.1
5.30	17.4	311	311	2.53	0.81	3.7	0.09	0.09	0.1
5.35	17.6	315	315	2.47	0.78	3.9	0.09	0.09	0.1
5.40	17.7	307	307	2.42	0.79	4.1	0.10	0.10	0.1
5.45	17.9	294	294	2.21	0.75	4.4	0.11	0.11	0.1
5.50	18.0	302	302	2.21	0.73	4.7	0.11	0.11	0.1
5.55	18.2	326	326	1.92	0.59	4.6	0.10	0.10	0.1
5.60	18.4	326	326	2.05	0.63	3.0	0.07	0.07	0.1
5.65	18.5	312	312	2.13	0.68	4.9	0.11	0.11	0.1
5.70	18.7	323	323	2.23	0.69	4.6	0.10	0.10	0.1
5.75	18.9	332	332	2.24	0.67	4.7	0.10	0.10	0.1
5.80	19.0	339	339	2.23	0.66	4.9	0.10	0.10	0.1
5.85	19.2	353	353	2.49	0.71	5.0	0.10	0.10	0.1
5.90	19.4	361	361	2.58	0.72	5.2	0.10	0.10	0.1
5.95	19.5	343	343	2.38	0.69	5.1	0.11	0.11	0.1
6.00	19.7	356	356	2.45	0.69	5.2	0.10	0.10	0.1
6.05	19.8	427	427	3.00	0.70	5.1	0.09	0.09	0.1
6.10	20.0	458	459	3.61	0.79	5.8	0.09	0.09	0.1
6.15	20.2	472	472	3.94	0.84	6.2	0.10	0.10	0.1
6.20	20.3	482	482	4.19	0.87	6.1	0.09	0.09	0.1
6.25	20.5	486	486	4.30	0.88	6.0	0.09	0.09	0.1
6.30	20.7	498	498	4.41	0.89	6.2	0.09	0.09	0.1
6.35	20.8	499	499	4.53	0.91	6.1	0.09	0.09	0.1
6.40	21.0	493	493	4.78	0.97	6.3	0.09	0.09	0.1
6.45	21.2	482	482	4.86	1.01	6.5	0.10	0.10	0.1
6.50	21.3	444	444	4.53	1.02	6.6	0.11	0.11	0.1
6.55	21.5	427	427	3.72	0.87	6.4	0.11	0.11	0.1
6.60	21.7	434	434	3.93	0.91	6.3	0.10	0.10	0.1
6.65	21.8	409	409	3.91	0.96	5.9	0.10	0.10	0.1
6.70	22.0	426	426	3.95	0.93	6.0	0.10	0.10	0.1
6.75	22.1	431	431	4.12	0.95	6.1	0.10	0.10	0.1
6.80	22.3	441	441	4.14	0.94	6.1	0.10	0.10	0.1
6.85	22.5	449	449	4.03	0.90	6.2	0.10	0.10	0.1
6.90	22.6	447	448	4.58	1.02	6.1	0.10	0.10	0.1
6.95	22.8	443	443	3.76	0.85	6.2	0.10	0.10	0.1
7.00	23.0	433	433	4.18	0.97	6.2	0.10	0.10	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	457	457	4.49	0.98	7.2	0.11	0.11	0.1
7.10	23.3	438	438	4.80	1.10	6.9	0.11	0.11	0.1
7.15	23.5	441	441	4.92	1.12	7.1	0.12	0.12	0.1
7.20	23.6	395	396	4.52	1.14	7.2	0.13	0.13	0.1
7.25	23.8	370	370	3.20	0.87	7.4	0.14	0.14	0.1
7.30	23.9	352	352	3.36	0.95	7.5	0.15	0.15	0.1
7.35	24.1	366	366	3.83	1.05	8.6	0.17	0.17	0.1
7.40	24.3	340	340	3.88	1.14	8.5	0.18	0.18	0.1
7.45	24.4	293	293	?	?	8.5	0.21	0.21	0.1
7.50	24.6	311	311	?	?	8.5	0.20	0.20	0.1

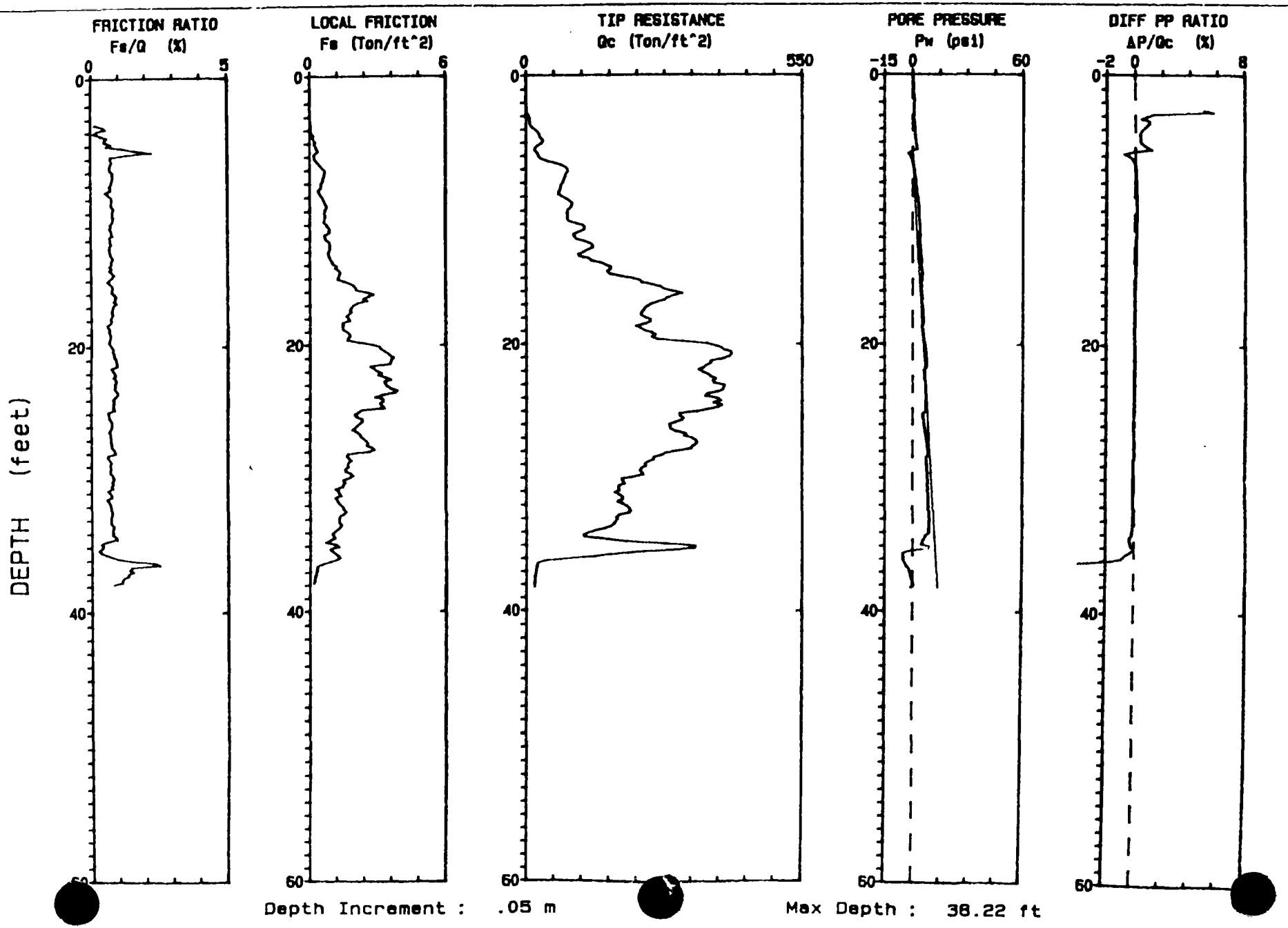
WRITE NUMBER OF RODS USED ___

Conoco, Inc.

Operator : DENNIS WILSON
Location : CPTI14

CPT Date : 11-16-91 11:44
Cone Used : 364

File No. I14-2 Pg 1 / 1
Hole No. 1



Depth Increment : .05 m

Max Depth : 38.22 ft

Conoco Inc.

Operator :DENNIS WILSON
On Site Loc:CPTI14
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-16-91 11:44
Cone Used :364
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	SPT N1	CSR
0.25	0.82	0.00	-0.01	0.00	0.03	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.50	1.64	0.00	-0.01	0.00	0.09	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.75	2.46	0.00	-0.01	0.00	0.15	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
1.00	3.28	3.80	0.00	0.00	0.22	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
1.25	4.10	11.00	0.03	0.25	0.28	sandy silt to clayey silt	UNDFND	UNDFD	4	8	UNDF
1.50	4.92	28.60	0.16	0.55	0.32	silty sand to sandy silt	40-50	40-42	9	16	.17
1.75	5.74	21.60	0.27	1.27	0.36	sandy silt to clayey silt	UNDFND	UNDFD	8	14	UNDF
2.00	6.56	35.00	0.25	0.72	0.39	silty sand to sandy silt	40-50	40-42	11	18	.19
2.25	7.38	78.60	0.60	0.76	0.43	sand to silty sand	70-80	42-44	19	29	.32
2.50	8.20	73.40	0.54	0.74	0.46	sand to silty sand	60-70	42-44	18	26	.28
2.75	9.02	66.40	0.45	0.67	0.50	sand to silty sand	60-70	42-44	16	23	.24
3.00	9.84	86.80	0.67	0.78	0.54	sand to silty sand	70-80	42-44	21	29	.31
3.25	10.66	81.40	0.65	0.80	0.57	sand to silty sand	60-70	42-44	19	26	.28
3.50	11.48	105.40	0.76	0.72	0.61	sand to silty sand	70-80	42-44	25	33	.39
3.75	12.30	100.60	0.72	0.72	0.64	sand to silty sand	70-80	42-44	24	30	.34
4.00	13.12	125.20	0.85	0.68	0.68	sand	70-80	42-44	24	29	.32
4.25	13.94	122.40	0.91	0.74	0.72	sand to silty sand	70-80	42-44	29	35	>0.5
4.50	14.76	163.60	1.23	0.75	0.75	sand	80-90	44-46	31	37	>0.5
4.75	15.58	219.60	1.53	0.69	0.79	sand	>90	44-46	42	48	>0.5
5.00	16.40	287.00	2.38	0.83	0.82	sand	>90	46-48	>50	>50	>0.5
5.25	17.22	259.20	2.13	0.82	0.86	sand	>90	44-46	50	>50	>0.5
5.50	18.04	230.80	1.71	0.74	0.89	sand	>90	44-46	44	47	>0.5
5.75	18.86	234.20	1.50	0.64	0.93	sand	>90	44-46	45	47	>0.5
6.00	19.69	249.40	1.68	0.67	0.97	sand	>90	44-46	48	49	>0.5
6.25	20.51	367.40	2.86	0.78	1.00	sand	>90	46-48	>50	>50	>0.5
6.50	21.33	396.40	3.56	0.90	1.04	sand	>90	46-48	>50	>50	>0.5
6.75	22.15	354.00	3.00	0.85	1.07	sand	>90	46-48	>50	>50	>0.5
7.00	22.97	370.60	3.29	0.89	1.11	sand	>90	46-48	>50	>50	>0.5
7.25	23.79	384.80	3.55	0.92	1.15	sand	>90	46-48	>50	>50	>0.5
7.50	24.61	377.80	3.11	0.82	1.18	sand	>90	44-46	>50	>50	>0.5
7.75	25.43	338.80	2.33	0.69	1.22	sand	>90	44-46	>50	>50	>0.5
8.00	26.25	297.00	2.18	0.73	1.25	sand	>90	44-46	>50	>50	>0.5
8.25	27.07	308.60	2.14	0.69	1.29	sand	>90	44-46	>50	>50	>0.5
8.50	27.89	334.20	2.61	0.78	1.33	sand	>90	44-46	>50	>50	>0.5
8.75	28.71	270.20	1.88	0.70	1.36	sand	>90	44-46	>50	45	>0.5
9.00	29.53	233.20	1.62	0.70	1.40	sand	80-90	42-44	45	38	>0.5
9.25	30.35	210.40	1.68	0.80	1.43	sand	80-90	42-44	40	34	.43
9.50	31.17	183.60	1.30	0.71	1.47	sand	70-80	40-42	35	29	.32

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.84) ****

Conoco Inc.

Operator :DENNIS WILSON On Site Loc:CPTI14 Page No.

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
9.75	31.99	187.60	1.24	0.66	1.51	sand	70-80	40-42	36	30	.33
10.00	32.81	199.60	1.46	0.73	1.54	sand	80-90	42-44	38	31	.35
10.25	33.63	174.20	1.30	0.74	1.58	sand	70-80	40-42	33	27	.29
10.50	34.45	128.00	1.06	0.82	1.61	sand to silty sand	60-70	40-42	31	24	.26
10.75	35.27	260.60	0.96	0.37	1.65	gravelly sand to sand	80-90	42-44	42	33	.39
11.00	36.09	176.20	1.15	0.65	1.68	sand	70-80	40-42	34	26	.28
11.25	36.91	24.00	0.46	1.93	1.72	sandy silt to clayey silt	UNDFND	UNDFD	9	7	UNDF
11.50	37.73	17.60	0.22	1.23	1.76	sandy silt to clayey silt	UNDFND	UNDFD	7	5	UNDF

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

SOUNDING DATA IN FILE I14-2 11-16-91 11:44

[redacted]ERATOR : DENNIS WILSON LOCATION : CPTI14

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.03		-8.8			1.7
0.05	0.2	-0	-0	-0.01	11.00	0.3	-29.30	-29.30	0.4
0.10	0.3	-0	-0	-0.01	4.17	0.4	-10.34	-10.34	0.4
0.15	0.5	-0	-0	-0.02	11.00	0.3	-13.79	-13.79	0.3
0.20	0.7	-0	-0	-0.01	4.43	0.4	-8.87	-8.87	0.2
0.25	0.8	0	0	-0.01	-34.00	0.4	62.06	62.06	0.2
0.30	1.0	0	0	-0.01	-32.00	0.3	58.61	58.61	0.2
0.35	1.1	0	0	-0.01	?	0.4	?	?	0.1
0.40	1.3	-0	-0	-0.01	16.00	0.3	-58.61	-58.61	0.2
0.45	1.5	0	0	-0.01	-16.00	0.8	134.45	134.45	0.1
0.50	1.6	0	0	-0.01	-28.00	0.8	137.90	137.90	0.2
0.55	1.8	0	0	-0.01	-16.00	0.9	144.80	144.80	0.2
[redacted].60	2.0	0	0	-0.01	-16.00	0.9	148.24	148.24	0.2
[redacted].65	2.1	0	0	-0.01	?	0.8	?	?	0.1
0.70	2.3	0	0	-0.01	-6.00	0.7	58.61	58.61	0.2
0.75	2.5	0	0	-0.01	-1.50	0.7	11.38	11.38	0.2
0.80	2.6	1	1	-0.00	-0.40	0.7	4.96	4.96	0.2
0.85	2.8	1	1	-0.00	-0.28	0.8	4.20	4.20	0.2
0.90	3.0	4	4	-0.00	-0.09	0.7	1.33	1.33	0.2
0.95	3.1	6	6	-0.00	-0.03	0.7	0.78	0.78	0.2
1.00	3.3	7	7	0.00	0.01	0.4	0.44	0.44	0.2
1.05	3.4	7	7	0.01	0.21	1.0	1.05	1.05	0.2
1.10	3.6	7	7	0.03	0.49	1.0	1.02	1.02	0.2
1.15	3.8	9	9	0.05	0.48	1.1	0.85	0.85	0.2
1.20	3.9	13	13	0.03	0.22	1.2	0.64	0.64	0.2
1.25	4.1	19	19	0.02	0.11	1.3	0.49	0.49	0.2
1.30	4.3	24	24	0.08	0.36	1.3	0.38	0.38	0.2
1.35	4.4	27	27	0.16	0.57	1.2	0.31	0.31	0.2
1.40	4.6	27	27	0.14	0.50	1.4	0.37	0.37	0.2
1.45	4.8	31	31	0.16	0.52	1.6	0.38	0.38	0.2
1.50	4.9	34	34	0.25	0.72	1.7	0.36	0.36	0.2
1.55	5.1	31	31	0.18	0.58	1.9	0.44	0.44	0.2
1.60	5.2	23	23	0.27	1.15	2.1	0.64	0.64	0.2
1.65	5.4	18	18	0.29	1.62	2.3	0.92	0.92	0.2
1.70	5.6	16	16	0.36	2.23	2.7	1.19	1.19	0.2
1.75	5.7	20	20	0.27	1.35	-0.5	-0.18	-0.18	0.2
1.80	5.9	23	23	0.16	0.70	-2.6	-0.80	-0.80	0.2
[redacted].85	6.1	25	25	0.18	0.72	-1.5	-0.42	-0.42	0.2
[redacted].90	6.2	29	29	0.22	0.74	-0.8	-0.20	-0.20	0.2
1.95	6.4	41	41	0.30	0.74	-0.4	-0.07	-0.07	0.2
2.00	6.6	57	57	0.40	0.70	0.1	0.01	0.01	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	71	71	0.48	0.68	0.4	0.04	0.04	0.2
2.10	6.9	79	79	0.55	0.70	0.5	0.05	0.05	0.2
2.15	7.1	82	82	0.66	0.80	1.0	0.09	0.09	0.2
2.20	7.2	83	83	0.66	0.79	1.0	0.09	0.09	0.2
2.25	7.4	78	78	0.64	0.81	1.2	0.11	0.11	0.2
2.30	7.5	77	77	0.61	0.79	1.3	0.13	0.13	0.2
2.35	7.7	75	75	0.57	0.76	1.5	0.15	0.15	0.2
2.40	7.9	74	74	0.55	0.75	1.7	0.16	0.16	0.1
2.45	8.0	72	72	0.49	0.68	1.7	0.17	0.17	0.1
2.50	8.2	69	69	0.49	0.71	1.9	0.20	0.20	0.1
2.55	8.4	68	68	0.48	0.70	2.0	0.21	0.21	0.1
2.60	8.5	67	67	0.35	0.53	2.1	0.23	0.23	0.1
2.65	8.7	64	64	0.40	0.62	2.3	0.26	0.26	0.1
2.70	8.9	63	63	0.46	0.73	2.3	0.27	0.27	0.1
2.75	9.0	70	70	0.54	0.77	2.6	0.27	0.27	0.1
2.80	9.2	79	79	0.59	0.74	2.9	0.26	0.26	0.1
2.85	9.4	86	86	0.64	0.74	3.0	0.25	0.25	0.1
2.90	9.5	91	91	0.68	0.75	3.2	0.25	0.25	0.1
2.95	9.7	90	90	0.75	0.83	3.3	0.26	0.26	0.1
3.00	9.8	88	88	0.71	0.81	3.5	0.29	0.29	0.1
3.05	10.0	82	82	0.65	0.79	3.5	0.30	0.30	0.1
3.10	10.2	81	81	0.64	0.79	3.5	0.32	0.32	[illegible]
3.15	10.3	81	82	0.66	0.81	3.6	0.32	0.32	[illegible]
3.20	10.5	82	82	0.67	0.82	3.6	0.32	0.32	0.1
3.25	10.7	81	81	0.64	0.79	3.7	0.33	0.33	0.1
3.30	10.8	85	85	0.60	0.70	3.8	0.32	0.32	0.1
3.35	11.0	99	99	0.72	0.73	3.9	0.29	0.29	0.1
3.40	11.2	113	113	0.77	0.68	4.0	0.25	0.25	0.1
3.45	11.3	116	116	0.85	0.73	4.2	0.26	0.26	0.1
3.50	11.5	114	114	0.86	0.76	4.2	0.26	0.26	0.1
3.55	11.6	103	103	0.81	0.79	4.1	0.29	0.29	0.1
3.60	11.8	93	93	0.63	0.68	4.3	0.33	0.33	0.1
3.65	12.0	95	95	0.65	0.68	4.3	0.33	0.33	0.1
3.70	12.1	99	99	0.69	0.70	3.9	0.28	0.28	0.1
3.75	12.3	113	113	0.84	0.74	4.0	0.26	0.26	0.1
3.80	12.5	127	127	0.87	0.68	4.2	0.24	0.24	0.1
3.85	12.6	132	132	0.87	0.66	4.3	0.23	0.23	0.1
3.90	12.8	132	132	0.88	0.66	4.4	0.24	0.24	0.1
3.95	13.0	121	121	0.84	0.69	4.5	0.26	0.26	0.1
4.00	13.1	114	114	0.80	0.70	4.6	0.29	0.29	0.1
4.05	13.3	103	103	0.81	0.78	4.6	0.32	0.32	0.1
4.10	13.5	106	106	0.85	0.80	4.8	0.33	0.33	0.1
4.15	13.6	125	125	0.91	0.72	5.0	0.29	0.29	0.1
4.20	13.8	129	129	0.97	0.75	5.0	0.28	0.28	0.1
4.25	13.9	149	149	1.00	0.67	5.0	0.24	0.24	0.1
4.30	14.1	158	158	1.18	0.74	4.6	0.21	0.21	0.1
4.35	14.3	168	169	1.10	0.65	5.1	0.22	0.22	[illegible]
4.40	14.4	167	167	1.26	0.76	5.2	0.23	0.23	[illegible]
4.45	14.6	160	160	1.34	0.84	5.4	0.24	0.24	0.2
4.50	14.8	165	165	1.29	0.78	5.5	0.24	0.24	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	185	185	1.24	0.67	5.1	0.20	0.20	0.2
4.60	15.1	210	210	1.22	0.58	5.2	0.18	0.18	0.2
4.65	15.3	225	225	1.48	0.66	5.5	0.18	0.18	0.2
4.70	15.4	229	229	1.75	0.77	4.5	0.14	0.14	0.1
4.75	15.6	249	249	1.94	0.78	5.0	0.14	0.14	0.1
4.80	15.7	267	267	2.03	0.76	5.1	0.14	0.14	0.1
4.85	15.9	274	274	2.03	0.74	4.5	0.12	0.12	0.1
4.90	16.1	291	291	2.46	0.85	4.9	0.12	0.12	0.1
4.95	16.2	311	311	2.81	0.90	5.0	0.12	0.12	0.1
5.00	16.4	292	292	2.59	0.89	5.2	0.13	0.13	0.1
5.05	16.6	279	279	2.34	0.84	5.4	0.14	0.14	0.1
5.10	16.7	274	274	2.50	0.91	5.2	0.14	0.14	0.1
5.15	16.9	258	258	2.09	0.81	5.2	0.15	0.15	0.1
5.20	17.1	246	246	1.92	0.78	5.2	0.15	0.15	0.1
5.25	17.2	239	239	1.81	0.76	5.5	0.16	0.16	0.1
5.30	17.4	234	234	1.76	0.75	5.5	0.17	0.17	0.1
5.35	17.6	231	231	1.81	0.78	5.6	0.17	0.17	0.1
5.40	17.7	227	227	1.70	0.75	5.8	0.18	0.18	0.1
5.45	17.9	227	228	1.59	0.70	5.9	0.19	0.19	0.1
5.50	18.0	235	235	1.70	0.73	5.9	0.18	0.18	0.1
5.55	18.2	246	246	1.75	0.71	6.2	0.18	0.18	0.1
[illegible]60	18.4	246	246	1.42	0.58	6.0	0.18	0.18	0.1
[illegible]65	18.5	236	236	1.44	0.61	6.0	0.18	0.18	0.1
5.70	18.7	217	217	1.43	0.66	5.0	0.17	0.17	0.1
5.75	18.9	226	226	1.45	0.64	5.4	0.17	0.17	0.1
5.80	19.0	234	234	1.59	0.68	5.6	0.17	0.17	0.1
5.85	19.2	248	248	1.73	0.70	5.8	0.17	0.17	0.1
5.90	19.4	257	257	1.77	0.69	5.9	0.17	0.17	0.1
5.95	19.5	249	249	1.66	0.67	6.2	0.18	0.18	0.1
6.00	19.7	259	259	1.64	0.63	6.2	0.17	0.17	0.1
6.05	19.8	311	311	2.14	0.69	6.6	0.15	0.15	0.1
6.10	20.0	361	361	2.71	0.75	6.9	0.14	0.14	0.1
6.15	20.2	379	380	3.07	0.81	7.2	0.14	0.14	0.1
6.20	20.3	390	390	3.11	0.80	7.2	0.13	0.13	0.1
6.25	20.5	396	396	3.27	0.82	7.2	0.13	0.13	0.1
6.30	20.7	409	409	3.42	0.84	7.5	0.13	0.13	0.1
6.35	20.8	409	409	3.53	0.86	7.5	0.13	0.13	0.1
6.40	21.0	405	406	3.70	0.91	7.5	0.13	0.13	0.1
6.45	21.2	392	392	3.59	0.92	7.6	0.14	0.14	0.1
6.50	21.3	367	368	3.55	0.97	7.5	0.15	0.15	0.1
6.55	21.5	367	368	3.51	0.95	7.6	0.15	0.15	0.1
6.60	21.7	358	358	2.62	0.73	7.7	0.15	0.15	0.1
6.65	21.8	352	352	2.79	0.79	7.5	0.15	0.15	0.1
6.70	22.0	342	342	2.92	0.85	5.9	0.12	0.12	0.1
6.75	22.1	351	351	3.14	0.90	6.4	0.13	0.13	0.1
6.80	22.3	362	362	3.01	0.83	6.6	0.13	0.13	0.1
[illegible]85	22.5	367	367	3.29	0.90	6.6	0.13	0.13	0.1
[illegible]90	22.6	378	379	3.57	0.94	6.7	0.13	0.13	0.1
6.95	22.8	372	372	3.28	0.88	6.9	0.13	0.13	0.1
7.00	23.0	374	374	3.31	0.89	7.1	0.14	0.14	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	396	396	3.39	0.86	7.2	0.13	0.13	0.1
7.10	23.3	394	394	3.54	0.90	7.2	0.13	0.13	0.1
7.15	23.5	392	392	3.86	0.98	7.2	0.13	0.13	0.1
7.20	23.6	382	383	3.74	0.98	7.2	0.14	0.14	0.1
7.25	23.8	360	360	3.22	0.89	7.4	0.15	0.15	0.1
7.30	23.9	356	356	2.86	0.80	7.5	0.15	0.15	0.1
7.35	24.1	382	382	3.22	0.84	7.4	0.14	0.14	0.1
7.40	24.3	388	388	3.21	0.83	7.2	0.13	0.13	0.1
7.45	24.4	373	374	3.08	0.82	7.2	0.14	0.14	0.1
7.50	24.6	390	390	3.18	0.82	7.3	0.14	0.14	0.1
7.55	24.8	383	383	3.28	0.86	7.2	0.13	0.13	0.1
7.60	24.9	363	363	2.25	0.62	7.2	0.14	0.14	0.1
7.65	25.1	339	339	2.12	0.63	7.2	0.15	0.15	0.1
7.70	25.3	304	304	1.95	0.64	5.4	0.13	0.13	0.1
7.75	25.4	305	305	2.04	0.67	5.6	0.13	0.13	0.1
7.80	25.6	313	313	2.30	0.74	5.8	0.13	0.13	0.1
7.85	25.8	309	309	2.31	0.75	6.2	0.14	0.14	0.1
7.90	25.9	295	295	2.21	0.75	6.2	0.15	0.15	0.1
7.95	26.1	283	284	2.09	0.74	6.4	0.16	0.16	0.1
8.00	26.2	285	286	1.98	0.69	6.6	0.17	0.17	0.1
8.05	26.4	286	286	1.86	0.65	6.9	0.17	0.17	0.1
8.10	26.6	296	297	2.05	0.69	6.9	0.17	0.17	0.1
8.15	26.7	317	317	2.20	0.69	7.2	0.16	0.16	0.1
8.20	26.9	314	314	2.24	0.71	7.5	0.17	0.17	0.1
8.25	27.1	330	331	2.35	0.71	7.6	0.17	0.17	0.1
8.30	27.2	337	337	2.46	0.73	7.9	0.17	0.17	0.1
8.35	27.4	340	340	2.54	0.75	8.1	0.17	0.17	0.1
8.40	27.6	337	337	2.49	0.74	8.2	0.17	0.17	0.1
8.45	27.7	330	331	2.71	0.82	8.2	0.18	0.18	0.1
8.50	27.9	327	328	2.84	0.87	8.4	0.18	0.18	0.1
8.55	28.1	301	302	2.63	0.87	8.7	0.21	0.21	0.1
8.60	28.2	277	278	1.66	0.60	8.7	0.23	0.23	0.1
8.65	28.4	268	269	1.61	0.60	8.5	0.23	0.23	0.1
8.70	28.5	253	253	1.69	0.67	7.3	0.21	0.21	0.1
8.75	28.7	252	252	1.81	0.72	7.5	0.22	0.22	0.1
8.80	28.9	241	241	1.69	0.70	7.6	0.23	0.23	0.1
8.85	29.0	235	235	1.65	0.70	7.8	0.24	0.24	0.1
8.90	29.2	237	237	1.68	0.71	7.9	0.24	0.24	0.1
8.95	29.4	228	229	1.54	0.67	7.9	0.25	0.25	0.1
9.00	29.5	225	225	1.56	0.69	8.1	0.26	0.26	0.1
9.05	29.7	230	230	1.79	0.78	8.5	0.27	0.27	0.1
9.10	29.9	232	232	1.89	0.81	8.2	0.25	0.25	0.1
9.15	30.0	210	210	1.72	0.82	8.2	0.28	0.28	0.1
9.20	30.2	188	188	1.46	0.78	8.5	0.33	0.33	0.1
9.25	30.3	192	192	1.54	0.80	8.6	0.32	0.32	0.1
9.30	30.5	195	195	1.46	0.75	8.2	0.30	0.30	0.1
9.35	30.7	183	183	1.42	0.77	8.4	0.33	0.33	0.1
9.40	30.8	182	182	1.09	0.60	6.7	0.34	0.34	0.1
9.45	31.0	184	184	1.23	0.67	8.2	0.32	0.32	0.1
9.50	31.2	174	174	1.28	0.73	8.8	0.36	0.36	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	184	184	1.37	0.75	8.8	0.35	0.35	0.2
9.60	31.5	191	191	1.08	0.56	8.8	0.33	0.33	0.2
9.65	31.7	191	191	1.18	0.62	8.8	0.33	0.33	0.2
9.70	31.8	180	180	1.24	0.69	8.8	0.35	0.35	0.2
9.75	32.0	192	192	1.34	0.70	8.8	0.33	0.33	0.2
9.80	32.2	199	199	1.45	0.73	8.8	0.32	0.32	0.2
9.85	32.3	205	205	1.49	0.73	8.8	0.31	0.31	0.2
9.90	32.5	207	207	1.58	0.76	9.1	0.31	0.31	0.2
9.95	32.6	204	204	1.50	0.74	9.2	0.32	0.32	0.2
10.00	32.8	183	183	1.30	0.71	9.1	0.36	0.36	0.2
10.05	33.0	177	178	1.26	0.71	9.2	0.37	0.37	0.2
10.10	33.1	179	179	1.26	0.70	9.4	0.38	0.37	0.2
10.15	33.3	175	175	1.26	0.72	9.2	0.38	0.37	0.2
10.20	33.5	173	173	1.38	0.80	9.0	0.38	0.36	0.3
10.25	33.6	167	167	1.32	0.79	9.1	0.39	0.38	0.3
10.30	33.8	155	155	1.19	0.77	8.9	0.41	0.39	0.3
10.35	34.0	136	136	1.06	0.78	8.9	0.47	0.44	0.3
10.40	34.1	122	122	0.94	0.77	8.8	0.52	0.49	0.3
10.45	34.3	112	112	1.01	0.91	7.0	0.45	0.41	0.3
10.50	34.4	115	115	1.08	0.94	6.6	0.41	0.37	0.3
10.55	34.6	160	160	0.86	0.54	5.6	0.25	0.22	0.3
.60	34.8	196	196	0.66	0.34	5.5	0.20	0.17	0.3
.65	34.9	274	274	1.14	0.42	4.9	0.13	0.10	0.3
10.70	35.1	338	338	1.26	0.37	9.2	0.20	0.17	0.4
10.75	35.3	335	335	0.86	0.26	8.7	0.19	0.16	0.4
10.80	35.4	293	293	0.94	0.32	-1.2	-0.03	-0.06	0.4
10.85	35.6	212	212	1.09	0.52	-5.5	-0.19	-0.23	0.4
10.90	35.8	163	163	1.22	0.75	-5.3	-0.24	-0.29	0.4
10.95	35.9	135	135	1.31	0.97	-5.2	-0.28	-0.35	0.4
11.00	36.1	78	78	1.17	1.49	-5.3	-0.48	-0.61	0.4
11.05	36.3	38	38	0.89	2.33	-4.9	-0.93	-1.22	0.5
11.10	36.4	22	22	0.55	2.46	-4.1	-1.34	-1.85	0.5
11.15	36.6	21	21	0.31	1.45	-3.5	-1.21	-1.77	0.5
11.20	36.7	20	20	0.28	1.40	-2.3	-0.80	-1.41	0.5
11.25	36.9	19	19	0.29	1.50	-1.7	-0.66	-1.33	0.5
11.30	37.1	19	19	0.26	1.37	-1.6	-0.61	-1.32	0.5
11.35	37.2	18	18	0.24	1.33	-1.3	-0.50	-1.25	0.5
11.40	37.4	17	17	0.20	1.17	-1.0	-0.40	-1.22	0.5
11.45	37.6	17	17	0.19	1.11	-0.5	-0.23	-1.10	0.5
11.50	37.7	17	17	0.19	1.13	-0.1	-0.03	-0.94	0.5
11.55	37.9	16	16	0.13	0.79	0.3	0.13	-0.85	0.5
11.60	38.1	16	16	?	?	0.7	0.31	-0.71	0.5
11.65	38.2	16	16	?	?	-1.0	-0.45	-1.53	0.5

WRITE NUMBER OF RODS USED __

FIELD ACTIVITY LOG SHEET

'age 1 of 1

ocation: I-19, Start Time: 10:50, End Time: 13:00

ite: DuPont, Town: E Chicago, State: IND

Jnit: 1, Operators: Sells, Kasl, Wilson,

'roj. Consultant: Tobin Lounsbury, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11/17/91	10:59	11:20	I-19	CPTI19	✓				39	1	2	F	C/Ay at 38.2

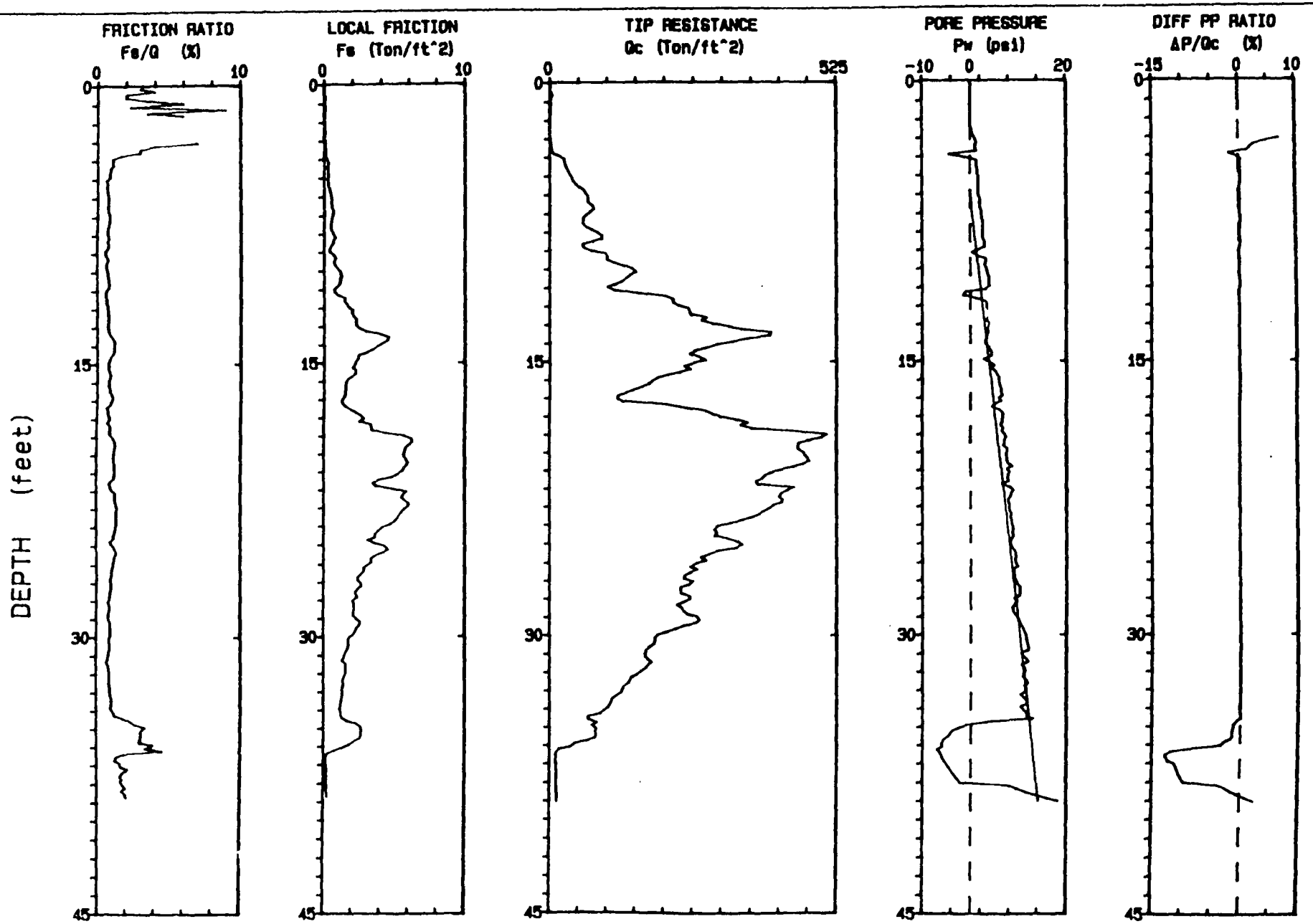
nr/cws725

Conoco, Inc.

OPERATOR : CALVIN SELLS
LOCATION : I-19

CPT Date : 11-18-91 10:59
CONE USED : 364

FILE CPTI19 Pg 1 / 1
HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 39.04 ft

SOUNDING DATA IN FILE CPTI19 11-18-91 10:59

OPERATOR : CALVIN SELLS LOCATION : I-19

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-295		-2.00		-3.9			0.1
0.05	0.2	1	1	0.03	3.44	0.0	0.00	0.00	0.2
0.10	0.3	1	1	0.04	4.17	0.0	0.00	0.00	0.2
0.15	0.5	2	2	0.04	1.92	0.0	0.00	0.00	0.2
0.20	0.7	5	5	0.10	2.23	-0.0	-0.06	-0.06	0.3
0.25	0.8	2	2	0.07	4.44	0.0	0.00	0.00	0.9
0.30	1.0	1	1	0.06	6.45	0.0	0.00	0.00	0.7
0.35	1.1	3	3	0.07	2.59	0.0	0.00	0.00	0.5
0.40	1.3	1	1	0.09	13.00	0.0	0.20	0.20	0.1
0.45	1.5	2	2	0.07	4.63	0.0	0.00	0.00	0.1
0.50	1.6	1	1	0.06	8.29	0.0	0.00	0.00	0.1
0.55	1.8	0	0	0.03	26.00	0.0	0.00	0.00	0.3
0.60	2.0	-1	-1	0.03	-5.08	0.0	0.00	0.00	[illegible]
0.65	2.1	-1	-1	0.02	-3.83	0.0	0.00	0.00	[illegible]
0.70	2.3	0	0	0.04	42.50	0.0	1.72	1.72	0.2
0.75	2.5	-1	-1	0.09	-15.69	0.1	-0.80	-0.80	0.2
0.80	2.6	0	0	0.09	68.67	0.3	18.39	18.39	0.5
0.85	2.8	0	0	0.03	20.67	0.4	25.28	25.28	0.1
0.90	3.0	0	0	0.04	93.00	0.7	110.32	110.32	0.2
0.95	3.1	1	1	0.07	9.81	1.0	10.56	10.56	0.2
1.00	3.3	2	2	0.08	4.27	1.3	4.98	4.98	0.3
1.05	3.4	3	3	0.09	3.14	1.1	2.97	2.97	0.2
1.10	3.6	4	4	0.12	2.98	1.1	2.88	2.88	0.2
1.15	3.8	6	6	0.10	1.65	1.2	1.41	1.41	0.2
1.20	3.9	18	18	0.19	1.07	-4.5	-1.81	-1.81	0.2
1.25	4.1	26	26	0.28	1.10	-1.3	-0.37	-0.37	0.3
1.30	4.3	27	27	0.30	1.09	1.3	0.34	0.34	0.2
1.35	4.4	29	29	0.27	0.92	1.3	0.32	0.32	0.2
1.40	4.6	31	31	0.28	0.89	1.3	0.30	0.30	0.5
1.45	4.8	34	34	0.29	0.87	1.5	0.32	0.32	0.3
1.50	4.9	37	37	0.32	0.86	1.5	0.30	0.30	0.3
1.55	5.1	41	41	0.25	0.62	1.6	0.28	0.28	0.3
1.60	5.2	43	43	0.31	0.70	1.6	0.27	0.27	0.3
1.65	5.4	47	47	0.32	0.68	1.6	0.24	0.24	0.3
1.70	5.6	53	53	0.37	0.69	1.6	0.22	0.22	0.3
1.75	5.7	62	62	0.43	0.69	1.6	0.19	0.19	0.3
1.80	5.9	65	65	0.49	0.75	1.6	0.18	0.18	0.3
1.85	6.1	70	70	0.54	0.78	1.7	0.18	0.18	[illegible]
1.90	6.2	71	71	0.54	0.76	1.9	0.19	0.18	[illegible]
1.95	6.4	71	71	0.54	0.75	2.0	0.20	0.18	[illegible]
2.00	6.6	78	78	0.59	0.76	1.9	0.18	0.16	0.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	81	81	0.64	0.80	2.0	0.18	0.15	0.3
2.10	6.9	75	75	0.64	0.86	2.3	0.22	0.18	0.3
2.15	7.1	68	68	0.60	0.88	2.3	0.24	0.20	0.3
2.20	7.2	62	62	0.54	0.86	2.4	0.28	0.22	0.6
2.25	7.4	61	61	0.52	0.85	2.5	0.30	0.23	0.6
2.30	7.5	61	61	0.48	0.78	2.6	0.30	0.23	0.6
2.35	7.7	66	66	0.49	0.75	2.6	0.29	0.21	0.6
2.40	7.9	76	76	0.56	0.74	2.6	0.25	0.17	0.6
2.45	8.0	88	88	0.66	0.75	2.6	0.21	0.14	0.6
2.50	8.2	96	96	0.81	0.84	2.6	0.20	0.13	0.6
2.55	8.4	96	96	0.68	0.71	2.6	0.20	0.12	0.6
2.60	8.5	80	80	0.66	0.82	2.9	0.26	0.17	0.6
2.65	8.7	60	60	0.48	0.80	3.0	0.36	0.22	0.6
2.70	8.9	62	62	0.38	0.62	3.0	0.35	0.21	0.6
2.75	9.0	76	76	0.44	0.58	1.7	0.17	0.04	0.6
2.80	9.2	102	102	0.68	0.67	0.3	0.02	-0.07	0.6
2.85	9.4	106	106	0.83	0.78	1.3	0.09	-0.01	0.6
2.90	9.5	105	105	0.72	0.69	3.2	0.22	0.11	0.6
2.95	9.7	118	118	0.75	0.63	3.3	0.20	0.10	0.6
3.00	9.8	137	137	0.93	0.68	2.9	0.15	0.07	0.6
3.05	10.0	153	153	1.14	0.75	3.3	0.15	0.07	0.6
3.10	10.2	158	158	1.24	0.79	3.4	0.16	0.07	0.6
3.15	10.3	148	148	1.22	0.82	3.6	0.17	0.08	0.6
3.20	10.5	141	141	1.14	0.81	3.9	0.20	0.10	0.6
3.25	10.7	133	133	1.14	0.86	3.9	0.21	0.10	0.6
3.30	10.8	122	122	1.02	0.84	3.9	0.23	0.11	0.6
3.35	11.0	106	106	0.72	0.67	3.9	0.26	0.12	0.6
3.40	11.2	119	119	0.73	0.62	3.1	0.19	0.06	0.7
3.45	11.3	164	164	1.00	0.61	-1.3	-0.06	-0.16	0.7
3.50	11.5	212	211	1.48	0.70	-1.6	-0.05	-0.13	0.7
3.55	11.6	226	226	1.44	0.64	1.1	0.04	-0.04	0.7
3.60	11.8	226	226	1.63	0.72	3.3	0.10	0.02	0.7
3.65	12.0	236	237	1.75	0.74	3.5	0.11	0.03	0.7
3.70	12.1	254	254	2.04	0.80	3.4	0.10	0.02	0.7
3.75	12.3	256	256	2.02	0.79	3.9	0.11	0.03	0.7
3.80	12.5	258	258	2.11	0.82	3.9	0.11	0.03	0.7
3.85	12.6	286	286	2.32	0.81	3.9	0.10	0.03	0.7
3.90	12.8	277	277	2.30	0.83	3.2	0.08	0.01	0.7
3.95	13.0	298	298	2.27	0.76	3.9	0.09	0.02	0.7
4.00	13.1	327	327	2.52	0.77	3.9	0.09	0.02	0.7
4.05	13.3	350	350	2.96	0.85	3.5	0.07	0.01	0.7
4.10	13.5	406	406	3.95	0.97	3.9	0.07	0.01	0.7
4.15	13.6	403	403	4.59	1.14	3.4	0.06	0.00	0.7
4.20	13.8	363	364	4.52	1.24	3.3	0.06	-0.00	0.7
4.25	13.9	335	335	4.19	1.25	3.0	0.06	-0.01	0.8
4.30	14.1	305	305	3.79	1.24	3.2	0.08	-0.01	0.8
4.35	14.3	286	286	3.44	1.20	3.9	0.10	0.01	0.8
4.40	14.4	266	266	2.99	1.12	4.2	0.11	0.02	0.8
4.45	14.6	256	256	2.45	0.96	4.5	0.13	0.02	0.7
4.50	14.8	272	272	2.43	0.89	4.3	0.11	0.01	0.9

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCL ON I deg
4.55	14.9	285	285	2.27	0.80	2.7	0.07	-0.03	1.0
4.60	15.1	264	264	2.20	0.84	3.9	0.11	0.00	1.2
4.65	15.3	246	246	2.00	0.81	4.9	0.14	0.03	1.0
4.70	15.4	257	257	2.22	0.86	4.4	0.12	0.01	1.2
4.75	15.6	240	240	2.25	0.94	5.2	0.16	0.03	1.0
4.80	15.7	217	217	1.95	0.90	5.6	0.19	0.05	0.9
4.85	15.9	199	200	1.66	0.83	5.9	0.21	0.06	1.4
4.90	16.1	189	189	1.57	0.83	5.9	0.22	0.06	1.0
4.95	16.2	182	182	1.54	0.85	6.0	0.24	0.06	1.1
5.00	16.4	169	169	1.54	0.91	6.2	0.27	0.08	1.2
5.05	16.6	155	155	1.45	0.94	6.4	0.30	0.08	1.2
5.10	16.7	140	141	1.48	1.05	6.4	0.33	0.09	1.2
5.15	16.9	125	125	1.40	1.12	6.7	0.39	0.12	1.2
5.20	17.1	124	124	1.25	1.00	5.9	0.34	0.06	1.2
5.25	17.2	134	134	1.27	0.95	6.4	0.34	0.08	1.2
5.30	17.4	214	214	1.49	0.70	5.2	0.18	0.01	1.2
5.35	17.6	248	248	1.90	0.76	4.5	0.13	-0.02	1.2
5.40	17.7	285	285	2.23	0.78	6.1	0.15	0.03	1.2
5.45	17.9	297	297	2.60	0.88	6.8	0.17	0.04	1.2
5.50	18.0	312	312	2.85	0.91	6.8	0.16	0.04	1.2
5.55	18.2	341	341	2.55	0.75	6.7	0.14	0.03	1.2
5.60	18.4	362	362	3.33	0.92	6.5	0.13	0.02	[illegible]
5.65	18.5	349	349	3.41	0.98	6.2	0.13	0.02	[illegible]
5.70	18.7	369	369	3.43	0.93	6.8	0.13	0.03	1.2
5.75	18.9	452	452	4.27	0.94	6.5	0.10	0.02	1.2
5.80	19.0	509	509	5.63	1.10	7.1	0.10	0.02	1.2
5.85	19.2	499	499	6.21	1.25	7.5	0.11	0.03	1.6
5.90	19.4	476	476	6.26	1.32	7.1	0.11	0.02	1.7
5.95	19.5	456	456	6.07	1.33	7.2	0.11	0.02	1.7
6.00	19.7	454	454	5.82	1.28	6.9	0.11	0.02	1.8
6.05	19.8	455	455	5.74	1.26	7.7	0.12	0.03	1.9
6.10	20.0	465	465	5.70	1.23	7.6	0.12	0.02	1.6
6.15	20.2	468	468	5.69	1.22	7.4	0.11	0.02	1.6
6.20	20.3	472	472	5.80	1.23	7.6	0.12	0.02	1.6
6.25	20.5	476	476	5.93	1.25	7.6	0.12	0.02	1.6
6.30	20.7	464	464	5.88	1.27	7.9	0.12	0.02	1.7
6.35	20.8	446	447	5.67	1.27	8.8	0.14	0.04	1.4
6.40	21.0	425	425	5.56	1.31	7.6	0.13	0.02	1.6
6.45	21.2	405	406	5.24	1.29	8.2	0.15	0.03	1.8
6.50	21.3	393	393	4.83	1.23	7.8	0.14	0.02	1.7
6.55	21.5	388	388	3.88	1.00	7.7	0.14	0.02	1.9
6.60	21.7	377	377	3.47	0.92	8.0	0.15	0.02	1.5
6.65	21.8	380	380	3.67	0.97	6.5	0.12	-0.01	1.8
6.70	22.0	448	448	4.83	1.08	8.2	0.13	0.02	2.2
6.75	22.1	436	436	5.86	1.34	9.0	0.15	0.03	2.6
6.80	22.3	424	424	5.63	1.33	8.5	0.14	0.02	2.4
6.85	22.5	419	419	5.51	1.31	8.4	0.15	0.02	2.6
6.90	22.6	426	426	5.76	1.35	7.9	0.13	0.01	[illegible]
6.95	22.8	425	425	6.03	1.42	7.9	0.13	0.01	[illegible]
7.00	23.0	409	409	5.94	1.45	8.1	0.14	0.01	1.8

EPTH DEPTH meters	feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
7.05	23.1	402	402	5.67	1.41	8.1	0.14	0.01	1.8
7.10	23.3	392	393	5.47	1.39	8.2	0.15	0.01	2.2
7.15	23.5	383	383	5.33	1.39	8.5	0.16	0.02	1.5
7.20	23.6	371	371	5.19	1.40	8.3	0.16	0.01	1.9
7.25	23.8	352	352	5.00	1.42	8.5	0.17	0.02	1.5
7.30	23.9	330	331	4.66	1.41	8.6	0.19	0.02	2.0
7.35	24.1	307	307	4.07	1.33	8.9	0.21	0.02	2.2
7.40	24.3	301	301	3.86	1.28	9.0	0.21	0.03	2.6
7.45	24.4	306	306	3.63	1.19	8.9	0.21	0.02	2.1
7.50	24.6	302	302	3.62	1.20	8.9	0.21	0.02	2.1
7.55	24.8	326	326	3.12	0.96	8.7	0.19	0.01	2.4
7.60	24.9	344	344	3.66	1.07	8.3	0.17	0.00	3.1
7.65	25.1	352	352	4.35	1.23	8.4	0.17	0.00	2.1
7.70	25.3	341	342	4.55	1.33	8.7	0.18	0.01	3.1
7.75	25.4	307	307	4.25	1.38	9.3	0.22	0.02	1.6
7.80	25.6	291	291	3.64	1.25	9.5	0.23	0.03	2.0
7.85	25.8	277	277	3.34	1.21	9.5	0.25	0.03	2.3
7.90	25.9	287	287	3.37	1.17	9.2	0.23	0.01	2.2
7.95	26.1	268	268	3.12	1.17	9.4	0.25	0.02	2.4
8.00	26.2	257	257	2.83	1.10	9.9	0.28	0.03	2.5
8.05	26.4	270	270	2.83	1.05	9.1	0.24	0.01	2.5
8.10	26.6	257	257	2.66	1.04	9.0	0.25	0.00	2.6
8.15	26.7	247	248	2.42	0.98	9.1	0.27	0.00	2.5
8.20	26.9	246	246	2.40	0.98	9.3	0.27	0.01	2.7
8.25	27.1	263	263	2.64	1.00	9.6	0.26	0.01	2.5
8.30	27.2	256	256	2.69	1.05	9.7	0.27	0.02	2.6
8.35	27.4	241	241	2.44	1.01	10.3	0.31	0.03	2.7
8.40	27.6	239	239	2.27	0.95	10.3	0.31	0.03	2.4
8.45	27.7	241	242	2.28	0.95	10.4	0.31	0.03	2.7
8.50	27.9	257	257	2.40	0.93	10.3	0.29	0.02	2.7
8.55	28.1	257	257	2.02	0.79	9.2	0.26	-0.01	2.7
8.60	28.2	246	246	2.17	0.88	9.8	0.29	0.00	2.7
8.65	28.4	234	234	2.15	0.92	9.3	0.29	-0.01	2.8
8.70	28.5	243	244	2.18	0.90	8.7	0.26	-0.03	2.8
8.75	28.7	246	247	2.11	0.86	8.9	0.26	-0.03	2.8
8.80	28.9	252	252	2.11	0.83	9.1	0.26	-0.02	2.8
8.85	29.0	270	270	2.30	0.85	9.7	0.26	-0.01	2.8
8.90	29.2	275	275	2.60	0.95	10.1	0.26	0.00	2.8
8.95	29.4	269	269	2.58	0.96	10.4	0.28	0.01	2.8
9.00	29.5	245	245	2.39	0.98	10.7	0.32	0.02	2.9
9.05	29.7	231	231	2.28	0.98	11.0	0.34	0.02	2.9
9.10	29.9	214	214	2.13	1.00	11.2	0.38	0.03	2.9
9.15	30.0	198	198	1.88	0.95	11.6	0.42	0.04	2.9
9.20	30.2	193	194	1.75	0.90	11.7	0.44	0.05	2.9
9.25	30.3	193	193	1.74	0.90	11.8	0.44	0.05	2.9
9.30	30.5	191	192	1.77	0.93	12.0	0.45	0.05	2.9
9.35	30.7	183	183	1.71	0.93	12.2	0.48	0.06	2.9
9.40	30.8	177	177	1.58	0.89	12.1	0.49	0.05	2.9
9.45	31.0	176	176	1.48	0.84	10.7	0.44	-0.00	2.9
9.50	31.2	175	176	1.44	0.82	11.0	0.45	0.01	2.9

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	180	180	1.29	0.72	11.7	0.47	0.03	2.9
9.60	31.5	187	187	1.56	0.83	12.1	0.46	0.04	2.9
9.65	31.7	180	180	1.57	0.87	10.7	0.43	-0.01	3.0
9.70	31.8	176	176	1.57	0.89	11.4	0.47	0.01	3.0
9.75	32.0	168	168	1.58	0.94	11.4	0.49	0.00	3.0
9.80	32.2	161	161	1.50	0.93	11.1	0.50	-0.01	3.0
9.85	32.3	150	150	1.39	0.93	11.0	0.53	-0.02	3.0
9.90	32.5	147	148	1.35	0.92	11.7	0.57	0.01	3.0
9.95	32.6	144	144	1.38	0.96	12.0	0.60	0.03	3.0
10.00	32.8	136	137	1.31	0.96	11.4	0.60	-0.01	3.0
10.05	33.0	134	134	1.30	0.97	11.7	0.63	-0.00	3.0
10.10	33.1	132	132	1.32	1.00	11.5	0.63	-0.01	3.0
10.15	33.3	124	124	1.31	1.06	10.4	0.61	-0.08	3.0
10.20	33.5	116	116	1.28	1.11	11.2	0.70	-0.04	3.0
10.25	33.6	113	113	1.23	1.09	11.8	0.75	-0.01	3.0
10.30	33.8	110	110	1.17	1.06	11.9	0.78	-0.01	3.0
10.35	34.0	107	107	1.13	1.07	10.4	0.70	-0.11	3.1
10.40	34.1	100	100	1.19	1.19	11.1	0.80	-0.08	3.1
10.45	34.3	93	93	1.19	1.28	11.8	0.92	-0.03	3.1
10.50	34.4	71	71	1.31	1.84	11.9	1.21	-0.04	3.1
10.55	34.6	71	71	1.66	2.36	13.1	1.33	0.07	3.0
10.60	34.8	88	88	2.37	2.70	3.3	0.27	-0.75	[illegible]
10.65	34.9	78	78	2.66	3.42	-1.0	-0.09	-1.25	[illegible]
10.70	35.1	86	86	2.71	3.16	-2.6	-0.22	-1.28	3.8
10.75	35.3	84	84	2.63	3.11	-3.9	-0.33	-1.41	3.8
10.80	35.4	86	86	2.66	3.07	-4.4	-0.37	-1.43	3.8
10.85	35.6	84	84	2.57	3.07	-4.9	-0.42	-1.52	3.9
10.90	35.8	71	71	2.13	2.98	-5.8	-0.58	-1.88	3.9
10.95	35.9	46	46	1.81	3.91	-6.2	-0.97	-2.98	3.9
11.00	36.1	39	39	1.34	3.40	-6.0	-1.10	-3.49	3.9
11.05	36.3	17	17	0.78	4.52	-7.1	-2.97	-8.43	3.9
11.10	36.4	12	12	0.23	1.93	-6.5	-4.01	-12.12	3.9
11.15	36.6	11	11	0.15	1.35	-6.2	-4.05	-12.70	3.9
11.20	36.7	11	11	0.14	1.31	-5.9	-3.91	-12.74	3.9
11.25	36.9	11	11	0.18	1.61	-5.5	-3.65	-12.46	3.9
11.30	37.1	12	11	0.20	1.72	-5.1	-3.19	-11.57	3.9
11.35	37.2	12	12	0.26	2.11	-4.6	-2.68	-10.63	3.9
11.40	37.4	12	12	0.22	1.75	-4.2	-2.43	-10.32	3.9
11.45	37.6	12	12	0.20	1.60	-3.7	-2.17	-10.12	3.9
11.50	37.7	12	12	0.21	1.69	-3.2	-1.88	-9.88	3.8
11.55	37.9	12	12	0.20	1.64	-2.6	-1.51	-9.52	3.8
11.60	38.1	12	12	0.22	1.82	-2.2	-1.31	-9.70	3.8
11.65	38.2	12	13	0.24	1.91	7.9	4.56	-3.53	3.9
11.70	38.4	13	13	0.23	1.81	9.6	5.42	-2.47	3.9
11.75	38.5	13	13	0.26	2.11	11.4	6.56	-1.53	3.9
11.80	38.7	13	13	0.27	2.10	13.6	7.56	-0.32	3.9
11.85	38.9	13	13	?	?	15.8	9.00	0.88	3.9
11.90	39.0	13	13	?	?	18.4	10.30	2.28	[illegible]

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:I-19
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-18-91 10:59
Cone Used :364
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	2.00	0.06	2.83	0.04	clay	UNDFND	UNDFD	2	.1
0.60	2	1.00	0.06	5.83	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	-0.14	0.05	-36.00	0.18	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	9.83	0.14	1.46	0.23	clayey silt to silty clay	UNDFND	UNDFD	5	.9
1.55	5	33.17	0.29	0.86	0.27	silty sand to sandy silt	50-60	40-42	11	UNDEFINED
1.85	6	56.67	0.41	0.72	0.32	sand to silty sand	60-70	42-44	14	UNDEFINED
2.15	7	74.00	0.59	0.80	0.36	sand to silty sand	70-80	44-46	18	UNDEFINED
2.45	8	69.00	0.54	0.79	0.40	sand to silty sand	60-70	42-44	17	UNDEFINED
2.75	9	78.33	0.58	0.73	0.45	sand to silty sand	70-80	42-44	19	UNDEFINED
3.05	10	120.17	0.84	0.70	0.49	sand to silty sand	80-90	44-46	29	UNDEFINED
3.35	11	134.67	1.08	0.80	0.53	sand to silty sand	80-90	44-46	32	UNDEFINED
3.65	12	197.17	1.34	0.68	0.57	sand	>90	46-48	38	UNDEFINED
3.95	13	271.50	2.18	0.80	0.62	sand	>90	46-48	>50	UNDEFINED
4.25	14	364.00	3.79	1.04	0.66	sand	>90	>48	>50	UNDEFINED
4.55	15	278.33	2.90	1.04	0.70	sand	>90	46-48	>50	UNDEFINED
4.85	16	237.17	2.05	0.86	0.75	sand	>90	44-46	45	UNDEFINED
5.15	17	160.00	1.50	0.94	0.79	sand	80-90	44-46	31	UNDEFINED
5.45	18	217.00	1.79	0.82	0.83	sand	>90	44-46	42	UNDEFINED
5.75	19	364.17	3.31	0.91	0.88	sand	>90	46-48	>50	UNDEFINED
6.05	20	474.83	5.95	1.25	0.92	sand	>90	46-48	>50	UNDEFINED
6.40	21	459.43	5.75	1.25	0.97	sand	>90	46-48	>50	UNDEFINED
6.70	22	398.50	4.32	1.08	1.01	sand	>90	46-48	>50	UNDEFINED
7.00	23	423.17	5.79	1.37	1.06	sand	>90	46-48	>50	UNDEFINED
7.35	24	362.43	5.06	1.39	1.10	sand	>90	46-48	>50	UNDEFINED
7.65	25	321.83	3.71	1.15	1.15	sand	>90	46-48	>50	UNDEFINED
7.95	26	295.17	3.71	1.26	1.19	sand	>90	44-46	>50	UNDEFINED
8.25	27	256.67	2.63	1.02	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	248.50	2.35	0.95	1.28	sand	>90	44-46	49	UNDEFINED
8.85	29	248.50	2.17	0.87	1.32	sand	80-90	42-44	48	UNDEFINED
9.15	30	238.67	2.31	0.97	1.36	sand	80-90	42-44	48	UNDEFINED
9.45	31	185.50	1.67	0.90	1.41	sand	80-90	42-44	46	UNDEFINED
9.75	32	177.67	1.50	0.85	1.45	sand	70-80	42-44	36	UNDEFINED
10.05	33	145.33	1.37	0.94	1.49	sand	70-80	40-42	34	UNDEFINED
10.35	34	117.00	1.24	1.06	1.54	sand to silty sand	70-80	40-42	35	UNDEFINED
10.65	35	83.50	1.73	2.07	1.58	sand to silty sand	60-70	38-40	28	UNDEFINED
10.95	36	76.17	2.42	3.18	1.62	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
11.25	37	16.83	0.47	2.79	1.67	sandy silt to clayey silt	UNDFND	UNDFD	29	7.3
11.55	38	12.00	0.21	1.79	1.71	clayey silt to silty clay	UNDFND	UNDFD	8	1.4
						clayey silt to silty clay	UNDFND	UNDFD	6	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

CONOCO INC

Operator :CALVIN SELLS On Site Loc:I-19 Page No.

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	12.67	-5461.13	-43114.18	1.75	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 9 ■ sounding

I-19

al Baseline

Qc	Fs	Pw	Inc
-295	-1.99	-4.3	0.2

Dep	
Qc	0
Fs	-0.00
Pw	0.0
Inc	0.2

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

CONOCO

Page 1 of ___

Location: J-8, Start Time: 09:44, End Time: 10:50

Site: Dupont, Town: East Chicago, State: Ind.

Unit: 1, Operators: KASL, Wilson, ___, ___

Proj. Consultant: ___, Company: Ders

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11/16/91	10:09	10:29	J-8	CPTJ8	✓				34.78	1	2		Hit clay 33.8

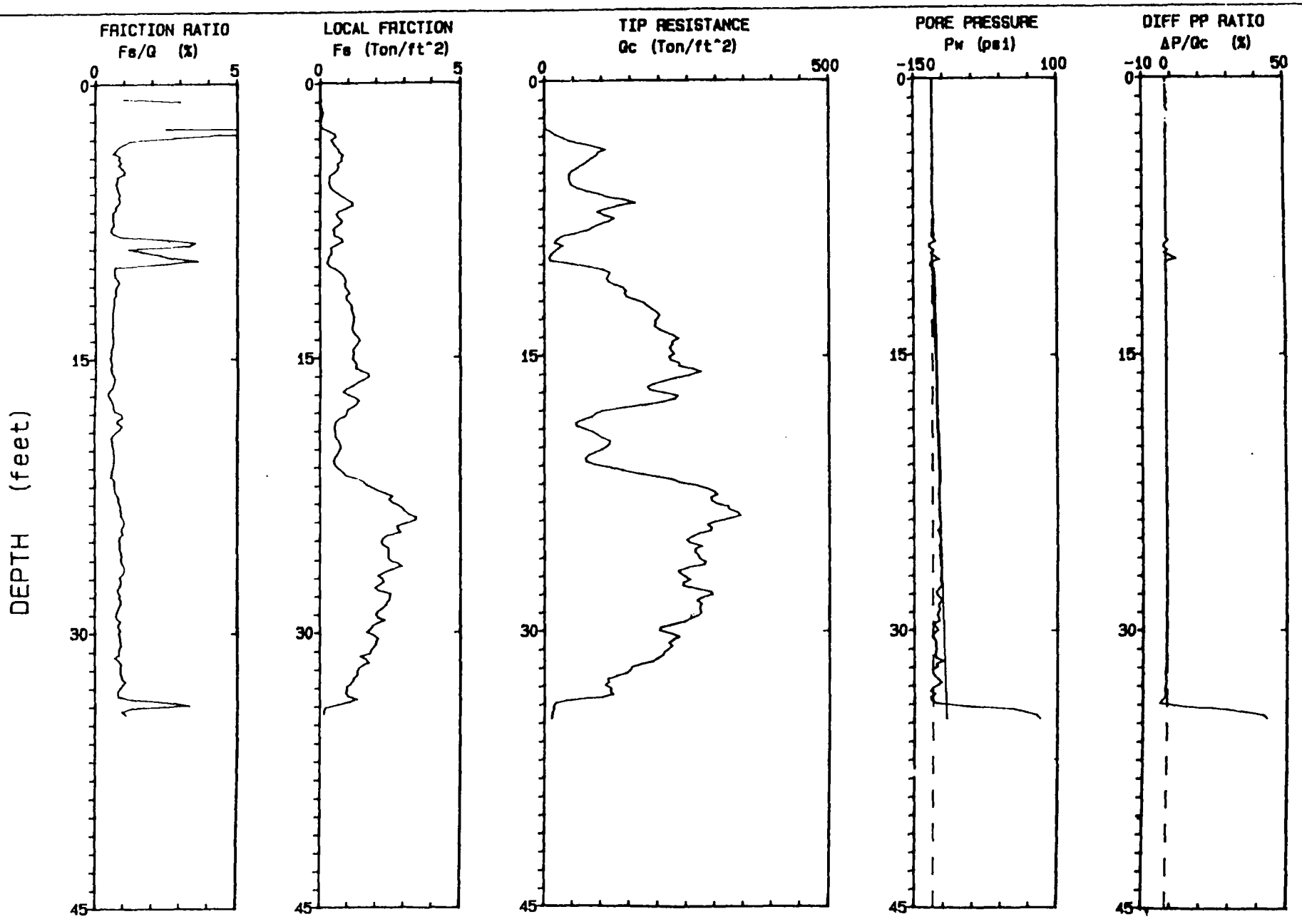
mr/cws725

Conoco, Inc.

Operator : DENNIS WILSON
Location : CPT-J8

CPT Date : 11-16-91 10:09
Cone Used : 364

File No. CPTJ8 Pg 1 / 1
Hole No. 1



Depth Increment : .05 m

Max Depth : 34.78 ft

SOUNDING DATA IN FILE CPTJ8 11-16-91 10:09

OPERATOR : DENNIS WILSON LOCATION : CPT-J8

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-262		-7.03		-8.5			0.1
0.05	0.2	0	0	-0.00	-1.00	0.0	0.00	0.00	0.1
0.10	0.3	0	0	-0.01	-17.00	0.0	3.45	3.45	0.1
0.15	0.5	0	0	-0.01	?	0.0	?	?	0.1
0.20	0.7	1	1	-0.01	-1.07	0.0	0.46	0.46	0.1
0.25	0.8	1	1	0.01	1.00	0.1	0.44	0.44	0.1
0.30	1.0	1	1	0.03	3.05	0.0	0.00	0.00	0.1
0.35	1.1	1	1	-0.01	-1.78	0.1	0.77	0.77	0.2
0.40	1.3	1	1	0.05	7.11	0.1	0.57	0.57	0.2
0.45	1.5	1	1	0.07	7.04	0.0	0.00	0.00	0.2
0.50	1.6	1	1	0.08	6.00	0.0	0.00	0.00	0.2
0.55	1.8	1	1	0.06	8.38	0.1	0.86	0.86	0.2
0.60	2.0	0	0	0.02	45.00	0.1	17.24	17.24	0.2
0.65	2.1	0	0	-0.01	-7.50	0.1	10.34	10.34	0.2
0.70	2.3	0	0	0.01	2.91	0.0	0.63	0.63	[illegible]
0.75	2.5	2	2	0.05	2.27	0.0	0.07	0.07	[illegible]
0.80	2.6	1	1	0.31	39.89	0.1	0.57	0.57	1.6
0.85	2.8	12	12	0.53	4.63	0.0	0.01	0.01	1.4
0.90	3.0	20	20	0.56	2.87	0.2	0.09	0.09	0.5
0.95	3.1	32	32	0.39	1.25	0.4	0.08	0.08	0.5
1.00	3.3	45	45	0.46	1.04	0.3	0.06	0.06	0.6
1.05	3.4	65	65	0.54	0.83	0.3	0.03	0.03	0.4
1.10	3.6	88	88	0.63	0.72	0.0	0.00	0.00	0.4
1.15	3.8	108	108	0.67	0.62	0.2	0.01	0.01	0.3
1.20	3.9	94	94	0.81	0.86	0.1	0.01	0.01	0.3
1.25	4.1	91	91	0.75	0.83	0.3	0.02	0.02	0.2
1.30	4.3	82	82	0.75	0.92	0.3	0.02	0.02	0.2
1.35	4.4	75	75	0.61	0.82	0.3	0.03	0.03	0.2
1.40	4.6	69	69	0.65	0.94	0.3	0.03	0.03	0.2
1.45	4.8	59	59	0.61	1.05	0.3	0.04	0.04	0.2
1.50	4.9	49	49	0.50	1.03	0.4	0.05	0.05	0.2
1.55	5.1	44	44	0.34	0.77	0.4	0.06	0.06	0.2
1.60	5.2	43	43	0.34	0.78	0.4	0.07	0.07	0.2
1.65	5.4	44	44	0.33	0.76	-0.1	-0.02	-0.02	0.2
1.70	5.6	44	44	0.33	0.75	-0.0	-0.01	-0.01	0.2
1.75	5.7	48	48	0.37	0.77	0.0	0.00	0.00	0.2
1.80	5.9	58	58	0.47	0.80	0.0	0.00	0.00	0.2
1.85	6.1	73	73	0.63	0.85	0.0	0.00	0.00	0.2
1.90	6.2	97	97	0.79	0.82	0.0	0.00	0.00	0.2
1.95	6.4	112	112	0.97	0.87	0.1	0.00	0.00	[illegible]
2.00	6.6	140	140	1.15	0.82	0.3	0.02	0.02	[illegible]

DEPTH ters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
2.05	6.7	160	160	1.17	0.73	0.0	0.00	0.00	0.2
2.10	6.9	132	132	0.96	0.73	0.1	0.01	0.01	0.2
2.15	7.1	108	108	0.67	0.62	0.7	0.04	0.04	0.2
2.20	7.2	93	93	0.58	0.63	0.7	0.06	0.06	0.1
2.25	7.4	105	105	0.65	0.62	0.8	0.06	0.06	0.1
2.30	7.5	123	123	0.78	0.63	0.7	0.04	0.04	0.1
2.35	7.7	114	114	0.73	0.64	0.7	0.04	0.04	0.2
2.40	7.9	99	99	0.57	0.58	0.9	0.07	0.07	0.1
2.45	8.0	86	86	0.46	0.53	1.0	0.08	0.08	0.1
2.50	8.2	77	77	0.50	0.65	0.8	0.07	0.07	0.2
2.55	8.4	55	55	0.50	0.91	0.8	0.10	0.10	0.2
2.60	8.5	31	31	0.78	2.54	1.6	0.38	0.38	0.2
2.65	8.7	23	23	0.81	3.48	0.8	0.25	0.25	0.2
2.70	8.9	18	18	0.60	3.27	3.1	1.21	1.21	0.2
2.75	9.0	33	33	0.39	1.20	-2.4	-0.53	-0.53	0.2
2.80	9.2	25	25	0.41	1.65	-2.2	-0.65	-0.65	0.2
2.85	9.4	18	18	0.41	2.24	1.6	0.65	0.65	0.3
2.90	9.5	12	12	0.32	2.68	-1.1	-0.66	-0.66	0.2
2.95	9.7	8	9	0.29	3.36	2.0	1.67	1.67	0.8
3.00	9.8	10	10	0.24	2.27	6.0	4.15	4.15	0.3
3.05	10.0	48	48	0.33	0.70	-1.0	-0.15	-0.15	0.2
3.10	10.2	78	78	0.54	0.69	-2.0	-0.18	-0.18	0.2
3.15	10.3	103	103	0.71	0.69	1.3	0.09	0.09	0.2
3.20	10.5	116	116	0.82	0.71	1.6	0.10	0.10	0.2
3.25	10.7	113	113	0.90	0.80	1.8	0.11	0.11	0.2
3.30	10.8	110	110	0.94	0.86	2.0	0.13	0.13	0.2
3.35	11.0	114	114	0.90	0.79	2.0	0.12	0.12	0.2
3.40	11.2	124	124	0.91	0.73	2.0	0.11	0.11	0.2
3.45	11.3	139	139	1.01	0.73	2.0	0.10	0.10	0.2
3.50	11.5	144	144	1.07	0.75	2.0	0.10	0.10	0.2
3.55	11.6	141	141	0.93	0.66	2.3	0.12	0.12	0.2
3.60	11.8	144	144	0.94	0.66	2.5	0.12	0.12	0.2
3.65	12.0	159	159	1.05	0.66	2.3	0.10	0.10	0.2
3.70	12.1	175	175	1.13	0.65	2.1	0.09	0.09	0.2
3.75	12.3	180	180	1.14	0.63	2.3	0.09	0.09	0.2
3.80	12.5	188	188	1.14	0.61	2.4	0.09	0.09	0.2
3.85	12.6	196	196	1.19	0.61	2.3	0.09	0.09	0.1
3.90	12.8	202	202	1.22	0.61	2.5	0.09	0.09	0.2
3.95	13.0	199	199	1.22	0.61	2.6	0.09	0.09	0.1
4.00	13.1	195	195	1.20	0.61	2.6	0.10	0.10	0.1
4.05	13.3	195	195	1.17	0.60	2.6	0.10	0.10	0.1
4.10	13.5	193	193	1.16	0.60	2.9	0.11	0.11	0.2
4.15	13.6	201	201	1.18	0.59	2.9	0.10	0.10	0.2
4.20	13.8	214	214	1.28	0.60	2.9	0.10	0.10	0.1
4.25	13.9	226	226	1.37	0.61	2.8	0.09	0.09	0.1
4.30	14.1	235	235	1.43	0.61	3.0	0.09	0.09	0.1
4.35	14.3	224	224	1.34	0.60	3.2	0.10	0.10	0.1
4.40	14.4	223	223	1.24	0.56	3.2	0.10	0.10	0.1
4.45	14.6	219	219	1.17	0.53	3.3	0.11	0.11	0.2
4.50	14.8	222	222	1.20	0.54	3.3	0.11	0.11	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION g
4.55	14.9	228	228	1.19	0.52	3.3	0.10	0.10	0.1
4.60	15.1	218	218	1.16	0.53	3.3	0.11	0.11	0.1
4.65	15.3	221	221	1.28	0.58	3.2	0.11	0.11	0.1
4.70	15.4	236	236	1.31	0.55	3.5	0.11	0.11	0.1
4.75	15.6	235	235	1.26	0.54	3.4	0.10	0.10	0.1
4.80	15.7	259	259	1.45	0.56	3.3	0.09	0.09	0.1
4.85	15.9	274	274	1.73	0.63	3.3	0.09	0.09	0.1
4.90	16.1	256	256	1.75	0.68	3.4	0.09	0.09	0.1
4.95	16.2	230	230	1.54	0.67	3.5	0.11	0.11	0.1
5.00	16.4	208	208	1.31	0.63	3.7	0.13	0.13	0.1
5.05	16.6	192	192	1.15	0.60	3.9	0.15	0.15	0.1
5.10	16.7	180	180	0.92	0.51	3.9	0.16	0.16	0.1
5.15	16.9	184	184	0.82	0.45	3.9	0.15	0.15	0.1
5.20	17.1	210	210	1.02	0.49	3.8	0.13	0.13	0.1
5.25	17.2	234	234	1.27	0.54	3.6	0.11	0.11	0.1
5.30	17.4	229	229	1.40	0.61	3.7	0.12	0.12	0.1
5.35	17.6	207	207	1.32	0.64	3.8	0.13	0.13	0.1
5.40	17.7	178	178	1.17	0.66	4.0	0.16	0.16	0.1
5.45	17.9	140	140	0.98	0.70	4.1	0.21	0.21	0.1
5.50	18.0	103	103	0.96	0.94	4.3	0.30	0.30	0.1
5.55	18.2	90	90	0.89	0.99	4.6	0.36	0.36	0.1
5.60	18.4	84	85	0.68	0.81	3.9	0.33	0.33	0.1
5.65	18.5	69	69	0.56	0.80	4.2	0.44	0.44	0.1
5.70	18.7	55	55	0.54	1.00	4.9	0.64	0.64	0.1
5.75	18.9	57	57	0.51	0.90	4.8	0.60	0.60	0.1
5.80	19.0	70	70	0.54	0.78	4.7	0.48	0.48	0.1
5.85	19.2	85	85	0.55	0.65	4.8	0.41	0.41	0.1
5.90	19.4	95	95	0.56	0.59	4.9	0.37	0.37	0.1
5.95	19.5	102	103	0.64	0.62	5.0	0.35	0.35	0.1
6.00	19.7	115	115	0.69	0.60	5.0	0.31	0.31	0.1
6.05	19.8	115	115	0.74	0.64	5.1	0.32	0.32	0.1
6.10	20.0	110	110	0.73	0.67	5.2	0.34	0.34	0.1
6.15	20.2	101	101	0.67	0.67	5.3	0.38	0.38	0.1
6.20	20.3	89	89	0.61	0.69	5.5	0.44	0.44	0.1
6.25	20.5	77	77	0.53	0.69	5.5	0.52	0.52	0.1
6.30	20.7	72	72	0.49	0.68	5.7	0.57	0.57	0.1
6.35	20.8	74	74	0.50	0.68	5.7	0.56	0.56	0.1
6.40	21.0	89	89	0.58	0.65	5.8	0.47	0.47	0.1
6.45	21.2	118	118	0.72	0.61	5.8	0.35	0.35	0.1
6.50	21.3	139	140	0.85	0.61	5.8	0.30	0.30	0.1
6.55	21.5	164	164	0.94	0.57	5.8	0.25	0.25	0.1
6.60	21.7	197	198	1.32	0.67	5.9	0.21	0.21	0.1
6.65	21.8	226	226	1.54	0.68	5.8	0.19	0.19	0.1
6.70	22.0	239	239	1.65	0.69	5.7	0.17	0.17	0.1
6.75	22.1	268	268	1.88	0.70	5.2	0.14	0.14	0.1
6.80	22.3	285	285	2.06	0.72	5.0	0.13	0.13	0.1
6.85	22.5	298	298	2.36	0.79	5.0	0.12	0.12	0.1
6.90	22.6	304	304	2.60	0.85	4.5	0.11	0.11	0.1
6.95	22.8	292	292	2.47	0.85	4.8	0.12	0.12	0.1
7.00	23.0	293	294	2.58	0.88	5.2	0.13	0.13	0.1

DEPTH ers	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	303	303	2.80	0.92	5.6	0.13	0.13	0.1
7.10	23.3	323	323	2.96	0.92	5.4	0.12	0.12	0.1
7.15	23.5	323	323	3.04	0.94	4.6	0.10	0.10	0.1
7.20	23.6	339	339	3.16	0.93	4.9	0.10	0.10	0.1
7.25	23.8	345	345	3.44	0.99	4.9	0.10	0.10	0.1
7.30	23.9	326	327	3.42	1.05	5.3	0.12	0.12	0.1
7.35	24.1	299	299	3.06	1.02	6.1	0.15	0.15	0.1
7.40	24.3	285	285	2.74	0.96	6.4	0.16	0.16	0.1
7.45	24.4	293	293	2.79	0.95	6.0	0.15	0.15	0.1
7.50	24.6	291	291	2.89	0.99	3.8	0.10	0.10	0.1
7.55	24.8	270	270	2.39	0.89	5.0	0.13	0.13	0.1
7.60	24.9	259	259	2.24	0.87	6.1	0.17	0.17	0.1
7.65	25.1	249	249	2.19	0.88	6.6	0.19	0.19	0.1
7.70	25.3	255	255	2.25	0.88	6.4	0.18	0.18	0.1
7.75	25.4	278	278	2.46	0.89	5.0	0.13	0.13	0.1
7.80	25.6	264	264	2.46	0.93	5.2	0.14	0.14	0.1
7.85	25.8	263	263	2.44	0.93	6.5	0.18	0.18	0.1
7.90	25.9	270	271	2.43	0.90	5.0	0.13	0.13	0.1
7.95	26.1	272	272	2.51	0.92	5.9	0.16	0.16	0.1
8.00	26.2	283	283	2.79	0.98	6.5	0.17	0.17	0.1
8.05	26.4	281	281	2.94	1.05	6.0	0.15	0.15	0.1
8.10	26.6	251	251	2.58	1.03	7.2	0.21	0.21	0.1
8.15	26.7	234	234	2.28	0.98	7.1	0.22	0.22	0.1
8.20	26.9	239	239	2.08	0.87	6.9	0.21	0.21	0.1
8.25	27.1	248	248	2.23	0.90	6.6	0.19	0.19	0.1
8.30	27.2	256	257	2.30	0.90	6.2	0.18	0.18	0.1
8.35	27.4	243	243	2.16	0.89	6.7	0.20	0.20	0.1
8.40	27.6	243	243	1.98	0.81	6.9	0.20	0.20	0.1
8.45	27.7	265	265	2.09	0.79	4.7	0.13	0.13	0.1
8.50	27.9	292	292	2.53	0.87	2.2	0.05	0.05	0.1
8.55	28.1	295	295	2.50	0.85	3.2	0.08	0.08	0.1
8.60	28.2	276	276	2.49	0.90	5.5	0.14	0.14	0.1
8.65	28.4	267	267	2.40	0.90	7.7	0.21	0.21	0.1
8.70	28.5	276	276	2.35	0.85	5.0	0.13	0.13	0.1
8.75	28.7	273	273	2.23	0.81	4.4	0.12	0.12	0.1
8.80	28.9	273	273	2.09	0.77	5.9	0.15	0.15	0.1
8.85	29.0	276	277	2.01	0.73	4.4	0.11	0.11	0.1
8.90	29.2	270	270	2.08	0.77	3.5	0.09	0.09	0.1
8.95	29.4	257	257	2.33	0.91	4.9	0.14	0.14	0.1
9.00	29.5	246	246	2.08	0.85	4.8	0.14	0.14	0.1
9.05	29.7	225	225	1.88	0.83	-0.4	-0.01	-0.01	0.1
9.10	29.9	202	202	1.79	0.89	2.2	0.08	0.08	0.1
9.15	30.0	201	201	1.67	0.83	4.2	0.15	0.15	0.1
9.20	30.2	222	222	1.93	0.87	0.8	0.03	0.03	0.1
9.25	30.3	237	237	2.08	0.88	-0.5	-0.01	-0.01	0.1
9.30	30.5	226	226	2.03	0.90	1.5	0.05	0.05	0.1
9.35	30.7	218	218	2.01	0.92	2.6	0.09	0.09	0.2
9.40	30.8	224	224	1.93	0.86	2.1	0.07	0.07	0.1
9.45	31.0	217	217	1.83	0.84	2.9	0.10	0.10	0.1
9.50	31.2	210	210	1.81	0.86	2.3	0.08	0.08	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCL[illegible]ON
9.55	31.3	208	208	1.44	0.69	2.0	0.07	0.07	0.1
9.60	31.5	199	199	1.68	0.84	2.0	0.07	0.07	0.1
9.65	31.7	190	190	1.75	0.92	8.5	0.32	0.32	0.1
9.70	31.8	170	170	1.52	0.90	2.5	0.11	0.11	0.1
9.75	32.0	153	153	1.38	0.91	3.7	0.17	0.17	0.1
9.80	32.2	150	150	1.33	0.88	-0.3	-0.02	-0.02	0.1
9.85	32.3	144	144	1.35	0.94	-0.4	-0.02	-0.02	0.1
9.90	32.5	127	127	1.22	0.96	1.4	0.08	0.08	0.1
9.95	32.6	111	112	1.19	1.07	3.9	0.25	0.25	0.1
10.00	32.8	114	114	1.11	0.97	7.0	0.45	0.45	0.1
10.05	33.0	107	107	0.97	0.90	4.3	0.29	0.28	0.1
10.10	33.1	118	118	0.97	0.82	-0.3	-0.02	-0.03	0.1
10.15	33.3	116	116	0.94	0.81	-2.0	-0.12	-0.13	0.1
10.20	33.5	122	122	1.01	0.83	1.6	0.10	0.08	0.1
10.25	33.6	102	102	1.35	1.33	-2.1	-0.15	-0.18	0.1
10.30	33.8	39	39	1.05	2.66	-1.7	-0.31	-0.39	0.1
10.35	34.0	19	19	0.63	3.24	2.3	0.85	0.66	0.1
10.40	34.1	16	16	0.20	1.31	23.5	10.81	10.55	0.1
10.45	34.3	16	17	0.15	0.95	65.2	29.88	29.59	0.1
10.50	34.4	14	15	0.15	1.07	74.5	38.62	38.25	0.1
10.55	34.6	13	14	?	?	84.0	45.61	45.19	0.1
10.60	34.8	13	14	?	?	86.6	48.25	47.78	0.1

WRITE NUMBER OF RODS USED ___

Conoco Inc.

Operator :DENNIS WILSON
On Site Loc:CPT-J8
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-16-91 10:09
Cone Used :364
Water table (meters) : 1.2

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
0.25	0.82	0.40	-0.00	-1.00	0.03	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.50	1.64	1.00	0.04	4.40	0.09	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.75	2.46	0.60	0.03	4.33	0.15	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
1.00	3.28	22.00	0.45	2.05	0.22	sandy silt to clayey silt	UNDFND	UNDFD	8	18	UNDF
1.25	4.10	89.20	0.68	0.76	0.28	sand to silty sand	80-90	44-46	21	41	>0.5
1.50	4.92	66.80	0.62	0.93	0.32	sand to silty sand	70-80	44-46	16	29	.31
1.75	5.74	44.60	0.34	0.77	0.36	silty sand to sandy silt	50-60	40-42	14	24	.26
2.00	6.56	96.00	0.80	0.84	0.39	sand to silty sand	70-80	44-46	23	37	>0.5
2.25	7.38	119.60	0.81	0.67	0.43	sand to silty sand	80-90	44-46	29	44	>0.5
2.50	8.20	99.80	0.61	0.61	0.46	sand to silty sand	70-80	44-46	24	36	>0.5
2.75	9.02	32.00	0.62	1.92	0.50	sandy silt to clayey silt	UNDFND	UNDFD	12	18	UNDF
3.00	9.84	14.60	0.33	2.29	0.54	clayey silt to silty clay	UNDFND	UNDFD	7	10	UNDF
3.25	10.66	91.60	0.66	0.72	0.57	sand to silty sand	70-80	42-44	22	29	.32
3.50	11.48	126.20	0.97	0.77	0.61	sand to silty sand	80-90	44-46	30	39	>0.5
3.75	12.30	159.80	1.04	0.65	0.64	sand	80-90	44-46	31	39	>0.5
4.00	13.12	196.00	1.19	0.61	0.68	sand	>90	44-46	38	46	>0.5
4.25	13.94	205.80	1.23	0.60	0.72	sand	>90	44-46	39	47	>0.5
4.50	14.76	224.60	1.28	0.57	0.75	sand	>90	44-46	43	>50	>0.5
4.75	15.58	227.60	1.24	0.54	0.79	sand	>90	44-46	44	50	>0.5
5.00	16.40	245.40	1.56	0.63	0.82	sand	>90	44-46	47	>50	>0.5
5.25	17.22	200.00	1.04	0.52	0.86	sand	80-90	44-46	38	42	>0.5
5.50	18.04	171.40	1.17	0.68	0.89	sand	80-90	42-44	33	35	>0.5
5.75	18.86	71.00	0.64	0.90	0.93	sand to silty sand	50-60	38-40	17	18	.19
6.00	19.69	93.40	0.60	0.64	0.97	sand to silty sand	60-70	40-42	22	23	.24
6.25	20.51	98.40	0.66	0.67	1.00	sand to silty sand	60-70	40-42	24	24	.25
6.50	21.33	98.40	0.63	0.64	1.04	sand to silty sand	60-70	40-42	24	23	.25
6.75	22.15	218.80	1.47	0.67	1.07	sand	80-90	44-46	42	41	>0.5
7.00	22.97	294.40	2.41	0.82	1.11	sand	>90	44-46	>50	>50	>0.5
7.25	23.79	326.60	3.08	0.94	1.15	sand	>90	44-46	>50	>50	>0.5
7.50	24.61	298.80	2.98	1.00	1.18	sand	>90	44-46	>50	>50	>0.5
7.75	25.43	262.20	2.31	0.88	1.22	sand	>90	44-46	>50	46	>0.5
8.00	26.25	270.40	2.53	0.93	1.25	sand	>90	44-46	>50	47	>0.5
8.25	27.07	250.60	2.42	0.97	1.29	sand	80-90	42-44	48	43	>0.5
8.50	27.89	259.80	2.21	0.85	1.33	sand	80-90	42-44	50	44	>0.5
8.75	28.71	277.40	2.39	0.86	1.36	sand	>90	44-46	>50	46	>0.5
9.00	29.53	264.40	2.12	0.80	1.40	sand	80-90	42-44	>50	43	>0.5
9.25	30.35	217.40	1.87	0.86	1.43	sand	80-90	42-44	42	35	>0.5
9.50	31.17	219.00	1.92	0.88	1.47	sand	80-90	42-44	42	35	>0.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ++++

Conoco Inc.

Operator :DENNIS WILSON On Site Loc:CPT-J8 Page No.

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
9.75	31.99	184.00	1.55	0.84	1.51	sand	70-80	40-42	35	29	.32
10.00	32.81	129.20	1.24	0.96	1.54	sand to silty sand	60-70	40-42	31	25	.27
10.25	33.63	113.00	1.05	0.93	1.58	sand to silty sand	60-70	38-40	27	22	.23
10.50	34.45	20.80	0.44	2.10	1.61	sandy silt to clayey silt	UNDFND	UNDFD	8	6	UNDF

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

FIELD ACTIVITY LOG SHEET

Page 1 of 1

Location: K-11, Start Time: 1045, End Time: 1235

Site: DuPont, Town: E. Chicago, State: IND

Unit: 1, Operators: Sells, Kasl, Wilson,

Proj. Consultant: Loundsbury, Company: DEPS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-19-91	1150	1220	K-11	CPTK11	✓				37.9	1	2	F	CLAY AT 34.9

FIELD ACTIVITY LOG SHEET

CONOCO

ıge ___ of ___

ocation: K-11, Start Time: 0745, End Time: 1045

te: DuPont, Town: E. Chicago, State: Ind

nit: 1, Operators: SEUS, EJ Wilson, Pametisky, ___

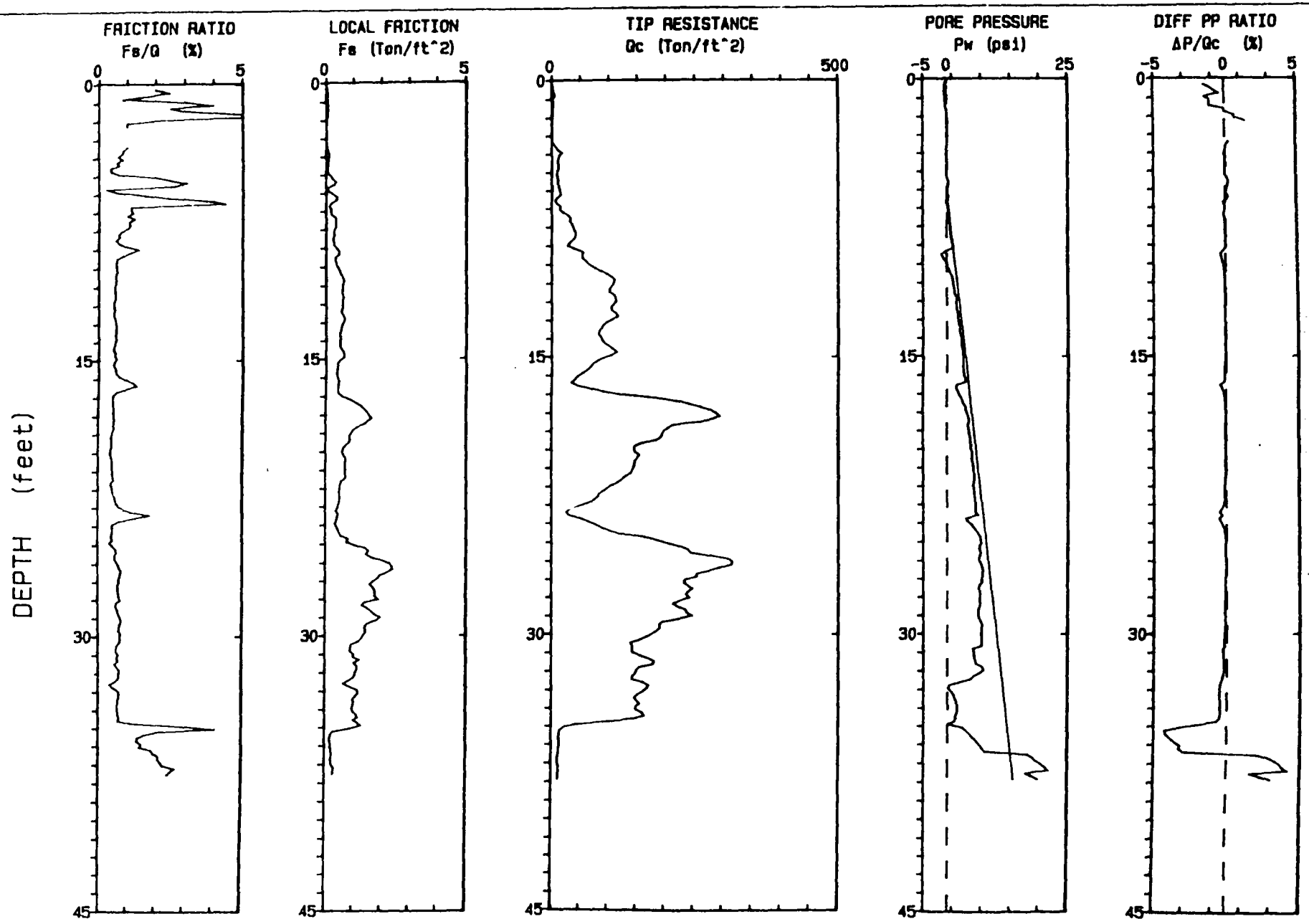
oj. Consultant: Lounsbury, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	all water collected w/ ENV. probe. Comments
12-10	0750	0808	K-11			100mL			3-5'	2	2		Fill material
	0809	0820				100mL			6-8'	2	2		Trace of Fill then sand
	0825	0835				100mL			9-11'	2	2		Wet sand
	0840	0905					0		10'	2	2		EN Prob -DRY-
	0910	0945					300mL		12'	3	2		Clear.
	0954	1040					300mL		30	4			Clear.

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-19-91 12:06 FILE CPTK11 Pg 1 / 1

LOCATION : K-11 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 37.89 ft

SOUNDING DATA IN FILE CPTK11 11-19-91 12:06

OPERATOR : CALVIN SELLS LOCATION : K-11

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.05		-0.1			0.1
0.05	0.2	0	0	0.02	7.00	-0.2	-4.60	-4.60	0.2
0.10	0.3	2	2	0.04	1.75	-0.4	-1.19	-1.19	0.1
0.15	0.5	2	2	0.05	2.21	-0.3	-0.98	-0.98	0.1
0.20	0.7	4	4	0.07	1.75	-0.4	-0.78	-0.78	0.1
0.25	0.8	6	6	0.05	0.83	-0.3	-0.42	-0.42	0.1
0.30	1.0	2	2	0.06	3.73	-0.4	-2.05	-2.05	0.1
0.35	1.1	2	2	0.08	3.47	-0.3	-1.04	-1.04	0.1
0.40	1.3	2	2	0.05	1.96	-0.3	-1.09	-1.09	0.1
0.45	1.5	2	2	0.06	3.76	-0.3	-1.40	-1.40	0.1
0.50	1.6	1	1	0.05	4.12	-0.0	-0.27	-0.27	0.1
0.55	1.8	1	1	0.05	3.79	0.0	0.10	0.10	0.1
0.60	2.0	1	1	0.02	2.05	0.1	0.49	0.49	0.1
0.65	2.1	1	1	0.01	1.71	0.1	1.23	1.23	0.1
0.70	2.3	1	1	0.01	1.32	0.2	1.45	1.45	0.1
0.75	2.5	-0	-0	0.01	-1.44	0.1	-1.15	-1.15	0.1
0.80	2.6	-0	-0	0.01	-1.45	0.1	-1.88	-1.88	0.1
0.85	2.8	-0	-0	0.00	-1.00	0.1	-1.57	-1.57	0.1
0.90	3.0	-0	-0	0.01	-1.09	0.1	-2.19	-2.19	0.1
0.95	3.1	-0	-0	0.00	-1.00	0.2	-3.13	-3.13	0.1
1.00	3.3	-0	-0	0.01	-5.20	0.1	-3.45	-3.45	0.1
1.05	3.4	3	3	0.03	0.95	0.1	0.22	0.22	0.1
1.10	3.6	7	7	0.06	0.89	0.1	0.10	0.10	0.1
1.15	3.8	11	11	0.09	0.76	0.0	0.01	0.01	0.1
1.20	3.9	19	19	0.13	0.68	0.0	0.01	0.01	0.1
1.25	4.1	13	13	0.11	0.87	-0.2	-0.09	-0.09	0.1
1.30	4.3	11	11	0.07	0.64	0.0	0.01	0.01	0.1
1.35	4.4	10	10	0.07	0.63	0.0	0.01	0.01	0.1
1.40	4.6	12	12	0.05	0.45	0.1	0.05	0.05	0.1
1.45	4.8	12	12	0.05	0.39	0.1	0.04	0.04	0.1
1.50	4.9	10	10	0.07	0.65	0.0	0.01	0.01	0.1
1.55	5.1	9	9	0.18	1.96	0.0	0.02	0.02	0.1
1.60	5.2	10	10	0.25	2.60	0.0	0.03	0.03	0.1
1.65	5.4	12	12	0.37	3.13	0.2	0.12	0.12	0.1
1.70	5.6	11	11	0.29	2.61	0.3	0.20	0.20	0.1
1.75	5.7	12	12	0.03	0.26	0.3	0.15	0.15	0.1
1.80	5.9	13	13	0.08	0.63	0.2	0.11	0.11	0.1
1.85	6.1	15	15	0.24	1.62	0.1	0.03	0.03	0.1
1.90	6.2	16	16	0.39	2.51	0.1	0.05	0.01	0.1
1.95	6.4	10	10	0.39	4.02	0.4	0.29	0.18	0.1
2.00	6.6	5	5	0.22	4.49	0.3	0.51	0.13	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	9	9	0.10	1.10	0.1	0.05	-0.18	0.1
2.10	6.9	16	16	0.18	1.15	0.2	0.09	-0.07	0.1
2.15	7.1	15	15	0.18	1.15	0.3	0.15	-0.05	0.1
2.20	7.2	20	20	0.20	1.01	0.3	0.12	-0.06	0.1
2.25	7.4	28	28	0.35	1.25	0.0	0.01	-0.14	0.1
2.30	7.5	33	33	0.35	1.05	0.2	0.04	-0.09	0.1
2.35	7.7	32	32	0.35	1.08	0.4	0.08	-0.08	0.1
2.40	7.9	36	36	0.37	1.03	0.6	0.13	-0.03	0.1
2.45	8.0	38	38	0.30	0.79	0.7	0.13	-0.03	0.1
2.50	8.2	40	40	0.28	0.70	0.7	0.13	-0.03	0.1
2.55	8.4	43	43	0.31	0.71	0.8	0.13	-0.03	0.1
2.60	8.5	42	42	0.25	0.59	0.9	0.15	-0.03	0.1
2.65	8.7	38	38	0.28	0.72	1.0	0.18	-0.03	0.1
2.70	8.9	32	32	0.30	0.94	1.0	0.22	-0.05	0.1
2.75	9.0	27	27	0.38	1.42	1.3	0.34	-0.01	0.1
2.80	9.2	41	41	0.47	1.17	1.3	0.23	-0.01	0.1
2.85	9.4	56	56	0.48	0.95	-0.1	-0.01	-0.19	0.1
2.90	9.5	54	54	0.34	0.63	-1.2	-0.15	-0.35	0.1
2.95	9.7	55	55	0.34	0.62	-0.8	-0.10	-0.31	0.1
3.00	9.8	61	61	0.37	0.61	-0.4	-0.05	-0.24	0.1
3.05	10.0	67	67	0.42	0.62	-0.0	-0.00	-0.19	0.1
3.10	10.2	75	75	0.49	0.66	0.1	0.01	-0.16	0.1
3.15	10.3	85	85	0.52	0.61	0.4	0.04	-0.12	0.1
3.20	10.5	97	97	0.58	0.59	0.7	0.05	-0.09	0.1
3.25	10.7	106	106	0.63	0.60	1.0	0.07	-0.07	0.1
3.30	10.8	111	111	0.65	0.59	1.2	0.08	-0.05	0.1
3.35	11.0	109	109	0.60	0.55	1.3	0.09	-0.05	0.1
3.40	11.2	106	106	0.60	0.56	1.4	0.09	-0.06	0.1
3.45	11.3	102	102	0.58	0.57	1.5	0.11	-0.05	0.1
3.50	11.5	101	101	0.59	0.58	1.6	0.12	-0.05	0.1
3.55	11.6	110	110	0.64	0.58	1.7	0.11	-0.05	0.1
3.60	11.8	113	113	0.61	0.54	2.0	0.12	-0.03	0.1
3.65	12.0	114	114	0.61	0.54	2.0	0.12	-0.04	0.1
3.70	12.1	109	109	0.60	0.55	1.9	0.13	-0.05	0.1
3.75	12.3	104	104	0.56	0.53	2.0	0.14	-0.05	0.1
3.80	12.5	105	105	0.54	0.51	2.0	0.14	-0.05	0.1
3.85	12.6	113	113	0.62	0.55	2.2	0.14	-0.04	0.1
3.90	12.8	117	117	0.68	0.58	2.3	0.14	-0.04	0.1
3.95	13.0	107	107	0.65	0.60	2.3	0.15	-0.05	0.1
4.00	13.1	97	98	0.59	0.60	2.4	0.17	-0.05	0.2
4.05	13.3	91	91	0.56	0.61	2.6	0.20	-0.04	0.2
4.10	13.5	88	88	0.54	0.61	2.6	0.21	-0.05	0.2
4.15	13.6	84	84	0.50	0.60	2.6	0.23	-0.05	0.2
4.20	13.8	82	82	0.50	0.61	2.7	0.24	-0.05	0.2
4.25	13.9	86	86	0.51	0.60	2.9	0.24	-0.05	0.2
4.30	14.1	89	89	0.50	0.56	3.0	0.24	-0.04	0.2
4.35	14.3	93	93	0.49	0.53	3.0	0.23	-0.04	0.2
4.40	14.4	102	102	0.53	0.52	3.0	0.21	-0.04	0.2
4.45	14.6	108	108	0.62	0.57	3.2	0.21	-0.04	0.2
4.50	14.8	115	115	0.66	0.57	3.3	0.20	-0.03	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	105	106	0.66	0.62	3.3	0.22	-0.04	0.2
4.60	15.1	91	91	0.51	0.56	3.3	0.26	-0.05	0.2
4.65	15.3	81	81	0.43	0.53	3.3	0.29	-0.06	0.2
4.70	15.4	72	72	0.42	0.58	3.3	0.34	-0.08	0.2
4.75	15.6	67	67	0.40	0.59	3.3	0.35	-0.09	0.2
4.80	15.7	61	61	0.38	0.63	3.4	0.40	-0.09	0.2
4.85	15.9	54	54	0.39	0.73	3.5	0.47	-0.11	0.2
4.90	16.1	45	45	0.43	0.96	3.6	0.57	-0.12	0.2
4.95	16.2	40	40	0.48	1.21	3.8	0.70	-0.11	0.2
5.00	16.4	34	34	0.45	1.32	3.9	0.81	-0.13	0.2
5.05	16.6	45	45	0.45	0.99	2.0	0.32	-0.41	0.2
5.10	16.7	69	69	0.43	0.62	1.8	0.19	-0.29	0.2
5.15	16.9	92	92	0.47	0.52	2.2	0.17	-0.20	0.2
5.20	17.1	124	124	0.62	0.50	2.4	0.14	-0.14	0.2
5.25	17.2	182	182	0.90	0.50	2.9	0.11	-0.08	0.2
5.30	17.4	219	219	1.11	0.51	3.2	0.10	-0.06	0.2
5.35	17.6	242	242	1.28	0.53	3.4	0.10	-0.05	0.2
5.40	17.7	261	261	1.38	0.52	3.9	0.11	-0.03	0.2
5.45	17.9	278	278	1.49	0.53	3.9	0.10	-0.03	0.2
5.50	18.0	288	289	1.57	0.54	4.2	0.11	-0.02	0.2
5.55	18.2	295	295	1.67	0.57	4.3	0.10	-0.02	0.2
5.60	18.4	283	283	1.54	0.54	4.5	0.11	-0.02	0.2
5.65	18.5	259	259	1.40	0.54	4.6	0.13	-0.02	0.2
5.70	18.7	212	212	1.14	0.54	4.3	0.15	-0.04	0.2
5.75	18.9	204	204	0.99	0.48	4.4	0.16	-0.04	0.2
5.80	19.0	197	197	0.92	0.47	4.6	0.17	-0.04	0.2
5.85	19.2	194	194	0.85	0.44	4.6	0.17	-0.04	0.2
5.90	19.4	192	192	0.87	0.46	4.8	0.18	-0.03	0.2
5.95	19.5	184	184	0.85	0.46	4.9	0.19	-0.04	0.2
6.00	19.7	159	159	0.74	0.47	4.9	0.22	-0.05	0.2
6.05	19.8	147	147	0.64	0.44	4.9	0.24	-0.05	0.2
6.10	20.0	144	144	0.60	0.41	4.9	0.25	-0.05	0.2
6.15	20.2	146	146	0.61	0.42	5.2	0.26	-0.04	0.3
6.20	20.3	154	155	0.70	0.45	5.2	0.24	-0.04	0.3
6.25	20.5	150	150	0.72	0.48	5.2	0.25	-0.05	0.3
6.30	20.7	146	146	0.70	0.48	5.2	0.26	-0.05	0.3
6.35	20.8	146	146	0.70	0.48	5.4	0.27	-0.05	0.3
6.40	21.0	144	144	0.72	0.50	5.5	0.27	-0.05	0.3
6.45	21.2	142	142	0.71	0.50	5.5	0.28	-0.05	0.3
6.50	21.3	139	139	0.72	0.52	5.6	0.29	-0.05	0.3
6.55	21.5	130	130	0.72	0.56	5.6	0.31	-0.06	0.3
6.60	21.7	123	123	0.56	0.45	5.7	0.33	-0.06	0.3
6.65	21.8	115	115	0.52	0.46	5.6	0.35	-0.08	0.3
6.70	22.0	104	104	0.50	0.48	5.4	0.38	-0.10	0.3
6.75	22.1	97	97	0.49	0.50	5.6	0.41	-0.10	0.3
6.80	22.3	90	90	0.48	0.54	5.6	0.45	-0.12	0.3
6.85	22.5	83	83	0.50	0.60	5.7	0.49	-0.12	0.3
6.90	22.6	81	81	0.50	0.62	5.8	0.52	-0.12	0.4
6.95	22.8	74	74	0.49	0.67	5.9	0.57	-0.13	0.4
7.00	23.0	61	61	0.45	0.74	5.9	0.69	-0.17	0.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	46	46	0.42	0.92	5.9	0.92	-0.24	0.4
7.10	23.3	32	32	0.37	1.17	5.9	1.32	-0.36	0.4
7.15	23.5	25	25	0.45	1.82	5.9	1.74	-0.47	0.4
7.20	23.6	31	31	0.40	1.30	6.5	1.52	-0.27	0.4
7.25	23.8	53	53	0.39	0.75	3.9	0.54	-0.51	0.4
7.30	23.9	66	66	0.33	0.50	4.3	0.47	-0.37	0.4
7.35	24.1	78	78	0.39	0.49	5.1	0.47	-0.25	0.4
7.40	24.3	90	90	0.45	0.50	5.6	0.45	-0.19	0.4
7.45	24.4	104	104	0.50	0.48	6.1	0.42	-0.13	0.4
7.50	24.6	121	121	0.56	0.46	6.5	0.39	-0.09	0.3
7.55	24.8	163	163	0.83	0.51	6.9	0.30	-0.06	0.3
7.60	24.9	187	187	0.76	0.40	7.0	0.27	-0.04	0.3
7.65	25.1	207	207	1.06	0.51	7.2	0.25	-0.04	0.3
7.70	25.3	226	226	1.42	0.63	6.8	0.22	-0.05	0.3
7.75	25.4	239	239	1.56	0.65	6.8	0.21	-0.05	0.3
7.80	25.6	245	245	1.45	0.59	7.0	0.21	-0.04	0.3
7.85	25.8	280	280	1.67	0.60	6.9	0.18	-0.04	0.3
7.90	25.9	311	311	2.06	0.66	6.6	0.15	-0.05	0.3
7.95	26.1	317	317	2.31	0.73	6.8	0.15	-0.04	0.3
8.00	26.2	315	315	2.40	0.76	7.1	0.16	-0.04	0.3
8.05	26.4	293	293	2.43	0.83	7.3	0.16	-0.04	0.3
8.10	26.6	277	277	2.19	0.79	7.5	0.19	-0.04	0.3
8.15	26.7	254	254	1.95	0.77	7.4	0.21	-0.05	0.3
8.20	26.9	254	254	1.86	0.73	7.4	0.21	-0.05	0.3
8.25	27.1	233	233	1.71	0.73	7.2	0.22	-0.06	0.3
8.30	27.2	232	232	1.60	0.69	7.4	0.23	-0.05	0.3
8.35	27.4	239	239	1.71	0.72	6.8	0.21	-0.07	0.3
8.40	27.6	248	248	1.78	0.72	6.6	0.19	-0.08	0.3
8.45	27.7	240	240	1.79	0.75	6.7	0.20	-0.08	0.3
8.50	27.9	236	236	1.79	0.76	6.9	0.21	-0.08	0.3
8.55	28.1	242	243	1.93	0.79	6.8	0.20	-0.08	0.3
8.60	28.2	224	224	1.42	0.64	6.7	0.22	-0.09	0.3
8.65	28.4	213	213	1.31	0.61	6.9	0.23	-0.09	0.3
8.70	28.5	223	223	1.52	0.68	6.8	0.22	-0.10	0.3
8.75	28.7	235	235	1.66	0.71	6.5	0.20	-0.10	0.3
8.80	28.9	238	238	1.78	0.75	6.5	0.20	-0.10	0.3
8.85	29.0	248	249	1.99	0.80	6.5	0.19	-0.10	0.3
8.90	29.2	224	224	1.84	0.82	6.7	0.21	-0.11	0.3
8.95	29.4	195	195	1.53	0.78	6.9	0.25	-0.12	0.3
9.00	29.5	189	189	1.43	0.75	7.3	0.28	-0.11	0.3
9.05	29.7	190	190	1.42	0.75	7.2	0.28	-0.11	0.3
9.10	29.9	184	184	1.45	0.78	7.2	0.28	-0.12	0.3
9.15	30.0	176	176	1.36	0.78	7.1	0.29	-0.13	0.3
9.20	30.2	167	167	1.31	0.78	7.2	0.31	-0.14	0.3
9.25	30.3	155	155	1.18	0.77	7.2	0.33	-0.16	0.3
9.30	30.5	139	139	0.94	0.68	7.2	0.37	-0.18	0.3
9.35	30.7	143	143	0.91	0.64	7.2	0.36	-0.18	0.4
9.40	30.8	142	143	0.90	0.63	5.3	0.27	-0.28	0.4
9.45	31.0	143	143	1.04	0.73	5.4	0.27	-0.27	0.4
9.50	31.2	155	155	1.03	0.67	5.5	0.26	-0.25	0.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	171	171	1.24	0.73	5.6	0.23	-0.23	0.4
9.60	31.5	181	182	1.04	0.57	5.8	0.23	-0.21	0.4
9.65	31.7	179	179	1.15	0.64	6.0	0.24	-0.21	0.4
9.70	31.8	155	155	1.16	0.75	7.3	0.34	-0.18	0.4
9.75	32.0	150	150	1.11	0.74	7.6	0.36	-0.18	0.4
9.80	32.2	146	148	1.08	0.73	6.8	0.33	-0.22	0.4
9.85	32.3	143	143	1.02	0.71	5.5	0.28	-0.29	0.4
9.90	32.5	142	142	0.82	0.58	4.7	0.24	-0.35	0.4
9.95	32.6	162	162	0.66	0.41	2.6	0.12	-0.40	0.4
10.00	32.8	171	171	0.91	0.53	0.3	0.01	-0.47	0.4
10.05	33.0	168	168	1.18	0.71	0.1	0.00	-0.50	0.4
10.10	33.1	161	161	1.20	0.75	0.8	0.04	-0.49	0.4
10.15	33.3	152	152	1.11	0.73	1.3	0.06	-0.50	0.4
10.20	33.5	146	146	1.01	0.69	1.5	0.08	-0.51	0.4
10.25	33.6	150	150	1.04	0.69	1.8	0.09	-0.48	0.4
10.30	33.8	156	156	1.02	0.65	2.0	0.09	-0.46	0.4
10.35	34.0	149	149	0.99	0.66	2.0	0.09	-0.49	0.4
10.40	34.1	148	148	1.02	0.69	2.1	0.10	-0.49	0.5
10.45	34.3	160	160	1.13	0.70	2.0	0.09	-0.46	0.5
10.50	34.4	164	164	1.19	0.73	1.7	0.07	-0.47	0.5
10.55	34.6	148	148	1.03	0.70	1.7	0.08	-0.52	0.5
10.60	34.8	106	106	1.20	1.13	1.6	0.11	-0.74	0.5
10.65	34.9	45	45	1.31	2.91	0.0	0.00	-2.00	0.5
10.70	35.1	21	21	0.86	4.05	3.1	1.07	-3.22	0.5
10.75	35.3	15	15	0.30	2.05	3.8	1.87	-4.38	0.5
10.80	35.4	14	14	0.22	1.57	4.5	2.26	-4.12	0.5
10.85	35.6	14	14	0.19	1.38	5.0	2.61	-4.07	0.5
10.90	35.8	14	14	0.19	1.33	5.6	2.86	-3.71	0.5
10.95	35.9	14	14	0.21	1.46	6.2	3.14	-3.39	0.5
11.00	36.1	14	14	0.20	1.43	6.8	3.51	-3.21	0.5
11.05	36.3	13	14	0.24	1.79	7.2	3.86	-3.13	0.5
11.10	36.4	13	13	0.25	1.97	7.8	4.50	-3.06	0.5
11.15	36.6	12	12	0.25	2.20	16.9	10.55	2.30	0.5
11.20	36.7	11	11	0.23	2.11	17.8	11.76	2.95	0.5
11.25	36.9	11	11	0.24	2.14	18.5	12.07	3.35	0.5
11.30	37.1	12	12	0.27	2.26	19.6	11.71	3.69	0.5
11.35	37.2	13	13	0.35	2.82	20.5	11.76	3.99	0.5
11.40	37.4	13	13	0.33	2.54	21.2	11.88	4.26	0.5
11.45	37.6	12	12	0.29	2.42	16.3	9.58	1.56	0.5
11.50	37.7	12	13	?	?	17.6	10.31	2.29	0.5
11.55	37.9	12	12	?	?	18.9	11.57	3.13	0.5

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:K-11
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-19-91 12:06
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	8.67	0.05	1.81	0.04	sensitive fine grained	UNDFND	UNDFD	1	.3
0.60	2	1.50	0.05	3.44	0.11	clay	UNDFND	UNDFD	1	.1
0.95	3	0.29	0.01	2.50	0.18	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	8.83	0.07	0.81	0.23	clayey silt to silty clay	UNDFND	UNDFD	4	.8
1.55	5	10.67	0.08	0.77	0.27	sandy silt to clayey silt	UNDFND	UNDFD	4	1.0
1.85	6	12.17	0.21	1.73	0.32	clayey silt to silty clay	UNDFND	UNDFD	6	1.1
2.15	7	11.63	0.24	2.06	0.36	clayey silt to silty clay	UNDFND	UNDFD	6	1.1
2.45	8	31.17	0.32	1.03	0.40	silty sand to sandy silt	40-50	38-40	10	UNDEFINED
2.75	9	37.00	0.30	0.81	0.45	silty sand to sandy silt	40-50	40-42	12	UNDEFINED
3.05	10	55.67	0.40	0.72	0.49	sand to silty sand	60-70	40-42	13	UNDEFINED
3.35	11	97.17	0.56	0.60	0.53	sand to silty sand	70-80	42-44	23	UNDEFINED
3.65	12	107.67	0.61	0.56	0.57	sand to silty sand	70-80	42-44	26	UNDEFINED
3.95	13	109.17	0.61	0.56	0.62	sand to silty sand	70-80	42-44	26	UNDEFINED
4.25	14	88.00	0.53	0.61	0.66	sand to silty sand	60-70	42-44	21	UNDEFINED
4.55	15	102.00	0.58	0.57	0.70	sand to silty sand	70-80	42-44	24	UNDEFINED
4.85	16	71.00	0.42	0.59	0.75	sand to silty sand	60-70	40-42	17	UNDEFINED
5.15	17	54.17	0.45	0.83	0.79	silty sand to sandy silt	50-60	38-40	17	UNDEFINED
5.45	18	217.67	1.13	0.52	0.83	sand	>90	44-46	42	UNDEFINED
5.75	19	256.83	1.38	0.54	0.88	sand	>90	44-46	49	UNDEFINED
6.05	20	178.83	0.81	0.45	0.92	sand	80-90	42-44	34	UNDEFINED
6.40	21	147.14	0.68	0.46	0.97	sand	70-80	42-44	28	UNDEFINED
6.70	22	125.50	0.62	0.50	1.01	sand	70-80	40-42	24	UNDEFINED
7.00	23	81.00	0.49	0.60	1.06	sand to silty sand	50-60	38-40	19	UNDEFINED
7.35	24	47.29	0.39	0.83	1.10	silty sand to sandy silt	40-50	36-38	15	UNDEFINED
7.65	25	145.33	0.69	0.48	1.15	sand	70-80	42-44	28	UNDEFINED
7.95	26	269.67	1.74	0.65	1.19	sand	>90	44-46	>50	UNDEFINED
8.25	27	271.00	2.09	0.77	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	239.50	1.77	0.74	1.28	sand	80-90	42-44	46	UNDEFINED
8.85	29	230.17	1.61	0.70	1.32	sand	80-90	42-44	44	UNDEFINED
9.15	30	193.00	1.50	0.78	1.36	sand	80-90	42-44	37	UNDEFINED
9.45	31	148.17	1.05	0.71	1.41	sand	70-80	40-42	26	UNDEFINED
9.75	32	165.17	1.12	0.68	1.45	sand	70-80	40-42	32	UNDEFINED
10.05	33	155.67	0.94	0.61	1.49	sand	70-80	40-42	30	UNDEFINED
10.35	34	152.33	1.06	0.70	1.54	sand	70-80	40-42	29	UNDEFINED
10.65	35	128.50	1.15	0.89	1.58	sand to silty sand	60-70	40-42	31	UNDEFINED
10.95	36	15.33	0.33	2.14	1.62	clayey silt to silty clay	UNDFND	UNDFD	7	1.2
11.25	37	12.33	0.23	1.91	1.67	clayey silt to silty clay	UNDFND	UNDFD	6	.5
11.55	38	12.33	-10922.46	-88560.48	1.71	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

CONOCO INC

Operator :CALVIN SELLS On Site Loc:K-11

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

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTRI (v 3.04) ****

File space: 215 ■ sounding

Initial Baseline

Qc	Fs	Pw	Inc
-260	-7.06	-8.6	0.1

Dep	
Qc	-0
Fs	0.00
Pw	-0.1
Inc	0.2

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

'age 1 of 1

ocation: K-16, Start Time: 1250, End Time: 1335

ite: DuPont, Town: E Chicago, State: IND

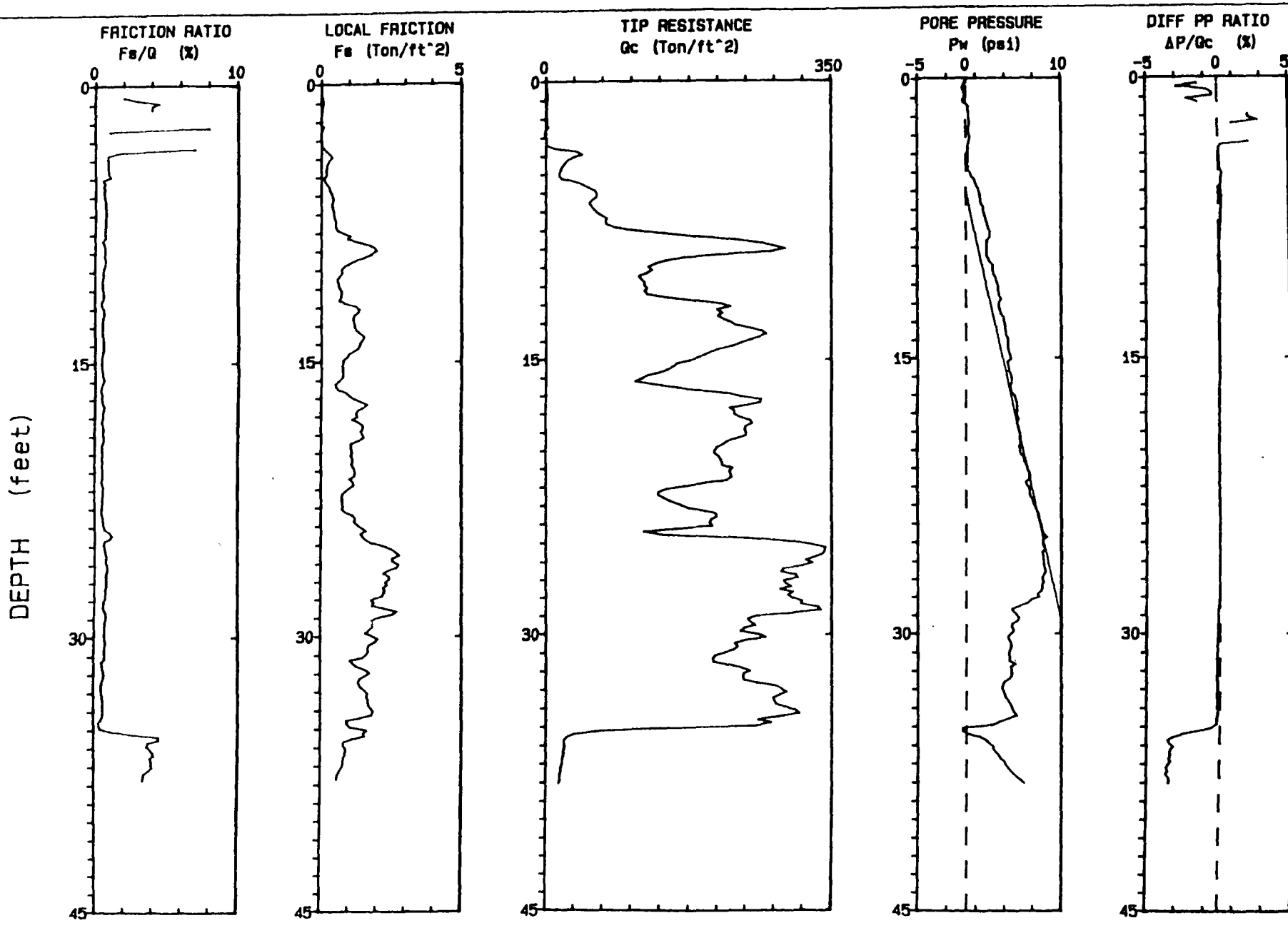
Jnit: 1, Operators: SEIIS, Kasl, Wilson,

'roj. Consultant: Lounsbury, Company: IDRS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-19-91	1255	1325	K-16	CPTK16	~				38.1'		2	F	clay AT 35.4'
													CONE # 293

Conoco, Inc.

OPERATOR : CALVIN SELLS
CPT Date : 11-19-91 13:00
FILE CPTK16 Pg 1 / 1
LOCATION : K-16
CONE USED : 293
HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 38.06 ft

SOUNDING DATA IN FILE CPTK16 11-19-91 13:00

PERATOR : CALVIN SELLS LOCATION : K-16

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-261		-7.05		-5.3			0.1
0.05	0.2	-0	-0	0.00	0.00	-0.1	3.45	3.45	0.2
0.10	0.3	1	1	-0.00	-0.03	-0.2	-1.12	-1.12	0.2
0.15	0.5	1	1	-0.00	-0.09	-0.4	-3.15	-3.15	0.2
0.20	0.7	2	2	0.04	2.47	-0.2	-0.86	-0.86	0.1
0.25	0.8	2	2	0.06	2.88	-0.1	-0.47	-0.47	0.1
0.30	1.0	2	2	0.09	4.02	-0.1	-0.40	-0.40	0.1
0.35	1.1	1	1	0.04	2.37	-0.3	-1.58	-1.58	0.1
0.40	1.3	1	1	0.04	5.05	-0.2	-1.45	-1.45	0.1
0.45	1.5	0	0	0.01	4.67	0.3	17.24	17.24	0.1
0.50	1.6	-0	-0	-0.01	1.44	0.2	-4.60	-4.60	0.1
0.55	1.8	0	0	-0.01	-3.33	0.3	4.98	4.98	0.1
0.60	2.0	1	1	-0.01	-2.27	0.3	3.45	3.45	0.1
0.65	2.1	1	1	-0.03	-4.05	0.3	2.90	2.90	0.1
0.70	2.3	1	1	0.08	10.83	0.4	3.64	3.64	0.1
0.75	2.5	3	3	0.03	1.19	0.4	1.10	1.10	0.2
0.80	2.6	-1	-1	-0.01	2.42	0.3	-3.73	-3.73	0.2
0.85	2.8	-1	-1	-0.01	2.50	0.3	-3.73	-3.73	0.2
0.90	3.0	-1	-1	-0.01	2.58	0.3	-4.88	-4.88	0.2
0.95	3.1	-0	-0	-0.01	2.64	0.4	-5.95	-5.95	0.2
1.00	3.3	-0	-0	0.00	-0.27	0.4	-6.27	-6.27	0.2
1.05	3.4	1	1	0.07	7.41	0.3	2.35	2.35	0.2
1.10	3.6	10	10	0.18	1.90	0.2	0.18	0.18	0.2
1.15	3.8	38	38	0.31	0.83	0.2	0.04	0.04	0.2
1.20	3.9	45	45	0.38	0.86	0.2	0.03	0.03	0.2
1.25	4.1	33	33	0.29	0.88	0.2	0.04	0.04	0.2
1.30	4.3	26	26	0.23	0.87	0.2	0.05	0.05	0.2
1.35	4.4	23	23	0.20	0.86	0.2	0.06	0.06	0.1
1.40	4.6	20	20	0.18	0.91	0.2	0.07	0.07	0.1
1.45	4.8	18	18	0.17	0.93	0.2	0.07	0.07	0.1
1.50	4.9	16	16	0.17	1.06	0.2	0.07	0.07	0.1
1.55	5.1	16	16	0.08	0.50	0.5	0.24	0.24	0.1
1.60	5.2	19	19	0.12	0.61	0.6	0.22	0.22	0.1
1.65	5.4	36	36	0.20	0.57	0.9	0.18	0.18	0.1
1.70	5.6	46	46	0.29	0.62	1.0	0.16	0.16	0.1
1.75	5.7	53	53	0.31	0.60	1.1	0.16	0.16	0.1
1.80	5.9	61	61	0.37	0.61	1.3	0.15	0.15	0.1
1.85	6.1	63	63	0.40	0.64	1.4	0.16	0.16	0.1
1.90	6.2	62	62	0.44	0.70	1.5	0.17	0.17	0.2
1.95	6.4	57	57	0.40	0.71	1.5	0.19	0.17	0.2
2.00	6.6	53	53	0.38	0.72	1.5	0.20	0.17	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	56	56	0.39	0.69	1.6	0.20	0.16	0.2
2.10	6.9	59	59	0.44	0.74	1.8	0.21	0.17	0.2
2.15	7.1	63	63	0.44	0.70	1.8	0.21	0.16	0.2
2.20	7.2	68	68	0.47	0.69	1.9	0.20	0.15	0.2
2.25	7.4	75	75	0.51	0.69	2.0	0.19	0.14	0.2
2.30	7.5	73	73	0.51	0.70	2.1	0.21	0.15	0.2
2.35	7.7	75	75	0.52	0.70	2.2	0.21	0.14	0.2
2.40	7.9	86	86	0.58	0.68	2.3	0.19	0.12	0.2
2.45	8.0	110	110	0.77	0.70	2.4	0.16	0.10	0.2
2.50	8.2	144	144	1.04	0.72	2.5	0.12	0.08	0.2
2.55	8.4	181	181	0.93	0.52	2.5	0.10	0.06	0.2
2.60	8.5	227	227	1.31	0.58	2.5	0.08	0.04	0.2
2.65	8.7	261	261	1.74	0.67	2.2	0.06	0.03	0.2
2.70	8.9	278	278	1.91	0.69	2.2	0.06	0.03	0.2
2.75	9.0	294	294	1.98	0.67	2.2	0.05	0.02	0.2
2.80	9.2	276	276	1.79	0.65	2.2	0.06	0.02	0.2
2.85	9.4	213	213	1.54	0.72	2.2	0.07	0.02	0.2
2.90	9.5	168	168	1.23	0.73	2.2	0.09	0.03	0.2
2.95	9.7	147	147	1.03	0.70	2.4	0.12	0.04	0.2
3.00	9.8	134	134	0.82	0.61	2.5	0.13	0.05	0.2
3.05	10.0	126	127	0.72	0.57	2.8	0.16	0.06	0.2
3.10	10.2	130	130	0.73	0.56	2.8	0.16	0.06	0.2
3.15	10.3	124	124	0.66	0.53	2.8	0.16	0.06	0.2
3.20	10.5	114	114	0.56	0.49	2.9	0.18	0.06	0.2
3.25	10.7	117	117	0.58	0.50	3.1	0.19	0.07	0.2
3.30	10.8	121	121	0.61	0.50	3.2	0.19	0.07	0.2
3.35	11.0	121	121	0.66	0.55	3.3	0.20	0.07	0.2
3.40	11.2	124	124	0.72	0.58	3.4	0.20	0.07	0.2
3.45	11.3	121	121	0.72	0.60	3.4	0.20	0.07	0.2
3.50	11.5	125	125	0.71	0.57	3.5	0.20	0.07	0.2
3.55	11.6	149	149	0.64	0.43	3.5	0.17	0.05	0.2
3.60	11.8	182	182	0.86	0.47	3.7	0.15	0.05	0.2
3.65	12.0	216	216	1.23	0.57	3.5	0.12	0.03	0.2
3.70	12.1	226	226	1.35	0.60	3.4	0.11	0.03	0.2
3.75	12.3	209	209	1.31	0.63	3.5	0.12	0.03	0.2
3.80	12.5	216	217	1.18	0.54	3.6	0.12	0.03	0.2
3.85	12.6	210	210	1.12	0.54	3.7	0.13	0.03	0.2
3.90	12.8	217	217	1.15	0.53	4.0	0.13	0.04	0.2
3.95	13.0	226	226	1.16	0.52	4.0	0.13	0.03	0.2
4.00	13.1	232	232	1.20	0.52	4.1	0.13	0.03	0.3
4.05	13.3	250	250	1.26	0.50	4.1	0.12	0.03	0.3
4.10	13.5	264	264	1.39	0.52	4.1	0.11	0.02	0.3
4.15	13.6	270	270	1.52	0.56	4.2	0.11	0.03	0.3
4.20	13.8	261	261	1.48	0.57	4.2	0.11	0.02	0.3
4.25	13.9	250	250	1.39	0.56	4.4	0.13	0.03	0.3
4.30	14.1	239	239	1.36	0.57	4.4	0.13	0.03	0.3
4.35	14.3	230	230	1.30	0.57	4.4	0.14	0.03	0.3
4.40	14.4	212	212	1.14	0.54	4.4	0.15	0.03	0.3
4.45	14.6	203	203	0.97	0.48	4.5	0.16	0.03	0.3
4.50	14.8	195	195	0.94	0.48	4.6	0.17	0.03	0.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	186	186	0.78	0.42	4.7	0.18	0.03	0.3
4.60	15.1	175	175	0.78	0.45	4.7	0.19	0.03	0.3
4.65	15.3	160	160	0.75	0.47	4.3	0.19	0.01	0.3
4.70	15.4	155	155	0.74	0.48	4.4	0.20	0.02	0.3
4.75	15.6	149	149	0.75	0.50	4.5	0.22	0.02	0.3
4.80	15.7	139	139	0.76	0.54	4.5	0.23	0.01	0.3
4.85	15.9	124	124	0.75	0.60	4.7	0.27	0.02	0.3
4.90	16.1	118	118	0.61	0.52	4.8	0.29	0.03	0.3
4.95	16.2	109	109	0.48	0.44	4.8	0.32	0.02	0.3
5.00	16.4	132	133	0.52	0.40	4.8	0.26	0.02	0.3
5.05	16.6	160	161	0.61	0.38	4.6	0.21	0.00	0.3
5.10	16.7	184	184	0.88	0.48	4.7	0.18	0.00	0.3
5.15	16.9	223	223	1.00	0.45	4.8	0.16	0.00	0.3
5.20	17.1	238	239	1.14	0.48	5.1	0.15	0.01	0.3
5.25	17.2	264	264	1.39	0.53	5.2	0.14	0.01	0.3
5.30	17.4	263	263	1.66	0.63	5.3	0.15	0.01	0.3
5.35	17.6	246	246	1.50	0.61	5.4	0.16	0.01	0.3
5.40	17.7	225	225	1.31	0.58	5.4	0.17	0.01	0.3
5.45	17.9	231	231	1.24	0.54	5.4	0.17	0.01	0.3
5.50	18.0	231	231	1.29	0.56	5.4	0.17	0.01	0.3
5.55	18.2	239	239	1.10	0.46	5.4	0.16	0.01	[illegible]
5.60	18.4	251	251	1.35	0.54	5.6	0.16	0.01	[illegible]
5.65	18.5	253	254	1.49	0.59	5.4	0.15	0.00	0.3
5.70	18.7	245	245	1.49	0.61	5.4	0.16	-0.00	0.3
5.75	18.9	243	243	1.42	0.58	5.5	0.16	-0.00	0.3
5.80	19.0	245	245	1.46	0.60	5.6	0.16	-0.00	0.3
5.85	19.2	245	245	1.52	0.62	5.7	0.17	0.00	0.3
5.90	19.4	233	233	1.33	0.57	5.7	0.18	-0.00	0.3
5.95	19.5	221	221	1.07	0.49	5.7	0.19	-0.00	0.3
6.00	19.7	216	216	1.05	0.49	5.8	0.19	-0.00	0.3
6.05	19.8	209	209	1.07	0.51	5.6	0.19	-0.01	0.3
6.10	20.0	206	206	1.10	0.53	5.7	0.20	-0.01	0.3
6.15	20.2	206	206	1.05	0.51	5.7	0.20	-0.01	0.3
6.20	20.3	212	212	1.11	0.52	5.9	0.20	-0.01	0.3
6.25	20.5	214	214	1.14	0.53	6.1	0.20	-0.01	0.3
6.30	20.7	215	215	1.08	0.50	6.1	0.20	-0.01	0.3
6.35	20.8	216	216	1.13	0.53	6.3	0.21	-0.00	0.3
6.40	21.0	229	229	1.18	0.52	6.4	0.20	-0.00	0.3
6.45	21.2	224	224	1.20	0.53	6.5	0.21	-0.00	0.3
6.50	21.3	226	227	1.19	0.53	6.7	0.21	0.00	0.2
6.55	21.5	227	227	1.01	0.44	6.7	0.21	0.00	0.2
6.60	21.7	221	221	1.13	0.51	6.7	0.22	-0.00	0.3
6.65	21.8	193	193	1.16	0.60	6.3	0.24	-0.02	0.2
6.70	22.0	171	171	1.01	0.59	6.4	0.27	-0.02	0.2
6.75	22.1	147	147	0.87	0.59	6.7	0.33	-0.01	0.3
6.80	22.3	138	138	0.76	0.55	6.7	0.35	-0.02	[illegible]
6.85	22.5	137	137	0.74	0.54	6.7	0.35	-0.02	[illegible]
6.90	22.6	144	144	0.73	0.51	6.8	0.34	-0.02	[illegible]
6.95	22.8	152	153	0.74	0.49	7.0	0.33	-0.01	0.3
7.00	23.0	163	163	0.76	0.46	7.1	0.32	-0.01	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	172	172	0.75	0.44	7.3	0.30	-0.00	0.2
7.10	23.3	189	189	0.85	0.45	7.4	0.28	-0.00	0.2
7.15	23.5	208	208	1.12	0.54	7.6	0.26	0.00	0.2
7.20	23.6	209	209	1.22	0.58	7.7	0.27	0.00	0.2
7.25	23.8	202	202	1.17	0.58	7.7	0.27	0.00	0.2
7.30	23.9	200	200	1.28	0.64	7.8	0.28	0.00	0.2
7.35	24.1	203	203	1.42	0.70	7.9	0.28	0.00	0.3
7.40	24.3	160	160	1.60	1.00	8.0	0.36	0.00	0.3
7.45	24.4	119	119	1.39	1.18	8.0	0.49	0.00	0.3
7.50	24.6	141	141	1.46	1.05	8.2	0.42	0.01	0.3
7.55	24.8	245	246	1.59	0.65	8.5	0.25	0.01	0.3
7.60	24.9	299	299	1.80	0.60	8.1	0.20	-0.00	0.3
7.65	25.1	326	326	2.22	0.68	8.1	0.18	-0.00	0.3
7.70	25.3	343	343	2.49	0.73	8.2	0.17	-0.00	0.3
7.75	25.4	342	342	2.67	0.78	8.4	0.18	-0.00	0.3
7.80	25.6	340	340	2.80	0.82	8.0	0.17	-0.01	0.3
7.85	25.8	330	330	2.54	0.77	8.1	0.18	-0.01	0.3
7.90	25.9	318	318	2.54	0.80	8.1	0.16	-0.01	0.3
7.95	26.1	327	327	2.77	0.85	8.2	0.18	-0.01	0.3
8.00	26.2	314	314	2.71	0.86	8.2	0.19	-0.01	0.3
8.05	26.4	290	290	2.39	0.82	8.3	0.21	-0.01	0.3
8.10	26.6	288	288	2.20	0.76	8.4	0.21	-0.01	0.3
8.15	26.7	306	306	2.42	0.79	8.3	0.20	-0.02	0.3
8.20	26.9	309	309	2.43	0.79	8.1	0.19	-0.02	0.3
8.25	27.1	291	291	2.29	0.79	8.1	0.20	-0.02	0.4
8.30	27.2	294	294	2.35	0.80	8.2	0.20	-0.02	0.4
8.35	27.4	301	301	2.21	0.74	8.0	0.19	-0.03	0.4
8.40	27.6	286	286	2.28	0.80	8.0	0.20	-0.03	0.4
8.45	27.7	303	303	2.20	0.73	7.9	0.19	-0.04	0.4
8.50	27.9	296	296	2.17	0.73	7.5	0.18	-0.05	0.4
8.55	28.1	302	302	1.78	0.59	7.7	0.16	-0.04	0.4
8.60	28.2	314	314	1.88	0.60	6.8	0.16	-0.06	0.4
8.65	28.4	312	312	1.82	0.58	6.5	0.15	-0.07	0.4
8.70	28.5	334	334	2.25	0.67	5.7	0.12	-0.09	0.4
8.75	28.7	337	338	2.71	0.80	4.8	0.10	-0.11	0.4
8.80	28.9	307	307	2.55	0.83	5.0	0.12	-0.11	0.4
8.85	29.0	257	257	2.09	0.81	5.4	0.15	-0.13	0.4
8.90	29.2	247	247	1.80	0.73	5.6	0.16	-0.13	0.4
8.95	29.4	251	251	1.85	0.74	5.4	0.16	-0.13	0.4
9.00	29.5	256	256	1.83	0.72	4.8	0.13	-0.15	0.4
9.05	29.7	242	242	1.70	0.70	4.8	0.14	-0.16	0.4
9.10	29.9	237	237	1.57	0.66	5.0	0.15	-0.16	0.4
9.15	30.0	261	261	1.83	0.70	4.8	0.13	-0.16	0.4
9.20	30.2	269	269	2.03	0.75	4.4	0.12	-0.16	0.4
9.25	30.3	244	244	1.94	0.79	4.5	0.13	-0.18	0.5
9.30	30.5	231	231	1.70	0.74	4.7	0.15	-0.18	0.5
9.35	30.7	235	235	1.66	0.71	4.8	0.15	-0.18	0.5
9.40	30.8	230	230	1.69	0.73	4.7	0.15	-0.19	0.5
9.45	31.0	218	218	1.61	0.74	4.5	0.15	-0.21	0.5
9.50	31.2	206	206	1.50	0.73	4.3	0.16	-0.22	0.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	203	203	1.03	0.51	4.6	0.16	-0.22	0.5
9.60	31.5	204	204	1.14	0.56	4.5	0.16	-0.23	0.5
9.65	31.7	222	222	1.27	0.57	5.2	0.17	-0.19	0.5
9.70	31.8	240	240	1.58	0.66	4.7	0.14	-0.19	0.5
9.75	32.0	250	250	1.75	0.70	4.8	0.14	-0.19	0.5
9.80	32.2	242	243	1.61	0.67	4.8	0.14	-0.19	0.5
9.85	32.3	241	241	1.40	0.58	4.8	0.14	-0.20	0.5
9.90	32.5	243	243	1.32	0.54	4.5	0.13	-0.21	0.5
9.95	32.6	259	259	1.35	0.52	4.8	0.11	-0.21	0.5
10.00	32.8	282	282	1.43	0.51	3.8	0.10	-0.20	0.5
10.05	33.0	289	289	1.59	0.55	3.7	0.09	-0.20	0.5
10.10	33.1	295	295	1.66	0.56	3.9	0.10	-0.19	0.5
10.15	33.3	286	286	1.63	0.57	4.0	0.10	-0.20	0.5
10.20	33.5	278	278	1.66	0.60	4.1	0.11	-0.20	0.5
10.25	33.6	280	280	1.69	0.61	4.4	0.11	-0.20	0.5
10.30	33.8	282	282	1.71	0.61	4.6	0.12	-0.19	0.5
10.35	34.0	295	295	1.81	0.61	4.8	0.12	-0.18	0.5
10.40	34.1	306	306	1.88	0.61	4.9	0.12	-0.17	0.5
10.45	34.3	311	311	1.83	0.59	5.1	0.12	-0.16	0.5
10.50	34.4	286	287	1.40	0.49	5.3	0.13	-0.18	0.5
10.55	34.6	259	259	0.90	0.35	4.4	0.12	-0.22	0.5
10.60	34.8	276	276	0.92	0.33	3.5	0.09	-0.23	0.5
10.65	34.9	256	256	1.05	0.41	2.8	0.08	-0.27	0.5
10.70	35.1	139	139	1.64	1.18	-0.4	-0.02	-0.67	0.5
10.75	35.3	62	62	1.53	2.49	-0.4	-0.05	-1.53	0.5
10.80	35.4	35	35	1.56	4.50	0.2	0.04	-2.61	0.5
10.85	35.6	25	25	1.12	4.55	1.5	0.43	-3.32	0.5
10.90	35.8	22	23	0.82	3.67	2.1	0.67	-3.45	0.5
10.95	35.9	22	23	0.80	3.57	2.4	0.78	-3.37	0.5
11.00	36.1	23	23	0.89	3.93	2.8	0.89	-3.25	0.5
11.05	36.3	22	22	0.89	4.06	2.8	0.93	-3.36	0.5
11.10	36.4	21	21	0.87	4.09	3.1	1.06	-3.40	0.5
11.15	36.6	21	21	0.81	3.92	3.4	1.19	-3.42	0.5
11.20	36.7	20	20	0.79	3.97	3.6	1.32	-3.50	0.5
11.25	36.9	20	20	0.79	4.03	4.0	1.48	-3.43	0.5
11.30	37.1	19	19	0.76	3.97	4.1	1.54	-3.50	0.5
11.35	37.2	18	19	0.68	3.67	4.4	1.70	-3.57	0.5
11.40	37.4	18	18	0.62	3.51	4.7	1.91	-3.65	0.5
11.45	37.6	17	17	0.58	3.39	5.0	2.11	-3.63	0.5
11.50	37.7	17	17	0.57	3.33	5.4	2.28	-3.50	0.5
11.55	37.9	17	17	?	?	5.7	2.44	-3.43	0.5
11.60	38.1	16	16	?	?	6.1	2.74	-3.48	0.5

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:K-16
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-19-91 13:00
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	1.33	0.03	2.38	0.04	sensitive fine grained	UNDFND	UNDFD	1	.1
0.60	2	0.50	0.01	2.00	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	0.29	0.01	2.00	0.19	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	21.17	0.20	0.97	0.23	sandy silt to clayey silt	UNDFND	UNDFD	8	2.0
1.55	5	19.83	0.17	0.87	0.27	sandy silt to clayey silt	UNDFND	UNDFD	8	1.9
1.85	6	46.33	0.28	0.61	0.32	silty sand to sandy silt	60-70	42-44	15	UNDEFINED
2.15	7	58.33	0.41	0.71	0.36	sand to silty sand	60-70	42-44	14	UNDEFINED
2.45	8	81.17	0.56	0.69	0.40	sand to silty sand	70-80	44-46	19	UNDEFINED
2.75	9	230.83	1.49	0.64	0.45	sand	>90	46-48	44	UNDEFINED
3.05	10	177.33	1.19	0.67	0.49	sand	>90	46-48	34	UNDEFINED
3.35	11	121.17	0.63	0.52	0.53	sand	80-90	44-46	23	UNDEFINED
3.65	12	152.83	0.81	0.53	0.57	sand	80-90	44-46	29	UNDEFINED
3.95	13	217.33	1.21	0.56	0.62	sand	>90	46-48	42	UNDEFINED
4.25	14	254.50	1.37	0.54	0.66	sand	>90	46-48	49	UNDEFINED
4.55	15	210.83	1.06	0.51	0.70	sand	>90	44-46	40	UNDEFINED
4.85	16	150.33	0.75	0.50	0.75	sand	80-90	44-46	29	UNDEFINED
5.15	17	154.33	0.68	0.44	0.79	sand	80-90	42-44	30	UNDEFINED
5.45	18	244.50	1.37	0.56	0.83	sand	>90	44-46	47	UNDEFINED
5.75	19	243.67	1.36	0.56	0.88	sand	>90	44-46	47	UNDEFINED
6.05	20	228.17	1.25	0.55	0.92	sand	>90	44-46	44	UNDEFINED
6.40	21	214.00	1.11	0.52	0.97	sand	80-90	44-46	41	UNDEFINED
6.70	22	210.33	1.12	0.53	1.01	sand	80-90	44-46	40	UNDEFINED
7.00	23	146.83	0.77	0.52	1.06	sand	70-80	42-44	26	UNDEFINED
7.35	24	197.57	1.12	0.56	1.10	sand	80-90	42-44	38	UNDEFINED
7.65	25	215.00	1.68	0.78	1.15	sand	80-90	42-44	41	UNDEFINED
7.95	26	333.33	2.63	0.79	1.19	sand	>90	44-46	>50	UNDEFINED
8.25	27	299.67	2.41	0.80	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	297.00	2.17	0.73	1.28	sand	>90	44-46	>50	UNDEFINED
8.85	29	310.17	2.22	0.71	1.32	sand	>90	44-46	>50	UNDEFINED
9.15	30	249.00	1.76	0.71	1.36	sand	80-90	42-44	48	UNDEFINED
9.45	31	237.83	1.77	0.74	1.41	sand	80-90	42-44	46	UNDEFINED
9.75	32	220.83	1.38	0.62	1.45	sand	80-90	42-44	42	UNDEFINED
10.05	33	259.33	1.45	0.56	1.49	sand	80-90	42-44	50	UNDEFINED
10.35	34	286.00	1.70	0.59	1.54	sand	>90	42-44	>50	UNDEFINED
10.65	35	282.33	1.33	0.47	1.58	gravelly sand to sand	80-90	42-44	43	UNDEFINED
10.95	36	50.83	1.25	2.45	1.62	sandy silt to clayey silt	UNDFND	UNDFD	19	4.8
11.25	37	21.17	0.84	3.97	1.67	silty clay to clay	UNDFND	UNDFD	14	1.8
11.55	38	17.67	-5460.80	-30910.18	1.71	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTRI (v 3.04) ****

CONOCO INC

Operator :CALVIN SELLS On Site Loc:K-16 Page No.

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

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

****** Note:** For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 202 6 sounding

Initial Baseline

Qc	Fs	Pw	Inc
-261	-7.06	-9.0	0.1

Dep

Qc	0
Fs	0.00
Pw	0.1
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

CONOCO

Page 1 of 1

Location: L-13, Start Time: 1600, End Time: 1645

Site: DuPont, Town: E. Chicago, State: IND

Unit: 1, Operators: Sells, Kase, Wilson,

Proj. Consultant: Lounsbury, Company: DERS

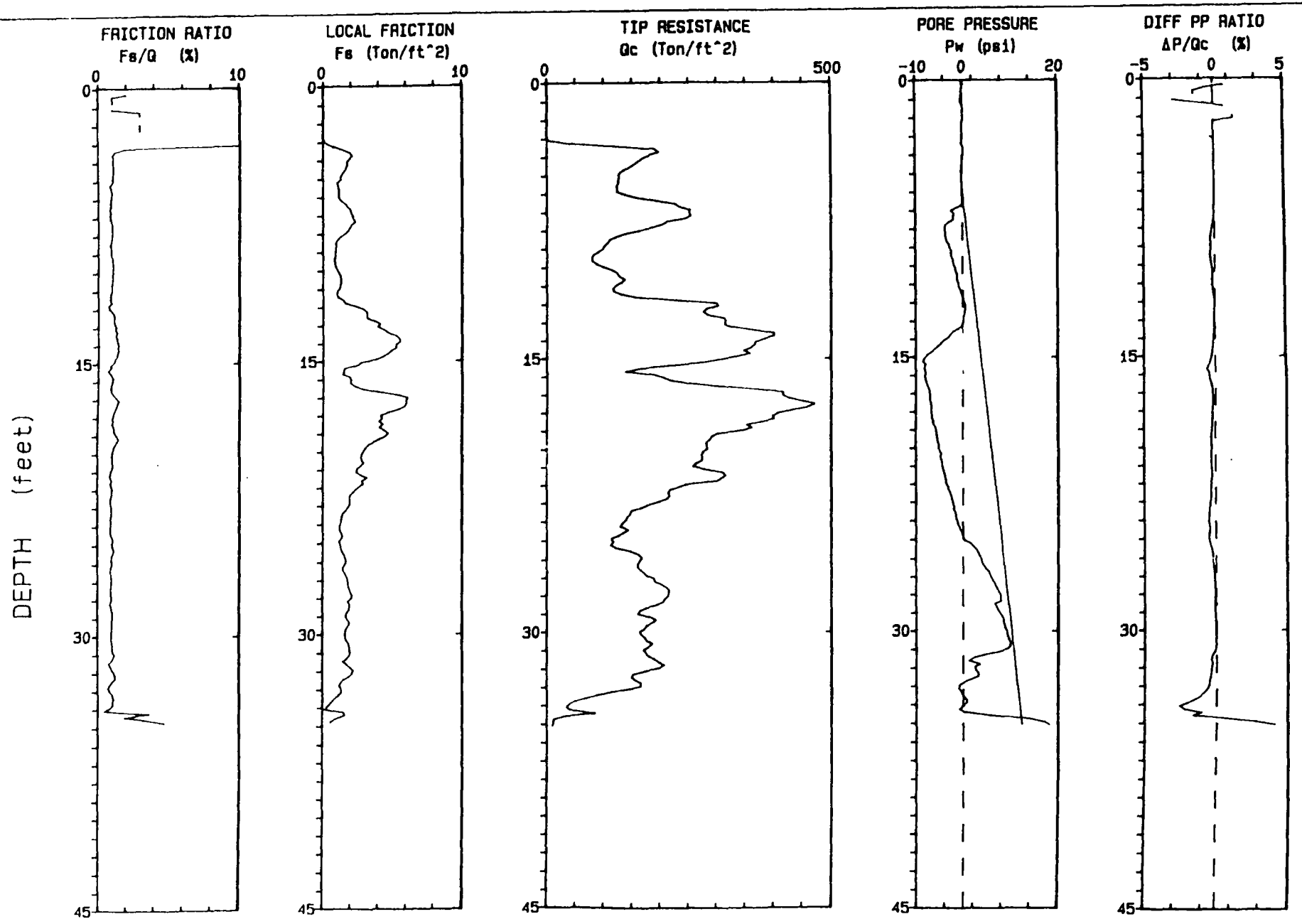
Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-18-91	1608	1640	L-13	CPT43	✓				35.1	1	2		CLAY AT 33.5

Conoco, Inc.

Operator : CALVIN SELLS
Location : L-13

CPT Date : 11-18-91 16:11
Cone Used : 364

File No. CPTL13 Pg 1 / 1
Hole No. 1



Depth Increment : .05 m

Max Depth : 35.10 ft

SOUNDING DATA IN FILE CPTL13 11-18-91 16:11

OPERATOR : CALVIN SELLS LOCATION : L-13

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-295		-2.01		-4.1			0.0
0.05	0.2	-0	-0	0.02	-6.00	0.2	-3.88	-3.88	0.0
0.10	0.3	1	1	0.02	1.73	0.1	0.73	0.73	0.0
0.15	0.5	1	1	0.01	1.00	-0.1	-0.30	-0.30	0.0
0.20	0.7	1	1	0.01	0.89	-0.2	-0.99	-0.99	0.0
0.25	0.8	1	1	0.01	1.88	-0.2	-2.43	-2.43	0.0
0.30	1.0	0	0	0.01	8.50	-0.3	-13.79	-13.79	0.0
0.35	1.1	1	1	0.01	2.46	-0.4	-5.30	-5.30	0.0
0.40	1.3	1	1	0.03	4.20	-0.1	-1.61	-1.61	0.0
0.45	1.5	1	1	0.03	4.57	0.1	1.48	1.48	0.0
0.50	1.6	0	0	0.03	13.00	0.1	4.02	4.02	0.0
0.55	1.8	-0	-0	0.03	-71.00	0.1	-24.13	-24.13	0.0
0.60	2.0	1	1	0.03	3.50	0.2	1.72	1.72	[redacted]
0.65	2.1	1	1	0.03	4.27	0.2	2.30	2.30	[redacted]
0.70	2.3	1	1	0.03	4.86	0.0	0.25	0.25	0.0
0.75	2.5	0	0	0.03	16.00	-0.0	-0.86	-0.86	0.0
0.80	2.6	0	0	0.03	6.09	0.0	0.31	0.31	0.0
0.85	2.8	0	0	0.04	22.00	-0.1	-2.59	-2.59	0.0
0.90	3.0	0	0	0.05	21.33	-0.1	-1.72	-1.72	0.0
0.95	3.1	3	3	0.31	11.50	-0.1	-0.32	-0.32	0.0
1.00	3.3	41	41	0.78	1.90	-0.1	-0.02	-0.02	0.0
1.05	3.4	120	120	1.41	1.18	-0.2	-0.01	-0.01	0.0
1.10	3.6	191	191	1.93	1.01	0.2	0.01	0.01	0.0
1.15	3.8	198	198	2.13	1.07	0.2	0.01	0.01	0.0
1.20	3.9	181	181	1.93	1.06	0.2	0.01	0.01	0.0
1.25	4.1	169	169	1.74	1.03	0.1	0.00	0.00	0.0
1.30	4.3	161	161	1.75	1.09	-0.0	-0.00	-0.00	0.0
1.35	4.4	154	154	1.68	1.09	0.0	0.00	0.00	0.0
1.40	4.6	146	146	1.57	1.07	-0.1	-0.00	-0.00	0.0
1.45	4.8	135	135	1.40	1.04	-0.1	-0.01	-0.01	0.0
1.50	4.9	128	128	1.30	1.02	-0.2	-0.01	-0.01	0.0
1.55	5.1	127	127	1.24	0.98	-0.2	-0.01	-0.01	0.0
1.60	5.2	126	126	1.00	0.79	-0.2	-0.01	-0.01	0.0
1.65	5.4	126	126	1.08	0.86	-0.2	-0.01	-0.01	0.0
1.70	5.6	123	123	1.14	0.93	0.0	0.00	0.00	0.0
1.75	5.7	124	124	1.16	0.93	-0.1	-0.00	-0.00	0.0
1.80	5.9	124	124	1.13	0.91	-0.1	-0.00	-0.00	0.0
1.85	6.1	139	139	1.18	0.85	-0.1	-0.01	-0.01	[redacted]
1.90	6.2	161	161	1.35	0.84	0.0	0.00	-0.00	[redacted]
1.95	6.4	192	192	1.65	0.86	0.1	0.00	-0.00	0.0
2.00	6.6	227	227	1.82	0.80	0.1	0.00	-0.00	0.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	235	235	2.01	0.85	-0.1	-0.00	-0.01	0.0
2.10	6.9	254	254	2.07	0.81	-1.2	-0.04	-0.05	0.0
2.15	7.1	252	252	2.19	0.87	-2.5	-0.07	-0.08	0.0
2.20	7.2	255	255	2.22	0.87	-1.8	-0.05	-0.06	0.0
2.25	7.4	243	243	2.34	0.96	-2.0	-0.06	-0.08	0.0
2.30	7.5	212	212	2.05	0.97	-2.0	-0.07	-0.09	0.0
2.35	7.7	203	203	1.93	0.95	-3.1	-0.11	-0.14	0.1
2.40	7.9	186	186	1.83	0.99	-3.7	-0.14	-0.17	0.1
2.45	8.0	162	162	1.57	0.97	-3.7	-0.17	-0.20	0.1
2.50	8.2	137	137	1.27	0.93	-3.7	-0.20	-0.24	0.1
2.55	8.4	123	123	1.09	0.89	-3.6	-0.21	-0.27	0.1
2.60	8.5	111	111	0.90	0.81	-3.5	-0.22	-0.29	0.1
2.65	8.7	107	107	0.95	0.89	-3.4	-0.23	-0.30	0.1
2.70	8.9	101	101	0.91	0.90	-2.9	-0.21	-0.29	0.1
2.75	9.0	99	99	0.90	0.91	-2.7	-0.20	-0.29	0.1
2.80	9.2	91	91	0.90	0.98	-2.5	-0.20	-0.30	0.1
2.85	9.4	81	81	0.81	1.01	-2.5	-0.22	-0.35	0.1
2.90	9.5	79	79	0.81	1.02	-2.4	-0.22	-0.35	0.1
2.95	9.7	80	80	0.84	1.05	-2.1	-0.19	-0.33	0.1
3.00	9.8	88	88	0.92	1.06	-2.0	-0.16	-0.30	0.1
3.05	10.0	101	101	1.04	1.02	-1.8	-0.13	-0.25	0.1
3.10	10.2	116	116	1.18	1.02	-1.5	-0.09	-0.20	0.1
3.15	10.3	125	125	1.29	1.03	-1.4	-0.08	-0.19	0.1
3.20	10.5	128	128	1.31	1.03	-1.1	-0.06	-0.17	0.1
3.25	10.7	138	138	1.31	0.95	-1.1	-0.06	-0.16	0.1
3.30	10.8	133	133	1.28	0.97	-1.1	-0.06	-0.17	0.1
3.35	11.0	123	123	1.21	0.98	-0.8	-0.05	-0.17	0.1
3.40	11.2	117	117	1.04	0.89	-0.8	-0.05	-0.18	0.2
3.45	11.3	118	118	1.01	0.85	-0.5	-0.03	-0.17	0.2
3.50	11.5	131	131	1.07	0.82	-0.4	-0.02	-0.15	0.2
3.55	11.6	157	157	1.46	0.93	-0.1	-0.01	-0.12	0.2
3.60	11.8	225	225	1.60	0.71	0.1	0.00	-0.08	0.2
3.65	12.0	301	301	2.37	0.79	0.3	0.01	-0.05	0.2
3.70	12.1	303	303	2.93	0.97	0.5	0.01	-0.05	0.2
3.75	12.3	282	282	3.19	1.13	0.6	0.01	-0.05	0.2
3.80	12.5	276	276	3.19	1.15	0.5	0.01	-0.06	0.2
3.85	12.6	285	285	3.22	1.13	0.4	0.01	-0.06	0.2
3.90	12.8	314	314	3.75	1.19	0.2	0.00	-0.06	0.2
3.95	13.0	316	316	4.15	1.31	0.2	0.01	-0.06	0.2
4.00	13.1	314	314	3.98	1.27	0.1	0.00	-0.07	0.2
4.05	13.3	324	324	4.46	1.38	-0.1	-0.00	-0.07	0.2
4.10	13.5	367	367	4.76	1.30	-0.8	-0.02	-0.08	0.2
4.15	13.6	401	401	5.31	1.32	-2.1	-0.04	-0.10	0.2
4.20	13.8	401	401	5.53	1.38	-2.7	-0.05	-0.11	0.2
4.25	13.9	383	383	5.60	1.46	-2.1	-0.06	-0.12	0.2
4.30	14.1	368	368	5.28	1.43	-4.0	-0.08	-0.15	0.4
4.35	14.3	366	366	5.28	1.44	-4.7	-0.09	-0.16	0.7
4.40	14.4	359	359	4.93	1.37	-5.4	-0.11	-0.18	0.8
4.45	14.6	347	347	4.76	1.37	-6.0	-0.13	-0.20	0.8
4.50	14.8	359	358	4.38	1.22	-6.7	-0.13	-0.21	0.8

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	336	336	3.89	1.16	-7.6	-0.16	-0.24	0.8
4.60	15.1	305	305	2.73	0.90	-8.3	-0.20	-0.29	0.8
4.65	15.3	275	275	2.49	0.90	-8.5	-0.22	-0.33	0.8
4.70	15.4	220	219	1.53	0.70	-7.9	-0.26	-0.39	0.8
4.75	15.6	165	165	1.48	0.90	-8.1	-0.35	-0.53	0.8
4.80	15.7	138	138	1.42	1.03	-8.2	-0.43	-0.65	0.8
4.85	15.9	186	186	1.94	1.04	-8.0	-0.31	-0.48	0.9
4.90	16.1	204	204	2.02	0.99	-8.1	-0.29	-0.44	0.8
4.95	16.2	218	218	2.00	0.92	-8.0	-0.26	-0.41	0.8
5.00	16.4	251	251	2.27	0.90	-7.8	-0.22	-0.35	0.8
5.05	16.6	304	304	2.89	0.95	-7.6	-0.18	-0.29	0.7
5.10	16.7	374	374	3.95	1.06	-7.3	-0.14	-0.23	0.7
5.15	16.9	417	417	5.38	1.29	-7.1	-0.12	-0.20	0.7
5.20	17.1	416	416	6.20	1.49	-7.0	-0.12	-0.20	0.7
5.25	17.2	426	426	6.03	1.42	-7.0	-0.12	-0.20	0.7
5.30	17.4	451	451	6.06	1.34	-7.0	-0.11	-0.19	0.7
5.35	17.6	473	473	5.90	1.25	-6.8	-0.10	-0.18	0.7
5.40	17.7	461	461	5.38	1.17	-6.7	-0.10	-0.18	0.7
5.45	17.9	433	433	4.72	1.09	-6.7	-0.11	-0.20	0.7
5.50	18.0	408	408	4.16	1.02	-6.7	-0.12	-0.21	0.7
5.55	18.2	398	398	4.26	1.07	-6.6	-0.12	-0.22	0.7
5.60	18.4	401	401	4.04	1.01	-6.6	-0.12	-0.21	[redacted]
5.65	18.5	379	379	4.33	1.14	-6.3	-0.12	-0.22	[redacted]
5.70	18.7	352	352	4.07	1.16	-6.3	-0.13	-0.24	0.9
5.75	18.9	362	362	4.40	1.22	-5.9	-0.12	-0.23	1.0
5.80	19.0	344	344	4.76	1.38	-5.7	-0.12	-0.24	0.8
5.85	19.2	301	301	4.53	1.50	-5.6	-0.13	-0.27	0.8
5.90	19.4	291	291	4.07	1.40	-5.5	-0.14	-0.28	0.8
5.95	19.5	288	288	3.65	1.27	-5.4	-0.13	-0.28	1.1
6.00	19.7	281	281	3.24	1.15	-5.3	-0.14	-0.29	1.0
6.05	19.8	282	282	3.06	1.08	-5.1	-0.13	-0.28	1.0
6.10	20.0	284	284	2.94	1.03	-5.1	-0.13	-0.26	1.2
6.15	20.2	276	276	2.83	1.02	-5.0	-0.13	-0.29	1.1
6.20	20.3	272	272	2.72	1.00	-4.6	-0.12	-0.29	1.5
6.25	20.5	274	274	2.82	1.03	-4.8	-0.13	-0.29	0.8
6.30	20.7	273	273	2.94	1.08	-4.6	-0.12	-0.29	1.1
6.35	20.8	262	262	2.71	1.03	-4.4	-0.12	-0.30	1.2
6.40	21.0	257	257	2.44	0.95	-4.4	-0.12	-0.30	0.9
6.45	21.2	278	278	2.39	0.86	-4.2	-0.11	-0.28	1.2
6.50	21.3	311	311	2.77	0.89	-4.0	-0.09	-0.25	1.3
6.55	21.5	316	316	3.23	1.02	-3.8	-0.09	-0.24	1.7
6.60	21.7	309	308	2.84	0.92	-3.7	-0.09	-0.24	1.0
6.65	21.8	301	301	2.94	0.98	-3.5	-0.08	-0.25	1.6
6.70	22.0	246	246	2.64	1.07	-3.5	-0.10	-0.31	1.6
6.75	22.1	232	232	2.36	1.02	-3.2	-0.10	-0.32	1.6
6.80	22.3	216	216	2.14	0.99	-3.1	-0.10	-0.34	1.8
6.85	22.5	213	213	1.93	0.91	-2.8	-0.09	-0.33	[redacted]
6.90	22.6	216	216	1.90	0.88	-2.6	-0.09	-0.32	[redacted]
6.95	22.8	211	211	1.93	0.91	-2.4	-0.08	-0.33	1.8
7.00	23.0	197	197	1.93	0.98	-2.2	-0.08	-0.35	1.9

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	178	178	1.77	0.99	-2.1	-0.06	-0.38	1.8
7.10	23.3	165	165	1.63	0.98	-1.8	-0.08	-0.40	1.9
7.15	23.5	148	148	1.43	0.97	-1.9	-0.09	-0.46	2.3
7.20	23.6	147	147	1.35	0.92	-1.5	-0.07	-0.45	2.3
7.25	23.8	141	141	1.33	0.95	-1.4	-0.07	-0.47	2.1
7.30	23.9	139	139	1.30	0.94	-1.3	-0.07	-0.47	1.3
7.35	24.1	133	133	1.20	0.90	-1.0	-0.06	-0.48	1.7
7.40	24.3	129	129	1.22	0.95	-0.9	-0.05	-0.49	2.3
7.45	24.4	143	143	1.30	0.91	-0.6	-0.03	-0.43	2.9
7.50	24.6	135	135	1.40	1.04	-0.3	-0.02	-0.45	2.7
7.55	24.8	126	126	1.37	1.09	-0.1	-0.01	-0.47	3.0
7.60	24.9	113	113	1.14	1.01	0.1	0.01	-0.51	1.9
7.65	25.1	117	117	1.24	1.06	0.4	0.03	-0.48	2.4
7.70	25.3	112	112	1.31	1.18	1.8	0.12	-0.42	2.3
7.75	25.4	122	122	1.37	1.12	2.3	0.14	-0.36	2.4
7.80	25.6	148	148	1.49	1.00	3.0	0.15	-0.27	2.4
7.85	25.8	162	162	1.60	0.99	3.3	0.14	-0.23	2.4
7.90	25.9	168	168	1.69	1.01	3.6	0.15	-0.22	2.4
7.95	26.1	164	164	1.67	1.02	4.0	0.18	-0.20	2.5
8.00	26.2	161	161	1.52	0.95	4.1	0.18	-0.21	2.5
8.05	26.4	160	160	1.45	0.90	4.4	0.20	-0.20	2.5
8.10	26.6	164	164	1.52	0.93	4.8	0.21	-0.18	2.5
8.15	26.7	171	171	1.64	0.96	5.4	0.23	-0.15	2.5
8.20	26.9	176	177	1.75	0.99	5.7	0.23	-0.14	2.5
8.25	27.1	189	189	1.79	0.95	6.0	0.23	-0.12	2.5
8.30	27.2	190	191	1.82	0.95	6.3	0.24	-0.11	2.5
8.35	27.4	202	203	1.84	0.91	6.7	0.24	-0.09	2.5
8.40	27.6	211	211	1.96	0.93	7.0	0.24	-0.08	2.5
8.45	27.7	216	216	2.04	0.95	7.3	0.25	-0.07	2.6
8.50	27.9	215	215	2.16	1.00	7.6	0.25	-0.06	2.6
8.55	28.1	214	214	2.09	0.98	8.0	0.27	-0.05	2.6
8.60	28.2	208	208	1.79	0.86	8.0	0.28	-0.06	2.6
8.65	28.4	205	205	1.97	0.96	8.1	0.28	-0.06	2.6
8.70	28.5	194	194	1.94	1.00	6.7	0.25	-0.11	2.7
8.75	28.7	175	175	1.89	1.08	7.0	0.29	-0.12	3.0
8.80	28.9	163	163	1.78	1.04	7.3	0.32	-0.11	3.2
8.85	29.0	160	160	1.63	1.02	7.7	0.35	-0.10	3.1
8.90	29.2	180	181	1.76	0.98	8.2	0.33	-0.07	3.2
8.95	29.4	193	193	1.92	1.00	8.6	0.32	-0.06	3.2
9.00	29.5	186	186	1.88	1.01	8.6	0.34	-0.06	3.1
9.05	29.7	175	176	1.69	0.96	8.8	0.36	-0.06	3.2
9.10	29.9	171	172	1.63	0.95	9.0	0.38	-0.06	3.3
9.15	30.0	163	164	1.60	0.98	9.3	0.41	-0.05	3.1
9.20	30.2	167	167	1.62	0.97	9.4	0.40	-0.05	3.4
9.25	30.3	173	173	1.70	0.98	9.6	0.40	-0.04	3.4
9.30	30.5	177	177	1.87	1.06	9.8	0.40	-0.03	3.4
9.35	30.7	187	188	1.94	1.03	10.2	0.39	-0.02	3.5
9.40	30.8	179	179	1.96	1.09	10.1	0.41	-0.02	3.6
9.45	31.0	170	170	2.00	1.18	9.4	0.40	-0.06	3.7
9.50	31.2	175	175	1.90	1.08	7.4	0.31	-0.14	3.6

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	179	179	1.74	0.97	4.4	0.16	-0.26	3.7
9.60	31.5	189	189	1.44	0.76	2.1	0.08	-0.34	3.7
9.65	31.7	197	197	1.71	0.87	1.2	0.04	-0.36	3.7
9.70	31.8	207	207	2.03	0.98	3.6	0.12	-0.26	3.8
9.75	32.0	199	199	2.24	1.13	2.5	0.09	-0.32	3.8
9.80	32.2	172	172	2.12	1.24	2.7	0.11	-0.36	3.9
9.85	32.3	151	151	1.89	1.25	3.3	0.16	-0.38	4.0
9.90	32.5	149	149	1.49	1.00	3.3	0.16	-0.39	3.9
9.95	32.6	156	156	1.32	0.84	1.8	0.08	-0.45	3.9
10.00	32.8	166	166	1.18	0.71	0.3	0.01	-0.49	4.0
10.05	33.0	166	166	1.32	0.80	-0.8	-0.03	-0.54	4.0
10.10	33.1	145	145	1.39	0.96	-1.0	-0.05	-0.63	4.0
10.15	33.3	113	113	1.18	1.04	-0.5	-0.03	-0.78	4.0
10.20	33.5	88	88	0.97	1.10	-0.2	-0.01	-0.99	4.0
10.25	33.6	68	68	0.69	1.02	0.2	0.02	-1.25	4.0
10.30	33.8	49	49	0.52	1.07	0.8	0.11	-1.65	4.0
10.35	34.0	39	39	0.32	0.83	0.8	0.14	-2.10	4.0
10.40	34.1	34	34	0.15	0.44	-0.1	-0.03	-2.57	4.2
10.45	34.3	42	42	1.54	3.67	-0.8	-0.14	-2.24	4.2
10.50	34.4	85	85	1.59	1.87	0.3	0.02	-1.01	4.8
10.55	34.6	30	30	0.99	3.26	5.7	1.36	-1.57	4.8
10.60	34.8	12	12	0.57	4.96	13.9	8.71	0.93	
10.65	34.9	12	12	?	?	17.2	10.38	2.80	
10.70	35.1	10	10	?	?	18.3	13.02	4.06	4.7

WRITE NUMBER OF RODS USED __

Conoco Inc.

Operator :CALVIN SELLS
On Site Loc:L-13
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-18-91 16:11
Cone Used :364
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	SPT N1	CSR
0.25	0.82	0.80	0.01	1.75	0.03	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.50	1.64	0.60	0.02	3.67	0.09	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.75	2.46	0.60	0.03	5.00	0.15	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
1.00	3.28	8.80	0.24	2.75	0.22	silty clay to clay	UNDFND	UNDFD	6	12	UNDF
1.25	4.10	171.80	1.83	1.06	0.28	sand	>90	>48	33	>50	>0.5
1.50	4.92	144.80	1.54	1.06	0.32	sand to silty sand	>90	46-48	35	>50	>0.5
1.75	5.74	125.20	1.12	0.90	0.36	sand to silty sand	80-90	46-48	30	>50	>0.5
2.00	6.56	168.60	1.43	0.85	0.39	sand	>90	46-48	32	>50	>0.5
2.25	7.38	247.80	2.17	0.87	0.43	sand	>90	>48	47	>50	>0.5
2.50	8.20	180.00	1.73	0.96	0.46	sand	>90	46-48	34	>50	>0.5
2.75	9.02	108.20	0.95	0.88	0.50	sand to silty sand	70-80	44-46	26	37	>0.5
3.00	9.84	83.80	0.86	1.02	0.54	sand to silty sand	70-80	42-44	20	28	.30
3.25	10.66	121.60	1.23	1.01	0.57	sand to silty sand	80-90	44-46	29	39	>0.5
3.50	11.48	124.40	1.12	0.90	0.61	sand to silty sand	80-90	44-46	30	39	>0.5
3.75	12.30	253.60	2.31	0.91	0.64	sand	>90	46-48	49	>50	>0.5
4.00	13.12	301.00	3.66	1.22	0.68	sand	>90	46-48	>50	>50	>0.5
4.25	13.94	375.20	5.13	1.37	0.72	sand	>90	46-48	>50	>50	>0.5
4.50	14.76	359.80	4.93	1.37	0.75	sand	>90	46-48	>50	>50	>0.5
4.75	15.58	260.20	2.42	0.93	0.79	sand	>90	46-48	50	>50	>0.5
5.00	16.40	199.40	1.93	0.97	0.82	sand	80-90	44-46	38	43	>0.5
5.25	17.22	387.40	4.89	1.26	0.86	sand	>90	46-48	>50	>50	>0.5
5.50	18.04	445.20	5.24	1.18	0.89	sand	>90	46-48	>50	>50	>0.5
5.75	18.86	378.40	4.22	1.12	0.93	sand	>90	46-48	>50	>50	>0.5
6.00	19.69	301.00	4.05	1.35	0.97	sand	>90	44-46	>50	>50	>0.5
6.25	20.51	277.60	2.87	1.04	1.00	sand	>90	44-46	>50	>50	>0.5
6.50	21.33	276.20	2.65	0.96	1.04	sand	>90	44-46	>50	>50	>0.5
6.75	22.15	280.80	2.80	1.00	1.07	sand	>90	44-46	>50	>50	>0.5
7.00	22.97	210.60	1.97	0.93	1.11	sand	80-90	42-44	40	39	>0.5
7.25	23.79	155.80	1.50	0.96	1.15	sand	70-80	42-44	30	28	.31
7.50	24.61	135.80	1.28	0.95	1.18	sand to silty sand	70-80	40-42	33	30	.34
7.75	25.43	118.00	1.29	1.09	1.22	sand to silty sand	60-70	40-42	28	26	.28
8.00	26.25	160.60	1.59	0.99	1.25	sand	70-80	42-44	31	28	.30
8.25	27.07	172.00	1.63	0.95	1.29	sand	70-80	42-44	33	29	.32
8.50	27.89	206.80	1.96	0.95	1.33	sand	80-90	42-44	40	35	.48
8.75	28.71	199.20	1.94	0.97	1.36	sand	80-90	42-44	38	33	.40
9.00	29.53	176.40	1.78	1.01	1.40	sand	70-80	42-44	34	29	.32
9.25	30.35	169.80	1.65	0.97	1.43	sand	70-80	40-42	33	27	.30
9.50	31.17	177.60	1.93	1.09	1.47	sand	70-80	40-42	34	28	.31

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Conoco Inc.

Operator :CALVIN SELLS On Site Loc:L-13 Page No.

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
9.75	31.99	194.20	1.83	0.94	1.51	sand	70-80	42-44	37	31	.34
10.00	32.81	156.80	1.60	1.01	1.54	sand to silty sand	70-80	40-42	38	31	.35
10.25	33.63	116.00	1.11	0.96	1.58	sand to silty sand	60-70	38-40	28	22	.23
10.50	34.45	49.80	0.82	1.65	1.61	silty sand to sandy silt	(40	34-36	16	13	.13

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 227 M sounding

Initial Baseline

Qc	Fs	Pw	Inc
-295	-2.01	-3.9	0.1

Dep

Qc -0
0 1000

Fs -0.01
0 10

Pw 0.0
0 500

Inc 0.1
0 10

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

Page ___ of ___

Location: L-19, Start Time: 1310, End Time: 1500

Site: DuPont, Town: E Chicago, State: IND

Unit: 1, Operators: Sells, Kasc, Wilson,

Proj. Consultant: Lounsbury, Company: DERS

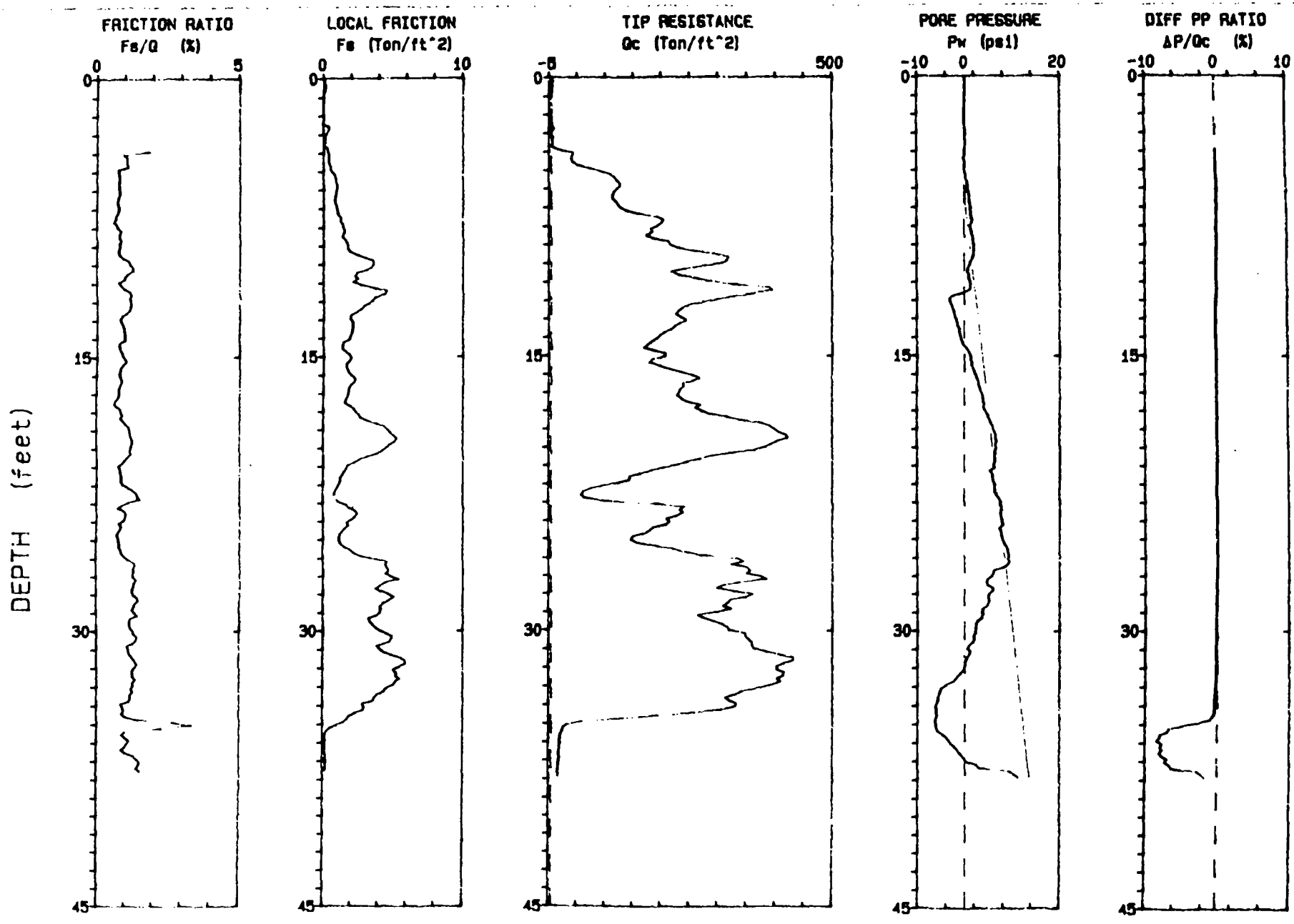
Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-18-91	1315	1400	L-19	cPtL19	✓				30.8		Computer aq:t. Bubble problem	F	~~Clay at~~
"	1415	1435	L-19	cPtL19	✓				37.9			F	CLAY AT 37.2

Conoco, Inc.

Operator : CALVIN SELLS
Location : L-19

CPT Date : 11-18-91 14:23
Cone Used : 364

File No. CPTL19 Pg 1 / 1
Hole No. 1



Depth Increment : .05 m

Max Depth : 37.69 ft

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:L-19
Job No. :1
Tot. Unit Wt. (avg) : 130 pcf

CPT Date :11-18-91 14:23
Cone Used :364
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.83	0.06	7.60	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.00	-0.01	0.00	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.90	3	0.43	0.15	34.67	0.18	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.20	4	10.17	0.17	1.70	0.23	clayey silt to silty clay	UNDFND	UNDFD	5	.9
1.50	5	52.17	0.47	0.91	0.27	silty sand to sandy silt	60-70	42-44	17	UNDEFINED
1.80	6	116.33	0.91	0.78	0.32	sand to silty sand	80-90	46-48	29	UNDEFINED
2.10	7	114.50	0.87	0.76	0.36	sand to silty sand	80-90	44-46	27	UNDEFINED
2.40	8	179.00	1.32	0.68	0.40	sand	>90	46-48	34	UNDEFINED
2.70	9	189.00	1.55	0.82	0.45	sand	>90	46-48	36	UNDEFINED
3.00	10	265.17	2.70	0.95	0.49	sand	>90	>48	>50	UNDEFINED
3.30	11	250.00	2.65	1.06	0.53	sand	>90	46-48	48	UNDEFINED
3.60	12	349.33	3.80	1.09	0.57	sand	>90	>48	>50	UNDEFINED
3.90	13	239.00	2.50	1.05	0.62	sand	>90	46-48	46	UNDEFINED
4.20	14	210.67	2.04	0.93	0.66	sand	>90	46-48	42	UNDEFINED
4.50	15	182.33	1.55	0.86	0.70	sand	80-90	44-46	35	UNDEFINED
4.80	16	199.00	1.79	0.90	0.75	sand	>90	44-46	38	UNDEFINED
5.10	17	246.00	2.04	0.83	0.79	sand	>90	44-46	47	UNDEFINED
5.40	18	242.67	1.78	0.73	0.83	sand	>90	44-46	46	UNDEFINED
5.70	19	327.00	3.16	0.97	0.88	sand	>90	46-48	>50	UNDEFINED
6.00	20	406.33	4.99	1.23	0.92	sand	>90	46-48	>50	UNDEFINED
6.40	21	300.71	3.20	1.06	0.97	sand	>90	44-46	>50	UNDEFINED
6.70	22	157.33	1.33	0.85	1.01	sand	70-80	42-44	30	UNDEFINED
7.00	23	70.67	0.91	1.29	1.06	silty sand to sandy silt	50-60	36-40	23	UNDEFINED
7.30	24	219.86	2.02	0.92	1.10	sand	80-90	44-46	42	UNDEFINED
7.65	25	168.67	1.34	0.79	1.15	sand	70-80	42-44	32	UNDEFINED
7.95	26	234.50	2.22	0.95	1.19	sand	80-90	42-44	45	UNDEFINED
8.25	27	349.00	4.63	1.33	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	335.83	4.46	1.33	1.28	sand	>90	44-46	>50	UNDEFINED
8.85	29	318.83	4.42	1.39	1.32	sand	>90	44-46	>50	UNDEFINED
9.15	30	293.50	3.65	1.24	1.36	sand	>90	44-46	>50	UNDEFINED
9.45	31	353.83	4.52	1.28	1.41	sand	>90	44-46	>50	UNDEFINED
9.75	32	411.00	5.37	1.31	1.45	sand	>90	44-46	>50	UNDEFINED
10.05	33	405.17	5.20	1.28	1.49	sand	>90	44-46	>50	UNDEFINED
10.35	34	333.93	3.80	1.14	1.54	sand	>90	44-46	>50	UNDEFINED
10.65	35	210.83	2.20	1.04	1.58	sand	80-90	42-44	40	UNDEFINED
10.95	36	18.67	0.34	1.83	1.62	sandy silt to clayey silt	UNDFND	UNDFD	7	1.6
11.25	37	13.93	0.15	1.11	1.67	sandy silt to clayey silt	UNDFND	UNDFD	5	1.1
11.55	38	11.67	-10922.55	-93521.84	1.71	undefined	UNDFND	UNDFD	UDF	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR (v 3.04) ****

CONOCO INC

Operator :CALVIN SELLS On Site Loc:L-19

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

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

SOUNDING DATA IN FILE CPTL19. 11-18-91 14:23

OPERATOR : CALVIN SELLS LOCATION : L-19

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
0.05	0.2	3	3	0.04	1.33	0.1	0.24	0.24	0.1
0.10	0.3	0	0	0.12	?	0.1	?	?	0.2
0.15	0.5	2	2	0.10	5.00	0.1	0.36	0.36	0.0
0.20	0.7	0	0	0.10	?	0.1	?	?	0.2
0.25	0.8	0	0	0.02	?	0.1	?	?	0.1
0.30	1.0	0	0	0.00	?	0.1	?	?	0.0
0.35	1.1	0	0	-0.01	?	0.0	?	?	0.2
0.40	1.3	0	0	-0.01	?	0.1	?	?	0.2
0.45	1.5	0	0	-0.01	?	0.0	?	?	0.0
0.50	1.6	0	0	-0.01	?	0.0	?	?	0.0
0.55	1.8	0	0	-0.01	?	0.0	?	?	0.2
0.60	2.0	0	0	0.01	?	0.0	?	?	0.2
0.65	2.1	0	0	0.01	?	0.0	?	?	[redacted]
0.70	2.3	0	0	-0.01	?	0.0	?	?	0.6
0.75	2.5	0	0	-0.09	?	0.0	?	?	1.2
0.80	2.6	1	1	0.45	45.00	0.0	0.00	0.00	0.1
0.85	2.8	5	5	0.40	8.00	0.1	0.14	0.14	0.1
0.90	3.0	-2	-2	0.22	-11.00	0.1	-2.36	-0.36	0.1
0.95	3.1	-1	-1	0.06	-6.00	0.2	-1.44	-1.44	0.1
1.00	3.3	3	3	0.06	2.00	0.0	0.00	0.00	0.0
1.05	3.4	0	0	0.09	?	0.1	?	?	0.0
1.10	3.6	1	1	-0.03	-3.00	0.1	0.72	0.72	0.1
1.15	3.8	0	0	0.25	?	0.1	?	?	0.1
1.20	3.9	16	16	0.29	1.81	0.0	0.00	0.00	0.1
1.25	4.1	41	41	0.38	0.93	0.0	0.00	0.00	0.1
1.30	4.3	36	36	0.38	1.06	0.1	0.02	0.02	0.0
1.35	4.4	35	35	0.37	1.06	-0.3	-0.06	-0.06	0.0
1.40	4.6	38	38	0.40	1.05	0.0	0.00	0.00	0.0
1.45	4.8	46	46	0.51	1.11	0.1	0.02	0.02	0.2
1.50	4.9	69	69	0.51	0.74	0.0	0.00	0.00	0.0
1.55	5.1	89	89	0.67	0.75	0.0	0.00	0.00	0.0
1.60	5.2	106	106	0.83	0.78	0.2	0.01	0.01	0.0
1.65	5.4	113	113	0.89	0.79	0.3	0.02	0.02	0.0
1.70	5.6	117	117	0.92	0.79	0.4	0.02	0.02	0.0
1.75	5.7	122	122	0.95	0.78	0.6	0.04	0.04	0.0
1.80	5.9	124	124	0.95	0.77	0.6	0.03	0.03	0.0
1.85	6.1	116	116	0.91	0.78	0.7	0.04	0.04	0.0
1.90	6.2	111	111	0.88	0.79	0.8	0.05	0.05	0.0
1.95	6.4	109	109	0.82	0.75	1.0	0.07	0.06	[redacted]
2.00	6.6	109	109	0.80	0.73	1.0	0.07	0.05	0.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	115	115	0.82	0.71	1.0	0.06	0.04	0.0
2.10	6.9	119	119	0.91	0.76	1.2	0.07	0.05	0.0
2.15	7.1	124	124	0.97	0.78	1.3	0.08	0.05	0.0
2.20	7.2	134	134	1.00	0.75	1.3	0.07	0.04	0.0
2.25	7.4	156	156	1.06	0.66	1.3	0.06	0.03	0.0
2.30	7.5	191	191	1.26	0.66	1.4	0.05	0.03	0.0
2.35	7.7	203	203	1.21	0.60	1.6	0.06	0.03	0.0
2.40	7.9	199	199	1.39	0.70	1.6	0.06	0.03	0.0
2.45	8.0	191	191	1.43	0.75	1.2	0.05	0.01	0.0
2.50	8.2	178	178	1.53	0.86	1.3	0.05	0.02	0.0
2.55	8.4	181	181	1.47	0.81	1.5	0.06	0.02	0.0
2.60	8.5	170	170	1.35	0.79	1.6	0.07	0.02	0.0
2.65	8.7	181	181	1.55	0.86	1.7	0.07	0.02	0.0
2.70	8.9	211	211	1.67	0.79	1.8	0.06	0.02	0.0
2.75	9.0	213	213	1.74	0.82	1.9	0.06	0.02	0.0
2.80	9.2	226	226	1.75	0.77	1.9	0.06	0.02	0.0
2.85	9.4	253	253	1.91	0.75	1.9	0.05	0.01	0.0
2.90	9.5	290	290	2.37	0.82	2.0	0.05	0.01	0.2
2.95	9.7	318	318	2.96	0.93	1.9	0.04	0.01	0.0
3.00	9.8	316	316	3.60	1.14	1.6	0.04	-0.00	0.0
3.05	10.0	308	308	3.63	1.18	1.2	0.03	-0.01	0.0
3.10	10.2	277	277	3.53	1.27	1.0	0.03	-0.02	0.2
3.15	10.3	241	241	3.11	1.29	0.7	0.02	-0.03	0.0
3.20	10.5	215	215	2.38	1.11	0.6	0.02	-0.04	0.1
3.25	10.7	229	229	2.26	0.99	0.9	0.03	-0.03	0.1
3.30	10.8	259	259	2.50	0.97	0.8	0.02	-0.04	0.1
3.35	11.0	279	279	2.13	0.76	1.1	0.03	-0.03	0.1
3.40	11.2	325	325	2.74	0.84	1.3	0.03	-0.02	0.1
3.45	11.3	389	389	3.73	0.96	1.3	0.02	-0.02	0.1
3.50	11.5	396	396	4.64	1.17	1.2	0.02	-0.02	0.1
3.55	11.6	362	362	4.46	1.23	-0.3	-0.01	-0.05	0.1
3.60	11.8	326	326	3.73	1.14	-2.5	-0.08	-0.11	0.1
3.65	12.0	298	298	3.51	1.18	-3.3	-0.08	-0.14	0.1
3.70	12.1	272	272	3.26	1.20	-3.1	-0.08	-0.15	0.1
3.75	12.3	245	245	2.90	1.18	-2.8	-0.08	-0.16	0.1
3.80	12.5	234	234	2.66	1.14	-2.6	-0.08	-0.17	0.1
3.85	12.6	227	227	2.35	1.04	-2.3	-0.07	-0.16	0.1
3.90	12.8	223	223	1.94	0.87	-2.1	-0.07	-0.16	0.1
3.95	13.0	233	233	1.89	0.81	-2.0	-0.06	-0.15	0.1
4.00	13.1	244	244	2.05	0.84	-1.7	-0.05	-0.14	0.1
4.05	13.3	232	232	2.11	0.91	-1.5	-0.05	-0.14	0.1
4.10	13.5	222	222	2.09	0.94	-1.4	-0.05	-0.15	0.3
4.15	13.6	215	215	2.06	0.96	-1.1	-0.04	-0.15	0.1
4.20	13.8	203	203	2.01	0.99	-1.1	-0.04	-0.16	0.1
4.25	13.9	196	196	1.91	0.97	-0.9	-0.03	-0.16	0.1
4.30	14.1	190	190	1.87	0.98	-0.7	-0.03	-0.16	0.1
4.35	14.3	181	181	1.42	0.78	-0.6	-0.02	-0.17	0.1
4.40	14.4	171	171	1.33	0.78	-0.4	-0.02	-0.17	0.1
4.45	14.6	165	165	1.31	0.79	0.2	0.01	-0.15	0.2
4.50	14.8	181	181	1.57	0.87	0.7	0.03	-0.12	0.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	206	206	1.86	0.90	1.0	0.03	-0.10	0.2
4.60	15.1	204	204	2.00	0.98	1.3	0.05	-0.09	0.3
4.65	15.3	180	180	1.89	1.05	1.3	0.05	-0.11	0.2
4.70	15.4	175	175	1.64	0.94	1.5	0.05	-0.11	0.3
4.75	15.6	193	193	1.63	0.84	1.5	0.06	-0.10	0.2
4.80	15.7	211	211	1.74	0.82	1.8	0.06	-0.08	0.2
4.85	15.9	231	231	1.83	0.79	2.0	0.06	-0.07	0.3
4.90	16.1	252	252	2.05	0.81	2.3	0.07	-0.06	0.2
4.95	16.2	267	267	2.32	0.87	2.5	0.07	-0.05	0.3
5.00	16.4	254	254	2.23	0.88	2.8	0.08	-0.05	0.2
5.05	16.6	236	236	1.97	0.83	2.9	0.09	-0.05	0.2
5.10	16.7	237	237	1.84	0.78	3.1	0.09	-0.05	0.3
5.15	16.9	230	230	1.81	0.79	3.3	0.10	-0.04	0.2
5.20	17.1	228	228	1.77	0.78	3.5	0.11	-0.04	0.3
5.25	17.2	225	225	1.73	0.77	3.8	0.12	-0.03	0.2
5.30	17.4	233	233	1.60	0.69	3.9	0.12	-0.03	0.3
5.35	17.6	243	243	1.50	0.62	3.9	0.12	-0.03	0.2
5.40	17.7	269	269	1.87	0.70	4.2	0.11	-0.22	0.1
5.45	17.9	258	258	2.19	0.84	3.9	0.11	-0.03	0.3
5.50	18.0	269	269	2.34	0.87	4.3	0.12	-0.02	0.4
5.55	18.2	282	282	2.56	0.91	4.7	0.12	-0.01	0.4
5.60	18.4	314	314	2.66	0.85	4.9	0.11	-0.01	[redacted]
5.65	18.5	337	337	3.16	0.94	5.2	0.11	-0.00	[redacted]
5.70	18.7	371	371	3.83	1.03	5.5	0.11	0.00	0.4
5.75	18.9	389	389	4.43	1.14	5.9	0.11	0.01	0.4
5.80	19.0	397	397	4.64	1.17	6.0	0.11	0.01	0.4
5.85	19.2	405	405	4.84	1.20	6.3	0.11	0.01	0.4
5.90	19.4	419	419	5.10	1.22	6.6	0.11	0.01	0.4
5.95	19.5	423	423	5.33	1.26	6.5	0.11	0.01	0.5
6.00	19.7	404	404	5.16	1.28	6.7	0.12	0.01	0.6
6.05	19.8	393	393	4.84	1.23	6.6	0.12	0.01	0.5
6.10	20.0	382	382	4.56	1.19	6.5	0.12	0.01	0.4
6.15	20.2	364	364	4.29	1.18	6.4	0.13	0.01	0.7
6.20	20.3	327	327	3.89	1.19	6.4	0.14	0.00	0.9
6.25	20.5	291	291	3.15	1.08	6.2	0.15	-0.00	0.5
6.30	20.7	267	267	2.59	0.97	6.3	0.17	-0.00	1.5
6.35	20.8	245	245	2.18	0.89	6.3	0.19	-0.00	0.2
6.40	21.0	229	229	1.74	0.76	6.0	0.19	-0.01	0.3
6.45	21.2	203	203	1.63	0.80	6.3	0.22	-0.01	1.6
6.50	21.3	180	180	1.48	0.82	5.3	0.21	-0.05	0.9
6.55	21.5	159	159	1.35	0.85	5.7	0.26	-0.04	1.7
6.60	21.7	140	140	1.21	0.86	5.8	0.30	-0.05	2.1
6.65	21.8	140	140	1.20	0.86	5.9	0.30	-0.05	2.7
6.70	22.0	122	122	1.12	0.92	6.2	0.37	-0.04	3.3
6.75	22.1	93	92	1.01	1.10	6.3	0.49	-0.05	1.1
6.80	22.3	70	70	0.90	1.29	6.3	0.65	-0.09	1.4
6.85	22.5	56	56	0.79	1.41	6.3	0.81	-0.10	[redacted]
6.90	22.6	53	53	0.77	1.45	6.7	0.91	-0.07	[redacted]
6.95	22.8	58	56	0.89	1.53	7.2	0.89	-0.21	1.4
7.00	23.0	95	95	1.09	1.15	7.6	0.58	0.02	4.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
7.05	23.1	187	187	1.70	0.91	7.5	0.29	0.00	4.0
7.10	23.3	242	242	1.82	0.75	7.7	0.23	0.01	3.6
7.15	23.5	230	230	2.25	0.98	7.8	0.34	0.01	3.8
7.20	23.6	237	237	2.47	1.04	7.4	0.22	-0.01	1.8
7.25	23.8	225	225	2.26	1.00	7.6	0.24	-0.00	1.0
7.30	23.9	206	206	2.00	0.97	7.8	0.27	0.00	1.0
7.35	24.1	212	212	1.67	0.79	7.9	0.27	0.00	1.0
7.40	24.3	205	205	1.78	0.87	8.1	0.28	0.01	1.0
7.45	24.4	182	182	1.51	0.83	7.2	0.28	-0.03	1.0
7.50	24.6	175	175	1.34	0.77	7.5	0.31	-0.02	1.0
7.55	24.8	163	163	1.17	0.72	7.7	0.34	-0.02	1.0
7.60	24.9	145	145	1.11	0.77	7.9	0.39	-0.02	1.1
7.65	25.1	142	142	1.12	0.79	8.1	0.41	-0.01	1.2
7.70	25.3	154	154	1.23	0.80	8.4	0.39	0.00	1.3
7.75	25.4	185	185	1.49	0.81	8.6	0.34	0.02	1.2
7.80	25.6	219	219	1.91	0.87	9.1	0.30	0.02	1.3
7.85	25.8	244	244	2.21	0.91	9.2	0.27	0.02	1.3
7.90	25.9	271	271	2.70	1.00	9.4	0.25	0.02	1.3
7.95	26.1	334	334	3.79	1.13	9.1	0.20	0.01	1.3
8.00	26.2	345	345	4.64	1.34	9.4	0.20	0.01	1.3
8.05	26.4	322	322	4.45	1.38	9.1	0.20	0.01	1.3
8.10	26.6	350	350	4.59	1.31	8.1	0.17	-0.02	1.3
8.15	26.7	356	356	4.73	1.33	6.1	0.12	-0.06	1.3
8.20	26.9	348	348	4.50	1.29	5.9	0.13	-0.06	1.3
8.25	27.1	373	373	4.88	1.31	5.6	0.11	-0.07	1.3
8.30	27.2	386	386	5.49	1.42	4.7	0.09	-0.09	1.4
8.35	27.4	337	337	4.52	1.34	4.5	0.10	-0.10	1.5
8.40	27.6	309	309	4.09	1.32	4.8	0.11	-0.11	1.3
8.45	27.7	296	296	3.78	1.28	6.0	0.15	-0.06	1.6
8.50	27.9	325	325	4.12	1.27	5.9	0.13	-0.08	1.5
8.55	28.1	362	362	4.74	1.31	5.1	0.10	-0.09	1.5
8.60	28.2	348	348	5.12	1.47	4.9	0.12	-0.12	1.9
8.65	28.4	320	320	4.76	1.49	5.2	0.13	-0.10	1.3
8.70	28.5	316	316	4.33	1.37	5.0	0.11	-0.11	1.9
8.75	28.7	307	307	4.09	1.33	4.6	0.11	-0.12	1.8
8.80	28.9	323	323	4.14	1.28	3.7	0.08	-0.14	2.2
8.85	29.0	299	299	4.09	1.37	3.6	0.09	-0.15	1.9
8.90	29.2	262	262	3.85	1.47	3.8	0.10	-0.17	2.2
8.95	29.4	271	271	3.23	1.19	3.5	0.09	-0.18	1.9
9.00	29.5	288	288	3.33	1.16	2.7	0.07	-0.19	1.5
9.05	29.7	306	306	3.56	1.16	2.3	0.05	-0.19	2.4
9.10	29.9	316	316	3.81	1.21	2.3	0.05	-0.18	1.8
9.15	30.0	318	318	4.10	1.29	2.2	0.05	-0.19	1.6
9.20	30.2	347	347	4.52	1.30	2.2	0.05	-0.17	1.9
9.25	30.3	347	347	5.02	1.45	1.8	0.04	-0.18	2.0
9.30	30.5	352	352	4.92	1.40	2.0	0.04	-0.18	1.7
9.35	30.7	358	358	4.73	1.32	1.7	0.03	-0.18	2.0
9.40	30.8	358	358	3.86	1.08	0.9	0.02	-0.20	1.7
9.45	31.0	361	361	4.07	1.13	0.5	2.01	-0.21	2.0
9.50	31.2	382	382	4.32	1.13	1.2	0.02	-0.18	1.9

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	405	405	4.83	1.20	1.0	0.02	-0.18	1.9
9.60	31.5	432	432	5.57	1.29	0.5	0.01	-0.18	1.8
9.65	31.7	432	432	5.95	1.38	0.2	0.00	-0.18	1.8
9.70	31.9	414	414	5.97	1.44	0.0	0.00	-0.19	1.9
9.75	32.0	401	401	5.50	1.37	-0.2	-0.00	-0.21	2.0
9.80	32.2	401	401	5.03	1.25	-0.4	-0.01	-0.21	2.0
9.85	32.3	415	415	5.25	1.27	-0.9	-0.02	-0.21	2.0
9.90	32.5	413	413	5.21	1.26	-1.5	-0.03	-0.23	1.9
9.95	32.6	401	401	5.49	1.37	-2.0	-0.04	-0.24	2.2
10.00	32.8	408	408	5.18	1.27	-2.6	-0.05	-0.25	2.1
10.05	33.0	393	393	5.03	1.28	-3.9	-0.07	-0.29	1.6
10.10	33.1	371	371	4.51	1.22	-5.1	-0.10	-0.33	2.1
10.15	33.3	341	341	4.35	1.28	-5.4	-0.11	-0.36	2.1
10.20	33.5	330	330	3.88	1.12	-5.5	-0.12	-0.36	1.8
10.25	33.6	311	311	3.67	1.18	-5.8	-0.13	-0.41	2.3
10.30	33.8	318	318	3.60	1.13	-5.9	-0.13	-0.40	2.1
10.35	34.0	332	332	3.02	0.85	-6.0	-0.13	-0.39	2.1
10.40	34.1	329	329	2.97	0.90	-6.3	-0.14	-0.40	2.1
10.45	34.3	305	305	2.89	0.95	-6.1	-0.14	-0.43	2.1
10.50	34.4	257	257	2.28	0.89	-6.2	-0.17	-0.52	2.3
10.55	34.6	192	192	1.87	0.97	-6.1	-0.23	-0.69	2.3
10.60	34.8	128	128	1.72	1.34	-5.4	-0.36	-1.06	2.3
10.65	34.9	54	54	1.44	2.67	-6.4	-0.85	-2.52	2.3
10.70	35.1	28	28	0.95	3.39	-6.3	-1.62	-4.86	2.3
10.75	35.3	20	20	0.46	2.30	-6.2	-2.23	-6.79	2.4
10.80	35.4	19	19	0.19	1.00	-5.8	-2.20	-7.02	2.4
10.85	35.6	16	16	0.14	0.88	-4.9	-2.20	-7.97	2.3
10.90	35.8	15	15	0.15	1.00	-4.0	-1.92	-8.10	2.3
10.95	35.9	14	14	0.16	1.14	-3.5	-1.80	-8.46	2.3
11.00	36.1	15	15	0.16	1.07	-3.0	-1.44	-7.69	2.3
11.05	36.3	14	14	0.14	1.00	-2.3	-1.18	-7.91	2.3
11.10	36.4	14	14	0.12	0.86	-1.7	-0.67	-7.64	2.3
11.15	36.6	13	13	0.13	1.00	-1.3	-0.72	-8.05	2.3
11.20	36.7	13	13	0.17	1.31	-0.7	-0.39	-7.75	2.3
11.25	36.9	14	14	0.20	1.43	-0.2	-0.10	-6.98	2.3
11.30	37.1	13	13	0.20	1.54	0.3	0.17	-7.28	2.3
11.35	37.2	12	12	0.18	1.50	2.5	1.50	-6.61	2.3
11.40	37.4	12	12	0.17	1.42	3.0	1.80	-6.35	2.3
11.45	37.6	11	11	0.17	1.55	9.4	6.15	-2.79	2.5
11.50	37.7	11	11	?	?	10.4	6.81	-2.18	2.5
11.55	37.9	11	11	?	?	11.3	7.40	-1.63	2.5

FIELD ACTIVITY LOG SHEET

age 1 of 1

ocation: M-15, Start Time: 1505, End Time: 1553

te: DuPont, Town: E. Chicago IND, State: IND

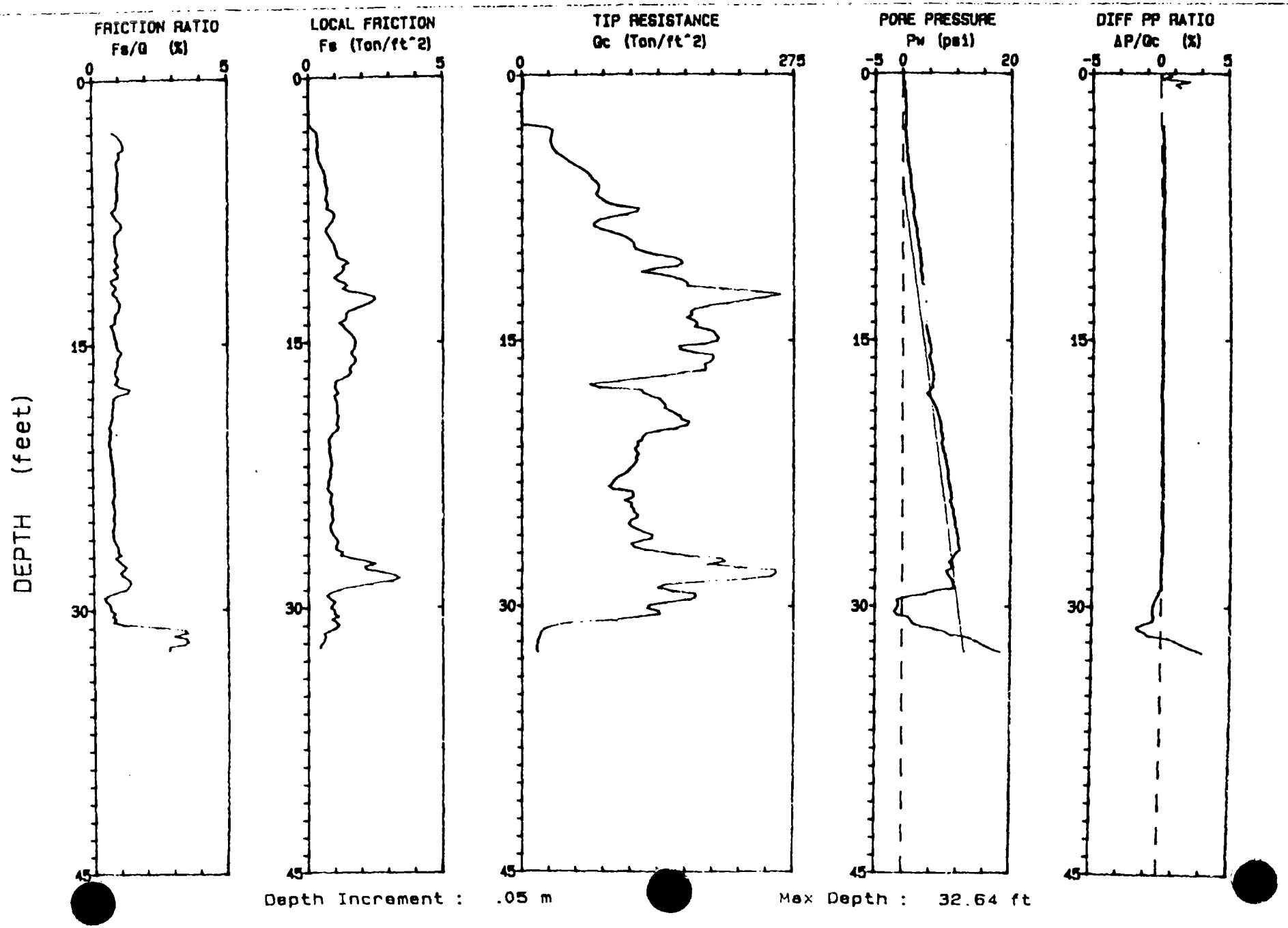
nit: 1, Operators: Sells, Kasl, Wilson,

roj. Consultant: Lounsbury, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-18-91	1510	1535	M-15	CPTM15	✓				32.6	1	2	F	Clay at 30.8

Conoco, Inc.

Operator : CALVIN SELLS
CPT Date : 11-18-91 15:21
File No. CPTM15 Pg 1 / 1
Location : M-15
Cone Used : 364
Hole No. 1



Depth Increment : .05 m
Max Depth : 32.64 ft

SOUNDING DATA IN FILE CPTM15 11-18-91 15:21

OPERATOR : CALVIN SELLS LOCATION : M-15

CONE ID : 364 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-296		-2.00		-4.2			0.0
0.05	0.2	1	1	-0.01	-1.65	0.1	1.22	1.22	0.0
0.10	0.3	2	2	-0.01	-0.72	0.0	0.00	0.00	0.1
0.15	0.5	1	1	-0.02	-1.32	0.3	1.45	1.45	0.0
0.20	0.7	2	2	0.00	0.04	0.3	0.95	0.95	0.1
0.25	0.8	1	1	-0.00	-0.10	0.2	1.26	1.26	0.1
0.30	1.0	0	0	0.00	0.71	0.5	12.81	12.81	0.1
0.35	1.1	0	0	0.00	2.00	0.5	31.03	31.03	0.1
0.40	1.3	0	0	0.00	2.00	0.5	29.38	29.88	0.2
0.45	1.5	0	0	0.00	?	0.5	?	?	0.2
0.50	1.6	0	0	0.00	?	0.5	?	?	0.3
0.55	1.8	0	0	0.00	?	0.5	?	?	0.4
0.60	2.0	0	0	0.00	5.00	0.5	89.64	89.64	0.2
0.65	2.1	0	0	0.00	?	0.5	?	?	0.3
0.70	2.3	0	0	0.00	?	0.5	?	?	0.1
0.75	2.5	-0	-0	0.00	-2.50	0.5	-46.54	-46.54	0.1
0.80	2.6	0	0	0.00	?	0.5	?	?	0.3
0.85	2.8	0	0	0.08	186.00	0.5	93.08	92.08	0.2
0.90	3.0	25	25	0.19	0.76	0.5	0.16	0.16	0.1
0.95	3.1	32	32	0.30	0.91	0.4	0.08	0.08	0.1
1.00	3.3	31	31	0.32	1.04	0.4	0.10	0.10	0.1
1.05	3.4	30	30	0.33	1.08	0.5	0.13	0.13	0.2
1.10	3.6	29	29	0.33	1.13	0.5	0.13	0.13	0.3
1.15	3.8	29	29	0.34	1.17	0.6	0.14	0.14	0.3
1.20	3.9	30	30	0.35	1.17	0.6	0.14	0.14	0.3
1.25	4.1	31	31	0.30	0.98	0.7	0.16	0.16	0.3
1.30	4.3	33	33	0.33	1.00	0.8	0.18	0.18	0.3
1.35	4.4	35	35	0.35	0.98	0.6	0.13	0.13	0.3
1.40	4.6	40	40	0.36	0.91	0.8	0.14	0.14	0.3
1.45	4.8	44	44	0.39	0.90	0.9	0.14	0.14	0.3
1.50	4.9	48	48	0.44	0.92	0.9	0.13	0.13	0.3
1.55	5.1	53	53	0.50	0.95	0.9	0.13	0.13	0.3
1.60	5.2	58	58	0.55	0.95	1.0	0.13	0.13	0.3
1.65	5.4	63	63	0.59	0.93	1.2	0.14	0.14	0.3
1.70	5.6	67	67	0.62	0.93	1.2	0.13	0.13	0.3
1.75	5.7	69	69	0.63	0.92	1.4	0.14	0.14	0.3
1.80	5.9	71	71	0.64	0.90	1.4	0.14	0.14	0.3
1.85	6.1	75	75	0.66	0.88	1.4	0.14	0.14	0.3
1.90	6.2	78	78	0.70	0.89	1.5	0.14	0.13	0.3
1.95	6.4	78	78	0.72	0.93	1.5	0.14	0.13	0.3
2.00	6.6	77	77	0.71	0.92	1.6	0.15	0.13	0.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	75	75	0.67	0.89	1.7	0.16	0.13	0.3
2.10	6.9	78	78	0.66	0.85	1.8	0.16	0.13	0.3
2.15	7.1	82	82	0.70	0.85	1.9	0.16	0.13	0.3
2.20	7.2	87	87	0.71	0.82	1.9	0.15	0.11	0.3
2.25	7.4	97	97	0.68	0.70	2.0	0.14	0.10	0.3
2.30	7.5	118	118	0.89	0.75	2.0	0.12	0.08	0.3
2.35	7.7	116	116	0.97	0.84	1.9	0.12	0.07	0.3
2.40	7.9	106	106	0.95	0.90	1.9	0.13	0.08	0.3
2.45	8.0	88	88	0.91	1.04	2.0	0.16	0.09	0.3
2.50	8.2	77	77	0.83	1.08	2.1	0.20	0.11	0.3
2.55	8.4	73	73	0.76	1.04	2.2	0.22	0.12	0.3
2.60	8.5	72	72	0.66	0.92	2.3	0.23	0.12	0.3
2.65	8.7	79	79	0.64	0.81	2.5	0.23	0.12	0.3
2.70	8.9	90	90	0.72	0.80	2.5	0.20	0.10	0.3
2.75	9.0	98	98	0.78	0.79	2.5	0.18	0.09	0.4
2.80	9.2	105	105	0.84	0.80	2.6	0.18	0.09	0.4
2.85	9.4	110	110	0.91	0.83	2.8	0.18	0.09	0.4
2.90	9.5	113	113	0.97	0.86	2.8	0.18	0.09	0.4
2.95	9.7	113	113	0.99	0.88	2.8	0.18	0.08	0.3
3.00	9.8	114	114	1.05	0.93	3.0	0.19	0.08	0.3
3.05	10.0	123	123	1.06	0.86	3.1	0.18	0.08	[illegible]
3.10	10.2	135	135	1.12	0.83	3.1	0.17	0.07	[illegible]
3.15	10.3	154	154	1.33	0.86	3.1	0.15	0.06	0.3
3.20	10.5	160	160	1.50	0.94	3.2	0.14	0.06	0.3
3.25	10.7	162	162	1.26	0.78	3.2	0.14	0.05	0.3
3.30	10.8	156	156	1.32	0.85	3.4	0.16	0.06	0.3
3.35	11.0	133	133	1.25	0.95	3.2	0.17	0.06	0.3
3.40	11.2	120	120	1.09	0.91	3.2	0.19	0.06	0.3
3.45	11.3	141	141	0.95	0.67	3.4	0.18	0.06	0.3
3.50	11.5	155	155	1.09	0.71	3.5	0.16	0.05	0.3
3.55	11.6	163	163	1.35	0.83	3.5	0.15	0.05	0.3
3.60	11.8	167	167	1.44	0.86	3.5	0.15	0.04	0.3
3.65	12.0	167	167	1.29	0.77	3.8	0.16	0.05	0.3
3.70	12.1	202	202	1.49	0.74	4.0	0.14	0.05	0.4
3.75	12.3	237	237	2.11	0.89	4.1	0.12	0.04	0.4
3.80	12.5	262	262	2.44	0.93	4.2	0.11	0.04	0.4
3.85	12.6	246	246	2.48	1.01	4.2	0.12	0.04	0.4
3.90	12.8	228	228	2.29	1.00	4.2	0.13	0.04	0.4
3.95	13.0	210	210	2.05	0.97	4.2	0.14	0.04	0.4
4.00	13.1	188	188	1.77	0.94	4.2	0.16	0.04	0.5
4.05	13.3	174	174	1.49	0.86	4.2	0.17	0.04	0.9
4.10	13.5	170	170	1.39	0.82	4.2	0.18	0.04	1.0
4.15	13.6	171	171	1.41	0.83	4.4	0.18	0.05	1.0
4.20	13.8	166	166	1.37	0.83	4.5	0.19	0.05	1.0
4.25	13.9	173	173	1.13	0.65	4.4	0.18	0.04	1.0
4.30	14.1	177	177	1.29	0.73	4.5	0.18	0.04	1.0
4.35	14.3	174	174	1.35	0.78	4.2	0.17	0.03	[illegible]
4.40	14.4	187	187	1.49	0.80	4.3	0.17	0.03	[illegible]
4.45	14.6	194	194	1.60	0.82	4.5	0.17	0.03	1.1
4.50	14.8	196	196	1.69	0.86	4.6	0.17	0.03	1.0

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
4.55	14.9	199	199	1.75	0.88	4.8	0.17	0.03	1.1
4.60	15.1	197	197	1.75	0.88	4.8	0.18	0.03	0.8
4.65	15.3	184	184	1.72	0.94	4.9	0.19	0.04	1.0
4.70	15.4	158	158	1.70	1.08	5.0	0.23	0.04	1.0
4.75	15.6	159	159	1.58	1.00	5.1	0.23	0.05	1.0
4.80	15.7	174	174	1.60	0.92	5.1	0.21	0.04	1.0
4.85	15.9	193	193	1.72	0.89	4.8	0.18	0.02	1.0
4.90	16.1	193	194	1.75	0.91	4.8	0.18	0.02	1.0
4.95	16.2	191	191	1.66	0.88	5.1	0.19	0.03	1.0
5.00	16.4	184	184	1.55	0.84	5.2	0.20	0.03	1.0
5.05	16.6	185	185	1.52	0.82	5.4	0.21	0.03	1.2
5.10	16.7	185	185	1.58	0.85	5.4	0.21	0.03	1.2
5.15	16.9	163	163	1.49	0.92	5.6	0.25	0.04	1.2
5.20	17.1	144	144	1.28	0.89	5.6	0.28	0.04	1.2
5.25	17.2	122	122	1.00	0.81	5.6	0.33	0.05	1.2
5.30	17.4	98	98	0.98	1.00	5.6	0.42	0.05	1.2
5.35	17.6	68	69	0.96	1.40	5.4	0.57	0.04	1.2
5.40	17.7	78	78	1.03	1.33	5.6	0.52	0.05	1.4
5.45	17.9	121	121	1.11	0.92	5.0	0.30	-0.00	1.4
5.50	18.0	123	123	0.95	0.77	4.4	0.26	-0.05	1.4
5.55	18.2	130	130	0.98	0.76	4.8	0.27	-0.02	1.5
5.60	18.4	139	139	1.05	0.75	5.3	0.27	-0.00	1.5
5.65	18.5	142	142	1.08	0.76	5.6	0.29	0.01	1.4
5.70	18.7	145	145	1.06	0.74	5.9	0.29	0.02	1.4
5.75	18.9	144	144	1.07	0.74	6.1	0.31	0.03	1.5
5.80	19.0	149	150	1.07	0.72	6.3	0.30	0.03	1.5
5.85	19.2	155	155	1.10	0.71	6.5	0.30	0.04	1.5
5.90	19.4	160	161	1.08	0.67	6.7	0.30	0.04	1.5
5.95	19.5	161	161	1.07	0.66	6.8	0.30	0.04	1.5
6.00	19.7	169	169	1.04	0.62	7.0	0.30	0.04	1.5
6.05	19.8	167	168	1.12	0.67	7.1	0.30	0.05	1.5
6.10	20.0	156	157	1.05	0.67	7.1	0.33	0.05	1.5
6.15	20.2	138	138	0.90	0.65	7.1	0.37	0.05	1.5
6.20	20.3	125	125	0.83	0.66	7.3	0.42	0.06	1.5
6.25	20.5	122	122	0.76	0.63	7.4	0.44	0.07	1.5
6.30	20.7	121	121	0.76	0.63	7.4	0.44	0.06	1.5
6.35	20.8	116	116	0.78	0.67	7.1	0.44	0.04	1.5
6.40	21.0	117	117	0.77	0.66	7.3	0.45	0.05	1.5
6.45	21.2	114	114	0.75	0.66	7.4	0.47	0.05	1.5
6.50	21.3	115	115	0.78	0.68	7.5	0.47	0.06	1.5
6.55	21.5	118	118	0.81	0.69	7.8	0.47	0.07	1.5
6.60	21.7	115	115	0.83	0.72	7.8	0.49	0.07	1.5
6.65	21.8	116	116	0.85	0.73	8.0	0.50	0.07	1.5
6.70	22.0	114	115	0.86	0.75	8.1	0.51	0.07	1.5
6.75	22.1	112	112	0.83	0.74	8.1	0.52	0.07	1.5
6.80	22.3	109	109	0.81	0.74	8.3	0.54	0.08	1.5
6.85	22.5	106	106	0.81	0.76	8.4	0.57	0.08	1.5
6.90	22.6	102	102	0.79	0.78	8.4	0.59	0.08	1.5
6.95	22.8	96	96	0.75	0.78	8.4	0.63	0.09	1.5
7.00	23.0	93	93	0.72	0.78	8.5	0.66	0.[illegible]	1.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	91	91	0.73	0.81	8.6	0.69	0.10	1.6
7.10	23.3	88	88	0.69	0.79	8.7	0.71	0.10	1.6
7.15	23.5	92	92	0.75	0.82	6.8	0.69	0.10	1.6
7.20	23.6	112	112	0.88	0.78	9.0	0.58	0.09	2.4
7.25	23.8	113	113	0.83	0.73	9.0	0.57	0.09	2.3
7.30	23.9	112	112	0.82	0.73	9.1	0.59	0.09	2.3
7.35	24.1	104	104	0.81	0.77	8.7	0.60	0.06	2.3
7.40	24.3	111	111	0.86	0.77	9.0	0.58	0.07	2.3
7.45	24.4	110	110	0.89	0.81	9.1	0.59	0.07	2.3
7.50	24.6	113	114	0.88	0.77	9.4	0.59	0.08	2.3
7.55	24.8	113	113	0.86	0.76	9.4	0.60	0.08	2.3
7.60	24.9	117	117	0.88	0.76	9.4	0.58	0.07	2.3
7.65	25.1	116	116	0.91	0.79	9.6	0.59	0.08	2.3
7.70	25.3	110	110	0.85	0.77	9.7	0.63	0.09	2.3
7.75	25.4	108	108	0.79	0.73	9.7	0.65	0.09	2.3
7.80	25.6	111	111	0.81	0.73	9.8	0.64	0.08	2.3
7.85	25.8	117	117	0.86	0.74	10.0	0.62	0.09	2.3
7.90	25.9	123	123	0.92	0.75	10.0	0.59	0.08	2.3
7.95	26.1	132	132	1.00	0.76	10.2	0.55	0.08	2.3
8.00	26.2	131	131	1.09	0.83	10.3	0.56	0.08	2.3
8.05	26.4	120	120	1.08	0.90	10.2	0.61	0.08	[illegible]
8.10	26.6	110	111	1.01	0.92	10.3	0.67	0.09	[illegible]
8.15	26.7	113	114	1.03	0.91	10.5	0.66	0.10	[illegible]
8.20	26.9	124	124	1.28	1.03	10.7	0.62	0.09	2.5
8.25	27.1	147	147	1.20	0.82	9.9	0.49	0.04	2.5
8.30	27.2	165	165	1.55	0.94	9.5	0.41	0.01	2.5
8.35	27.4	203	203	2.13	1.05	9.1	0.32	-0.01	2.6
8.40	27.6	206	206	2.51	1.22	8.5	0.30	-0.03	2.6
8.45	27.7	187	187	2.09	1.12	9.0	0.35	-0.01	2.6
8.50	27.9	219	219	2.16	0.99	9.4	0.31	-0.00	2.6
8.55	28.1	257	257	2.74	1.07	8.1	0.23	-0.04	2.7
8.60	28.2	258	258	3.20	1.24	8.3	0.23	-0.04	2.7
8.65	28.4	253	253	3.41	1.35	8.7	0.25	-0.03	2.7
8.70	28.5	227	227	3.14	1.38	9.2	0.29	-0.02	2.7
8.75	28.7	183	183	2.37	1.30	9.4	0.37	-0.02	2.7
8.80	28.9	144	144	1.70	1.19	9.5	0.48	-0.02	2.7
8.85	29.0	137	137	1.14	0.83	9.8	0.51	-0.01	2.7
8.90	29.2	151	151	0.80	0.53	5.8	0.28	-0.20	2.7
8.95	29.4	175	175	0.67	0.39	4.2	0.17	-0.25	2.7
9.00	29.5	176	176	0.80	0.46	0.8	0.03	-0.39	2.7
9.05	29.7	171	171	0.99	0.58	-1.1	-0.05	-0.48	2.8
9.10	29.9	145	145	0.90	0.62	-0.8	-0.04	-0.55	2.8
9.15	30.0	128	128	0.80	0.63	-0.8	-0.04	-0.63	3.4
9.20	30.2	126	126	0.98	0.78	-1.1	-0.06	-0.66	3.3
9.25	30.3	138	138	0.96	0.70	-1.5	-0.08	-0.63	3.3
9.30	30.5	140	140	1.13	0.81	-1.1	-0.06	-0.60	[illegible]
9.35	30.7	119	119	0.87	0.73	1.3	0.08	-0.57	[illegible]
9.40	30.8	96	96	1.04	1.09	1.6	0.12	-0.68	[illegible]
9.45	31.0	49	49	1.16	2.35	1.9	0.27	-1.31	3.2
9.50	31.2	30	30	1.02	3.41	3.4	0.81	-1.81	3.2

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	22	22	0.77	3.48	5.9	1.94	-1.65	3.2
9.60	31.5	19	19	0.57	3.01	8.0	3.02	-1.16	3.3
9.65	31.7	18	18	0.62	3.53	8.7	3.56	-0.97	3.3
9.70	31.8	17	18	0.60	3.44	12.3	5.10	0.49	3.3
9.75	32.0	16	17	0.54	3.31	13.5	5.94	1.01	3.3
9.80	32.2	16	16	0.45	2.84	14.6	6.57	1.47	3.3
9.85	32.3	15	15	0.42	2.83	15.5	7.54	2.01	3.3
9.90	32.5	15	15	?	?	16.8	8.16	2.61	3.3
9.95	32.6	16	16	?	?	18.2	8.40	3.08	3.3

WRITE NUMBER OF RODS USED ___

Conoco Inc.

Operator :CALVIN SELLS
On Site Loc:M-15
Hole No. 1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-18-91 15:21
Cone Used :364
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	SPT N1	CSR
0.25	0.82	1.40	-0.01	-0.57	0.03	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.50	1.64	0.00	0.00	0.00	0.09	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
0.75	2.46	0.00	0.00	0.00	0.15	undefined	UNDFND	UNDFD	UDF	UDF	UNDF
1.00	3.28	17.60	0.18	1.01	0.22	sandy silt to clayey silt	UNDFND	UNDFD	7	15	UNDF
1.25	4.10	29.80	0.33	1.11	0.28	silty sand to sandy silt	50-60	40-42	10	18	.19
1.50	4.92	40.00	0.37	0.93	0.32	silty sand to sandy silt	50-60	40-42	13	23	.24
1.75	5.74	62.00	0.58	0.93	0.36	silty sand to sandy silt	60-70	42-44	20	34	.41
2.00	6.56	75.80	0.69	0.91	0.39	sand to silty sand	70-80	42-44	18	29	.32
2.25	7.38	83.80	0.68	0.82	0.43	sand to silty sand	70-80	42-44	20	31	.35
2.50	8.20	101.00	0.91	0.90	0.46	sand to silty sand	70-80	44-46	24	36	>0.5
2.75	9.02	82.40	0.71	0.86	0.50	sand to silty sand	70-80	42-44	20	28	.31
3.00	9.84	111.00	0.95	0.86	0.54	sand to silty sand	70-80	44-46	27	37	>0.5
3.25	10.66	146.80	1.25	0.85	0.57	sand	80-90	44-46	28	38	>0.5
3.50	11.48	141.00	1.14	0.81	0.61	sand	80-90	44-46	27	35	>0.5
3.75	12.30	187.20	1.54	0.82	0.64	sand	>90	44-46	36	45	>0.5
4.00	13.12	226.80	2.21	0.97	0.68	sand	>90	46-48	43	>50	>0.5
4.25	13.94	170.80	1.36	0.80	0.72	sand	80-90	44-46	33	39	>0.5
4.50	14.76	185.60	1.48	0.80	0.75	sand	80-90	44-46	36	42	>0.5
4.75	15.58	179.40	1.70	0.95	0.79	sand	80-90	44-46	34	39	>0.5
5.00	16.40	187.00	1.66	0.89	0.82	sand	80-90	44-46	36	40	>0.5
5.25	17.22	159.80	1.37	0.86	0.86	sand	80-90	42-44	31	33	.41
5.50	18.04	97.60	1.01	1.03	0.89	sand to silty sand	60-70	40-42	23	25	.27
5.75	18.86	140.00	1.05	0.75	0.93	sand	70-80	42-44	27	28	.30
6.00	19.69	158.80	1.07	0.68	0.97	sand	80-90	42-44	30	31	.36
6.25	20.51	141.60	0.93	0.66	1.00	sand	70-80	42-44	27	27	.30
6.50	21.33	116.60	0.77	0.66	1.04	sand to silty sand	70-80	40-42	28	26	.30
6.75	22.15	115.00	0.84	0.73	1.07	sand to silty sand	60-70	40-42	28	27	.29
7.00	22.97	101.20	0.78	0.77	1.11	sand to silty sand	60-70	40-42	24	23	.24
7.25	23.79	99.20	0.78	0.78	1.15	sand to silty sand	60-70	40-42	24	22	.24
7.50	24.61	110.00	0.85	0.77	1.18	sand to silty sand	60-70	40-42	26	25	.26
7.75	25.43	112.80	0.86	0.76	1.22	sand to silty sand	60-70	40-42	27	25	.26
8.00	26.25	122.80	0.94	0.76	1.25	sand to silty sand	60-70	40-42	29	27	.29
8.25	27.07	122.80	1.12	0.91	1.29	sand to silty sand	60-70	40-42	29	26	.28
8.50	27.89	196.00	2.09	1.07	1.33	sand	80-90	42-44	38	33	.40
8.75	28.71	235.60	2.97	1.26	1.36	sand	80-90	42-44	45	39	>0.5
9.00	29.53	156.60	1.02	0.65	1.40	sand	70-80	40-42	30	26	.27
9.25	30.35	141.60	0.93	0.65	1.43	sand	70-80	40-42	27	23	.24
9.50	31.17	86.80	1.04	1.20	1.47	sand to silty sand	50-60	38-40	21	17	.18

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

*** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ***

Conoco Inc.

erator :CALVIN SELLS On Site Loc:M-15

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	SPT N1	CSR
9.75	31.99	18.40	0.62	3.37	1.51	clayey silt to silty clay	UNDFND	UNDFD	9	7	UNDF

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 CSR: Seed et al. 1983 - M=7.5

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 238 M sounding

Initial Baseline

Qc	Fs	Pw	Inc
-295	-2.01	-3.8	0.0

Dep

Qc 0

'0 '1000'

Fs 0.00

'0 '10'

Pw 0.1

'0 '500'

Inc 0.0

'0 '10'

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

CONOCO

age ___ of ___

ocation: N-13 , Start Time: 0800 , End Time: 1420

ite: DUPONT , Town: E. Chicago , State: Ind

Init: 1 , Operators: SEIS , EJ Wilson , B. Ramsey ,

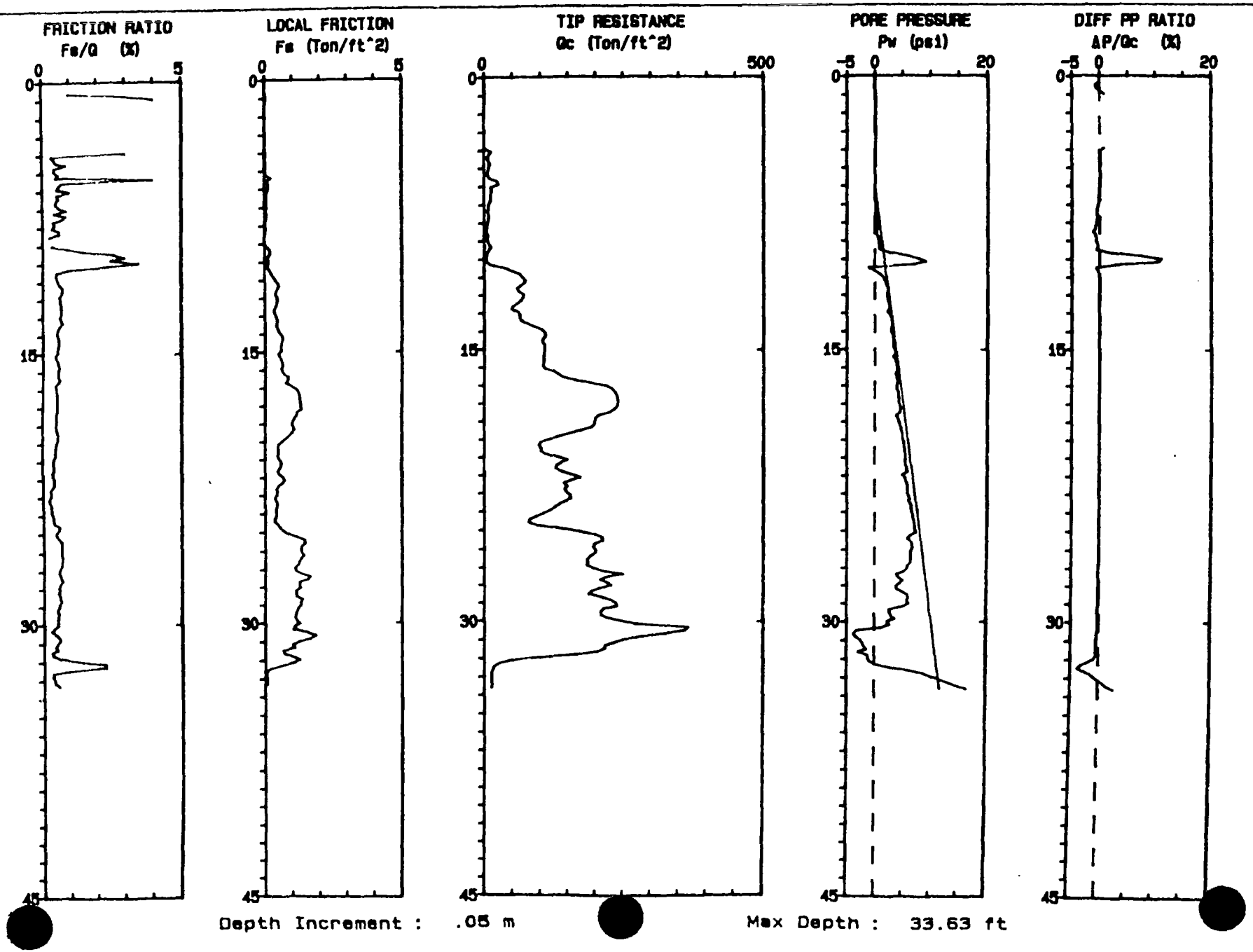
roj. Consultant: Louisbury , Company: OES

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
12-7	0805	0820	N-13			0			5-7'	2	2		NO sample
	0840	0857			*	75mL		*	5-7'	3	2		move & touch
	0900	0915				100mL		**	7-9'	4	2		* Sample is fill material
	0920	935					0		9½'	A	2		move 1 ft. S
	0940	0945					0	***	9'	1	2		** sample ½ fill ½ sand
	0950	1025					0		11.5'	1	NO WATER 2		*** pulled probe up .5'
	1030	1115					300mL		14.5'	4			
	1245	1415					0		31½'	4			Pulled up 1'
							0		30½'	4			" "
							50mL		29½'	1			
													"Screen leaked silted in.

Conoco, Inc.

OPERATOR : CALVIN SELLS
CPT Date : 11-21-91 10:41
FILE CPTN13 Pg 1 / 1

LOCATION : N-13
CONE USED : 293
HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 33.63 ft

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	106	109	0.61	0.56	3.5	0.23	-0.02	0.4
4.60	15.1	108	108	0.52	0.47	3.7	0.25	-0.02	0.4
4.65	15.3	106	108	0.54	0.50	3.8	0.25	-0.01	0.4
4.70	15.4	106	106	0.58	0.55	3.2	0.23	-0.05	0.4
4.75	15.6	107	107	0.62	0.58	3.7	0.25	-0.03	0.4
4.80	15.7	105	106	0.65	0.61	3.9	0.27	-0.02	0.4
4.85	15.9	105	106	0.60	0.57	4.0	0.27	-0.02	0.4
4.90	16.1	108	108	0.62	0.57	4.0	0.27	-0.02	0.4
4.95	16.2	125	125	0.70	0.56	4.0	0.23	-0.02	0.4
5.00	16.4	133	133	0.85	0.63	3.6	0.21	-0.03	0.4
5.05	16.6	142	142	0.84	0.60	4.0	0.20	-0.03	0.4
5.10	16.7	163	163	0.76	0.46	4.1	0.19	-0.02	0.4
5.15	16.9	193	194	0.94	0.48	4.1	0.15	-0.02	0.4
5.20	17.1	221	221	1.12	0.51	4.0	0.13	-0.02	0.4
5.25	17.2	231	231	1.21	0.53	4.0	0.13	-0.02	0.4
5.30	17.4	236	236	1.25	0.53	4.3	0.13	-0.02	0.4
5.35	17.6	239	239	1.26	0.53	4.3	0.13	-0.02	0.4
5.40	17.7	243	243	1.28	0.53	4.4	0.13	-0.02	0.3
5.45	17.9	242	242	1.30	0.54	4.4	0.13	-0.02	0.3
5.50	18.0	241	241	1.31	0.54	4.5	0.14	-0.02	0.3
5.55	18.2	239	239	1.33	0.56	4.7	0.14	-0.02	0.3
5.60	18.4	234	234	1.16	0.49	4.7	0.14	-0.02	0.3
5.65	18.5	225	225	1.15	0.51	4.6	0.15	-0.03	0.3
5.70	18.7	205	205	1.08	0.53	3.9	0.14	-0.06	0.3
5.75	18.9	200	200	1.02	0.51	4.2	0.15	-0.05	0.3
5.80	19.0	199	199	0.97	0.49	4.4	0.16	-0.05	0.3
5.85	19.2	198	199	1.03	0.52	4.6	0.17	-0.04	0.3
5.90	19.4	193	193	1.07	0.55	4.7	0.17	-0.04	0.3
5.95	19.5	174	174	0.98	0.57	4.8	0.20	-0.04	0.3
6.00	19.7	154	155	0.86	0.56	5.0	0.23	-0.04	0.3
6.05	19.8	135	135	0.74	0.55	5.0	0.27	-0.05	0.3
6.10	20.0	116	116	0.60	0.52	5.1	0.32	-0.06	0.3
6.15	20.2	100	101	0.48	0.47	5.3	0.38	-0.06	0.3
6.20	20.3	97	97	0.46	0.47	5.3	0.39	-0.07	0.3
6.25	20.5	102	102	0.47	0.46	5.4	0.38	-0.06	0.3
6.30	20.7	101	101	0.46	0.47	5.5	0.39	-0.06	0.3
6.35	20.8	110	110	0.46	0.42	5.6	0.37	-0.05	0.3
6.40	21.0	131	131	0.51	0.39	5.6	0.31	-0.05	0.3
6.45	21.2	150	150	0.60	0.40	5.6	0.27	-0.05	0.3
6.50	21.3	139	139	0.59	0.43	5.6	0.29	-0.05	0.3
6.55	21.5	130	130	0.56	0.43	5.7	0.32	-0.05	0.3
6.60	21.7	122	128	0.46	0.36	5.8	0.32	-0.05	0.4
6.65	21.8	138	138	0.50	0.36	6.0	0.31	-0.05	0.4
6.70	22.0	156	157	0.64	0.41	5.0	0.23	-0.09	0.4
6.75	22.1	173	173	0.71	0.41	5.5	0.23	-0.08	0.4
6.80	22.3	156	156	0.65	0.41	5.6	0.25	-0.07	0.4
6.85	22.5	143	143	0.50	0.35	5.9	0.30	-0.05	0.4
6.90	22.6	149	149	0.41	0.27	6.0	0.29	-0.06	0.4
6.95	22.8	144	144	0.43	0.30	6.0	0.30	-0.06	0.4
7.00	23.0	148	149	0.43	0.29	6.0	0.29	-0.6	0.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
7.05	23.1	155	155	0.36	0.23	6.2	0.29	-0.06	0.4
7.10	23.3	156	156	0.39	0.25	6.4	0.30	-0.05	0.4
7.15	23.5	148	148	0.45	0.31	6.3	0.31	-0.06	0.4
7.20	23.6	136	136	0.44	0.32	6.6	0.35	-0.05	0.4
7.25	23.8	126	126	0.38	0.30	6.6	0.38	-0.06	0.4
7.30	23.9	118	118	0.39	0.33	6.7	0.41	-0.06	0.4
7.35	24.1	106	106	0.40	0.38	6.9	0.47	-0.06	0.4
7.40	24.3	93	94	0.35	0.38	6.9	0.53	-0.07	0.4
7.45	24.4	80	81	0.33	0.40	7.1	0.63	-0.06	0.4
7.50	24.6	78	79	0.47	0.60	7.2	0.66	-0.07	0.4
7.55	24.8	94	94	0.55	0.59	7.3	0.56	-0.06	0.4
7.60	24.9	130	132	0.67	0.48	7.3	0.38	-0.04	0.4
7.65	25.1	172	172	0.83	0.48	7.6	0.32	-0.03	0.4
7.70	25.3	200	200	1.15	0.58	6.6	0.24	-0.06	0.4
7.75	25.4	214	214	1.45	0.68	6.0	0.22	-0.06	0.4
7.80	25.6	214	215	1.47	0.69	5.6	0.22	-0.06	0.4
7.85	25.8	198	198	1.35	0.68	6.3	0.25	-0.06	0.4
7.90	25.9	195	195	1.30	0.66	6.5	0.25	-0.06	0.4
7.95	26.1	201	201	1.33	0.66	6.6	0.24	-0.07	0.4
8.00	26.2	200	200	1.42	0.71	6.6	0.24	-0.08	0.4
8.05	26.4	191	191	1.32	0.69	6.6	0.25	-0.08	0.4
8.10	26.6	185	185	1.24	0.67	6.6	0.26	-0.09	0.4
8.15	26.7	186	186	1.22	0.66	6.6	0.26	-0.09	0.4
8.20	26.9	185	185	1.09	0.59	6.0	0.23	-0.12	0.4
8.25	27.1	195	196	1.10	0.56	5.9	0.22	-0.12	0.4
8.30	27.2	214	214	1.31	0.61	5.3	0.18	-0.13	0.4
8.35	27.4	251	251	1.65	0.66	4.0	0.11	-0.15	0.4
8.40	27.6	222	222	1.58	0.71	4.3	0.14	-0.16	0.4
8.45	27.7	209	209	1.26	0.60	5.2	0.18	-0.15	0.4
8.50	27.9	222	222	1.26	0.57	4.6	0.15	-0.16	0.4
8.55	28.1	229	229	1.29	0.56	3.9	0.12	-0.18	0.4
8.60	28.2	208	208	1.11	0.53	4.0	0.14	-0.19	0.4
8.65	28.4	193	194	1.14	0.59	5.0	0.19	-0.17	0.4
8.70	28.5	187	187	1.13	0.60	6.0	0.23	-0.15	0.4
8.75	28.7	210	210	1.37	0.65	6.2	0.21	-0.18	0.4
8.80	28.9	228	228	1.31	0.58	5.9	0.19	-0.13	0.4
8.85	29.0	238	238	1.31	0.55	5.3	0.19	-0.11	0.4
8.90	29.2	240	240	1.21	0.50	5.3	0.16	-0.14	0.4
8.95	29.4	215	215	1.16	0.54	2.7	0.09	-0.25	0.4
9.00	29.5	210	210	1.13	0.54	2.8	0.10	-0.25	0.4
9.05	29.7	211	211	1.10	0.52	3.1	0.11	-0.24	0.4
9.10	29.9	223	223	1.17	0.52	3.6	0.12	-0.22	0.4
9.15	30.0	249	249	1.26	0.50	2.2	0.06	-0.24	0.5
9.20	30.2	273	273	1.07	0.39	2.7	0.07	-0.20	0.5
9.25	30.3	369	369	1.02	0.28	1.2	0.03	-0.18	0.5
9.30	30.5	363	363	1.53	0.42	-3.4	-0.07	-0.28	0.5
9.35	30.7	330	329	1.84	0.56	-3.8	-0.08	-0.32	0.5
9.40	30.8	286	286	1.67	0.58	-3.3	-0.08	-0.35	0.5
9.45	31.0	251	251	1.24	0.50	-2.5	-0.07	-0.38	0.5
9.50	31.2	234	234	1.01	0.43	-2.1	-0.06	-0.42	0.5

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:N-13
Job No. :1
Tot. Unit wt. (avg) : 150 pcf

CPT Date :11-21-91 10:41
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.83	0.01	1.00	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	0.00	0.01	0.00	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	0.00	0.01	0.00	0.16	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	2.33	0.02	0.79	0.20	sensitive fine grained	UNDFND	UNDFD	1	.3
1.55	5	3.17	0.04	0.53	0.27	sensitive fine grained	UNDFND	UNDFD	4	.7
1.85	6	14.00	0.12	0.88	0.32	sandy silt to clayey silt	UNDFND	UNDFD	5	1.3
2.15	7	11.00	0.06	0.58	0.36	sandy silt to clayey silt	UNDFND	UNDFD	4	1.2
2.45	8	6.63	0.04	0.51	0.40	sensitive fine grained	UNDFND	UNDFD	3	.6
2.75	9	5.50	0.01	0.21	0.45	sensitive fine grained	UNDFND	UNDFD	3	.4
3.05	10	7.00	0.14	2.05	0.49	silty clay to clay	UNDFND	UNDFD	4	.6
3.35	11	39.50	0.23	0.59	0.53	silty sand to sandy silt	40-50	38-40	13	UNDEFINED
3.65	12	66.50	0.45	0.67	0.57	sand to silty sand	60-70	40-42	19	UNDEFINED
3.95	13	59.50	0.40	0.67	0.62	sand to silty sand	50-60	40-42	14	UNDEFINED
4.25	14	77.67	0.47	0.60	0.66	sand to silty sand	60-70	40-42	19	UNDEFINED
4.55	15	107.50	0.62	0.58	0.70	sand to silty sand	70-80	42-44	26	UNDEFINED
4.85	16	106.67	0.56	0.55	0.75	sand to silty sand	70-80	42-44	26	UNDEFINED
5.15	17	144.00	0.75	0.55	0.79	sand	80-90	42-44	36	UNDEFINED
5.45	18	234.83	1.24	0.53	0.83	sand	>90	44-46	45	UNDEFINED
5.75	19	224.00	1.17	0.52	0.88	sand	>90	44-46	43	UNDEFINED
6.05	20	175.50	0.94	0.54	0.92	sand	80-90	42-44	34	UNDEFINED
6.40	21	108.14	0.49	0.46	0.97	sand	60-70	40-42	21	UNDEFINED
6.70	22	140.17	0.56	0.40	1.01	sand	70-80	42-44	27	UNDEFINED
7.00	23	152.17	0.52	0.34	1.06	sand	70-80	42-44	29	UNDEFINED
7.35	24	135.00	0.40	0.30	1.10	sand	70-80	40-42	26	UNDEFINED
7.65	25	109.17	0.53	0.49	1.15	sand	60-70	40-42	21	UNDEFINED
7.95	26	203.67	1.34	0.66	1.19	sand	80-90	42-44	39	UNDEFINED
8.25	27	190.50	1.23	0.65	1.23	sand	80-90	42-44	36	UNDEFINED
8.55	28	224.50	1.39	0.62	1.28	sand	80-90	42-44	43	UNDEFINED
8.85	29	218.67	1.23	0.56	1.32	sand	80-90	42-44	40	UNDEFINED
9.15	30	224.67	1.17	0.52	1.36	sand	80-90	42-44	43	UNDEFINED
9.45	31	312.00	1.40	0.45	1.41	gravelly sand to sand	>90	44-46	60	UNDEFINED
9.75	32	190.67	0.96	0.50	1.45	sand	70-80	42-44	37	UNDEFINED
10.05	33	21.50	0.32	1.50	1.49	sandy silt to clayey silt	UNDFND	UNDFD	8	1.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 230 a sounding

Initial Baseline

Gc	Fs	Pw	Inc
-261	-7.35	-9.1	0.1

Dep	
Gc	-0
Fs	0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

CONOCO

Location: N-17, Start Time: 1040, End Time: 1115

Site: DuPont, Town: E. Chicago, State: Ind

Unit: 1, Operators: Sells, Kosh, D. Wilson,

Proj. Consultant: Lounsbury, Company: DERS

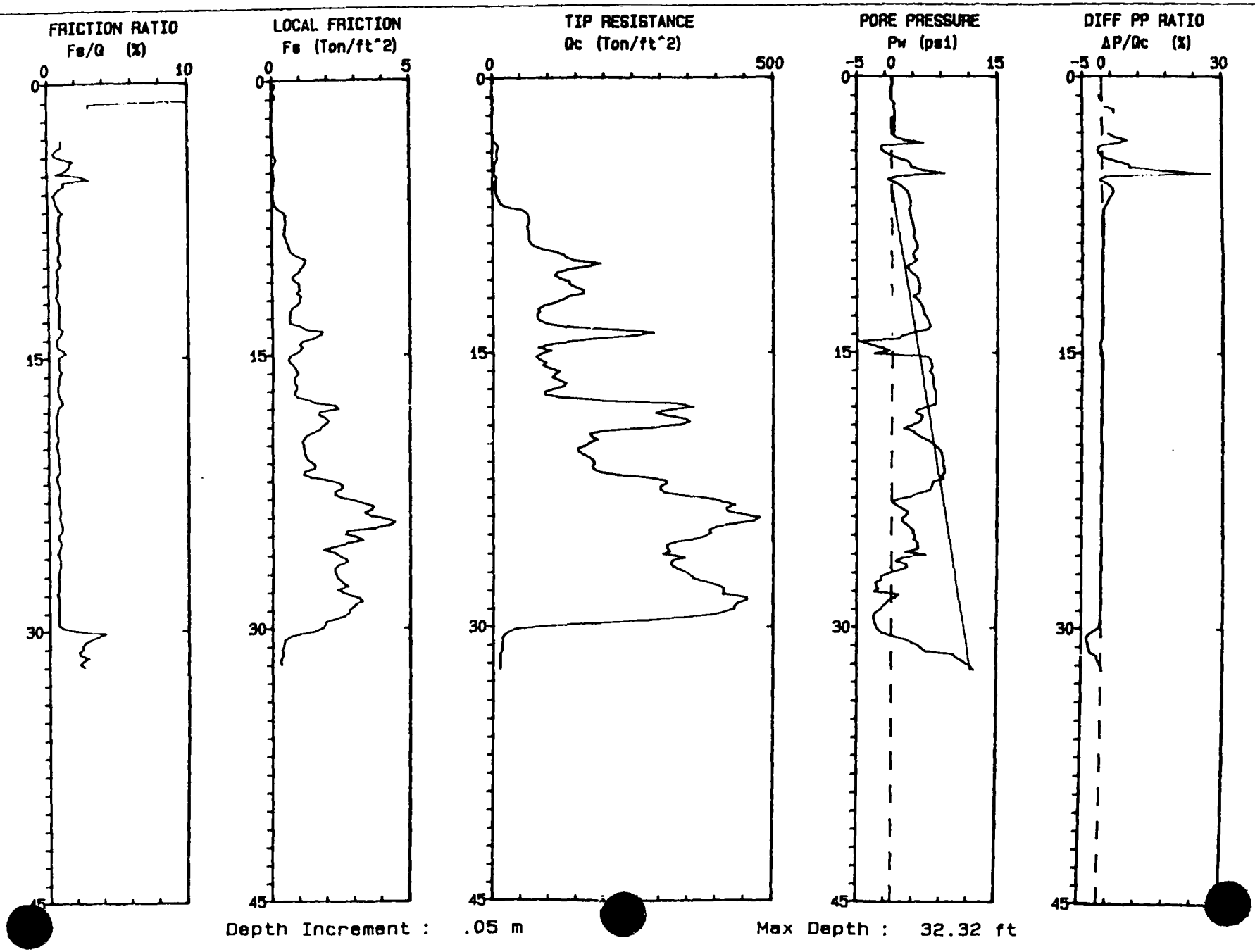
Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-20-91	1045	1106	N-17		✓				32.3	1	2	F	Clay at 30.5

Conoco, Inc.

OPERATOR : CALVIN SELLS
LOCATION : N-17

CPT Date : 11-20-91 10:40
CONE USED : 293

FILE CPTN17 Pg 1 / 1
HOLE NO. : 1



Depth Increment : .05 m

Max Depth : 32.32 ft

SOUNDING DATA IN FILE CPTN17 11-20-91 10:40

OPERATOR : CALVIN SELLS LOCATION : N-17

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
Baseline		-250		-7.06		-5.9			0.1
0.05	0.2	3	3	0.11	3.28	0.1	0.31	0.31	0.1
0.10	0.3	0	0	0.12	33.00	0.1	2.30	2.30	0.4
0.15	0.5	1	1	0.05	3.21	0.2	0.20	0.20	0.3
0.20	0.7	0	0	0.03	40.00	-0.1	-5.17	-5.17	0.3
0.25	0.8	0	0	0.11	31.63	-0.3	-4.31	-4.31	0.1
0.30	1.0	1	1	0.11	9.25	-0.1	-0.86	-0.86	0.1
0.35	1.1	1	1	0.03	2.67	-0.1	-0.34	-0.34	0.3
0.40	1.3	1	1	0.03	5.13	0.0	0.46	0.46	0.3
0.45	1.5	0	0	0.03	?	0.4	?	?	0.1
0.50	1.6	2	2	0.02	2.91	0.2	0.82	0.82	0.1
0.55	1.8	1	1	0.00	0.00	0.4	2.37	2.37	0.1
0.60	2.0	1	1	0.00	0.00	0.4	2.45	2.45	0.1
0.65	2.1	0	0	0.00	?	0.4	?	?	0.1
0.70	2.3	-0	-0	0.00	0.00	0.4	-62.06	-62.06	0.1
0.75	2.5	0	0	0.00	?	0.4	?	?	0.1
0.80	2.6	-0	-0	0.00	0.00	0.4	-18.96	-18.96	0.1
0.85	2.8	-0	-0	0.01	-3.00	0.4	-36.20	-36.20	0.1
0.90	3.0	0	0	0.01	3.00	0.4	13.79	13.79	0.1
0.95	3.1	1	1	0.01	1.07	0.2	2.07	2.07	0.1
1.00	3.3	1	1	0.01	0.89	0.4	4.21	4.21	0.1
1.05	3.4	2	2	0.02	1.20	1.7	7.41	7.41	0.1
1.10	3.6	8	8	0.05	0.72	4.6	4.35	4.35	0.1
1.15	3.8	11	11	0.05	0.43	-1.5	-0.95	-0.95	0.1
1.20	3.9	9	9	0.05	0.59	-1.5	-1.17	-1.17	0.1
1.25	4.1	7	7	0.08	1.09	-1.1	-1.08	-1.06	0.1
1.30	4.3	8	8	0.15	1.82	-0.2	-0.16	-0.16	0.1
1.35	4.4	9	9	0.15	1.71	0.8	0.65	0.65	0.1
1.40	4.6	5	5	0.08	1.52	2.3	3.15	3.15	0.1
1.45	4.8	3	3	0.04	1.20	2.7	5.73	5.73	0.1
1.50	4.9	3	3	0.02	0.89	2.6	7.49	7.49	0.1
1.55	5.1	2	2	0.05	3.18	4.4	19.60	19.60	0.1
1.60	5.2	2	2	0.06	2.85	7.5	26.86	26.86	0.1
1.65	5.4	7	7	0.08	1.09	0.6	0.78	0.78	0.1
1.70	5.6	6	6	0.07	1.12	-0.5	-0.67	-0.67	0.1
1.75	5.7	5	5	0.04	0.73	0.4	0.57	0.57	0.1
1.80	5.9	5	5	0.03	0.52	1.3	1.72	1.72	0.1
1.85	6.1	5	5	0.02	0.43	1.9	2.36	2.38	0.1
1.90	6.2	6	6	0.03	0.49	2.3	2.93	2.83	0.1
1.95	6.4	7	7	0.04	0.55	2.4	2.32	2.19	0.1
2.00	6.6	10	10	0.06	0.62	2.5	1.81	1.66	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	12	12	0.09	0.74	2.7	1.59	1.51	0.1
2.10	6.9	15	15	0.12	0.82	2.7	1.32	1.14	0.1
2.15	7.1	25	25	0.27	1.08	2.7	0.78	0.66	0.1
2.20	7.2	54	54	0.43	0.79	2.4	0.32	0.25	0.1
2.25	7.4	62	62	0.50	0.80	2.6	0.30	0.23	0.1
2.30	7.5	64	64	0.48	0.75	2.7	0.31	0.24	0.1
2.35	7.7	66	66	0.50	0.76	2.6	0.30	0.22	0.1
2.40	7.9	66	66	0.50	0.76	3.0	0.32	0.24	0.1
2.45	8.0	63	63	0.48	0.76	3.0	0.35	0.25	0.1
2.50	8.2	62	62	0.48	0.78	3.1	0.36	0.25	0.1
2.55	8.4	64	64	0.42	0.66	3.2	0.36	0.24	0.1
2.60	8.5	65	65	0.47	0.72	3.3	0.36	0.24	0.1
2.65	8.7	65	65	0.51	0.79	3.1	0.34	0.22	0.1
2.70	8.9	65	65	0.54	0.83	3.3	0.37	0.23	0.1
2.75	9.0	68	68	0.60	0.88	3.5	0.37	0.24	0.1
2.80	9.2	74	74	0.64	0.86	3.7	0.36	0.22	0.1
2.85	9.4	88	88	0.66	0.75	3.7	0.32	0.19	0.1
2.90	9.5	111	111	0.79	0.71	3.4	0.22	0.12	0.1
2.95	9.7	128	128	0.97	0.76	3.1	0.17	0.09	0.1
3.00	9.8	133	133	1.24	0.93	3.1	0.17	0.08	0.1
3.05	10.0	146	146	1.18	0.80	3.6	0.18	0.09	0.1
3.10	10.2	194	194	1.13	0.58	3.0	0.11	0.04	0.1
3.15	10.3	173	174	1.02	0.59	2.1	0.09	0.01	0.1
3.20	10.5	135	135	0.97	0.72	2.4	0.13	0.03	0.1
3.25	10.7	115	115	0.81	0.70	2.8	0.17	0.05	0.1
3.30	10.8	111	111	0.73	0.66	3.3	0.21	0.08	0.1
3.35	11.0	121	121	0.82	0.68	3.7	0.22	0.09	0.1
3.40	11.2	138	138	0.98	0.71	3.9	0.20	0.08	0.1
3.45	11.3	139	139	0.98	0.71	-.0	0.21	0.09	0.1
3.50	11.5	150	150	1.03	0.69	4.0	0.19	0.08	0.1
3.55	11.6	164	164	0.89	0.54	3.6	0.17	0.07	0.1
3.60	11.8	162	163	1.05	0.64	3.9	0.17	0.06	0.1
3.65	12.0	135	135	1.00	0.74	3.0	0.16	0.02	0.1
3.70	12.1	124	125	1.01	0.81	3.7	0.21	0.06	0.1
3.75	12.3	111	111	0.90	0.81	4.0	0.26	0.08	0.1
3.80	12.5	91	91	0.73	0.80	4.3	0.34	0.12	0.1
3.85	12.6	82	82	0.67	0.82	4.5	0.40	0.15	0.1
3.90	12.8	84	85	0.66	0.78	4.6	0.39	0.14	0.1
3.95	13.0	79	80	0.62	0.78	4.7	0.43	0.16	0.9
4.00	13.1	80	80	0.63	0.79	5.1	0.45	0.18	0.3
4.05	13.3	85	85	0.66	0.78	5.2	0.44	0.19	0.1
4.10	13.5	99	99	1.04	1.06	5.4	0.40	0.16	0.1
4.15	13.6	130	130	1.20	0.93	5.5	0.30	0.12	0.1
4.20	13.8	223	223	1.83	0.82	5.0	0.16	0.05	0.1
4.25	13.9	289	289	1.77	0.61	3.1	0.08	-0.01	0.1
4.30	14.1	256	256	1.52	0.60	1.4	0.04	-0.06	0.1
4.35	14.3	183	183	1.09	0.60	0.5	0.04	-0.10	0.1
4.40	14.4	137	137	0.98	0.71	-4.8	-0.25	-0.44	0.1
4.45	14.6	100	100	1.09	1.09	-3.2	-0.23	-0.50	0.1
4.50	14.8	81	81	1.02	1.25	-1.5	-0.13	-0.46	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
4.55	14.9	105	105	0.86	0.82	-0.4	-0.03	-0.29	0.1
4.60	15.1	87	86	0.63	0.73	-2.5	-0.20	-0.53	0.1
4.65	15.3	76	77	0.56	0.74	5.0	0.47	0.09	0.1
4.70	15.4	83	83	0.61	0.73	5.5	0.48	0.12	0.1
4.75	15.6	95	95	0.74	0.78	5.6	0.42	0.11	0.1
4.80	15.7	89	89	0.82	0.92	5.7	0.46	0.12	0.1
4.85	15.9	102	102	0.87	0.85	5.7	0.41	0.10	0.1
4.90	16.1	120	120	0.93	0.77	5.3	0.33	0.06	0.1
4.95	16.2	111	111	0.82	0.74	5.5	0.36	0.09	0.1
5.00	16.4	106	106	0.79	0.75	5.9	0.40	0.10	0.1
5.05	16.6	120	120	0.80	0.67	6.0	0.36	0.09	0.1
5.10	16.7	131	131	0.88	0.67	5.9	0.33	0.07	0.1
5.15	16.9	127	127	0.88	0.70	6.0	0.34	0.08	0.1
5.20	17.1	107	107	0.82	0.77	6.2	0.43	0.10	0.1
5.25	17.2	92	92	0.79	0.86	6.3	0.49	0.12	0.1
5.30	17.4	94	95	0.91	0.96	6.3	0.48	0.11	0.1
5.35	17.6	130	130	1.37	1.05	6.3	0.35	0.08	0.1
5.40	17.7	200	200	1.55	0.78	6.4	0.22	0.05	0.1
5.45	17.9	334	334	2.32	0.69	6.3	0.14	0.03	0.1
5.50	18.0	360	360	2.43	0.68	5.1	0.10	-0.00	0.1
5.55	18.2	319	319	1.73	0.54	3.7	0.08	-0.03	0.1
5.60	18.4	292	292	1.69	0.58	3.4	0.09	-0.05	0.1
5.65	18.5	309	309	1.93	0.63	4.4	0.10	-0.02	0.1
5.70	18.7	345	345	2.05	0.60	4.2	0.09	-0.03	0.1
5.75	18.9	353	353	1.96	0.56	4.0	0.08	-0.03	0.1
5.80	19.0	336	336	1.80	0.54	3.0	0.06	-0.06	0.1
5.85	19.2	284	284	1.71	0.60	1.7	0.04	-0.10	0.1
5.90	19.4	201	201	1.43	0.71	3.1	0.11	-0.10	0.1
5.95	19.5	174	174	1.23	0.70	3.4	0.14	-0.10	0.1
6.00	19.7	177	177	1.15	0.65	4.2	0.17	-0.07	0.1
6.05	19.8	188	188	1.08	0.57	5.1	0.20	-0.03	0.1
6.10	20.0	174	174	1.13	0.65	5.9	0.25	-0.00	0.1
6.15	20.2	166	166	1.15	0.69	6.4	0.26	0.01	0.1
6.20	20.3	153	153	1.18	0.77	6.8	0.32	0.03	0.1
6.25	20.5	153	153	1.17	0.76	7.1	0.33	0.04	0.1
6.30	20.7	162	162	1.22	0.75	7.2	0.32	0.04	0.1
6.35	20.8	174	174	1.29	0.74	7.3	0.30	0.04	0.1
6.40	21.0	180	180	1.45	0.81	7.4	0.29	0.04	0.1
6.45	21.2	183	183	1.56	0.85	7.3	0.29	0.03	0.1
6.50	21.3	179	179	1.53	0.86	7.5	0.30	0.03	0.1
6.55	21.5	181	181	1.17	0.65	7.6	0.30	0.04	0.1
6.60	21.7	193	193	1.14	0.59	7.5	0.29	0.03	0.1
6.65	21.8	226	226	1.42	0.63	7.1	0.23	0.01	0.1
6.70	22.0	286	286	1.99	0.70	7.4	0.19	0.01	0.1
6.75	22.1	311	311	2.42	0.78	5.9	0.14	-0.02	0.1
6.80	22.3	312	312	2.56	0.82	5.3	0.13	-0.03	0.1
6.85	22.5	300	300	2.52	0.84	5.6	0.14	-0.04	0.1
6.90	22.6	301	301	2.28	0.76	5.4	0.13	-0.04	0.1
6.95	22.8	308	308	2.26	0.73	3.9	0.09	-0.08	0.1
7.00	23.0	348	348	2.52	0.72	2.7	0.06	-0.10	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
7.05	23.1	396	396	2.98	0.75	0.8	0.01	-0.12	0.1
7.10	23.3	414	414	3.37	2.81	-0.0	-0.00	-0.13	0.1
7.15	23.5	434	434	3.69	0.85	0.7	0.01	-0.11	0.1
7.20	23.6	419	419	3.64	0.87	1.5	0.03	-0.11	0.1
7.25	23.8	415	419	3.36	0.90	2.3	0.04	-0.09	0.1
7.30	23.9	445	445	3.57	0.80	2.1	0.03	-0.09	0.1
7.35	24.1	477	477	4.14	0.87	1.5	0.02	-0.10	0.1
7.40	24.3	467	467	4.46	0.95	1.5	0.03	-0.10	0.1
7.45	24.4	432	432	4.29	0.99	2.1	0.03	-0.12	0.1
7.50	24.6	400	400	3.72	0.93	2.7	0.05	-0.10	0.1
7.55	24.8	388	389	3.71	0.70	3.1	0.06	-0.09	0.1
7.60	24.9	391	391	2.66	0.68	3.1	0.06	-0.09	0.1
7.65	25.1	382	382	3.09	0.81	3.4	0.06	-0.09	0.1
7.70	25.3	365	366	3.31	0.90	3.1	0.06	-0.10	0.3
7.75	25.4	329	329	2.69	0.82	3.7	0.08	-0.10	0.3
7.80	25.6	312	312	2.29	0.73	3.7	0.09	-0.11	1.3
7.85	25.8	312	312	1.83	0.59	3.8	0.09	-0.11	5.3
7.90	25.9	317	317	2.26	0.71	1.9	0.04	-0.15	3.0
7.95	26.1	305	306	2.45	0.90	4.9	0.12	-0.09	4.8
8.00	26.2	345	345	2.69	0.78	1.4	0.03	-0.15	1.8
8.05	26.4	322	322	2.72	0.64	0.5	0.01	-0.19	0.1
8.10	26.6	319	319	2.39	0.75	1.1	0.03	-0.15	0.1
8.15	26.7	324	324	2.27	0.70	2.2	0.05	-0.15	3.6
8.20	26.9	337	337	2.26	0.67	0.9	0.02	-0.17	1.9
8.25	27.1	349	349	2.32	0.67	-0.5	-0.01	-0.20	0.5
8.30	27.2	356	356	2.35	0.66	-1.6	-0.03	-0.22	0.1
8.35	27.4	360	360	2.45	0.69	-1.5	-0.03	-0.22	0.1
8.40	27.6	384	384	2.60	0.68	-2.3	-0.04	-0.22	0.1
8.45	27.7	402	402	2.77	0.69	-2.2	-0.04	-0.21	0.1
8.50	27.9	414	414	2.35	0.57	-1.9	-0.03	-0.20	0.1
8.55	28.1	413	413	2.58	0.63	-2.5	-0.04	-0.21	0.1
8.60	28.2	412	413	2.83	0.69	1.1	0.02	-0.15	0.1
8.65	28.4	455	455	3.21	0.71	0.5	0.01	-0.15	0.1
8.70	28.5	455	455	3.30	0.73	-0.4	-0.01	-0.16	0.1
8.75	28.7	438	438	3.05	0.70	-0.8	-0.01	-0.17	0.1
8.80	28.9	432	432	2.95	0.66	-1.3	-0.02	-0.19	0.1
8.85	29.0	432	432	2.81	0.65	-1.6	-0.03	-0.19	0.1
8.90	29.2	414	414	2.80	0.68	-2.3	-0.04	-0.21	0.1
8.95	29.4	393	393	2.60	0.66	-2.6	-0.05	-0.23	0.1
9.00	29.5	342	342	2.26	0.66	-2.6	-0.05	-0.27	0.1
9.05	29.7	278	278	1.95	0.70	-2.5	-0.06	-0.33	0.1
9.10	29.9	188	188	1.91	1.01	-2.3	-0.09	-0.48	0.1
9.15	30.0	95	95	1.82	1.91	-2.2	-0.16	-0.95	0.1
9.20	30.2	39	39	1.59	4.06	-1.8	-0.33	-2.26	1.6
9.25	30.3	27	27	0.97	3.57	-1.3	-0.34	-3.14	1.1
9.30	30.5	20	20	0.60	3.02	0.0	0.01	-3.85	0.1
9.35	30.7	17	17	0.44	2.60	1.2	0.78	-3.74	0.1
9.40	30.8	17	17	0.41	2.43	2.8	1.21	-3.38	0.1
9.45	31.0	16	16	0.39	2.53	3.7	1.69	-3.30	0.1
9.50	31.2	16	16	0.34	2.20	4.3	1.97	-3.05	0.1

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
9.55	31.3	16	16	0.36	2.30	4.9	2.27	-2.78	0.1
9.60	31.5	13	14	0.37	2.73	8.9	4.74	-1.15	0.1
9.65	31.7	13	13	0.32	2.47	9.3	5.17	-1.01	0.1
9.70	31.8	13	13	0.29	2.23	10.1	5.70	-0.56	0.1
9.75	32.0	13	13	0.33	2.56	10.7	6.00	-0.29	0.1
9.80	32.2	13	13	?	?	11.4	6.33	0.05	0.1
9.85	32.3	13	13	?	?	11.8	6.62	0.36	0.1

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:N-17
Job No. :1
Tot. Unit Wt. (avg) : 150 pcf

CPT Date :11-20-91 10:40
Cone Used :293
Water table (feet) : 2.296588

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	0.83	0.09	10.80	0.04	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.60	2	1.00	0.02	1.83	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	0.14	0.00	3.00	0.18	undefined	UNDFND	UNDFD	UDF	UNDEFINED
1.25	4	6.33	0.04	0.65	0.23	sensitive fine grained	UNDFND	UNDFD	2	.8
1.55	5	5.00	0.06	1.63	0.27	sensitive fine grained	UNDFND	UNDFD	2	.7
1.85	6	5.00	0.05	1.00	0.32	sensitive fine grained	UNDFND	UNDFD	2	.7
2.15	7	12.50	0.10	0.81	0.36	sandy silt to clayey silt	UNDFND	UNDFD	5	1.2
2.45	8	62.50	0.48	0.77	0.40	sand to silty sand	60-70	42-44	15	UNDEFINED
2.75	9	64.83	0.50	0.76	0.45	sand to silty sand	60-70	42-44	16	UNDEFINED
3.05	10	113.33	0.91	0.81	0.49	sand to silty sand	80-90	44-46	27	UNDEFINED
3.35	11	141.50	0.91	0.65	0.53	sand	80-90	44-46	27	UNDEFINED
3.65	12	148.17	0.99	0.67	0.57	sand	80-90	44-46	28	UNDEFINED
3.95	13	95.17	0.77	0.80	0.62	sand to silty sand	70-80	42-44	23	UNDEFINED
4.25	14	151.00	1.19	0.79	0.66	sand	80-90	44-46	29	UNDEFINED
4.55	15	143.67	1.09	0.76	0.70	sand	80-90	44-46	28	UNDEFINED
4.85	16	88.67	0.70	0.80	0.75	sand to silty sand	60-70	40-42	21	UNDEFINED
5.15	17	119.17	0.85	0.71	0.79	sand to silty sand	70-80	42-44	29	UNDEFINED
5.45	18	159.50	1.29	0.81	0.83	sand	80-90	42-44	31	UNDEFINED
5.75	19	329.67	1.97	0.60	0.88	gravelly sand to sand	>90	46-48	>50	UNDEFINED
6.05	20	226.67	1.40	0.62	0.92	sand	>90	44-46	43	UNDEFINED
6.40	21	166.00	1.23	0.74	0.97	sand	80-90	42-44	32	UNDEFINED
6.70	22	208.00	1.47	0.71	1.01	sand	80-90	44-46	40	UNDEFINED
7.00	23	313.33	2.43	0.77	1.06	sand	>90	44-46	>50	UNDEFINED
7.35	24	429.57	3.54	0.82	1.10	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.65	25	410.00	3.43	0.85	1.15	gravelly sand to sand	>90	46-48	>50	UNDEFINED
7.95	26	323.50	2.47	0.76	1.19	sand	>90	44-46	>50	UNDEFINED
8.25	27	332.67	2.44	0.73	1.23	sand	>90	44-46	>50	UNDEFINED
8.55	28	398.17	2.52	0.65	1.28	gravelly sand to sand	>90	44-46	>50	UNDEFINED
8.85	29	437.33	3.03	0.69	1.32	gravelly sand to sand	>90	46-48	>50	UNDEFINED
9.15	30	285.00	2.22	0.78	1.36	sand	>90	44-46	>50	UNDEFINED
9.45	31	22.67	0.73	3.24	1.41	clayey silt to silty clay	UNDFND	UNDFD	11	2.0
9.75	32	14.00	0.34	2.39	1.45	clayey silt to silty clay	UNDFND	UNDFD	7	1.1

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 154 # sounding

Initial Baseline

Qc	Fs	Pw	Inc
-261	-7.06	-8.7	0.1

Dep	
Qc	0
Fs	0.00
Pw	0.0
Inc	0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

FIELD ACTIVITY LOG SHEET

conoco

age 1 of 1

ocation: ~~P #~~ 0-15, Start Time: 1125, End Time: 1320

ite: DUPONT, Town: E. Chicago, State: Ind

nit: 1, Operators: SEIIS, KASL, D. Wilson,

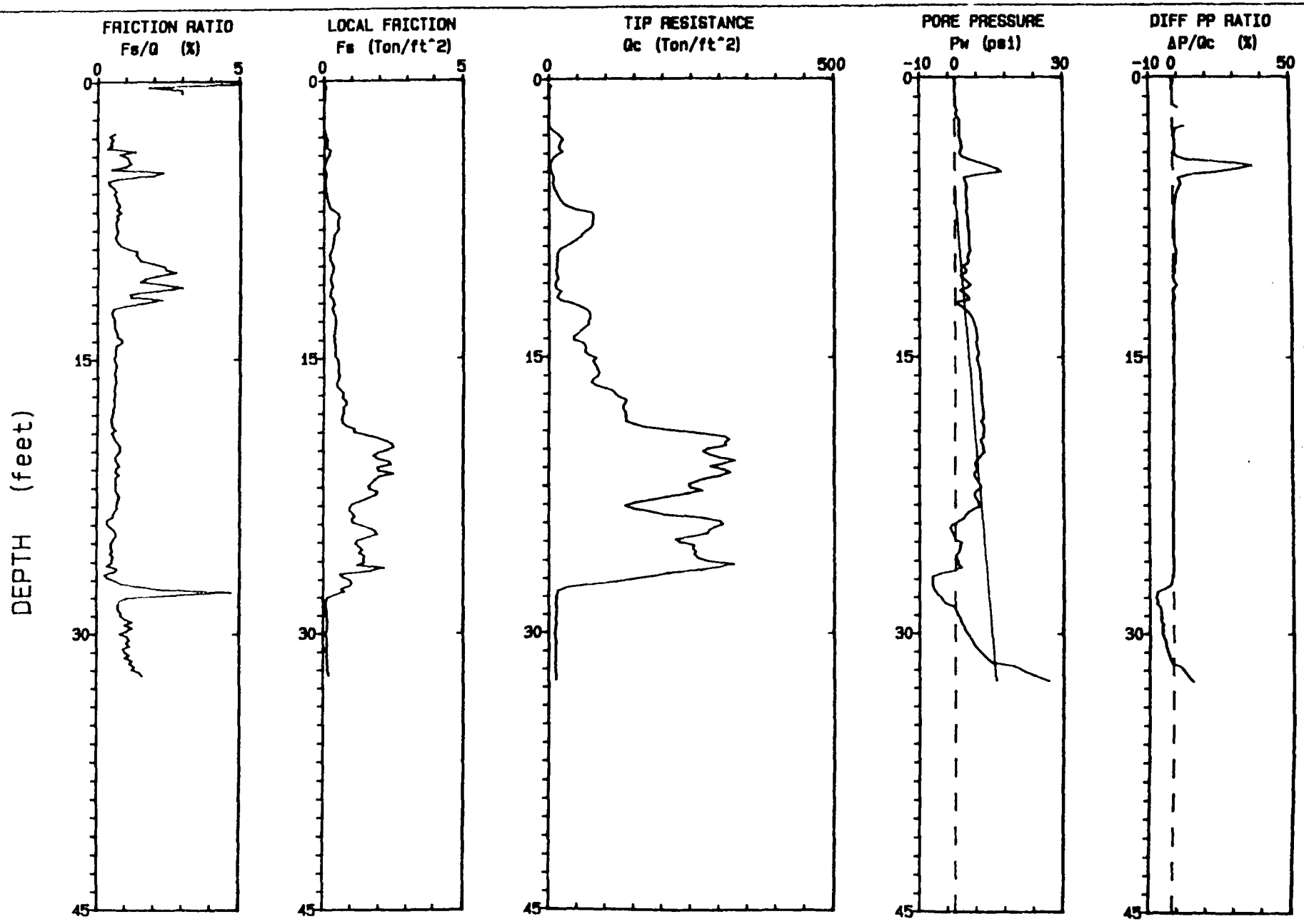
roj. Consultant: Lounsbury, Company: DERS

Date	Start Time	End Time	Location	File	Cone Strat.	Soil	Water	Mont. Well	Depth (ft)	Hole No.	Reason for Stopping 1. Tip Pressure 2. Predetermined Depth 3. Friction 4. Inclination 5. Hydraulic Pressure	Grouting: F - Funnel T - Tubing D - Downhole	Comments
11-20-91	1232	1305	0-15	CPT015	✓				32.6	1	2	F	Clay AT 29.2

Conoco, Inc.

OPERATOR : CALVIN SELLS CPT Date : 11-20-91 12:43 FILE CPT015 Pg 1 / 1

LOCATION : 0-15 CONE USED : 293 HOLE NO. : 1



Depth Increment : .05 m Max Depth : 32.64 ft

SOUNDING DATA IN FILE CPT015 11-20-91 12:43

OPERATOR : CALVIN SELLS LOCATION : O-15

CONE ID : 293 JOB No. : 1

Conoco, Inc.

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATIO I deg
Baseline		-260		-7.36		-9.2			0.1
0.05	0.2	1	1	0.05	4.37	3.1	0.77	2.77	0.3
0.10	0.3	5	5	0.09	1.88	0.3	0.38	0.38	0.3
0.15	0.5	2	2	0.06	3.69	0.0	0.14	0.14	0.3
0.20	0.7	1	1	0.03	4.69	0.2	0.22	0.22	0.3
0.25	0.8	0	0	0.05	10.18	0.0	0.00	0.00	0.2
0.30	1.0	1	1	0.04	3.10	0.0	0.00	0.00	0.4
0.35	1.1	0	0	-0.00	-5.00	0.0	6.90	6.90	0.2
0.40	1.3	0	0	-0.01	?	0.0	-	?	0.1
0.45	1.5	1	1	-0.01	-0.58	0.0	0.28	0.28	0.3
0.50	1.6	1	1	-0.01	-1.17	0.3	4.82	4.82	0.3
0.55	1.8	0	0	-0.01	-8.00	2.7	56.88	56.88	
0.60	2.0	0	0	-0.21	?	0.2	?	?	
0.65	2.1	-0	-0	-0.01	2.67	0.7	-20.11	-20.11	0.3
0.70	2.3	-0	-0	-0.01	4.00	1.3	-54.30	-54.30	1.9
0.75	2.5	-0	-0	-0.01	11.00	1.3	%-227.54	%-227.54	
0.80	2.6	2	2	0.00	0.09	1.3	5.17	5.17	1.3
0.85	2.8	8	8	0.05	0.61	1.3	1.20	1.20	1.1
0.90	3.0	16	16	0.07	0.43	1.3	0.61	0.61	0.9
0.95	3.1	21	21	0.18	0.89	1.1	0.38	0.38	0.7
1.00	3.3	24	24	0.11	0.45	1.3	0.40	0.40	0.6
1.05	3.4	20	20	0.10	0.49	1.6	0.58	0.58	0.6
1.10	3.6	18	18	0.06	0.35	1.7	0.66	0.66	0.6
1.15	3.8	18	18	0.24	1.30	2.0	0.78	0.78	0.5
1.20	3.9	24	24	0.19	0.81	1.6	0.50	0.50	0.5
1.25	4.1	15	15	0.16	1.10	1.3	0.65	0.65	0.4
1.30	4.3	8	8	0.09	1.19	2.0	1.90	1.90	0.3
1.35	4.4	5	5	0.06	1.28	4.0	6.09	6.09	0.3
1.40	4.6	2	2	0.02	1.00	6.9	24.28	24.28	0.3
1.45	4.8	2	2	0.01	0.70	9.5	36.51	36.51	0.3
1.50	4.9	3	3	0.07	2.47	11.8	30.19	30.19	0.3
1.55	5.1	5	5	0.10	1.96	12.9	19.34	19.34	0.3
1.60	5.2	7	7	0.05	0.72	6.1	5.42	6.42	0.4
1.65	5.4	6	6	0.03	0.33	2.3	1.98	1.98	0.4
1.70	5.6	7	8	0.03	0.41	2.7	2.57	2.57	0.3
1.75	5.7	7	8	0.04	0.49	3.1	2.96	2.96	0.3
1.80	5.9	9	9	0.06	0.67	3.2	2.47	2.47	
1.85	6.1	12	12	0.07	0.64	3.2	1.95	1.95	
1.90	6.2	15	15	0.10	0.63	3.0	1.43	1.40	0.4
1.95	6.4	18	18	0.12	0.67	3.1	1.22	1.17	0.4
2.00	6.6	21	21	0.16	0.77	3.3	1.13	1.05	0.4

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
2.05	6.7	26	26	0.20	0.79	3.3	0.92	0.84	0.4
2.10	6.9	33	33	0.23	0.68	3.4	0.73	0.65	0.3
2.15	7.1	48	48	0.40	0.84	3.4	0.50	0.44	0.3
2.20	7.2	76	76	0.53	0.70	3.0	0.28	0.24	0.3
2.25	7.4	77	77	0.55	0.72	3.3	0.31	0.26	0.3
2.30	7.5	77	77	0.50	0.65	3.5	0.33	0.27	0.3
2.35	7.7	76	76	0.49	0.65	3.5	0.34	0.27	0.3
2.40	7.9	76	76	0.50	0.66	3.6	0.34	0.27	0.3
2.45	8.0	73	73	0.52	0.71	3.6	0.36	0.28	0.3
2.50	8.2	65	65	0.45	0.70	3.8	0.42	0.32	0.3
2.55	8.4	59	59	0.37	0.62	3.9	0.48	0.36	0.3
2.60	8.5	56	56	0.36	0.64	3.9	0.51	0.37	0.3
2.65	8.7	48	48	0.35	0.72	3.9	0.55	0.41	0.3
2.70	8.9	40	40	0.33	0.83	3.9	0.70	0.49	0.3
2.75	9.0	30	30	0.30	1.06	4.0	0.95	0.64	0.3
2.80	9.2	20	20	0.28	1.39	4.1	1.48	0.99	0.3
2.85	9.4	17	17	0.23	1.37	4.1	1.74	1.13	0.4
2.90	9.5	14	14	0.20	1.38	3.7	1.86	1.10	0.3
2.95	9.7	14	14	0.21	1.53	3.3	1.75	0.92	0.3
3.00	9.8	14	14	0.27	1.96	3.7	1.96	1.09	0.3
3.05	10.0	14	14	0.33	2.40	3.6	1.91	1.00	0.3
3.10	10.2	14	14	0.34	2.39	2.2	1.11	0.21	0.3
3.15	10.3	12	12	0.33	2.80	3.0	1.82	0.68	0.3
3.20	10.5	13	13	0.27	2.12	3.0	1.66	0.39	0.3
3.25	10.7	15	15	0.25	1.68	1.6	0.77	-0.20	0.3
3.30	10.8	16	16	0.24	1.46	2.3	1.02	0.12	0.3
3.35	11.0	12	12	0.29	2.52	3.3	2.08	0.75	0.3
3.40	11.2	11	11	0.33	2.95	4.4	2.86	1.43	0.3
3.45	11.3	13	13	0.27	2.08	3.3	1.81	0.55	0.3
3.50	11.5	21	21	0.24	1.14	1.3	0.45	-0.34	0.3
3.55	11.6	17	17	0.20	1.17	2.5	1.07	0.04	0.3
3.60	11.8	14	14	0.32	2.24	3.6	1.83	0.57	0.3
3.65	12.0	21	21	0.35	1.70	3.9	1.36	0.47	0.3
3.70	12.1	39	39	0.38	0.97	0.0	0.00	-0.48	0.3
3.75	12.3	53	53	0.30	0.56	1.3	0.18	-0.18	0.4
3.80	12.5	65	66	0.33	0.50	2.6	0.29	-0.02	0.4
3.85	12.6	71	71	0.37	0.53	3.6	0.37	0.08	0.4
3.90	12.8	72	72	0.43	0.59	4.3	0.43	0.13	0.4
3.95	13.0	72	72	0.43	0.60	4.9	0.49	0.19	0.4
4.00	13.1	69	69	0.43	0.62	5.2	0.55	0.23	0.4
4.05	13.3	70	70	0.43	0.61	5.6	0.57	0.25	0.4
4.10	13.5	63	63	0.42	0.67	5.7	0.65	0.29	0.4
4.15	13.6	56	56	0.40	0.71	5.9	0.76	0.34	0.4
4.20	13.8	50	50	0.35	0.70	6.0	0.87	0.38	0.4
4.25	13.9	43	43	0.37	0.87	6.2	1.04	0.46	0.4
4.30	14.1	43	43	0.37	0.86	6.2	1.05	0.46	0.4
4.35	14.3	60	60	0.40	0.67	5.9	0.71	0.28	0.4
4.40	14.4	64	64	0.41	0.63	6.1	0.66	0.28	0.4
4.45	14.6	64	64	0.41	0.65	6.3	0.72	0.30	0.4
4.50	14.8	63	63	0.41	0.64	6.6	0.75	0.32	0.3

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
4.55	14.9	70	70	0.41	0.58	6.6	0.67	0.26	0.3
4.60	15.1	53	53	0.51	0.62	5.1	0.53	0.19	0.4
4.65	15.3	77	78	0.52	0.67	6.3	0.59	0.22	0.4
4.70	15.4	80	80	0.54	0.67	6.6	0.59	0.22	0.4
4.75	15.6	84	84	0.54	0.64	6.7	0.58	0.22	0.3
4.80	15.7	86	87	0.53	0.61	6.9	0.57	0.22	0.3
4.85	15.9	87	87	0.54	0.63	6.9	0.57	0.22	0.3
4.90	16.1	85	85	0.54	0.64	6.9	0.59	0.22	0.3
4.95	16.2	77	77	0.51	0.66	7.1	0.66	0.25	0.3
5.00	16.4	73	73	0.45	0.62	7.2	0.71	0.27	0.3
5.05	16.6	81	81	0.48	0.59	7.2	0.64	0.24	0.3
5.10	16.7	99	99	0.58	0.59	7.2	0.52	0.19	0.3
5.15	16.9	111	112	0.70	0.63	7.2	0.47	0.16	0.4
5.20	17.1	117	117	0.70	0.60	7.4	0.45	0.15	0.4
5.25	17.2	122	122	0.69	0.57	7.5	0.44	0.16	0.4
5.30	17.4	136	136	0.82	0.60	7.4	0.39	0.13	0.4
5.35	17.6	134	134	0.82	0.61	7.5	0.40	0.14	0.4
5.40	17.7	130	131	0.71	0.54	7.7	0.43	0.15	0.4
5.45	17.9	130	130	0.72	0.56	7.6	0.43	0.15	0.4
5.50	18.0	134	134	0.72	0.54	7.9	0.42	0.14	0.4
5.55	18.2	135	135	0.66	0.49	7.9	0.42	0.14	0.4
5.60	18.4	135	135	0.66	0.49	7.9	0.42	0.14	0.4
5.65	18.5	135	135	0.69	0.51	7.2	0.39	0.10	0.4
5.70	18.7	150	150	0.81	0.54	7.9	0.36	0.11	0.4
5.75	18.9	159	159	1.12	0.66	8.1	0.35	0.11	0.4
5.80	19.0	214	214	1.10	0.51	8.1	0.27	0.08	0.4
5.85	19.2	265	265	1.53	0.58	7.9	0.21	0.06	0.4
5.90	19.4	310	310	1.93	0.62	8.0	0.19	0.05	0.4
5.95	19.5	318	318	2.25	0.71	7.2	0.16	0.03	0.4
6.00	19.7	311	312	2.47	2.79	7.4	0.17	0.03	0.4
6.05	19.8	312	312	2.54	0.81	7.8	0.18	0.04	0.4
6.10	20.0	261	261	2.31	0.82	7.8	0.20	0.05	0.4
6.15	20.2	271	271	1.95	0.72	8.2	0.22	0.05	0.4
6.20	20.3	282	282	1.77	0.63	7.2	0.18	0.03	0.4
6.25	20.5	301	301	1.94	0.64	6.6	0.16	0.01	0.4
6.30	20.7	328	328	2.37	0.72	5.8	0.13	-0.01	0.4
6.35	20.8	309	309	2.42	0.78	5.4	0.13	-0.02	0.4
6.40	21.0	284	284	1.93	0.68	5.9	0.15	-0.01	0.4
6.45	21.2	308	308	1.97	0.64	6.2	0.15	-0.01	0.4
6.50	21.3	320	321	2.53	0.79	5.3	0.12	-0.03	0.4
6.55	21.5	302	302	1.99	0.66	5.4	0.13	-0.03	0.5
6.60	21.7	277	277	1.86	0.67	6.0	0.16	-0.02	0.5
6.65	21.8	260	260	1.74	0.67	6.6	0.18	-0.01	0.4
6.70	22.0	246	246	1.62	0.66	7.2	0.20	0.00	0.4
6.75	22.1	248	248	1.67	0.68	7.0	0.20	-0.00	0.4
6.80	22.3	270	270	1.93	0.71	5.8	0.15	-0.03	0.4
6.85	22.5	243	243	1.90	0.75	5.2	0.15	-0.06	0.4
6.90	22.6	209	209	1.59	0.76	5.6	0.19	-0.05	0.4
6.95	22.8	183	183	1.31	0.72	6.2	0.24	-0.04	0.5
7.00	23.0	150	150	1.03	0.69	6.5	0.31	-0.04	0.5

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
7.05	23.1	133	134	0.94	0.71	6.8	0.37	-0.03	0.6
7.10	23.3	149	149	0.93	0.62	4.9	0.24	-0.12	0.5
7.15	23.5	181	181	1.05	0.58	3.5	0.14	-0.16	0.6
7.20	23.6	204	204	1.13	0.56	2.6	0.10	-0.17	0.4
7.25	23.8	271	271	1.02	0.38	2.3	0.06	-0.14	0.5
7.30	23.9	303	303	1.05	0.35	0.7	0.02	-0.17	0.5
7.35	24.1	307	307	1.40	0.46	-1.0	-0.02	-0.21	0.5
7.40	24.3	291	291	1.69	0.58	-1.3	-0.04	-0.23	0.5
7.45	24.4	282	282	1.85	0.66	-1.1	-0.03	-0.23	0.5
7.50	24.6	279	279	1.93	0.69	-0.6	-0.02	-0.22	0.5
7.55	24.8	257	257	1.36	0.61	-2.3	-0.01	-0.24	0.5
7.60	24.9	222	222	1.20	0.54	0.0	0.00	-0.26	0.5
7.65	25.1	230	230	1.14	0.50	1.7	0.05	-0.21	0.5
7.70	25.3	256	256	1.26	0.50	1.3	0.04	-0.20	0.5
7.75	25.4	253	253	1.40	0.55	1.3	0.04	-0.20	0.5
7.80	25.6	259	259	1.27	0.49	1.0	0.03	-0.21	0.5
7.85	25.8	256	256	1.46	0.58	0.1	0.00	-0.24	0.5
7.90	25.9	262	262	1.43	0.54	0.4	0.01	-0.23	0.5
7.95	26.1	278	278	1.47	0.53	0.7	0.02	-0.21	0.5
8.00	26.2	326	326	1.21	0.37	0.7	0.02	-0.18	0.6
8.05	26.4	299	299	2.20	0.74	1.7	0.04	-0.17	0.6
8.10	26.6	269	269	1.71	0.64	-0.2	-0.00	-0.24	0.7
8.15	26.7	210	210	0.57	0.27	-4.2	-0.14	-0.45	0.7
8.20	26.9	185	185	0.70	0.38	-6.5	-0.25	-0.60	0.7
8.25	27.1	149	149	0.96	0.65	-6.5	-0.31	-0.75	0.7
8.30	27.2	118	118	1.03	0.87	-6.5	-0.39	-0.95	0.7
8.35	27.4	65	65	0.95	1.46	-6.4	-0.71	-1.73	0.7
8.40	27.6	29	29	0.63	2.16	-6.1	-1.52	-3.61	0.5
8.45	27.7	16	16	0.76	4.63	-5.5	-2.43	-6.56	0.5
8.50	27.9	15	15	0.42	2.79	-4.9	-2.36	-6.90	0.6
8.55	28.1	13	13	0.14	1.05	-3.9	-2.14	-7.42	0.6
8.60	28.2	14	14	0.11	0.80	-3.4	-1.82	-6.90	0.6
8.65	28.4	13	13	0.10	0.76	-2.9	-1.62	-6.98	0.6
8.70	28.5	13	13	0.10	0.73	-0.5	-0.26	-5.60	0.8
8.75	28.7	13	13	0.10	0.79	0.0	0.00	-5.45	0.6
8.80	28.9	13	13	0.11	0.83	0.4	0.21	-5.36	0.6
8.85	29.0	13	13	0.11	0.86	0.7	0.41	-5.29	0.8
8.90	29.2	12	12	0.12	0.99	1.3	0.74	-5.14	0.9
8.95	29.4	12	12	0.15	1.21	1.6	0.97	-4.96	0.8
9.00	29.5	14	14	0.14	1.05	2.0	1.05	-4.34	0.9
9.05	29.7	12	12	0.15	1.23	2.5	1.45	-4.59	0.8
9.10	29.9	12	12	0.13	1.09	2.8	1.74	-4.69	0.8
9.15	30.0	11	11	0.09	0.83	3.3	2.07	-4.54	0.5
9.20	30.2	11	11	0.12	1.08	3.9	2.44	-4.17	0.8
9.25	30.3	12	12	0.14	1.23	4.3	2.65	-3.88	0.9
9.30	30.5	13	13	0.14	1.10	4.9	3.71	-3.20	0.8
9.35	30.7	12	12	0.14	1.23	5.3	3.30	-3.33	0.9
9.40	30.8	12	12	0.11	0.95	6.1	3.98	-2.91	0.8
9.45	31.0	12	12	0.12	0.97	6.9	4.15	-2.39	0.8
9.50	31.2	12	12	0.14	1.22	7.8	4.24	-1.74	0.8

DEPTH meters	DEPTH feet	TIP RESISTANCE Qc tsf	CORRECTED TIP Qt tsf	LOCAL FRICTION Fs tsf	FRICTION RATIO Fs/Qc %	PORE PRESSURE Pw psi	P P RATIO Pw/Qc %	DIFF P P RATIO (Pw-Ph)/Qc %	INCLINATION I deg
9.55	31.3	12	12	0.12	1.05	8.5	5.24	-1.51	0.8
9.60	31.5	12	12	0.15	1.23	9.4	5.59	-0.94	0.8
9.65	31.7	12	12	0.14	1.17	10.5	6.16	-0.36	0.8
9.70	31.8	12	12	0.16	1.34	15.3	10.02	3.13	0.9
9.75	32.0	12	13	0.15	1.31	18.2	10.60	4.06	0.8
9.80	32.2	12	13	0.18	1.48	19.8	11.51	4.93	0.8
9.85	32.3	13	13	0.21	1.58	21.9	12.10	5.80	0.8
9.90	32.5	13	14	?	-	23.8	12.91	6.69	0.8
9.95	32.6	13	13	?	?	26.1	14.40	8.04	0.8

WRITE NUMBER OF RODS USED ___

CONOCO INC

Operator :CALVIN SELLS
On Site Loc:D-15
Job No. :1
Tot. Unit Wt. (avg) : 130 pcf

CPT Date :11-20-91 12:43
Cone Used :293
Water table (feet) : 2.000000

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	1.67	0.05	3.00	0.04	clay	UNDFND	UNDFD	2	.1
0.60	2	0.33	-0.01	-2.50	0.11	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.95	3	6.71	0.03	0.45	0.18	sensitive fine grained	UNDFND	UNDFD	3	.5
1.25	4	19.83	0.14	0.72	0.22	sandy silt to clayey silt	UNDFND	UNDFD	8	1.9
1.55	5	4.17	0.06	1.40	0.27	sensitive fine grained	UNDFND	UNDFD	3	.3
1.85	6	8.33	0.05	0.56	0.32	sensitive fine grained	UNDFND	UNDFD	4	.7
2.15	7	26.83	0.20	0.75	0.36	silty sand to sandy silt	40-50	36-40	9	UNDEFINED
2.45	8	75.83	0.51	0.62	0.40	sand to silty sand	70-80	42-44	18	UNDEFINED
2.75	9	49.67	0.35	0.73	0.45	silty sand to sandy silt	50-60	40-42	16	UNDEFINED
3.05	10	15.50	0.25	1.63	0.49	clayey silt to silty clay	UNDFND	UNDFD	7	1.4
3.35	11	13.67	0.29	2.10	0.53	clayey silt to silty clay	UNDFND	UNDFD	7	1.2
3.65	12	16.17	0.29	1.76	0.57	clayey silt to silty clay	UNDFND	UNDFD	8	1.5
3.95	13	62.00	0.37	0.60	0.62	sand to silty sand	50-60	42-42	15	UNDEFINED
4.25	14	58.50	0.40	0.68	0.66	sand to silty sand	50-60	40-42	14	UNDEFINED
4.55	15	60.67	0.40	0.66	0.70	sand to silty sand	50-60	40-42	15	UNDEFINED
4.85	16	82.83	0.53	0.64	0.75	sand to silty sand	60-70	42-42	20	UNDEFINED
5.15	17	87.67	0.54	0.62	0.79	sand to silty sand	60-70	40-42	21	UNDEFINED
5.45	18	128.17	0.74	0.58	0.83	sand	70-80	42-44	25	UNDEFINED
5.75	19	143.00	0.78	0.54	0.88	sand	70-80	42-44	27	UNDEFINED
6.05	20	288.33	1.97	0.68	0.92	sand	>90	44-46	>50	UNDEFINED
6.40	21	293.71	2.10	0.71	0.97	sand	>90	44-46	>50	UNDEFINED
6.70	22	285.50	1.95	0.68	1.01	sand	>90	44-46	>50	UNDEFINED
7.00	23	217.17	1.57	0.72	1.06	sand	80-90	44-46	42	UNDEFINED
7.35	24	221.14	1.37	0.49	1.10	sand	80-90	44-46	42	UNDEFINED
7.65	25	250.17	1.56	0.60	1.15	sand	>90	44-46	50	UNDEFINED
7.95	26	260.67	1.39	0.53	1.19	sand	>90	44-46	50	UNDEFINED
8.25	27	209.67	1.23	0.51	1.23	sand	80-90	42-44	45	UNDEFINED
8.55	28	42.67	0.66	1.54	1.28	silty sand to sandy silt	<40	34-36	14	UNDEFINED
8.85	29	13.17	0.10	0.80	1.32	sandy silt to clayey silt	UNDFND	UNDFD	5	1.1
9.15	30	12.17	0.13	1.07	1.36	sandy silt to clayey silt	UNDFND	UNDFD	5	.9
9.45	31	12.00	0.13	1.07	1.41	sandy silt to clayey silt	UNDFND	UNDFD	5	.9
9.75	32	12.00	0.14	1.19	1.45	clayey silt to silty clay	UNDFND	UNDFD	6	.9

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 10

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

File space: 142 a sounding

Initial Baseline

Qc	Fs	Rw	Inc
-261	-7.06	-8.5	0.1

Dep

Qc [illegible]

Fs -0.00

Rw 0.0

Inc 0.1

F1=Start F2=Baseline F3=Continue F4=Printer Off F10=DOS

Monitoring Network Information

Monitoring Sites Installed by U.S.G.S.

Summary of DuPont Monitoring Well Construction Information

Technical Memorandum No. 1: Phase II Groundwater Assessment Field Work Implementation

Phase III Monitoring Wells and Piezometers

Resurveying of Monitoring Well Elevations

Monitoring Sites Installed by U.S.G.S.

(excerpts from Fenelon and Watson 1993)

Geohydrology and Water Quality of the Calumet Aquifer, in the Vicinity of the Grand Calumet River/Indiana Harbor Canal, Northwestern Indiana

By JOSEPH M. FENELON and LEE R. WATSON

Prepared in cooperation with the
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 92-4115

Indianapolis, Indiana
1993

Table 1. Characteristics of observation wells completed in the Calumet aquifer

[USGS, U.S. Geological Survey; i.d., identification; n.a., not applicable; ?, not known; CA, screened in the Calumet aquifer; GAA, Gary Airport Authority; USX, USX Corporation; Auger, hollow stem auger]

Well name	Well owner	Latitude/longitude	USGS site i.d. number	Date drilled (month/year)	Method of installation	Land surface in feet above sea level	Screened interval in feet below land surface	Screen and casing stainless-steel type	Relative vertical position of screen in aquifer
A1	USGS	413647/871919	413647087191901	07/85	Auger	604	18-21	304	Top
A2	USGS	413706/871818	413706087181800	06/87	Auger	603	34-39	316L	Middle
A3	USGS	413631/871820	413631087182000	06/87	Hand driven	590	3-6	316L	Top
A4	USGS	413630/871821	413630087182100	06/87	Auger	603	18-23	316L	Middle
A5	USGS	413629/871921	413629087192102	12/85	Auger	601	18-21	304	Top
A6	USGS	413706/871701	413706087170101	06/87	Hand driven	588	4-7	316L	Top
A10	USGS	413626/871919	413626087191901	07/85	Hand driven	590	12-15	304	Top
A15	USGS	413617/871912	413617087191201	07/85	Hand driven	591	2-5	304	Top
A20	USGS	413503/871935	413503087193501	12/85	Auger	614	21-24	304	Top
B1	USGS	413637/872343	413637087234301	08/85	Hand driven	585	9-12	304	Top
B2	USGS	413752/872235	413752087223500	06/87	Auger	608	43-48	316L	Middle
B3	USGS	413633/872220	413633087222000	06/87	Auger	594	18-23	316L	Middle
B5	USGS	413632/872340	413632087234001	08/85	Hand driven	589	8-11	304	Top
B7	USGS	413617/872252	413617087225202	06/87	Hand driven	596	8-11	316L	Top
B8	USGS	413617/872252	413617087225201	06/87	Auger	596	32-37	316L	Bottom
B10	USGS	413544/872337	413544087233700	12/85	Auger	607	17-20	304	Top
C1	USGS	413830/872600	413830087260001	12/85	Auger	587	4-7	304	Top
C2	USGS	414031/872450	414031087245000	06/87	Auger	594	22-27	316L	Middle
C3	USGS	413828/872513	413828087251301	06/87	Auger	589	23-28	316L	Middle
C4	USGS	413828/872513	413828087251302	06/87	Auger	589	8-13	316L	Top
C5	USGS	413655/872620	413655087275202	07/85	Hand driven	584	2-5	304	Top
C10	USGS	413650/872620	413652087274901	07/85	Hand driven	584	1-4	304	Top
C12	USGS	413650/872620	413650087262000	06/87	Auger	584	13-18	316L	Middle
C15	USGS	413648/872620	413650087274802	07/85	Hand driven	583	1-4	304	Top
[1]C17	USGS	413559/872703	413559087270301	07/86	Mud rotary	592	18-23	n.a.	Bottom

Table 1. Characteristics of observation wells completed in the Calumet aquifer--Continued

Well name	Well owner	Latitude/longitude	USGS site I.d. number	Date drilled (month/year)	Method of installation	Land surface in feet above sea level	Screened interval in feet below land surface	Screen and casing stainless-steel type	Relative vertical position of screen in aquifer
C18	USGS	413607/872522	413607087252200	06/87	Auger	595	17-22	316L	Bottom
C19	USGS	413617/872620	413617087262001	12/86	Hand driven	591	2-5	304	Top
C20	USGS	413557/872611	413557087283901	07/85	Hand driven	593	3-6	304	Top
C25	USGS	413527/872543	413527087254301	07/85	Hand driven	599	2-5	304	Top
CGA3	GAA	413722/872513	n.a.	pre-1985	?	590	CA	n.a.	?
CGA4	GAA	413719/872519	n.a.	pre-1985	?	591	CA	n.a.	?
CGA5	GAA	413733/872520	n.a.	pre-1985	?	594	CA	n.a.	?
D1	USGS	414052/872912	414052087291201	07/85	Hand driven	590	8-11	304	Top
D5	USGS	414043/872908	414043087290802	07/85	Hand driven	588	2-7	304	Top
D10	USGS	414043/872908	414043087290802	07/85	Hand driven	588	7-10	304	Top
D11	USGS	414043/872908	414043087290801	06/87	Auger	588	17-22	316L	Middle
D20	USGS	413941/872900	413941087290000	07/85	Hand	588	6-9	304	Top
D21	USGS	413941/872926	413941087292600	06/87	Auger	584	13-18	316L	Middle
D25	USGS	413909/872803	413804087291102	07/85	Hand driven	588	5-8	304	Top
D30	USGS	413907/872758	413758087290702	07/85	Hand driven	586	6-9	304	Top
D31	USGS	413907/872758	413907087275901	06/87	Auger	586	12-17	316L	Middle
D35	USGS	413906/872757	413757087290601	07/85	Hand driven	586	4-7	304	Top
D40	USGS	413835/872851	413835087245101	07/85	Hand driven	584	4-7	304	Top
D45	USGS	413812/872702	413812087270201	07/85	Hand driven	586	6-9	304	Top
D50	USGS	413800/872854	413800087285401	12/85	Hand driven	585	9-12	304	Top

Table 1. Characteristics of observation wells completed in the Calumet aquifer--Continued

Well name	Well owner	Latitude/longitude	USGS site I.d. number	Date drilled (month/year)	Method of installation	Land surface in feet above sea level	Screened interval in feet below land surface	Screen and casing stainless-steel type	Relative vertical position of screen in aquifer
D55	USGS	413758/872814	413758087281401	07/85	Hand driven	585	5-8	304	Top
D60	USGS	413758/872810	413758087281001	07/85	Hand driven	587	5-8	304	Top
D65	USGS	413759/872801	413759087280101	07/85	Hand driven	584	1-4	304	Top
D66	USGS	413654/872740	413654087274000	06/87	Auger	587	17-22	316L	Middle
D67	USGS	413647/872825	413647087282502	06/87	Hand driven	589	4-7	316L	Top
D68	USGS	413647/872825	413647087282501	06/87	Auger	589	18-23	316L	Middle
D70	USGS	413515/872914	413515087291401	07/85	Hand driven	603	6-9	304	Top
D75	USGS	413435/872919	413435087291901	07/85	Hand driven	601	5-8	304	Top
E1	USGS	413844/873104	413844087310401	07/85	Hand driven	582	5-8	304	Top
E2	USGS	414105/872939	414105087293900	06/87	Hand driven	585	3-6	316L	Top
E3	USGS	414013/873033	414013087303300	06/87	Auger	585	7-12	316L	Middle
E5	USGS	413810/873052	413810087305201	07/85	Hand driven	587	9-12	304	Top
E6	USGS	413938/873043	413938087304301	06/87	Auger	586	17-22	316L	Bottom
E7	USGS	413938/873043	413938087304302	06/87	Hand driven	586	3-6	316L	Top
E10	USGS	413722/873041	413722087304101	07/85	Hand driven	586	6-9	304	Top
E15	USGS	413720/873042	413720087304201	07/85	Hand driven	584	11-14	304	Top
E17	USGS	413719/873045	413719087304501	07/85	Hand driven	584	5-8	304	Top
E20	USGS	413627/873105	413627087310500	07/85	Hand driven	592	5-8	304	Top
HWT2-9	USX	413752/872235	n.a.	04/84	Auger	608	50-70	n.a.	Bottom
HWT2-10	USX	413732/872322	n.a.	04/84	Auger	589	24-44	n.a.	Bottom
HWT14-5	USX	413722/872255	n.a.	04/84	Auger	589	27-47	n.a.	Bottom
P4	USX	413744/872239	n.a.	04/84	Auger	603	25-35	n.a.	Top
P7	USX	413738/872248	n.a.	04/84	Auger	601	20-30	n.a.	Top
P11	USX	413734/872251	n.a.	04/84	Auger	596	15-25	n.a.	Top

[1]Continuous recording water-level well (LK 13) operated by the USGS as part of a State ground-water data network. Water levels are published in the USGS annual data report for Indiana, water years 1986 92.

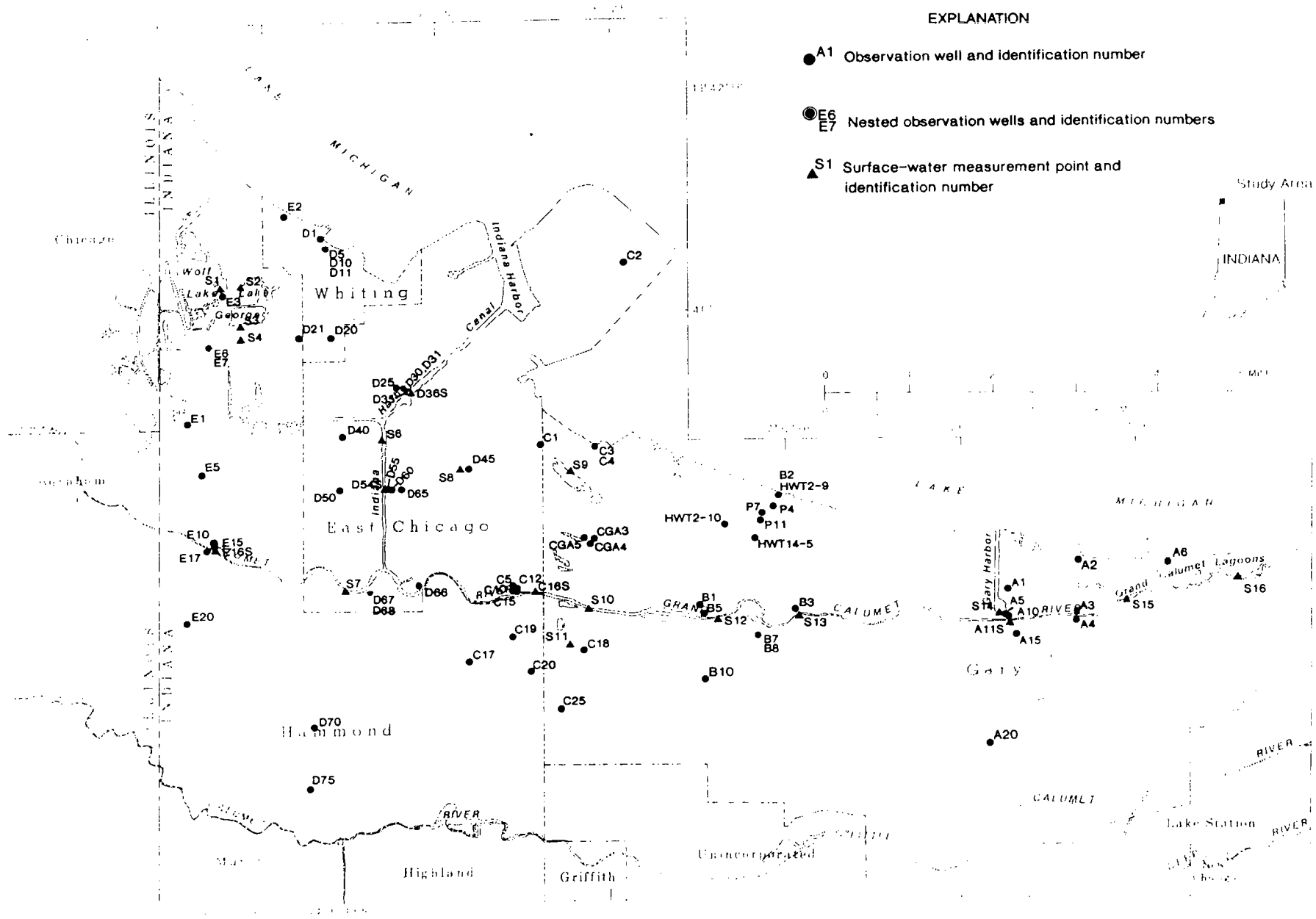
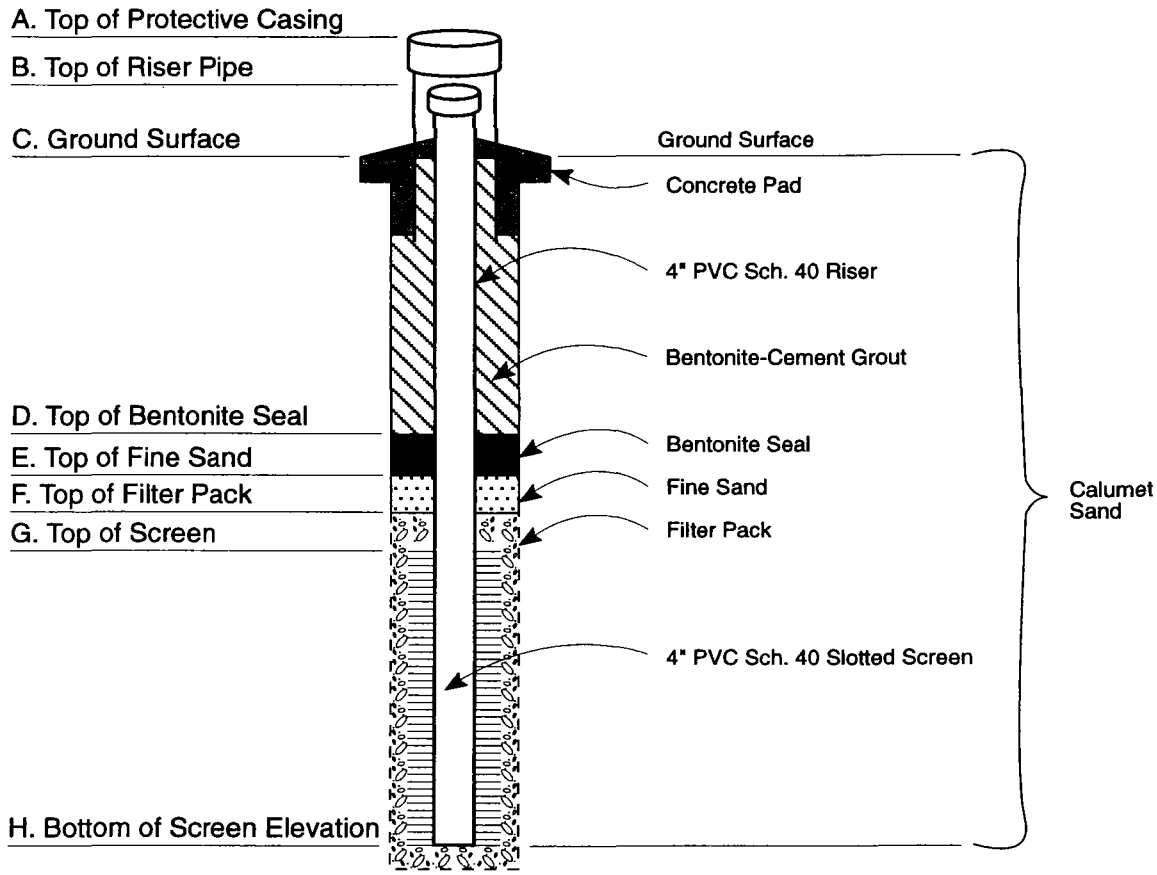


Figure 2. Water-level network in the study area.

Summary of DuPont Monitoring Well Construction Information



	MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW14	MW15	MW16	MW17	MW18	MW19	MW20	MW21	MW22
A.	592.92	590.54	594.30	590.17	590.28	589.25	585.58	592.22	589.62	590.67	590.38	590.45	589.12	591.23	592.11	591.53	591.67	593.43	591.96	592.88	591.81	592.16
B.	592.78	590.48	594.19	589.89	590.13	589.08	585.34	591.82	589.31	590.47	590.10	590.12	588.99	590.87	591.86	591.17	591.24	593.15	591.58	592.46	590.14	590.69
C.	590.10	587.21	591.07	587.46	587.79	586.77	582.82	589.27	587.16	587.84	587.62	587.70	586.46	588.38	590.45	588.61	588.96	590.02	589.26	590.20	588.65	589.02
D.	*	*	*	579.46	579.79	578.77	575.82	582.27	580.66	577.84	578.62	576.70	574.46	576.38	581.45	577.61	576.96	579.02	577.26	581.20	581.65	583.02
E.	*	*	*	577.46	576.19	574.77	572.82	579.27	577.16	574.84	574.12	574.70	572.46	574.38	579.45	575.61	574.96	575.52	575.26	578.20	581.65	583.02
F.	*	*	*	575.46	573.79	572.77	570.02	577.27	575.16	571.34	571.62	572.70	569.46	572.38	577.45	573.61	572.96	573.52	573.26	575.70	581.65	583.02
G.	*	*	*	573.46	571.79	571.77	568.12	575.27	572.66	569.34	571.22	570.70	567.46	570.38	575.45	571.61	570.96	571.52	571.26	573.20	580.15	580.52
H.	570.60	558.21	561.87	558.46	556.79	556.77	553.52	560.27	557.66	554.34	556.22	555.70	557.46	560.38	560.45	556.61	555.96	556.52	556.26	558.20	554.65	555.02

* Not constructed by DuPont; data unavailable.
Summary information for MW1-MW20 obtained in 1990.
Summary information for MW21-MW22 obtained in 199_.

Monitoring Well Construction Diagram

DuPont East Chicago Current Conditions Report

CH2MHILL

Technical Memorandum No. 1: Phase II Groundwater Assessment Field Work Implementation

(includes hydraulic conductivity information)

TO: Gene Hartstein/Du Pont
O. J. Meyer/Du Pont
Steve Cline/Du Pont

FROM: Pixie Newman/CH2M HILL
Cindi Cruciani/CH2M HILL
Mary Kate Dwyer/CH2M HILL

DATE: August 21, 1990

SUBJECT: Phase II Groundwater Assessment Field Work Implementation, Du Pont—East Chicago

PROJECT: CHI28770.A0.DA

INTRODUCTION

The primary goal of the Phase II Groundwater Assessment performed at the Du Pont East Chicago plant is to reduce the uncertainty about key groundwater assessment factors on a plantwide basis. The Phase I report completed February 1990 concluded that more information about site geology, hydrogeology, hydraulic characteristics, and water quality is needed with respect to contaminant type, velocity, and direction of movement.

Activities being performed to obtain this information includes drilling and soil sampling, monitoring well installation, staff gauge installation, surveying, hydraulic conductivity testing of wells, and groundwater and surface water sampling. A perimeter monitoring well network was installed for obtaining sitewide hydraulic, hydrogeologic, and water quality information from the uppermost aquifer (the Calumet Sand). Five interior monitoring wells have also been installed to supplement this network. Fieldwork relative to these investigations was conducted between May 21 and June 20, 1990. A second round of groundwater sampling is planned for the fall of 1990.

PERSONNEL

The field investigative portion was completed by the following CH2M HILL personnel:

Team Member—Responsibility	Activities
Pixie Newman—Project Manager	Drilling/Monitoring Well Installation
Cindi Cruciani—Asst. Project Manager	Drilling/Monitoring Well Installation
Mary Kate Dwyer—Field Team Leader	Drilling Monitoring Well Installation
Laura Weyer—Team Member	Drilling Monitoring Well Installation
Paul Boersma—Team Member	Groundwater Sampling Hydraulic Testing
Dave Shekowski—Team Member	Groundwater Sampling Hydraulic Testing
Dan Plomb—Activity Team Leader	Hydraulic Testing

FIELD ACTIVITIES

DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION

Drilling and well installation services were provided by Fox Drilling Company of Itasca, Illinois. Two drilling rigs were used: an ATV-mounted CME Model 55, and a Mobile Drill Model B-61 truck-mounted rig. Drilling began on May 21, 1990.

Drilling and sampling were performed at the locations shown in Figure TM-1-1. The original sampling plan stated that split-spoon samples would be taken every 5 feet through 6¼-inch hollow-stem augers during drilling, or through collection of grab samples from cuttings if sand heaving prevented split-spoon sampling. Boreholes would be advanced to the depth of the clay unit underlying the sand unit, or about 30 feet. A 4-inch monitoring well would then be constructed inside the hollow-stem auger. Split-spoon sampling was possible at locations 5 and 13, but sand heaving at the other locations made in situ split-spoon sampling impractical, if not impossible. The stratigraphy encountered generally consisted of approximately 30 feet of fine grained grey to brown sand overlying dark grey silty clay.

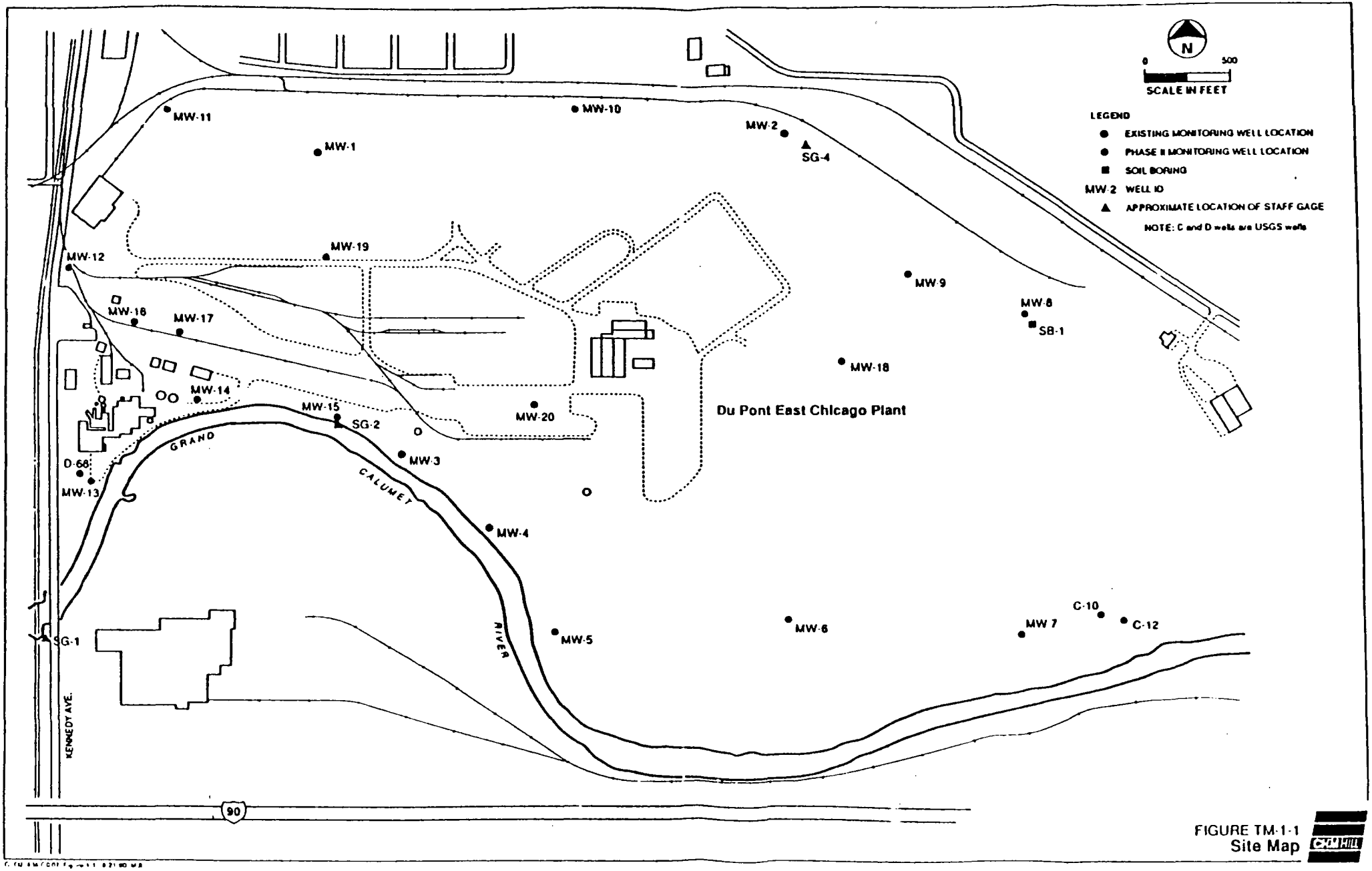


FIGURE TM-1-1
Site Map

The alternative plan for collecting soil samples was implemented as outlined in the QAPP, thereby achieving the goal of installing the perimeter monitoring well network. The lead 6¼-inch auger was fitted with a PVC plug to inhibit the flow of saturated sand into the auger flight during drilling. The flight was advanced to within or just above the clay layer underlying the Calumet Sand. Cuttings were characterized and drilling progress was noted to determine if a change of lithology was encountered. When the auger flight was removed from the hole, the depth to the clay unit was confirmed by observing where clay was present on the outside of the lead auger. Observations were noted on soil boring log sheets that will be included in the final report. Some samples were retained for evaluation of grain size. Table TM-1-1 presents the location and depth of these samples.

One additional soil boring was advanced near MW-8 (see Figure TM-1-1) to confirm the depth to the clay as the monitoring well borehole for MW-8 did not encounter clay. Solid-stem augers of 3⅝-inch outer diameter were advanced to depth and then removed from the borehole so the clay depth could be observed from the lead auger.

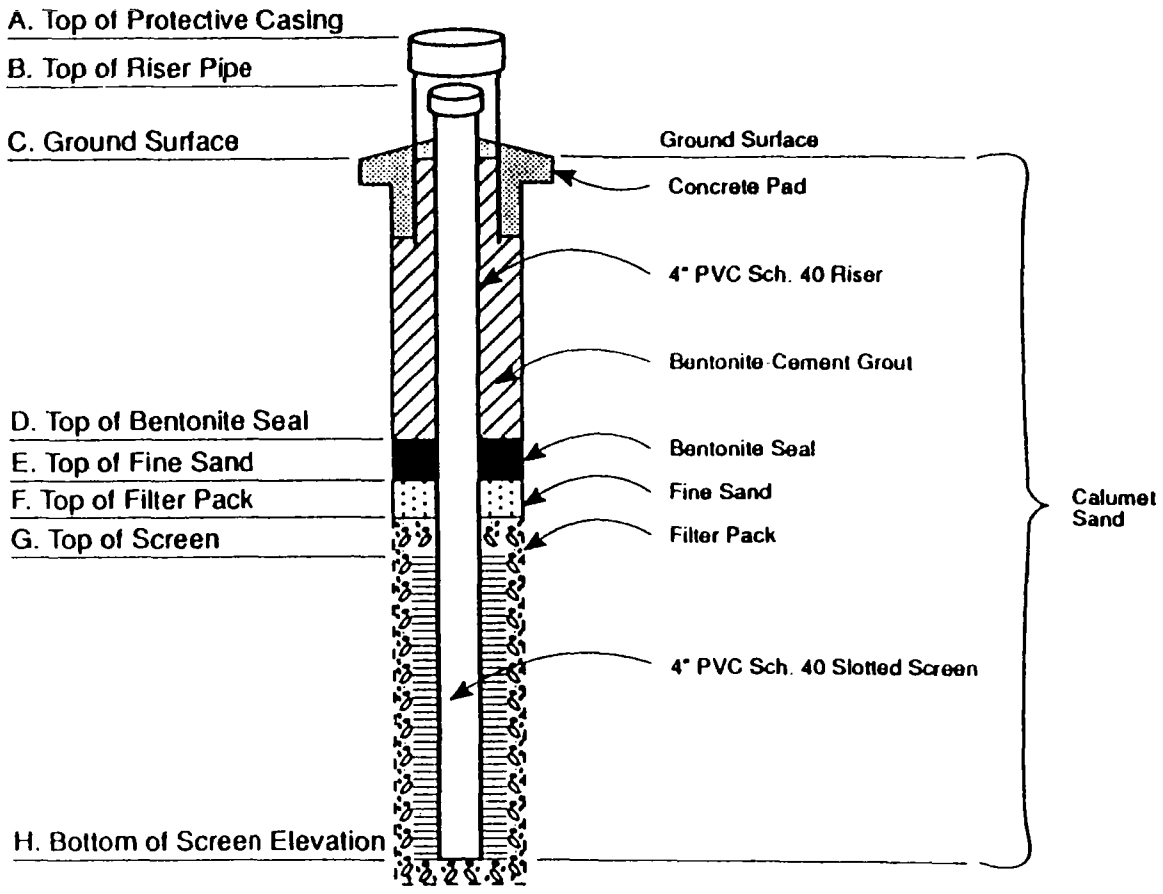
MONITORING WELL CONSTRUCTION

Monitoring wells were constructed inside the hollow-stem auger flight after the flight had been advanced to depth. In most instances, heaving sands entered the augers between the auger joints. Depths of 2 to 10 feet of sand within the augers prevented the installation of wells without the use of clean water to flush out the sand. The amount of water used was recorded in field logbooks so that extra volumes of well water could be removed during development to compensate for the use of flushing water. Next, the PVC plug was knocked loose using the well screen and riser. The auger flight was then removed from around the well, leaving the well in place.

Well construction details are shown in Figure TM-1-2. Wells were usually constructed of 15-foot, 4-inch-diameter Schedule 40 PVC slotted screen with 4-inch-diameter Schedule 40 PVC riser. A 10-foot screen was used at MW-13 so that the silty layer near the ground surface was not screened for groundwater sampling purposes. The screen slot size was 0.010 inch. A coarse sand pack was placed around the screen to approximately 2 feet above the upper edge of the well screen. In addition to the coarse sand pack, most well screens were surrounded by some natural sand as that sand had a tendency to cave in and heave toward the screen when the auger was withdrawn. A 2-foot layer of fine grained silica sand was placed above the filter pack sand, and the remaining annulus of the borehole was filled with a cement-bentonite grout that was tremied in place from the surface. A 7½-inch-diameter locking steel protector pipe was placed over the well with approximately

Table TM-1-1 SOIL SAMPLES TO BE ANALYZED FOR GRAIN SIZE AND HYDROMETER PROPERTIES		
Location	**Depth (ft)**	**Type**
MW-5	14 to 16	Sand
MW-5	34 to 36	Clay
MW-9	15 to 20	Sand
MW-13	28 to 29	Sand
MW-13	29 to 30	Clay
MW-19	18 to 20	Sand
SB-1	35 to 37	Clay

GLT976/104.51



	MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW14	MW15	MW16	MW17	MW18	MW19	MW20
A.	592 92	590.54	594.30	590.17	590.28	589.25	585 58	592.22	589.62	590.67	590.38	590.45	589.12	591.23	592 11	591.53	591.67	593.43	591.96	592 88
B.	592.78	590.48	594.19	589.89	590.13	589.08	585.34	591.82	589.31	590.47	590.10	590.12	588.99	590.87	591.88	591.17	591.24	593.15	591.58	592.46
C.	590.10	587.21	591.07	587.46	587.79	586.77	582.82	589.27	587.16	587.84	587.62	587.70	586.46	588.38	590.45	588.61	588.96	590 02	589.26	590.20
D.	*	*	*	579.46	579.79	578.77	575.82	582.27	580.66	577.84	578.62	576.70	574.46	576.38	581.45	577.61	576.96	579 02	577 26	581 20
E.	*	*	*	577.46	576.19	574.77	572.82	579.27	577.16	574.84	574.12	574.70	572.46	574.38	579.45	575.61	574.96	575.52	575 26	578 20
F.	*	*	*	575.46	573.79	572.77	570.02	577.27	575.16	571.34	571.62	572.70	569.46	572.38	577.45	573 61	572 96	573.52	573 26	575.70
G.	*	*	*	573.46	571.79	571.77	568.52	575.27	572.66	569.34	571.22	570.70	567.46	570 38	575.45	571.61	570.96	571 52	571 26	573 20
H.	570.60	558.21	561.87	558.46	556.79	556.77	553.52	560.27	557.66	554.34	556 22	555.70	557.46	560.38	560.45	556.61	555.96	556.52	556 26	558.20

* CH2M HILL did not construct well; data unavailable.

3 feet of the protective cover that sticks up from the ground surface. A concrete surface seal was installed between the borehole wall and the protective casing.

MONITORING WELL DEVELOPMENT

Wells were developed until the amount of water used during the drilling process and an additional 25 to 30 gallons was removed from each well. A double-line airflight method was used for development.

STAFF GAUGE INSTALLATION

Staff gauges were installed at the locations shown in Figure TM-1-3. (SG-3 was placed to the east of the site boundary and is not visible on Figure TM-1-3.) Staff gauges SG-1 and SG-3 were attached to the sides of the Kennedy Avenue and Cline Avenue bridges, respectively. Staff gauges SG-2 and SG-4 were bolted to 1-inch blac pipe and driven into place.

SURVEYING

Elevations of the top of the protective casing, the top of the riser pipe, and the ground surface were determined for each well location, as were the elevations of the tops of the staff gauges (Table TM-1-2). Horizontal coordinates for the wells and gauges were also determined and tied to site data points. Surveying was performed by ACA Calumet under subcontract to CH2M HILL. Initial surveying was completec during the week of June 18. Selected points were re-surveyed during the week of July 2.

VARIABLE HEAD HYDRAULIC CONDUCTIVITY TESTING

Testing Methodology

Hydraulic conductivity tests were conducted on monitoring wells MW-4, 5, 10, 11, 13, 15, 16, and 18 at the East Chicago plant on June 20. Locations of these wells are shown in Figure TM-1-4. Hydraulic conductivity values of the unconfined, surficial sand aquifer were measured using variable head (slug) tests.

Variable head tests are single well tests used to estimate hydraulic conductivity near a well screen by adding or removing a known volume of water. The rate at which the water level in the well recovers is measured and used to estimate hydraulic conductivity.

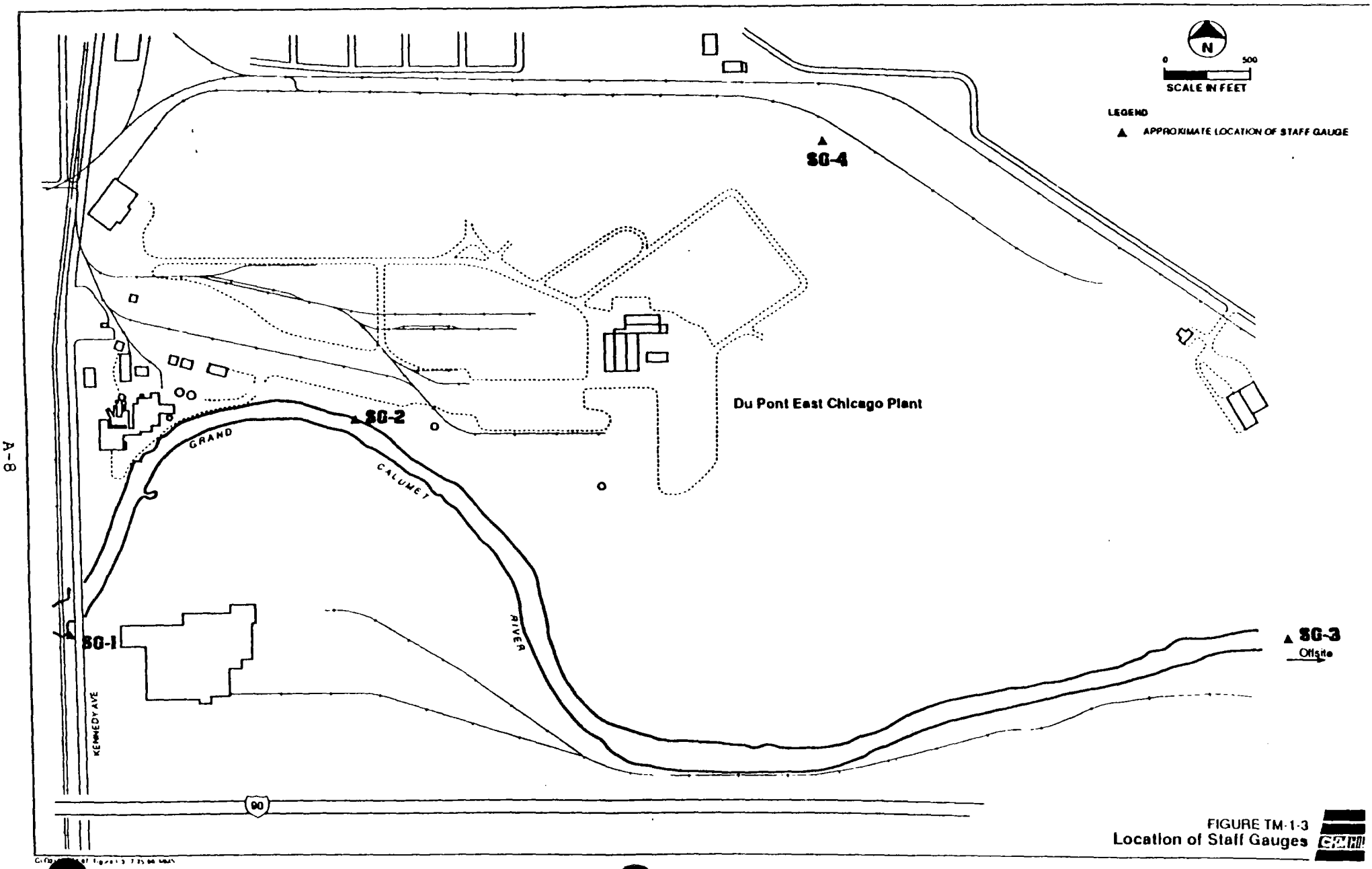


FIGURE TM-1-3
Location of Staff Gauges

Table TM-1-2
SURVEYING ELEVATION RESULTS

Monitoring Location	ELEVATION (feet asml) Outer Casing With Cover	Inner Casing	Ground Surface
WELLS			
MW-1	592.94	592.78	590.10
MW-2	590.56	590.48	587.21
MW-3	594.32	594.19	591.07
MW-4	590.19	589.89	587.46
MW-5	590.30	590.13	587.79
MW-6	589.27	589.08	586.77
MW-7	585.60	585.34	582.82
MW-8	592.24	591.82	589.27
MW-9	589.64	589.31	587.13
MW-10	590.69	590.47	587.84
MW-11	590.40	590.10	587.62
MW-12	590.57	590.12	587.70
MW-13	589.14	588.99	586.46
MW-14	591.25	590.87	588.38
MW-15	592.13	591.86	590.45
MW-16	591.55	591.17	588.61
MW-17	591.69	591.24	588.96
MW-18	593.45	593.15	590.02
MW-19	591.98	591.58	589.26
MW-20	592.90	592.46	590.20

STAFF GAUGES	ZERO POINT
SG-1	579.72
SG-2	578.57
SG-3	579.43
SG-4	587.26

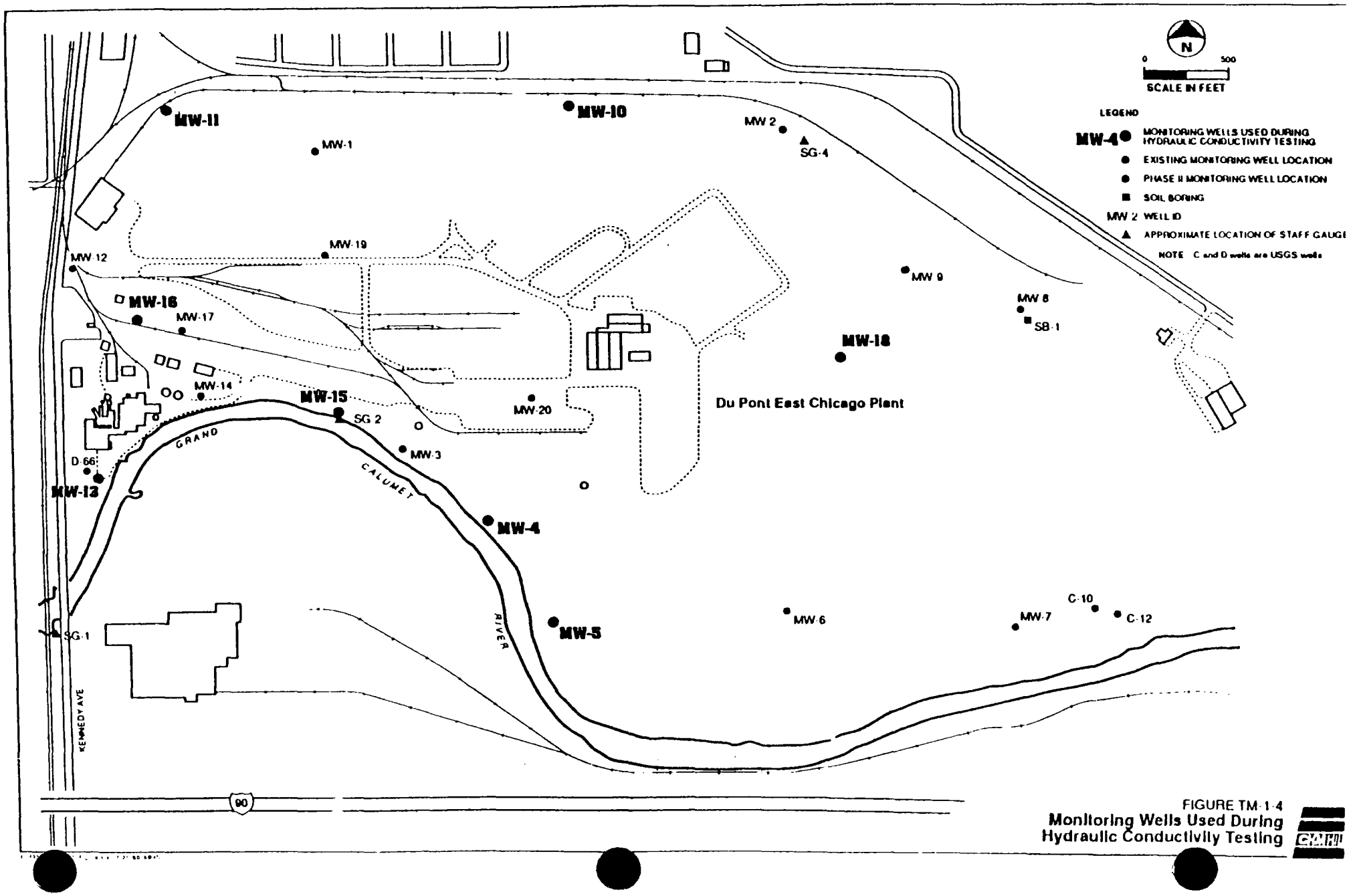


FIGURE TM-1-4
Monitoring Wells Used During
Hydraulic Conductivity Testing

The tests conducted at the Du Pont plant were "rising" head tests. An artificial pressure head was applied to each well by displacing water from the well using nitrogen gas under pressure. When the water level in the well fully stabilized from the stress, the gas pressure was removed instantaneously. Data were then collected while water levels recovered within the well. All tests were run in duplicate to improve the confidence in the test results.

The test assembly used to displace well water is shown in Figure TM-1-5. The wellhead assembly was attached to the top of the riser pipe. A gas-tight seal between the assembly and riser pipe was obtained by mechanically expanding a rubber packer at the base of the assembly. The wellhead assembly contained gas-tight ports for connecting two pressure transducers, a fitting for attaching a pressure regulator, and a vent valve. The pressure transducers were connected to an electronic data logger (Campbell Scientific Model 21X). Transducer No. 1 measured total head, which is the sum of the elevation head and pressure head above the transducer. Transducer No. 2 measured the pressure head resulting from the nitrogen gas.

Besides recording head values at discrete time intervals for later analysis, the data logger was programmed to calculate hydraulic conductivity directly in the field using simplifying assumptions regarding aquifer geometry. Therefore, a quick field check on the validity of the data was possible before disassembling the equipment.

Analysis Methodology

Tests were evaluated using the Bouwer and Rice method.[1] This method was corrected to adjust the well radius to account for a porosity change associated with the sand pack when the water level changes within the screened portion of the well. The equation for estimating hydraulic conductivity is:

$$K = \frac{rc^2 \times \ln(R_e/r_w) \times \ln(y_o/y_t)}{2 \times L \times t}$$

Where:

K = hydraulic conductivity [L/T]
L = length of test zone [L]
t = time measured from start of test [T]

[1] Bouwer, Herman, and R. C. Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. *Water Resources Research*. Vol. 12, No. 3.

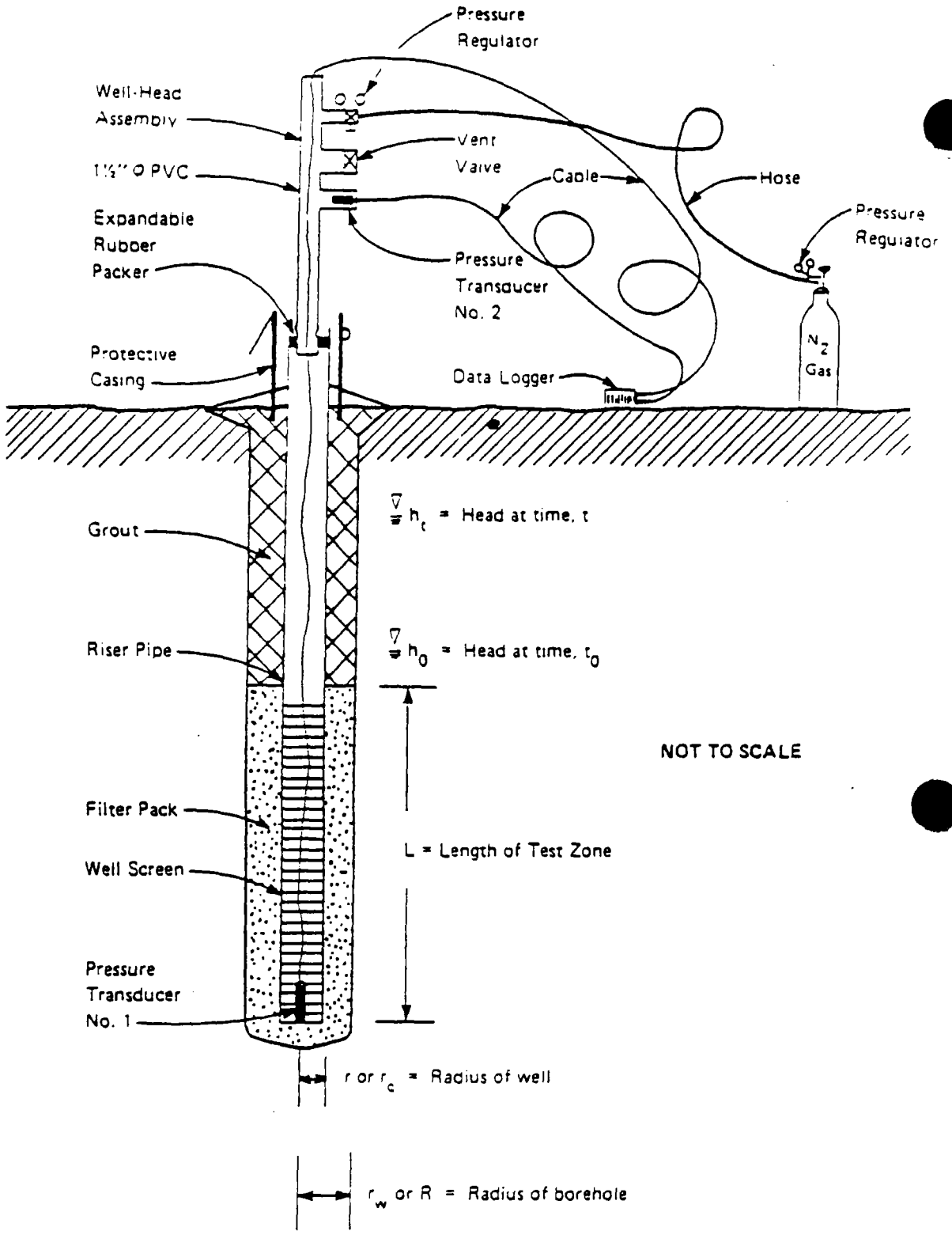


FIGURE TM-1-5
Schematic Diagram of
Nitrogen Slug Test Assembly

y_o = initial head difference [L]
y_t = head difference at time t [L]
r_c = well radius [L] (corrected for porosity in the sand pack)
R_e = effective radial distance over which the head (y) is dissipated [L]
r_w = radius of the borehole [L]

The value of $\ln(R_e/R_w)$ is determined graphically using several curves for empirical constants given in Bouwer and Rice (1976, p. 426).

Results

Input data for each well are presented as Attachment A to this appendix. Test results of hydraulic conductivities calculated using the Bouwer and Rice method are summarized in Table TM-1-3. Average values of hydraulic conductivity indicate a range from 6.4×10^{-3} to 3.7×10^{-3} cm/s.

Data Limitations

The following assumptions are inherent in the theoretical development of the Bouwer and Rice equation for analyzing slug test data:

1. Drawdown of the water table around the well is negligible.
2. Flow in the unsaturated zone can be ignored.
3. Well losses are negligible.
4. The aquifer is homogeneous and isotropic.

Assumptions 1, 2, and 3 are probably satisfied at the East Chicago site. The effect of deviation from Assumption 4 on computed results is unknown. Therefore, each test is assumed to be an average of the formation material in the immediate vicinity of each test location.

GROUNDWATER SAMPLING

Groundwater sampling was conducted from June 18 to 21, 1990, and from September 10 to 12, 1990. Finalized analytical results will provide the basis for characterizing water quality across the site.

The monitoring well network at the East Chicago site consists of the 17 newly installed wells and 3 existing wells. After the new wells were installed and developed. conditions were allowed to stabilize at least 1 week before sampling. The samples were collected as follows:

Table TM-1-3
RESULTS OF VARIABLE HEAD TESTING

Well I.D.	Hydraulic Conductivity (cm/s)		
	Test 1	Test 2	Log Average
MW-4	6.4×10^{-3}	---	6.4×10^{-3}
MW-5	3.8×10^{-3}	4.0×10^{-3}	3.9×10^{-3}
MW-10	4.6×10^{-3}	4.6×10^{-3}	4.6×10^{-3}
MW-11	3.6×10^{-3}	3.8×10^{-3}	3.7×10^{-3}
MW-13	3.7×10^{-3}	---	3.7×10^{-3}
MW-15	5.5×10^{-3}	5.7×10^{-3}	5.6×10^{-3}
MW-16	4.3×10^{-3}	4.3×10^{-3}	4.3×10^{-3}
MW-18	4.8×10^{-3}	5.1×10^{-3}	4.9×10^{-3}

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1. The well was unlocked and the inner cap was removed. Organic vapor concentrations of the air at the riser were measured with an HNu to monitor well conditions and determine if it was necessary to monitor breathing space conditions of sampling personnel.

2. The water level was measured with an electronic water level indicator, which has an accuracy of 0.01 foot.

3. The total depth of the monitoring well was measured. Both the water level and the depth of the well were recorded.

4. The water column volume was calculated using the formula

   $$\text{Volume (gallons)} = H \times (D/2)^2 \times \pi \times 7.48 \text{ gal/ft}^3$$

   Where:

   H = Height of water column, in feet
   (depth of well minus depth to water surface)

   D = Inside diameter of casing, in feet

5. The monitoring well was purged using a Masterflex peristaltic pump, a Brainard-Kilman pump, or a bailer. Wells were purged of three well volumes or until parameters had stabilized. Purge water was stored in 55-gallon drums and labeled with the well number.

6. VOC vials were filled immediately after purging using a stainless steel bailer. Water was poured directly into the vials from the bailer to minimize the formation of air bubbles.

7. Sample bottles for the other parameters were filled using a stainless steel bailer.

8. Samples were delivered to the CH2M HILL site field office to be preserved, filtered, documented, and held in custody until transported to the laboratory.

9. The bailer and pump were decontaminated following established decontamination procedures. Nylon cord used to lower the bailer into the well was discarded after use and replaced with new cord for the next well.

10. Samples were kept in an insulated cooler with ice until shipment. Samples were directly delivered or shipped on a daily basis to NET laboratories by overnight mail.

Quality Control Measures

The analytical parameters for each well's sample are specified in Table TM-1-4, along with location of duplicate samples. Two duplicate water samples were collected for the 20 wells sampled. A water trip blank was shipped with each cooler containing VOC sample vials.

Field blanks were collected on two separate days. HPLC water was run through the sampling equipment after it had been decontaminated as a check on in-field decontamination procedures.

SURFACE WATER SAMPLING

Surface water samples were taken at three locations (Figure TM-1-6). Table TM-1-4 shows the parameters each sample was analyzed for and where sample duplicates were taken. On the day of sampling, the observed flow direction of the river was westerly. SW-01-01 was located to the east of the site (upgradient), adjacent to where the powerline along the eastern edge of the site crosses the river. The water sampled at SW-01 may have been somewhat stagnant because it was difficult to get a midstream sample because of the marshy terrain along the river in that location.

Surface water sample SW-02-01 was taken standing on the river bank adjacent to MW-03 (Figure TM-1-6). An oil sheen was observed floating on the water surface near the river's edge at a distance of about 2 feet from the bank. Care was taken to prevent oil from entering the sample bottles, but some oil may have been introduced into the sample.

Surface water sample SW-03-01 was taken to the west (downgradient) of the site to the east of the Kennedy Avenue bridge (Figure TM-1-6). An oil sheen was also observed near the edge of the river similar to that noted while sampling SW-02-01. Some oil may have been introduced into the sample bottles.

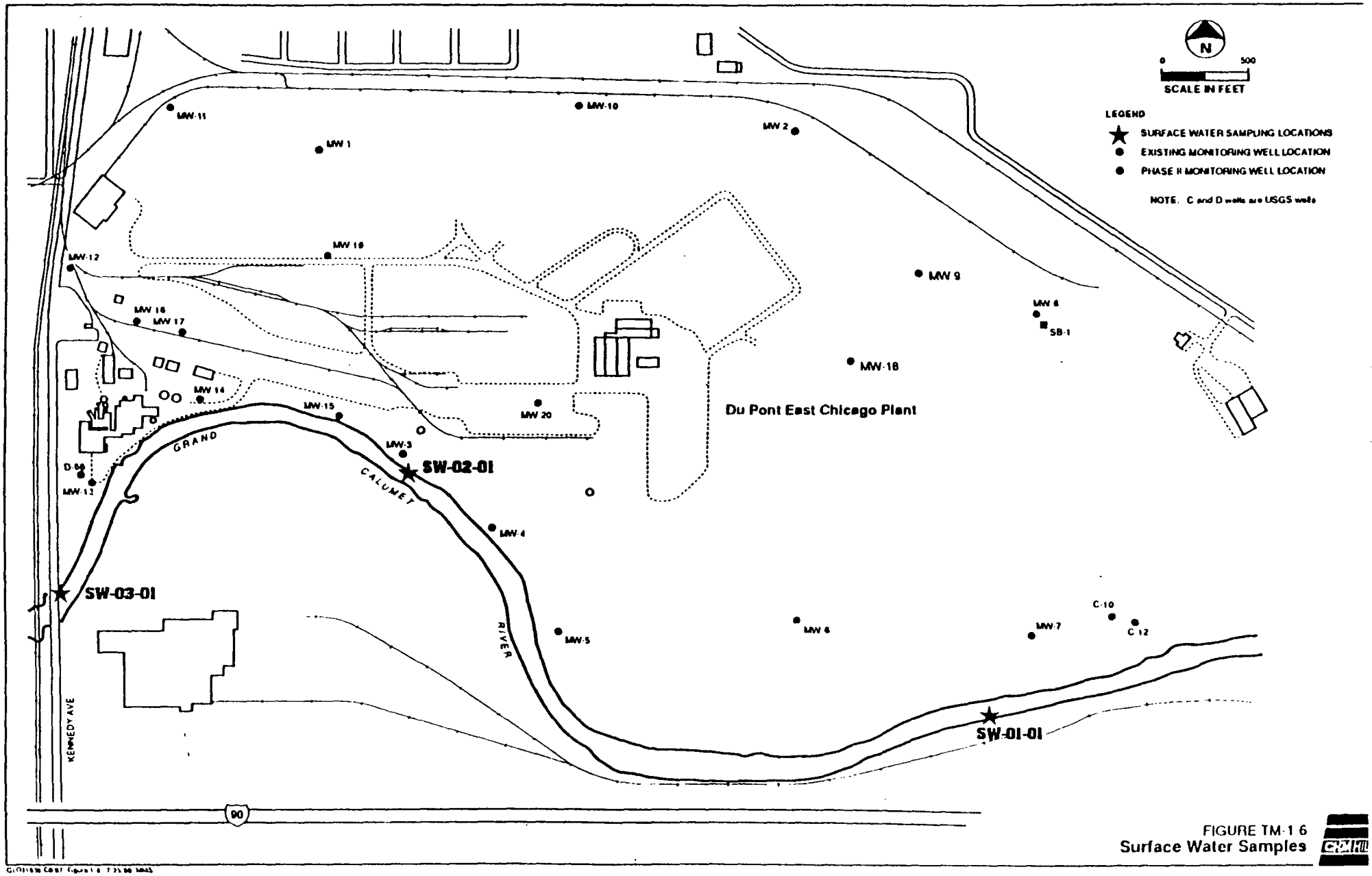

FIGURE TM-1 6
Surface Water Samples

Table TM-1-4
WATER ANALYSES

Sample Parameters	Monitoring Wells																				Staff Gauges		
	1	2	3	4	5	6	7	8	9	10	11*	12	13	14*	15	16	17	18	19	20	01	02	03 *
VOCs	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x
BNAs	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x
PCBs																		x					
Selected Organics: Be, Cd, Cr^{+6}, Cr, Cu, Hg, Pb, Ni, Sb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x
Al, Ba	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
As, Zn	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Water Quality Paramters: Ca, Mg, K, Na, SO_4, Cl, Carbonate, Iron, TDS, Mn, Alkalinity	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cyanide	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x
Phosphate	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x
Total Kieldahl and Ammonia N	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x

*Duplicate sample taken at WM-11, MW-14, and SW-03 locations.

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MONTHLY WATER LEVEL PROGRAM

At the request of IDEM, water levels from the monitoring wells and the staff gauges are being measured monthly. The first set of water level data from the monitoring wells was collected on June 18. A water level indicator was lowered into the well casing until water was encountered. The depth to water and the reference point used were both recorded. Water levels for the staff gauges were recorded on June 21. Because the June water level for SG-2 was suspect, the gauge was re-surveyed on July 17. Water level information for June and July is listed in Table TM-1-5.

Table TM-1-5
WATER ELEVATIONS

Monitoring Location	ELEVATION (feet amsl) 6/18/90	6/21/90	7/17/90
WELLS			
MW-1	586.39		586.08
MW-2	585.90		585.87
MW-3	582.34	582.32	582.49
MW-4	582.23		582.28
MW-5	581.63		581.67
MW-6	585.65		585.91
MW-7	581.67		581.90
MW-8	583.00		585.83
MW-9	585.94		585.81
MW-10	585.80		585.74
MW-11	586.02		585.79
MW-12	585.40		585.92
MW-13	581.18	581.07	581.28
MW-14	583.49	583.42	583.92
MW-15	582.01	581.98	585.02
MW-16	585.99		586.68
MW-17	586.14		586.78
MW-18	586.43		583.25
MW-19	586.61		586.42
MW-20	586.62		586.50
STAFF GAUGES			
SG-1		580.65	580.51
SG-2		580.27	580.56
SG-3		581.11	581.18
SG-4		587.46	587.46

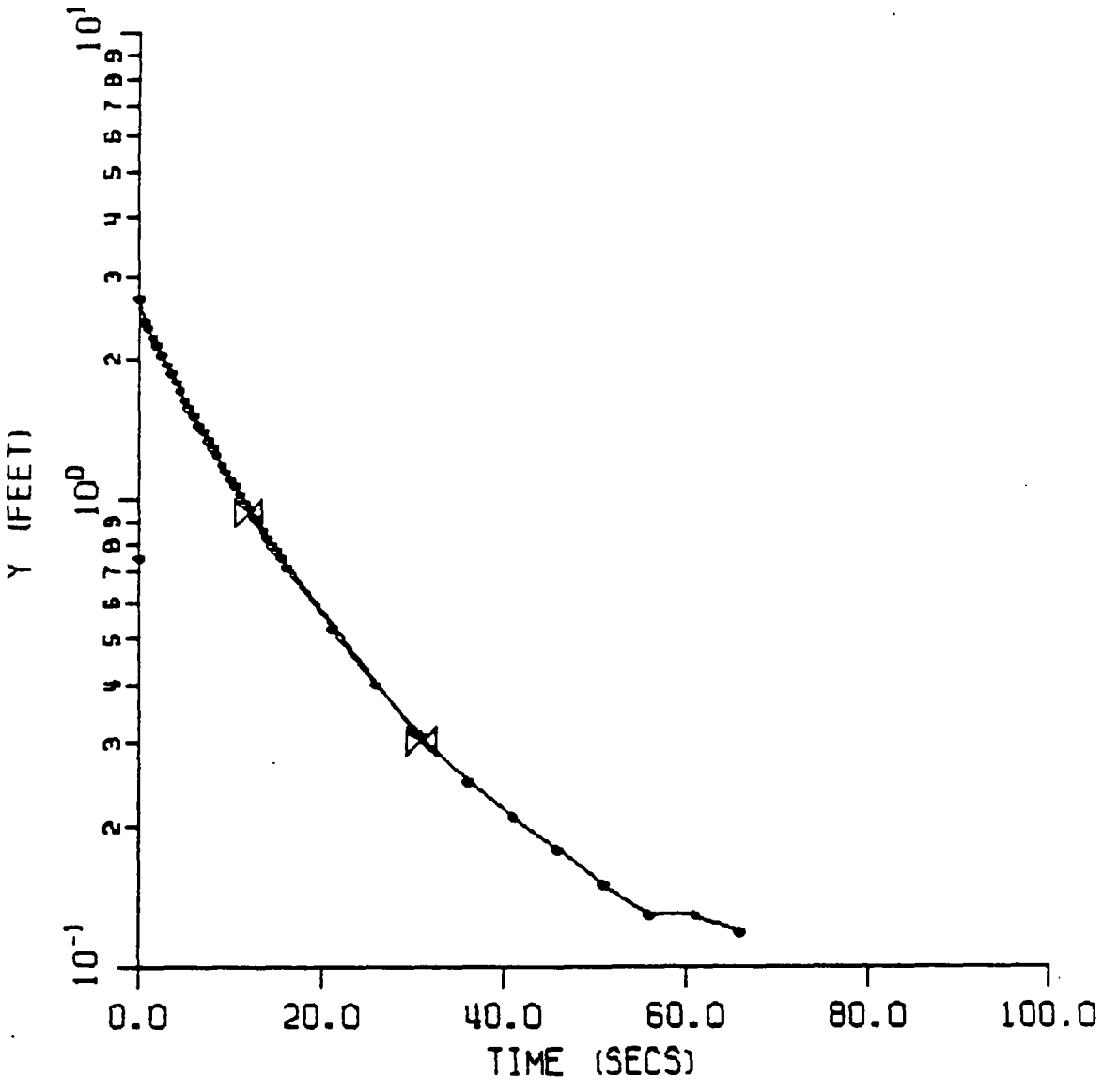
Attachment A

GRAPHICAL REPRESENTATIONS OF HYDRAULIC CONDUCTIVITY DATA

DUPONT - EAST CHICAGO

MW-4

TEST 1



K (CM/S) = 0.006360

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 23.5

H (FEET) = 23.50

COEFFICIENTS

A = 0.00

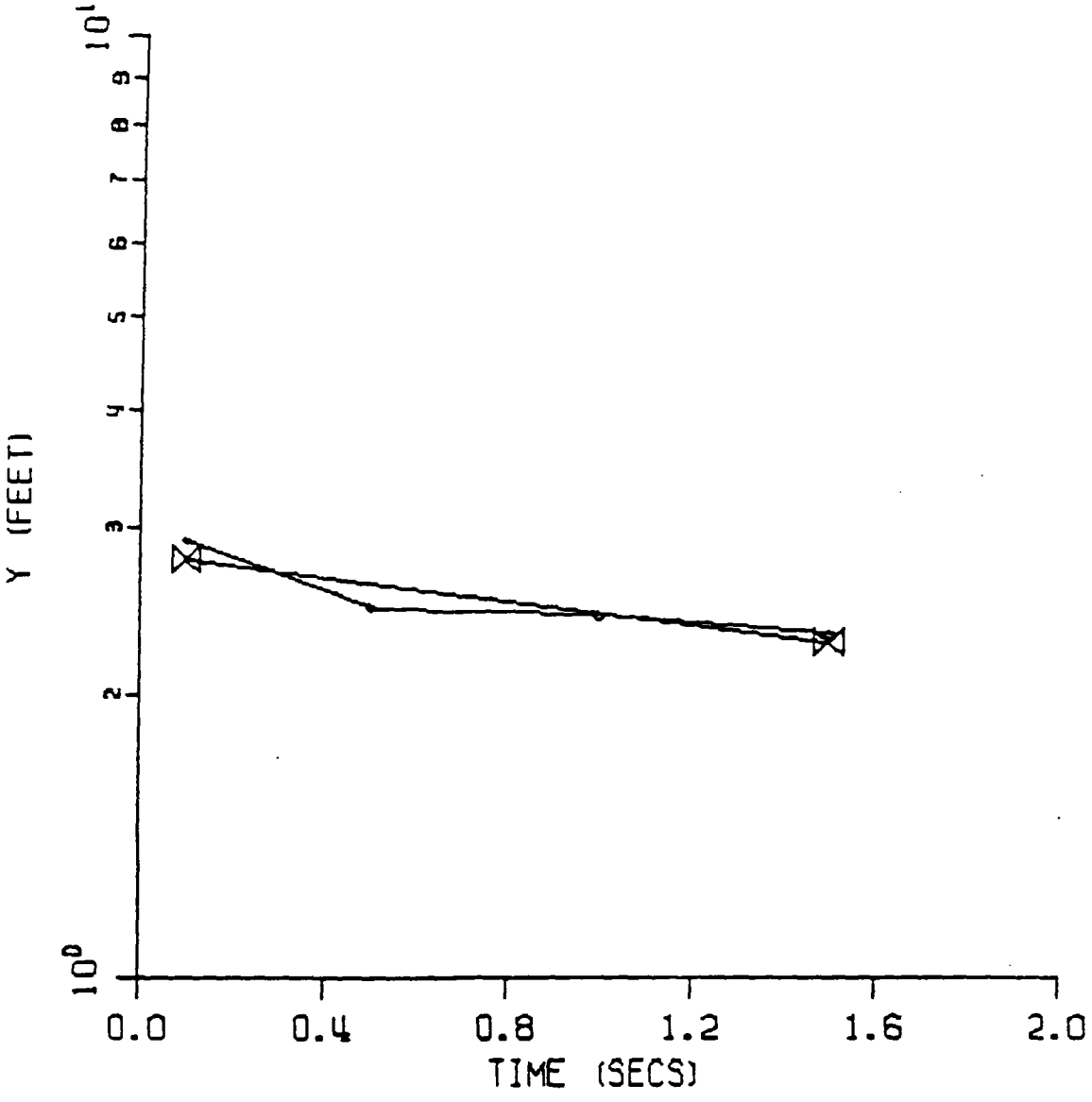
B = 0.00

C = 3.85

Y-INTERCEPT = 1.92

SLOPE = -0.0259

DUPONT - EAST CHICAGO
MW-4
TEST 2



K (CM/S) = 0.015360

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 23.5

H (FEET) = 23.50

COEFFICIENTS

A = 0.00

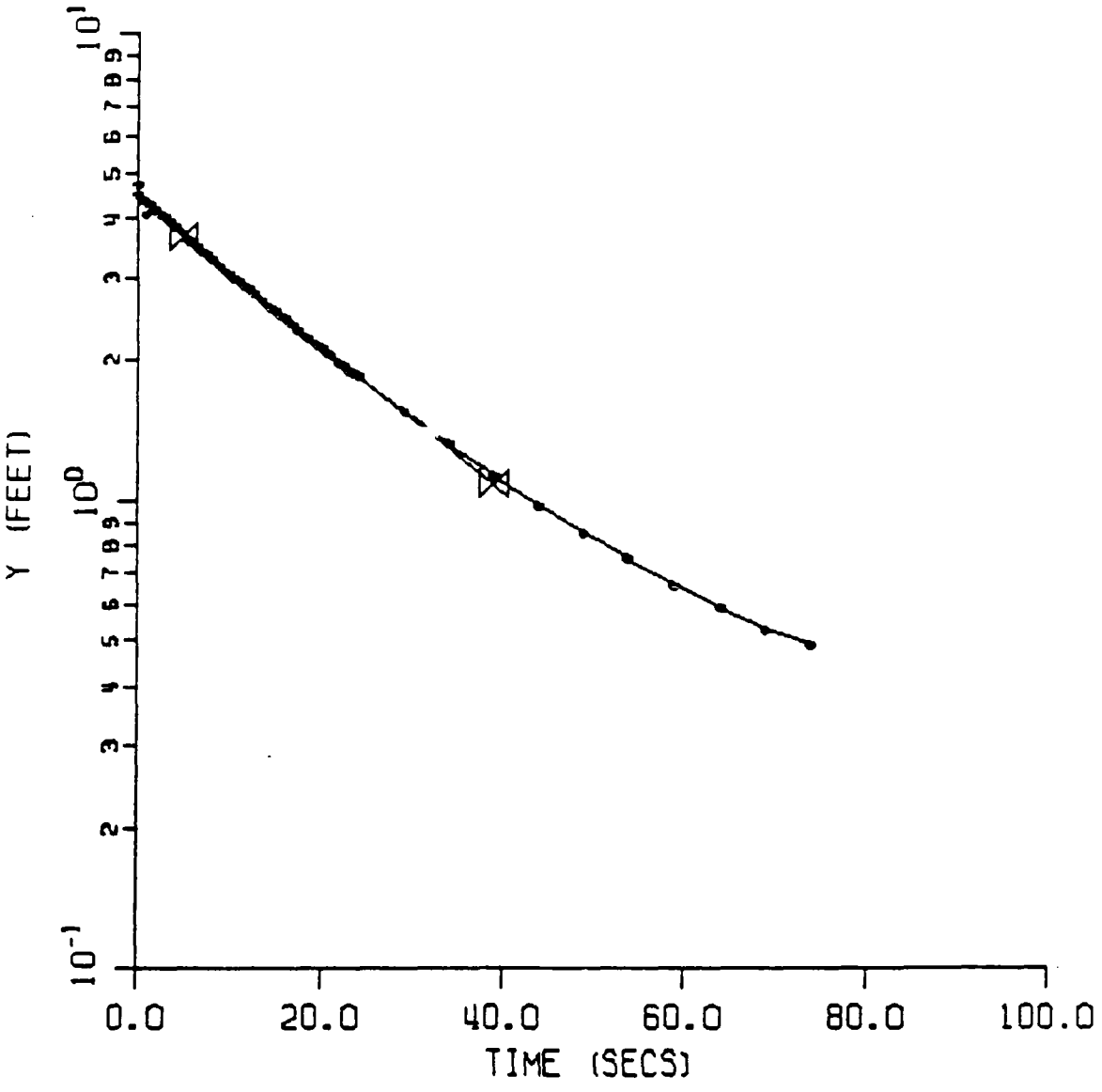
B = 0.00

C = 3.85

Y-INTERCEPT = 2.82

SLOPE = -0.0626

DUPONT - EAST CHICAGO
MW-5
TEST 1



K (CM/S) = 0.003845

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 25.0

H (FEET) = 25.00

COEFFICIENTS

A = 0.00

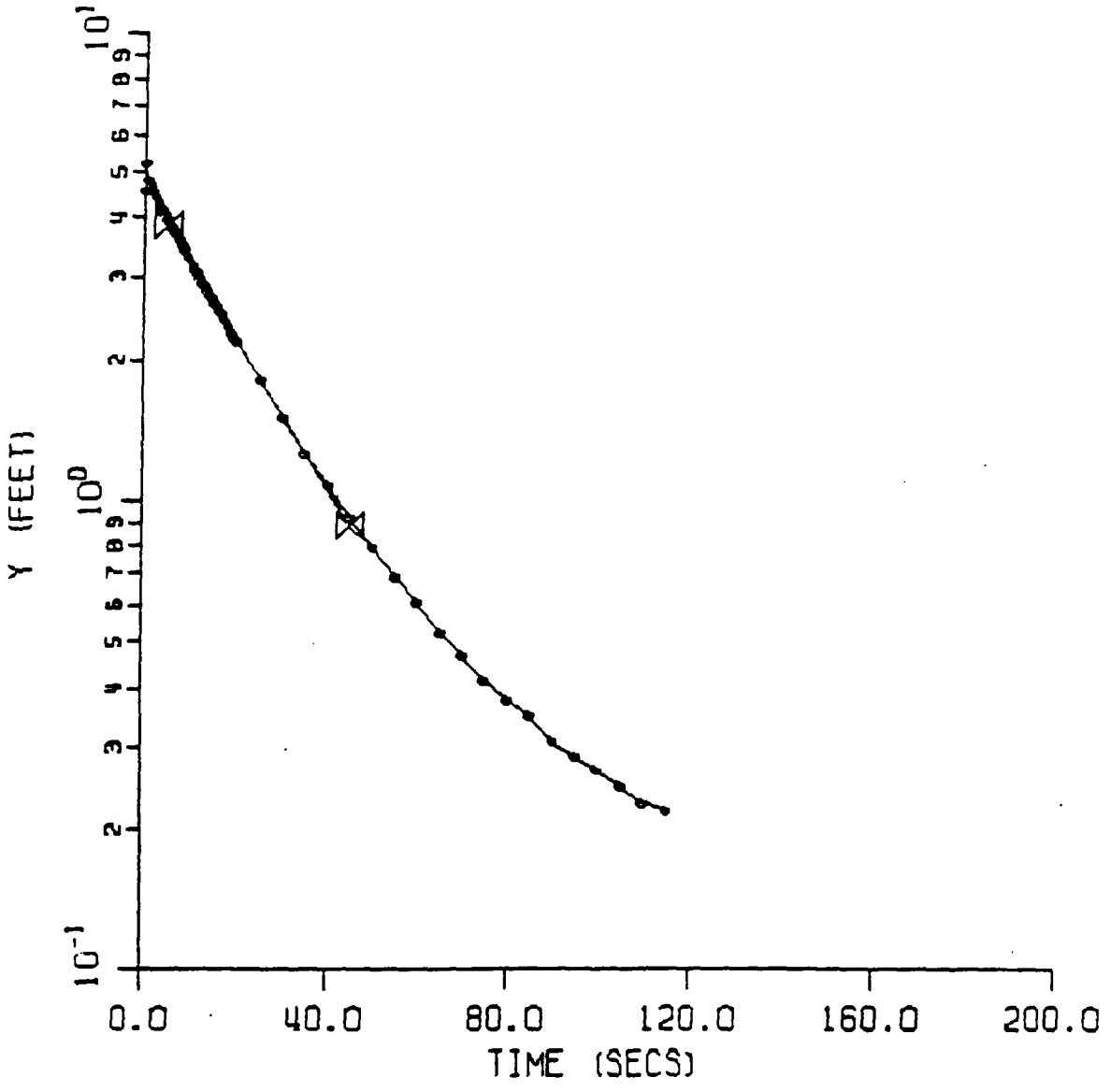
B = 0.00

C = 3.85

Y-INTERCEPT = 4.35

SLOPE = -0.0155

DUPONT - EAST CHICAGO
MW-5
TEST 2



K (CM/S) = 0.003961

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 25.0

H (FEET) = 25.00

COEFFICIENTS

A = 0.00

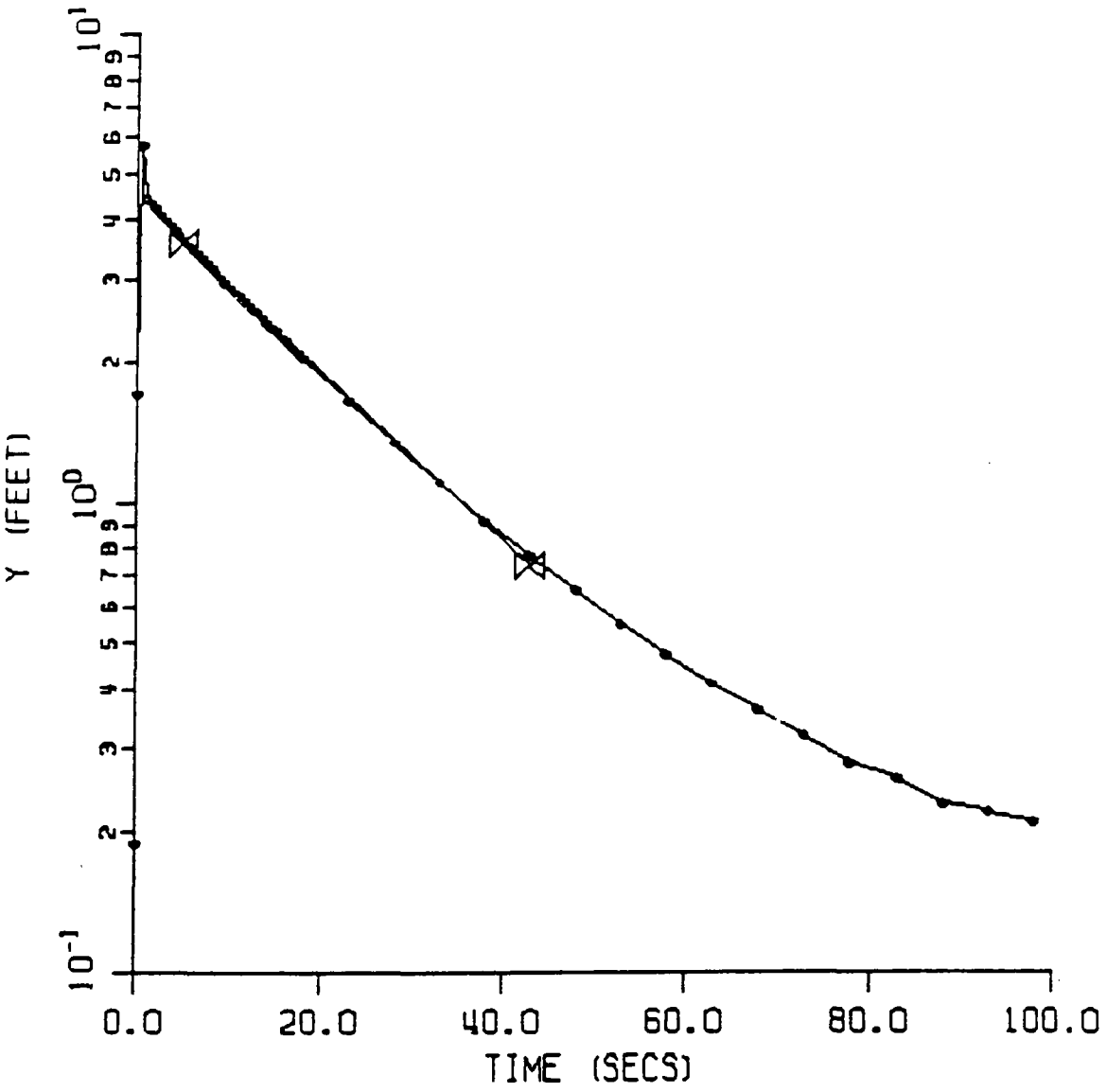
B = 0.00

C = 3.85

Y-INTERCEPT = 4.65

SLOPE = -0.0160

DUPONT - EAST CHICAGO
MW-10
TEST 1



K (CM/S) = 0.004630

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 31.5

H (FEET) = 31.50

COEFFICIENTS

A = 0.00

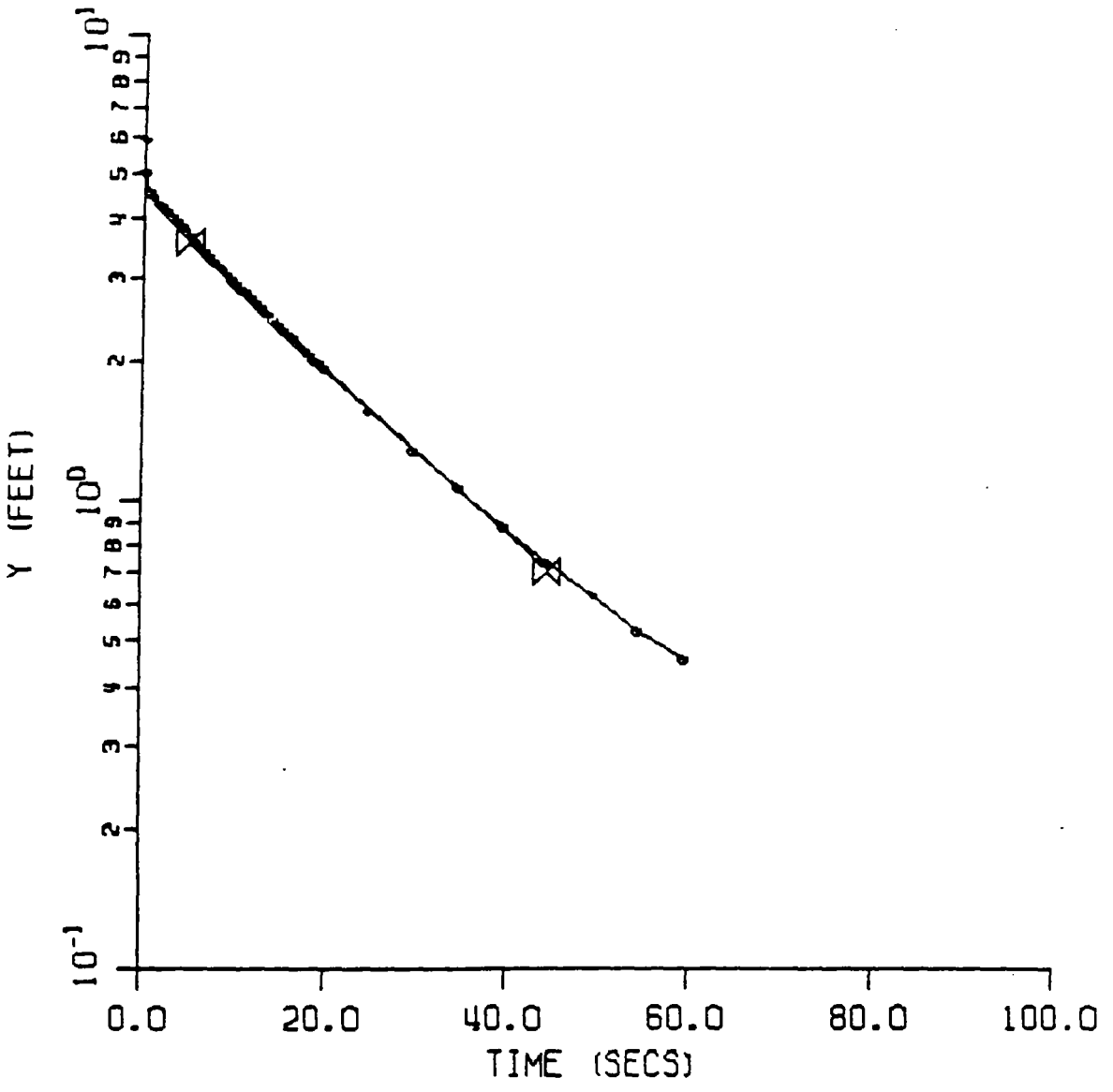
B = 0.00

C = 3.85

Y-INTERCEPT = 4.37

SLOPE = -0.0180

DUPONT - EAST CHICAGO
MW-10
TEST 2



K (CM/S) = 0.004582

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 31.5

H (FEET) = 31.50

COEFFICIENTS

A = 0.00

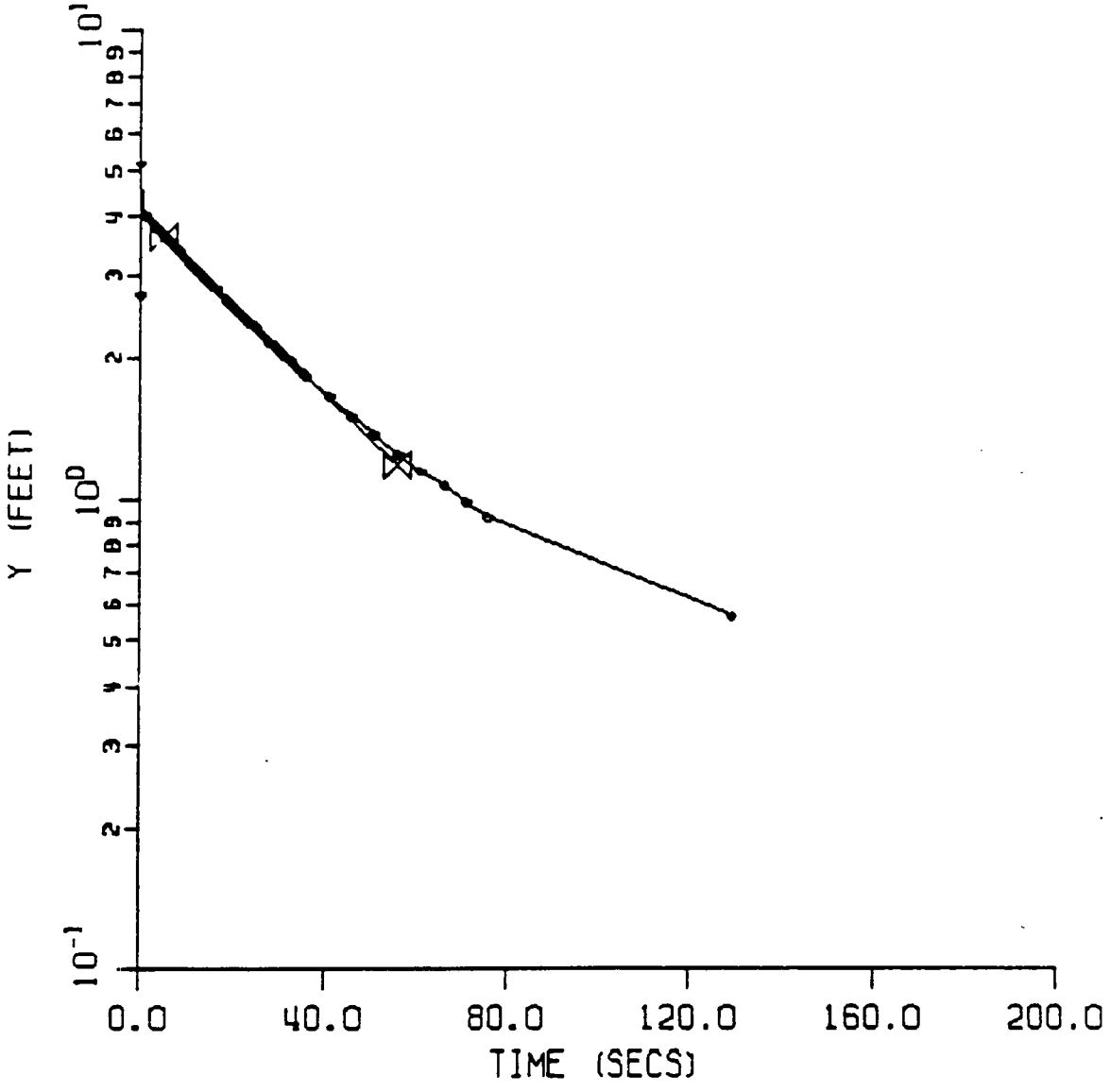
B = 0.00

C = 3.85

Y-INTERCEPT = 4.38

SLOPE = -0.0178

DUPONT - EAST CHICAGO
MW-11
TEST 1



K (CM/S) = 0.003564

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 30.5

H (FEET) = 30.50

COEFFICIENTS

A = 0.00

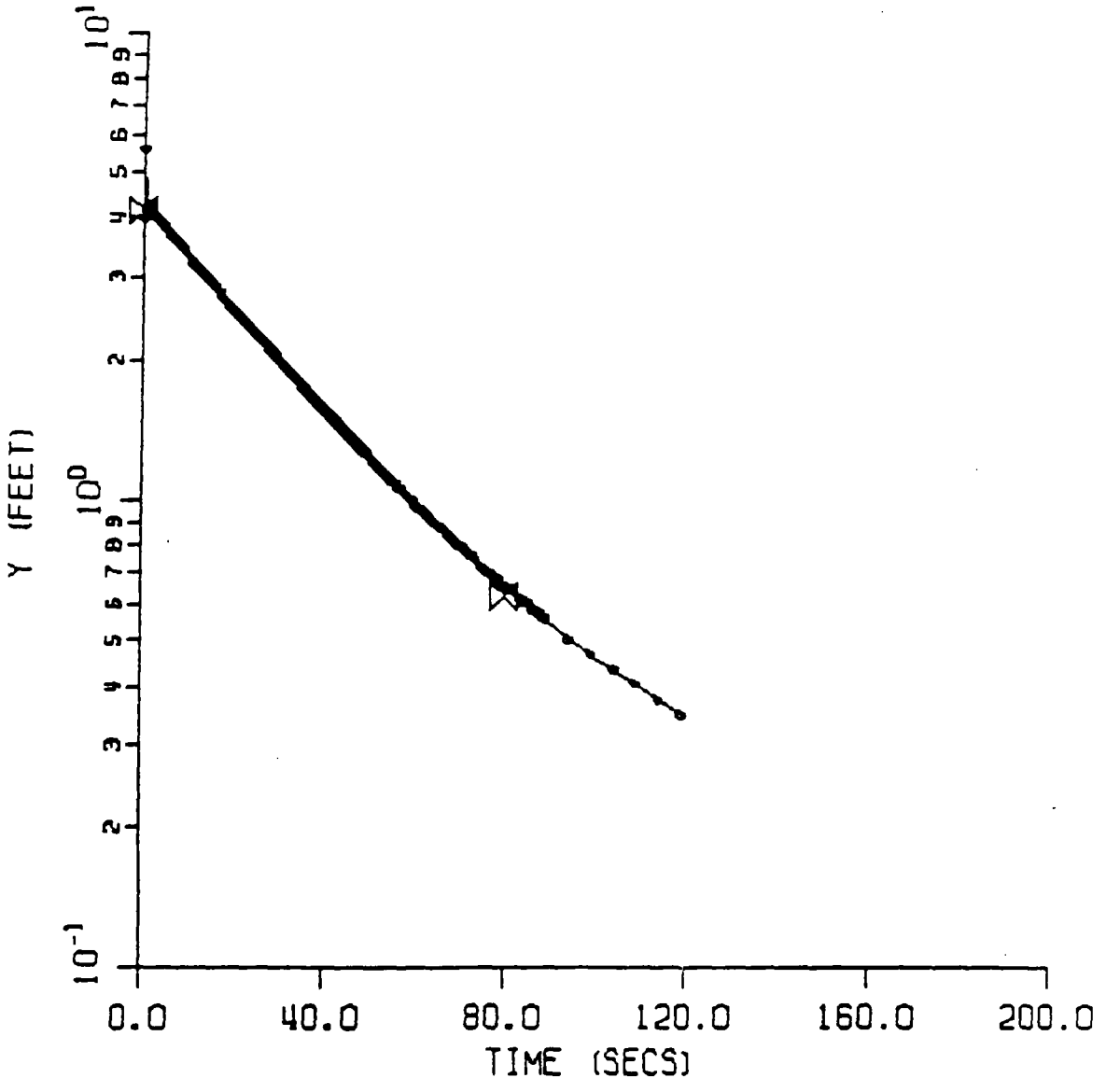
B = 0.00

C = 2.94

Y-INTERCEPT = 4.02

SLOPE = -0.0095

DUPONT - EAST CHICAGO
MW-11
TEST 2



K (CM/S) = 0.003851

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 30.5

H (FEET) = 30.50

COEFFICIENTS

A = 0.00

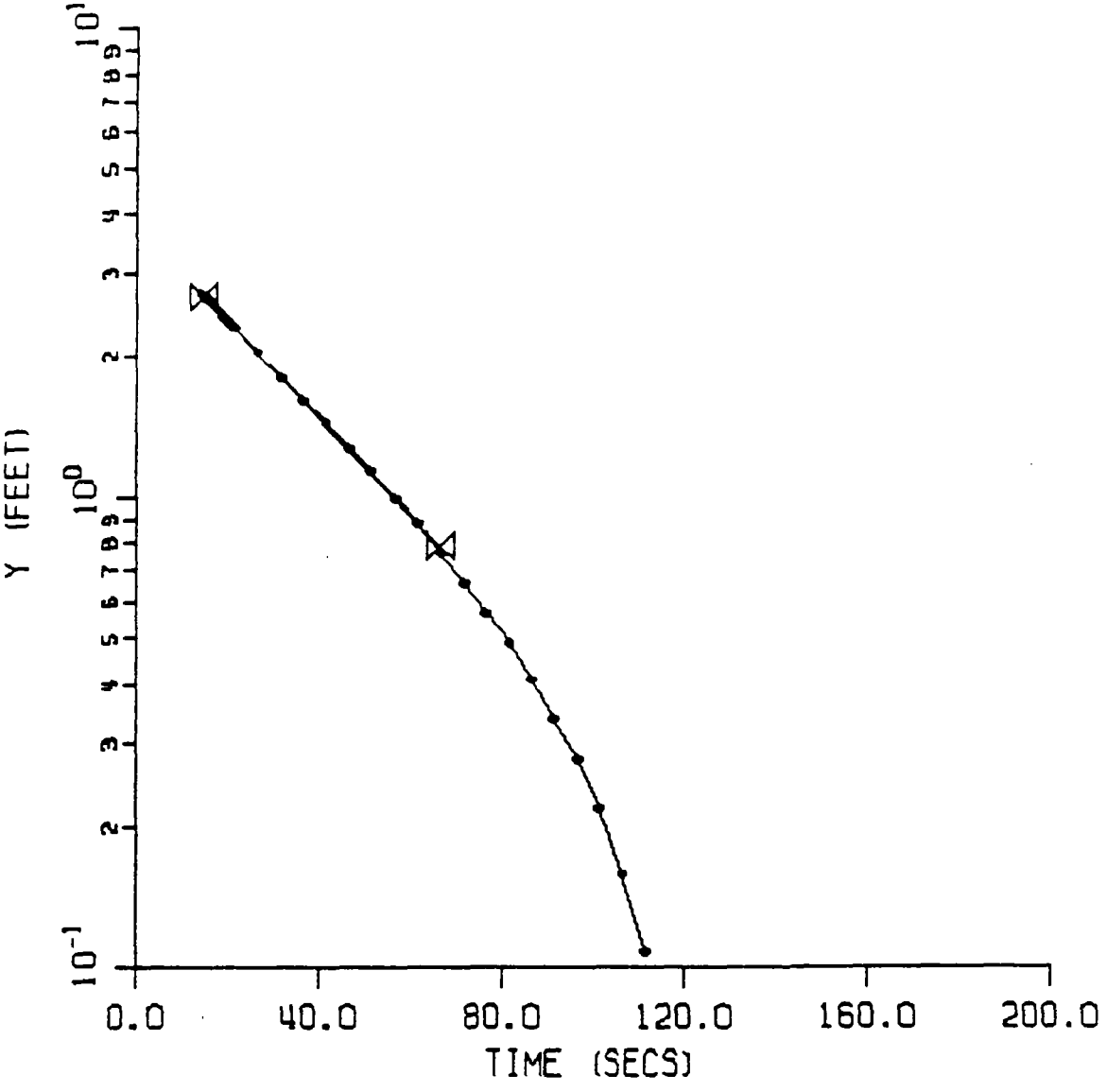
B = 0.00

C = 2.94

Y-INTERCEPT = 4.14

SLOPE = -0.0103

DUPONT - EAST CHICAGO
MW-13
TEST 1



K (CM/S) = 0.003724

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 24.0

H (FEET) = 24.00

COEFFICIENTS

A = 0.00

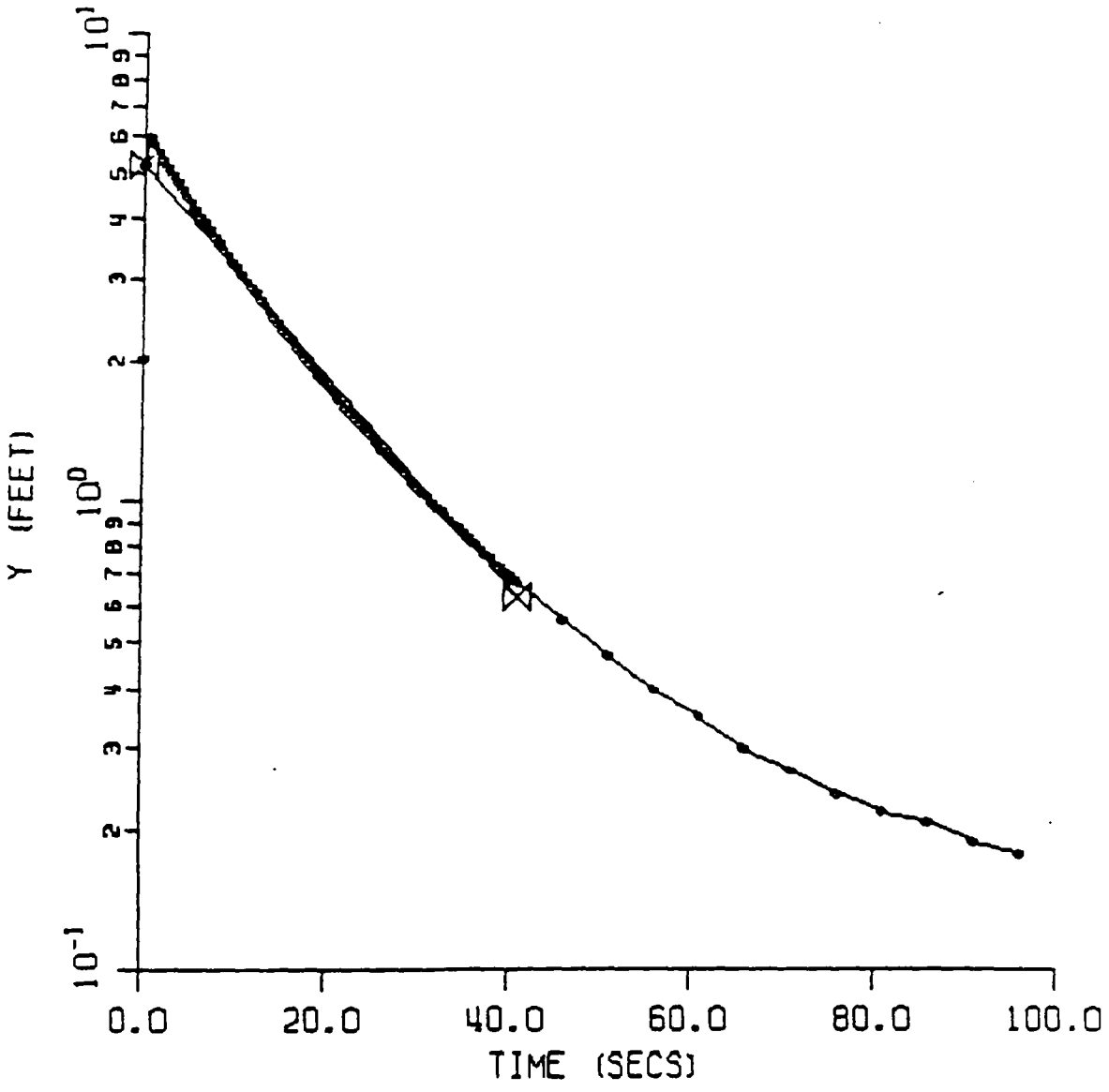
B = 0.00

C = 2.94

Y-INTERCEPT = 3.81

SLOPE = -0.0103

DUPONT - EAST CHICAGO
MW-15
TEST 1



K (CM/S) = 0.005483

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 22.5

H (FEET) = 22.50

COEFFICIENTS

A = 0.00

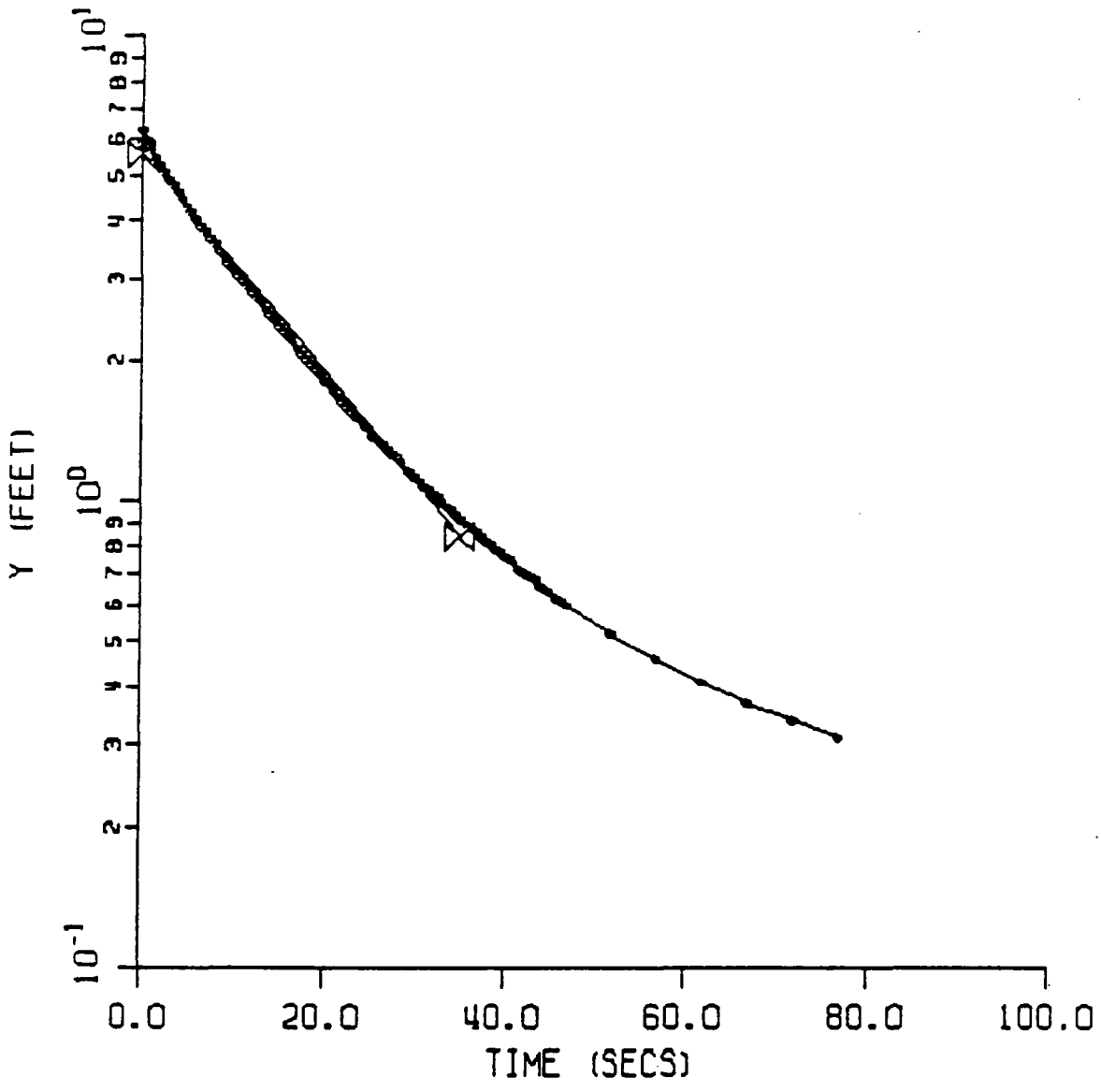
B = 0.00

C = 3.85

Y-INTERCEPT = 5.22

SLOPE = -0.0225

DUPONT - EAST CHICAGO
MW-15
TEST 2



K (CM/S) = 0.005716

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 22.5

H (FEET) = 22.50

COEFFICIENTS

A = 0.00

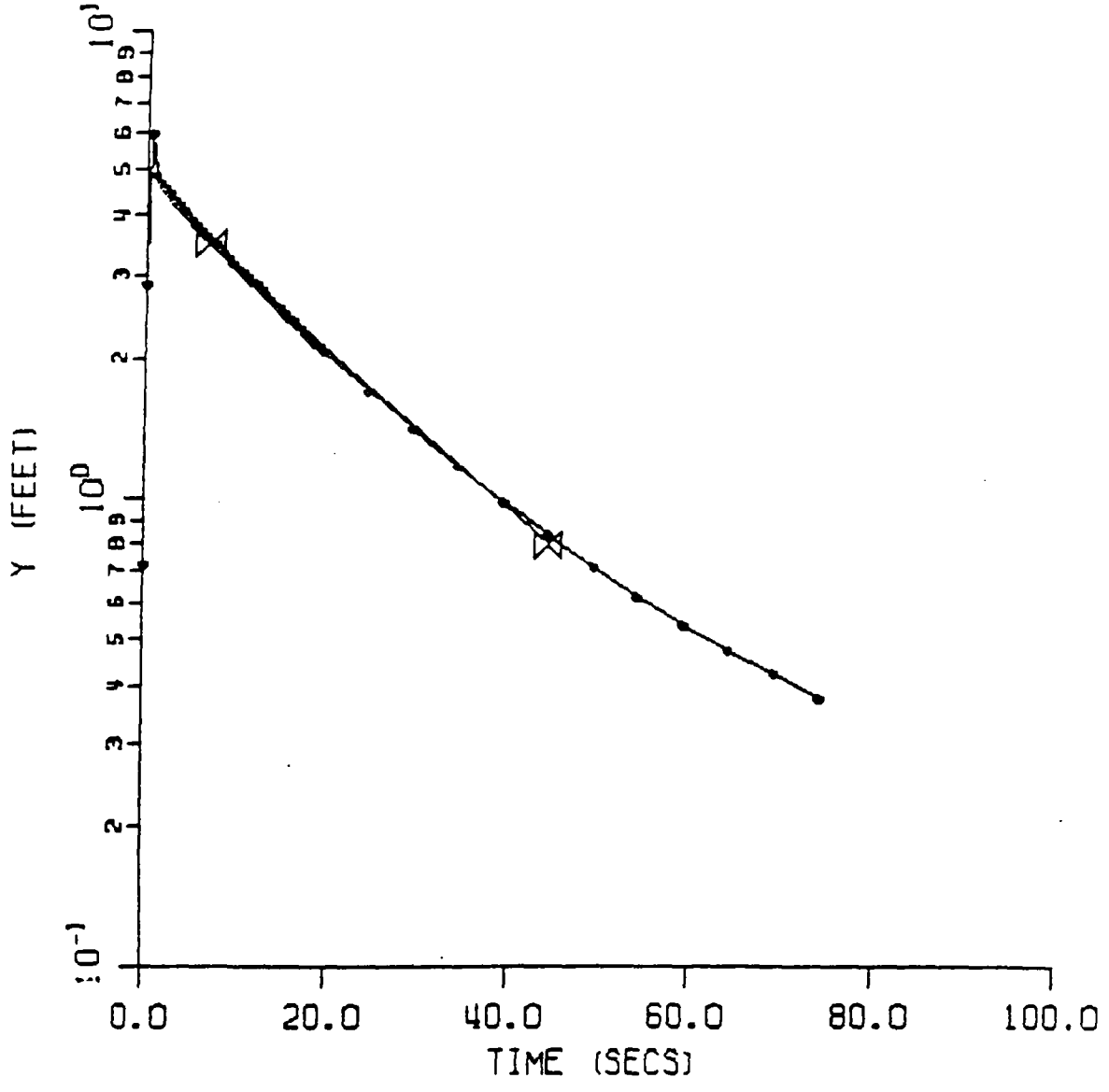
B = 0.00

C = 3.85

Y-INTERCEPT = 5.59

SLOPE = -0.0235

DUPONT - EAST CHICAGO
MW-16
TEST 1



K (CM/S) = 0.004315

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 29.5

H (FEET) = 29.50

COEFFICIENTS

A = 0.00

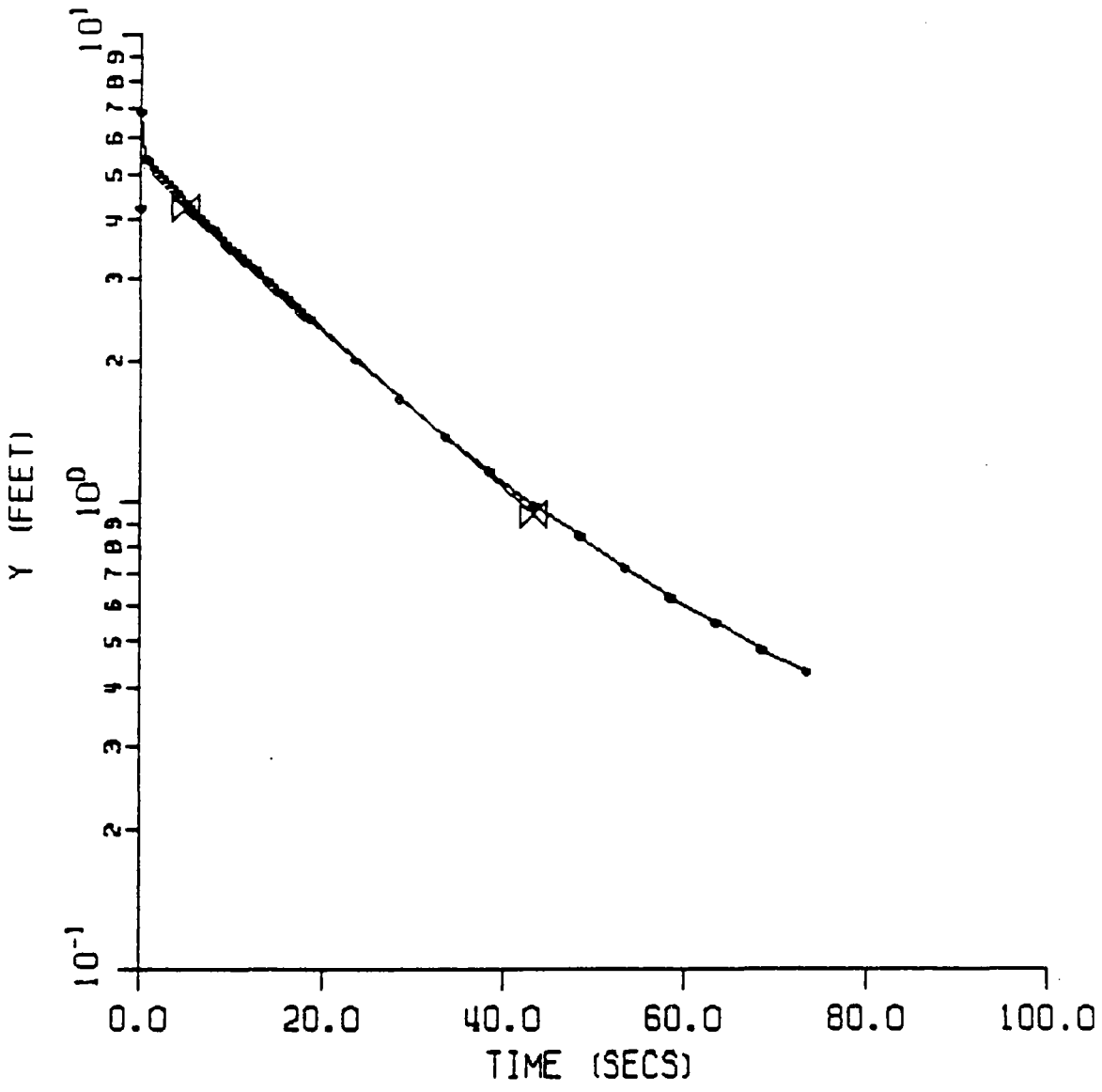
B = 0.00

C = 3.85

Y-INTERCEPT = 4.56

SLOPE = -0.0170

DUPONT - EAST CHICAGO
MW-16
TEST 2



K (CM/S) = 0.004332

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 29.5

H (FEET) = 29.50

COEFFICIENTS

A = 0.00

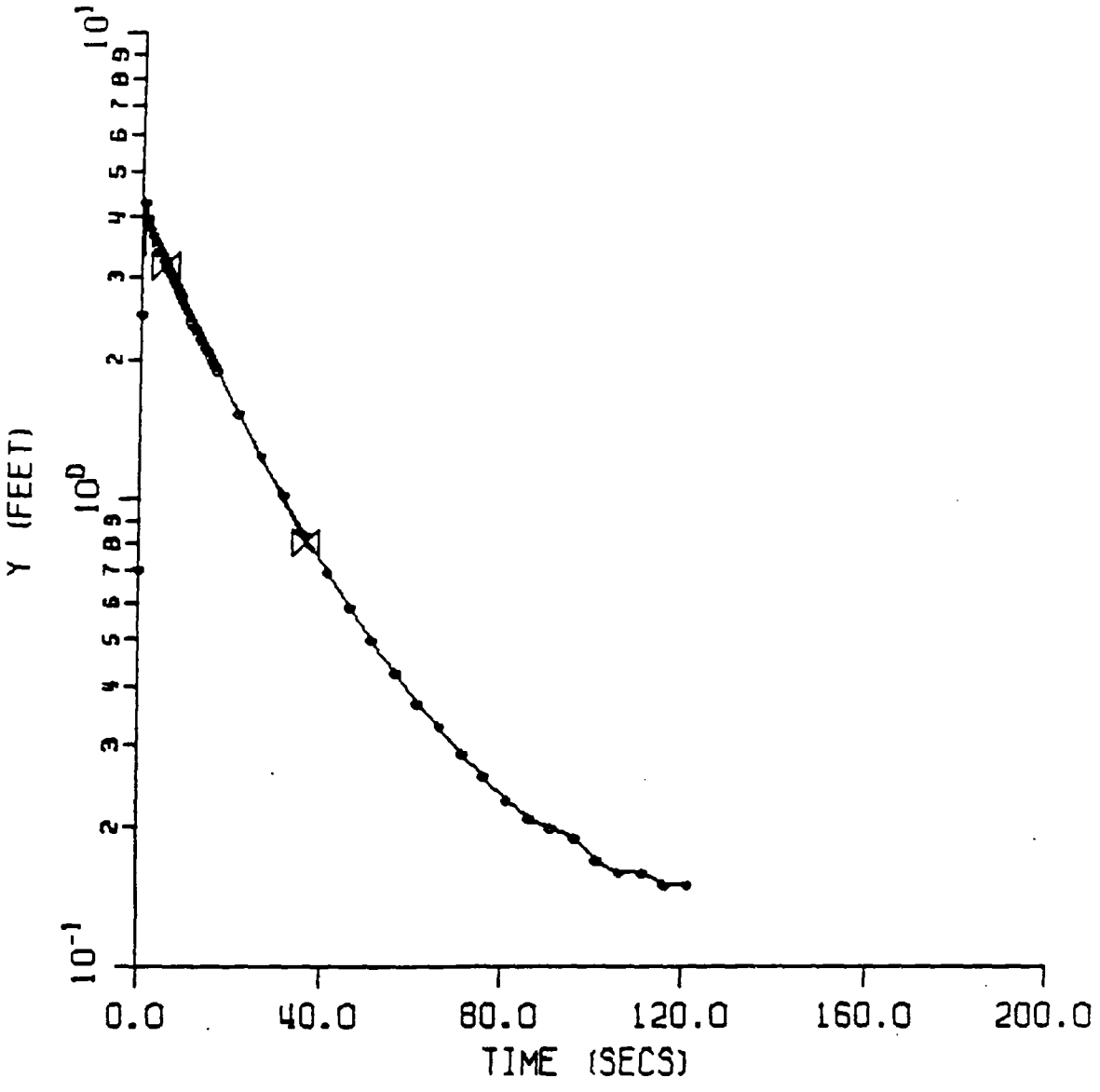
B = 0.00

C = 3.85

Y-INTERCEPT = 5.14

SLOPE = -0.0170

DUPONT - EAST CHICAGO
MW-18
TEST 1



K (CM/S) = 0.004781

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 29.5

H (FEET) = 29.50

COEFFICIENTS

A = 0.00

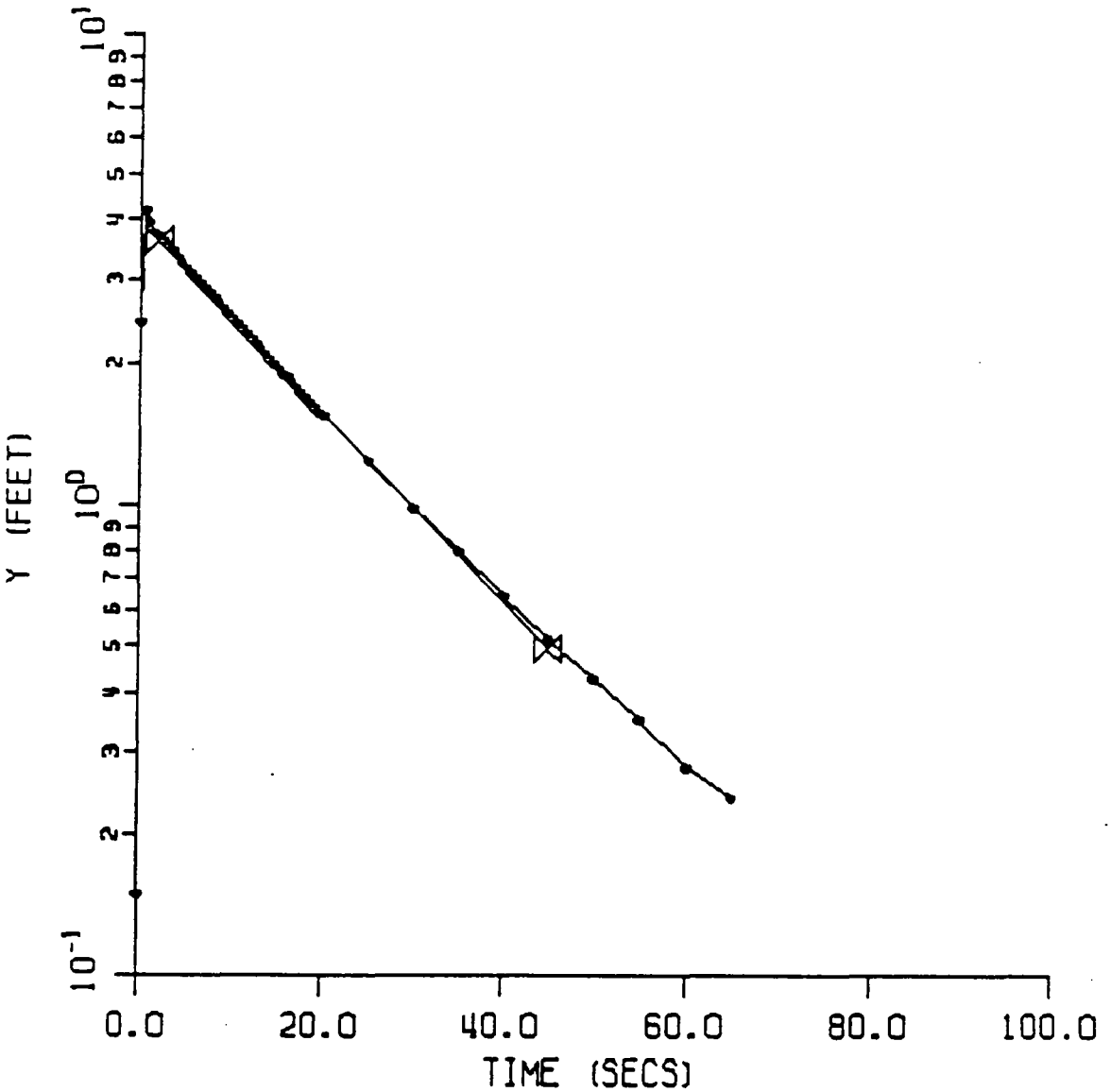
B = 0.00

C = 3.85

Y-INTERCEPT = 3.93

SLOPE = -0.0188

DUPONT - EAST CHICAGO
MW-18
TEST 2



K (CM/S) = 0.005092

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 29.5

H (FEET) = 29.50

COEFFICIENTS

A = 0.00

B = 0.00

C = 3.85

Y-INTERCEPT = 3.94

SLOPE = -0.0200

Phase III Monitoring Wells and Piezometers

(DERS 1992 and 1995)

Phase III Monitoring Wells and Piezometers

Two monitoring wells and 18 piezometers were installed by DERS in 1992 and 1995 (during Phase III). The locations of the piezometers have yet to be surveyed. Approximate locations are illustrated in the attached figure.

The first ten piezometers were positioned to provide better potentiometric information coverage within the center of the developed area or as additional monitoring points to support the hydraulic conductivity testing at MW10, MW17, and MW20 (performed in 1992). These piezometers were installed between February 22, 1992 and March 5, 1992, by the cone penetrometer direct push method. At each location, three-inch diameter steel rods with an expendable aluminum tip were pushed to a total depth of 30 to 36 feet below ground surface. These hollow rods served as a temporary protective casing for piezometer installation. Five or seven one-meter threaded sections of one-inch diameter, Schedule 40 PVC screen with 0.010-inch mill slots were threaded together with ¾-inch PVC riser pipe and inserted into the temporary casing. The steel rods were then slowly retracted, to allow the native formation materials to collapse around the lower portion of the piezometer. The upper 8 to 12 feet of the annular space around the piezometer was filled with Volclay grout slurry, installed using pressure grouting techniques, while the final portion of the temporary casing was removed. Each piezometer was completed with a Portland Cement pad at the surface. A small fence post was installed next to each riser to clearly mark its location.

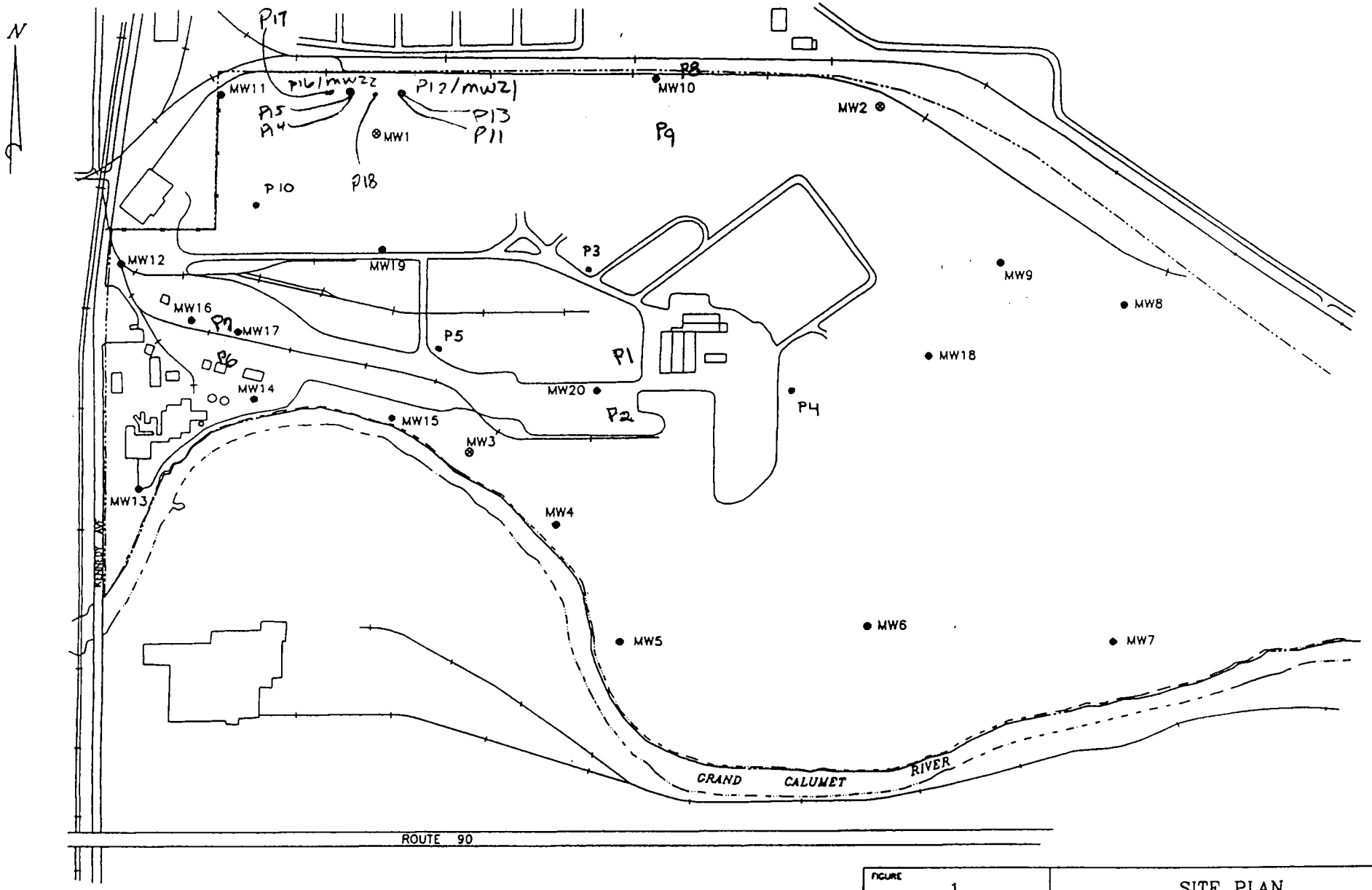
The following locational and construct information is available regarding these piezometers:

	Location	Screen Length	Total Depth	Grouted Interval
P1	20 feet N of MW20	5 meters	35.5 feet	0 to 8 feet
P2	50 feet W of MW20	5 meters	35.5 feet	0 to 8 feet
P3	35 feet E to F13	5 meters	35.5 feet	0 to 12 feet
P4	at J18	7 meters	35 feet	0 to 9.75 feet
P5	22 feet S of H9	5 meters	31 feet	0 to 8 feet
P6	40 feet S of MW17	5 meters	30 feet	0 to 7 feet
P7	24 feet W of MW17	5 meters	29.5 feet	0 to 7 feet

	Location	Screen Length	Total Depth	Grouted Interval
P8	20 feet E of MW10	6 meters	31 feet	0 to 7.75 feet
P9	51 feet S of MW10	6 meters	32 feet	0 to 9 feet
P10	Between MW11& MW17	Not reported	Not reported	Not reported

Eight additional piezometers (P11 through P18) and two monitoring wells (MW21 and MW22) were installed near the northern edge of the property by DERS in 1995. All of these piezometers were installed within 125 feet of either MW21 or MW22 and were screened through most (if not all) of the saturated zone found at these locations.

The second set of piezometers were installed between May 9, 1995 and May 15, 1995, by the hollow-stem auger method using 4 ¼-inch diameter augers as temporary casing. The borings for the piezometers were advanced until the clay till was encountered (found at depths of 33 to 34 feet below ground surface). The boring for P11 was sampled continuously, that for P14 was sampled at 5-foot intervals, and those for P12, P13, and P15 through P18 were not sampled. All of the wells were constructed of two-inch diameter, threaded Schedule 40 PVC screen and riser. Screens are 25 feet in length and have 0.010-inch mill slots. Sand packs extend 2 to 2.5 feet above the tops of the screens and 2- to 3-foot bentonite pellet seals were installed above the sand packs. These piezometers were grouted with cement grout to ground surface and have above ground risers with protective steel covers. Boring logs and construction information for two of the piezometers (P11 and P14) and the two monitoring wells are attached.



LEGEND

- ⊗ EXISTING MONITOR WELL LOCATION(U.S. EPA WELLS)
- ● PHASE I I MONITOR WELL LOCATION
- ---- DU PONT PLANT PROPERTY LINE

0 100 300 800
SCALE IN FEET

FIGURE 1	SITE PLAN			
SCALE 1"=800'	DESIGNED BY	DRAWN BY SMM	CAD DRAWING NO 1101-1	
DATE 9/20/91	CHECKED	APPROVED	PROJECT NO 401101	
DU PONT EAST CHICAGO PLANT				
Du Pont Environmental Remediation Services				

DU PONT ENVIRONMENTAL REMEDIATION SERVICES

BORING NUMBER P-11 | CLIENT DuPont

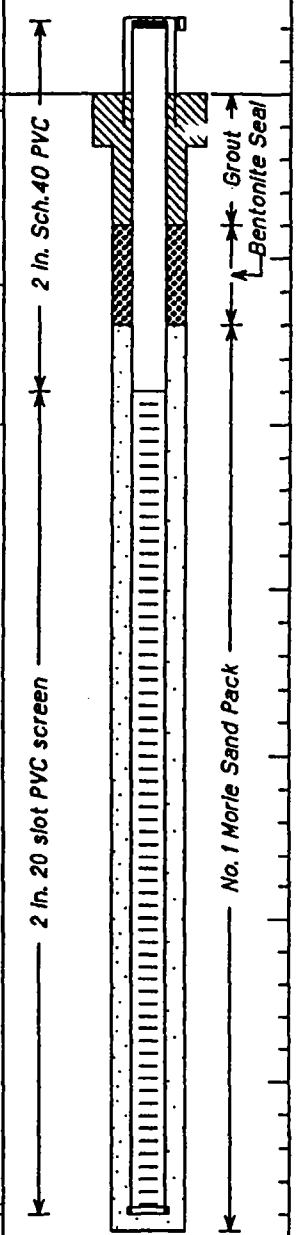
PROJECT DUPONT EAST CHICAGO | DRILLING COMPANY FOX DRILLING

LOCATION E. Chicago, IN | DRILLING METHOD HSA

DATE DRILLED 5/9/95 | SAMPLING METHOD SPLIT SPOON

LOGGED BY T. LOUNSBURY | Grade ELEVATION ft (msl)

DEPTH feet	SAMPLE	BLOWS/6 in	RECOVERY (%)	(ppm)	GRAPHIC LOG	USCS	DESCRIPTION AND REMARKS
0		1,1	40			FL	Silt topsoil with grass and roots, black color some sand.
		1,1					FILL - sandy gravel, black, angular pebbles and sand.
		2,1	30				
		5,2					FILL - cinder type of angular pebbles with fill sand, wet. Near 2 ft is white to tan fill (silt-like). Some miscellaneous brick pieces, loose, wet.
5		2,1	30				
		1,2				SW	FILL - Sand, with silty process type material. Sand is very coarse grained, light brown to tan color.
		3,5	50				
		7,10					SAND, trace of silt (<4%), fine to medium grained, light gray to green/gray color.
		5,7	75				
		9,10					
10		3,4	60			SP	SAND, medium grained, green/gray color, wet (saturated). Sand becomes more coarse grained at 8 to 9 ft depth. Thin lens (1.5 inch thick) of very coarse grained sand (9.2 ft deep).
		8,9					
		5,11					At 9.5 ft deep is thin (.5 inch) layer of (peat-like) stems and organic debris (1/4 inch long stems) followed below by fine grained sand.
		15,18					
15		6,11	80				
		12,14					SAND, fine to medium grained, (30% fine grained sand), green to gray.
		10,15	90				
		25,20					SAND, as above, slightly less fine grained sand (10-20%), trace of coarse grained sand, wet.
		5,12	90				
		14,18					SAND, medium grained, trace of fine grained sand (5%), well sorted, slightly rounded grains, green to gray color, wet.
20		6,15	90				
		15,20					SAND, fine to medium grained, with greater concentration of fine grained sand at lower (bottom 1 ft) of split spoon (may be washed through the spoon to the lower end). Sand is greenish gray color.
		8,11	80				
		18,13					SAND, as above, approximately 60% fine and 40% medium grained.
		13,18	90				
25		22,24					SAND, as above, (80%) medium and (20%) fine grained, green color.
		8,16	50				
		21,23					SAND, fine to very fine grained, well sorted, green to gray, wet.
		11,14	80				
		24,26					SAND, fine to medium grained, rounded grains, greenish/gray color. Contact at 33.7 feet deep.
30		4,7	60				
		15,13					CLAY, soft, plastic, very moist, green/gray color.
		7,11	80				
		4,7				CL	End of Boring at 34 feet.
35							
40							



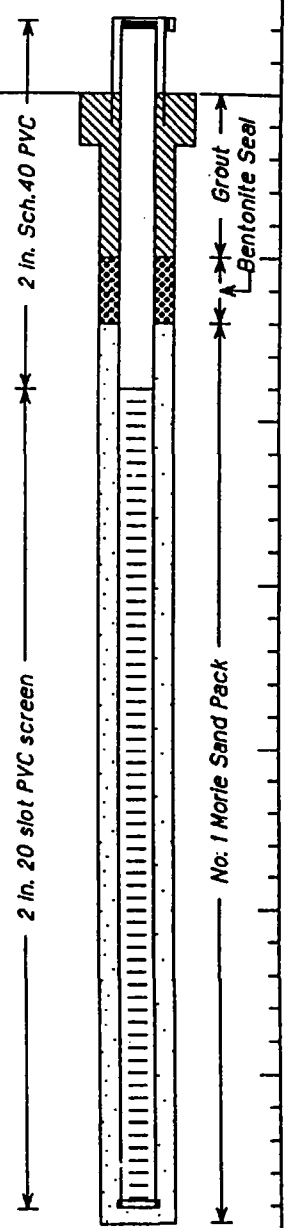
WELL DIAGRAM

DU PONT ENVIRONMENTAL REMEDIATION SERVICES

BORING NUMBER P-14 | CLIENT DuPont
PROJECT DUPONT EAST CHICAGO | DRILLING COMPANY FOX DRILLING
LOCATION E. Chicago, IN | DRILLING METHOD HSA
DATE DRILLED 5/11/95 | SAMPLING METHOD SPLIT SPOON
LOGGED BY T. LOUNSBURY | Grade ELEVATION ft (msl)

DEPTH feet	SAMPLE	BLOWS/6 in	RECOVERY (%)	(ppm)	GRAPHIC LOG	USCS	DESCRIPTION AND REMARKS
0							
						FL	FILL - sandy gravel, black cinders with roots and g ass in upper 1 foot.
		1,1	50				FILL - cinders, angular pebbles. Red pigment covered on spoon sampler. Included 2 inch thick
5		1,2				SW	layer of bright orange material (silty pigment), wet, soft. Some wood fill pieces.
							SAND, with silt (5 to 10%), medium grained, with light color streaks in a dark brown sand, moist.
		3,3	60			SP	SAND, medium to coarse grained (20% coarse grained), dark brown color with some horizontal
10		3,5					banding of black sand (1/8-1/4 inch streaks), wet (some sample recovery washed out of spoon).
		4,8	90				SAND, medium to coarse (10%) grained, trace of silt (<4%) light gray to green color, wet.
15		13,15					
		10,15	100				SAND, fine to medium grained, becomes more fine grained with depth. running sand in auger
20		20,25					stem-perhaps 50-70% of sample is slough material (medium grained sand). Sand is greenish gray color, wet.
		5,5	90				SAND, medium grained, medium green to dark brown-green, wet.
25		8,10					
		9,8	80				SAND, medium grained, well sorted, green color, wet. (Estimate 10-20% sample recovery-slough in
		12,16					borehole)
30		4,8	100				Heaving sand in auger. Tremie pipe wash to remove sand.
		15,18					
		5,3	70				SAND, fine to medium grained (50% each), pale green color, wet.
		3,5				CL	
35							SAND, medium and fine (20%) grained, well sorted, green with some horizontal, thin (1/8 inch), black lamination. Contact at 33.5 ft.
							CLAY, soft, medium plastic, very moist, pale green color.
40							End of Boring at 34 feet.

WELL DIAGRAM



JOB NUMBER: 1101

DU PONT ENVIRONMENTAL REMEDIATION SERVICES

BORING NUMBER MW-21 | CLIENT DuPont

PROJECT DUPONT EAST CHICAGO | DRILLING COMPANY FOX DRILLING

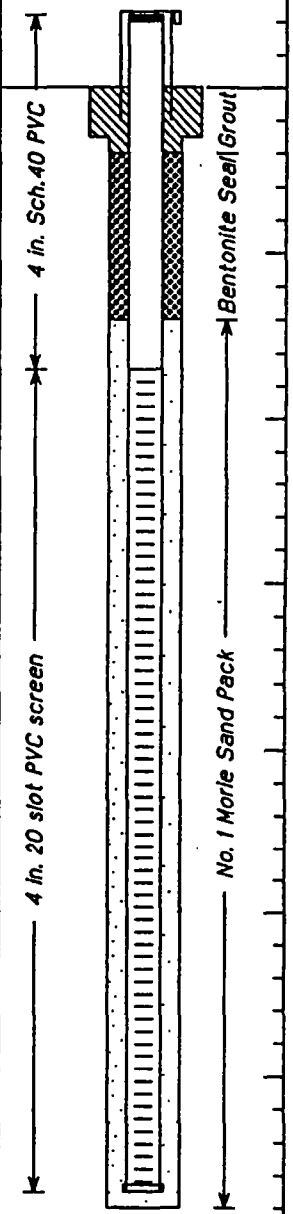
LOCATION E. Chicago, IN | DRILLING METHOD HSA

DATE DRILLED 5/10/95 | SAMPLING METHOD SPLIT SPOON

LOGGED BY T. LOUNSBURY | Grade ELEVATION ft (msl)

DEPTH feet	SAMPLE	BLOWS/6 in	RECOVERY (%)	(ppm)	GRAPHIC LOG	USCS	DESCRIPTION AND REMARKS
0						FL	Soil boring log by observed auger cuttings. FILL – 3 feet– cinders, angular pebbles and sand, black color.
5						SP	SAND, with silt (5 to 10%), medium grained, brown color, wet.
15							SAND, medium and fine grained (50%), trace of silt (<5%), green color , wet.
20							SAND, as above, wet. (auger drill cuttings)
30							SAND, fine grained well sorted, pale green color, wet. Contact with clay layer at approximately 33 feet deep.
35						CL	CLAY, soft, medium plastic, pale green color. End of Boring at 34 feet.

WELL DIAGRAM



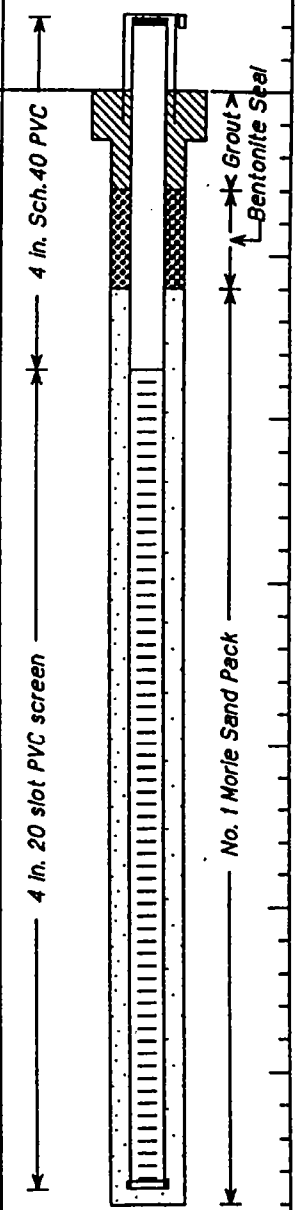
JOB NUMBER: 1101

DU PONT ENVIRONMENTAL REMEDIATION SERVICES

BORING NUMBER MW-22 | CLIENT DuPont
PROJECT DUPONT EAST CHICAGO | DRILLING COMPANY FOX DRILLING
LOCATION E. Chicago, IN | DRILLING METHOD HSA
DATE DRILLED 5/12/95 | SAMPLING METHOD SPLIT SPOON
LOGGED BY T. LOUNSBURY | Grade ELEVATION ft (msl)

DEPTH feet	SAMPLE	BLOWS/6 in	RECOVERY (%)	(ppm)	GRAPHIC LOG	USCS	DESCRIPTION AND REMARKS
0							
						FL	Soil boring log by observed auger cuttings. FILL - Surface to 10 feet. Mixture of fine grained sand and fill material (silt-like material), very wet, dark reddish brown color (soupy sand-silt fill).
5							
10						SP	SAND, fine grained, wet, dark green color.
15							
20							SAND, very fine to fine grained with some (15%) medium grained sand, pale green color, very wet.
25							SAND, as above, wet. (auger drill cuttings)
30							SAND, fine grained well sorted, pale green color, wet. Contact with clay layer at approximately 33.5 feet.
35						CL	CLAY, soft, medium plastic, pale green color. End of Boring at 34 feet.
40							

WELL DIAGRAM



Resurveying of Monitoring Well Elevations

Resurveying of Monitoring Well Elevations

Following are three attachments that outline monitoring well and piezometer elevations surveyed during Phase III. Attachment 1 summarizes the surveyed elevations of MW1 through MW20, SG1 through SG4 and P1 through P10. Surveying of MW1 through MW20 was conducted in July 1991 and December 1993, while P1 through P10 were surveyed only in March 1992. MW10, MW17, and MW20 were also surveyed at that time. Attachment 2 summarizes the June 1995 surveyed elevations for P11 through P18, as well as the newly installed MW21 and MW22 monitoring wells.

Attachment 1

Site Survey Data

East Chicago Plant

Location ID	Top of PVC Survey Data by ACA Calumet July, 1991 (ft AMSL)	Survey Data by Plumb Tuckett & Assoc. - March '92 (ft AMSL)	Top of Protective Casing Elevations (5) on Topo Map December '93 [Plumb Tuckett?]	Top of PVC Elevations Surveyed June '95 (6) [Plumb Tuckett?]
MW 1	592.78	---	592.94	---
MW 2	590.48	---	590.15	---
MW 3	594.19	---	594.46	---
MW 4	589.89	---	590.12	---
MW 5	590.13	---	590.24	---
MW 6	589.08	---	585.73	---
MW 7	585.34	---	---	---
MW 8	591.82	---	---	---
MW 9	589.31	---	---	---
MW 10	590.47	590.63	591.07	---
MW 11	590.10	---	590.29	---
MW12	590.12	---	590.44	---
MW13	588.99	---	589.19	---
MW14	590.87	---	591.23	---
MW15	591.86	---	592.15	---
MW16	591.17	---	591.55	---
MW17	591.24	589.43	591.60	---
MW18	593.15	---	593.51	---
MW19	591.58	---	592.00	---
MW20	592.46	593.13	593.59	---
SG-1	579.72 (1)	---	---	---
SG-2	578.57 (1)	583.32 (2)	---	---
SG-3	579.43 (1)	---	---	---
SG-4	587.26 (1)	---	---	---
P 1	NA	591.54 (3,4)	---	---
P 2	NA	591.27 (3,4)	---	---
P 3	NA	592.15 (3,4)	---	---
P 4	NA	590.99 (3,4)	---	---
P 5	NA	589.27 (3,4)	---	---
P 6	NA	589.13 (3,4)	---	---
P 7	NA	587.67 (3,4)	---	---
P 8	NA	589.39 (3,4)	---	---
P 9	NA	590.60 (3,4)	---	---
P 10	NA	590.28 (3,4)	---	---

(1) Zero point.
NA Well not yet existant.
'--- Well not re-surveyed.
(2) Top of pole elev.
(3) Piezometers installed in first qtr '92.
(4) Top of PVC elev.
(5) Top of protective casing (under lid).
(6) Elev. ref. pt.=MW11 top of casing (590.29).

Attachment 2

Site Survey Data
East Chicago Plant

Location ID	Top of PVC Survey Data by ACA Calumet July, 1991 (ft AMSL)	Survey Data by Plumb Tuckett & Assoc. - March '92 (ft AMSL)	Top of Protective Casing Elevations (5) on Topo Map December '93 [Plumb Tuckett?]	Top of PVC Elevations Surveyed June '95 (6) [Plumb Tuckett?]
MW20	NA	NA	NA	592.19
MW21	NA	NA	NA	592.47
P 11	NA	NA	NA	590.58
P 12	NA	NA	NA	591.94
P 13	NA	NA	NA	591.55
P 14	NA	NA	NA	590.80
P 15	NA	NA	NA	591.36
P 16	NA	NA	NA	590.93
P 17	NA	NA	NA	590.14
P 18	NA	NA	NA	590.69

(1) Zero point
NA Well not yet existant
'--- Well not re-surveyed.
(2) Top of pole elev.
(3) Piezometers installed in first qtr. '92.
(4) Top of PVC elev.
(5) Top of protective casing (under lid).
(6) Elev. ref. pt.=MW11 top of casing (590.29).

Groundwater / Surface Water Hydraulic Information

Pre-1990 Groundwater Level Data

Phase II Groundwater/Surface Water Level Data

Phase III Groundwater Level Data

Phase III Hydraulic Conductivity Information

Spring (Seep) Flow Data

U.S.G.S. Water Level Information

Phase III Hydraulic Conductivity Information

(DERS 1992)

Pre-1990 Groundwater Level Data

(excerpts from Phase I Groundwater Assessment Report [CH2M HILL 1990])

Table 4-3
EXISTING WATER LEVEL DATA
EAST CHICAGO FACILITY

Monitoring Location	Date	Water Level (ft amsl)
U.S. EPA Wells[a]		
MW-1 (Northwest)	March 1 & 2, 1983	586.54
MW-2 (Northeast)	March 1 & 2, 1983	586.43
MW-3 (South)	March 1 & 2, 1983	582.82
USGS Wells[b]		
C-5 (North)	February 4, 1986	Frozen
C-10 (Middle)	February 4, 1986	583.87
C-15 (South)	February 4, 1986	583.10
C-16S (East)	February 4, 1986	583.82
C-5 (North)	May 15, 1986	584.17
C-10 (Middle)	May 15, 1986	583.40
C-15 (South)	May 15, 1986	583.06
C-16S (East)	May 15, 1986	583.80

[a]Source of data: DuPont files
[b]Source of data: Lee Watson, USGS, Indianapolis

GLT848/2

Phase II Groundwater/Surface Water Level Data

(excerpts from Phase II Groundwater Assessment Report [CH2M HILL 1991])

Table 4-1
PHASE II WATER LEVEL MONITORING DATA
DU PONT EAST CHICAGO PLANT

	Elevation (Feet Above Mean Sea Level)									
	6/18/90	7/17/90	8/28/90	8/29/90	9/10/90	10/16/90	11/16/90	11/30/90	2/19/91	4/11/91
Du Pont Monitoring Wells										
MW-1	586.39	586.08	587.24	587.14	586.56	586.81	586.85	588.05	586.71	587.03
MW-2	585.90	585.87	586.73	586.68	586.31	586.65	586.59	587.12	587.03	587.16
MW-3	582.34	582.39	582.93	582.74	582.53	582.74	582.48	583.25	581.96	582.41
MW-4	582.23	582.28	582.79	582.78	582.46	582.51	582.48	582.96	582.00	582.36
MW-5	581.63	581.67	581.98	581.97	581.71	582.05	582.03	582.57	582.01	582.12
MW-6	585.65	585.91	NA	586.19	585.64	586.28	586.33	NA	586.50	586.33
MW-7	581.67	581.90	582.48	582.21	581.86	582.30	582.34	582.50	582.46	582.40
MW-8	586.00	585.83	586.62	586.62	586.33	586.40	586.54	587.22	587.17	587.23
MW-9	585.94	585.81	586.61	586.58	586.31	586.34	586.47	587.11	586.96	587.11
MW-10	585.80	585.74	586.39	586.37	585.93	586.27	586.20	586.92	586.30	586.55
MW-11	586.02	585.79	586.86	586.85	586.35	586.54	586.55	NA	586.50	586.77
MW-12	585.40	585.92	586.62	586.59	585.86	586.83	585.82	587.14	585.69	585.94
MW-13	581.18	581.28	581.59	581.49	581.32	581.50	581.49	581.78	581.29	581.36
MW-14	583.49	583.92	584.35	584.29	584.54	584.56	583.55	584.87	582.89	583.36
MW-15	582.01	585.02	582.79	582.74	582.23	582.45	585.08	583.18	581.48	582.04
MW-16	585.99	586.68	587.14	587.14	586.93	587.19	586.21	587.36	585.97	586.21
MW-17	586.14	586.78	587.34	587.32	587.00	587.45	586.48	588.05	585.99	586.42
MW-18	586.43	583.25	586.93	586.88	586.60	586.63	586.64	587.32	587.08	587.27
MW-19	586.61	586.42	587.46	587.40	586.79	587.06	586.96	588.22	586.88	587.21
MW-20	586.62	586.50	587.48	587.44	586.76	586.99	586.74	587.99	586.46	586.96
Staff Gauges										
	(6/21/90)									
SG-1	580.65	580.51	580.87	580.76	580.74	580.46	580.60	580.19	579.92	580.67
SG-2	580.27	580.56	NA	580.82	580.57	580.55	580.55	<579.98	<579.98	<579.98
SG-3	581.11	581.18	581.67	581.60	581.37	581.37	581.26	581.19	580.12	580.71
SG-4	<587.26	NA	588.04	588.02	587.77	587.71	587.84	588.50	588.56	588.70
Other Monitoring Sites										
U.S.G.S. Monitoring Wells										
C-5	583.74	NA	NA	NA	NA	584.31	584.43	NA	NA	584.95
C-10	582.44	NA	583.04	NA	NA	583.11	583.17	583.56	583.36	583.34
C-12	582.32	NA	583.03	NA	NA	583.11	583.12	583.64	583.39	583.41
C-15	581.83	NA	NA	NA	NA	NA	NA	NA	NA	NA
D-66	581.54	NA	NA	NA	NA	581.99	581.83	582.15	581.64	581.64

NOTE: NA = Not Analyzed.
"<" = Water level below bottom of gauge.

Phase III Groundwater Level Data

(DERS 1992)

Summary of Monitor Well Gauging Results
Water Level Elevations Using 1991 Survey Data

Well ID	Top of Casing Elevation	Depth to Water	Piezometric Elevation
MW-1	592.78	6.51	586.27
MW-2	590.48	4.03	586.45
MW-3	594.19	11.97	582.22
MW-4	589.89	7.67	582.22
MW-5	590.13	8.04	582.09
MW-6	689.08	2.79	586.29
MW-7	585.34	3.03	582.31
MW-8	591.82	5.54	586.28
MW-9	589.31	3.07	586.24
MW-10	590.47	4.30	586.17
MW-11	590.10	4.20	585.90
MW-12	590.12	4.93	585.19
MW-13	588.99	7.54	581.45
MW-14	590.87	7.94	582.93
MW-15	591.86	10.11	581.75
MW-16	591.17	5.71	585.46
MW-17	591.24	5.75	585.49
MW-18	593.15	6.55	586.60
MW-19	591.58	5.10	586.48
MW-20	592.46	6.31	586.15
SG-2	578.57	0.22	578.79

Note: All values in feet
Source: DERS Proj. No. 1101
* = TOC elev not remeasured

Summary of Monitor Well Gauging Results
Water Level Elevations Using 1993 Survey Data

Well ID	Top of Casing Elevation	Depth to Water	Piezometric Elevation
MW-1	592.94	6.51	586.43
MW-2	590.15	4.03	586.12
MW-3	594.36	11.97	582.39
MW-4	590.05	7.67	582.38
MW-5	590.05	8.04	582.01
MW-6	585.73	2.79	582.94
MW-7*	585.34	3.03	582.31
MW-8*	591.82	5.54	586.28
MW-9*	589.31	3.07	586.24
MW-10	591.07	4.30	586.77
MW-11	590.29	4.20	586.09
MW-12	590.44	4.93	585.51
MW-13	589.19	7.54	581.65
MW-14	591.23	7.94	583.29
MW-15	592.15	10.11	582.04
MW-16	591.55	5.71	585.84
MQ-17	591.60	5.75	585.85
MW-18	593.51	6.55	586.96
MW-19	592.00	5.10	586.90
MW-20	593.59	6.31	587.28
SG-2*	578.57	0.22	578.79

Summary of Piezometer Gauging Results
March 1992 Water Depths and Well Survey Data

Piezometer ID	Top of Casing Elevation	Depth to Water	Piezometric Elevation
P3	592.15	4.05	588.1
P4	590.99	3.98	587.01
P5	589.27	2.68	586.59
P10	590.28	3.92	586.36

Phase III Groundwater Level Data

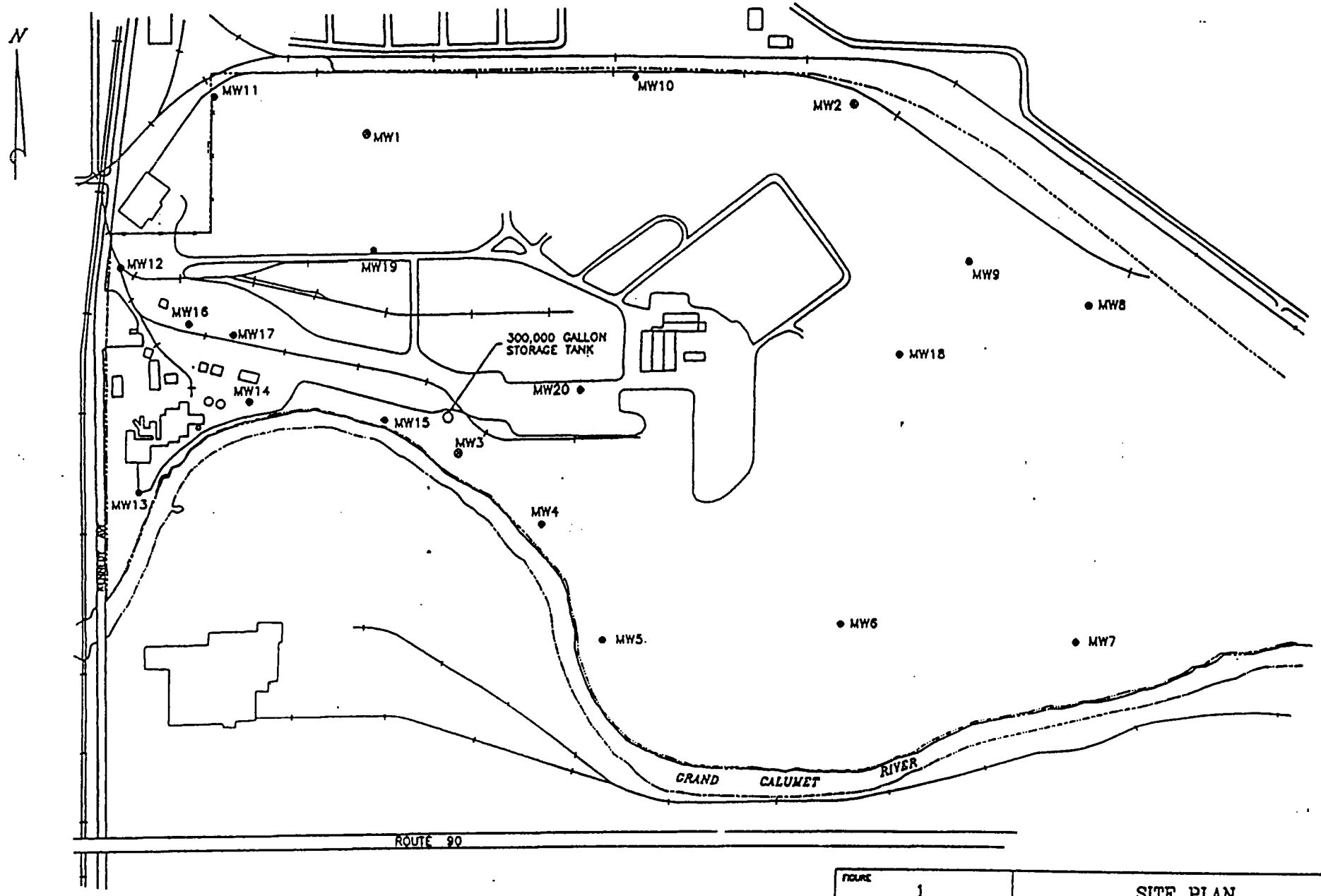
Following is a summary of water level elevations measured during Phase III. Two sets of water level elevations are presented for MW-1 through MW-20, corresponding to two separate surveys of these wells in July 1991 and December 1993. Water level elevations calculated from P-3, P-4, P-5 and P-10 data are also included, based on surveyed piezometer elevations and water levels measured in March 1992. Surveyed elevations for the wells and piezometers are summarized elsewhere in the appendix.

Table 5

AQUIFER PUMPING TEST RESULTS SUMMARY

	MW-17 Pumping Test			MW-10 Pumping Test		
	MW-17	P-6	P-7	MW-10	P-8	P-9
Neuman Solution	N/A			N/A		
n		0.2	0.06		0.2	0.8
Transmissivity (gpd/ft):						
Early Time		9,841	7,967		2,988	8,365
Late Time		6,692	5,769		2,884	8,161
Storativity		0.000774	0.000976		0.00058	0.00119
Specific Yield		0.0583	0.045		0.254	0.0932
Hydraulic Conductivity (cm/s)		0.013	0.011		0.0046	0.013
Jacob Straight Line	N/A			N/A		
Transmissivity (gpd/ft)		8,570	8,346		7,963	10,617
Storativity		0.027	0.015		0.019	0.061
Hydraulic Conductivity (cm/s)		0.013	0.013		0.013	0.017
Recovery Data Analysis						N/A
Transmissivity (gpd/ft)	7,412	10,560	8,030	17,844	19,705	
Hydraulic Conductivity (cm/s)	0.012	0.017	0.013	0.028	0.031	

N/A = Analysis method not applicable to data



LEGEND

- ⊕ EXISTING MONITOR WELL LOCATION(U.S. EPA WELLS)
- ● PHASE I I MONITOR WELL LOCATION
- ——— DU PONT PLANT PROPERTY LINE

0 100 300 800

SCALE IN FEET

FIGURE 1	SITE PLAN		
SCALE 1" = 800'	DESIGNED BY	DRAWN BY SMM	CAD DRAWING NO 1101-1
DATE 9/20/91	CHECKED	APPROVED	PROJECT NO 401101
DU PONT EAST CHICAGO PLANT			
Du Pont Environmental Remediation Services			

/ 5 7 Color, Copies.

MW-17 PUMPING TEST BACKGROUND DATA

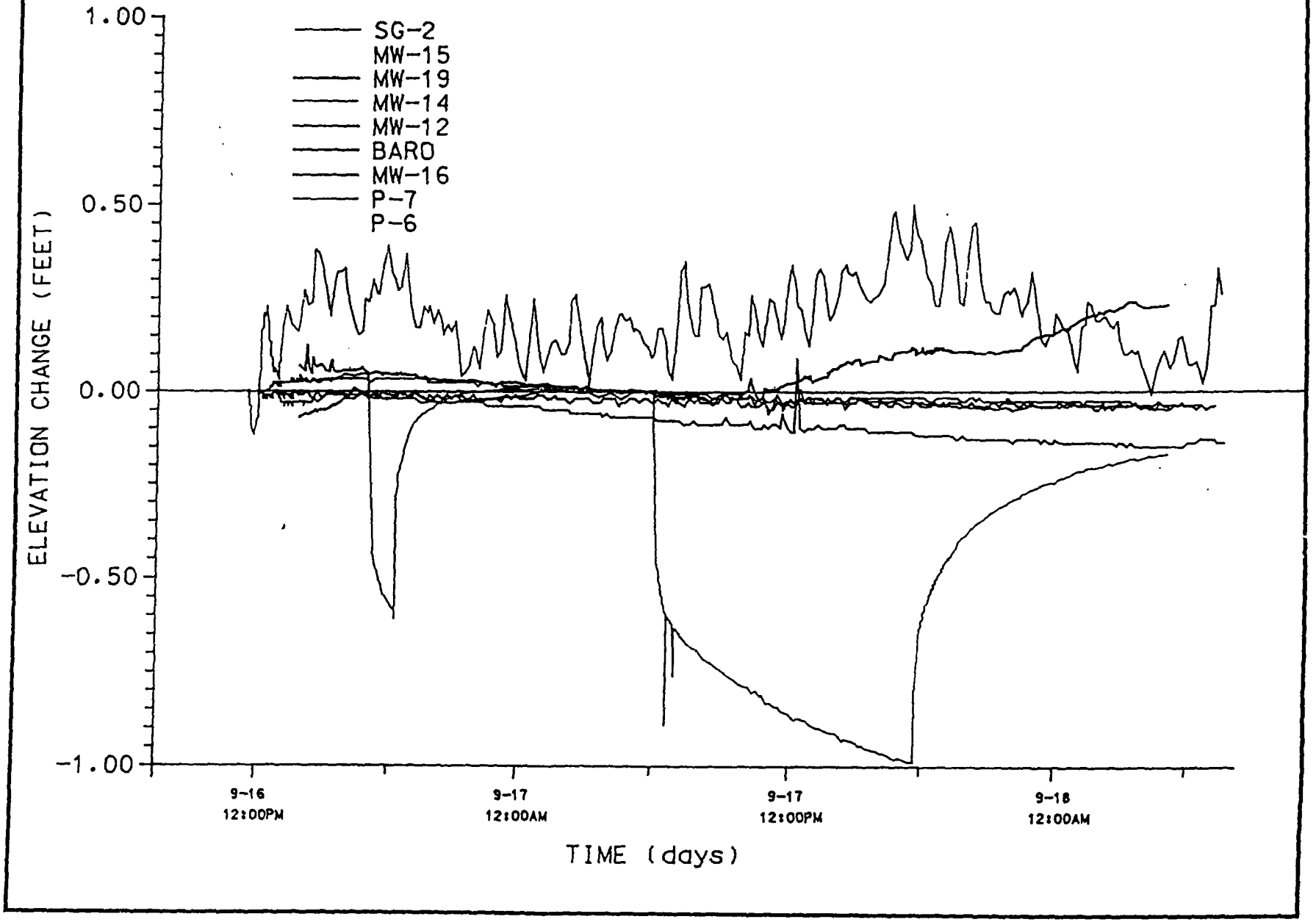


Figure 6 10 (color copies)

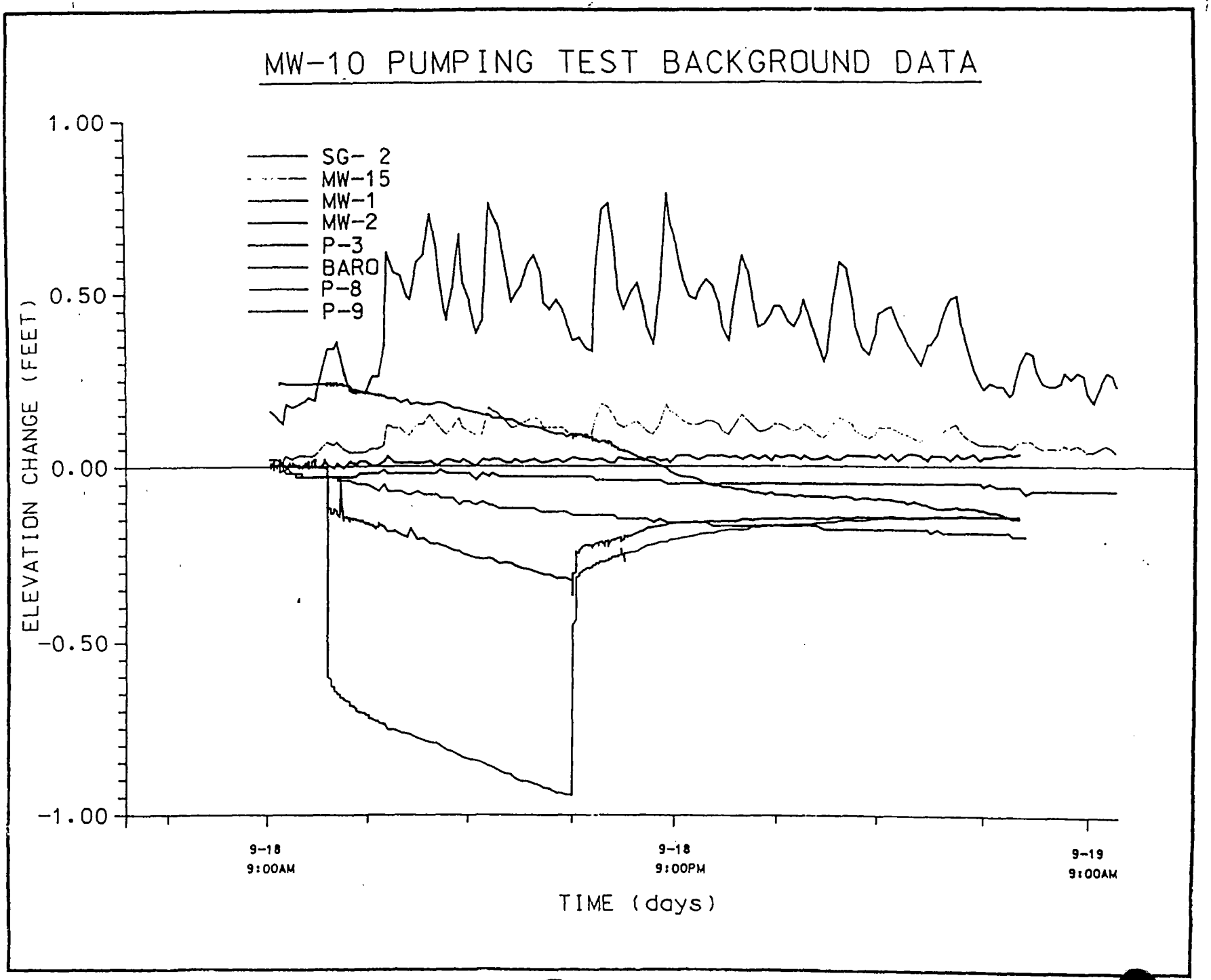


FIGURE 7 11

MW-17 PUMPING TEST

DATA LOGGER VS. HAND MEASUREMENT DATA

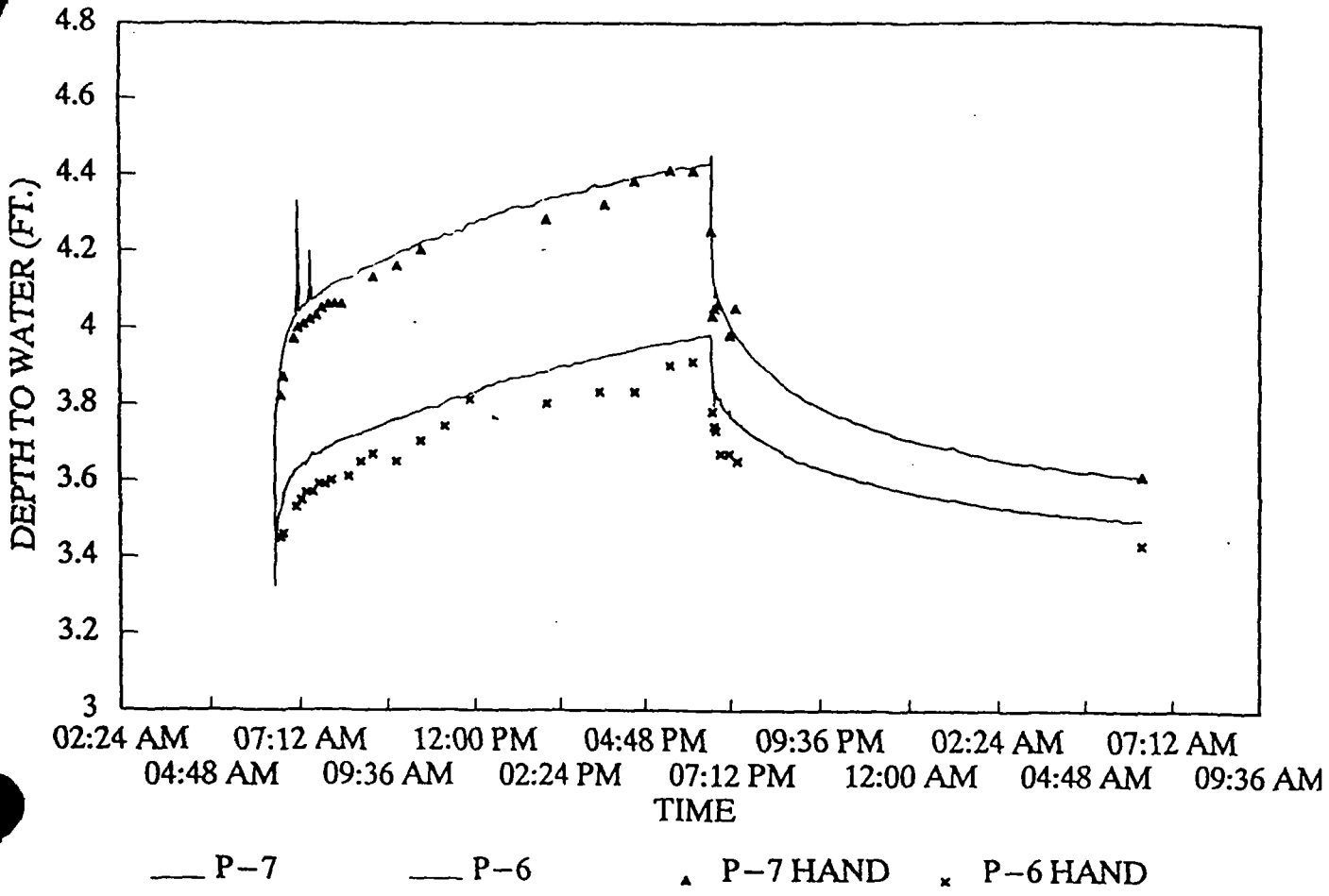
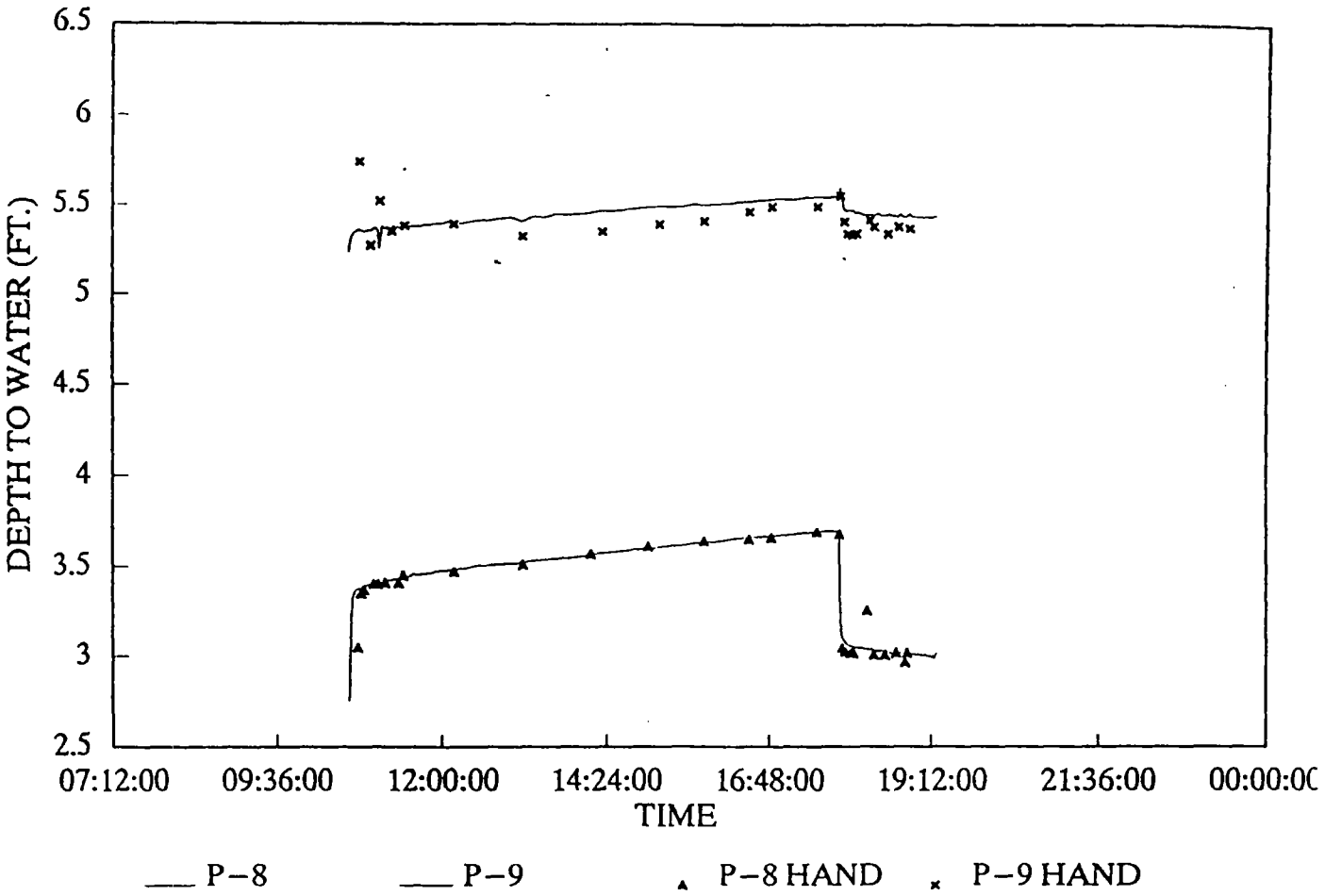


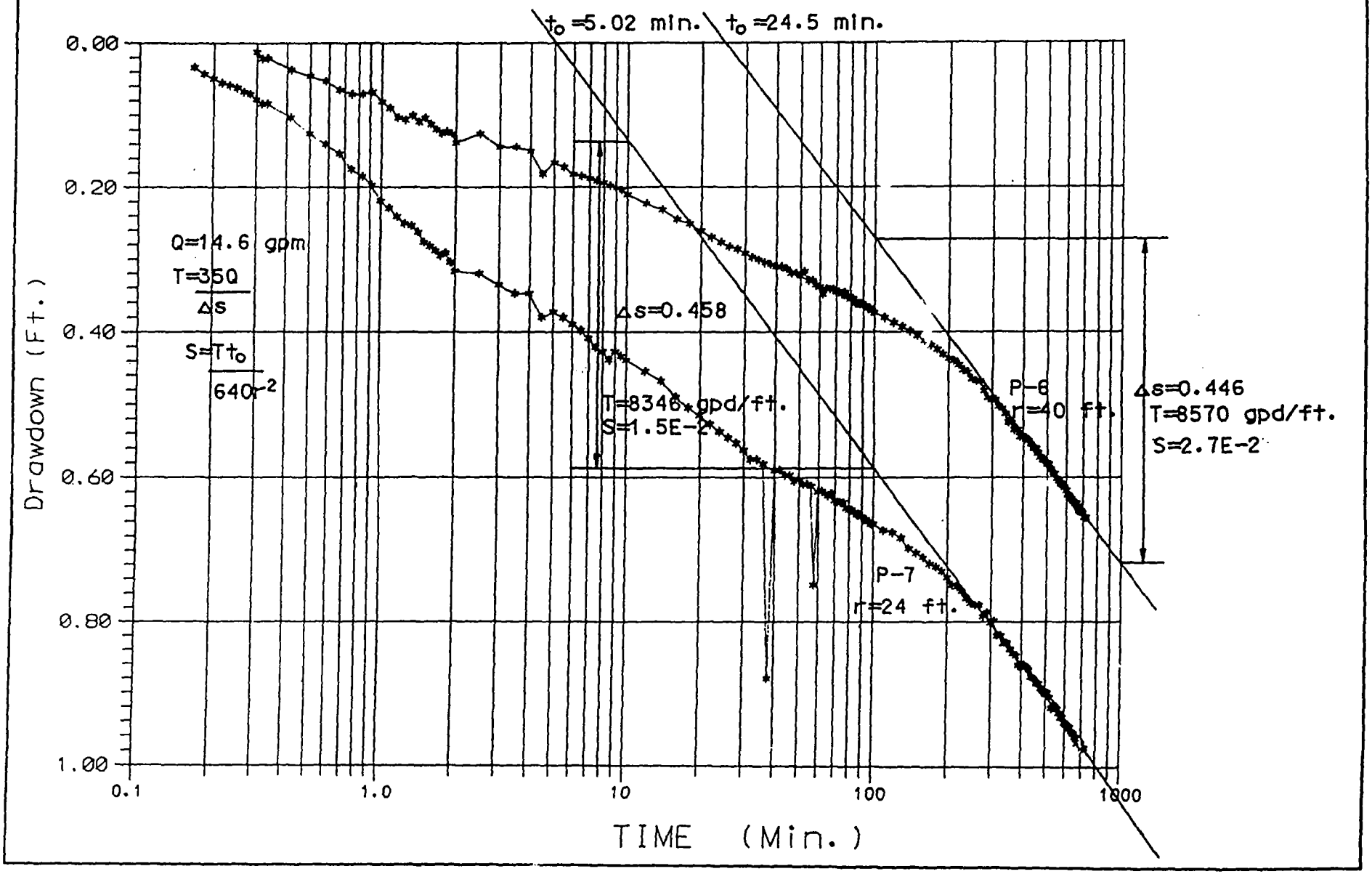
FIGURE 8 12

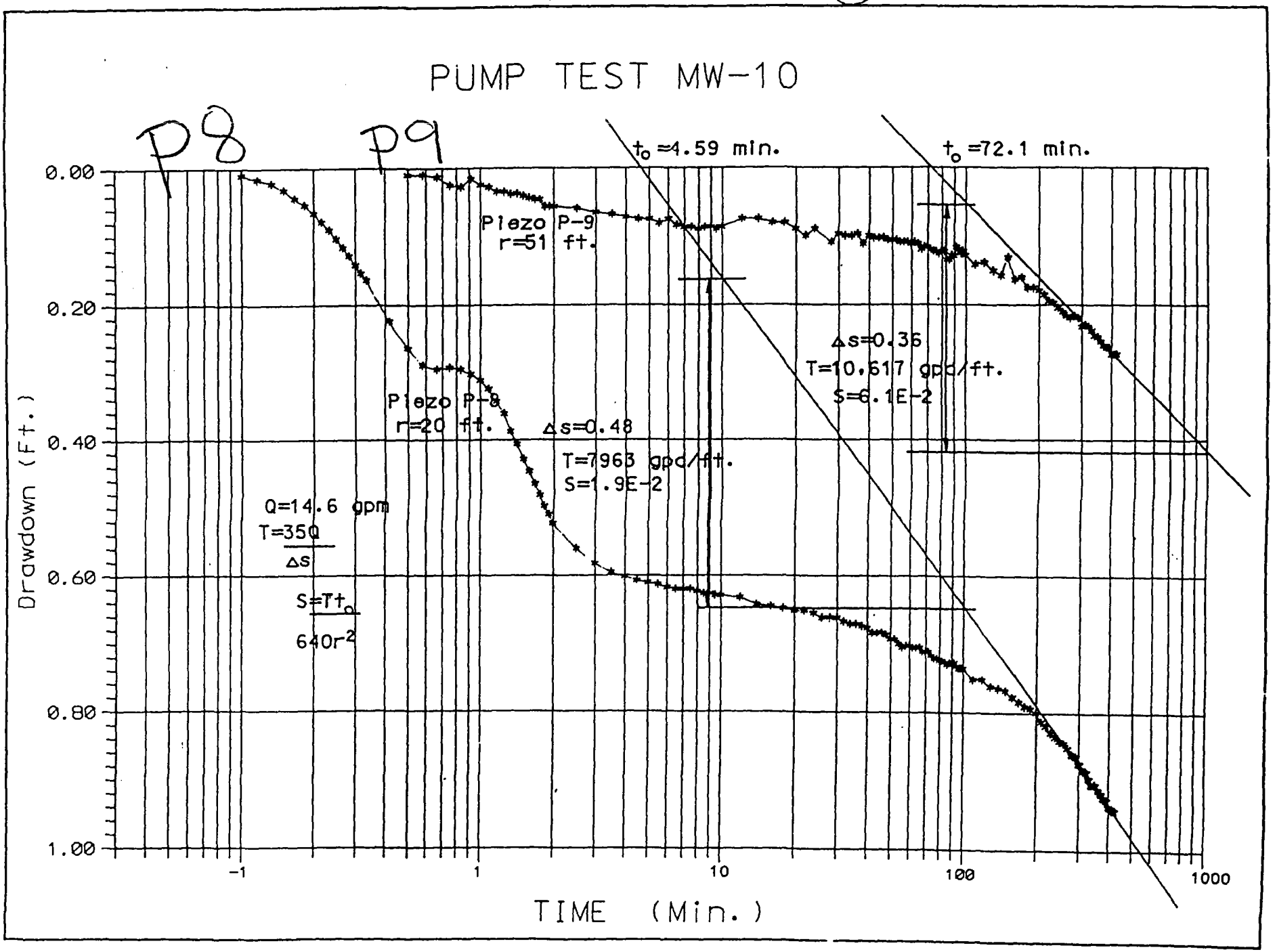
MW-10 PUMPING TEST

DATA LOGGER VS. HAND MEASUREMENT DATA



PUMP TEST MW-17




PUMP TEST MW-10
P8
P9
t_o =4.59 min.
t_o =72.1 min.
Piezo P-9
r=51 ft.
Piezo P-8
r=20 ft.
Δs=0.48
T=7963 gpd/ft.
S=1.9E-2
Δs=0.36
T=10,617 gpd/ft.
S=6.1E-2
Q=14.6 gpm
$T=\frac{35Q}{\Delta s}$
$S=\frac{Tt_o}{640r^2}$
Drawdown (Ft.)
0.00
0.20
0.40
0.60
0.80
1.00
-1
1
10
100
1000
TIME (Min.)

MW-17 PUMPING TEST
NEUMAN CURVE MATCHING (P6)

$$T = \frac{QW(u_A)}{4\pi s}$$ early time

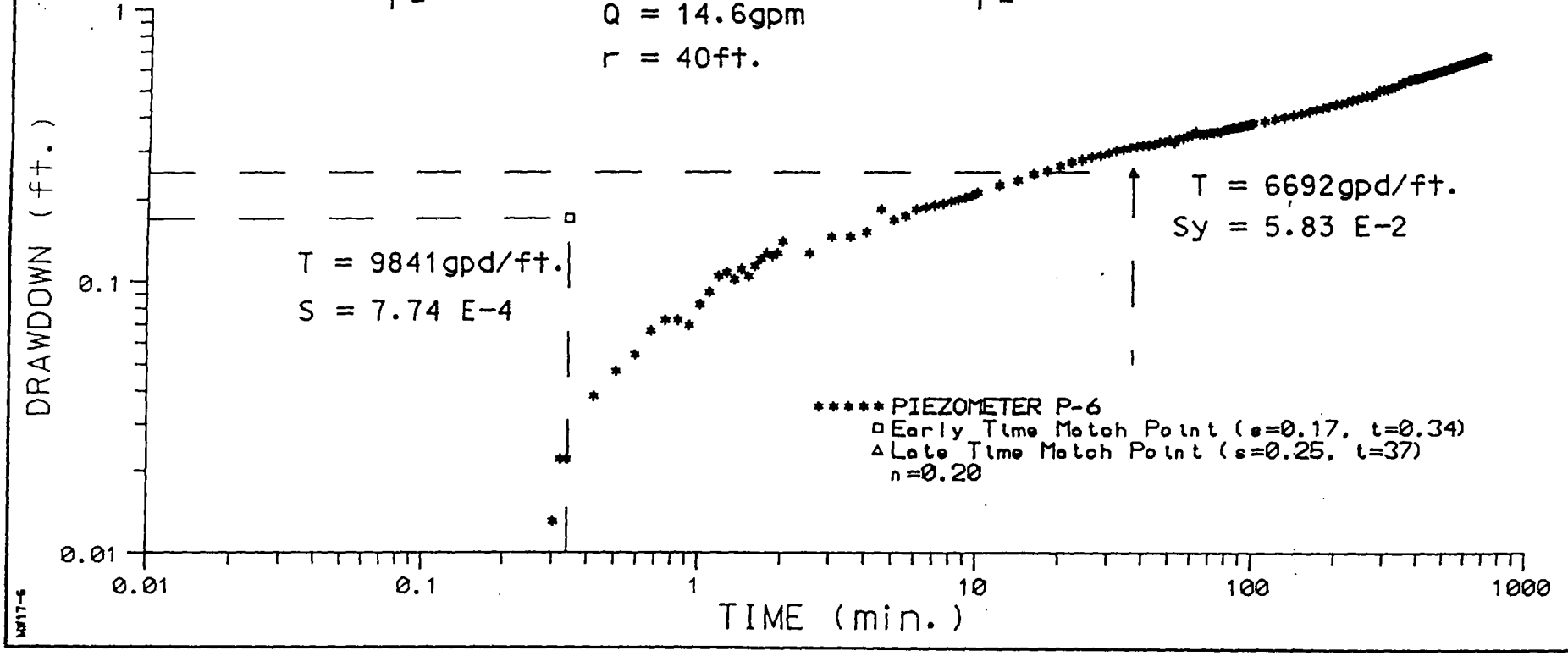
$$T = \frac{QW(u_B)}{4\pi s}$$ late time

$$S = \frac{4Tt\ u_A}{r^2}$$

$$Sy = \frac{4Tt\ u_B}{r^2}$$

Q = 14.6gpm

r = 40ft.



MW-17 PUMPING TEST
NEUMAN CURVE MATCHING (P7)

$$T = \frac{QW(u_A)}{4\pi s}$$ early time

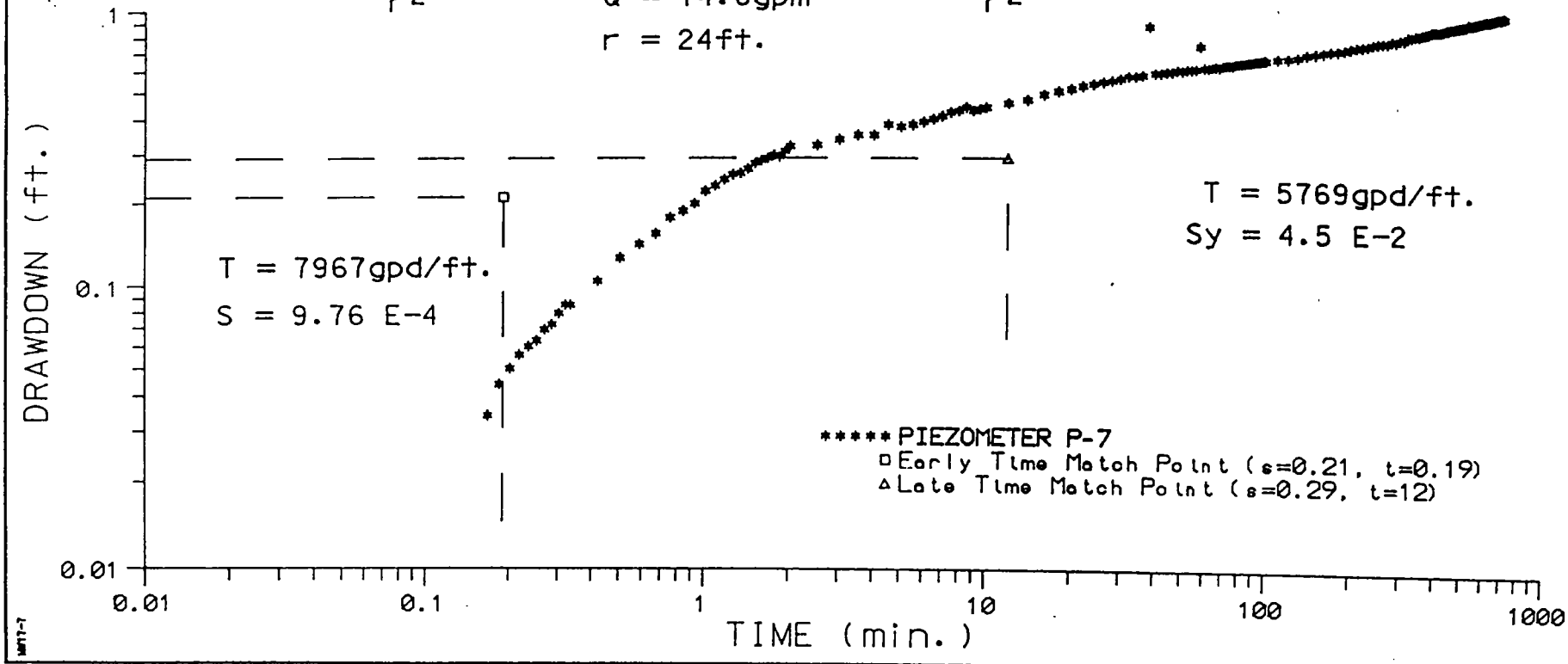
$$T = \frac{QW(u_B)}{4\pi s}$$ late time

$$S = \frac{4Tt\ u_A}{r^2}$$

$$Sy = \frac{4Tt\ u_B}{r^2}$$

Q = 14.6gpm

r = 24ft.



MW-10 PUMPING TEST
NEUMAN CURVE MATCHING (P 8)

$$T = \frac{QW(u_A)}{4\pi s}$$ early time

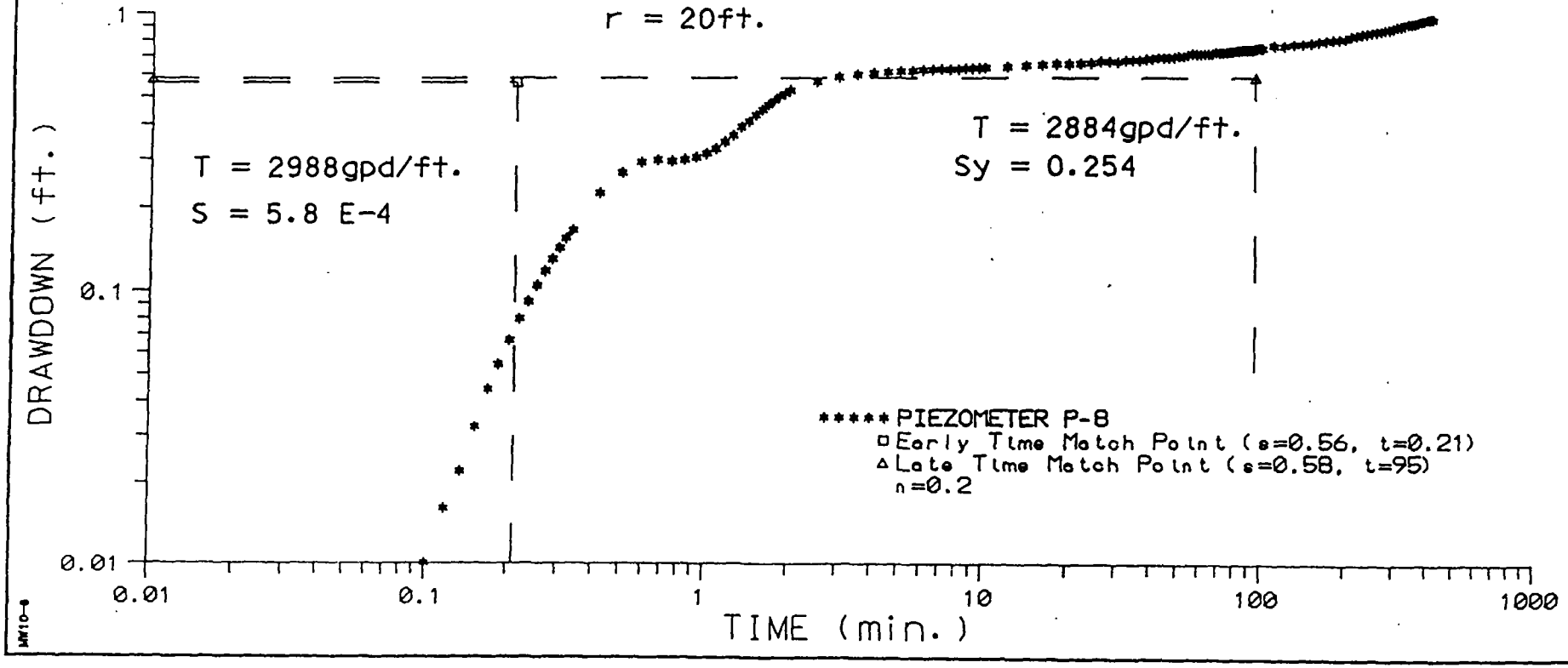
$$T = \frac{QW(u_B)}{4\pi s}$$ late time

$$S = \frac{4Tt\ u_A}{r^2}$$

$$Sy = \frac{4Tt\ u_B}{r^2}$$

Q = 14.6gpm

r = 20ft.



MW-10 PUMPING TEST
NEUMAN CURVE MATCHING (P4)

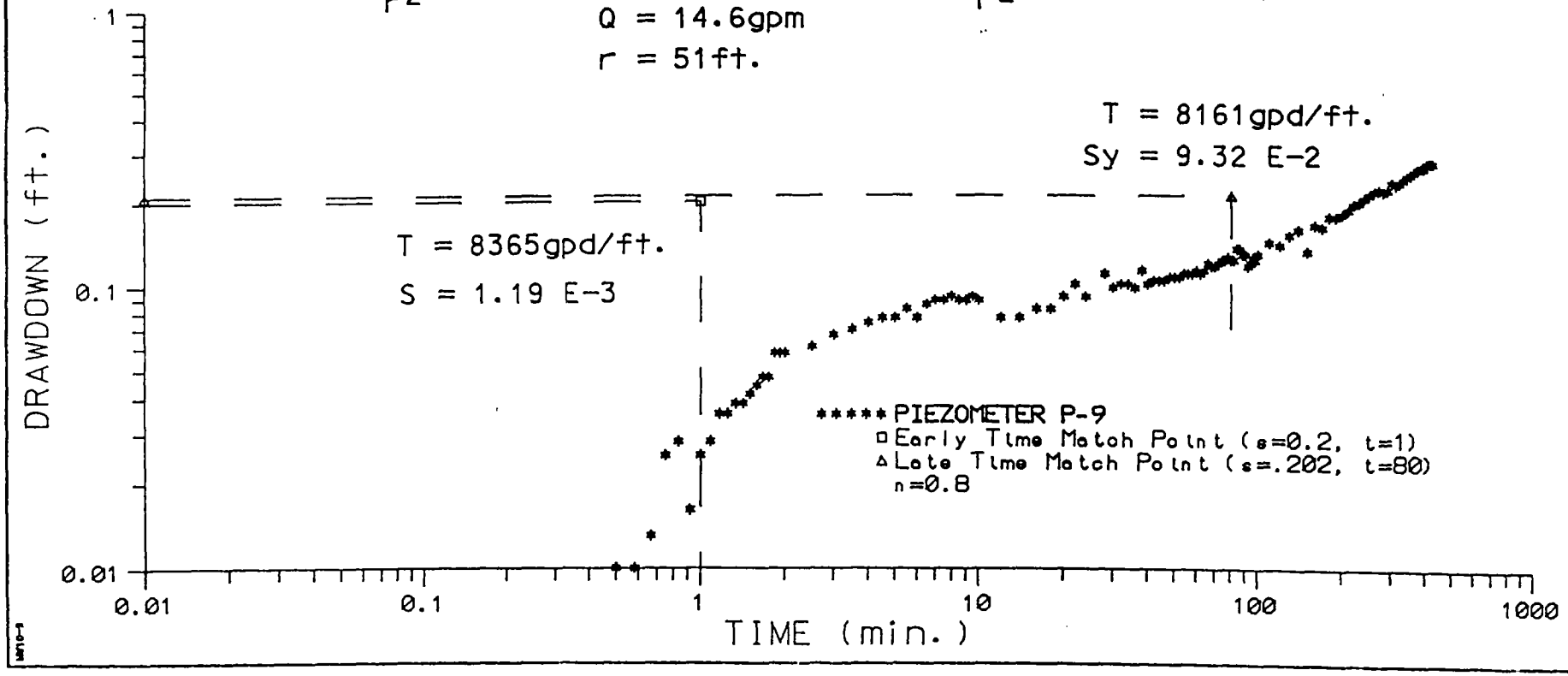
$$T = \frac{QW(u_A)}{4\pi s}$$ early time

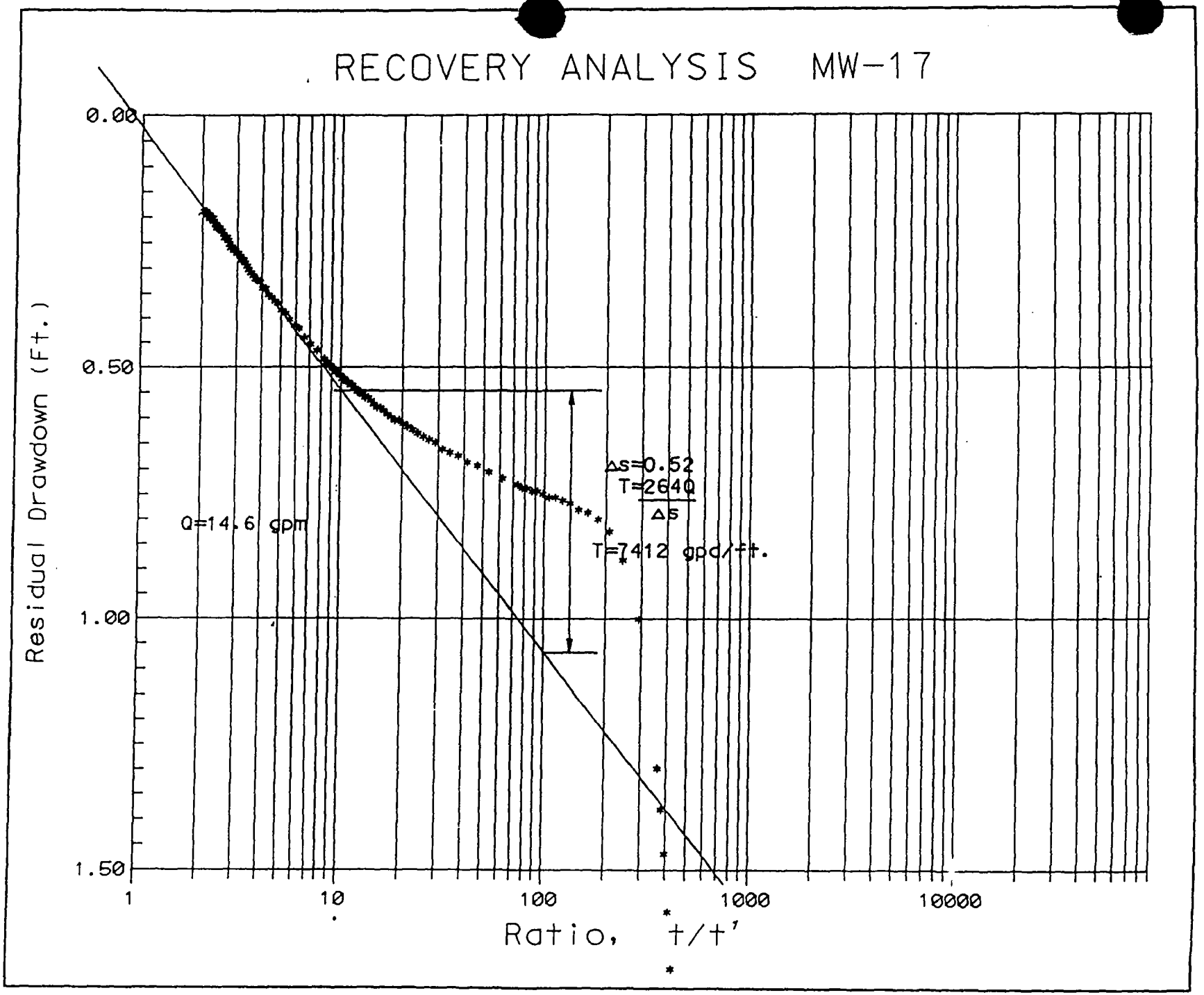
$$T = \frac{QW(u_B)}{4\pi s}$$ late time

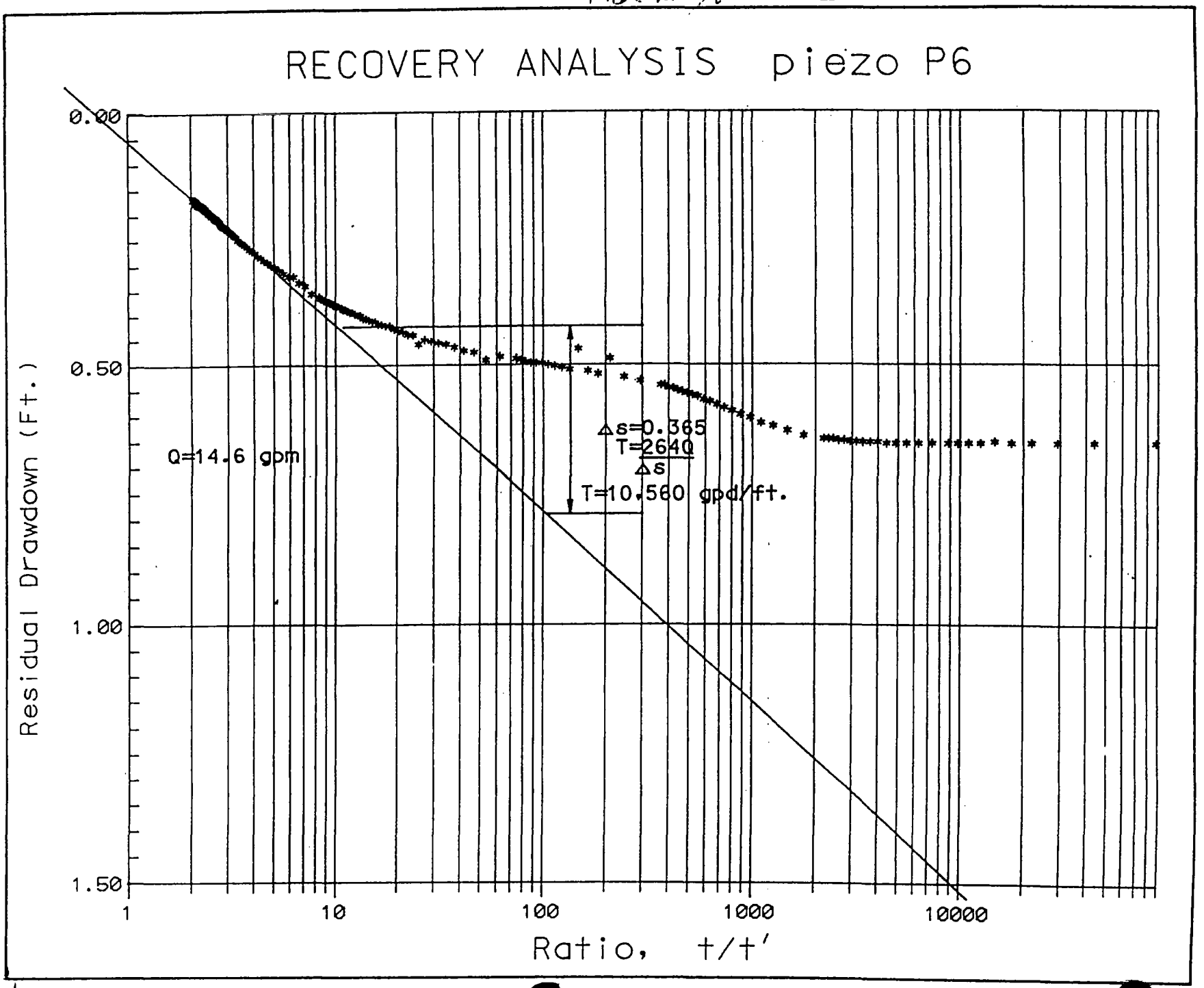
$$S = \frac{4Tt\ u_A}{r^2}$$

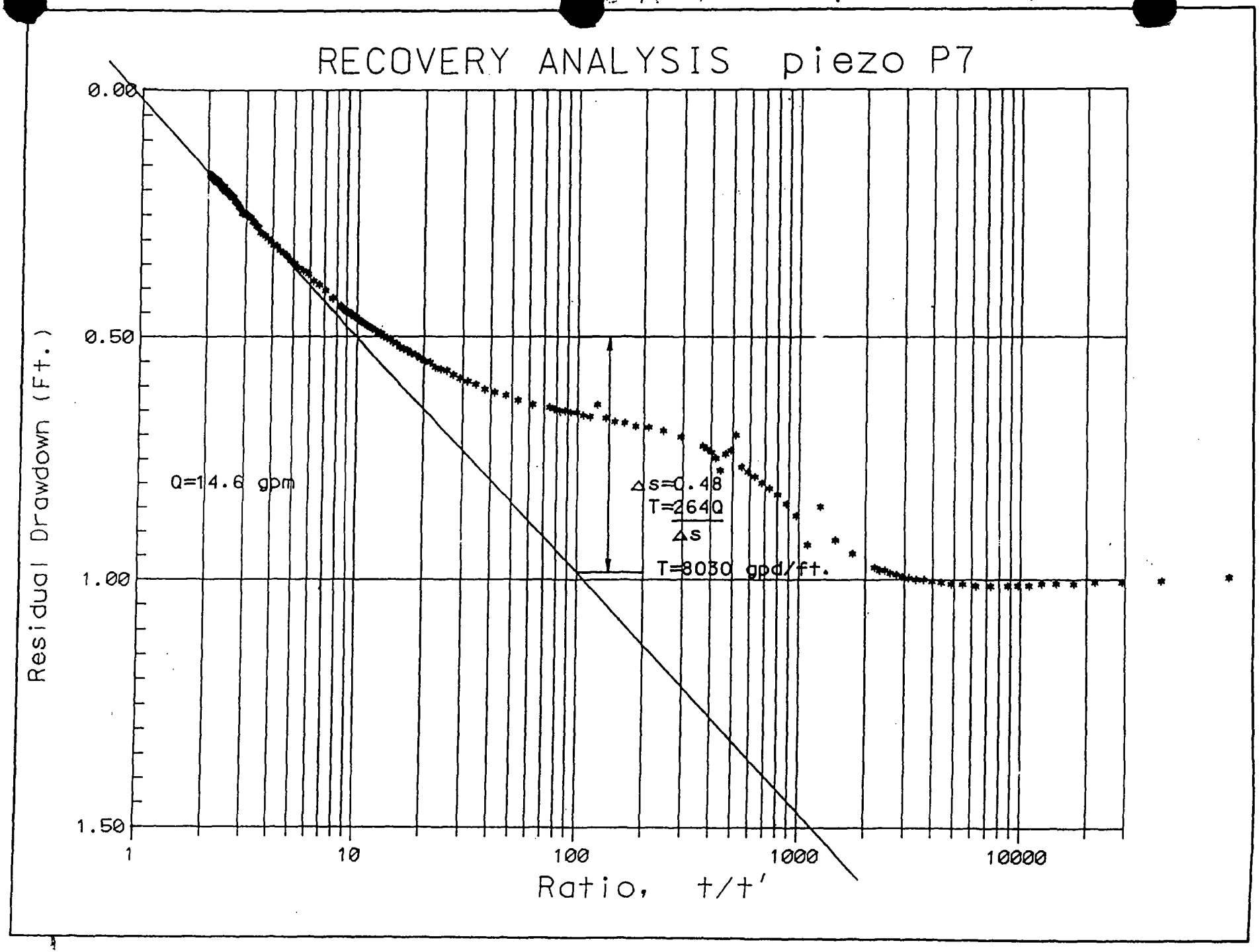
$$Sy = \frac{4Tt\ u_B}{r^2}$$

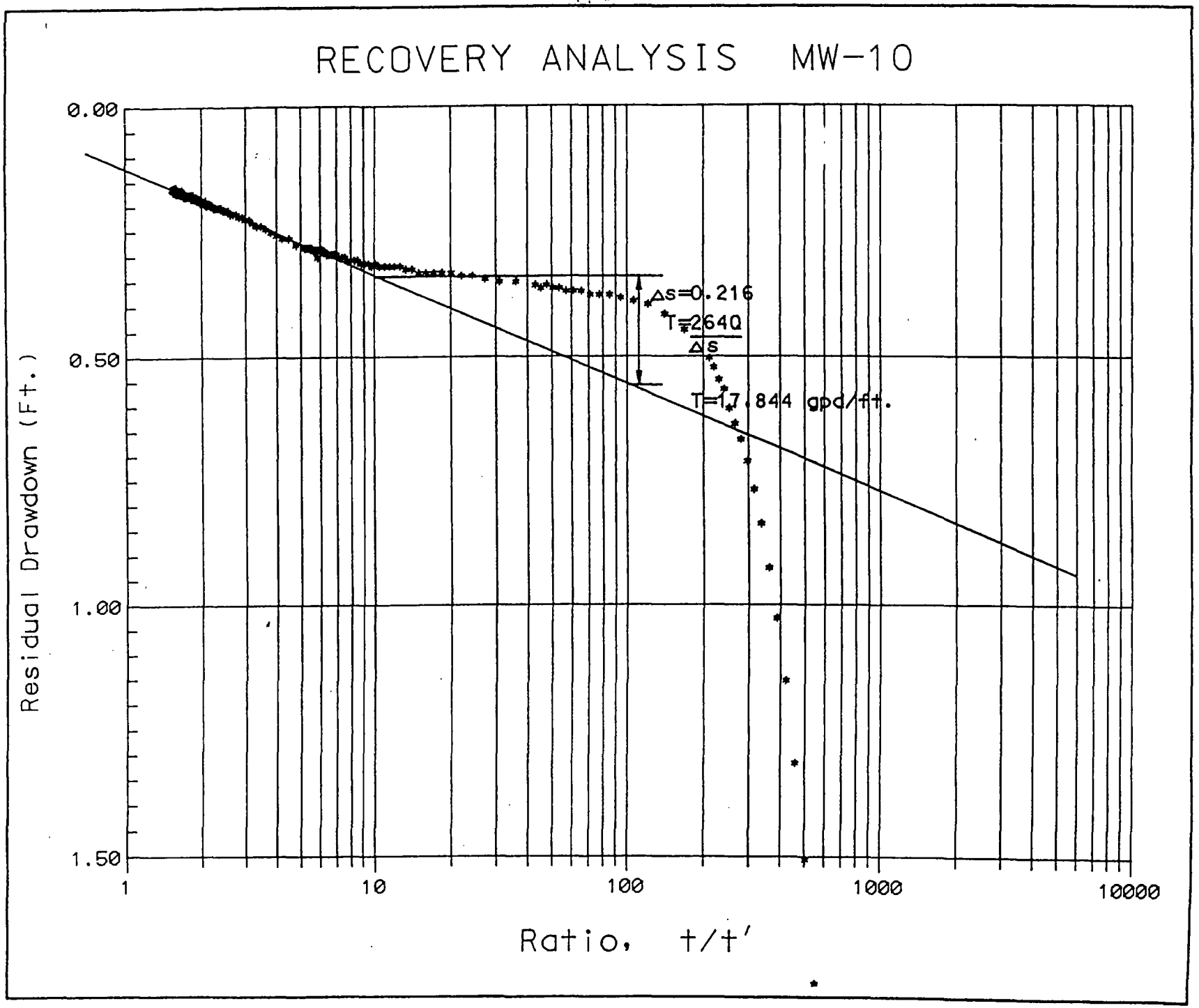
Q = 14.6gpm
r = 51ft.

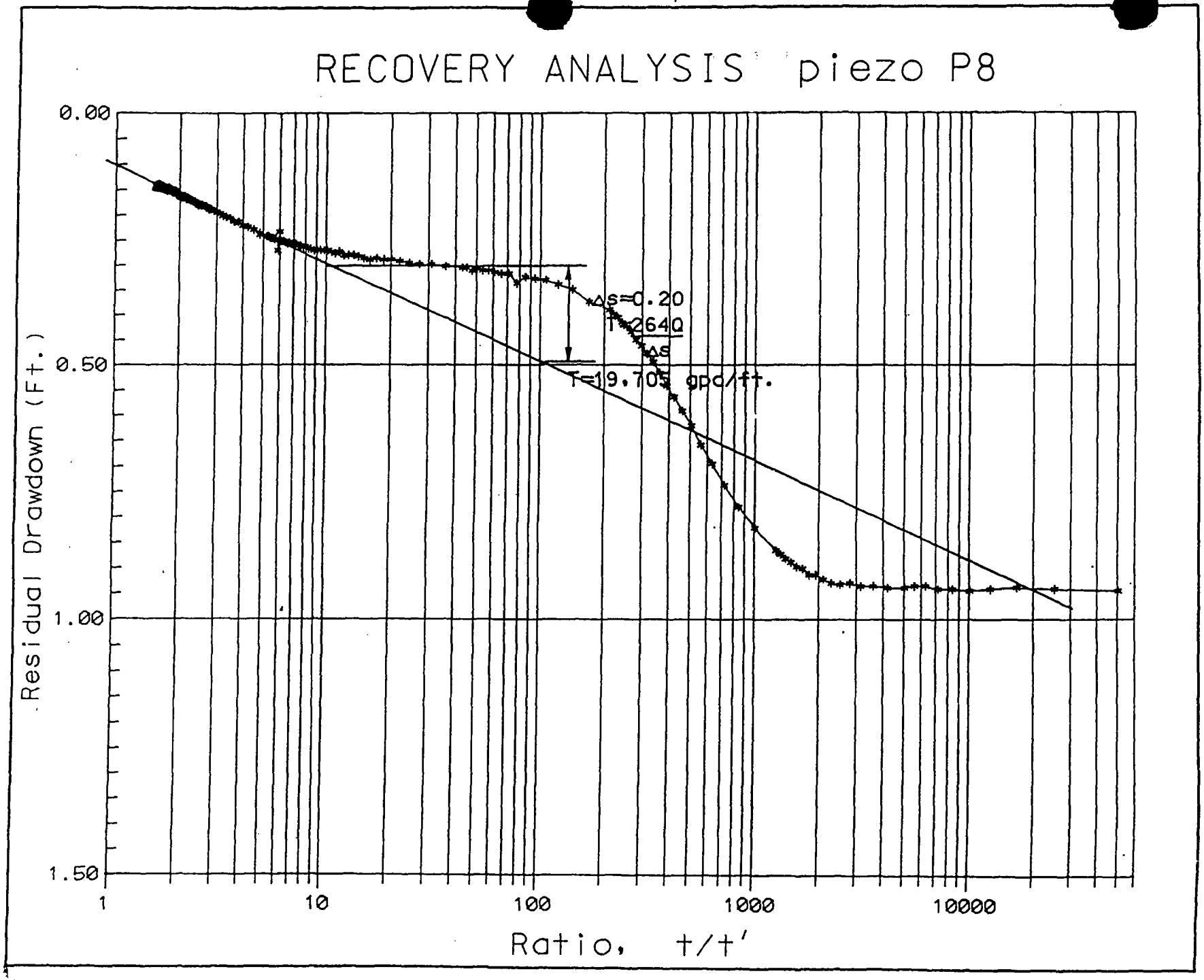


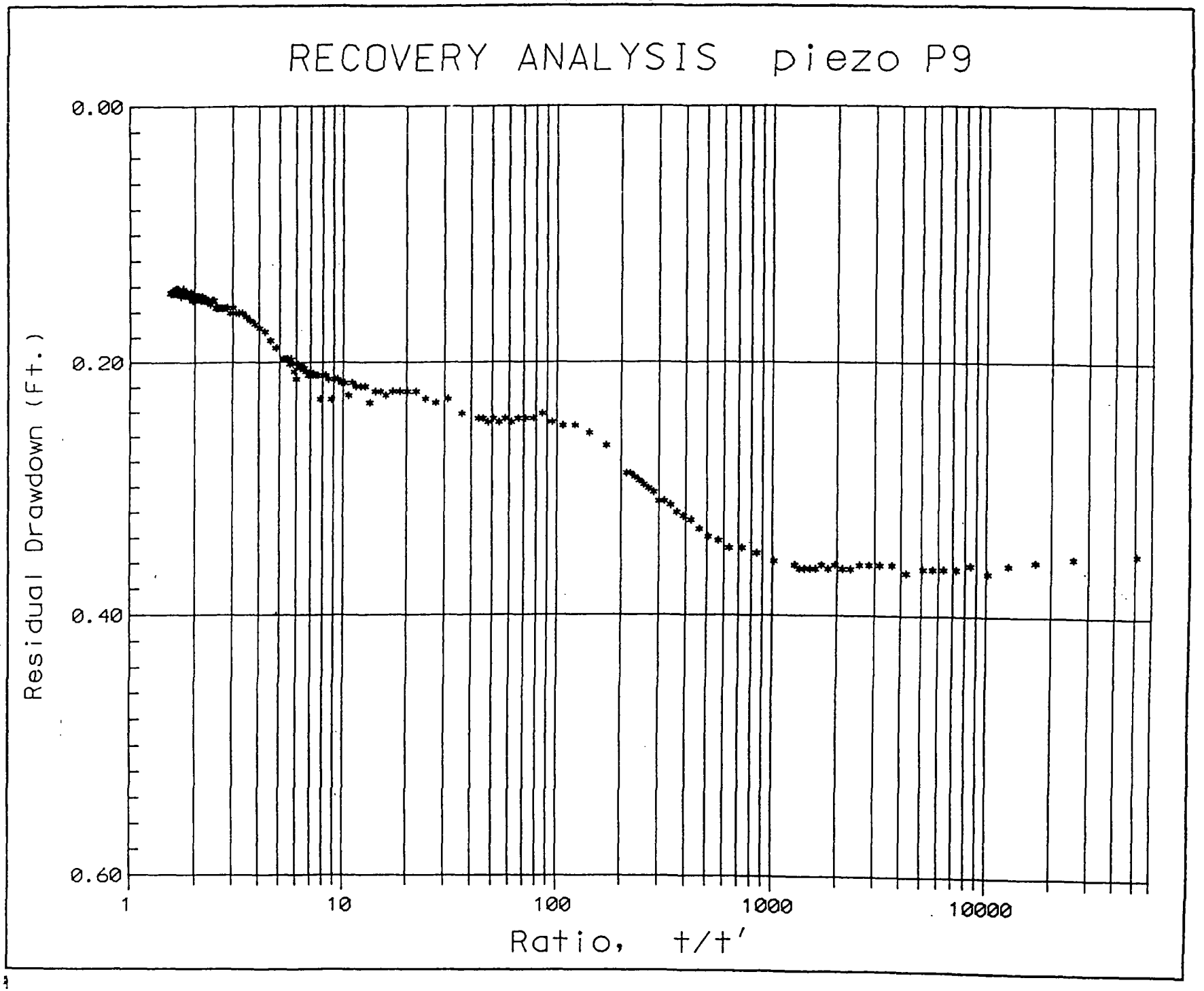

RECOVERY ANALYSIS MW-17
Residual Drawdown (Ft.)
0.00
0.50
1.00
1.50
1
10
100
1000
10000
Ratio, t/t'
Q=14.6 gpm
Δs=0.52
T=2640/Δs
T=7412 gpd/ft.


RECOVERY ANALYSIS piezo P6
Residual Drawdown (Ft.)
0.00
0.50
1.00
1.50
1
10
100
1000
10000
Ratio, t/t'
Q=14.6 gpm
Δs=0.365
T=264Q/Δs
T=10,560 gpd/ft.


RECOVERY ANALYSIS piezo P7
0.00
0.50
1.00
1.50
Residual Drawdown (Ft.)
Q=14.6 gpm
Δs=0.48
T=264Q/Δs
T=8030 gpd/ft.
1
10
100
1000
10000
Ratio, t/t'


RECOVERY ANALYSIS MW-10
0.00
0.50
1.00
1.50
Residual Drawdown (Ft.)
Δs=0.216
T=264Q/Δs
T=17,844 gpd/ft.
1
10
100
1000
10000
Ratio, t/t'


RECOVERY ANALYSIS piezo P8
0.00
0.50
1.00
1.50
Residual Drawdown (Ft.)
Δs=0.20
T=2640
Δs
T=19,705 gpd/ft.
1
10
100
1000
10000
Ratio, t/t'


RECOVERY ANALYSIS piezo P9
0.00
0.20
0.40
0.60
Residual Drawdown (Ft.)
1
10
100
1000
10000
Ratio, t/t'

Spring (Seep) Flow Data

Seep Flow Rates
Du Pont, East Chicago

Groundwater Seeps	Flow Rate (gpm)																
Date:	1/22/91	3/15/91	3/21/91	3/28/91	4/4/91	4/11/91	4/18/91	4/25/91	5/2/91	5/9/91	5/16/91	5/23/91	5/30/91	6/6/91	6/13/91	6/20/91	6/27/91
Seep 1	0.26	0.33	0.01	0.10	0.32	0.13	1.57	1.12	0.48	0.97	0.78	0.87	1.20	1.25	1.15	0.88	0.18
Seep 2																	
Seep 3																	

Notes:
Flow rates for averaged from three flow reading taken at each seep for each monitoring date
Blank indicates not measured

Seep Flow Rates
Du Pont, East Chicago

Groundwater Seeps	Flow Rate (gpm)																
Date:	7/2/91	7/11/91	7/18/91	7/25/91	8/1/91	8/8/91	8/15/91	8/22/91	8/29/91	9/5/91	9/12/91	9/19/91	9/26/92	10/3/91	10/10/92	10/17/92	10/23/92
Seep 1	0.93	0.72	0.48	0.35	0.28	0	0.37	0.38	0.36	0.48	0.56	0.05	0	0	0	0	0
Seep 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seep 3	0	0	0	0	0.10	0	0.61	0	0.47	0.26	0	0	0	0	0	0	0

p Flow Rates
ıt, East Chicago

Seep Flow Rates
Du Pont, East Chicago

Groundwater Seeps	w Rate (gpm)													Flow Rate (gpm)			
Date:	10/31/91	11/7/91	11/14/91	11/21/91	11/26/91	12/5/91	12/12/91	12/18/91	12/26/91	1/2/92	1/9/92	1/15/92	1/22/92	1/29/92	2/6/92	2/13/92	2/20/92
Seep 1	0.78	0.29	0	0.24	0	0.24	0.68	0.32	0	0	0	0	0	0	0	0	0
Seep 2	8.8	9.5	4.72	17.62	10.22	12.9	16.83	12.0	9.0	6.92	8.24	10.97	3.95	5.37	6.49	4.10	14.65
Seep 3	0.53	0.22	0	0	0	0	0	0.33	0	0	0	0	0	0	0	0	0

Seep Flow Rates
Du Pont, East Chicago

Groundwater Seeps	Flow Rate (gpm)																	
Date:	2/26/92	3/4/92	3/12/92	3/19/92	3/25/92	4/2/92	4/9/92	4/15/92	4/23/92	4/30/92	5/7/92	5/14/92	5/21/92	5/28/92	Min	Max	Ave	1991 Ave
Seep 1	0	0	0.15	0.07	0	0	0	0.34	0	0	0	0	0	0	0	1.57	0.30	0.45
Seep 2	12.05	10.30	15.08	11.87	11.92	10.08	7.32	8.22	9.58	5.1	5.65	4.05	1.64	0	0	17.62	5.73	3.91
Seep 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.61	0.05	0.10

U.S.G.S. Water Level Information

(excerpts from Greeman 1995 and
Fenelon and Watson 1993)

WATER LEVELS IN THE CALUMET AQUIFER AND THEIR RELATION TO SURFACE-WATER LEVELS IN NORTHERN LAKE COUNTY, INDIANA, 1985–92

By THEODORE K. GREEMAN

Prepared in cooperation with the
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 94-4110

Indianapolis, Indiana
1995

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992
[Water level is in feet above sea level]

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
A-1	10/24/85	586.85	12/17/85	587.46	02/06/86	586.72	02/18/86	586.67	03/17/86	586.58
	03/31/86	586.60	05/16/86	586.80	06/09/86	587.15	07/24/86	587.72	09/22/86	587.10
	11/25/86	587.32	02/25/87	586.77	08/04/87	587.30	03/31/88	586.58	07/06/88	586.49
	10/13/88	586.41	01/25/89	586.46	04/19/89	586.42	08/03/89	587.12	02/27/90	586.00
	05/30/90	586.78	09/18/90	587.27	11/27/90	586.46	03/19/91	586.25	07/10/91	586.49
	10/16/91	586.19	01/14/92	587.34	03/31/92	586.60	06/23/92	586.04	09/09/92	585.54
A-2	06/26/87	587.13	07/08/87	587.02	08/04/87	586.90	03/31/88	586.96	07/06/88	587.49
	10/13/88	586.93	01/25/89	587.01	04/19/89	586.88	08/03/89	587.14	02/27/90	587.12
	05/30/90	587.47	09/18/90	587.59	11/27/90	587.59	03/19/91	587.59	07/10/91	587.28
	10/16/91	587.23	01/14/92	587.27	03/31/92	587.09	05/13/92	586.80	06/23/92	586.73
	09/09/92	587.49								
A-3	06/25/87	588.52	06/26/87	588.48	07/09/87	588.43	08/04/87	588.53	03/31/88	588.48
	07/06/88	588.44	10/13/88	588.32	01/25/89	588.50	04/19/89	588.43	08/03/89	588.52
	02/27/90	588.35	05/30/90	588.58	11/27/90	588.71	03/19/91	588.67	07/10/91	588.51
	10/16/91	588.40	01/14/92	588.53	03/31/92	588.43	06/23/92	588.31	09/09/92	588.31
A-4	06/26/87	588.69	07/15/87	588.61	08/05/87	588.52	03/31/88	588.64	07/06/88	588.60
	10/13/88	588.48	01/25/89	588.70	04/19/89	588.72	08/03/89	588.67	02/27/90	588.56
	05/30/90	588.85	09/18/90	588.74	11/27/90	588.85	03/19/91	588.99	07/10/91	588.74
	10/16/91	588.53	01/14/92	588.73	03/31/92	588.69	06/23/92	588.55	09/09/92	588.34
A-5	12/17/85	586.40	02/06/86	585.60	02/18/86	585.65	03/17/86	585.67	03/31/86	585.65
	05/16/86	586.00	09/22/86	585.71	11/25/86	585.85	02/26/87	585.42	06/26/87	586.42
	08/04/87	585.95	03/31/88	585.41	07/06/88	585.33	10/13/88	585.39	01/25/89	585.44
	04/19/89	585.45	08/03/89	586.20	02/27/90	585.61	05/30/90	586.31	09/18/90	585.87
	11/27/90	585.88	03/19/91	586.04	07/10/91	586.06	10/16/91	585.79	01/14/92	585.89
	03/31/92	585.55	06/23/92	586.35	09/09/92	585.96				
A-6	07/14/87	585.57	08/05/87	585.19	03/30/88	585.32	07/07/88	584.61	10/12/88	584.58
	01/24/89	585.23	04/20/89	585.33	08/03/89	585.34	02/27/90	585.21	05/30/90	586.04
	09/18/90	585.89	11/27/90	585.88	03/19/91	586.23	07/10/91	585.38	10/16/91	585.52
	01/14/92	586.01	03/31/92	585.58	06/23/92	584.94	09/11/92	584.88		

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
A-10	10/24/85	585.95	12/17/85	585.88	02/06/86	585.64	02/18/86	585.60	03/17/86	585.59
	03/31/86	585.59	05/15/86	585.86	09/22/86	585.85	11/25/86	585.66	02/26/87	585.39
	06/26/87	586.21	08/04/87	586.08	03/31/88	585.47	07/06/88	585.98	10/13/88	585.56
	01/25/89	585.40	04/19/89	585.48	08/03/89	586.05	02/27/90	585.31	05/30/90	585.89
	09/18/90	585.70	11/27/90	585.76	03/19/91	585.76	07/10/91	586.00	10/16/91	585.62
	01/14/92	585.59	03/31/92	585.39	06/23/92	585.90	09/09/92	585.55		
A-15	10/24/85	589.54	12/10/85	591.15	03/06/86	589.74	03/20/86	589.79	03/31/86	589.84
	05/09/86	589.69	06/09/86	589.99	07/24/86	590.43	08/04/86	590.23	08/19/86	589.90
	09/25/86	589.58	12/30/86	590.03	02/25/87	589.52	08/04/87	589.92	03/31/88	589.97
	07/05/88	589.28	10/13/88	589.30	01/25/89	589.84	04/19/89	590.11	08/03/89	589.94
	02/27/90	589.80	05/30/90	591.15	09/18/90	590.38	11/27/90	590.83	03/19/91	591.55
	07/10/91	590.49	10/16/91	589.77	01/14/92	590.39	03/31/92	589.92	06/24/92	589.51
	09/09/92	589.15								
A-20	01/03/86	595.41	02/03/86	595.29	02/07/86	595.15	02/17/86	595.13	03/06/86	595.06
	03/20/86	595.18	03/31/86	595.10	05/16/86	595.21	08/13/86	595.46	08/27/86	595.37
	11/25/86	595.40	02/24/87	595.38	07/06/87	595.95	08/05/87	595.72	12/17/87	595.61
	04/01/88	595.81	07/07/88	595.78	10/12/88	595.59	01/25/89	595.80	04/19/89	595.96
	08/03/89	595.91	02/27/90	595.85	05/30/90	596.37	09/18/90	596.05	11/27/90	596.08
	03/19/91	596.29	07/10/91	596.02	10/16/91	595.85	01/14/92	596.18	03/31/92	596.03
	06/24/92	595.96	09/09/92	595.76						
B-1	08/28/85	580.29	10/24/85	580.49	11/11/85	580.93	11/27/85	581.95	12/04/85	582.03
	12/17/85	581.76	01/03/86	581.23	02/03/86	580.69	02/17/86	580.71	03/06/86	580.85
	03/20/86	581.20	03/31/86	581.06	05/09/86	580.67	06/09/86	581.11	07/24/86	581.33
	08/04/86	581.06	08/19/86	580.72	09/25/86	580.42	12/30/86	582.40	02/26/87	580.57
	08/04/87	580.61	04/01/88	584.18	07/05/88	580.23	10/11/88	580.63	01/26/89	580.82
	04/20/89	581.60	08/01/89	581.89	02/27/90	581.72	05/30/90	583.35	09/20/90	583.17
	11/28/90	585.15	03/20/91	585.90	07/10/91	585.51	10/17/91	585.23	01/15/92	585.39
	04/01/92	585.44	06/24/92	584.90	09/10/92	585.22				
B-2	06/25/87	581.62	07/08/87	581.39	08/04/87	581.14	03/31/88	580.24	07/06/88	580.17
	10/13/88	579.86	01/25/89	579.56	04/19/89	579.46	08/03/89	580.13	02/27/90	579.73
	05/30/90	580.19	09/18/90	580.17	11/27/90	579.55	03/19/91	579.97	07/10/91	580.43
	10/16/91	580.06	01/14/92	580.08	03/31/92	579.80	06/23/92	579.88	09/09/92	579.73
B-3	07/14/87	584.48	08/04/87	584.30	03/31/88	584.54	07/06/88	583.90	10/11/88	583.85
	01/24/89	584.10	04/20/89	584.39	08/03/89	584.53	02/27/90	584.24	05/30/90	584.90
	09/18/90	584.59	11/27/90	584.71	03/20/91	584.56	07/10/91	585.14	10/16/91	584.17
	01/15/92	583.96	04/01/92	584.04	06/24/92	584.40	09/09/92	583.62		

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
B-5	08/28/85	582.25	10/17/85	585.38	10/24/85	582.36	11/11/85	582.52	11/27/85	583.55
	12/04/85	583.52	12/17/85	583.37	01/03/86	582.88	02/03/86	582.42	02/17/86	582.42
	03/06/86	582.52	03/20/86	583.57	03/31/86	582.80	05/09/86	582.48	06/09/86	582.78
	07/24/86	583.07	08/04/86	582.84	08/19/86	582.53	09/25/86	582.23	12/30/86	582.67
	02/26/87	582.24	04/01/88	582.53	07/05/88	581.92	10/11/88	581.69	01/26/89	582.43
	04/20/89	582.85	08/01/89	583.09	02/27/90	582.89	05/30/90	583.90	09/20/90	583.69
	11/28/90	585.35	03/20/91	585.10	07/10/91	585.04	10/17/91	584.59	01/15/92	584.94
	04/01/92	584.98	05/13/92	584.75	06/24/92	584.36	09/10/92	584.46		
B-7	06/22/87	587.94	08/04/87	587.33	03/31/88	587.50	07/07/88	586.84	10/11/88	586.75
	01/26/89	587.46	04/20/89	587.77	08/03/89	587.74	02/27/90	587.76	05/30/90	588.57
	09/19/90	588.12	11/26/90	588.07	03/20/91	588.39	07/10/91	587.58	10/16/91	587.39
	01/15/92	587.48	04/01/92	587.34	06/24/92	586.87	09/09/92	586.34		
B-8	07/14/87	587.56	08/04/87	587.31	03/31/88	587.48	07/07/88	586.83	10/11/88	586.73
	01/26/89	587.43	04/20/89	587.74	08/03/89	587.73	02/27/90	587.85	05/30/90	588.56
	09/19/90	588.10	11/27/90	588.16	03/20/91	588.37	07/10/91	587.69	10/16/91	587.39
	01/15/92	587.47	04/01/92	587.35	06/24/92	586.89	09/09/92	586.35		
B-10	12/10/85	593.67	01/03/86	593.23	02/03/86	592.74	02/17/86	592.68	03/06/86	592.99
	03/20/86	593.28	03/31/86	593.40	05/09/86	592.97	06/09/86	593.23	07/24/86	593.25
	08/04/86	592.99	08/19/86	592.60	09/25/86	591.88	12/30/86	594.30	02/25/87	592.77
	07/13/87	593.63	08/05/87	592.96	04/01/88	593.64	07/05/88	592.58	10/11/88	591.83
	01/24/89	593.42	04/19/89	593.99	08/03/89	593.39	02/27/90	593.51	06/01/90	594.78
	09/19/90	593.94	11/27/90	594.09	03/20/91	595.14	07/10/91	593.64	10/17/91	592.60
	01/17/92	593.58	04/01/92	593.71	06/24/92	592.81	09/09/92	591.74		
C-1	12/09/85	583.45	01/06/86	582.76	02/03/86	582.46	02/17/86	582.64	03/08/86	582.91
	03/20/86	583.26	03/31/86	582.94	05/09/86	582.50	06/09/86	583.23	07/24/86	582.94
	08/04/86	582.64	08/19/86	582.27	09/25/86	582.57	12/30/86	584.38	02/27/87	582.80
	06/24/87	583.26	07/07/87	583.02	08/04/87	582.68	03/31/88	583.64	07/05/88	582.14
	10/11/88	581.68	01/24/89	582.71	04/18/89	582.98	08/01/89	582.91	02/28/90	583.58
	05/31/90	583.89	09/19/90	583.33	11/28/90	584.70	03/20/91	584.27	07/11/91	583.08
	10/17/91	582.70	01/17/92	583.04	04/02/92	583.30	06/23/92	582.13	09/10/92	583.03
C-2	07/07/87	583.55	08/04/87	583.47	08/04/87	583.44	12/07/88	583.98	01/24/89	584.99
	04/18/89	584.73	08/01/89	584.96	02/28/90	585.02	05/31/90	585.06	09/19/90	585.12
	11/28/90	584.97	03/20/91	584.94	07/11/91	584.78	10/17/91	584.91	01/15/92	585.39
	04/01/92	585.46								

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
C-4	06/24/87	581.87	07/09/87	581.62	08/04/87	581.56	03/31/88	580.87	07/05/88	580.58
	10/11/88	580.38	01/24/89	580.01	04/18/89	580.61	08/01/89	580.77	02/28/90	580.50
	05/31/90	580.86	09/19/90	580.69	11/28/90	579.93	03/20/91	580.74	07/11/91	580.55
	10/17/91	580.08	01/17/92	580.46	04/02/92	580.63	06/23/92	580.24	09/10/92	580.23
C-5	10/25/85	583.58	11/27/85	584.67	12/06/85	584.59	02/20/86	585.39	03/21/86	584.51
	04/01/86	583.69	05/15/86	583.98	08/13/86	583.13	12/16/86	584.26	02/24/87	583.99
	07/21/87	583.04	08/05/87	582.74	12/17/87	585.17	03/30/88	584.74	03/31/88	584.81
	07/06/88	582.36	01/25/89	583.61	04/19/89	584.10	08/04/89	582.99	03/01/90	584.27
	05/31/90	584.42	09/20/90	583.69	11/28/90	585.73	03/21/91	585.12	07/11/91	583.27
	10/17/91	583.21	01/17/92	584.01	04/01/92	584.36	06/24/92	582.99	09/10/92	582.81
C-10	10/25/85	582.96	11/27/85	584.19	12/06/85	583.41	12/18/85	583.26	01/08/86	583.17
	02/04/86	583.68	02/20/86	583.49	03/07/86	583.41	03/21/86	583.32	04/01/86	583.30
	05/15/86	583.21	08/13/86	582.80	12/16/86	583.29	02/24/87	583.12	07/21/87	582.35
	08/05/87	582.22	12/17/87	583.20	03/30/88	583.53	07/06/88	581.37	10/13/88	581.33
	01/25/89	582.86	04/19/89	583.00	08/04/89	582.14	03/01/90	583.03	05/31/90	583.03
	09/20/90	582.61	11/28/90	583.91	03/21/91	583.37	07/11/91	582.38	10/17/91	582.41
	01/17/92	582.89	04/01/92	583.11	09/10/92	582.71				
C-12	08/05/87	582.25	03/31/88	583.42	07/06/88	581.28	10/13/88	581.28	01/25/89	582.76
	04/19/89	582.93	08/04/89	582.10	03/01/90	582.91	05/31/90	583.00	09/20/90	582.58
	11/28/90	583.96	03/21/91	583.41	07/11/91	582.33	10/17/91	582.30	01/17/92	582.79
	04/01/92	583.09	06/24/92	581.99	09/10/92	582.98				
C-15	10/25/85	582.51	11/27/85	582.82	12/06/85	582.95	02/04/86	582.91	02/20/86	582.78
	03/21/86	582.53	04/01/86	583.40	05/15/86	582.87	08/13/86	582.93	12/17/86	582.64
	02/24/87	582.55	08/05/87	582.37	12/17/87	582.54	03/30/88	582.58	07/06/88	580.97
	10/13/88	581.20	01/25/89	582.24	04/19/89	582.26	08/04/89	581.82	03/01/90	582.20
	05/31/90	582.21	09/20/90	582.11	11/28/90	582.62	03/21/91	582.42	07/11/91	582.12
	10/17/91	581.92	01/17/92	582.17	04/01/92	582.39	06/24/92	581.72	09/10/92	582.43

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
C-17	07/20/86	588.10	08/15/86	587.35	09/15/86	586.90	10/15/86	588.45	11/15/86	588.60
(LK-13)	12/15/86	589.76	01/15/87	590.10	02/15/87	589.87	02/28/87	590.55	03/15/87	589.93
	04/15/87	590.81	05/15/87	589.42	06/15/87	589.66	07/15/87	588.60	08/05/87	587.59
	08/15/87	587.88	09/15/87	588.53	10/15/87	588.54	11/15/87	588.88	12/15/87	590.42
	01/15/88	589.43	02/15/88	591.91	03/31/88	590.99	04/15/88	591.04	05/15/88	589.82
	06/15/88	588.36	07/07/88	587.72	07/15/88	587.47	08/15/88	588.33	09/15/88	587.18
	10/12/88	587.01	11/15/88	589.80	12/15/88	589.47	01/26/89	590.32	01/26/89	590.32
	02/15/89	590.00	03/15/89	590.85	04/19/89	590.54	05/15/89	589.83	06/15/89	590.88
	07/15/89	588.62	08/04/89	588.74	08/05/89	588.83	08/15/89	588.76	09/15/89	589.25
	10/15/89	587.91	11/15/89	590.46	12/15/89	589.29	01/15/90	589.60	02/15/90	590.20
	02/29/90	590.94	03/15/90	591.20	04/15/90	590.96	05/15/90	591.58	05/31/90	591.12
	06/15/90	590.50	07/15/90	589.74	08/15/90	590.45	09/20/90	589.04	10/15/90	590.57
	11/15/90	590.64	11/30/90	591.70	12/15/90	591.55	01/15/91	591.02	02/15/91	591.21
	03/20/91	591.57	04/15/91	591.90	05/15/91	591.16	06/15/91	589.40	07/10/91	588.01
	08/15/91	587.58	09/15/91	587.69	10/17/91	588.30	11/15/91	590.21	12/15/91	590.77
	01/17/92	590.16	02/15/92	590.88	03/15/92	590.83	04/01/92	590.77	04/15/92	590.82
	05/12/92	589.80	06/24/92	588.45	07/15/92	588.45	08/15/92	587.68	09/10/92	589.17
C-18	06/24/87	591.45	07/14/87	590.95	08/04/87	590.29	04/01/88	591.08	07/07/88	590.10
	10/12/88	589.62	01/24/89	591.42	04/19/89	590.75	05/12/92	591.07	06/24/92	590.92
	09/10/92	590.58								
C-19	12/15/86	590.06	02/27/87	589.98	08/04/87	588.90	04/01/88	590.25	07/07/88	588.58
	10/12/88	588.39	01/26/89	590.15	04/18/89	590.00	08/04/89	589.57	03/01/90	590.17
	05/31/90	589.88	09/20/90	589.73	11/29/90	590.62	03/21/91	590.20	07/11/91	588.94
	10/17/91	589.68	01/17/92	589.95	05/12/92	589.82	06/24/92	589.47	09/10/92	590.03
C-20	08/28/85	592.64	12/05/85	593.69	02/04/86	592.63	02/19/86	588.64	03/04/86	587.61
	03/21/86	588.94	04/01/86	590.57	05/10/86	592.01	06/10/86	592.81	08/05/86	591.84
	08/20/86	591.37	09/26/86	591.45	12/31/86	593.28	02/25/87	593.53	07/16/87	592.63
	08/04/87	591.73	03/31/88	594.03	07/07/88	591.60	10/12/88	590.98	01/26/89	593.59
	04/19/89	593.83	08/04/89	592.88	02/28/90	593.92	09/20/90	593.45	11/29/90	594.71
	03/20/91	594.61	07/11/91	592.27	10/17/91	592.68	01/17/92	593.82	04/01/92	593.96
	06/24/92	592.62	09/10/92	592.49						
C-25	12/05/85	597.62	01/03/86	596.37	02/04/86	596.84	02/19/86	597.64	03/04/86	597.08
	03/21/86	597.41	04/03/86	596.88	05/12/86	596.15	06/10/86	597.81	08/05/86	596.12
	08/20/86	596.13	09/26/86	596.05	12/31/86	596.73	02/27/87	596.40	08/04/87	595.84
	03/31/88	597.93	07/07/88	595.10	10/12/88	595.76	01/24/89	597.08	04/18/89	597.10
	08/04/89	596.62	02/28/90	598.04	06/01/90	597.04	09/20/90	596.36	11/29/90	598.13
	03/21/91	597.82	07/11/91	595.39	10/17/91	596.64	01/17/92	596.68	04/01/92	597.11
	06/24/92	595.71	09/10/92	597.99						

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
CGA-3	10/24/85	584.81	12/05/85	585.15	02/03/86	584.88	02/17/86	584.98	03/06/86	584.98
	03/31/86	584.98	05/09/86	584.80	06/09/86	585.00	07/24/86	584.81	08/04/86	584.73
	08/19/86	584.70	09/25/86	584.77	12/30/86	585.02	02/27/87	585.04	08/04/87	584.71
	04/01/88	585.56	07/05/88	584.77	10/11/88	584.63	01/26/89	585.25	04/20/89	585.36
	08/01/89	585.14	02/27/90	585.69	09/20/90	585.46	11/28/90	586.26	03/20/91	585.93
	07/10/91	585.26	10/17/91	584.96	01/15/92	585.50	04/01/92	585.59	06/24/92	585.09
	09/09/92	585.04								
CGA-4	10/24/85	584.16	12/05/85	584.83	02/03/86	584.51	02/17/86	584.74	03/06/86	584.72
	03/20/86	584.83	03/31/86	584.66	05/09/86	584.44	06/09/86	584.78	07/24/86	584.57
	08/04/86	584.45	08/19/86	584.30	09/25/86	584.34	'2/30/86	584.84	08/04/87	584.49
	04/01/88	585.41	07/05/88	584.57	10/11/88	584.19	01/26/89	585.08	04/20/89	585.20
	08/01/89	584.94	02/27/90	585.50	09/20/90	585.27	11/28/90	586.19	03/20/91	585.79
	07/10/91	585.07	10/17/91	585.00	01/15/92	585.29	04/01/92	585.41	06/24/92	584.88
	09/09/92	584.70								
CGA-5	10/24/85	586.36	12/05/85	588.16	02/07/86	587.29	03/06/8	587.56	03/20/86	587.51
	03/31/86	587.62								
D-1	08/25/85	583.48	10/24/85	582.74	01/06/86	582.67	02/03/86	582.53	02/19/86	582.67
	03/04/86	582.58	03/21/86	582.91	04/03/86	582.76	05/09/86	582.73	06/10/86	583.16
	07/24/86	583.30	08/04/86	583.12	08/19/86	583.08	09/25/86	583.10	12/30/86	582.94
	02/25/87	582.89	02/27/87	582.93	08/04/87	582.39	10/13/87	582.18	11/04/87	581.83
	03/31/88	581.76	07/05/88	581.56	10/11/88	581.40	01/25/89	581.35	04/18/89	581.55
	08/02/89	581.77	02/26/90	581.40	05/29/90	582.16	09/17/90	581.91	11/26/90	581.47
	03/18/91	581.78	07/09/91	581.51	10/15/91	581.18	01/13/92	581.25	03/30/92	581.65
	06/23/92	581.34	09/08/92	581.15						
D-5	08/28/85	583.22*	10/24/85	583.50*	12/11/85	584.12*	01/06/86	583.30*	02/04/86	583.19*
	02/19/86	583.32*	03/04/86	583.41*	03/21/86	583.56*	04/03/86	583.52*	05/09/86	583.34*
	06/10/86	583.88*	07/24/86	584.06*	08/04/86	583.80*	08/19/86	583.49*	09/25/86	583.51*
	12/30/86	583.34*	02/25/87	583.51*	06/10/87	584.09*	06/11/87	584.08*	08/04/87	583.51*
	10/13/87	583.27*	03/31/88	583.15*	06/15/89	584.05*	06/15/89	583.51**	02/26/90	583.15*
	05/29/90	583.88*	09/17/90	583.62*	11/26/90	583.34*	03/18/91	583.69*	07/09/91	582.23*
	10/15/91	582.49*	01/13/92	582.59*	06/23/92	582.51*	09/08/92	582.67*		

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
D-10	08/28/85	583.22	10/24/85	583.46	12/11/85	583.97	01/06/86	583.23	02/04/86	583.15
	02/16/86	583.23	03/04/86	583.44	03/21/86	583.43	04/03/86	583.40	05/09/86	583.27
	06/10/86	583.75	07/24/86	583.87	08/04/86	583.69	08/19/86	583.40	09/25/86	583.47
	12/30/86	583.26	02/25/87	583.41	06/11/87	583.99	08/04/87	583.42	10/13/87	583.19
	11/04/87	582.87	03/31/88	583.10	07/05/88	582.56	10/11/88	582.66	01/25/89	582.86
	04/18/89	583.00	06/15/89	583.95	08/02/89	583.29	02/26/90	583.12	05/29/90	583.82
	09/17/90	583.49	11/26/90	583.25	03/18/91	583.55	07/09/91	582.29	10/15/91	582.51
	01/13/92	582.56	03/30/92	583.00	06/24/92	582.46	09/08/92	582.65		
D-11	06/11/87	584.01	08/04/87	583.45	10/13/87	583.22	11/04/87	582.88	03/31/88	583.16
	07/05/88	582.61	10/11/88	582.71	01/25/89	582.91	04/18/89	583.05	06/15/89	584.01
	08/02/89	583.33	02/26/90	583.12	05/29/90	583.87	09/17/90	583.53	11/26/90	583.30
	03/18/91	583.59	07/09/91	582.30	10/15/91	582.48	01/13/92	582.60	03/30/92	583.04
	06/23/92	582.54	09/08/92	582.65						
D-20	08/28/85	583.78	10/24/85	584.02	12/05/85	584.47	01/06/86	583.63	02/03/86	583.58
	02/19/86	584.36	03/04/86	584.42	03/21/86	584.24	04/03/86	584.04	05/09/86	584.61
	06/10/86	584.81	07/24/86	584.68	08/04/86	584.34	08/19/86	584.04	09/25/86	584.25
	12/30/86	583.55	02/25/87	583.14	07/16/87	584.12	08/04/87	583.72	10/13/87	583.55
	11/04/87	583.48	03/31/88	583.07	07/05/88	583.11	10/11/88	581.80	01/24/89	582.04
	04/18/89	581.99	08/02/89	583.02	02/28/90	584.56	05/31/90	584.48	09/19/90	583.94
	11/28/90	585.32	03/18/91	582.77	07/09/91	584.04	10/15/91	583.54	01/13/92	583.61
	04/02/92	583.60	06/23/92	583.22	09/08/92	583.22				
D-21	07/17/87	581.22	08/04/87	580.89	10/13/87	581.04	11/04/87	581.08	03/31/88	582.07
	07/05/88	580.61	10/11/88	580.84	01/24/89	581.37	04/18/89	581.08	08/02/89	581.10
	02/28/90	582.21	05/31/90	581.17	09/19/90	580.97	11/28/90	582.88	03/18/91	581.74
	07/09/91	581.04	10/15/91	580.87	01/13/92	580.78	04/02/92	580.92	06/23/92	580.23
	09/08/92	580.07								
D-25	12/05/85	584.65	01/07/86	583.41	01/15/86	583.43	01/23/86	583.37	02/17/86	583.41
	03/08/86	583.65	03/22/86	583.77	03/31/86	583.44	05/15/86	583.27	08/13/86	583.62
	01/14/87	583.74	02/23/87	583.41	08/04/87	583.22	10/13/87	583.35	11/04/87	583.04
	12/17/87	583.38	03/31/88	583.10	07/05/88	582.51	10/11/88	582.39	01/24/89	582.77
	04/18/89	582.76	08/02/89	583.02	02/28/90	583.44	05/31/90	583.88	09/19/90	583.17
	11/26/90	584.92	03/20/91	583.56	07/11/91	581.93	10/17/91	582.24	01/15/92	582.74
	04/02/92	582.91	06/23/92	582.15	09/10/92	582.79				

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
D-30	12/05/85	583.24	01/06/86	582.45	01/15/86	582.38	01/23/86	582.49	02/17/86	582.44
	03/08/86	582.43	03/22/86	581.43	03/31/86	581.73	05/15/86	582.81	08/13/86	583.04
	11/24/86	582.97	02/23/87	582.44	07/16/87	582.37	08/04/87	582.21	10/13/87	581.58
	11/04/87	581.43	12/17/87	581.72	03/31/88	581.43	07/05/88	581.10	01/24/89	580.93
	04/18/89	581.00	08/02/89	581.30	09/19/90	581.13	03/20/91	581.21	07/11/91	581.25
	10/17/91	580.61	01/15/92	581.21	04/02/92	581.12	05/12/92	580.90	06/23/92	580.86
	09/10/92	581.19								
D-31	07/16/87	582.46	08/04/87	582.24	10/13/87	581.64	11/04/87	581.51	03/31/88	581.49
	07/05/88	581.15	10/11/88	580.77	01/24/89	580.82	04/18/89	580.87	08/02/89	581.19
	02/28/90	580.98	05/31/90	581.32	09/19/90	581.04	11/28/90	581.38	03/20/91	581.11
	07/11/91	581.13	10/17/91	580.50	01/15/92	580.91	04/02/92	580.98	06/23/92	580.83
	09/10/92	581.21								
D-35	12/05/85	582.82	01/06/86	582.48	01/15/86	582.01	01/. 3/86	582.20	02/17/86	582.47
	03/08/86	581.93	03/22/86	581.74	03/31/86	582.40	05/15/86	582.58	08/13/86	582.92
	11/25/86	582.63	02/23/87	582.16	08/04/87	582.23	11/04/87	580.95	12/17/87	581.08
	03/31/88	580.77	07/05/88	580.78	10/11/88	580.35	01/24/89	580.37	04/18/89	580.33
	08/02/89	580.56	05/31/90	580.13	09/19/90	580.47	11/28/90	580.67	03/20/91	580.21
	07/11/91	580.78	10/17/91	580.19	01/15/92	580.01	04/02/92	580.45	06/23/92	580.56
	09/10/92	580.46								
D-40	10/24/85	582.47	12/05/85	583.55	01/06/86	582.45	02/03/86	582.62	02/19/86	583.30
	03/04/86	582.97	03/21/86	583.15	04/03/86	582.70	05/10/86	582.66	06/10/86	583.41
	07/24/86	583.10	08/04/86	582.92	08/19/86	582.87	09/25/86	583.16	12/30/86	582.92
	02/26/87	582.49	08/04/87	582.32	03/30/88	583.49	07/06/88	582.19	10/11/88	581.55
	01/24/89	582.56	04/18/89	582.61	08/02/89	582.40	02/28/90	582.29	05/29/90	582.12
	09/19/90	581.51	11/28/90	583.80	03/20/91	582.32	07/09/91	581.59	10/15/91	581.05
	01/13/92	582.20	04/02/92	581.60	06/23/92	580.66	09/08/92	581.05		
D-45	10/24/85	580.44	12/13/85	581.20	01/06/86	580.69	01/15/86	580.58	02/03/86	580.38
	03/07/86	580.72	03/20/86	580.95	03/31/86	580.84	05/09/86	580.47	06/09/86	580.61
	07/24/86	580.59	08/04/86	580.31	08/19/86	580.18	09/25/86	580.31	12/30/86	579.73
	02/26/87	580.58	08/05/87	580.37	03/31/88	581.26	07/06/88	580.48	10/12/88	580.36
	01/24/89	580.90	04/18/89	580.03	08/01/89	580.87	02/28/90	581.55	05/29/90	581.49
	09/20/90	580.88	11/28/90	582.64	03/21/91	581.60	07/11/91	580.55	10/15/91	580.78
	01/17/92	581.04	04/01/92	581.24	06/23/92	580.63	09/10/92	581.22		

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
D-50	12/13/85	578.22	03/22/86	578.61	04/03/86	578.42	05/10/86	578.10	06/10/86	578.25
	08/05/86	577.95	08/20/86	577.84	09/26/86	577.76	12/31/86	578.26	02/25/87	577.79
	08/04/87	577.79	03/30/88	578.03	07/06/88	577.72	10/11/88	577.54	01/24/89	577.81
	04/18/89	578.03	08/02/89	577.93	02/28/90	578.45	05/29/90	578.44	09/19/90	577.94
	11/28/90	578.35	03/20/91	578.51	07/09/91	578.01	10/15/91	578.35	01/13/92	577.99
	04/02/92	577.87	06/23/92	577.51	09/08/92	577.47				
D-55	10/24/85	582.27	10/29/85	582.34	11/05/85	582.64	11/12/85	582.88	11/27/85	582.73
	12/05/85	582.60	12/12/85	582.54	01/06/86	582.20	02/05/86	582.66	02/19/86	582.28
	03/07/86	582.45	03/21/86	582.27	04/03/86	582.58	05/15/86	582.70	08/14/86	582.65
	11/25/86	582.61	02/24/87	582.16	08/05/87	582.01	12/17/87	581.28	03/30/88	580.88
	07/06/88	580.68	10/12/88	580.23	01/24/89	580.33	04/19/89	580.43	08/04/89	580.59
	02/28/90	579.81	05/29/90	581.08	09/19/90	580.53	11/28/90	579.81	03/20/91	580.24
	07/11/91	580.85	10/18/91	580.18	01/17/92	580.26	04/02/92	580.46	06/23/92	580.45
	09/10/92	580.36								
D-60	10/29/85	582.76	11/05/85	582.99	11/11/85	583.49	11/27/85	583.78	12/05/85	583.62
	01/06/86	583.00	02/05/86	583.19	02/19/86	583.16	03/21/86	583.40	04/03/86	583.22
	05/15/86	583.18	08/14/86	582.99	12/16/86	583.46	02/24/87	583.05	07/22/87	582.57
	08/05/87	582.37	12/17/87	582.85	03/31/88	582.62	07/06/88	581.17	10/12/88	580.70
	01/24/89	581.89	04/19/89	582.11	08/04/89	581.81	02/28/90	581.97	05/29/90	582.48
	09/19/90	581.93	11/28/90	582.08	03/20/91	582.48	07/11/91	581.71	10/18/91	581.41
	01/17/92	581.96	04/02/92	582.19	06/23/92	581.28	09/10/92	580.79		
D-65	10/24/85	583.50	10/29/85	583.92	11/05/85	583.75	11/11/85	584.27	11/27/85	584.23
	03/21/86	584.32	04/03/86	584.23	05/15/86	584.02	08/14/86	583.55	11/25/86	584.22
	02/24/87	584.19	08/05/87	583.21	12/17/87	584.69	03/30/88	584.45	07/06/88	581.74
D-66	07/15/87	582.27	08/05/87	582.24	03/30/88	581.74	07/05/88	581.41	10/13/88	581.26
	01/25/89	581.75	04/19/89	581.66	08/04/89	581.76	03/01/90	581.77	05/31/90	581.81
	09/20/90	581.63	11/28/90	582.15	03/21/91	582.04	07/11/91	581.71	10/17/91	581.66
	01/17/92	581.74	04/01/92	581.78	06/24/92	581.25	09/10/92	581.64		
D-67	07/16/87	585.16	08/05/87	584.52	03/31/88	586.24	07/07/88	584.05	10/12/88	583.49
	01/25/89	585.49	04/18/89	585.63	08/04/89	585.17	03/01/90	586.15	05/31/90	586.53
	09/19/90	585.36	11/28/90	588.38	03/20/91	587.29	07/09/91	584.57	10/17/91	584.79
	01/17/92	585.52	04/01/92	585.91	06/23/92	583.87	09/11/92	585.15		
D-68	07/16/87	585.17	08/05/87	584.52	03/31/88	586.24	07/07/88	584.03	10/12/88	583.49
	01/25/89	585.49	04/18/89	585.64	08/04/89	585.18	03/01/90	586.14	05/31/90	586.53
	09/19/90	585.36	11/28/90	588.31	03/20/91	587.32	07/09/91	584.59	10/16/91	584.79
	01/17/92	585.52	04/01/92	585.94	06/24/92	583.86	09/11/92	585.13		

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
D-70	01/07/86	599.26	02/04/86	599.56	02/20/86	600.26	03/04/86	599.77	03/22/86	600.12
	04/01/86	599.70	05/10/86	599.16	06/09/86	599.38	08/05/86	598.82	08/20/86	598.53
	09/26/86	598.71	12/31/86	599.60	02/25/87	599.46	08/04/87	598.87	03/31/88	600.65
	07/06/88	598.81	10/12/88	598.48	01/25/89	599.72	04/18/89	599.90	08/02/89	599.48
	02/28/90	600.67	05/31/90	600.24	09/20/90	599.36	11/28/90	602.29	03/21/91	601.13
	07/11/91	598.94	10/16/91	599.35	01/15/92	600.32	04/02/92	600.30	06/24/92	599.01
	09/11/92	600.07								
D-75	01/07/86	595.98	01/24/86	596.09	02/04/86	596.09	02/20/86	596.49	03/04/86	596.39
	03/22/8	596.60	04/01/86	596.44	05/10/86	596.22	06/09/86	596.70	08/05/86	596.31
	08/20/86	596.12	09/26/86	596.43	12/31/86	596.30	02/25/87	596.18	02/26/87	596.19
	08/04/87	596.27	03/31/88	596.94	07/06/88	596.15	10/12/88	596.20	01/25/89	596.30
	04/18/89	596.46	08/02/89	596.62	02/28/90	596.88	05/31/90	596.76	09/20/90	596.39
	11/28/90	597.09	03/21/91	597.10	07/11/91	596.16	10/17/91	596.47	01/15/92	596.34
	04/02/92	596.66	06/24/92	595.95	09/11/92	596.98				
E-1	12/13/85	579.09	01/06/86	578.61	02/04/86	579.22	02/19/86	579.45	03/04/86	579.17
	03/21/86	579.39	04/03/86	579.05	05/09/86	578.49	06/10/86	578.94	07/24/86	578.46
	08/04/86	578.48	08/19/86	578.39	09/25/86	577.87	12/30/86	578.83	02/27/87	578.93
	08/04/87	577.89	10/13/87	577.89	03/31/88	578.90	07/06/88	577.79	10/12/88	577.62
	01/25/89	578.52	04/17/89	578.34	08/02/89	577.91	02/26/90	578.50	05/29/90	578.86
	09/17/90	578.15	11/26/90	578.51	03/18/91	579.52	07/09/91	578.74	10/15/91	578.01
	01/13/92	578.86	03/30/92	579.06	06/23/92	578.80	09/08/92	577.83		
E-2	06/09/87	582.49	07/14/87	582.14	08/04/87	581.72	10/13/87	581.46	11/03/87	581.05
	03/31/88	580.99	07/05/88	580.81	10/11/88	580.61	01/25/89	580.29	08/02/89	580.74
	02/26/90	580.75	06/01/90	580.89	09/17/90	581.02	11/26/90	580.35	03/18/91	580.77
	07/09/91	580.90	10/15/91	580.33	01/13/92	580.18	03/30/92	581.04	06/23/92	580.92
	09/08/92	580.36								
E-3	06/22/87	582.54	07/13/87	582.58	08/04/87	582.05	10/13/87	582.39	11/04/87	582.70
	03/31/88	583.98	07/05/88	581.71	10/11/88	582.30	01/25/89	582.94	04/17/89	582.84
	08/02/89	582.77	02/26/90	583.91	05/29/90	583.28	09/17/90	582.30	11/26/90	582.89
	03/18/91	583.82	07/09/91	582.30	10/15/91	582.68	01/13/92	582.78	03/30/92	583.11
	06/23/92	582.17	09/08/92	582.19						

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
E-5	08/28/85	580.57	10/25/85	580.76	12/13/85	581.66	01/06/86	580.96	02/04/86	580.86
	02/19/86	581.23	03/04/86	581.13	03/22/86	581.46	04/03/86	581.39	05/09/86	581.02
	06/10/86	581.21	08/04/86	580.95	08/19/86	580.73	09/25/86	580.56	12/30/86	581.11
	02/25/87	580.88	08/04/87	580.98	03/31/88	581.58	07/06/88	580.71	10/12/88	580.62
	01/25/89	581.24	04/17/89	581.39	08/02/89	581.30	02/26/90	581.96	05/29/90	581.92
	09/17/90	581.33	11/26/90	581.49	03/18/91	582.20	07/09/91	581.30	10/15/91	581.09
	01/13/92	581.39	03/30/92	581.72	06/23/92	581.05	09/08/92	580.79		
E-6	06/22/87	584.72	07/15/87	584.85	08/04/87	583.83	10/13/87	584.22	11/04/87	584.48
	03/31/88	585.30	07/05/88	583.07	10/11/88	584.25	01/25/89	584.61	04/17/89	584.42
	08/02/89	584.30	02/26/90	585.26	05/29/90	584.87	09/17/90	583.71	11/26/90	584.70
	03/18/91	585.31	07/09/91	583.88	10/15/91	584.34	01/13/92	584.43	03/30/92	584.95
	06/23/92	583.62	09/08/92	583.99						
E-7	06/22/87	584.70	07/15/87	584.92	08/04/87	583.86	10/13/87	584.24	11/04/87	584.51
	03/31/88	585.33	07/05/88	583.06	10/11/88	584.16	01/25/89	584.67	04/17/89	584.45
	08/02/89	584.31	02/26/90	585.36	05/29/90	584.94	09/17/90	583.79	11/26/90	584.73
	03/18/91	585.44	07/09/91	583.96	10/15/91	584.48	01/13/92	584.57	03/30/92	585.13
	05/13/92	584.15	06/23/92	583.60	09/08/92	584.02				
E-10	10/17/85	582.02	10/30/85	581.10	11/05/85	581.31	11/11/85	581.81	12.18.85	582.48
	01/06/86	581.92	02/06/86	581.99	02/20/86	581.92	02/26/86	582.16	03/08/86	582.13
	03/22/86	582.59	04/03/86	582.42	05/16/86	581.91	08/14/86	581.38	11/24/86	582.46
	12/15/86	582.72	01/14/87	582.25	02/23/87	582.05	06/26/87	582.31	07/16/87	581.93
	08/04/87	581.48	03/31/88	582.82	07/06/88	580.99	10/12/88	580.42	01/25/89	582.12
	04/17/89	582.26	08/02/89	581.54	02/26/90	582.46	05/29/90	583.04	09/17/90	581.81
	11/26/90	582.20	03/21/91	583.24	07/09/91	581.74	10/18/91	580.85	01/15/92	582.15
	04/03/92	582.48	06/23/92	581.23						
E-15	10/17/85	582.04	10/30/85	581.14	11/05/85	581.42	11/11/85	581.89	12/19/85	582.20
	01/06/86	581.72	02/06/86	581.84	02/20/86	581.79	03/08/86	581.83	03/22/86	582.15
	04/03/86	582.16	05/16/86	581.71	08/14/86	581.29	11/24/86	582.18	02/23/87	581.85
	08/04/87	581.24	03/31/88	582.48	07/06/88	580.84	01/25/89	581.83	08/02/89	581.14
	02/26/90	582.11	05/29/90	582.45	09/17/90	581.46	11/26/90	581.80	03/21/91	582.48
	07/09/91	581.33	10/18/91	580.62	01/15/92	581.68	03/30/92	581.92	06/23/92	580.93
	09/11/92	580.68								
E-17	10/25/85	581.31	11/27/85	581.89	01/06/86	581.51	02/20/86	581.67	03/08/86	581.42
	03/22/86	581.45	04/03/86	581.52	05/09/86	581.61	06/10/86	581.71	08/04/86	581.67
	08/19/86	581.52	09/26/86	581.97	12/31/86	581.60	02/25/87	581.34	08/04/87	580.93
	03/31/88	581.23								

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
E-20	08/28/85	587.34	10/25/85	587.44	12/06/85	588.67	01/08/86	587.67	02/04/86	587.80
	02/20/86	588.10	03/08/86	588.03	03/22/86	588.41	04/03/86	588.13	05/09/86	587.66
	06/10/86	588.10	08/04/86	587.26	08/20/86	586.79	09/26/86	587.37	12/31/86	588.03
	02/25/87	587.84	02/26/87	587.84	07/15/87	587.72	08/04/87	587.16	03/31/88	588.94
	07/06/88	586.98	10/11/88	586.79	01/25/89	588.26	04/17/89	588.56	08/02/89	587.79
	02/26/90	589.11	05/29/90	588.85	09/19/90	587.96	11/26/90	588.42	03/21/91	589.34
	07/09/91	587.71	10/18/91	587.67	01/15/92	588.50	04/03/92	588.96	06/24/92	587.44
	09/08/92	588.34								
HWT2-9	12/10/85	582.21	02/06/86	581.93	02/18/86	581.64	03/17/86	581.77	03/31/86	581.80
	05/09/86	581.91	06/09/86	582.35	07/24/86	582.44	09/22/86	582.26	11/25/86	581.89
	02/26/87	581.60	06/25/87	581.68	03/31/88	580.28	07/06/88	580.26	10/13/88	579.90
	01/25/89	579.69	04/19/89	579.55	08/03/89	580.28	02/27/90	579.74	05/30/90	580.21
	09/18/90	580.30	11/27/90	579.67	03/19/91	580.04	07/10/91	580.53	10/16/91	580.15
	01/14/92	580.05	03/31/92	579.97	06/23/92	580.07	09/09/92	579.89		
HWT2-10	12/10/85	588.66	02/06/86	588.08	02/18/86	585.55	03/17/86	588.27	03/31/86	587.91
	05/09/86	587.30	06/09/86	588.15	07/24/86	587.73	09/22/86	586.79	11/25/86	587.94
	02/26/87	587.50	08/04/87	587.12	03/31/88	588.57	07/06/88	586.36	10/13/88	586.16
	01/25/89	587.83	04/19/89	588.01	08/03/89	587.56	02/27/90	588.18	05/30/90	588.88
	09/18/90	588.15	11/27/90	589.16	03/19/91	588.90	07/10/91	587.47	10/16/91	587.33
	01/14/92	588.18	03/31/92	588.22	06/24/92	586.61	09/09/92	586.31		
HWT2-12S	(REPLACES P-7)		06/23/92	584.95						
HWT14-5	12/10/85	584.84	02/06/86	584.55	02/18/86	584.56	03/17/86	584.61	03/31/86	584.57
	05/09/86	584.09	06/09/86	584.71	07/24/86	584.61	09/22/86	583.08	11/25/86	584.53
	02/26/87	585.44	08/04/87	584.39	03/31/88	585.17	07/06/88	584.07	10/13/88	583.94
	01/25/89	584.57	04/19/89	584.59	08/03/89	584.59	02/27/90	586.26	06/01/90	584.80
	09/18/90	584.72	11/27/90	584.10	03/19/91	585.45	07/10/91	584.39	10/16/91	584.43
	01/14/92	584.89	03/31/92	585.23	06/24/92	584.33	09/09/92	584.39		
P-4	12/10/85	583.86	02/06/86	583.93	02/18/86	584.25	03/17/86	583.86	03/31/86	583.80
	05/09/86	583.23	06/09/86	584.12	07/24/86	583.96	09/22/86	583.56	11/25/86	583.28
	02/26/87	584.01	08/04/87	582.96	03/31/88	583.38	07/06/88	582.32	10/13/88	581.97
	01/25/89	582.75	04/19/89	582.47	08/03/89	583.06	02/27/90	583.19	05/30/90	583.48
	09/18/90	583.02	11/27/90	582.79	03/19/91	583.37	07/10/91	583.18	10/16/91	583.04
	01/14/92	582.31	03/31/92	582.78	06/23/92	582.24	09/09/92	582.36		

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
P-7	12/10/85	585.71	02/06/86	584.74	02/18/86	584.71	03/17/86	584.83	03/31/86	584.88
	05/09/86	584.84	06/09/86	585.04	07/24/86	585.36	09/22/86	584.70	11/25/86	584.94
	02/26/87	585.99	08/04/87	584.57	03/31/88	584.14	07/06/88	584.27	10/13/88	584.31
	01/25/89	584.28	04/19/89	584.23	08/03/89	584.63	06/23/92	584.95		
P-11	12/10/85	586.89	02/06/86	585.51	02/18/86	585.44	03/17/86	585.71	03/31/86	585.49
	05/09/86	585.28	06/09/86	585.84	07/24/86	586.10	09/22/86	585.06	11/25/86	585.57
	02/26/87	585.87	08/04/87	585.38	03/31/88	585.41	07/06/88	584.81	10/13/88	584.96
	01/25/89	585.36	04/19/89	585.34	08/03/89	585.63	02/27/90	585.88	05/30/90	588.21
	09/18/90	586.48	11/27/90	586.25	03/19/91	586.13	07/10/91	585.77	10/16/91	586.13
	01/14/92	585.67	03/31/92	585.44	06/23/92	585.13	09/09/92	585.08		
S-1	03/04/86	583.01	03/21/86	582.93	04/03/86	582.96	05/09/86	583.18	06/03/86	583.22
	06/10/86	583.31	07/24/86	583.28	08/04/86	583.23	08/19/86	583.15	09/25/86	583.27
	12/30/86	583.21	02/25/87	583.19	06/22/87	583.12	08/04/87	583.03	10/13/87	583.00
	11/04/87	583.14	03/31/88	583.51	07/05/88	582.82	10/11/88	583.11	01/25/89	583.23
	04/17/89	583.06	08/02/89	583.08	02/26/90	583.43	05/29/90	583.81	09/17/90	583.78
	11/26/90	583.87	03/18/91	584.18	07/09/91	583.73	10/15/91	583.85	01/13/92	583.87
	03/30/92	583.87	06/23/92	583.04	09/08/92	582.91				
S-2	05/09/86	582.32	06/03/86	582.64	06/10/86	582.81	08/04/86	582.79	08/19/86	582.62
	09/25/86	582.69	12/30/86	582.50	02/25/87	582.15	08/04/87	581.74	08/06/87	581.68
	10/13/87	582.06	11/04/87	582.08	03/31/88	582.41	07/05/88	581.20	10/11/88	581.12
	01/25/89	582.33	04/17/89	582.93	08/02/89	582.47	02/26/90	582.93	05/29/90	582.58
	09/17/90	582.17	11/26/90	582.40	03/18/91	582.50	07/09/91	581.72	10/15/91	581.26
	01/13/92	582.02	03/30/92	582.04	06/23/92	581.27				
S-3	06/04/86	582.66	08/04/87	581.99	10/13/87	582.00	03/31/88	582.37	07/05/88	582.02
	10/11/88	581.95	01/25/89	582.08						
S-4	06/04/86	582.65	08/05/87	581.99	10/13/87	582.00	11/04/87	582.04	03/31/88	582.32
	07/05/88	582.02	10/11/88	581.94	01/25/89	582.07				
S-7	12/06/85	582.75	01/07/86	582.18	02/03/86	582.28	02/17/86	582.33	03/04/86	582.10
	03/22/86	581.38	04/01/86	582.20	05/09/86	582.85	06/09/86	583.07	08/05/86	582.77
	08/19/86	583.11	09/26/86	583.23	12/31/86	582.06				
S-8	01/14/86	579.62	02/03/86	579.75	02/17/86	579.12	03/06/86	579.31	03/20/86	579.43
	05/09/86	579.41	06/09/86	579.39	09/25/86	579.31	12/30/86	579.57	08/05/87	579.80
	03/31/88	580.12	07/06/88	579.89	10/12/88	579.99	04/18/89	580.03	08/01/89	579.89
	03/01/90	580.07	05/29/90	580.12	09/20/90	579.96	11/28/90	579.92	03/21/91	580.17
	07/11/91	579.88	10/15/91	579.91	04/02/92	580.07	06/23/92	579.91	09/10/92	579.85

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
S-9	08/04/87	585.79	03/31/88	586.03	07/07/88	585.01	10/11/88	584.05	01/24/89	585.13
	04/18/89	585.85	08/01/89	585.72	02/28/90	585.93	05/31/90	586.10	09/19/90	585.77
	11/28/90	586.18	03/20/91	586.58	07/11/91	586.04	10/17/91	585.40	04/02/92	586.33
	06/23/92	585.59	09/10/92	585.27						
S-10	11/11/85	582.08	11/27/85	581.96	12/04/85	582.75	01/03/86	582.84	02/04/86	582.92
	02/17/86	582.62	03/06/86	582.68	03/20/86	582.96	03/31/86	582.51	05/09/86	583.13
	06/09/86	583.09	07/24/86	583.13	08/04/86	583.04	08/19/86	583.17	09/25/86	583.10
	12/30/86	582.74	08/04/87	582.49	04/01/88	581.63	07/05/88	581.46	10/11/88	581.45
	01/26/89	581.90	04/20/89	581.54	08/01/89	582.17	02/27/90	581.81	05/31/90	581.76
	09/20/90	582.16	11/28/90	582.83	03/20/91	581.97	)7/10/91	583.08	10/17/91	581.53
	01/15/92	581.23	04/01/92	581.22	06/24/92	582.08	09/09/92	582.09		
S-11	08/05/87	589.97	04/01/88	590.19	07/07/88	589.83	10/12/88	589.99	01/24/89	590.24
	04/19/89	590.24	08/04/89	590.07	03/01/90	590.19	05/31/90	590.15	11/29/90	590.52
	03/21/91	590.34	07/11/91	590.07	10/17/91	590.10	04/01/92	590.37	06/24/92	589.28
	09/08/92	589.56								
S-12	08/28/85	582.20	11/11/85	583.47	11/27/85	583.21	12/04/85	582.89	12/12/85	581.69
	01/03/86	582.96	02/03/86	582.53	02/17/86	582.87	03/06/86	582.67	03/20/86	583.04
	03/31/86	582.65	05/09/86	583.16	06/09/86	583.17	07/24/86	583.36	08/04/86	583.11
	08/19/86	583.09	09/25/86	583.10	12/30/86	582.71	02/26/87	582.28	08/04/87	582.89
	04/01/88	582.44	07/05/88	582.39	10/12/88	581.91	01/26/89	581.74	04/20/89	581.79
	08/01/89	582.94	02/27/90	581.59	05/30/90	582.41	09/20/90	583.08	11/28/90	583.56
	07/10/91	583.80	10/17/91	582.20	01/15/92	581.56	04/01/92	581.76	06/24/92	583.40
	09/09/92	582.57								
S-13	10/12/88	582.74	01/24/89	582.62	04/20/89	582.60	08/03/89	583.38	02/27/90	582.47
	05/30/90	583.01	09/18/90	583.56	11/27/90	583.69	03/20/91	583.22	07/10/91	584.20
	10/16/91	583.05	01/15/92	582.39	04/01/92	582.58	06/24/92	583.70	09/08/92	583.18
S-14	09/10/85	581.85	05/16/86	582.56	06/09/86	582.81	07/24/86	582.64	02/26/87	581.87
	08/04/87	581.86	08/06/87	581.45	03/31/88	580.96	07/06/88	580.33	10/13/88	580.39
	01/25/89	579.71	04/19/89	579.47	08/03/89	579.37	02/27/90	5'.9.06	09/18/90	579.58
	11/27/90	579.63	03/19/91	579.01	07/10/91	580.28	01/14/92	580.27	03/31/92	579.36
	06/23/92	580.10	09/09/92	579.85						
S-15	08/06/87	586.90	09/15/87	587.20	03/31/88	587.20	07/06/88	587.00	10/13/88	586.90
	01/25/89	587.10	04/19/89	587.00	08/03/89	586.80	02/27/90	587.00	05/30/90	587.20
	09/18/90	587.00	11/27/90	587.20	03/20/91	587.60	07/10/91	587.30	01/14/92	587.17
	03/31/92	587.06	06/23/92	586.96	09/09/92	586.94	12/08/92	587.19		

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
S-16	08/07/87	589.24	07/07/88	588.76						
S-17	12/05/85	582.22	01/08/86	581.81	02/04/86	582.50	02/20/86	582.19	03/07/86	582.41
	03/21/86	582.02	04/01/86	582.30	05/10/86	582.82	06/10/86	582.76	08/05/86	582.77
	08/20/86	582.84	09/26/86	582.94	12/31/86	582.00				
S-18	06/04/86	583.01	08/04/87	582.51	10/13/87	582.58	11/04/87	582.61	03/31/88	583.16
	07/05/88	582.37	10/11/88	582.54	01/25/89	582.62				
S-19	06/04/86	583.00	06/22/87	583.01	08/04/87	582.68	10/13/87	582.74	11/04/87	582.72
	03/31/88	583.09	07/05/88	582.30	10/11/88	582.73	01/25/89	582.74		
S-20	06/04/86	582.99	08/04/87	582.40	10/13/87	582.23	11/04/87	582.17	03/31/88	583.14
	07/05/88	581.24	10/11/88	582.18	01/25/89	582.44				
S-21	06/04/86	582.97	08/04/87	582.71	10/13/87	582.48	11/04/87	582.46		
S-22	06/04/86	583.27	08/04/87	582.03	11/04/87	582.06	03/31/88	582.37	07/05/88	582.06
	10/11/88	582.08	01/25/89	582.14						
S-23	06/15/85	582.35	07/15/85	582.18	08/15/85	582.05	09/15/85	582.15	10/17/85	581.79
	10/24/85	581.92	11/11/85	582.51	11/27/85	582.48	12/04/85	582.09	12/17/85	581.86
	01/03/86	582.38	02/03/86	582.02	02/17/86	581.99	03/06/86	582.25	03/20/86	582.22
	03/31/86	581.99	04/15/86	582.51	05/09/86	582.54	06/09/86	582.58	07/24/86	582.61
	08/04/86	582.71	08/19/86	582.91	09/25/86	582.91	10/15/86	583.10	11/15/86	582.12
	12/30/86	582.41	01/15/87	582.25	02/26/87	581.86	03/15/87	582.12	04/15/87	582.05
	05/15/87	581.72	06/15/87	581.82	07/05/87	581.79	08/04/87	581.72	08/06/87	581.46
	09/15/87	581.07	10/15/87	580.64	11/15/87	580.61	12/15/87	581.17	01/15/88	579.56
	02/14/88	579.89	03/15/88	580.25	03/31/88	580.31	04/15/88	580.31	05/15/88	580.51
	06/15/88	580.31	07/05/88	580.31	08/15/88	579.79	09/15/88	579.79	10/13/88	579.40
	11/15/88	579.63	12/15/88	579.69	01/25/89	579.79	02/14/89	579.26	03/15/89	579.43
	04/20/89	579.49	05/15/89	579.66	06/15/89	580.38	07/15/89	580.22	08/03/89	579.76
	09/15/89	579.89	10/15/89	579.33	11/15/89	579.72	12/15/89	579.10	01/15/90	578.64
	02/27/90	578.58	03/15/90	578.74	04/15/90	578.97	05/30/90	579.66	06/15/90	579.69
	07/15/90	579.99	08/15/90	579.66	09/18/90	579.63	10/15/90	579.43	11/27/90	579.53
	12/15/90	579.49	01/15/91	579.49	02/14/91	579.79	03/19/91	579.13	04/15/91	580.12
	05/15/91	580.22	06/15/91	580.35	07/10/91	580.38	08/15/91	580.05	09/15/91	579.69
	10/16/91	579.00	11/15/91	579.53	12/15/91	579.23	01/14/92	580.05	02/14/92	579.40
	03/31/92	579.56	04/15/92	579.85	05/15/92	580.05	06/24/92	580.12	07/15/92	580.22
	08/15/92	580.25	09/09/92	579.59	09/30/92	579.92				

* U.S. GOVERNMENT PRINTING OFFICE: 1995—649-291

Table 5. Water levels in selected wells in the Calumet aquifer and surface-water sites in northern Lake County, Indiana, August 1985 through October 1992—Continued

Site name	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level	Date measured (month/day/year)	Water level
A-11S	12/17/85	585.66	02/06/86	585.60	02/18/86	585.58	03/17/86	585.58	03/31/86	585.62
	05/16/86	585.62	09/22/86	585.82	11/25/86	585.53	02/26/87	585.50	06/26/87	586.27
	08/04/87	586.39	03/31/88	585.57	07/06/88	586.51	10/13/88	585.65	01/25/89	585.45
	04/19/89	585.57	08/03/89	586.25	02/27/90	585.47	05/30/90	585.73	09/18/90	585.68
	11/27/90	585.69	03/19/91	585.67	07/10/91	586.08	10/16/91	585.72	01/14/92	585.60
	03/31/92	585.51	06/23/92	586.17	09/09/92	585.73				
C-16S	12/18/85	582.47	01/08/86	582.24	02/04/86	582.89	02/20/86	582.51	03/07/86	582.69
	03/21/86	582.35	04/01/86	582.55	05/15/86	582.87	08/13/86	583.42	12/17/86	582.47
	02/24/87	582.33	08/05/87	582.36	09/18/87	582.32	12/17/87	582.28	03/30/88	582.25
	07/06/88	580.97	10/13/88	581.22	01/25/89	581.83	04/19/89	581.91	08/04/89	581.61
	03/01/90	581.90	05/31/90	581.96	09/20/90	581.87	11/28/90	582.03	03/21/91	581.98
	07/11/91	582.06	10/17/91	581.71	01/17/92	581.92	04/01/92	582.02	06/24/92	582.00
	09/10/92	582.08								
D-36S	01/23/86	582.03	03/08/86	581.63	03/22/86	581.59	03/3. /86	582.61	05/15/86	583.05
	08/13/86	582.80	11/24/86	582.23	11/25/86	582.44	02/26/87	582.23	03/26/87	581.66
	08/04/87	581.94	10/13/87	580.94	07/05/88	580.86	10/11/88	579.90	01/24/89	580.38
	04/18/89	579.64	08/02/89	580.66	02/28/90	578.91	05/31/90	579.80	09/19/90	580.27
	11/28/90	578.92	03/20/91	579.22	07/11/91	580.44	10/17/91	578.99	01/15/92	580.27
	04/02/92	579.80	06/23/92	580.52	09/10/92	579.55				
D-54S	12/12/85	582.47	02/05/86	582.57	03/07/86	582.27	04/03/86	582.27	05/15/86	582.49
	08/14/86	582.83	11/25/86	582.47	12/16/86	582.46	10/12/88	580.20	01/24/89	580.05
	04/19/89	580.16	02/28/90	579.12	09/10/92	580.02				
E-16S	12/19/85	581.04	01/06/86	581.16	02/06/86	581.59	02/20/86	581.41	03/08/86	580.93
	03/22/86	580.83	04/03/86	581.58	05/16/86	581.60	08/14/86	581.21	11/24/86	581.42
	02/23/87	581.30	03/26/87	581.02	08/04/87	581.00	03/31/88	580.99	07/06/88	580.50
	10/11/88	579.41	01/25/89	580.32	04/17/89	580.28	08/02/89	579.99	02/26/90	580.25
	05/29/90	580.45	09/17/90	579.89	11/26/90	580.27	03/21/91	580.20	07/09/91	579.85
	10/18/91	579.56	01/15/92	579.98	04/03/92	580.02	06/23/92	579.74	09/11/92	580.24

* Air/oil interface.
** Oil/water interface.

Geohydrology and Water Quality of the Calumet Aquifer, in the Vicinity of the Grand Calumet River/Indiana Harbor Canal, Northwestern Indiana

By JOSEPH M. FENELON and LEE R. WATSON

Prepared in cooperation with the
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 92-4115

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1993

Table 11. Surface-water levels at site C16S, December 18, 1985, through September 8, 1986

[Dashes (--) indicate no data collected]

	Mean water levels in feet above sea level, water year October 1985 through September 1986											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	--	--	--	582.18	582.42	582.19	582.65	582.80	583.47	583.63	583.51	583.31
2	--	--	--	582.39	582.42	582.21	582.68	582.66	583.62	583.58	583.47	583.40
3	--	--	--	582.82	582.43	582.45	582.84	582.67	583.32	583.46	583.48	583.36
4	--	--	--	582.63	582.75	582.29	582.99	582.40	583.20	583.22	583.39	583.28
5	--	--	--	582.52	582.77	582.22	582.90	582.44	583.54	583.25	583.36	583.26
6	--	--	--	582.37	582.84	582.79	582.83	582.75	583.54	583.33	583.50	583.33
7	--	--	--	582.52	582.88	582.68	582.62	582.85	583.53	583.43	583.57	583.32
8	--	--	--	582.20	582.56	582.00	582.67	583.04	583.32	583.47	583.44	583.01
9	--	--	--	581.57	582.35	582.27	582.78	583.05	583.36	583.79	583.36	--
10	--	--	--	582.09	582.34	582.50	582.70	582.99	583.50	583.63	583.48	--
11	--	--	--	582.02	582.43	582.59	582.60	582.93	583.46	583.75	583.46	--
12	--	--	--	582.22	582.27	582.68	582.89	582.95	583.60	583.74	583.37	--
13	--	--	--	582.57	582.05	582.77	582.91	582.93	583.37	583.67	583.35	--
14	--	--	--	582.68	582.24	582.56	582.91	582.95	583.41	583.65	583.31	--
15	--	--	--	582.31	582.18	582.41	583.02	582.93	583.65	583.63	583.40	--
16	--	--	--	582.23	582.34	582.44	583.14	582.97	583.44	583.79	583.42	--
17	--	--	--	582.18	582.53	582.43	583.03	583.35	583.38	583.63	583.63	--
18	--	--	582.22	582.18	582.54	582.52	582.89	583.67	583.39	583.57	583.76	--
19	--	--	582.18	582.59	582.57	582.91	582.76	583.78	583.42	583.69	583.68	--
20	--	--	582.45	582.35	582.75	582.85	582.73	583.56	583.59	583.78	583.57	--
21	--	--	582.30	582.19	582.92	582.34	583.22	583.32	583.48	583.79	583.71	--
22	--	--	582.05	582.53	582.40	581.90	583.05	583.35	583.40	583.69	583.65	--
23	--	--	582.25	582.29	582.44	582.31	582.71	583.35	583.33	583.59	583.61	--
24	--	--	583.07	582.25	582.46	582.43	582.68	583.31	583.64	583.46	583.41	--
25	--	--	582.51	582.29	582.33	582.26	582.91	583.39	583.44	583.74	583.33	--
26	--	--	581.90	582.66	582.46	582.46	583.05	583.45	583.35	583.74	583.62	--
27	--	--	582.25	582.94	582.90	582.49	582.89	583.51	583.41	583.67	583.83	--
28	--	--	581.86	582.27	582.41	582.25	582.76	583.39	583.51	583.74	583.56	--
29	--	--	581.93	582.40	--	582.33	582.68	583.31	583.48	583.66	583.28	--
30	--	--	581.83	582.28	--	582.46	582.80	583.21	583.67	583.60	583.19	--
31	--	--	582.18	582.30	--	582.49	--	583.25	--	583.55	583.28	--
MEAN	--	--	--	582.36	582.50	582.43	582.84	583.11	583.46	583.61	583.48	--
MAXIMUM	--	--	--	582.94	582.92	582.91	583.22	583.78	583.67	583.79	583.83	--
MINIMUM	--	--	--	581.57	582.05	581.90	582.60	582.40	583.20	583.22	583.19	--

Table 12. Ground-water levels in well C15, February 4, 1986, through July 6, 1988

[Dashes (--) indicate no data collected]

	Mean water levels in feet above sea level, water year October 1985 through September 1986											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	--	--	--	--	--	582.64	582.73	582.82	583.22	583.25	583.11	582.81
2	--	--	--	--	--	582.63	582.72	582.71	583.25	583.19	583.07	582.89
3	--	--	--	--	--	582.65	582.83	582.70	582.96	583.08	583.08	582.88
4	--	--	--	--	582.93	582.65	583.00	582.62	582.84	582.86	583.00	582.81
5	--	--	--	--	582.84	582.66	582.91	582.55	583.23	582.85	582.97	582.77
6	--	--	--	--	582.90	582.86	582.86	582.72	583.19	582.92	583.12	582.85
7	--	--	--	--	583.02	583.24	582.70	582.81	583.19	583.03	583.18	582.88
8	--	--	--	--	582.71	582.91	582.71	582.99	582.98	583.08	583.05	582.62
9	--	--	--	--	582.62	582.65	582.79	583.02	583.02	583.43	582.97	582.58
10	--	--	--	--	--	582.75	582.73	582.96	583.16	583.26	583.10	582.59
11	--	--	--	--	--	582.77	582.67	582.90	583.12	583.36	583.07	582.92
12	--	--	--	--	--	582.76	582.86	582.92	583.25	583.35	582.98	583.13
13	--	--	--	--	--	582.84	582.92	582.89	583.02	583.27	582.94	582.94
14	--	--	--	--	--	582.73	582.91	582.93	583.08	583.25	582.85	583.06
15	--	--	--	--	--	582.68	583.04	582.94	583.30	583.24	582.91	583.30
16	--	--	--	--	--	582.66	583.12	582.85	583.09	583.39	582.93	583.29
17	--	--	--	--	582.69	582.65	583.05	582.99	583.03	583.21	583.15	582.97
18	--	--	--	--	582.74	582.68	582.90	583.34	583.03	583.15	583.27	583.08
19	--	--	--	--	582.77	582.94	582.78	583.43	583.06	583.28	583.18	583.15
20	--	--	--	--	582.90	583.13	582.74	583.22	583.23	583.37	583.09	583.30
21	--	--	--	--	583.17	582.72	583.19	582.99	583.10	583.37	583.22	583.15
22	--	--	--	--	582.73	582.61	583.05	583.01	583.02	583.28	583.18	583.17
23	--	--	--	--	582.68	582.62	582.75	583.00	582.95	583.18	583.14	583.18
24	--	--	--	--	582.68	582.66	582.69	582.94	583.27	583.05	582.94	583.12
25	--	--	--	--	582.69	582.59	582.88	583.03	583.07	583.33	582.85	583.23
26	--	--	--	--	582.70	582.62	583.02	583.09	582.98	583.33	583.15	583.30
27	--	--	--	--	582.97	582.66	582.89	583.16	583.05	583.26	583.34	583.36
28	--	--	--	--	582.82	582.59	582.78	583.03	583.14	583.33	583.10	583.34
29	--	--	--	--	--	582.54	582.70	582.96	583.10	583.25	582.83	583.32
30	--	--	--	--	--	582.60	582.84	582.85	583.30	583.19	582.72	583.44
31	--	--	--	--	--	582.62	--	582.89	--	583.15	582.78	--
MEAN	--	--	--	--	--	582.72	582.86	582.94	583.11	583.21	583.04	583.05
MAXIMUM	--	--	--	--	--	583.24	583.19	583.43	583.30	583.43	583.34	583.44
MINIMUM	--	--	--	--	--	582.54	582.67	582.55	582.84	582.85	582.72	582.58

Table 12. Ground-water levels in well C15, February 4, 1986, through July 6, 1988--Continued

	Mean water levels in feet above sea level, water year October 1986 through September 1987											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	583.49	583.27	583.27	582.62	582.63	--	--	--	--	--	--	582.47
2	583.46	583.22	583.10	582.72	582.68	--	--	--	--	--	--	582.44
3	583.75	582.96	582.79	582.66	582.67	--	--	--	--	--	--	582.41
4	583.91	583.29	582.68	582.62	582.65	--	--	--	--	--	--	582.36
5	583.53	583.16	582.64	582.61	582.62	--	--	--	--	--	582.27	582.33
6	583.39	582.94	582.62	582.61	582.59	--	--	--	--	--	582.18	582.31
7	583.06	583.02	582.74	582.67	582.60	--	--	--	--	--	582.06	582.32
8	583.23	582.89	582.92	582.62	583.67	--	--	--	--	--	582.10	582.35
9	583.82	582.71	583.01	582.58	583.86	--	--	--	--	--	582.22	582.35
10	583.48	582.70	582.87	582.91	583.59	--	--	--	--	--	582.33	582.31
11	583.33	582.97	582.76	582.86	583.59	--	--	--	--	--	582.18	582.27
12	583.27	582.88	582.61	582.62	583.64	--	--	--	--	--	582.06	582.42
13	583.34	583.10	582.63	582.61	583.64	--	--	--	--	--	582.08	582.42
14	583.29	582.88	582.61	582.65	583.85	--	--	--	--	--	582.62	582.34
15	583.37	582.61	582.58	582.71	583.96	--	--	--	--	--	582.46	582.30
16	583.32	582.73	582.64	582.66	583.95	--	--	--	--	--	582.58	582.46
17	583.63	582.77	582.66	582.64	584.03	--	--	--	--	--	583.05	582.57
18	583.38	583.26	582.73	582.63	584.02	--	--	--	--	--	582.67	582.56
19	583.26	582.93	582.65	582.65	583.96	--	--	--	--	--	582.60	582.50
20	583.11	583.01	582.69	582.64	583.96	--	--	--	--	--	582.53	582.44
21	583.20	582.92	582.66	582.58	583.96	--	--	--	--	--	582.62	582.50
22	583.15	582.70	582.60	582.65	583.97	--	--	--	--	--	582.61	582.75
23	583.23	582.79	582.59	582.71	583.98	--	--	--	--	--	582.55	582.62
24	583.53	582.75	582.69	--	583.98	--	--	--	--	--	582.49	582.59
25	583.65	582.68	582.69	--	--	--	--	--	--	--	582.57	582.55
26	583.58	583.31	582.64	--	--	--	--	--	--	--	582.84	582.49
27	583.38	582.81	582.64	--	--	--	--	--	--	--	582.73	582.43
28	583.08	582.70	582.60	--	--	--	--	--	--	--	582.68	582.41
29	583.39	582.79	582.58	--	--	--	--	--	--	--	582.64	582.61
30	583.29	583.10	582.74	--	--	--	--	--	--	--	582.57	582.55
31	583.01	--	582.65	--	--	--	--	--	--	--	582.51	--
MEAN	583.38	582.93	582.72	--	--	--	--	--	--	--	--	582.45
MAXIMUM	583.91	583.31	583.27	--	--	--	--	--	--	--	--	582.75
MINIMUM	583.01	582.61	582.58	--	--	--	--	--	--	--	--	582.27

Table 12. Ground-water levels in well C15, February 4, 1986, through July 6, 1988--Continued

	Mean water levels in feet above sea level, water year October 1987 through September 1988											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	582.49	582.43	582.57	--	--	--	582.55	582.44	581.86	581.51	--	--
2	582.45	582.52	582.51	--	--	--	582.57	582.41	581.86	581.38	--	--
3	582.58	582.48	582.51	--	--	--	582.62	582.39	581.85	581.25	--	--
4	582.50	582.44	582.53	--	--	--	582.57	582.36	581.79	581.14	--	--
5	582.44	582.42	582.48	--	--	--	582.54	582.32	581.72	581.08	--	--
6	582.42	582.38	582.47	--	--	--	582.79	582.29	581.64	581.09	--	--
7	582.42	582.36	582.56	--	--	--	582.62	582.28	581.60	--	--	--
8	582.41	582.37	582.59	--	--	--	582.57	582.29	581.65	--	--	--
9	582.40	582.39	582.56	--	--	582.62	582.56	582.41	581.69	--	--	--
10	582.43	582.39	582.52	--	--	582.56	582.55	582.38	581.63	--	--	--
11	582.53	582.37	582.50	--	--	582.53	582.54	582.35	581.56	--	--	--
12	582.48	582.33	582.50	--	--	582.53	582.53	582.30	581.48	--	--	--
13	582.43	582.33	582.48	--	--	582.50	582.51	582.26	581.41	--	--	--
14	582.38	582.32	582.45	--	--	582.50	582.50	582.23	581.34	--	--	--
15	582.35	582.32	582.62	--	--	582.50	582.50	582.24	581.29	--	--	--
16	582.34	582.33	582.60	--	--	582.50	582.49	582.26	581.29	--	--	--
17	582.50	582.38	582.54	--	--	582.48	582.47	582.23	581.32	--	--	--
18	582.43	582.33	582.52	--	--	582.43	582.47	582.22	581.28	--	--	--
19	582.42	582.26	582.58	--	--	582.42	582.46	582.18	581.19	--	--	--
20	582.55	582.24	582.74	--	--	582.41	582.45	582.15	581.38	--	--	--
21	582.49	582.24	582.64	--	--	582.38	582.45	582.12	582.07	--	--	--
22	582.46	582.24	582.62	--	--	582.37	582.45	582.11	581.78	--	--	--
23	582.44	582.28	--	--	--	582.39	582.52	582.36	581.61	--	--	--
24	582.56	582.29	--	--	--	582.51	582.49	582.57	581.52	--	--	--
25	582.53	582.57	--	--	--	582.49	582.46	582.46	581.36	--	--	--
26	582.50	582.52	--	--	--	582.42	582.46	582.39	581.28	--	--	--
27	582.49	582.48	--	--	--	582.38	582.54	582.30	581.23	--	--	--
28	582.48	582.55	--	--	--	582.52	582.53	582.19	581.17	--	--	--
29	582.47	582.55	--	--	--	582.60	582.48	582.08	581.80	--	--	--
30	582.45	582.53	--	--	--	582.63	582.46	581.99	581.70	--	--	--
31	582.43	--	--	--	--	582.57	--	581.92	--	--	--	--
MEAN	582.46	582.39	--	--	--	--	582.52	582.27	581.54	--	--	--
MAXIMUM	582.58	582.57	--	--	--	--	582.79	582.57	582.07	--	--	--
MINIMUM	582.34	582.24	--	--	--	--	582.45	581.92	581.17	--	--	--

Table 13. Ground-water levels in well C10, December 18, 1985, through May 4, 1988

[Dashes (--) indicate no data collected]

	Mean water levels in feet above sea level, water year October 1985 through September 1986											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	--	--	--	583.18	--	583.37	583.18	583.28	583.27	583.39	583.03	582.68
2	--	--	--	583.20	--	583.36	583.16	583.18	583.34	583.32	582.98	582.70
3		--	--	583.25	--	583.36	583.13	583.12	583.17	583.18	582.99	582.77
4	--	--	--	--	583.62	583.36	583.16	583.06	583.12	583.03	582.92	582.74
5	--	--	--	--	583.52	583.40	583.16	582.98	583.38	582.93	582.88	582.64
6	--	--	--	--	583.45	583.44	583.15	582.96	583.34	582.90	583.01	582.64
7	--	--	--	--	583.43	583.38	583.11	583.01	583.57	582.96	583.08	582.70
8	--	--	--	--	583.39	583.31	583.08	583.05	583.37	583.15	582.98	582.61
9	--	--	--	--	583.34	583.40	583.09	583.10	583.26	583.61	582.88	582.51
10	--	--	--	--	583.32	583.49	583.09	583.07	583.49	583.50	583.00	582.43
11	--	--	--	--	583.30	583.41	583.07	583.03	583.40	583.57	582.99	582.81
12	--	-	--	--	583.27	583.37	583.10	583.03	583.40	583.53	582.88	583.06
13	--	--	--	--	583.24	583.39	583.16	583.03	583.28	583.40	582.83	582.94
14	--	--	--	--	583.21	583.35	583.23	583.13	583.35	583.33	582.82	582.91
15	--	--	--	--	583.18	583.32	583.30	583.24	583.69	583.30	582.81	583.05
16	--	--	--	--	583.20	583.29	583.30	583.26	583.44	583.34	582.81	583.19
17	--	--	--	--	583.34	583.27	583.28	583.28	583.32	583.22	582.91	583.00
18	--	--	583.24	--	583.50	583.36	583.21	583.58	583.25	583.12	583.05	582.97
19	--	--	583.23	--	583.55	583.42	583.14	583.71	583.21	583.21	582.99	583.13
20	--	--	583.23	--	583.50	583.38	583.13	583.53	583.28	583.30	582.92	583.29
21	--	--	583.23	--	583.53	583.30	583.26	583.37	583.19	583.27	582.95	583.17
22	--	--	583.23	--	583.45	583.27	583.26	583.31	583.11	583.22	583.00	583.12
23	--	--	583.24	--	583.42	583.25	583.15	583.28	583.05	583.11	582.97	583.31
24	--	--	583.44	--	583.39	583.23	583.07	583.22	583.22	583.02	582.86	583.24
25	--	--	583.29	--	583.38	583.19	583.04	583.21	583.11	583.35	582.76	583.23
	--	--										
26			583.23	--	583.39	583.20	583.09	583.35	583.01	583.30	583.03	583.34
27	--	--	583.22	--	583.42	583.18	583.07	583.54	583.20	583.19	583.26	583.35
28	--	--	583.21	--	583.40	583.15	583.09	583.39	583.27	583.33	583.18	583.35
29	--	--	583.19	--	--	583.11	583.06	583.38	583.17	583.21	582.95	583.44
30	--	--	583.18	--	--	583.09	583.37	583.24	583.46	583.11	582.79	583.58
31	--	--	583.18	--	--	583.08	--	583.15	--	583.06	582.69	--
MEAN	--	--	--	--	--	583.31	583.16	583.23	583.29	583.24	582.94	583.00
MAXIMUM	--	--	--	--	--	583.49	583.37	583.71	583.69	583.61	583.26	583.58
MINIMUM	--	--	--	--	--	583.08	583.04	582.96	583.01	582.90	582.69	582.43

Table 13. Ground-water levels in well C10, December 18, 1985, through May 4, 1988--Continued

	Mean water levels in feet above sea level, water year October 1986 through September 1987											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	583.61	583.38	583.53	583.19	583.32	583.45	583.05	583.09	583.53	582.74	582.44	582.97
2	583.57	583.42	583.56	583.18	583.39	583.35	583.07	583.27	583.44	582.70	582.29	582.91
3	584.02	583.29	583.43	583.18	583.37	583.27	583.05	583.33	583.36	582.59	582.18	582.87
4	584.06	583.38	583.37	583.16	583.32	583.23	583.05	583.25	583.22	582.51	582.14	582.81
5	583.84	583.35	583.32	583.15	583.28	583.21	583.05	583.18	583.13	582.53	582.14	582.74
6	583.68	583.26	583.31	583.15	583.26	583.19	583.05	583.12	583.04	582.57	582.10	582.69
7	583.52	583.21	583.45	583.15	583.25	583.17	583.03	583.07	582.95	582.85	582.04	582.68
8	583.45	583.21	583.53	583.15	583.69	583.15	583.01	583.05	582.90	582.69	582.09	582.71
9	583.79	583.16	583.51	583.14	583.72	583.42	583.00	583.00	582.94	582.60	582.17	582.70
10	583.64	583.12	583.39	583.16	583.32	583.30	582.99	582.93	582.86	582.74	582.12	582.65
11	583.51	583.15	583.33	583.23	583.28	583.20	583.25	582.97	582.91	582.80	582.05	582.60
12	583.45	583.14	583.31	583.17	583.26	583.16	583.25	583.20	583.19	582.62	582.00	582.74
13	583.46	583.12	583.29	583.18	583.23	583.14	583.16	583.08	582.97	582.54	582.04	582.74
14	583.45	583.09	583.27	583.29	583.22	583.16	583.46	583.00	582.84	582.52	582.69	582.66
15	583.45	583.09	583.27	583.38	583.21	583.21	583.51	582.95	582.77	582.69	582.57	582.61
16	583.43	583.09	583.27	583.32	583.17	583.16	583.42	582.89	582.72	582.69	582.81	582.79
17	583.61	583.09	583.28	583.27	583.17	583.12	583.35	582.86	582.66	582.50	583.65	582.97
18	583.51	583.51	583.28	583.25	583.16	583.12	583.29	583.47	582.59	582.38	583.30	582.99
19	583.43	583.52	583.26	583.24	583.14	583.16	583.24	583.74	582.56	582.30	583.13	582.92
20	583.35	583.41	583.24	583.22	583.13	583.12	583.19	583.51	582.69	582.26	583.00	582.85
21	583.30	583.39	583.24	583.19	583.13	583.11	583.17	583.35	583.02	582.46	583.12	582.91
22	583.29	583.30	583.21	583.18	583.13	583.09	583.41	583.39	582.93	582.30	583.04	583.40
23	583.30	583.34	583.20	583.17	583.12	583.07	583.47	583.31	582.87	582.21	582.93	583.25
24	583.54	583.29	583.20	583.14	583.11	583.07	583.35	583.29	582.75	582.16	582.85	583.15
25	583.75	583.25	583.19	583.12	583.12	583.13	583.29	583.35	582.87	582.12	582.99	583.07
26	583.77	583.86	583.19	583.12	583.11	583.10	583.23	583.34	582.88	582.27	583.64	583.00
27	583.63	583.68	583.19	583.11	583.11	583.09	583.19	583.19	582.73	582.48	583.49	582.92
28	583.44	583.50	583.17	583.11	583.27	583.07	583.16	583.10	582.59	582.47	583.33	582.88
29	583.49	583.44	583.16	583.15	--	583.06	583.12	583.02	582.59	582.33	583.22	583.14
30	583.47	583.44	583.20	583.24	--	583.05	583.10	583.15	582.69	582.24	583.12	583.05
31	583.35	--	583.21	583.23	--	583.05	--	583.31	--	582.45	583.04	--
MEAN	583.55	583.32	583.30	583.19	583.25	583.17	583.20	583.19	582.91	582.49	582.70	582.88
MAXIMUM	584.06	583.86	583.56	583.38	583.72	583.45	583.51	583.74	583.53	582.85	583.65	583.40
MINIMUM	583.29	583.09	583.16	583.11	583.11	583.05	582.99	582.86	582.56	582.12	582.00	582.60

Table 13. Ground-water levels in well C10, December 18, 1985, through May 4, 1988--Continued

	Mean water levels in feet above sea level, water year October 1987 through September 1988											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	582.97	582.89	--	583.28	583.43	583.31	583.37	583.15	--	--	--	--
2	582.90	583.00	--	583.26	583.37	583.30	583.39	583.13	--	--	--	--
3	582.94	582.96	--	583.25	583.33	583.27	583.48	583.10	--	--	--	--
4	582.91	582.93	--	583.24	583.31	583.25	583.42	583.09	--	--	--	--
5	582.87	582.89	--	583.20	583.29	583.22	583.38	--	--	--	--	--
6	582.85	582.87	--	583.17	583.29	583.20	583.83	--	--	--	--	--
7	582.84	582.85	--	583.16	583.28	583.19	583.61	--	--	--	--	--
8	582.83	582.84	--	583.15	583.27	583.19	583.49	--	--	--	--	--
9	582.83	582.85	--	583.13	583.27	583.24	583.41	--	--	--	--	--
10	582.85	582.85	--	583.11	583.27	583.21	583.38	--	--	--	--	--
11	582.94	582.84	--	583.08	583.27	583.19	583.36	--	--	--	--	--
12	582.91	582.82	--	583.07	583.27	583.19	583.34	--	--	--	--	--
13	582.87	582.80	--	583.07	583.27	583.18	583.32	--	--	--	--	--
14	582.83	582.79	--	583.07	583.30	583.16	583.31	--	--	--	--	--
15	582.78	582.77	--	583.05	583.54	583.15	583.29	--	--	--	--	--
16	582.74	582.77	--	583.04	583.43	583.14	583.27	--	--	--	--	--
17	582.92	582.84	583.20	583.21	583.42	583.13	583.26	--	--	--	--	--
18	582.87	582.81	583.19	583.43	583.49	583.11	583.26	--	--	--	--	--
19	582.86	582.77	583.27	583.50	583.49	583.10	583.24	--	--	--	--	--
20	583.03	582.75	583.67	583.64	583.46	583.10	583.23	--	--	--	--	--
21	582.96	582.74	583.49	583.51	583.41	583.08	583.23	--	--	--	--	--
22	582.92	582.73	583.40	583.43	583.42	583.07	583.22	--	--	--	--	--
23	582.90	582.74	583.36	583.39	583.46	583.07	583.26	--	--	--	--	--
24	583.05	582.78	583.34	583.37	583.41	583.17	583.22	--	--	--	--	--
25	583.03	583.09	583.34	583.35	583.37	583.19	583.20	--	--	--	--	--
26	583.00	583.05	583.32	583.34	583.34	583.13	583.19	--				
27	582.99	583.02	583.30	583.33	583.33	583.10	583.28	--	--	--	--	--
28	582.97	583.11	583.39	583.31	583.33	583.28	583.26	--	--	--	--	--
29	582.94	583.11	583.40	583.33	583.33	583.44	583.21	--	--	--	--	--
30	582.92	583.09	583.35	583.38	--	583.58	583.18	--	--	--	--	--
31	582.90	--	583.32	583.49	--	583.45	--	--	--	--	--	--
MEAN	582.91	582.88	--	583.27	583.36	583.21	583.33	--	--	--	--	--
MAXIMUM	583.05	583.11	--	583.64	583.54	583.58	583.83	--	--	--	--	--
MINIMUM	582.74	582.73	--	583.04	583.27	583.07	583.18	--	--	--	--	--

Table 14. Ground-water levels in well C5, May 15, 1986, through June 29, 1988

[Dashes (--) indicate no data collected]

	Mean water levels in feet above sea level, water year October 1985 through September 1986											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	--	--	--	--	--	--	--	--	584.03	584.04	583.41	582.92
2	--	--	--	--	--	--	--	--	583.99	583.98	583.38	582.90
3	--	--	--	--	--	--	--	--	583.96	583.87	583.37	582.89
4	--	--	--	--	--	--	--	--	583.94	583.74	583.32	582.89
5	--	--	--	--	--	--	--	--	584.08	583.65	583.29	582.84
6	--	--	--	--	--	--	--	--	584.05	583.60	583.30	582.82
7	--	--	--	--	--	--	--	--	584.42	583.57	583.33	582.80
8	--	--	--	--	--	--	--	--	584.35	583.62	583.31	582.79
9	--	--	--	--	--	--	--	--	584.19	584.34	583.24	582.77
10	--	--	--	--	--	--	--	--	584.33	584.20	583.28	582.75
11	--	--	--	--	--	--	--	--	584.37	584.30	583.25	582.90
12	--	--	--	--	--	--	--	--	584.26	584.25	583.18	583.02
13	--	--	--	--	--	--	--	--	584.17	584.12	583.15	582.98
14	--	--	--	--	--	--	--	--	584.17	584.00	583.14	582.95
15	--	--	--	--	--	--	--	584.48	584.64	583.93	583.13	582.91
16	--	--	--	--	--	--	--	584.13	584.47	583.84	583.11	582.91
17	--	--	--	--	--	--	--	584.09	584.35	583.74	583.09	582.93
18	--	--	--	--	--	--	--	584.31	584.24	583.67	583.07	582.94
19	--	--	--	--	--	--	--	584.73	584.13	583.61	583.05	583.04
20	--	--	--	--	--	--	--	584.45	584.07	583.66	583.03	583.22
21	--	--	--	--	--	--	--	584.38	584.00	583.56	583.01	583.21
22	--	--	--	--	--	--	--	584.30	583.92	583.54	583.01	583.17
23	--	--	--	--	--	--	--	584.23	583.84	583.50	583.00	583.31
24	--	--	--	--	--	--	--	584.16	583.78	583.47	582.98	583.33
25	--	--	--	--	--	--	--	584.10	583.76	583.70	582.96	583.33
26	--	--	--	--	--	--	--	584.17	583.71	583.64	583.10	583.38
27	--	--	--	--	--	--	--	584.46	583.85	583.54	583.16	583.43
28	--	--	--	--	--	--	--	584.38	583.98	583.63	583.20	583.41
29	--	--	--	--	--	--	--	584.37	583.85	583.54	583.13	583.50
30	--	--	--	--	--	--	--	584.25	584.06	583.47	583.04	583.65
31	--	--	--	--	--	--	--	584.12	--	583.43	582.96	--
MEAN	--	--	--	--	--	--	--	--	584.10	583.77	583.16	583.06
MAXIMUM	--	--	--	--	--	--	--	--	584.64	584.34	583.41	583.65
MINIMUM	--	--	--	--	--	--	--	--	583.71	583.43	582.96	582.75

Table 14. Ground-water levels in well C5, May 15, 1986, through June 29, 1988--Continued

	Mean water levels in feet above sea level, water year October 1986 through September 1987											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	583.70	583.95	584.56	584.09	584.15	584.43	583.90	584.12	--	--	--	--
2	583.69	583.94	584.62	584.09	584.19	584.31	583.89	584.29	--	--	--	--
3	584.45	583.93	584.54	584.07	584.30	584.23	583.88	584.37	--	--	--	--
4	584.62	583.90	584.45	584.04	584.35	584.17	583.87	584.29	--	--	--	--
5	584.58	583.89	584.40	584.02	--	584.15	583.86	584.22	--	--	--	--
6	584.47	583.87	584.37	584.02	--	584.12	583.86	584.17	--	--	--	--
7	584.36	583.84	584.50	584.02	--	584.10	583.85	584.10	--	--	--	--
8	584.23	583.83	584.61	584.01	584.34	584.08	583.84	584.07	--	--	--	--
9	584.16	583.81	584.58	584.00	584.33	584.06	583.83	584.03	--	--	--	--
10	584.14	583.78	584.56	584.00	584.29	584.04	583.82	583.98	--	--	--	--
11	584.09	583.77	584.50	584.00	584.26	584.02	584.01	584.02	--	--	--	--
12	584.06	583.76	584.39	584.00	584.23	584.00	584.08	584.19	--	--	--	--
13	584.03	583.74	584.39	584.01	584.19	584.00	584.02	584.07	--	--	--	--
14	584.01	583.72	584.34	584.08	584.17	584.02	584.34	584.00	--	--	--	--
15	583.98	583.72	584.27	584.25	584.15	584.06	584.54	583.94	--	--	--	--
16	583.96	583.72	584.26	584.24	584.13	584.02	584.51	583.90	--	--	--	--
17	583.94	583.71	584.27	584.19	584.09	583.99	584.46	583.87	--	--	--	--
18	583.93	584.01	584.29	584.17	584.05	583.99	584.41	584.44	--	--	--	--
19	583.91	584.17	584.26	584.16	584.03	584.03	584.36	584.93	--	--	--	--
20	583.88	584.15	584.23	584.14	584.00	583.98	584.30	584.86	--	--	--	--
21	583.86	584.13	584.20	--	584.00	583.97	584.25	584.79	--	--	--	--
22	583.82	584.08	584.18	--	584.02	583.96	584.45	584.82	--	--	--	--
23	583.81	584.13	584.17	--	584.02	583.95	584.63	584.72	--	--	--	--
24	583.87	584.09	584.17	--	583.99	583.95	584.50	584.63	--	--	--	--
25	584.16	584.05	584.16	--	583.98	583.99	584.41	584.63	--	--	--	--
26	584.26	584.66	584.13	--	583.97	583.96	584.34	584.71	--	--	--	--
27	584.19	584.74	584.11	--	583.97	583.94	584.29	584.53	--	--	--	--
28	584.12	584.71	584.09	--	584.13	583.93	584.24	584.36	--	--	--	--
29	584.05	584.66	584.09	--	--	583.92	584.20	584.22	--	--	--	--
30	584.02	584.59	584.11	--	--	583.91	584.15	584.18	--	--	--	--
31	583.99	--	584.11	--	--	583.90	--	584.26	--	--	--	--
MEAN	584.08	584.03	584.32	--	--	584.04	584.17	584.31	--	--	--	--
MAXIMUM	584.62	584.74	584.62	--	--	584.43	584.63	584.93	--	--	--	--
MINIMUM	583.69	583.71	584.09	--	--	583.90	583.82	583.87	--	--	--	--

Table 14. Ground-water levels in well C5, May 15, 1986, through June 29, 1988--Continued

	Mean water levels in feet above sea level, water year October 1987 through September 1988											
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	--	--	--	--	--	--	584.71	584.31	583.64	--	--	--
2	--	--	--	--	--	--	584.72	584.28	583.60	--	--	--
3	--	--	--	--	--	--	584.81	584.26	583.57	--	--	--
4	--	--	--	--	--	--	584.83	584.23	583.53	--	--	--
5	--	--	--	--	--	--	584.78	584.21	583.48	--	--	--
6	--	--	--	--	--	--	585.12	584.18	583.42	--	--	--
7	--	--	--	--	--	--	585.13	584.16	583.36	--	--	--
8	--	--	--	--	--	--	585.09	584.16	583.33	--	--	--
9	--	--	--	--	--	--	585.04	584.22	583.31	--	--	--
10	--	--	--	--	--	--	584.99	584.16	583.27	--	--	--
11	--	--	--	--	--	--	584.92	584.12	583.23	--	--	--
12	--	--	--	--	--	--	584.85	584.11	583.18	--	--	--
13	--	--	--	--	--	--	584.80	584.09	583.12	--	--	--
14	--	--	--	--	--	--	584.74	584.06	583.08	--	--	--
15	--	--	--	--	--	--	584.67	584.04	583.04	--	--	--
16	--	--	--	--	--	--	584.62	584.01	583.01	--	--	--
17	--	--	585.17	--	--	--	584.59	584.00	582.98	--	--	--
18	--	--	585.16	--	--	--	584.56	583.97	582.95	--	--	--
19	--	--	585.23	--	--	--	584.51	583.93	582.90	--	--	--
20	--	--	585.48	--	--	--	584.48	583.90	582.96	--	--	--
21	--	--	585.49	--	--	--	584.46	583.87	583.13	--	--	--
22	--	--	585.49	--	--	--	584.43	583.84	583.03	--	--	--
23	--	--	585.50	--	--	--	584.46	584.05	582.94	--	--	--
24	--	--	585.51	--	--	--	584.41	584.43	582.86	--	--	--
25	--	--	585.50	--	--	--	584.38	584.27	582.81	--	--	--
26	--	--	585.49	--	--	--	584.37	584.18	582.74	--	--	--
27	--	--	585.49	--	--	--	584.46	584.07	582.73	--	--	--
28	--	--	--	--	--	--	584.44	583.97	582.72	--	--	--
29	--	--	--	--	--	--	584.37	583.86	582.82	--	--	--
30	--	--	--	--	--	--	584.33	583.76	--	--	--	--
31	--	--	--	--	--	584.73	--	583.69	--	--	--	--
MEAN	--	--	--	--	--	--	584.67	584.08	--	--	--	--
MAXIMUM	--	--	--	--	--	--	585.13	584.43	--	--	--	--
MINIMUM	--	--	--	--	--	--	584.33	583.69	--	--	--	--

Environmental Quality Information

Phase I Groundwater Data

Soil Quality Data Collected for IDEM

Phase II Quality Assurance Project Plan

Phase II Groundwater and Surface Water Quality Data and Associated Data Validation

Spring (Seep) Quality Data

Sewer Sample Results and Comparison to Nearby Spring (Seep) and Nearby Groundwater Quality

Phase III Quality Assurance Project Plan

Phase III Unsaturated Soil and Groundwater Quality Data

Phase III Supplemental Groundwater Quality Data (Pumping Test Data)

U.S.G.S. Groundwater Quality Data

Property Transfer Study—Conoco Area

Constituent Distribution Diagrams

Phase I Groundwater Data

(excerpts from Phase I Groundwater Assessment Report [CH2M HILL 1990])

Table 4-6
COMPOUNDS DETECTED
MARCH 2, 1983
GROUNDWATER QUALITY DATA

Compounds Detected	U.S. EPA Analytical Results Concentration (ug/l) MW-1 (Northwest)	MW-2/DUP (Northeast)	MW-3 (South)	Blank	DuPont Analytical Results Concentration (ug/l) MW-1 (Northwest)	MW-2 (Northeast)	MW-3 (South)	Blank
Organics--Volatile Fraction								
Benzene						LT		
Methylene Chloride				10	LT	15	14	LT
Tetrachloroethylene							LT	
Toluene				5		14	LT	LT
1,2-Trans-Dichloroethylene						LT		
Trichloroethylene						LT		
Trichlorofluoromethane					19	12	47	49
Organics--Acid Fraction								
Pentachlorophenol	160	180/160	42			1,320[b]		
Phenolics, Total					LT	51	LT	LT
Phenols						LT		
Organics--Base/Neutral Fraction								
Bis(2-ethylhexyl)phthalate		/53[e]						
Butyl benzyl phthalate	LT							
Di-n-butyl phthalate					LT	LT		LT
Di-n-octyl phthalate	100	/LT[e]	23[e]					
Diethyl phthalate		/LT[e]						
Dimethyl phthalate		/LT[e]						
Inorganics								
[illegible]inum	1,200[a]	1,200/4,400[a]	2,600[a]		NA			NA
[illegible]nic	90[a]	110/110[a]	330[a]		16[a]	14[a]	56[a]	
Barium	200		700		NA	NA	NA	NA
Boron	180	195/200	200		NA	NA	NA	NA
Cadmium	11[a]	2/3	10					
Chromium							LT	
Cobalt					NA	NA	NA	NA
Iron	13,900[a]	67,100/74,000[a]	16,700[a]		NA	NA	NA	NA
Lead			350					
Manganese	1,150	350/510	1,030		NA	NA	NA	NA
Mercury						LT		
Nickel							LT	LT
Selenium							43	
Silver							LT	
Zinc	190	110/170	3,890		60	80	2,800	
Cyanide	NA	NA/NA	NA		<5	8	<5	<5

Notes:

--Blank indicates not detected
NA--Indicates not analyzed
LT--Indicates detected but at levels less than the method detection limit

[a]Exceeds the MCL
[b]Exceeds the RMCL
[c]Method detection limit concentration exceeds the 1 x 10^{-6} excess lifetime cancer risk concentration
[d]advisory
[e]Suspected field contaminant
[f]Trace levels of these constituents are commonly found in PVC monitoring wells at these concentrations
[g]Identified in blank, suspected laboratory contaminant

[illegible]78/20

Soil Quality Data Collected for IDEM

- Letter to IDEM regarding vegetation damage and sampling
- Letter of acknowledgment from IDEM
- Analytical data
- Sample locations

Soil Quality Data Collected for IDEM

DuPont collected two soil samples (ECH-Swamp and ECH-Treel) along the southern boundary of the site in the wet area south of the chrome outfall in 1989 (see attached correspondence between IDEM and DuPont and the analytical results). The sample locations are near or within the 100-year floodplain for the Grand Calumet River. The samples were analyzed for metals, other inorganic compounds, organic compounds, PCBs, pesticides, insecticides, and herbicides.

Concentrations of detected constituents for each location were similar. Lead, nickel, cadmium, chromium, vanadium, and zinc were present at concentrations similar to the upper range concentrations observed in the groundwater for these constituents. Arochlor 1242 (9,000 to 11,000 µg/kg) and hexazinone (0.19 to 0.34 µg/kg) were detected in both samples. Hexazinone was produced at the facility in the AgChem and insecticides areas. According to plant information, some demolition materials from the AgChem area were disposed of in this area (104(e) response).

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
EAST CHICAGO, INDIANA 46312

CHEMICALS AND PIGMENTS DEPARTMENT

bcc: R. M. Salemi, B-12252-A, Wilm.
N. Bell, B-12254, Wilmington
E. F. Hartstein, E. Chgo. (2)
J. N. Orban, E. Chgo.
File

8/30

cc: M. P. Kuss, IDEM, Indpls.,IN
M. Mikulka, EPA Region 5, Chicago, IL.

July 24, 1989

Robert Bunner
IDEM
Office of Enforcement
105 S. Meridian
Indianapolis, IN 46225

Dear Robert:

SUBJECT: Vegetation Damage

Per our telephone discussion we are sending this response with preliminary findings and our proposed course of action.

In 1987 an abandoned outfall was filled in with brick and concrete rubble. This outfall had existed before the time of NPDES permitting and was abandoned many years ago as a result of outfall consolidation on the site. The vegetation on the edges of the outfall grew normally through the spring and early summer of 1988. We noticed wilting of some cottonwood and poplar trees late in the summer of 1988 and attributed this to the stress placed on the trees by the severe heat and drought and the fact that we had covered some of the root structure with the fill material.

The trees did not recover in the 1989 growing season, although there was substantial growth of other vegetation on and around the trees. The vegetation damage is very localized along the edge of the filled area.

We have agreed to take two soil samples one of which will be taken along the river bank at a site selected by Mike Kuss. The other will be taken nearby, adjacent to some of the affected trees. Both samples will be run for a complete Appendix IX scan. In addition we will analyze these for several herbicides and other products which were once produced on this site. It is expected that analysis of the samples will take a minimum of 6 to 8 weeks. We will keep you informed on progress and the results of these tests.

The damaged trees will be cut down and the healthy trees will be tagged. The area will be observed through the remainder of this season and monitored during the spring of 1990. We feel that, given the current growth of new vegetation in the area, whatever damaged the trees is not a persistent situation

If you have any questions concerning this matter or the course of action outlined please feel free to contact me.

Yours truly,

C. F. Hatt for OJM

O. J. Meyer
Environmental Coordinator
(219) 391-4653

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

105 South Mendian Street
P.O. Box 6015
Indianapolis 46206-6015
Telephone 317-232-8603

September 7, 1989

Mr. O. J. Meyer, Environmental Coordinator
E.I. Dupont de Nemours and Company, Inc.
5215 Kennedy Avenue
East Chicago, Indiana 46312

Re: Vegetation Damage

Dear Mr. Meyer:

Thank you for responding to our inquiry regarding the dead vegetation at your facility. Gathering soil samples along the river bank and analyzing them for a complete Appendix IX scan and other products which were once produced on-site is appropriate. We appreciate Duponts' willingness to address our concerns in this manner.

While discussing the matter with Dupont personnel on the telephone, my staff inquired as to Dupont's past disposal practices of products once produced on-site. As we understood the response, the disposal practices over the past twenty or so years have been in adherence to environmental laws. However, prior to that time, on-site disposal had occurred.

Our office is responsible for the surface and subsurface waters of the State. I believe we would be remiss in our duties if we did not request more information about the subject of buried products.

Therefore, we are requesting that Dupont advise us of past disposal practices of products that were once produced on-site and the measures taken by Dupont to ensure that no threat to the environment exists from the buried products.

Should you have any questions, please call Robert Bunner, II, at AC 317/232-8409.

Very truly yours,

Stephen A. Wolfe, Chief
Enforcement Section
Office of Water Management

An Equal Opportunity Employer

FILE

MARCH 5, 1990

TO: SKIP BUNNER
IDEM

FROM: O J MEYER
DUPONT

SUBJECT: SOIL SAMPLE ANALYSIS

location of samples ? → approx. on attached aerial

12

ATTACHED ARE THE ANALYSIS OF THE SOIL SAMPLES TAKEN AT THE LOCATIONS DIRECTED BY THE IDEM. WE HAVE HAD THESE ANALIZED AND PRESENT THIS TO YOU AS RAW DATA.

OUR ASSESSMENT OF THE ANALYSES IS THAT IT IS ESSENTIALLY THE SAME AS THE ANALYSIS OF THE RIVER BOTTOM AS INDICATED IN THE STUDY OF GRAND CALUMET WASTEWATER ALLOCATION STUDY PERFORMED BY HYDROQUAL IN SEPTEMBER, 1984. THERE ARE 2 CONSTITUENTS WHICH ARE HIGHER, AS WE EXPECTED, NAMELY HEXAZINONE AND ZINC.

I AM GIVING YOU THIS DATA TO CLOSE THE LOOP ON THE QUESTION OF "SOIL SAMPLES". AT THIS POINT I FEEL THAT THE SOIL SAMPLE QUESTION IS A MOOT POINT.

SINCERELY,

OJ Meyer

O J MEYER

COHOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECR-SWAMP
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
2,4,5-T	< 25000	UG/KG	METHOD 8150	04-OCT-89		
2,4,5-TP (SILVEX)	< 25000	UG/KG	METHOD 8150	04-OCT-89		
2,4-D	< 25000	UG/KG	METHOD 8150	04-OCT-89		
SILVER	3.1	MG/KG	METHOD 6010			
ARSENIC	76	MG/KG	METHOD 7060			
BARIUM	< 3	MG/KG	METHOD 6010			
BERYLLIUM BY ICP	1.6	MG/KG	METHOD 6010			
CADMIUM	380	MG/KG	METHOD 6010			
TOTAL CYANIDE	1.6	MG/KG	METHOD 9010			
COBALT	< 2	MG/KG	METHOD 6010			
CHROMIUM	430	MG/KG	METHOD 6010			
COPPER BY ICP	330	MG/KG	METHOD 6010			
4,4 -DDD	< 2100	UG/KG		03-OCT-89		
4,4 -DDE	< 2100	UG/KG		03-OCT-89		
4,4 -DDT	< 2100	UG/KG		03-OCT-89		
ALDRIN	< 1100	UG/KG		03-OCT-89		
ALPHA-BHC	< 1100	UG/KG		03-OCT-89		
BETA-BHC	< 1100	UG/KG		03-OCT-89		
CHLORDANE	< 11000	UG/KG		03-OCT-89		
DELTA-BHC	< 1100	UG/KG		03-OCT-89		
DIELDRIN	< 2100	UG/KG		03-OCT-89		
ENDOSULFAN I	< 1100	UG/KG		03-OCT-89		
ENDOSULFAN II	< 2100	UG/KG		03-OCT-89		
ENDOSULFAN SULFATE	< 2100	UG/KG		03-OCT-89		
ENDRIN	< 2100	UG/KG		03-OCT-89		
ENDRIN ALDEHYDE	< 2100	UG/KG		03-OCT-89		
GAMMA-BHC (LINDANE)	< 1100	UG/KG		03-OCT-89		
HEPTACHLOR	< 1100	UG/KG		03-OCT-89		
HEPTACHLOR EPOXIDE	< 1100	UG/KG		03-OCT-89		
METHOXYCHLOR	< 11000	UG/KG		03-OCT-89		
PCB-1016	< 11000	UG/KG		03-OCT-89		
PCB-1221	< 11000	UG/KG		03-OCT-89		
PCB-1232	< 11000	UG/KG		03-OCT-89		
PCB-1242	11000	UG/KG		03-OCT-89		
PCB-1248	< 11000	UG/KG		03-OCT-89		
PCB-1254	< 11000	UG/KG		03-OCT-89		
PCB-1260	< 11000	UG/KG		03-OCT-89		
TOXAPHENE	< 21000	UG/KG		03-OCT-89		
1,2,4,5-TETRACHLOROBENZENE	< 180	MG/KG	METHOD 8270	04-OCT-89		
1,2,4-TRICHLOROBENZENE	< 86	MG/KG	METHOD 8270	04-OCT-89		
1,2-DIBROMO-3-CHLOROPROPANE	< 440	MG/KG	METHOD 8270	04-OCT-89		
1,2-DICHLOROBENZENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
1,3,5-TRINITROBENZENE	< 440	MG/KG	METHOD 8270	04-OCT-89		
1,3-DICHLOROBENZENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
1,3-DINITROBENZENE	< 180	MG/KG	METHOD 8270	04-OCT-89		
1,4-BENZENEDIAMINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
1,4-DICHLOROBENZENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
1,4-NAPHTHOQUINONE	< 1800	MG/KG	METHOD 8270	04-OCT-89		
1-NAPHTHYLAMINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
2,3,4,6-TETRACHLOROPHENOL	< 180	MG/KG	METHOD 8270	04-OCT-89		
2,4,5-TRICHLOROPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
2,4,6-TRICHLOROPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
2,4-DICHLOROPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
2,4-DIMETHYLPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
2,4-DINITROPHENOL	< 440	MG/KG	METHOD 8270	04-OCT-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-SWAMP
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
2,4-DINITROTOLUENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
2,6-DICHLOROPHENOL	< 440	MG/KG	METHOD 8270	04-OCT-89		
2,6-DINITROTOLUENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
2-ACETYLAMINOFLUORENE	< 180	MG/KG	METHOD 8270	04-OCT-89		
2-CHLORONAPHTHALENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
2-CHLOROPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
2-METHYL BENZENAMINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
2-METHYL PYRIDINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
2-METHYLNAPHTHALENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
2-METHYLPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
2-NAPHTHYLAMINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
2-NITROANILINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
2-NITROPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
3,3 -DICHLOROBENZIDINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
3,3-DIMETHYLBENZIDINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
3-METHYLCHOLANTHRENE	< 180	MG/KG	METHOD 8270	04-OCT-89		
3-METHYLPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
3-NITROANILINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
4,6-DINITRO-O-CRESOL	< 440	MG/KG	METHOD 8270	04-OCT-89		
4-AMINOBIPHENYL	< 180	MG/KG	METHOD 8270	04-OCT-89		
4-BROMOPHENYL-PHENYLETHER	< 88	MG/KG	METHOD 8270	04-OCT-89		
4-CHLORO-3-METHYLPHENOL	< 180	MG/KG	METHOD 8270	04-OCT-89		
4-CHLOROANILINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
4-CHLOROPHENYL-PHENYLETHER	< 88	MG/KG	METHOD 8270	04-OCT-89		
4-METHYLPHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
4-NITROANILINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
4-NITROPHENOL	< 440	MG/KG	METHOD 8270	04-OCT-89		
-NITROQUINOLINE 1-OXIDE	< 440	MG/KG	METHOD 8270	04-OCT-89		
5-NITRO-O-TOLUIDINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
7,12-DIMETHYLBENZ[A]ANTHRACENE	< 180	MG/KG	METHOD 8270	04-OCT-89		
A,A-DIMETHYLPHENETHYLAMINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
ACENAPHTHENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
ACENAPHTHYLENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
ACETOPHENONE	< 440	MG/KG	METHOD 8270	04-OCT-89		
ANILINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
ANTHRACENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
ARAMITE	< 880	MG/KG	METHOD 8270	04-OCT-89		
BENZO(A)ANTHRACENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
BENZO(A)PYRENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
BENZO(B)FLUORANTHENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
BENZO(G,H,I)PERYLENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
BENZO(K)FLUORANTHENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
BENZYL ALCOHOL	< 180	MG/KG	METHOD 8270	04-OCT-89		
BIS(2-CHLOROETHOXY)METHANE	< 88	MG/KG	METHOD 8270	04-OCT-89		
BIS(2-CHLOROETHYL)ETHER	< 88	MG/KG	METHOD 8270	04-OCT-89		
BIS(2-CHLOROISOPROPYL)ETHER	< 88	MG/KG	METHOD 8270	04-OCT-89		
BIS(2-ETHYLHEXYL)PHTHALATE	< 88	MG/KG	METHOD 8270	04-OCT-89		
BUTYLBENZYLPHTHALATE	< 88	MG/KG	METHOD 8270	04-OCT-89		
CHLORBENZILATE	< 440	MG/KG	METHOD 8270	04-OCT-89		
CHRYSENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
DI-N-BUTYL PHTHALATE	< 88	MG/KG	METHOD 8270	04-OCT-89		
DI-N-OCTYLPHTHALATE	< 88	MG/KG	METHOD 8270	04-OCT-89		
DIALATE	< 180	MG/KG	METHOD 8270	04-OCT-89		
DIBENZO(A,H)ANTHRACENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
DIBENZOFURAN	< 88	MG/KG	METHOD 8270	04-OCT-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-SWAMP
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
DIETHYLPHTHALATE	< 88	MG/KG	METHOD 8270	04-OCT-89		
DIMETHOATE	< 440	MG/KG	METHOD 8270	04-OCT-89		
DIMETHYLNITROSAMINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
DIMETHYLPHTHALATE	< 88	MG/KG	METHOD 8270	04-OCT-89		
DINOSEB	< 440	MG/KG	METHOD 8270	04-OCT-89		
DIPHENYLAMINE ✓	< 88	MG/KG	METHOD 8270	04-OCT-89		
DISULFOTONE	< 440	MG/KG	METHOD 8270	04-OCT-89		
ETHYL METHACRYLATE	< 440	MG/KG	METHOD 8270	04-OCT-89		
ETHYL METHANESULFONATE	< 440	MG/KG	METHOD 8270	04-OCT-89		
FAMPHUR	< 440	MG/KG	METHOD 8270	04-OCT-89		
FLUORANTHENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
FLUORENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROBENZENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROBUTADIENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROCYCLOPENTADIENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROETHANE	< 88	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROPHENE	< 1800	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROPROPENE	< 880	MG/KG	METHOD 8270	04-OCT-89		
INDENO(1,2,3-CD)PYRENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
ISODRIN	< 180	MG/KG	METHOD 8270	04-OCT-89		
ISOPHORONE	< 88	MG/KG	METHOD 8270	04-OCT-89		
ISOSAFROLE	< 180	MG/KG	METHOD 8270	04-OCT-89		
KEPONE	< 440	MG/KG	METHOD 8270	04-OCT-89		
METHAPYRILENE ✓	< 1800	MG/KG	METHOD 8270	04-OCT-89		
METHYL METHANESULFONATE ✓	< 440	MG/KG	METHOD 8270	04-OCT-89		
METHYL PARATHION	< 180	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSO-DI-N-PROPYLAMINE	< 88	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSODI-N-BUTYLAMINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSODIETHYLAMINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSODIPHENYLAMINE (1)	< 88	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSOMETHYLETHYLAMINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSOMORPHOLINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSOPIPERIDINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSOPYRROLIDINE	< 440	MG/KG	METHOD 8270	04-OCT-89		
NAPHTHALENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
NITROBENZENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
O,O,O-TRIETHYLPHOSPHOROTHIOATE	< 180	MG/KG	METHOD 8270	04-OCT-89		
P-(DIMETHYLAMINO)AZOBENZENE	< 440	MG/KG	METHOD 8270	04-OCT-89		
PARATHION	< 180	MG/KG	METHOD 8270	04-OCT-89		
PENTACHLOROBENZENE	< 180	MG/KG	METHOD 8270	04-OCT-89		
PENTACHLOROETHANE	< 180	MG/KG	METHOD 8270	04-OCT-89		
PENTACHLORONITROBENZENE	< 180	MG/KG	METHOD 8270	04-OCT-89		
PENTACHLOROPHENOL	< 440	MG/KG	METHOD 8270	04-OCT-89		
PHENACETIN	< 180	MG/KG	METHOD 8270	04-OCT-89		
PHENANTHRENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
PHENOL	< 88	MG/KG	METHOD 8270	04-OCT-89		
PHORATE	< 440	MG/KG	METHOD 8270	04-OCT-89		
PRONAMIDE	< 180	MG/KG	METHOD 8270	04-OCT-89		
PYRENE	< 88	MG/KG	METHOD 8270	04-OCT-89		
PYRIDINE	< 180	MG/KG	METHOD 8270	04-OCT-89		
SAFROLE	< 180	MG/KG	METHOD 8270	04-OCT-89		
SULFOTEPP	< 180	MG/KG	METHOD 8270	04-OCT-89		
THIONAZIN	< 180	MG/KG	METHOD 8270	04-OCT-89		
SULFIDE	4.0	MG/KG	METHOD 375.4			
HEXABINONE	0.19	UG/G	SPECIAL	29-SEP-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-SWAMP
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
MERCURY	0.81	MG/KG	METHOD 7470			
NICKEL BY ICP	21.0	MG/KG	METHOD 6010			
LEAD -FURNACE	7300	MG/KG	METHOD 7420			
PHENOLIC	0.011	MG/L	METH-9065	31-AUG-89		
ANTIMONY - FURNACE	34	MG/KG	METHOD 7040			
SELENIUM	1.3	MG/KG	METHOD 7740			
TIN BY FLAME	200	MG/KG	METHOD 7870			
THALLIUM - FURNACE	0.5	MG/KG	METHOD 7841			
1,1,1,2-TETRACHLOROETHANE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
1,1,1-TRICHLOROETHANE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
1,1,2,2-TETRACHLOROETHANE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
1,1,2-TRICHLOROETHANE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
1,1-DICHLOROETHANE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
1,1-DICHLOROETHYLENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
1,2,3-TRICHLOROPROPANE	< 16	UG/KG	METHOD 8240	02-OCT-89		
1,2-DICHLOROETHANE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
1,2-DICHLOROPROPANE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
1,2-TRANS-DICHLOROETHYLENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
1,4-DIOXANE	< 3900	UG/KG	METHOD 8240	02-OCT-89		
2-CHLORO-1,3-BUTADIENE	< 16	UG/KG	METHOD 8240	02-OCT-89		
2-HEXANONE	< 39	UG/KG	METHOD 8240	02-OCT-89		
ACETONE	< 78	UG/KG	METHOD 8240	02-OCT-89		
ACETONITRILE	< 3900	UG/KG	METHOD 8240	02-OCT-89		
ACROLEIN	< 390	UG/KG	METHOD 8240	02-OCT-89		
ACRYLONITRILE	< 390	UG/KG	METHOD 8240	02-OCT-89		
ALLYL CHLORIDE	< 16	UG/KG	METHOD 8240	02-OCT-89		
BENZENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
BROMODICHLOROMETHANE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
BROMOFORM	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
CARBON DISULFIDE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
CARBON TETRACHLORIDE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
CHLOROBENZENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
CHLORODIBROMOMETHANE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
CHLOROETHANE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
CHLOROFORM	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
CIS-1,3-DICHLOROPROPENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
DIBROMOMETHANE	< 16	UG/KG	METHOD 8240	02-OCT-89		
DICHLORODIFLUOROMETHANE	< 78	UG/KG	METHOD 8240	02-OCT-89		
ETHYL CYANIDE	< 78	UG/KG	METHOD 8240	02-OCT-89		
ETHYLBENZENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
ETHYLENE DIBROMIDE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
ISOBUTYL ALCOHOL	< 3900	UG/KG	METHOD 8240	02-OCT-89		
METHACRYLONITRILE	< 16	UG/KG	METHOD 8240	02-OCT-89		
METHYL BROMIDE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
METHYL CHLORIDE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
METHYL ETHYL KETONE	< 78	UG/KG	METHOD 8240	02-OCT-89		
METHYL IODIDE	< 16	UG/KG	METHOD 8240	02-OCT-89		
METHYL ISOBUTYL KETONE	< 39	UG/KG	METHOD 8240	02-OCT-89		
METHYL METHACRYLATE	< 16	UG/KG	METHOD 8240	02-OCT-89		
METHYLENE CHLORIDE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
STYRENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
TETRACHLOROETHYLENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
TOLUENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
TRANS-1,3-DICHLOROPROPENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
TRANS-1,4-DICHLORO-2-BUTENE	< 16	UG/KG	METHOD 8240	02-OCT-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-SWAMP
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
TRICHLOROETHYLENE	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
TRICHLOROFLUOROMETHANE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
VINYL ACETATE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
VINYL CHLORIDE	< 7.8	UG/KG	METHOD 8240	02-OCT-89		
XYLENES, TOTAL	< 3.9	UG/KG	METHOD 8240	02-OCT-89		
VANADIUM BY ICP	13.0	MG/KG	METHOD 6010			
ZINC BY ICP	32000	MG/KG	METHOD 6010			

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-TREEL
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
2,4,5-T	< 25000	UG/KG	METHOD 8150	04-OCT-89		
2,4,5-TP (SILVEX)	< 25000	UG/KG	METHOD 8150	04-OCT-89		
2,4-D	< 25000	UG/KG	METHOD 8150	04-OCT-89		
SILVER	2.8	MG/KG	METHOD 6010			
ARSENIC	60	MG/KG	METHOD 7060			
BARIUM	< 3	MG/KG	METHOD 6010			
BERYLLIUM BY ICP	1.0	MG/KG	METHOD 6010			
CADMIUM	250	MG/KG	METHOD 6010			
TOTAL CYANIDE	2.3	MG/KG	METHOD 9010			
COBALT	5.5	MG/KG	METHOD 6010			
CHROMIUM	210	MG/KG	METHOD 6010			
COPPER BY ICP	410	MG/KG	METHOD 6010			
4,4 -DDD	< 1700	UG/KG		03-OCT-89		
4,4 -DDE	< 1700	UG/KG		03-OCT-89		
4,4 -DDT	< 1700	UG/KG		03-OCT-89		
ALDRIN	< 850	UG/KG		03-OCT-89		
ALPHA-BHC	< 850	UG/KG		03-OCT-89		
BETA-BHC	< 850	UG/KG		03-OCT-89		
CHLORDANE	< 8500	UG/KG		03-OCT-89		
DELTA-BHC	< 850	UG/KG		03-OCT-89		
DIELDRIN	< 1700	UG/KG		03-OCT-89		
ENDOSULFAN I	< 850	UG/KG		03-OCT-89		
ENDOSULFAN II	< 1700	UG/KG		03-OCT-89		
ENDOSULFAN SULFATE	< 1700	UG/KG		03-OCT-89		
ENDRIN	< 1700	UG/KG		03-OCT-89		
ENDRIN ALDEHYDE	< 1700	UG/KG		03-OCT-89		
GAMMA-BHC (LINDANE)	< 850	UG/KG		03-OCT-89		
HEPTACHLOR	< 850	UG/KG		03-OCT-89		
HEPTACHLOR EPOXIDE	< 850	UG/KG		03-OCT-89		
METHOXYCHLOR	< 8500	UG/KG		03-OCT-89		
PCB-1016	< 8500	UG/KG		03-OCT-89		
PCB-1221	< 8500	UG/KG		03-OCT-89		
PCB-1232	< 8500	UG/KG		03-OCT-89		
PCB-1242	9000	UG/KG		03-OCT-89		
PCB-1248	< 8500	UG/KG		03-OCT-89		
PCB-1254	< 8500	UG/KG		03-OCT-89		
PCB-1260	< 8500	UG/KG		03-OCT-89		
TOXAPHENE	< 17000	UG/KG		03-OCT-89		
1,2,4,5-TETRACHLOROBENZENE	< 66	MG/KG	METHOD 8270	04-OCT-89		
1,2,4-TRICHLOROBENZENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
1,2-DIBROMO-3-CHLOROPROPANE	< 170	MG/KG	METHOD 8270	04-OCT-89		
1,2-DICHLOROBENZENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
1,3,5-TRINITROBENZENE	< 170	MG/KG	METHOD 8270	04-OCT-89		
1,3-DICHLOROBENZENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
1,3-DINITROBENZENE	< 66	MG/KG	METHOD 8270	04-OCT-89		
1,4-BENZENEDIAMINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
1,4-DICHLOROBENZENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
1,4-NAPHTHOQUINONE	< 660	MG/KG	METHOD 8270	04-OCT-89		
1-NAPHTHYLAMINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
2,3,4,6-TETRACHLOROPHENOL	< 66	MG/KG	METHOD 8270	04-OCT-89		
2,4,5-TRICHLOROPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
2,4,6-TRICHLOROPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
2,4-DICHLOROPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
2,4-DIMETHYLPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
2,4-DINITROPHENOL	< 170	MG/KG	METHOD 8270	04-OCT-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-TREEL
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
2,4-DINITROTOLUENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
2,6-DICHLOROPHENOL	< 170	MG/KG	METHOD 8270	04-OCT-89		
2,6-DINITROTOLUENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
2-ACETYLAMINOFLUORENE	< 66	MG/KG	METHOD 8270	04-OCT-89		
2-CHLORONAPHTHALENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
2-CHLOROPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
2-METHYL BENZENAMINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
2-METHYL PYRIDINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
2-METHYLNAPHTHALENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
2-METHYLPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
2-NAPHTHYLAMINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
2-NITROANILINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
2-NITROPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
3,3 -DICHLOROBENZIDINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
3,3-DIMETHYLBENZIDINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
3-METHYLCHOLANTHRENE	< 66	MG/KG	METHOD 8270	04-OCT-89		
3-METHYLPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
3-NITROANILINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
4,6-DINITRO-O-CRESOL	< 170	MG/KG	METHOD 8270	04-OCT-89		
4-AMINOBIPHENYL	< 66	MG/KG	METHOD 8270	04-OCT-89		
4-BROMOPHENYL-PHENYLETHER	< 33	MG/KG	METHOD 8270	04-OCT-89		
4-CHLORO-3-METHYLPHENOL	< 66	MG/KG	METHOD 8270	04-OCT-89		
4-CHLOROANILINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
4-CHLOROPHENYL-PHENYLETHER	< 33	MG/KG	METHOD 8270	04-OCT-89		
4-METHYLPHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
4-NITROANILINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
4-NITROPHENOL	< 170	MG/KG	METHOD 8270	04-OCT-89		
6-NITROQUINOLINE 1-OXIDE	< 170	MG/KG	METHOD 8270	04-OCT-89		
5-NITRO-O-TOLUIDINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
7,12-DIMETHYLBENZ[A]ANTHRACENE	< 66	MG/KG	METHOD 8270	04-OCT-89		
A,A-DIMETHYLPHENETHYLAMINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
ACENAPHTHENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
ACENAPHTHYLENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
ACETOPHENONE	< 170	MG/KG	METHOD 8270	04-OCT-89		
ANILINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
ANTHRACENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
ARAMITE	< 330	MG/KG	METHOD 8270	04-OCT-89		
BENZO(A)ANTHRACENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
BENZO(A)PYRENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
BENZO(B)FLUORANTHENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
BENZO(G,H,I)PERYLENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
BENZO(K)FLUORANTHENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
BENZYL ALCOHOL	< 66	MG/KG	METHOD 8270	04-OCT-89		
BIS(2-CHLOROETHOXY)METHANE	< 33	MG/KG	METHOD 8270	04-OCT-89		
BIS(2-CHLOROETHYL)ETHER	< 33	MG/KG	METHOD 8270	04-OCT-89		
BIS(2-CHLOROISOPROPYL)ETHER	< 33	MG/KG	METHOD 8270	04-OCT-89		
BIS(2-ETHYLHEXYL)PHTHALATE	< 33	MG/KG	METHOD 8270	04-OCT-89		
BUTYLBENZYLPHTHALATE	< 33	MG/KG	METHOD 8270	04-OCT-89		
CHLORBENZILATE	< 170	MG/KG	METHOD 8270	04-OCT-89		
CHRYSENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
DI-N-BUTYL PHTHALATE	< 33	MG/KG	METHOD 8270	04-OCT-89		
DI-N-OCTYLPHTHALATE	< 33	MG/KG	METHOD 8270	04-OCT-89		
DIALATE	< 66	MG/KG	METHOD 8270	04-OCT-89		
DIBENZO(A,H)ANTHRACENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
DIBENZOFURAN	< 33	MG/KG	METHOD 8270	04-OCT-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-TREEL
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
DIETHYLPHTHALATE	< 33	MG/KG	METHOD 8270	04-OCT-89		
DIMETHOATE	< 170	MG/KG	METHOD 8270	04-OCT-89		
DIMETHYLNITROSAMINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
DIMETHYLPHTHALATE	< 33	MG/KG	METHOD 8270	04-OCT-89		
DINOSEB	< 170	MG/KG	METHOD 8270	04-OCT-89		
DIPHENYLAMINE	< 33	MG/KG	METHOD 8270	04-OCT-89		
DISULFOTONE	< 170	MG/KG	METHOD 8270	04-OCT-89		
ETHYL METHACRYLATE	< 170	MG/KG	METHOD 8270	04-OCT-89		
ETHYL METHANESULFONATE	< 170	MG/KG	METHOD 8270	04-OCT-89		
FAMPHUR	< 170	MG/KG	METHOD 8270	04-OCT-89		
FLUORANTHENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
FLUORENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROBENZENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROBUTADIENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROCYCLOPENTADIENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROETHANE	< 33	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROPHENE	< 660	MG/KG	METHOD 8270	04-OCT-89		
HEXACHLOROPROPENE	< 330	MG/KG	METHOD 8270	04-OCT-89		
INDENO(1,2,3-CD)PYRENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
ISODRIN	< 66	MG/KG	METHOD 8270	04-OCT-89		
ISOPHORONE	< 33	MG/KG	METHOD 8270	04-OCT-89		
ISOSAFROLE	< 66	MG/KG	METHOD 8270	04-OCT-89		
KEPONE	< 170	MG/KG	METHOD 8270	04-OCT-89		
METHAPYRILENE	< 660	MG/KG	METHOD 8270	04-OCT-89		
METHYL METHANESULFONATE	< 170	MG/KG	METHOD 8270	04-OCT-89		
METHYL PARATHION	< 66	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSO-DI-N-PROPYLAMINE	< 33	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSODI-N-BUTYLAMINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSODIETHYLAMINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSODIPHENYLAMINE (1)	< 33	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSOMETHYLETHYLAMINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSOMORPHOLINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSOPIPERIDINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
N-NITROSOPYRROLIDINE	< 170	MG/KG	METHOD 8270	04-OCT-89		
NAPHTHALENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
NITROBENZENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
O,O,O-TRIETHYLPHOSPHOROTHIOATE	< 66	MG/KG	METHOD 8270	04-OCT-89		
P-(DIMETHYLAMINO)AZOBENZENE	< 170	MG/KG	METHOD 8270	04-OCT-89		
PARATHION	< 66	MG/KG	METHOD 8270	04-OCT-89		
PENTACHLOROBENZENE	< 66	MG/KG	METHOD 8270	04-OCT-89		
PENTACHLOROETHANE	< 66	MG/KG	METHOD 8270	04-OCT-89		
PENTACHLORONITROBENZENE	< 66	MG/KG	METHOD 8270	04-OCT-89		
PENTACHLOROPHENOL	< 170	MG/KG	METHOD 8270	04-OCT-89		
PHENACETIN	< 66	MG/KG	METHOD 8270	04-OCT-89		
PHENANTHRENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
PHENOL	< 33	MG/KG	METHOD 8270	04-OCT-89		
PHORATE	< 170	MG/KG	METHOD 8270	04-OCT-89		
PRONAMIDE	< 66	MG/KG	METHOD 8270	04-OCT-89		
PYRENE	< 33	MG/KG	METHOD 8270	04-OCT-89		
PYRIDINE	< 66	MG/KG	METHOD 8270	04-OCT-89		
SAFROLE	< 66	MG/KG	METHOD 8270	04-OCT-89		
SULFOTEPP	< 66	MG/KG	METHOD 8270	04-OCT-89		
THIONAZIN	< 66	MG/KG	METHOD 8270	04-OCT-89		
SULFIDE	8.0	MG/KG	METHOD 375.4			
HEXAZINONE	0.34	UG/G	SPECIAL	29-SEP-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-TREEL
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
MERCURY	1.3	MG/KG	METHOD 7470			
NICKEL BY ICP	30.0	MG/KG	METHOD 6010			
LEAD -FURNACE	5500	MG/KG	METHOD 7420			
ANTIMONY - FURNACE	14	MG/KG	METHOD 7040			
SELENIUM	1.1	MG/KG	METHOD 7740			
TIN BY FLAME	< 100	MG/KG	METHOD 7870			
THALLIUM - FURNACE	0.3	MG/KG	METHOD 7841			
TOC	< 1	MG/L	METH-415.1	11-SEP-89		
1,1,1,2-TETRACHLOROETHANE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
1,1,1-TRICHLOROETHANE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
1,1,2,2-TETRACHLOROETHANE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
1,1,2-TRICHLOROETHANE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
1,1-DICHLOROETHANE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
1,1-DICHLOROETHYLENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
1,2,3-TRICHLOROPROPANE	< 16	UG/KG	METHOD 8240	02-OCT-89		
1,2-DICHLOROETHANE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
1,2-DICHLOROPROPANE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
1,2-TRANS-DICHLOROETHYLENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
1,4-DIOXANE	< 4100	UG/KG	METHOD 8240	02-OCT-89		
2-CHLORO-1,3-BUTADIENE	< 16	UG/KG	METHOD 8240	02-OCT-89		
2-HEXANONE	< 41	UG/KG	METHOD 8240	02-OCT-89		
ACETONE	< 82	UG/KG	METHOD 8240	02-OCT-89		
ACETONITRILE	< 4100	UG/KG	METHOD 8240	02-OCT-89		
ACROLEIN	< 410	UG/KG	METHOD 8240	02-OCT-89		
ACRYLONITRILE	< 410	UG/KG	METHOD 8240	02-OCT-89		
ALLYL CHLORIDE	< 16	UG/KG	METHOD 8240	02-OCT-89		
BENZENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
BROMODICHLOROMETHANE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
BROMOFORM	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
CARBON DISULFIDE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
CARBON TETRACHLORIDE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
CHLOROBENZENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
CHLORODIBROMOMETHANE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
CHLOROETHANE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
CHLOROFORM	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
CIS-1,3-DICHLOROPROPENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
DIBROMOMETHANE	< 16	UG/KG	METHOD 8240	02-OCT-89		
DICHLORODIFLUOROMETHANE	< 82	UG/KG	METHOD 8240	02-OCT-89		
ETHYL CYANIDE	< 82	UG/KG	METHOD 8240	02-OCT-89		
ETHYLBENZENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
ETHYLENE DIBROMIDE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
ISOBUTYL ALCOHOL	< 4100	UG/KG	METHOD 8240	02-OCT-89		
METHACRYLONITRILE	< 16	UG/KG	METHOD 8240	02-OCT-89		
METHYL BROMIDE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
METHYL CHLORIDE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
METHYL ETHYL KETONE	< 82	UG/KG	METHOD 8240	02-OCT-89		
METHYL IODIDE	< 16	UG/KG	METHOD 8240	02-OCT-89		
METHYL ISOBUTYL KETONE	< 41	UG/KG	METHOD 8240	02-OCT-89		
METHYL METHACRYLATE	< 16	UG/KG	METHOD 8240	02-OCT-89		
METHYLENE CHLORIDE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
STYRENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
TETRACHLOROETHYLENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
TOLUENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
TRANS-1,3-DICHLOROPROPENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
TRANS-1,4-DICHLORO-2-BUTENE	< 16	UG/KG	METHOD 8240	02-OCT-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-TREEL
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
TRICHLOROETHYLENE	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
TRICHLOROFLUOROMETHANE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
VINYL ACETATE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
VINYL CHLORIDE	< 8.2	UG/KG	METHOD 8240	02-OCT-89		
XYLENES, TOTAL	< 4.1	UG/KG	METHOD 8240	02-OCT-89		
VANADIUM BY ICP	15.0	MG/KG	METHOD 6010			
ZINC BY ICP	14000	MG/KG	METHOD 6010			

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-FBLK
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
2,4,5-T	< 50	UG/L	METHOD 8150	04-OCT-89		
2,4,5-TP (SILVEX)	< 50	UG/L	METHOD 8150	04-OCT-89		
2,4-D	< 50	UG/L	METHOD 8150	04-OCT-89		
SILVER	< 0.01	MG/L	METHOD 6010			
ARSENIC	0.008	MG/L	METOHD 7060			
BARIUM	< 0.03	MG/L	METHOD 6010			
BERYLLIUM BY ICP	< 0.001	MG/L	METHOD 6010			
CADMIUM	< 0.01	MG/L	METHOD 6010			
TOTAL CYANIDE	< 0.01	MG/L	METHOD 9010			
COBALT	< 0.02	MG/L	METHOD 6010			
CHROMIUM	< 0.01	MG/L	METHOD 6010			
COPPER BY ICP	0.19	MG/L	METHOD 6010			
4,4 -DDD	< 2.0	UG/L		03-OCT-89		
4,4 -DDE	< 2.0	UG/L		03-OCT-89		
4,4 -DDT	< 2.0	UG/L		03-OCT-89		
ALDRIN	< 1.0	UG/L		03-OCT-89		
ALPHA-BHC	< 1.0	UG/L		03-OCT-89		
BETA-BHC	< 1.0	UG/L		03-OCT-89		
CHLORDANE	< 10	UG/L		03-OCT-89		
DELTA-BHC	< 1.0	UG/L		03-OCT-89		
DIELDRIN	< 2.0	UG/L		03-OCT-89		
ENDOSULFAN I	< 1.0	UG/L		03-OCT-89		
ENDOSULFAN II	< 2.0	UG/L		03-OCT-89		
ENDOSULFAN SULFATE	< 2.0	UG/L		03-OCT-89		
ENDRIN	< 2.0	UG/L		03-OCT-89		
ENDRIN ALDEHYDE	< 2.0	UG/L		03-OCT-89		
GAMMA-BHC (LINDANE)	< 1.0	UG/L		03-OCT-89		
HEPTACHLOR	< 1.0	UG/L		03-OCT-89		
HEPTACHLOR EPOXIDE	< 1.0	UG/L		03-OCT-89		
METHOXYCHLOR	< 10	UG/L		03-OCT-89		
PCB-1016	< 10	UG/L		03-OCT-89		
PCB-1221	< 10	UG/L		03-OCT-89		
PCB-1232	< 10	UG/L		03-OCT-89		
PCB-1242	< 10	UG/L		03-OCT-89		
PCB-1248	< 10	UG/L		03-OCT-89		
PCB-1254	< 10	UG/L		03-OCT-89		
PCB-1260	< 10	UG/L		03-OCT-89		
TOXAPHENE	< 20	UG/L		03-OCT-89		
1,2,4,5-TETRACHLOROBENZENE	< 40	UG/L	METHOD 8270	04-OCT-89		
1,2,4-TRICHLOROBENZENE	< 20	UG/L	METHOD 8270	04-OCT-89		
1,2-DIBROMO-3-CHLOROPROPANE	< 100	UG/L	METHOD 8270	04-OCT-89		
1,2-DICHLOROBENZENE	< 20	UG/L	METHOD 8270	04-OCT-89		
1,3,5-TRINITROBENZENE	< 100	UG/L	METHOD 8270	04-OCT-89		
1,3-DICHLOROBENZENE	< 20	UG/L	METHOD 8270	04-OCT-89		
1,3-DINITROBENZENE	< 40	UG/L	METHOD 8270	04-OCT-89		
1,4-BENZENEDIAMINE	< 100	UG/L	METHOD 8270	04-OCT-89		
1,4-DICHLOROBENZENE	< 20	UG/L	METHOD 8270	04-OCT-89		
1,4-NAPHTHOQUINONE	< 400	UG/L	METHOD 8270	04-OCT-89		
1-NAPHTHYLAMINE	< 100	UG/L	METHOD 8270	04-OCT-89		
2,3,4,6-TETRACHLOROPHENOL	< 40	UG/L	METHOD 8270	04-OCT-89		
2,4,5-TRICHLOROPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
2,4,6-TRICHLOROPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
2,4-DICHLOROPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
2,4-DIMETHYLPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
2,4-DINITROPHENOL	< 100	UG/L	METHOD 8270	04-OCT-89		

COHOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-FBLK
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
2,4-DINITROTOLUENE	< 20	UG/L	METHOD 8270	04-OCT-89		
2,6-DICHLOROPHENOL	< 100	UG/L	METHOD 8270	04-OCT-89		
2,6-DINITROTOLUENE	< 20	UG/L	METHOD 8270	04-OCT-89		
2-ACETYLAMINOFLUORENE	< 40	UG/L	METHOD 8270	04-OCT-89		
2-CHLORONAPHTHALENE	< 20	UG/L	METHOD 8270	04-OCT-89		
2-CHLOROPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
2-METHYL BENZENAMINE	< 40	UG/L	METHOD 8270	04-OCT-89		
2-METHYL PYRIDINE	< 100	UG/L	METHOD 8270	04-OCT-89		
2-METHYLNAPHTHALENE	< 20	UG/L	METHOD 8270	04-OCT-89		
2-METHYLPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
2-NAPHTHYLAMINE	< 100	UG/L	METHOD 8270	04-OCT-89		
2-NITROANILINE	< 100	UG/L	METHOD 8270	04-OCT-89		
2-NITROPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
3,3 -DICHLOROBENZIDINE	< 40	UG/L	METHOD 8270	04-OCT-89		
3,3-DIMETHYLBENZIDINE	< 40	UG/L	METHOD 8270	04-OCT-89		
3-METHYLCHOLANTHRENE	< 40	UG/L	METHOD 8270	04-OCT-89		
3-METHYLPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
3-NITROANILINE	< 100	UG/L	METHOD 8270	04-OCT-89		
4,6-DINITRO-O-CRESOL	< 100	UG/L	METHOD 8270	04-OCT-89		
4-AMINOBIPHENYL	< 40	UG/L	METHOD 8270	04-OCT-89		
4-BROMOPHENYL-PHENYLETHER	< 20	UG/L	METHOD 8270	04-OCT-89		
4-CHLORO-3-METHYLPHENOL	< 40	UG/L	METHOD 8270	04-OCT-89		
4-CHLOROANILINE	< 40	UG/L	METHOD 8270	04-OCT-89		
4-CHLOROPHENYL-PHENYLETHER	< 20	UG/L	METHOD 8270	04-OCT-89		
4-METHYLPHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
4-NITROANILINE	< 100	UG/L	METHOD 8270	04-OCT-89		
4-NITROPHENOL	< 100	UG/L	METHOD 8270	04-OCT-89		
-NITROQUINOLINE 1-OXIDE	< 100	UG/L	METHOD 8270	04-OCT-89		
5-NITRO-O-TOLUIDINE	< 40	UG/L	METHOD 8270	04-OCT-89		
7,12-DIMETHYLBENZ[A]ANTHRACENE	< 40	UG/L	METHOD 8270	04-OCT-89		
A,A-DIMETHYLPHENETHYLAMINE	< 100	UG/L	METHOD 8270	04-OCT-89		
ACENAPHTHENE	< 20	UG/L	METHOD 8270	04-OCT-89		
ACENAPHTHYLENE	< 20	UG/L	METHOD 8270	04-OCT-89		
ACETOPHENONE	< 100	UG/L	METHOD 8270	04-OCT-89		
ANILINE	< 100	UG/L	METHOD 8270	04-OCT-89		
ANTHRACENE	< 20	UG/L	METHOD 8270	04-OCT-89		
ARAMITE	< 200	UG/L	METHOD 8270	04-OCT-89		
BENZO(A)ANTHRACENE	< 20	UG/L	METHOD 8270	04-OCT-89		
BENZO(A)PYRENE	< 20	UG/L	METHOD 8270	04-OCT-89		
BENZO(B)FLUORANTHENE	< 20	UG/L	METHOD 8270	04-OCT-89		
BENZO(G,H,I)PERYLENE	< 20	UG/L	METHOD 8270	04-OCT-89		
BENZO(K)FLUORANTHENE	< 20	UG/L	METHOD 8270	04-OCT-89		
BENZYL ALCOHOL	< 40	UG/L	METHOD 8270	04-OCT-89		
BIS(2-CHLOROETHOXY)METHANE	< 20	UG/L	METHOD 8270	04-OCT-89		
BIS(2-CHLOROETHYL)ETHER	< 20	UG/L	METHOD 8270	04-OCT-89		
BIS(2-CHLOROISOPROPYL)ETHER	< 20	UG/L	METHOD 8270	04-OCT-89		
BIS(2-ETHYLHEXYL)PHTHALATE	< 20	UG/L	METHOD 8270	04-OCT-89		
BUTYLBENZYLPHTHALATE	< 20	UG/L	METHOD 8270	04-OCT-89		
CHLORBENZILATE	< 100	UG/L	METHOD 8270	04-OCT-89		
CHRYSENE	< 20	UG/L	METHOD 8270	04-OCT-89		
DI-N-BUTYL PHTHALATE	< 20	UG/L	METHOD 8270	04-OCT-89		
DI-N-OCTYLPHTHALATE	< 20	UG/L	METHOD 8270	04-OCT-89		
DIALATE	< 40	UG/L	METHOD 8270	04-OCT-89		
DIBENZO(A,H)ANTHRACENE	< 20	UG/L	METHOD 8270	04-OCT-89		
DIBENZOFURAN	< 20	UG/L	METHOD 8270	04-OCT-89		

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-FBLK
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
DIETHYLPHTHALATE	< 20	UG/L	METHOD 8270	04-OCT-89		
DIMETHOATE	< 100	UG/L	METHOD 8270	04-OCT-89		
DIMETHYLNITROSAMINE	< 100	UG/L	METHOD 8270	04-OCT-89		
DIMETHYLPHTHALATE	< 20	UG/L	METHOD 8270	04-OCT-89		
DINOSEB	< 100	UG/L	METHOD 8270	04-OCT-89		
DIPHENYLAMINE	< 20	UG/L	METHOD 8270	04-OCT-89		
DISULFOTONE	< 100	UG/L	METHOD 8270	04-OCT-89		
ETHYL METHACRYLATE	< 100	UG/L	METHOD 8270	04-OCT-89		
ETHYL METHANESULFONATE	< 100	UG/L	METHOD 8270	04-OCT-89		
FAMPHUR	< 100	UG/L	METHOD 8270	04-OCT-89		
FLUORANTHENE	< 20	UG/L	METHOD 8270	04-OCT-89		
FLUORENE	< 20	UG/L	METHOD 8270	04-OCT-89		
HEXACHLOROBENZENE	< 20	UG/L	METHOD 8270	04-OCT-89		
HEXACHLOROBUTADIENE	< 20	UG/L	METHOD 8270	04-OCT-89		
HEXACHLOROCYCLOPENTADIENE	< 20	UG/L	METHOD 8270	04-OCT-89		
HEXACHLOROETHANE	< 20	UG/L	METHOD 8270	04-OCT-89		
HEXACHLOROPHENE	< 400	UG/L	METHOD 8270	04-OCT-89		
HEXACHLOROPROPENE	< 200	UG/L	METHOD 8270	04-OCT-89		
INDENO(1,2,3-CD)PYRENE	< 20	UG/L	METHOD 8270	04-OCT-89		
ISODRIN	< 40	UG/L	METHOD 8270	04-OCT-89		
ISOPHORONE	< 20	UG/L	METHOD 8270	04-OCT-89		
ISOSAFROLE	< 40	UG/L	METHOD 8270	04-OCT-89		
KEPONE	< 100	UG/L	METHOD 8270	04-OCT-89		
METHAPYRILENE	< 400	UG/L	METHOD 8270	04-OCT-89		
METHYL METHANESULFONATE	< 100	UG/L	METHOD 8270	04-OCT-89		
METHYL PARATHION	< 40	UG/L	METHOD 8270	04-OCT-89		
N-NITROSO-DI-N-PROPYLAMINE	< 20	UG/L	METHOD 8270	04-OCT-89		
N-NITROSODI-N-BUTYLAMINE	< 40	UG/L	METHOD 8270	04-OCT-89		
N-NITROSODIETHYLAMINE	< 100	UG/L	METHOD 8270	04-OCT-89		
N-NITROSODIPHENYLAMINE (1)	< 20	UG/L	METHOD 8270	04-OCT-89		
N-NITROSOMETHYLETHYLAMINE	< 100	UG/L	METHOD 8270	04-OCT-89		
N-NITROSOMORPHOLINE	< 40	UG/L	METHOD 8270	04-OCT-89		
N-NITROSOPIPERIDINE	< 40	UG/L	METHOD 8270	04-OCT-89		
N-NITROSOPYRROLIDINE	< 100	UG/L	METHOD 8270	04-OCT-89		
NAPHTHALENE	< 20	UG/L	METHOD 8270	04-OCT-89		
NITROBENZENE	< 20	UG/L	METHOD 8270	04-OCT-89		
O,O,O-TRIETHYLPHOSPHOROTHIOATE	< 40	UG/L	METHOD 8270	04-OCT-89		
P-(DIMETHYLAMINO)AZOBENZENE	< 100	UG/L	METHOD 8270	04-OCT-89		
PARATHION	< 40	UG/L	METHOD 8270	04-OCT-89		
PENTACHLOROBENZENE	< 40	UG/L	METHOD 8270	04-OCT-89		
PENTACHLOROETHANE	< 40	UG/L	METHOD 8270	04-OCT-89		
PENTACHLORONITROBENZENE	< 40	UG/L	METHOD 8270	04-OCT-89		
PENTACHLOROPHENOL	< 100	UG/L	METHOD 8270	04-OCT-89		
PHENACETIN	< 40	UG/L	METHOD 8270	04-OCT-89		
PHENANTHRENE	< 20	UG/L	METHOD 8270	04-OCT-89		
PHENOL	< 20	UG/L	METHOD 8270	04-OCT-89		
PHORATE	< 100	UG/L	METHOD 8270	04-OCT-89		
PRONAMIDE	< 40	UG/L	METHOD 8270	04-OCT-89		
PYRENE	< 20	UG/L	METHOD 8270	04-OCT-89		
PYRIDINE	< 40	UG/L	METHOD 8270	04-OCT-89		
SAFROLE	< 40	UG/L	METHOD 8270	04-OCT-89		
SULFOTEPP	< 40	UG/L	METHOD 8270	04-OCT-89		
THIONAZIN	< 40	UG/L	METHOD 8270	04-OCT-89		
SULFIDE	< 0.1	MG/L	METHOD 375.4			
MERCURY	< 0.0002	MG/L	METHOD 7470			

CONOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-FBLK
DATE : 15-SEP-89

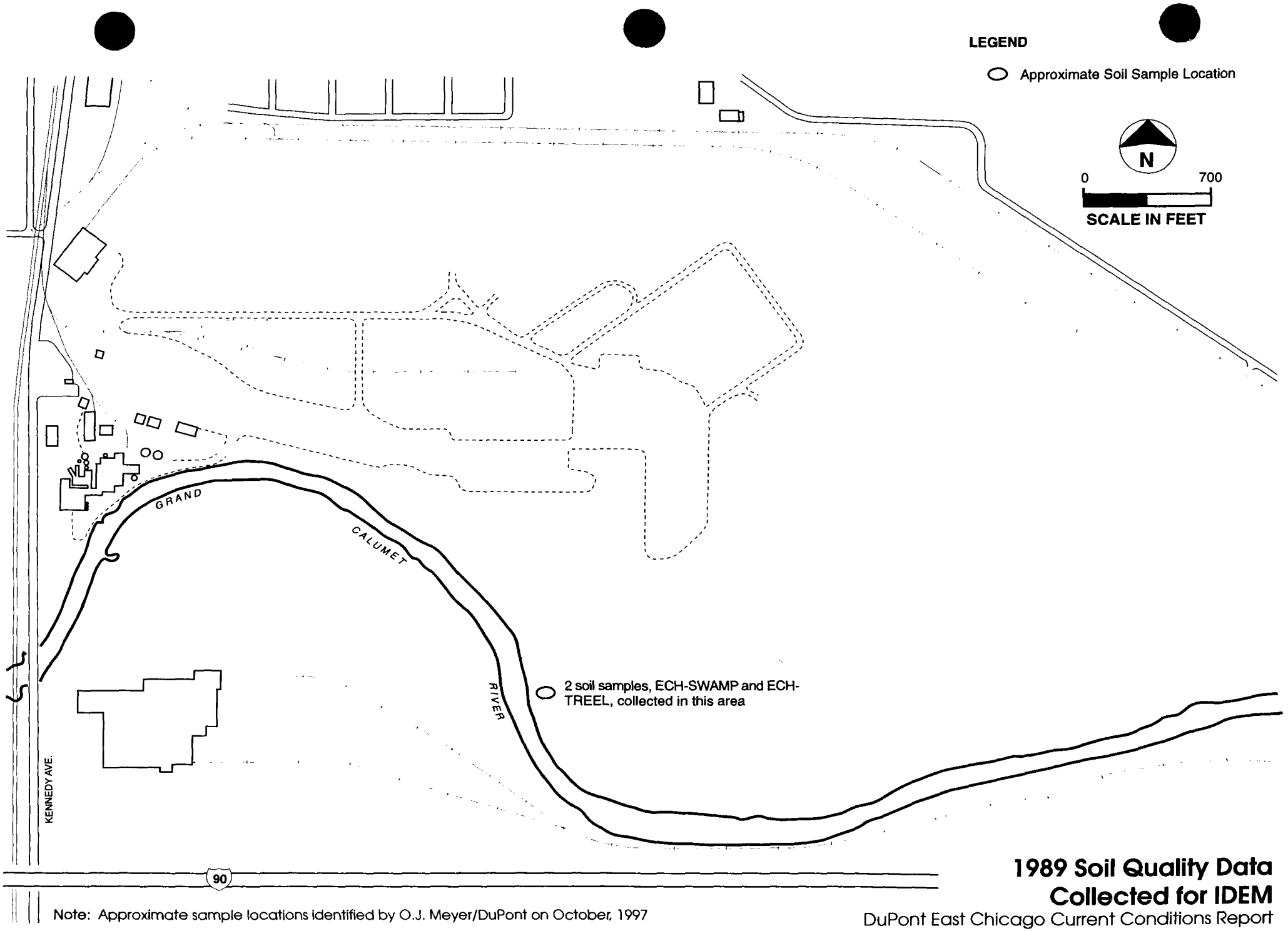
PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
NICKEL BY ICP	< 0.03	MG/L	METHOD 6010			
LEAD -FURNACE	0.007	MG/L	METHOD 7420			
ANTIMONY - FURNACE	< 0.003	MG/L	METHOD 7040			
SELENIUM	< 0.005	MG/L	METHOD 7740			
TIN BY FLAME	< 1	MG/L	METHOD 7870			
THALLIUM - FURNACE	< 0.001	MG/L	METHOD 7841			
1,1,1,2-TETRACHLOROETHANE	< 10	UG/L	METHOD 8240	29-SEP-89		
1,1,1-TRICHLOROETHANE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
1,1,2,2-TETRACHLOROETHANE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
1,1,2-TRICHLOROETHANE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
1,1-DICHLOROETHANE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
1,1-DICHLOROETHYLENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
1,2,3-TRICHLOROPROPANE	< 20	UG/L	METHOD 8240	29-SEP-89		
1,2-DICHLOROETHANE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
1,2-DICHLOROPROPANE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
1,2-TRANS-DICHLOROETHYLENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
1,4-DIOXANE	< 5000	UG/L	METHOD 8240	29-SEP-89		
2-CHLORO-1,3-BUTADIENE	< 20	UG/L	METHOD 8240	29-SEP-89		
2-HEXANONE	< 50	UG/L	METHOD 8240	29-SEP-89		
ACETONE	< 100	UG/L	METHOD 8240	29-SEP-89		
ACETONITRILE	< 5000	UG/L	METHOD 8240	29-SEP-89		
ACROLEIN	< 500	UG/L	METHOD 8240	29-SEP-89		
ACRYLONITRILE	< 500	UG/L	METHOD 8240	29-SEP-89		
ALLYL CHLORIDE	< 20	UG/L	METHOD 8240	29-SEP-89		
BENZENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
BROMODICHLOROMETHANE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
BROMOFORM	< 5.0	UG/L	METHOD 8240	29-SEP-89		
CARBON DISULFIDE	< 10	UG/L	METHOD 8240	29-SEP-89		
CARBON TETRACHLORIDE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
CHLOROBENZENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
CHLORODIBROMOMETHANE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
CHLOROETHANE	< 10	UG/L	METHOD 8240	29-SEP-89		
CHLOROFORM	< 5.0	UG/L	METHOD 8240	29-SEP-89		
CIS-1,3-DICHLOROPROPENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
DIBROMOMETHANE	< 20	UG/L	METHOD 8240	29-SEP-89		
DICHLORODIFLUOROMETHANE	< 100	UG/L	METHOD 8240	29-SEP-89		
ETHYL CYANIDE	< 100	UG/L	METHOD 8240	29-SEP-89		
ETHYLBENZENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
ETHYLENE DIBROMIDE	< 10	UG/L	METHOD 8240	29-SEP-89		
ISOBUTYL ALCOHOL	< 5000	UG/L	METHOD 8240	29-SEP-89		
METHACRYLONITRILE	< 20	UG/L	METHOD 8240	29-SEP-89		
METHYL BROMIDE	< 10	UG/L	METHOD 8240	29-SEP-89		
METHYL CHLORIDE	< 10	UG/L	METHOD 8240	29-SEP-89		
METHYL ETHYL KETONE	< 100	UG/L	METHOD 8240	29-SEP-89		
METHYL IODIDE	< 20	UG/L	METHOD 8240	29-SEP-89		
METHYL ISOBUTYL KETONE	< 50	UG/L	METHOD 8240	29-SEP-89		
METHYL METHACRYLATE	< 20	UG/L	METHOD 8240	29-SEP-89		
METHYLENE CHLORIDE	< 10	UG/L	METHOD 8240	29-SEP-89		
STYRENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
TETRACHLOROETHYLENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
TOLUENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
TRANS-1,3-DICHLOROPROPENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
TRANS-1,4-DICHLORO-2-BUTENE	< 20	UG/L	METHOD 8240	29-SEP-89		
TRICHLOROETHYLENE	< 5.0	UG/L	METHOD 8240	29-SEP-89		
TRICHLOROFLUOROMETHANE	< 10	UG/L	METHOD 8240	29-SEP-89		

COSOCO ENVIRONMENTAL SERVICES

11/15/89

WELL : ECH-FBLK
DATE : 15-SEP-89

PARAMETER	RESULT	UNIT	METHOD	DATE ANALYZED	PRESERV.	BATCH % RECOVERY
VINYL ACETATE	< 10	UG/L	METHOD 8240	29-SEP-89		
VINYL CHLORIDE	< 10	UG/L	METHOD 8240	29-SEP-89		
XYLENES, TOTAL	< 5.0	UG/L	METHOD 8240	29-SEP-89		
VANADIUM BY ICP	< 0.02	MG/L	METHOD 6010			
ZINC BY ICP	0.03	MG/L	METHOD 6010			



Note: Approximate sample locations identified by O.J. Meyer/DuPont on October, 1997

1989 Soil Quality Data Collected for IDEM

DuPont East Chicago Current Conditions Report

CH2MHILL

Phase II Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN

for

LIMITED INVESTIGATION OF GROUNDWATER AND SURFACE WATER QUALITY

at the DuPont East Chicago Plant

Engineers
Planners
Economists
Scientists

Engineers
Planners
Economists
Scientists

June 4, 1990

CHI28770.A0

Mr. O. J. Meyer
E.I. DuPont de Nemours & Company
Chemicals and Pigments
5215 Kennedy Avenue
East Chicago, Indiana 46312

Dear Mr. Meyer:

Subject: Final QAPP for Groundwater and Surface Water Quality
Limited Investigation
DuPont, East Chicago Facility

Enclosed please find two copies of the Groundwater and Surface Water Limited Investigation QAPP. Additional copies will be available to you upon request. We have incorporated your review comments into this final document. Feel free to call us with any questions you may have.

Sincerely,

CH2M HILL

Cynthia L. W. Cruciani
Assistant Project Manager

ph/GLT976/055.51
Enclosures
cc: E. F. Hartstein/DuPont
Pixie Newman/CHI

QUALITY ASSURANCE PROJECT PLAN

for

LIMITED INVESTIGATION OF GROUNDWATER AND SURFACE WATER QUALITY

at the DuPont East Chicago Plant
East Chicago, Indiana

Prepared for
E.I. DuPont de Nemours and Co., Inc.

Prepared by
CH2M HILL, Inc.

May 1990

APPROVAL SIGNATURES

The undersigned have read and agree with the guidelines and procedures set forth in this document. This Quality Assurance Project Plan (QAPP) will be implemented by the CH2M HILL Project Team as part of the limited investigation and engineering evaluation at the DuPont East Chicago Plant.

PREPARED BY: _____ _____

Cynthia Cruciani — Date
Hydrogeologist, CH2M HILL

APPROVED BY: _____ _____

Pixie A.B. Newman — Date
Project Manager, CH2M HILL

APPROVED BY: _____ _____

O. J. Meyer — Date
Chemicals and Pigments, DuPont

GLT925/036.51

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Appendix A. Standard Operating Procedures for Field Measurements
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Section 1
INTRODUCTION

E.I. DuPont de Nemours and Co., Inc. (DuPont), has made a corporate commitment to assess the quality of groundwater at all of its operating facilities worldwide and to take steps to correct situations where groundwater has either become or threatens to become contaminated as a result of past or present manufacturing and/or waste management practices.

DuPont is taking a phased approach to this endeavor. The first phase of the groundwater assessment involved reviewing plant records to identify past and present manufacturing operations and/or waste management practices which may have caused groundwater contamination. Available data of local and regional geology, groundwater quality, and use were also reviewed. From this review, a list of waste management units (WMUs) was developed. WMUs were evaluated against nine criteria and subsequently assigned a relative risk category. WMUs were prioritized and recommendations were then made for further evaluation.

The Phase I groundwater assessment for the East Chicago Plant was conducted by searching existing plant records and published literature, and interviewing plant personnel. CH2M HILL identified 36 known or suspected WMUs on the plant property. The results are presented in a report dated February 1990.

Because of the high or uncertain mobility of several of the waste constituents, uncertainty regarding WMU locations, sensitivity of the hydraulic setting, and the lack of groundwater monitoring at the site, the majority of the WMUs were assigned to the high or moderate risk category. Because of the risk of contamination from the site, DuPont has decided that a plant-scale groundwater/surface water monitoring program will be implemented. In addition, site-specific monitoring at some of the WMUs will be conducted. This Quality Assurance Project Plan (QAPP) addresses environmental sampling and analytical protocols that will be followed during the course of the work.

PROJECT OBJECTIVES

The objectives of the investigation are:

- Determine whether past waste management practices at the facility have resulted in groundwater contamination that is migrating offsite
- Qualitatively determine whether these chemicals threaten human health and the environment
- Refine understanding of local hydrology and hydrogeology
- Assess potential contribution of groundwater discharge to water quality of the Grand Calumet River

- Determine extent of contamination in close proximity to WMU 2 (Rubble Area) and WMU 24 (Zinc Chloride Milling Area).

BACKGROUND

SITE DESCRIPTION

The East Chicago plant, located in the northwestern corner of Indiana (Figure 1-1) began production in 1893. Over its lifetime, the facility has produced sulfuric acid, zinc chloride, insecticide, chlorofluorocarbon compounds, trisodium phosphate, sodium silicate, colloidal silica, hydrochloric acid, nitric acid, and many other products. Coal, PCBs, and petroleum products have also been used and/or stored at the East Chicago plant. A more detailed description of each of the plant production processes is provided in the Phase I Groundwater Assessment (CH2M HILL, 1990).

Wastes, raw materials, support materials, and products are known or thought to have been buried or stored in approximately 36 WMUs (Figure 1-2). A detailed description of the materials stored or disposed of in the WMUs can be found in the Phase I Groundwater Assessment. Although the raw materials, support materials, and products are not wastes, their presence constitutes a potential for groundwater contamination. Therefore, they are called "wastes" for consistency.

The site is located on the north bank of the Grand Calumet River in the center of the Grand Calumet River/Indiana Harbor Canal drainage basin. Low areas adjacent to the river are frequently flooded (Hartke, et al., 1975). Water quality of the river is poor because of shallow depth and heavy contaminant loadings due to industry.

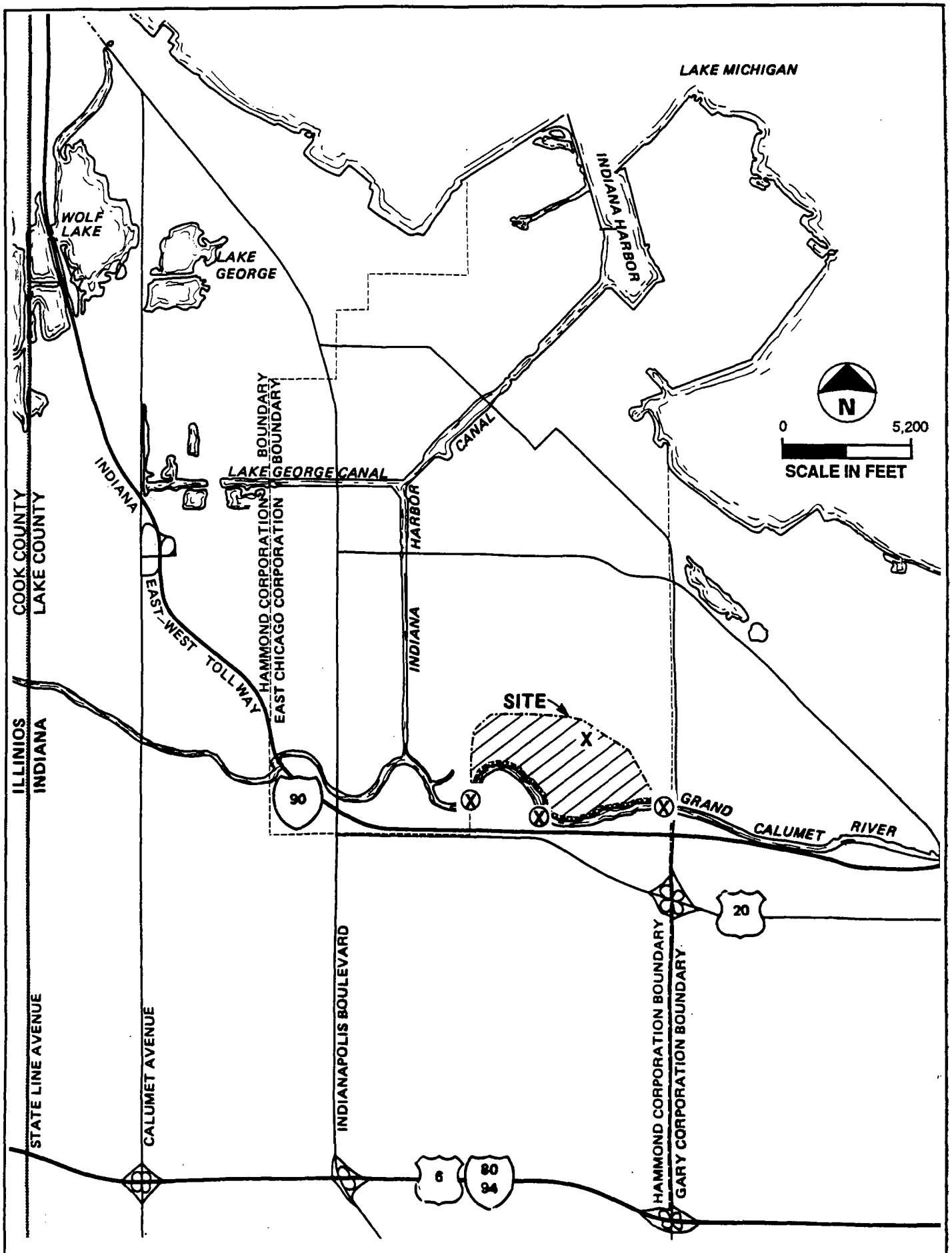
From ground surface the geology at the site consists of:

- Calumet Sand, approximately 40 feet thick
- Clay, approximately 80 feet thick
- Silurian, Ordovician, and Cambrian sedimentary rocks, >1,000 feet thick

The groundwater table occurs from 0 to 8 feet below ground surface at the site. Much of the surface area, particularly the eastern two-fifths of the site, is mature beach dune and swale topography with groundwater near the land surface in the swale areas. The Calumet Sand is the uppermost aquifer at the site and is considered to be important for water supply in the area. From the limited data for the site, the potential groundwater flow direction is from north to south. The discharge area is believed to be the Grand Calumet River. No water supply wells are located between the WMUs and the Grand Calumet River.

PROJECT DESCRIPTION

CH2M HILL will gather additional data necessary to determine whether past waste management practices have resulted in groundwater contamination that has migrated offsite and, if so, whether these chemicals threaten human health and the



X = PROPOSED STAFF GAGE LOCATION

⊗ = PROPOSED STAFF GAGE LOCATIONS AND SURFACE WATER SAMPLING LOCATIONS

FIGURE 1-1
Site Location Map
Du Pont East Chicago QAPP

CH2M HILL

environment. In addition, this study will be used to guide future facility-wide and WMU-specific investigation and possible remediation.

PURPOSE

This Quality Assurance Project Plan (QAPP) details the procedures to be followed over the course of the field investigation and serves as the quality assurance and quality control (QA/QC) outline for the project data. The QAPP is prepared to address analytical work performed by DuPont's designated laboratory and the field work performed by CH2M HILL. The following elements included in this plan are consistent with U.S. EPA guidance.

- Project Description
- Project Organization and Responsibility
- Quality Assurance Objectives for Data Measurement
- Sampling Procedures
- Sample Handling, Documentation, Custody, Shipping
- Calibration Procedures and Maintenance Frequency
- Analytical Procedures
- Data Management and Reporting
- Quality Control Checks
- Performance and System Audits
- Preventative Maintenance
- Data Measurement Assessment Procedures
- Corrective Action
- Quality Assurance Reporting

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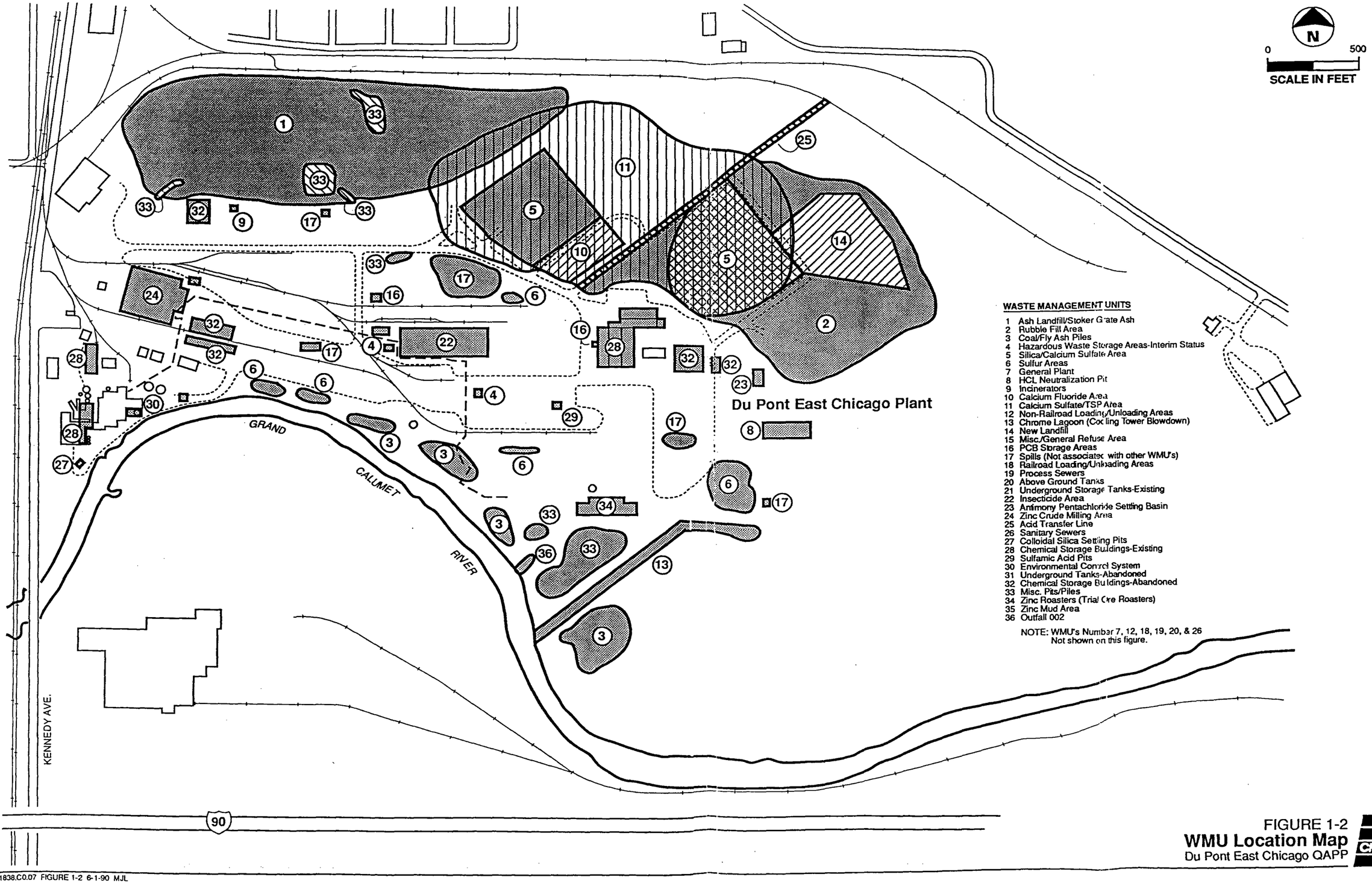

WASTE MANAGEMENT UNITS

1 Ash Landfill/Stoker Grate Ash
2 Rubble Fill Area
3 Coal/Fly Ash Piles
4 Hazardous Waste Storage Areas-Interim Status
5 Silica/Calcium Sulfate Area
6 Sulfur Areas
7 General Plant
8 HCL Neutralization Pit
9 Incinerators
10 Calcium Fluoride Area
11 Calcium Sulfate/TSP Area
12 Non-Railroad Loading/Unloading Areas
13 Chrome Lagoon (Cooling Tower Blowdown)
14 New Landfill
15 Misc./General Refuse Area
16 PCB Storage Areas
17 Spills (Not associated with other WMU's)
18 Railroad Loading/Unloading Areas
19 Process Sewers
20 Above Ground Tanks
21 Underground Storage Tanks-Existing
22 Insecticide Area
23 Antimony Pentachloride Settling Basin
24 Zinc Crude Milling Area
25 Acid Transfer Line
26 Sanitary Sewers
27 Colloidal Silica Settling Pits
28 Chemical Storage Buildings-Existing
29 Sulfamic Acid Pits
30 Environmental Control System
31 Underground Tanks-Abandoned
32 Chemical Storage Buildings-Abandoned
33 Misc. Pits/Piles
34 Zinc Roasters (Trial Ore Roasters)
35 Zinc Mud Area
36 Outfall 002

NOTE: WMU's Number 7, 12, 18, 19, 20, & 26 Not shown on this figure.

FIGURE 1-2
WMU Location Map
Du Pont East Chicago QAPP

GLO21838.C0.07 FIGURE 1-2 6-1-90 MJL

Section 2
PROJECT ORGANIZATION AND RESPONSIBILITY

Pixie Newman is the Project Manager for this project. Ms. Newman is a Senior Hydrogeologist and Project Manager in CH2M HILL's Chicago office. She has more than 7 years experience in designing, implementing, and managing hydrogeologic investigations and groundwater sampling projects. Ms. Newman will serve as the principal point of contact with DuPont and will be responsible for maintaining project quality and controlling the budget and schedule.

The Assistant Project Manager for this project is Cynthia Cruciani. Ms. Cruciani is the Principal Hydrogeologist who will be responsible for preparing the project operations plans and for conducting and coordinating the field effort. Ms. Cruciani has extensive field experience and has written many investigative reports.

The Field Team Leader for the project is Mary Dwyer. As Field Team Leader, Ms. Dwyer will be responsible for coordinating activities with subcontractors and assuring the availability and maintenance of all sampling equipment and materials. She will also supervise the completion of field notebooks.

The Project Consultants will provide technical review of the work performed by the project team to ensure the work's technical quality. The Project Consultant/Senior Review Team were selected based on their experience in projects of this nature and technical expertise in the response technologies likely to be considered. Fox Drilling will provide drilling and related field services. NET Midwest Inc., will provide analytical services.

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Section 3
QUALITY ASSURANCE OBJECTIVES FOR DATA MEASUREMENT

Quality assurance objectives for data measurement are usually expressed in terms of precision, accuracy, completeness, representativeness, and comparability. Definitions and application of these characteristics are presented below. QC measurements to quantify precision, accuracy, and completeness and ensure representativeness and completeness are described in the field sampling and laboratory analysis sections.

PRECISION

Precision is the measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation (measure of the variability of a group of measurements compared to an average value). Various measures of precision exist depending upon the "prescribed similar conditions." The specific criteria of precision for each major measurement parameter are detailed within their individual analytical test methodology. Duplicates will be collected and analyzed for both the onsite and offsite laboratories as a means to assess sampling and analytical reproducibility and as a measure of precision of the data collection activity.

ACCURACY

Accuracy is a measure of the bias in a system. It is the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T, usually expressed as the difference between the two values, (X-T), or the difference as a percentage of the reference or true value, 100 (X-T)/T, and sometimes expressed as a ratio, (X/T). The specific criteria of accuracy for each measurement parameter are detailed within specific laboratory analytical test methods.

Blank samples will provide checks for procedural contamination and ambient conditions at the site, and will be used to assess the accuracy of sample collection and laboratory analyses. One per 10 blanks or 1 blank per daily batch, whichever is more frequent, will be collected for samples being analyzed at both the onsite and offsite laboratories.

COMPLETENESS

Completeness is the measure of the amount of valid data obtained from the collection and measurement system compared with the amount of data expected under normal circumstances. Thus, completeness is defined as the percentage of measurements made that are judged to be valid measurements.

REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variation at a sampling point, or an environmental condition. As part of the routine sampling program, blind replicate samples will be collected and used as a means to assess field representativeness. One replicate sample per 10 will be collected for samples being analyzed at both the onsite and offsite laboratories. By definition, replicate samples should be representative of a given point in space and time.

The objective of representativeness is to assess whether the information obtained during the investigation accurately represents the actual site conditions. The sampling network was designed to provide data representative of site conditions. All field sampling activities will be performed following the standards outlined in Section 4.

COMPARABILITY

Comparability expresses the confidence with which one data set can be compared to another. The samples will be comparable, if the same unit is sampled and analyzed, and if the units of measurement are the same. The use of the standard sampling procedures and recognized field techniques for sampling should make the resulting data comparable to other measurements on similar samples under similar sampling conditions.

FIELD MEASUREMENT QUALITY ASSURANCE

Procedures or operator's manuals used in field measurement, calibration, and maintenance are given in Appendix A. Air monitoring for health and safety will be done using an organic vapor photoionization detector and an explosimeter. In addition, field monitoring to define the magnitude and extent of contamination and provide parameters necessary for remedial design will also be collected. All calibrations, measurements, and maintenance performed on field instruments should be recorded in field notebooks.

The HNu photoionization detector will be calibrated with a standard calibration gas a minimum of once each day. The pH meters will also be calibrated daily with standard solutions as outlined in Appendix A. With calibration, accuracy of the field measurements is checked. Precision is measured by taking replicate measurements of the calibration standards. To achieve completeness, field measurements will be repeated after recalibration or by using another instrument if invalid measurements are obtained. Representativeness and comparability of field measurements is achieved by the use of standard techniques to analyze samples.

LABORATORY ANALYSIS QUALITY ASSURANCE

The general quality assurance objective is to provide data of acceptable and documented quality. Table 3-1 presents the target quantitation limits (MDLs) for VOC analyses per the U.S. EPA's Contract Laboratory Program. These target

Table 3-1
TARGET QUANTITATION LIMITS

	Volatiles	CAS Number	Quantitation Limits[a] Low Soil/Sediment[b] (µg/l)	Water (µg/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	75-00-2	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	75-35-4	5	5
9.	1,1-Dichloroethane	75-34-3	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	78-93-3	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.	1,2-Dichloropropane	78-87-5	5	5
19.	cis-1,3-Dichloropropene	10061-01-5	5	5
20.	Trichloroethene	79-01-6	5	5
21.	Dibromochloromethane	124-48-1	5	5
22.	1,1,2-Trichloroethane	79-00-5	5	5
23.	Benzene	71-43-2	5	5
24.	trans-1,3-Dichloropropene	10061-02-6	5	5
25.	Bromoform	75-25-2	5	5
26.	4-Methyl-2-pentanone	108-10-1	10	10
27.	2-Hexanone	591-78-6	10	10
28.	Tetrachloroethene	127-18-4	5	5
29.	Toluene	108-88-3	5	5
30.	1,1,2,2-Tetrachloroethane	79-34-5	5	5
31.	Chlorobenzene	108-90-7	5	5
32.	Ethylbenzene	100-41-4	5	5
33.	Styrene	100-42-5	5	5
34.	Xylenes (total)	1330-20-7	5	5
35.	Tetrahydrofuran	———	10	10

Note: Specific quantitation limits are highly matrix and sample dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable in all samples.

[a] Quantitation limits listed for soil/sediment are based on wet weight. The quantitation 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 target quantitation limits for Volatile TCL Compounds are 125 times the individual Low Soil/Sediment quantitation limits.

quantitation limits will be used for the DuPont field investigation and engineering evaluation.

Because of the large number of organic parameters and potential matrixes, it is difficult to develop precision and accuracy objectives and control limits for every organic parameter in every matrix. Therefore, it is necessary to extrapolate this information from a more limited set of compounds. This is typically done with 1) surrogate spike compounds that are added to every sample before extraction and analysis, and 2) matrix spike and matrix spike duplicate compounds that are added to selected samples before extraction and analysis. Although the surrogate and matrix spike analyses do not provide statistically valid statements about precision and accuracy for every compound in a sample, they do give the data reviewer enough information to make qualitative judgments about precision and accuracy on a sample-by-sample basis. The recoveries of the surrogate and matrix spike compounds can also be used to accept or reject data. The recoveries of the surrogate are also used as a criterion to reanalyze the sample or series of samples.

The matrix spiked sample analysis is designated to provide information about the effect of the sample matrix on the digestion and measurement methodology. The spike is added before any extraction or sample preparation steps. At least one spiked sample and one duplicate spiked sample analysis will be performed for each batch of samples or for each 20 samples received, whichever is more frequent. The individual component percent recoveries (%R) will be calculated and reported.

Data completeness can be quantified during data assessment. The laboratories are expected to provide data meeting QC acceptance criteria for 90 percent or more of the requested determinations. For completeness, it is expected that the procedures proposed for chemical characterization of the samples collected will provide data meeting QC acceptance criteria for all samples tested.

Representativeness is to assess the degree to which the data represent actual site conditions. Standard sampling techniques and the design of a sampling network were used to provide data representativeness of site conditions. Standard techniques to analyze representative samples are used to provide comparable data. Analytical methods to be used by the laboratory are specified in the laboratory's QAPP (Appendix B).

Analytical data quality and method performance will be monitored by the use of study blanks, laboratory blanks, and matrix spike and matrix spike duplicate analyses. As data are generated, they will be reviewed for compliance with the quality assurance objectives and control charts developed. Data that fall outside of the quality control limits will be investigated and corrective actions taken.

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Section 4
SAMPLING PROCEDURES

CH2M HILL will install groundwater monitoring wells for the collection of groundwater samples and potentiometric surface data. CH2M HILL will conduct sampling of groundwater and surface water to assess the impact of the site on the local environmental quality. Surface water samples will be collected at several points upstream, downstream, and adjacent to the DuPont East Chicago facility. In addition, four staff gages will be installed for the collection of surface water elevations at and near the site to evaluate the interaction of groundwater and surface water and to verify groundwater and surface water flow direction. The approximate locations of the staff gages are shown in Figure 1-1.

HEALTH AND SAFETY REQUIREMENTS

Work at the East Chicago facility will be conducted in accordance with the Health and Safety Plan. Work will be conducted in Level D or C personal health and safety protection.

All necessary health and safety equipment will be readily available at the site at all times and be in conformance with the site Health and Safety Plan. All work will cease whenever health and safety requirements are not followed or if environmental conditions deteriorate to work cessation levels indicated in the site Health and Safety Plan.

PRE-FIELD WORK ACTIVITIES

Before field work begins, the following tasks will be performed:

- The designated lab coordinators will be notified as soon as possible (10 working days) before samples will be collected so the coordinator can secure laboratory space and ship sample containers. (All anticipated samples, including trip blanks, duplicates, replicates, and equipment blanks, will be accounted for).

- The DuPont Project Manager will be notified of the upcoming sampling event at least 2 weeks (10 working days) before field work begins.

- Required equipment and supplies will be assembled 3 working days before the event. Some of the supplies will be purchased on the day of sampling or immediately before.

- All sampling and support equipment will be checked to be sure it is in good working order before going to the field. Equipment will be selected no more than 5 working days before departure.

- Arrangements will be made for Federal Express pickup or the route to the closest Federal Express office will be determined.

- The field work team will be assembled and briefed on the upcoming event. The sampling check list, equipment check list, team responsibilities, and sampling sequence will be reviewed.

UPON ARRIVING AT THE SITE

The following tasks will be performed upon arriving at the site:

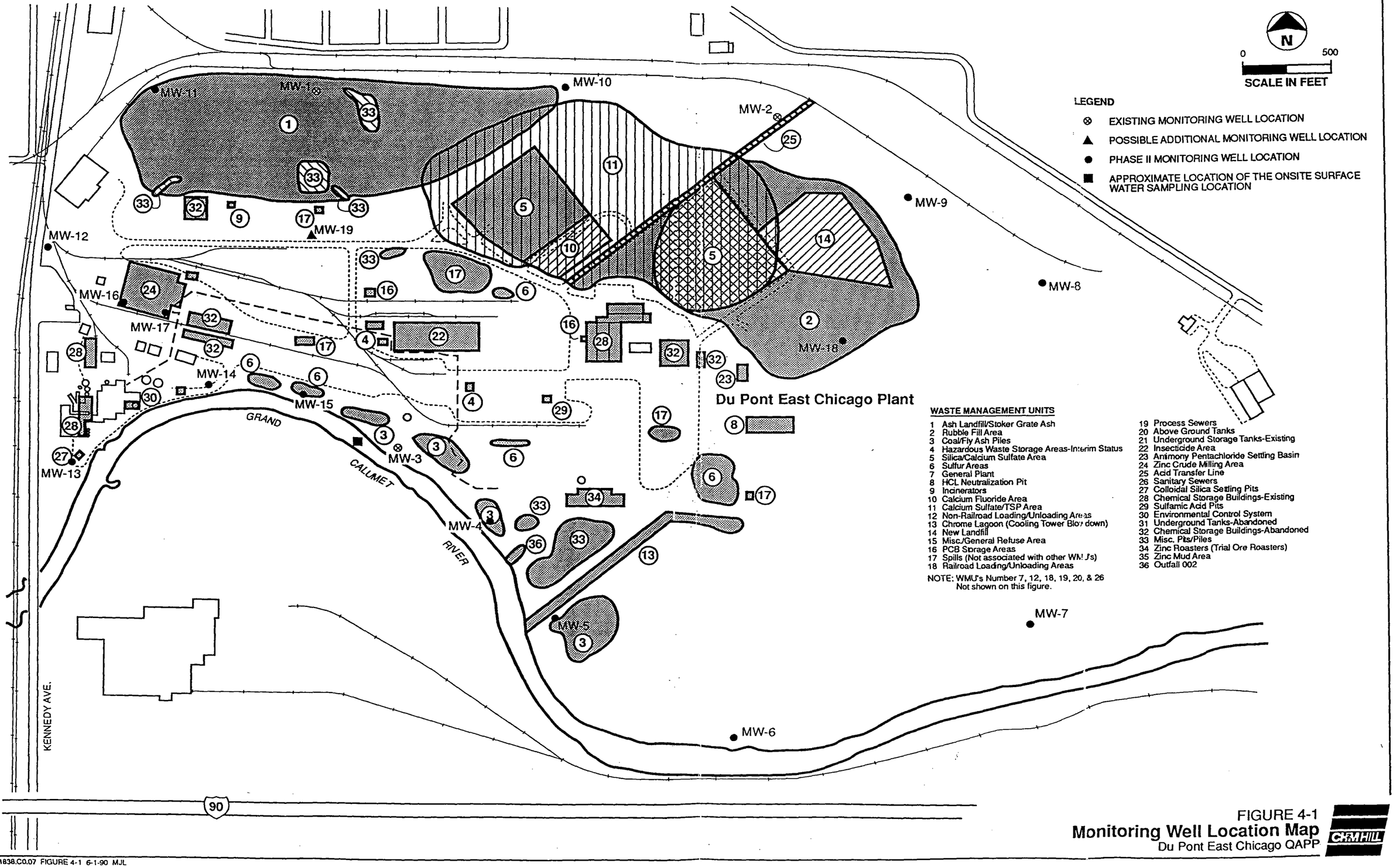
- Check in with the designated East Chicago Plant project coordinator.
- Post the route to the hospital and emergency phone numbers.
- Purchase all necessary supplies not acquired at the home office.
- Unpack vehicle of all necessary equipment.
- Check for sample bottle damage.
- Meet with the subcontractor personnel and discuss project coordination.
- Assemble necessary sampling/monitoring equipment for the day's sampling.
- Fill out field sheets with as much information as possible (e.g., boring or well location).
- Label sample bottles with as much information as possible (if not provided by the laboratory).

FIELD WORK ACTIVITIES

MONITORING WELL DRILLING, INSTALLATION, COMPLETION, AND DEVELOPMENT

Fifteen to seventeen groundwater monitoring wells will be installed and sampled. In addition, three existing monitoring wells at the East Chicago facility will be sampled. Approximate well locations are included in Figure 4-1 and the rationale for well placement is included in Table 4-1.

Well borings will be advanced using 6-1/4 inch I. D. hollow stem augers through the Calumet Sand to the top of the confining clay till layer approximately 30 to 40 feet below ground surface. Standard split-spoon samples will be collected every 5 feet for geologic logging if conditions permit. The primary objective of the field effort is to install monitoring wells so that groundwater flow direction and groundwater quality can be assessed. If the Calumet Sand formation produces blow-in such that split-spoon sampling is impractical, end plugs may be used to prevent blow-in of sand into augers so that wells may be installed. Cuttings will be characterized and drilling rates noted to determine the lower boundary of the Calumet Sand. Samples will be retained in glass Mason-type jars for possible future geotechnical testing.



WASTE MANAGEMENT UNITS

1 Ash Landfill/Stoker Grate Ash
2 Rubble Fill Area
3 Coal/Fly Ash Piles
4 Hazardous Waste Storage Areas-Interim Status
5 Silica/Calcium Sulfate Area
6 Sulfur Areas
7 General Plant
8 HCL Neutralization Pit
9 Incinerators
10 Calcium Fluoride Area
11 Calcium Sulfate/TSP Area
12 Non-Railroad Loading/Unloading Areas
13 Chrome Lagoon (Cooling Tower Blow down)
14 New Landfill
15 Misc./General Refuse Area
16 PCB Storage Areas
17 Spills (Not associated with other WMUs)
18 Railroad Loading/Unloading Areas

NOTE: WMU's Number 7, 12, 18, 19, 20, & 26 Not shown on this figure.

19 Process Sewers
20 Above Ground Tanks
21 Underground Storage Tanks-Existing
22 Insecticide Area
23 Antimony Pentachloride Settling Basin
24 Zinc Crude Milling Area
25 Acid Transfer Line
26 Sanitary Sewers
27 Colloidal Silica Settling Pits
28 Chemical Storage Buildings-Existing
29 Sulfamic Acid Pits
30 Environmental Control System
31 Underground Tanks-Abandoned
32 Chemical Storage Buildings-Abandoned
33 Misc. Pits/Piles
34 Zinc Roasters (Trial Ore Roasters)
35 Zinc Mud Area
36 Outfall 002

FIGURE 4-1
Monitoring Well Location Map
Du Pont East Chicago QAPP

CH2MHILL

GLO21838.C0.07 FIGURE 4-1 6-1-90 MJL

Table 4-1
RATIONALE FOR MONITORING WELL PLACEMENT

Well No.	Rationale
MW-4 through MW-15	Site Perimeter Wells: In addition to providing groundwater quality information for sections of the site's perimeter, these wells will provide potentiometric information across the site—groundwater flow direction, and whether groundwater flow is discharging to the Calumet River.
MW-16, MW-17	These monitoring wells should provide downgradient water quality for the zinc crude milling area (WMU-24).
MW-18	The location of a monitoring well in this location should allow for an additional downgradient water quality monitoring point for the New Landfill (WMU-14) and the rubble fill area (WMU-2).
MW-19	Location provides an additional groundwater quality monitoring point ~~downgradient of the insecticide area (WMU-22).~~ in the interior of the former manufacturing area
MW-20	Location provides a groundwater quality monitoring point ~~upgradient of the insecticide area (WMU-22).~~ in the interior of the former manufacturing area

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Wells will be constructed of 15-foot, 4-inch-diameter Schedule 40 PVC slotted screen with 4-inch-diameter Schedule 40 PVC riser. The slot size will be selected based on the grain size of the formation encountered. A 0.010-inch slot size is anticipated. A coarse sand to medium gravel pack will extend from the bottom of the boring to 2 feet above the top of the well screen. Wherever practical, the screen will be placed immediately above the confining clay till layer. A 2-foot layer of fine-grained transition sand (Ottawa type or equivalent) will be placed above the sand pack. A 2-foot bentonite seal will be placed above the fine sand. The remaining annulus of the borehole will be filled with a cement-bentonite grout which will be tremied in place. The grout will extend to a minimum of 1 foot below ground surface between a protective casing and the well riser. A 4-foot length concrete seal will be installed between the borehole wall and a protective casing. (The concrete seal will be a minimum of 5 total feet to prevent frost heave of the well). A 7-foot, 6-inch-diameter locking steel protector pipe will be placed over the well and, in traffic areas, bumper posts will also be installed around the well. Wells will have a minimum 3-foot stickup. Typical well construction is shown in Figure 4-2.

Following installation, each monitoring well will be developed until substantially free of sediment. Purge water from wells adjacent to former plant activity areas will be placed in 55-gallon drums adjacent to the well until laboratory results are received. Based on the analytical results, development water will be disposed of on the ground adjacent to the well or treated at the onsite water treatment facility. Wells will be developed using surge and purge methods. Elevation of the top of the inner casing of the new and existing monitoring wells will be surveyed to the nearest 0.01 foot as referenced to the U.S.G.S.

GROUNDWATER SAMPLING PROCEDURES

Groundwater samples will be collected during two sampling rounds from the new and existing monitoring wells. Sampling will proceed in the following sequence.

1. The well cap will be removed and the organic vapor concentrations of the air at the riser will be measured with an HNu to monitor the health and safety of the sampling personnel.

2. The water level will be measured with an electronic water level indicator, which has an accuracy of ±0.01 foot.

3. The depth of monitoring wells will be measured and recorded.

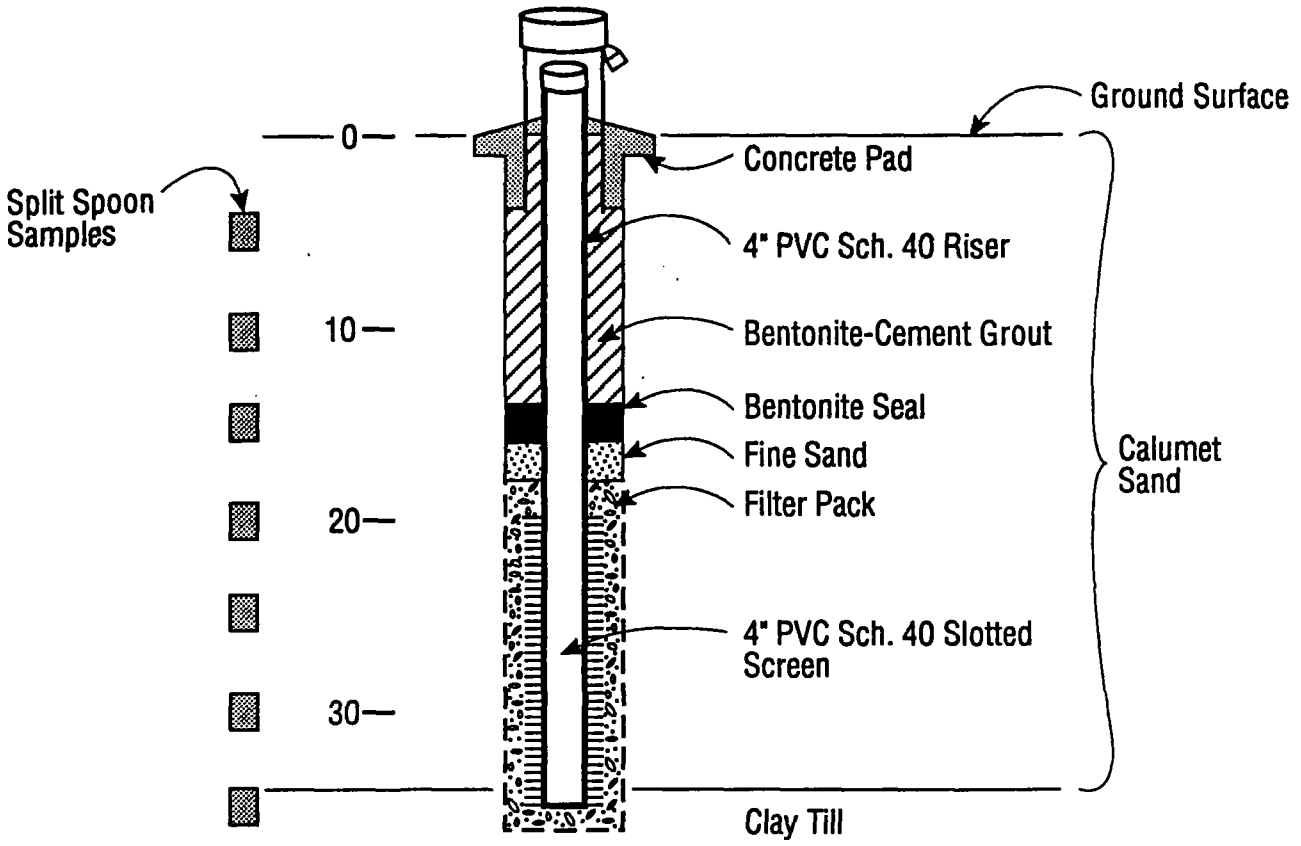
4. The casing volume will be calculated using the formula

   $$\text{Volume (gallons)} = H \times (D/2)^2 \times 7.48 \times \pi$$

   where:

   H = Height of water column in feet
   (depth of well minus depth to water surface)
   D = Inside diameter of casing in feet

GLO21838.DOC/07 Figure 2 5-14-90



Note:
Protective System includes 3 Protective Posts as needed to protect wells.

FIGURE 4-2
Monitoring Well Diagram
Du Pont East Chicago QAPP

5. The monitoring wells will be purged using a peristaltic, submersible, or Brainard-Kilman (BK) pump or a bailer. Purge water will be stored in 55-gallon drums next to the wells until the analytical results are received. Based on the results, purge water will be disposed of on the ground adjacent to the well or treated in the onsite water treatment facility.

6. Where applicable, the samples for VOCs will be collected immediately after purging using either a stainless steel or Teflon bailer by pouring from the bailer directly into the vials so that the formation of air bubbles is minimized. Only one VOC vial will be taken from each full bailer to minimize the loss of VOCs through subsequent pouring and exposure to air.

7. Samples for other parameters will be collected after VOCs using a stainless steel or Teflon bailer.

8. Samples will be preserved as listed in Table 4-2.

9. The bailer will be decontaminated according to the procedures described below under Decontamination. Nylon cord used to lower bailers into the wells will be discarded after use at each well and new cord will be used for the following well.

SURFACE WATER SAMPLING

Three surface water samples will be collected during two sampling rounds downgradient, adjacent to, and upgradient of the East Chicago facility. At each location, the elevation of the water surface at the sampling point will be measured to the nearest 0.01 foot. The sample bottles will be inverted and immersed into the water and then righted below the water surface. Care will be taken to make sure the bottles fill slowly. Also, no air bubbles will be allowed in the VOA vials. The onsite surface water sampling location is shown in Figure 4-1; offsite locations are shown in Figure 1-1. The samples will be preserved as described in Table 4-2.

STAFF GAGE INSTALLATION AND MEASUREMENT

Four staff gages calibrated to 0.10 foot will be installed at the East Chicago facility. Three gages will be placed in the Grand Calumet River and the fourth in an onsite area with standing water (most likely in the eastern two-fifths of the site). The staff gages will be attached to metal stakes that will be driven into the ground or attached to bridge pilings. The top of each gage will be surveyed. A reading to the nearest one-tenth of a foot with an estimate to the nearest one-hundredth of a foot, will be obtained from each gage when the groundwater elevations are measured. Staff gage locations are shown in Figure 1-1.

HYDROGEOLOGIC EVALUATION

Following well installation and development, static groundwater levels will be measured in each well to determine the local configuration of the groundwater

Table 4-2
SAMPLE TYPES AND PRESERVATIVES - GROUNDWATER SAMPLING
DUPONT EAST CHICAGO PLANT

Analysis	Bottles	Preservation	Holding Time	Quantity
ORGANICS				
- Acid Extractables	Two 1/2-gallon amber bottles (Teflon-lined caps)	Iced to 4°C	5 days for extraction 40 days for analysis	Fill to shoulder
- Volatiles	Two 40-ml volatile organic analysis vials	Iced to 4°C	7 days	Fill to top, no air space
- PCBs	One 1-liter polyethylene bottle	Iced to 4°C	7 days for extraction 40 days after extraction for analysis	Fill to shoulder
INORGANICS				
- Dissolved Metals	One 1-liter polyethylene bottle	HNO3 to pH <2, Iced to 4°C	6 months	Fill to shoulder
CONVENTIONAL				
- COD	One 1-liter polyethylene bottle	H2SO4 to pH <2, Iced to 4°C	28 days	Fill to shoulder
- Ammonia	One 1-liter polyethylene bottle	H2SO4 to pH <2, Iced to 4°C	28 days	Fill to shoulder
- Total Kjeldahl N	One 1-liter polyethylene bottle	H2SO4 to pH <2, Iced to 4°C	28 days	Fill to shoulder
- Major Ions (1)	One 1-liter polyethylene bottle	Iced to 4°C	28 days	Fill to shoulder
- Alkalinity	One 1-liter polyethylene bottle	Iced to 4°C	14 days	Fill to shoulder
- Phosphorous (Total)	One 1-liter polyethylene bottle	Iced to 4°C	28 days	Fill to shoulder
- Total Dissolved Solids	One 1-liter polyethylene bottle	Iced to 4°C	7 days; 48 hours	Fill to shoulder
CYANIDE	One 1-liter polyethylene bottle	NaOH to pH >12 Iced to 4°C	14 days	Fill to shoulder

NOTES:
(1) Major Ions include: Fe, Mn, F, Ca, Mg, K, Na, Cl, SO4, HCO3.

surface and the potential direction of groundwater movement. After groundwater sample collection, rising head hydraulic conductivity tests will be performed on three to six wells. This information will be used to calculate expected average groundwater velocities at the site.

RISING HEAD CONDUCTIVITY TESTS

Variable head (slug) tests are single well tests used to estimate hydraulic conductivity in the vicinity of the well screen by adding or removing a known volume of water. The rate at which the water level in the well recovers is measured in a rising head conductivity test and results are used to estimate hydraulic conductivity.

An artificial head pressure will be applied to the inside of the well casing using a volume of inert gas under pressure. A known volume of water will be displaced through the well screen and back into the aquifer. When the water level has fully stabilized, the pressure will be released and the water level will be lowered. Data will then be collected using the pressure transducers while the water level recovers in the well. Collected data will be evaluated using Bouwer and Rice's (1976) method.

EQUIPMENT DECONTAMINATION PROCEDURES

All drilling equipment (soil boring augers, rods) will be steam cleaned before use and between drilling locations. All sampling and well purging equipment will be decontaminated between each boring and well in the following manner:

- Visible debris or dirt will be brushed off and then scrub washed with clean water. Tap water may be used for this initial washing.
- Nylon rope will be removed from bailers and discarded after use.
- Equipment will be washed and scrubbed with a 2.5 percent (w/w) trisodium phosphate solution. The exterior surface of the article will be scrubbed thoroughly and rinsed with clear water.
- Equipment will be rinsed with a 10 percent (v/v) methanol solution.
- Equipment will be final rinsed with deionized or distilled water.
- Equipment will be placed on a clean plastic sheet to allow for air drying.

REFERENCES

Bouwer, Herman, and R.C. Rice. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Well. Water Resources Research. Vol. 12, No. 3. 1976.

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Section 5
SAMPLE HANDLING, DOCUMENTATION, CUSTODY, AND SHIPPING

The sample custody procedures outlined below will ensure that sample handling from the time of collection through time of shipment is properly documented. Proper custody procedures are necessary to ensure that analytical results are representative of site conditions. A sample is under your custody if it is:

- In your possession
- In your view, after being in your possession
- In your possession and you placed it in a secured location
- In a designated secure area

FIELD SAMPLE HANDLING AND CUSTODY PROCEDURES

The sampling team will always consist of at least two people. The person designated the field team leader (FTL) will assume ultimate responsibility for sample custody. The FTL "accepts" the samples from the sampler. The FTL in turn prepares the samples and relinquishes them to the laboratory or the sampling team member delivering the samples to the laboratory who relinquishes them to the laboratory.

The sampler is responsible for documentation of preservatives used, supplies used, exact sampling locations, etc. The sampler will also be responsible for decontamination of the sample containers and labeling the containers before relinquishing them to the FTL.

The following sample packaging and shipment procedure should allow samples to arrive at the laboratory with the chain-of-custody intact:

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible will handle the samples.

- All bottles will be labeled with sample numbers and locations.

- Monitoring well groundwater grab samples will be given the following designation:

  MW-xx-yy

  where:

  xx = the well number
  yy = the sequential number of samples collected at that location

  MW-04-01 would therefore indicate the first sample collected from monitoring well designated as 04.

- Surface water grab samples will be given the following designation:

  SW-xx-yy

  where:

  xx = the number of the surface water sampling location

  yy = the sequential number of samples collected at that location

  SW-03-01 would therefore indicate the first sample collected at surface water sampling location 03.

- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions, and will include sample number, location, date, and time collected, preservative used, requested analysis, and sampler's initials.

- The outside of the sample containers will be decontaminated using clean water and mild detergent if needed and toweled dry. The lids will be sealed with electrical tape. Labels will be secured onto the containers with clear plastic tape. Sample jars will be placed into individual ziploc bags.

- All chain-of-custody forms will be completed by the FTL. The laboratory may provide its own chain-of-custody forms with the sample containers.

- Samples will be placed in coolers or sample shuttles with ice and inert packing material and shipped to NET Midwest, Inc. for analysis, with a separate signed custody record enclosed in each sample shuttle or cooler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. The custody seal will be attached to the front right and back left of the sample shuttle and covered with clear plastic tape. The shuttle will be strapped shut with strapping tape in at least two locations. Samples taken to the onsite laboratory will be placed on ice immediately after collection and will be taken to the lab as soon as possible.

SAMPLE SHIPPING

All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and a copy will be retained by the sampler for return to the sampling office. All shipments will be shipped to NET Midwest via Federal Express.

FINAL EVIDENCE FILES AND CUSTODY PROCEDURES

The final evidence files will be maintained by CH2M HILL until the project is concluded. Files will be maintained along with all relevant records, logs, field notebooks, pictures, subcontractor reports and data reviews under custody of the CH2M HILL Project Manager or Assistant Project Manager.

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Section 6
CALIBRATION PROCEDURES AND MAINTENANCE FREQUENCY

FIELD EQUIPMENT

The calibration procedures and frequency of calibration for field equipment are provided in Appendix A. Each piece of field equipment will be tested in the CH2M HILL warehouse before each use to ensure it is in proper working order before it is sent to the site. The instrument operator's manual will dictate the frequency of calibration and maintenance.

LABORATORY EQUIPMENT

The calibration and maintenance procedures and frequency of calibration for laboratory equipment should be in accordance with the laboratory's QAPP (Appendix B).

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Section 7
ANALYTICAL PROCEDURES

The procedures for measurements taken in the field are described in Appendix A. They include air monitoring with an organic vapor photoionization detector and an explosimeter and groundwater measurements for pH, conductivity, temperature, dissolved oxygen, and oxidation-reduction potential.

LABORATORY ANALYTICAL METHODS

Groundwater and surface water samples collected during the field investigation will be analyzed for chemical constituents by NET Midwest, Inc. These analyses are to evaluate the magnitude and extent, if any, of the impact of the site and selected WMUs on the surface water and groundwater in the area. Selected soil samples collected during monitoring well drilling may be submitted for grain size analysis. Table 7-1 presents the predicted number of surface water and groundwater samples to be analyzed.

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Table 7-1
GROUNDWATER AND SURFACE WATER SAMPLING ANALYTICAL PROGRAM

	GROUNDWATER INVESTIGATION				SURFACE WATER INVESTIGATION				
	No. of Samples	No. of Replicates	No. of Blanks	Total	No. of Samples	No. of Replicates	No. of Blanks	Total	PROJECT TOTAL
TCL VOCs	34	4	4	42	6	1	1	8	50
TCL BNAs	30	3	3	36	6	1	1	8	44
PCBs	1	1	1	3	0	0	0	0	3
SELECTED TRACE INORGANICS									
Bo, Cd, Cr+6, Cr, Cu, Hg, Pb, Ni, Sb	30	3	3	36	6	1	1	8	44
Al	32	4	4	40	6	1	1	8	48
As	34	4	4	42	6	1	1	8	50
Ba	32	4	4	40	6	1	1	8	48
Zn	36	4	4	44	6	1	1	8	52
MAJOR IONS AND WATER QUALITY PARAMETERS									
Calcium	30	3	3	36	6	1	1	8	44
Magnesium	30	3	3	36	6	1	1	8	44
Potassium	30	3	3	36	6	1	1	8	44
Sodium	30	3	3	36	6	1	1	8	44
Sulfate	34	4	4	42	6	1	1	8	50
Chloride	36	4	4	44	6	1	1	8	52
HCO3, CO3	36	4	4	44	6	1	1	8	52
Iron	36	4	4	44	6	1	1	8	52
Manganese	30	3	3	36	6	1	1	8	44
Phosphate	34	4	4	42	6	1	1	8	50
Total Kjeldahl	32	4	4	40	6	1	1	8	48
Ammonia Nitrogen	32	4	4	40	6	1	1	8	48
TDS	30	3	3	36	6	1	1	8	44
Alkalinity	30	3	3	36	6	1	1	8	44
Cyanide	30	3	3	36	6	1	1	8	44
FIELD MEASUREMENTS - Dissolved O2 - pH - Specific Conductance - Oxidation Reduction Potential - Temperature	36	4	4	44	6	1	1	8	52

Section 8
DATA MANAGEMENT AND REPORTING

FIELD DATA

All field recording sheets, instrument outputs, and worksheets for calculating results will be retained. Field measurements should be recorded in the site log book. Data used in project reports will be reduced and summarized as appropriate. Field data quality review shall be the responsibility of the field team leader.

LABORATORY DATA

The data will be reported directly from the laboratory to CH2M HILL. Quality control review of the NET Midwest data package will be conducted by a CH2M HILL project team member experienced in QC review of analytical data from CLP laboratories. The data will be reviewed to evaluate their validity and to assure that required protocols were followed so that data are scientifically defensible. CH2M HILL will manage the data by transcribing it into spreadsheet format or other database management system for use during project interpretation.

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Section 9
QUALITY CONTROL CHECKS

FIELD QUALITY CONTROL

Field analyses will be performed onsite and will not involve samples that are collected and retained. The primary QA/QC objective is to obtain reproducible measurements to a degree of accuracy consistent with limits imposed by analytical methodologies used and with the intended use of the data. A precision limit of 10 percent will be used for all measurements taken in the field. Quality control procedures will be limited to checking the reproducibility of measurements by taking multiple readings and by calibration of instruments.

LABORATORY QUALITY CONTROL

The internal quality control procedures for the analytical samples will be in control of NET Midwest, Inc.

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Section 10
PERFORMANCE AND SYSTEMS AUDITS

The capability and performance of the total laboratory measurement systems will be monitored with system and performance audits as outlined in the NET Midwest QAPP (Appendix B).

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Section 11
PREVENTIVE MAINTENANCE

FIELD MEASUREMENTS

Appropriate preventive maintenance procedures will be followed before and during fieldwork to minimize downtime. The FTL will be responsible for notifying CH2M HILL's equipment manager at least 1 week before the sampling event so that proper field equipment and supplies can be obtained and serviced, if needed.

The FTL will ensure that the measurement an monitoring equipment are calibrated before sampling and that calibration is documented. Strict adherence to presampling activity in accordance with the sampling procedures (Section 4) will allow for preventive maintenance.

LABORATORY PROCEDURES

Laboratory preventive maintenance procedures and schedules shall be specified by NET Midwest, Inc.

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Section 12
DATA MEASUREMENT ASSESSMENT PROCEDURES

Equations for calculating precision, accuracy, and completeness as described in Section 4 are detailed below. Precision is a measure of the reproducibility of field sampling and laboratory analyses. Both field duplicates (replicates) and laboratory duplicates will be analyzed to determine data precision. The results will be reported as relative percent difference (RPD), calculated by:

$$RPD = \frac{D1 - D2}{(D1 + D2)/2} \times 100$$

where:

D1 = concentration of first duplicate
D2 = concentration of second duplicate

The accuracy of analytical results is a measure of the agreement between an experimental determination of the true value of the parameter being measured. Sample spike analyses are used to determine the accuracy of analyses. A known quantity of the constituent of interest is added to a sample and analyzed. The amount of spiked compound recovered by analysis is compared to the amount added. Percent recovery is calculated by:

$$\%R = \frac{SSR-SR}{SA} \times 100$$

SSR = quantity measured in spike sample
SR = quantity measured in unspiked sample
SA = quantity of spike added

The completeness of data from a sampling program is interpreted as the percentage of valid data obtained compared to the amount that was expected to be obtained.

$$\text{Completeness} = \frac{\text{Data values usable}}{\text{Total data values obtained}} \times 100$$

Analytical data from the laboratory will be assessed for accuracy, precision, and completeness by laboratory personnel.

The laboratory will document that both initial and ongoing instrument calibration and tuning and analytical QC criteria have been met. The laboratory will demonstrate that interferences from the analytical system are under control and that surrogate spike, matrix spike, and matrix duplicate recoveries outside the specified acceptance windows are attributable to sample matrix interferences and not to laboratory analytical errors.

Data from field measurements will be assessed for precision and accuracy through review of calibrations and by taking duplicate readings. Any standards, blanks, or

duplicates will be examined and precision and accuracy calculated from the formulas given. All data will be reviewed for completeness by the FTL.

GLT971/074.51

Section 13
CORRECTIVE ACTION

FIELD MEASUREMENTS

The FTL will be responsible for correcting any deviations from the sampling procedures identified in Section 4. Deviations and subsequent corrective measures will be documented by the FTL. As the possible deviations are dependent upon unknown field conditions, corrective measures cannot be specified. For field measurements, the corrective action must be suited to the situation and may include:

- Repeating measurements
- Checking batteries
- Recalibrating an instrument
- Replacing an instrument

LABORATORY CORRECTIONS

The laboratory's Corrective Actions Program will be specified by NET Midwest, Inc.

GLT961/070.51

Section 14
QUALITY ASSURANCE REPORTING

No separate QA report for this project is anticipated.

GLT961/071.51

Appendix A

STANDARD OPERATING PROCEDURES FOR FIELD MEASUREMENTS

FIELD MEASUREMENT OF pH

METHOD

Electrometric

REFERENCES

Methods for Chemical Analysis of Water and Wastes, U.S. EPA, Method 150.1, 1983.

Orion SA250 pH Meter Instruction Manual, 1987, Part No. 205376-001, Orion Research Incorporated, Boston, MA.

Orion Ross pH Electrode Instruction Manual, 1988, Part No. 502700-098, Orion Research Incorporated, Boston, MA.

SENSITIVITY

0.01 pH unit

RANGE

1 to 12 pH units

SAMPLE HOLDING TIME

Less than 6 hours

REAGENTS

- pH buffer solutions for pH 4, 7, and 10
- Deionized water in squirt bottle
- 3 M KCL internal filling solution
- Storage solutions

APPARATUS

- pH meter
- Combination pH and reference electrode
- Beakers, plastic or glass
- Spare battery

CALIBRATION (most pH Meters)

1. Select either pH 4 and 7, or pH 7 and 10 buffers, whichever will bracket the expected sample concentration. Note: Mix all buffer solutions before use.

2. Place electrode in pH 7 buffer solution. Wait for the pH to stabilize and adjust CAL until pH display reads 7.0.

3. Rinse electrodes and replace pH 7 buffer with either pH 4 or 10 buffer.

4. Wait for the pH value to stabilize. Adjust SLOPE until pH display reads 4.0 for the pH 4 buffer or 10.0 for the pH 10 buffer. Note: Slope values in the 92 to 102 percent range are acceptable.

5. Rinse electrodes and replace pH 4/10 buffer with pH 7 buffer.

6. If display reading is not 7.0, repeat steps 2 through 4.

AUTOCALIBRATION (ORION SA 250)

1. Select either pH 4 and 7, or pH 7 and 10 buffers, whichever will bracket the expected sample concentration. Note: Shake all buffer solutions before use.

2. Select pH mode and resolution (pH 0.1).

3. Press ISO and verify that the isopotential point is 7.0.

4. Place electrode and Automatic Temperature Compensation (ATC) probe in pH 7 buffer.

5. Press CAL. The display will alternate between 0.1 and the pH value of the buffer. Wait for the pH value to stabilize. Press ENTER. After a short pause the display will advance to 0.2.

6. Rinse electrodes and ATC probe and replace pH 7 buffer with either pH 4 or 10 buffer.

7. Wait for pH value to stabilize. Press ENTER. The letters pH will be displayed. The pH meter is calibrated and ready for use. Note: Slope values in the 92 to 102 percent range are acceptable.

8. Rinse electrode and ATC probe and place into sample. Read the pH directly.

CALIBRATION FREQUENCY

Daily, at the beginning and end of the day, recheck calibration with pH 7 buffer once every ten samples and after maintenance.

OPERATING PROCEDURE

1. Check all connections for tight fit.

2. Inspect electrodes (and ATC probe).

3. Check battery charge.

4. Perform calibration, at the beginning and end of the day.

5. Rinse the electrode with distilled water and then with the sample to be measured.

6. Place electrode (and ATC probe) in previously mixed sample. Immerse electrode such that junction is covered by sample.

7. When the display is stable, record sample pH.

8. Recheck calibration with pH 7 buffer solution once every ten samples.

9. After use store electrode. For short-term storage (up to 1 week) soak electrode in manufacturer's recommended storage solution. For long-term storage, the reference chamber should be filled and the filling hole securely covered.

10. Cover the sensing element and/or reference junction with its protective cap and a few drops of the manufacturer's recommended storage solution.

When calibrating the meter, use pH 4 and 7 buffers for sample with pH <7, and pH 7 and 10 buffers for samples with pH >7. Measurement of pH is temperature dependent. Therefore, temperatures of buffers and samples should be within 2°C. This is not applicable for meters equipped with an automatic temperature compensation probe.

Weak organic salts, inorganic salts, and oil and grease interfere with pH measurements. If oil and grease are visible, note on data sheet. Clean electrode as described in manufacturer's instrument manual.

Avoid rubbing or wiping electrode bulb to reduce chance of error from polorization. To ensure a quick response and free-flowing liquid junction, the sensing element and reference junction must not be allowed to dry out.

QUALITY CONTROL REQUIREMENTS

Accuracy will be assessed by performing two measurements on two standard buffer solutions that bracket the pH range of the samples. Recheck calibration with ph 7 buffer solution once every ten samples. Each measurement will be within $\pm$0.05 standard unit of pH selection. Precision will be assessed by duplicate measurements and must be less than or equal to 0.1 standard unit. Duplicates will be run at the rate of one every ten samples.

PREVENTATIVE MAINTENANCE (frequency)

1. Check batteries (daily).

2. Perform a two-point calibration (daily and after maintenance).

3. Inspect the electrode for scratches, cracks, salt crystal buildup, or membrane/junction deposits. Rinse off any salt buildup with deionized water and remove membrane/junction deposits as described in the manufacturer's operators manual (as needed).

4. Clean electrode by soaking in 0.1M HCL or $HN0_3$ for 30 minutes, followed by soaking in storage solution for at least 1 hour (as needed or when slow response is observed).

5. Drain the reference chamber and flush it with the manufacturer's filling solution (weekly).

FIELD MEASUREMENT OF SPECIFIC CONDUCTIVITY AND TEMPERATURE

REFERENCES

Methods for Chemical Analysis of Water and Wastes, U.S. EPA Method 120.1, 1983.

YSI Models 33 and 33M S-C-T Meters, Instructions, November 1987, Item 021470, Yellow Springs Instrument Co., Yellow Springs, Ohio.

SENSITIVITY

1 umho/cm @ 25°C.

RANGE

0.1 to 100,000 umho/cm.

SAMPLE HOLDING TIME

Determine onsite or within 24 hours.

REAGENTS

Distilled water in squirt bottle and standard potassium chloride solution.

REAGENT PREPARATION

1. Stock Potassium Chloride (KCl) Solution (1.00 N): Dissolve 74.555 g KCl in distilled water and dilute to 1,000 ml in a volumetric flask.

2. Standard Potassium Chloride Solution (0.01 N): Dilute 10.0 ml of stock 1.00 N KCl solution to 1,000 ml with distilled water using a volumetric pipet and flask.

APPARATUS

Conductivity meter and electrodes. Beakers or jars, plastic, or glass; spare batteries, size D alkaline.

CALIBRATION PROCEDURE

1. Switch mode to OFF and unplug the probe, correct meter zero (if necessary) by turning the adjustment screw so that the meter needle coincides with the zero on the conductivity scale.

2. Switch mode to REDLINE, correct meter redline (if necessary) by turning the adjustment screw so that the meter needle coincides with the redline on the meter face. If this cannot be accomplished, replace the batteries.

3. Plug the probe into the probe jack.

4. Place the probe in the 0.01 N standard potassium chloride solution. Record temperature (°C) and conductance (micromho/cm).

5. Correct conductivity reading for temperature. This value must correspond ($\pm$10 percent) to the expected value in Table 1. If the calibration fails, then appropriate corrective action must be performed and the instrument recalibrated.

Note: The temperature probe should be calibrated against a NBS, an ATSM standard or equivalent thermometer before each sampling event.

OPERATION PROCEDURE

1. Perform calibration at end and beginning of the day.

2. Switch mode to TEMPERATURE. Allow time for the probe temperature to come to equilibrium with that of the water before reading. Read the temperature on the bottom scale of the meter in degrees Celsius.

3. Switch mode to X100. If the reading is below 50 on the 0-500 range (5.0 on the 0-50 mS/m range), switch to X10. If the reading is still below 50 (5.0 mS/m), switch to the X1 scale. Read the meter scale and multiply the reading by the mode factor. The answer is expressed in microohms/cm. Measurements are not temperature compensated.

4. When measuring on the X100 and X10 scales, depress the CELL TEST button. The meter reading should fall less than 2 percent; if greater, the probe is fouled and the measurement is in error. Clean the probe and remeasure.

OPERATING SUGGESTIONS

- Obstructions near the probe can disturb readings.

- When the calibration test indicates low readings the probable cause is dirty electrodes. Hard water deposits, oil, and organic matter are the most likely contaminants.

- Caution: Do not touch the electrodes inside the probe. The plating material is soft and can be scraped off.

- If cleaning does not restore the probe performance, replating may be required. Always rinse the probe thoroughly in tap water, then in distilled or deionized water after cleaning and before storage. It is best (not required) to store conductivity cells in deionized water.

- Most problems in obtaining good records with monitoring equipment are related to electrode fouling and to inadequate sample circulation.

CALIBRATION FREQUENCY

At the beginning and end of the day or after maintenance, recharge battery after each use. Factory checkout and calibration shall be yearly or when malfunctioning.

CALCULATIONS

Calculate conductivity using the formula:

$$G_{25} = \frac{G_T}{[1 + 0.02\ (T-25)]}$$

where:

G_{25} = conductivity at 25°C, umho/cm
T = temperature of sample, °C
G_T = conductivity of sample at temperature T, umho/cm

Table 1
CONDUCTIVITY METER CALIBRATION TABLE

Temperature °C	Conductivity (umho/cm)
15	1,141.5
16	1,167.5
17	1,193.6
18	1,219.9
19	1,246.4
20	1,273.0
21	1,299.7
22	1,326.6
23	1,353.6
24	1,380.8
25	1,408.1
26	1,436.5
27	1,463.2
28	1,490.9
29	1,518.7
30	1,546.7

QUALITY CONTROL REQUIREMENTS

The accuracy of conductivity measurements will be assessed by measurement with a 0.01 N standard KCl solution before sample analysis and at the end of the day. Accuracy of measurements will be ± 5 percent of the standard. Precision will be assessed by analysis of duplicate measurements which will have a relative percent difference of ≤ 15 percent. Duplicates will be run at the rate of one every ten samples. The thermometer on the conductivity meter will be checked before each sampling event for accuracy against an ASTM, NBS standard or equivalent thermometer. Accuracy of the measurement shall be ± 1°C.

PREVENTATIVE MAINTENANCE

- The only maintenance required in battery replacement (every 200 hours or as needed).
- Recalibration (if necessary) should be done at the factory.

HNu MONITORING

REFERENCES

HNu Model PI101 Portable Photoioniozation Analyzer Instruction Manual, December 1985, HNu Systems, Inc., Newton, MA.

HNu Model ISP1 101 Intrinsically Safe Portable Photoionization Analyzer Instruction Manual, January 1986, HNu Systems, Inc., Newton, MA.

SENSITIVITY

0 to 20 ppm at full-scale detection at span = 9.8 ppm; 10.2 ev Probe.

RANGE

0.1 to 2,000 ppm.

CALIBRATION GAS

Isobutylene at 100 ppm

CALIBRATION

By analyzing a gas of known concentration, the HNu is easily calibrated. Isobutylene is typically used as the calibration gas with the instrument calibrated to benzene equivalents. When calibrating the HNu, always remember to deliver the calibration gas at ambient temperature and pressure, handle gas cylinders with care, and calibrate every day. Also, the calibration gas must be stable during the period of use, all gas cylinders must have proper regulators.

CALIBRATION PROCEDURE

1. Identify the probe by lamp label.

2. Attach the probe to the readout unit. Twist connector clockwise until locked.

3. Affirm the relative photoionization sensitivity (PS) calibration gas. [The required reading for isobutylene to read in benzene equivalents is equal to isobutylene ppm x PS (Isob)/PS (benzene)]

4. Turn the function switch to battery check position. The indicator should read within the green arc. If indicator is below the green arc or if red L&D comes on, battery must be charged.

5. Zero the instrument by turning function switch to standby and rotate potentiometer until the meter reads zero.

6. Connect sampling hose to regulator outlet and the other end to sampling probe of HNu.

7. Crack regulator valve.

8. Adjust span potentiometer to obtain proper reading.

9. If calibration can not be achieved, clean the UV light source window using lens paper and HNu cleaning compound.

10. If still unable to calibrate, perform preventative maintenance. Return to factory if those procedures do not work.

CALIBRATION FREQUENCY

Daily or after maintenance. Recharge battery after ea
and calibration shall be yearly or when malfunctioning.

Sentence fragment

PREVENTATIVE MAINTENANCE (t

BATTERY (daily)

Check the battery charge during each period of operation. When the meter needle falls below the green zone or the low-battery indicator light illuminates recharge battery. Do not use the instrument when light is on. When not operating, leave the analyzer assembled and connected to the battery charger. In case of emergency, the analyzer may be used with a low-battery charge.

GAS CYLINDERS AND VALVES (after installation)

All gas supply lines must be leak tested. Leakage can be determined by testing line connections and valve stems with a commercially available leak test solution. Leaks are generally stopped by tightening the fitted surfaces but may require new hardware.

AIR SAMPLING STREAM (initially, then as needed)

Leaks that develop in this system may result in dilution or loss of sample, causing erroneous vapor concentrations and slow response. A fan draws gas in through the probe and ion chamber. Small fluctuations in the flow rate will not affect the measurement. A major obstruction to the flow rate will prevent proper operation and lengthen response time. Refer to the manufacturer's instrument manual for specific procedures.

QUALITY CONTROL REQUIREMENTS

Precision of $\pm$30 percent. Daily calibration.

OVA MONITORING

REFERENCE

Model OVA 128 Century Organic Vapor Analyzer, Instruction, December 1985, Foxboro, New Haven, CT.

SENSITIVITY

0.1 ppm (methane).

RANGE

0 to 1,000 ppm.

CALIBRATION GAS

Methane gas at 100 ppm.

CALIBRATION

By analyzing a gas of known concentration, the OVA is easily calibrated. Methane in air at a concentration of 100 ppm is typically used as the calibration mixture, although the OVA can be calibrated to many other compounds. Primary calibration of an OVA is performed at the factory. When calibrating the OVA, always remember to deliver the calibration gas at ambient temperature and pressure, handle the gas cylinders with care, and calibrate every day. Also, the calibration gas must be stable during the period of use, and all gas cylinders must have proper regulators.

CALIBRATION PROCEDURE

1. Connect probe readout assembly to sidepack unit.
2. Check battery condition by moving INSTR Switch to BATT.
3. Turn INSTR to ON and allow 5 minutes to warm up.
4. Use calibration adjust knob to set needle to level desired for activating alarm. If alarm level is not zero, the calibration switch must be set to appropriate level.
5. Turn volume knob fully clockwise.
6. Turn the alarm level adjust knob until the audible alarm is activated.
7. Move calibration switch to 1X and adjust meter reading to zero using zero calibration adjustment.

8. Turn pump switch on.

9. Open hydrogen tank valve and hydrogen supply valve. Wait 1 minute.

10. Depress ignitor button until burner lights (not more than 6 seconds).

11. Set calibration switch to 10X.

12. Connect sampling hose to regulator outlet and the other end to sampling probe of OVA.

13. Crack the regulator valve.

14. Check to see if proper reading is achieved.

15. If reading is $\pm$10 percent from expected value, return to factory for recalibration.

CALIBRATION FREQUENCY

Daily or after maintenance, recharge battery after each use. Factory check out and calibration shall be yearly or when malfunctioning.

PREVENTATIVE MAINTENANCE

BATTERY (daily)

Check battery condition by moving the INSTR switch to the BATT position. Recharge the battery if a low charge is indicated. Do not use the instrument with a low battery charge. When not operating, leave the analyzer connected to a battery charger. Never recharge battery in a hazardous environment.

PARTICLE FILTER (as needed)

Particle filters (primary and secondary) remove foreign matter (>10 microns) from the sample stream. These filters must be in the sample line whenever the instrument is operating. A decrease in flow rate may indicate a plugged filter.

SAMPLING FIXTURES (as needed)

Sampling fixtures should be periodically cleaned with an air hose and/or detergent water to eliminate foreign particulate matter.

HYDROGEN FUEL, CALIBRATION GAS, AND VALVES (initially, after changes)

Use prepurified or zero-grade hydrogen (certified total hydrocarbons as methane <0.5 ppm recommended). All fuel and calibration gas supply lines should be

leak tested. Leakage can be determined by testing line connections and valve stems with a commercially available leak test solution. Leaks are usually stopped by tightening the fitted surfaces but may require new washers or hardware.

AIR SAMPLING PUMP SYSTEM (initially, as needed)

Leaks that develop in this system may result in dilution or loss of sample, causing erroneous vapor concentrations and slow response. The OVA is equipped with a flow gauge that provides a method to check for air leaks. Refer to the manufacturer's instrument manual for specific procedures.

CONTAMINATED CONTROL (as needed)

Background readings may be relatively high under normal ambient conditions. The sources of high background are normal methane background, contaminated hydrogen supply gas, and contamination in the air sample line. Background readings less than 1 ppm are generally accepted since sample measurement is additive to that background. However, the low background values are more desirable. High background is commonly corrected by running the OVA for an extended time in a clean area. Refer to the manufacturer's instrument manual for specific analysis and correction procedures.

QUALITY CONTROL REQUIREMENTS

Precision of ±30 percent. Daily calibration.

GLT925/057.50

MSA

Combustible Gas and Oxygen Alarm

part no. 449900

model 260

instruction manual

IMPORTANT WARNING

Like any piece of complex equipment, the MSA Combustible Gas and Oxygen Alarm will perform as designed only if it is used and serviced in accordance with the manufacturer's instructions. This manual must be carefully read by all individuals who have or will have the responsibility for using or servicing the product. The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following them. NOTE: See other cautions and limitations inside.

Factory Mutual System Approved

Factory Mutual approved as intrinsically safe for Class I, Division 1, Groups C and D and non-incendive for use in Class I, Division 2, Groups A, B, C and D hazardous locations when used with MSA Battery, Pt. No. 457839.

Manufactured by:
MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A. 15208

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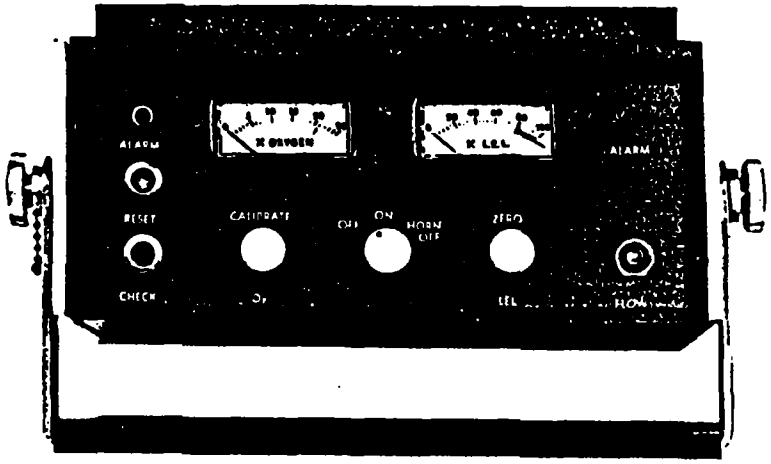

FIGURE 1 — MSA MODEL 260 CONTROL PANEL

I. CAUTIONS AND LIMITATIONS

Prior to testing potentially dangerous atmospheres with the MSA® Model 260 Combustible Gas and Oxygen Alarm the user should be familiar with the first five sections of this instruction manual.

Cautions and limitations associated with the use of the Model 260 are as follows:

1. **The Model 260 is designed to measure combustible gas or vapor content in air. It will not indicate the combustible gas content in an inert gas background, furnace stack or in a reducing atmosphere. Further, this instrument should not be used where the oxygen concentration exceeds that of fresh air (oxygen enriched atmospheres).**
2. **Proper readings are obtained only when the battery has a sufficient level of charge.**
   a. **The battery charge level should be checked occasionally throughout a testing period.**
   b. **Upon receiving a new Model 260, it is recommended that the battery be charged for at least 16 hours.**
   c. **As a regular monthly maintenance item for optimum battery service, the Model 260 should be run for 8 to 10 hours and then fully charged for 24 to 36 hours.**
   d. **After each day of use or if the indicator has not been used for more than 7 days, the battery should be charged for a minimum of 16 hours.**
   e. **Do not operate Model 260 while it is charging.**
   f. **Recharging must be done in a non-hazardous location, known to be free of combustible gases or vapors.**

3. Certain materials such as silicone, silicates and organic lead compounds tend to poison the pelement catalyst thereby giving erroneously low readings. Calibration checks should be made frequently if such materials are suspected to be present in the tested atmosphere. (See Section III for more detail.)
4. The combustible gas indicator detects only combustible gases and vapors in air. It will not indicate the presence of combustible airborne mists or dusts such as lubricating oils, coal dust, or grain dust.
5. Pressurized or low pressure samples will give erroneous oxygen percent readings. For atmospheric sampling at higher or lower altitudes the instrument oxygen meter should be calibrated at the elevation where sampling is to take place.
6. Acid gases, such as carbon dioxide will shorten the service life of the oxygen sensor.
7. The oxygen sensor is packaged separately in an inert atmosphere. It must be installed before the Model 260 can be used.
8. When sampling with accessory sampling lines, a 50 foot sample line will increase the initial response time of the Model 260 to approximately 30 seconds and the final response to approximately 3 minutes. Two 50 foot lines connected in series will increase the response times to 60 seconds and 6 minutes respectively. Lines over 100 feet in length are not recommended.

INITIAL INSTALLATION INSTRUCTIONS FOR OXYGEN SENSOR

The oxygen sensor used in the Model 260 to measure the oxygen concentration is now packaged separately. The oxygen sensor must be installed in the Model 260 prior to placing the instrument into service. Once installed, it should be left in place until end of its useful life, normally one year.

To install the sensor:

1. Remove the carrying handle by loosening both knurled screws and spreading the handle beyond the collars. Lift it from the shafts of the screws.
2. Remove the left side of the case by removing the four mounting screws. Slowly draw the side away from the case as far as the connecting wires will permit. (Hold the case lid to prevent its falling from the case).
3. Slide the top panel approximately three inches from the remainder of the case.
4. Open the protective bag containing the oxygen sensor and install the "O" ring provided onto the threaded end of the sensor.
5. Screw the sensor into the manifold by hand, firmly, so as to compress the "O" ring and prevent sample flow leakage.
6. Push the connectors onto the two terminals at the top of the sensor — the gray wire to the positive terminal and the yellow wire to the negative.

7. Reassemble the case by sliding the top panel back into position.
8. Place the case side in position and install the lid hinge pins into each side.
9. Install the mounting screws. Note: Insert all four screws loosely before tightening any one of them.
10. Reattach the handle.
11. See the instruction manual pages for leak testing the sample flow system and adjusting the oxygen calibration.

II. INSTRUMENT DESCRIPTION

The MSA Model 260 Combustible Gas and Oxygen Alarm is a hand-carried, battery-operated instrument (See Figures 1 and 2). It has been designed to sample atmospheres for combustible gases or vapors and oxygen content and warn the user when pre-determined concentrations of either are reached.

Major features of the Model 260 are ease of operation and reliability. Integrated circuit electronics and rugged components have been used to provide a tough, compact instrument.

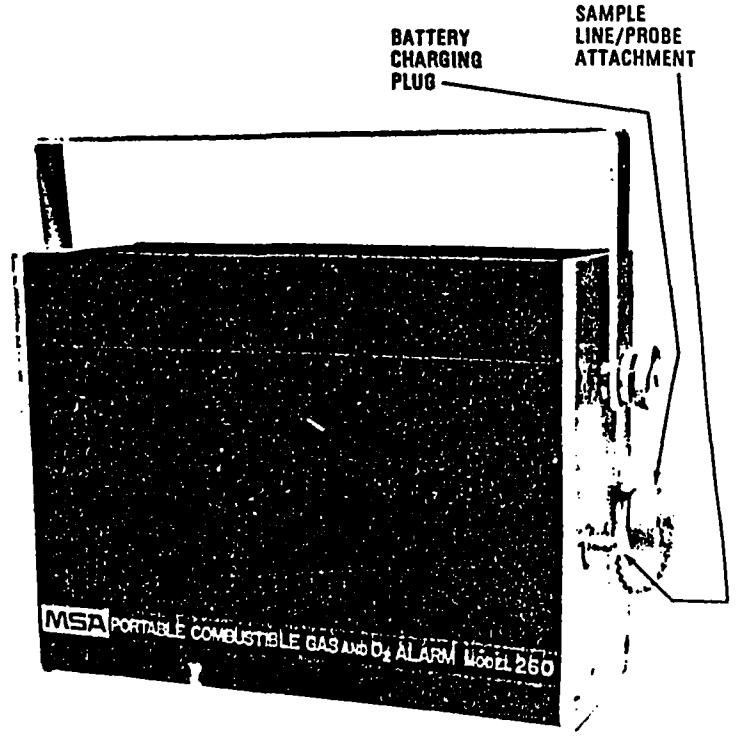

FIGURE 2 —
SAMPLE LINE/PROBE AND BATTERY CHARGING CABLE ATTACHMENTS

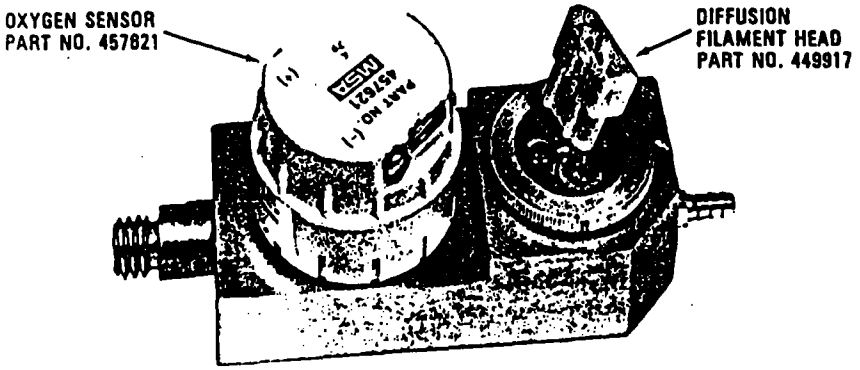

FIGURE 3 — MANIFOLD BLOCK

The Model 260 is two completely separate indicators in a single housing and uses a common flow system. Oxygen and combustible gas concentrations shown on separate meters are automatically indicated by red alarm lights and an audible alarm. Other controls provide quick on-site operational checks. The zero and calibrate controls may have "lift-to-adjust" knobs to prevent accidental changing of adjustments.

A small pump pulls the atmospheric sample through a manifold block in which the oxygen sensor and combustible gas diffusion head are mounted (Figure 3). The flow then passes through the pump and to a flow indicator on the control panel prior to being exhausted (Figure 4). The approximate flow rate is 1 liter per minute.

The Model 260 is powered by a rechargeable 2.4 volt Ni-Cd battery pack (Figure 5) sealed in a plastic case. Recharging circuitry is contained within the instrument. Recharging requires only connecting the instrument into a 115V ac outlet using the cord supplied with the instrument.

The battery also can be recharged from a 12V dc source (such as an automobile battery) by the use of an accessory charge cord. The connectors of the charging cords are keyed to the receptacle on the instrument to prevent accidental use of an incorrect power supply. A fully-charged battery provides over 8 hours of continuous non-alarm operation.

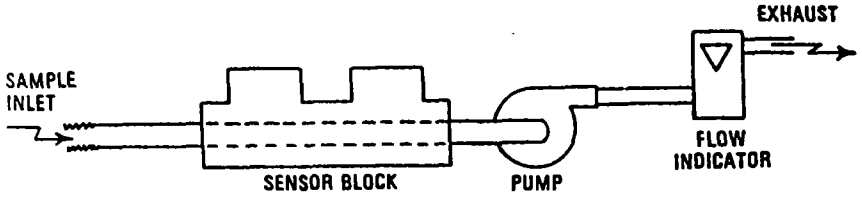

FIGURE 4 — FLOW DIAGRAM

III. USE AND LIMITATIONS

The MSA Model 260 Oxygen and Combustible Gas Alarm provides an efficient and reliable method of testing atmospheres for sufficient oxygen content for life support and/or the presence of combustible gases or vapors which may pose a potential flammability hazard. Common examples of such locations are man-holes, storage tanks, tank cars, confined spaces, pumping stations, etc.

It is important that the instrument response be appraised by someone skilled or experienced in properly interpreting the instrument readings with respect to particular conditions, on-going operations and safe practices. For example, an atmosphere that shows no flammability hazard can still be toxic to workmen. Also a tank or vessel which is safe before work is initiated may be rendered unsafe by work activities which cause a temperature increase, or by stirring or handling bottom sludge in petroleum tanks.

Combustible gases will burn or explode only when the fuel/air mixtures are within certain proportions. For most common hydrocarbon gases this range of proportions runs from approximately 1% to as high as 15% by volume in air. The minimum concentration of a particular combustible gas in air which can be ignited is defined as the LOWER EXPLOSIVE LIMIT; abbreviated L.E.L. The maximum concentration that can be ignited is defined as the UPPER EXPLOSIVE LIMIT; abbreviated U.E.L. In some references the terms are called LOWER and UPPER LIMITS of FLAMMABILITY (LFL or UFL).

The combustible measurement is dependent upon catalytic combustion of the flammable gas in combination with the oxygen in the air. Conditions can exist in a closed space where not enough oxygen remains to provide a correct combustible gas reading. (NOTE: This low oxygen level is far below what is required for human life.) In these instances, the % oxygen reading is most important. A low oxygen concentration in an enclosed atmosphere indicates that: (1) some other gas has displaced much of the air, or (2) some process has consumed much of the available oxygen.

Upon initially opening and probing an enclosed area, move the probe into the area slowly while watching the meters to provide the earliest possible indication of a potentially dangerous condition.

Be prepared to vacate the area if the Model 260 combustible or oxygen meter indicates the possibility of a hazardous condition.

The oxygen sensor responds to the partial pressures of oxygen in the atmosphere being tested. For this reason, changes in atmospheric or sample pressure will change the oxygen reading. Calibration should be checked and adjusted at the elevation where the instrument is to be used.

The oxygen sensor is temperature compensated in the range of 32 to 104°F (0 to 40°C), use down to 0°F is possible when calibrated at the temperature and if more sampling time is allowed for slow sensor response — approximately 3 minutes without sample line.

The life of the oxygen sensor is reduced by exposure to carbon dioxide. The sensor life will be reduced to 2 days in 100% carbon dioxide. Therefore all tests of atmospheres containing excess concentrations of carbon dioxide should be stopped as soon as a constant reading is obtained. Abnormally slow recoveries to the air calibration point after exposure to high carbon dioxide is to be expected.

Certain materials in the sampled atmosphere affect the catalytic material on the pelement and may cause the indicator to respond incorrectly. Included are organic lead compounds such as are used in leaded gasoline and silicon compounds in the form of silanes, silicones and silicates (often found in hydraulic fluids).

When an atmosphere contaminated with leaded gasoline is tested, the lead produces a solid product of combustion which, upon repeated exposure, may develop a coating upon the detector pelement resulting in a loss of sensitivity. To reduce this possibility, an inhibitor-filter is available for insertion in an external cartridge holder. This device chemically reacts with the tetra-ethyl lead vapors to produce a more volatile lead compound.

The inhibitor-filters are available in packages of six each and identified by part number 47740. Each consists of a glass ampoule wrapped with cotton and filled with chemical. To prepare the item for use, the ampoule should be crushed between the fingers then inserted in the external cartridge holder. One inhibitor-filter will provide instrument protection for eight hours of continuous testing.

Silanes, silicones, silicates and other volatile compounds containing silicon in the tested atmosphere may seriously impair the response of the instrument. Some of these materials rapidly "poison" the detector filament so that it will not function properly. When such materials are even suspected to be in the atmosphere being tested, the instrument calibration must be checked after each series of tests.

As mentioned previously, the battery must have a sufficient charge level for the Alarm to function properly. For this reason, a convenient battery check push-button has been included on the Alarm control panel. The battery should also be performance-checked monthly. See Section VI, MAINTENANCE AND CALIBRATION.

The Model 260 Combustible Gas Indicator is normally calibrated on pentane as being representative of the flammability characteristics of most commonly encountered combustible gases. The meter scale is calibrated from zero to 100% L.E.L. which corresponds to actual volume concentrations of 0 to approximately 1.4% pentane in air. A booklet of response curves is supplied with the Model 260. These curves may be used to interpret meter readings when sampling combustible gases other than pentane. Calibration for combustibles other than pentane may be made on special order.

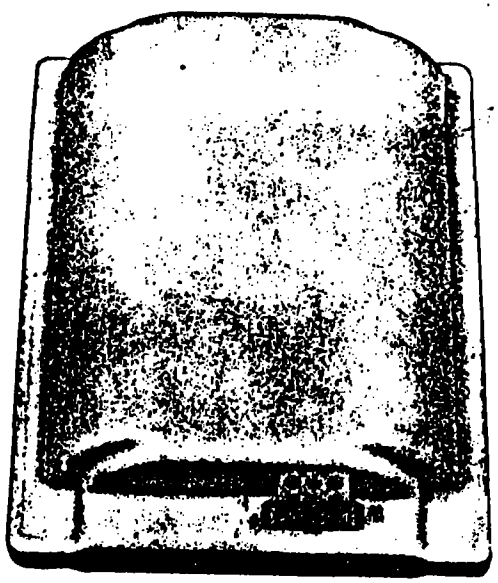

FIGURE 5 — BATTERY PACK

Accessory Items

A number of accessories are available for use with the Model 260 Combustible Gas and Oxygen Alarm. Part numbers are listed in the last section.

Sample lines	special synthetic rubber lines which have minimal gas adsorption characteristics are available in 5, 10, 25 and 50 foot lengths.
Sample probes	3-foot hollow brass probe, a 3-foot plastic probe for possible electrical hazards and a 4-foot solid end probe to prevent liquid pickup from wet tank bottoms, etc.
Dust filter	a cotton filter fitting an external holder provides sensor protection from dirt accumulation in dusty or dirty atmospheres.
Inhibitor filter	protects catalytic filaments from being "poisoned" by leaded fuels. Fits external filter holder.
External filter holder	accommodates either a dust filter or an inhibitor filter.
Line trap assembly	prevents liquids from being drawn into the instrument.

Calibration check equipment ....consists of a supply of calibration gas, a flow regulator and an adapter hose.

Harness, carrying .....neck and waist straps to hold the Model 260 while climbing etc.

IV. PRINCIPLES OF OPERATION

A block diagram of the MSA Model 260 is shown in Figure 6. The oxygen and combustible gas indicators are operated simultaneously. Each indicator has an alarm warning light which provides a visual alarm signal. An alarm signal on either unit will energize an audible alarm as well. A switch allows the audible alarm to be turned off if so desired. The alarm lights will stay on until the reset button is pushed after the concentration returns to the predetermined level.

Oxygen Analyzer

The oxygen analyzer is a galvanic type cell containing dissimilar metal electrodes in a special electrolyte. The cell is sealed with a membrane which allows oxygen to diffuse into the active area. The current generated by the cell is proportional to the oxygen partial pressure in the atmospheric sample passing over the face of the membrane. The generated current passes through a resistance to provide a voltage input signal for an amplifier. The output of the amplifier drives the oxygen indicating meter and also serves as an input to the alarm comparator circuitry.

Combustible Gas Indicator

The flammable properties of combustible gases are used as a basis of detection for the combustible gas indicator. The sensor consists of a pair of pelletized filaments called "pelements" arranged in an electrically balanced bridge circuit. The detector pelement is treated with a special catalyst. The catalyst causes the combustible gases to combine with oxygen at much lower temperatures than would be required for normal burning. The inactive compensator pelement is also exposed to the sample flow and acts to offset any electrical changes caused by flow conditions, sample temperature, pressure and/or humidity.

Combustible gases in the sample combine with oxygen at the surface of the catalyzed detector pelement. Heat is liberated by this chemical reaction increasing the temperature of this pelement causing an associated increase in the pelement electrical resistance.

Increased resistance of the detector pelement unbalances the bridge causing a voltage change in the mid-point connection between the detector pelement and compensating pelement. This voltage signal is applied to an amplifier which drives the combustible gas indicating meter and provides an input for an alarm comparator circuit.

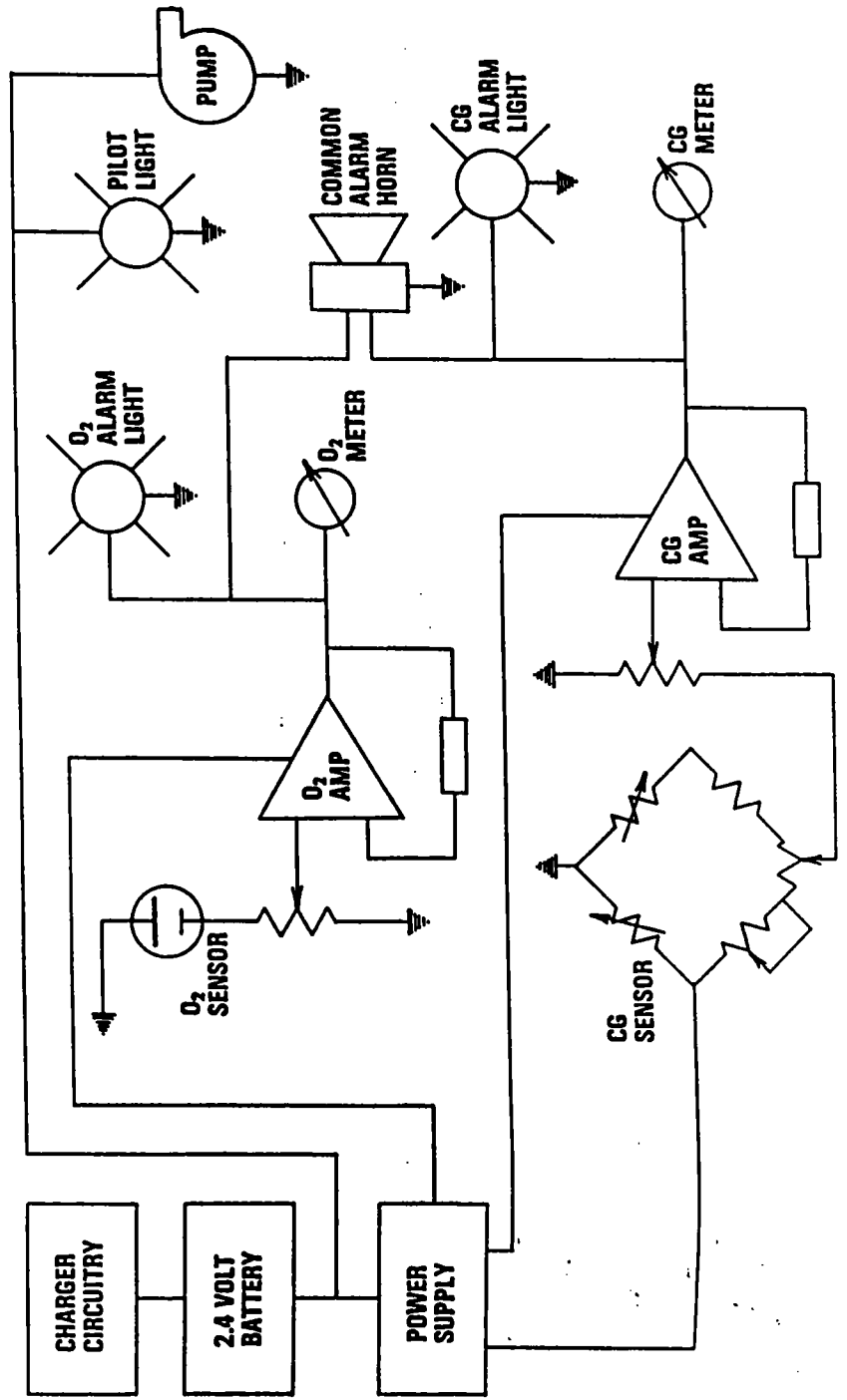

FIGURE 6 — BLOCK DIAGRAM

V. OPERATING PROCEDURE

The Model 260 should be checked and "zeroed" in an uncontaminated atmosphere. Refer to Figure 1 and use the following procedure.

1. Open the instrument lid. Turn the center ON-OFF control to the far right HORN-OFF position. Both meter pointers will move and one or both alarm lights may light.
2. If the % oxygen meter pointer stabilizes at a value other than 20.8%, the pointer should be set to 20.8% by using the CALIBRATE O_2 control.
3. The % LEL meter pointer should be set to zero by adjusting the ZERO LEL control.
4. If either the alarm lights are lighted press the Alarm Reset button.
5. Momentarily place a finger over the sample inlet fitting or the end of the sample line probe. Observe that the flow indicator float drops out of sight indicating no flow. If the float does not drop, check out the flow system for leaks as described under Section VII.
6. Press the CHECK button and observe the % LEL meter. The pointer must read at 80% LEL or higher as marked by the BATTERY zone on the meter. If the pointer reading is less, the batteries must be recharged. No tests should be attempted as the instrument will not perform properly. See Section VI for battery charging instructions.
7. If it is desired that the audible alarm sound for combustible gas or low oxygen concentrations, turn the center ON-OFF control back one position to the ON setting.
8. Accessory equipment such as sampling lines, probes, carrying harness, filters or line traps should be attached as required. See Figure 2.
9. The instrument is ready for atmospheric sampling.

VI. MAINTENANCE AND CALIBRATION

Battery Service

The primary maintenance item of the Model 260 is the rechargeable 2.4 volt nickel cadmium (Ni-Cd) battery (Figure 7). The battery is recharged by simply removing the screw cap covering receptacle and connecting one end of the charging cable to the instrument and the other end to a 115V ac outlet.

If desired, the battery can be recharged from a 12V dc source. An accessory battery charging cable is available, one end of which plugs into the Model 260 while the other end is fitted with an automobile cigarette lighter plug.

Recommended charging time is 16 hours. It may be left on charge for longer periods without damaging the battery.
CAUTION: RECHARGING MUST BE DONE IN A NON-HAZARDOUS LOCATION.

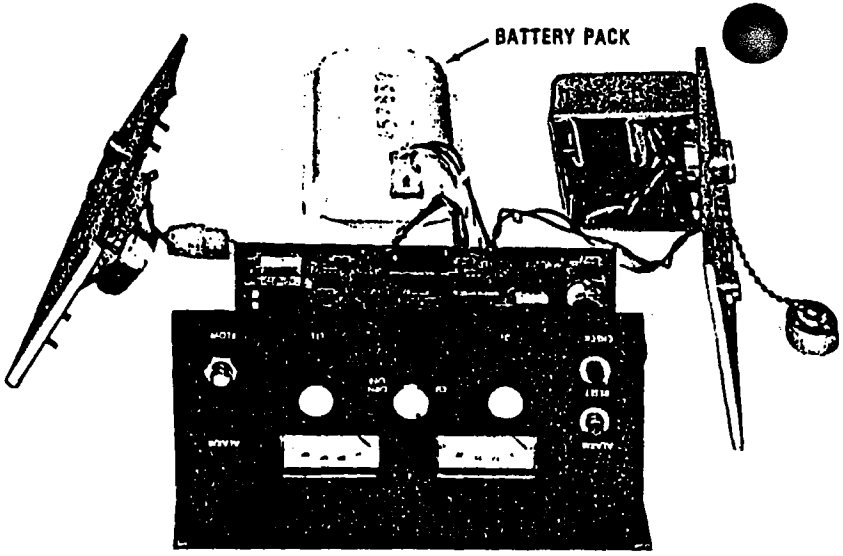

FIGURE 7 — DISASSEMBLY SHOWING BATTERY PACK

The batteries sometimes will not supply full power capacity after repeated partial use between chargings. For this reason, it is recommended that the batteries be "exercised" at least once monthly. Run the Model 260 for 8 to 10 hours and then recharge.

If the instrument has not been used for 30 days, the batteries should be charged prior to use.

Should the battery not respond to recharging or not "hold" a charge, the battery should be replaced. Replacement procedure is as follows:

1. Loosen the knurled screws holding the handle and remove the handle.
2. Looking at the front panel of the instrument, remove the right side (audible alarm side panel) by unscrewing the four side panel screws.
3. Gently pull the side panel loose and tilt the instrument to help the battery case slide out. Disconnect the molded nylon plug.
4. Install new battery in the reverse procedure outlined above.

Calibration

Before the calibration of the combustible gas indicator can be checked, the Model 260 must be in operating condition as described in the OPERATING PROCEDURE, Section V. Optional calibration equipment is shown in Figure 8. Calibration check-adjustment is made as follows:

1. Attach the flow control to the recommended calibration gas tank.
2. Connect the adapter-hose to the flow control.
3. Open flow control valve.
4. Connect the adapter-hose fitting to the inlet of the instrument; after about 15 seconds the L.E.L. meter pointer should be stable and within the range specified on the calibration sheet accompanying the calibration equipment. If the meter pointer is not in the correct range, stop the flow, remove the right hand side cover. Turn on the flow and adjust the "S" control with a small screwdriver to obtain a reading as specified on the calibration sheet.
5. Disconnect the adapter-hose fitting from the instrument.
6. Close the flow control valve.
7. Remove the adapter-hose from the flow control.
8. Remove the flow control from the calibration gas tank.
9. Replace the side cover on the Model 260.

CAUTION: Calibration gas tank contents are under pressure. Use no oil, grease or flammable solvents on the flow control or the calibration gas tank. Do not store calibration gas tank near heat or fire or in rooms used for habitation. Do not throw in fire, incinerate or puncture. Keep out of reach of children. It is illegal and hazardous to refill this tank. Do not attach the calibration gas tank to any other apparatus than described above. Do not attach any gas tank other than MSA calibration tanks to the regulator.

Printed Circuit Board Adjustments

The printed circuit board contains six adjustment pots as shown in Figure 9. These are identified as:

Combustible Gas Indicator

CZ — coarse zero is adjusted by setting the ZERO L.E.L. control at mid-range; sampling fresh air and adjusting the % L.E.L. meter to read zero.

S — span is adjusted after proper zeroing by sampling calibration gas and adjusting the read-out accordingly.

CHK — this controls the battery charge indication and should read at "B" in the word BATTERY on the meter face when the battery voltage measured with a voltmeter is 2.40V.

CGA — the combustible gas alarm point is factory set at 50% L.E.L.

Oxygen Indicator

OA — the oxygen alarm point adjustment. It is factory set at 19.5% oxygen.

OT — oxygen trim is factory adjusted with the instrument turned on to obtain a zero reading on the oxygen meter when sampling a pure inert gas (100% nitrogen).

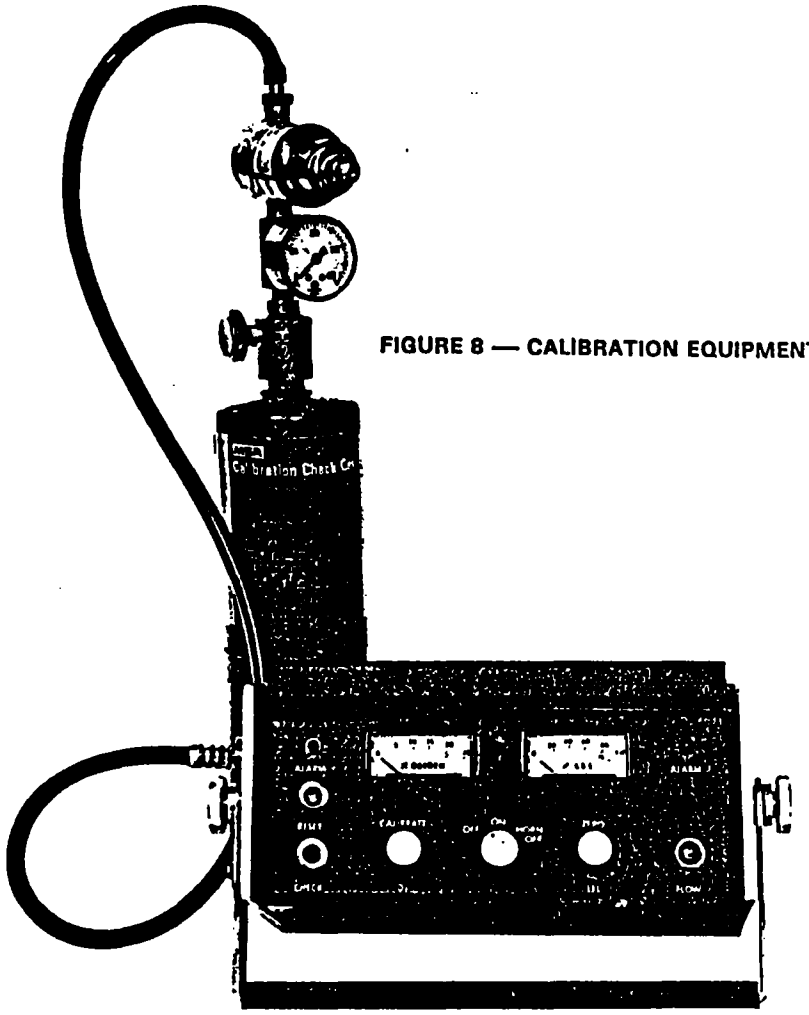

FIGURE 8 — CALIBRATION EQUIPMENT

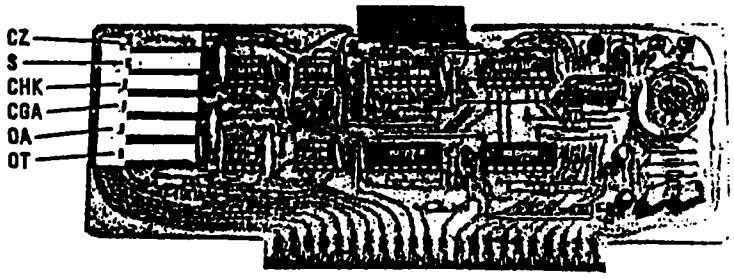

FIGURE 9 — PRINTED CIRCUIT BOARD ADJUSTMENTS

VII. TROUBLE-SHOOTING AND REPAIR

Difficulties with the Model 260 can be localized by disassembling the instrument and performing a few tests described below. Refer to Figure 10. Disassembly procedure is:

1. If an accessory is attached to the side of the instrument case, disconnect it.
2. Remove the carrying handle.
   a. Loosen both knurled screws.
   b. The arms of the handle ride on a collar. Spread the arms beyond the collar and lift the handle from the shaft of the knurled screw.

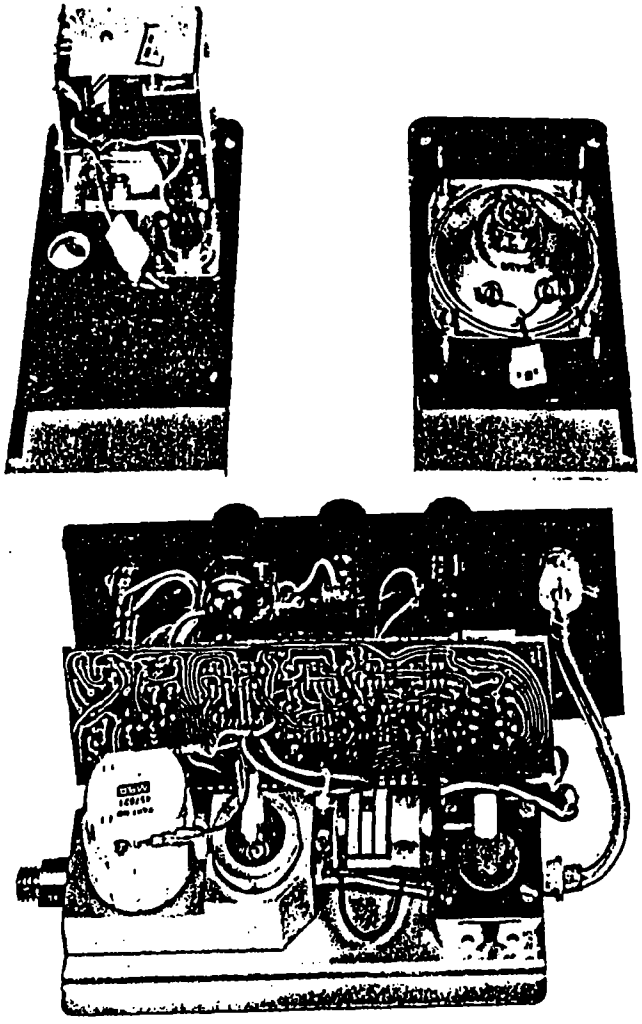

FIGURE 10 — DISASSEMBLY PHOTO

3. Remove both sides of the case by removing the two sets of four screws. Slowly draw the sides away from the case as far as the connecting wires will permit.
4. Disconnect molded nylon plugs from battery and the speaker.
5. Slide the battery out of the case.
6. All of the remaining components and wiring are bolted to the top panel of the case. This panel assembly can be removed as a unit by simply sliding the assembly from the extruded sides of the case.
7. For trouble-shooting, the battery can be re-connected after the instrument is out of the case.

Flow System

Flow problems — should flow continue when the inlet is shut, a leak in the flow system is indicated. Stop off the flow at the pump inlet ascertaining that the pump stalls. Work back the flow path towards the sample inlet until the leak is identified.

Pump — the pump and motor are capable of 750 to 1000 hours of sampling. After this period of time the motor may fail to start or may run erratically. The pump assembly should be replaced if the panel mounted flow indicator indicates no flow when the instrument is turned on and the battery check reading indicates a charged battery. The pump assembly is replaced as follows:

1. Remove the printed circuit board.
2. Unsolder the pump leads.
3. Remove the two screws from the base of the Pump Assembly.
4. Withdraw the Pump Assembly and remove the plastic tubing.
5. Attach the new Pump Assembly (pump and motor) to the mounting plate with the two screws.
6. Connect the plastic tubing to the pump.
7. Solder the pump power leads to the motor terminals.
   a. Solder the red wire to the positive terminal of the motor.
   b. Solder the black wire to the negative terminal of the motor.
8. Insert the printed circuit board, check operation and reassemble the instrument.

Oxygen Cell

The Oxygen Cell should perform for approximately one year without attention or maintenance. Eventually, however, it will lose sensitivity. When it does, the meter needle can no longer be set to 20.8% with the CALIBRATE knob when sampling uncontaminated fresh air. At this time, the cell should be replaced. Use the following procedure. Refer to Figure 11.

To remove the Oxygen Cell, disassemble the instrument and remove the printed circuit board.

1. Disconnect the positive (gray) and negative (yellow) slip-on leads from the Oxygen Cell.
2. Turn the Oxygen Cell counterclockwise to remove it and its O-ring from the manifold.

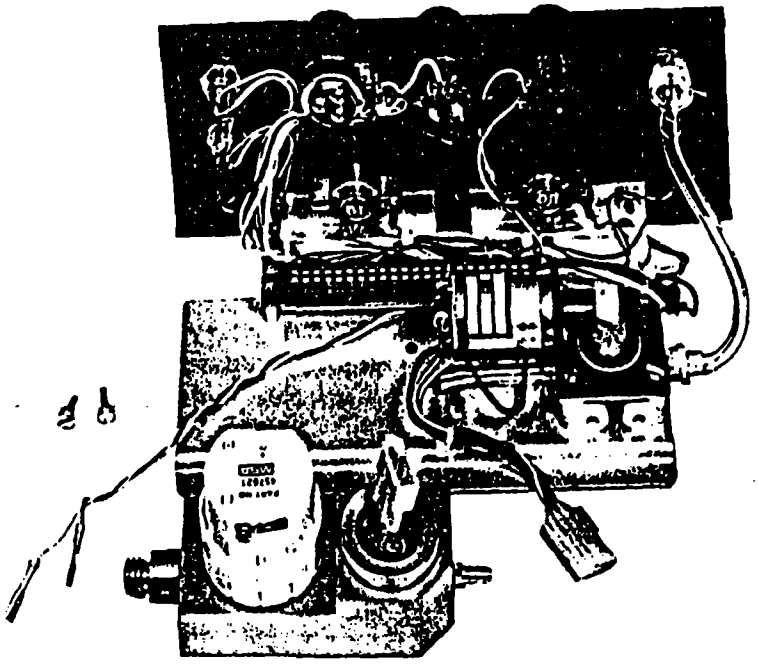

FIGURE 11 — SENSOR REPLACEMENT

3. Install the O-ring and the new Oxygen Cell.
4. Connect the gray lead to the positive terminal and the yellow lead to the negative terminal.
5. Check for leaks in flow system; see step 5 of Operation Procedure.
6. Reassemble the instrument; turn ON and check the O_2 calibration — adjust if necessary.

Combustible Gas Indicator

It is recommended that at least once each week the combustible gas indicating portion of the instrument be checked for operating accuracy with a known gas-air mixture and be adjusted as necessary. (MSA supplies such calibration equipment as accessory items.) If proper calibration cannot be attained and/or the combustible gas meter cannot be zeroed, then the sensor diffusion head should be replaced and the instrument calibrated. Use the following procedure:

1. Unplug the nylon connector from the sensing head. Refer to Figure 11.
2. The diffusion head is held to the manifold with a retaining ring. Unscrew the retaining ring by turning it counterclockwise, remove the diffusion head and remove the O-ring.
3. Insert the O-ring and the new diffusion head into the manifold.
4. Lock the diffusion head to the manifold with the retaining ring. Use enough finger pressure on the retaining ring to compress the O-ring.
5. Connect the nylon sensing head plug.
6. Reassemble the instrument.
7. Check for leaks in flow system, see step 5 of Operation Procedure.
8. Check calibration: see Maintenance and Calibration.

If additional servicing is required, send the complete instrument to: **Mine Safety Appliances Company**
Repair Department
7522 Meade Street
Pittsburgh, Pennsylvania 15208

VIII. PARTS AND ACCESSORIES LIST

When ordering MSA Combustible Gas and Oxygen Alarm, or any of the replacement parts or accessories, please use part numbers.

Description	Part No.
Combustible Gas and Oxygen Alarm Model 260	449900
5-foot synthetic rubber sampling line complete with couplings	11354
10-foot synthetic rubber sampling line complete with couplings	11955
15-foot synthetic rubber sampling line complete with couplings	11912
25-foot synthetic rubber sampling line complete with couplings	11913
50-foot synthetic rubber sampling line complete with couplings	11958
Tube, 3-foot hollow brass probe	11961
Tube, 3-foot plastic probe	73743
Rod, 4-foot solid brass probe	11960
Filter, Cotton Dust, package of 6	16499
Filter, Inhibitor, package of 6	47740
External cartridge holder	14273
Line trap	74809
Line trap adaptor	459641
Oxygen Sensor	457621
Pump Assembly	449965
Harness, carrying	457754
Cable, charging, 115V 60Hz ac	449918
Cable, charging, 12V dc	449919
Diffusion Head	449917
Battery Pack	457839
Calibration:	
Flow control, 1.5 1/m	459948
Cylinder, gas 0.6% Propane in air	459943
Adapter, Hose	449401

MSA Instrument Division
Instruction Manual:

MODEL 360 CARBON MONOXIDE, COMBUSTIBLE GAS & OXYGEN ALARM OR MODEL 361 HYDROGEN SULFIDE, COMBUSTIBLE GAS & OXYGEN ALARM

MINE SAFETY APPLIANCES COMPANY - INSTRUMENT DIVISION
P.O. BOX 427, PITTSBURGH, PENNSYLVANIA 15230

6870 (L) REV 8

476473

IMPORTANT WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR INSTALLING, USING, OR SERVICING THE PRODUCT. Like any piece of complex equipment, the MODEL 360 CARBON MONOXIDE, COMBUSTIBLE GAS & OXYGEN ALARM OR MODEL 361 HYDROGREN SULFIDE, COMBUSTIBLE GAS & OXYGEN ALARM will perform as designed only if it is installed, used and serviced in accordance with the manufacturer's instructions. OTHERWISE IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE BODILY INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not installed, used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following them. We encourage our customers to write or call for a demonstration of this equipment prior to use or for any additional information relative to use or repairs.

CAUTIONS AND WARNINGS

1. The toxic sensors used in the Model 360 or 361 are designed to detect carbon monoxide or hydrogen sulfide, respectively. These two toxic gases may be present in work areas. Other toxic gases and vapors may also be present in work areas which cannot be detected by the Model 360 or 361. Every work area should be appraised by someone trained in hazard control to make sure that the correct instrument is chosen and to determine whether other instruments or methods should be used in addition to the Model 360 or 361 to prevent possible exposures to other toxic gases.

2. The toxic gas sensors will exhibit cross-sensitivities to several other gases (NOTE: See Section 6 for cross-sensitivity tables).

3. Handle the toxic sensor carefully; it is a sealed unit which contains an acid electrolyte. If electrolyte is leaking from the sensor, exercise caution so that the electrolyte does not contact skin, eyes or clothing, thus avoiding acid burns. If contact occurs, rinse the area immediately with a large quantity of water. In case of contact with eyes, immediately flush eyes with plenty of clean water for at least 15 minutes and contact a physician.

4. The combustible gas sensor of the Model 360 or 361 is designed to measure combustible gas or vapor content in air. It will not indicate the combustible gas content in an inert gas background, furnace stack or in other atmospheres with less than 10% oxygen. Further, these instruments should not be used where the oxygen concentration exceeds that of fresh air (oxygen enriched atmospheres) because the extra oxygen makes any combustible mix easier to ignite and, thus, more dangerous.

5. Certain materials such as silicone, silicates and organic lead compounds tend to poison the combustible gas sensor, thereby causing erroneously low readings. Calibration checks should be made frequently if such materials are suspected to be present in the tested atmosphere. (NOTE: See Uses and Limitations, Section 1 - OPERATION for more detailed information.)

6. The combustible gas sensor detects only combustible gases and vapors in air. It will not indicate the presence of combustible airborne mists or dusts such as lubricating oils, coal dust or grain dust.

7. Combustible gases will burn or explode only when the fuel/air mixtures are within certain proportions. The minimum concentration of a particular combustible gas in air which will burn and continue to burn when ignited is defined as the lower explosive limit (LEL). The maximum concentration that can be ignited is defined as the upper explosive limit (UEL). In some references, the terms used are lower and upper flammable limits (LFL and UFL). See Uses and Limitations, Section 1 - OPERATION.

8. Before each day's usage, sensitivity must be tested on a known concentration of the combustible gas for which the instrument is calibrated (equivalent to 25% to 50% of full-scale concentration). The indication must be equal to or higher than the actual concentration.

9. The oxygen sensor of the Model 360 or 361 detects the partial pressure of the oxygen in the sample. High or low pressure samples will give erroneous oxygen percent (%) readings. For atmospheric sampling at higher or lower altitudes, the instrument oxygen meter should be calibrated at the elevation where sampling is to take place.

10. Acid gases, such as carbon dioxide will shorten the service life of the oxygen sensor.

11. The oxygen and toxic gas sensors are packaged separately in sealed containers. They must be installed before the Model 360 or 361 can be used.

12. Sampling lines will increase the response time of the instrument. For example: a 50-foot sample line will increase the initial response time of the Model 360 or 361 to approximately 30 seconds and the final response to approximately 3 minutes.

13. Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance and may void all warranties and approvals. Repair or alteration of the Model 360 or 361 beyond the scope of these maintenance instructions, by anyone other than a certified MSA serviceman, may void all warranties and approvals.

14. Proper readings are obtained only when the battery has a sufficient level of charge.
    a. Upon receiving a new Model 360 or 361, it is recommended that the battery be charged for at least 14 hours.

    b. After each day of use the battery should be charged for a minimum of 14 hours.

    c. Recharging must be done in a non-hazardous location to prevent the potential ignition of combustible atmospheres.

    d. Do not operate the Model 360 or 361 while the battery is being charged.

e. As a regular monthly maintenance item for optimum battery service, the Model 360 or 361 battery should be charged for 14 hours. Then run the instrument for 8 hours and fully charge the battery for 24 to 36 hours.

15. The sample inlet filter should be examined each time the Model 360 or 361 is recharged. If the filter element appears to be coated with dust or dirt, it should be washed, dried and reinserted or a new element substituted. Make sure that the inlet seal O-ring in the inlet filter cap is properly seated. If O-ring is damaged or missing, the O-ring must be replaced before using the Model 360 or 361 with any sampling accessories.

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SECTION 1
OPERATION

GENERAL SPECIFICATIONS

Performance Characteristics

- ACCURACY: Combustible Gas: ±3% LEL up to 50% of full-scale; ±5% LEL, 50% to 100% of full-scale
  Oxygen: ±0.8% O_2, 0% to 10% oxygen
  ±0.3% O_2, 10% to 25% oxygen
  Toxic Gas: When calibrated with 300 ppm CO or 40 ppm H_2S calibration gas at temperature of use:
  Model 360: ±10 ppm CO or ±10% of reading (whichever is greater)
  Model 361: ±2 ppm H_2S or ±10% of reading (whichever is greater)

- RANGES: Toxic Gas: o Model 360: 0 to 500 ppm CO;
  o Model 361: 0 to 50 ppm H_2S
  Combustible Gas: 0 to 100% LEL measurement; 60% LEL maximum alarm set point
  Oxygen: 0 to 25% O_2

- RESPONSE TIME TO 90% OF FINAL READING:
  Combustible Gas: 15 seconds
  Oxygen: 20 seconds

- OPERATING HUMIDITY RANGE:
  10 to 90% RH; (NOTE: Long-term exposures to extreme limits of humidity will reduce the life of the toxic gas sensor.)

- OPERATING TEMPERATURE RANGE:
  32° to 104°F (0° to 40°C)
  Model 360: Temperature compensated for a maximum error of ±25 ppm CO from 0° to 40°C
  Model 361: Temperature compensated for a maximum error of ±5 ppm H_2S from 0° to 40°C

- STORAGE TEMPERATURE RANGE: 32° to 104°F

- ALARMS: High Oxygen, Low Oxygen, High Combustible Gas and High Toxic Gas Alarms (all adjustable); Off-scale, LEL Latching and Low Battery Alarms (not adjustable)

Operating Characteristics

- POWER SUPPLY: Rechargeable, sealed, 4.0-volt lead-acid battery pack

- OPERATING TIME: A minimum of 8 hours with fully charged battery

- READOUT: LCD with individual descriptors for range identification & alarms:
  - SCAN Mode: The LCD digital display automatically and sequentially switches to each of the three sensors for approximately 7 seconds per sensor (NOTE: All three alarm circuits are continuously monitored, regardless of display readout)
  - MANUAL Mode: The LCD digital display is connected to one of the three sensors manually selected by a push button control (NOTE: All three alarm circuits are continuously monitored, regardless of display readout)

- SAMPLE FLOW RATE: Approximately 1.5 liters per minute

Physical Characteristics

- CASE CONSTRUCTION: Aluminum
- DIMENSIONS: 10 x 7 x 3-3/4 in.
- WEIGHT: 7-1/2 lbs.
- ACCESSORIES: Sample lines up to 50 feet long, sample line liquid trap, probe tubes, 120 and 240 VAC battery chargers, carrying harness, and calibration kits are available
- SERIAL NUMBER: Located on nameplate inside of lid

INTRODUCTION

Prior to testing potentially dangerous atmospheres with the MSA® Model 360 or 361 Toxic Gas, Combustible Gas and Oxygen Alarm, the user must be familiar with all sections of this Instruction Manual.

The Model 360 or 361 is a hand-carried, battery-operated instrument (Figures 1A, 1B and 2). It is designed to sample atmospheres for carbon monoxide concentration (Model 360), hydrogen sulfide concentration (Model 361), combustible gases or vapors, oxygen content, and to warn the user when predeterminded concentrations are reached.

Major features of the Model 360 or 361 are ease of operation and reliability; the integrated circuit electronics and rugged components provide a tough, compact instrument.

The Model 360 or 361 houses three separate sensors and uses a common flow system. The zero and calibration controls have "lift-to-adjust" knobs to prevent any accidental change in adjustments.

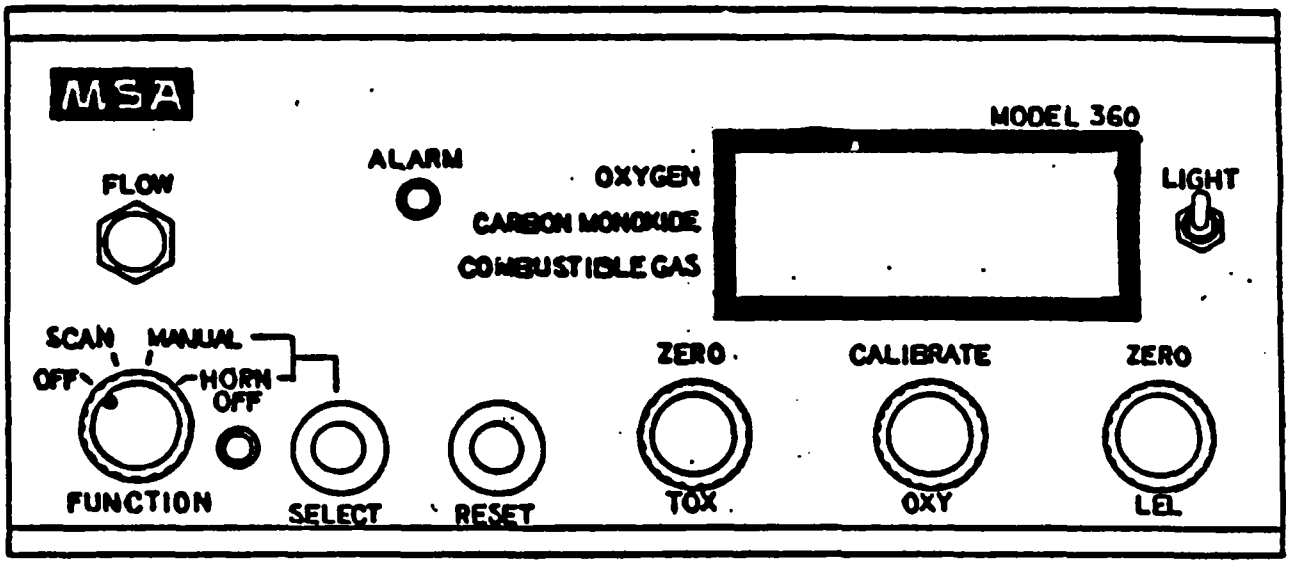

Figure 1A. MSA Mode 360 Control Panel

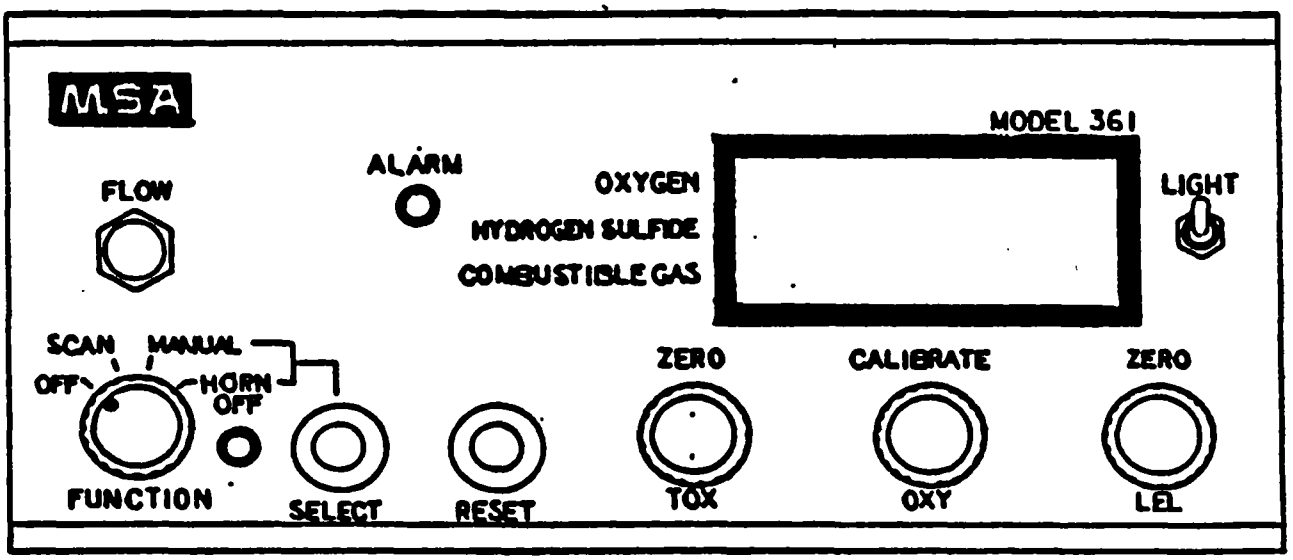

Figure 1B. MSA Mode 361 Control Panel

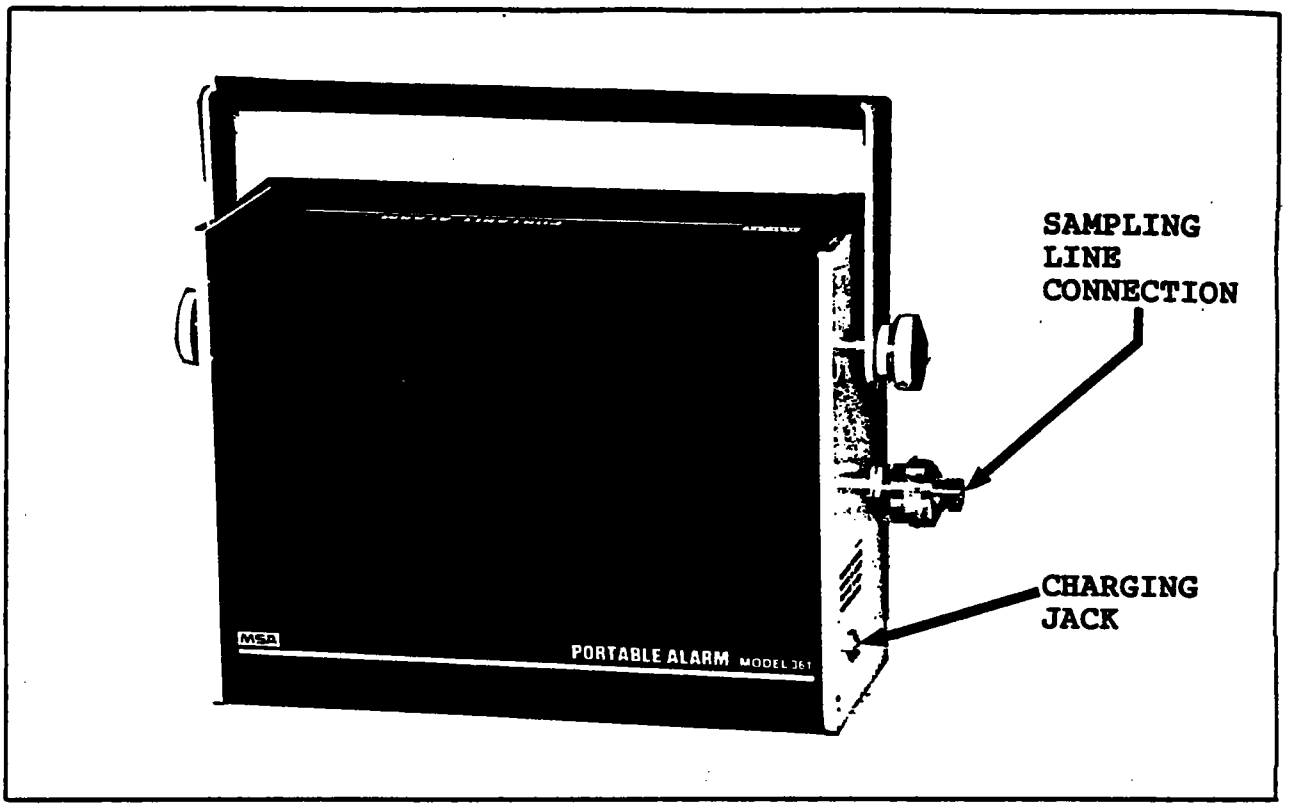

Figure 2. Sample Line/Probe Connection and Battery Charging Jack

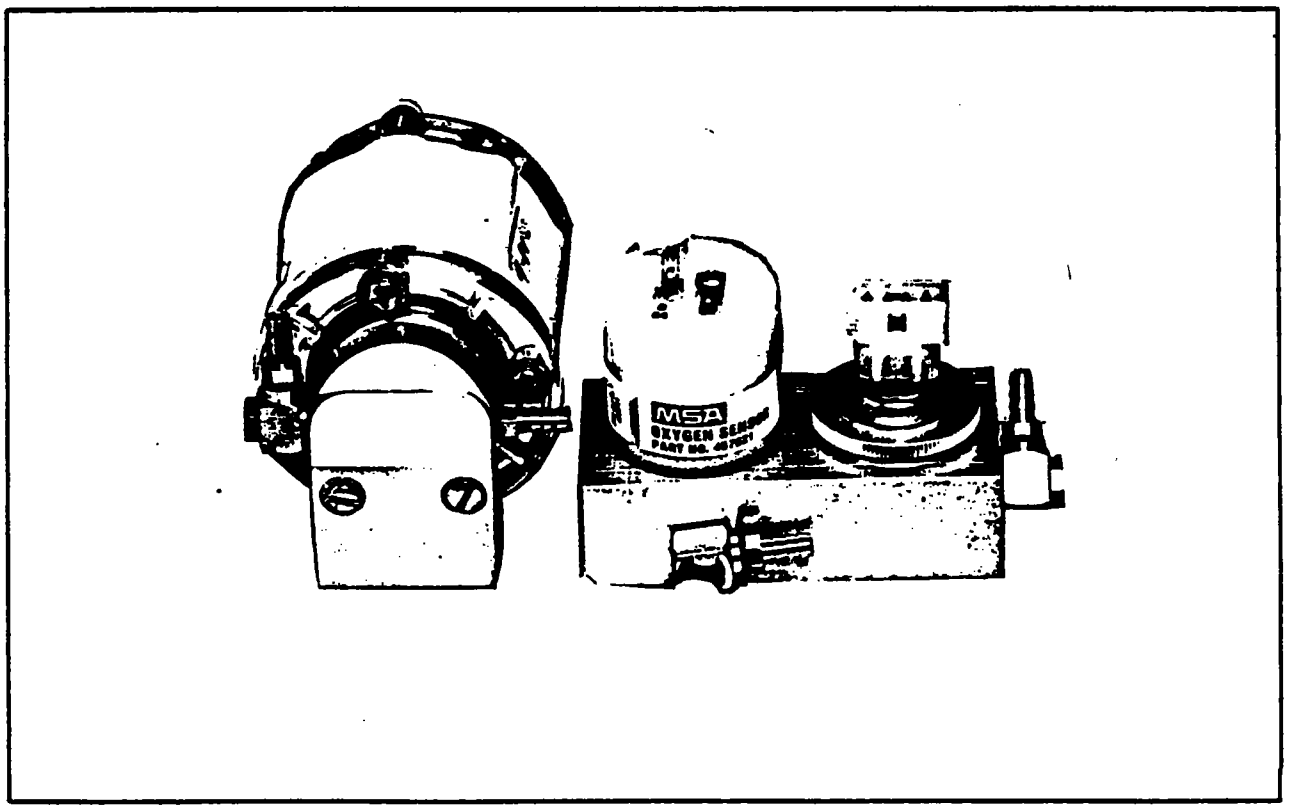

Figure 3. Manifold Blocks

A small pump pulls the atmospheric sample through a filter and pushes it through the manifold blocks in which the toxic gas, combustible gas and oxygen sensors are mounted (Figure 3). The flow then passes through a flow indicator on the control panel (Figure 4) and is finally exhausted to the side of the case. The approximate flow rate is 1.5 liters per minute.

The Model 360 or 361 is powered by a rechargeable, 4.0-volt lead-acid battery pack (Figure 5) sealed in a plastic case. Recharging requires only connecting the instrument to the charger. (NOTE: 120-volt and 240-volt versions are available.) A fully charged battery provides a minimum of 8 hours continuous non-alarm operation at normal temperatures.

USES AND LIMITATIONS

The MSA Model 360 or 361 Alarm provides an efficient and reliable method of testing atmospheres for: the presence of carbon monoxide (Model 360) or hydrogen sulfide (Model 361); combustible gases or vapors which may pose a potential flammability hazard; and sufficient oxygen content for life support. Common examples of such locations are manholes, storage tanks, tank cars, confined spaces, pumping stations, etc.

It is important that the instrument response be appraised by someone trained or experienced in properly interpreting the instrument readings with respect to particular conditions, on-going operations and safe practices. For example, an atmosphere that shows no flammability hazard can still be toxic to workmen. Also, if there is less than 10% oxygen, the instrument may not give an accurate combustible gas reading. Further, a tank or vessel which is safe before work is initiated may be rendered unsafe by changing conditions or work activities, such as by causing a temperature increase, or by stirring or handling bottom sludge in petroleum tanks.

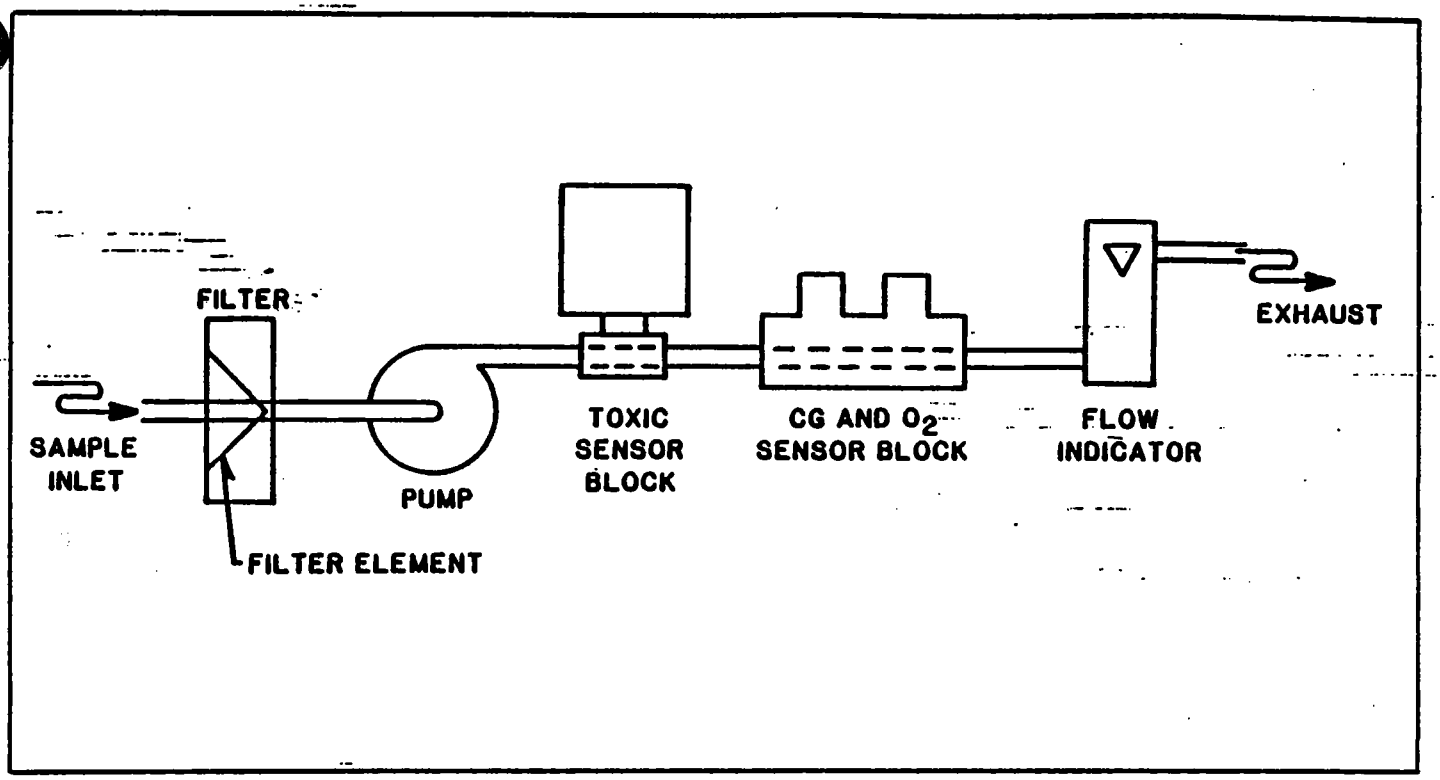

Figure 4. Flow Diagram

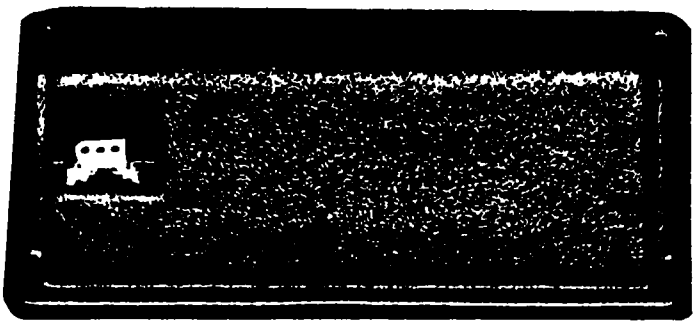

Figure 5. Battery Pack

The toxic sensors used in the Model 360 or 361 are designed to detect carbon monoxide and hydrogen sulfide, respectively. These two toxic gases may be present in work areas. Other toxic gases and vapors which cannot be detected by the Model 360 or 361 may also be present in work areas. It is important that every work area be appraised by someone trained in hazard control to make sure that the correct instrument is chosen and to determine whether other instruments or methods should be used in addition to the Model 360 or 361 to prevent possible exposures to other toxic gases.

Combustible gases will burn or explode only when the fuel/air mixtures are within certain proportions. The minimum concentration of a particular combustible gas in air which will burn when ignited is defined as the lower explosive limit (LEL). The maximum concentration that can be ignited is defined as the upper explosive limit (UEL). In some references, the terms used are lower and upper flammable limits (LFL and UFL).

Certain materials in the sampled atmosphere affect the catalytic material on the combustible gas sensor and may cause the indicator to respond incorrectly. Included are organic lead compounds used in leaded gasoline and silicon compounds in the form of silanes, silicones and silicates (often found in hydraulic fluids). Some of these materials rapidly "poison" the detector pelement so that it will malfunction. When such materials are even suspected to be in the atmosphere being tested, the instrument calibration must be checked before and after each series of tests.

The combustible gas sensor of these instruments is normally calibrated on pentane as being representative of the flammability characteristics of most commonly encountered combustible gases. The meter scale is calibrated from 0% to 100% LEL which corresponds to actual volume concentrations of 0% to approximately 1.5% pentane. Even though the instrument responds

to any combustible gas/air mixture below the flammable range, it provides accurate measurement only of the specific gas for which it has been calibrated. For response to other combustibles, see Section 6. The responses to these combustibles may be more or less sensitive than pentane. Calibration for combustibles other than pentane may be obtained through special order. The conversion factors in Section 6 may only be used with a Model 360 or 361 calibrated on pentane.

The combustible measurement is dependent upon catalytic combustion of the flammable gas in combination with the oxygen in the air. Conditions can exist in a closed space where not enough oxygen remains to provide a correct combustible gas reading (approximately 10% oxygen or less).

(NOTE: This low oxygen level is far below what is required for human life.)

In these instances, the % oxygen reading is most important. A low oxygen concentration in an enclosed atmosphere indicates that: (1) some other gas has displaced much of the air, or (2) some process has consumed much of the available oxygen. Upon initially opening and probing an enclosed area, move the probe into the area slowly while watching the readout to provide the earliest possible indication of a potentially dangerous condition.

The oxygen sensor responds to the partial pressures of oxygen in the atmosphere being tested. For this reason, changes in the atmospheric or sample pressure will change the oxygen reading. Calibration should be checked and adjusted in fresh air at the elevation where the instrument is to be used.

The oxygen sensor is temperature compensated in the range of 32° to 104°F (0° to 40°C). Use down to 0°F is possible when

calibrated at the temperature of use and if more sampling time is allowed for slower sensor response (approximately 3 minutes without sample line). The life of the oxygen sensor is reduced by exposure to carbon dioxide. The sensor life will be reduced to 2 days in 100% carbon dioxide, 50 days in 5%, and 100 days in 1%. The effect is cumulative; therefore, all tests of atmospheres containing excess concentrations of carbon dioxide should be stopped as soon as a constant reading is obtained. Flush the flow system with fresh air (20.8% oxygen) as soon as possible. Slow recovery to the air calibration point after exposure to high carbon dioxide is to be expected.
Evacuate all personnel from the area if the Model 360 or 361 toxic gas, combustible gas or oxygen alarm indicates the possibility of a hazardous condition.

The battery must have a sufficient charge level for the indicator to function properly. The descriptor BATT will appear in the readout when the battery voltage is too low. In addition, when operating in the ON position, the audible alarm activates when the battery voltage drops to a low level, thus indicating that recharging is necessary. The battery should be performance-checked on a monthly basis. (NOTE: See Section 3, MAINTENANCE.)

Accessory Items

The following accessory items are available for use with the Model 360 or 361 Combustible Gas, Oxygen and Toxic Alarm. See Section 5, PARTS LIST for their respective part numbers.

SAMPLE LINES: Special synthetic rubber lines which have minimal gas absorption characteristics are available in 5, 10, 15, 25, 35, and 50-foot lengths

SAMPLE PROBES: 3-foot, hollow brass probe; 3-foot hollow plastic probe for use in areas where contact with hazardous voltages is possible; and a 4-foot, solid end probe to prevent liquid pickup from wet tank bottoms

LINE TRAP ASSEMBLY: Helps prevent liquids from being drawn into the instrument

CALIBRATION EQUIPMENT: Consists of calibration gases, a flow regulator, and an adapter hose

CARRYING HARNESS: Neck and waist straps to hold the Model 360/361 in place while climbing, etc.

INITIAL OXYGEN AND TOXIC SENSOR INSTALLATION

The oxygen and toxic sensors are packaged separately and must be installed in the Model 360 or 361 prior to placing the instrument into service. Once installed, the sensors should be left in place until the end of their useful lives.

Sensor Installation

1. Remove the carrying handle by loosening both knurled screws and spreading the handle beyond the collars. Lift handle from screw shafts.

2. Remove the left side of the case (the end with the threaded inlet fitting) by removing the four mounting screws. Allowing left side to remain attached to the top panel (via tubing and charge jack wires) slowly slide the top panel from the case until the plastic connectors for the battery and speaker are accessible. Disconnect these connectors. (NOTE: Hold the case lid to prevent it from falling off case; set lid aside.)

3. Slide the top panel completely off the remainder of the case.

4. Open the protective bag containing the oxygen sensor and install the O-ring onto the threaded end of the sensor.

5. Firmly screw the sensor into the manifold by hand so as to compress the O-ring and thereby prevent sample flow leakage.

6. Push the connectors onto the two terminals at the top of the sensor [NOTE: Connect the gray wire to the positive (+) terminal and the yellow wire to the negative (-) terminal.]

7. Open the protective bag containing the toxic sensor and install the O-ring into the threaded end of the sensor.

8. Remove toxic sensor manifold from chassis by removing the 2 screws from the back of the chassis.

9. Remove plastic cap and packaging material and discard. Make sure the sintered metal disc is in place in the manifold.

10. Firmly screw the sensor onto the manifold by hand so as to compress the O-ring and thereby prevent sample flow leakage.

11. Reinstall the flowblock onto the chassis and connect the mating electrical connectors.

12. Reassemble the case by sliding the top panel back into position and reconnect the speaker and battery pack. (NOTE: The top and case fit together by two dove-tail type tongue and grooves. Be sure to align both carefully before sliding the panel onto the instrument. The panel should slide on easily; if resistance occurs, the tongue and grooves are positioned incorrectly.) While sliding the panel, make sure that the tubing is not pinched.

13. Place the case side in position and install the lid hinge pins into each side. Make sure the tubing is not pinched.

14. Install the mounting screws. (NOTE: Insert all four screws loosely before tightening any one of them.)

15. Reattach the handle.

16. See Troubleshooting Guidelines and Oxygen and Toxic Calibration in Section 3, MAINTENANCE for instructions on leak testing the sample flow system and adjusting the oxygen calibration.

OPERATING INSTRUCTIONS

The Model 360 or 361 oxygen calibration and toxic and combustible zero checks must be made in fresh air or with the inlet end of the sampling line in fresh air.

1. Turn the FUNCTION control to the HORN OFF position; the HORN OFF indicator will light and the descriptor % LEL will show in the readout.

2. Set the readout to zero (00) by adjusting the LEL ZERO control (NOTE: this must be done within 30 seconds of turning ON to prevent the possibility of activating the off-scale, LEL latching alarm).

3. Press the SELECT button firmly to obtain % OXY on the readout; then set the readout to 20.8% by adjusting the OXY CALIBRATE control.

4. Press the SELECT button firmly to obtain PPM TOX on the readout; then set the readout to zero (00) by adjusting the TOX ZERO control.

5. Press the RESET button.

6. Turn the FUNCTION control to MANUAL for continuous readout of any one gas or to SCAN for automatic scanning of the three gas

readings. (NOTE: All alarm functions operate in either position.)

7. Momentarily place a finger over the sample inlet fitting or the end of the sample line. Observe that the FLOW indicator float drops out of sight, indicating no flow. If it does not, check the flow system for leaks.

8. The instrument is ready for sampling. Move it to the area for sampling or place the end of the sampling line at the point where the sample is to be taken.

WARNING

If an alarm condition is indicated by an ALARM or OVER sign in the readout or a pulsing horn, evacuate personnel from the area and notify the safety officer or fire department.

A low battery condition is indicated by a BATT sign in the readout or by a steady horn; remove the Model 360 or 361 and recharge in a nonhazardous area to prevent potential ignition of combustible atmospheres.

SECTION 2

THEORY OF OPERATION

INTRODUCTION

A block diagram of the MSA Model 360 or 361 is provided in Figure 6. The Model 360 or 361 toxic gas, combustible gas and oxygen sensors operate simultaneously. Each sensing circuit is equipped with an individual, visual alarm descriptor. There is a common, pulsating audible alarm; one position of the FUNCTION switch enables the audible alarm to be turned off, if so desired. The alarm descriptors will remain on until the concentration returns to within the alarm setpoints, and the reset button is depressed.

A low-battery alarm will activate the BATT descriptor in the display and a continuous, steady-sounding audible alarm. This steady sound indicates that the Model 360 or 361 must be removed from service and charged in a nonhazardous area.

WARNING

Exposure of the combustible gas sensor to a concentration high enough to cause the readout to indicate a reading greater than 100% LEL will cause the readout to latch. When latched, the LEL readout will be blank and the descriptors for OVER and LEL ALARM will appear. This latching circuit is a warning that the gas concentration has exceeded the LEL and that all personnel must be evacuated from the area.

This latching circuit can be reset by removing the Model 360 or 361 to an area known to be free of combustible gas (fresh air) and turning off the instrument. The Model 360 or 361 can then be turned on and rezeroed in fresh air. This latch circuit does not operate during the first 30 seconds after turning on the instrument, thus providing sufficient time for sensor warm-up and rezeroing.

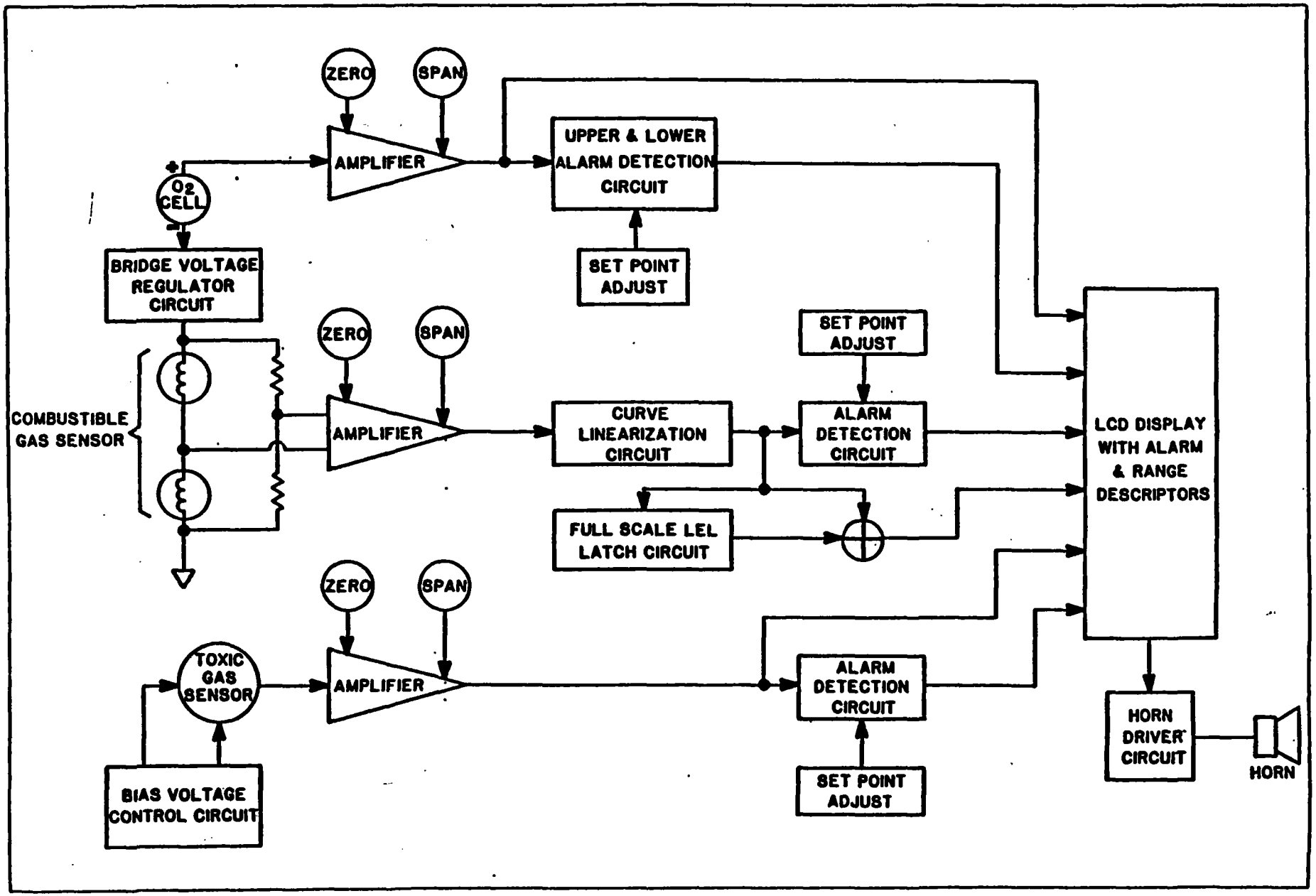

Figure 6. Block Diagram

TOXIC GAS SENSOR

The toxic gas sensor used in both the Model 360 and 361 is a membrane-sealed electrochemical cell. The cell requires an external voltage source to function and produces a current output that is proportional to the amount of CO or H_2S present. The CO or H_2S diffuses through the front membrane of the cell and is oxidized at the working electrode. Current flows through the liquid electrolyte (acid solution) to the counter/reference electrode where oxygen reduction occurs. The amount of current produced for a concentration of CO or H_2S is dependent on the voltage across the working and reference electrodes as well as the electrode materials and the electrolyte. The choice of the particular noble metal electrodes and the setting of the cell voltage optimizes the sensor for the detection of CO or H_2S.

The current from the cell is fed to a current to voltage converter. This voltage signal is applied to an amplifier which drives the toxic gas readout and provides an input for an alarm comparator circuit.

COMBUSTIBLE GAS SENSOR

The flammable properties of combustible gases are used as the basis of detection. The sensor consists of a pair of pelletized filaments called "Pelements™" arranged in an electrically balanced bridge circuit. The detector pelement is treated with a palladium catalyst that causes the combustible gases to combine with oxygen at much lower temperatures than would be required for normal burning. The inactive compensator pelement is also exposed to the sample flow and acts to offset any electrical changes caused by flow conditions, sample temperature, pressure and/or humidity.

Combustible gases in the sample combine with oxygen in the air at the surface of the catalyzed detector pelement. Heat is liberated by this chemical reaction, thus increasing the temperature of the pelement and causing an associated increase in

the pelement electrical resistance.

Increased resistance of the detector pelement unbalances the bridge circuit, causing a voltage change at the mid-point connection between the detector pelement and the compensating pelement. This voltage signal is applied to an amplifier which drives the combustible gas readout and provides an input for an alarm comparator circuit.

OXYGEN SENSOR

The oxygen sensor is a galvanic type cell containing gold and lead electrodes in a potassium hydroxide solution. The cell is sealed with a membrane which allows oxygen to diffuse into the active area. The current generated by the cell is proportional to the oxygen partial pressure in the atmospheric sample passing over the face of the membrane. The generated current passes through a resistance to provide a voltage input signal for an amplifier. The output of the amplifier drives the oxygen readout and also serves as an input to the alarm comparator circuit.

SECTION 3
MAINTENANCE

BATTERY PACK CHARGING

The primary maintenance item of the Model 360 or 361 is the rechargeable, 4.0-volt lead-acid battery (Figure 7). Upon receiving a new Model 360 or 361, the battery pack must be fully charged, per the following procedure. Using the appropriate battery charger [120 VAC (Part No. 631664) or 240 VAC (Part No. 631712)] insert charger plug into charge jack (Figure 2).

CAUTION

Use only the chargers specified above to charge the instrument; otherwise, damage to the battery pack and/or the instrument circuitry may result.

The POWER ON lamp indicates that the charger is receiving power from the 120 or 240 VAC line. The FAST CHARGE lamp indicates that the battery voltage is low and that the charger has automatically switched to the higher charge rate. When the battery is approximately 95% charged, the charger will change to the trickle charge rate and the FAST CHARGE lamp will be extinguished. Recommended charging time is 14 hours. The battery pack may be left on charge for longer periods without damage.

WARNING

Do not charge the battery pack in areas that may contain a flammable mixture of combustible gases, vapors, mists or dust and air; otherwise, an explosion may occur since a source of ignition exists during charging. The battery pack may not supply full power capacity after repeated partial use between chargings; therefore, it is recommended that

the battery pack be "exercised" at least once per month by operating the fully charged Model 360 or 361 for 8 hours and then recharging. The battery pack should be charged after each day of use (or prior to use if the instrument has not been operated for 30 days).

Extended Operation

External Charging Adapter (Part No. 477153) can be used to charge a depleted battery while it is removed from the instrument. Use of this adapter permits extended operation by enabling the user to install a second, back-up battery into the instrument while externally charging the depleted battery.

BATTERY PACK REPLACEMENT

When the rechargeable, 4.0-volt lead-acid battery pack no longer responds to recharging or no longer "holds" a charge, the pack should be replaced according to the following procedure (Figure 7):

1. Loosen the knurled screws holding the handle and remove handle.

2. Looking at the front panel of the instrument, remove the right (audible alarm side) panel by unscrewing the 4 side panel screws.

3. Gently pull the side panel loose and tilt the instrument to help slide out the battery case. Disconnect the molded nylon plug from the battery case. (NOTE: Do not disconnect the alarm speaker.)

4. Install the new battery by reversing steps 1 through 3 above.

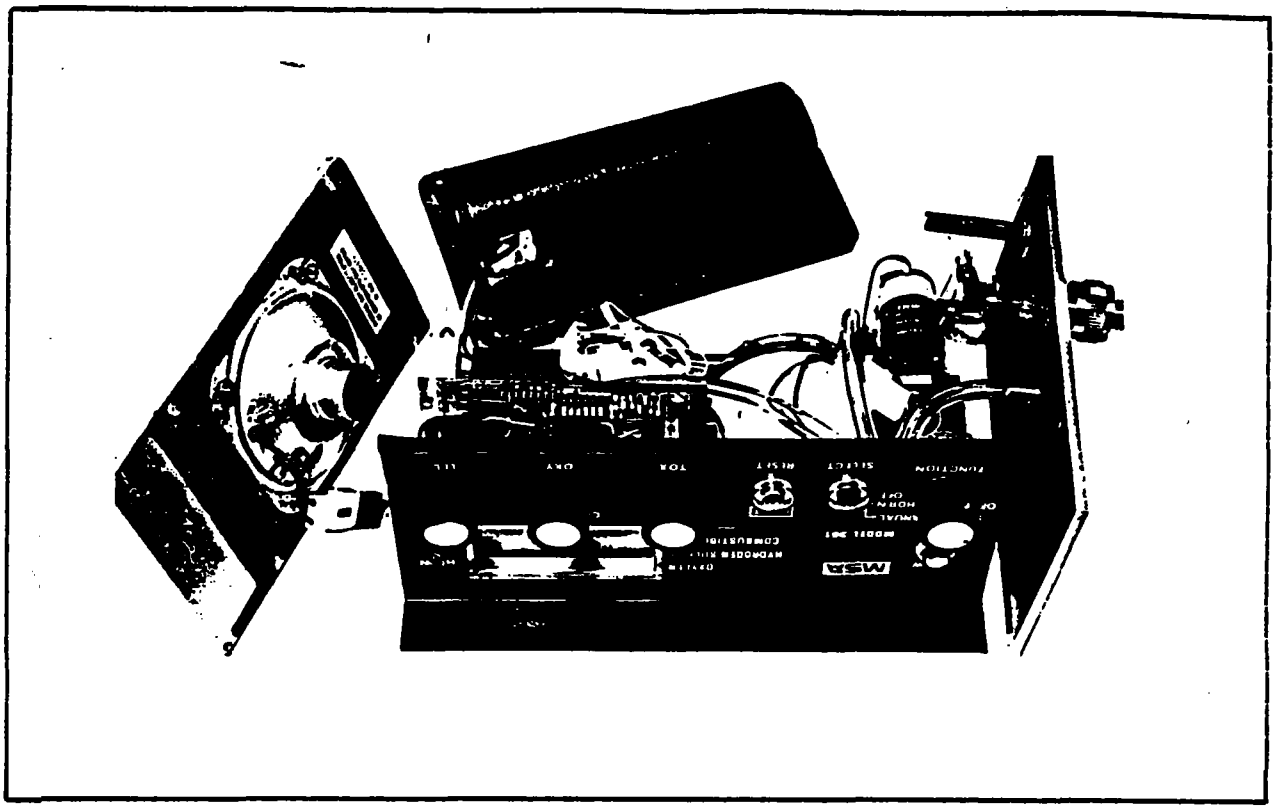

Figure 7. Disassembly Showing Battery Pack

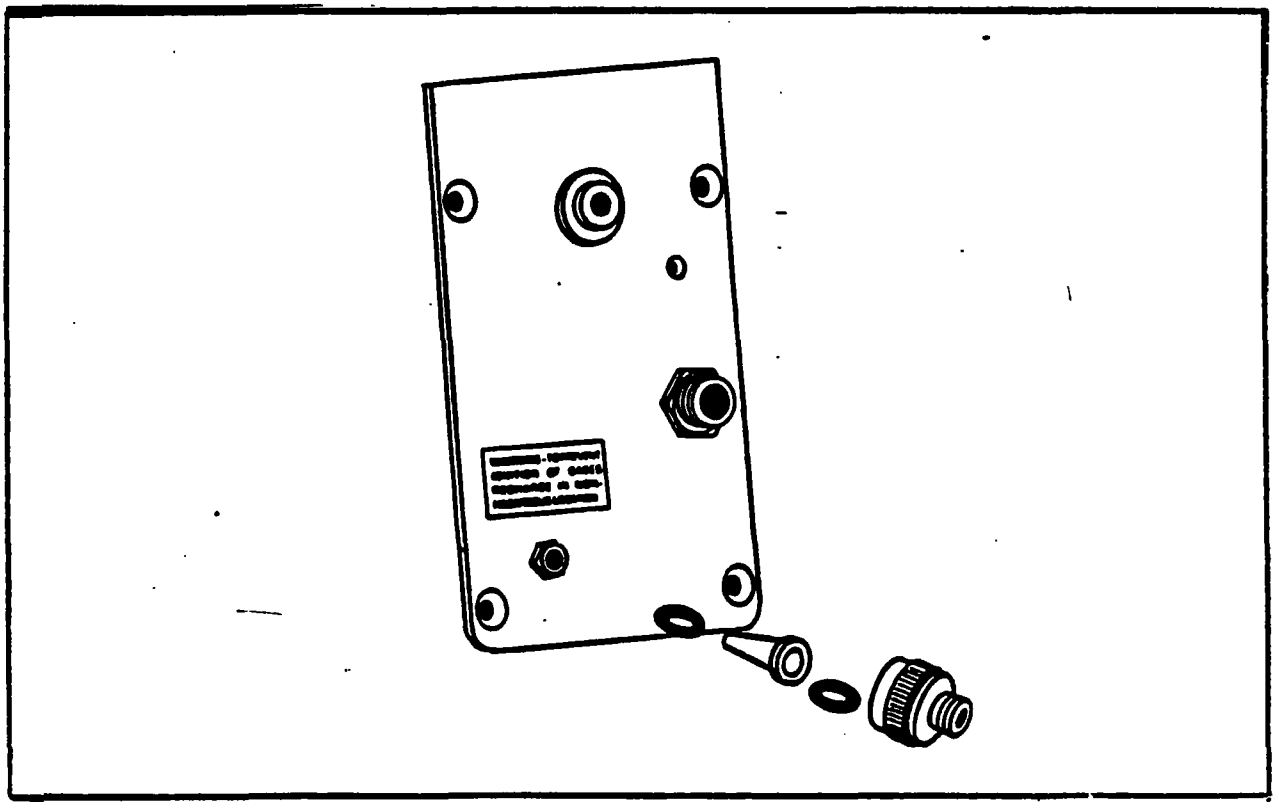

Figure 8. Disassembly Showing Sample Inlet Filter

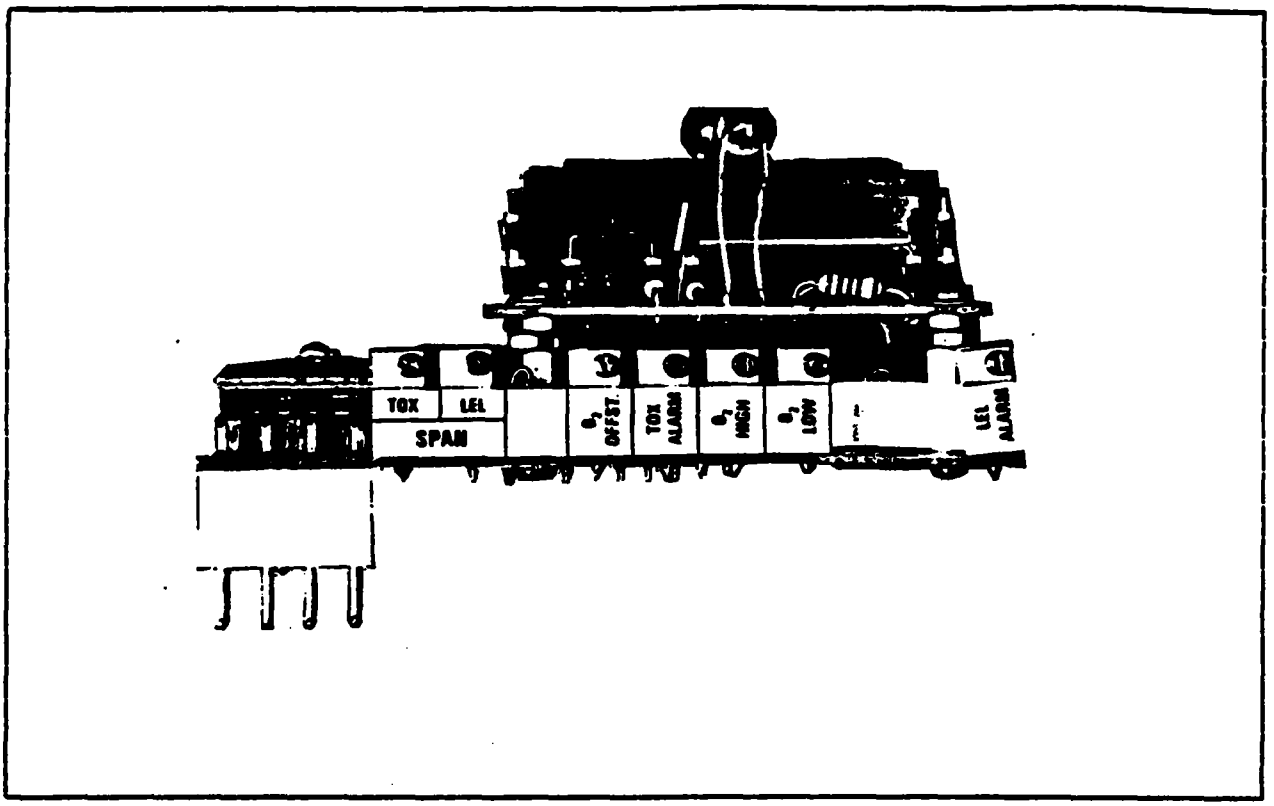

Figure 9. Printed Circuit Board Adjustments

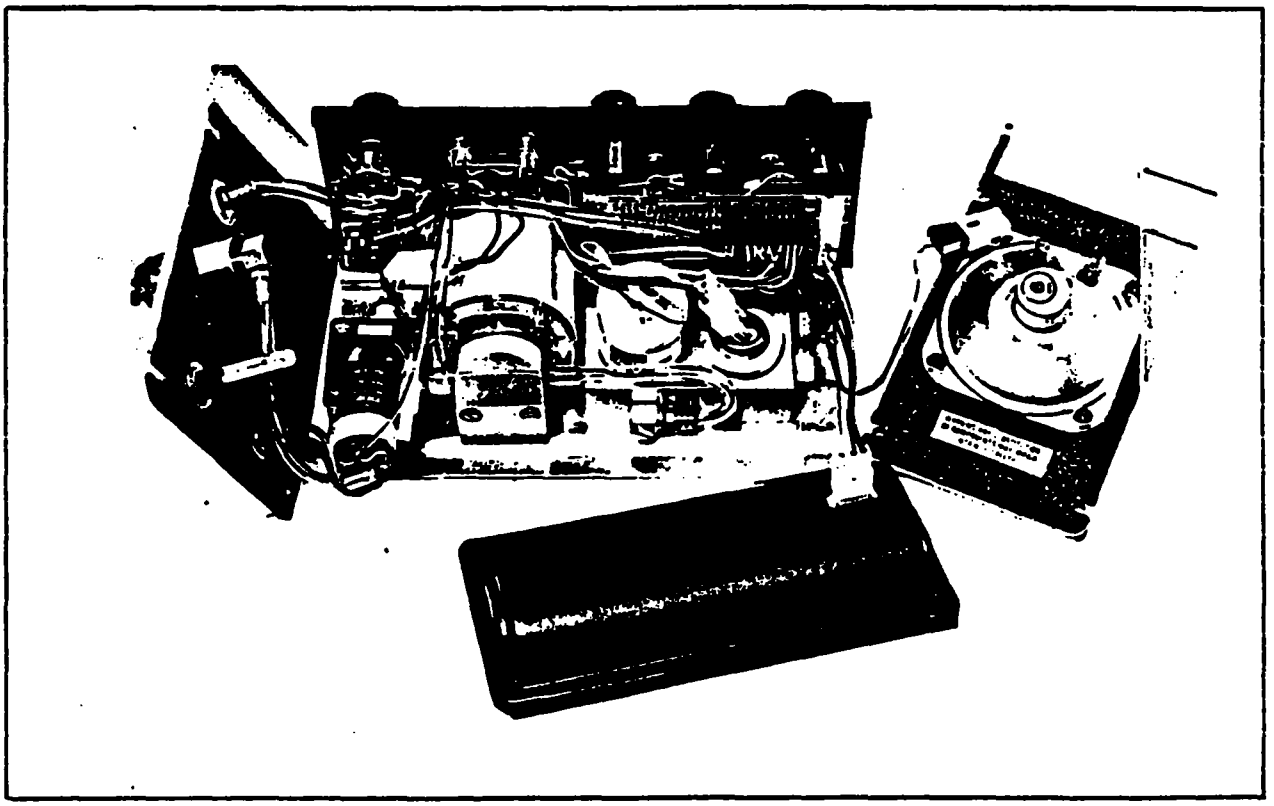

Figure 10. Disassembly Photo

SAMPLE INLET FILTER/FILTER ELEMENT

The sample inlet filter should be examined each time the Model 360 or 361 is recharged (Figure 8). If the filter element appears to be coated with dust or dirt, it should be washed, dried and re-inserted or a new element substituted. If a new element is installed, also install a new filter o-ring. Make sure the inlet seal O-ring in the inlet filter cap is properly seated. If the O-ring is damaged or missing, replace it before using the Model 360 or 361 with any sampling accessories.

PRINTED CIRCUIT BOARD ADJUSTMENT

The printed circuit board contains seven adjustment pots (Figure 9), identified as follows:

Toxic Gas Adjustments

TOX

ALARM: Model 360 -- The Carbon Monoxide Gas Alarm Point Adjustment (factory-set at 50 ppm)

Model 361 -- The Hydrogen Sulfide Gas Alarm Point Adjustment (factory-set at 10 ppm)

TOX

SPAN: After zeroing, the TOX SPAN is adjusted by sampling calibration gas and adjusting the readout accordingly

Combustible Gas Adjustments

LEL

ALARM: The Combustible Gas Alarm Point Adjustment (factory-set at 25% LEL; maximum setting is 60% LEL)

LEL

SPAN: After zeroing, the Span is adjusted by sampling calibration check gas and adjusting the readout accordingly

Oxygen Adjustments

O_2
HIGH: The Oxygen High Alarm Point adjustment (factory-set at 23%)

O_2
LOW: The Oxygen Low Alarm Point Adjustment (factory-set at 19.5% oxygen)

O_2
OFFSET: The Oxygen Offset controls the zero reading of the oxygen meter. The leads to the oxygen cell must be disconnected and shorted together, and the front panel OXY CALIBRATE knob turned fully clockwise. The % oxygen meter should indicate zero; adjust the O_2 OFFSET, if necessary.

TROUBLESHOOTING GUIDELINES

Difficulties with the Model 360 or 361 can be localized by disassembling the instrument and performing the following tests (Figure 10):

1. Disconnect any accessories attached to the side of the instrument case.

2. Loosen knurled screws holding the handle and remove handle.

3. Remove both sides of case by removing the two sets of four screws. Remove instrument lid and set aside. Slowly draw the sides away from the case as far as the connecting wires allow.

4. Disconnect molded nylon plugs from the battery and speaker.

5. Slide the battery out of the case.

6. All of the remaining components and wiring are bolted to the top panel of the case; this panel can be removed as a unit by simply sliding the assembly from the extruded sides of case.

7. For troubleshooting purposes, the battery (and speaker, if desired) can be reconnected after the instrument is removed from the case.

FLOW SYSTEM

A leak in the flow system is indicated when flow continues after the inlet is blocked. Block off the flow at the pump inlet by pinching the tubing with pliers to ensure that the pump stalls. If the pump stalls, remove the inlet filter cap and filter element and place a finger over the opening. If the pump then stalls, the O-ring in the inlet cap should be replaced. If the pump does not stall when the inlet opening is blocked, inspect the condition of the pump assembly, tubing, barbed hose fitting and its O-ring, and the O-ring behind the filter adapter. Replace any worn or damaged parts.

A blockage in the flow system is indicated when the float does not rise in the panel indicator. Remove any sampling line and, if this does not allow the flow to resume, examine the sample inlet filter for blockage or dirt. Clean or replace the filter element if necessary. If the flow is not restored by either of these procedures, the pump assembly should be inspected and/or replaced.

PUMP ASSEMBLY REPLACEMENT

The pump and motor are capable of 750 to 1000 hours of sampling. After this time period has lapsed, the motor may fail to start or may run erratically. The pump assembly should be replaced if the panel-mounted flow indicator indicates no flow when the instrument is turned on and the BATT check does not show in the display. Replace pump assembly by performing the following procedure:

1. Unsolder the leads from the motor.

2. Remove the four screws from the base of the pump assembly.

3. Withdraw the pump assembly and remove the plastic tubing.

4. Connect the plastic tubing to the pump.

5. Attach the new pump assembly to the mounting plate with the four screws.

6. Solder the pump power leads to the motor terminals.

   a. Solder the yellow wire to the positive (+) terminal of the motor.

   b. Solder the green wire to the negative (-) terminal of the motor.

7. Check for leaks in the flow system (NOTE: See Step 7 of Operating Instructions, Section 1 - OPERATION).

8. Reassemble the instrument.

TOXIC CELL REPLACEMENT

The toxic cell should perform for approximately 1 year without maintenance. Eventually however, it will lose sensitivity and will not span correctly.

At this time, the cell should be replaced by performing the following procedure:

1. Remove the toxic cell and manifold from chassis by removing the two screws from the back of the chassis.

2. Disconnect the mating electrical connector.

3. Unscrew the toxic cell from the manifold. Make sure that the sintered metal disc remains in place in the manifold.

WARNING

Handle the sensor carefully; it is a sealed unit which contains an acid electrolyte. If electrolyte is leaking from the sensor, exercise caution so that the electrolyte does not contact skin, eyes or clothing, thus avoiding acid burns. If contact occurs, rinse the area immediately with a large quantity of water. In case of contact with eyes, immediately flush eyes with plenty of clean water for at least 15 minutes and call a physician.

4. Open the protective bag containing the toxic sensor and install the O-ring into the threaded end of the sensor.

5. Firmly screw the sensor into the manifold by hand so as to compress the O-ring and thereby prevent sample flow leakage.

6. Reinstall the flow block onto the chassis and connect the mating electrical connector.

7. Check for leaks in the flow system. (NOTE: See Step 7 of Operating Instructions, Section 1 - OPERATION.)

8. Reassemble the instrument.

9. Check calibration (NOTE: See Section 4, CALIBRATION).

COMBUSTIBLE GAS SENSOR REPLACEMENT

Before each day's use, check the combustible gas indicating portion of the Model 360 or 361 for operating accuracy with a known gas-air mixture and adjust as necessary. (NOTE: See Section 5, PARTS LIST for available MSA calibration equipment.) If proper calibration cannot be obtained and/or the combustible

gas readout cannot be zeroed, the sensor diffusion head should be replaced and the instrument recalibrated by performing the following procedure:

1. Unplug the nylon connector from the sensing head.

2. Unscrew the retaining ring holding the diffusion head to the manifold by turning the retaining ring counterclockwise. Remove the diffusion head and O-ring.

3. Inspect and reinstall the O-ring and replacement diffusion head into the manifold.

4. Install the diffusion head in the manifold with the retaining ring. Use enough finger pressure on the retaining ring to compress the O-ring.

5. Connect the nylon sensing head plug.

6. Check for leaks in the flow system (NOTE: See step 7 of Operating Instructions in Section 1, OPERATION).

7. Reassemble the instrument.

8. Check calibration (See Section 4, CALIBRATION).

OXYGEN CELL REPLACEMENT

The oxygen cell should perform for approximately 1 year without maintenance. Eventually, however, it will lose sensitivity. When it does, the readout can no longer be set to 20.8% with the OXY CALIBRATE knob when sampling fresh air. At this time, the cell should be replaced by performing the following procedure:

1. Disconnect the gray [positive (+)] and the yellow [negative (-)] leads from the oxygen cell.

2. Turn the oxygen cell counterclockwise to remove it and its O-ring from the manifold.

3. Open the protective bag containing the oxygen cell and install the O-ring onto the threaded end of the cell.

4. Firmly screw the cell into the manifold by hand in order to compress the O-ring and thereby prevent sample flow leakage.

5. Connect the gray lead to the positive terminal and the yellow lead to the negative terminal.

6. Check for leaks in the flow system. (See Step 7 of Operating Instructions in Section 1, OPERATION).

7. Reassemble the instrument.

8. Check calibration (NOTE: See Section 4, CALIBRATION).

ORDERING REPLACEMENT PARTS

The Section 5, PARTS LIST itemizes common replacement assemblies and components associated with the MSA Model 360 or 361 Toxic Gas, Combustible Gas, and Oxygen Alarm. To obtain a replacement part, specify the description and MSA part number of each item and address the order or inquiry to your nearest MSA branch district office or to:

Mine Safety Appliances Company
Instrument Division
P.O. Box 427
Pittsburgh, PA 15230

If service other than that outlined is necessary, the Model 360 or 361 should be returned to your nearest MSA branch district office or to:

Mine Safety Appliances Company
Repair Department
Walden Road
Mars, PA 16046

WARNING

Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance and may void all warranties and approvals. Repair or alteration of the Model 360 or Model 361 beyond the scope of these maintenance instructions, by anyone other than a certified MSA serviceman, may void all warranties and approvals.

SECTION 4
CALIBRATION

Before calibration of the Model 360 or Model 361 can be checked, the instrument must be in operating condition (NOTE: See Operating Instructions in Section 1, OPERATION). Optional calibration equipment is shown in Figure 11. Calibration check adjustment is made as follows:

MODEL 360 CALIBRATION (USING THE MODEL R CALIBRATION CHECK KIT)

1. Attach the flow control to the 0.75% pentane/15% oxygen calibration gas tank.

2. Connect the adapter-hose to the flow control.

3. Open the flow control valve.

4. Connect the adapter-hose fitting to the inlet of the instrument; within 30 seconds, the LEL readout should stabilize and indicate between 47 and 55%. If the indication is not in the correct range, remove the right end of the indicator and adjust the LEL SPAN control to obtain 50%.

5. Verify the oxygen reading; it should be between 13 and 17%.

6. Disconnect the adapter-hose fitting from the instrument.

7. Close the flow control valve.

8. Remove the flow control from the calibration gas tank.

9. Attach the flow control to the 300 ppm carbon monoxide calibration gas tank.

10. Open the flow control valve.

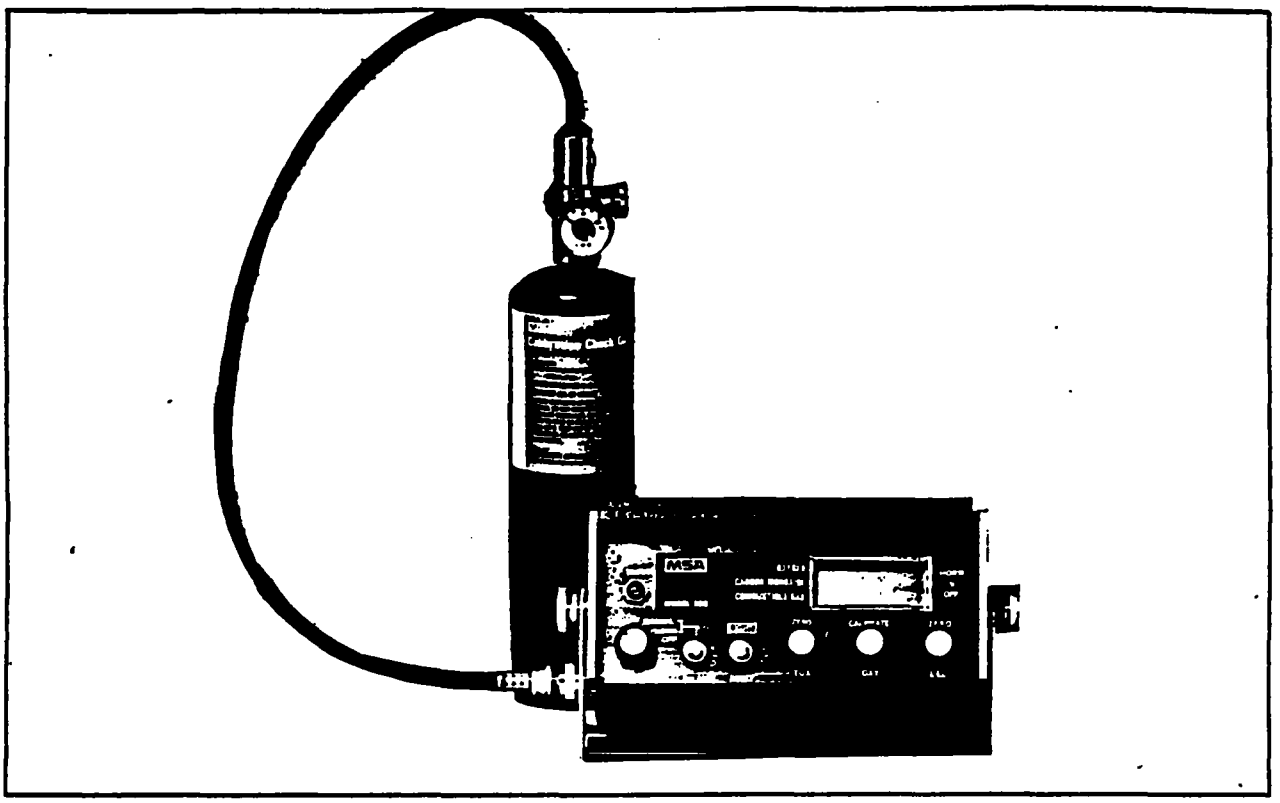

Figure 11. Model 360 or 361 with Calibration Equipment

11. Connect the adapter-hose fitting to the inlet of the instrument; after approximately 2 minutes, the TOX readout should stabilize and indicate between 275 and 325 ppm. If the indication is not in the correct range, remove the right end of the indicator and adjust the TOX SPAN control to obtain 300ppm.

12. Disconnect the adapter-hose fitting from the instrument.

13. Close the flow control valve.

14. Remove the adapter-hose from the flow control.

15. Remove the flow control from the calibration gas tank.

MODEL 361 CALIBRATION (USING MODEL RP CALIBRATION CHECK KIT) (FIGURE 11)

1. Attach the flow control to the .75% pentane/15% oxygen calibration gas tank.

2. Connect the adapter-hose to the flow control.

3. Open the flow control valve.

4. Connect the adapter-hose fitting to the inlet of the instrument; within 30 seconds, the LEL meter should stabilize and indicate between 47 and 55%. If the indication is not in the correct range, remove the right end of the indicator and adjust the LEL SPAN control to obtain 50%

5. Verify the oxygen reading; it should be between 13 and 17%.

6. Disconnect the adapter-hose fitting from the instrument.

7. Close the flow control valve.

8. Remove the flow control from the calibration gas tank.

9. Attach the flow control to the 40 ppm hydrogen sulfide calibration gas tank.

10. Open the flow control valve.

11. Connect the adapter-hose fitting to the inlet of the instrument; after approximately 1 minute, the TOX readout should stabilize and indicate between 35 to 45 ppm. If the indication is not in the correct range, remove the right end of the indicator and adjust the TOX SPAN control to obtain 40 ppm.

12. Disconnect the adapter-hose fitting from the instrument.

13. Close the flow control valve.

14. Remove the adapter-hose from the flow control.

15. Remove the flow control from the calibration gas tank.

CAUTION

Calibration gas tank contents are under pressure. Do not use oil, grease or flammable solvents on the flow control or the calibration gas tank. Do not store calibration gas tank near heat or fire, nor in rooms used for habitation. Do not throw in fire, incinerate or puncture. Keep out of the reach of children. It is illegal and hazardous to refill this tank. Do not attach any gas tank other than MSA calibration tanks to the flow control.

SECTION 5
PARTS LIST

Component/Assembly	MSA Part NO.
Model 360 Carbon Monoxide, Combustible Gas and Oxygen Alarm	476151
Model 361 Hydrogen Sulfide, Combustible Gas and Oxygen Alarm	476152
5-Foot Synthetic Rubber Sampling Line w/Couplings	11354
10-Foot Synthetic Rubber Sampling Line w/Couplings	11955
15-Foot Synthetic Rubber Sampling Line w/Couplings	11912
25-Foot Synthetic Rubber Sampling Line w/Couplings	11913
50-Foot Synthetic Rubber Sampling Line w/Couplings	11958
3-Foot Hollow Brass Probe Tube	11961
3-Foot Plastic Probe Tube	73743
4-Foot Solid Brass Probe Rod	11960
Line Trap Assembly	74814
Oxygen Sensor	457621
Carbon Monoxide Sensor	472077
Hydrogen Sulfide Sensor	467376
Pump Assembly	476086
Carrying Harness	457754
Diffusion Head	449917
O-Ring (for Diffusion Head)	67283
Carbon Monoxide Sensor for Model 360, with O-Ring	472077
Hydrogen Sulfide Sensor for Model 361, with O-Ring	478840
O-Ring (for Toxic Sensors)	62740
Disc (Porous)	472301
Battery Pack	476144
Battery Charger, 120 Volt	631664
Battery Charger, 240 Volt	631712
Sample Inlet Filter Element Replacement Kit	469995
Inlet Seal (O-ring)	632152
Printed Circuit Board	476750

PARTS LIST (CONT.)

Component/Assembly	MSA Part No.
MODEL 360 Calibration	
(Using Model R Calibration Check Kit)	
Flow Control, 1.5 L/m	459948
Gas Cylinder, 0.75% Pentane/15% oxygen	476304
Gas Cylinder, 300 ppm Carbon Monoxide	461769
Adapter-Hose	449401
MODEL 361 Calibration	
(Using Model RP Calibration Check Kit)	
Flow Control, 1.5 L/m	467896
Gas Cylinder, 0.75% Pentane/15% Oxygen	478192
Gas Cylinder, 40 ppm Hydrogen Sulfide	467897
Adapter-Hose	449401
Instruction Manual, Model 360/361	476473

SECTION 6
RESPONSE INFORMATION

Table 6-1. Model 360 CO Response to Interferants

INTERFERANT	INTERFERANT CONCENTRATION (PPM)	SENSOR RESPONSE (PPM)
Ammonia	100	-4
Benzene	17.7	0
Carbon Dioxide	5000	-4
Carbon Disulfide	14.5	2
Carbon Monoxide	100	100
Chlorine	5	0
Dimethyl Sulfide	4.5	2
Ethylene	50	100
Freon 12	1000	-2
Hexane	500	-2
Hydrogen	500	70
Hydrogen Cyanide	42	30
Hydrogen Sulfide	40	170
Isopropanol	50	40
Mercaptan		
Ethyl	4.4	6
Methyl	5	7
Methane	50,000	-3
Methanol	50	130
Nitric Oxide	100	260
Nitrogen Dioxide	100	80
Sulfur Dioxide	150	30

Table 6-2. Model 361 H_2S Response to Interferants

INTERFERANT	INTERFERANT CONCENTRATION (PPM)	SENSOR RESPONSE (PPM)
Ammonia	100	0
Benzene	17.7	0
Carbon Dioxide	5000	0
Carbon Disulfide	14.5	0
Carbon Monoxide	100	0
Chlorine	5	0
Dimethyl Sulfide	4.5	0
Ethylene	50	0
Freon 12	1000	0
Hexane	500	0
Hydrogen	500	1
Hydrogen Cyanide	42	0
Hydrogen Sulfide	40	40
Isopropanol	50	0
Mercaptan		
Ethyl	44	3
Methyl	5	5
Methane	50,000	0
Methanol	50	0
Nitric Oxide	100	2
Nitrogen Dioxide	100	-8
Sulfur Dioxide	150	5

SECTION 7

CONVERSION FACTORS

CHEMICAL	CONVERSION FACTOR
Acetone	1.0
Acetylene	0.8
Benzene	1.1
Iso-Butane	1.0
n-Butane	1.0
Butadiene	0.8
Butene-1	1.0
Carbon Monoxide	0.6
Ethane	0.7
Ethyl Acetate	1.1
Ethyl Alcohol	1.0
Ethylene	0.8
Ethylene Oxide	0.9
Ethyl Ether	1.1
Gasoline	1.0
Heptane	1.1
Hexane	1.3
Hydrogen	0.6
Methane	0.6
Methyl Alcohol	0.7
Methyl Ethyl Kentone	1.6
Pentane	1.0
Propane	0.9
Propylene	1.0
Propylene Oxide	1.0
Iso Propyl Alcohol	1.1
Tetrahydrofuran	0.8
Toluene	1.2

EXAMPLE:
When a Model 360 or Model 361, calibrated on Pentane, is used to test for propane, the conversion factor is 0.9. If the meter reads 50% LEL, the true propane concentration is:

(50% x 0.9) OR 45% LEL

The curves presented in this manual are typical of a Model 360 or Model 361 calibrated on Pentane. The response of a particular Model 360 or Model 361 may be higher or lower than the stated response. For this reason an accuracy tolerance of ±25% should be applied in the interpretation of any meter response.

MSA

CALIBRATION TEST SYSTEM MODEL RP CHECK KIT USING FLOW CONTROL PART NO. 467896

instruction manual

IMPORTANT WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR INSTALLING, USING, OR SERVICING THE PRODUCT. Like any piece of complex equipment, the MODEL RP CHECK KIT USING FLOW CONTROL PART NO. 467896 will perform as designed only if it is installed, used and serviced in accordance with the manufacturer's instructions. OTHERWISE IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE BODILY INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not installed, used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following them. We encourage our customers to write or call for a demonstration of this equipment prior to use or for any additional information relative to use or repairs.

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Manufactured by
MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A. 15230
588 (L) REV. 0
478303

MSA CALIBRATION TEST SYSTEM
for use with
MSA HYDROGEN SULFIDE, COMBUSTIBLE GAS AND OXYGEN ALARM MODEL 361

Parts Required:
- Flow Control, part no. 467896
- Adapter-Hose, part no. 449401
- Calibration Gas, part no. 478192
  50% LEL Pentane (.75% Pentane and 15% Oxygen in nitrogen)
- Calibration Gas, part no. 467898
  Hydrogen Sulfide 10 ppm in Nitrogen

INSTRUCTIONS

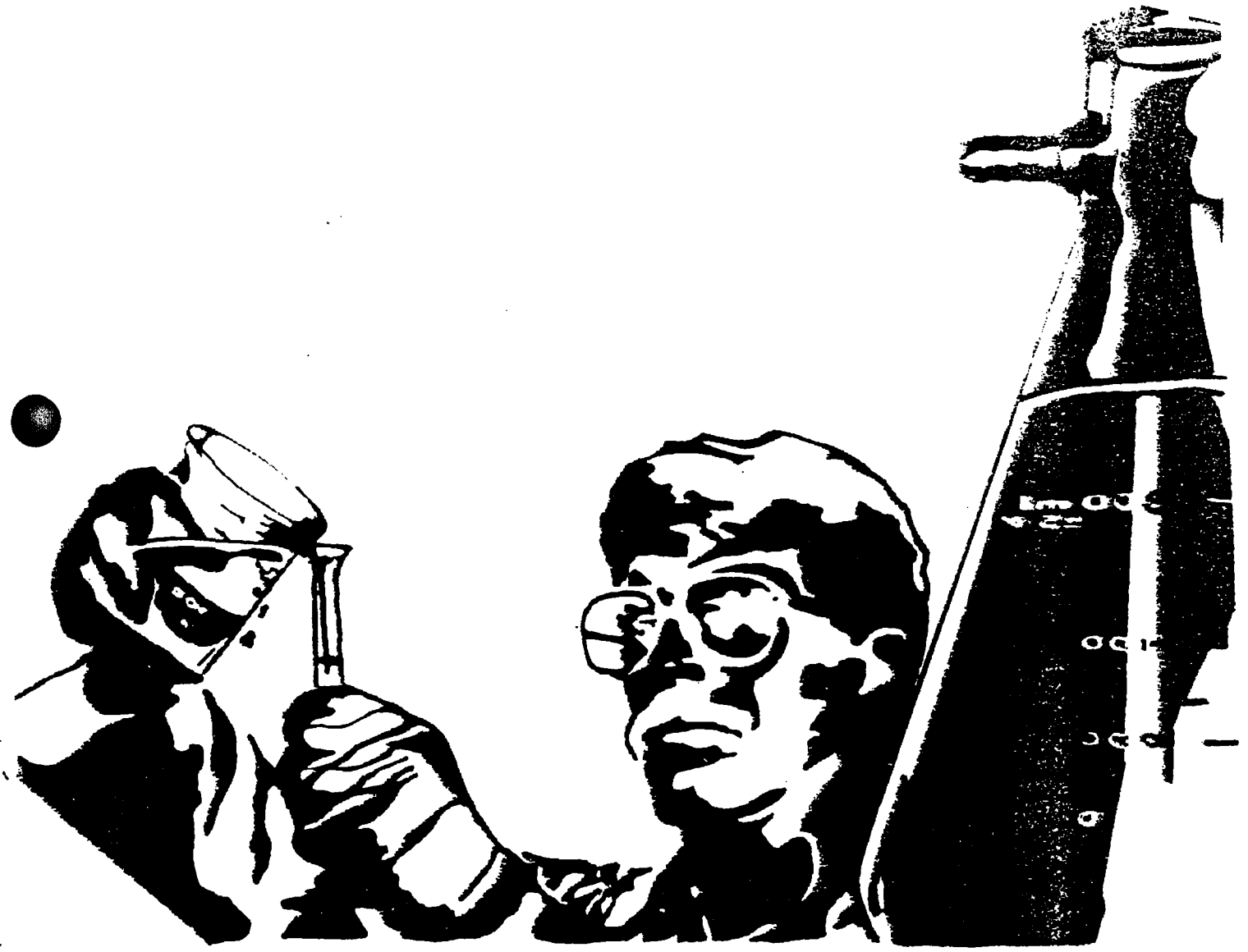
Test the operation of the pump and sample flow indicator by momentarily placing a finger over the sample inlet of the instrument. The flow indicator should be at the top of the window before falling from view while the inlet is blocked. If not, see the instrument Instruction Manual for required maintenance.

1. Attach the flow control to the .75% pentane and 15% oxygen calibration gas tank.
2. Connect the adapter-hose to the flow control.
3. Open the flow control valve.
4. Connect the adapter-hose fitting to the inlet of the instrument; after approximately 15 seconds, the LEL meter should stabilize and indicate between 47 and 55%. If the indication is not in the correct range, remove the right end of the indicator and adjust the LEL SPAN control to obtain 50%.
5. Verify the oxygen reading; it should be between 13 and 17%. (This is a response check only. The oxygen sensor should be calibrated to 20.8% oxygen in fresh air before each use.)
6. Disconnect the adapter-hose fitting from the instrument.
7. Close the flow control valve.
8. Remove the flow control from the calibration gas tank.
9. Attach the flow control to the hydrogen sulfide calibration gas tank.
10. Open the flow control valve.
11. Connect the adapter-hose fitting to the inlet of the instrument; after approximately 1 minute, the TOX readout should stabilize and indicate 7 to 13 ppm. If the indication is not in the correct range, remove the right end of the indicator and adjust the TOX SPAN control to obtain 10 ppm.

12. Disconnect the adapter-hose fitting from the instrument.
13. Close the flow control valve.
14. Remove the adapter-hose from the flow control.
15. Remove the flow control from the calibration gas tank.

Appendix B
NET MIDWEST LABORATORY QAPP

NET



NET

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QUALIFICATIONS PROFILE

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OVERVIEW

NET Midwest, Inc.'s regional headquarters are in Bartlett, Illinois. NET Midwest, Inc. currently has five operating divisional laboratories: Bartlett, Illinois; Cedar Falls, Iowa, Chicago, Illinois; Indianapolis, Indiana; and Rockford, Illinois. It is the intent of the management of the corporation and its parent company, National Environmental Testing, Inc., to establish additional divisional laboratories at other strategic locations.

NATIONAL ENVIRONMENTAL TESTING, INC., is a network of high quality regional laboratories in California, Illinois, Indiana, Iowa, New Jersey, and Texas, that offers a comprehensive range of environmental testing services. NET Midwest, Inc. can offer the best of both worlds - the customized, personal service you would expect from your regional lab, but also the advantages made possible by a large, national corporation.

Division Managers are each responsible for profitability and analytical quality assurance within their operating units. They are accountable for their performance to the President who is assisted by the Vice-President of Finance, the Vice-President and Director of Quality Assurance, and the Vice President of Business Development.

While the division manager's autonomy allows flexibility to meet the needs of our clients on a local basis, NET Midwest, Inc.'s corporate staff monitors and coordinates the activities of all laboratories to assure consistent quality of results and services. Each lab must operate within guidelines established at the corporate level for business practices, personnel management, laboratory methods, facilities management, and record keeping. Most importantly, each must participate in our inter-laboratory quality assurance program.

In summary, NET's management approach has allowed us to develop a network of responsive, self-sufficient laboratories which are competitively superior.

FACILITIES

NET Midwest's regional headquarters are located at 850 West Bartlett Road, Bartlett, Illinois. The Bartlett Division laboratory is in the same facility. This location has a total of 7500 square feet of which 2100 square feet is corporate offices; 5300 square feet is laboratory. As is the case at each of the NET Midwest facilities, there are actually four separate laboratories: inorganic chemistry, organic chemistry, wastewater, and microbiology. In addition, each divisional laboratory has a specialty -- at Bartlett this special section is gas chromatography/mass spectrometry. Each laboratory in the NET Midwest group maintains several separate and complete sets of analytical glassware, thus eliminating cross-contamination between high-level and trace-level analyses.

NET Midwest's second laboratory is located at 704 Enterprise Drive in Cedar Falls, Iowa. This laboratory is 9800 square feet, of which 3000 square feet is office and 6800 square feet is laboratory space. The Iowa laboratory specializes in a wide variety of environmental and industrial hygiene analyses. The Cedar Falls laboratory is currently the only AIHA accredited laboratory in the NET group of laboratories. This laboratory is also accredited by the National Institute of Standards and Technology (formerly the National Bureau of Standards) under the NVLAP program for the analysis of bulk materials for asbestos content.

NET Midwest's third laboratory is located at 222 South Morgan Street in Chicago, Illinois. This facility is 5100 square feet of lab space and 1200 square feet of office. This lab specializes in the analysis of foods, grains, pharmaceuticals, cosmetics and feed additives. With a wide range of clients throughout the United States, nutrition labeling and vitamin analyses are the primary services of this laboratory.

NET Midwest's fourth facility is at 6964 Hillsdale Court in Indianapolis, Indiana. This laboratory is 6380 square feet of which 1900 square feet is office and 4480 square feet is laboratory. The Indianapolis laboratory specializes in the analysis of a wide variety of matrices in support of the auto industry.

NET Midwest's fifth facility is located at 3548 35th Street, Rockford, Illinois. This laboratory is 5000 square feet of which 900 square feet is devoted to office, 2600 square feet to laboratory, and 1500 square feet of warehouse. The Rockford lab specializes in environmental testing of drinking water wells for VOC contamination with complete GC/MS capabilities. It also provides the other NET Midwest divisions with the capability for the Waste Incineration Profile which includes BTU, Chlorine and Sulfur.

GENERAL SERVICES

With its extensive laboratory capabilities and creative application of professional experience, NET Midwest serves a variety of client needs in the fields of chemical and microbiological testing. The list below describes general categories of services offered by NET Midwest, while the Special Projects Section presents examples of how we have integrated certain elements of our services for specific projects.

SOIL	**MINERALS**
FOOD	**BACTERIA**
SLUDGE	**RESIDUES**
GRAINS	**PROXIMATES**
COSMETICS	**NUTRITION LABELING**
HAZARDOUS WASTE	**PRIORITY POLLUTANTS**
HEALTH PRODUCTS	**TRACE METALS**
GROUNDWATER	**AMINO ACIDS**
FEED ADDITIVES	**PESTICIDES**
WASTEWATER	**VITAMINS**
PHARMACEUTICALS	**SOLVENTS**
SEDIMENT	**PCB'S**
INDUSTRIAL HYGIENE	**ASBESTOS ANALYSIS**

* EPA Contract Laboratory Program *

* Air Sample Analysis *

* RCRA groundwater programs *

* AHERA Asbestos Testing *

* U.S. Army Nutrition Study *

* NPDES permit monitoring *

* Landfill leachate analyses *

* OTC drug quality control *

* Incineration profile *

* Bacteriological monitoring *

* Contaminated grain study *

* Vitamin assaying *

* Industrial Hygiene Surveys *

* Underground Storage Tanks *

SPECIAL PROJECTS

Client. . . . . Illinois EPA
Springfield IL
217-785-5168
Karl Reed

Project Name: Contract Lab Program

NET Midwest was selected to be an Illinois Environmental Protection Agency contract laboratory. Under that program, we provided analytical services for three activities: emergency response, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the Clean Illinois Program relating to hazardous wastes sites. As part of these programs, samples were analyzed to determine the presence and concentration of specific chemicals including: heavy metals, cyanide, PCB's and complete organic priority pollutants. Extensive GC/MS analyses were performed to identify unknown organic compounds. Sample matrices included: soils, wastewater, groundwater, sludge, and unidentified material from drums. NET Midwest prepared an extensive QA plan in accordance with the federal Contract Laboratory Program (CLP). This was utilized to provide consistent results of known and documented quality that are legally defensible in court.

Client. . . . . General Foods
Chicago IL
312-471-7719
Tom O'Brian

Project Name: "Tang" Quality Control

General Foods routinely sends samples of "Tang" to NET Midwest to be analyzed for vitamins. This is done to primarily check their batch processor.

Client. . . . . Sheller Globe Corp.
Iowa City IA
319-524-4560
Bill Murray

Project Name: Industrial Hygiene Survey

NET Midwest completed a comprehensive industrial hygiene survey at the Iowa City facility to evaluate worker exposure to a wide variety of chemicals.Contaminants evaluated included solvents, metals, dusts, acids, stripping compounds as well as other contaminants.

Client. . . . . U.S. Army - Natick
Research Center
617-651-4489
Bonnie Atwood

Project Name: Rations for
Nutrient Content

The U.S. Army awarded a contract to the Chicago division of NET Midwest, Inc. to analyze rations for Fatty Acids, Cholesterol, Vitamins, Minerals, etc. This 3-year project was to determine the stability of these nutrients in both the components and the complete meals.

Client. . . . . Petroleum Marketers
of Iowa
Des Moines IA
515-244-6273
Ed Kistenmacher

Project Name: Benzene Monitoring

Working with the Petroleum Marketers of Iowa, NET Midwest completed the analysis of several hundred benzene air samples for oil jobbers in Iowa. The air samples were analyzed to determine compliance with the OSHA Benzene Standard. Soil testing has also been completed in conjunction with the removal of several hundred underground storage tanks in Iowa.

Client. . . . . Soft Sheen Inc.
Chicago IL
312-978-0700
Kevin Gross

Project Name: Preservative
Challenge Test

This sizable manufacturer of beauty and hair-care products submits samples for preservative testing. A Preservative Challenge Test is performed with specific microoganisms incubated at optimum conditions and then tested at one, two, three and four hour intervals.

Client. . . . . Dames and Moore
Park Ridge IL
312-297-6120
Mike Ander

Project Name: Indiana Army
Ammunition Plant
Contamination Survey

As a subcontractor to Dames & Moore, NET Midwest was responsible for the chemical analysis of surface water, sediment and soil samples. Analytical parameters included explosives and priority pollutants. The performance of the contract was monitored by the US Army Toxic and Hazardous Materials Agency and included an extensive Quality Assurance Program. Months of testing and methods development were required to achieve certification before actual samples could be analyzed.

Client. . . . . Illinois Power Co.
Decatur IL
217-424-6832
Harry Walton

Project Name: Groundwater
Monitoring

Illinois Power Company contracted with NET Midwest to perform a two year groundwater monitoring study at several Illinois Power facilities. Much of this work fell under the RCRA monitoring requirements. Analyses included groundwater contamination parameters, Safe Drinking Water Act metals, organics and radiological parameters.

Client. . . . . Rockwell International
Cedar Rapids IA
319-395-5716
Darrell Kula

Project Name: Wastewater Monitoring

NET Midwest is involved in ongoing analysis of the plant effluent into the Cedar Rapids Water Pollution Control Facility. The work involves analysis of various organic and metals parameters to ensure that they are in compliance with their pretreatment permits. NET Midwest was able to meet the stringent 24 hour turn around required for this project.

Client. . . . . **Fannie May**
Chicago IL
312-243-2700
Ken Day

Project Name: Raw Ingredient QC

Fannie May Candy Company daily sends many of its raw ingredients to NET Midwest for Quality Control analyses. This includes such tests as aflatoxin in nuts. As part of a quarterly inspection of their Chicago manufacturing facility, we also do a thorough audit of their of their facility for proper sanitation.

Client. . . . . **Testing Service Co.**
Wheaton IL
312-653-3920
Charles Luther

Project Name: TCE Monitoring

As subcontractor to Testing Services Corporation, NET Midwest was responsible for groundwater monitoring of trichloroethylene. This project, located in Michigan, was to determine the extent and movement of the TCE contamination plume. Water and soil samples were analyzed in addition to drinking water monitoring from a nearby city.

Client. . . . . **Mardel**
Glendale Heights IL
312-351-0606
Ron Reid

Project Name: Product Labeling Verification

NET Midwest routinely analyzes finished products for this manufacturer of aquarium pet food, to assure that the various lots contain the labeled specifications.

Client. . . . . Iowa Environmental Services
515-279-8042
Glenn Soyer

Project Name: VA Medical Center
Iowa City

Iowa Environmental Services is involved with an asbestos abatement project that is being done in conjunction with the renovation of a VA hospital. NET Midwest has been responsible for analytical testing of asbestos bulk and air samples. IES has also contracted with NET Midwest to periodically inspect the site to assure that proper abatement practices are followed.

Client. . . . . E.A. Hickok & Assoc.
Des Moines IA
515-277-6678
Rod Vlieger

Project Name: Marshalltown Instruments

Working for E.A. Hickok and Associates, NET Midwest was responsible for the analysis of soil and water samples at the Marshalltown Instruments site. This analysis was required to comply with RCRA site closure regulations. Analyses included volatile organics and Safe Drinking Water Act metals.

Client. . . . . Sundstrand Aviation
Rockford IL
815-226-6000
Olven Briles

Project Name: Space Shuttle
Water Quality

NET Midwest supplied Standard Plate Count analyses to Sundstrand Aviation during their development of the water supply system to be used on the space shuttles. NET Midwest's bacteriology lab has been certified by the Illinois Department of Public Health to perform specific bacteriological tests on drinking water.

Client. . . . . Dames & Moore
Park Ridge IL
312-297-6120
Mike Ander

Project Name: Buffalo Rock
Reclamation Project

As a subcontractor to Dames & Moore, NET Midwest was responsible for all analytical work on the Buffalo Rock Reclamation Project. This abandoned coal mine study included analysis of mine spoil samples, water samples, and soil samples. Procedures applicable to overburden and mine soils were used. Analyses included minerals, heavy metals, general water quality parameters, neutralization potential, and available and exchangeable soil constituents.

Client. . . . . Fred C. Hart & Assoc.
Denver, CO
816-459-6719
John M. Wise

Project Name: Farmland Industries

Under contract from Fred C. Hart & Assoc., NET Midwest conducted a priority pollutant screening of soil samples for one of Farmland Industries' plants. The samples were analyzed for all 128 priority pollutants as listed in Section 3 of the Clean Water Act. At the time, no reference methods existed for soil samples; NET Midwest adapted existing methods to meet the needs of our client.

Client. . . . . Owens-Illinois
Toledo, Ohio
419-247-9506
Gary Griffith

Project Name: Priority Pollutant
Monitoring

Owens-Illinois contracted with NET Midwest for priority pollutant analysis of wastewater effluents at four of their paper mills located across the United States. These analytical results were used for NPDES permit application requirements. Analysis included the complete priority pollutant list of 128 parameters.

Client. . . . . Dames & Moore
Park Ridge IL
312-297-6120
Mike Ander

Project Name: Exxon Mine Site

As a subcontractor to Dames & Moore, NET Midwest was responsible for surface water, ground water, air, sediment, and macrophyte analysis on a monthly and/or quarterly basis. This included data generation for minerals, trace metals, pesticides, and other organics. Sediment loading and sulfur dioxide air monitoring were added to the study. The purpose of the project was to provide a complete baseline study of an area in Wisconsin relative to a new ore mine.

Client. . . . . Harza Engineering
Chicago IL
312-855-7000
Krishna Myankar

Project Name: Oil Removal Study

Harza Engineering was the prime contractor to design and construct a drinking water treatment plant on a pilot scale to remove oil contamination. NET Midwest analyzed samples obtained from 6 treatment points throughout the system. The purpose of the project was to determine the most efficient method of removing oil contamination from a water supply and to see if the final effluent would meet drinking water requirements. A portion of the project included 7 samples for complete priority pollutant analysis and Safe Drinking Water Act organic parameters at the part per trillion level.

Client. . . . . Conagra Poultry Company
El Dorado AR
501-863-1624
Dr. R. L. Hood

Project Name: Vitamins in Premix

Conagra Poultry Company contracts with NET Midwest to analyze their premix feed ingredients for vitamins. This is done to ensure that the premix, which is eventually fed to livestock and poultry, is mixed correctly and satisfies label claims.

Client. . . . . **Amoco Oil**
Whiting IN
219-473-3075
Jim Miller

Project Name: Specialized Testing

Samples of waxes and oils are analyzed per the Code of Federal Regulations in order to establish their compliance with the appropriate regulation. This establishes their suitability to be used as coatings in the food industry.

Client. . . . . **Metcalf & Eddy**
Wakefield MA
617-246-5200
Bruce Goodwin

Project Name: Pembroke/Cross Brothers
Superfund Site

As a subcontractor to Metcalf & Eddy, NET Midwest was responsible for the chemical analysis of soil, groundwater and drinking water samples to determine the presence and extent of contamination at a superfund site. Analysis included heavy metals, cyanide, phenol, and the complete organic target compound list (TCL). An extensive Quality Assurance Project Plan was prepared in accordance with guidelines and specifications presented in the federal Contract Laboratory Program (CLP). USEPA approval of the QAPP was required prior to performing this contract.

CREDENTIALS AND CERTIFICATIONS

NET Midwest's laboratories are staffed with professionally qualified and experienced chemists, biologists, microbiologists, and managers utilizing the latest equipment.

As a member of the American Council of Independent Laboratories, NET Midwest has pledged to maintain absolute impartiality and confidentiality whether the client be government, industry, or an individual. The ACIL's strict Qualification Program outlines standards for personnel, equipment and reference sample programs. In addition to its professional recognition, ACIL divisional and national conferences provide NET Midwest with information on governmental regulations, legislative analysis and management assistance.

Through either corporate or individual memberships, NET Midwest is represented in many other industrial and professional associations, a few of which are:

American Chemical Society
American Water Works Association
Institute of Food Technologists
American Electroplaters Society
Association of Official Analytical Chemists
National Feed Ingredient Association
Water Quality Association
Society for Applied Spectroscopy
American Society-Mass Spectrometry
Association of Vitamin Chemists
American Society for Testing and Materials
American Industrial Hygiene Association
American Industrial Hygiene Association-IA/IL Section
Iowa Safety Council
American Society of Safety Engineers
Black Hawk County(Iowa)Environmental Task Force
Iowa Association of Business and Industry
Iowa Society of Solid Waste Operation
National Asbestos Council

The Department of Public Health, State of Illinois, has inspected and approved our personnel and facilities to conduct microbiological analyses of public and private drinking water supplies. This certification is listed in the U.S. Department of Health, Education and Welfare registry of laboratories. Periodic inspections by the State ensures compliance in quality assurance, record keeping and facility maintenance. Most states have certification reciprocity.

NET Midwest is also certified by the Illinois Environmental Protection Agency for the analyses required under the Safe Drinking Water Act.

In addition to IEPA's certification, NET Midwest was also "approved" to provide analytical services to the Agency under its Contract Lab Program. Under this program, NET Midwest provided services for three activities: emergency response, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), and the Clean Illinois Program relating to hazardous waste sites. An extensive Quality Assurance Plan was prepared modeled after the Federal Contract Lab Program. This is utilized to provide results consistent with the federal program which requires results of a known and documented quality that are legally defensible in a court of law.

The Cedar Falls Division of NET Midwest is accredited by the American Industrial Hygiene Association (#285), and is certified by the EPA for bulk asbestos analyses. The laboratory is also enrolled in the NVLAP bulk asbestos certification program administered by the National Bureau of Standards.

NET Midwest is certified by the Wisconsin Department of Natural Resources. Minimum requirements and criteria for laboratories submitting monitoring data to the Department have been established. These rules are applicable to commercial, municipal, and industrial laboratories that analyze wastewater, groundwater, surface water, hazardous substances, hazardous waste, and sediments. These rules specify methodology, laboratory quality control procedures, and laboratory records.

NET Midwest is also certified by the US Army Toxic and Hazardous Materials Agency (USATHAMA) to perform analysis on water, soil, and sediments for a wide variety of tests, including explosives and priority pollutants.

NET Midwest is certified by the State of Iowa for the analysis of Safe Drinking Water Act parameters and participates in the EPA Water Pollution and Water Supply Performance Evaluation Studies.

PARTIAL LIST OF CLIENTS

JOHN DEERE	WRIGLEY'S
FANNIE MAY	NABISCO BRANDS
CHRYSLER CORP	WEHRAN ENGINEERS
ARMY CORPS OF ENG	ILLINOIS POWER COMPANY
BAXTER-TRAVENOL	DONOHUE & ASSOCIATES
BAXTER & WOODMAN	ESPEY, HUSTON & ASSOC
BROWNING-FERRIS CO	U. S. ARMY - NATICK
ROCKWELL INT'L	METCALF & EDDY
U.S. VETERAN'S ADMIN	HARZA ENGINEERING
CATERPILLAR	INGERSOLL
KEEBLER COMPANY	MOBIL CHEMICAL
MINNESOTA MINING	F.P.D. DUPAGE COUNTY
COMMONWEALTH EDISON	ROLLINS INVIRONMENTAL
GENERAL ELECTRIC	HICKOK AND ASSOCIATES
DAMES & MOORE	S.E.T. ENVIRONMENTAL
MCDONALD'S	MOTOROLA
DEL MONTE	QUAKER OATS
ILLINOIS EPA	FERMILAB
AMOCO OIL	UNION OIL CO
VON DUPRIN	U. S. STEEL
SAFETY KLEEN	WOODWARD-CLYDE
ARVIN INDUSTRIES	CPC DIV. OF GMC
B. F. GOODRICH	WESTERN ELECTRIC
DELCO REMY DIV. OF GMC	IN'T MINERALS & CHEMICALS
A.E. STALEY MANUFACTURING	INDIANA DEPT. ENVIRON. MGT.

REGULATORY AGENCIES

Compliance with rules issued by various government regulatory agencies is often the prime reason for a client to seek the services of NET Midwest. Therefore, we maintain contact with such agencies and stay attuned to their ever-changing requirements. This program of positive communication proves invaluable to many of our clients by providing them with assistance in regulation monitoring, permitting, compliance, data gathering, etc. NET Midwest regularly communicates with agencies such as:

FEDERAL

Environmental Protection Agency
Department of Agriculture
Department of the Army, Corps of Engineers
Department of Wildlife and Conservation
Bureau of Standards
Geological Survey
Department of Commerce
Nuclear Regulatory Commission
Food and Drug Administration
Department of Public Health
US Army Toxic and Hazardous Materials Agency
Occupational Safety and Health Administration(OSHA)
National Institute of Occupational Safety and Health(NIOSH)

STATE

Environmental Protection Agency
Department of Public Health
Department of Natural Resources
Department of Environmental Monitoring
Department of Transportation
Department of Conservation
Department of Water Resources
State Water Survey

MISCELLANEOUS

Metropolitan Sanitary District of Greater Chicago
Rockford Sanitary District
Northeastern Illinois Planning Commission
Various Municipal Utility Districts

EQUIPMENT AND PROCEDURES

Laboratory Equipment..... 16
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LABORATORY EQUIPMENT

A substantial investment in laboratory equipment is necessary to properly perform high quality analytical work. NET Midwest is committed to a continuous expansion and upgrading of equipment and capabilities as required to maintain its total service commitment to clients. NET Midwest's present laboratory equipment includes:

5 - H-P 5970b MSD Gas Chromatograph/Mass Spectrometers

2 - H-P 5993b Gas Chromatograph/Mass Spectrometer

P E 8500 Gas Chromatograph with NPD & FID

P E 3920 Gas Chromatograph with FID & TCD

2 - H-P 5890 Gas Chromatograph with ECD & FID

H-P 5880 Gas Chromatograph with dual ECD, FID, & NPD

H-P 5880 Gas Chromatograph with dual ECD & FID

H-P 5890 Gas Chromatograph with FID

Tracor 560 Gas Chromatograph with ECD

Varian 1475 Atomic Absorption Spectrophotometer

PE 5100 Atomic Absorption Spectrophotometer

PE 703 Atomic Absorption Spectrophotometer

PE 560 Atomic Absorption Spectrophotometer

2-PE 460 Atomic Absorption Spectrophotometers

PE Plasma 40 ICP Emission Spectrometer

Beckman DU-20 UV/VIS Spectrophotometer

Waters 440/441 HPLC with 420 Fluorescence

Dohrmann DC-80 Low Level TOC Analyzer

Dohrman DX-20 TOX Analyzer

Olympus BH-2 Phase Contrast Microscope

Olympus BH-2 Polarized Light Microscope

Sequoia-Turner Model 450 Fluorometer

Parr Oxygen Bomb Calorimeter System

Pye Unicam UV-VIS Spectrophotometer

LABORATORY PROCEDURES

NET Midwest analyzes a wide range of sample matrices for a long list of parameters. The types of samples would include: water, foods, cosmetics, sludges, bottom sediments, grains, alloys, tissues, feed additives, hazardous waste, soils, fertilizers, and many more.

As is the case with all submitted analytical work, NET Midwest utilizes the current approved procedure or the most appropriate methodology. For example, any samples submitted in conjunction with requirements to satisfy U.S. Environmental Protection Agency permits or applications would necessitate use of USEPA methods. Many food products submitted for quality control would use procedures from the Association of Official Analytical Chemists.

Analytical protocols can be specified by the client or the appropriate method will be selected by the laboratory.

The following is a list of the principal agencies and associations that provide analytical method reference sources for laboratories like NET Midwest.

National Bureau of Standards
U.S. Environmental Protection Agency
Association of Official Analytical Chemists
American Society of Testing Materials
Institute of Food Technology
AWWA/WPCF Standard Methods Committee
Department of Public Health
U.S. Department of Agriculture
U.S. Pharmacopeia
National Institute of Occupational Safety and Health(NIOSH)
Occupational Safety and Health Administration(OSHA)

A complete list of reference manuals, books, methods, etc. is available for review in NET Midwest's copyrighted Quality Assurance Manual.

In addition to all of the available reference methods, NET Midwest has written a complete set of Procedure Manuals. These Manuals not only give the complete analytical protocol, but also compile the background information from all of the references and from experiences of the staff, and incorporate them into the procedure. This would include such information as interferences, pretreatment, holding times, etc.

SAMPLE MANAGEMENT

The following is a table from 40CFR 136 to be utilized as a guideline for sample containers, preservation of samples, and holding times. This table is extremely important in assuring data reliability. NET Midwest provides all required sample containers at no extra charge to control contamination and preservation.

PARAMETER	CONTAINER	PRESERVATIVE	MAXIMUM HOLDING TIME
Acidity/Alkalinity	P,G	None	14 days
Ammonia	P,G	H2SO4 to pH<2	28 days
BOD	P,G	None	48 hours
Chloride	P,G	None	28 days
Chlorine	P,G	None	immediately
Chromium, hex	P,G	None	24 hours
COD	P,G	H2SO4 to pH<2	28 days
Color	P,G	None	48 hours
Conductivity	P,G	None	28 days
Cyanide	P,G	NaOH to pH>12	14 days
Fluoride	P,G	None	28 days
Hardness	P,G	None	6 months
MBAS	P,G	None	48 hours
Mercury	P,G	HN03 to pH<2	28 days
Metals	P,G	HN03 to pH<2	6 months
Nitrate	P,G	None	48 hours
Nitrite	P,G	None	48 hours
Nitrogen,total	P,G	H2S04 to pH<2	28 days
Oil & grease	G	H2S04 to pH<2	28 days
Organic compounds			
Volatiles	G	None	14 days
Extractables			
pre-extraction	G	None	7 days
post-extraction	G	None	40 days
pH	P,G	None	immediately
Phenol	G	H2S04 to pH<2	28 days
Phosphorus	P,G	H2S04 to pH<2	28 days
Radiologicals	P,G	HNO3 to pH<2	6 months
Silica	P	None	28 days
Solids: tot, susp, vol	P,G	None	7 days
Solids: diss, sett.	P,G	None	48 hours
Sulfate	P,G	None	28 days
Sulfide	P,G	ZnAc+NaOH to pH>9	7 days
Sulfite	P,G	None	immediately
TOC	P,G	H2S04 to pH<2	28 days
TOX	G	HN03 pH<2	14 days
Turbidity	P,G	None	48 hours

P = Plastic G = Glass

With the exception of fluoride, metals, and radiologicals, all samples must be kept at 4C in addition to listed preservatives.

COMPUTER MANAGEMENT SYSTEM

NET Midwest utilizes a computerized laboratory management system to assist the entire operations of the laboratory from the logging in of samples to the generation of customized reports. This custom written system is one of the most advanced systems in the country, and allows us at NET Midwest to give you the service you need with the speed, accuracy, and unlimited flexibility of the computer. We've virtually eliminated the mistakes and excuses that go hand in hand with a manual system; i.e. transcription errors; paperwork being lost or buried on someones desk; due dates or holding times being missed because it wasn't written down; etc. The computer system allows us to maximize the quality and responsiveness of our analytical service and at the same time minimizes a lot of the burdensome manual tasks required in our business. This nets out to better quality service and data at lower costs.

The following is the menu from which most of the day to day operations of LABSYS are accomplished:

LABSYS LABORATORY MANAGEMENT SYSTEM MAIN MENU

1...ENTER NEW SAMPLES (LOGIN)
2...CORRECT SAMPLE AND TEST SELECTION
3...PRINT LABELS
4...PRINT CLIENT FILE
5...PRINT DAILY LOG

6...PRINT TEST QUEUE / PRINT DATA SHEETS
7...ENTER TEST RESULTS
8...CORRECT TEST RESULTS
9...LOAD & CORRECT TEST RESULTS

10..PRINT/DISPLAY - INDIVIDUAL SAMPLE STATUS
11..PRINT ALL SAMPLE COMPLETION STATUS
12..PRINT AND APPROVE DATA
13..PRINT REPORT
14..PRINT INVOICE

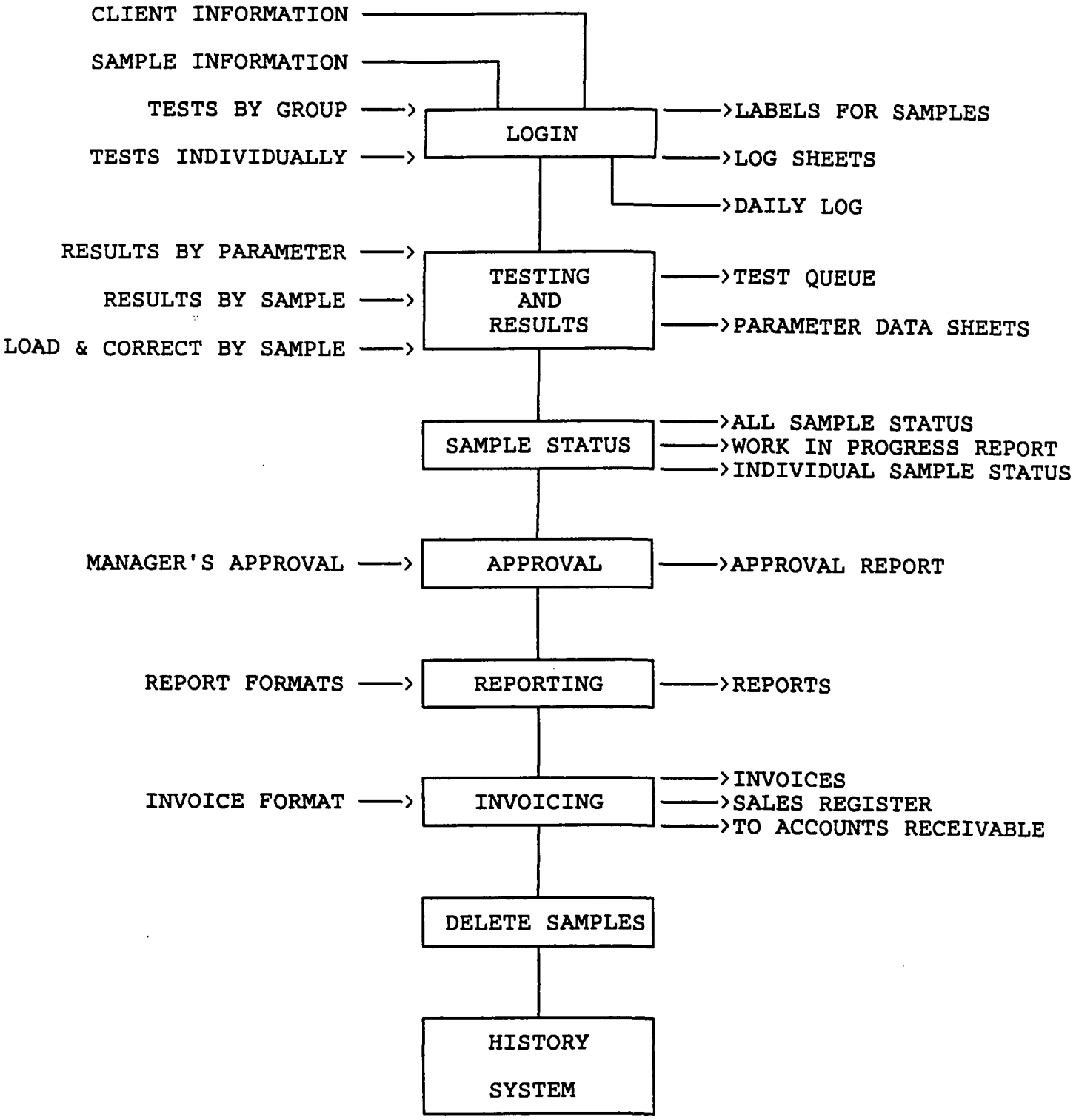
15..PRINT TEST LIST AND GROUP LISTS
16..HISTORY MENU

In addition, LABSYS also has a maintenance menu. Each of the modules on this menu perform some sort of maintenance function.

1...CLIENT FILE MAINTENANCE
2...DELETE SAMPLES
3...TEST FILE MAINTENANCE & REPORTS
4...INITIAL SYSTEM, FORMAT REPORT/INVOICE/SET SAMPLE NO.
5...END OF MONTH REORGANIZATION OF DATA
6...CREATE DATA FILES
7...CONFIGURE TERMINAL
8...BALANCE
9...SET CUSTOMER ACCESS INFORMATION
10..INITIALIZE QA COUNTER SYSTEM
11..PRINT/DISPLAY WORK IN PROGRESS

Again, the system maximizes the quality and responsiveness of data tracking and reporting of NET Midwest analytical services. We're proud of our computer management system at NET Midwest and would welcome the opportunity to discuss it further. The following page shows a brief diagram of the flow of data using the system.

LABSYS DATA FLOW



QUALITY ASSURANCE

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GENERAL DISCUSSION

The purpose of the independent analytical laboratory is to provide information that is accurate, reliable, and adequate for its intended use with absolute impartiality. To meet this purpose, NET Midwest has developed a complete Quality Assurance Program to guide the total operations of our laboratories from shipping of bottles to filing of reports. This program is described in full in our Quality Assurance Manual. This manual is the basis for instruction and direction in the establishment and maintenance of NET Midwest's Quality Assurance Program. It describes the criteria, guidelines and recommendations for the physical resources, the human resources, the data validation and the mode of operation of the laboratory. Management, statistical, preventative, corrective, administrative, and investigative techniques are employed to maximize this achievement.

NET Midwest's copyrighted Quality Assurance Manual is representative of our great investment in total quality assurance. Therefore, we consider much of its content proprietary. While a manual is available for inspection and review at each of NET Midwest's offices, copies will only be allowed to leave the office when the party makes a request in writing and agrees to sign our release form.

The following table of contents from our Quality Assurance Manual gives a listing of all sections that are covered. As can be seen, NET Midwest has invested in an extensive program which covers every aspect of laboratory operations.

1. INTRODUCTION
2. QUALITY ASSURANCE OVERVIEW
3. ORGANIZATION FOR QUALITY
4. COSTS AND BENEFITS
5. TRAINING AND CERTIFICATION
6. PROCEDURE MANUALS
7. FACILITIES
8. PROCUREMENT CONTROL, REAGENTS AND REFERENCE STANDARDS
9. MAINTENANCE AND CALIBRATION
10. PACKING AND SHIPPING
11. DOCUMENT CONTROL
12. DATA HANDLING, REPORTING AND RECORDKEEPING
13. CUSTOMER RELATIONS
14. CALIBRATION CURVES
15. PRECISION AND ACCURACY
16. INTERLABORATORY TESTING
17. DATA VALIDATION AND REVIEW
18. CLOSED LOOP CORRECTIVE ACTION AND FEEDBACK
19. AUDITS
20. REFERENCES

Q.A. MANUAL SUMMARY

In order to obtain a clearer picture of NET Midwest's commitment to quality, the following is a summary of each section of our Q.A. Manual. For a more detailed review of our program, we invite you to meet with one of our Division Managers at your nearest NET Midwest office.

SECTION 2. QUALITY ASSURANCE OVERVIEW

This section was written to provide a general overview of our Quality Assurance Program. This summary allows the reader to obtain a total picture of our program without reading the entire Q.A. Manual.

SECTION 3. ORGANIZATION FOR QUALITY

The establishment of a quality assurance program, as described in our Quality Assurance Manual, requires the assistance of all the people within NET Midwest to carry out the monitoring, recordkeeping, statistical techniques and other functions required by our system. This total commitment of all personnel to the production of reliable data is dependent upon the conscientious effort of everyone involved. Therefore it is important that each member of the organization have a clear understanding of his or her duties, responsibilities and their relationship to the company-wide effort. This section assists in that understanding by giving a structure and organization to this commitment to quality. Organization charts for the corporation and the divisions, along with job descriptions for all personnel are provided.

SECTION 4. COSTS AND BENEFITS

Quality assurance costs are segregated and recorded to identify elements of our quality assurance program whose costs may be disproportionate to the benefits derived. This assists in carrying out policies in the most efficient and economical manner commensurate with continued accuracy and precision of the data produced. Simply stated - what are the real costs associated with our Q.A. program in relationship to the benefits?

SECTION 5. TRAINING & CERTIFICATION

The most important element in providing quality data is our people. Therefore, it is vital to make sure every employee is thoroughly knowledgeable in their area of responsibility and can demonstrate competence on a regular basis in documented form. To attain this, we have a formal training program which not only ensures that every employee knows what they're doing, but generates confidence that our analytical results are correct. This mandatory training program covers all aspects of our operation, including extensive training in quality assurance and safety.

SECTION 6. PROCEDURE MANUALS

A quality assurance program should assure that all work, from the ordering of materials to the reporting of results, be prescribed in clear and complete written instructions of a type appropriate to the circumstances. Manuals are not only written for our analytical testing programs but also for such aspects of our operation as maintenance, calibration, reporting, quoting, and invoicing. Bench sheets, when appropriate, have been developed for immediate reference.

SECTION 7. FACILITIES

Because of the extent to which the laboratory environment can affect the results of the analysis, the laboratory facility must be carefully planned and that plan periodically evaluated. In general, the physical conditions shall comply with applicable local building codes, OSHA requirements, EPA requirements, and/or other legal requirements. Emphasis will be placed on professionalism, efficiency, and safety.

SECTION 8. PROCUREMENT CONTROL, REAGENTS, AND REFERENCE STANDARDS

The quality of our reagents and chemicals can directly affect the quality of our analytical results. Described in this section are the procedures for ordering, receiving, marking, and storing materials, reagents, and chemicals. Minimum standards are specified to insure that these supplies do not jeopardize the quality of our analytical results. Also established are the shelf lives for reagents, standards, and chemicals.

SECTION 9. MAINTENANCE AND CALIBRATION

Because we rely so heavily on our instruments, it is the purpose of this section to assure that only properly maintained and calibrated instruments and equipment are used in the measurement process. Preventive maintenance is an orderly program of positive actions (equipment cleaning, lubricating, adjusting, reconditioning, and/or testing) to prevent instruments from failing during use. Calibration is the process by which a standard or piece of equipment of a given accuracy is compared against a standard or piece of equipment of a higher accuracy. Adjustments are made as necessary to assure that the standards or equipment are within the prescribed accuracy.

SECTION 10. PACKING AND SHIPPING

Because of the fragile and sometimes sensitive nature of samples and their containers, special precautions must be taken for handling, storage, packing and shipping to protect the integrity of the samples and to minimize damage, loss, deterioration, degradation, and/or modification. This section addresses acceptable sample containers, sample volumes, preservatives, holding times, chain of custody procedures, DOT shipping regulations, and the disposal of samples.

SECTION 11. DOCUMENT CONTROL

Sound procedural documentation of laboratory operations - from dishwashing and balance calibration to maintenance and analytical testing - are essential to overall quality control. Inaccurate or outdated procedures within a facility can cause severe quality problems. It is the purpose of this section therefore, to describe the system we use to ensure that current specifications, methods, and standards are in the hands of users and that they do not use obsolete documents. A system of distribution, review, approval, recall, and update is established and rigidly utilized.

SECTION 12. DATA HANDLING, REPORTING AND RECORDKEEPING

Essential to our business and clients is a systematic approach to our handling of the large amount of data we generate. This system should allow for rapid information recovery and access. It should also allow for the maintenance and the storage of this data for future reference. It is the purpose of this section,

therefore, to describe the system and the forms that are used to request, record, transcribe, report, and store the results of our analytical testing.

SECTION 13. CUSTOMER RELATIONS

Vital to our business is the establishment of a good working relationship with our clients. To assist in maintaining that relationship on a professional level, guidelines are established concerning turn-around time, emergency requests, customer complaints, and our rerun policy.

SECTION 14. CALIBRATION CURVES

Calibration curves are plots of the instrument response versus the concentration. 90% of the analyses we perform are based on a calibration curve and the validity of our data is dependent to a great degree on how well these are established. Since it would be impractical to develop a new standard curve every time an analysis is performed, we have established a method for verifying it with each set of samples. It is the purpose of this section to describe how calibration curves are developed and to establish the methods for their verification on a daily basis.

SECTION 15. PRECISION AND ACCURACY

Our precision and accuracy program is a continuing, systematic, in-house regimen intended to ensure the production of analytical data of continuing high validity. This is accomplished primarily by running precision and accuracy control checks with every sample set. Control charts have been developed at the 99% confidence limit to plot this data as it is generated.

SECTION 16. INTERLABORATORY TESTING

The interlaboratory control program involves analysis of check samples (EPA, USGS, ERA, etc.) by each division laboratory in order to assess the continuing capability and relative performance of each. This program shall not be limited to check samples from the corporate office. Check samples from clients, EPA surveys, USGS surveys, certification programs, etc. are also analyzed.

SECTION 17. DATA VALIDATION AND REVIEW

This section describes the process whereby data is screened, and accepted or rejected based on a set of criteria. This involves a critical review of a body of data in order to locate dubious values. It may involve only cursory scan to detect extreme values or a detailed evaluation requiring the use of a computer. Included in this section are anion-cation balances, chemical relationships, etc.

SECTION 18. CLOSED LOOP CORRECTIVE ACTION AND FEEDBACK

Experience has shown that most problems will not disappear until positive action has been taken by management. The significant characteristic of any good management system is the step that closes the loop - the determination to make a change if the system demands it. This section establishes a mode for correcting a deviation, fixing responsibility for the action required, documenting the steps taken, and securing a report on the resolution of the problem.

SECTION 19. SYSTEM AUDITS

Our Q.A. Program dictates a number of steps, procedures, and documentations that must be followed in order to ensure the accuracy and reliability of our results. All that is needed then, is a follow-up system to ensure that all items dictated in this manual are being carried out. This section describes the three different auditing systems that we use: 1) Divisional - Each division manager is required to do an internal audit at least every quarter. 2) Corporate - Auditing is performed by the Vice-President and Director of Quality Assurance at least annually. 3) Other - These audits are performed by our clients or regulatory agencies as needed to satisfy their own Q.A. programs or as a prerequisite to obtaining a specific job or certification.

PERSONNEL

Key Personnel..... 29

KEY PERSONNEL

NET Midwest, as a member of the American Council of Independent Laboratories, subscribes to its Manual of Practice, which contains a general description of the basic personnel requirements. The ACIL also provides "A Guide for Preparing a Personnel Policy Manual". This guide was used extensively in the preparation of NET Midwest's Personnel Policy Manual.

A file is maintained on each employee as required by various Federal and State Agencies. This file contains miscellaneous information, vacations, background, education, etc. Its primary function is to maintain the following records:

Safety meeting attendance is required for all employees. To protect the health and welfare of our lab people, regular safety meetings are held and attendance is recorded.

Health and accident records are kept for both the protection of the personnel and the Company. When an employee is sick at work or is absent due to illness, the reason is recorded. NET Midwest's insurance company and OSHA require posting of accidents and rates.

NET Midwest trains its people so that their capabilities constantly expand. Thus, as the company grows, people have grown to fill management needs. Laboratory training is both on an individual basis and informal classes are held by the Division Manager.

Among NET Midwest's total staff of professional and administrative personnel, the following people hold positions of key responsibility in management, technical direction, and client service.

STAN S. ZAWORSKI

PRESIDENT

St. Mary's College, Winona, Minnesota, B.S. 1970;
Biology Major, Chemistry Minor

SPECIAL INTERESTS

Air, Water & Sediment Chemistry
Atomic Absorption Procedural Development
Gas Chromatography for Pesticides & Halogenated Hydrocarbons
TOC Analysis of Surface Waters and Sediments

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)
President, 1988 - present

AQUALAB, INC.
President, 1987 - 1988

Responsible for complete technical and business operation of the corporation. This includes all aspects in the areas of finance, marketing, informational systems, and lab operations.

AQUALAB, Inc.
Vice-President, Lab Operations, 1980 - 1987
Vice-President, 1978 - 1980

Responsible for all multi-divisional technical operations. This included the preparation of all analytical procedure manuals, a review of regulations for the entire corporation, and QA/QC.

AQUALAB, Inc.
General Manager, 1977 - 1980

Accountable for the total performance of the division. This included profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

AQUALAB, Inc.
Chief Chemist, 1976

Suburban Labs
Analytical Chemist, 1972-76

PROFESSIONAL AFFILIATIONS

AWWA Committee for Standard Methods
Illinois Potable Water Supply Association
Chicago Area Association of Laboratories
American Council of Independent Laboratories

PAPERS AND SPECIAL WORK

"Halogenated Hydrocarbons in a Public Water Supply," prepared for City of Elgin, 1977

"PCB Contamination of Airport Environs following Airplane Accident," prepared for Liquid Waste, Inc., 1977

Pesticide Analysis of Rock River Fish Tissue," prepared for Espey, Huston & Assoc., 1977

"Benthic and Macrophyte Analysis of Various Wisconsin Flora and Fauna," prepared for Dames & Moore, 1977

"Elutriate Analysis of Louisiana River Sediments," prepared for SAI, Inc., 1977

"Analysis of Priority Pollutants by GC/MS using capillary column," for AQUALAB, Inc., 1981

"Quality Assurance Manual" revised for AQUALAB, 1983

"Quality Assurance Manual prepared for AQUALAB, 1977

"Dredging Baseline Analysis," prepared for Corps of Engineers, 1977

"TOC in Rock River Sediments," prepared for Espey Huston & Assoc., 1976

"Acanthocephelon Infestattion of Fresh Water Game Fish from the Mississippi River," 1970

"Analysis of Trace Bismuth and Lead in Nickel Alloy," prepared for Charles Kawin Co., 1976

"Quality Assurance Manual updated for AQUALAB, 1980

"Analytical Procedure Manual" prepared for AQUALAB, Inc., 1982

IRENE R. PLAGGE

VICE-PRESIDENT, FINANCE

Collegiate studies in accounting, budget and finance, interpreting financial statements and personnel.

SPECIAL INTERESTS

Computer Data Management
Budget Preparation
Cash Management
Administrative Management
Credit Policies and Procedures

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)
Vice-President, Finanace; Corporate Secretary, Treasurer
1988 - present

AQUALAB, Inc.
Vice-President, Finance; Corporate Secretary, Treasurer
1987 - 1988

Vice-President, Business Operations, 1985 - 1987

Manages the general accounting and data processing staff. Responsible for the preparation of the organizations financial data including budgets and cash management.

AQUALAB, Inc.
Administrative Manager, 1984-1985

Prepared the company's payrolls for four divisions and the Corporate staff using a computerized system. Recommended improvements in record keeping and systems operations. Maintained personnel records.

AQUALAB, Inc. Bartlett Division
Office Manager, 1978-1984

Responsible for Accounts Receivable, Accounts Payable, Customer Service and reporting of analytical data.

AQUALAB, Inc. Bartlett Division
Secretary 1977-78

DUKANE CORPORATION
Secretary to the Chief Engineer, 1954-1961

PROFESSIONAL AFFILIATIONS

American Council of Independent Laboratories
Associated Management Institute
Bartlett Area Chamber of Commerce
Illinois State Chamber of Commerce

ROBERT N. BUCARO

VICE PRESIDENT AND DIRECTOR OF QUALITY ASSURANCE

B.S., Northern Illinois University, 1974,
Biology Major, Chemistry Minor

SPECIAL INTERESTS

Water Chemistry
Aquatic Ecology
Quality Assurance in Analytical Methods
Laboratory Management

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)
Vice-President, 1988 - present
Director of Quality Assurance, 1985 - present

AQUALAB, Inc.
Vice-President, 1987 - 1988
Director of Quality Assurance, 1985 - 1988

Responsible for the multi-divisional development and implementation of all aspects of AQUALAB's QA/QC efforts. This includes the preparation of all analytical procedure manuals and a review of regulations for the entire corporation.

AQUALAB, Inc. - Bartlett Division
Division Manager, 1980 - 1985

Accountable for the total performance of the division. This included profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included was personnel training, guidance, and evaluation.

Hazleton Environmental Sciences
Chemistry Group Leader, 1977 - 1980

Responsible for the technical operations of the chemistry laboratories.

Hazleton Environmental Sciences
Associate Chemist, 1977

Performed analyses in the water chemistry laboratory, including the operation and maintenance of the auto-analyzers.

Suburban Labs
Supervisor, Wet Chemistry Laboratory 1975 - 1977

Responsible for the technical operations of the wet chemistry laboratory.

Analytical Chemist, 1974 - 1975

PROFESSIONAL AFFILIATIONS

Association of Official Analytical Chemists
American Council of Independent Laboratories
American Water Works Association

PAPERS AND SPECIAL WORK

"Lead Content in Orconectes Virilis from the Kishwaukee River," prepared for Northern Illinois University, 1974

"Chemistry Procedures Manual" prepared for Suburban Labs, 1977

"Water Quality of Lake Michigan at the Zion Nuclear Power Station," prepared for Commonwealth Edison, 1977

"Analysis of Hazardous Wastes Using USEPA and ASTM Methods," prepared for Residuals Management Technology, 1980

"Heavy Metal Uptake in Trout," prepared for the Colorado UTE Electric Association, 1980

"Water Quality of the Missouri River at the Cooper Nuclear Power Station," prepared for the Nebraska Public Power District, 1978

"Water Qquality of the Rock River(Michigan),"prepared for Harza Engineering, 1979

"Study of Bacterial Contamination and Dissolved Oxygen Citation Lake," prepared the Citation Lake Homeowners Association, 1979

"Quality Assurance Audit for the City of Lincoln, Nebraska, Wastewater System Laboratory," prepared for the City of Lincoln, Nebraska, 1980

"Quality Assurance Audit of Sanitation Laboratory at the Park District of Chicago," 1982

"Oil Removal from a Drinking Water Source to Part-Per-Trillion Level," prepared for Harza Engineering, 1982

"Method Development for the Analysis of Near-surface Hydrocarbon Soil Gases," prepared for Illinois Crude Oil Productions, 1983

"Quality Control Plan for INAAP Contamination Survey," prepared for Dames & Moore, 1983

"Quality Assurance Project Plan - IEPA Contract Lab Program", prepared for AQUALAB, Inc., 1986

"Explosives Analysis by GC-FID of water & soil at INAAP,"prepared for USATHAMA, 1982

"The Importance of Quality Assurance,"presented to the Illinois Chapter, Government Refuse Collection and Disposal Association, 1982

"Fatty Acids in Industrial Wastewater," prepared for Owens-Illinois, 1983

SCOTT C. GERRICK

VICE PRESIDENT, BUSINESS DEVELOPMENT

College of DuPage, Glen Ellyn, IL
Associate in Science, 1982
University of Wisconsin, College of Engineering
The Department of Engineering Professional Development

SPECIAL INTERESTS

Investigation and Remediation of Sanitary Landfill Sites
Marketing Techniques in Analytical Laboratories
Interaction between the regulated Community and the Political System

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)
Vice President, Business Development, 1988 - Present

Responsible for all marketing and business development within the Midwest Region. This includes guidance, literature, personnel training, trade shows and market research.

AQUALAB, Inc - Bartlett Division
Manager Client Services 1987-1988

Established and maintained marketing and sales program for the Bartlett and Rockford Divisions.

Forest Preserve District of DuPage County
Environmental Control Manager 1984-1987

Responsible for integrating and coordinating a number of dissimilar environmental functions at the Forest Preserve's eight landfills to ensure adherence to county, state and federal environmental laws on FPD land, and oversaw all inspections. Responsible for approving EPA permits for waste disposal, conducting the sampling program on all pre-groundwater monitoring wells(250) and interpreting all data.

Forest Preserve District of DuPage County
Environmental Testing Coordinator, 1978-1984

Suburban Laboratories
Supervisor, 1975-1978

Environmental testing laboratory. Responsible for the scheduling of all sampling and receipt of all samples. This included water, wastewater, waste, air pollution and Industrial Hygiene Testing.

Suburban Laboratories
Lab Technician, 1973-1975

Performed analyses in the water chemistry laboratory.

Richardson Research
Technician, 1972-1973

Performed air, stack, noise, waste and water analysis.

PROFESSIONAL AFFILIATIONS

American Public Works Association-Institute of Solid Wastes
Illinois Department of Agriculture-Certified Public Operator
National Environmental Health Association-Certified Environmental Health Technician
Goverment Refuse Collection Disposal Association
American Public Health Association

WILLIAM H. MOTTASHED III

MANAGER - BARTLETT DIVISION

Harper College, 1976-78

SPECIAL INTERESTS

Water Chemistry
Atomic Absorption Spectrophotometry
Methods Development
Laboratory Management

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.) - Bartlett
Division Manager, 1988 - present

AQUALAB, Inc. - Bartlett Division
Division Manager, 1985 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

AQUALAB, Inc. - Rockford Division
Division Manager, 1984-1985

Accountable for the total performance of the division. This included profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

AQUALAB, Inc. - Bartlett Division
Laboratory Supervisor, 1983-1984

Worked directly with the division manager, assisting with various aspects of client services, personnel management, and lab operations. Also served as an analytical back-up in the inorganics laboratories.

AQUALAB, Inc. - Bartlett Division
Atomic Absorption Analyst, 1980-1983

Performed metals analyses using Atomic Absorption Spectroscopy, including all digestions and sample preps.

AQUALAB, Inc. - Bartlett Division
Wastewater Technician, 1978-1980

Responsible for all wastewater analyses and field sampling.

PROFESSIONAL AFFILIATIONS

American Water Works Association
American Chemical Society
American Council of Independent laboratories
American Electroplaters Society

PAPERS AND SPECIAL WORK

"Nephelometric Turbidity and Chlorine Removal by a Prototype Granular Carbon Cartridge", prepared for Brunswick Corp., 1979

"Low Level TOC in Surface Water Samples", prepared for Gulf Coast Laboratory, 1983

"Selective Metals by AA in Groundwater Contaminated with Explosives", prepared for the Indiana Army Ammunition Plant Project, 1983

"Polymeric Removal of Oil & Heavy Metals in Industrial Wastewater," prepared for Fehr, Graham & Associates, 1985

"Effectiveness of a Renewable Cartridge Filter", prepared for Autotrol Corporation, 1979

"Quality Assurance Analyses of Arsenic and Selenium in Groundwater", prepared for AQUALAB, 1982

"Utilization of the Perkin Elmer MHS-10 in the Analyis of Water Samples for Arsenic Mercury and Selenium", prepared for Aqualab Procedure Manual, 1983

"Analysis of Volatile Priority Pollutants by GC/FID", for AQUALAB, Inc., 1984

MICHAEL K. MCGEE

DIVISION MANAGER - CEDAR FALLS

University of Massachusetts, Amherst, Massachusetts, M.S. 1980;
Public Health and Environmental Health

University of Iowa, Iowa City, Iowa, B.A. 1976;
Biology Major, Phi Beta Kappa

SPECIAL INTERESTS

Industrial Hygiene Audits
Employee Exposure Monitoring
Noise Level Monitoring
Hearing Conservation Programs
Right-to-Know Programs
Evaluation and Control of Workplace Health Risks

EXPERIENCE

NET Midwest, Inc. - (formerly Serco Labs)-Cedar Falls Division
Division Manager, 1988 - present

Serco Labs
Division Manager, 1984 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, quality assurance, and maintenance of AIHA Laboratory Accreditation. Also included is personnel training, guidance, and evaluation.

In addition to management responsibilities, provides a broad range of industrial hygiene and safety consulting services.

John Deere Dubuque Works
Industrial Hygienist, 1979 - 1984

Responsible for the development and administration of health and safety programs for a workforce of 5000 employees of a heavy machinery manufacturer.

CERTIFICATION

Certified Industrial Hygienist, Comprehensive Practice

PROFESSIONAL AFFILIATIONS

American Industrial Hygiene Association (AIHA)
American Industrial Hygiene Association, Iowa/Illinois Section
President, 1984
Sectretary-Treasurer, 1982
American Academy of Industrial Hygiene
American Society of Safety Engineers
Iowa Safety Council, President-Elect, 1988
Iowa Safety Council, Vice-President, 1987
Iowa Safety Council, Treasurer, 1986
Board of Directors, 1985 - present
University of Iowa Institute of Agricultural and Preventive Medicine Advisory Council, 1984

PUBLICATIONS

McGee, M. K. and R. K. Oestenstad: "The Effect of the Growth of Facial Hair on Protective Factors for One Model of Closed Circuit Pressure Demand Self-Contained Breathing Apparatus," American Industrial Hygiene Association Journal, 44(7):480-484, 1983.

Moore, G. S., E. J. Calabrese and M.K. McGee: "Health Effects of Monochloramine in Drinking Water," Journal of Environmental Science Health, A15(3):239-258, 1980.

CONTINUING EDUCATION

"Analytical Business Techniques for the Industrial Hygienist" - AIHA Conference/ San Francisco, 1988

"Current Techniques for Asbestos Sampling and Analysis" - AIHA Conference/Montreal, 1987

"Right-to-Know" - University of Minnesota, 1986

"Effective Professional Presentation" - AIHA Conference/ Detroit, 1984

"Heat and Health Performance"- AIHA Conference, 1982

"Advanced Occupational Health" - University of Iowa, 1981

"Advanced Industrial Noise Exposure Monitoring" - AIHA Conference/Montreal, 1987

"Health Hazard Recognition" - Iowa Safety Council, 1986

"Industrial Hygiene Applications of Microcomputers" - AIHA Conference/Las Vegas, 1985

"Local Exhaust Systems Troubleshooting" - AIHA Conference/

"Problems in Preventive Medicine" - Univ. of Iowa, 1982

"Audiometric Technician Training". - Univ. of Michigan 1981

"Occupational Respirator Protection" - NIOSH, 1979

JAIME M. MACEDA

MANAGER - CHICAGO DIVISION

B.S., Mapua Institute of Technology; Manila, Philippines
Bachelor of Science in Chemistry

SPECIAL INTERESTS

Vitamin Chemistry
High Performance Liquid Chromatography

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.) - Chicago Division
Division Manager, 1988 - present

AQUALAB, Inc. - Chicago Division
Division Manager, 1986 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

AQUALAB, Inc. - Chicago Division
Chief Chemist, 1984 - 1986

ROSNER/RUNYON LABORATORIES, Inc. (purchased by Aqualab, Inc. -1984)
Lab Supervisor, 1978 - 1984

BAY LABORATORIES
Analytical Chemist, April 1978 - Sept. 1978
Pharmaceutical Products

ROSNER-HIXON LABORATORIES
Chemist, April 1970 - March 1978
Commercial Analytical Lab. Food, Feeds, Drugs, etc.

CONSOLIDATED DISTILLED PRODUCTS INC.
Chemist, July 1968 - March 1970
Wine, Cordials and Liquors

MERCURY DRUG COMPANY, INC.
Quality Control Supervisor, January 1965 - May 1968
Drugs and Pharmaceutical Products

PROFESSIONAL AFFILIATIONS

Registered Chemist, Philippines Board of Examiners for Chemists
American Chemical Society
Association of Vitamin Chemists
Gas Chromatography Discussion Group, Chicago Chapter
Association of Official Analytical Chemists
National Feed Ingredients Association

JOSEPH D. SHAFER

MANAGER - INDIANAPOLIS DIVISION

B.A. University of Indianapolis(formerly Indiana Central Univ.)
Indianapolis, Indiana 1972
Chemistry Major, Mathematics Minor

Graduate Studies, Indiana University/Purdue University of Indianapolis

SPECIAL INTERESTS

Investigation and remediation of uncontrolled waste sites
Quality Assurance techniques in analytical laboratories
Certification of analytical laboratories
Interaction between the regulated community and the political system

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)-Indianapolis Division
Division Manager, 1988 - present

AQUALAB, Inc. - Indianapolis Division
Division Manager, 1987 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation. Additionally functioned as sales manager for the division.

Anatech Environmental Services
Vice President, 1985-1987

Responsible for managing the Environmental Services Division of Anatech Inc. This included overseeing the operation of the laboratory, Quality Assurance officer, Government Liason, and Sales Director.

Indiana State Board of Health
Superfund On-Scene Coordinator, Working Group Leader 1984-1985

Oversaw the work of other On-Scene Coordinators while actively functioning in the same capacity. Position included investigating uncontrolled waste sites and

representing the State through the negotiation, plan approvals and eventual site clean-ups.

Indiana State Board of Health
Senior Technical Support Chemist 1981-1984

Supported the Solid and Hazardous Waste groups by inspecting analytical laboratories, reviewing plans and permits, training employees, overseeing sampling and analysis, reviewing pending legislation, interpreting analytical data and investigating complaints.

Indiana State Board of Health
Analytical Chemist 1976-1981

Worked as an analytical bench chemist in the water and sewage laboratory performing analysis on water, wastewater and solid waste.

Best Foods Division of CPC International
Associate Quality Assurance Chemist 1972-1976

Investigated consumer complaints, audited production and tested alternate ingredients. Oversaw production start ups.

PROFESSIONAL AFFILIATIONS

Water Pollution Control Federation
Environmental Quality Control Inc.

PAPERS AND SPECIAL WORK

"Quality Assurance Manual" prepared for Anatech Inc., 1981.

"Laboratory Procedural and Quality Assurance Program Plans" prepared for the Ind. Department of Environmental Management, 1986.

"Longterm Effectiveness of Nitrification Inhibitors on Oxygen Demands in Selective Wastewaters" Prepared for the Indiana State Board of Health, 1978.

TONI GARTNER

MANAGER - ROCKFORD DIVISION

M.S.Ed. Northern Illinois University, 1981; B.S. Biological Sciences, Northern Illinois University, 1962, Medical Technologist (ASCP), Swedish-American Hospital, 1963.

PROFESSIONAL CERTIFICATIONS

American Society for Clinical Pathologists-Medical Technologist,045655.
Illinois Department of Public Health and Illinois Environmental Protection Agency Certified Analyst

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.) - Rockford Division
Division Manager, 1988 - present

AQUALAB, Inc. - Rockford Division
Division Manager, 1985 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

Illinois College of Medicine at Rockford
Biomedical Service Laboratories, 1982 - 1985

Winnebago County Health Dept. 1976-present
Clinical Research Coordinator
Laboratory Consultant/Technologist

Rockford School of Medicine
Laboratory Supervisor,
Division of Infectious Diseases, 1975 - 1982

AQUALAB, Inc.
Microbiology Supervisor, 1974 - 1975

PROFESSIONAL AFFILIATIONS

Illinois Society for Microbiology
American Society for Medical Technology
American Water Works Association

Clinical Laboratory Management Association
American Society for Microbiology
American Council of Independent Laboratories

PAPERS AND SPECIAL WORK

" A Cost Effective Method for Triple Site Culturing for N. Gonorrhea." Journal of Clinical Microbiology, Vol.19 No. 6, June 1984

"In Vitro Activity of Moxalactam Alone and in Combination with Ten Other Selected Antibiotics." International Conference on Antimicrobial Agents and Chemotherapy, 1981

"Synergy of Cefazolin-Tobramycin Against Gram Positive Bacteria" Presented at American Society of Microbiology 78th Annual Meeting, May 1978

"A Comparison of Bacampicillin with Amoxicillin in Treating Genital and Extragenital Gonnorrhea." First STD World Conference, San Juan PR, 1981

Phase II Groundwater and Surface Water Quality Data and Associated Data Validation

(excerpts from Phase II Groundwater Assessment Report [CH2M HILL 1991])

Appendix J Contents

- Technical Memorandum: Phase II Groundwater Assessment, Du Pont East Chicago Plant, Round No. 1 Data Review
- Technical Memorandum: Data Validation for Du Pont-East Chicago Round 2 Sample Data
- Round 1 Laboratory Analytical Reports
- Round 2 Laboratory Analytical Reports

TECHNICAL MEMORANDUM CH2M HILL

TO: Project File

FROM: Chris Ohland/GLO

DATE: September 24, 1990

SUBJECT: Phase II Groundwater Assessment
Du Pont East Chicago Plant
Round No. 1 Data Review

PROJECT: CHI28770.A0.MN

INTRODUCTION

This technical memorandum describes the review of Round No. 1 laboratory data generated during the investigation of groundwater and surface water quality at the Du Pont East Chicago Plant. This data review is an assessment of the laboratory data for its compliance to stated quality assurance (QA) and quality control (QC) goals.

The Quality Assurance Project Plan (QAPP) identifies the specific QA/QC measures needed to provide data of known and documentable quality. In summary, these measures include: holding time limitations, blanks, instrument performance (tuning and calibration), matrix variables (surrogate recovery, spike recovery, and duplicates), overall system performance, and reporting format.

All Round No. 1 analytical data were produced at National Environmental Laboratories Midwest (NET) of Bartlett, Illinois using procedures consistent with the Contract Laboratory Program and U.S. EPA SW-846 methodologies. Data QA/QC packages received from NET contained summaries of QA/QC measures by test method. Some of these packages contained detailed information, others contained only summary information.

The level of information provided affected the type of review provided by CH2M HILL and described herein. Where sufficient documentation was provided by NET the data were reviewed and validated in accordance to the Functional Guidelines for Evaluation Organic Analyses, U.S. EPA (February 1988). Validation is an assessment of the laboratory data in terms of the data quality objectives described in the QAPP.

Data evaluation, which assesses the data in terms of the project objectives was not included in this task.

Test methods can be generally categorized into four analytical groups used to measure the requested water quality parameters: Volatile organic analyses (VOAs), semi-volatile organic analyses (SVOAs), PCBs analyses, inorganic analyses and non-metallic inorganic analyses or conventionals.

SEMI-VOLATILE ORGANICS

The laboratory provided results from their laboratory spike blank for assessment of recovery. No matrix spike analyses were performed on samples collected at the East Chicago site. Bias caused by sample matrix cannot be addressed from these data.

NET's instrument tuning and calibration summaries, surrogate recoveries, method blanks, and blank spikes were reviewed by CH2M HILL. Except for the following deficiencies, the results appear to be acceptable:

- No method blank or laboratory spike samples were analyzed with field samples MW-3, MW-6, MW-5, MW-4, MW-12, MW-13, MW-14D, MW-15, MW-16, and MW-19. Except for sample MW-13, no sample contained any of the target compound list (TCL) parameters and therefore no qualification of the data was applied to the results.

- Sample MW-13 showed unacceptable surrogate recoveries after two attempts to re-analyze. No attempt to re-extract and re-analyze was demonstrated and the uncertainty of the analytical results is unusually high. The results for this analysis should not be used without qualification. Because phenol was reported in the sample MW-13 will be reassessed during Round 2.

VOLATILE ORGANIC ANALYSES

The laboratory's reported detection limits are lower than those typically reported by laboratories using the same methods. A more typical and realistic approach is to report quantification limits above the method detection limits.

Other concerns identified are:

- Samples MW-2, MW-7, MW-8, MW-20, and FB-1 were analyzed within an analytical QC batch associated with a method blank that contained unacceptable levels of carbon disulfide and chloroform. The level in the blank does not however account for all that is present in the sample. Because the uncertainty of the source of the blank contamination, the results for these samples are suspect and will be checked during Round 2.

- The analysis of sample MW-20 appeared to have been preceded by analysis of a sample containing high levels of VOCs. The levels reported for MW-20 may be affected by carryover in the chromatography. These results for MW-20 are suspect and will be checked during Round 2.

- Samples MW-2, MW-7, MW-8, MW-20, and FB-1 were analyzed within a few days of the acceptable limit for holding times. This delay may

have resulted in a loss of sample VOCs. The detection limits in these samples may have a low bias.

- Samples MW-9, MW-6, FB-2, TB-1, MW-1, MW-11, MW-11D, MW-10, and MW-18 (analyzed within a QC batch) were analyzed just before or after exceeding the holding time requirement. Non-detected parameters may have been present in higher levels of concentration at time of collection. The detection limit in these sample were estimated and may have a low bias.

- The presence of xylene in sample MW-9 can be attributed to blank contamination. The other parameters which were found in samples analyzed in this QC batch are bromodicholoromethane, carbon disulfide, chloroform, toluene, and 1,1,1-trichloroethane. Because of the inconsistencies presented in the VOA data the presence of these parameters should be supported with subsequent analytical results.

- Samples MW-4 and MW-15 were analyzed within a QC batch with a method blank that contained toluene and methylene chloride at concentration levels sufficient to affect the levels reported in the samples. The only other parameters which were found in these samples were bromodichloromethane, dibromochloromethane, carbon disulfide, chloroform, and toluene. The concentration of carbon disulfide is significantly higher than would we expected from contamination within this QC set.

POLYCHLORINATED BIPHENYLS

No raw data or QC summaries for the polychlorinated biphenyls parameters were available for review.

METALS AND CONVENTIONALS

No raw data or raw data summaries for the metals and conventional parameters except for recovery information for laboratory control samples, were available for review. The metals and conventional test methods were assessed through personal communication with the Laboratory QA supervisor (Ray Kalicki, August 30, 1990) at NET—Bartlett.

As part of the NET's laboratory QA/QC program specific QC measures are taken and evaluated against control criteria. These measures include instrument calibration and calibration checks, blanks, duplicates, laboratory control samples, and blank spikes (if appiicable).

CH2M HILL's samples were not analyzed unless certain instrument conditions were met. In other circumstances, the samples may have been reanalyzed depending upon the QC measure that had been exceeded.

Unlike the QC measures taken for organic analyses where a subset of indicator parameters are extrapolated to the range of parameters tested, metal and conventional test generally have parameter specific QC measures. Based on the information provided, it is reasonable to assume that the laboratory performed all the necessary QC measures and followed all corrective action when necessary and has provided data that meets the data quality objectives of this project.

CHI184/027.51

TECHNICAL MEMORANDUM

CH2M HILL

TO: Pixie Newman/CHI

FROM: Dan MacGregor/GLO

DATE: October 22, 1990

SUBJECT: Data Validation for Du Pont-East Chicago Round 2 Sample Data

PROJECT: CHI28770.A0.MN

INTRODUCTION: This technical memorandum summarizes data validation for Round 2 laboratory data for the Du Pont-East Chicago Phase II Groundwater Assessment. This data validation was a technical review of the three data packages (Volatiles, Base/Neutral/Acids, and Inorganics) submitted by NET laboratories. The purpose of the review was to assess the quality of the analytical data. The data was found acceptable with the qualifiers noted below.

VOLATILE DATA VALIDATION: Field samples MW-01-02 through MW-15-02, MW-18-02 through MW-20-02, and SW-01-02 through SW-03-02 were analyzed for volatile parameters.

Holding times: All samples were analyzed within 14 days of sampling, thus all holding time requirements were met.

Instrument tune requirements: Samples were analyzed on 9/19, 21, 22, 23, 25, and 26/90. On each of these days, the Gas Chromatograph/Mass Spectrometer (GC/MS) was successfully evaluated with bromofluoromethane against tune requirements.

Initial and continuing calibration: Due to an imperfection in the GC/MS software every time an initial calibration was updated, it's date of calibration also got updated. This caused come confusion as to which continuing calibration data went with what initial calibration data. With this clarification from NET laboratories, the calibration data were inspected and all calibration data were found to be acceptable.

Blanks: Both field blanks and both trip blanks contained no contaminating compounds above reporting limits. All lab blanks showed concentrations of methylene chloride. Instrument F, 9/26/90 data, had the high methylene chloride concentration at 43.67 μg/l. The majority of lab blanks also showed residues of acetone, typically in the 5 μg/l range. Other lab blank contaminates were 2-butanone, tetrahydrofuran, chloromethane, and tetrachloroethene. No samples contained any of these blank contaminating compounds.

Surrogate recoveries: Surrogate recoveries were inspected and were found to be acceptable.

Internal standards: No data were provided for internal standard review.

Matrix spike/matrix spike duplicate (MS/MSD): The MS/MSD data were generated from deionized water (DI water), not from field subsamples, thus these data do not provide an accurate measure of accuracy and precision for the analytical method in regards to the field samples. The DI water MS/MSD data were acceptable except for a 1,1-diclhoroethene fortification that only had a 60% percent recovery (the lower control limit for 1,1-dichloroethane is 61%). No qualifiers were added as a result of the MS/MSD data.

Field duplicates: Field duplicates were taken and analyzed for samples MW-03, MW-13, and MW-20. All three samples showed similar results. A full assessment of these samples could be made if spectra and quantitation sheets were obtained.

Sample completeness: Six of the 21 samples contained positive results. Samples MW-04-02, SW-01, SW-02, and SW-03-02 all had chloroform residues at 1.0, 1.2, 1.0, and 1.2 μg/l respectively. Sample MW-05-02 had 1,1-dichloroethane at 2.4 μg/l and 1,2-dichloroethane at 44.7 μg/l. The 1,2-dichloroethane result was flagged as estimated due to poor calibration of this compound. Sample MW-20-02 had 1,1-dichloroethane at 6.7 μg/l and 1,1,1-trichloroethane at 1.3 μg/l. All samples were checked for the number of positive hits and the magnitude of these hits. Sample calculations, dilutions, preparation, retention times, and spectra could be reviewed in the future if this information were obtained.

BASE/NEUTRAL/ACID DATA VALIDATION (BNAs): Field samples MW-01-02 through MW-15-02, MW-19-02, MW-20-02, and SW-01-02 through SW-03-02 were analyzed for BNAs. These samples were reviewed as outlined below.

Holding times: Due to insufficient sample data, it was not possible to determine if the 7-day extraction hold time was meet or not. Hold data were evaluated for the analysis holding time, all samples were analyzed within 40 days of sampling, thus meeting this requirement.

Instrument tune requirements: Samples were analyzed on 9/19, 20, 22, 24, 25, 26, and 27/90. On each of these days the GC/MS was successfully evaluated with decafluorotriphenylphosphine against tune requirements.

Initial and continuing calibration: Initial and continuing calibration data were validated and all were found to be acceptable.

Blanks: Neither field blanks contained any contaminating compounds above the reporting limit. Both lab blanks contained one or two low level compounds. Phenol was found in one lab blank at 3.8 μg/l, and bis(2-ethylhexyl)phthalate (1.43 μg/l), and di-n-butylphthalate (5.29 μg/l), were found in the other lab blank. MW-13-02 samples contained concentrations of phenol, and the MW-14-02 sample and one of two of the MW-20-02 samples contained concentrations of bis(2-ethylhexyl)phthalate, but they were in excess of 10 times the blank contamination concentrations, thus, no qualifiers were added.

Surrogate recoveries: Surrogate recoveries were inspected and all were found to be acceptable.

Internal standards: No data were provided for internal standard review.

Matrix spike/matrix spike duplicate (MS/MSD): The MS/MSD data were generated from deionized water (DI water), not from field subsamples, thus these data do not provide an accurate measure of accuracy and precision for the analytical method in regards to the field samples. The DI water MS/MSD data were acceptable. No qualifiers were added as a result of the MS/MSD data.

Field duplicates: Field duplicates were taken and analyzed for samples MW-03, MW-13, and MW-20. All three samples showed similar results. A full assessment of these samples could be made if spectra and quantitation sheets are obtained.

Sample completeness: Only two samples had any compounds detected above the detection limit. Sample MW-13-02, and its duplicate FRMW-13-02, both contained phenol at approximately 200 μg/l. The corresponding lab blank was phenol contamination but only at a concentration of 3.8 μg/l which was 10 times less than the sample value, thus no qualifier was added to the sample data. Sample MW-14-02 contained bis(2-ethylhexyl)phthalate at 15 μg/l again the corresponding lab blank was contamination with this compound, but again its concentration value of 1.43 μg/l was 10 times less than the sample value thus, no qualifier was added.

INORGANIC DATA VALIDATION: Field samples MW-01-02 through MW-20-02, and SW-01-02 through SW-03-02 were analyzed for inorganics. These samples were reviewed as outlined below.

Holding times: The 14-day holding time for cyanide was exceeded by 1 day for samples MW-02-02, SW-01-02, and SW-03-02. The cyanide results for these samples were flagged as estimated (UJ or J). All other samples met holding time requirements.

Instrument calibration: All calibrations were acceptable for all samples. There were some calculation errors but the difference was typically only a few percentage points, never moving a sample outside the acceptable criteria range.

Blanks: There were many low level contaminating compounds in the field blank samples, but all levels were significantly lower (at least an order of magnitude) than sample concentrations. No data were provided for laboratory blanks. No qualifiers were added as a result of blank contamination.

Lab control spikes/external standards: Several recoveries were outside accepted control limits, these are listed below:

- o Alkalinity recoveries for samples MW-03-02 and MW-6-02 were greater than the acceptable limit.
- o Cadmium recoveries for samples MW-10-02 and MW-14-02 were greater than the acceptable limit.
- o Iron recoveries for samples MW-10-02 and MW-14-02 were greater than the acceptable limit.
- o Manganese recoveries for samples MW-10-02 and MW-14-02 were greater than the acceptable limit.
- o Lead recoveries were less than the acceptable limit for samples MW-2-02, MW-10-02, MW-13-02, MW-14-02, SW-01-02, and ME-03-02.

Any positive sample results for these compounds in these samples were flagged as estimated (J), and negative results for these compounds were also flagged as estimated (UJ).

Field duplicates: Field duplicates were taken and analyzed for samples MW-03-02, MW-13-02, and MW-20-02. All three samples showed similar results. The original sample MW-3-02 had a potassium value of 6.26 mg/l and the duplicate had a value of 59.8 mg/l. This possible dilution error was brought to the laboratory's attention. After verifying that the error had occurred, the duplicate sample report was corrected. The original carbonate alkalinity value for MW-20-02 was less than 1 mg/l, and the duplicate had a value of 60 mg/l.

Matrix spike/matrix spike duplicate (MS/MSD): The MS/MSD recovery and replication data were generally very good. Total kjeldahl nitrogen was greater than acceptable limits for samples MW-12-02, MW-16-02, and MW-17-02. Total phosphate was greater than the acceptable limits for MW-04-02, MW-09-02, and MW-12-02. Positive results for these compounds in these samples were flagged as estimated (J).

ROUND 1

LABORATORY ANALYTICAL REPORTS

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	100.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	100.	mg/L
Chloride	18.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	1.3	mg/L
pH	6.63	units
Phosphate, Total	0.04	mg/L
Solids, Dissolved	2360.	mg/L
Sulfate	1570.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.07	mg/L
Arsenic	0.15	mg/L
Barium	0.023	mg/L
Boron	0.17	mg/L
Cadmium	0.013	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	1.59	mg/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	12.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.00.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

Alkalinity, Bicarb.(CaC03)	168.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	168.	mg/L
Chloride	18.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	9.46	mg/L
pH	6.32	units
Phosphate, Total	0.69	mg/L
Solids, Dissolved	2500.	mg/L
Sulfate	1660.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.05	mg/L
Barium	0.015	mg/L
Boron	0.24	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.031	mg/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112072

Sample Description: MW-07-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	34.9	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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Milwaukee WI 53201

07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

Alkalinity, Bicarb.(CaC03)	260.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	260.	mg/L
Chloride	35.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	2.55	mg/L
pH	6.86	units
Phosphate, Total	1.35	mg/L
Solids, Dissolved	1250.	mg/L
Sulfate	610.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.4	mg/L
Barium	0.093	mg/L
Boron	0.29	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.087	mg/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	16.6	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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ANALYTICAL REPORT

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310 West Wisconsin Ave
Suite 700 P.O. Box 2090
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07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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CH2M HILL
310 West Wisconsin Ave
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07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

Alkalinity, Bicarb.(CaC03)	152.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	152.	mg/L
Chloride	46.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	6.40	mg/L
pH	6.93	units
Phosphate, Total	0.03	mg/L
Solids, Dissolved	1710.	mg/L
Sulfate	1300.	mg/L
Aluminum	0.06	mg/L
Antimony	<0.04	mg/L
Arsenic	0.005	mg/L
Barium	0.025	mg/L
Boron	0.34	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.309	mg/L

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	50.4	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	6.3	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	4.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	5.3	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	1.5	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C..07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

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Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-25-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

Alkalinity, Bicarb.(CaC03)	472.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	472.	mg/L
Chloride	397.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	28.3	mg/L
pH	6.31	units
Phosphate, Total	0.10	mg/L
Solids, Dissolved	8350.	mg/L
Sulfate	4400.	mg/L
Aluminum	0.22	mg/L
Antimony	<0.04	mg/L
Arsenic	0.16	mg/L
Barium	0.039	mg/L
Boron	0.27	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Zinc	9.75	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	11.3	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	1.6	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	30.7	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	2.8	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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ANALYTICAL REPORT

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07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

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Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	774.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	774.	mg/L
Chloride	17,000.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	10.	mg/L
pH	5.39	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	30,600.	mg/L
Sulfate	90.	mg/L
Aluminum	0.20	mg/L
Antimony	<0.04	mg/L
Arsenic	0.008	mg/L
Barium	1.39	mg/L
Boron	8.04	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.074	mg/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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ANALYTICAL REPORT

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310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	170.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	170.	mg/L
Chloride	106.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	0.91	mg/L
pH	6.82	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	1050.	mg/L
Sulfate	360.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.055	mg/L
Boron	0.29	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

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ANALYTICAL REPORT

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Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	14.2	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI?8770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Clegborn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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07-20-90

Sample No.: 112191

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CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	258.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	258.	mg/L
Chloride	131.	mg/L
Cyanide, Total	0.006	mg/L
Nitrogen, Ammonia	1.25	mg/L
pH	6.46	units
Phosphate, Total	0.81	mg/L
Solids, Dissolved	2290.	mg/L
Sulfate	1200.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.07	mg/L
Arsenic	0.018	mg/L
Barium	0.043	mg/L
Boron	0.64	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

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07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	27.5	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	160.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	160.	mg/L
Chloride	750.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	19.	mg/L
pH	6.20	units
Phosphate, Total	1.5	mg/L
Solids, Dissolved	4450.	mg/L
Sulfate	2140.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	<0.01	mg/L
Barium	0.029	mg/L
Boron	1.42	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.006	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.02	mg/L
Zinc	10.5	mg/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.7	ug/L
1,1,1-Trichloroethane	2.1	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	8.6	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	1.7	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL0218[illegible].C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	196.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	196.	mg/L
Chloride	108.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	5.9	mg/L
pH	6.33	units
Phosphate, Total	2.9	mg/L
Solids, Dissolved	3010.	mg/L
Sulfate	1810.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.05	mg/L
Arsenic	0.4	mg/L
Barium	0.127	mg/L
Boron	0.25	mg/L
Cadmium	0.011	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.049	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	104.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	104.	mg/L
Chloride	56.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	1.3	mg/L
pH	6.68	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	2070.	mg/L
Sulfate	1270.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.010	mg/L
Barium	0.028	mg/L
Boron	0.33	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.01	mg/L
Zinc	5.67	mg/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	2.3	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	1.1	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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ANALYTICAL REPORT

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Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	144.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	144.	mg/L
Chloride	53.	mg/L
Cyanide, Total	0.006	mg/L
Nitrogen, Ammonia	0.5	mg/L
pH	6.69	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	2040.	mg/L
Sulfate	1010.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.06	mg/L
Arsenic	0.010	mg/L
Barium	0.028	mg/L
Boron	0.35	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.01	mg/L
Zinc	5.02	mg/L

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07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	2.0	ug/L
1,1,1-Trichloroethane	5.3	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	16.8	ug/L
Bromodichloromethane	1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	22.7	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

Tetrachloroethene	112.	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	2.9	ug/L
meta & para-Xylene	11.7	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	2.6	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.00.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorr
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

Alkalinity, Bicarb.(CaC03)	212.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	212.	mg/L
Chloride	109.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	3.06	mg/L
pH	6.85	units
Phosphate, Total	0.15	mg/L
Solids, Dissolved	880.	mg/L
Sulfate	270.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.011	mg/L
Barium	0.071	mg/L
Boron	0.25	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.02	mg/L
Zinc	0.246	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	4.5	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	2.5	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	1.1	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	<1.	mg/L
Alkalinity, Carb. (CaC03)	4800.	mg/L
Alkalinity, Total (CaC03)	6600.	mg/L
Chloride	40.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	39.3	mg/L
pH	11.33	units
Phosphate, Total	6.1	mg/L
Solids, Dissolved	9940.	mg/L
Sulfate	80.	mg/L
Aluminum	18.0	mg/L
Antimony	<0.04	mg/L
Arsenic	0.14	mg/L
Barium	0.159	mg/L
Boron	0.67	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.3	mg/L
Chromium, Total	0.022	mg/L
Copper	0.10	mg/L
Lead	0.28	mg/L
Mercury	0.0004	mg/L
Nickel	0.03	mg/L
Zinc	0.230	mg/L

T. Gartner

Toni Gartner
Division Manager

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CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

T. Gartner

Toni Gartner
Division Manager

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CORRECTED REPORT

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Toni Gartner
Division Manager

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09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

T. Gartner

Toni Gartner
Division Manager

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Milwaukee WI 53201

09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Toni Gartner
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CORRECTED REPORT

ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	55.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	160.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	160.	mg/L
Chloride	700.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	23.6	mg/L
pH	6.30	units
Phosphate, Total	0.09	mg/L
Solids, Dissolved	3590.	mg/L
Sulfate	1400.	mg/L
Aluminum	0.15	mg/L
Antimony	<0.04	mg/L
Arsenic	0.010	mg/L
Barium	0.020	mg/L
Boron	0.20	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.01	mg/L
Zinc	3.345	mg/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	160.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	160.	mg/L
Chloride	730.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	23.4	mg/L
pH	6.12	units
Phosphate, Total	0.09	mg/L
Solids, Dissolved	3610.	mg/L
Sulfate	1500.	mg/L
Aluminum	0.07	mg/L
Antimony	<0.04	mg/L
Arsenic	0.009	mg/L
Barium	0.017	mg/L
Boron	0.19	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.01	mg/L
Zinc	2.92	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

J-104

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

Alkalinity, Bicarb.(CaC03)	336.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	336.	mg/L
Chloride	43.	mg/L
Cyanide, Total	0.033	mg/L
Nitrogen, Ammonia	0.55	mg/L
pH	6.64	units
Phosphate, Total	0.74	mg/L
Solids, Dissolved	2320.	mg/L
Sulfate	1400.	mg/L
Aluminum	0.18	mg/L
Antimony	<0.04	mg/L
Arsenic	0.23	mg/L
Barium	0.027	mg/L
Boron	1.19	mg/L
Cadmium	0.014	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	0.09	mg/L
Mercury	<0.0001	mg/L
Nickel	0.02	mg/L
Zinc	2.42	mg/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	6.6	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	3.8	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	1.9	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	1.4	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

J-:08

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112016

Sample Description: MW-16-01
GL02[illegible]838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1230

Date Received: 06-21-90 1120

Alkalinity, Bicarb.(CaC03)	128.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	128.	mg/L
Chloride	1320.	mg/L
Nitrogen, Ammonia	27.9	mg/L
Solids, Dissolved	3150.	mg/L
Sulfate	180.	mg/L
Aluminum	<0.01	mg/L
Arsenic	0.005	mg/L
Barium	0.139	mg/L
Zinc	10.64	mg/L

Toni Gartner
Division Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112000

Sample Description: MW-17-01
GLO21838.CO.07; DuPort

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

Alkalinity, Bicarb.(CaC03)	96.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	96.	mg/L
Chloride	875.	mg/L
pH	6.11	units
Solids, Dissolved	2060.	mg/L
Sulfate	84.	mg/L
Aluminum	0.08	mg/L
Arsenic	0.002	mg/L
Barium	1.03	mg/L
Zinc	65.4	mg/L

Toni Gartner
Division Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

08-01-90

Sample No.: 114182

Sample Description: MW-17-01
GLO21838.CO.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

Nitrogen, Ammonia	13.7	mg/L

Toni Gartner
Division Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112169

Sample Description: MW-18-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	314.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	314.	mg/L
Chloride	84.	mg/L
pH	6.64	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	4500.	mg/L
Sulfate	3200.	mg/L
Arsenic	0.006	mg/L
Zinc	4.18	mg/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112169

Sample Description: MW-18-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	51.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	5.9	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	2.6	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112169

Sample Description: MW-18-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

06-29-90

Sample No.: 112168

Sample Description: MW-18-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1030

pH	6.89	units
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

Alkalinity, Bicarb.(CaC03)	208.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	208.	mg/L
Chloride	127.	mg/L
Cyanide, Total	<0.002	mg/L
pH	6.84	units
Phosphate, Total	0.09	mg/L
Solids, Dissolved	1530.	mg/L
Sulfate	790.	mg/L
Aluminum	0.20	mg/L
Antimony	<0.04	mg/L
Arsenic	0.005	mg/L
Barium	0.045	mg/L
Boron	0.15	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.007	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.612	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	6.9	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	7.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	4.4	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	1.8	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	468.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	468.	mg/L
Chloride	277.	mg/L
Cyanide, Total	0.003	mg/L
pH	8.70	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	5190.	mg/L
Sulfate	3000.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.10	mg/L
Barium	0.03	mg/L
Boron	0.94	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	5.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	10.4	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	5.5	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	2.1	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Clegnorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
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07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	140.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	140.	mg/L
Chloride	4.	mg/L
Cyanide, Total	0.004	mg/L
Nitrogen, Ammonia	0.56	mg/L
pH	7.66	units
Phosphate, Total	0.09	mg/L
Solids, Dissolved	243.	mg/L
Sulfate	39.	mg/L
Aluminum	0.14	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.024	mg/L
Boron	0.05	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.051	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	3.4	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	136	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	136.	mg/L
Chloride	30.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	0.68	mg/L
pH	7.62	units
Phosphate, Total	0.03	mg/L
Solids, Dissolved	270.	mg/L
Sulfate	41.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.004	mg/L
Barium	0.019	mg/L
Boron	0.05	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.051	mg/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.7	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	4.9	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	1.2	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
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CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	156.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	156.	mg/L
Chloride	31.	mg/L
Cyanide, Total	0.002	mg/L
Nitrogen, Ammonia	0.64	mg/L
pH	7.54	units
Phosphate, Total	0.06	mg/L
Solids, Dissolved	247.	mg/L
Sulfate	50.	mg/L
Aluminum	0.25	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.016	mg/L
Boron	0.04	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.042	mg/L

Toni Gartner
Division Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
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Tel: (708) 289-3100
Fax: (708) 289-5445

CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	4.8	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

T. Gartner

Toni Gartner
Division Manager

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CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Toni Gartner
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CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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CORRECTED REPORT

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

T. Gartner

Toni Gartner
Division Manager

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ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Toni Gartner
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	142.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	142.	mg/L
Chloride	29.	mg/L
Cyanide, Total	0.007	mg/L
Nitrogen, Ammonia	0.75	mg/L
pH	7.74	units
Phosphate, Total	0.18	mg/L
Solids, Dissolved	237.	mg/L
Sulfate	55.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.029	mg/L
Boron	0.05	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	0.0002	mg/L
Nickel	<0.01	mg/L
Zinc	0.012	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.8	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	4.8	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL02183.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	7.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	7.	mg/L
Chloride	4.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	0.09	mg/L
pH	8.78	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	40.	mg/L
Sulfate	<1.0	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	<0.005	mg/L
Boron	<0.01	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	6.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	6.	mg/L
Chloride	<1.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	0.03	mg/L
pH	10.23	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	7.	mg/L
Sulfate	<1.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.04	mg/L
Arsenic	<0.001	mg/L
Barium	<0.005	mg/L
Boron	<0.01	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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Bartlett Division
850 West Bartlett Road
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-06-90

Sample No.: 112004

Sample Description: TB-01-01
GL021838.CO.07; DuPont

Date Taken: 06-20-90 0954

Date Received: 06-21-90 1030

VOLATILE COMPOUNDS

Acrolein	<10.	ug/L
Acrylonitrile	<10.	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<10.	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<10.	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<10.	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Toni Gartner
Division Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-06-90

Sample No.: 112004

Sample Description: TB-01-01
GL021803.CO.07; DuPont

Date Taken: 06-20-90 0954

Date Received: 06-21-90 1030

VOLATILE COMPOUNDS		
1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<10.	ug/L
Xylenes, Total	<1.0	ug/L

Toni Gartner
Division Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-10-90

Sample No.: 112163

Sample Description: TB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-10-90

Sample No.: 112163

Sample Description: TB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

ROUND 2

LABORATORY ANALYTICAL REPORTS

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

09-26-90

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Avenue
Suite 700 P.O.Box 2090
Milwaukee WI 53201

REF: Sample No(s).
117644, 117649, 117695

Dear Ms. Newman,

Attached please find Analytical Reports for the above referenced Sample No(s).

The QA/QC package you requested will follow in a few days. If, however, you receive an invoice in the meantime, please be assured that we have not overlooked the QA/QC data.

If you have any concerns, please feel free to give us a call.

Sincerely,
NET Midwest, Inc.

Neal E Cleghorn

Neal Cleghorn
Project Manager

Encls.

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

10/02/90

Mr. Chris Ohland
CH2M HILL
310 W. Wisconsin Ave.
Suite 700 PO Box 2090
Milwaukee, WI 53201

REF: Sample #s
117317-8
117442-9

Dear Mr. Ohland,

Enclosed please find Analytical Reports for the above referenced Sample No(s).

The QA/QC package you requested will follow in a few days accompanied with a Case Narrative. As you will notice on samples 117442 and 117448, we found N, Ammonia results higher than Total Nitrogen results. The samples were re-run, on another day, and the same result was found. This information will be detailed on the Case Narrative.

If you have any concerns, please feel free to give us a call.

Sincerely,
NET Midwest, Inc.

Ray Kalicki
QA Coordinator

Encls. Reports

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW-01-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	140.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	140.	mg/L
Chloride	30.	mg/L
COD	20.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	8.	mg/L
Nitrogen, Ammonia	0.32	mg/L
Nitrogen, Kjeldahl	<0.05	mg/L
Phosphate, Total	1.64	mg/L
Solids, Dissolved	2280.	mg/L
Sulfate	1100.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.3	mg/L
Barium	0.04	mg/L
Boron	0.23	mg/L
Cadmium	<0.005	mg/L
Calcium	519.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.026	mg/L
Copper	<0.01	mg/L
Iron	11.7	mg/L
Lead	<0.04	mg/L
Magnesium	17.8	mg/L
Manganese	0.43	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	5.95	mg/L
Sodium	15.7	mg/L

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW-01-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

Zinc	3.59	mg/L

Kelly Jones
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chlcromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	4.3	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117692

Page 1

Sample Description: MW02-02, Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	260.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	260.	mg/L
Chloride	20.	mg/L
COD	957.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	10.	mg/L
Nitrogen, Ammonia	3.31	mg/L
Nitrogen, Kjeldahl	3.71	mg/L
Phosphate, Total	1.50	mg/L
Solids, Dissolved	2400.	mg/L
Sulfate	1900.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.09	mg/L
Barium	0.07	mg/L
Boron	0.26	mg/L
Cadmium	<0.005	mg/L
Calcium	358.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.008	mg/L
Copper	<0.01	mg/L
Iron	60.5	mg/L
Lead	<0.04	mg/L
Magnesium	129.	mg/L
Manganese	0.35	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	3.75	mg/L
Sodium	93.1	mg/L

Kelly Jones
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117692

Sample Description: MW02-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

Zinc	0.040	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-C2
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	10.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117665

Page 1

Sample Description: MW03-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	268.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	268.	mg/L
Chloride	40.	mg/L
COD	30.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	2.	mg/L
Nitrogen, Ammonia	2.36	mg/L
Nitrogen, Kjeldahl	1.77	mg/L
Phosphate, Total	2.45	mg/L
Solids, Dissolved	1690.	mg/L
Sulfate	1500.	mg/L
Aluminum	0.03	mg/L
Antimony	<0.04	mg/L
Arsenic	1.7	mg/L
Barium	0.15	mg/L
Boron	0.23	mg/L
Cadmium	0.064	mg/L
Calcium	299.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.007	mg/L
Copper	<0.01	mg/L
Iron	13.6	mg/L
Lead	<0.04	mg/L
Magnesium	71.5	mg/L
Manganese	1.33	mg/L
Mercury	<0.0002	mg/L
Nickel	0.01	mg/L
Potassium	6.26	mg/L
Sodium	61.0	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117665

Sample Description: MW03-02[illegible]ab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Zinc	0.100	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	20.9	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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)RRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

11-07-90

Sample No.: 117666

Sample Description: FRMW03-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	300.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	300.	mg/L
Chloride	40.	mg/L
COD	27.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	0.8	mg/L
Nitrogen, Ammonia	2.31	mg/L
Nitrogen, Kjeldahl	1.90	mg/L
Phosphate, Total	2.52	mg/L
Solids, Dissolved	1670.	mg/L
Sulfate	1400.	mg/L
Aluminum	0.03	mg/L
Antimony	<0.04	mg/L
Arsenic	2.1	mg/L
Barium	0.14	mg/L
Boron	0.28	mg/L
Cadmium	0.068	mg/L
Calcium	287.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.007	mg/L
Copper	<0.01	mg/L
Iron	13.5	mg/L
Lead	<0.04	mg/L
Magnesium	67.0	mg/L
Manganese	1.24	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	5.98	mg/L
Sodium	57.2	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117666

Page 9

Sample Description: FRMW03-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Zinc	0.020	mg/L

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-C?
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	14.4	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Tetrachloroethene	7.2	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117395

Sample Description: MW04-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	230.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	230.	mg/L
Chloride	50.	mg/L
COD	37.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	1.8	mg/L
Nitrogen, Ammonia	19.5	mg/L
Nitrogen, Kjeldahl	21.6	mg/L
Phosphate, Total	0.76	mg/L
Solids, Dissolved	2980.	mg/L
Sulfate	2500.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.012	mg/L
Barium	<0.01	mg/L
Boron	0.42	mg/L
Cadmium	<0.005	mg/L
Calcium	570.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.013	mg/L
Copper	<0.01	mg/L
Iron	51.0	mg/L
Lead	<0.04	mg/L
Magnesium	99.5	mg/L
Manganese	1.00	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Potassium	16.5	mg/L
Sodium	75.2	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117395

Sample Description: MW04-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1030

Zinc	1.14	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	75.4	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117396

Sample Description: MW04-02MS
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	72.2	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.1	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117396

Sample Description: MW04-02MS
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117397

Sample Description: MW04-02MSD
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	89.6	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117397

Sample Description: MW04-02MSD
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	760.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	760.	mg/L
Chloride	470.	mg/L
COD	105.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	12.	mg/L
Nitrogen, Ammonia	21.2	mg/L
Nitrogen, Kjeldahl	25.0	mg/L
Phosphate, Total	0.80	mg/L
Solids, Dissolved	9310.	mg/L
Sulfate	7030.	mg/L
Aluminum	0.10	mg/L
Antimony	<0.04	mg/L
Arsenic	0.32	mg/L
Barium	0.04	mg/L
Boron	1.24	mg/L
Cadmium	<0.005	mg/L
Calcium	678.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	132.	mg/L
Lead	<0.04	mg/L
Magnesium	1080.	mg/L
Manganese	2.35	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Potassium	22.5	mg/L
Sodium	244.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

Zinc	11.4	mg/L

Kelly Jones
Project Manager

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CH2M HILL
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Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	21.4	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	2.4	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	44.7	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117667

Sample Description: MW06-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	1170.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	1170.	mg/L
Chloride	18,000.	mg/L
COD	509.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	2.	mg/L
Nitrogen, Ammonia	5.51	mg/L
Nitrogen, Kjeldahl	6.16	mg/L
Phosphate, Total	0.05	mg/L
Solids, Dissolved	28,700.	mg/L
Sulfate	180.	mg/L
Aluminum	0.39	mg/L
Antimony	0.08	mg/L
Arsenic	0.030	mg/L
Barium	2.15	mg/L
Boron	10.9	mg/L
Cadmium	<0.005	mg/L
Calcium	7560.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	619.	mg/L
Lead	<0.04	mg/L
Magnesium	498.	mg/L
Manganese	6.14	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	45.4	mg/L
Sodium	730.	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117667

Sample Description: MW06-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

Zinc	0.070	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	39.7	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	230.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	230.	mg/L
Chloride	150.	mg/L
COD	98.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	0.89	mg/L
Nitrogen, Kjeldahl	0.95	mg/L
Phosphate, Total	1.92	mg/L
Solids, Dissolved	987.	mg/L
Sulfate	400.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.04	mg/L
Boron	0.37	mg/L
Cadmium	<0.005	mg/L
Calcium	218.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.013	mg/L
Copper	0.01	mg/L
Iron	15.9	mg/L
Lead	0.05	mg/L
Magnesium	32.1	mg/L
Manganese	0.51	mg/L
Mercury	<0.0002	mg/L
Nickel	0.07	mg/L
Potassium	3.49	mg/L
Sodium	51.2	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

Zinc	0.034	mg/L

Kelly Jones
Project Manager

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10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	28.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

J-232

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW-08-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: y9-11-90 1443

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	300.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	300.	mg/L
Chloride	210.	mg/L
COD	41.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	9.	mg/L
Nitrogen, Ammonia	0.99	mg/L
Nitrogen, Kjeldahl	1.11	mg/L
Phosphate, Total	5.13	mg/L
Solids, Dissolved	2190.	mg/L
Sulfate	1300.	mg/L
Aluminum	0.11	mg/L
Antimony	<0.04	mg/L
Arsenic	0.009	mg/L
Barium	0.08	mg/L
Boron	0.58	mg/L
Cadmium	<0.005	mg/L
Calcium	486.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	54.9	mg/L
Lead	0.08	mg/L
Magnesium	42.8	mg/L
Manganese	1.42	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	6.05	mg/L
Sodium	88.6	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW-08-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: y9-11-90 1443

Date Received: 09-12-90 1030

Zinc	0.018	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	95.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117398

Sample Description: MW09-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	370.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	370.	mg/L
Chloride	1030.	mg/L
COD	95.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	9.	mg/L
Nitrogen, Ammonia	55.4	mg/L
Nitrogen, Kjeldahl	62.7	mg/L
Phosphate, Total	5.45	mg/L
Solids, Dissolved	6410.	mg/L
Sulfate	4200.	mg/L
Aluminum	0.05	mg/L
Antimony	<0.04	mg/L
Arsenic	0.03	mg/L
Barium	<0.01	mg/L
Boron	3.22	mg/L
Cadmium	<0.005	mg/L
Calcium	619.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.012	mg/L
Copper	<0.01	mg/L
Iron	158.	mg/L
Lead	0.06	mg/L
Magnesium	324.	mg/L
Manganese	6.55	mg/L
Mercury	<0.0002	mg/L
Nickel	0.07	mg/L
Potassium	36.5	mg/L
Sodium	640.	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117398

Page 9

Sample Description: MW09-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1030

Zinc	27.8	mg/L

Kelly Jones
Project Manager

J-241

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	18.1	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	240.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	240.	mg/L
Chloride	90.	mg/L
COD	78.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	5.	mg/L
Nitrogen, Ammonia	10.8	mg/L
Nitrogen, Kjeldahl	10.9	mg/L
Phosphate, Total	23.	mg/L
Solids, Dissolved	2730.	mg/L
Sulfate	1800.	mg/L
Aluminum	0.03	mg/L
Antimony	0.04	mg/L
Arsenic	0.4	mg/L
Barium	0.21	mg/L
Boron	0.47	mg/L
Cadmium	<0.005	mg/L
Calcium	351.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.005	mg/L
Copper	<0.01	mg/L
Iron	61.4	mg/L
Lead	<0.04	mg/L
Magnesium	19.9	mg/L
Manganese	0.93	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	19.8	mg/L
Sodium	188.	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Page 23

Sample Description: MW10-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

Zinc	0.050	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	45.7	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: :W10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	120.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	120.	mg/L
Chloride	100.	mg/L
COD	41.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	3.	mg/L
Nitrogen, Ammonia	1.34	mg/L
Nitrogen, Kjeldahl	1.40	mg/L
Phosphate, Total	9.9	mg/L
Solids, Dissolved	2360.	mg/L
Sulfate	1700.	mg/L
Aluminum	0.06	mg/L
Antimony	<0.04	mg/L
Arsenic	0.011	mg/L
Barium	0.04	mg/L
Boron	0.59	mg/L
Cadmium	<0.005	mg/L
Calcium	540.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	17.1	mg/L
Lead	0.07	mg/L
Magnesium	24.3	mg/L
Manganese	0.62	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Potassium	5.19	mg/L
Sodium	51.8	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

Zinc	7.46	mg/L

Kelly Jones
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	5.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
CHI28770.AOMN; DuPont East Chicago

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

Alkalinity, Bicarb.(CaC03)	228.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	228.	mg/L
Chloride	68.	mg/L
COD	85.	mg/L
Cyanide, Total	<0.001	mg/L
Fluoride	0.9	mg/L
Nitrogen, Ammonia	2.47	mg/L
Nitrogen, Kjeldahl	2.84	mg/L
Phosphate, Total	10.3	mg/L
Solids, Dissolved	783.	mg/L
Sulfate	420.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.063	mg/L
Barium	0.08	mg/L
Boron	0.46	mg/L
Cadmium	<0.005	mg/L
Calcium	176.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	10.6	mg/L
Lead	0.06	mg/L
Magnesium	13.9	mg/L
Manganese	0.51	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	5.32	mg/L
Sodium	24.9	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
CHI28770.AOMN; DuPont East Chicago

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

Zinc	0.019	mg/L

Kelly Jones
Project Manager

J-262

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	193.	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117683

Page 1

Sample Description: MW13-02; Grab
DuPont-East Chicago; C1181500.KO.MN

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	<1.	mg/L
Alkalinity, Carb. (CaC03)	4800.	mg/L
Alkalinity, Total (CaC03)	7000.	mg/L
Chloride	30.	mg/L
COD	760.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	3.	mg/L
Nitrogen, Ammonia	14.1	mg/L
Nitrogen, Kjeldahl	16.4	mg/L
Phosphate, Total	23.5	mg/L
Solids, Dissolved	11,500.	mg/L
Sulfate	180.	mg/L
Aluminum	0.90	mg/L
Antimony	<0.04	mg/L
Arsenic	0.09	mg/L
Barium	0.51	mg/L
Boron	0.74	mg/L
Cadmium	<0.005	mg/L
Calcium	0.188	mg/L
Chromium, Hexavalent	<0.2	mg/L
Chromium, Total	0.010	mg/L
Copper	0.06	mg/L
Iron	1.63	mg/L
Lead	0.08	mg/L
Magnesium	0.040	mg/L
Manganese	<0.01	mg/L
Mercury	<0.0004	mg/L
Nickel	0.02	mg/L
Potassium	3.1	mg/L
Sodium	3600.	mg/L

Kelly Jones
Project Manager

NATIONAL
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117683

Sample Description: MW13-02; Grab
DuPont-East Chicago; C1181500.KO.MN

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Zinc	0.160	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	208.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117684

Page 8

Sample Description: FRMW13-02; Grab
DuPont-East Chicago

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	<1.	mg/L
Alkalinity, Carb. (CaC03)	5600.	mg/L
Alkalinity, Total (CaC03)	7600.	mg/L
Chloride	30.	mg/L
COD	760.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	14.3	mg/L
Nitrogen, Kjeldahl	18.9	mg/L
Phosphate, Total	23.0	mg/L
Solids, Dissolved	11,700.	mg/L
Sulfate	160.	mg/L
Aluminum	0.86	mg/L
Antimony	<0.04	mg/L
Arsenic	0.08	mg/L
Barium	0.39	mg/L
Boron	3.10	mg/L
Cadmium	<0.005	mg/L
Calcium	0.190	mg/L
Chromium, Hexavalent	<0.2	mg/L
Chromium, Total	0.012	mg/L
Copper	0.08	mg/L
Iron	1.38	mg/L
Lead	0.15	mg/L
Magnesium	0.045	mg/L
Manganese	<0.01	mg/L
Mercury	<0.0004	mg/L
Nickel	0.03	mg/L
Potassium	2.8	mg/L
Sodium	3080.	mg/L

Kelly Jones
Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117684

Sample Description: FRMW13-02; Grab
DuPont-East Chicago

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Zinc	0.150	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117684

Sample Description: RMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	10.9	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	2.1	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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Milwaukee WI 53201

01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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310 West Wisconsin Ave
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01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	198.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	156.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	156.	mg/L
Chloride	670.	mg/L
COD	14.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	17.2	mg/L
Nitrogen, Kjeldahl	19.0	mg/L
Phosphate, Total	1.55	mg/L
Solids, Dissolved	3490.	mg/L
Sulfate	1000.	mg/L
Aluminum	0.13	mg/L
Antimony	0.06	mg/L
Arsenic	0.014	mg/L
Barium	0.11	mg/L
Boron	0.26	mg/L
Cadmium	<0.005	mg/L
Calcium	731.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	23.3	mg/L
Lead	<0.04	mg/L
Magnesium	87.5	mg/L
Manganese	1.00	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Potassium	3.95	mg/L
Sodium	41.5	mg/L

Kelly Jones

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Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

Zinc	2.11	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: Mw14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

J-285

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	15.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

CORRECTED REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117399

Sample Description: MW15-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	440.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	440.	mg/L
Chloride	40.	mg/L
COD	68.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	11.	mg/L
Nitrogen, Ammonia	0.70	mg/L
Nitrogen, Kjeldahl	2.46	mg/L
Phosphate, Total	2.77	mg/L
Solids, Dissolved	2630.	mg/L
Sulfate	1900.	mg/L
Aluminum	0.12	mg/L
Antimony	<0.04	mg/L
Arsenic	0.26	mg/L
Barium	<0.01	mg/L
Boron	0.40	mg/L
Cadmium	0.006	mg/L
Calcium	519.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	15.0	mg/L
Lead	<0.04	mg/L
Magnesium	94.0	mg/L
Manganese	0.72	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	8.3	mg/L
Sodium	83.7	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

CORRECTED REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117399

Sample Description: MW15-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1030

Zinc	2.49	mg/L

Kelly Jones
Project Manager

3-290

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117318

Sample Description: MW16-02
CHI28770.AOMN; DuPont East Chicago

Date Taken: 09-10-90 1711

Date Received: 09-11-90 1030

Alkalinity, Bicarb.(CaC03)	204.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	204.	mg/L
Chloride	2,300.	mg/L
COD	122.	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	77.4	mg/L
Nitrogen, Kjeldahl	98.5	mg/L
Solids, Dissolved	4720.	mg/L
Sulfate	540.	mg/L
Aluminum	0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.33	mg/L
Calcium	768.	mg/L
Iron	10.5	mg/L
Magnesium	316.	mg/L
Manganese	3.09	mg/L
Potassium	36.2	mg/L
Sodium	43.8	mg/L
Zinc	35.8	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117319

Sample Description: MW17-02
CHI28770.AOMN; DuPont East Chicago

Date Taken: 09-10-90 1840

Date Received: 09-11-90 1030

Alkalinity, Bicarb.(CaC03)	208.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	208.	mg/L
Chloride	2,200.	mg/L
COD	119.	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	32.9	mg/L
Nitrogen, Kjeldahl	41.5	mg/L
Solids, Dissolved	4150.	mg/L
Sulfate	300.	mg/L
Aluminum	0.07	mg/L
Arsenic	0.001	mg/L
Barium	1.05	mg/L
Calcium	705.	mg/L
Iron	137.	mg/L
Magnesium	279.	mg/L
Manganese	2.62	mg/L
Potassium	13.0	mg/L
Sodium	33.8	mg/L
Zinc	227.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117732

Page 1

Sample Description: MW18-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1445

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	392.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	392.	mg/L
Chloride	150.	mg/L
COD	61.	mg/L
Fluoride	17.	mg/L
Phosphate, Total	1.67	mg/L
Solids, Dissolved	5440.	mg/L
Sulfate	3900.	mg/L
Arsenic	0.05	mg/L
Calcium	430.	mg/L
Iron	42.7	mg/L
Magnesium	77.0	mg/L
Manganese	1.96	mg/L
Potassium	11.8	mg/L
Sodium	1010.	mg/L
Zinc	4.52	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117332

Sample Description: MW18-02
DuPont

Date Taken: 09-12-90 1445

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	6.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117332

Sample Description: MW18-02
DuPont

Date Taken: 09-12-90 1445

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-26-90

Sample No.: 117695

Sample Description: FRMW18-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1445

Date Received: 09-12-90 1830

PCB's

PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	420.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	420.	mg/L
Chloride	400.	mg/L
COD	51.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	6.	mg/L
Nitrogen, Ammonia	7.15	mg/L
Nitrogen, Kjeldahl	7.55	mg/L
Phosphate, Total	1.08	mg/L
Solids, Dissolved	4380.	mg/L
Sulfate	3500.	mg/L
Aluminum	0.06	mg/L
Antimony	<0.04	mg/L
Arsenic	0.04	mg/L
Barium	0.03	mg/L
Boron	0.81	mg/L
Cadmium	<0.005	mg/L
Calcium	626.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.005	mg/L
Copper	<0.01	mg/L
Iron	41.9	mg/L
Lead	<0.04	mg/L
Magnesium	150.	mg/L
Manganese	0.48	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	16.0	mg/L
Sodium	372.	mg/L

Kelly Jones

Kelly Jones
Project Manager

3-302

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

Zinc	2.88	mg/L

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	1.2	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117442

Sample Description: MW[illegible]-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	570.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	570.	mg/L
Chloride	310.	mg/L
COD	126.	mg/L
Cyanide, Total	<0.02	mg/L
Fluoride	7.	mg/L
Nitrogen, Ammonia	5.54	mg/L
Nitrogen, Kjeldahl	4.90	mg/L
Phosphate, Total	4.45	mg/L
Solids, Dissolved	5200.	mg/L
Sulfate	3500.	mg/L
Aluminum	0.09	mg/L
Antimony	<0.04	mg/L
Arsenic	0.005	mg/L
Barium	0.03	mg/L
Boron	1.22	mg/L
Cadmium	<0.005	mg/L
Calcium	320.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	0.20	mg/L
Lead	0.05	mg/L
Magnesium	108.	mg/L
Manganese	0.62	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	30.5	mg/L
Sodium	986.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117442

Sample Description: MW20-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Zinc	0.071	mg/L

Kelly Jones
Project Manager

J-310

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117442

Sample Description: MW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	44.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	6.7	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	1.3	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117442

Sample Description: MW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117442

Sample Description: MW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117442

Sample Description: MW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117442

Sample Description: MW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

J-315

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	550.	mg/L
Alkalinity, Carb. (CaC03)	60.	mg/L
Alkalinity, Total (CaC03)	610.	mg/L
Chloride	370.	mg/L
COD	142.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	8.	mg/L
Nitrogen, Ammonia	5.32	mg/L
Nitrogen, Kjeldahl	5.62	mg/L
Phosphate, Total	4.45	mg/L
Solids, Dissolved	5250.	mg/L
Sulfate	3900.	mg/L
Aluminum	0.04	mg/L
Antimony	<0.04	mg/L
Arsenic	0.005	mg/L
Barium	<0.01	mg/L
Boron	1.27	mg/L
Cadmium	<0.005	mg/L
Calcium	324.	mg/L
Chromium, Hexavalent	<0.1	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	0.12	mg/L
Lead	<0.04	mg/L
Magnesium	110.	mg/L
Manganese	0.56	mg/L
Mercury	0.0008	mg/L
Nickel	<0.01	mg/L
Potassium	30.8	mg/L
Sodium	1190.	mg/L

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FR[illegible]20-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Zinc	0.029	mg/L

Kelly Jones
Project Manager

J-31[illegible]

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW[illegible] 02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	53.7	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	6.4	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	1.3	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	20.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117693

Sample Description: SW01-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	136.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	136.	mg/L
Chloride	47.	mg/L
COD	105.	mg/L
Cyanide, Total	0.008	mg/L
Fluoride	0.5	mg/L
Nitrogen, Ammonia	0.48	mg/L
Nitrogen, Kjeldahl	1.77	mg/L
Phosphate, Total	0.83	mg/L
Solids, Dissolved	293.	mg/L
Sulfate	68.	mg/L
Aluminum	1.55	mg/L
Antimony	<0.04	mg/L
Arsenic	0.001	mg/L
Barium	0.09	mg/L
Boron	0.15	mg/L
Cadmium	<0.005	mg/L
Calcium	45.2	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.048	mg/L
Copper	0.06	mg/L
Iron	17.1	mg/L
Lead	<0.04	mg/L
Magnesium	15.1	mg/L
Manganese	0.30	mg/L
Mercury	<0.0002	mg/L
Nickel	0.01	mg/L
Potassium	4.59	mg/L
Sodium	21.8	mg/L

Kelly Jones
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117693

Page 9

Sample Description: SW01-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

Zinc	0.470	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW[illegible]-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	4.7	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.2	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	212.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	212.	mg/L
Chloride	40.	mg/L
COD	115.	mg/L
Cyanide, Total	0.010	mg/L
Fluoride	0.4	mg/L
Nitrogen, Ammonia	0.81	mg/L
Nitrogen, Kjeldahl	4.49	mg/L
Phosphate, Total	6.29	mg/L
Solids, Dissolved	217.	mg/L
Sulfate	70.	mg/L
Aluminum	3.30	mg/L
Antimony	<0.04	mg/L
Arsenic	0.017	mg/L
Barium	0.25	mg/L
Boron	0.35	mg/L
Cadmium	<0.005	mg/L
Calcium	50.9	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.098	mg/L
Copper	0.06	mg/L
Iron	36.3	mg/L
Lead	0.11	mg/L
Magnesium	17.2	mg/L
Manganese	0.46	mg/L
Mercury	<0.0002	mg/L
Nickel	0.01	mg/L
Potassium	5.53	mg/L
Sodium	24.0	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

Zinc	0.760	mg/L

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	33.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SWC2-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

J-335

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117694

Sample Description: SW03-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	136.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	136.	mg/L
Chloride	46.	mg/L
COD	48.	mg/L
Cyanide, Total	0.009	mg/L
Fluoride	0.4	mg/L
Nitrogen, Ammonia	0.48	mg/L
Nitrogen, Kjeldahl	0.49	mg/L
Phosphate, Total	0.75	mg/L
Solids, Dissolved	317.	mg/L
Sulfate	72.	mg/L
Aluminum	7.21	mg/L
Antimony	<0.04	mg/L
Arsenic	0.026	mg/L
Barium	0.17	mg/L
Boron	0.28	mg/L
Cadmium	0.006	mg/L
Calcium	63.0	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.305	mg/L
Copper	0.22	mg/L
Iron	124.	mg/L
Lead	0.72	mg/L
Magnesium	20.7	mg/L
Manganese	1.68	mg/L
Mercury	0.0009	mg/L
Nickel	0.01	mg/L
Potassium	5.34	mg/L
Sodium	27.3	mg/L

Kelly Jones

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117694

Sample Description: SW03-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

Zinc	3.35	mg/L

Kelly Jones
Project Manager

J-338

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.2	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117668

Sample Description: FB01-02;Grab; Equipment Blank
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	6.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	6.	mg/L
Chloride	<1.	mg/L
COD	3.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	<0.1	mg/L
Nitrogen, Ammonia	0.03	mg/L
Nitrogen, Kjeldahl	<0.05	mg/L
Phosphate, Total	<0.01	mg/L
Solids, Dissolved	13.	mg/L
Sulfate	<1.	mg/L
Aluminum	0.03	mg/L
Antimony	<0.04	mg/L
Arsenic	<0.01	mg/L
Barium	0.02	mg/L
Boron	0.11	mg/L
Cadmium	<0.005	mg/L
Calcium	0.179	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.006	mg/L
Copper	0.07	mg/L
Iron	0.10	mg/L
Lead	<0.04	mg/L
Magnesium	0.052	mg/L
Manganese	<0.01	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	0.029	mg/L
Sodium	0.131	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117668

Sample Description: FB01-02;Grab; Equipment Blank
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

Zinc	0.060	mg/L

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

J-346

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

J-347

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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Tel: (708) 289-3100
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
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01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117645

Page 1

Sample Description: FB02-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	6.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	6.	mg/L
Chloride	<1.	mg/L
COD	<3.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	<0.1	mg/L
Nitrogen, Ammonia	<0.05	mg/L
Nitrogen, Kjeldahl	<0.02	mg/L
Phosphate, Total	0.31	mg/L
Solids, Dissolved	<1.	mg/L
Sulfate	<1.	mg/L
Aluminum	0.03	mg/L
Antimony	<0.04	mg/L
Arsenic	<0.001	mg/L
Barium	0.01	mg/L
Boron	0.04	mg/L
Cadmium	<0.005	mg/L
Calcium	0.051	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	0.08	mg/L
Iron	<0.02	mg/L
Lead	<0.04	mg/L
Magnesium	0.017	mg/L
Manganese	<0.01	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	0.022	mg/L
Sodium	0.045	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

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Suite 700 P.O. Box 2090
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10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

Zinc	0.010	mg/L

Kelly Jones
Kelly Jones
Project Manager

J-352

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L
Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

J-356

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L
N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117644

Sample Description: TB01-02
DuPont

Date Taken: 09-11-90 1150

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117644

Sample Description: TB01-02
DuPont

Date Taken: 09-11-90 1150

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

J-360

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117649

Sample Description: TB02-02
DuPont

Date Taken: 09-12-90 1240

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117649

Sample Description: TB02-02
DuPont

Date Taken: 09-12-90 1240

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager