CONSTRUCTION QUALITY ASSURANCE
FINAL REPORT
ON-SITE DISPOSAL FACILITY, PHASE I AND LEACHATE CONVEYANCE SYSTEM

REVISION 0
JANUARY 1998
VOLUME V

United States Department of Energy
Fernald Environmental Management Project
Fernald, Ohio

prepared by
GeoSyntec Consultants
1100 Lake Hearn Drive, NE, Suite 200
Atlanta, Georgia 30342

under
Fluor Daniel Fernald
Subcontract 95PS005028

Compacted Clay Liner

- **Nuclear Moisture/Density Test Log**

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 11 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE / COMPACTED): ±8"

% COMPACTION: > 95% (APZ) MOISTURE RANGE: ± 3% (APZ) @ 8/20/97 ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: – QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
~~228~~ 1	SEE ATTACHED MAP	6" / 1ST	N/A	N/A	N/A	12.4	123.0	109.4	N/A *		F	N/A **		
~~229~~ 2	↓	↓	↓	↓	↓	12.7	131.0	116.2	↓		F	↓		
~~230~~ 3	↓	↓	↓	↓	↓	13.8	134.3	118.0	↓		F	↓		
~~231~~ 4	↓	↓	↓	↓	↓	16.5	128.5	110.2	↓		F	↓		
~~232~~ 5	↓	↓	↓	↓	↓	13.5	132.4	116.6	↓		F	↓		
~~233~~ 6	↓	↓	↓	↓	↓	12.3	134.5	119.8	↓		F	↓		
~~234~~ 7	↓	↓	↓	↓	↓	13.3	133.0	117.4	↓		F	↓		

NOTE: NO TESTS WERE EXPECTED TO FAIL WITHIN ACCEPTABLE PERMEABILITY ZONE (APZ).

COMMENTS: APPROXIMATELY 50' X 100' AREA @ N.E. CORNER OF CELL NO. 1

** TESTS ONLY PERFORMED TO DETERMINE MOISTURE PROFILE ACROSS AREA. AREA WAS SCARIFIED AND THE SURFACE ONLY SEALED UTILIZING A DYNAPAK CA251 SMOOTH DRUM ROLLER.

RCM 8/22/97

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: FRIDAY 22 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: CLAY STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED):

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MICROWAVE % M QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
29	SEE ATTACHED MAP LANE NO. 1	6" / 1ST.	LP-42	12.5	123.8	14.2	138.0	120.8	97.6	P				
30	↓	↓	↓	↓	↓	14.2	136.8	119.8	96.8	P				
31	↓	↓	↓	↓	↓	13.8	136.7	120.1	97.0	P				
** 31A	LANE #1	6" / 1ST	LP-42	12.5	123.8	11.0	133.4	120.2	97.1	N/A				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF SPECIFICATION

** SAND CONE TEST LOCATION. FMC NOT CORRECTED. SURFACE PREPARED BY DYNAPAK CA251 SMOOTH DRUM ROLLER.

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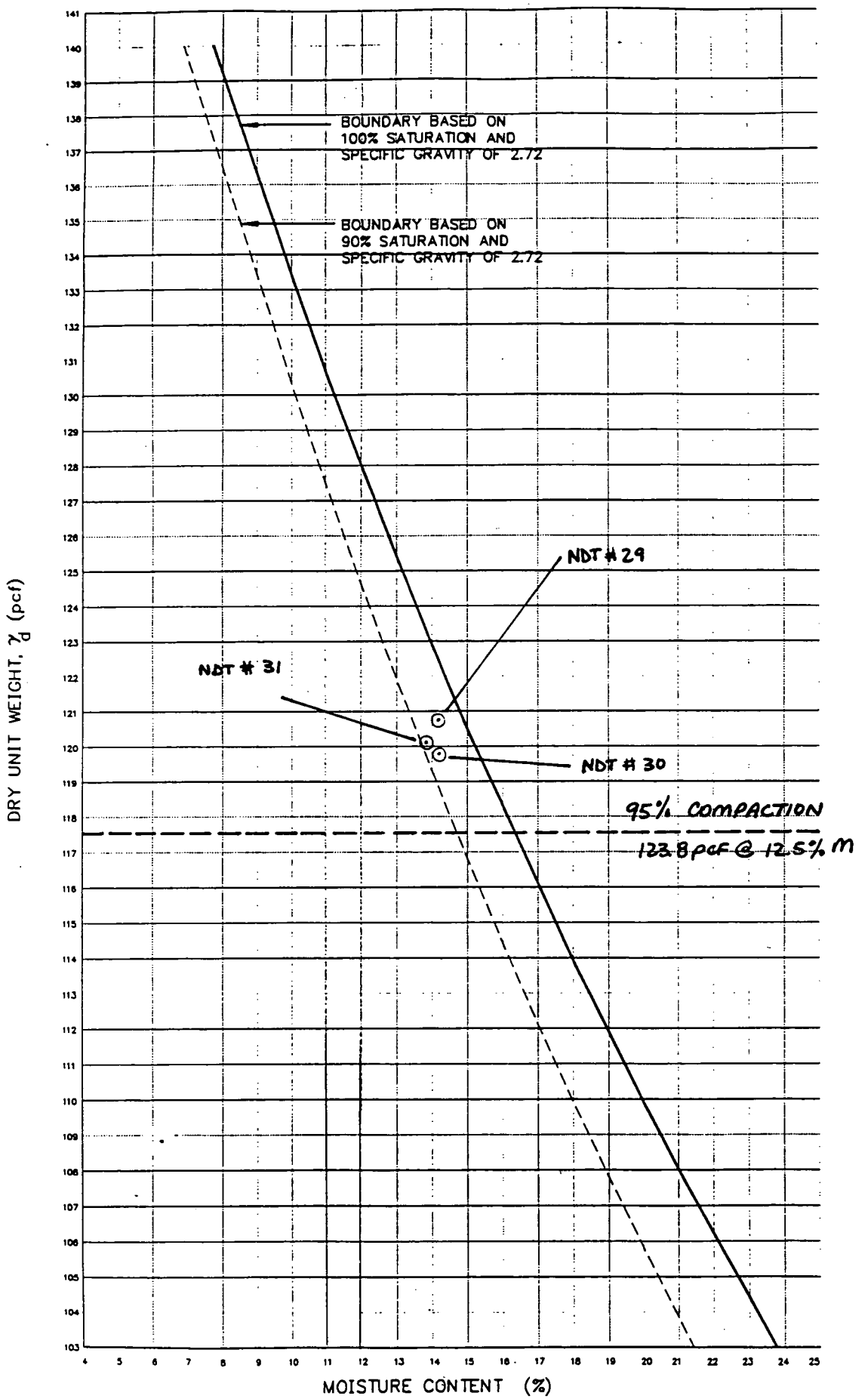
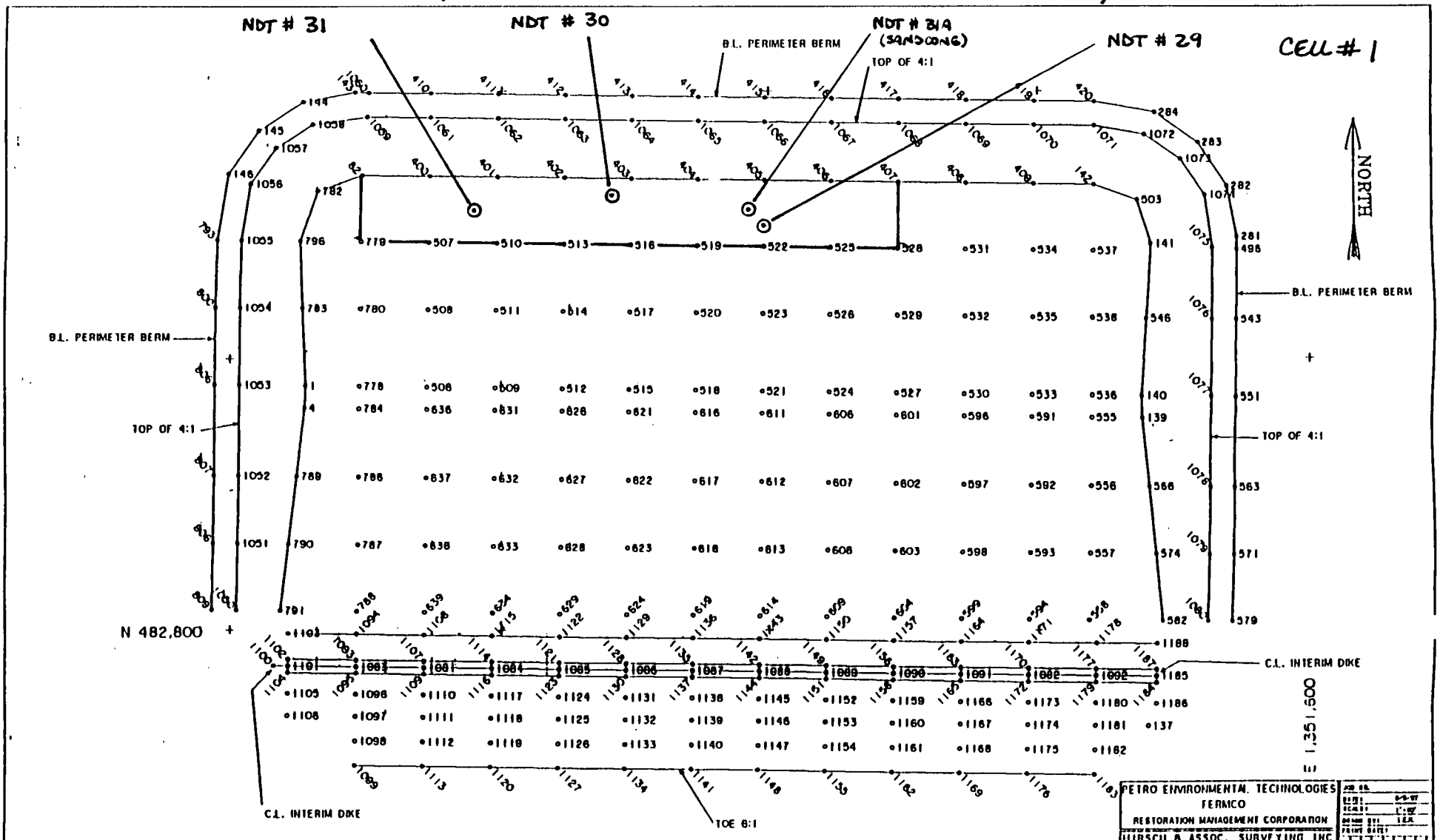
FRIDAY 22AUG97



NOTE: NDT # 31A NOT PLOTTED → SAND CONE

SHEET NO. 2 OF 3

NUCLEAR DENSITY TEST LOCATIONS NDT # 's 29 → 31A FRIDAY 24AUG97



SHEET NO. 3 OF 3

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: SATURDAY 23 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: CLAY STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±10" LIFT THICKNESS (LOOSE/COMPACTED):

% COMPACTION: 95% APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

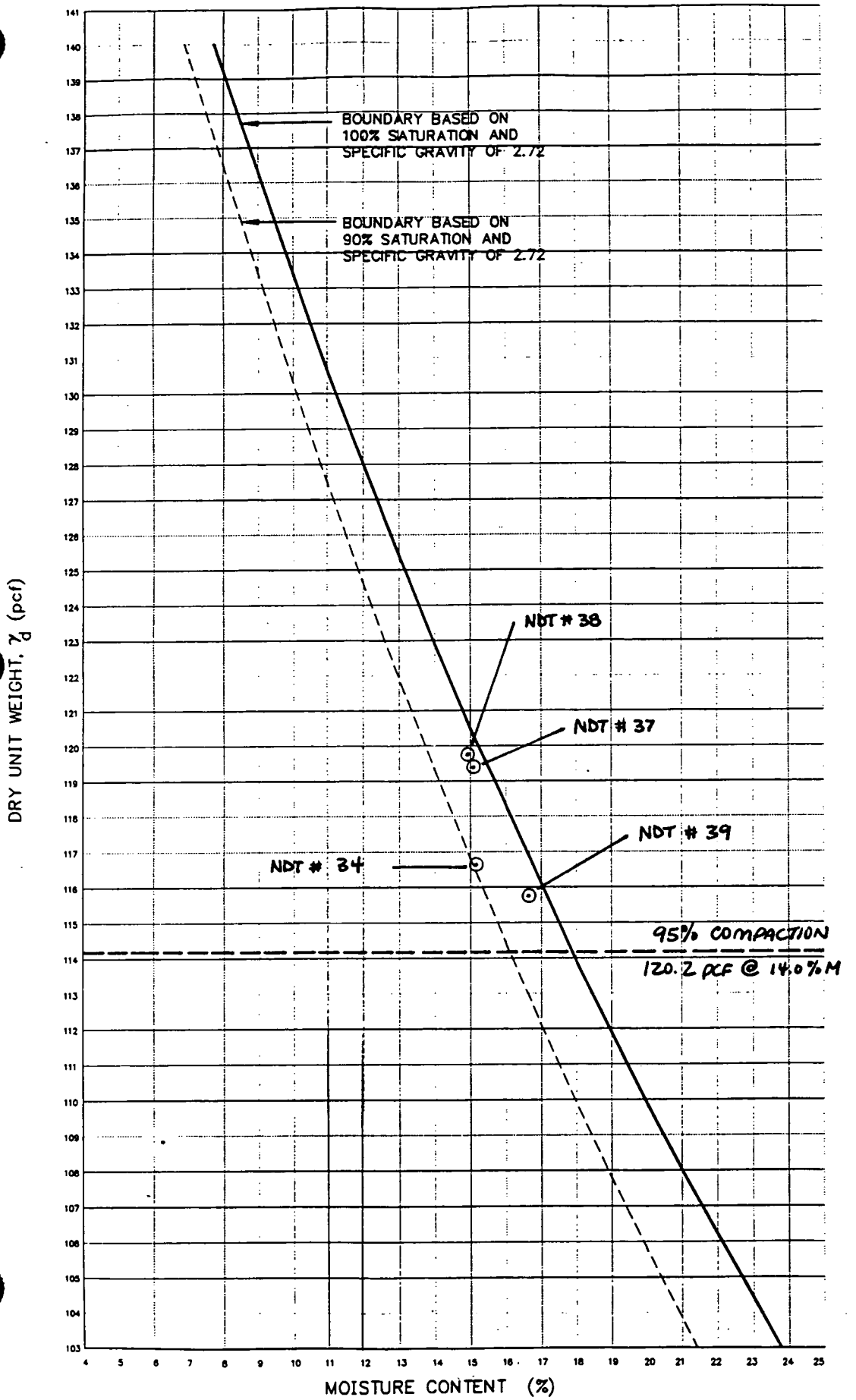
NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MICROWAVE %M QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
32	SEE ATTACHED MAP LANE #8	6" / 1ST.	LP-37	15.5	114.2	16.6	128.8	110.5	96.8		F	41		F
33	LANE #8		LP-37	15.5	114.2	18.1	131.1	111.0	97.2	P				
34	LANE #7		LP-43	14.0	120.2	15.2	134.2	116.5	96.9	P				
35	LANE #7		LP-37	15.5	114.2	17.7	131.1	111.4	97.5	P				
36	LANE #6		LP-37	15.5	114.2	17.4	129.4	110.2	96.5		F	57	P	
37	LANE #6		LP-43	14.0	120.2	15.2	137.4	119.3	99.3	P				
38	LANE #6					15.0	137.6	119.7	99.6	P				
39	LANE #6					16.6	134.9	115.7	96.3	P				
40	LANE #6		LP-37	15.5	114.2	16.2	113.1	113.1	99.0		F	57	P	

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

SATURDAY 23 AUG 97



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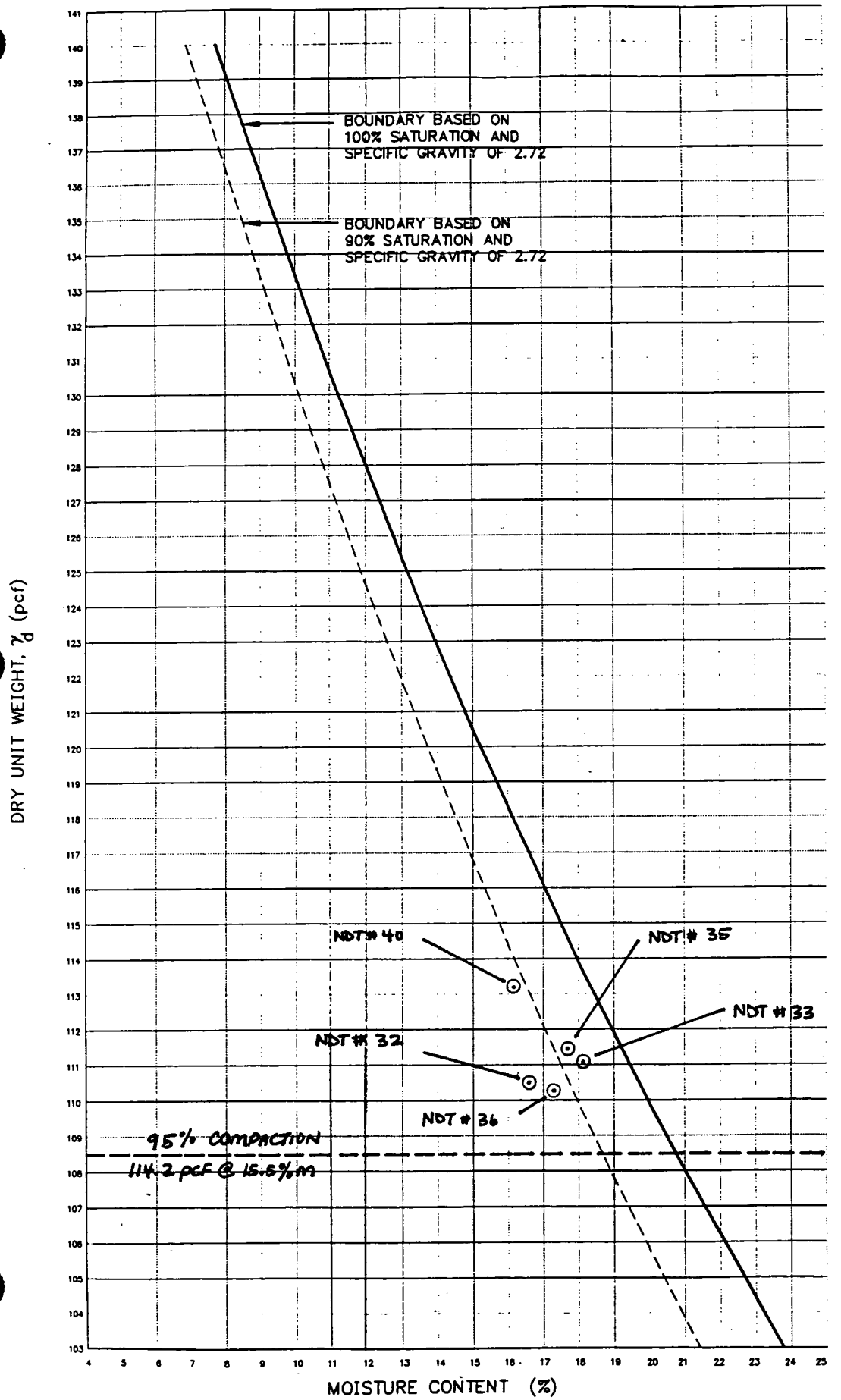
SHEET NO. 2 OF 4

SATURDAY 23 AUG 97



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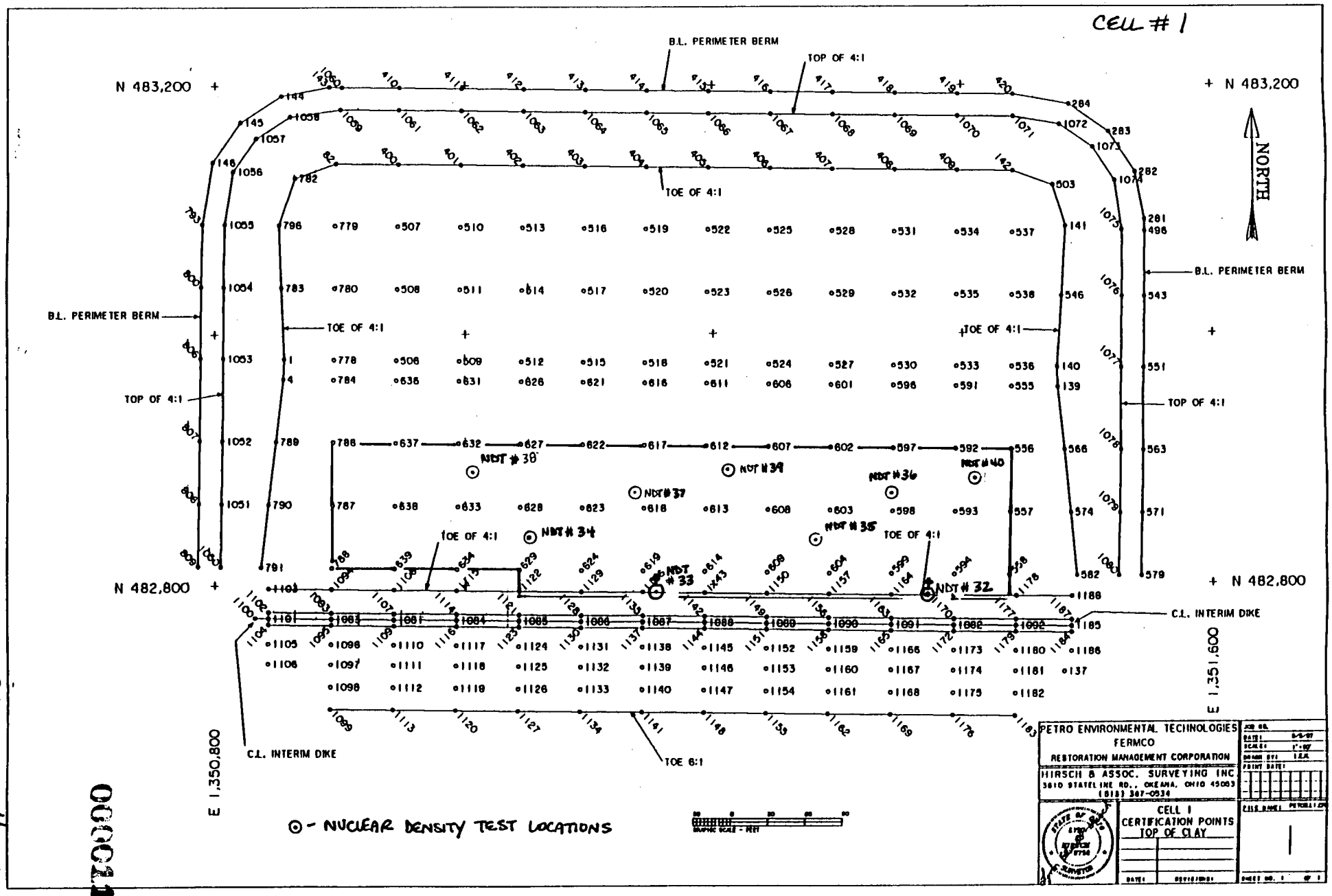
SHEET NO. 3 OF 4

NUCLEAR DENSITY TEST LOCATIONS
NDT #'S 32 THRU 40

SATURDAY 23AUG97

RECEIVED
AUG 06 1997
8/23/97

CELL # 1



SHEET NO. 4 OF 4

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION MONDAY DATE: 25 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

1ST → ≈10-12" 2ND → ≈8"

SOURCE: CLAY STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): _____
(CIRCLE ONE)

% COMPACTION: 95% APZ * MOISTURE RANGE: + 3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MICROWAVE % M QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
41	SEE ATTACHED MAP LANE #8	6" / 1ST.	LP-37	15.5	114.2	19.0	131.9	110.8	97.0		F	58	P	
42	LANE #2	6" / 1ST.	LP-43	14.0	120.2	14.9	135.4	117.8	98.0	P				
43	LANE #1	6" / 1ST.	LP-43	14.0	120.2	15.0	135.1	117.5	97.8	P				
44	LANE #2	6" / 2ND	LP-43	14.0	120.2 ~~114.2~~ @ 9/23/97	16.6	133.7	114.7	95.4	P				
45	LANE #1	6" / 2ND	LP-37	15.5	114.2	15.7	128.6	111.1	97.3		F	56	P	
46	LANE #2	6" / 2ND	LP-37	15.5	114.2	15.6	129.1	111.7	97.8		F	55		F
47	LANE #1	6" / 2ND	LP-43	14.0	120.2	15.6	135.4	117.1	97.4	P				
48	LANE #3	6" / 1ST	LP-43	14.0	120.2	14.5	136.8	119.5	99.4	P				
49	LANE #3	6" / 1ST	LP-43	14.0	120.2	14.6	134.4	117.3	97.6		F	51		F

10/6/97

COMMENTS: * ACCEPTABLE PERMEABILITY ZONE (APZ) SPECIFICATION 02225 (SECTION) PART 3.02A

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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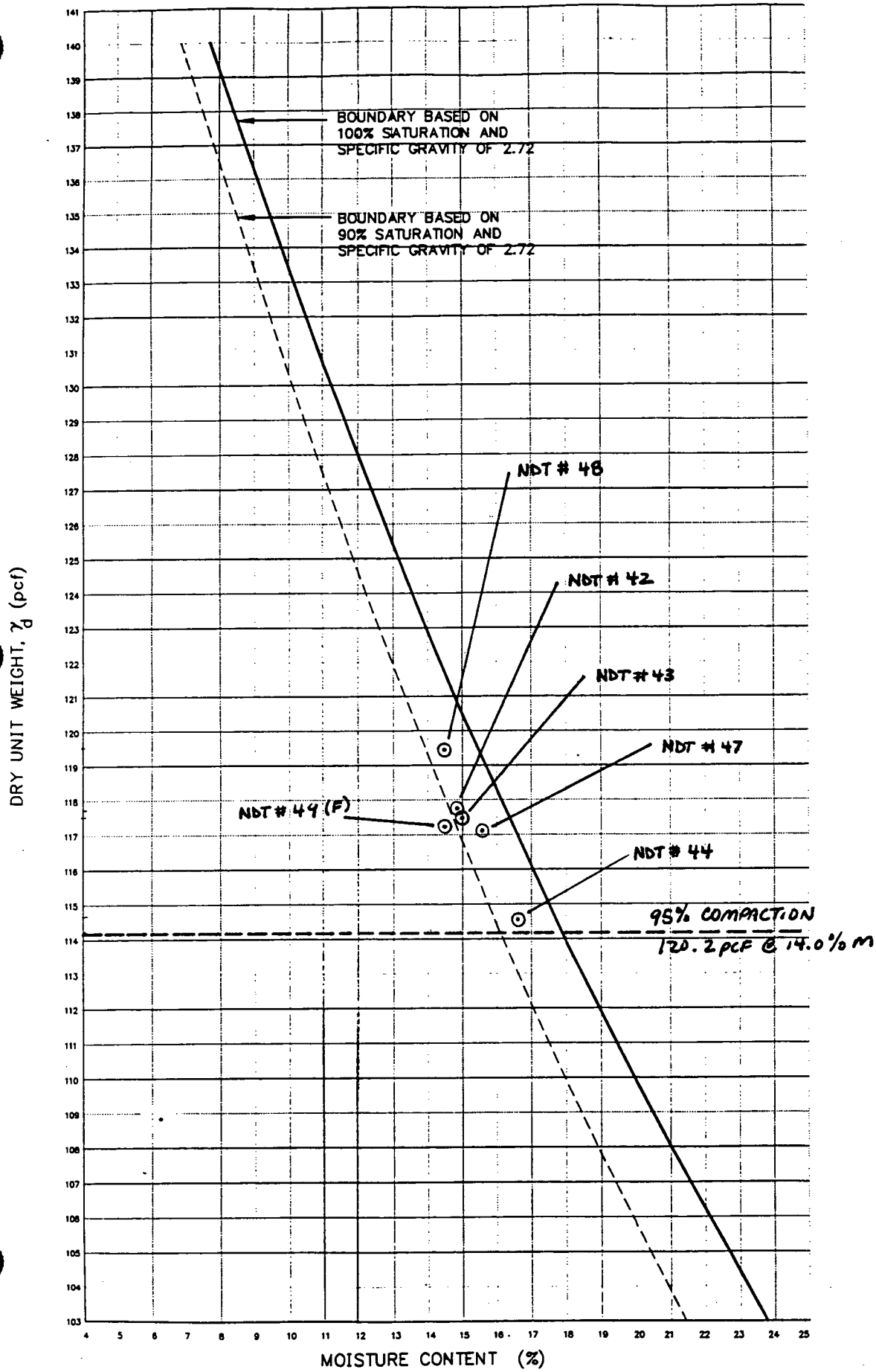
MONDAY 25 AUG 97

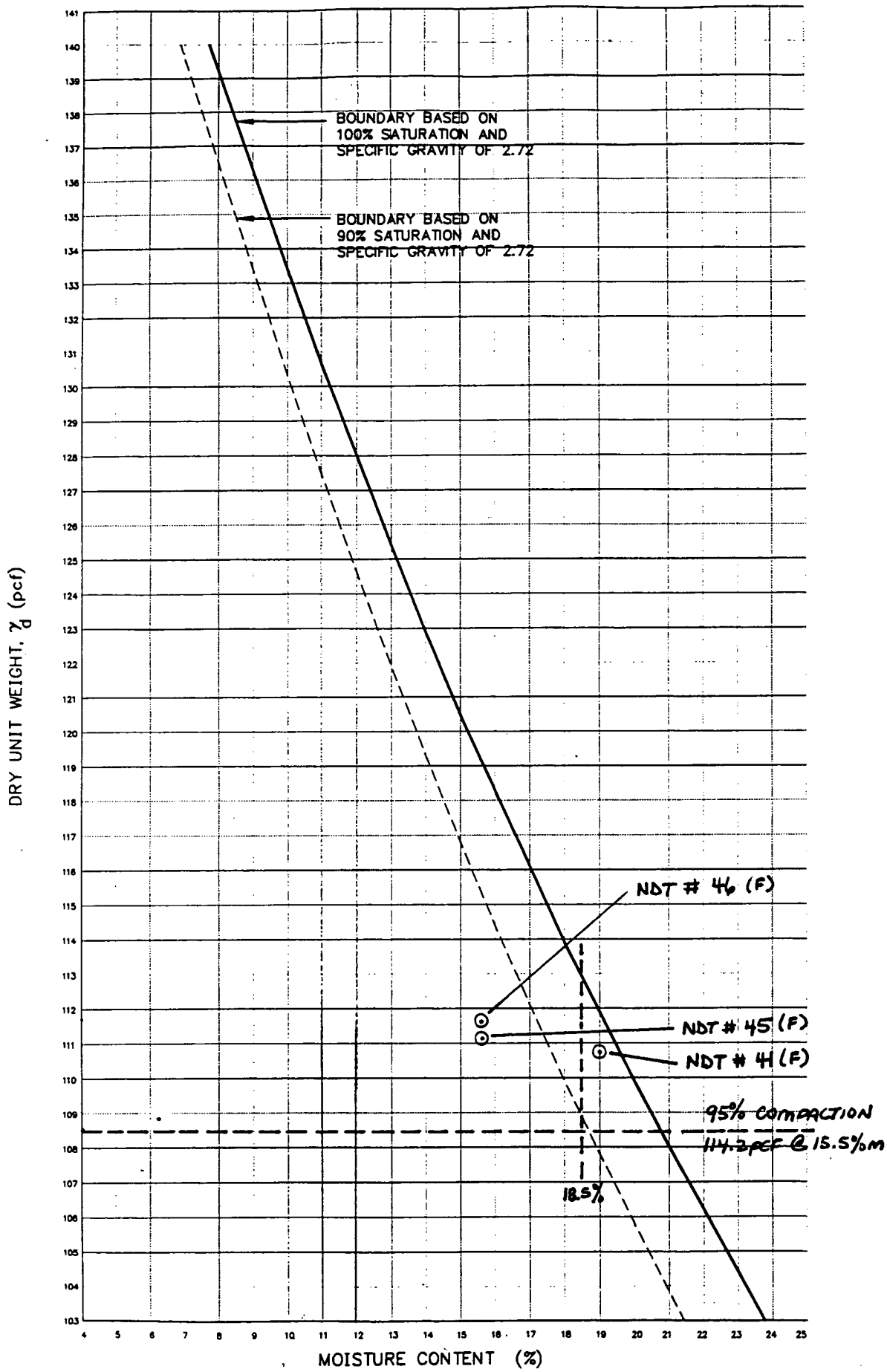


NDT #'S
42 → 49

000013

SHEET NO. 2 OF 4

MONDAY 25AUG97



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SHEET NO. 3 OF 4

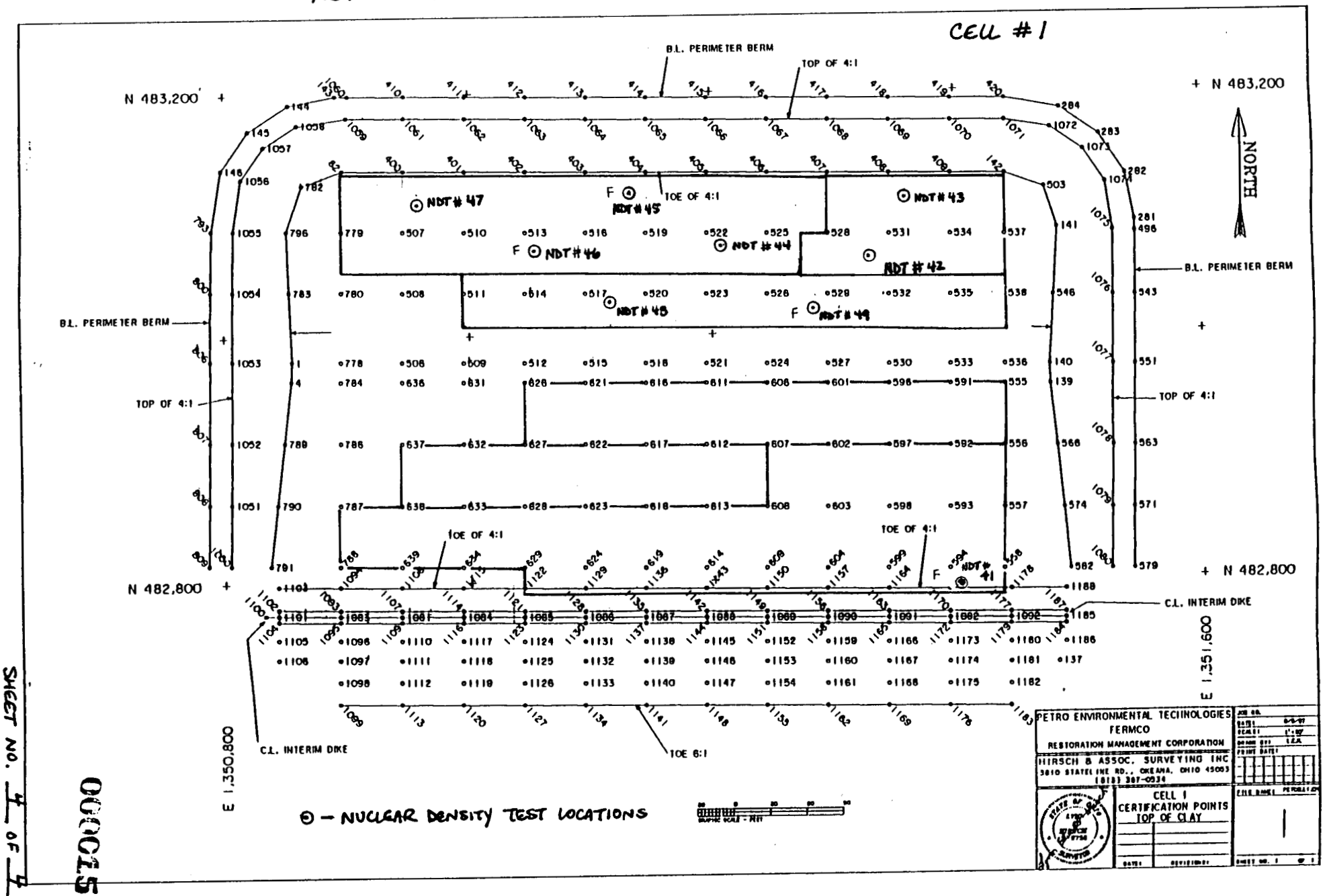
NUCLEAR DENSITY TEST LOCATIONS

NDT #'S 41 THRU 49

MONDAY 25 AUG 97

RECEIVED AUG 06

0740 063



SHEET NO. 4 OF 4

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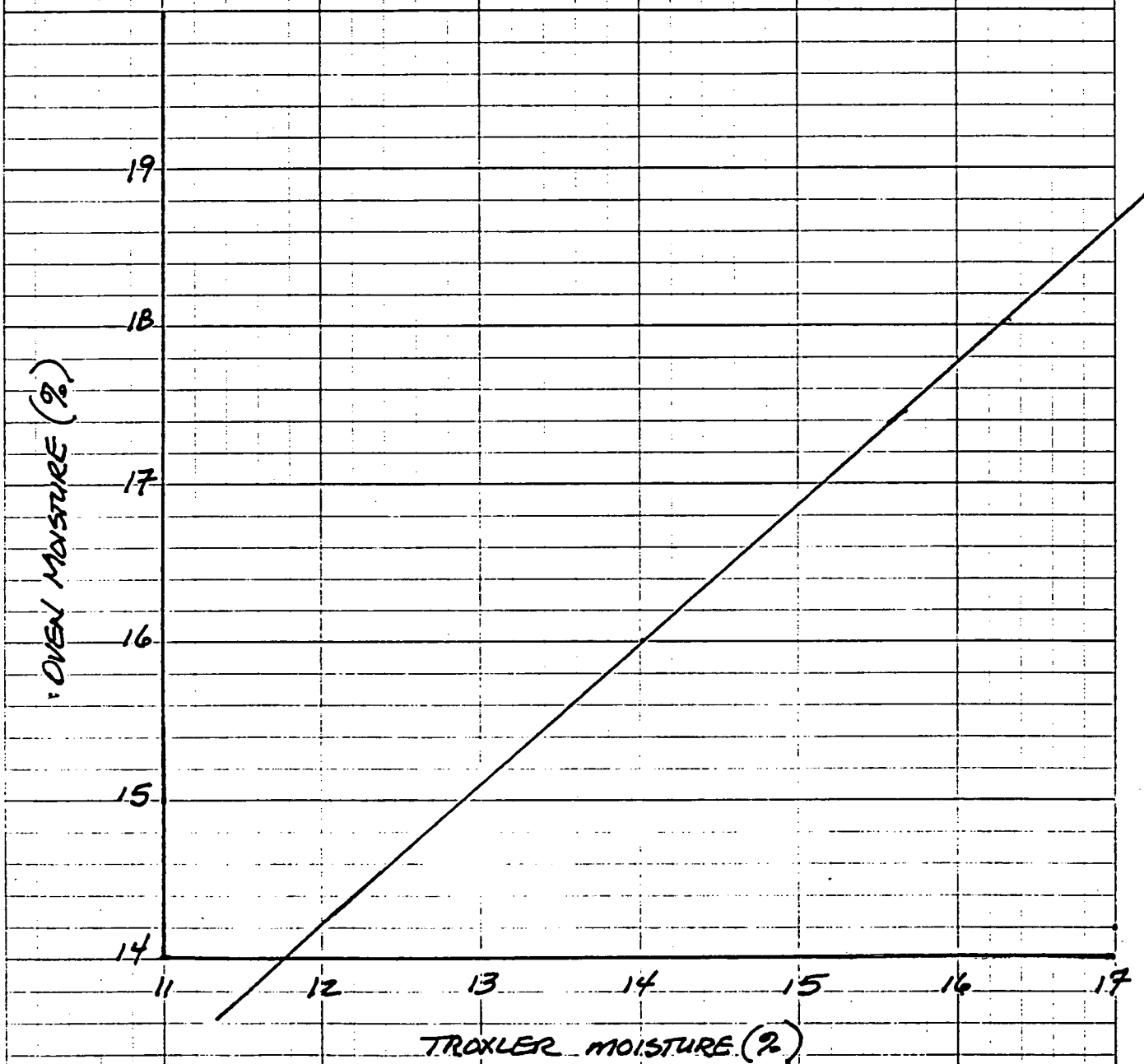
GEOSYNTEC CONSULTANTS

Written by: KWC Date: 97 / 08 / 26 Reviewed by: _____ Date: ___/___/___

Client: _____ Project: _____ Project/Proposal No.: _____ Task No.: _____

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE
TO OVEN FOR USE WEEK OF 26 AUG. '97
(26 AUG. – 31 AUG. 1997)



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 26 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

1ST - 10" 2ND - 8"

SOURCE: CLAY STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED):

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MICROWAVE %m QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
50	SEE ATTACHED MAP LANE #3	6" / 1ST	LP-43	14.0	120.2	15.2	135.7	117.8	98.0	P				
51	LANE #3	6" / 1ST	LP-42	12.5	123.8	12.6	136.1	120.9	97.7		F	75		F
52	LANE #5		LP-43	14.0	120.2	15.6	133.7	115.7	96.3	P				
53	LANE #5		LP-37	15.5	114.2	16.7	132.7	113.7	99.6	P				
54	LANE #5		LP-37	15.5	114.2	16.3	131.9	113.4	99.3	P				
55	LANE #2	6" / 2ND	LP-37	15.5	114.2	15.8	128.8	111.2	97.4		F	65	P	
56	LANE #1	6" / 2ND	LP-43	14.0	120.2	15.5	135.8	117.5	97.8	P				
57	LANE #6	6" / 1ST	LP-43	14.0	120.2	15.8	137.0	118.3	98.4	P				
58	LANE #8	6" / 1ST	LP-43	14.0	120.2	16.0	137.3	118.4	98.5	P				
59	LANE #6	6" / 2ND	LP-37	15.5	114.2	16.6	126.9	108.8	95.3		F	67	P	

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE AS DEFINED IN SECTION 02225 PART 3.02 A OF PROJECT SPECIFICATIONS

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

000027

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 26 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: CLAY STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED):
(CIRCLE ONE)

% COMPACTION: 95% APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MICROWAVE %m QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
60	SEE ATTACHED MAP LANE #6	6"/2ND	LP-37	15.5	114.2	16.9	130.3	111.5	97.6		F	66	P	
61	LANE #6	6"/2ND	LP-37	15.5	114.2	17.0	132.7	113.4	99.3	P				
62	LANE #7	6"/2ND	LP-43	14.0	120.2	16.1	133.1	114.6	95.3	P				
63	LANE #7	6"/2ND	LP-37	15.5	114.2	16.7	133.0	114.0	99.8	P				
64	LANE #8	6"/2ND	LP-43	14.0	120.2	~~13.7~~ 16.6 @ 8/26/97	134.3	115.2	95.8	P				
65	LANE #2	6"/2ND	LP-43	14.0	120.2	15.8	134.8	116.4	96.8	P				

KW 10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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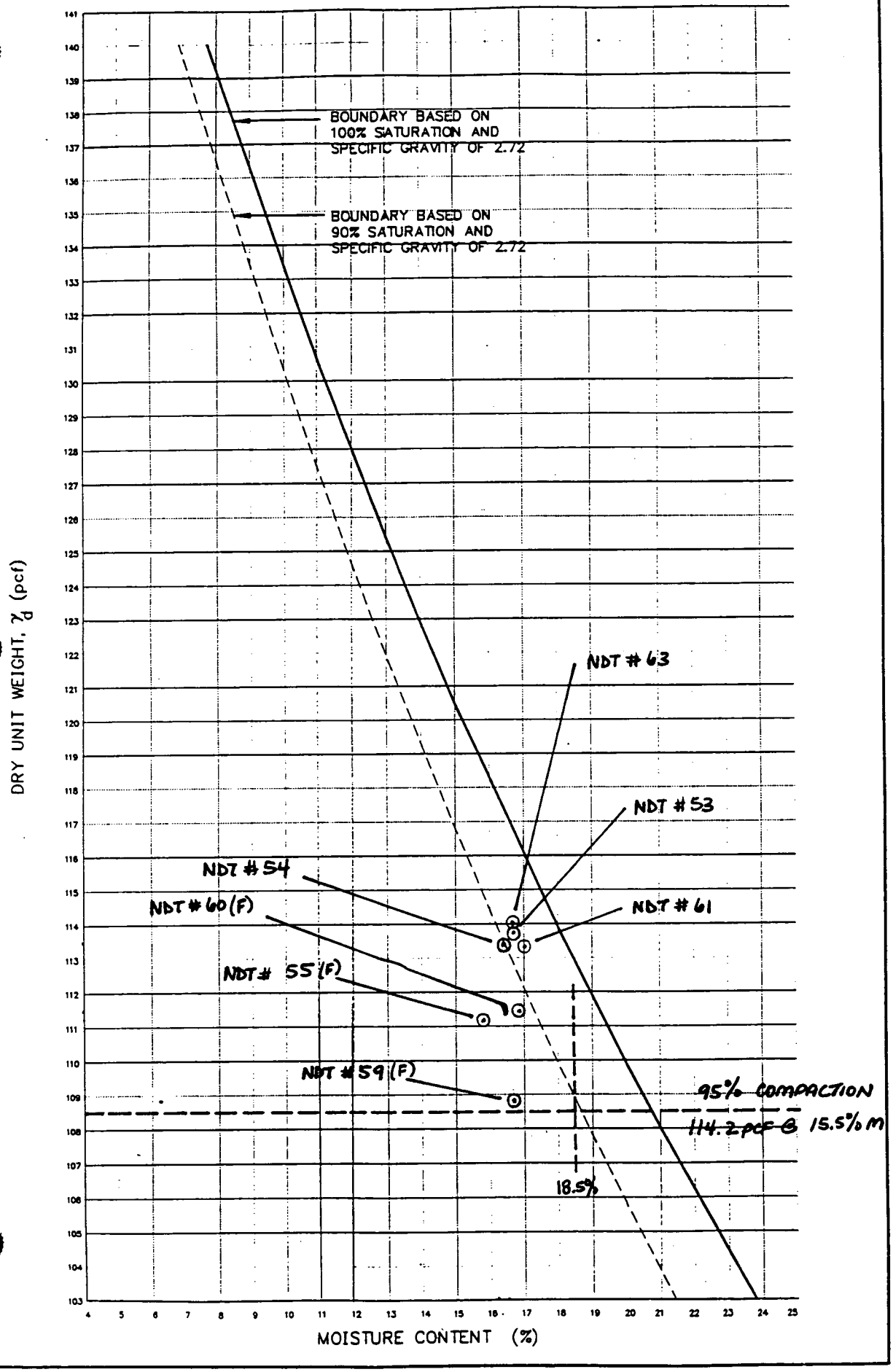
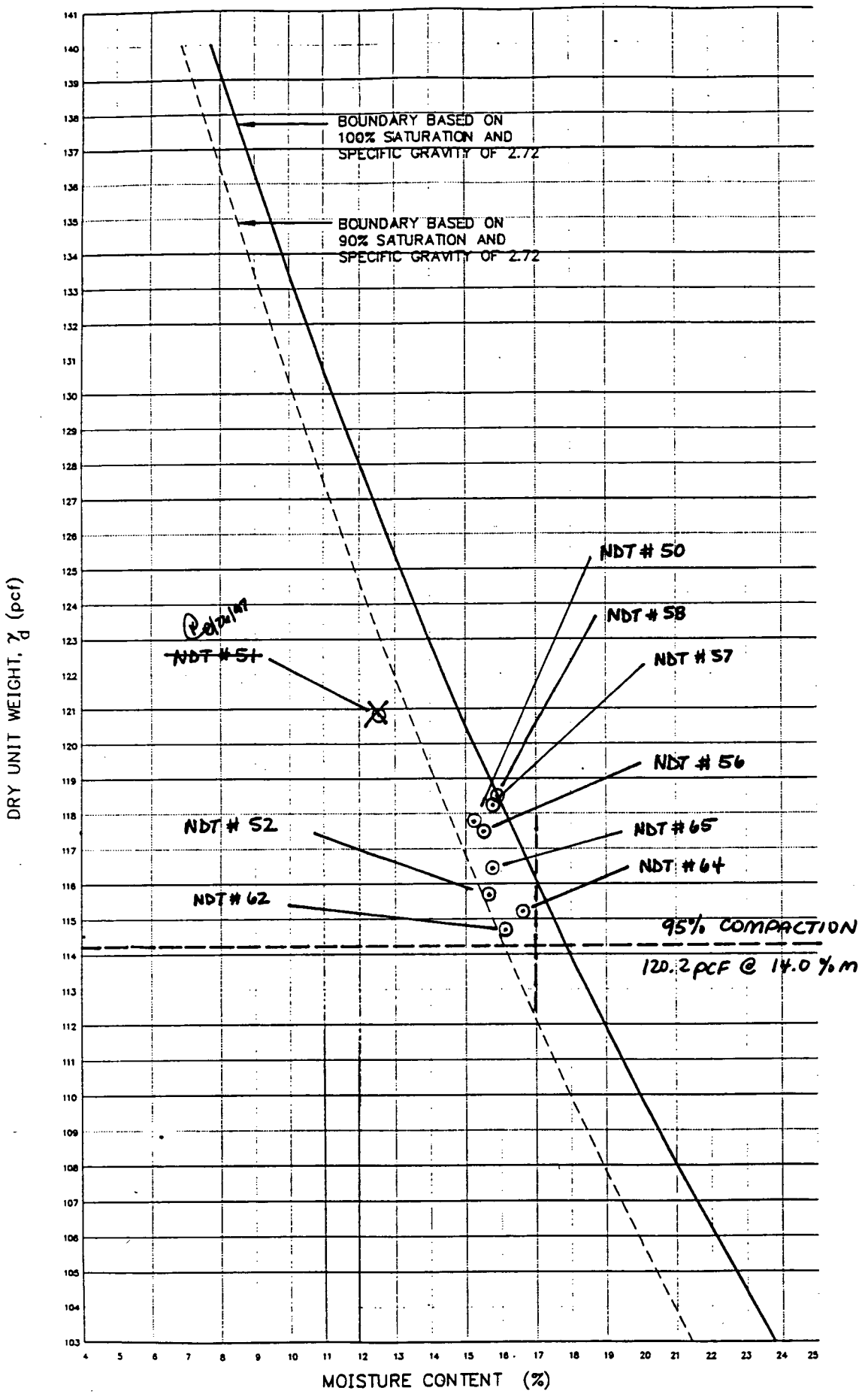
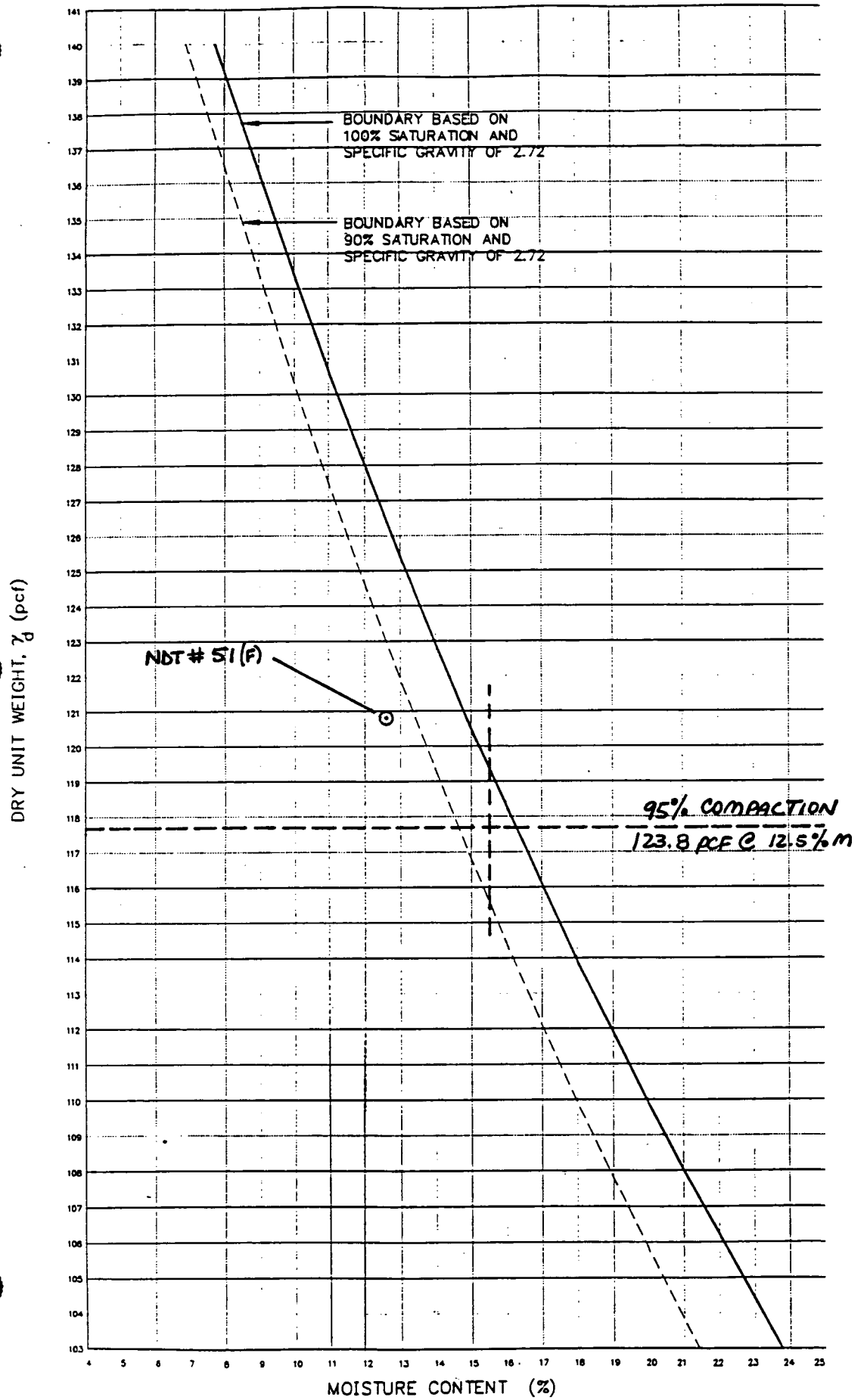
TUESDAY 26 AUG 97



TUESDAY 26 AUG 97



TUESDAY 26 AUG 97



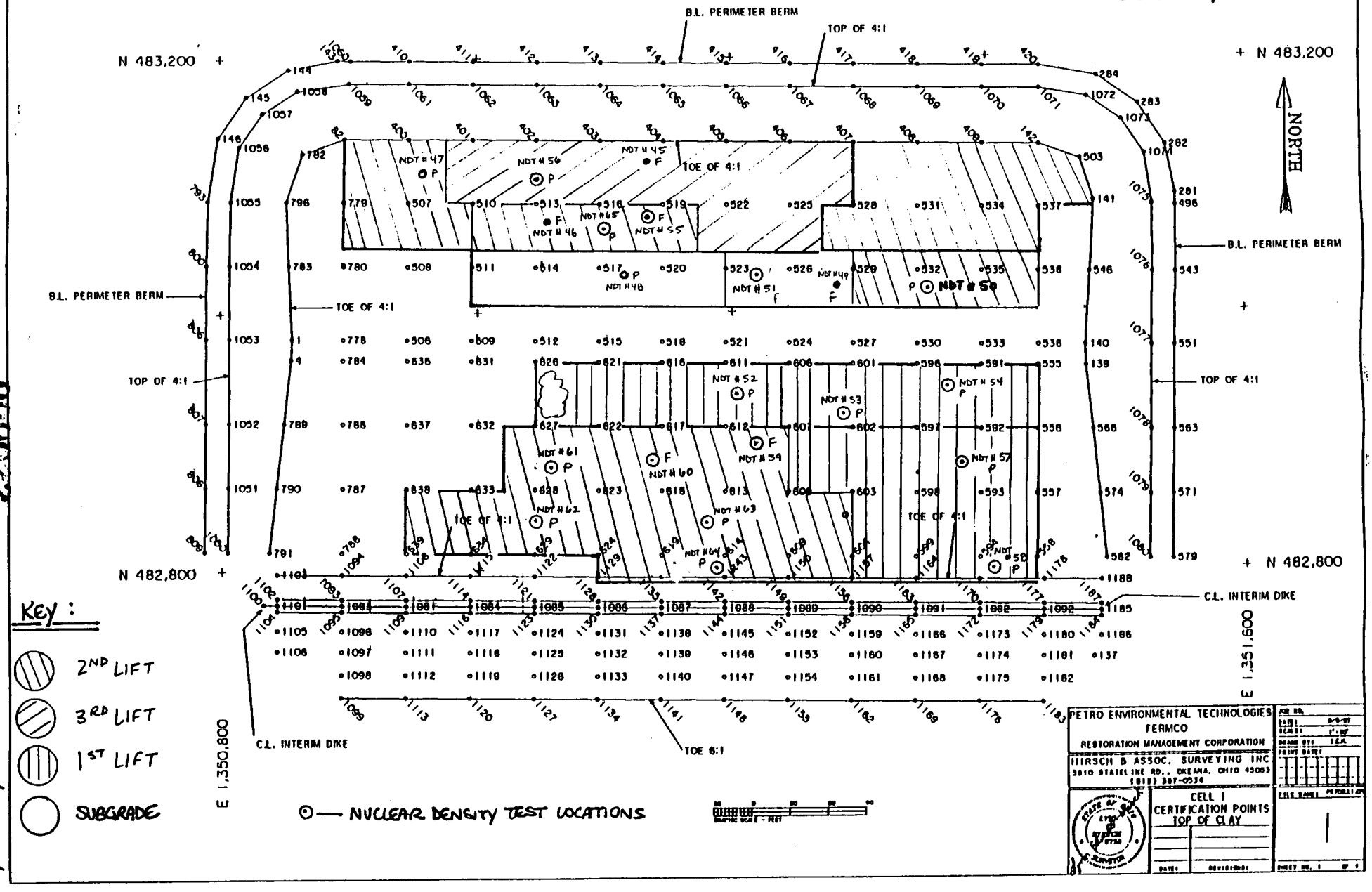
SHEET NO. 5 OF 6

RECEIVED
AUG 06
@ 8/26/97

NUCLEAR DENSITY TEST LOCATIONS
NDT #'S 50 THRU 65

TUESDAY 26 AUG 97

CELL #1



SHEET NO. 4 OF 6

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 27 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: CLAY LINER STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" 1ST → ±10" LIFT THICKNESS (LOOSE/COMPACTED):

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
66	SEE ATTACHED MAP LANE #6	6" / 2ND	**	16.7	112.8	16.3	134.7	115.8	102.7	P				
67	LANE #6	6" / 2ND				17.0	131.6	112.5	99.7	P				
68	LANE #1	6" / 3RD				16.8	134.1	114.8	101.8	P				
69	LANE #1	6" / 3RD				17.2	131.5	112.2	99.5	P				
70	LANE #1	6" / 2ND				15.4	130.6	113.2	100.4		F	74	P	
71	LANE #2	6" / 2ND				15.0	135.5	117.8	104.4	P				
72	LANE #3	6" / 1ST				16.3	132.0	113.5	100.6	P				
73	LANE #3	6" / 1ST				16.6	132.6	113.7	100.8	P				
74	LANE #1	6" / 2ND				15.9	133.7	115.4	102.3	P				
75	LANE #3	6" / 1ST				16.4	130.0	111.7	99.0		F	80		F

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** STOCKPILE NO.5 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STANDARD PROCTOR LAB RESULTS

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

000023 12967

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 27 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: CLAY LINER STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ± 8" LIFT THICKNESS (LOOSE/COMPACTED): ✓
(CIRCLE ONE)

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: RW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	FIELD TEST RESULTS: PASS	FIELD TEST RESULTS: FAIL	RETEST NO.	RETEST: PASS	RETEST: FAIL
76	SEE ATTACHED MAP LANE #5	6"/2ND	***	16.7	112.8	17.0	130.8	111.8	99.1		F	~~78~~ 79	P	
77	LANE #5	6"/2ND	↓	↓	↓	16.6	133.9	114.8	101.8	P				
78	LANE #5	6"/2ND	↓	↓	↓	16.2	135.2	116.4	103.2	P				
79	LANE #5	6"/2ND	↓	↓	↓	17.1	131.9	112.6	99.8	P				

Ed 10/29/97 ***
**
KW 10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION
*** STOCKPILE NO.5 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STANDARD PROCTOR LAB RESULTS.
** - SAND CONE PERFORMED · RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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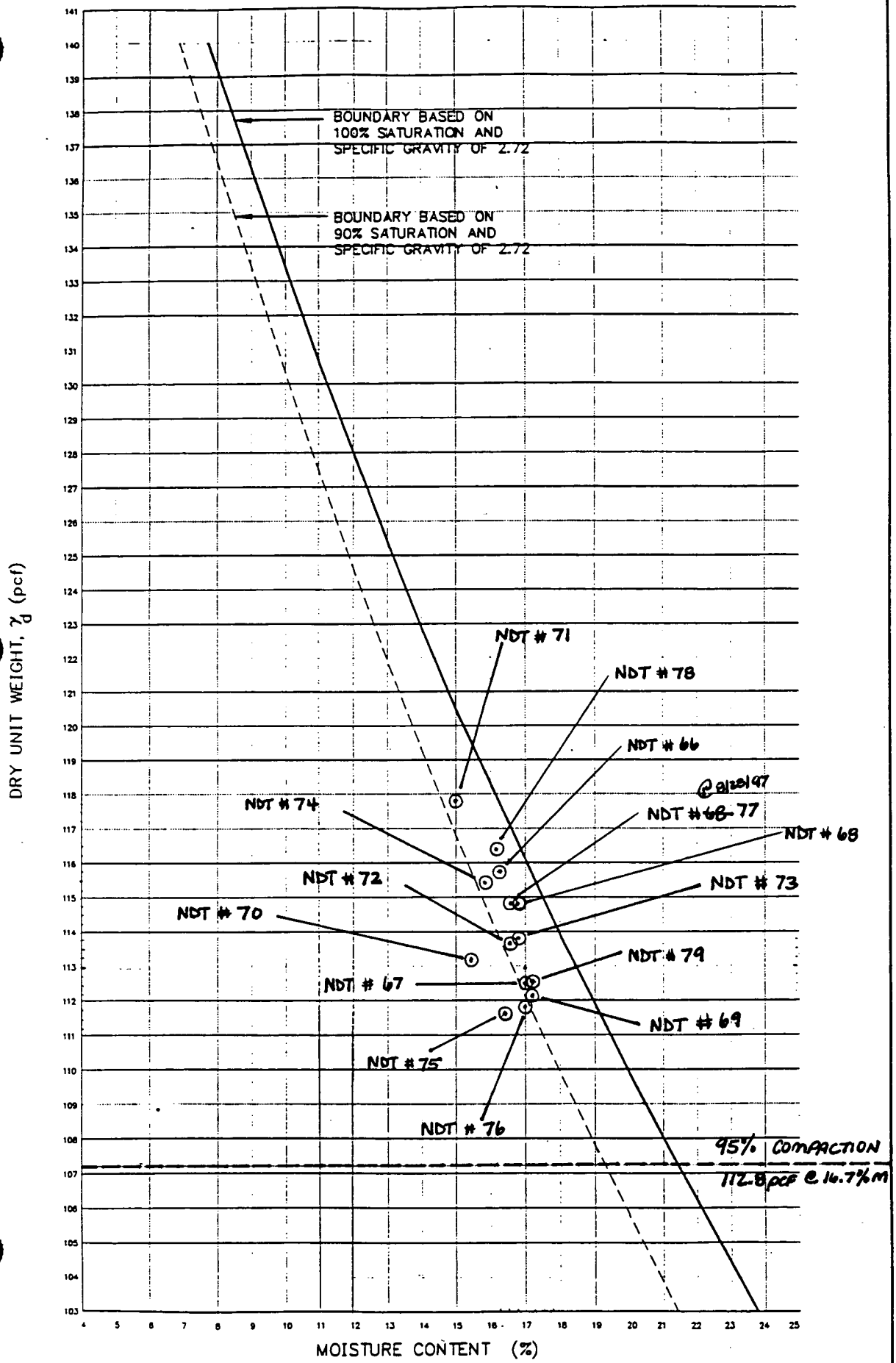
12672

WEDNESDAY 27 AUG 97

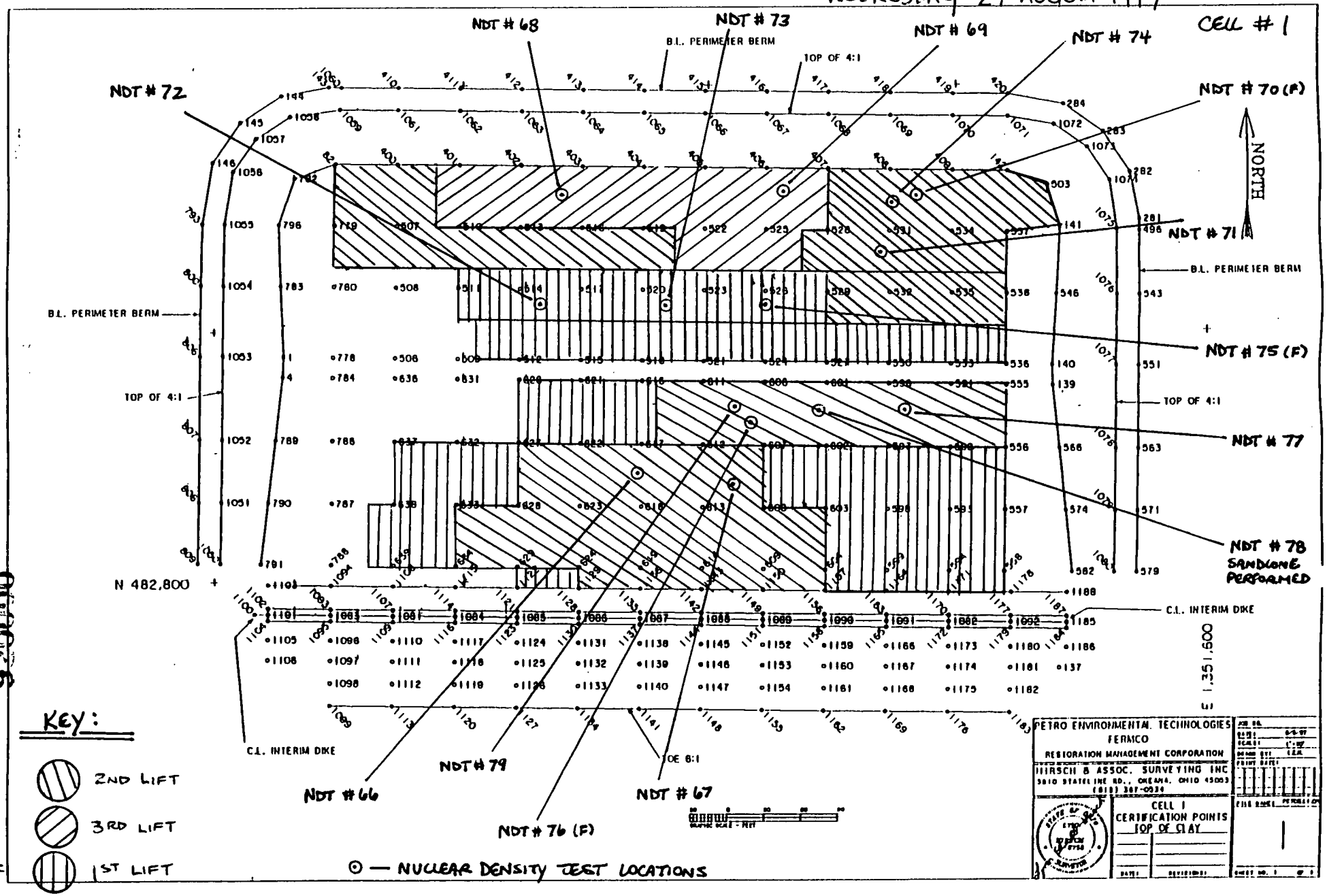


SHEET NO. 3 OF 4

NUCLEAR DENSITY TEST LOCATIONS
NDT #'S 66 THRU 79

WEDNESDAY 27 AUGUST 1997

CELL #1



SHEET NO. 4 OF 4

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 28 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: STOCKPILE No. 5 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8-in

% COMPACTION: ≥95 STD. PROCTOR ** APZ MOISTURE RANGE: +3% APZ ** ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. * (B. ERISMANN) COR. FACTOR: MOISTURE CORRELATION QA ID: BN

TEST NO.	CELL I TEST LOCATION (SEE SKETCH ATTACHED)	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-80	LANE 3	6-in/L1	***	16.7	112.8	17.1	130.0	111.0	98		F	NDT#83	P	
-81	LANE 3	6in/L1				15.8	135.0	116.6	103	P				
82	LANE 3	6-in/L1				16.0	132.8	114.5	102	P				
83	LANE 3	6-in/L1				16.0	133.5	115.1	102	P				
84	LANE 2	6-in/L2				16.5	134.4	115.4	102	P				
85	LANE 2	6in/L2				15.1	138.0	120.0	106					
86	LANE 2	6in/L3				16.8	132.8	113.6	101	P				
87	LANE 2	6-in/L3				18.7	126.8	106.8	95		F	NDT#111	P	
88	LANE 2	6in/L3				15.7	135.1	116.8	104	P				
** 89	LANE 1	6-in/L3				15.3	134.7	116.8	104	P				

COMMENTS: * TROXLER 3440 MODEL (SERIAL NO. 20979) WAS UTILIZED FOR TESTING; TROXLER 3430 (SERIAL NO. 27418) CONDUCTING BATTERY RECHARGING ON UNIT. ** APZ → ACCEPTABLE PERMEABILITY ZONE

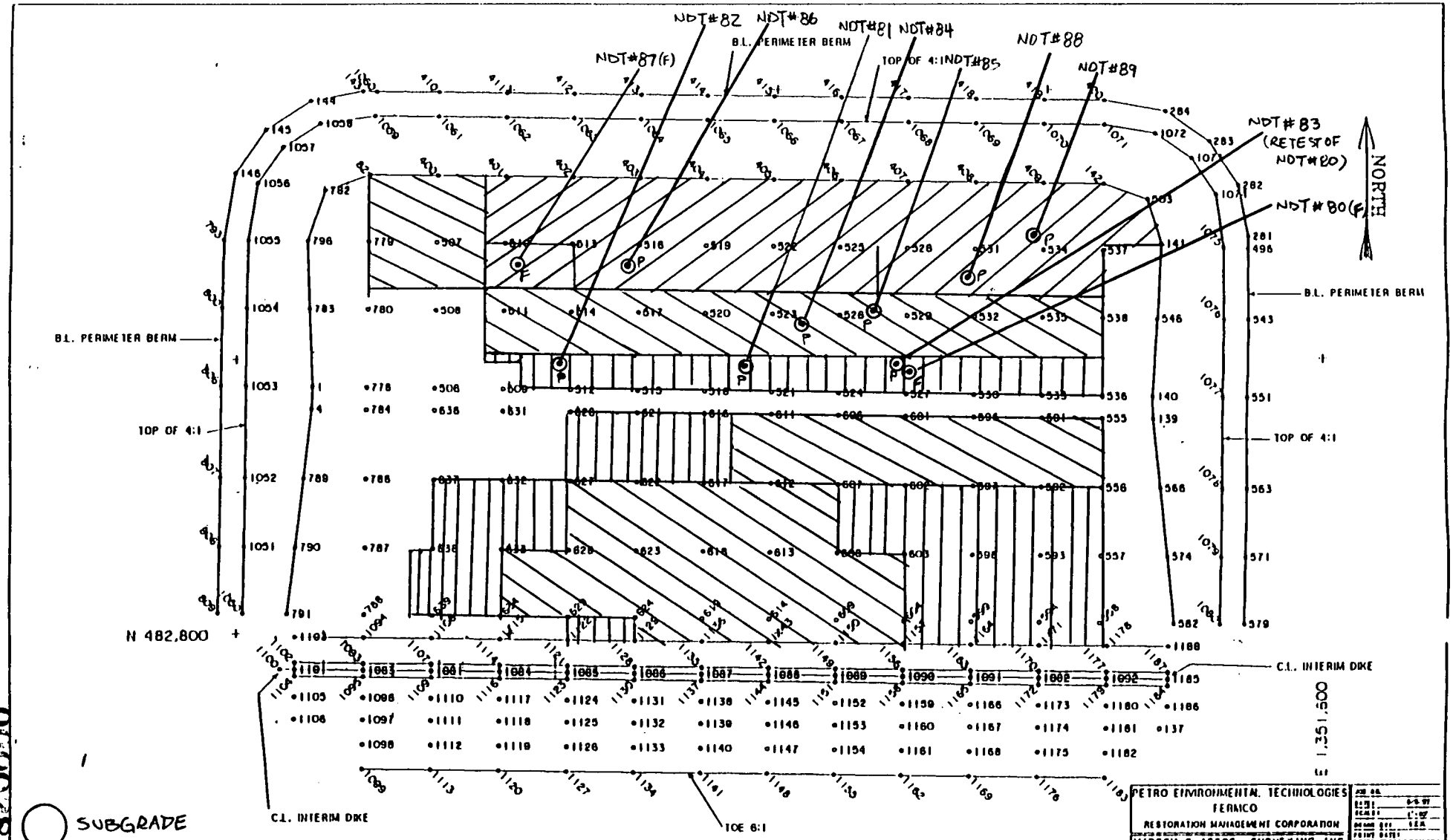
*** STOCKPILE No. 5 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS

*GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] ** SAND CONE TEST LOCATION SHEET NO. 1 OF 3

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

12967

THURSDAY 28 AUGUST 1977



SUBGRADE

1ST LIFT

2ND LIFT

3RD LIFT

NDT TEST LOG AND LIFT PLACEMENT LOCATION SKETCH

PETRO ENVIRONMENTAL TECHNOLOGIES
FERMCO
RESTORATION MANAGEMENT CORPORATION

HIRSCH & ASSOC. SURVEYING INC
3810 STATELINE RD., CHEANA, OHIO 45003
(513) 367-0534

CELL I
CERTIFICATION POINTS
TOP OF CLAY

SHEET 2 of 3

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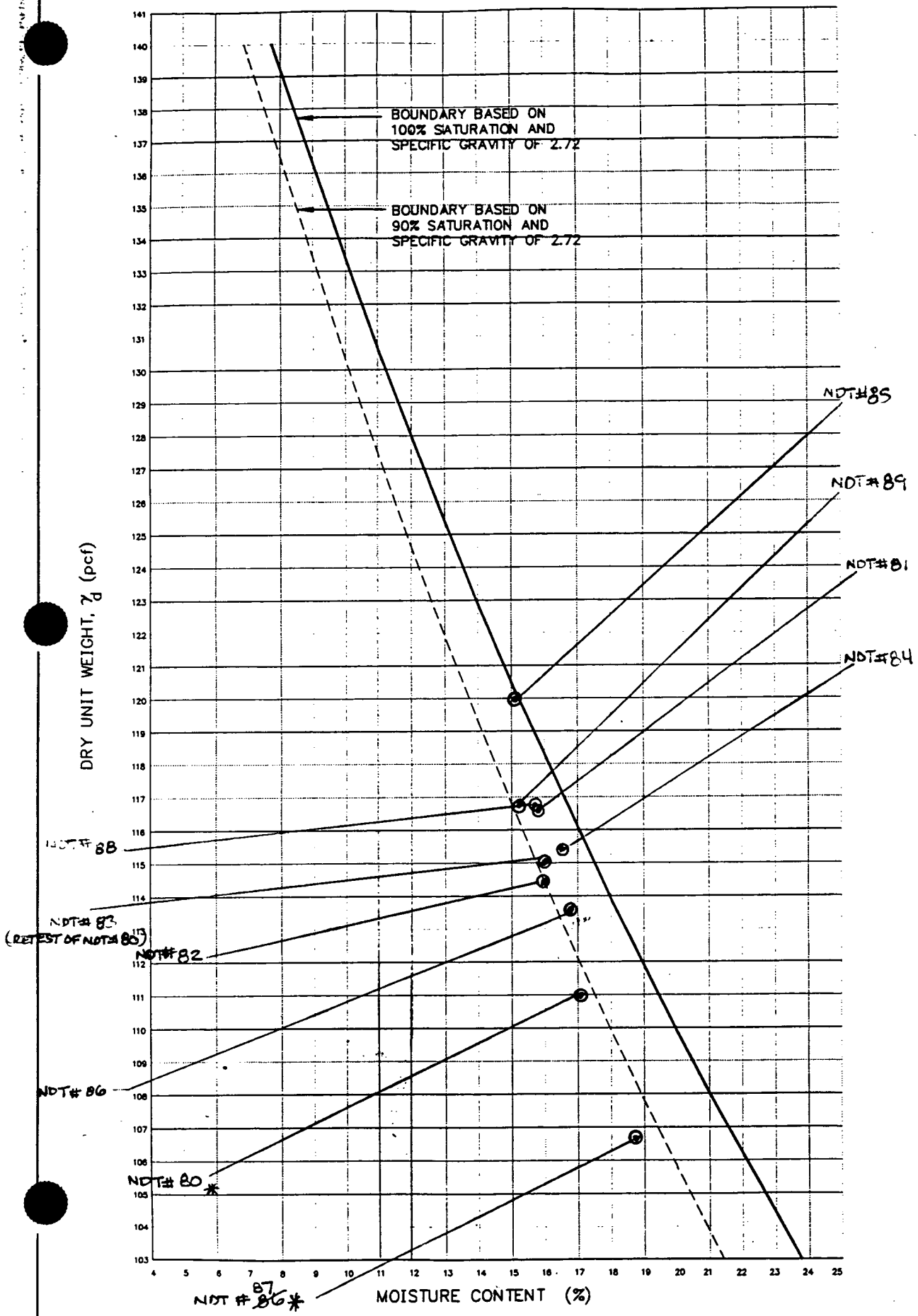
28 AUGUST 1997



BN 8/26/97 * = OUTSIDE OF WINDOW

SHEET 3 of 3

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 29 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: STOCKPILE No. 5 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8 in

% COMPACTION: ≥ 95% STD. PROCTOR MOISTURE RANGE: ±3% APZ * (ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418/ _____ COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE/RP

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-90	LANE 3	6 in / L2	**	16.7	112.8	16.1	135.2	116.5	103	P				
91	LANE 3	6 in / L2				16.4	134.3	115.4	102	P				
92	LANE 2 (SOUTH EDGE)	6 in / L2				14.7	134.0	116.8	104		F	95	P	
93	LANE 2 (SOUTH EDGE)	6 in / L2				14.4	139.6	122.0	108	P				
94	LANE 2	6 in / L2				15.7	133.1	115.0	102	P				
95	LANE 2	6 in / L2				15.3	135.5	117.5	104	P				
96	LANE 6	6 in / L2				16.3	135.0	116.1	103	P				
97	LANE 6	6 in / L2				16.1	132.8	114.4	101	P				
98	LANE 8	6 in / L2				16.6	132.4	113.6	101	P				
99	LANE 7	6 in / L2				16.0	133.7	115.3	102	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE

** STOCKPILE No. 5 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS.

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

000020

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 29 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8-in

% COMPACTION: ≥95% STD. PROCTOR MOISTURE RANGE: * +3% APZ ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C _____

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE/RP

TEST NO.	CELL I TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-100	LANE 7	6-in/L2	**	16.7	112.8	16.1	132.6	114.2	101	P				
101	LANE 7	6-in/L2				15.4	135.2	117.2	104	P				
102	LANE 6	6-in/L2				16.0	131.3	113.2	100		F	104	P	
103	LANE 1	6-in/L3				16.9	132.6	113.4	101	P				
104	LANE 6	6-in/L2				16.7	133.6	114.5	102	P				
105	LANE 5	6-in/L1				15.8	133.7	115.5	102	P				
106	LANE 3	6-in/L3				17.0	131.2	112.1	99	P				
107	LANE 3	6-in/L3				16.7	130.8	112.1	99		F	109	P	
108	LANE 3	6-in/L3				16.3	134.1	115.3	102	P				
109	LANE 3	6-in/L3				16.3	134.0	115.2	102	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE

** STOCKPILE NO. 5 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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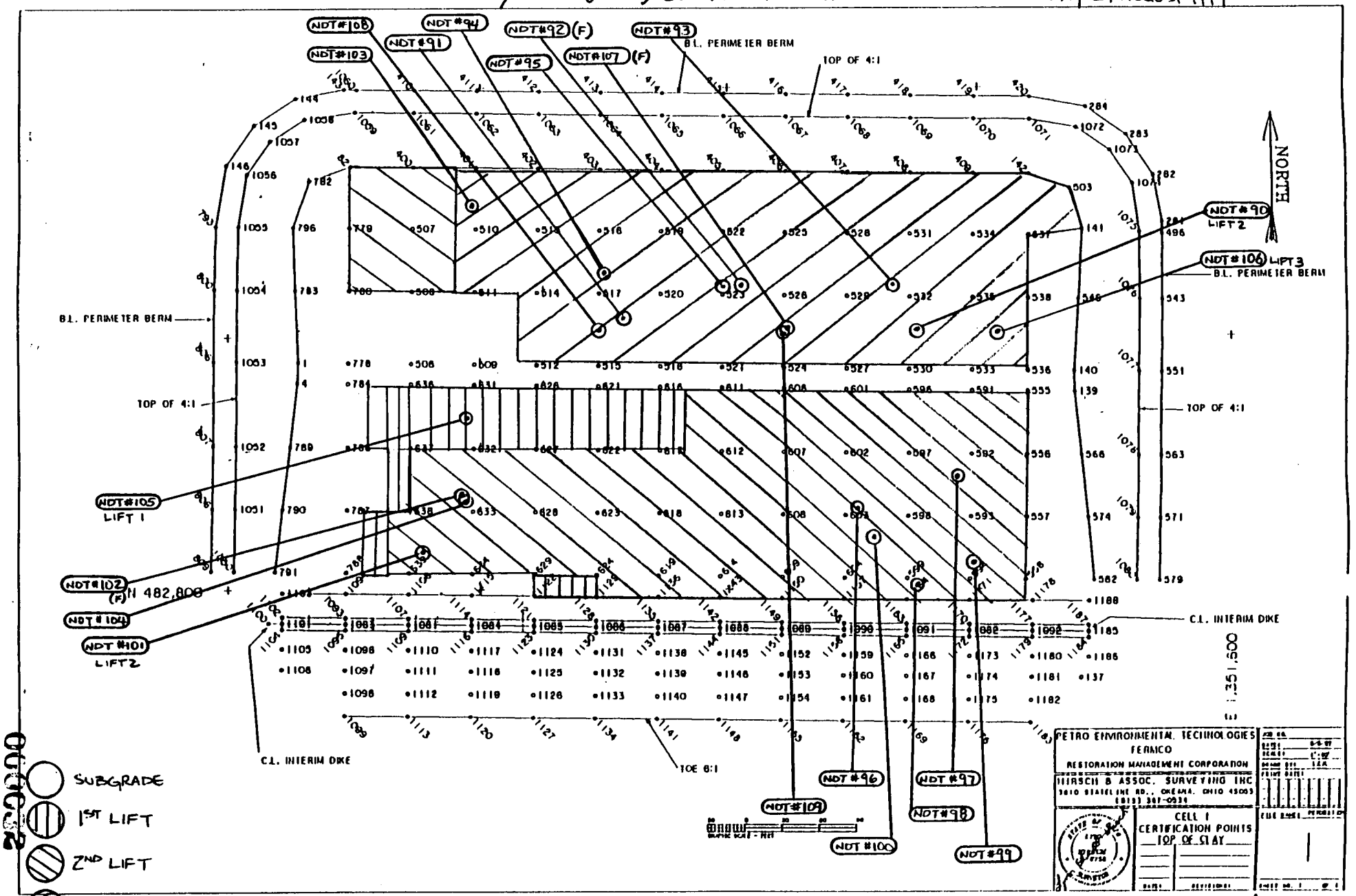
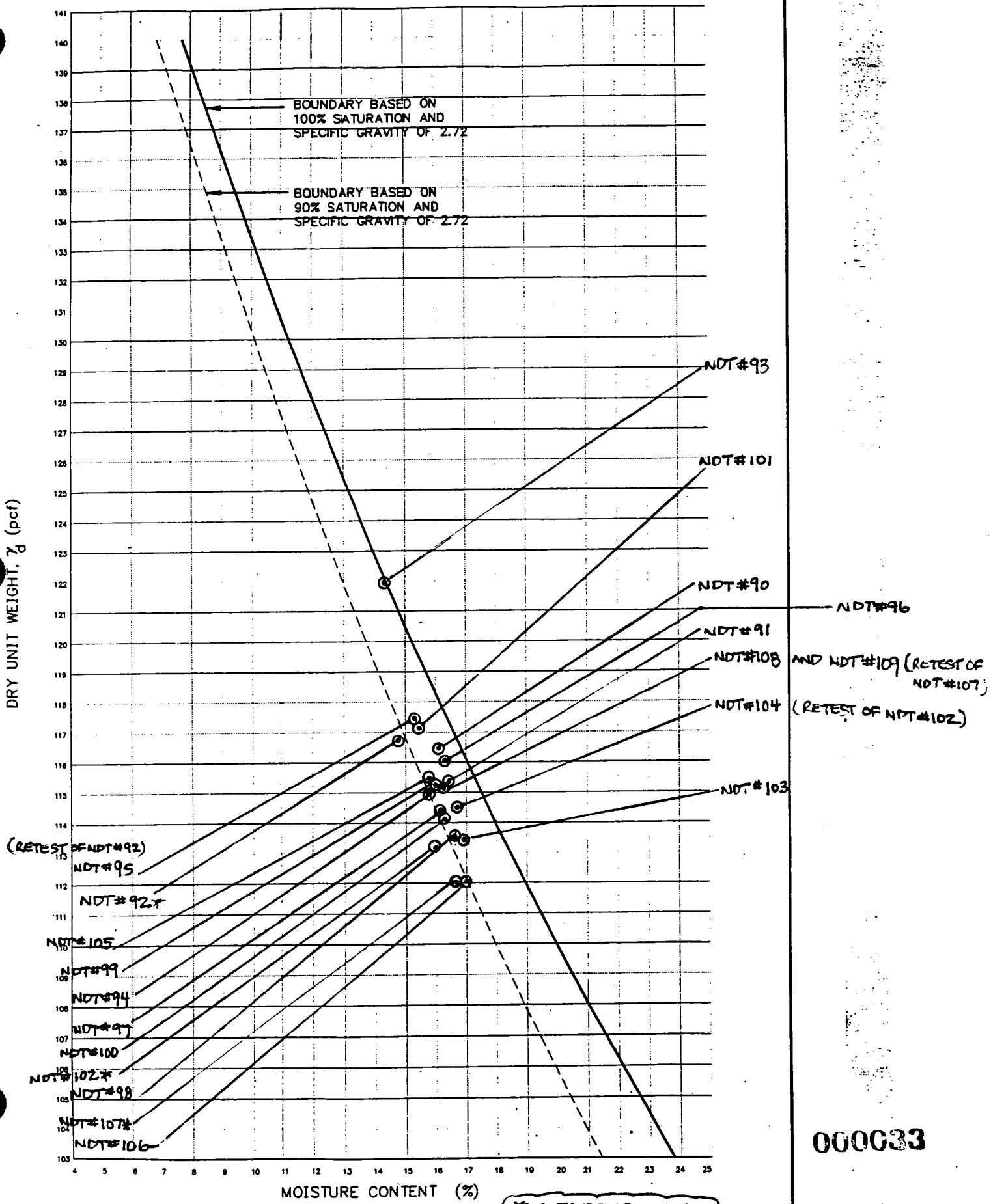
NUCLEAR DENSITY TEST (NDT) LOCATION MAP

FRIDAY 29 AUGUST 1997



SHEET 3 & 4

29 AUGUST 1997



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SHEET 4 of 4

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 30 day Aug month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: on site stockpile MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 6"
(CIRCLE ONE)

% COMPACTION: 95% MOISTURE RANGE: ±3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRECTION QA ID: RP

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
** 110	see drawing	6"/3	***	16.7	112.8	~~14.5~~ 16.4 HGM 9/2/97	134.6	~~117.5~~ 115.6 HGM 9/2/97	~~104.2~~ 102 HGM 9/2/97	P				

RW 10/6/97

COMMENTS: *** STOCKPILE No. 5 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STANDARD PROCTOR LAB RESULTS

* APZ - ACCEPTABLE PERMEABILITY ZONE ** SAND CONE PERFORMED

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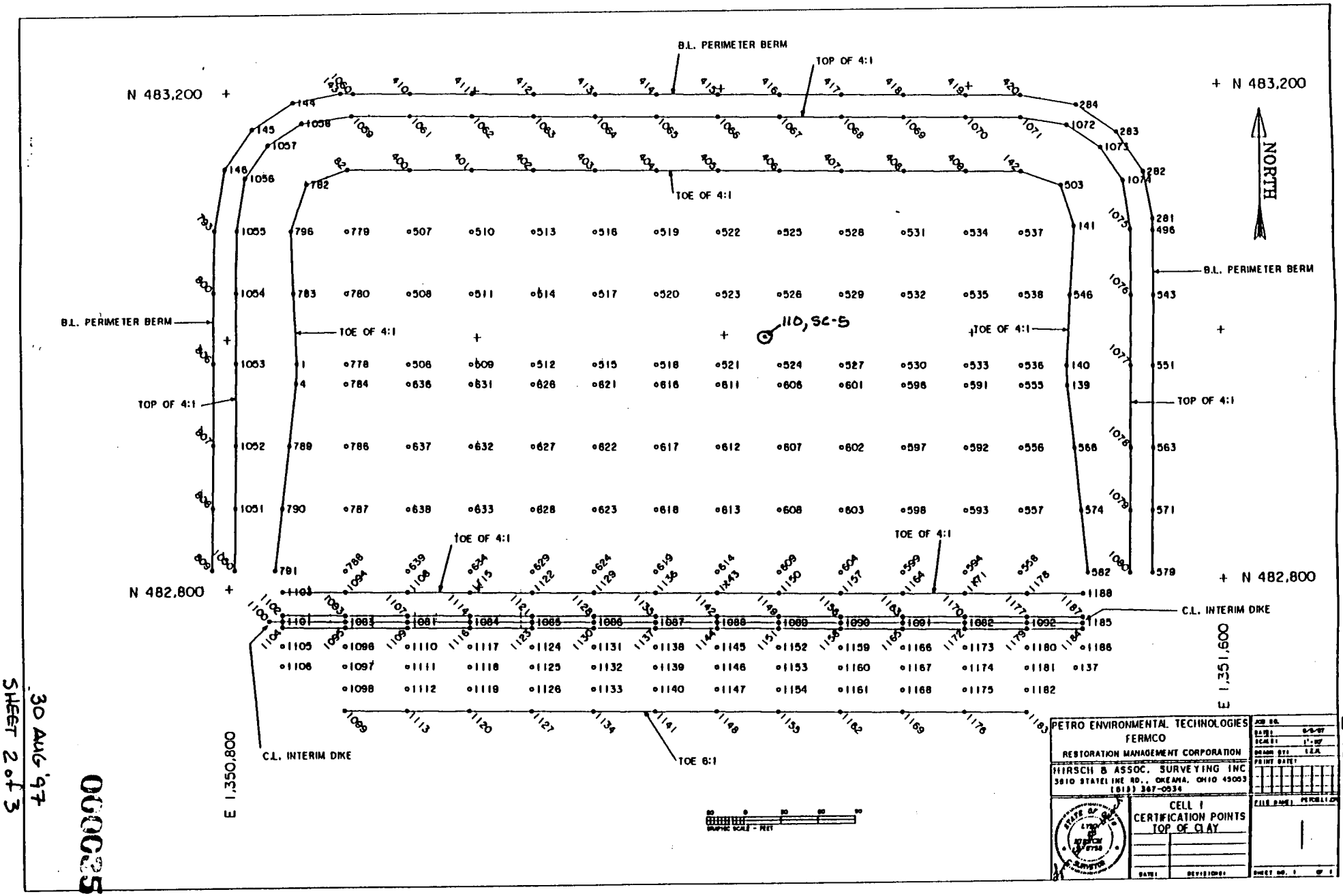

30 AUG '97
SHEET 2 of 3

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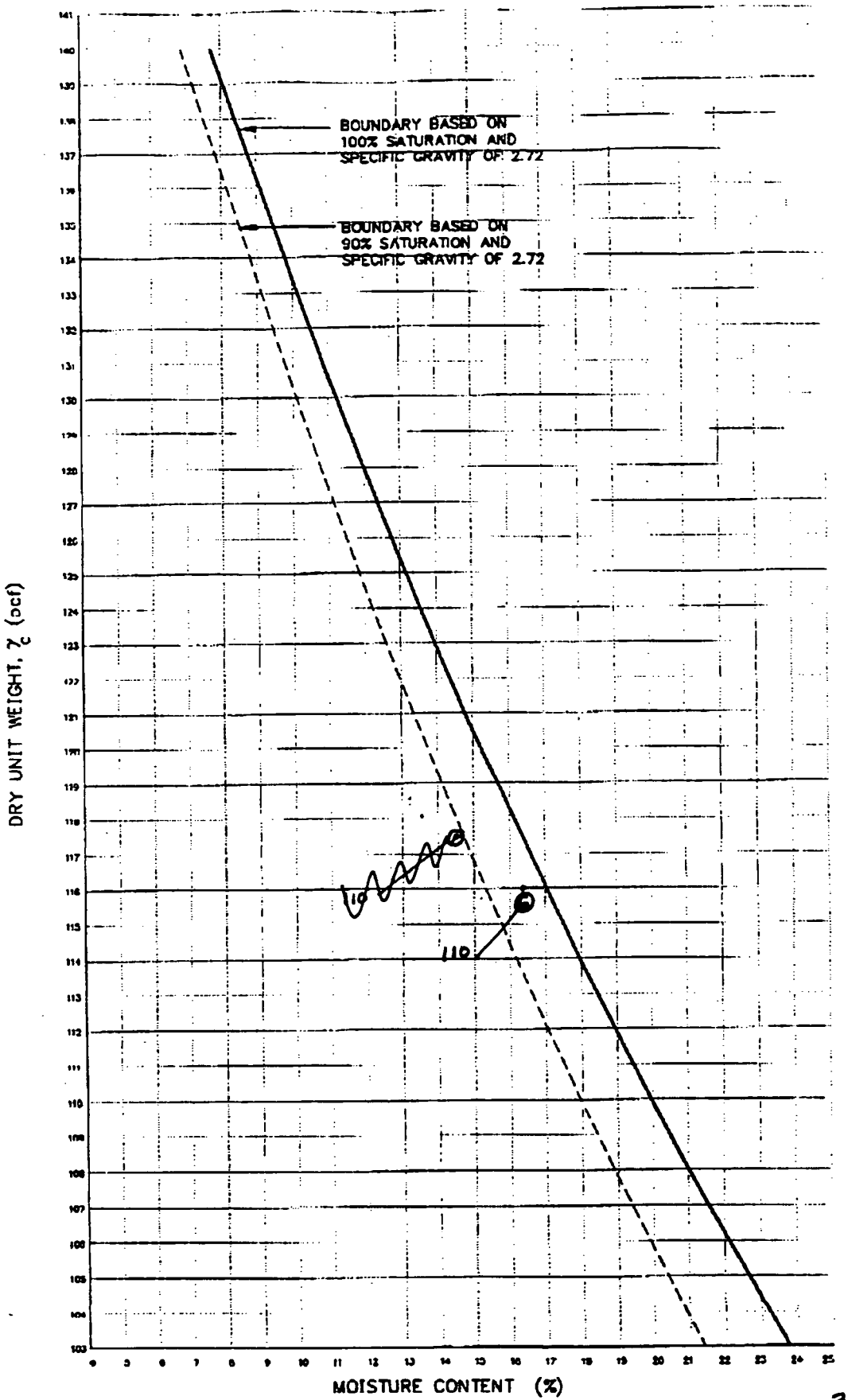

30 AUG. 1997
SHEET 3 of 3

TOTAL P.01

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Page ____ of ____

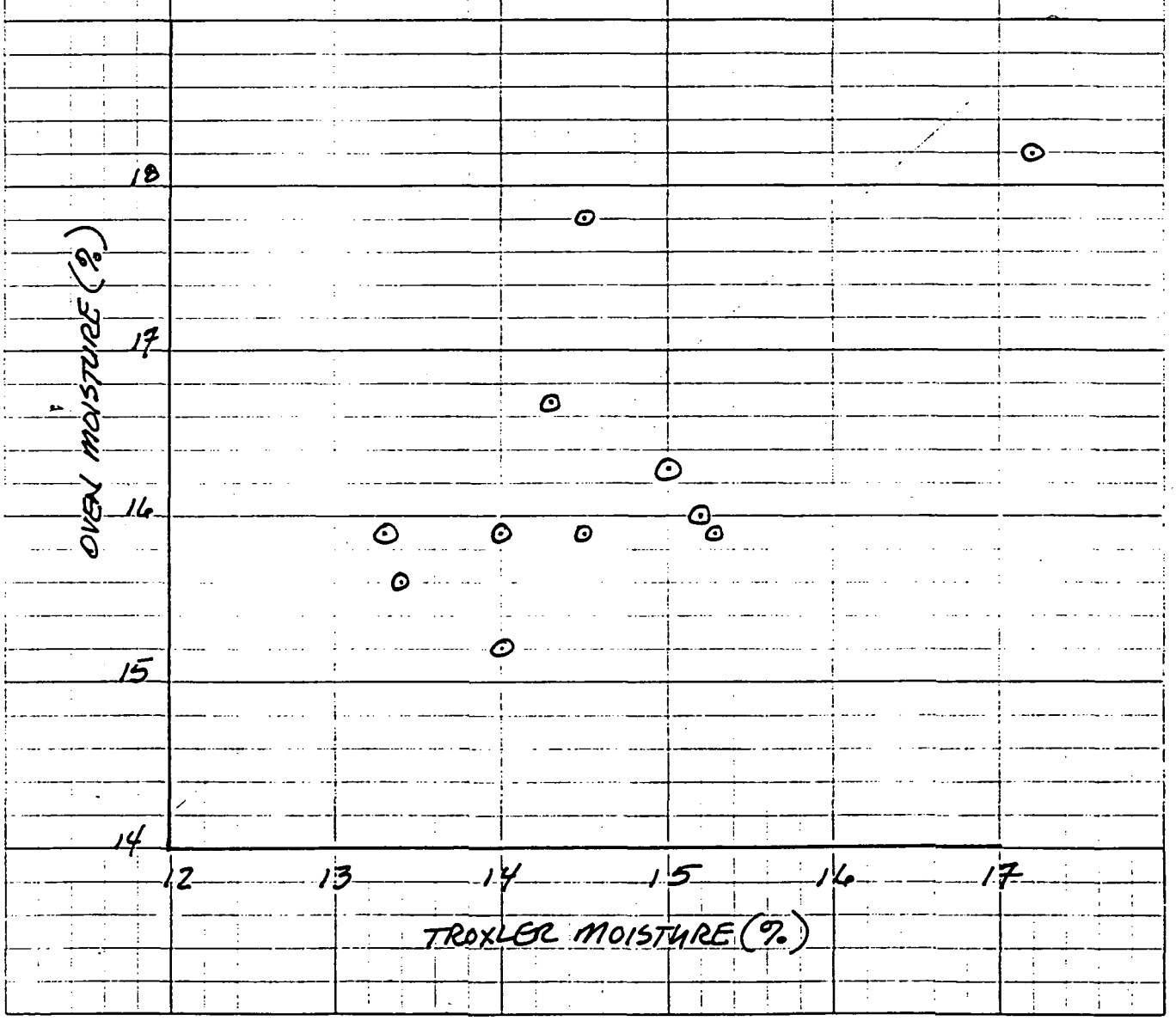
Written by: HEM Date: 97 / 08 / 30 (YY MM DD) Reviewed by: ____ Date: ___/___/___ (YY MM DD)

Client: ____ Project: ____ Project/Proposal No.: ____ Task No.: ____

SAMP. NO	OVEN MC	GAUGE MC	Δ MC
LP-142	16.0	15.2	0.8
143	16.3	15.0	1.3
144	15.9	13.3	2.6
145	16.7	14.3	2.4
146	17.8	14.5	3.3
~~149~~ 149	~~17.2~~ 15.9	15.3	0.6
~~148~~ 155	15.2	14.0	1.2
151	18.2	17.2	1.0
152	15.6	13.4	2.2
153	15.9	14.5	1.4
154	15.9	14.0	1.9

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR WEEK OF 01 SEPT. '97

(01 SEPT. — 07 SEPT. 1997)



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 02 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: STOCKPILE No. ~~6~~ 4 (Item 9/9/97) MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ~8IN

% COMPACTION: ≥95% STD. PROCTOR MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	LAB RESULTS OMC (%)	LAB RESULTS MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-111	LANE 2	6in/L3	**	14.6	115.9	15.2	136.1	118.1	102	P				
-112	LANE 8	6in/L3				14.3	129.9	113.6	98		F	NDT-132	P	
-113	LANE 8	6in/L3				15.3	134.5	116.6	101	P		(MOISTURE)		
-114	LANE 8	6in/L3				16.1	136.1	117.2	101	P				
-115	LANE 7	6in/L3				14.7	134.0	116.8	101		F	NDT-120	P	
-116	LANE 7	6in/L3				15.2	135.0	117.2	101	P	~~F~~	(BN) 9/2/97 (MOISTURE)		
-117	LANE 7	6in/L3				14.6	132.9	116.0	100		F	NDT-119	P	
-118	LANE 7	6in/L3				15.2	135.9	118.0	102	P				
-119	LANE 7	6in/L3				15.2	135.2	~~119.6~~ 117.4	(BN) 9/2/97 101	P				
-120	LANE 7	6in/L3				14.9	135.3	~~120.0~~ 117.8	(BN) 9/2/97 102	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE

** STOCKPILE NO.4 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STANDARD PROCTOR LAB RESULTS.

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

00096 1 of 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

DATE: 02 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: STOCKPILE No. 4 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8-in

% COMPACTION: ≥95 % STD. PROCTOR MOISTURE RANGE: +3% APZ*** ASTM D 698: (A) B C (CIRCLE ONE) / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	FIELD TEST RESULTS: PASS	FIELD TEST RESULTS: FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-121	LANE 6	6in/L3	****	14.6	115.9	14.6	134.8	117.6	101		F	NDT-125	P	
-122	LANE 5	6in/L2				15.7	130.4	112.7	97		F	NDT-126		F
-123	LANE 5	6in/L3				15.6	132.3	114.4	99		F	NDT-127	P	
-124	LANE 6	6in/L3				16.3	131.1	112.7	97		F	NDT-129	P	
-125	LANE 6	6in/L3				16.2	135.5	116.6	101	P				
-126	LANE 5	6in/L2				14.0	135.8	119.1	103		F	NDT-128	P	
-127*	LANE 5**	6in/L3				16.1	133.2	114.7	99	P				
-128	LANE 5	6in/L2				16.1	132.9	114.5	99	P				
-129	LANE 6	6in/L3				15.8	133.8	115.5	100	P				
-130*	LANE 5**	6in/L3				16.6	135.9	116.6	101	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: KEY: * : NDT PERFORMED/CONDUCTED UTILIZING THE TROXLER 3440 FIELD NUCLEAR MOISTURE DENSITY GAUGE (SERIAL NO. 24487); AND
** : A SANDCONE (NDT VERIFICATION TESTING) TEST PERFORMED AT NDT LOCATION.

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*** APZ → ACCEPTABLE PERMEABILITY ZONE

**** STOCKPILE No. 4 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STANDARD PROCTOR LAB RESULTS

000029

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 02 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: STOCKPILE 40.4 MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8 in
(CIRCLE ONE)

% COMPACTION: ≥95% STD PROCTOR MOISTURE RANGE: +3% APZ *** ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/RL

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
NDT-131	LANE 6 **	6-in/L3	****	14.6	115.9	14.7	130.2	113.5	98		F	NDT-133		F
↓ -132	LANE 8	6in/L3	↓	↓	↓	14.7	137.8	120.1	104	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: ** SANDCONE (NDT VERIFICATION) TEST PERFORMED AT NDT TEST LOCATION
*** APZ → ACCEPTABLE PERMEABILITY ZONE
**** STOCKPILE No.4 CLAYLINER MATERIAL → AVERAGE VALUE USED FOR STANDARD PROCTOR LAB RESULTS.

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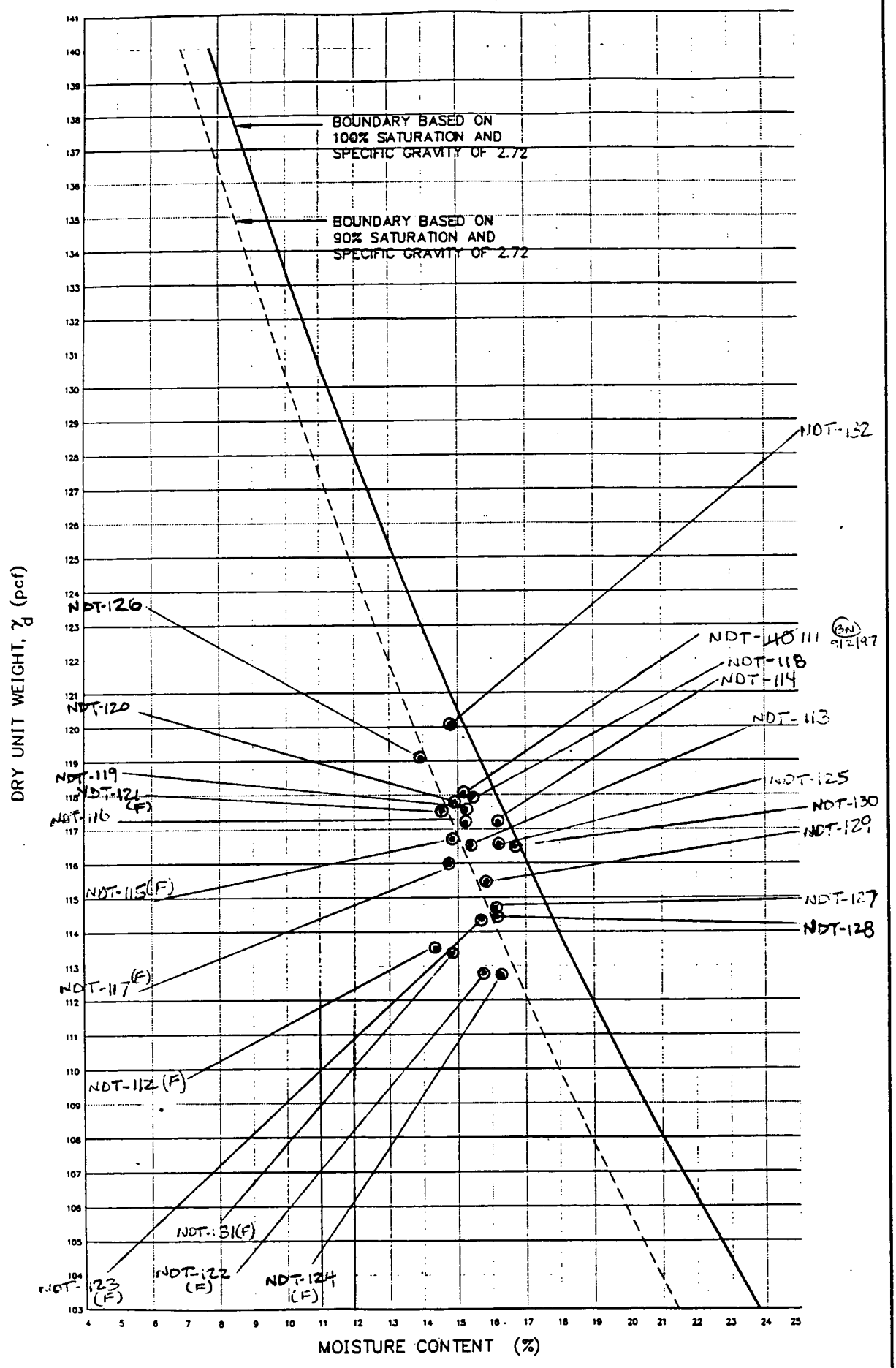

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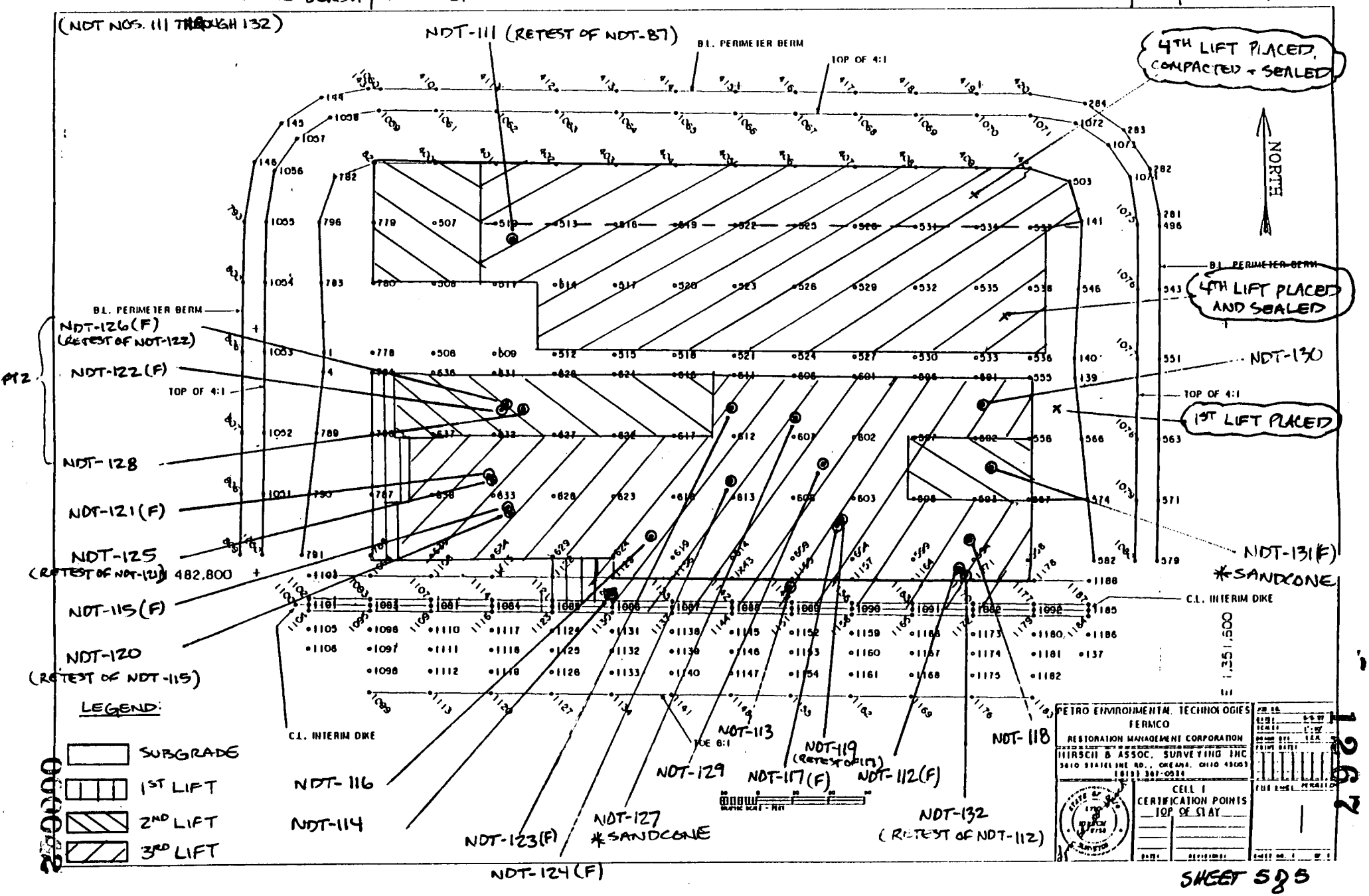
• FIELD NUCLEAR MOISTURE DENSITY TESTING

TUESDAY SEPT 02 1997



SHEET 5 of 5

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 03 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: STOCKPILE No. 4 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8in

% COMPACTION: >95% STD. PROCTOR *APZ MOISTURE RANGE: +3% *APZ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	LAB RESULTS OMC (%)	LAB RESULTS MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	FIELD TEST RESULTS WET UNIT WT (PCF)	FIELD TEST RESULTS DRY UNIT WT (PCF)	FIELD TEST RESULTS PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-133	LANE 6	6in/L3	**	14.6	115.9	14.6	134.4	117.3	101		F	NDT-134	P	
-134	LANE 6	6in/L3				14.8	138.0	120.2	104	P				
-135	LANE 3	6in/L4				15.8	136.0	117.4	101	P				
-136	LANE 2	6in/L4				16.0	134.1	115.6	100	P				
-137	LANE 3	6in/L4				15.2	133.2	115.6	100		F	NDT-139	P	
-138	LANE 3	6in/L4				15.1	134.6	116.9	101	P				
-139	LANE 3	6in/L4				15.9	133.5	115.2	99	P				
-140	LANE 2	6in/L4				15.1	134.6	116.9	101	P				
-141	LANE 1	6in/L4				16.3	134.6	115.7	100	P				
-142	LANE 1	6in/L4				15.3	133.7	116.0	100	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: NOTE 1). NDT-133 IS A RETEST FOR FAILING NDT-131 FROM PREVIOUS DATE.

*APZ → ACCEPTABLE PERMEABILITY ZONE

** STOCKPILE No. 6 CLAY LINER MATERIAL — AVG. VALUE USED FOR STANDARD PROCTOR LAB RESULTS

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

DATE: 03 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: STOCKPILE NO. 4 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8 IN

% COMPACTION: ≥95% STD. PROCTOR MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE/SQ

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-143	LANE 2	6in/L4	**	14.6	115.9	15.4	134.5	116.6	101	P				
-144	LANE 2	6in/L4				15.0	136.7	118.9	103	P				
-145	LANE 1	6in/L4				16.8	131.1	112.2	97		F	149	P	
-146	LANE 6	6in/L3				16.2	134.8	116.0	100	P				
-147	LANE 6	6in/L3				16.1	132.3	114.0	98	P				
-148	LANE 6	6in/L3				15.5	134.2	116.2	100	P				
-149	LANE 1	6in/L4				16.1	135.8	117.0	101	P				
-150	LANE 1	6in/L3				14.7	136.0	118.6	102	P				
-151	LANE 5	6in/L				17.5	129.7	110.4	95		F	152	P	
-152	LANE 5	6in/L				18.1	133.2	112.8	97	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: NOTES: 1). NDT NUS 146, 147 AND 148 PERFORMED OVER RE-SCARIFIED AND COMPACTED AREA - LANE 6 AFTER LIFT 2/LIFT 3 SEPARATION (IE, DEFICIENT/INSUFFICIENT MATERIAL BONDING) WAS OBSERVED

* APZ → ACCEPTABLE PERMEABILITY ZONE ** STOCKPILE NO. 4 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 03 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: STOCKPILE No. 4 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8 IN

% COMPACTION: ≥95 % STD PROCTOR MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) (A) B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BAJ/BE

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-153	LANE 7	6-in/L4	**	14.6	115.9	15.7	134.1	115.9	100	P				
-154	LANE 7	6-in/L4	↓	↓	↓	16.6	131.2	112.5	97		F	NDT-155	P	
-155	LANE 7	6-in/L4	↓	↓	↓	15.5	132.8	115.0	99	P				
-156	LANE 7	6-in/L3	↓	↓	↓	16.3	133.6	114.9	99	P				
-157	LANE 7	6-in/L4	↓	↓	↓	15.9	130.8	112.9	97		F	NDT-158	P	

P 10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE

** STOCKPILE No. 4 CLAY LINER MATERIAL → AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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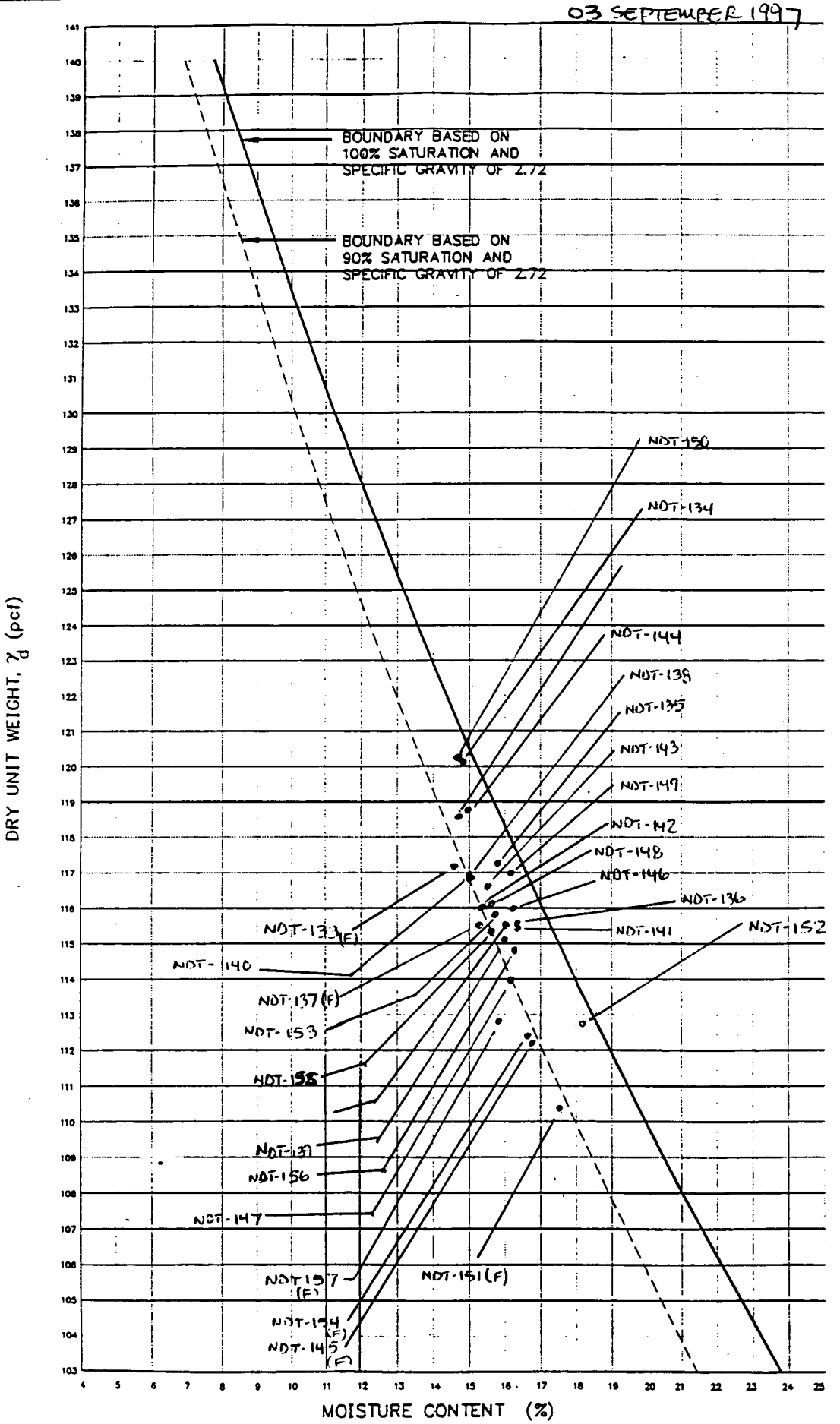
03 SEPTEMBER 1997



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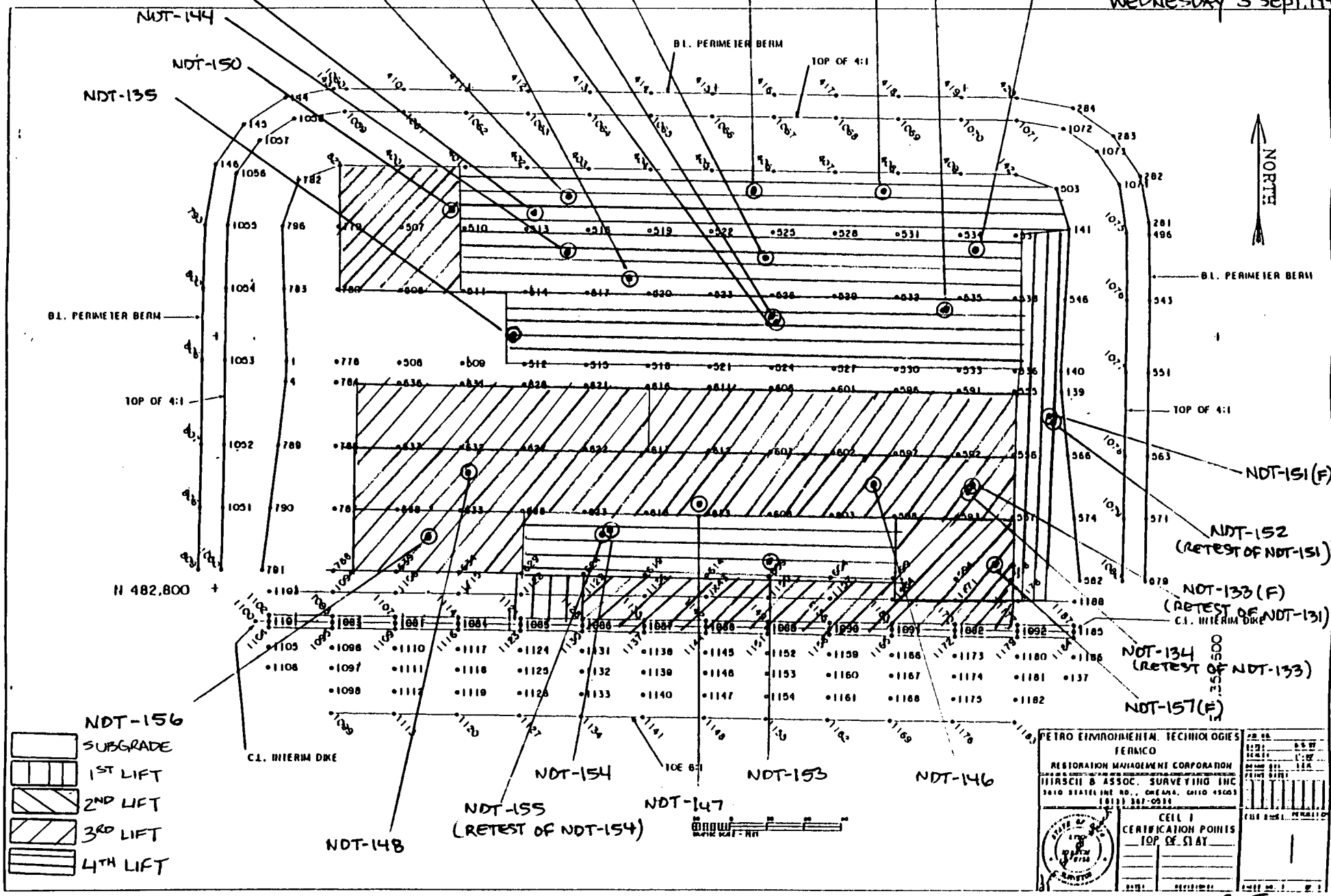

⊙ FIELD NUCLEAR MOISTURE / DENSITY TEST LOCATION

SHEET 5 of 5

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 04 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE NOS. 3 AND 6 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8 IN

% COMPACTION: ≥95% STD. PROCTOR MOISTURE RANGE: +3% APZ ASTM D 698: (CIRCLE ONE) (A) B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN

TEST NO.	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	* LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-158	LANE 7	6 in / L4	**	15.9	113.7	16.0	136.9	118.0	103.8	P			1	
-159	LANE 2	6 in / L5				17.6	130.9	111.3	97.9	P				
-160	LANE 2	6 in / L5				15.7	133.8	115.6	101.7	P		(MOISTURE)		
-161	LANE 2	6 in / L5				16.7	134.4	115.2	101.3	P				
-162	LANE 2	6 in / L5				15.8	133.7	115.5	101.6	P				
-163	LANE 3	6 in / L5				17.0	132.2	113.0	99.4	P				
-164	LANE 3	6 in / L5				16.1	133.7	115.2	101.3	P				
-165	LANE 3	6 in / L5				16.4	128.8	110.7	97.4		F	NDT-166		F
-166	LANE 3	6 in / L5				16.0	132.4	114.1	100.4		F	NDT-167	P	
-167	LANE 3	6 in / L5				16.3	133.4	114.7	100.9	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: NOTE: NDT TEST NO. 158 IS THE RETEST OF NDT TEST NO. 157 (FAILING OUTSTANDING TEST PERFORMED 7/3/97)

** SCREENED MATERIAL FROM STOCKPILE NOS. 3 AND 6 (COMBINATION MATERIAL), AVERAGE STOCKPILE VALUE FROM MORE CONSERVATIVE STOCKPILE (NO. 6) WAS USED FOR MAX. DRY UNIT WEIGHT AND CORRESPONDING MATERIAL MOISTURE CONTENT (STOCKPILE NOS. 3 & 6 CLAY LINER MATERIAL AVERAGE VALUE USED FOR STD. PROCTOR LAB. RESULTS).

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 04 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE NOS. 3 AND 6 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE)/COMPACTED): ~8-in

% COMPACTION: ≥95% STD. PROCTOR MOISTURE RANGE: +3% APZ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE

TEST NO.	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	* LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-168	LANE 1	6in / L5	**	15.9	113.7	16.4	134.3	115.4	101.5	P				
-169	LANE 1	6in / L5				15.0	135.4	117.7	103.5	P				
-170	LANE 1	6in / L5				16.8	131.1	112.2	98.7		F	NDT-172 (moisture)	P	
-171	LANE 1	6in / L5				16.2	135.2	116.4	102.4	P				
-172	LANE 1	6in / L5				15.8	136.5	117.9	103.7	P				
-173	LANE 6	6in / L4				16.1	130.6	112.5	98.9		F	NDT-177	P	
-174	LANE 6	6in / L4				16.2	132.3	113.9	100.2	P				
-175	LANE 6	6in / L4				16.8	132.3	113.3	99.6	P				
-176	LANE 6	6in / L4				17.4	132.8	113.1	99.5	P				
-177	LANE 6	6in / L4				15.5	136.1	117.8	103.6	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: ** SCREENED MATERIAL FROM STOCKPILE NOS. 3 AND 6 (BLENDED/COMBINATION MATERIAL); AVERAGE VALUE FROM MORE CONSERVATIVE STOCKPILE (NO. 6) WAS USED FOR MAX. DRY UNIT WEIGHT AND CORRESPONDING MOISTURE CONTENT. (IE, STOCKPILE NOS. 3&6 CLAY LINER MATERIAL AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS).

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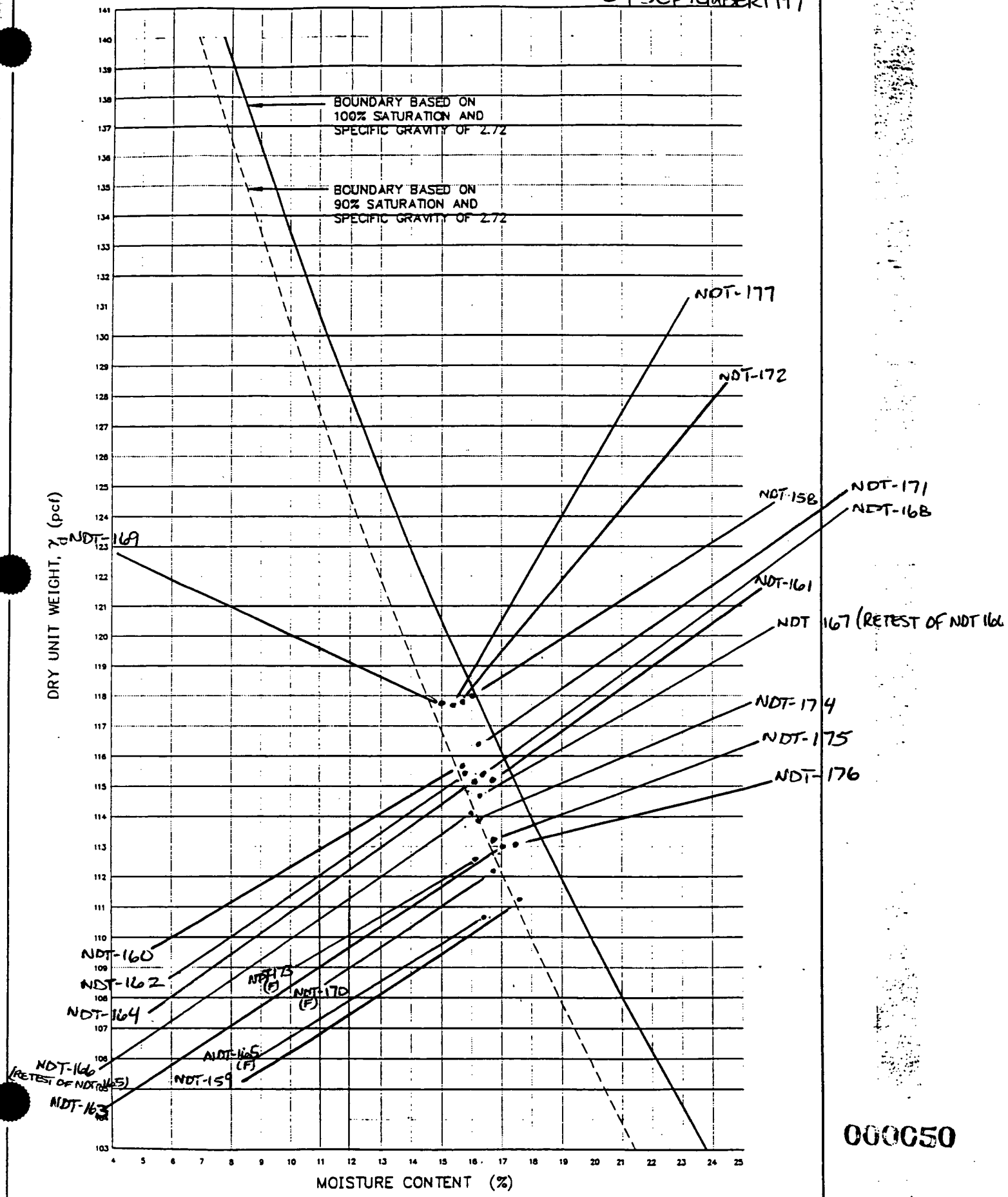
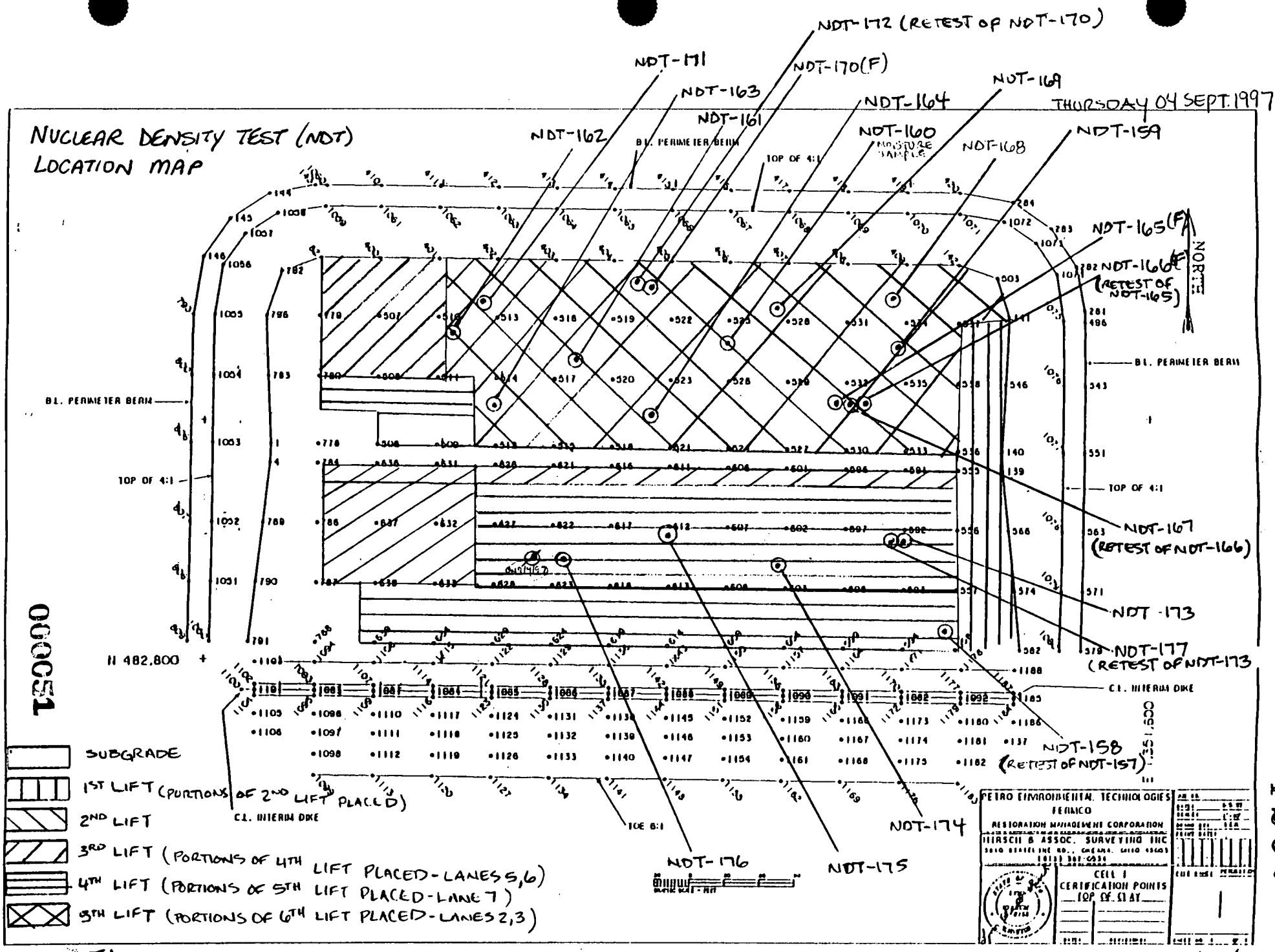
04 SEPTEMBER 1997



SHEET 3 of 4

NUCLEAR DENSITY TEST (NDT) LOCATION MAP

THURSDAY 04 SEPT. 1997



NOTE: PORTIONS OF LANE 4 1ST LIFT PLACEMENT OVERLYING SUBGRADE PERFORMED (ON-GOING).

SHEET 4 of 4

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE NOS. 3 AND 6 MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≤8 in

% COMPACTION: ≥95% STD. PROCTOR MOISTURE RANGE: +3% APZ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-178	LANE 7 *	6in / LS	**	15.9	113.7	16.1	135.1	116.4	102.4	P		SANDCONE		
-179	LANE 7	6in / LS				16.1	133.1	114.6	100.8	P				
-180	LANE 7	6in / LS				16.9	132.5	113.3	99.6	P				
-181	LANE 7	6in / LS				16.0	134.5	115.9	101.9	P				
-182	LANE 6	6in / (L3)4				16.5	131.9	113.2	99.6	P		MOISTURE		
-183	LANE 4	6in / L1				16.8	132.6	113.5	99.8	P				
-184	LANE 4	6in / L1				16.0	133.9	115.4	101.5	P				
-185	LANE 4	6in / L1				16.8	132.4	113.4	99.7	P				
-186	LANE 8	6in / LS				16.1	133.0	114.6	100.8	P				
-187	LANE 8	6in / LS				15.6	134.7	116.5	102.5	P		MOISTURE		

COMMENTS: * SAND CONE PERFORMED
** STOCKPILE NO. 6 CLAY LINER MATERIAL AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS; MATERIAL PLACEMENT FROM A COMBINATION OF STOCKPILE NOS. 3 AND 6 (SCREENED) SOURCES.

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1267

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE NOS. 3 AND 6 MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≤8 in

% COMPACTION: ≥95% STD. PROCTOR MOISTURE RANGE: +3% APZ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	LAB RESULTS OMC (%)	LAB RESULTS MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	FIELD TEST RESULTS WET UNIT WT (PCF)	FIELD TEST RESULTS DRY UNIT WT (PCF)	FIELD TEST RESULTS PERCENT COMPACT (%)	FIELD TEST RESULTS PASS	FIELD TEST RESULTS FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-188	LANE 4 @ TOE OF EAST BERM	6 in / L2	**	15.9	113.7	16.3	134.5	115.6	101.7	P				
NDT-189	(SEE NEXT SHEET*)													

10/6/97

COMMENTS: ** STOCKPILE NO. 6 CLAY LINER MATERIAL AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS; MATERIAL PLACEMENT FROM A COMBINATION OF STOCKPILE NOS. 3 AND 6 (SCREENED) SOURCES.

* CONTRACTOR CHANGED STOCKPILES TO NOS. 4 AND 6 WITHOUT NOTIFYING CQC; NOTED AT ~1500 HOURS, CONSERVATIVE ADJUSTMENT THUS TO BE INTRODUCED/IMPLEMENTED AT 1255 HOURS)

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1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE NOS. 4 AND 6 * MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≤8 in

% COMPACTION: ≥95% STD. PROCTOR MOISTURE RANGE: +3 % APZ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE

TEST NO.	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	LAB RESULTS OMC (%)	LAB RESULTS MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	FIELD TEST RESULTS WET UNIT WT (PCF)	FIELD TEST RESULTS DRY UNIT WT (PCF)	FIELD TEST RESULTS PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-189	LANE 1	6 in / L6	**	14.6	115.9	15.2	131.1	113.8	98.2		F	NDT-192	P	
-190	LANE 1	6 in / L6				16.7	134.1	114.9	99.1	P				
-191	LANE 1	6 in / L6				15.2	133.8	116.1	100.2		F	NDT-193	P	
-192	LANE 1	6 in / L6				15.9	134.1	115.7	99.8	P				
-193	LANE 1	6 in / L6				15.8	135.2	116.8	100.8	P				
-194	LANE 2	6 in / L6				16.5	133.0	114.2	98.5	P				
-195	LANE 2	6 in / L6				16.1	134.8	116.1	100.2	P				
-196	LANE 2	6 in / L6				17.8	131.9	112.0	96.6		F	NDT-222	P	
-197	LANE 3	6 in / L6				17.0	132.2	113.0	97.5	P				
-198	LANE 3	6 in / L6				16.1	133.2	114.7	99.0	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: * CONTRACTOR CHANGED STOCKPILES THIS DATE TO NOS. 4 AND 6 WITHOUT NOTIFYING CQC PERSONNEL (NOTED AT ~1500 HOURS); THUS A CONSERVATIVE ADJUSTMENT WAS INTRODUCED AND IMPLEMENTED (INITIATED AT 1230 HOURS).

** STOCKPILE NO. 4 CLAY LINER MATERIAL AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS, MATERIAL PLACEMENT FROM COMBINATION OF STOCKPILE NOS. 3, 4 AND 6.

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE NOS. 4 AND 6 * MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): 8-in

% COMPACTION: 95% STD PROCTOR MOISTURE RANGE: +3% APZ ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-199	LANE 3	6in/L6	**	14.6	115.9	15.4	132.5	114.8	99.1		F	NDT-210	P	

10/6/97

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: * CONTRACTOR CHANGED STOCKPILES THIS DATE TO NOS. 4 AND 6 WITHOUT NOTIFYING CQC PERSONNEL; ADJUSTMENT AS NOTED.

** STOCKPILE NO. 4 CLAY LINER MATERIAL AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS; MATERIAL PLACEMENT FROM A COMBINATION OF STOCKPILE NOS. 3, 4 AND 6 (POTENTIALLY) - SCREENED MATERIAL

©GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: HEM SHEET NO. 4 OF 6

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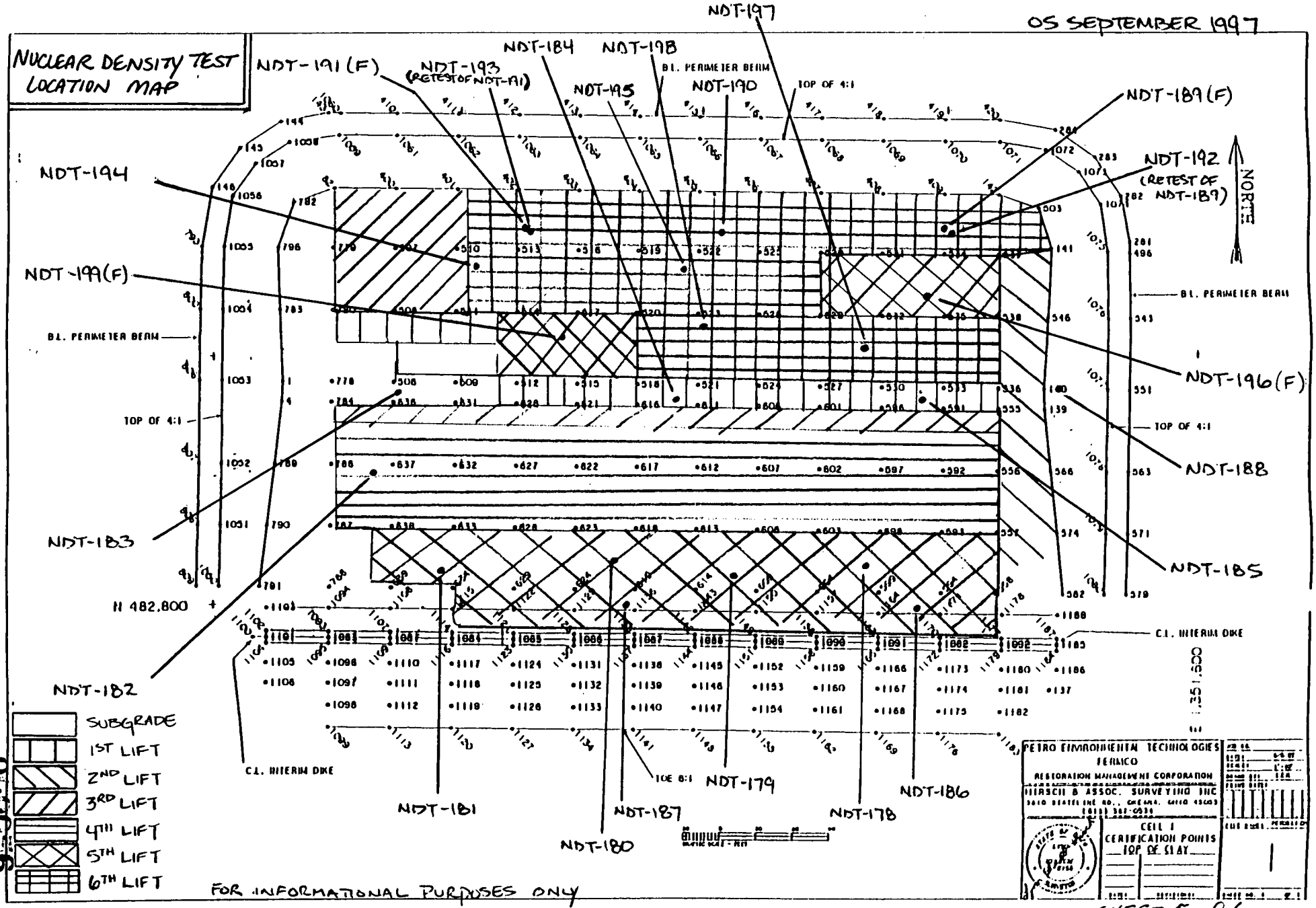
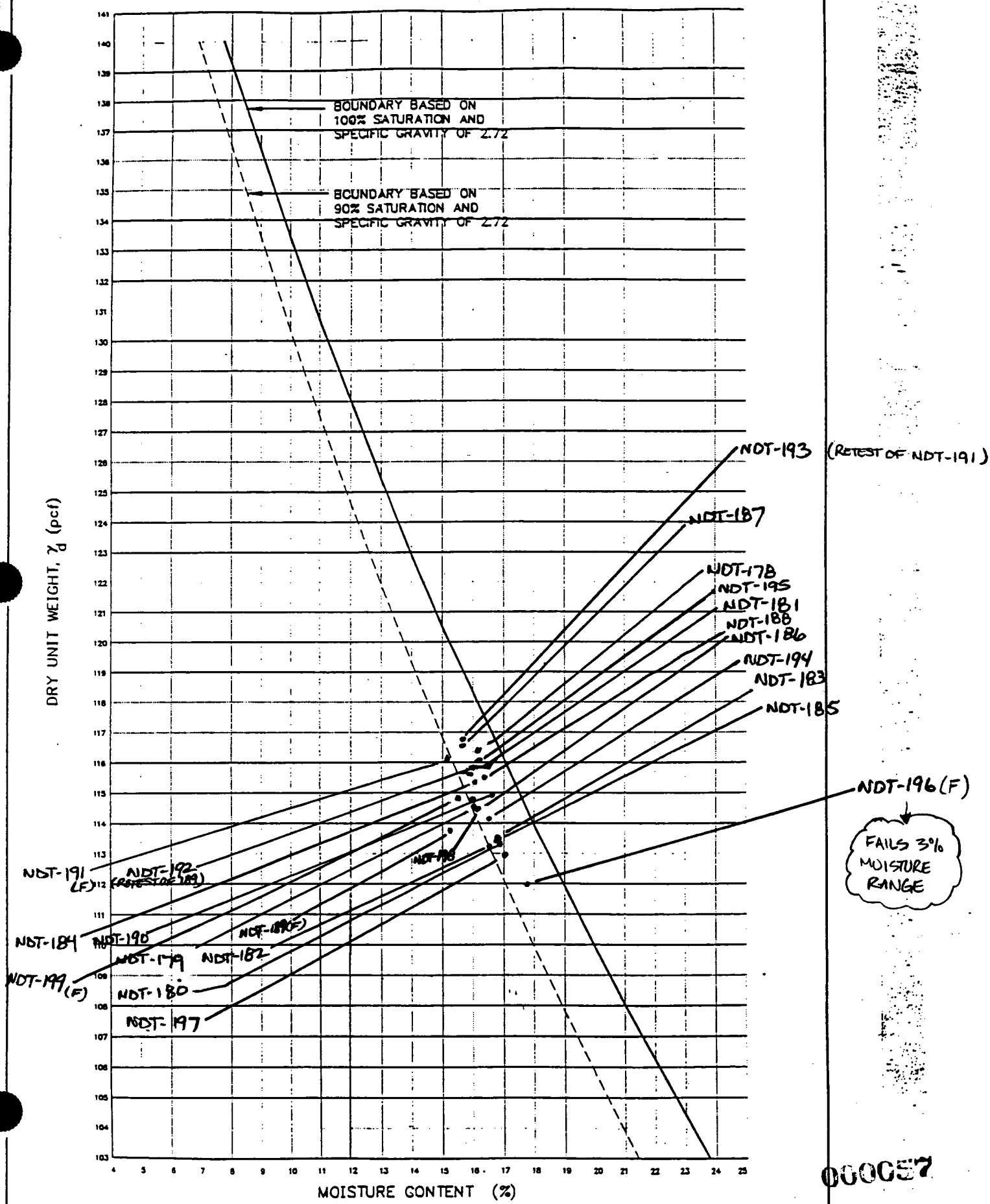
05 SEPTEMBER 1997

NUCLEAR DENSITY TEST LOCATION MAP



SHEET 5 of 6

5 SEPT 1997



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SHEET 6 of 6

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 06 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE NOS. 4 AND 6 MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≤8 in

% COMPACTION: ≥95% STD. PROCTOR * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/BE

TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-200	LANE 8	6 in / L6	**	14.6	115.9	16.3	133.4	114.7	99.0	P				
-201	LANE 7	6 in / L6				16.4	133.1	114.3	98.6	P				
-202	LANE 7	6 in / L6				16.0	131.2	113.1	97.6		F	NDT-208	P	
-203	LANE 8	6 in / L6				16.1	131.0	112.8	97.3		F	NDT-207	P	
-204	LANE 7	6 in / L6				15.8	134.3	116.0	100.1	P				
-205	LANE 7	6 in / L6				15.9	135.5	116.9	100.9	P				
-206	LANE 8	6 in / L6				15.0	133.4	116.0	100.1		F	NDT-209	P	
-207	LANE 8	6 in / L6				15.2	136.4	118.4	102.2	P				
-208	LANE 7	6 in / L6				17.6	131.6	111.9	96.5	P				
-209	LANE 8	6 in / L6				15.6	135.3	117.0	100.9	P				

144

COMMENTS: ** STOCKPILE NO. 4 CLAY LINER MATERIAL AVERAGE VALUES USED FOR STD PROCTOR LAB RESULTS.

* APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 06 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE NOS. 4 AND 6 MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≤8 in

% COMPACTION: ≥95% STD. PROCTOR • APZ MOISTURE RANGE: ± 3% APZ • ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORROLATION QA ID: BN/AE

	TEST NO.	CELL I TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
*	NDT-210	LANE 3	6in / L6	**	14.6	115.9	16.2	135.0	116.2	100.3	P				
	-211	LANE 1	6in / L4				15.5	136.2	117.9	101.7	P				
	-212	LANE 6	6in / L5				14.8	133.5	116.3	100.3		F	NDT-216	P	
	-213	LANE 6	6in / L5				15.0	125.9	109.5	94.5		F	NDT-217	P	
	-214	LANE 6	6in / L5				16.4	134.9	115.9	100.0	P				
	-215	LANE 6	6in / L5				15.9	134.9	116.4	100.4	P				
	-216	LANE 6	6in / L5				14.9	135.3	117.8	101.6	P				
	-217	LANE 6	6in / L5				15.3	135.0	117.1	101.0	P				
	-218	LANE 4	6in / L3				15.9	132.8	114.6	98.9	P				
	-219	LANE 4	6in / L2				16.5	133.5	114.6	98.9	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: ** STOCKPILE NO. 4 CLAY LINER MATERIAL AVERAGE VALUES USED FOR STD. PROCTOR LAB RESULTS.

* NDT-210 IS THE RETEST OF NDT-199

• APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 06 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE NOS. 4 AND 6 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ≤8-in

% COMPACTION: 95% STD. PROCTOR MOISTURE RANGE: +3% APZ • ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORROLATION QA ID: BN/BE

TEST NO.	TEST LOCATION (SEE ATTACHED SKETCH)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-220	LANE 4	6-in / L2	**	14.6	115.9	15.9	132.9	114.7	99.0	P				
-221	LANE 4	6-in / L2				15.3	135.5	117.5	101.4	P				
* -222	LANE 2	6-in / L6				16.1	134.9	116.2	100.3	P				
-223	LANE 8	6-in / L3				14.6	132.6	115.7	99.8		F	NDT-~~225~~ 227	(B) 6-in P	
-224	LANE 2	6-in / L5				16.0	132.6	114.3	98.6		F	NDT-225		F
-225	LANE 2	6-in / L5				15.1	131.8	114.5	98.8		F	NDT-226	P	
-226	LANE 2	6-in / L5				16.5	131.6	113.0	97.5	P				
-227	LANE 8	6-in / L3				16.3	133.0	114.4	98.7	P				
10/6/97														

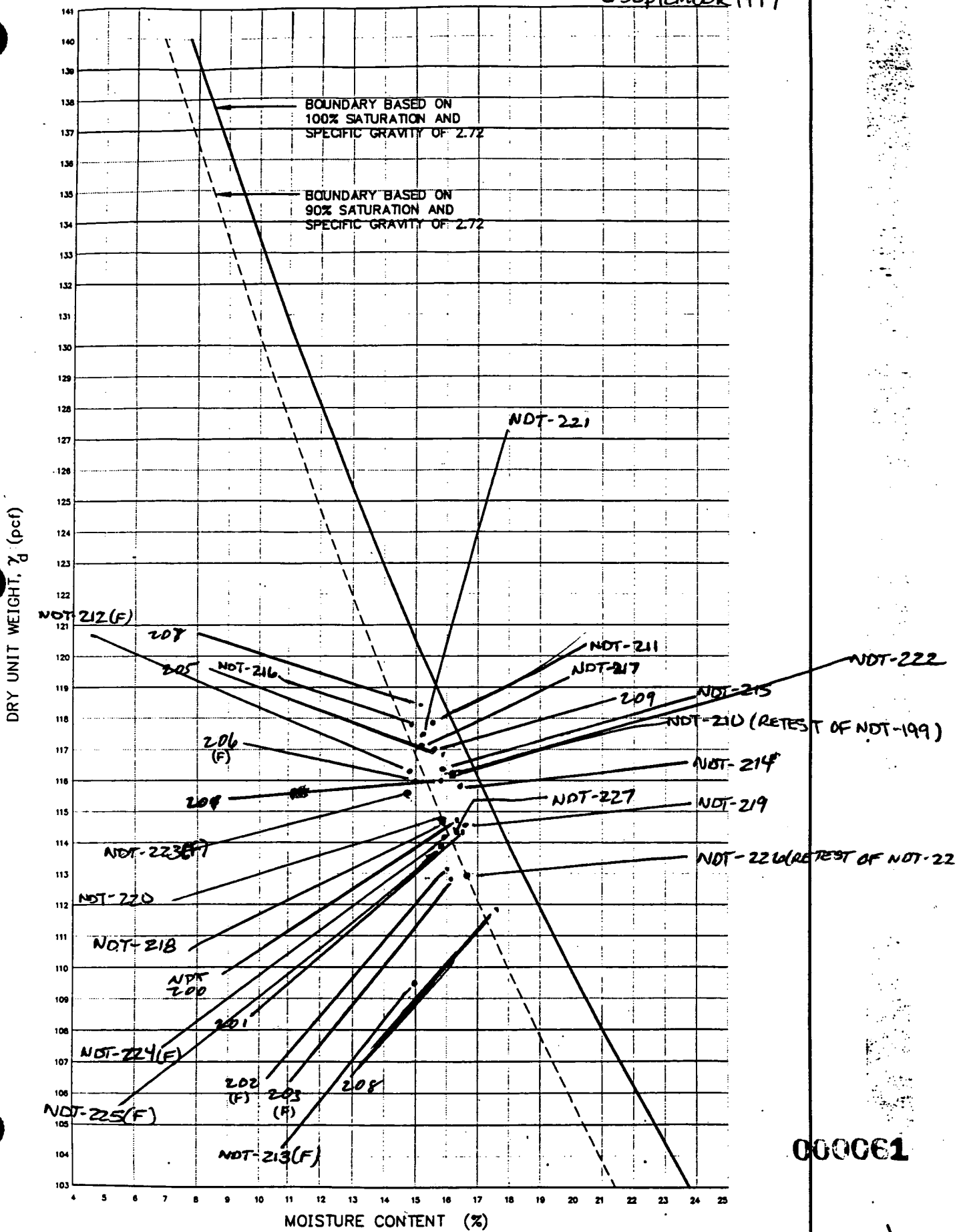
RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: ** STOCKPILE NO. 4 CLAY LINER MATERIAL AVERAGE VALUES USED FOR STD. PROCTOR LAB RESULTS.

* RETEST: NDT-222 IS A RETEST OF NDT-196

• APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

6 SEPTEMBER 1997



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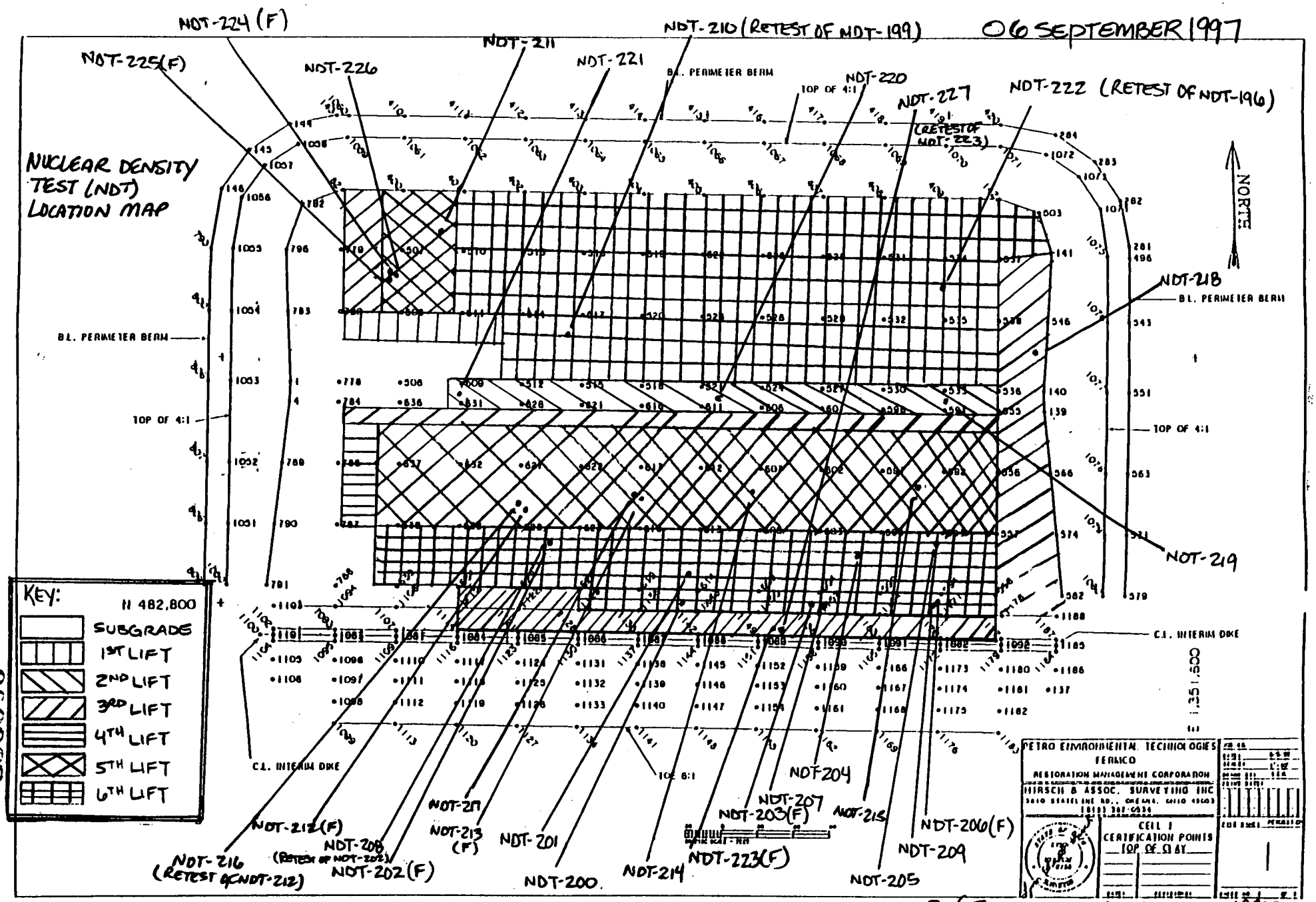
SHEET 4 of 5

06 SEPTEMBER 1997

NUCLEAR DENSITY TEST (NDT) LOCATION MAP



NOTES: NDT 208 IS RETEST OF NDT 202
NDT 207 IS RETEST OF NDT 203
NDT 209 IS RETEST OF NDT 206

SHEET 5 of 5

06 SEPTEMBER 1997

FOR INFORMATIONAL PURPOSES ONLY

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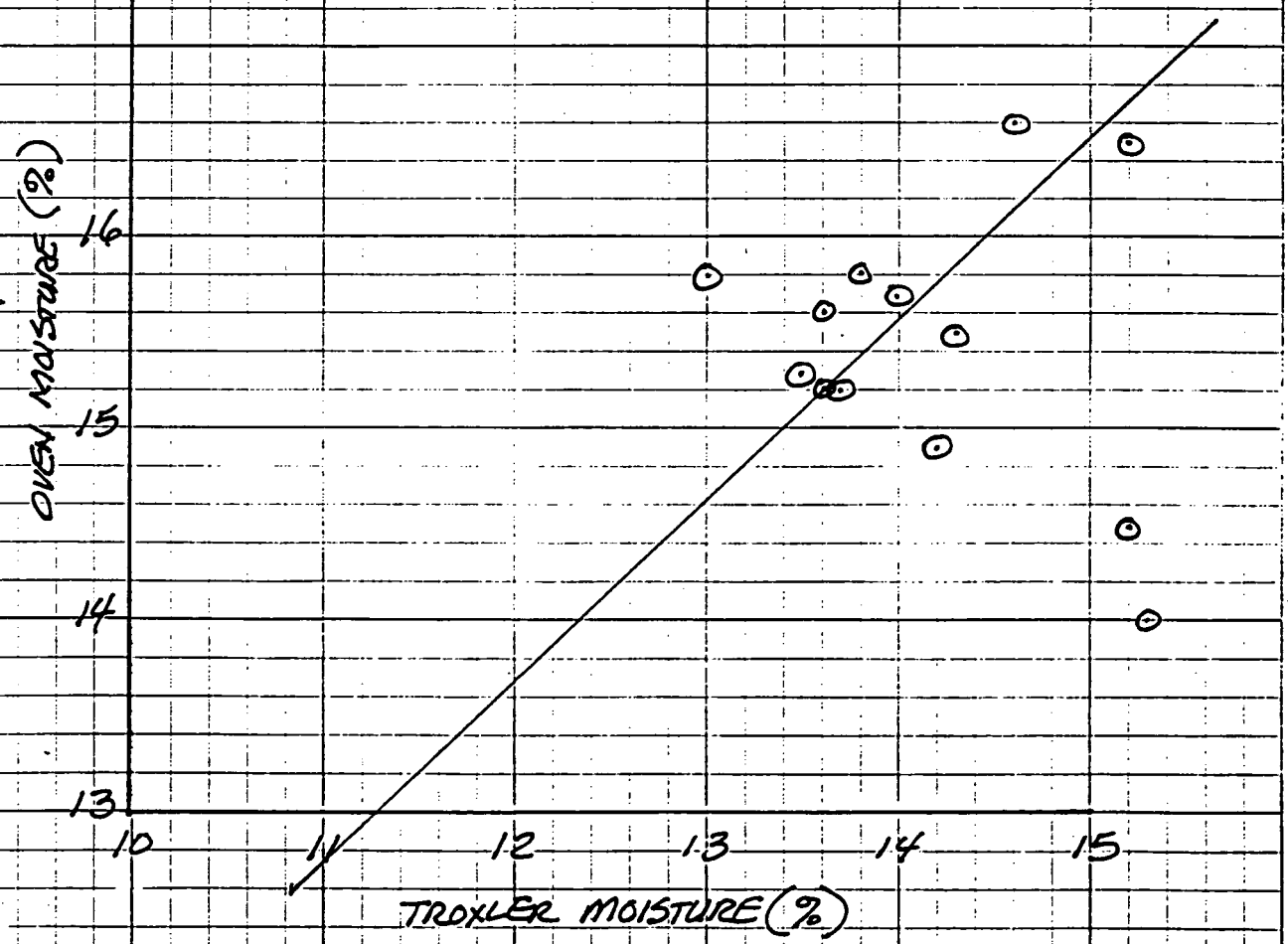
Written by: HEM Date: 97 / 09 / 08 (YY MM DD) Reviewed by: ____ Date: ___/___/___ (YY MM DD)

Client: ____ Project: ____ Project/Proposal No.: ____ Task No.: ____

SAMP NO	OVEN MC	GAUGE MC	Δ MC
LP-155	14.0	15.3	-1.3
LP-156	14.5	15.2	-0.7
LP-157	15.5	14.3	1.2
LP-159	15.8	13.8	2.0
LP-160	15.8	13.0	2.8
LP-161	15.3	13.5	1.8
LP-162	15.2	13.7	1.5
LP-163	14.9	14.2	0.7
LP-164	16.6	14.6	2.0
LP-165	15.6	13.6	2.0
LP-166	16.5	15.2	1.3
LP-167	15.2	13.6	1.6
LP-169	15.7	14.0	1.7

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN MOIST. FOR WEEK OF 08 Sept. 97

08 SEPT. — 14 SEPT. 1997



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 08 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE NOS 4 & 6 MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ~8-IN

% COMPACTION: ≥95% STD PROCTOR MOISTURE RANGE: +3% APZ • ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION * QA ID: BE/BN

TEST NO.	TEST LOCATION (SEE ATTACHED MAP)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-228	LANE 3	6in/L2	**	14.6	115.9	~~16.4~~ 16.1 @ 9/8/97	~~134.7~~ 133.5 @ 9/8/97	~~117.7~~ 115.0 @ 9/8/97	~~99.0~~ 99.2 @ 9/8/97	P				
-229	LANE 4	6in/L3				14.7	135.5	118.1	101.9	P				
-230	LANE 4	6in/L3				15.5	133.8	115.8	99.9	P				
-231	LANE 4	6in/L3				14.3	134.5	117.7	101.6		F	NDT-232	P	
-232	LANE 4	6in/L3				15.6	133.9	115.8	99.9	P				
-233	LANE 6	6in/L6				14.6	137.0	119.5	103.1	P				
-234	LANE 6	6in/L6				15.2	133.0	115.5	99.7		F	NDT-237	P	
-235	LANE 5 (@6)	6in/L6				15.6	134.8	116.6	100.6	P				
-236	LANE 6	6in/L6				15.0	129.9	113.0	97.5		F	NDT-238	P	
-237	LANE 6	6in/L6				15.4	134.3	116.4	100.4	P				

• APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

COMMENTS: ** STOCKPILE NO. 4 CLAY LINER MATERIAL AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS.

* UPDATED MOISTURE CORRELATION SHEET (GAUGE MOISTURE VS. "TRUE" MOISTURE) WAS GENERATED AND UTILIZED THIS DATE (NOTE CHANGE IN NDT-228 - TEST PERFORMED PRIOR TO UPDATE DISTRIBUTION).

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 08 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE NOS. 4 & 6 MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ~8-IN

% COMPACTION: 95% STD. PROCTOR MOISTURE RANGE: +3% APZ • ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION * QA ID: BE/BN

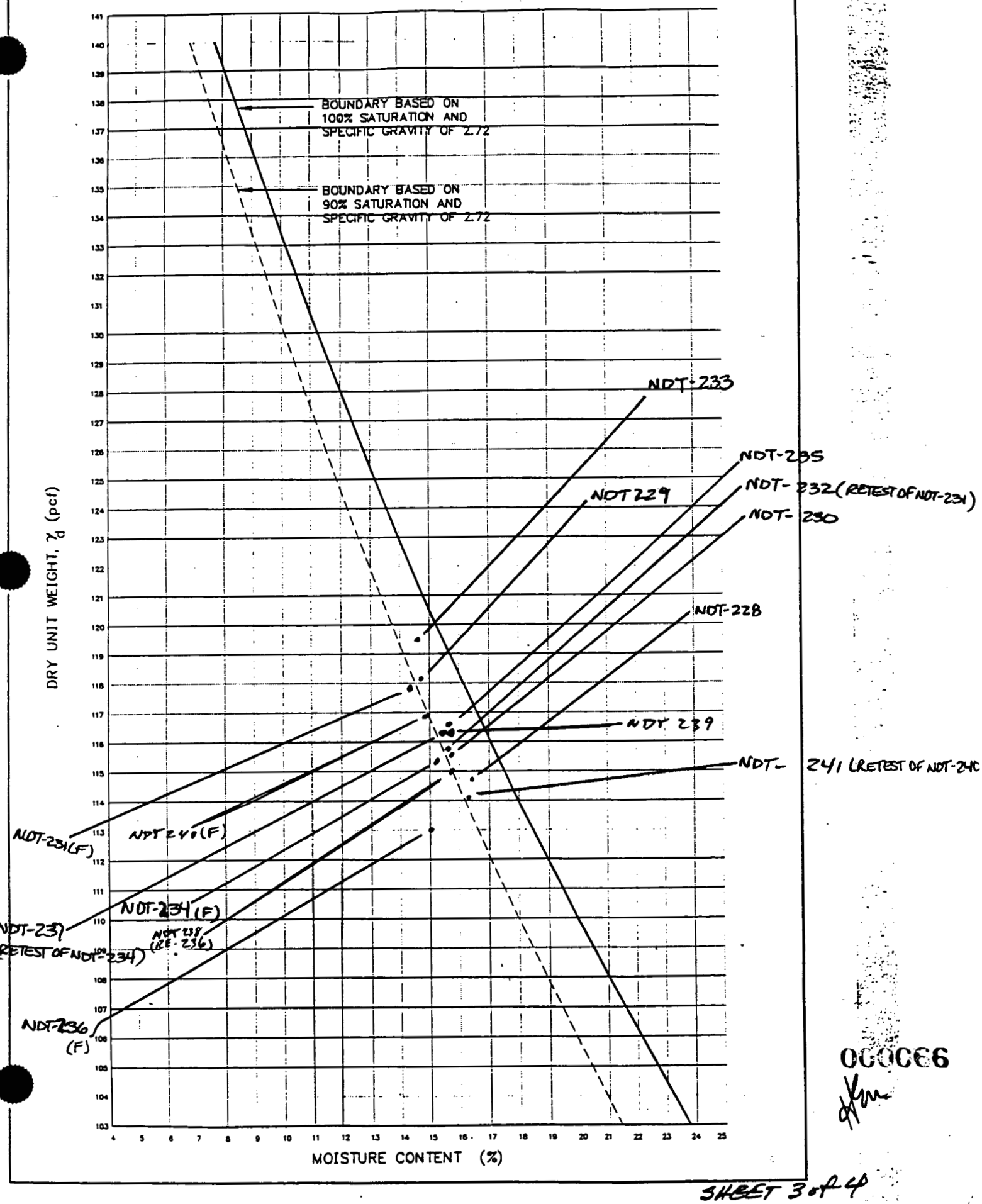
TEST NO.	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT-238	LANE 6	6-in / L6	**	14.6	115.9	15.7	133.0	115.0	99.2	P				
-239	LANE 1	6-in / L6				15.6	134.4	116.3	100.3	P				
-240	LANE 2	6-in / L3				14.9	134.3	116.9	100.9		F	NDT-241	P	
-241	LANE 2	6-in / L3				16.3	132.7	114.1	98.4	P				

10/6/97

• APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02 A OF PROJECT SPECIFICATION

COMMENTS: ** STOCKPILE NO. 4 CLAY LINER MATERIAL AVERAGE VALUE USED FOR STD. PROCTOR LAB RESULTS.
* UPDATED MOISTURE CORRELATION SHEET (GAUGE MOISTURE VS. "TRUE" (OVEN) MOISTURE) WAS GENERATED AND UTILIZED THIS DATE.

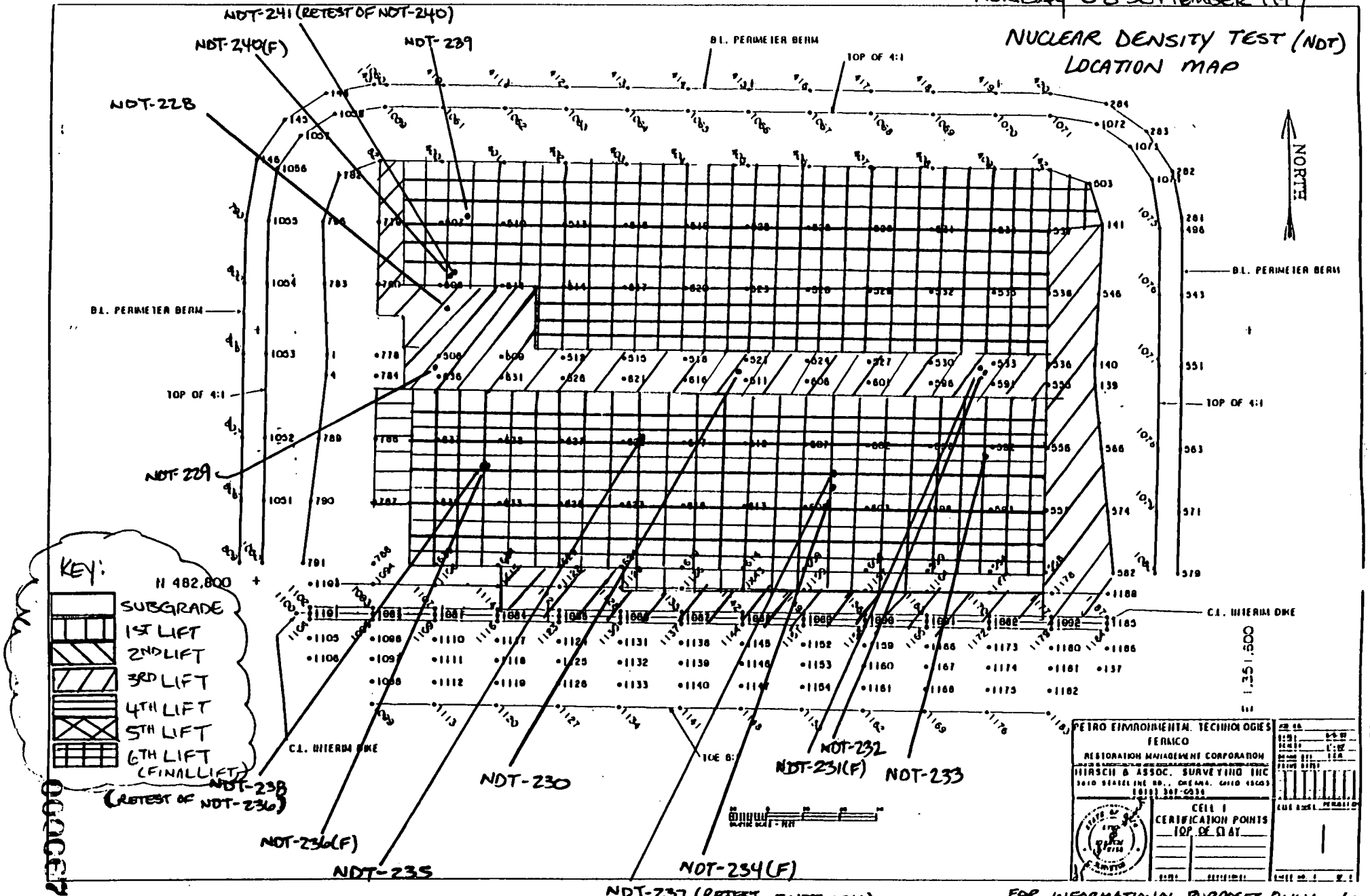
MONDAY, 8 SEPTEMBER 1997



SHEET 3 of 4

MONDAY 08 SEPTEMBER 1997

NUCLEAR DENSITY TEST (NDT) LOCATION MAP



FOR INFORMATIONAL PURPOSES ONLY
SHEET 4 of 4

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 11 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±8" 14/09/97 LIFT THICKNESS (LOOSE) COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW

TEST NO. NDT-	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
242	N. PERIMETER BERM SOUTH FACE	6" - L1	** #4	14.6	115.9	17.4	131.1	111.7	96.4	P				
243	↓	↓	↓	↓	↓	15.8	133.3	115.1	99.3	P				
244	↓	↓	↓	↓	↓	15.6	131.2	113.5	97.9		F	246	P	
245	↓	↓	↓	↓	↓	15.1	134.6	116.9	100.9	P				
246	↓	↓	↓	↓	↓	15.8	133.1	114.9	99.2	P				

10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** STOCKPILE NO. 4 AVERAGE VALUE FOR STANDARD PROCTOR

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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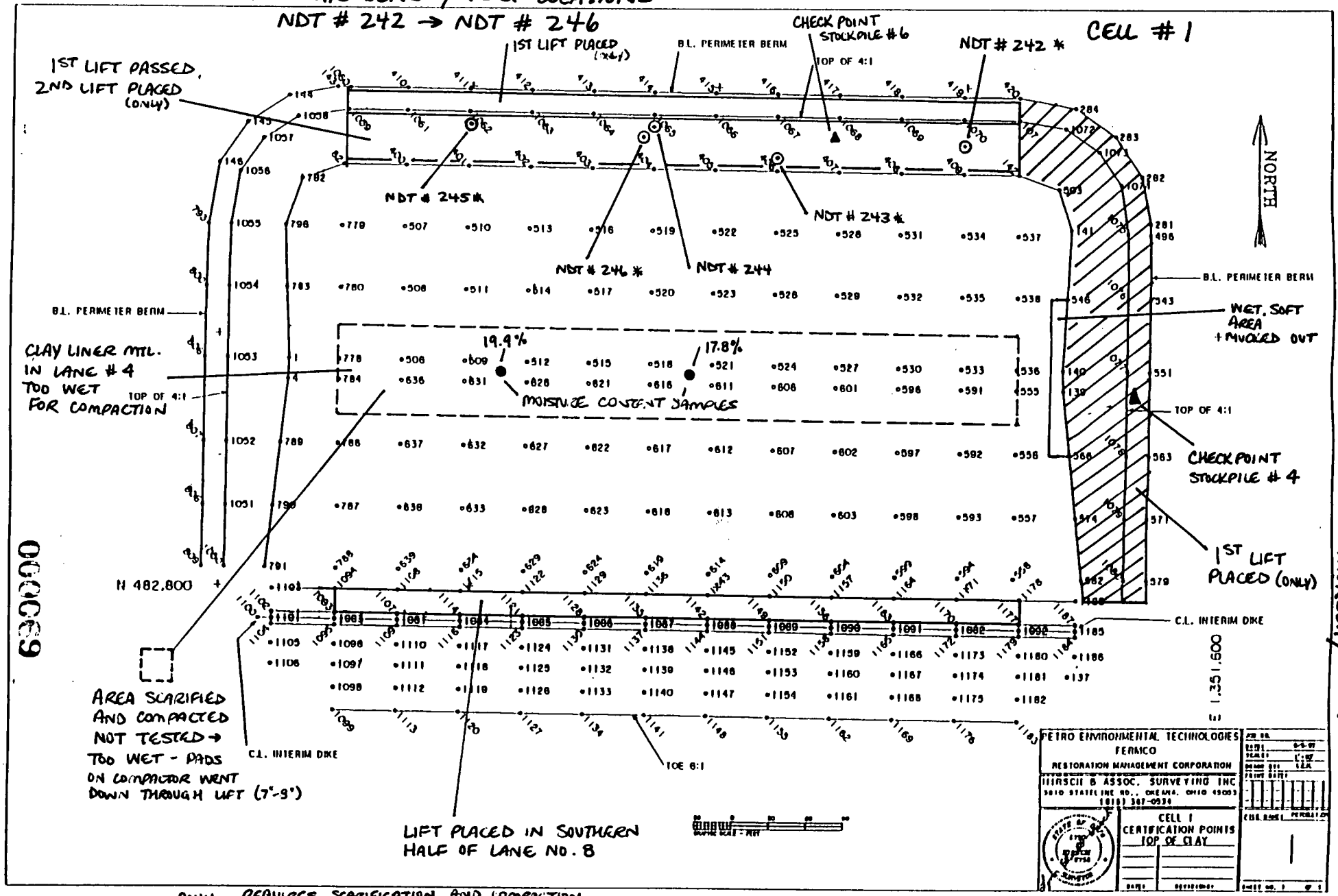
NUCLEAR DENSITY TEST LOCATIONS

NDT # 242 → NDT # 246

CELL # 1



ONLY - REQUIRES SCARIFICATION AND COMPACTION

* - SOIL SAMPLE COLLECTED FOR MOISTURE CONTENT DETERMINATION.

THURSDAY 11 SEPT 97

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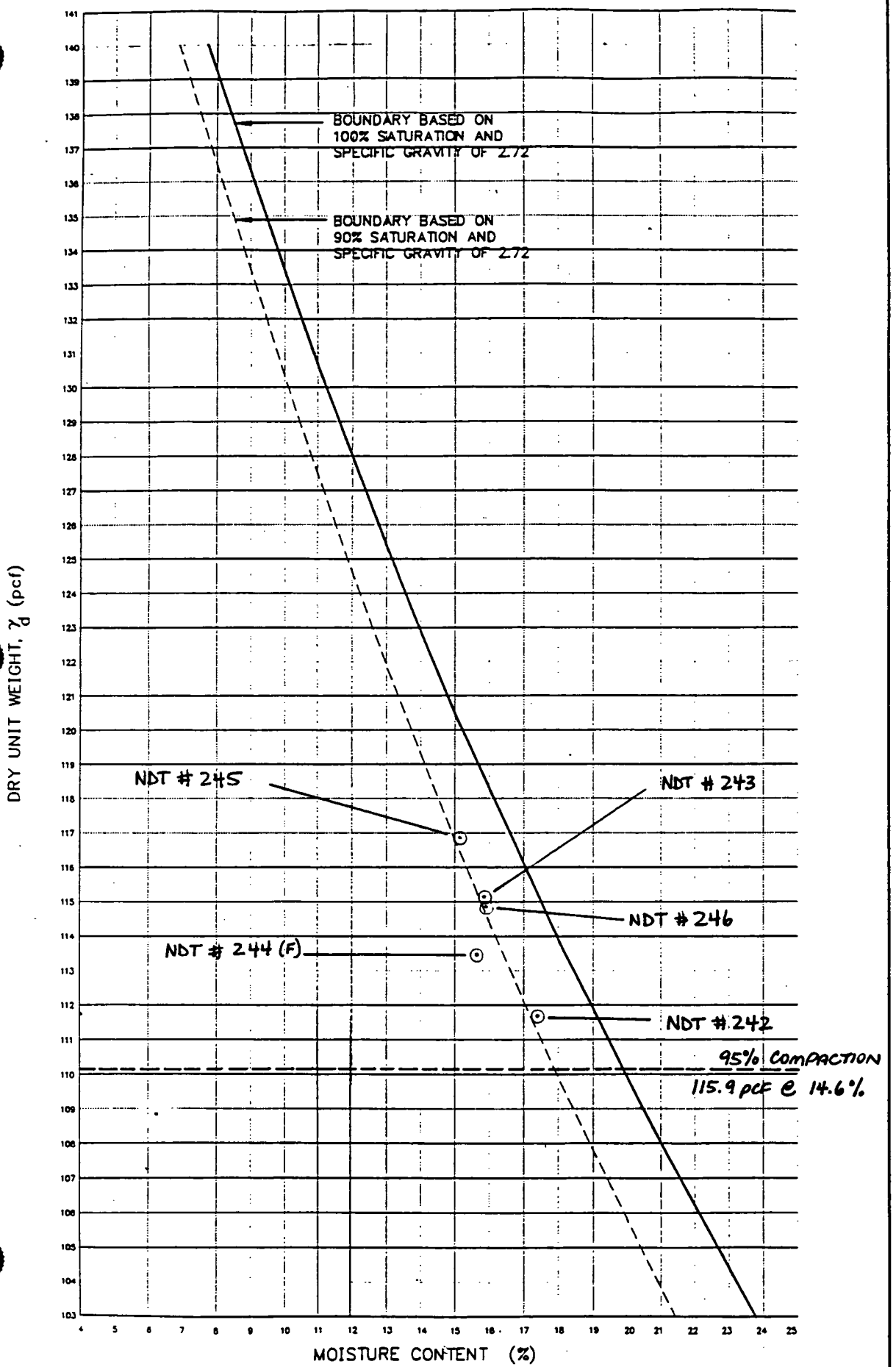
SHEET NO. 2 OF 3

THURSDAY 11 SEPT 97



STOCKPILE
NO. 4 AVERAGE

000070

SHEET NO. 3 OF 3

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

FRIDAY DATE: 12 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" HEM 4/23/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
247	N. BERM (BENCH)	6" L1	**	14.6	115.9	15.7	131.3	113.5	97.9		F	252		F
248	N. BERM (BENCH)	6" L1	↓	14.6	115.9	16.1	134.1	115.5	99.7	P				
249	LANE # 4	6" L4	LP-22	13.5	120.0	15.0	136.8	119.0	99.1	P				
250	↓	↓	**	14.6	115.9	15.8	133.2	115.0	99.2	P				
251			↓	↓	↓	16.8	133.4	114.2	98.5	P				
252	N. BERM (BENCH)	6" L1	↓	↓	↓	15.8	131.1	113.2	97.7		F	253	P	
253	N. BERM (BENCH)	6" L1	LP-19	14.0	119.5	15.9	135.1	116.6	97.5	P				
254	N. BERM (SLOPE)	6" L2	↓	↓	↓	15.3	134.0	116.2	97.3	P				
255	N. BERM (SLOPE)	6" L2	**	14.6	115.9	16.2	133.3	114.7	99.0	P				
256	E. BERM (SLOPE)	6" L1	**	14.6	115.9	14.6	131.5	114.7	99.0		F	313	P	

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** AVERAGE VALUES FOR STOCKPILE # 4

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: FRIDAY 12 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" 11/27/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
257	E. BERM (SLOPE)	6" L1	**	14.6	115.9	13.2	129.7	114.6	98.9		F	315		F ⊖
258	N. BERM (TOE)	6" L1	↓	↓	↓	15.9	133.3	115.0	99.2	P				
259	N. BERM (TOE)	6" L1	LP-19	14.0	119.5	14.5	134.7	117.6	98.4		F	~~260~~ 261 9/13/97	P	~~F~~ 9/13/97

10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** AVERAGE VALUES FOR STOCKPILE #4 ⊖ RETESTED 315 F RETESTED 353 F RETESTED 355 F

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

©GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: SHEET NO. 2 OF 4

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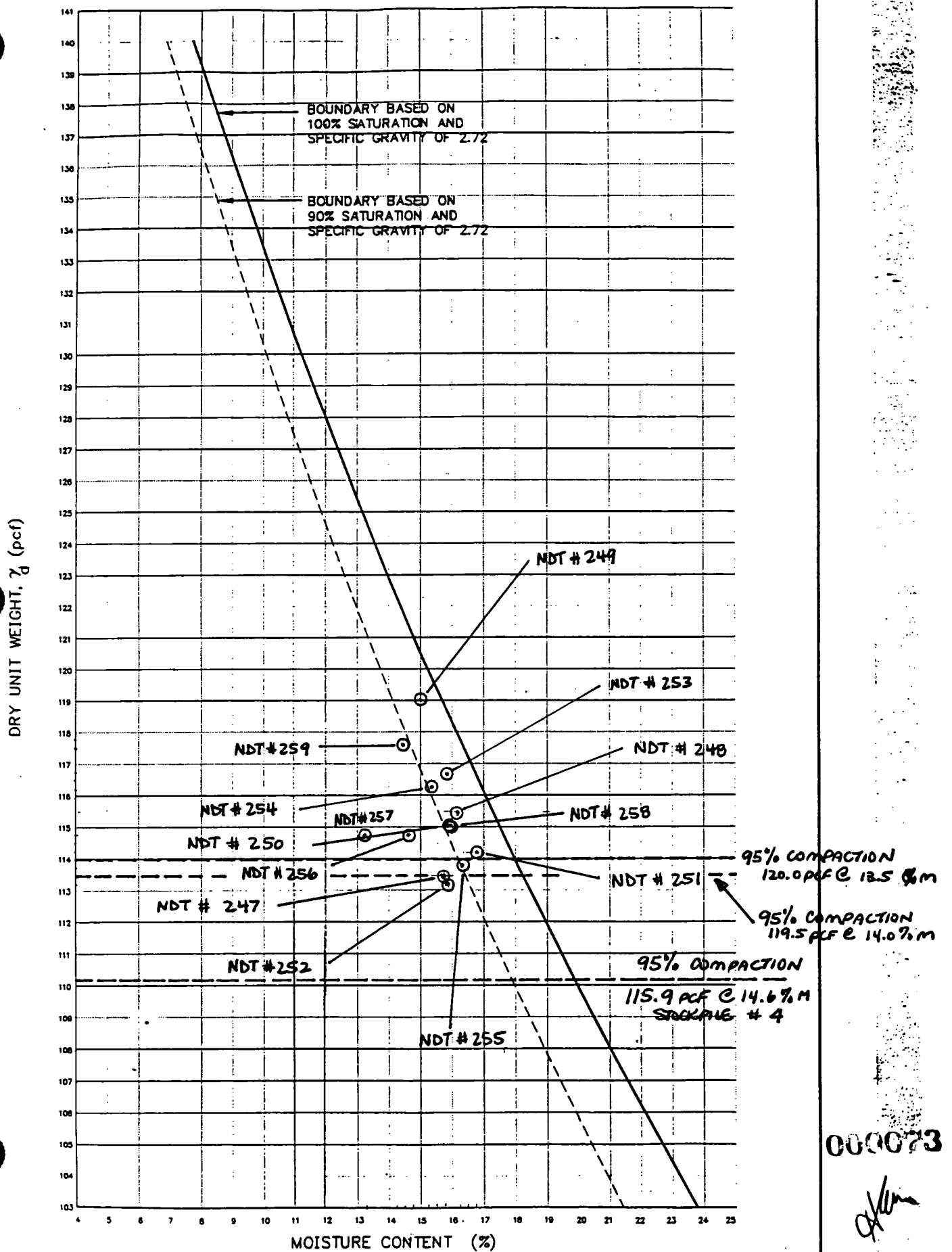
FRIDAY 12 SEPT 97



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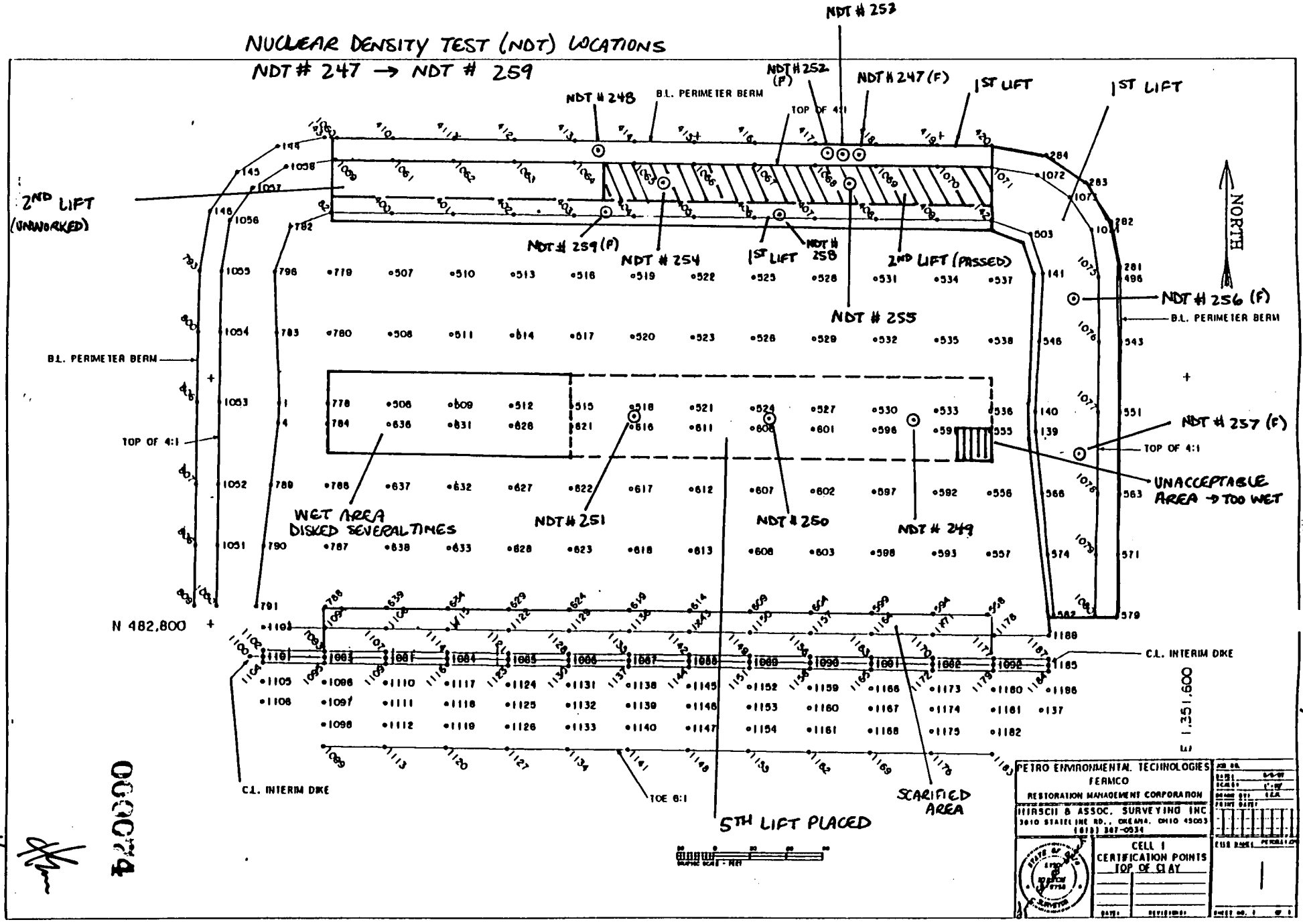
SHEET NO. 3 OF 4

NUCLEAR DENSITY TEST (NDT) LOCATIONS

NDT # 247 → NDT # 259



FRIDAY 12 SEPT 97

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SHEET NO. 4 OF 4

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: SATURDAY 13 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~±8"~~ 11/12/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
260	N. BERM (TOE)	6" L1	LP-19	14.0	119.5	14.0	132.7	116.4	97.4		F	285	P	
261	N. BERM (TOE)	6" L1	LP-19	14.0	119.5	14.9	135.9	118.3	99.0	P				
262	LANE 8	6" L3	** #4	14.6	115.9	15.0	134.1	116.6	100.6		F	269	P	
263	LANE 8	6" L7	** #4	14.6	115.9	14.8	133.8	116.6	100.6		F	270	P	
264	LANE 8	6" L7	** #4	14.6	115.9	14.3	129.3	113.1	97.6		F	271		F
265	LANE 8	6" L3	LP-21	12.5	123.8	13.9	134.9	118.4	95.7		F	272		F
266	E. BERM	6" L1	LP-21	12.5	123.8	13.1	138.2	122.2	98.7	P				
267	LANE 8	6" L3	** #4	14.6	115.9	16.1	131.6	113.4	97.8		F	336	P	
268	LANE 8	6" L3	** #4	14.6	115.9	14.1	131.6	115.3	99.5		F	273		F
269	LANE 8	6" ~~L3~~ L7 11/12/97	LP-19	14.0	119.5	14.7	136.0	118.6	99.2	P				

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** AVERAGE VALUE FOR STOCKPILE

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: SATURDAY 13 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ 11/21/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO. 11/22/97	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
270	LANE 8	6" ~~L7~~ L5	LP-19	14.0	119.5	14.2	136.4	119.4	99.9	P				
271	LANE 8	6" L7	STOCKPILE #4 **	14.6	115.9	14.5	132.5	115.7	99.8		F	292	P	
272	LANE 8	6" L3	↓	↓	↓	15.3	132.9	115.3	99.5		F	291	P	
273	LANE 8	6" L3				15.5	132.1	114.4	98.7		F	276		F
274	LANE 4	6" L4				15.0	132.2	115.0	99.2		F	275	P	
275	LANE 4	6" L4				15.8	132.9	114.8	99.0	P				
276	LANE 8	6" L3	** #4	14.6	115.9	13.3	135.6	119.7	102.3		F	~~340~~ 334	P	
277***	N. BERM SLOPE	6" L2	LP-19	14.0	119.5	14.9	135.2	117.7	98.5	P				
278	N. BERM TOE	6" L1	↓	↓	↓	16.0	133.5	115.1	96.3	P				
279***	N. BERM BENCH	6" L2				15.5	132.8	115.0	96.2		F	282	P	

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** AVERAGE VALUES FOR CLAY LINER STOCKPILES *** SAND CONE PERFORMED

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

DATE: SATURDAY 13 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±8" HGM 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ MOISTURE RANGE: +3% APZ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
280	N. BERM BENCH	6" L2	LP-12	15.2	116.5	15.5	134.8	116.7	100.2	P				
281	N. BERM BENCH	6" L2	↓	↓	↓	15.4	134.8	116.8	100.3	P				
282	N. BERM BENCH	6" L2				15.2	135.9	118.0	101.3	P				
283	N. BERM SLOPE	6" L3				14.5	133.1	116.2	99.8		F	301	P	
284	N. BERM SLOPE	6" L3				15.2	131.9	114.5	98.3		F	299	P	
285	N. BERM TOE	6" L1				15.5	136.9	118.5	101.7	P				
286	N. BERM SLOPE	6" L3				14.4	133.4	116.6	100.1		F	303	P	
287	LANE 4	6" L5				15.6	132.6	114.7	98.5		F	293	P	
288	LANE 4	6" L5				15.9	134.1	115.7	99.3	P				
289	LANE 4	6" L5				15.7	134.6	116.3	99.9	P				

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: SATURDAY 13 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ±8" 11/22/97

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/EN/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
290	LANE 4	6" L5	LP-12	15.2	116.5	15.2	135.6	117.7	101.0	P				
291	LANE 8	6" L3	** #4	14.6	115.9	15.4	137.1	118.8	102.5	P				
292	LANE 8	6" L7 ~~L3~~	↓	14.6	115.9	14.9	136.4	118.7	102.4	P				
293	LANE 4	6" L5	LP-12	15.2	116.5	14.7	134.9	117.6	101.0	P				
294	LANE 4	6" L4	** #4	14.6	115.9	15.9	132.4	114.2	98.6		F	297		F
295	LANE 4	6" L4	↓	↓	↓	16.8	133.8	114.6	98.8	P				
296	LANE 4	6" L4	↓	↓	↓	16.5	130.8	112.3	96.9		F	304	P	

10/6/97

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** AVERAGE VALUES FOR STOCKPILE

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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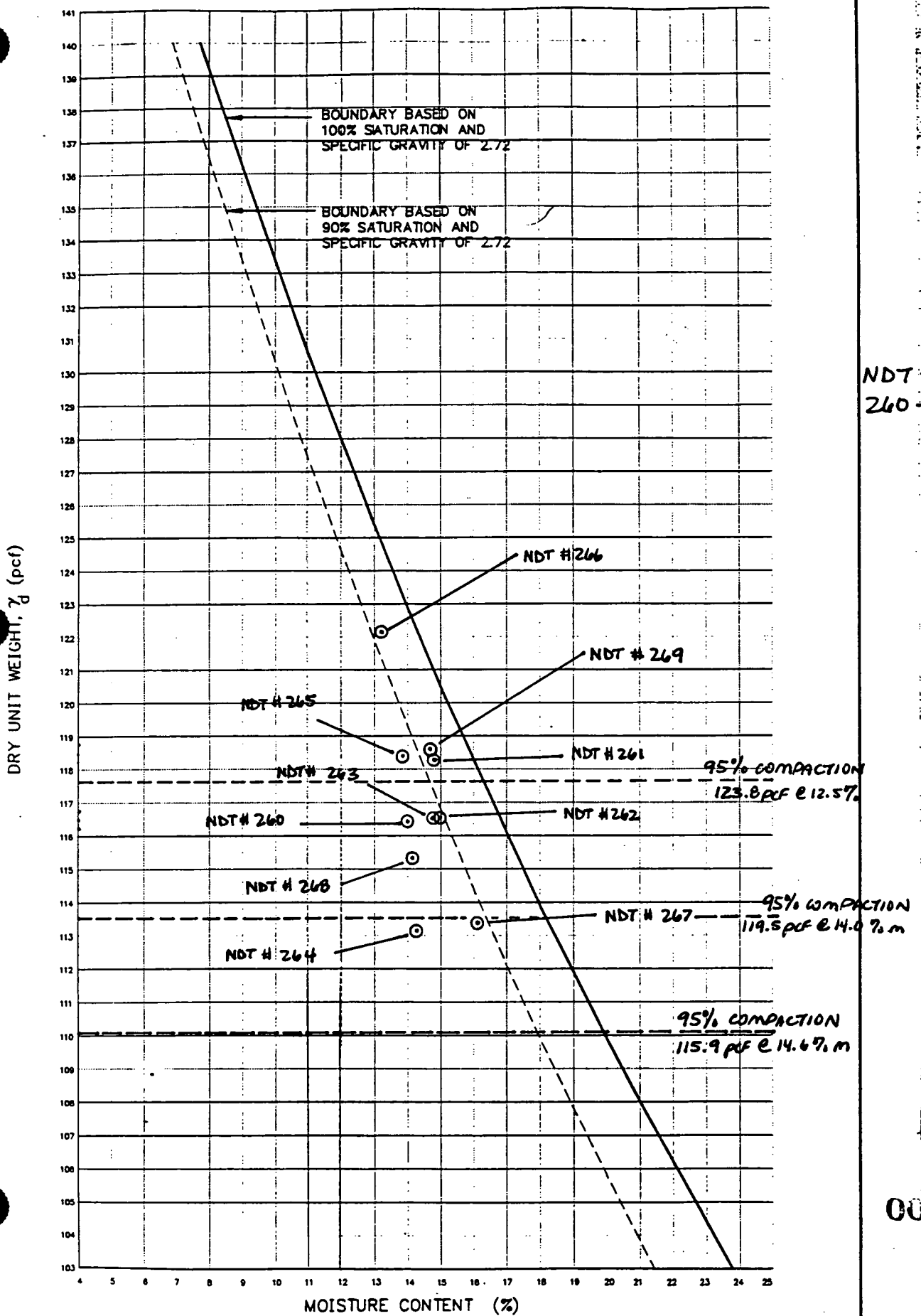
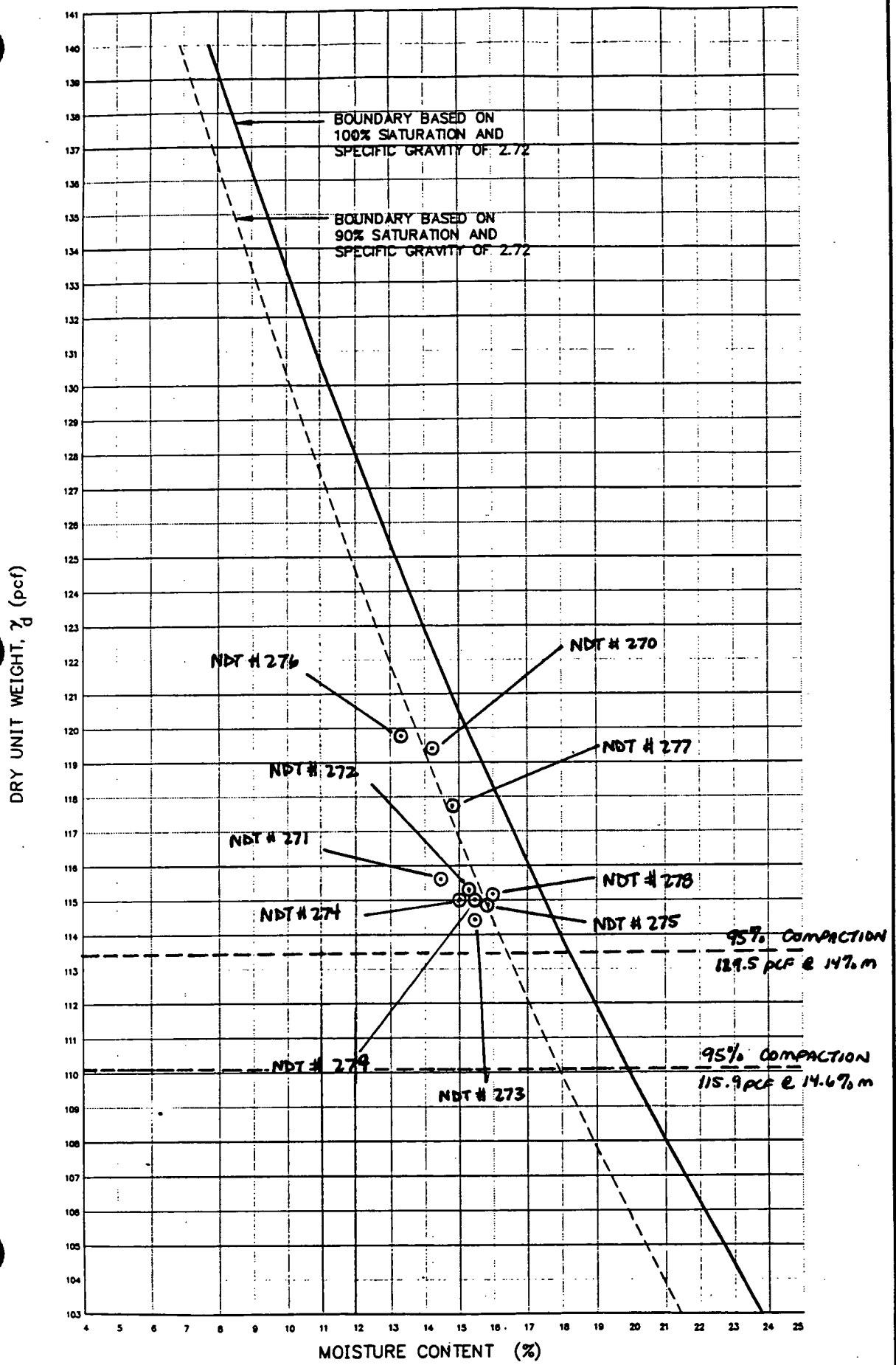
SATURDAY 13 SEPT 97



NDT # S
260 → 269

SHEET NO. 5 OF 10

SATURDAY 13 SEPT 97



NDT #'S
270 → 279

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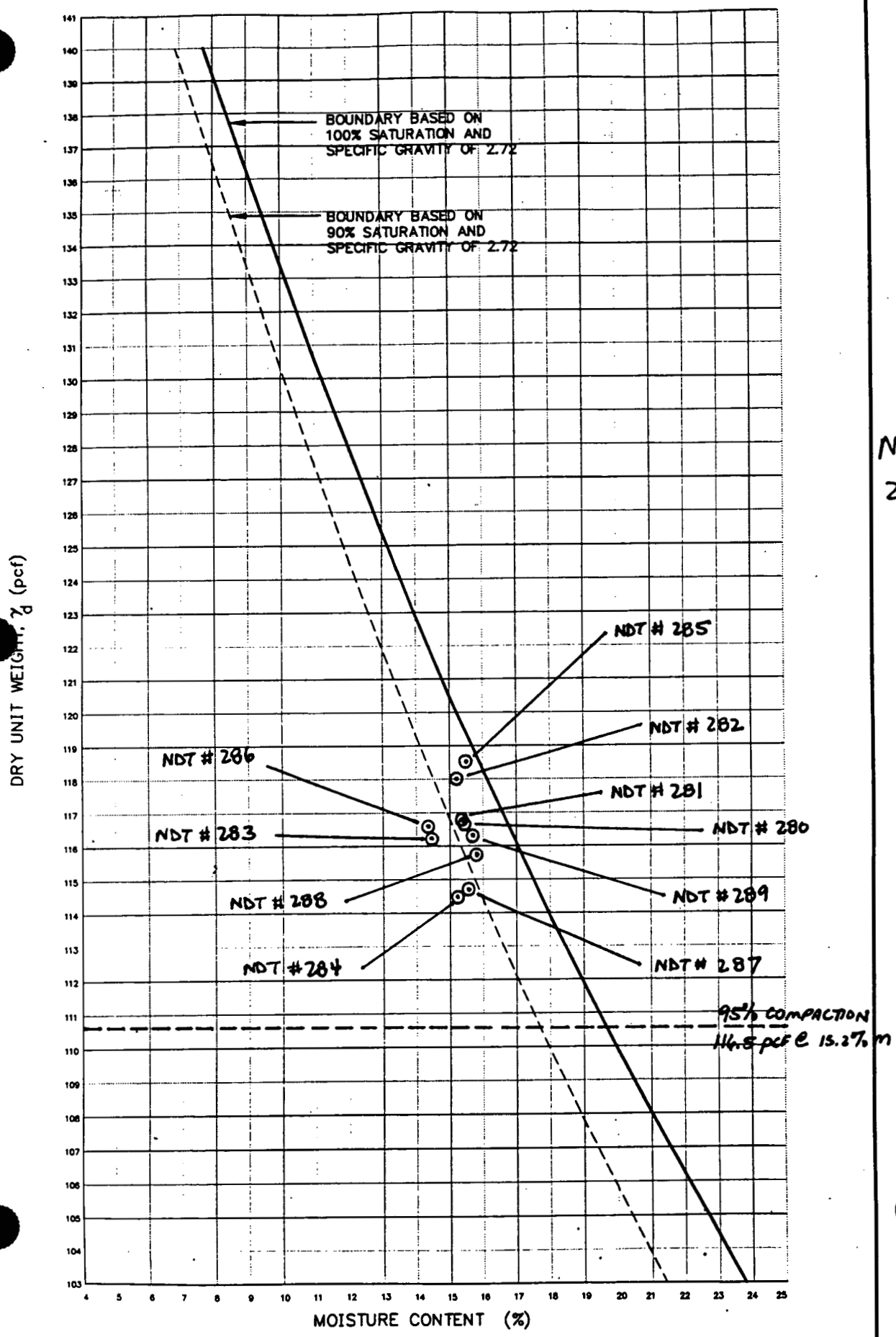
SHEET NO. 6 OF 10

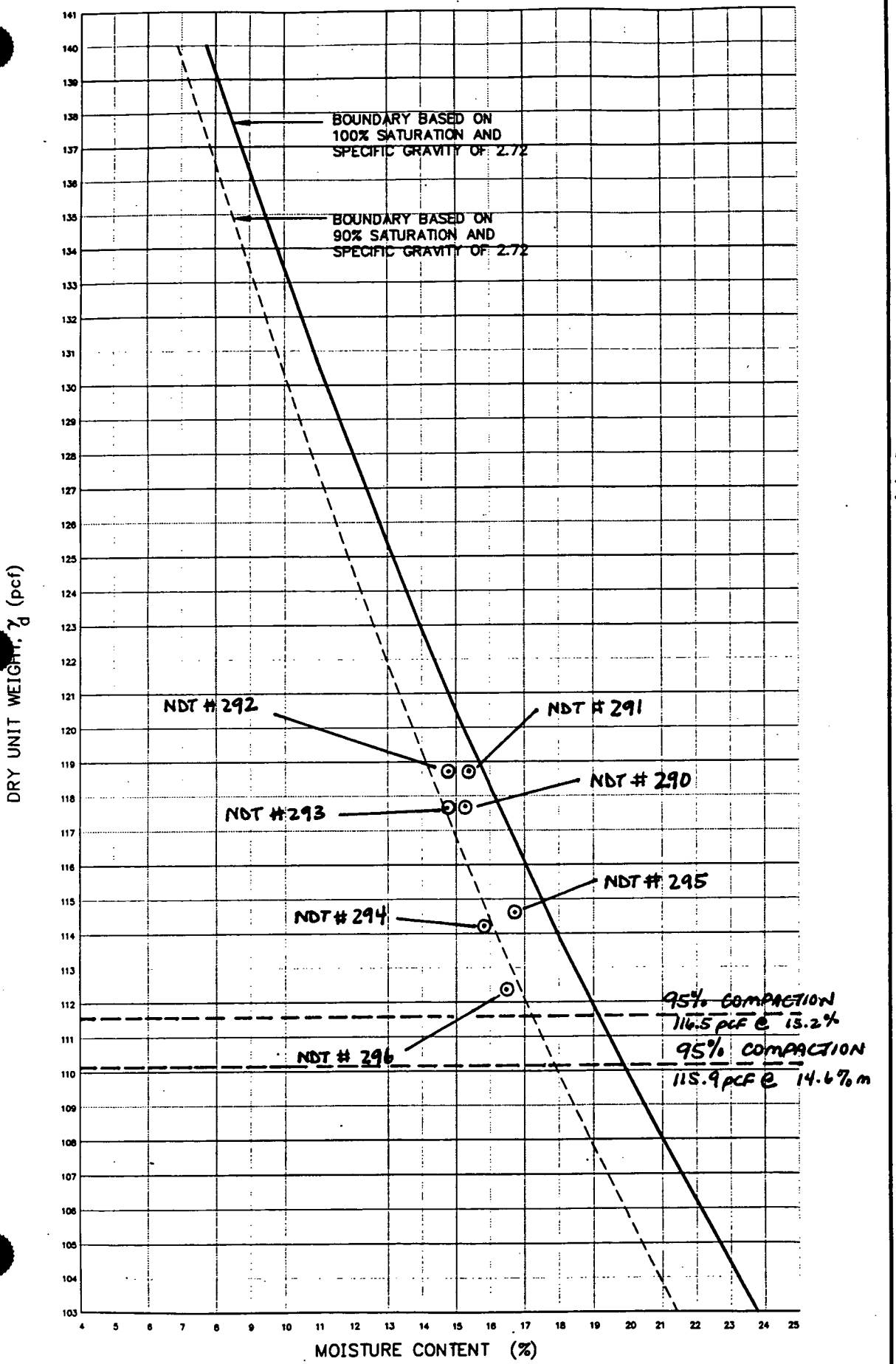
SATURDAY 13 SEPT 97



NDT #'S
280 → 289

SHEET NO. 7 OF 10

SATURDAY 13 SEPT 1997



NDT #'s
290 → 296

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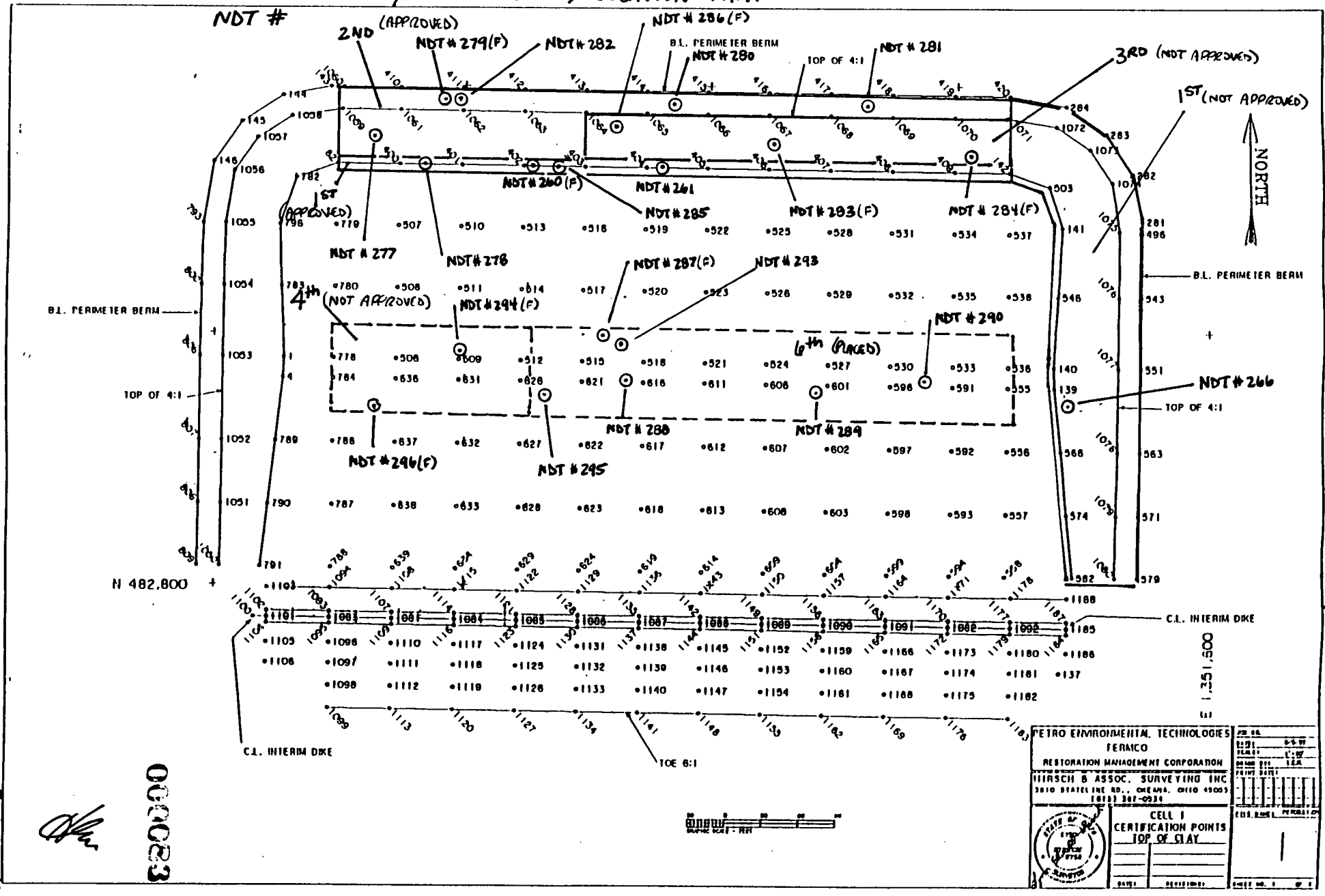
SHEET NO. 8 OF 10

NUCLEAR DENSITY TEST (NDT) LOCATION MAP



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SHEET NO. 9 OF 10

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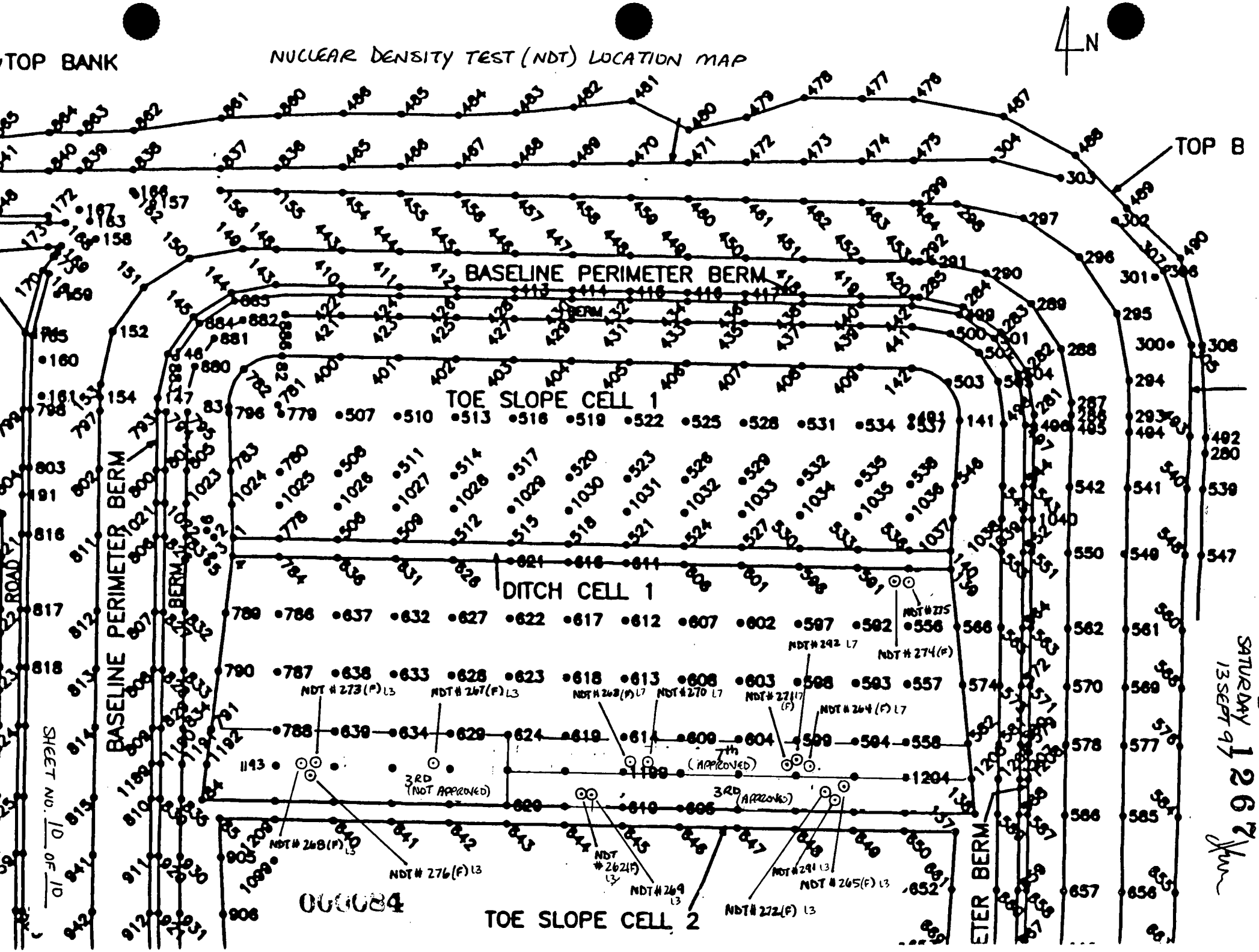
NUCLEAR DENSITY TEST (NDT) LOCATION MAP



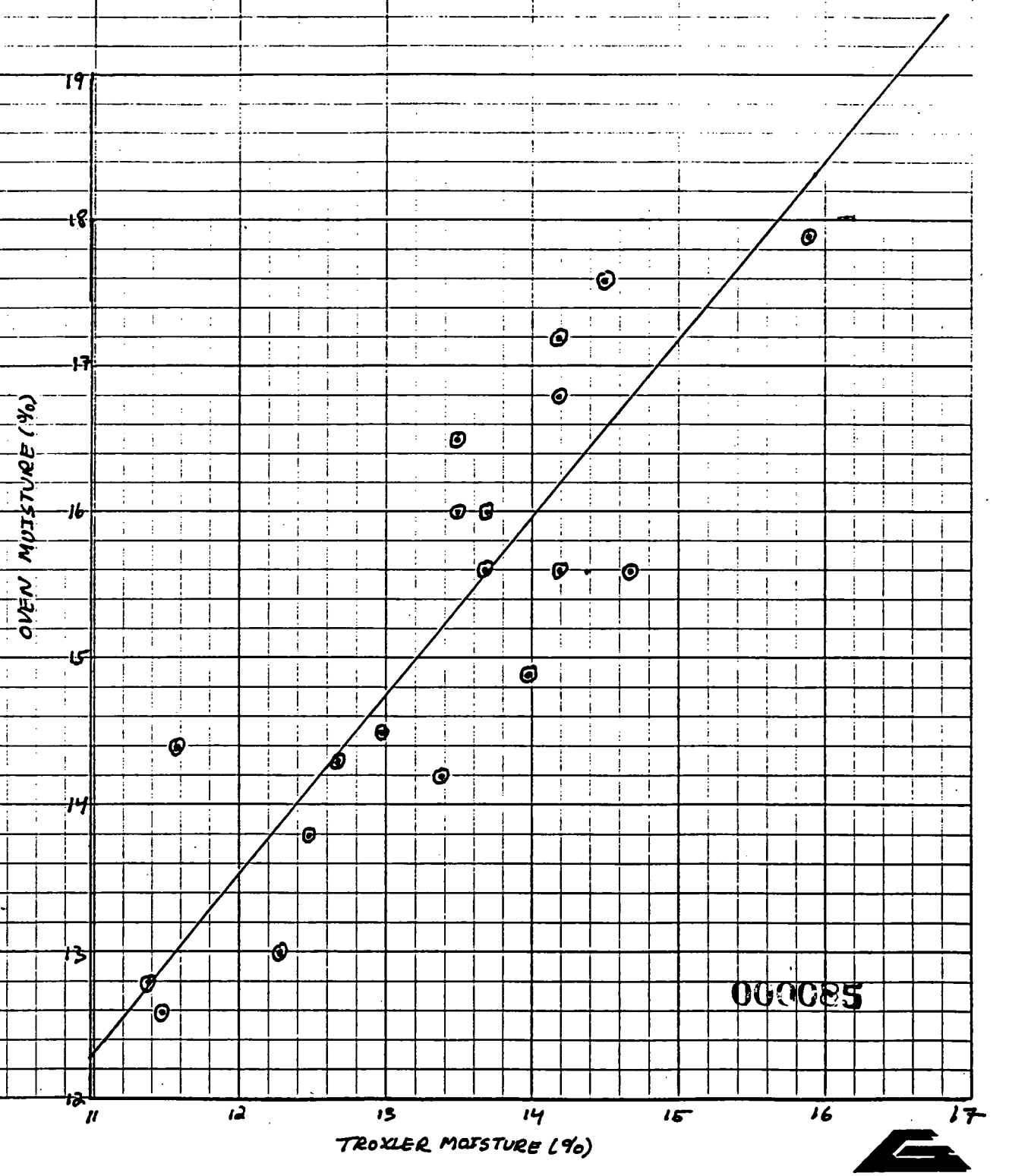
GEOSYNTEC CONSULTANTS

Written by: RBN Date: 97 / 09 / 15 (YY MM DD) Reviewed by: Date: / / (YY MM DD)

Client: Project: Project/Proposal No.: Task No.:

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR USE WEEK OF 15 SEPT. 97

(15 SEPT. — 21 SEPT. 1997)



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 15 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~±8"~~ 1422/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: BE/SQ KW/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
297	LANE 4	6" L4	LP-19	14.0	119.5	13.9	136.2	119.6	100.0		F	300	P	
298	LANE 4	6" L4	LP-19	~~15.8~~ 14.0 @ 4/23/97	~~113.7~~ 119.5	15.9	131.8	113.7	95.1		F	302	P	
299	N. BERM SLOPE	6" L3	LP-19	14.0	119.5	14.9	136.5	118.8	99.4	P				
300	LANE 4	6" L4	LP-19	14.0	119.5	14.4	135.5	118.4	99.1	P				
301	N. BERM SLOPE	6" L3	LP-19	14.0	119.5	15.2	134.7	116.9	97.8	P				
302	LANE 4	6" L4	LP-19	14.0	119.5	15.6	134.2	116.1	97.1	P				
303	N. BERM SLOPE	6" L3	LP-19	14.0	119.5	15.5	136.5	118.2	98.9	P				
304	LANE 4	6" L4	LP-19	14.0	119.5	14.6	136.8	119.4	99.9	P				
305	N. BERM SLOPE	6" L3	LP-19	14.0	119.5	16.0	130.8	112.7	94.4		F	327	P	
306	LANE 4	6" L6	LP-19	14.0	119.5	16.8	133.8	114.6	95.9	P				

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION
REJESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS
ODD NDT #S → TROXLER 3430 NO. 27418, EVEN NDT#S → TROXLER 3440 NO. 20979

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 15 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~10"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ~~10"~~ 18"
(CIRCLE ONE)

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418 / 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: BE/SQ KW/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
307	N. BERM BENCH	6"	L3	** #6	15.9	113.7	16.4	132.7	114.0	100.3	P				
308	LANE 4	6"	L6	↓ @ 11/24/97 ~~#6~~	15.9	113.7	16.4	132.3	113.7	100.0	P				
309	N. BERM BENCH	6"	L3	** #6	15.9	113.7	16.2	131.6	113.3	99.6		F	317	P	
310	LANE 4	6"	L6	** #6	15.9	113.7	16.0	133.0	114.7	100.8	P				
311	N. BERM BENCH	6"	L3	** #6	15.9	113.7	16.4	132.6	113.9	100.2	P				
312	LANE 4	6"	L6	** #6	15.9	113.7	15.6	132.5	114.6	100.8		F	314		F
313	E. BERM SLOPE	6"	L1	LP-19	14.0	119.5	14.8	135.2	117.8	98.6	P				
314	LANE 4	6"	L6	↓	↓	↓	14.3	134.8	117.9	98.7		F	316	P	
315	E. BERM SLOPE	6"	L1	↓	↓	↓	15.1	130.3	113.2	94.7		F	353		F
316	LANE 4	6"	L6	↓	↓	↓	15.4	134.6	116.6	97.6	P				

COMMENTS: * APZ – ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS ODD NDT #'S → TROXLER 3430 NO. 27418

• – MOISTURE CONTENT SAMPLE COLLECTED EVEN NDT #'S → TROXLER 3440 NO. 20979

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 15 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED): ±8" (CIRCLE ONE)

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: BE/SQ KW/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
317	N. BERM BENCH	6" L3	** #4	14.6	115.9	16.0	134.4	115.9	100.0	P				
318	E. BERM BENCH	6" L1				15.6	133.8	115.7	99.9	P				
319	N. BERM TIE-IN @ TOE	6" L2				15.6	133.3	115.3	99.5	P				
320	E. BERM BENCH	6" L1				15.0	131.6	114.4	98.7		F	339		F
321	N. BERM TIE-IN @ TOE	6" L2				14.8	133.6	116.4	100.4		F	325	P	
322	LANE 4	6" L5				15.6	133.0	115.1	99.3		F	332	P	
323	N. BERM TIE-IN @ TOE	6" L2				15.6	133.3	115.3	99.5	P				
324	LANE 4	6" L5				15.9	131.3	113.3	97.7		F	328		F
325	N. BERM TIE-IN @ TOE	6" L2				14.8	135.1	117.7	101.5	P				
326	LANE 3&4	6" L5				16.8	132.2	113.2	97.7	P				

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION
RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS
ODD NDT #'S → TROXLER 3430 NO. 27418; EVEN NDT #'S → TROXLER 3440 NO. 20979

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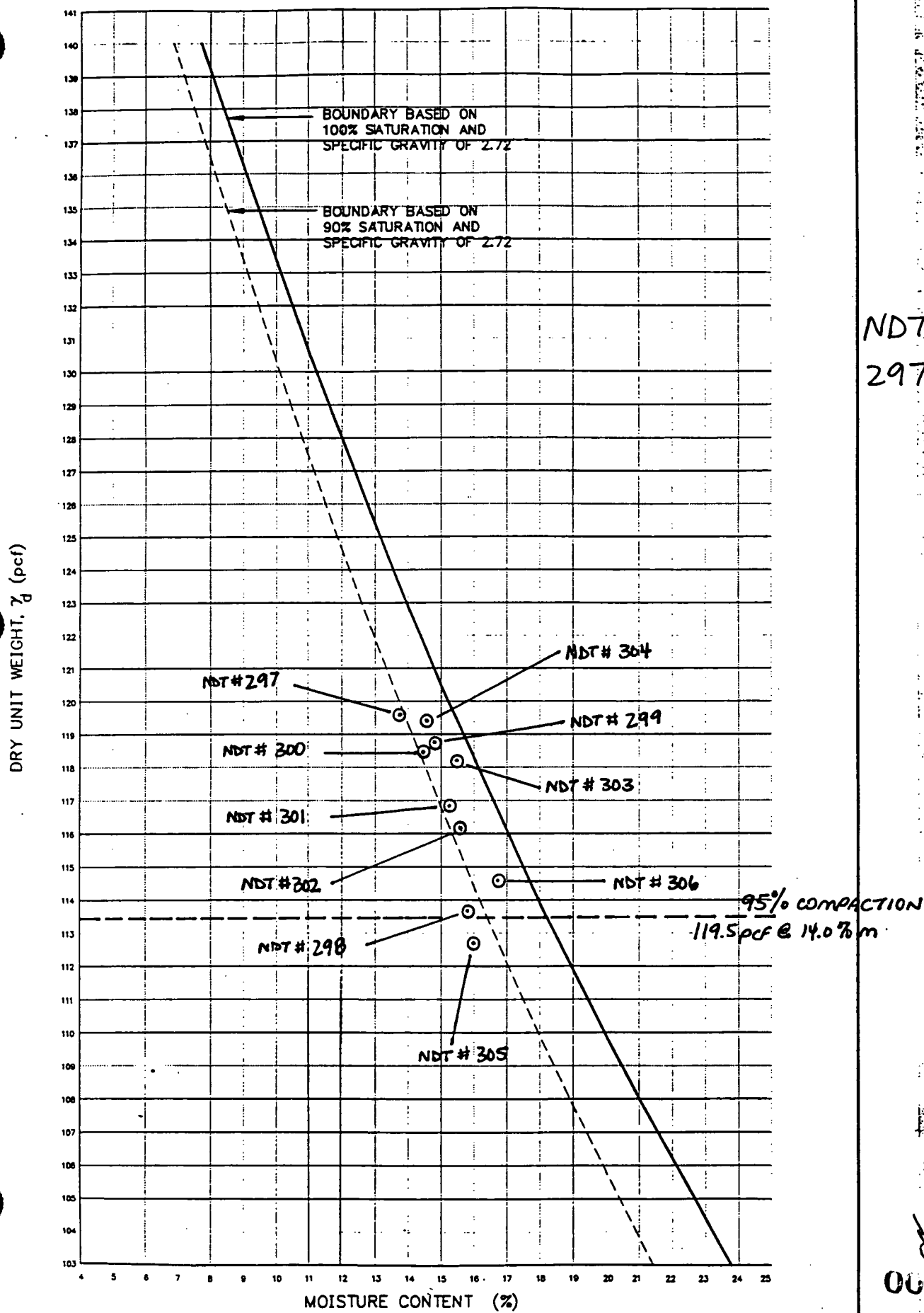
MONDAY 15 SEPT 97

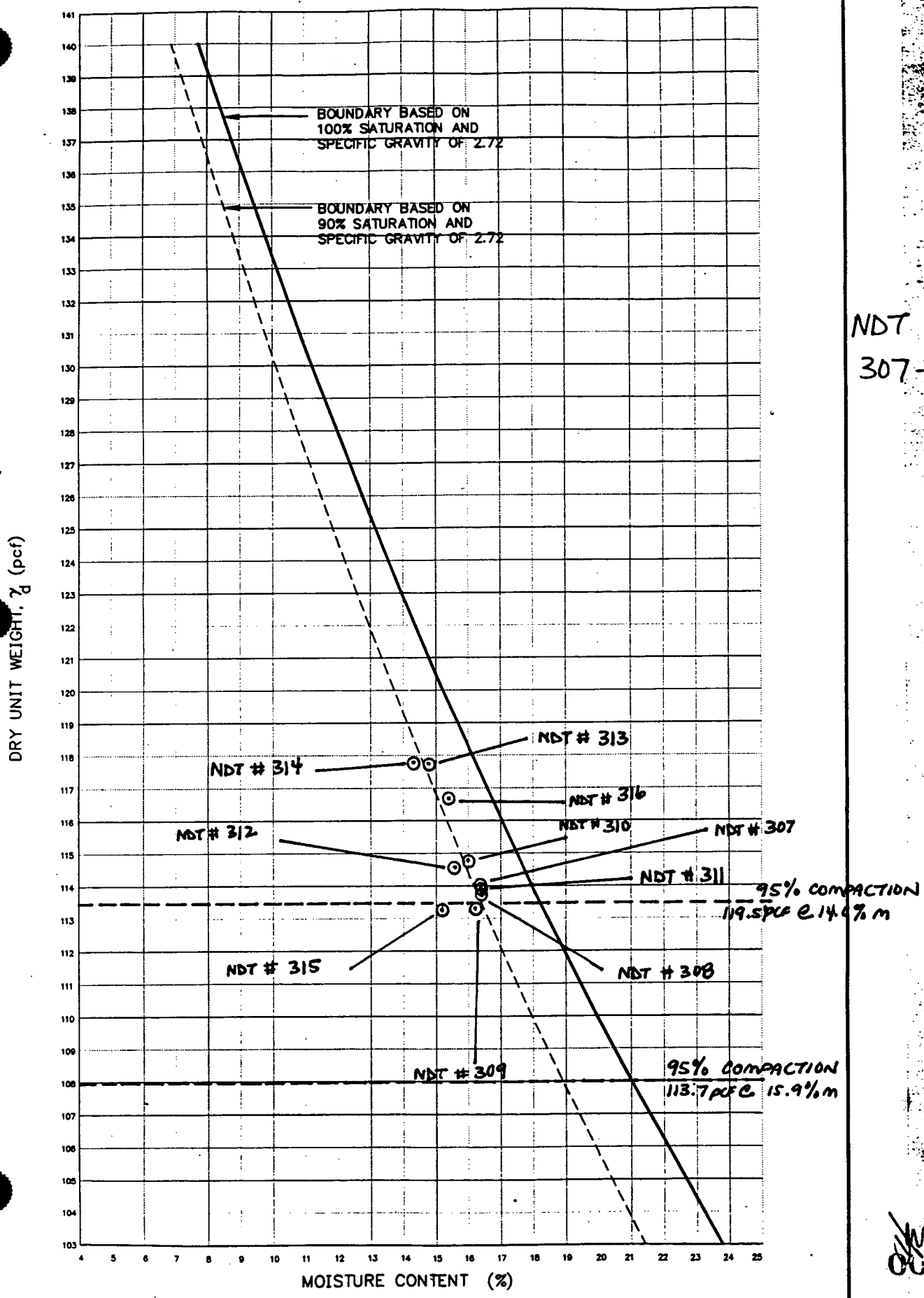


NDT #'S
297 → 306

000089

SHEET NO. 4 OF 7

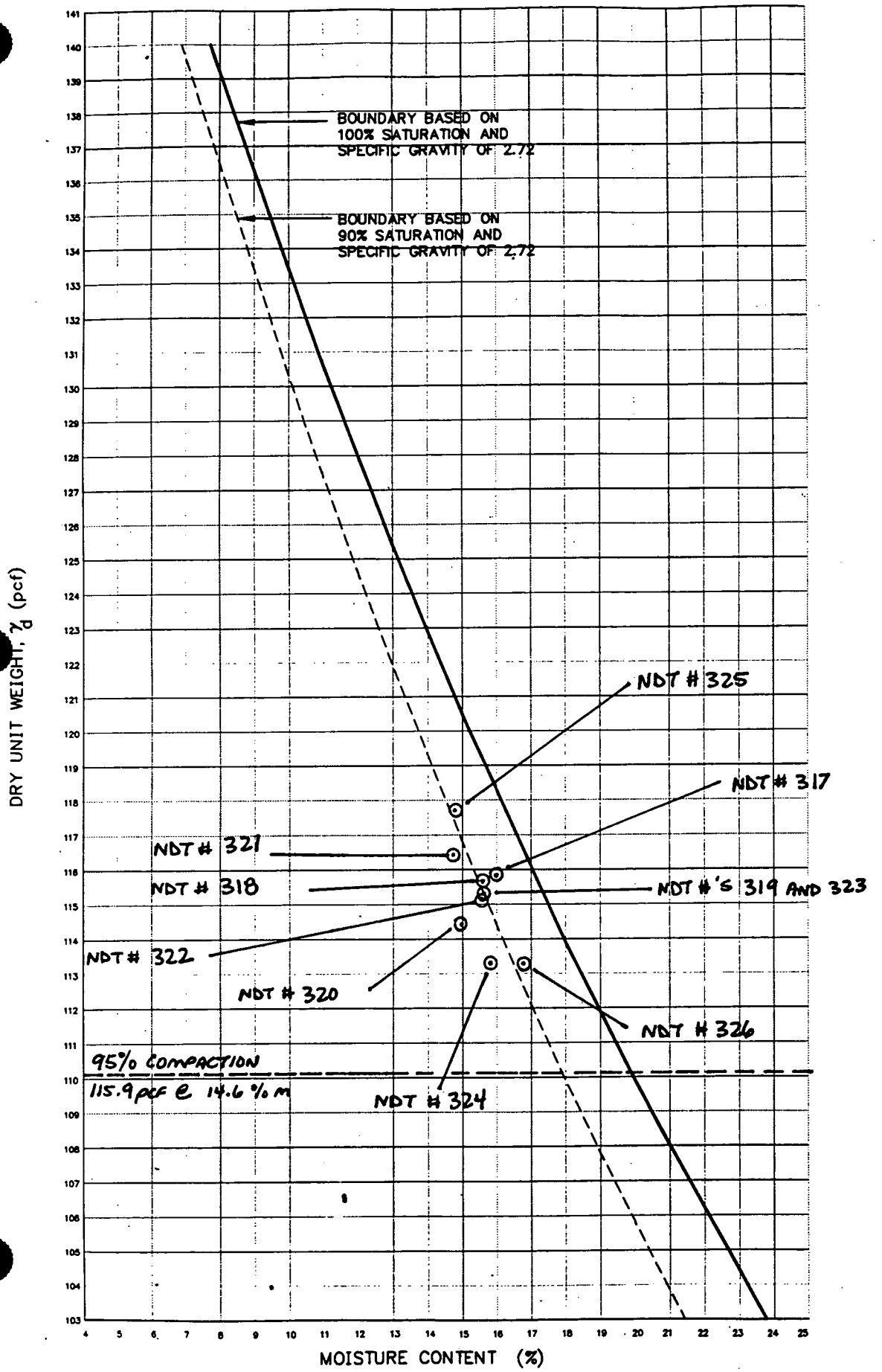
MONDAY 15 SEPT 97



NDT #'S
307 → 316

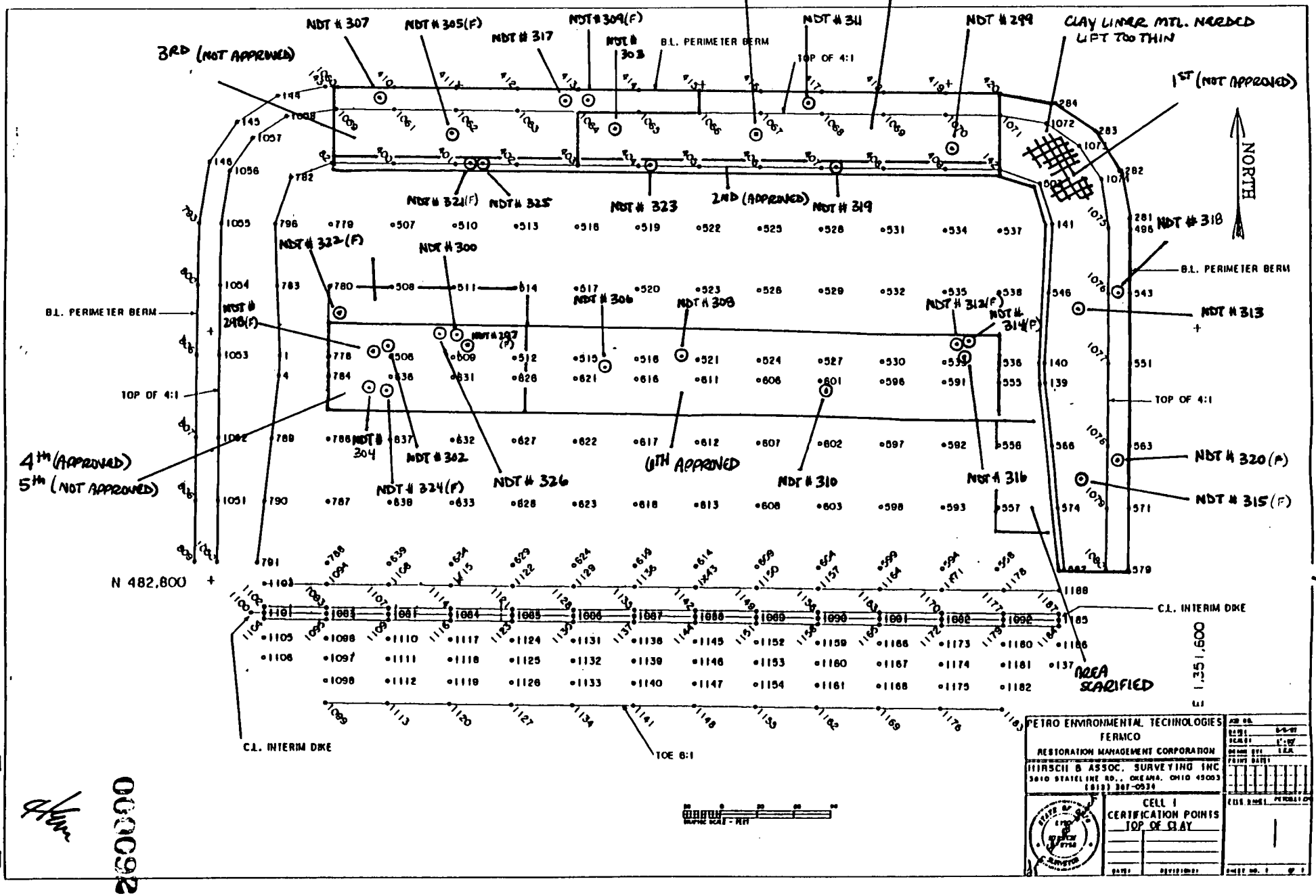
SHEET NO. 5 OF 7

MONDAY 15 SEPT 1997



NDT #'s
317 → 326

NUCLEAR DENSITY TEST (NDT) LOCATION MAP



MONDAY 15 SEPT 97 1267

SHEET NO. 7 OF 7

000092

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 16 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ HEK 4/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ~~±8~~"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/SA/BE

	TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
m/c	327	N. BERM SLOPE	6" L3	LP-34	13.8	118.2	16.9	133.6	114.3	96.7	P				
	328	LANE 4	6" L5	LP-12	15.2	116.5	15.1	133.5	116.0	99.6		F	332	P	
	329	N. BERM SLOPE	6" L4	LP-34	13.8	118.2	14.5	133.9	116.9	98.9		F	349		F
	330	LANE 3	6" L5	LP-12	15.2	116.5	16.8	134.4	115.1	98.8	P				
m/c	331	N. BERM BENCH	6" L4	LP-34	13.8	118.2	15.0	132.9	115.6	97.8		F	347		F
	332	LANE 4	6" L5	LP-12	15.2	116.5	16.1	134.1	115.5	99.1	P				
	333	N. BERM SLOPE	6" L4	LP-34	13.8	118.2	14.9	133.9	116.5	98.6		F	345		F
	334	LANE 8	6" L3	LP-12	15.2	116.5	16.1	133.8	115.2	98.9	P				
	335	N. BERM BENCH	6" L4	LP-34	13.8	118.2	14.8	135.0	117.6	99.5	P				
	336	LANE 8	6" L3	LP-12	15.2	116.5	14.5	137.6	120.2	103.2	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

NOTE: NO LIFT THICKNESS CONTROLS USED BY CONTRACTOR, LIFT THICKNESS IS APPROXIMATE. RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

ODD #S GAUGE → 27418, EVEN #S GAUGE 20979

000083

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 16 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±8" (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ±8" HGM 11/22/97

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BM/SG/BE

	TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
m/c	337	N. BERM SLOPE	6" L4	LP-34	13.8	118.2	14.2	132.9	116.4	98.5		F	343	P	
	338	LANE 8	6" ~~L8~~ L4 HGM 11/22/97	LP-12	15.2	116.5	16.5	133.0	114.2	98.0	P				
	339	E. BERM BENCH	6" L1	LP-34	13.8	118.2	13.5	136.0	119.8	101.4		F	351	P	
	340	LANE 8	6" ~~L8~~ L4 HGM 11/22/97	LP-12	15.2	116.5	16.1	131.8	113.5	97.4		F	346	P	
m/c	341	N. BERM BENCH	6" L4	LP-34	13.8	118.2	16.2	132.5	114.0	96.5	P				
	342	LANE 8	6" L8	LP-12	15.2	116.5	14.9	134.1	116.7	100.2		F	348		F
m/c	343	N. BERM SLOPE	6" L4	LP-34	13.8	118.2	12.6	140.2	124.5	105.3	P				
	344	LANE 8	6" L8	LP-12	15.2	116.5	14.7	133.2	116.1	99.7		F	350	P	
	345	N. BERM SLOPE	6" L4	▲ LP-34	13.8	118.2	13.4	133.5	117.7	99.6		F	361		F
	346	LANE 8	6" ~~L8~~ L4 HGM 11/22/97	LP-12	15.2	116.5	15.8	134.9	116.5	100.0	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

NOTE: NO LIFT THICKNESS CONTROLS USED BY CONTRACTOR, LIFT THICKNESS IS APPROXIMATE, RETESTS IN GENERAL VICINITY OF ORIGINAL TEST.

ODD #'S GAUGE → 27418, EVEN #'S GAUGE → 20979 ▲ - VERIFIED BY CHECKPOINT

12962

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 16 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~18"~~ HCM 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): 18"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/SO/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
M/C 347	N. BERM BENCH	6" L4	LP-34	13.8	118.2	13.7	135.6	119.3	100.9		F	365	P	
348	LANE 8	6" L8	LP-12	15.2	116.5	15.0	133.9	116.4	99.9		F	352	P	
349	N. BERM SLOPE	6" L4	LP-34	13.8	118.2	14.3	133.8	117.1	99.0		F	359	P	
350	LANE 8	6" L8	LP-12	15.2	116.5	15.3	135.9	117.9	101.2	P				
351	E. BERM BENCH	6" L1	LP-34	13.8	118.2	15.2	134.8	117.0	99.0	P				
352	LANE 8	6" L8	LP-12	15.2	116.5	15.7	134.7	116.4	99.9	P				
353	E. BERM SLOPE	6" L1	LP-34	13.8	118.2	14.0	132.9	116.6	98.6		F	355	P	
354	LANE 3	6" L5	LP-12	15.2	116.5	14.6	135.6	118.3	101.6	P				
~~356~~ 355	E. BERM SLOPE	6" L1	LP-34	13.8	118.2	15.5	133.8	115.8	98.0	P				
@ 9/17/97 ~~357~~ 356	LANE 8	6" L4	LP-12	15.2	116.5	16.3	133.3	114.6	98.4	P				

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

NOTE: NO LIFT THICKNESS CONTROLS USED BY CONTRACTOR, LIFT THICKNESS IS APPROXIMATE. RETESTS IN GENERAL VICINITY OF ORIGINAL TEST.

ODD #'S GAUGE → 27418, EVEN #'S GAUGE → 20979

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 16 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ~~±8"~~

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) (A) B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/SQ/BE

	TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
m/c	357	N. BERM SLOPE	6"	L3	LP-34	13.8	118.2	16.6	134.0	114.9	97.2	P				
	358	LANE 8	6"	L4	** #4	14.6	115.9	15.9	131.0	113.0	97.5		F	360	P	
	360	LANE 8	6"	L4	↓	↓	↓	16.9	132.1	113.0	97.5	P				
	362	LANE 4	6"	L6	↓	↓	↓	16.8	125.8	107.7	92.9		F	370		F
	364	LANE 3	6"	L6	↓	↓	↓	16.1	129.6	111.6	96.3		F	368	P	
	366	LANE 3	6"	L6	↓	↓	↓	15.9	132.9	114.7	98.9	P				
	368	LANE 3	6"	L6	↓	↓	↓	15.6	135.6	117.3	101.2	P				
	370	LANE 4	6"	L6	↓	↓	↓	15.9	131.1	113.1	97.6		F	372		F
	372	LANE 4	6"	L6	↓	↓	↓	15.6	130.9	113.2	97.7		F	378	P	
	11/6/97															

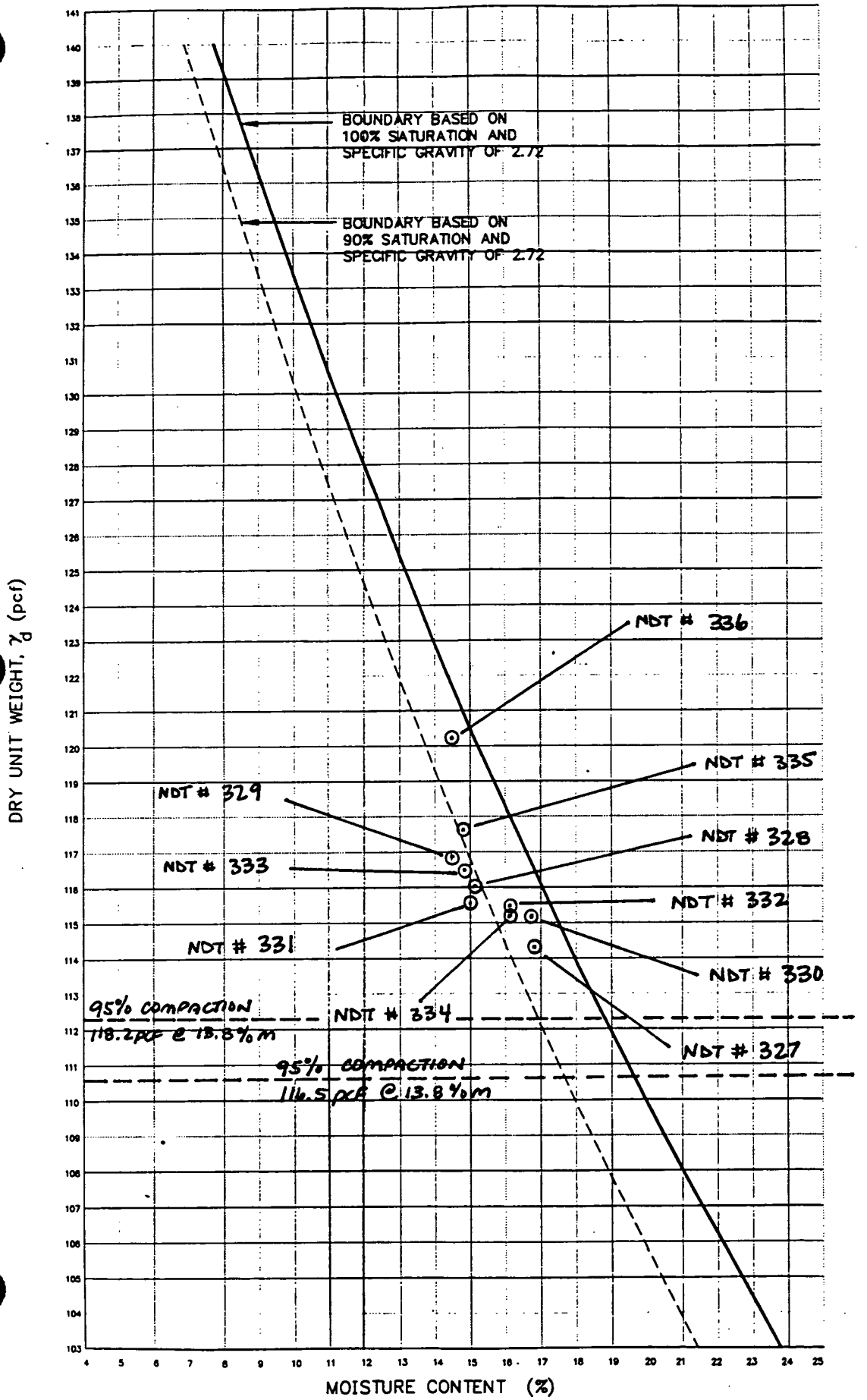
COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

NOTE: NO LIFT THICKNESS CONTROLS USED BY CONTRACTOR, LIFT THICKNESS IS APPROXIMATE. RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

357 GAUGE # 27418 # 358 → 372 GAUGE # 20979 (EVEN #'s)

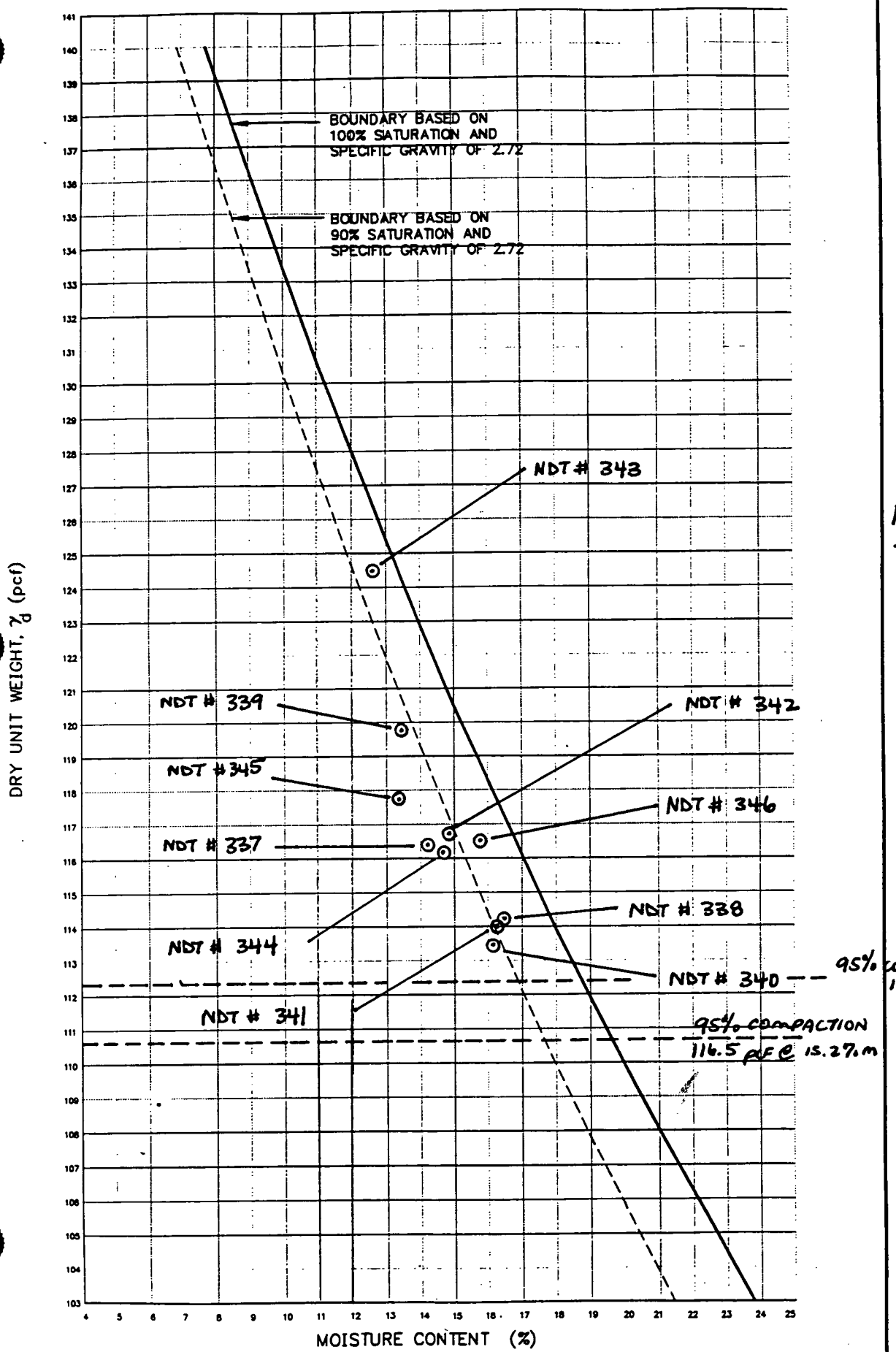
1267

TUESDAY 16 SEPT 1997



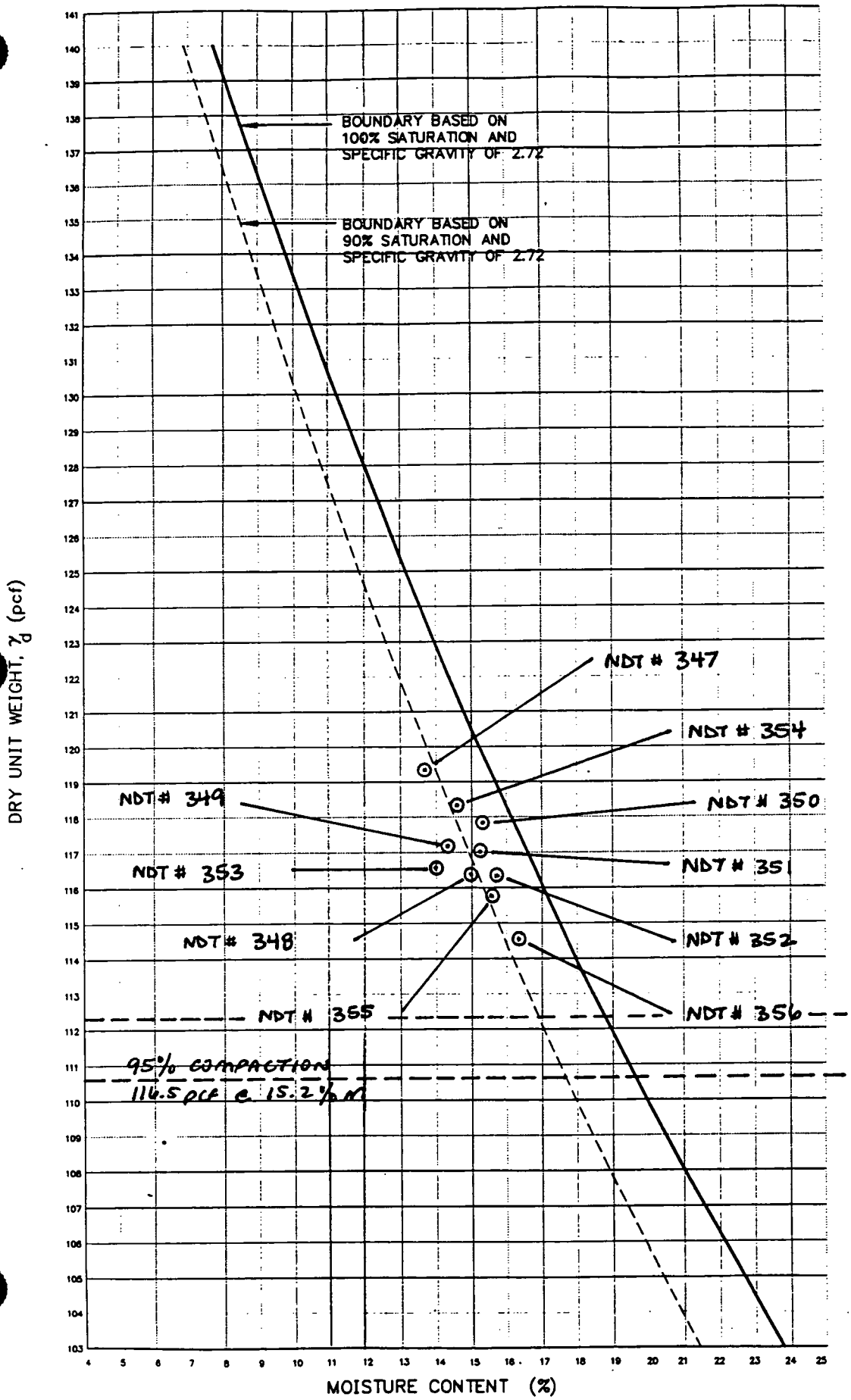
NDT #'S
327 → 336

TUESDAY 16 SEPT 1997



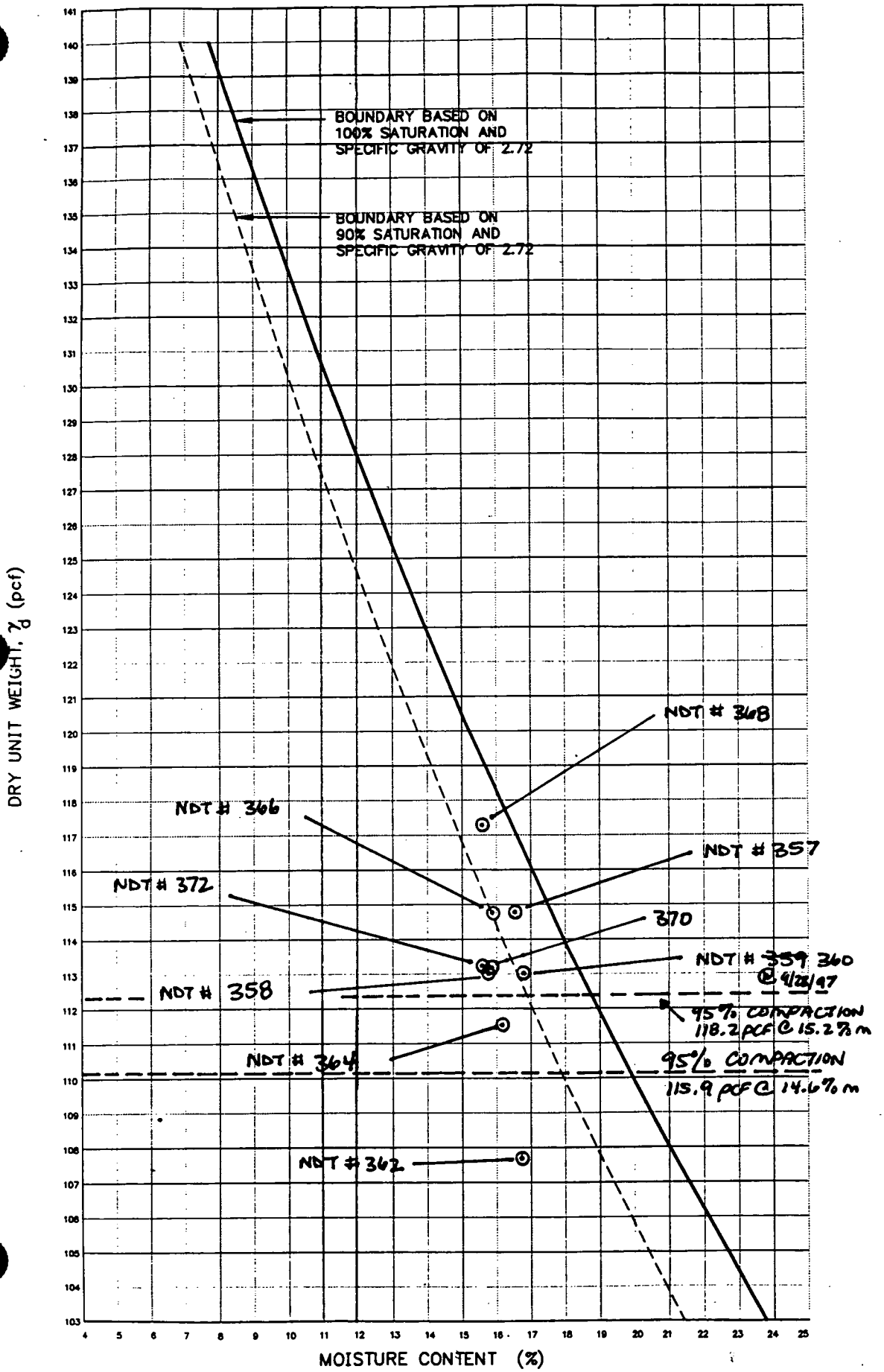
NDT #'S
337 → 346

TUESDAY 16 SEPT 97



NDT #'s 347 → 356

TUESDAY 16 SEPT 1997

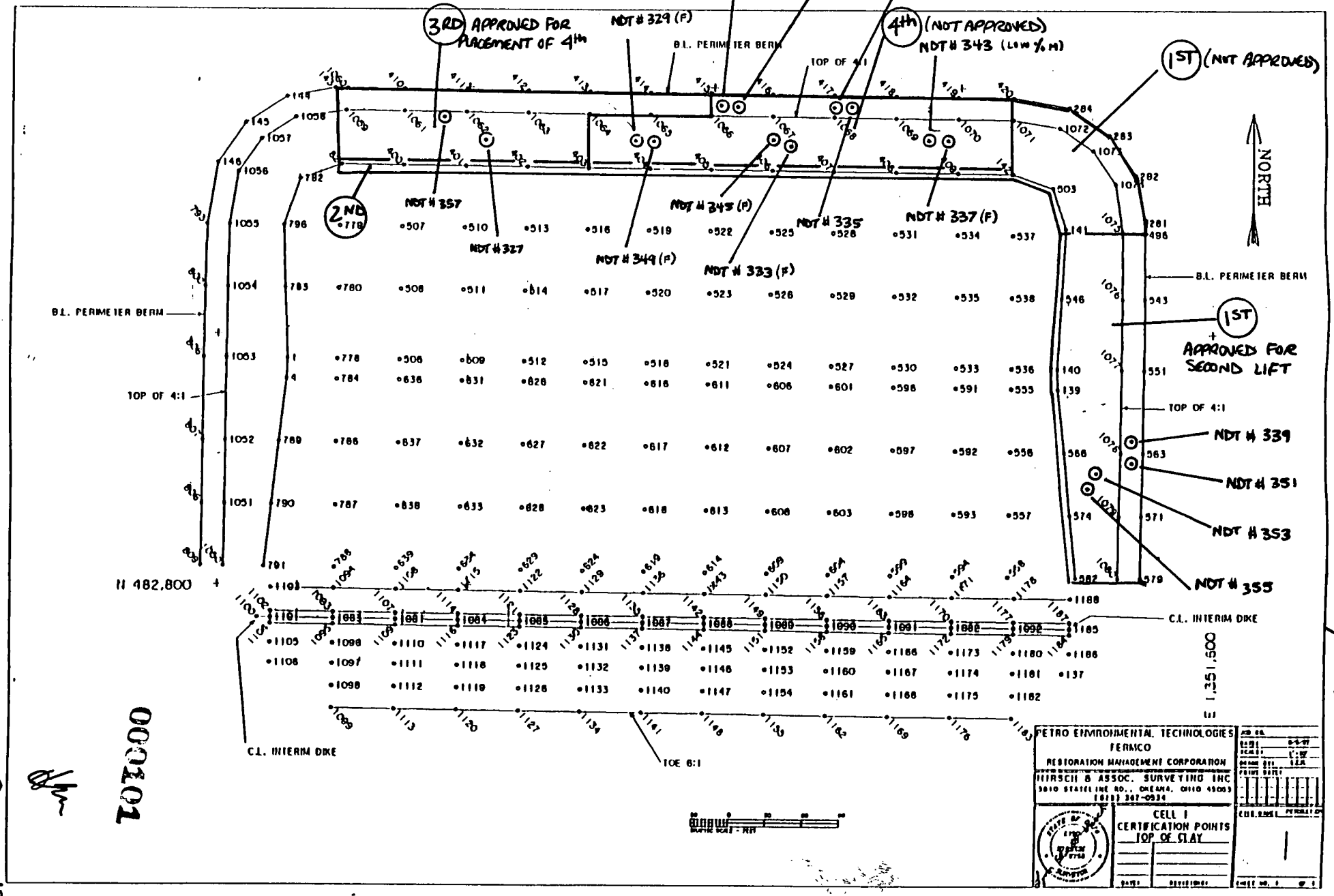


NDT #'S
357 → 372

000100

SHEET NO. 8 OF 10

NUCLEAR DENSITY TEST LOCATION MAP (NDT)



TUESDAY 16 SEPT 1997

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SHEET NO. 9 OF 10

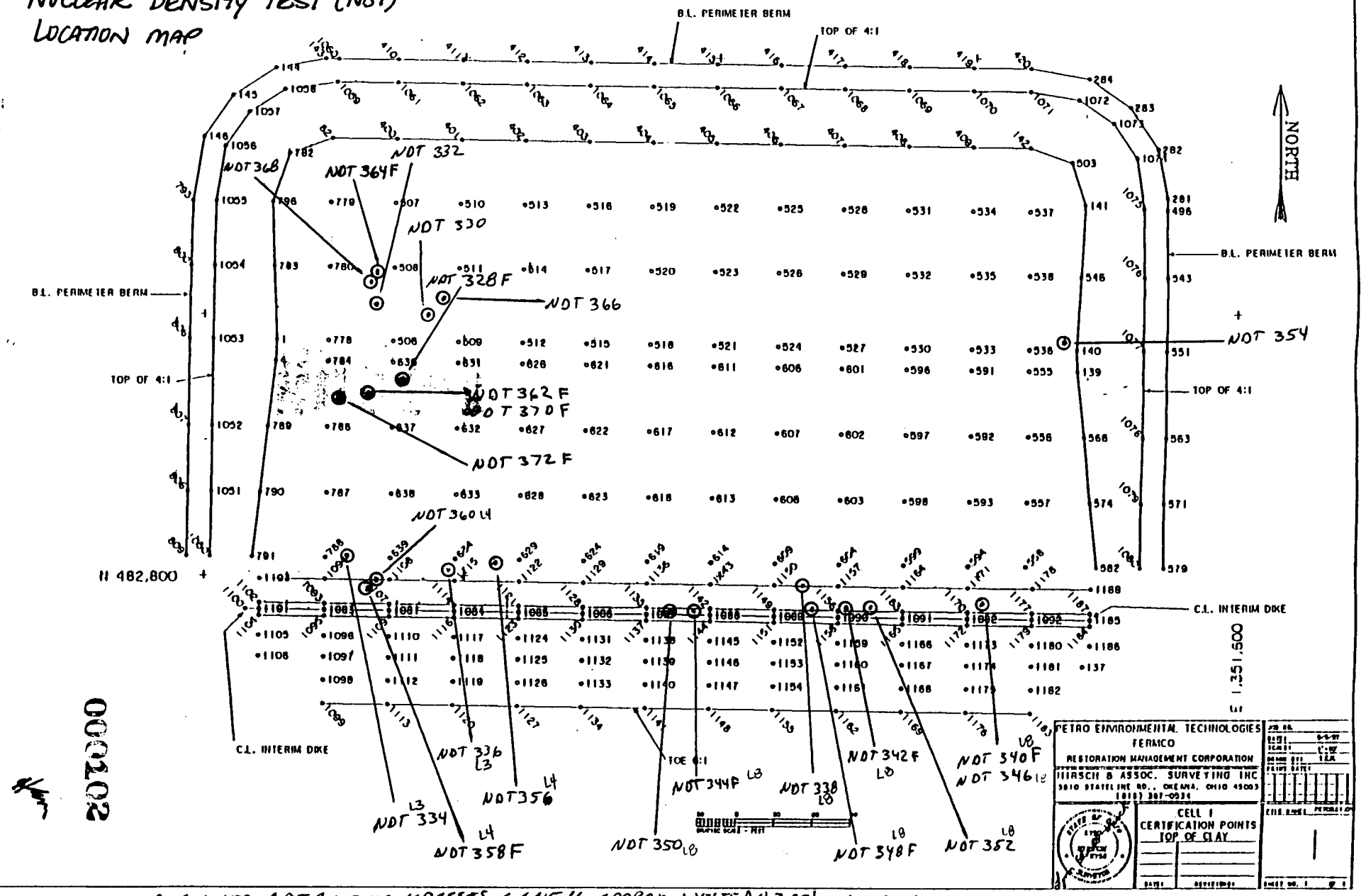
000101

= FAILED TEST

= UNRESOLVED FAILEAREA

16 SEPT. 1997

NUCLEAR DENSITY TEST (NDT) LOCATION MAP



UNRESOLVED AREA ENCOMPASSES LANE 4, APPROX. WESTERN 200', LIFT 6

—NOT TO SCALE—

SHEET NO. 10 OF 10

000102

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 17 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER ~~±8"~~ HEM. 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8" (CIRCLE ONE)

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BY/SQ/BE

	TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
m/c	359	N. BERM SLOPE	6" L4	LP-19	14.0	119.5	15.3	137.1	118.9	99.5	P				
	361	N. BERM SLOPE	6" L4	↓	↓	↓	15.7	132.3	114.3	95.7		F	363	P	
m/c	363	N. BERM SLOPE	6" L4	↓	↓	↓	16.0	135.8	117.1	98.0	P				
	365	N. BERM BENCH	6" L4	** #4	14.6	115.9	16.4	131.9	113.3	97.8	P				
m/c	367	N.E. CORNER SLOPE	6" L1	LP-21	12.5	123.8	13.3	139.1	122.8	99.2	P				
	369	E. BERM SLOPE	6" L2	** #7	17.3	111.0	19.5	130.1	108.9	98.1	P				
	371	E. BERM SLOPE	6" L2	LP-19	14.0	119.5	15.4	135.0	117.0	97.9	P				
	373	N. BERM SLOPE	6" L5	↓	↓	↓	14.9	131.2	114.2	95.6		F	375	P	
	374	LANE 4	6" L6	↓	↓	↓	15.3	133.7	116.0	97.0	P				
m/c	375	N. BERM SLOPE	6" L5	↓	↓	↓	16.4	133.8	114.9	96.2	P				

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

ODD NDT #'S TROXLER 3430 NO. 27418 · RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

EVEN NDT #'S TROXLER 3440 NO. 20979

CHECKED BY: [illegible]

SHEET NO. 1 OF 8

1267

000103

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 17 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~±8"~~ Item 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/SQ/BE

TEST NO. NDT#	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
376	LANE 4	6" L6	STOCKPILE #7 AVG	17.3	111.0	17.7	131.1	111.4	100.4	P				
377	N. BERM SLOPE	6" L5	↓	17.3	111.0	15.7	132.1	114.2	102.9		F	379	P	
378	LANE 4	6" L6	#7 LP-158	15.8	115.1	16.0	135.8	117.1	101.7	P				
379	N. BERM SLOPE	6" L5	STOCKPILE #7 AVG.	17.3	111.0	19.0	131.1	110.2	99.3	P				
380	LANE 8	6" L5	STOCKPILE #4 LP-12	15.2	116.5	16.5	132.3	113.6	97.5	P				
381	N. BERM SLOPE	6" L5	STOCKPILE #7 AVG.	17.3	111.0	17.9	130.8	~~111.0~~ 110.9 9/22/97	99.9	P				
382	LANE 8	6" L5	STOCKPILE #4 LP-12	15.2	116.5	16.5	132.4	113.6	97.6	P				
383	N. BERM SLOPE	6" L4	STOCKPILE #7 AVG.	17.3	111.0	17.0	131.7	112.6	101.4	P				
m/c 384	LANE 8	6" L9	STOCKPILE #4 LP-12	15.2	116.5	16.0	133.5	115.1	98.8	P				
385	N. BERM SLOPE	6" L4	#7 LP-158	15.8	115.1	15.5	135.8	117.6	102.2	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

NOTE: NO LIFT THICKNESS CONTROLS USED BY CONTRACTOR, LIFT THICKNESS IS APPROXIMATE. RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

ODD NDT #S TROXLER 3430 NO. 27418, EVEN NDT #S TROXLER 3440 NO. 20979

12672

000204

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 17 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~±8"~~ Item 1/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% * MOISTURE RANGE: +3% * ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/SW/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
386	E. BERM SLOPE	6" L3	STOCKPILE #7 AVG.	17.3	111.0	19.4	129.4	108.4	97.6	P				
387	E. BERM SLOPE	6" L3	STOCKPILE #7 AVG.	17.3	111.0	18.5	132.7	112.0	100.9	P				
388	E. BERM BENCH	6" L2	STOCKPILE #4 LP-12	15.2	116.5	15.4	135.7	117.6	100.9	P				
389	E. BERM BENCH	6" L2	STOCKPILE #4 LP-12	15.2	116.5	15.0	133.2	115.8	99.4		F	391	P	
390	N.E. CO. SLOPE	6" L2	STOCKPILE #7 AVG.	17.3	111.0	17.9	133.1	112.9	101.7	P				
391	E. BERM BENCH	6" L2	STOCKPILE #4 LP-12	15.2	116.5	14.9	135.8	118.2	101.5	P				

10/6/97

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION.

ODD NDT #S TROXLER 3430 NO. 27418 RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

EVEN NDT #S TROXLER 3440 NO. 20979

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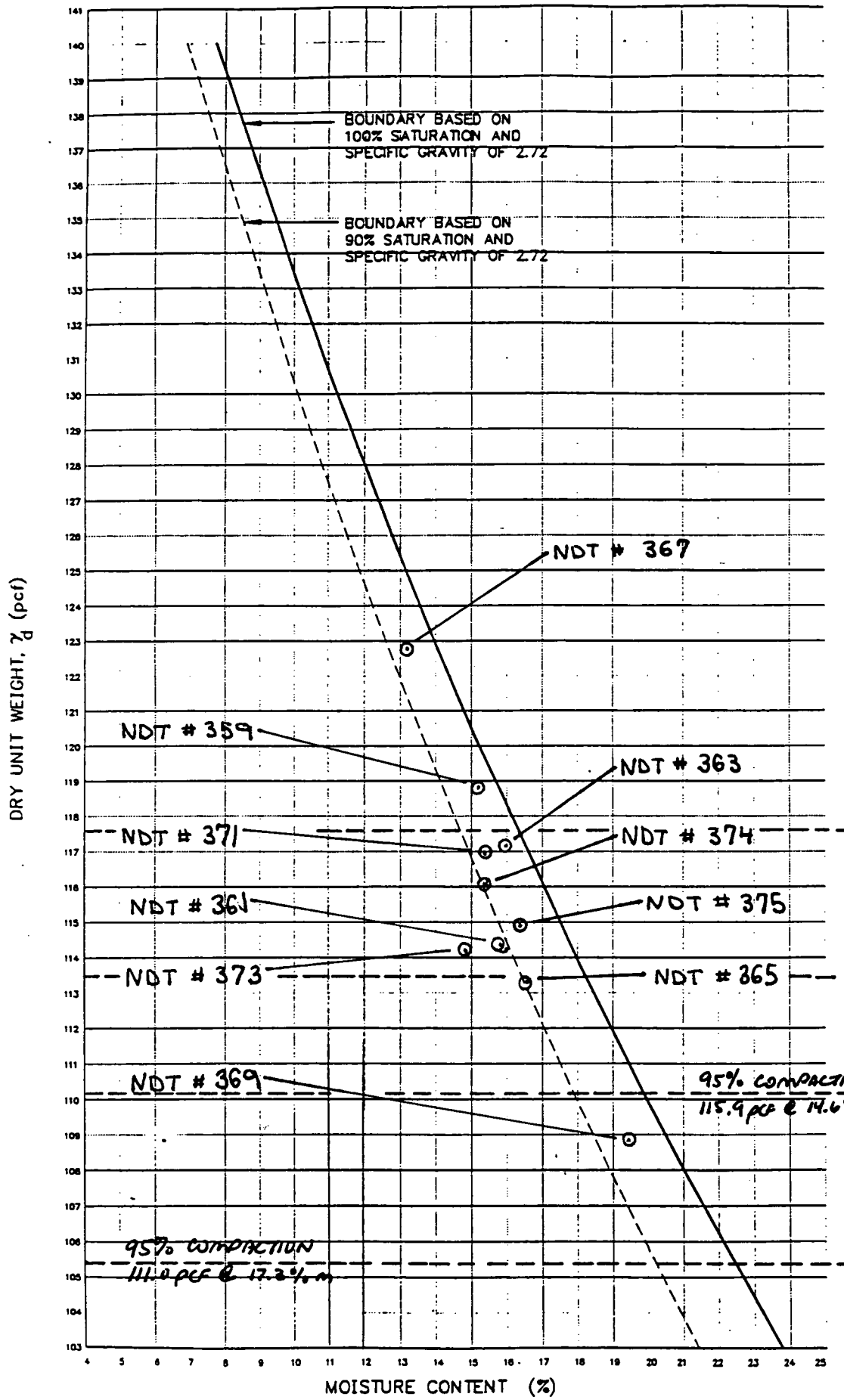
12672

000205

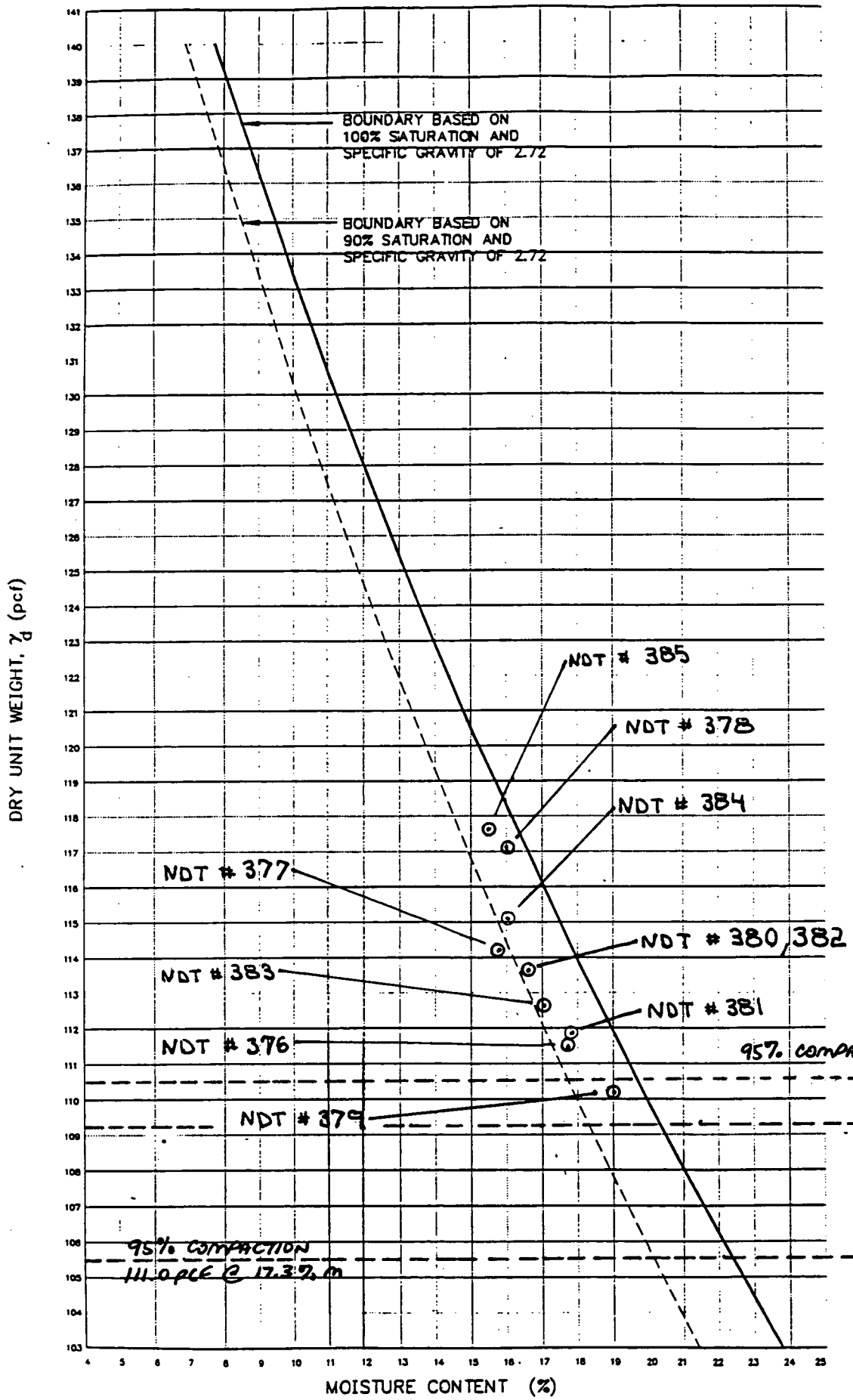
WEDNESDAY 17 SEPT 97



NDT #'S
359 → 375

SHEET NO. 4 OF 8

WEDNESDAY 17 SEPT 1997



NDT #'S
~~386~~ → ~~391~~ JL 23/9/97
376 → 385

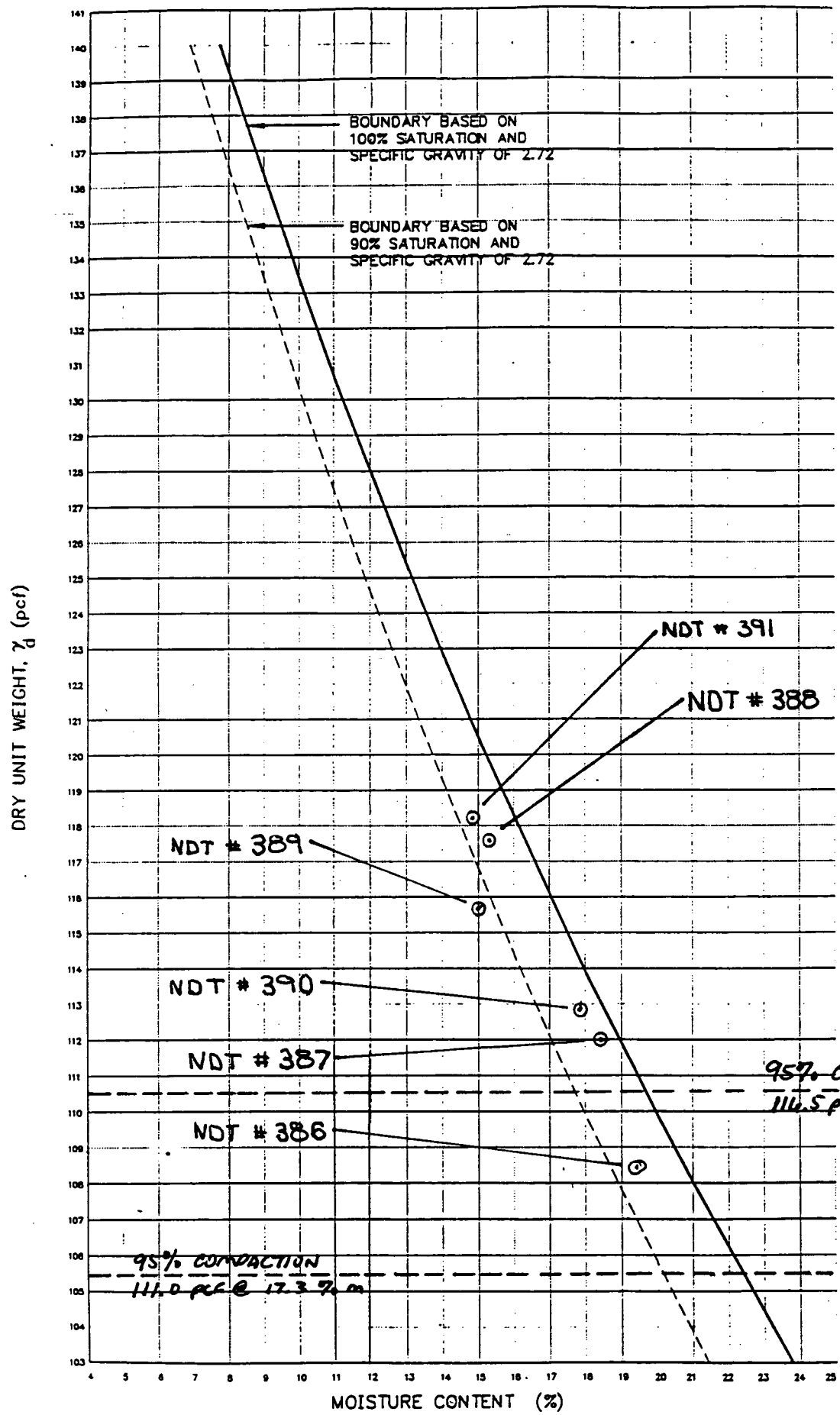
95% COMPACTION 116.5 PCF @ 15.2% m

95% COMPACTION 115.1 PCF @ 15.8% m

000207

SHEET NO. 5 OF 8

WEDNESDAY 17 SEPT 1997

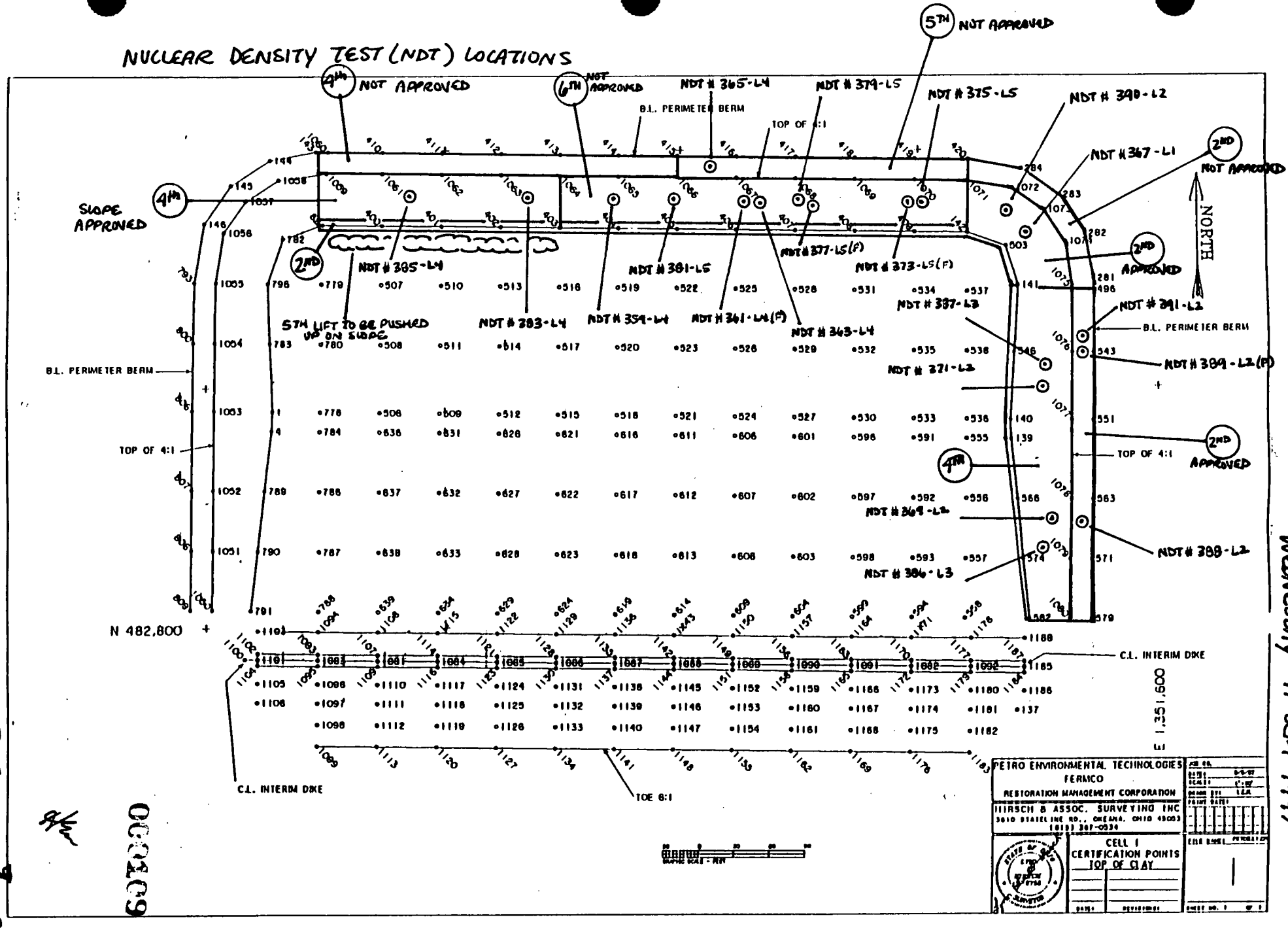


NDT #'S
~~376~~ → 385 (2/19/97)
386 → 391

000108

SHEET NO. 6 OF 9

NUCLEAR DENSITY TEST (NDT) LOCATIONS



WEDNESDAY 17 SEPT 1997

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SHEET NO. 1 OF 10 @ 9/18/97

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17, SEPT. 1997 3 of 3

RECEIVED AUG 06 1997

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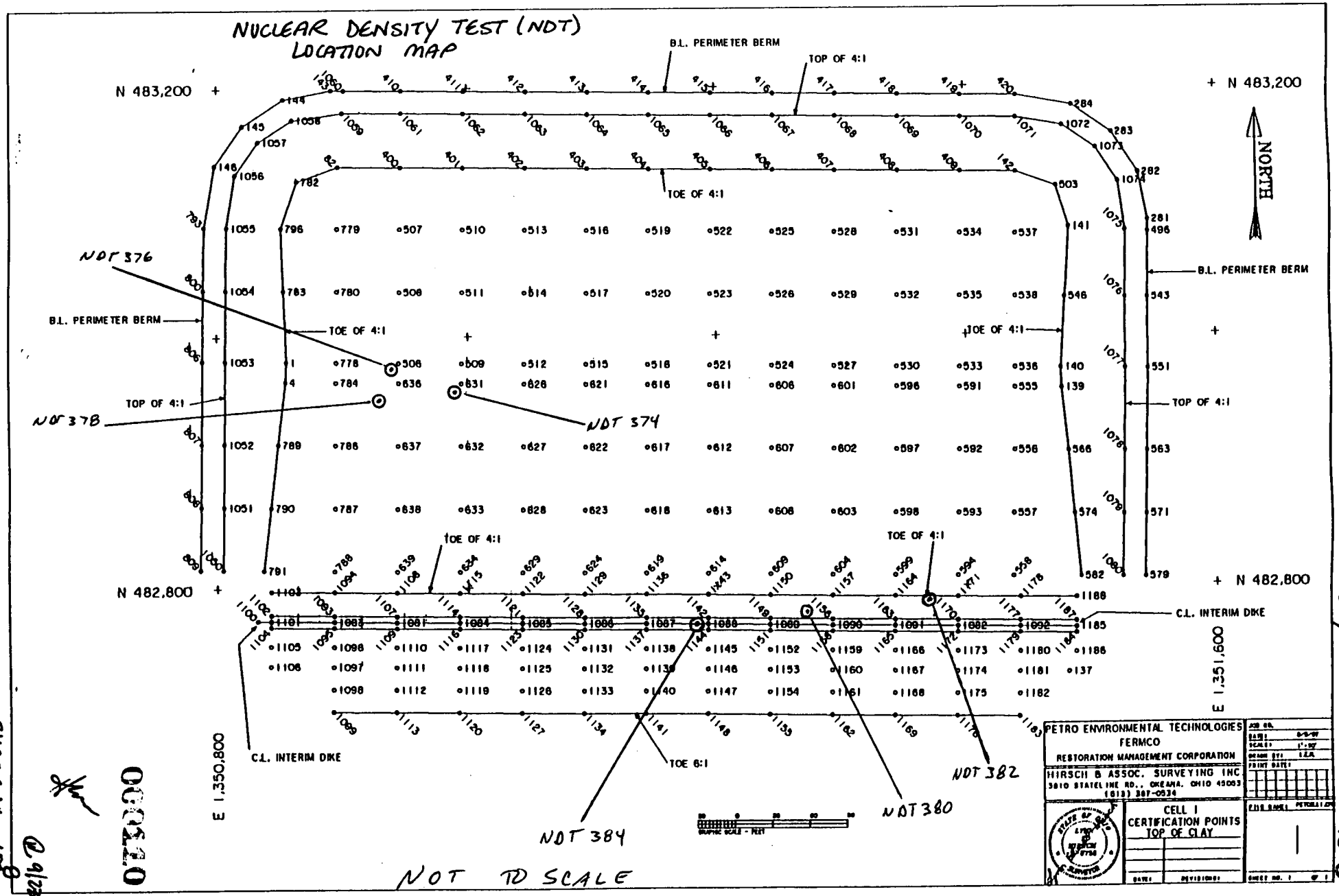
NUCLEAR DENSITY TEST (NDT) LOCATION MAP



WEDNESDAY 17 SEPT 97 1267

SHEET NO. 18 OF 18

@ 9/23/97

000220

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 18 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" (HEM 11/22/97) LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/SB/PP/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP		PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
392	N. BERM SLOPE		6"	L6	LP-12	16.2	116.5	17.9	133.6	113.3	97.3	P				
393	N. BERM SLOPE		6"	L6	↓	↓	↓	15.9	131.9	113.8	97.7		F	395	P	
394	N. BERM SLOPE		6"	L6	↓	↓	↓	15.9	135.4	116.8	100.3	P				
395	N. BERM SLOPE		6"	L6	↓	↓	↓	15.2	135.2	117.4	100.7	P				
396	N.E. CORNER CELL #1	SLOPE	6"	L3	↓	↓	↓	17.4	132.2	112.6	96.7	P				
397	E. BERM SLOPE		6"	L4	↓	↓	↓	16.1	129.8	111.8	96.0		F	399	P	
398	E. BERM SLOPE		6"	L4	↓	↓	↓	14.4	135.2	118.2	101.4	P				
399	E. BERM SLOPE		6"	L4	↓	↓	↓	15.0	134.9	117.3	100.7	P				
400	N. BERM SLOPE		6"	L5	↓	↓	↓	16.4	133.4	114.6	98.4	P				
401	LANE 8	INTERCELL BERM	6"	L3	↓	↓	↓	15.8	133.9	115.6	99.3	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

NOTE: NO THICKNESS CONTROLS USED BY CONTRACTOR, LIFT THICKNESS IS APPROXIMATE. RETESTS IN GENERAL VICINITY OF ORIGINAL TESTS

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 18 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/SW/PP/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
402	LANE B INTERCELL BERM	6" L3	LP-12	15.2	116.5	15.7	130.7	113.0	97.0		F	403	P	
403	LANE B INTERCELL BERM	6" L3	↓	↓	↓	17.2	131.7	112.4	96.5	P				
404	N.E. CORNER BENCH	6" L2	↓	↓	↓	14.0	136.5	119.7	102.8	P				
405	N. BERM BENCH	6" L5	↓	↓	↓	14.1	132.0	115.7	99.3		F	409	P	

KW 10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION
RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

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12667

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 18 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ LIFT THICKNESS (LOOSE/COMPACTED): ~~±8"~~

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/SQ/PP/BE

	TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
	406	N. BERM BENCH	6" L5 ~~L6~~	** #4	14.6	115.9	16.9	133.6	114.3	98.6	P				
m/c	407	N. BERM BENCH	6" L4 ~~L6~~	↓	14.6	115.9	15.2	134.4	116.7	100.7	P				
	408	N. BERM BENCH	6" L4 ~~L5~~	↓	14.6	115.9	16.1	130.8	112.7	97.2		F	410	P	
	409	N. BERM BENCH	6" L5 ~~L6~~	↓	14.6	115.9	15.7	134.5	116.2	100.3	P				
	410	N. BERM BENCH	6" L4 ~~L5~~	LP-21	12.5	123.8	14.1	137.3	120.3	97.2	P				
	411	LANE 8	6" L	LP-12	15.2	116.5	14.7	134.8	117.5	100.9	P				
	412	E. BERM BENCH	6" L3	** #4	14.6	115.9	14.3	136.9	119.8	103.3	P				
SC	413	E. BERM BENCH	6" L3	** #4	14.6	115.9	15.1	135.3	117.5	101.4	P				
	414	SEE ATTACHED MAP LANE 8	6" L5	LP-12	15.2	116.5	22.6	125.6	102.4	87.9		F	431	P	
	415	↓ INTERCELL BERM	6" L9	LP-12	15.2	116.5	16.3	133.8	115.0	98.8	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

SC = SANDCONE ** AVG VALUE FOR STOCKPILE NO. 4

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

1262

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 18 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~±8"~~ HEM 11/24/97 LIFT THICKNESS (LOOSE/COMPACTED): ~~±8"~~

% COMPACTION: 95% APZ MOISTURE RANGE: +3% APZ ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/SD/AP/BE

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
416	LANE #8	6" L5	LP-12	15.2	116.5	17.4	128.7	109.6	94.1		F	432		F
417	LANE #8	6" L5	LP-12	15.2	116.5	14.7	133.1	116.0	99.6		F	438	P	
418	E. BERM SLOPE	6" L5	** #4	14.6	115.9	15.3	133.1	115.4	99.6		F	427	P	
419	E. BERM SLOPE	6" L5	** #4	14.6	115.9	14.9	134.3	116.9	100.8		F	420	P	
420	SEE ATTACHED MAP E. BERM SLOPE	6" L5	LP-12	15.2	116.5	15.6	134.8	116.6	100.1	P				
421	LANE #8 INTERCELL BERM	6" L3				16.9	131.1	112.2	96.3	P				
▲ 422	HORIZONTAL M.W.	6" L4				16.5	132.8	114.0	97.8	P				
423	N. BERM SLOPE	6" L6				15.2	131.6	114.2	98.1		F	433	P	
424	N. BERM SLOPE	6" L6				15.9	132.9	114.7	98.4	P				
425	N. BERM BENCH	6" L5				15.7	135.5	117.1	100.5	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

▲ - COMPACTED FILL

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1267

00024

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 18 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" LIFT THICKNESS (LOOSE / COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/SW/PA/BE

TEST NO. NDT#	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
426	E. BERM SLOPE	6" L5	LP-12	15.2	116.5	17.1	134.8	115.1	98.8	P				
427	E. BERM SLOPE	6" L5	LP-12	15.2	116.5	15.6	134.9	116.7	100.2	P				

10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

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000225

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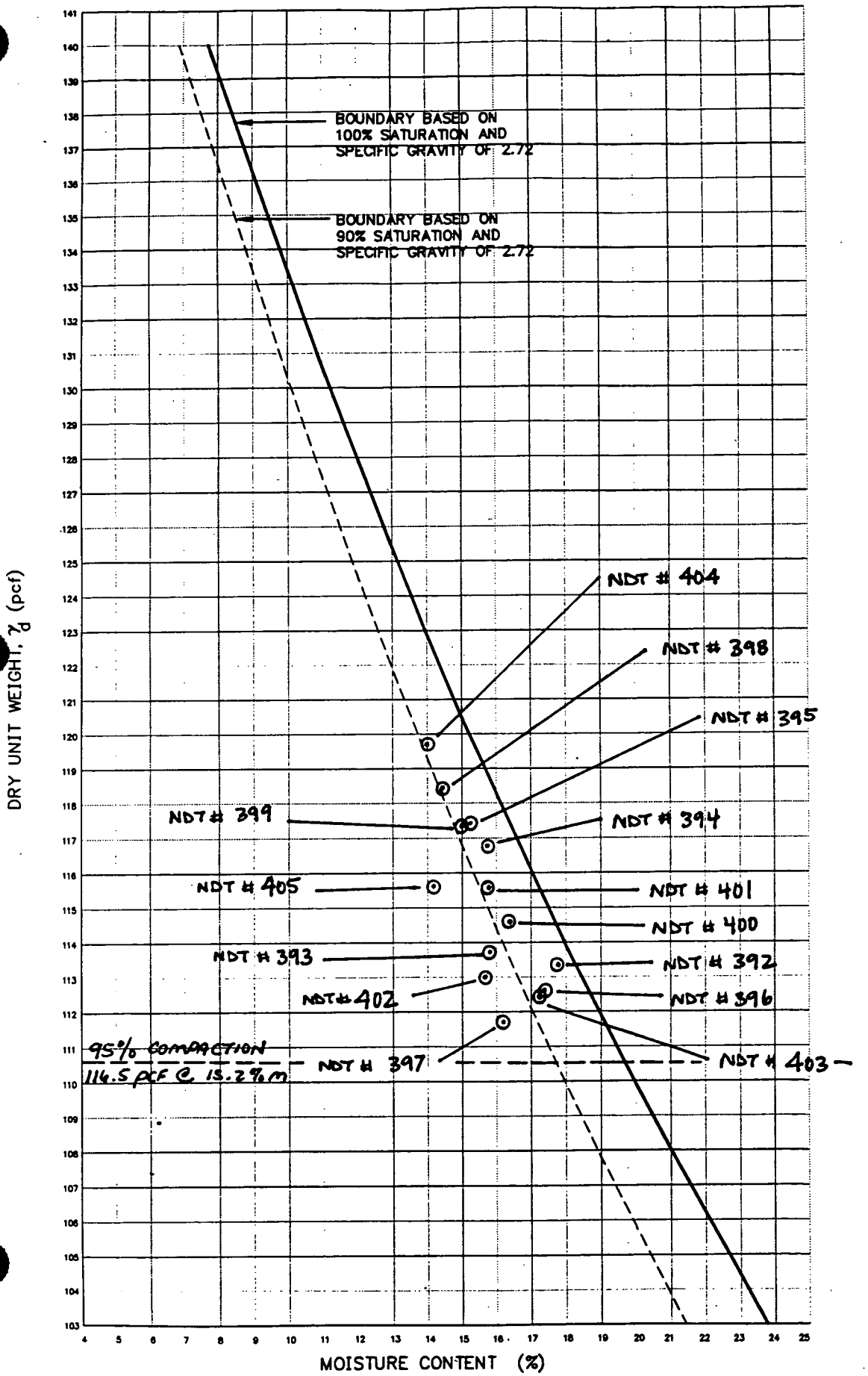
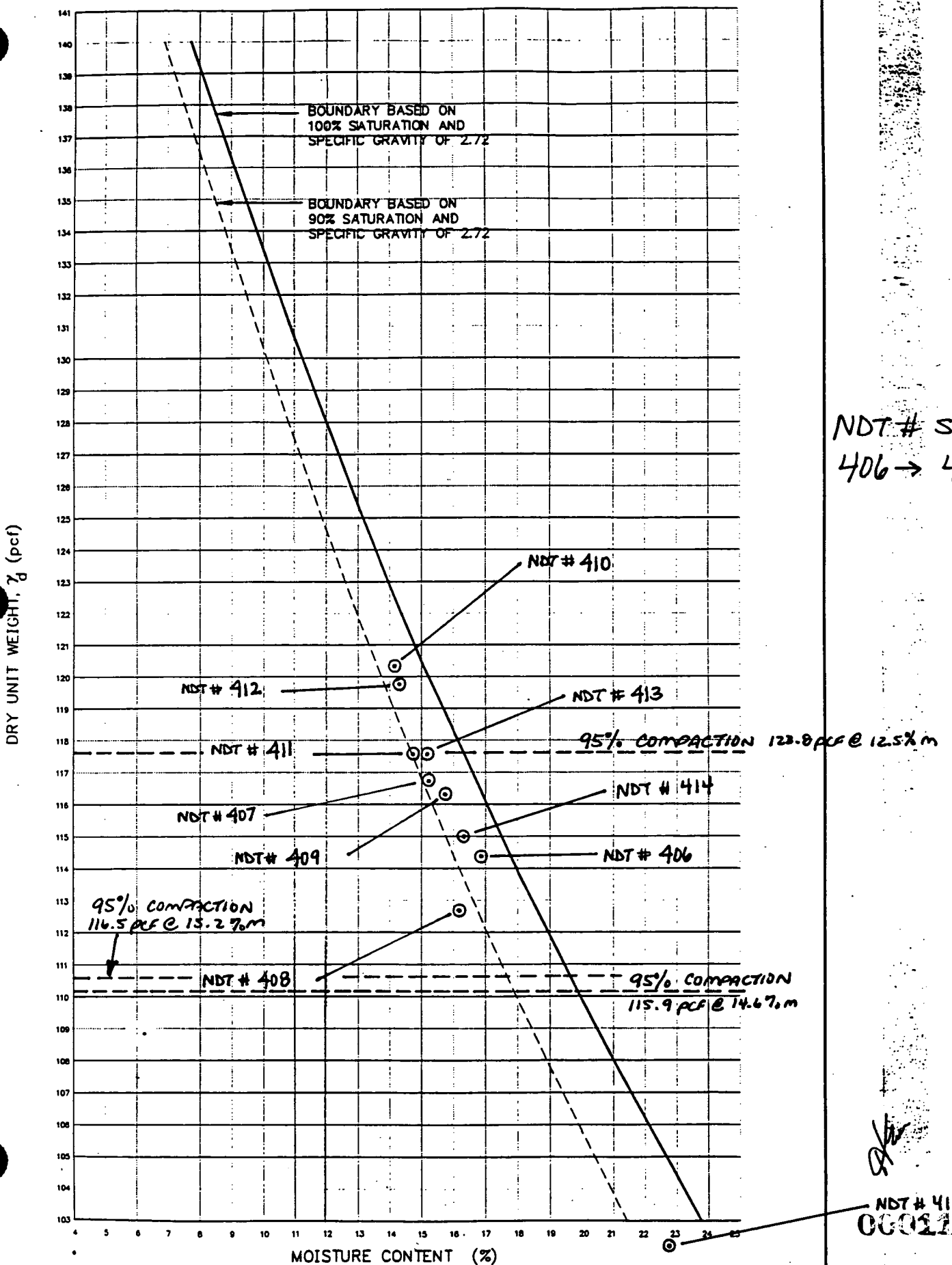
9/23/97

THURSDAY 18 SEPT 97



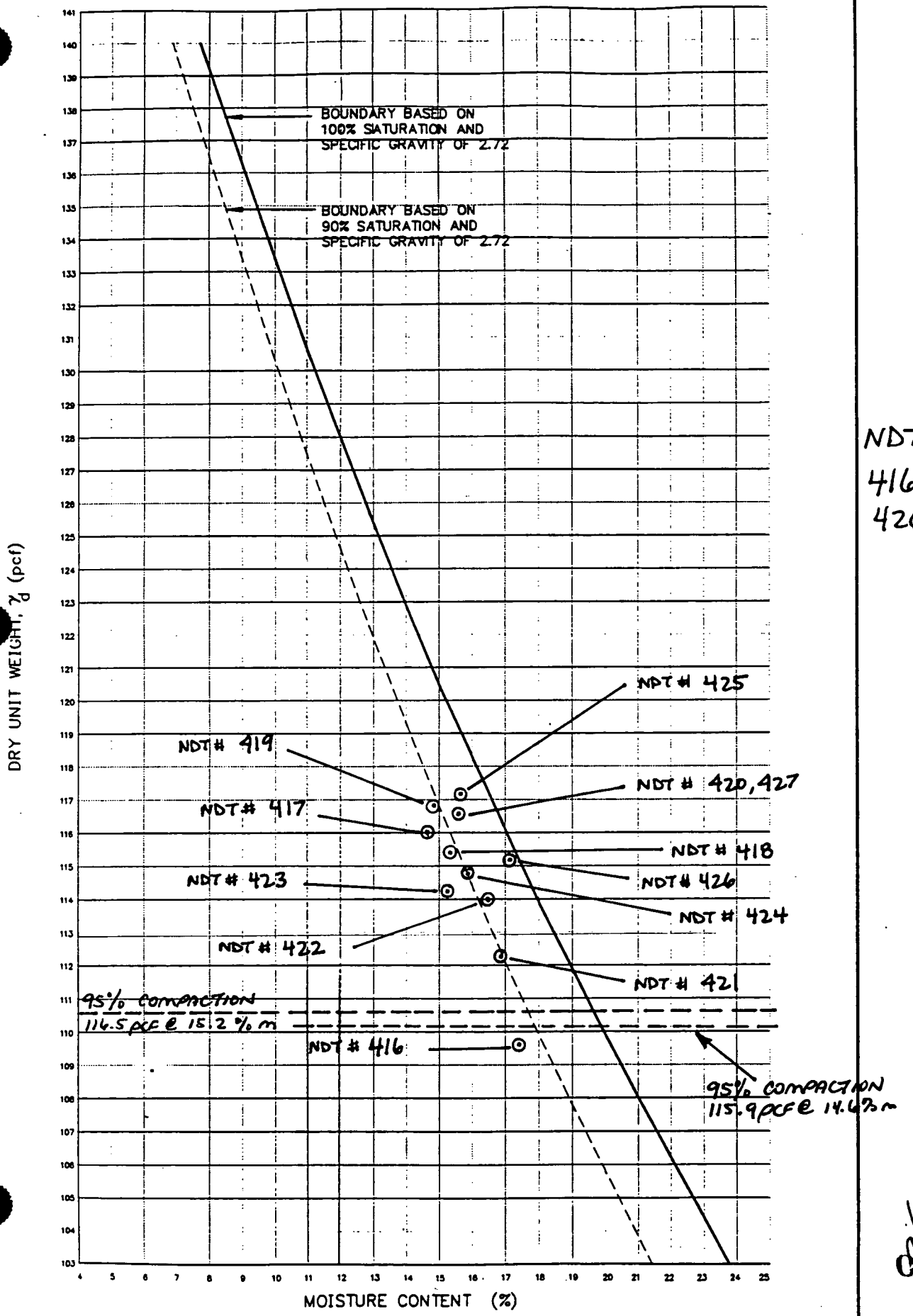
NDT # 392 → 405

THURSDAY 18 SEPT 1997



NDT # S
406 → 415

THURSDAY 18 SEPT 1997



NDT #'s
416 → 425,
426, 427

00218

SHEET NO. 8 OF 109

18 SEPT. 1997

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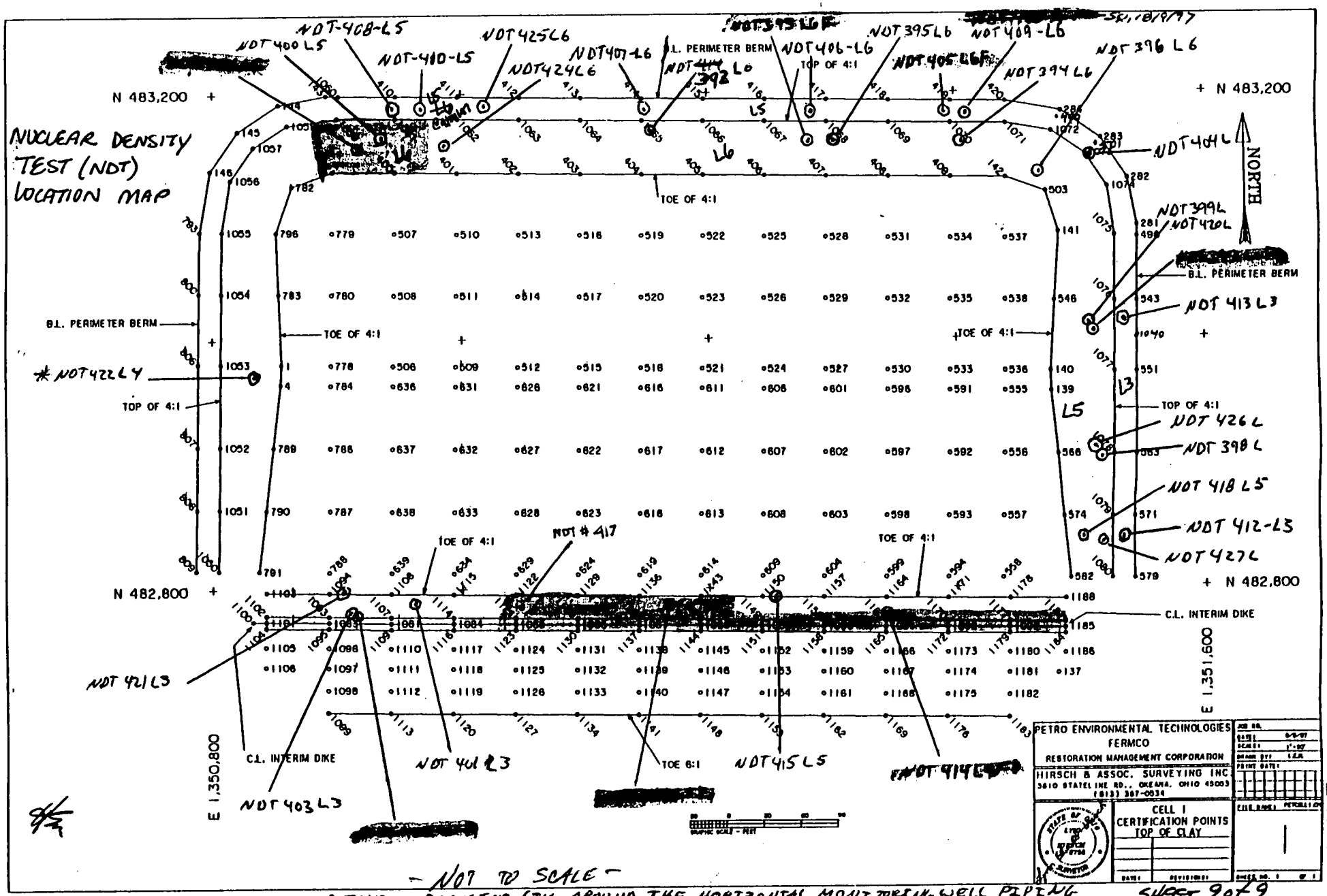
NUCLEAR DENSITY TEST (NDT) LOCATION MAP



- NOT TO SCALE -

* FIFTH LIFT OF MATERIAL OVER THE EMBEDMENT FILL AROUND THE HORIZONTAL MONITORING WELL PIPING

NOTE: LIFT NUMBERS AND AREAS ARE AS PER DAVID WILLIAMS FROM DISCUSSION 15 SEPT. 1997

OU2219

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: FRIDAY 19 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" HEM 4/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BE/SG/DP

	TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
	428	N. BERM BENCH	6" L6	LP-17	13.2	118.8	13.7	137.7	121.1	101.9	P				
DT	429	N. BERM BENCH	6" L6	↓	↓	↓	14.9	135.4	117.8	99.2	P				
	430	N. BERM BENCH	6" L6	↓	↓	↓	15.7	133.6	115.5	97.2	P				
	431	LANE 8 INTERCELL BERM	6" L9	↓	↓	↓	15.5	135.0	116.9	98.4	P				
	432	↓	L9	↓	↓	↓	14.5	133.7	116.8	98.3		F	434		F
	433	N. BERM SLOPE	6" L6	↓	↓	↓	16.0	135.5	116.8	98.3	P				
	434	LANE 8 INTERCELL BERM	6" L9	↓	↓	↓	15.5	130.4	112.9	95.0		F	435		F
	435	↓	6" L9	↓	↓	↓	14.9	133.0	115.8	97.5		F	437		F
▲	436	COMPACTED FILL HORIZONTAL M. WELL	6" L6	OSDF-4	14.0	117.8	16.1	134.8	116.1	98.6	P				
	437	LANE 8 INTERCELL BERM	6" L9	LP-17	13.2	118.8	18.5	119.4	100.8	84.8		F	460	P	

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

PROCTOR USED IS VERIFIED BY CHECKPOINT DT = DRIVE TUBE DENSITY PERFORMED

▲ - COMPACTED FILL · RETESTS IN GENERAL VICINITY OF ORIGINAL TESTS

000120

12672

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: FRIDAY 19 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED): ±8" (CIRCLE ONE)

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BE/SB/PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
438	LANE #8 INTERCELL BERM	6" L3	LP-17	13.2	118.8	14.0	136.3	119.6	100.7	P				
439		6" L3				15.7	133.6	115.5	97.2	P				
440		6" L3				14.1	133.8	117.3	98.7		F	441	P	
441		6" L3				16.3	134.1	115.3	97.1	P				
442	N. BERM BENCH	6" L7				15.2	133.9	116.2	97.8		F	448	P	
443	N. BERM BENCH	6" L7				14.8	133.2	116.0	97.6		F	447	P	
444	N.E. CORNER BENCH	6" L3				15.0	135.0	117.4	98.8	P				
445	E. BERM BENCH	6" L4				16.1	129.8	111.8	94.1		F	449	P	
446	E. BERM BENCH	6" L4				14.5	136.5	119.2	100.3	P				
447	N. BERM BENCH	6" L7				13.9	136.3	119.7	100.8	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION
PROCTOR USED IS VERIFIED BY CHECKPOINT
RETESTS IN GENERAL VICINITY OF ORIGINAL TESTS

CHECKED BY: [signature]

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

FRIDAY DATE: 19 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) OTHER: ±8 HEM 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BE/BP

	TEST NO. NDT#	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
	448	N. BERM BENCH	6" L7	LP-17	13.2	118.8	14.3	136.6	119.5	99.4	P				
SC	449	E. BERM BENCH	6" L4	↓	↓	↓	14.4	135.5	118.4	99.7	P				

10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION PROCTOR USED IS VERIFIED BY CHECK POINT. SC = SAND CONE PERFORMED

©GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: HEM SHEET NO. 3 OF 6

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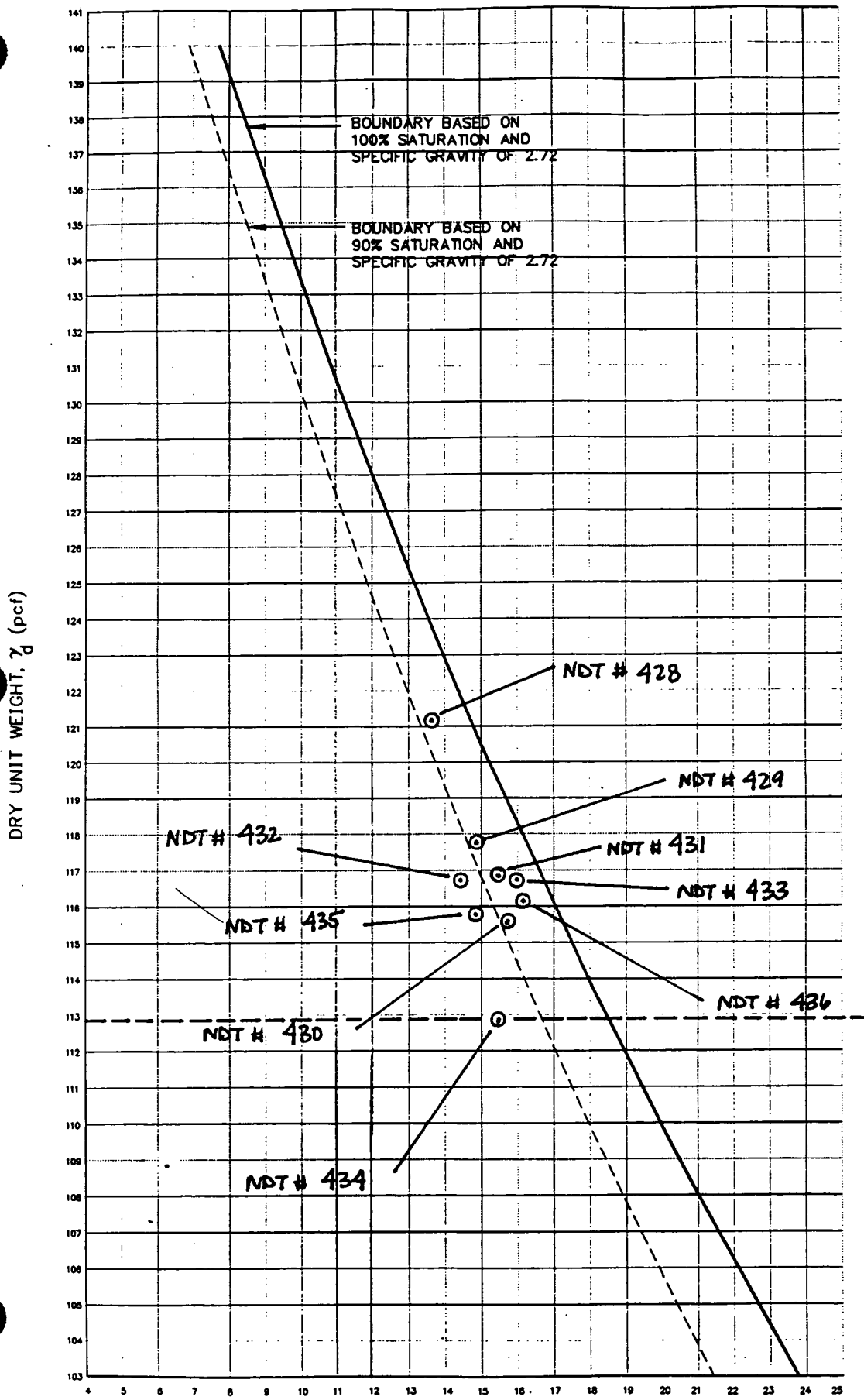
FRIDAY 19 SEPT 1997



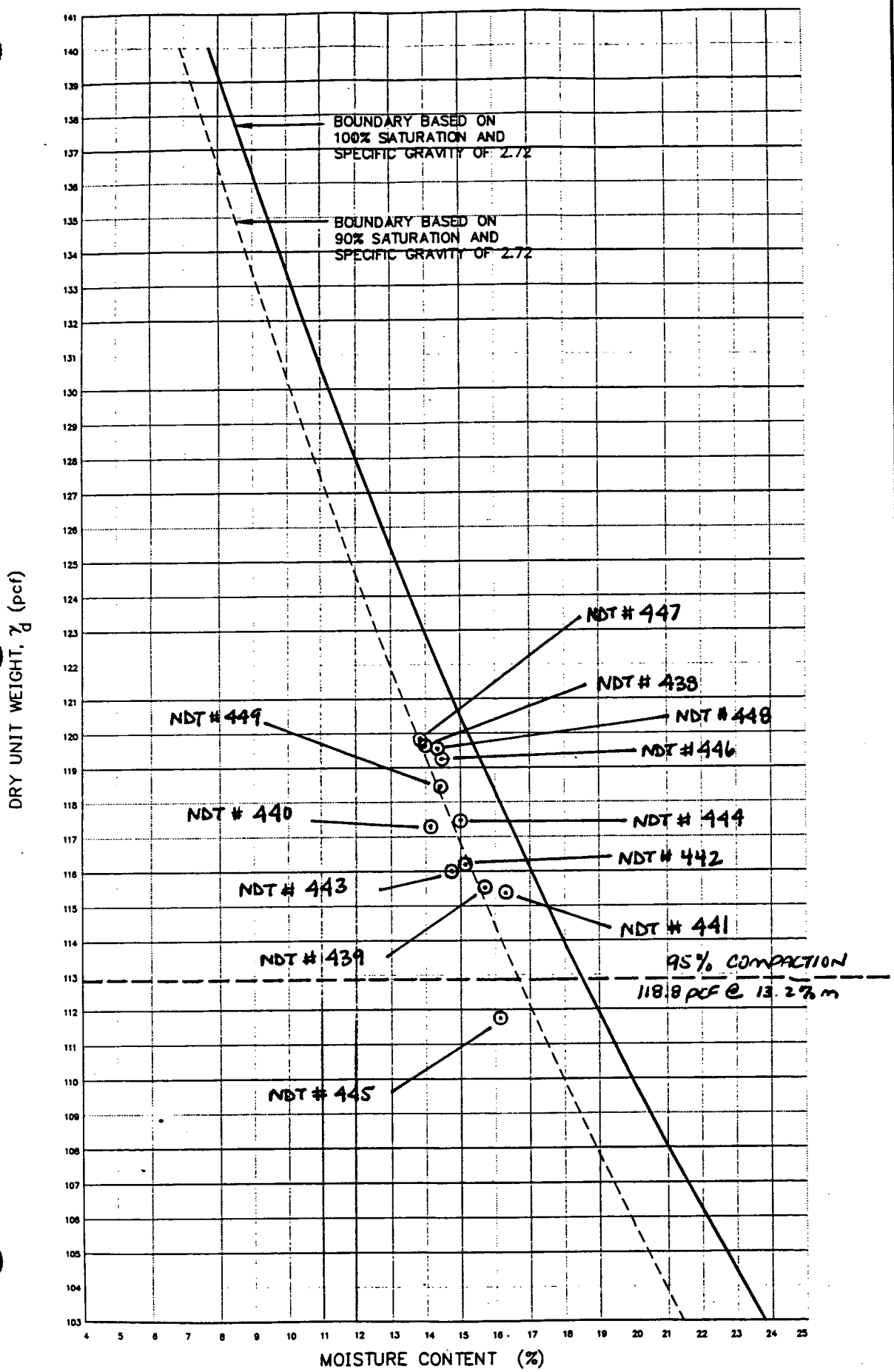
NDT #'S 428 → 437

95% COMPACTION 118.8 pcf @ 12.2% m

NOTE: NDT # 437 DOES NOT PLOT ON GRAPH

SHEET NO. 4 OF 6

FRIDAY 19 SEPT 97

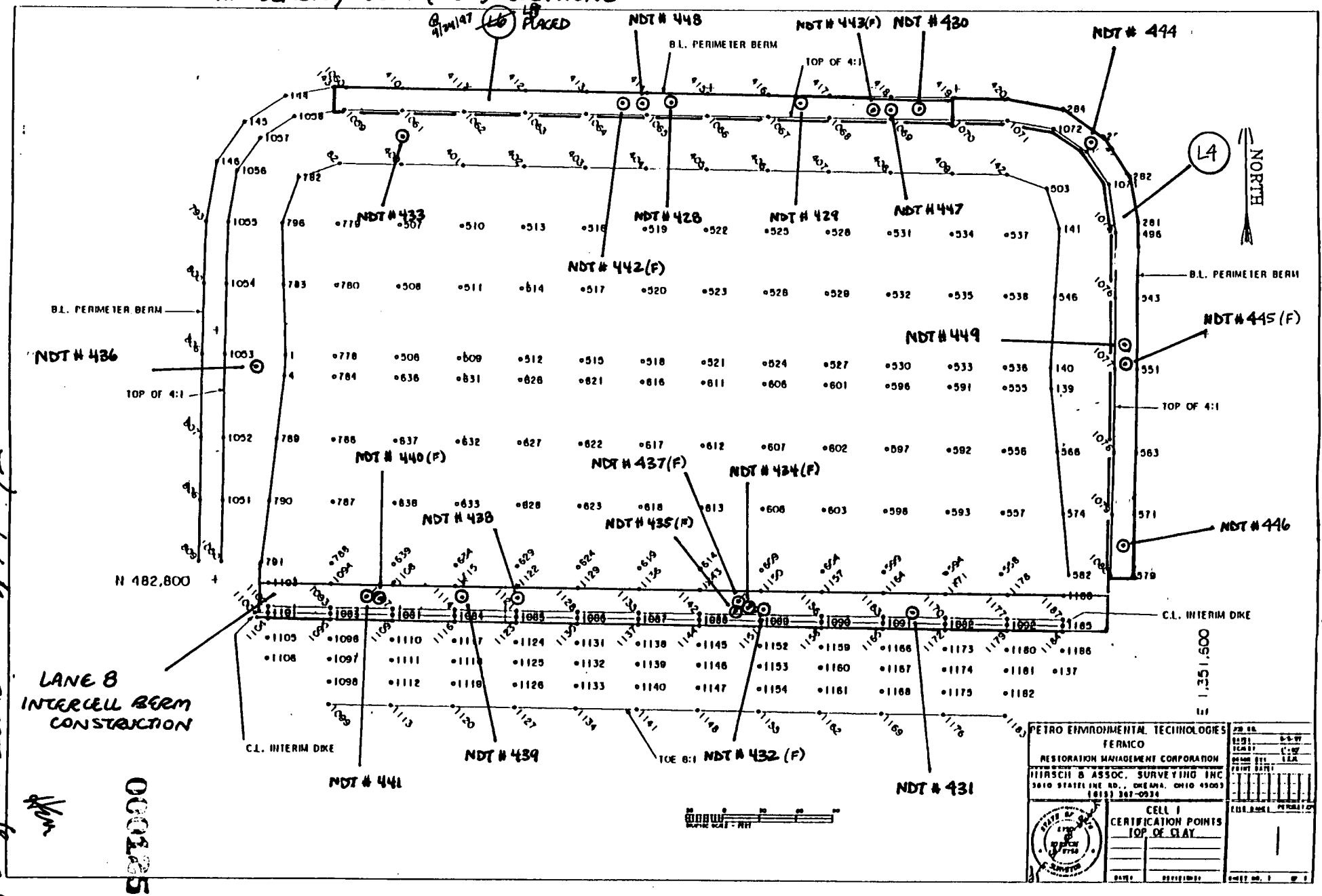


NDT #'s
438 → 449

000224

SHEET NO. 5 OF 6

NUCLEAR DENSITY TEST (NDT) LOCATIONS



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BY: Jack Wilke

SHEET NO. 6 OF 6

00025

FRIDAY 19 SEPT 97 1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: SATURDAY 20 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~8"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): 8"

% COMPACTION: 95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BE/PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
450	N.E. CORNER BENCH	6" L4 ~~L5~~	#7	15.8	115.1	16.1	131.7	113.4	98.5		F	453	P	
451	E. BERM BENCH	6" L5	#7	↓	↓	15.6	134.0	115.9	100.7	P				
452	E. BERM BENCH	6" L5	#7	↓	↓	16.0	130.6	112.6	97.8		F	454	P	
453	N.E. CORNER BENCH	6" L4 ~~L5~~	#7	↓	↓	15.9	135.0	116.5	101.2	P				
454	E. BERM BENCH	6" L5	#7	↓	↓	16.4	132.9	114.2	99.2	P				
455	E. BERM BENCH	6" L6	#7	↓	↓	16.1	133.1	114.6	99.6	P				
456	E. BERM BENCH	6" L6	#7	↓	↓	16.9	133.0	113.8	98.9	P				
457	LANE 8 INTERCELL BERM	6" L4	#4	15.2	116.5	15.7	134.2	116.0	99.6	P				
458	↓	6" L4	↓	↓	↓	15.1	134.8	117.1	100.5	P				
459	↓	6" L10	↓	↓	↓	14.6	136.6	119.2	102.3	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION
RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

00028 6

- 12677

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: SATURDAY 20 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±8" HEM 9/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: + 3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

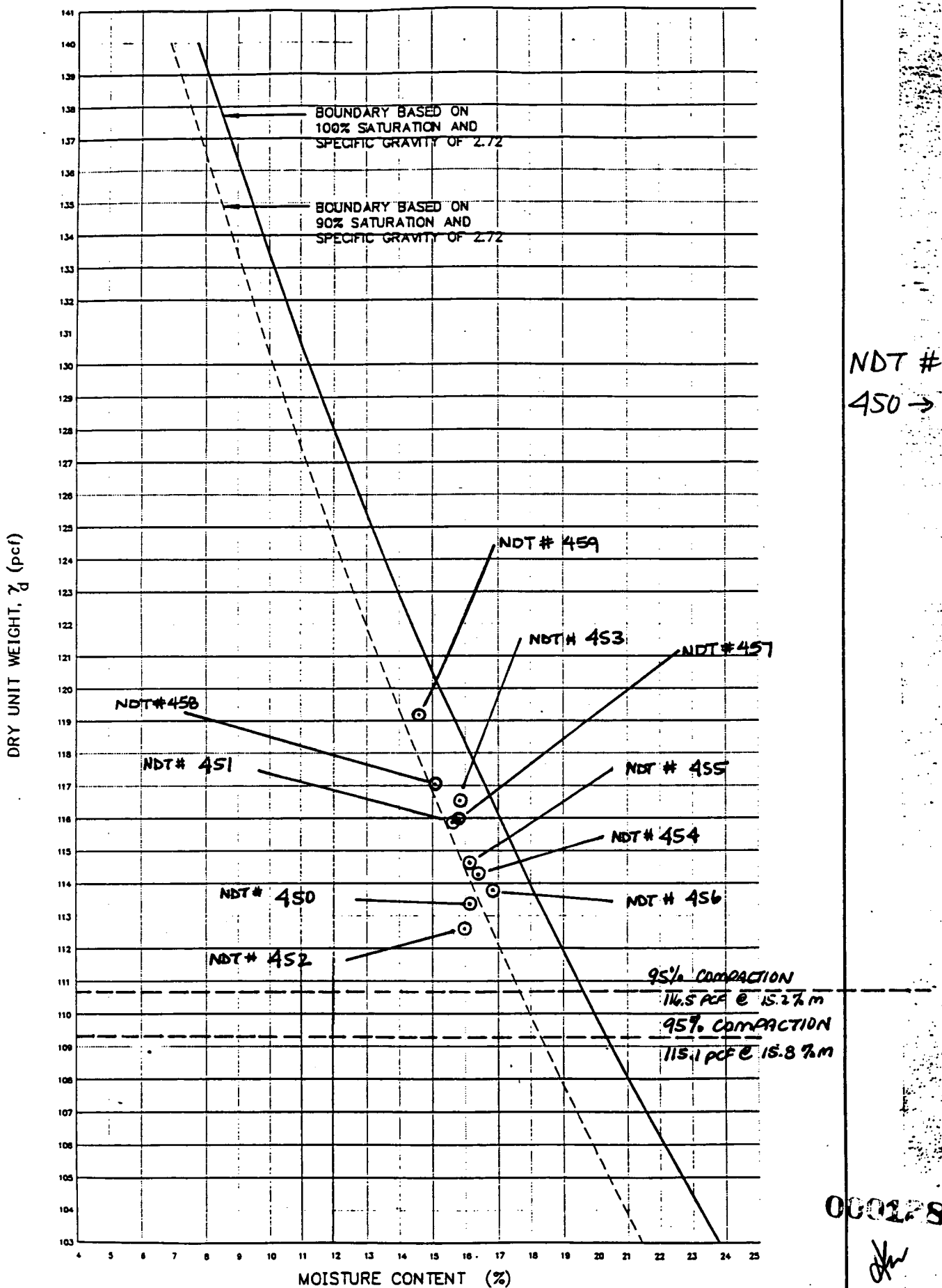
NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: BE

TEST NO. NDT#	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
460	LANE B INTERCELL BERM	6" L10	#4	15.2	116.5	14.6	134.9	117.7	101.0	P				
461		6" L5				16.9	133.5	114.2	98.0	P				
462		6" L11				16.4	134.8	115.8	99.4	P				
463		6" L11				16.9	131.3	112.3	96.4	P				
464		6" L6				17.5	132.4	112.7	96.7	P				
465		6" L12				15.5	135.5	117.3	100.7	P				
466		6" L12				17.7	132.4	112.5	96.6	P				
467		6" L7				14.6	136.2	118.8	102.0	P				

10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02 A OF PROJECT SPECIFICATION

SATURDAY 20 SEPT 97



NDT #'S 450 → 459

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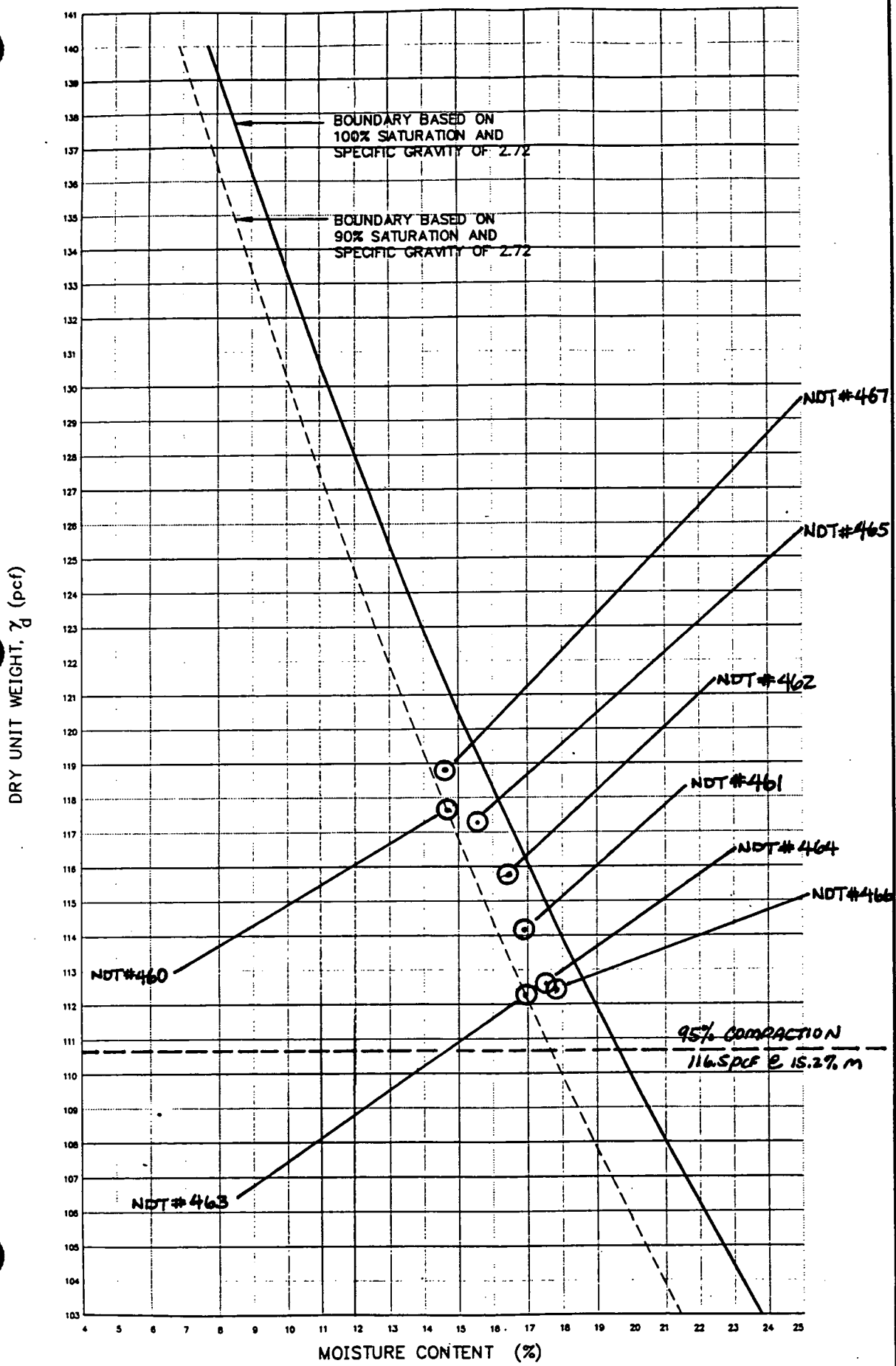
SHEET NO. 3 OF 5

SATURDAY 20 SEPT 1997



NDT #'S
460 → 467

SHEET NO. 4 OF 5

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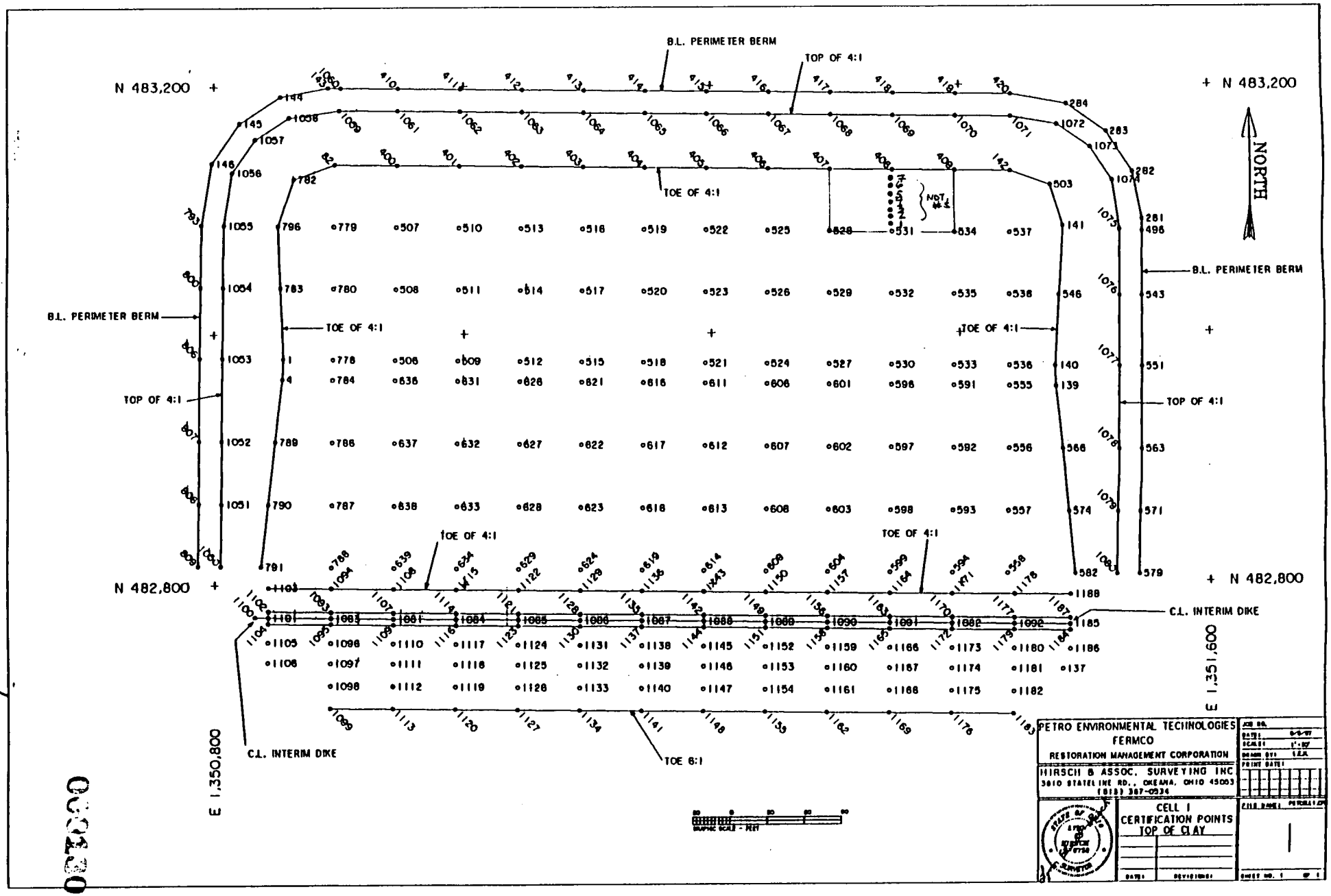

MONDAY 11 AUG 97 1267

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 12 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±10" LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: * APZ 95% MOISTURE RANGE: * APZ +3% ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: — QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
~~235~~ 8	SEE ATTACHED MAP	6" / 1ST.	LP-25A	12.7	123.0	12.8	134.4	119.1	96.8		F	43	P	
~~236~~ 9	↓	↓	↓	↓	↓	14.5	135.0	117.9	95.9		F	43	P	
~~237~~ 10						14.0	136.6	119.7	97.3	P				
~~238~~ 11						13.5	136.4	120.2	97.7		F	43	P	
~~239~~ 12						13.9	135.5	118.9	96.7		F	43	P	
~~240~~ 13						12.4	137.3	122.1	99.3		F	43	P	

KEM 8/22/97

* ACCEPTABLE PERMEABILITY ZONE (APZ)

COMMENTS: TESTS PERFORMED IN LANE #1 → N.E. CORNER OF CELL #1. DYNAPAK CA251 VIBRATORY SMOOTH DRUM ROLLER WAS UTILIZED FOR COMPACTION AFTER CAT 815B COMPACTOR WAS UTILIZED. COMPACTION USING VIBRATORY DRUM ROLLER IS NOT SPECIFIED. TEST AREA USE ONLY.

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TUESDAY 12 AUG 97

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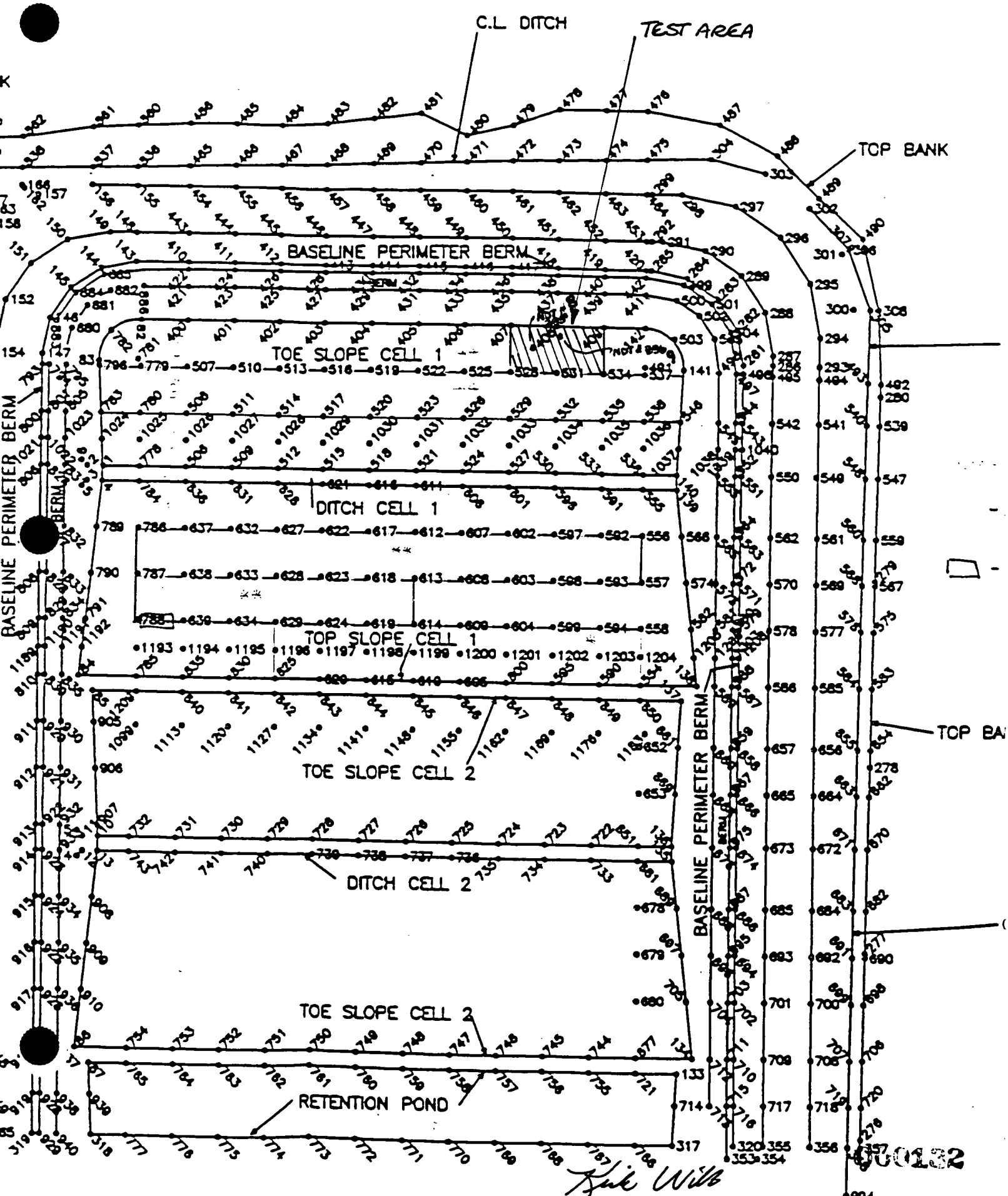

Rick Wills

000132

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 13 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ± 10" LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: * APZ 95% MOISTURE RANGE: * APZ +3% ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: - QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
~~24414~~	SEE ATTACHED MAP	6" / 1ST	LP-43	14.0	120.2	11.9	137.5	122.9	102.2		F	21	P	
~~24215~~	↓	↓	LP-43	14.0	120.2	11.8	136.4	122.0	101.5		F	23	P	
~~24316~~			LP-25A	12.7	123.0	14.7	134.1	116.9	95.0		F	43	P	
~~24417~~			LP-43	14.0	120.2	12.8	135.7	120.3	100.1		F	21	P	
~~24518~~			LP-43	14.0	120.2	11.6	137.5	123.2	102.5		F	21	P	
~~24619~~			LP-25A	12.7	123.0	12.3	137.1	122.0	99.2		F	43	P	
~~24720~~			LP-43	14.0	120.2	12.9	136.6	121.0	100.7		F	22	P	

HW 8/22/97

* APZ → ACCEPTABLE PERMEABILITY ZONE

COMMENTS: TEST AREAS - LANE NO.'S ~~#~~ @011447 1 AND 2 NORTHEAST CORNER.

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PHASE I CONSTRUCTION
CLAY LINER TEST AREA

WEDNESDAY 13AUG97

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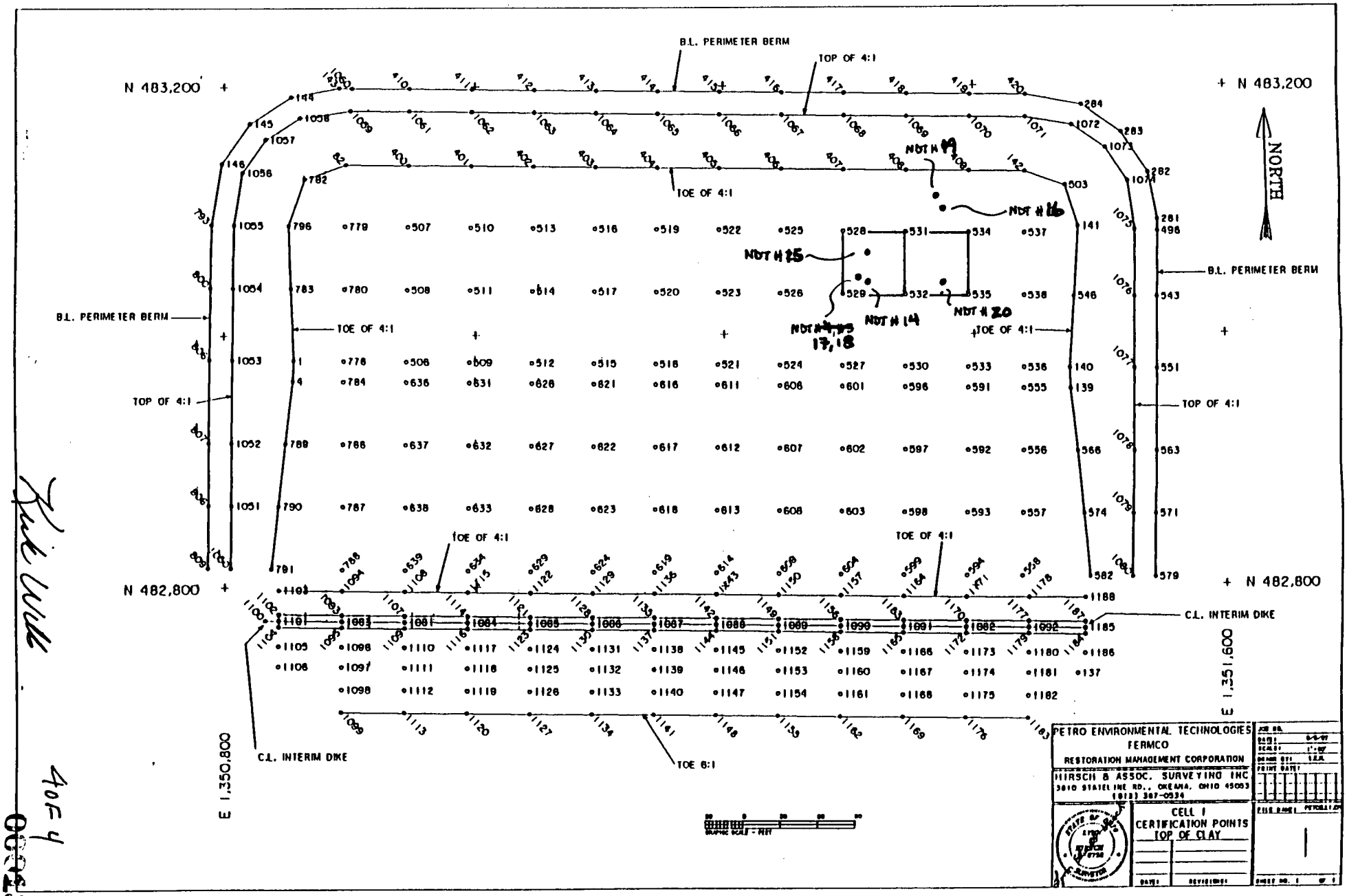
Q.740 ..... R63



File Note

4 of 4

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 19 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±10 +2 @ 8/20/97 LIFT THICKNESS (LOOSE/COMPACTED): ± 8"
(CIRCLE ONE)

% COMPACTION: APZ * 95% MOISTURE RANGE: APZ * +3% ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: ~2% (MICROWAVE) QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
~~24821~~	SEE ATTACHED MAP LANE #2 LIFT #1	6" / 1ST	LP-43	14.0	120.2	15.6	134.3	116.2	96.7	P				
~~24922~~	↓	↓	↓	↓	↓	14.6	135.7	118.4	98.5	P				
~~25023~~						15.4	136.1	117.9	98.1	P				
~~25124~~						16.2	133.5	114.9	95.6	P				

KW 8/22/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SPECIFICATION 02225 PART 3.02A
CLAY LINER TEST AREA → LANE #2 BETWEEN CONTROL PTS. 528-529 AND 534-535 (SEE ATTACHED MAP)

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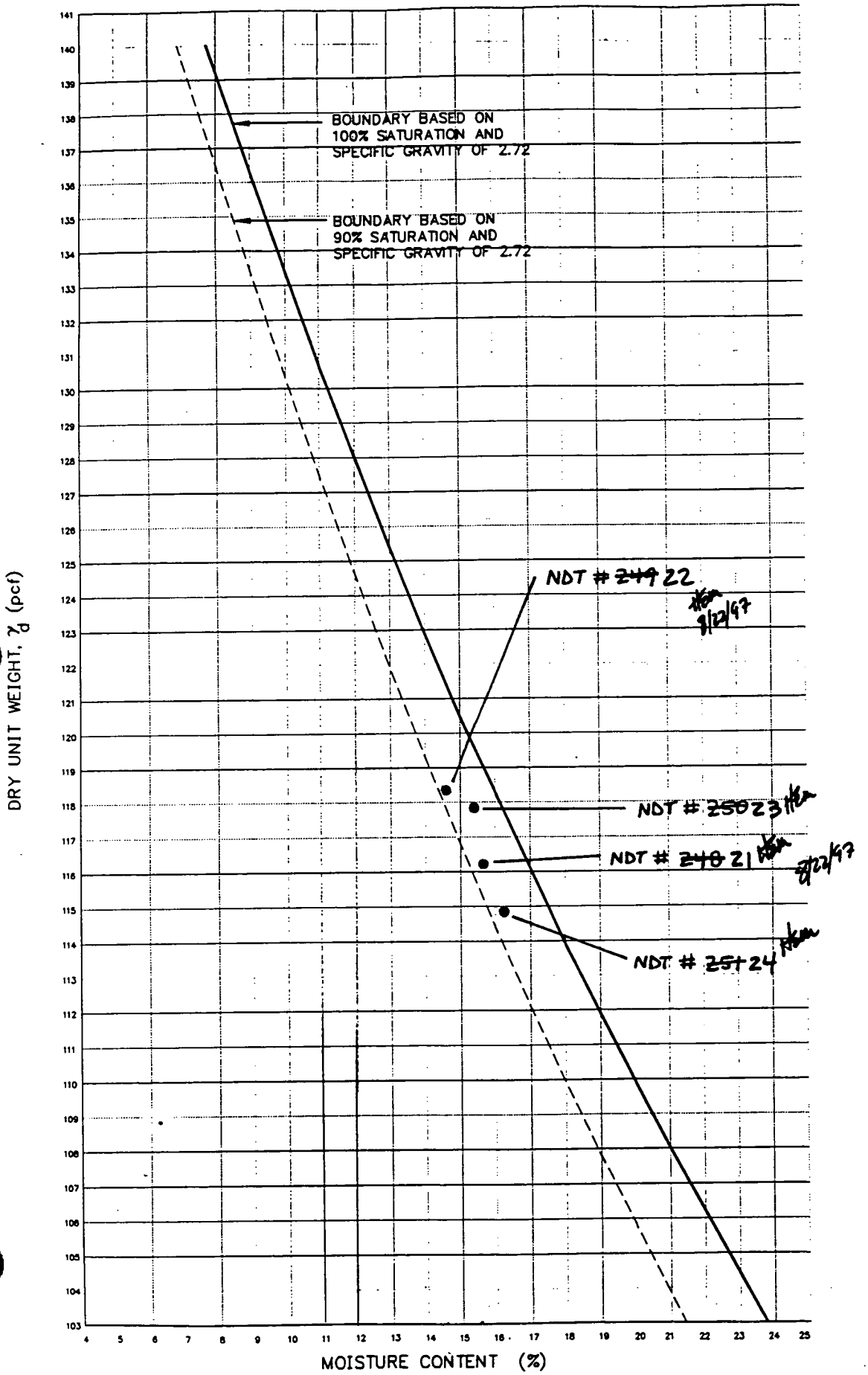
TUESDAY 19 AUG 97



SHEET NO. 2 OF 3

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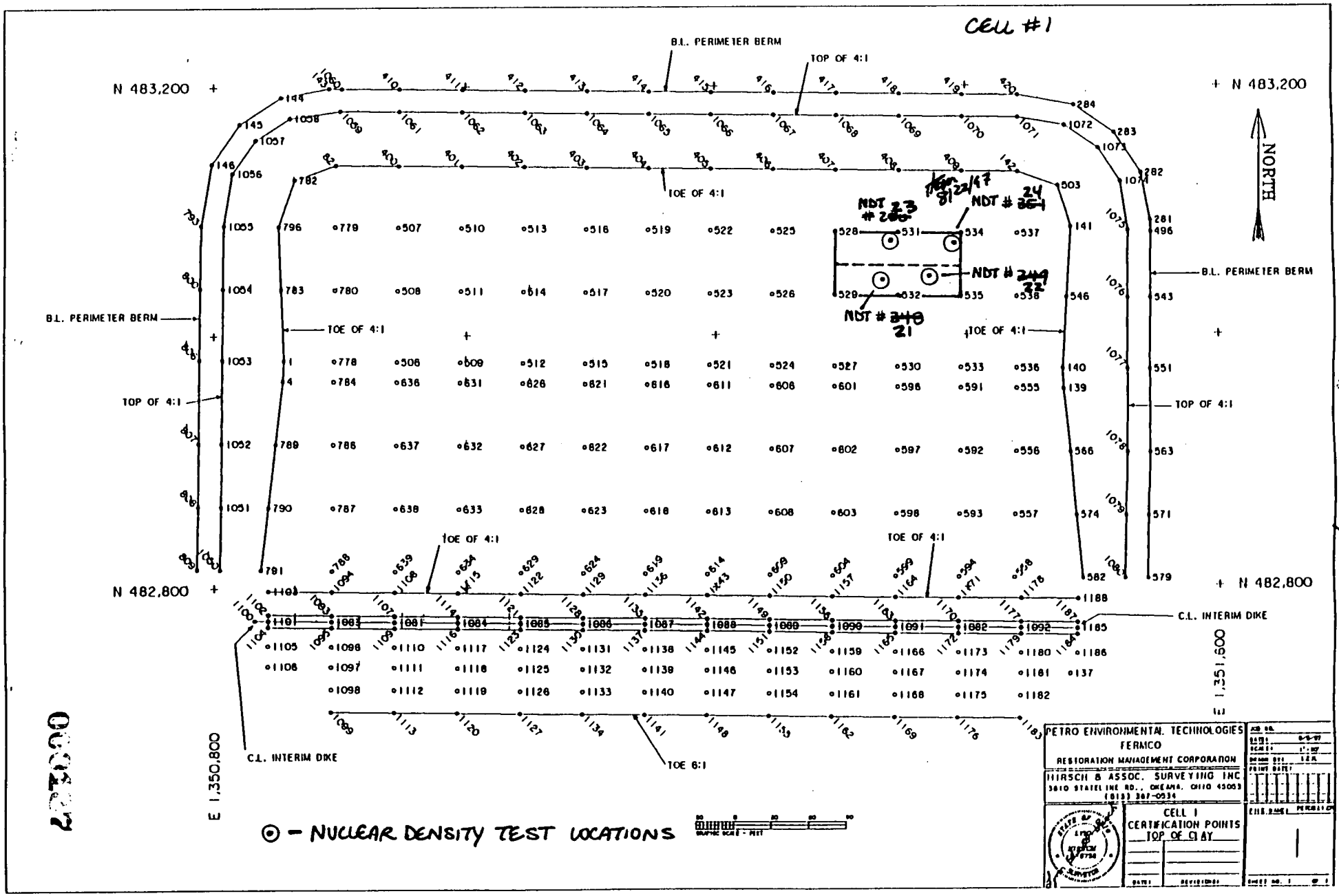
AUG 06 1997
@ 8/20/97
0740 DG3

CLAY LINER
TEST AREA

CELL #1



TUESDAY 19 AUG 97

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CC: FILE

RE: Tuk Wilke

SHEET NO. 3 OF 3

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 21 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±10" ~~±2"~~ (P) 8/20/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8-10"
(CIRCLE ONE)

% COMPACTION: APZ * 95% MOISTURE RANGE: APZ * +3% ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: ~2% MICROWAVE (MW) QA ID: KW

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
~~25225~~	SEE ATTACHED MAP LANE #2 LIFT #1	6" / 1ST	LP-43	14.0	120.2	15.1	137.4	119.4	99.3	P				
~~25326~~	↓	↓	↓	↓	↓	15.5	135.8	117.6	97.8	P				
~~25427~~						15.1	137.2	119.2	99.2	P				
~~25528~~						14.8	135.9	118.4	98.5	P				

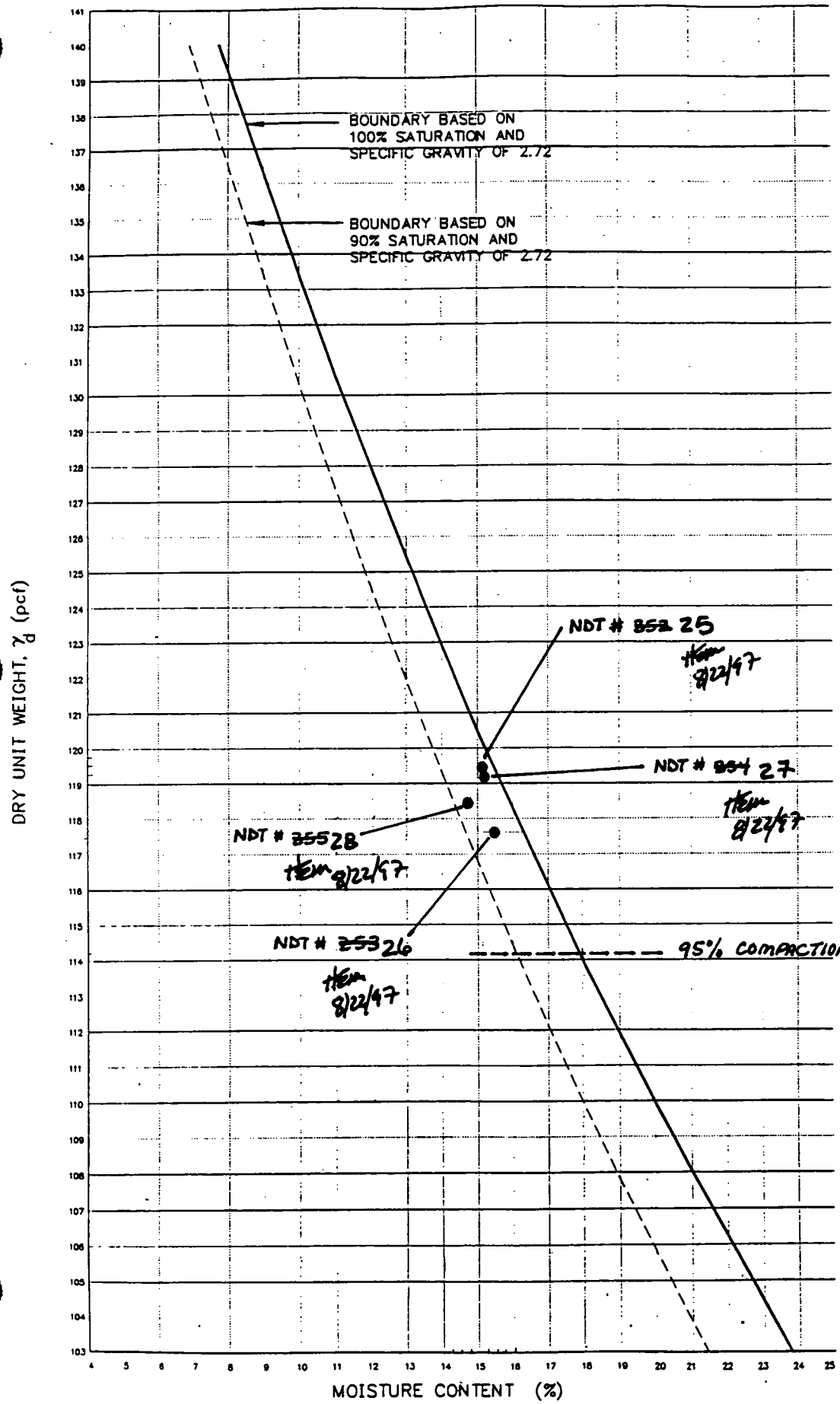
KW 8/22/97

COMMENTS: * APZ ACCEPTABLE PERMEABILITY ZONE SPECIFICATION 02225 PART
LANE #2 BETWEEN CONTROL PT. #'S 779/780 → 25' W OF 528/529

000158

12667

THURSDAY 21 AUG 97

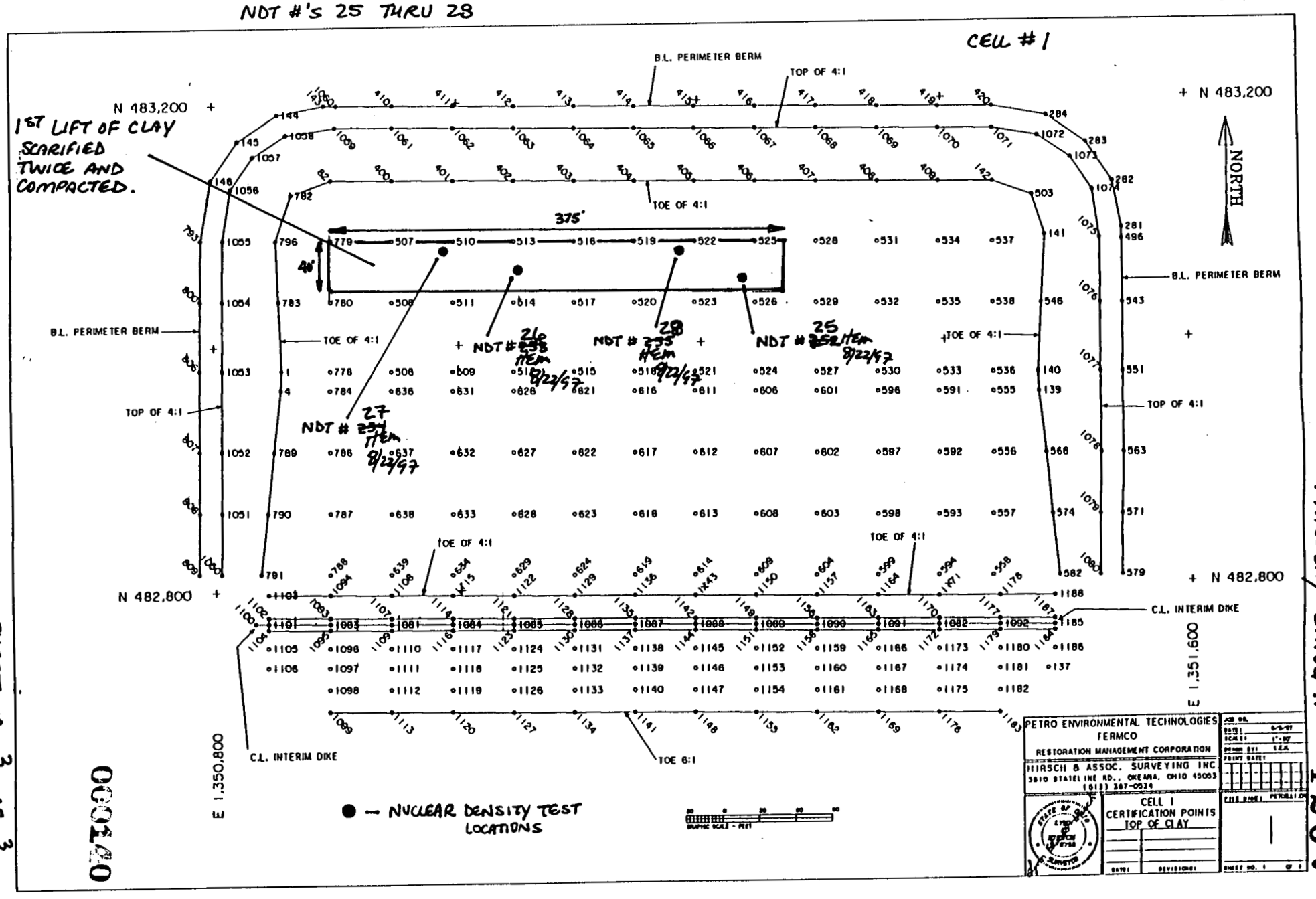


PROCTOR → 120.2 pcf @ 14% MOISTURE

SHEET NO. 2 OF 3

RECEIVED
AUG 06 1997
8/21/97

NUCLEAR DENSITY TEST LOCATIONS
NDT #'s 25 THRU 28



THURSDAY 21AUG97

1267

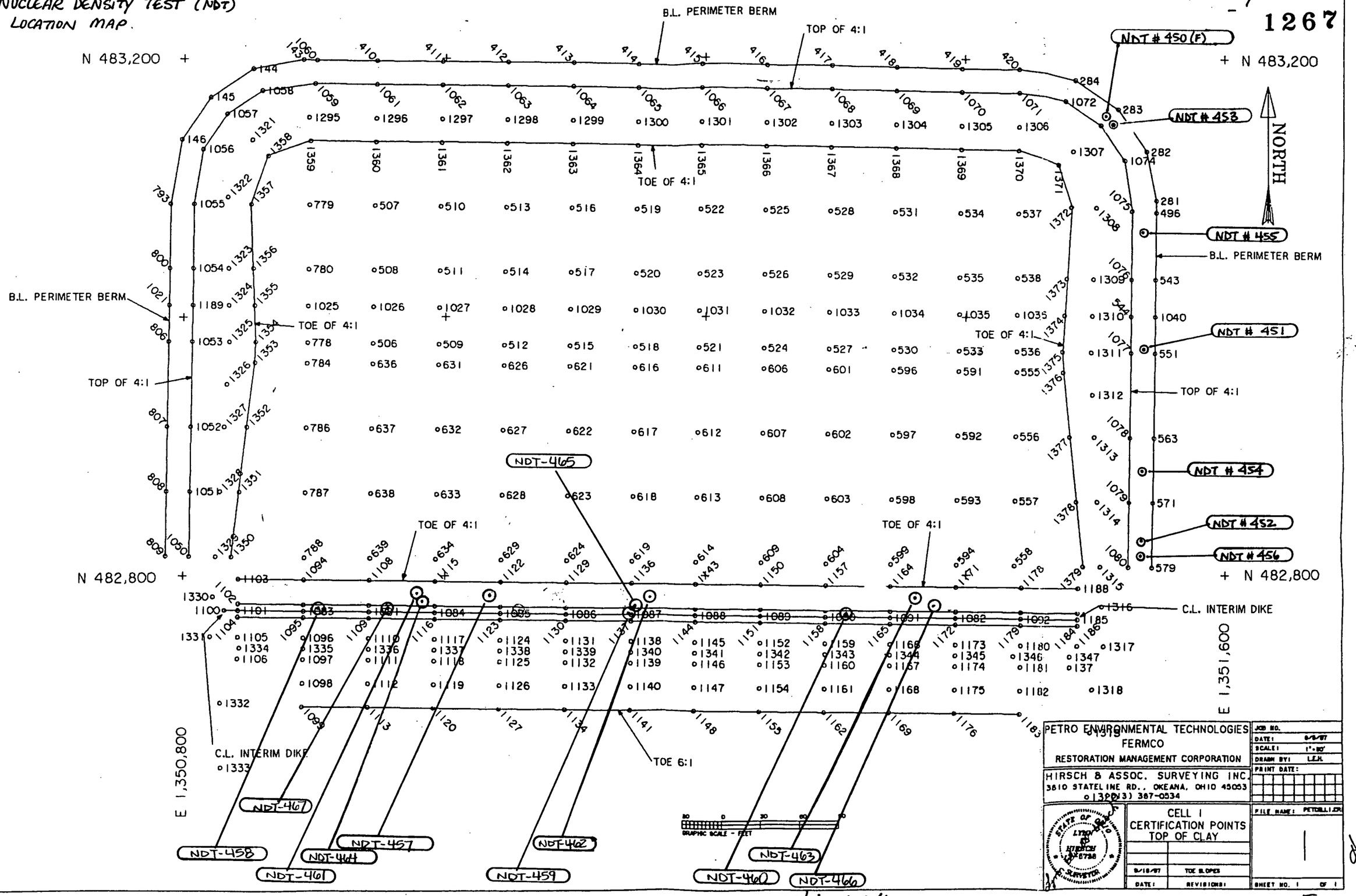
SHEET NO. 3 OF 3

000120

NUCLEAR DENSITY TEST (NDT)
LOCATION MAP.

SATURDAY 20 SEPT 97

1267



COPY: FILE

PER: Rick Wells

SHEET NO. 5 OF 5

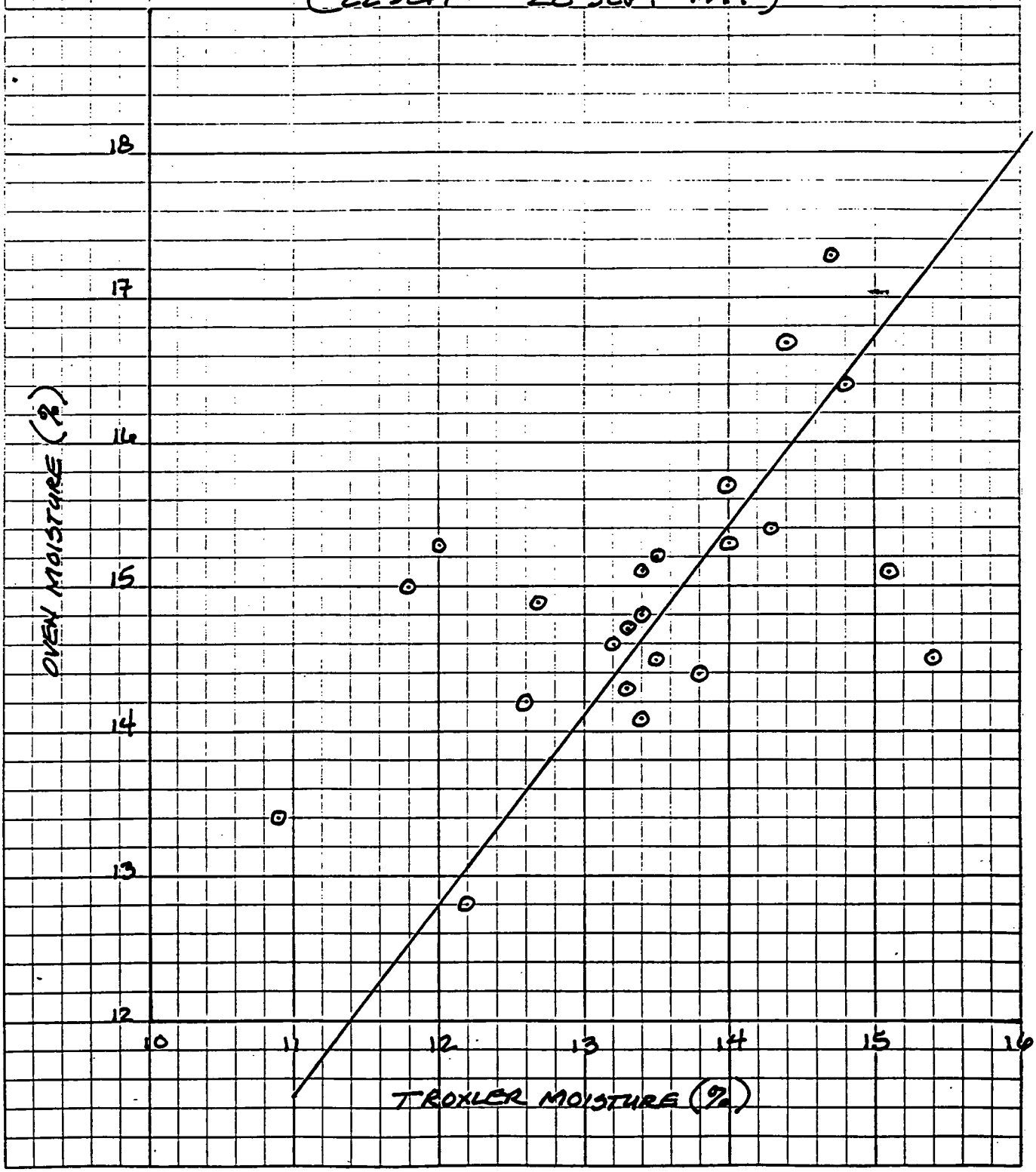
000121

Written by: HEM Date: 97 / 09 / 22 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: OSDF - PHASE I Project/Proposal No.: GQ01666 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR USE WEEK OF 22 SEPT. 1997

(22 SEPT — 28 SEPT 1997)



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 22 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE 4 MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: 8" LIFT THICKNESS (LOOSE/COMPACTED): 8" (CIRCLE ONE) 11/24/97

% COMPACTION: >95% STD. PROCTOR/APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/PP

TEST NO. NDT#	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
468	NORTH BERM-CREST	8"	LB	~~SPOILS~~ #4 LP-21	12.5	123.8	13.6	126.4	111.3	89.9		F	472		F
469	NORTH BERM BENCH	6"	LB				12.9	135.8	120.3	97.2		F	471	P	
470	NORTH BERM BENCH	6"	LB				13.0	132.2	117.0	94.5		F	473		F
471	NORTH BERM BENCH	6"	LB				14.0	136.1	119.4	96.4	P				
472	NORTH BERM ~~BENCH~~ CREST @ 9/22/97	6"	LB				14.1	135.6	118.8	96.0		F	474	P	
473	NORTH BERM BENCH	6"	LB				14.4	133.2	116.4	94.0		F	475		F
474	NORTH BERM ~~BENCH~~ CREST @ 9/22/97	6"	LB				13.4	138.8	122.4	98.9	P				
475	NORTH BERM BENCH	6"	LB				13.7	135.2	118.9	96.0		F	476	P	
476	NORTH BERM BENCH	6"	LB				14.9	138.0	120.1	97.0	P				
477	LANE B INTERCELL BERM	6"	LB				17.5	129.4	110.1	88.9		F	479	P	

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02 A PROJECT SPECIFICATION

PROCTOR USED IS VERIFIED BY CHECKPOINT

RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

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00023

12677

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 22 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE No. 4 MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~8"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): 8" (CIRCLE ONE)

% COMPACTION: ≥95% STD. PROCTOR / APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/PP

TEST NO. NDT#	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
478	INTERCELL BERM SLOPE CELL 2	6" L2	#4 LP-14	13.8	117.8	18.3	118.3	100.0	84.9		F	517		F
479	LANE 8 INTERCELL BERM	6" L8	↓	↓	↓	16.3	133.2	114.5	97.2	P				
480	LANE 8 INTERCELL BERM	6" L9	↓	↓	↓	15.1	132.3	114.9	97.5		F	516	P	

9/24/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02 A PROJECT SPECIFICATION
PROCTOR USED IS VERIFIED BY CHECKPOINT
RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

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00013 4

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: OSDF- PHASE ONE DATE: 22 day 09 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~±8"~~ LIFT THICKNESS (LOOSE) (COMPACTED): ±8"

(CIRCLE ONE)

% COMPACTION: >95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C

(CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3440/3430 NUCLEAR GAUGE SERIAL NO. 20979/27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BE/KW/PP SQ

TEST NO. NDT#	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
481	LANE 8 INTERCELL BERM	6"	L9	~~6~~ LP-14	13.8	117.8	14.7	132.4	115.4	98.0		F	518	P	
482	↓	6"	L9	↓	↓	↓	14.2	132.8	116.3	98.7		F	515	P	
483	↓	6"	L13	↓	↓	↓	15.8	132.1	114.1	96.9		F	492	P 2/11/97	F
484	LANE 8 INTERCELL BERM	6"	L9	↓	↓	↓	15.2	134.8	117.0	99.3	P				
485	LANE 6	6"	L6	LP-22	13.5	120.0	13.7	133.7	117.6	98.0		F	489	P	F
486	LANE 7	6"	L6	↓	↓	↓	15.5	133.2	115.3	96.1		F	491	P	
487	LANE 3	6"	L6	↓	↓	↓	15.7	132.2	114.3	95.3		F	490	P	
488	LANE 3	6"	L6	↓	↓	↓	16.2	134.1	115.4	96.2	P				
489	LANE 6	6"	L6	↓	↓	↓	14.0	137.0	120.2	100.2	P				
490	LANE 3	6"	L6	↓	↓	↓	15.9	135.1	116.6	97.2	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

PROCTOR USED IS VERIFIED BY CHECKPOINT

RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

12677

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: OSDF-Phase ONE DATE: 22 day 09 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~± 8"~~ 11/22/97 LIFT THICKNESS (LOOSE / COMPACTED): ~~±8"~~

(CIRCLE ONE)

% COMPACTION: ≥95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C

(CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3440/3430 NUCLEAR GAUGE SERIAL NO. 20979/27418 COR. FACTOR: moisture correlation QA ID: BE/KW/PP S.G.

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
491	LANE 7	6" L6	LP-22	13.5	120.0	17.1	134.4	114.8	95.7	P				

9/29/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

00022 8

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION MONDAY DATE: 22 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~8 in~~ HEM 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STD. PROCTOR / APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C (CIRCLE ONE) / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORROLATION QA ID: KW/PP

	TEST NO. NOT #	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
✓	492	LANE 8 INTERCELL BERM	6" L9	#4 LP-14	13.8	117.8	14.6	133.4	116.4	98.8		F	512		P
✓	493	↓	6" L9	↓	↓	↓	14.6	130.8	114.1	96.9		F	@ 9/24/97 ~~503~~ 504	P	
✓	494	LANE 5	6" L3	#4 LP-22	13.5	120.0	13.3	134.7	118.9	99.0		F	@ 9/23/97 ~~504~~ 621	P	P
✓	495	LANE 6	6" L3	↓	↓	↓	15.9	130.3	112.4	93.7		F	622		F
✓	496	LANE 3	6" L5	↓	↓	↓	15.4	129.3	112.0	93.3		F	672	P	
✓	497	LANE 2	6" L6	↓	↓	↓	15.6	130.5	112.9	94.1		F	673	P	
SC	498	NORTH BERM BENCH	6" L9	#8 LP-175	16.2	112.5	18.2	131.5	111.3	98.9	P				
✓	499	NORTH BERM BENCH	6" L9	↓	↓	↓	18.3	129.6	109.6	97.4	P				
✓	500	NORTH EAST CORNER-BENCH AREA	6" L5	↓	↓	↓	16.1	132.3	114.0	101.3	P				
✓	501	EAST BERM BENCH	6" L7	↓	↓	↓	16.2	131.5	113.2	100.6		F	503	P	

COMMENTS: * APZ → APPROVED PERMEABILITY ZONE SECTION 02225 PART 3.02 A PROJECT SPECIFICATIONS

PROCTOR USED VERIFIED BY CHECKPOINT SC = SAND CONE PERFORMED

RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

CHECKED BY: [illegible] SHEET NO. 35 OF 10

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1267

0003

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION MONDAY DATE: 22 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~8"~~ 11/22/97 LIFT THICKNESS ((LOOSE)/COMPACTED): 18"

(CIRCLE ONE)

% COMPACTION: ≥95% STD. PROCTOR / APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C

(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/KW

TEST NO. NDT #	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
502	EAST BERM BENCH	6" L7	#4 LP-14	13.8	117.8	17.6	126.9	107.9	91.6		F	NDT # 504 @ 11/24/97 502	P	
503	EAST BERM BENCH	6" L7	↓	↓	↓	15.5	134.4	116.4	98.8	P				
504	EAST BERM BENCH	6" L7	↓	↓	↓	15.1	135.2	117.5	99.7	P				
505	INTERCELL BERM - LANE 8	6" L13	↓	↓	↓	16.4	133.6	114.8	97.5	P				
506	INTERCELL BERM - LANE 8	6" L10	↓	↓	↓	16.4	134.8	115.8	98.3	P				

@ 9/24/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

PROCTOR USED VERIFIED BY: CHECKPOINT

RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

@ 9/24/97

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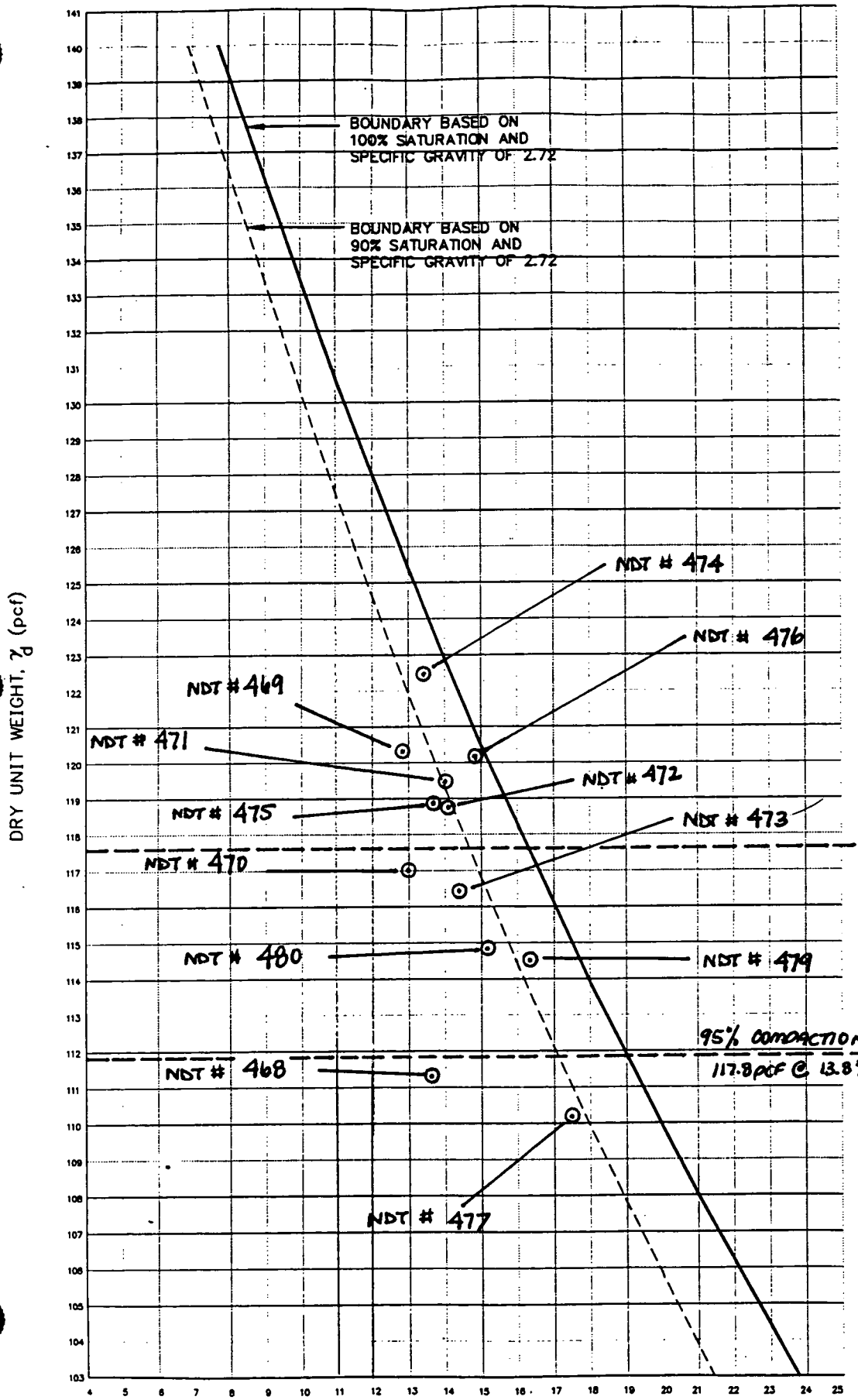
2962

00120

MONDAY 22 SEPT 1997



NDT # 468 → 480

95% COMPACTION 123.8 pcf @ 12.6% m

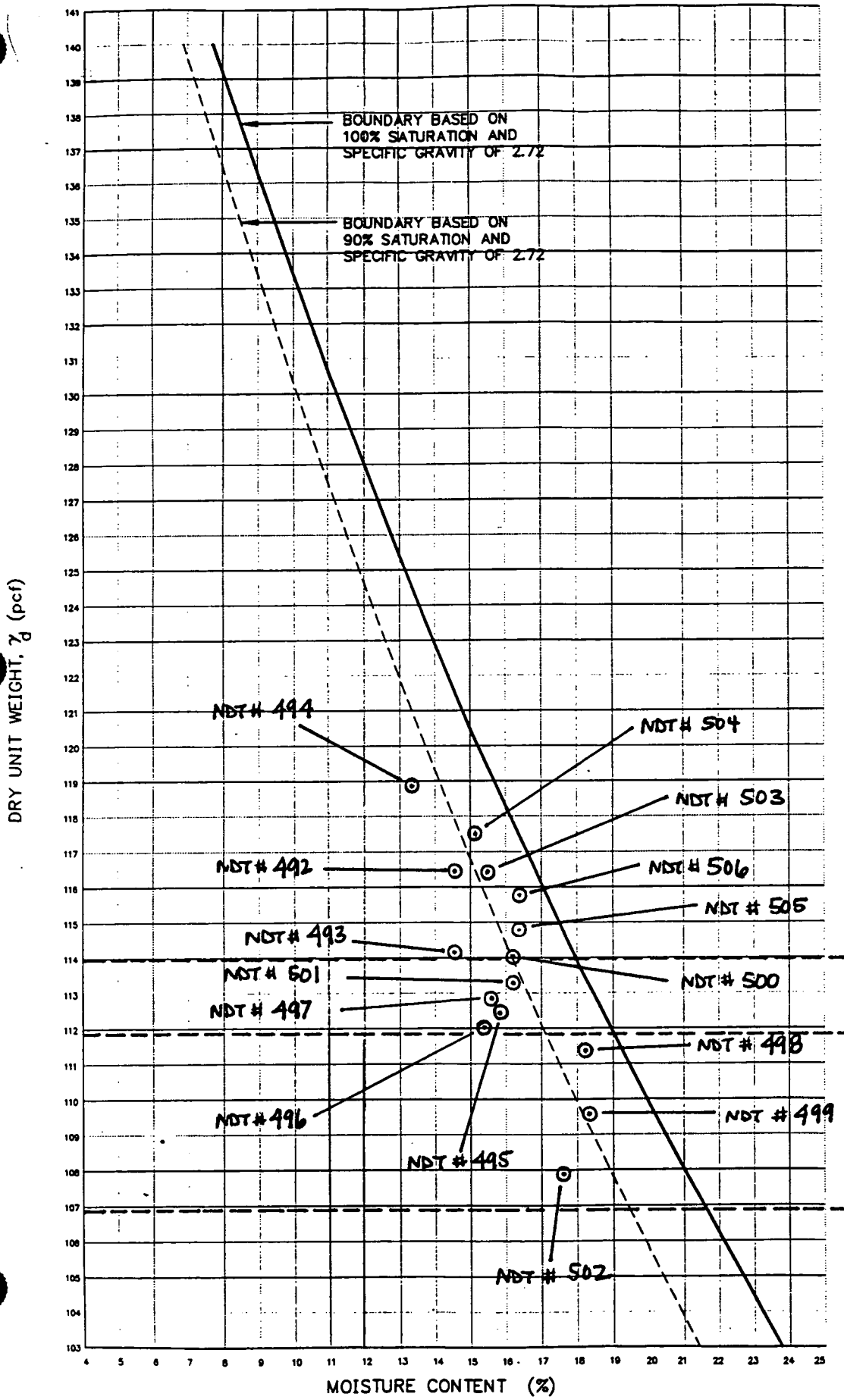
95% COMPACTION 117.8 pcf @ 13.8% m

NOTE: NDT # 478 PLOTS OFF OF GRAPH

SHEET NO. 1 OF 10

000109

MONDAY 22 SEPT 97



NDT #'s 492 → 506

95% COMPACTION 120.0 pcf @ 13.5% m

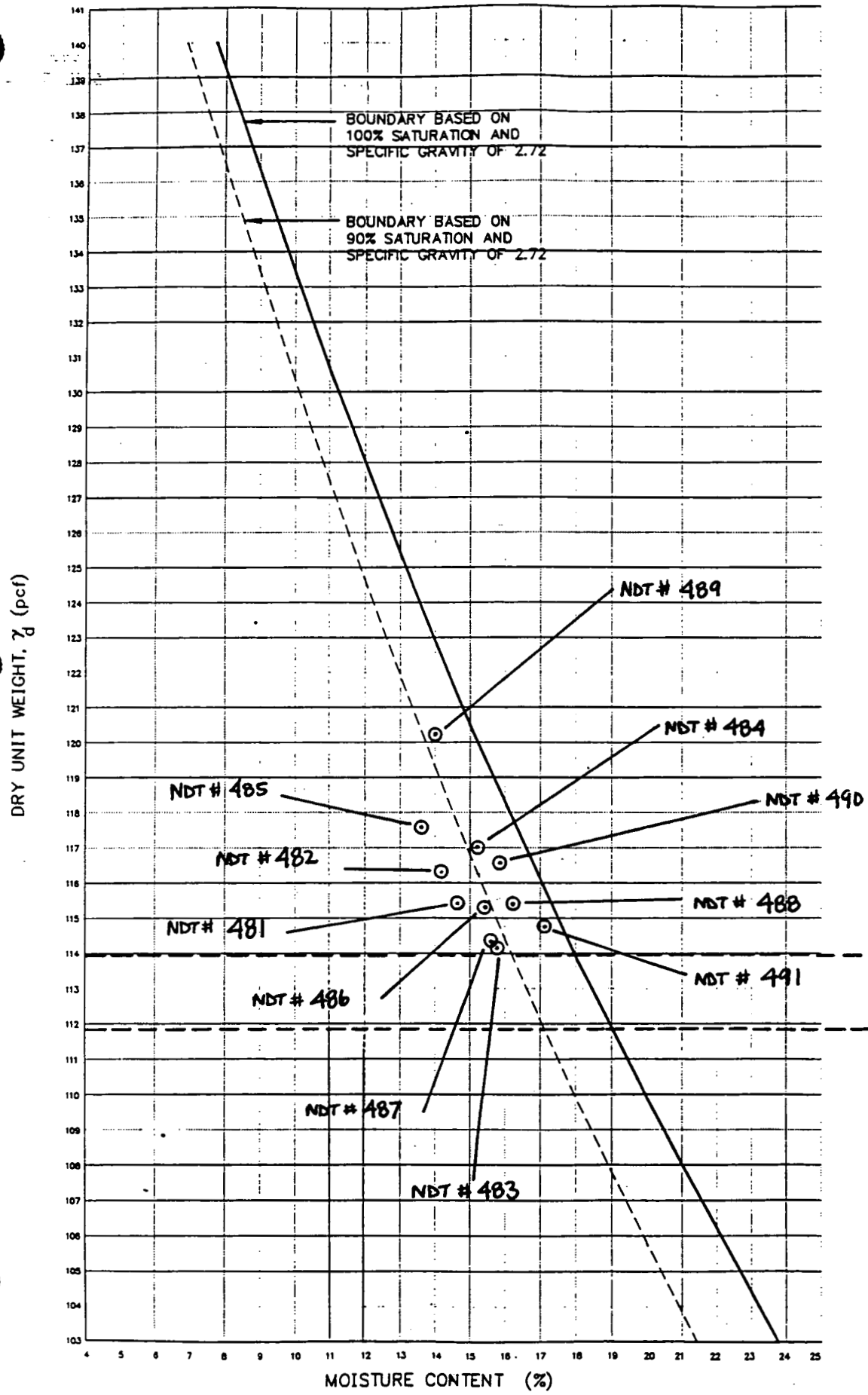
95% COMPACTION 117.8 pcf @ 13.8% m

95% COMPACTION 112.5 pcf @ 16.2% m

000250

SHEET NO. 8 OF 10

MONDAY 22 SEPT 1997



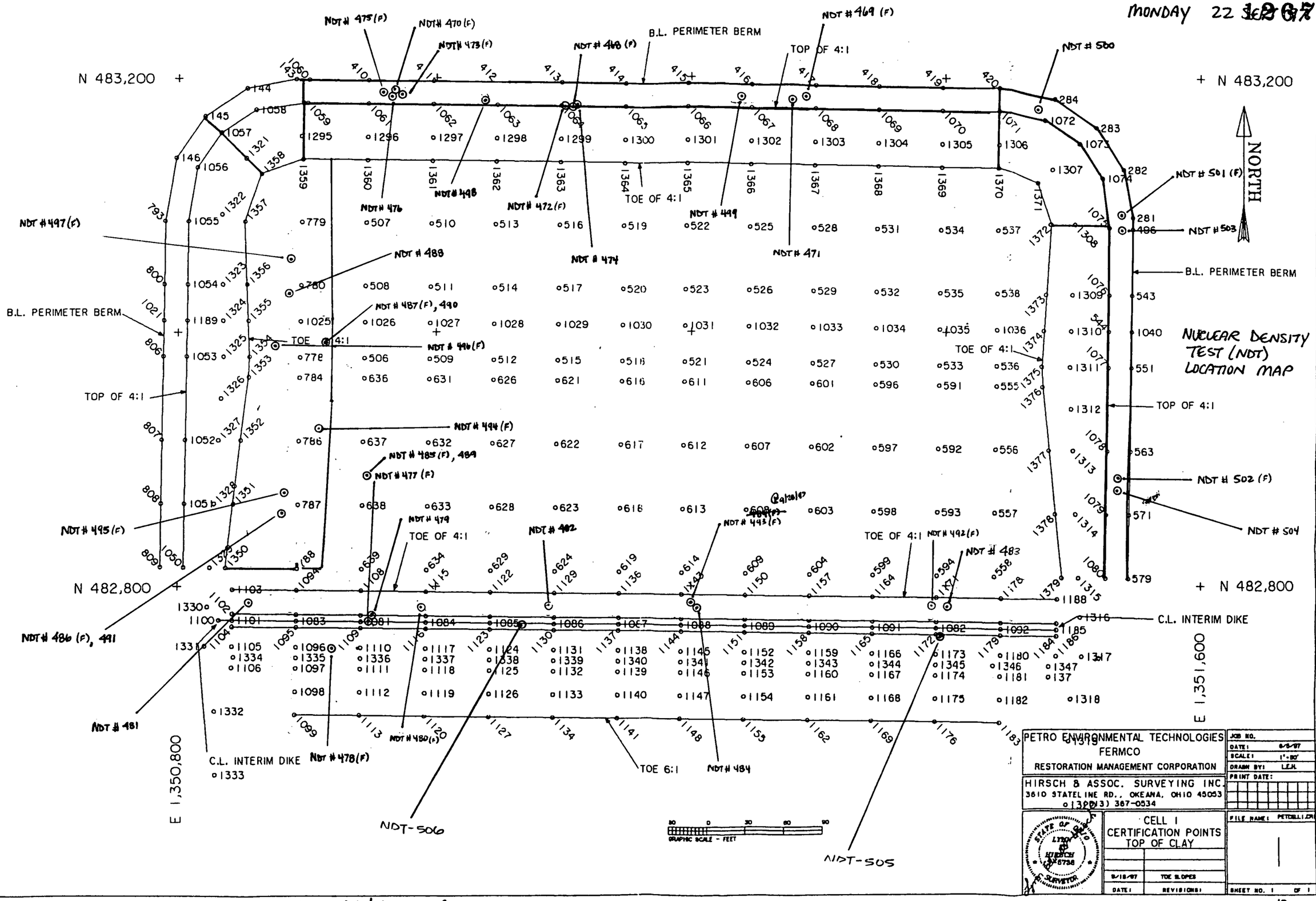
NDT #'s
481 → 491

95% COMPACTION
120.0 pcf @ 12.5% m

95% COMPACTION
117.8 pcf @ 13.8% m

SHEET NO. 9 OF 10

MONDAY 22 ~~16~~ 07



PETRO ENVIRONMENTAL TECHNOLOGIES
FERMCO
RESTORATION MANAGEMENT CORPORATION

HIRSCH & ASSOC. SURVEYING INC.
3610 STATELINE RD., OKEANA, OHIO 45053
(513) 367-0534

CELL I
CERTIFICATION POINTS
TOP OF CLAY

JOB NO.	
DATE:	8-5-97
SCALE:	1"=80'
DRAWN BY:	L.E.H.
PRINT DATE:	
FILE NAME:	PETCELL1.DWG
8/18/97	TOE SLOPES
DATE:	REVISIONS:
SHEET NO. 1	OF 1

COPY: FILE

PER: Kirk Will

SHEET NO. 10 OF 10

000152

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: OSDF - PHASE ONE DATE: 23 day 09 month 97 year (TUESDAY)

SPECIFICATION REQUIREMENTS

SOURCE: On site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" (11/22/97) LIFT THICKNESS (LOOSE / COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: ≥95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: 3440/3430 NUCLEAR GAUGE SERIAL NO. 20979/27418 COR. FACTOR: moisture correlation QA ID: BE-SH-PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
507	E. BERM BENCH	6" LB	#4 **	14.6	115.9	17.9	128.7	109.2	94.2		F	510	P	
508	E. BERM BENCH	6" LB	↓	↓	↓	17.2	133.4	113.8	98.2	P				
509	N.E. CORNER BENCH	6" L6	↓	↓	↓	16.6	131.7	113.0	97.5	P				
510	E. BERM BENCH	6" LB	↓	↓	↓	17.0	135.0	115.4	99.6	P				
511							121.3							
512	LANE #8 INTERCELL BERM	6" L9	#4 **	14.6	115.9	15.7	132.8	114.8	99.1	P				
513	↓	L9	↓	↓	↓	17.0	131.2	112.1	96.7	P				
514		L9				17.1	132.5	113.2	97.7	P				
515		L9				15.3	133.3	111.0	95.8	P				
516		L9				17.5	132.4	112.7	97.2	P				

BE 9-24-97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 302A OF PROJECT SPECIFICATION

** - AVERAGE STOCKPILE AVERAGE

RETESTS IN GENERAL VICINITY OF ORIGINAL TESTS

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000133

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: OSDF - PHASE ONE DATE: 23 day 09 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ±8" 11/23/97

% COMPACTION: ≥95% APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: 3440/3430 NUCLEAR GAUGE SERIAL NO. 20979/27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BE-SQ-PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
517	LANE #8 INTERCELL BERM	6" L9	#4 **	14.6	115.9	15.3	126.1	109.4	94.4		F	519		F
518	↓	6" L9	↓	↓	↓	17.9	131.1	111.2	95.9	P				
519	↓	6" L9	↓	↓	↓	15.4	131.3	113.8	98.2		F	520	P	
520	↓	6" L9	↓	↓	↓	14.6	135.4	118.2	102.0	P				
521	E. BERM BENCH	6" L9	↓	↓	↓	15.0	135.2	117.6	101.5	P				
522	E. BERM BENCH	6" L9	↓	↓	↓	15.4	133.9	116.0	100.0	P				
523	N.E. CORNER BENCH	6" L7	↓	↓	↓	15.5	135.0	116.9	100.9	P				
524	N. BERM BENCH	6" L10	↓	↓	↓	17.1	131.9	112.6	97.2	P				
525	N. BERM BENCH	6" L10	↓	↓	↓	14.6	134.4	117.3	101.2		F	528		F
526	N.W. CORNER BENCH	6" L2	↓	↓	↓	15.5	132.4	114.6	98.9		F	530	P	

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 302A OF PROJECT SPECIFICATION

** AVERAGE STOCKPILE VALUE

RETESTS IN GENERAL VICINITY OF ORIGINAL TESTS

000254

12672

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: OSDF-PHASE ONE DATE: 23 day 09 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER (CIRCLE ONE) ~~±8"~~ HEA 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% APZ * MOISTURE RANGE: ±3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: 3440/3450 NUCLEAR GAUGE SERIAL NO. 20929/27418 COR. FACTOR: moisture correlation QA ID: BE SQ-PP

TEST NO. NDT#	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
527	N. BERM BENCH	6"	L10	#4 **	14.6	115.9	18.2	129.2	109.3	94.3		F	550	P	
528	N. BERM BENCH	6"	L10				16.5	131.1	112.5	97.1		F	549	P	
529	N. BERM BENCH	6"	L10				13.7	133.9	117.8	101.6		F	548		F
530	N.W. CORNER BENCH	6"	L2				15.3	134.9	117.0	100.9	P				
531	LANE #8 INTERCELL BERM	6"	L13				16.1	132.9	114.5	98.8	P				
532		6"	L10				16.2	130.7	112.5	97.1		F	534		F
533		6"	L13				17.9	131.9	111.9	96.5	P				
534		6"	L10				15.8	130.2	112.4	97.0		F	536	P	
535		6"	L13				17.0	132.8	113.5	97.9	P				
536		6"	L10				16.1	132.6	114.2	98.5	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 302A OF PROJECT SPECIFICATION

** AVERAGE STOCKPILE VALUE

RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: OSDF- PHASE ONE DATE: 23 day 09 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY (CIRCLE ONE) OTHER: ± 8" LIFT THICKNESS (LOOSE/COMPACTED):

% COMPACTION: >95% APZ * MOISTURE RANGE: + 3% APZ * ASTM D 698: A B C (CIRCLE ONE) / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: 3440/3430 NUCLEAR GAUGE SERIAL NO. 20979/27418 COR. FACTOR: moisture correlation QA ID: BE-SQ-PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
537	LANE #8 INTERCELL BERM	6"	L9	#4 **	14.6	115.9	15.0	132.7	115.4	99.6		F	539	P	
538	↓	6"	L10	#8 ↓	17.0	111.6	18.0	130.3	110.4	98.9	P				
539	↓	6"	L9	#4 ↓	14.6	115.9	16.1	134.6	115.3	99.5	P				
540	N.W. CORNER BENCH	6"	L3	#4 ↓	14.6	115.9	16.5	133.2	114.3	98.6	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 302A OF PROJECT SPECIFICATION

** - AVERAGE STOCKPILE VALUE

RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

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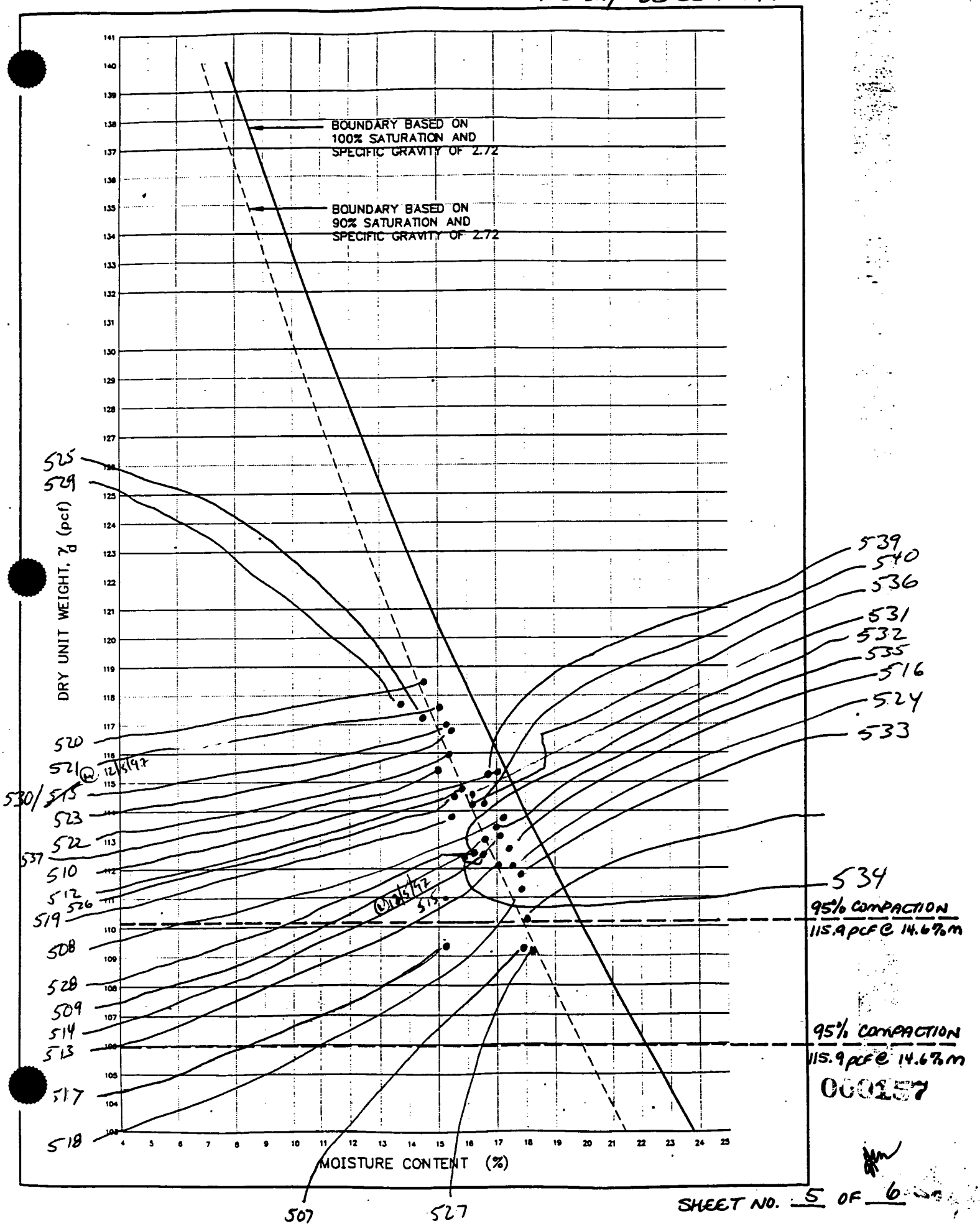
00015

12692

TUESDAY 23 SEPT 1997

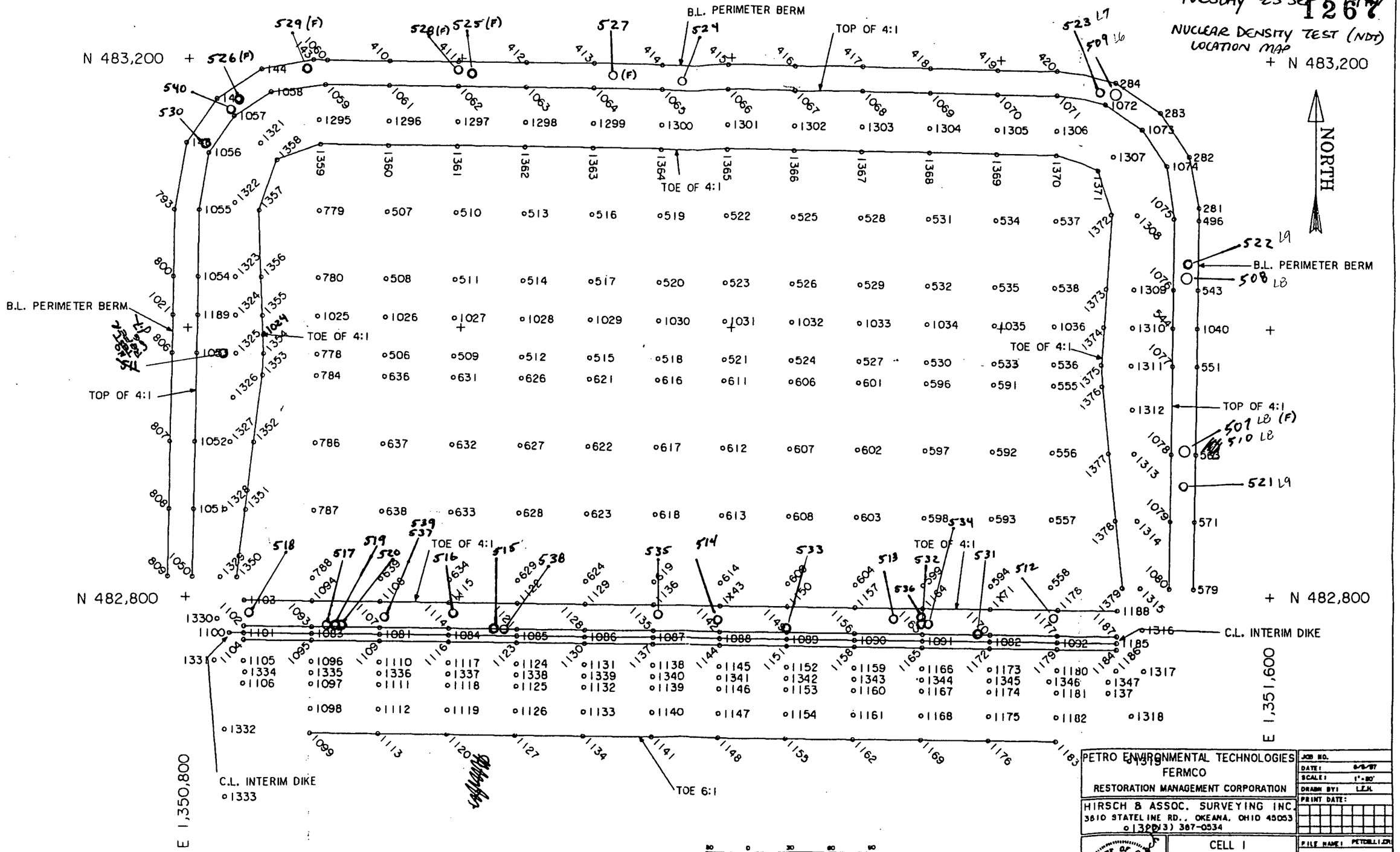


000257

SHEET NO. 5 OF 6

TUESDAY 23 SEPT 1997 1267

NUCLEAR DENSITY TEST (NDT) LOCATION MAP



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HIRSCH & ASSOC. SURVEYING INC.
3610 STATELINE RD., OKEANA, OHIO 45053
(513) 387-0534

CELL I
CERTIFICATION POINTS
TOP OF CLAY

JOB NO.	
DATE:	9/8/97
SCALE:	1"=80'
DRAWN BY:	L.E.H.
PRINT DATE:	
FILE NAME:	PETCELL1.CR
9/18/97	TOE SLOPES
DATE:	REVISIONS:
SHEET NO. 1	OF 1

COPY: FILE

PER: Kai Wilk

SHEET NO. 6 OF 6

000128

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 24 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~±8"~~ Item 11/23/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8" (CIRCLE ONE)

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
541	LANE 8 INTERCELL BERM	6" L14	#7 LP-158	15.8	115.1	17.5	134.0	114.0	99.1	P				
542	↓	6" L12	↓	↓	↓	16.5	131.8	113.1	98.3	P				
543	↓	6" L10	↓	↓	↓	15.4	133.7	115.9	100.7	P				
544	↓	6" L10	↓	↓	↓	15.9	129.0	111.3	96.7		F	546	P	
545	↓	6" L10	↓	↓	↓	15.5	134.8	116.7	101.4	P				
546	↓	6" L10	↓	↓	↓	17.6	133.2	113.3	98.4	P				
547	N.W. CORNER BENCH	6" TOP	#8 LP-175	16.2	112.5	17.5	131.4	111.8	99.4	P				
548	N. BERM BENCH	6" ↓	#8 LP-175	16.2	112.5	14.6	134.4	117.3	104.2		F	551		F
549	↓	6" ↓	↓	↓	↓	16.7	131.5	112.7	100.2	P				
550	↓	6" ↓	↓	↓	↓	18.7	133.2	~~111.3~~ 112.2 9/10/97	99.7	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATIONS

NOTE: RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

0001359

1262

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 24 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8 (HGM 11/24/97) LIFT THICKNESS (LOOSE/COMPACTED): ±8" (CIRCLE ONE)

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
551	N. BERM BENCH	6" TOP	#4 LP-19	14.0	119.5	15.0	132.2	115.0	96.2		F	552		F
552	↓	6" ↓	↓	↓	↓	15.3	133.5	115.8	96.9		F	553	P	
553		6"				14.8	135.0	117.6	98.4	P				
554		6"				15.1	135.0	117.3	98.2	P				
555	LANE 8 INTERCELL BERM (BENCH)	6" L15				15.1	134.4	116.8	97.7	P				
556		6" L15	#8 LP-175	16.2	112.5	17.0	129.5	110.7	98.4		F	557	P	
557		6" L15				18.4	130.6	110.3	98.0	P				
△ 558		6" L13				15.1	132.2	114.9	102.1		F	561		F
△ 559		6" L12				16.5	130.6	112.1	99.6		F	560	P	
△ 560		6" L12				16.7	132.1	113.2	100.6	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

NOTE: RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

△ → PERFORMED W/ TROXLER GAUGE 3440 # 20979

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1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 24 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED): ±8"

(CIRCLE ONE)

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C

(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418/20979 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/AP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
561	LANE 8 INTERCELL BERM	6" L13	#8 LP-175	16.2	112.5	18.0	126.0	106.8	94.9		F	563	P	
562	TOE OF W. BERM SLOPE LANE #4 HORIZ. MW	6" L1	↓	↓	↓	17.8	131.2	111.4	99.0	P				
563	LANE 8 (BENCH) INTERCELL BERM	6" L13	↓	↓	↓	17.9	131.9	111.9	99.4	P				

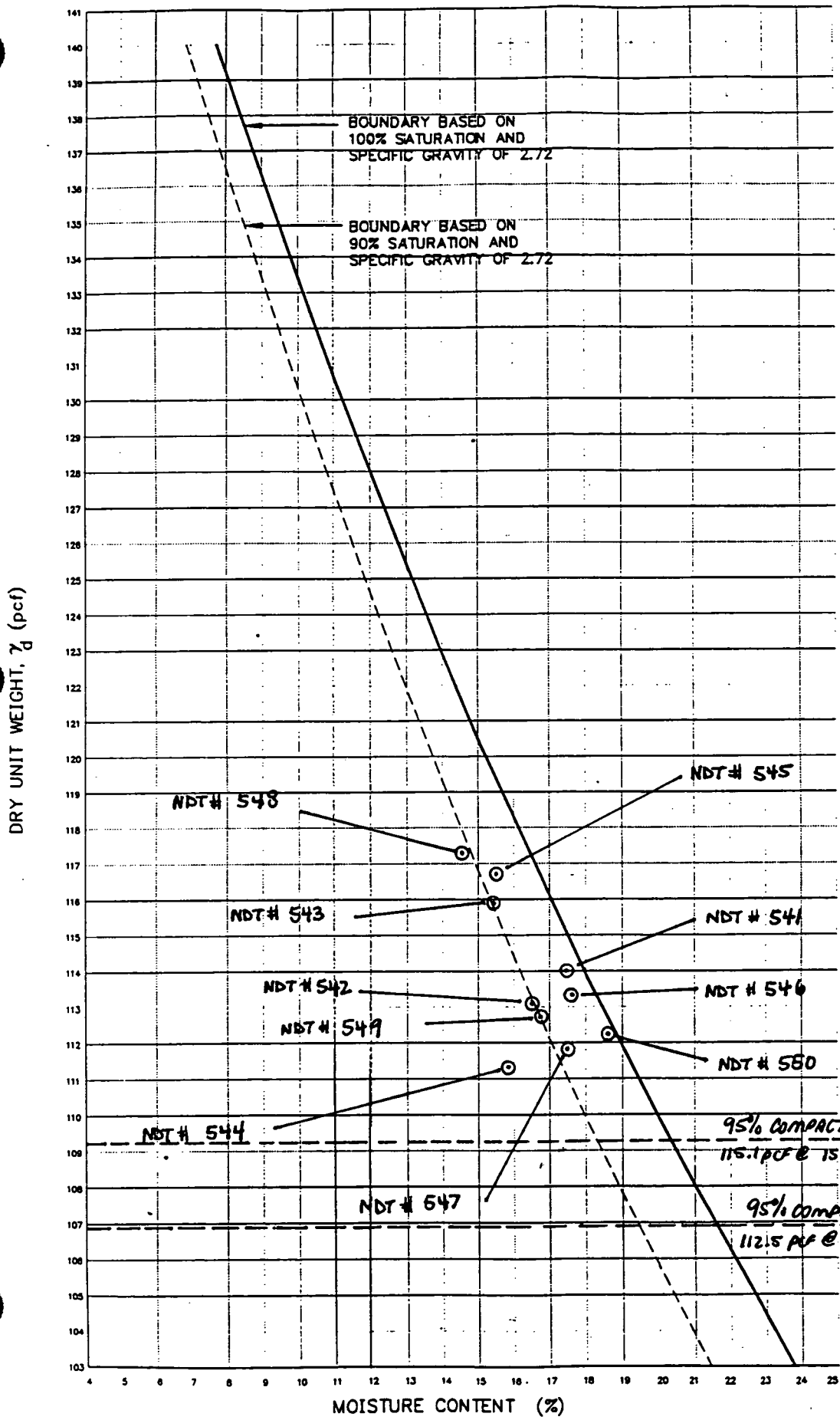
10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

NOTE: RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

1267

WEDNESDAY 24 SEPT 1997

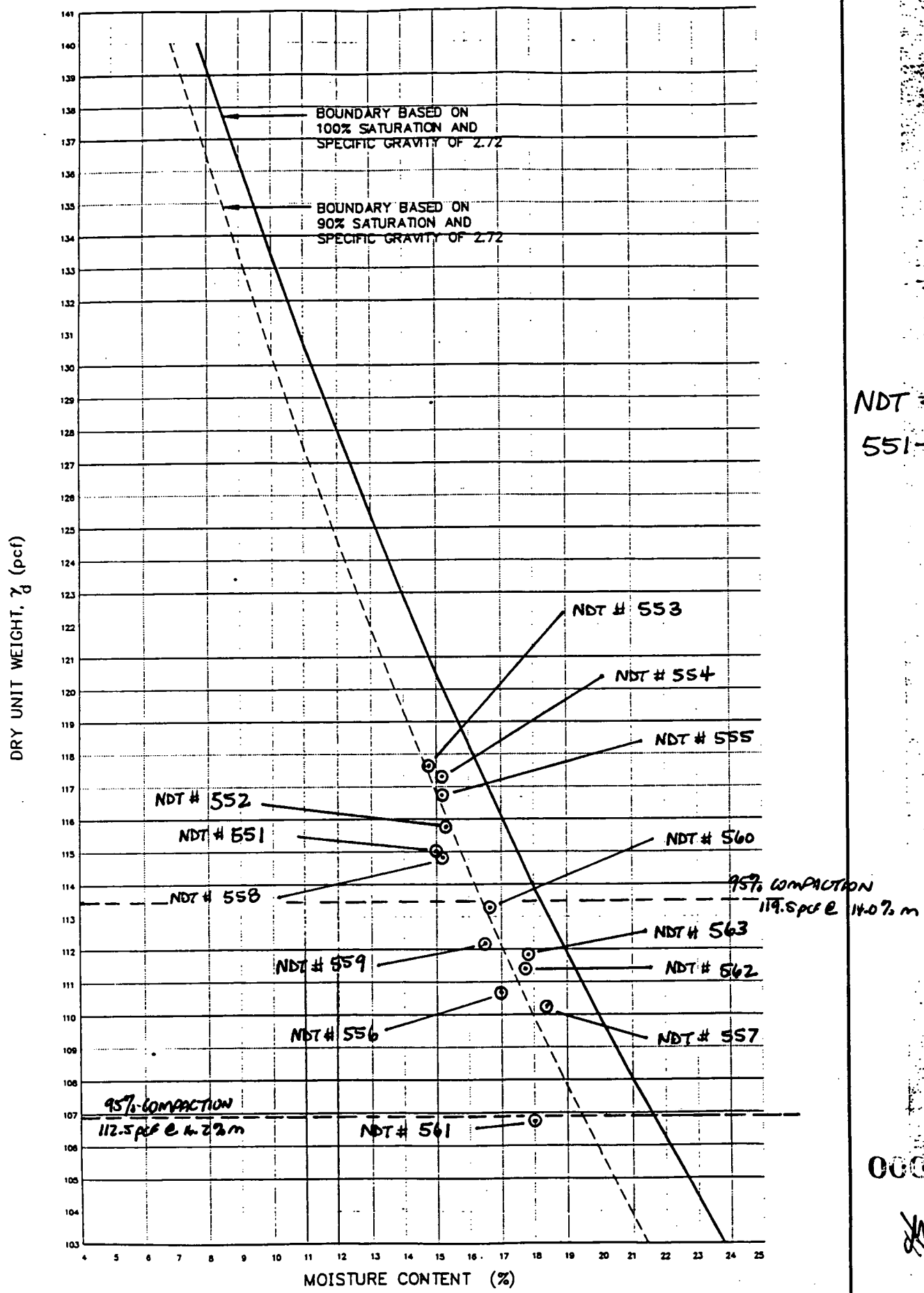


NDT #'S
541 → 550

000162

SHEET NO. 4 OF 6

WEDNESDAY 24 SEPT 1997



NDT #'S 551 → 563

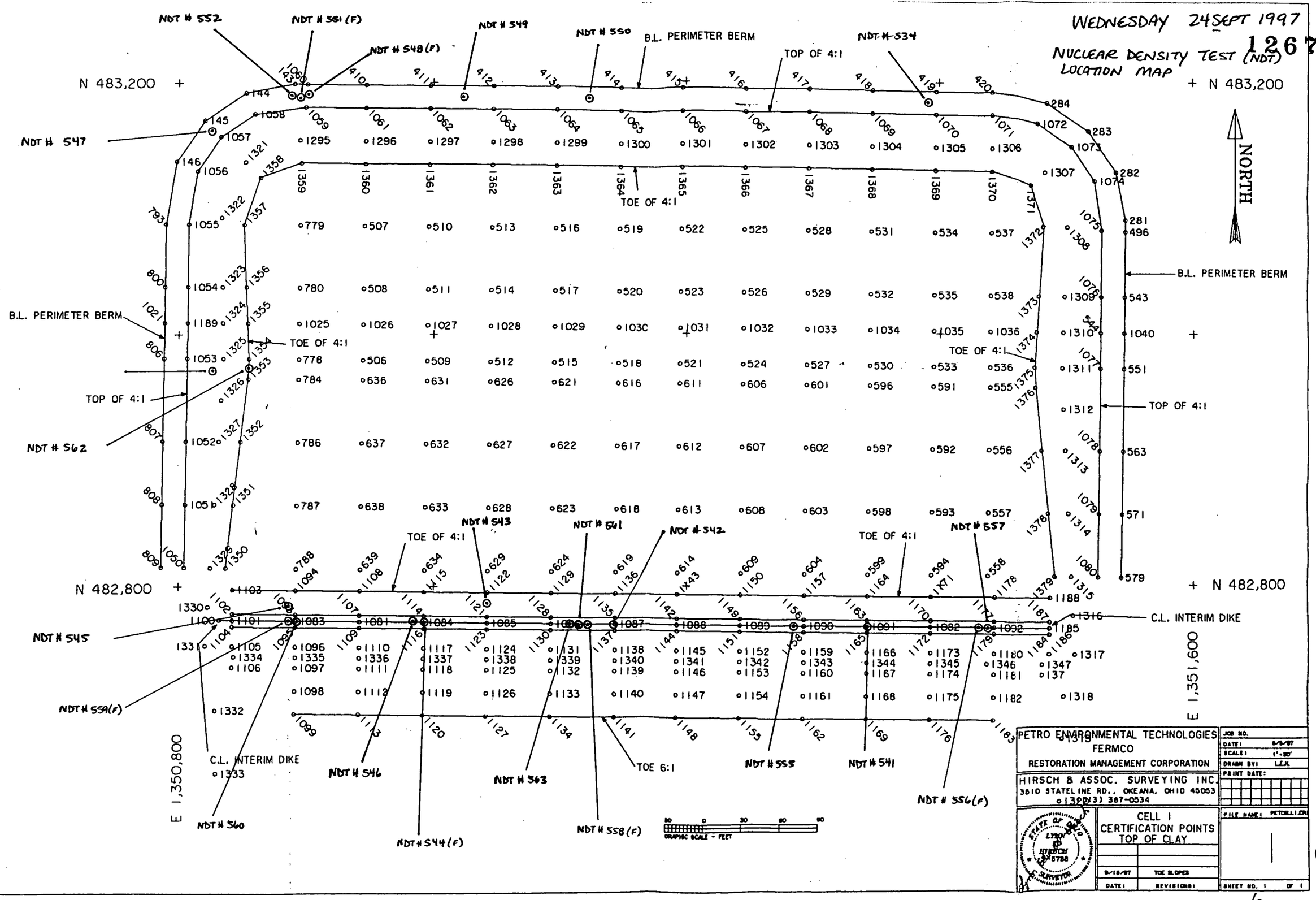
000163

SHEET NO. 5 OF 6

WEDNESDAY 24 SEPT 1997

NUCLEAR DENSITY TEST (NDT) LOCATION MAP

1267



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HIRSCH & ASSOC. SURVEYING INC.
3810 STATELINE RD., OKEANA, OHIO 45053
(513) 387-0534

JOB NO.	
DATE:	8-18-97
SCALE:	1"=80'
DRAWN BY:	L.E.H.
PRINT DATE:	
FILE NAME:	PETCELL1.DR

CELL I
CERTIFICATION POINTS
TOP OF CLAY

8/18/97	TOE SLOPES
DATE:	REVISIONS:

SHEET NO. 1 OF 1

SHEET NO. 6 OF 6

000164

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

DATE: THURSDAY 25 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ 4/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (CIRCLE ONE) (A) B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BE/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
564	SOUTH SLOPE OF INTERCELL BERM	6" L1	** #8 LP-158	15.8	115.1	13.7	135.4	119.1	103.5		F	569	P	
565	↓	6" L1	↓	↓	↓	14.9	132.2	115.1	100.0		F	568		F
566	↓	6" L1	↓	↓	↓	15.8	132.1	114.1	99.1		F	567		F
567	↓	6" L1	↓	↓	↓	16.2	131.0	112.7	97.9		F	571		F
568	↓	6" L1	↓	↓	↓	15.8	132.6	114.5	99.5		F	570	P	
569	↓	6" L1	↓	↓	↓	17.3	131.5	112.1	97.4	P				
570	↓	6" L1	↓	↓	↓	15.8	134.3	116.0	100.8	P				
571	↓	6" L1	↓	↓	↓	16.3	131.5	113.1	98.3		F	572	P	
572	↓	6" L1	↓	↓	↓	17.9	131.7	111.7	97.0	P				
KW 10/6/97														

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

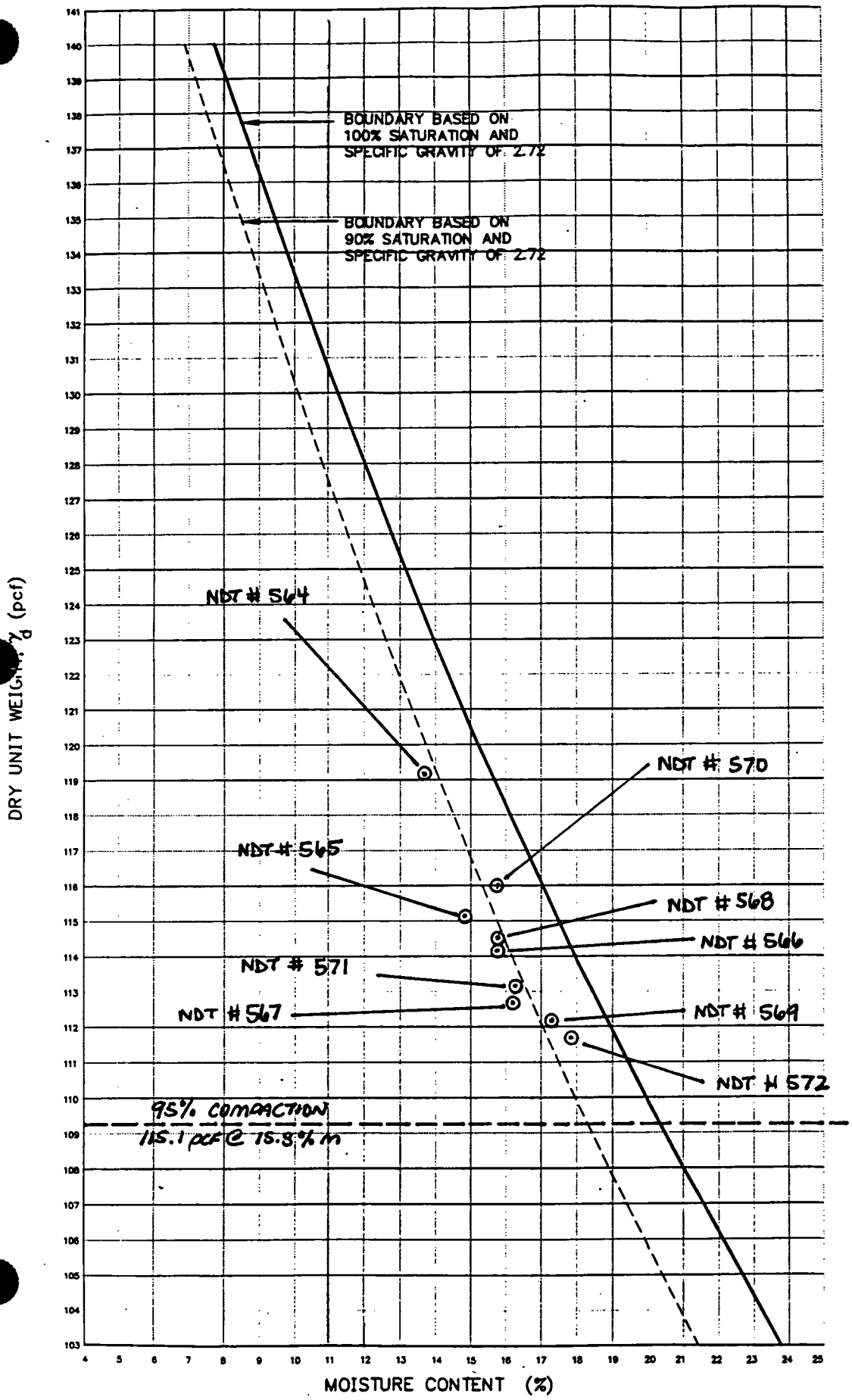
** - VERIFIED BY CHECKPOINT PERFORMED ON CLAY LINER MATERIAL

NOTE: RETESTS IN GENERAL VICINITY OF ORIGINAL TEST

000125

1267

THURSDAY 25 SEPT 1997

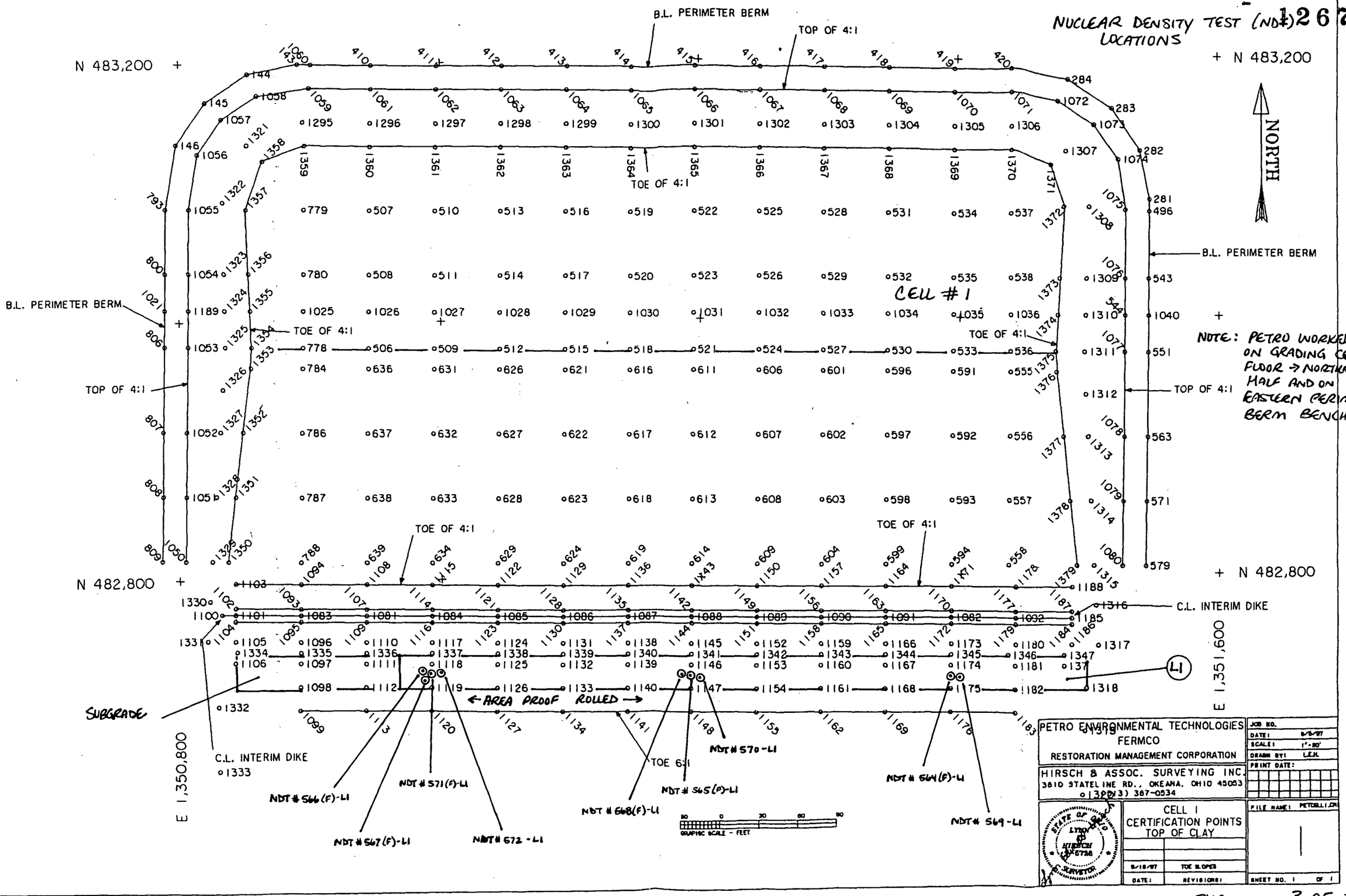


NDT #'S
564 → 572

SHEET NO. 2 OF 3

THURSDAY 25 SEPT 97

NUCLEAR DENSITY TEST (NDT) 267
LOCATIONS



NOTE: PETRO WORKED ON GRADING CELL FLOOR → NORTHERN HALF AND ON EASTERN PERIMETER BERM BENCH.

SHEET NO. 3 OF 3

000187

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: FRIDAY 26 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" (HEM 11/22/97) LIFT THICKNESS (LOOSE / COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/KW

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
573	SOUTH SLOPE OF INTERCELL BERM	6"	L2	LP-158**	15.8	115.1	15.0	132.4	115.1	100.0		F	575		F
574	↓	6"	L2	↓	↓	↓	17.7	132.4	112.5	97.7	P				
575	↓	6"	L2	↓	↓	↓	15.7	130.7	113.0	98.2		F	577	P	
576	↓	6"	L1	↓	↓	↓	18.3	131.3	111.0	96.4	P				
577	↓	6"	L2	↓	↓	↓	16.8	132.7	113.6	98.7	P				
578	INTERCELL BERM BENCH	6"	L10	↓	↓	↓	18.3	130.5	110.3	95.8	P				
579	↓	6"	L9	↓	↓	↓	18.5	128.1	108.1	93.9		F	580	P	
580	↓	6"	L9	↓	↓	↓	16.8	131.8	112.8	98.0	P				
581	SOUTH SLOPE OF INTERCELL BERM	6"	L3	↓	↓	↓	16.4	131.6	113.1	98.3		F	583	P	
582	↓	6"	L3	↓	↓	↓	17.1	130.4	111.4	96.8		F	584		F

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** CONFIRMED BY CHECK POINT

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

000458

1262

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: FRIDAY 26 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~±8"~~ 11/24/97 LIFT THICKNESS (LOOSE/COMPACTED): ~~±8"~~

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/KW

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
583	SOUTH SLOPE OF INTERCELL BERM	6" L3	LP-158**	15.8	115.1	17.2	130.8	111.6	97.0	P				
584	↓	6" L3	↓	↓	↓	15.1	133.3	115.8	100.6		F	587	P	
585	↓	6" L2	↓	↓	↓	16.7	128.4	110.0	95.6		F	586		F
586	↓	6" L2	↓	↓	↓	15.5	133.0	115.2	100.1		F	588	P	
587	↓	6" L3	↓	↓	↓	16.9	131.7	112.7	97.9	P				
588	↓	6" L2	↓	↓	↓	16.7	134.5	115.3	100.2	P				
589	↓	6" L2	↓	↓	↓	16.4	131.6	113.1	98.3		F	590	P	
590	↓	6" L2	↓	↓	↓	15.9	133.7	115.4	100.3	P				
10/6/97														

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

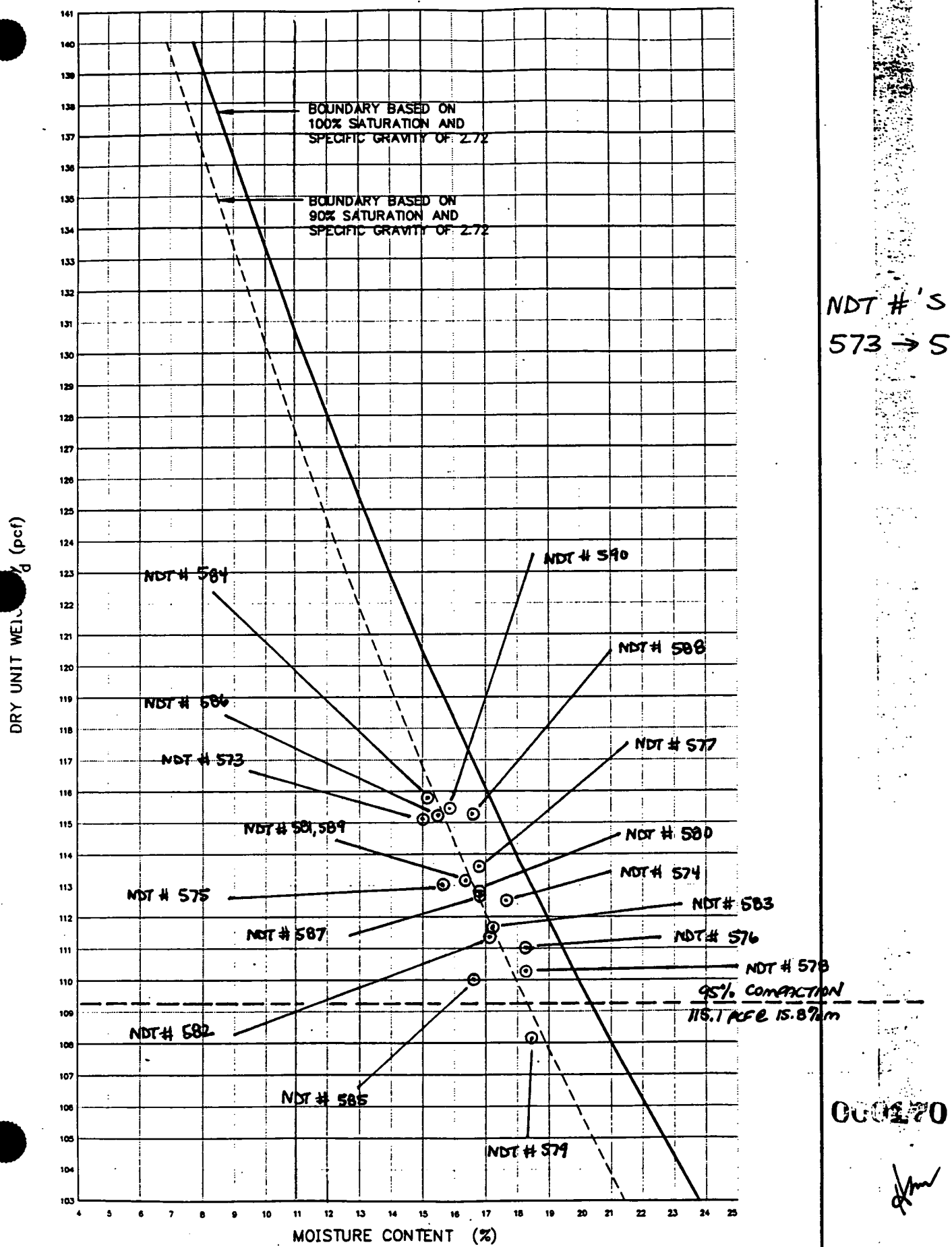
** - CONFIRMED BY CHECKPOINT

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

000139

12672

FRIDAY 26 SEPT 1997



NDT #'S
573 → 590

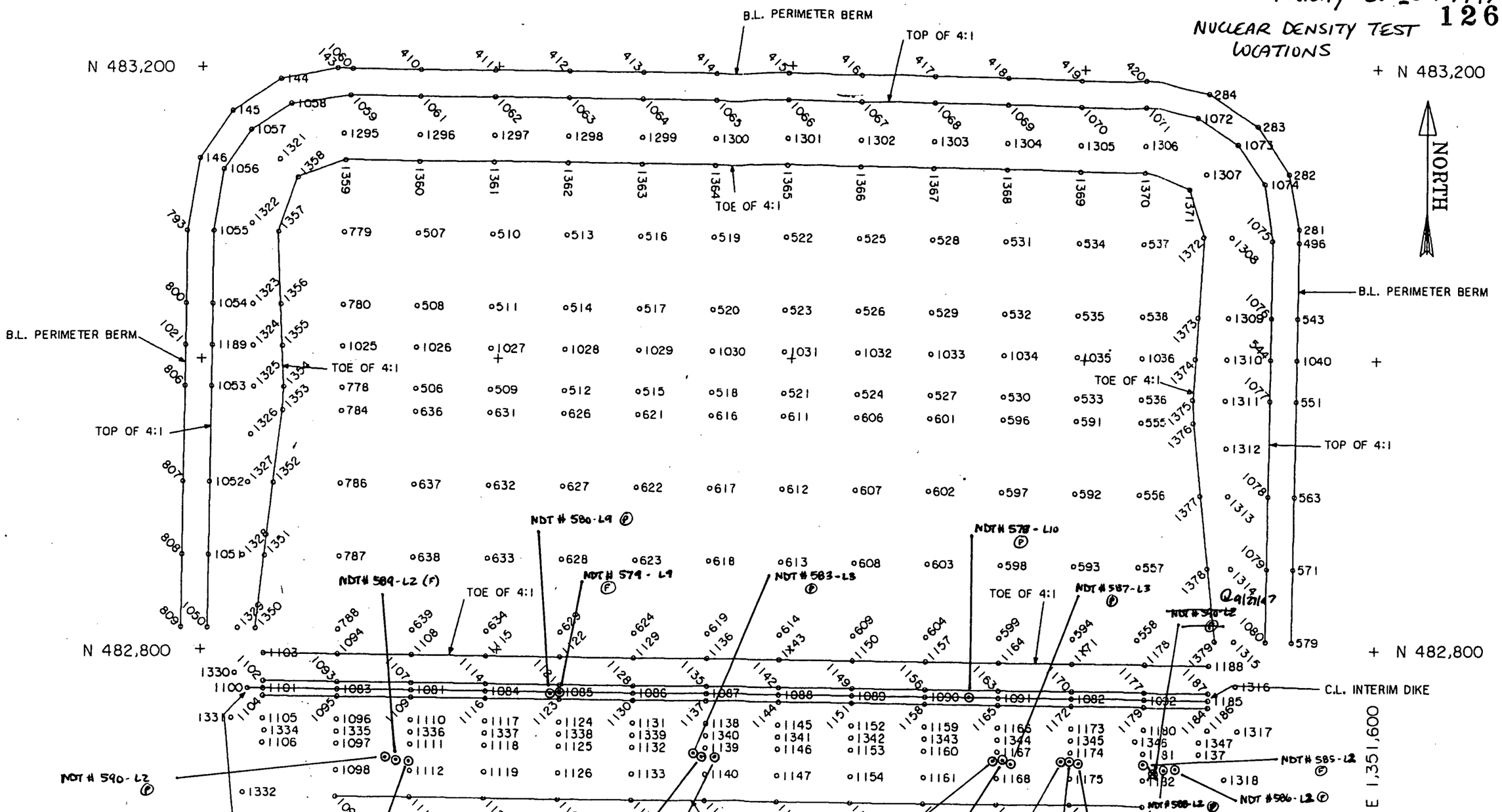
000270

SHEET NO. 3 OF 4

FRIDAY 26 SEPT 1997

NUCLEAR DENSITY TEST LOCATIONS

1267



PETRO ENVIRONMENTAL TECHNOLOGIES
FERMCO
RESTORATION MANAGEMENT CORPORATION

HIRSCH & ASSOC. SURVEYING INC.
3610 STATELINE RD., OKEANA, OHIO 45053
(513) 387-0534

JOB NO.	
DATE:	9/18/97
SCALE:	1"=80'
DRAWN BY:	L.E.H.
PRINT DATE:	

CELL I
CERTIFICATION POINTS
TOP OF CLAY

9/18/97	TOE SLOPES
DATE:	REVISIONS:

FILE NAME: PETCELL1.CRI

SHEET NO. 1 OF 1

SHEET NO. 4 OF 4

000171

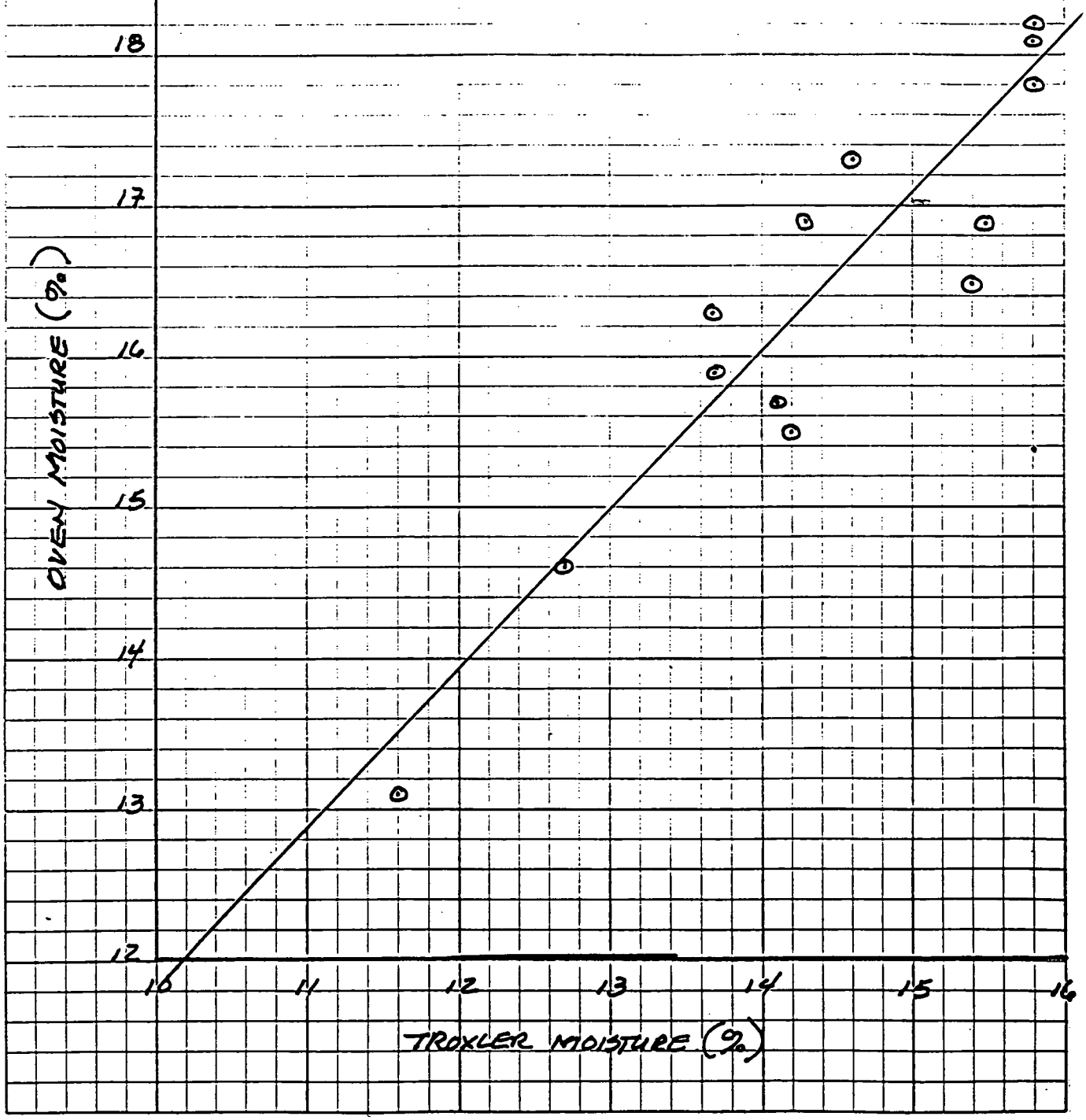
GEOSYNTEC CONSULTANTS

Written by: HEM Date: 97 / 09 / 27 (YY MM DD) Reviewed by: _____ Date: __/__/__ (YY MM DD)

Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR WEEK OF 29 SEPTEMBER 1997

(29 SEPT — 05 OCT. 1997)



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 29 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~8"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ~~8~~ 18"

% COMPACTION: ≥95% STD. PROCTOR / APZ * MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORROLATION QA ID: BN/KW/PP/RI

TEST NO. NDT#	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: STOCKPILE SAMPLE NO. (AVE. VALUE)	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
591	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L3	9	17.5	110.5	16.0	134.9	116.3	105.2	P				
592	↓	6" L4	9	↓	↓	16.2	132.3	113.9	103.1	P				
593	↓	6" L4	9	↓	↓	16.4	132.9	114.2	103.3	P				
594	↓	6" L3	9	↓	↓	15.6	134.0	115.9	104.9	P				
595	EAST END OF CELL I ALONG TOE OF EAST BERM	4" SURFACE	LP-158	15.8	115.1	15.5	131.1	113.5	98.6		F	606	P	
596	↓	4" SURFACE	↓	↓	↓	15.3	128.7	111.6	97.0		F	607		F
597	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L4	9	17.5	110.5	17.0	131.5	112.4	101.7	P				
598	↓	6" L5	9	↓	↓	18.2	130.4	110.3	99.8	P				
599	↓	6" L5	9	↓	↓	18.1	128.8	109.1	98.7		F	602	P	
600	↓	6" L4	9	↓	↓	15.0	130.0	113.0	102.3		F	601	P	

COMMENTS: * APZ → APPROVED PERMEABILITY ZONE SECTION 02225 PART 3.02 A PROJECT SPECIFICATIONS

RETESTS IN GENERAL VICINITY OF ORIGINAL TESTS

000123

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION MONDAY DATE: 29 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~[illegible]~~ 8" LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: ≥95% STD. PROCTOR / APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (CIRCLE ONE) (A) B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/KW/PP/RL

TEST NO. NDT#	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: STOCKPILE ~~SAMPLE~~ NO. (AVE. VALUE)	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
6001	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L4	#LP-25	14.0	118.3	15.8	134.9	116.5	98.5	P				
6002	↓	6" L5	#9	17.5 ZB 9/14/97	110.5 ZB 9/14/97	17.6	130.5	111.0	100.5	P				
6003	TOP OF INTERCELL BERM	6" L11	↓	↓	↓	17.5	130.0	110.6	100.1		F	605	P	
6004	↓	6" L11	↓	↓	↓	17.5	133.4	113.5	102.7	P				
6005	↓	6" L11	↓	↓	↓	18.1	130.8	110.8	100.3	P				
6006	CELL I FLOOR AREA AT TOE OF EAST BERM	4" SURFACE	LP-25	14.0	118.3	16.4	133.2	114.4	96.7	P				
6007	↓	4" ↓	↓	↓	↓	14.7	134.2	117.0	98.9		F	609 ~~6108~~ 9/14/97	P	
6008	↓	4" ↓	#9	17.5	110.5	17.1	130.6	111.5	100.9		F	~~6109~~	P	
6009	↓	4" ↓	LP-25	14.0	118.3	15.8	135.9	117.4	99.2	P				
6010	↓	4" ↓	#9	17.5	110.5	19.5	128.3	107.4	97.2	P				

COMMENTS: * APZ → APPROVED PERMEABILITY ZONE SECTION 02225 PART 3.02A PROJECT SPECIFICATIONS

RETESTS IN GENERAL VICINITY OF ORIGINAL TESTS

000174

12967

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 29 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~8"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ~~12~~ 8"

% COMPACTION: 95% STD. PROCTOR / APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/KW/PP/RL

TEST NO. NDT#	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	FIELD TEST RESULTS: PASS	FIELD TEST RESULTS: FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
611	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L5	AVG. VALUE STOCKPILE #9	17.5	110.5	16.1	130.5	112.4	101.7		F	614		F
612		6" L6	9			16.9	131.6	112.6	101.9	P				
613		6" L5	9			15.4	131.7	114.1	103.3		F	616	P	
614		6" L5	9			18.2	127.1	107.5	97.3		F	615		F
615		6" L5	9			21.2	126.6	104.5	94.6		F	617	P	
616		6" L5	9			17.9	130.5	110.7	100.2	P				

10/6/97

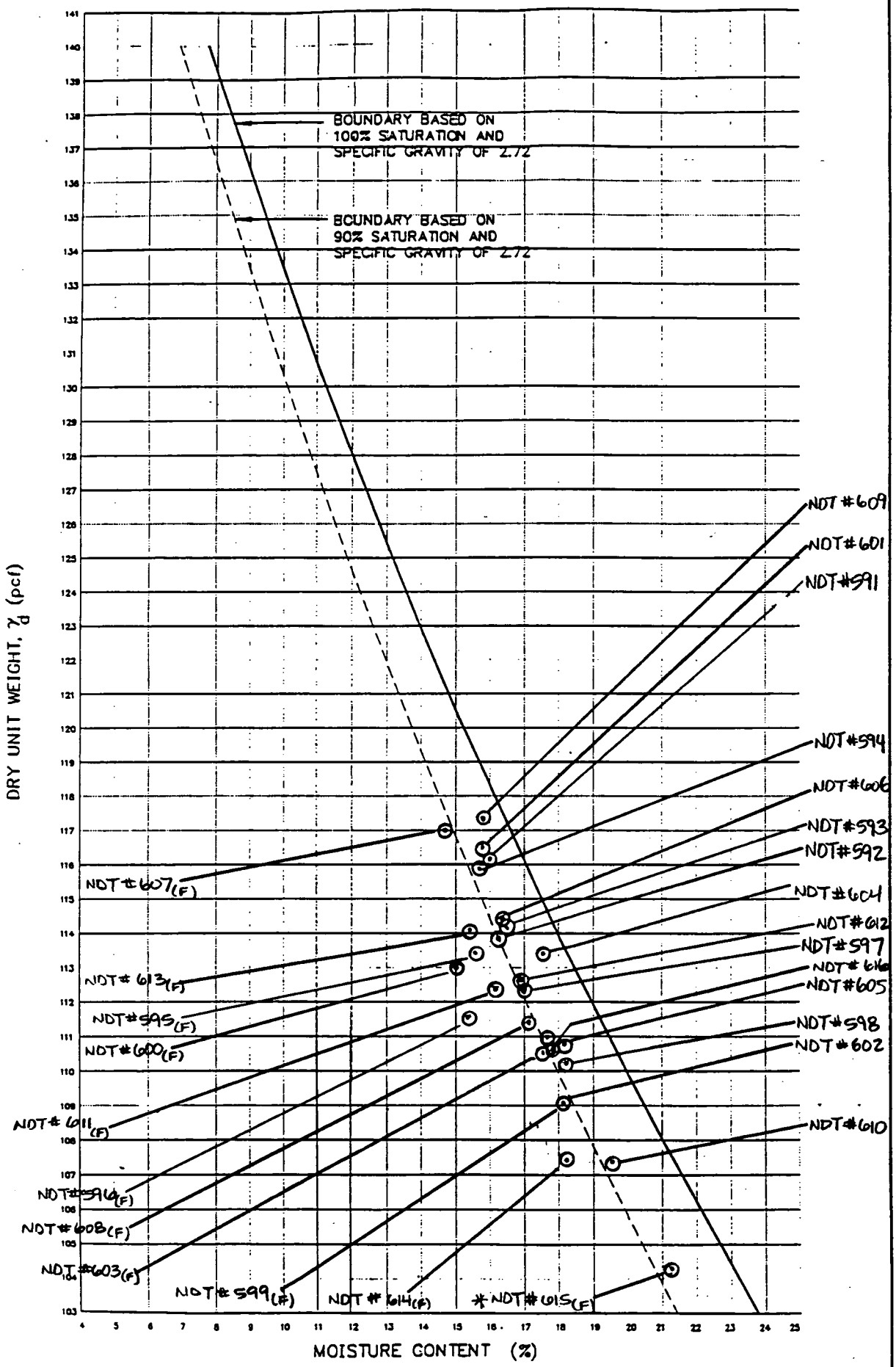
COMMENTS: * APZ → APPROVED PERMEABILITY ZONE SECTION 02225 PART 3.02A PROJECT SPECIFICATIONS

RETESTS IN GENERAL VICINITY OF ORIGINAL TESTS

001125

12672

MONDAY 29 SEPTEMBER 1997

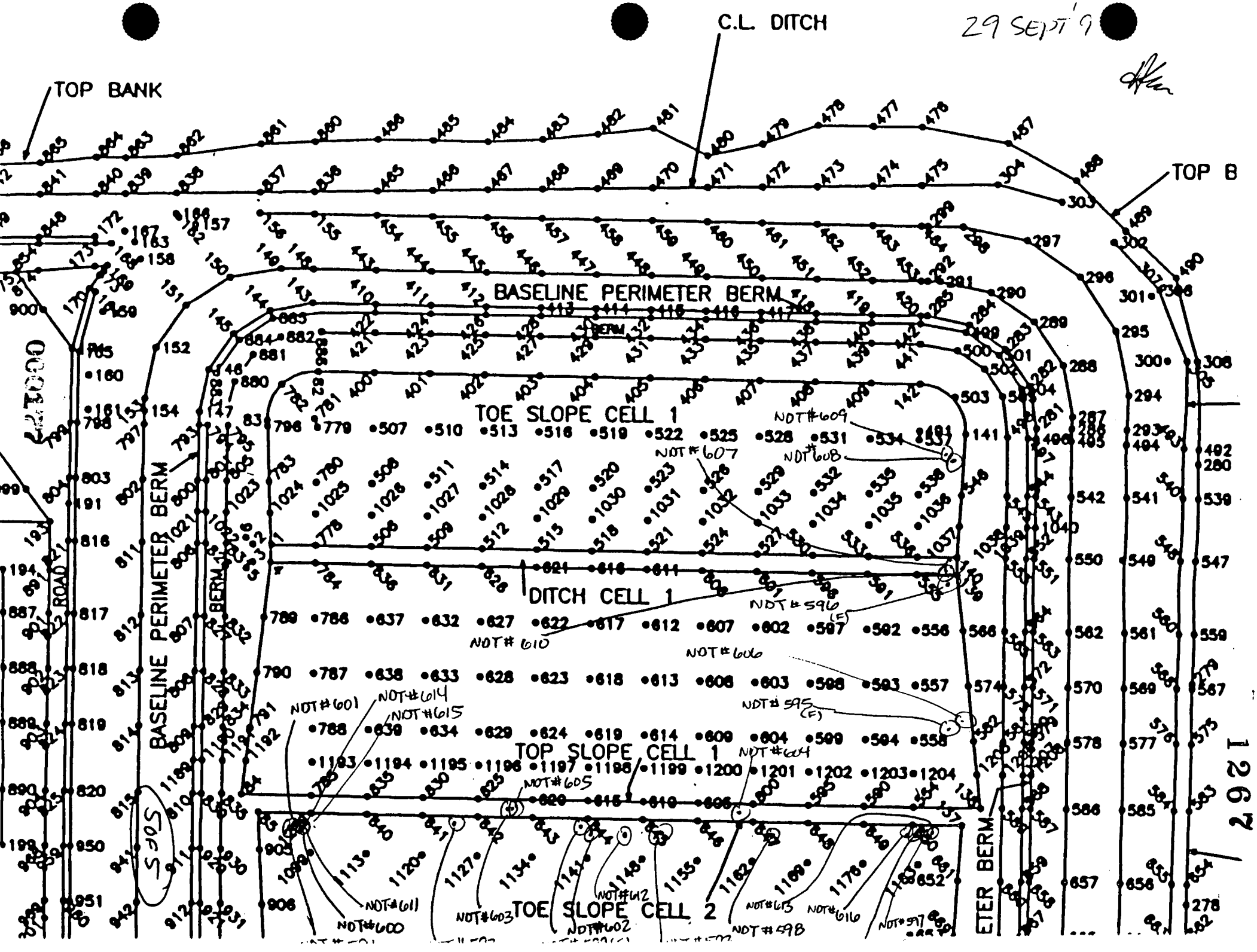


00276

SHEET # 4 OF 5

* - SAMPLE FAILS + 3% OPTIMUM MOISTURE CONTENT OF AVERAGE STOCKPILE VALUE {OF 17.5% (OPTIMUM MOISTURE CONTENT)} REQUIREMENT

29 SEPT '9


C.L. DITCH
TOP BANK
TOP B
BASELINE PERIMETER BERM
TOE SLOPE CELL 1
DITCH CELL 1
TOP SLOPE CELL 1
TOE SLOPE CELL 2
BASELINE PERIMETER BERM
ROAD
NOT#609
NOT#607
NOT#608
NOT#596
NOT#610
NOT#606
NOT#601
NOT#614
NOT#615
NOT#595
NOT#604
NOT#605
NOT#611
NOT#600
NOT#603
NOT#612
NOT#602
NOT#613
NOT#616
NOT#598
NOT#597

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION TUESDAY DATE: 30 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ~~>8"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: ≥95% STD. PROCTOR / APZ* MOISTURE RANGE: + 3% APZ* ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/PP/KW

	TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
RETEST→	617	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L5	9	17.5	110.5	17.2	131.3	112.0	101.4	P				
	618	↓	6" L6	↓	↓	↓	17.8	132.0	112.1	101.4	P				
	619	↓	6" L7	↓	↓	↓	16.9	132.9	113.7	102.9	P				
	620	↓	6" L6	↓	↓	↓	18.8	131.1	110.4	99.9	P				
	621	SOUTHWEST CORNER OF CELL I FLOOR AREA - LANE 5	6" L4	LP-37	15.5	114.2	14.4	131.6	115.0	100.7		F	631	P	
	622	SOUTHWEST CORNER OF CELL I FLOOR AREA - LANE 6	6" L3	↓	↓	↓	15.8	131.2	113.3	99.2		F	629	P	
	623	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L7	9	17.5	110.5	17.7	131.1	111.4	100.8	P				
	624	↓	6" L8	↓	↓	↓	17.2	132.5	113.1	102.4	P				
**	625	↓	6" L8	↓	↓	↓	16.0	132.4	114.1	103.3	P				
	626	SOUTHWEST CORNER OF CELL I FLOOR AREA - LANE 7	6" L4	LP-37	15.5	114.2	14.9	128.2	111.6	97.7		F	630		F

COMMENTS: * APZ → APPROVED PERMEABILITY ZONE SECTION 02225 PART 3.02 A PROJECT SPECIFICATIONS

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION TUESDAY DATE: 30 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~28"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8" (CIRCLE ONE)

% COMPACTION: 95% STD. PROCTOR / APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/KW/PP

TEST NO. NDT #	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
627	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L8	AVG #9	17.5	110.5	16.9	132.8	113.6	102.8	P				
628**	↓	6" L7	↓ #9	17.5	110.5	16.5	129.5	111.2	100.6		F	639	P	
629	SOUTHWEST CORNER OF CELL I FLOOR AREA - LANE 6	6" L3	LP-42	15.4	116.0	16.5	133.3	114.4	98.6	P				
630	↓ - LANE 7	6" L4	LP-21	12.5	123.8	13.6	136.7	120.3	97.2		F	640		F
631	AREA REWORKED - LANE 6	6" L4	LP-21	12.5	123.8	13.1	139.9	123.7	100.0	P		642	P	
632	- LANE 5	6" L4	LP-42	15.4	116.0	14.9	131.6	114.5	98.7		F	641		F
633	↓ - LANE 5	6" L2	LP-42	15.4	116.0	16.6	134.0	114.9	99.1	P				
634	LDS NO. 1 CLAY BACKFILL @ OH64.52, 10' N OF C.P. 1416	6"	AVG. #10	19.3	106.0	15.9	106.3	91.7	86.5		F			
△ 635	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L8	LP-42	15.4	116.0	16.5	131.8	113.1	97.5	P				
636**	↓	6" L9	↓	↓	↓	16.6	129.7	111.2	95.9		F	638	P	

COMMENTS: * APZ → APPROVED PERMEABILITY ZONE SECTION 02225 PART 3.02 A PROJECT SPECIFICATIONS

** LIFT BONDING / SEPARATION PROBLEM OBSERVED

△ — SANDCONE PERFORMED RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

10/6/97

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 30 day SEPT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±8" 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/KW/PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
637	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L9	LP-42	15.4	116.0	18.1	131.1	111.0	95.7	P				

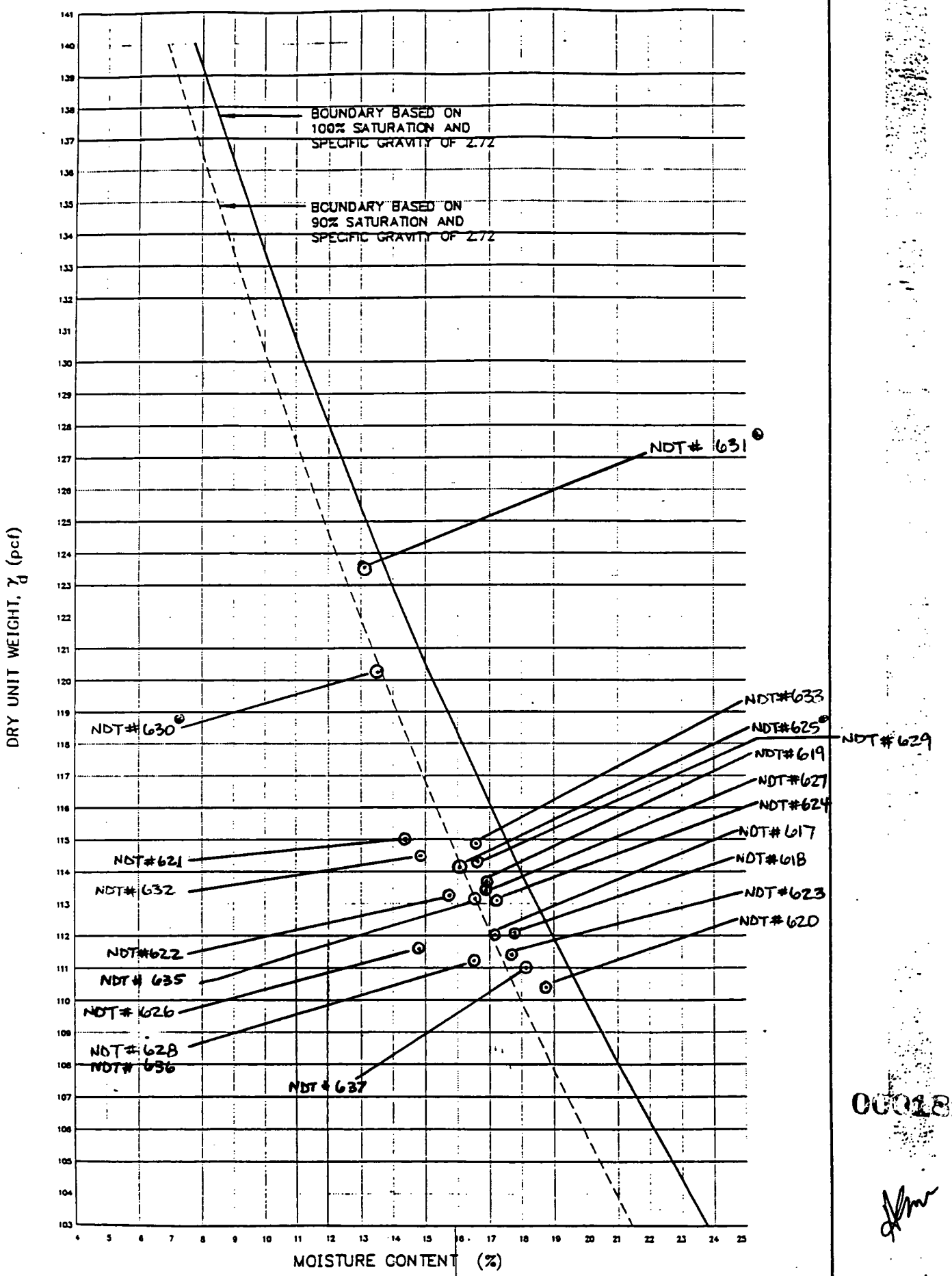
10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

©GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: SHEET NO. 3 OF 5

1267

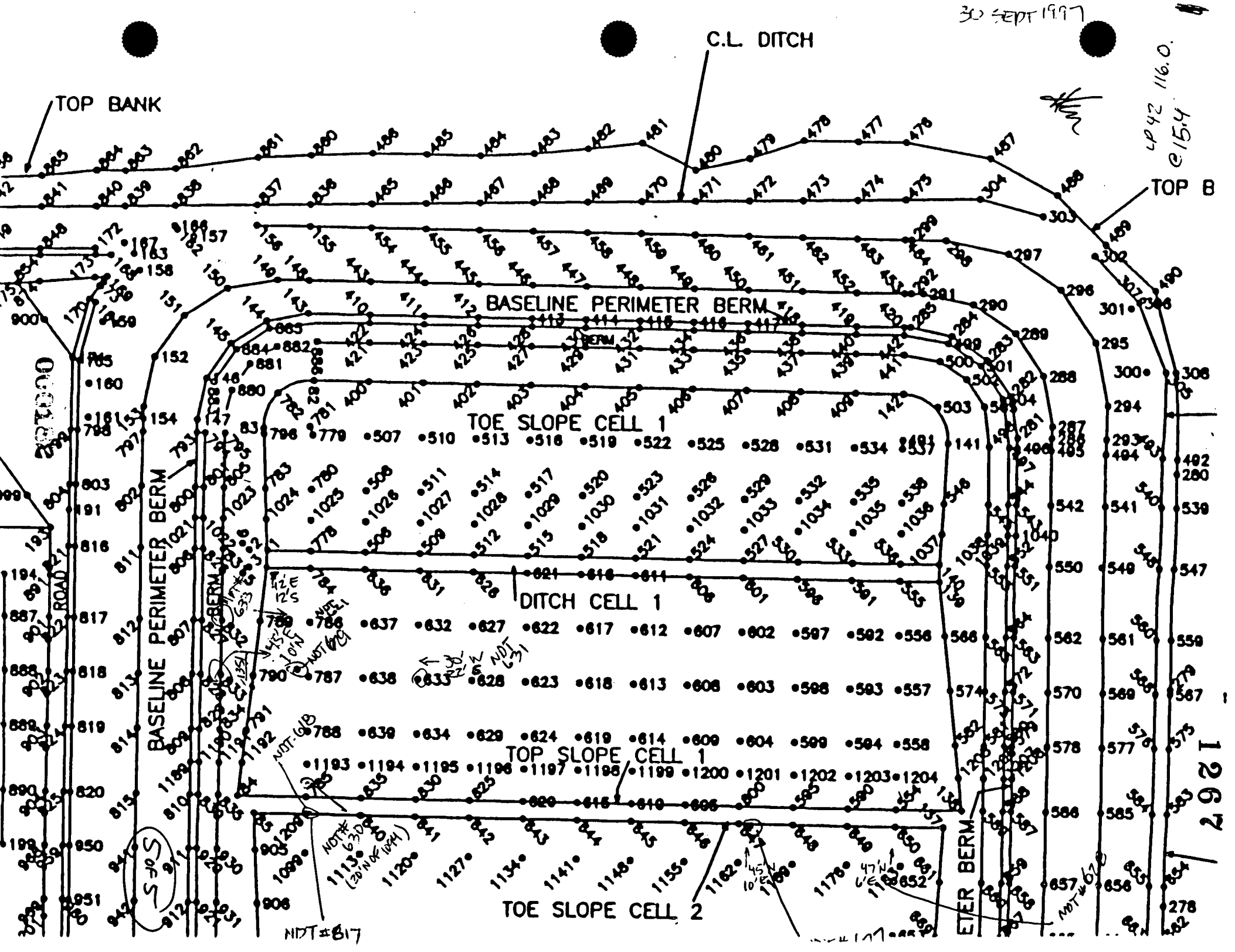
TUESDAY SEPTEMBER 30, 1997



000181

SHEET NO. 4 OF 5

30 SEPT 1997


C.L. DITCH
TOP BANK
TOP B
BASELINE PERIMETER BERM
TOE SLOPE CELL 1
DITCH CELL 1
TOP SLOPE CELL 1
TOE SLOPE CELL 2
BASELINE PERIMETER BERM
ROAD
NDT#817
NDT#670

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 01 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED): 8" 1/22/97

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
638	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L9	LP-263	17.5	108.1	17.6	130.3	110.8	102.5	P				
639	↓	6" L7	↓	↓	↓	17.8	130.2	110.5	102.2	P				
640	SW. CORNER OF CELL I LANE #7	6" ~~L4~~ L5 1/22/97	• LP-37	15.5	114.2	16.7	128.6	110.2	96.5		F	642	P	
641	LANE #5	6" L5				17.4	125.5	106.9	93.6		F	644	P	
642	LANE #6	6" ~~L4~~ L5 1/22/97				17.2	131.5	112.2	98.2	P				
643	LANE #7	6" L4				16.3	135.7	116.7	102.2	P				
644	LANE #5	6" L5				16.3	132.7	114.1	100.0	P				
645	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L9				16.9	134.2	114.8	100.5	P				
646	↓	6" L10	LP-37	15.5	114.2	18.4	130.1	109.9	96.2	P				
647	↓	6" L8	↓	↓	↓	17.2	131.3	112.0	98.1	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

• VERIFIED BY CHECKPOINT

NOTE: RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 01 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~8"~~ Kem. #22/42 LIFT THICKNESS (LOOSE/COMPACTED): 8"

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
648	S.W. CORNER OF CELL #1	6"	L3	LP-263	17.5	108.1	18.7	129.7	109.3	101.1	P				
649	↓	6"	L3	↓	↓	↓	17.9	129.3	109.7	101.5		F	650	P	
650	↓	6"	L3	↓	↓	↓	17.7	130.0	110.5	102.2	P				
651	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6"	L9	↓	↓	↓	18.7	131.8	111.0	102.7	P				
652	↓	6"	L11	↓	↓	↓	17.6	133.3	113.4	105.0	P				
653	↓	6"	L10	↓	↓	↓	17.9	132.4	112.3	103.9	P				
654	LANE #7	6"	L4	LP-37	15.5	114.2	18.5	126.8	107.0	93.7		F	656	P	
655	LANE #5	6"	L4	↓	↓	↓	16.9	132.8	113.6	99.5	P				
656	LANE #7	6"	L4	↓	↓	↓	17.5	131.5	111.9	98.0	P				
657	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6"	L10	LP-263	17.5	108.1	18.1	130.2	110.2	101.9	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 302A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: WEDNESDAY 01 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED): ±8" (CIRCLE ONE)

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ * ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
658	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L10	LP-263	17.5	108.1	17.4	131.4	111.9	103.5	P				
659	↓	6" L12	↓	↓	↓	18.8	131.0	110.3	102.0	P				
660		6" L11 ~~L12~~ @ 10/6/97				17.3	129.1	110.1	101.9		F	661	P	
661	↓	6" L11				19.3	131.0	109.8	101.6	P				
662	S.W. CORNER OF CELL I	6" L6				19.4	128.4	107.5	99.4	P				
663	↓	6" L5				18.3	127.4	107.7	99.6		F	664	P	
664	↓	6" L5	↓	↓	↓	18.7	130.0	109.5	101.3	P				

10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

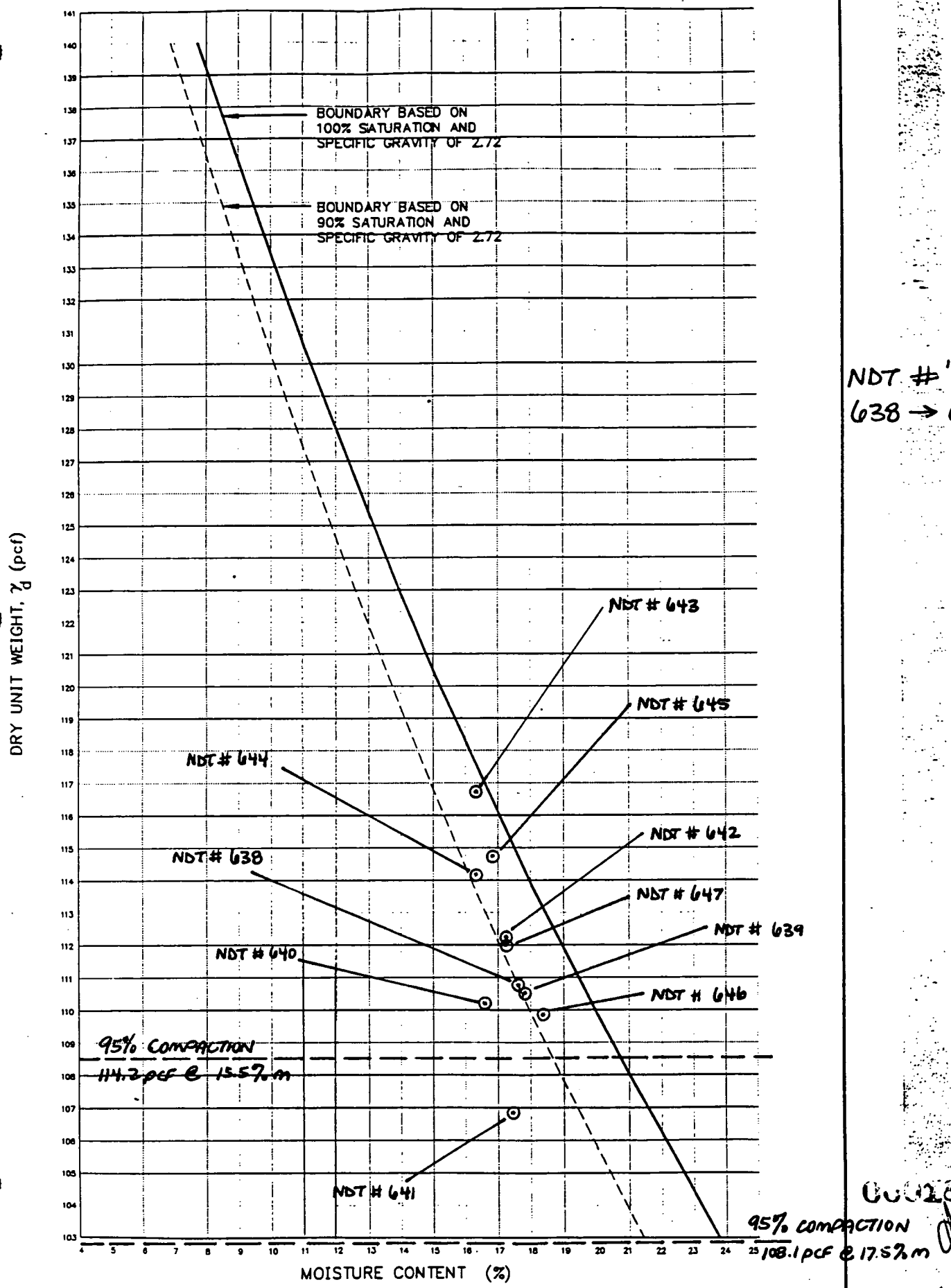
RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

©GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: SHEET NO. 3 OF 7

1267

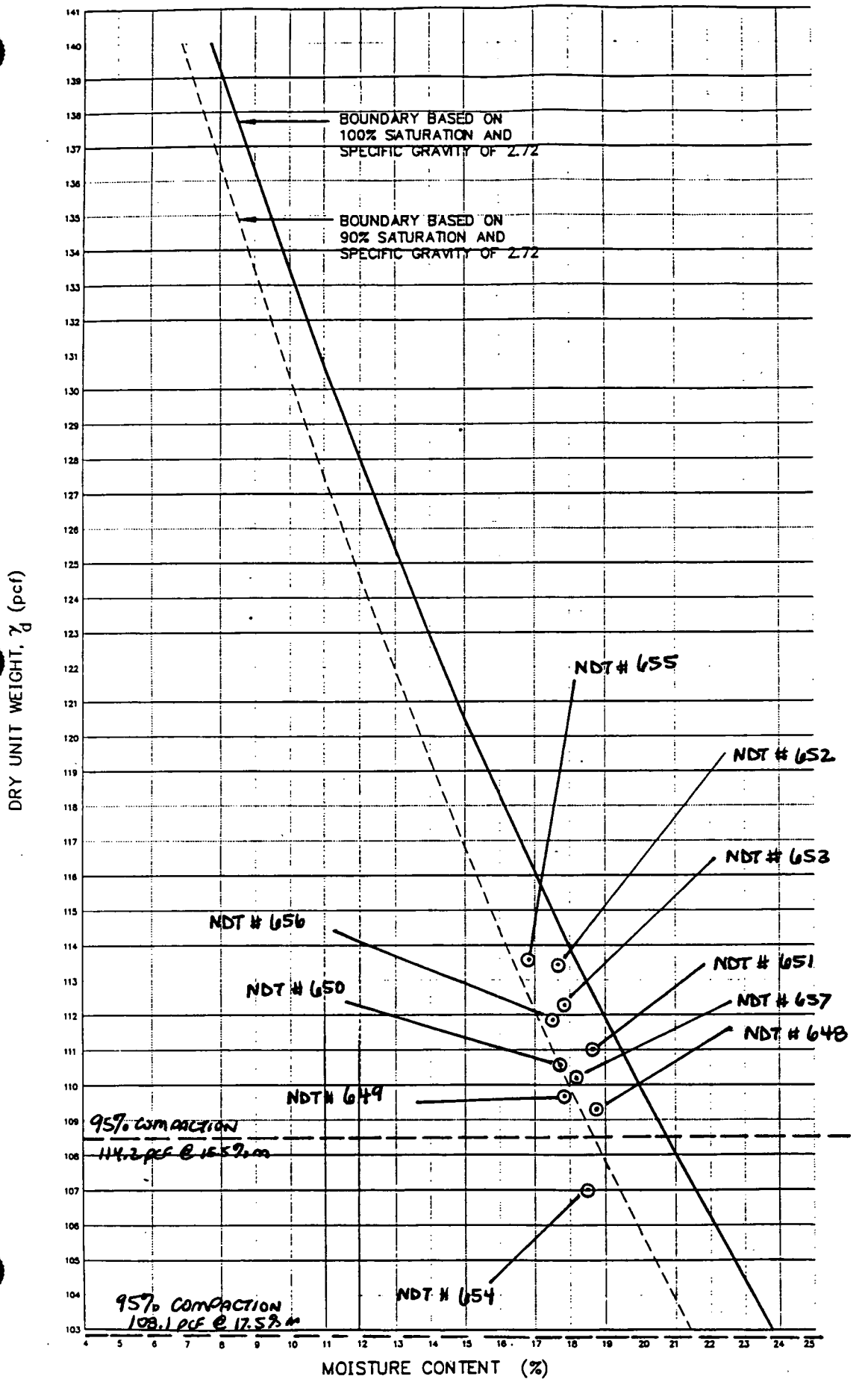
000125

WEDNESDAY 01 OCT 1997



NDT #'s
638 → 647

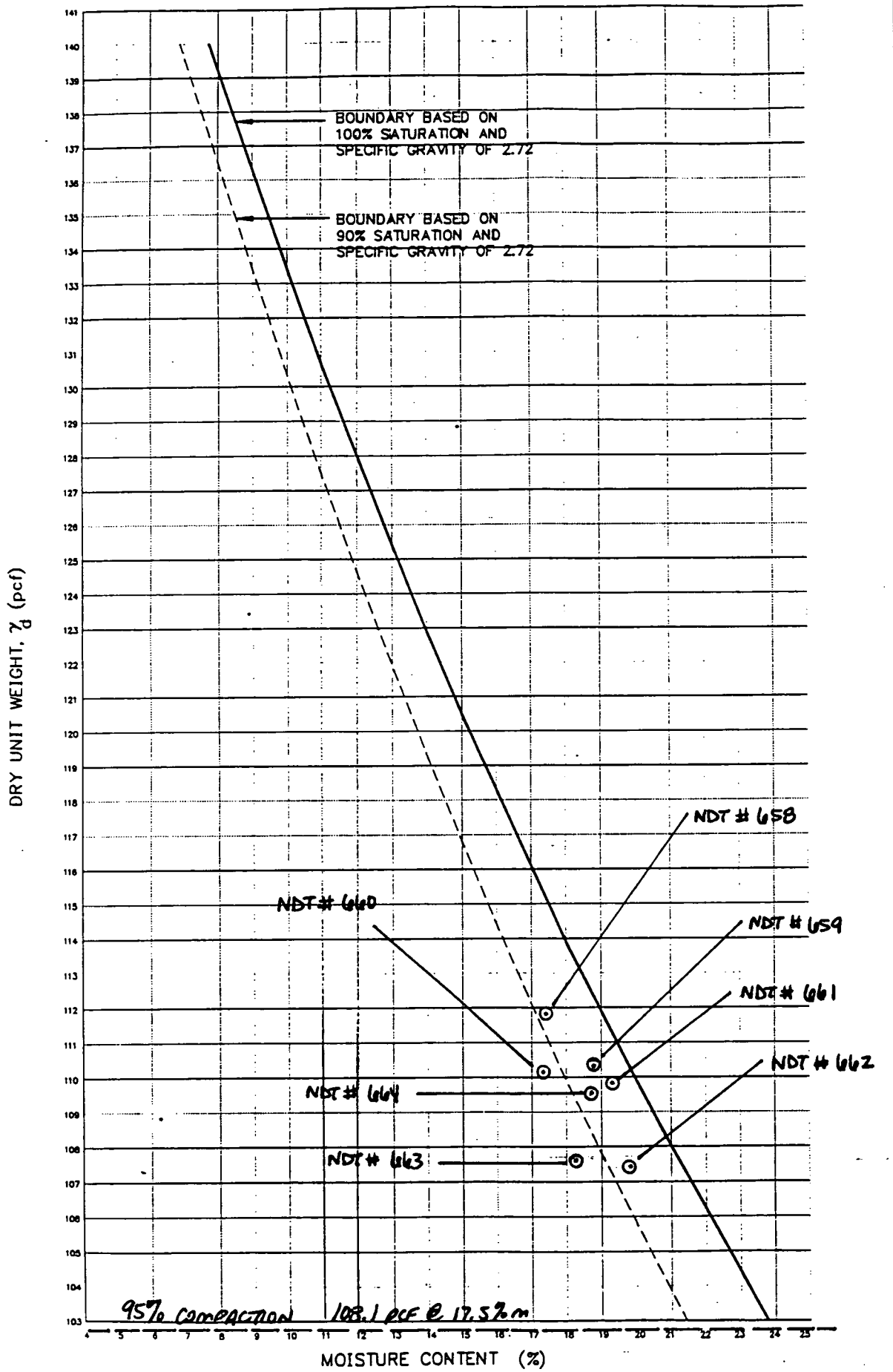
WEDNESDAY 01 OCT 1997



NDT #'s
648 → 657

SHEET NO. 5 OF 7

WEDNESDAY 01 OCT 1997

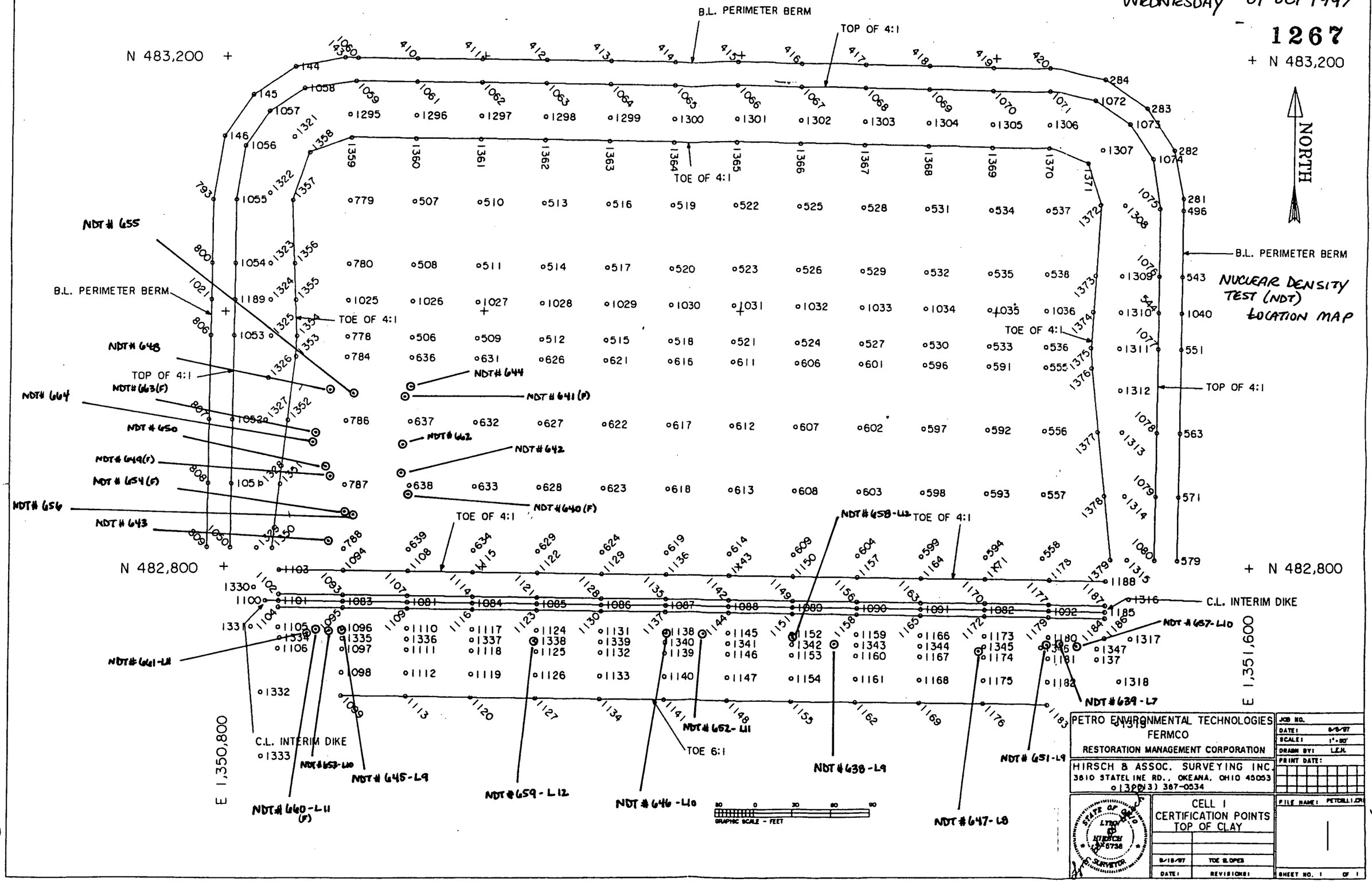


NDT #'S
658 → 664

SHEET NO. 6 OF 7

WEDNESDAY 01 OCT 1997

1267



000189 SHEET NO. 7 OF 7

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

THURSDAY DATE: 02 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~2-8 IN~~ HEA 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: ≥95% STD. PROCTOR / APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
665	SOUTH SLOPE OF INTERCELL BERM (CELL I/II)	6" L12	LP-263	17.5	108.1	17.9	129.9	110.2	101.9	P				
666		6" L13				17.2	130.6	111.4	103.1		F	668	P	
667		6" L11				18.3	131.0	110.7	102.4	P				
668		6" L13				17.2	132.2	112.8	104.3	P				
669	SOUTHWEST CORNER OF CELL I FLOOR AREA • LANE 7	6" L4				18.5	130.4	110.0	101.8	P				
670	• LANE 6	6" L4				19.8	127.8	106.7	98.7	P				
671	• LANE 5	6" L5				20.1	129.4	107.7	99.6	P				
672	NORTHWEST CORNER OF CELL I FLOOR AREA • LANE 3	6" L5	~~LP-22~~ LP-21	~~13.5~~ 12.5	~~120.0~~ 123.8	14.7	138.2	120.5	97.3	P				
673	• LANE 2	6" L6	LP-21	12.5	123.8	14.6	135.6	118.3	95.6	P				
674	SOUTH SLOPE OF INTERCELL BERM (CELL I/II)	6" L13	LP-263	17.5	108.1	18.1	131.1	111.0	102.7	P				

COMMENTS: APZ* → APPROVED PERMEABILITY ZONE SECTION 02225 PART 3.02 A PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION THURSDAY DATE: 02 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: ≥95% STD. PROCTOR / APZ* MOISTURE RANGE: + 3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
675	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L14	LP-263	17.5	108.1	18.6	125.7	106.0	98.1		F	678	P	
676		6" L14				18.0	128.4	108.8	100.6		F	679	P	
677		6" L12				17.8	126.5	108.4	99.4		F	680		F
678		6" L14				18.2	129.5	109.6	101.4	P				
679		6" L14				19.3	128.0	107.3	99.3	P				
680		6" L12				17.8	129.3	109.8	101.6		F	681	P	
681		6" L12				19.0	130.0	109.2	101.0	P				
682	NORTHWEST CORNER OF CELL I FLOOR AREA • LANE 3	6" L4	LP-42	15.4	116.0	18.4	132.6	112.0	96.6	P				
683	• LANE 1	6" L5				16.3	133.0	114.4	98.6	P				
~~684~~														

10-02-97

COMMENTS: APZ* ← APPROVED PERMEABILITY ZONE SECTION 02225 PART 3.02.A PROJECT SPECIFICATIONS

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

12667

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 02 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±3" LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
684	SOUTH SLOPE OF INTERCELL BERM	6" L14	LP-263	17.5	108.1	18.5	129.7	109.5	101.3	P				
685	↓	6" L15	↓	17.5	108.1	16.8	130.3	111.6	103.2		F	686	•	F

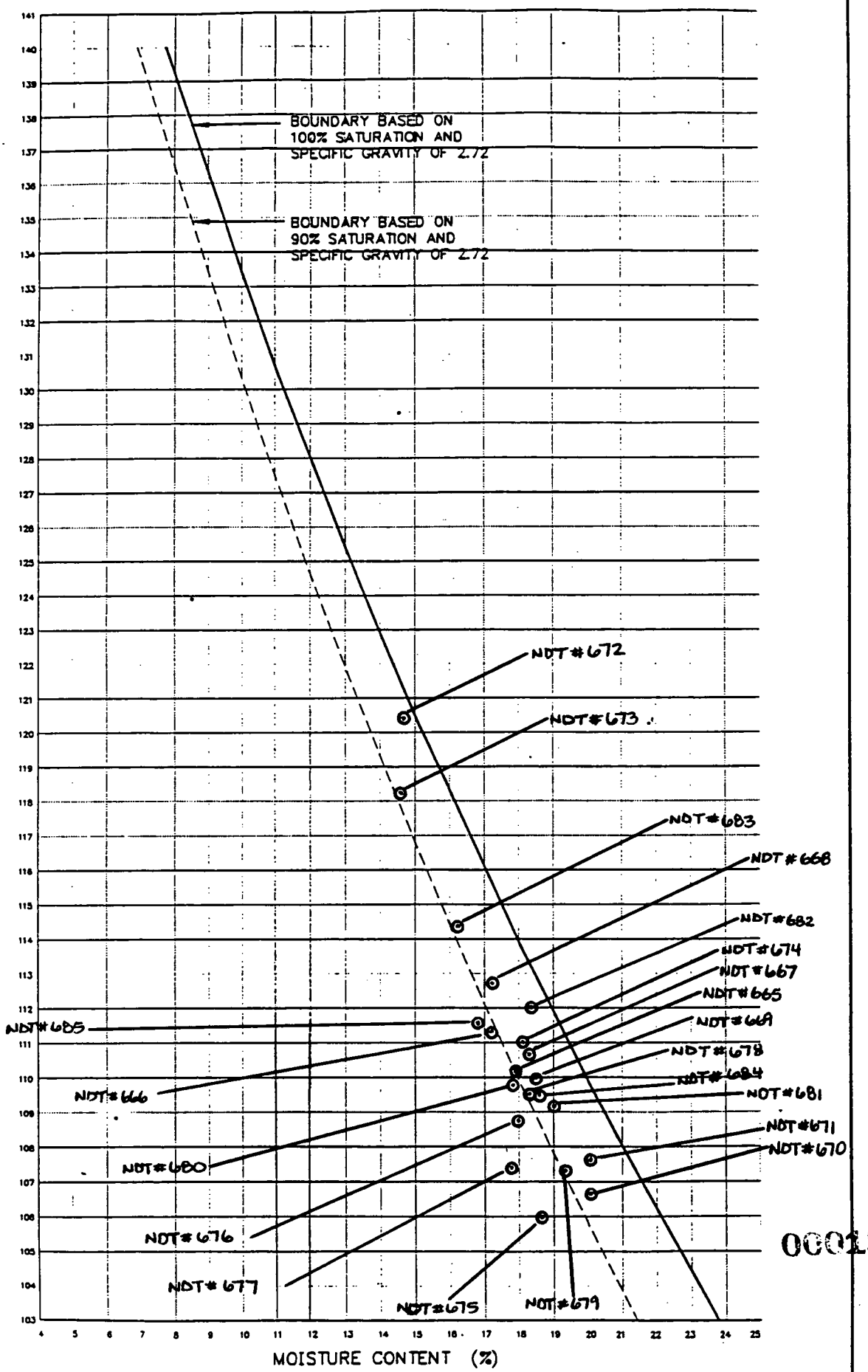
10/6/97

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

12967

THURSDAY OCTOBER 2, 1997

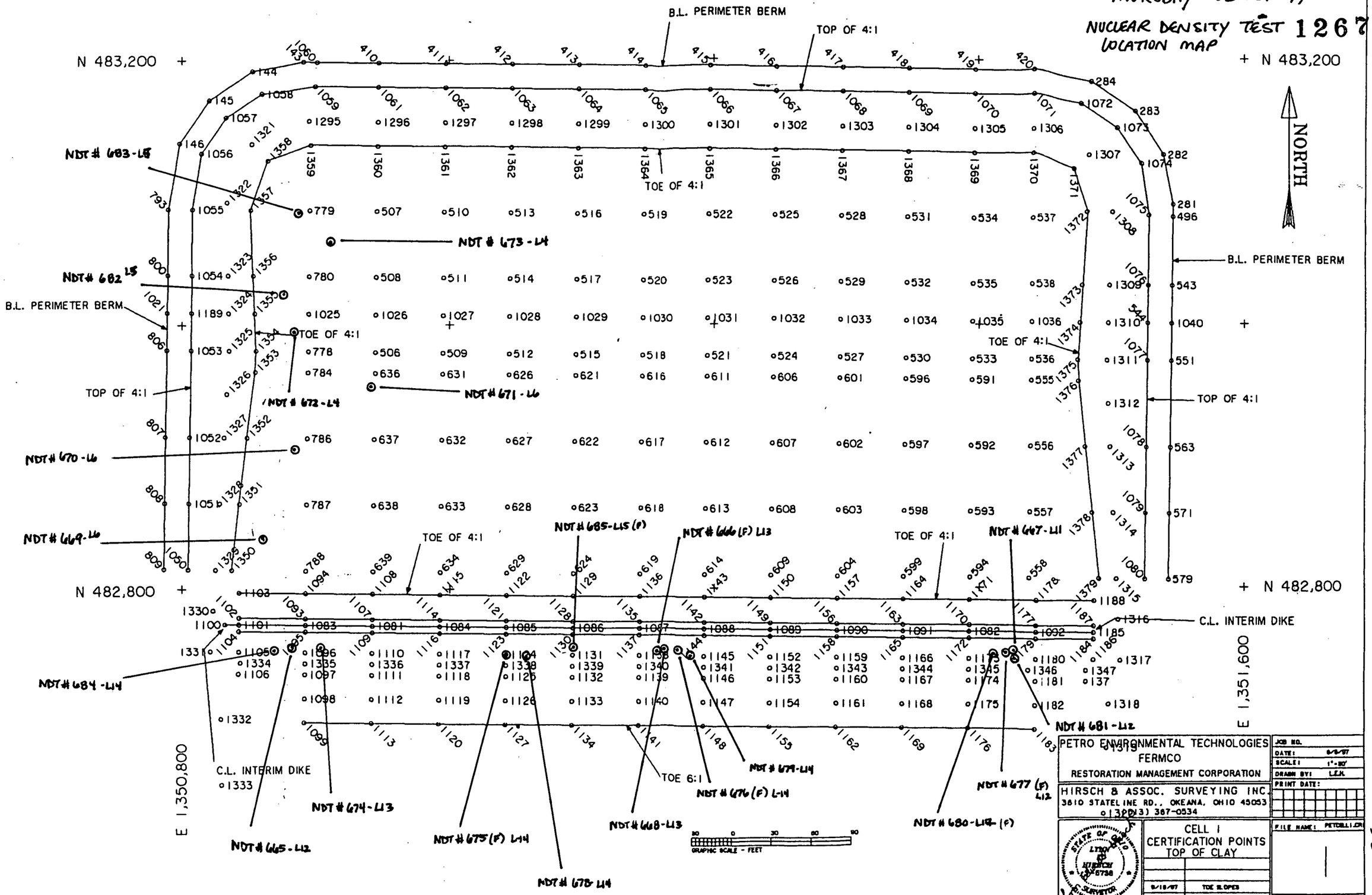


000193

SHEET NO. 4 o

THURSDAY 02 OCT 97

NUCLEAR DENSITY TEST 1267
LOCATION MAP



000194

SHEET NO. 5 OF 5

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: FRIDAY 3 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≈8"

% COMPACTION: ≥95% Std. Proctor/APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correction QA ID: PJP

TEST NO. NDT#	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
—	Top/South Side of Cell 1/2 Intercell berm.													
686	10' south of pt. 1121 3' west	6" / 15	LP-37	15.5	114.2	13.6 15.6	132.1	116.3 114.3	100.1		F	687	P	
687	10' south of pt. 1149 35' west	6" / 15		↓	↓	13.5 15.5	133.6	117.7 115.7	101.3	P				
688	35' south of pt. 1177 10' west	6" / 13	#11 LP-263 AVG.	17.5	108.1	17.3 19.4	128.8	101.7 107.9	99.8	P				
689	21' south of pt. 1121 10' east	6" / 15	#11 LP-263 AVG.	17.5	108.1	16.6 18.7	131.0	112.4 110.4	102.1	P		~~686~~		
—	Northwest Floor, Lift #6													
690	Northwest Floor - See plan	6" / 6	#11 LP-263 AVG.	17.5	108.1	15.4 18.0	128.6	110.9 107.0	100.8		F	691	P	
691	"	6" / 6	#11 LP-263 AVG.	17.5	108.1	15.6 17.7	131.2	113.4 111.5	103.1	P				
—	South Slope Stepped Build up → Lift #1													
692	18' west and 10' north of pt. 1113	6" / 1	#11 LP-263 AVG.	17.5	108.1	16.4 18.5	133.2	114.4 112.4	104.0	P				

COMMENTS: *APZ → Approved permeability zone Section 02225 Project Specifications (Part 3.02A)

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TESTS

©GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: _____ SHEET NO. 1 OF 4

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 3 day Oct month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 8"

% COMPACTION: ≥ 95% Std. Proctor / APZ* MOISTURE RANGE: +3 APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

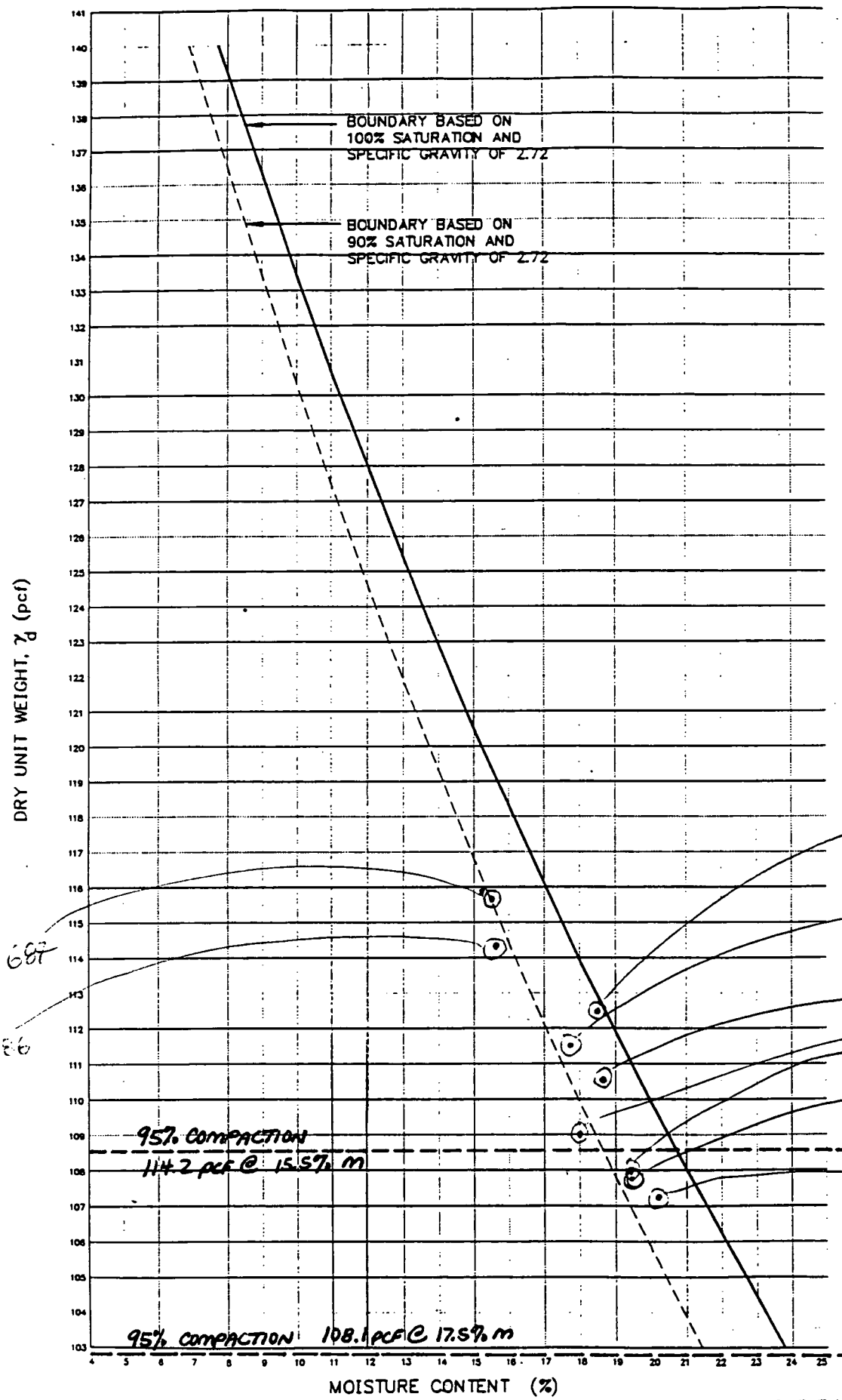
NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correction QA ID: GP

TEST NO. NDT#	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
—	South slope stepped build up. Intercept from 20' north and 15' west of pt. 1134													
693		6" / 1	#11 ~~AVG~~ 10-263 @ 1444	17.5	108.1	18.0 20.1	128.7	109.1 107.2	99.2	P				
694	17' north and 3' west of pt. 1162	6" / 1	#11 ↓	↓	↓	17.2 19.3	128.9	109.9 108.0	100.0	P				

COMMENTS: *APZ → Approved permeability zone Section 02225 Project Specifications (Part 3.02A)

GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: _____ SHEET NO. 2 OF 4

FRIDAY 03 OCT 97

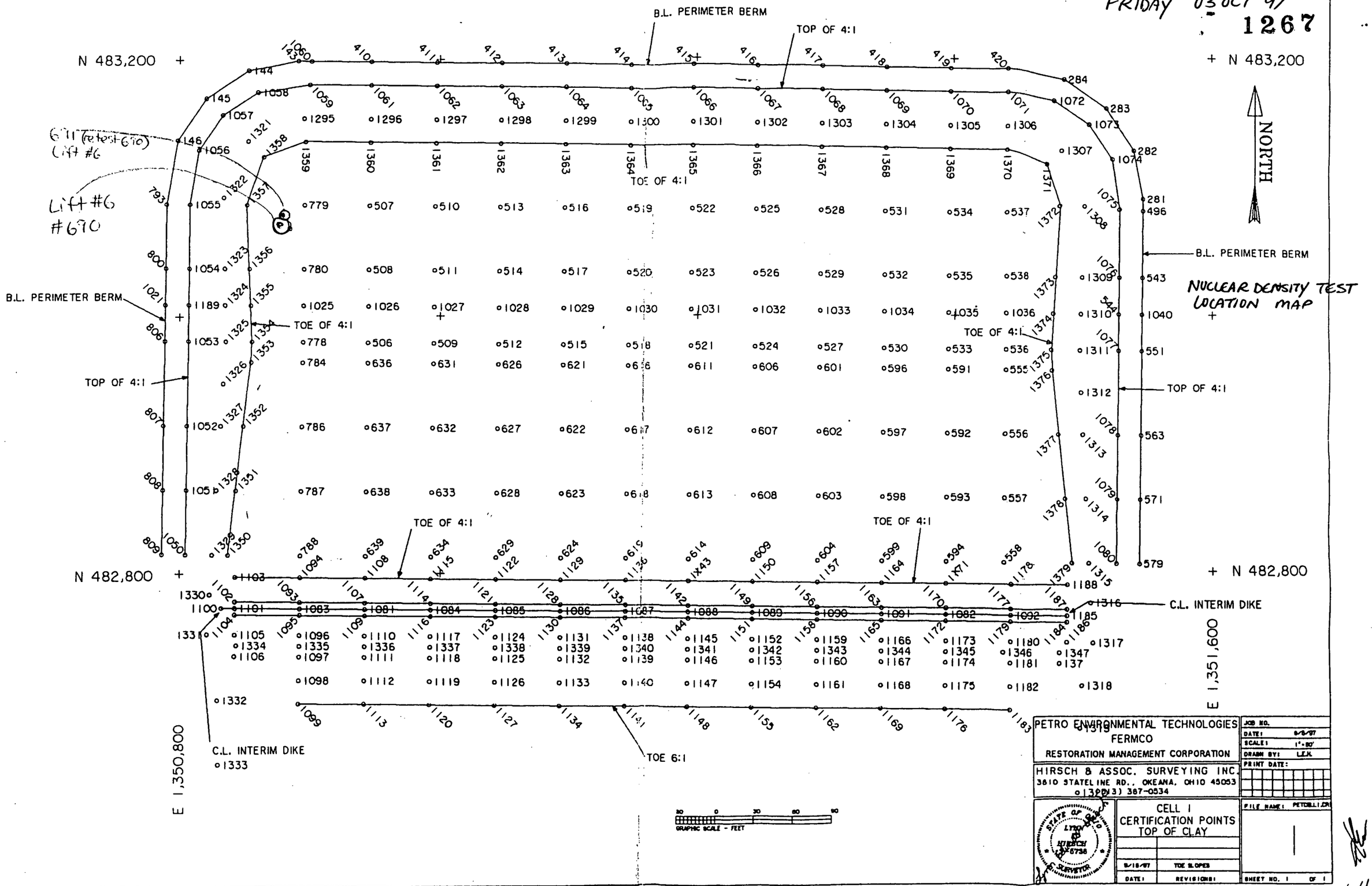


NDT #'s
686 → 694

NDT Log
PJP
3 Oct 97

FRIDAY 03 OCT 97

1267



PETRO ENVIRONMENTAL TECHNOLOGIES
FERMCO
RESTORATION MANAGEMENT CORPORATION

HIRSCH & ASSOC. SURVEYING INC.
3810 STATELINE RD., OKEANA, OHIO 45053
(513) 387-0534

JOB NO.	
DATE:	9/8/97
SCALE:	1"=80'
DRAWN BY:	L.E.K.
PRINT DATE:	
FILE NAME:	PETCELL1.CR

CELL 1
CERTIFICATION POINTS
TOP OF CLAY

DATE:	REVISIONS:
9/18/97	TOE SLOPES

SHEET NO. 1 OF 1

NDT Log PJP 4 of 4
3 Oct 97

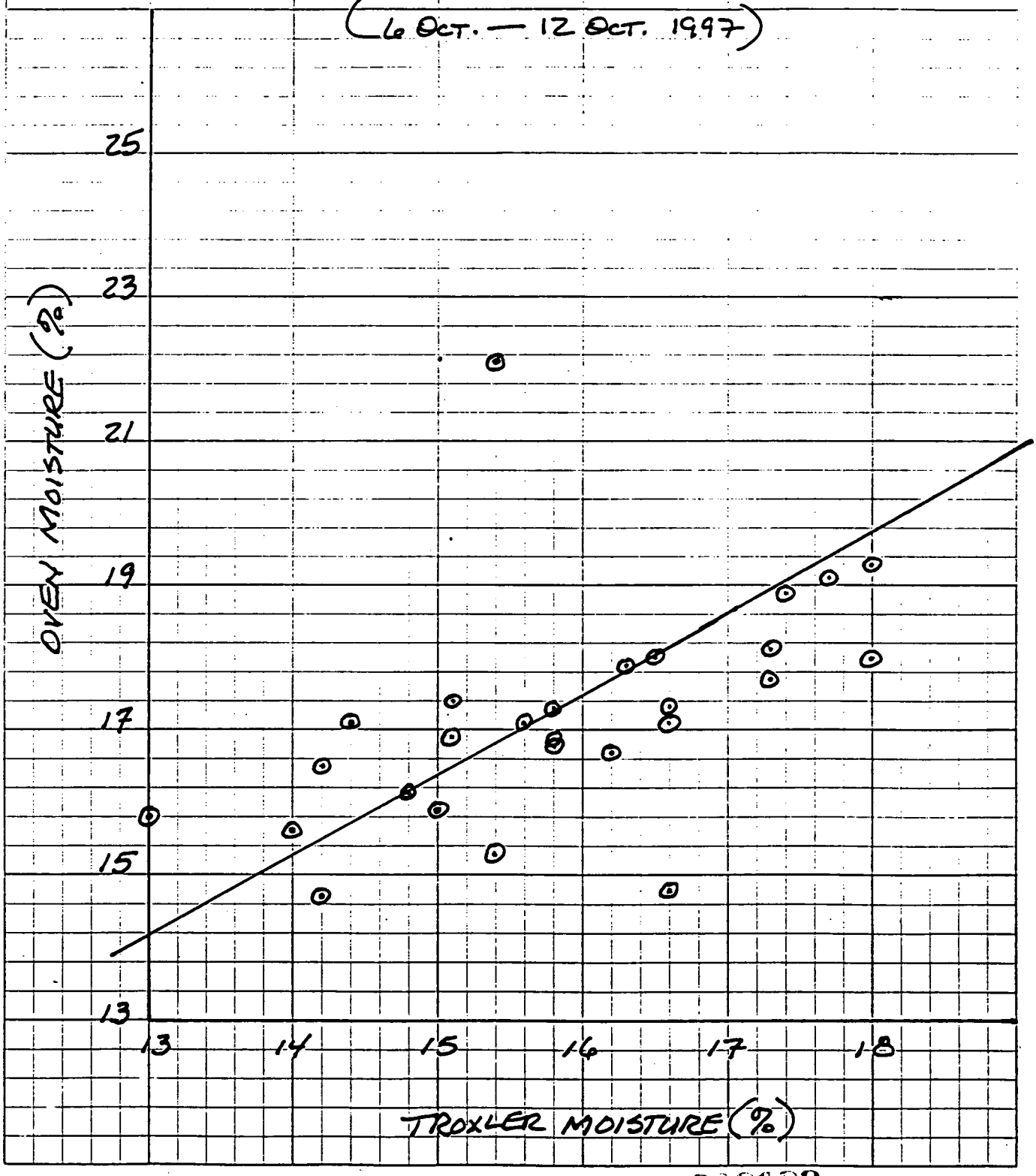
000198

Written by: HEM Date: 97 / 10 / 04 (YY MM DD) Reviewed by: _____ Date: ___ / ___ / ___ (YY MM DD)

Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ01166 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR WEEK OF 06 OCTOBER, 1997

(6 OCT. — 12 OCT. 1997)



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 7 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" (SHEW 11/22/97) LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: A B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
695	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L2	LP-299	18.0	110.0	17.7	128.9	109.5	99.5		F	698	P	
696	↓	6" L2	↓	↓	↓	17.7	127.3	108.2	98.4		F	699	P	
697	↓	6" L2	↓	↓	↓	17.3	130.9	111.6	101.5		F	700	P	
698	↓	6" L2	↓	↓	↓	19.3	129.1	108.2	98.4	P				
699	↓	6" L2	↓	↓	↓	19.4	128.0	107.2	97.5	P				
700	↓	6" L2	↓	↓	↓	17.7	130.9	111.2	101.1	P				
701	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L4	LP-299	18.0	110.0	17.5	129.5	110.2	100.2		F	705	P	
702	↓	6" L4	↓	↓	↓	17.4	130.8	111.4	101.3	P				
703	↓	6" L3	↓	↓	↓	19.2	129.0	108.2	98.4	P				
704	↓	6" L3	↓	↓	↓	19.0	126.2	106.1	96.5		F	706	P	

COMMENTS: *APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

000200

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: TUESDAY 07 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ LIFT THICKNESS (LOOSE/COMPACTED): ~~±8"~~

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN

TEST NO. NDT #	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
705	SEE ATTACHED MAP SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L4	LP-37	15.5	114.2	17.3	132.1	112.6	98.6	P				
706	↓	6" L3	↓	↓	↓	17.7	130.4	110.8	97.0	P				

10/10/97

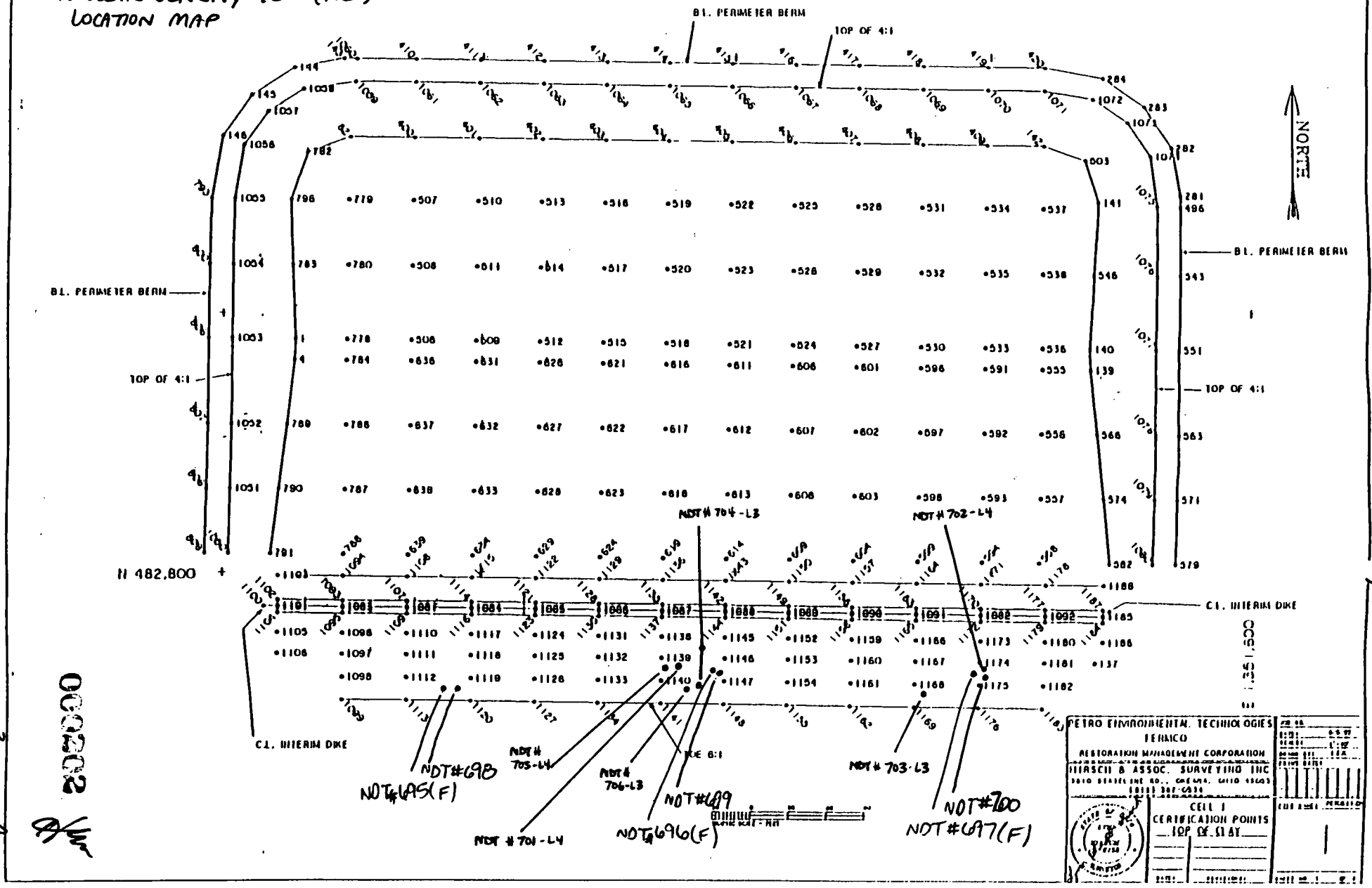
COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

1267

7 OCTOBER 1997

NUCLEAR DENSITY TEST (NDT)
LOCATION MAP



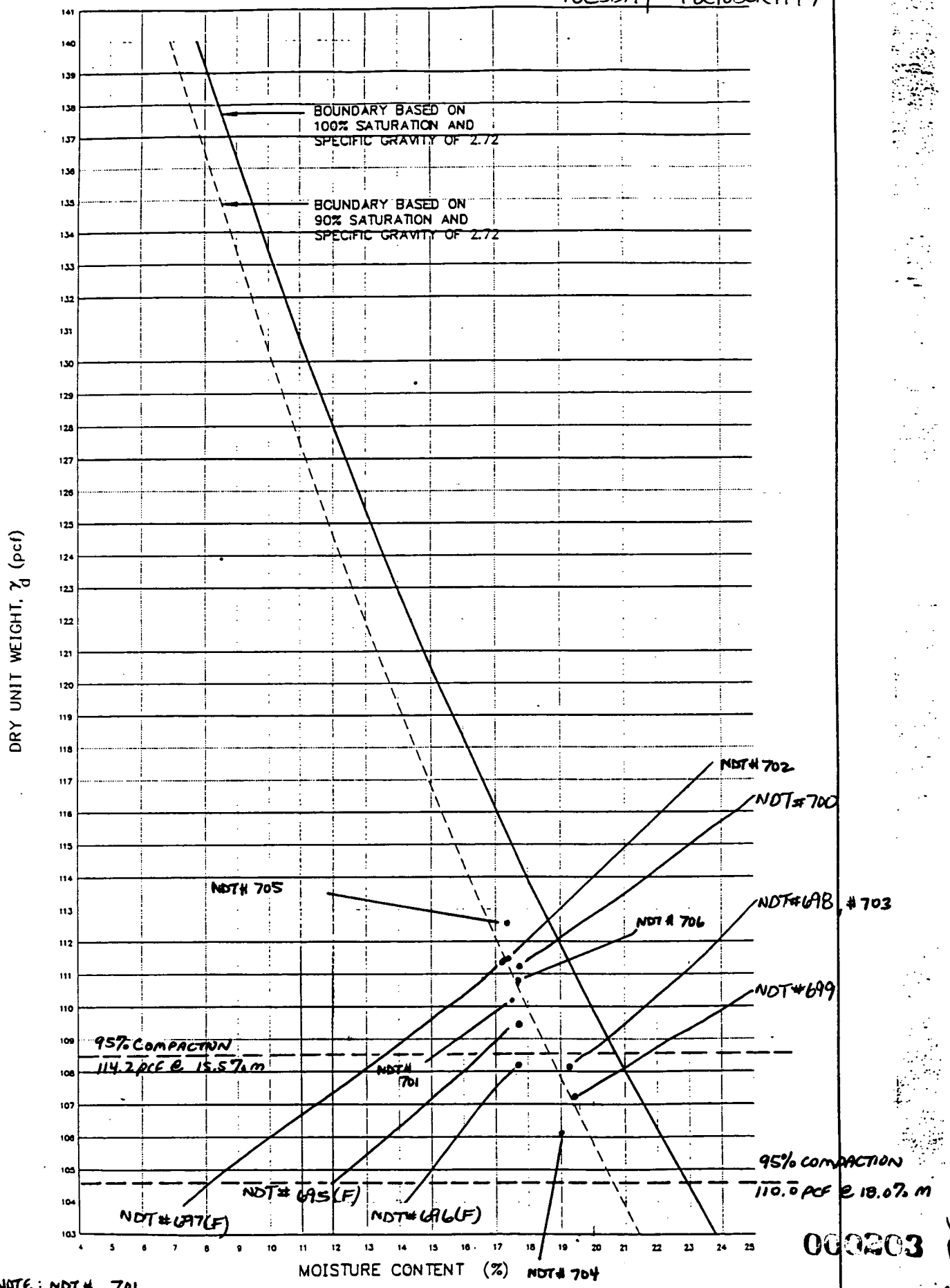
TUESDAY 07 OCT 1997

1267

SHEET NO. 3 OF 4

0000202

TUESDAY 07 OCTOBER 1997



NOTE: NDT # 701

000203

SHEET NO. 4 OF 4

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase 1 Construction ~~Wednesday~~ DATE: 8 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ≈8"

% COMPACTION: 95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C (CIRCLE ONE) / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: PJP/KW

TEST NO. NDT#	TEST LOCATION See attached map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
707	Intercell Berm	6" / 4	#11 LP-299	18.0	110.0	15.2 16.6	130.6	113.4 112.0	101.8		F	709	P	
708	↓	3	↓	↓	↓	15.5 16.9	133.6	115.7 114.3	103.9	P				
709		4				15.2 16.6	132.5	115.0 113.6	103.3	P				
710	NE Slope, Cell 2	1				16.0 17.6	128.6	110.9 109.4	99.5		F	712		F
711	NE Bench, Cell 2	1				14.4 15.8	131.5	114.9 113.6	103.3		F	717		F
712	NE Slope, Cell 2	1				16.7 18.2	123.0	105.1 104.1	94.6		F	716		F
713	Intercell Berm	4				15.5 16.9	124.6	108.7 106.6	96.9		F	724		F
714	↓	5				15.7 17.2	124.2	107.4 106.0	96.4		F	722	P	
715		4				16.4 18.0	122.0	104.8 103.4	94.0		F	725		F
716	NE Slope, Cell 2	1				15.9 17.4	128.1	111.2 109.1	99.2		F	718		F

COMMENTS: *APZ → acceptable permeability zone Section 02225 Part 3.02A of project specification

Retests performed in general vicinity of original test

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- 1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction Wednesday DATE: 8 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≈8"

% COMPACTION: 95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: RIP/KW/SO

TEST NO. NDT #	TEST LOCATION See attached map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
717	NE Bench, Cell 2	6" / 1	#11 LP-299	18.0	110.0	15.6 17.0	129.9	112.4 111.0	100.9		F	721	P	
718	NE Slope, Cell 2	1				19.4 21.4	124.6	104.4 102.6	93.3		F	720	P	
719	West Berm Slope b/t LCS/LDS and Interceptor	1				16.7 18.3	124.3	106.5 105.1	95.5		F	727		F
720	NE Slope, Cell 2	1				18.4 20.2	131.3	110.9 109.2	99.3	P				
721	NE Bench, Cell 2	1				17.4 19.1	129.8	110.5 109.0	99.1	P				
722	Intercell Berm	5				16.6 18.1	130.2	111.7 110.2	100.2	P				
723	↓	5				16.1 17.6	128.0	110.3 108.8	98.9		F	732		F
724		4				16.6 18.1	123.4	105.8 104.5	95.0		F	726		F
725		4				16.6 18.1	128.5	110.2 108.8	98.9		F	731		F
726		4				16.9 18.4	128.1	109.6 108.2	98.4		F	733		F

COMMENTS: *APZ → acceptable permeability zone Section 02225 Part 3.02A of project specifications

Retests performed in general vicinity of original test

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1262

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase 1 Construction Wednesday DATE: 8 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ≈8"

% COMPACTION: 95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (CIRCLE ONE) (A) B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: PJP/KW/AW

TEST NO. NDT#	TEST LOCATION See Attached Map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
727	West Berm Cell 1 b/t LCS/LDS and Intercell	6" / 1	LP-299	18.0	110.0	16.4 18.0	128.7	110.5 109.1	99.2		F	728	P	
728	↓	6" / 1	↓	↓	↓	17.7 19.4	127.9	108.7 108.0	98.2	P				
729	West Berm Cell 1 b/t LCS/LDS and North Berm	6" / 1	↓	↓	↓	17.9 19.6	126.2	107.0 105.5	95.9		F	730	P	

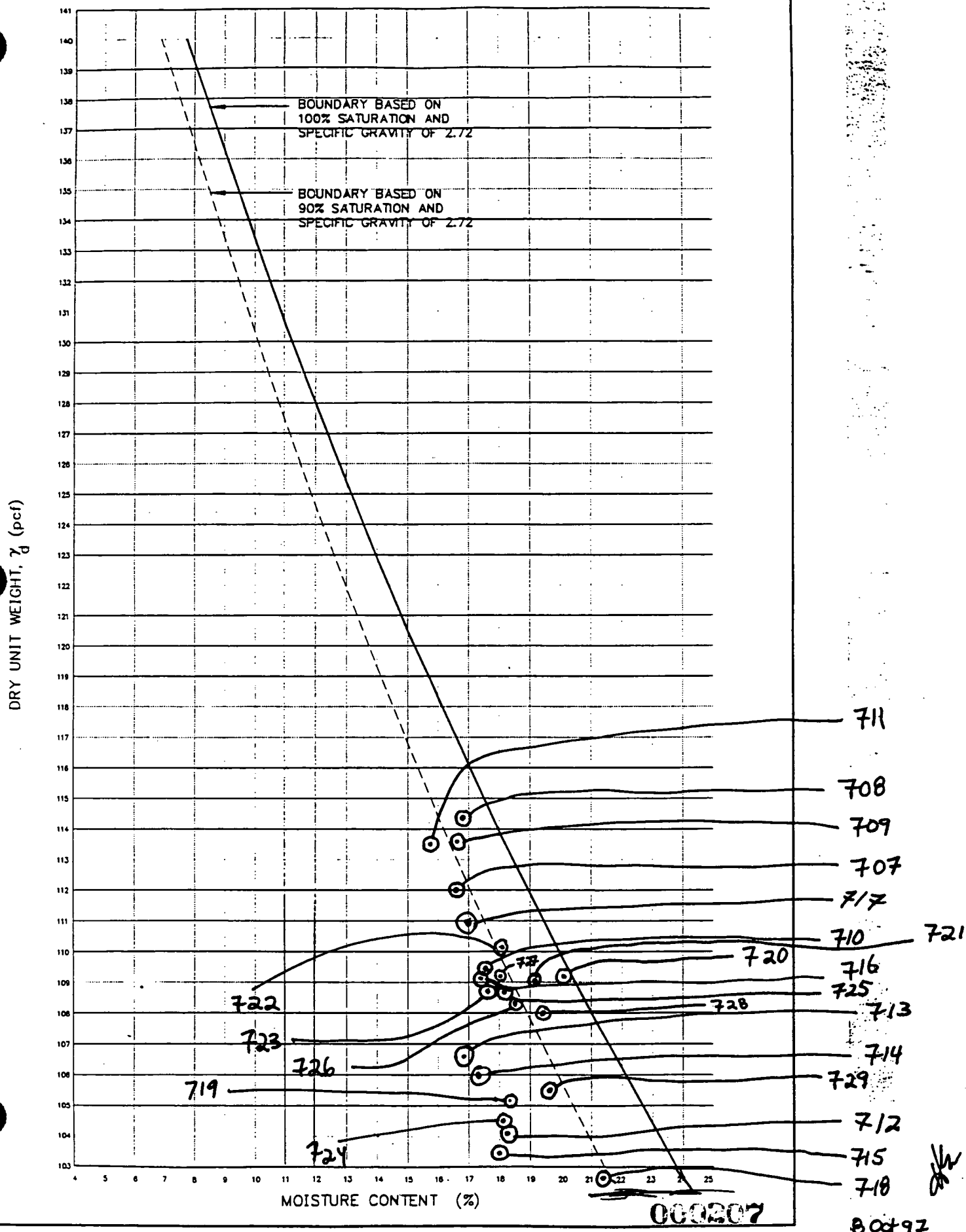
10/10/97

COMMENTS: *APZ → acceptable permeability zone Section 02225 Part 3.02A of project specifications

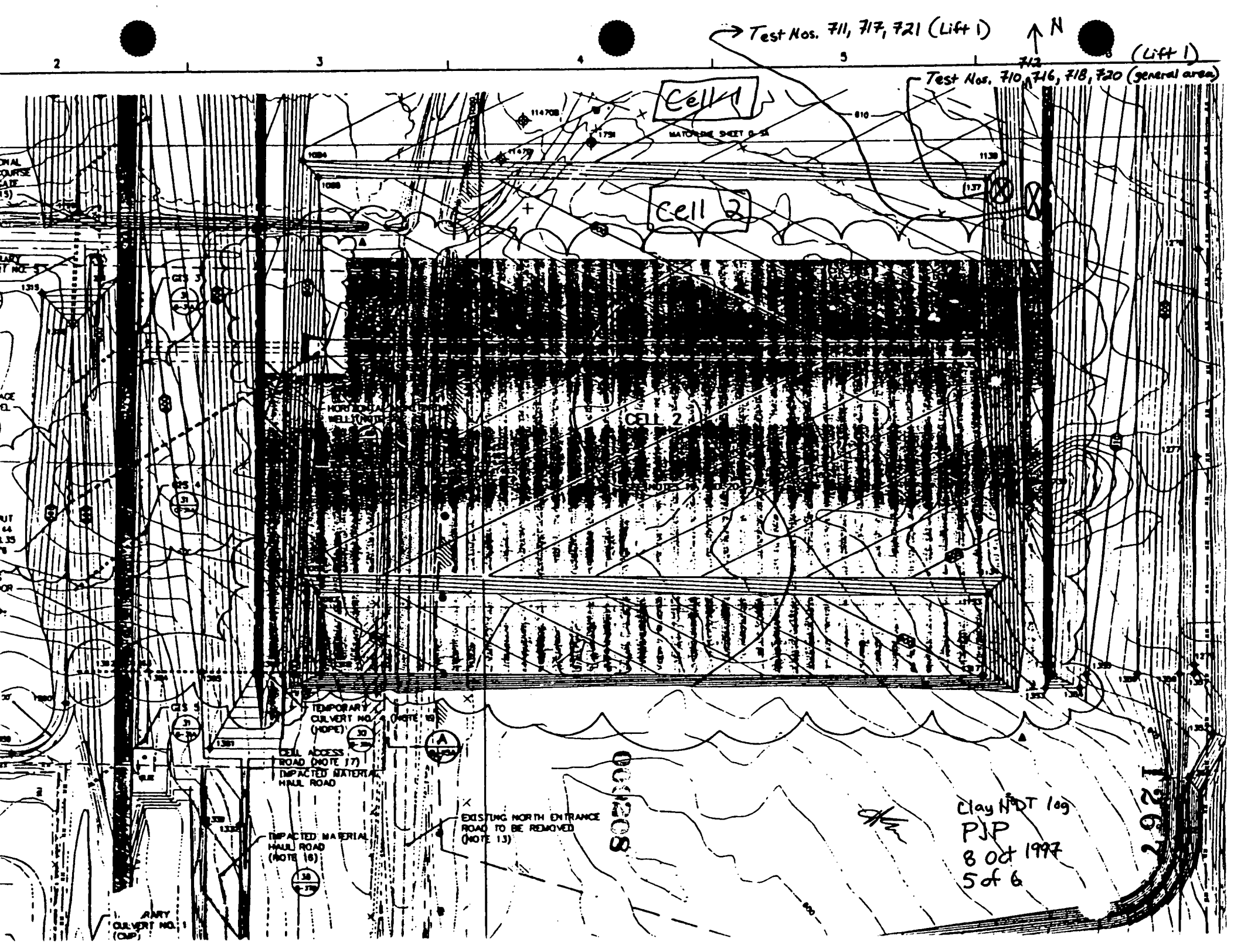
Retests performed in general vicinity of original test

12692

WEDNESDAY 08 OCT 97



8 Oct 97
PJP
4 of 6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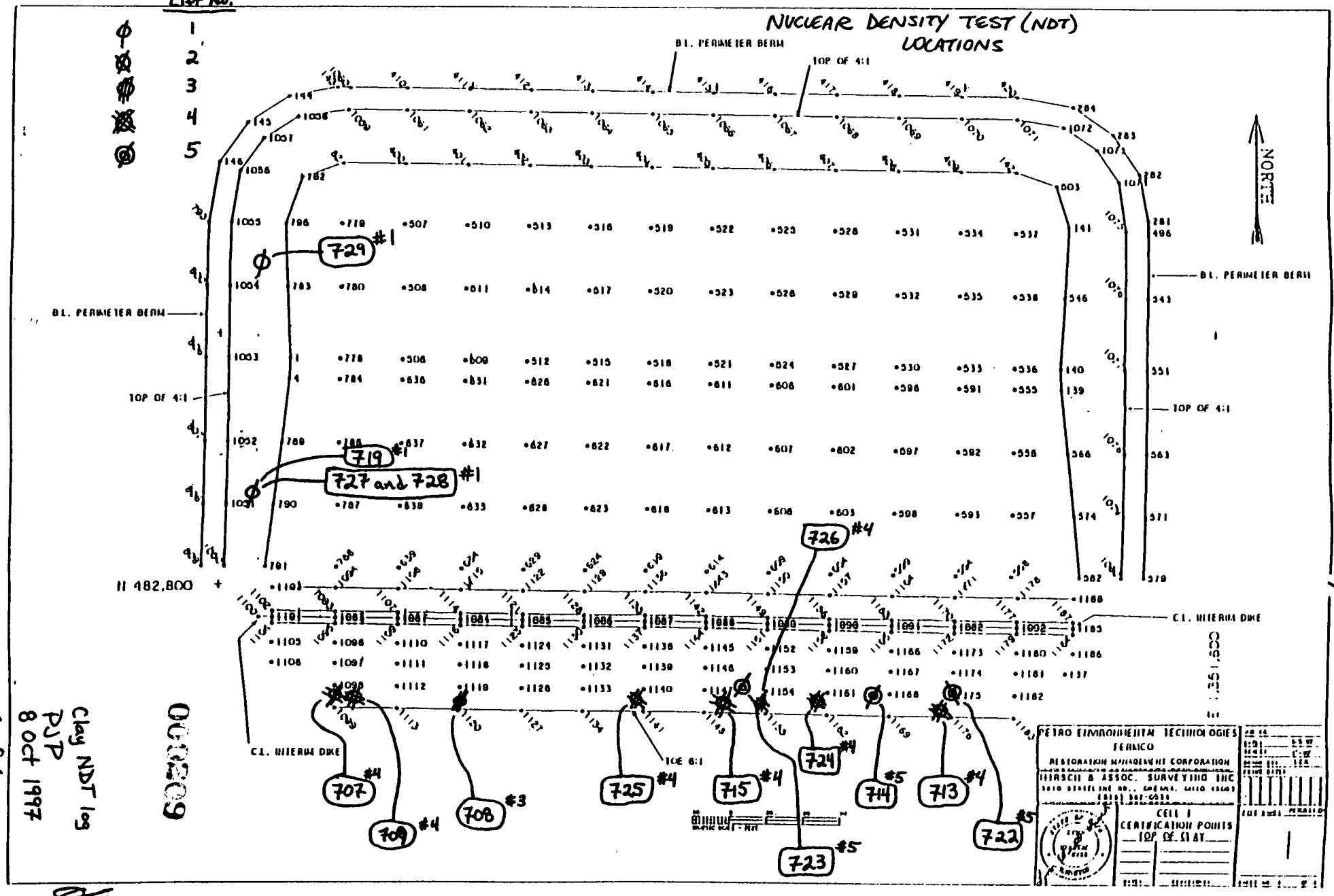
N
(Lift 1)
Test Nos. 710, 716, 718, 720 (general area)
Cell 1
Cell 2
CELL 2
TEMPORARY CULVERT NO. 1 (HDPE)
CELL ACCESS ROAD (NOTE 17)
IMPACTED MATERIAL HAUL ROAD
EXISTING NORTH ENTRANCE ROAD TO BE REMOVED (NOTE 13)
IMPACTED MATERIAL HAUL ROAD (NOTE 16)
Clay NDT log
PJP
8 Oct 1997
5 of 6



WEDNESDAY 08 OCT 97 12 67

Clay NDT log
PJP
8 Oct 1997

6 of 6

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase 1 Construction Thursday DATE: 9 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≈8"

% COMPACTION: 95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: KW/MN/RP/SA

TEST NO.	TEST LOCATION See Attached Map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
730	West berm slope Cell 1 b/t LCS/LDS and Intercell	6" / 2	LP-299	18.0	110.0	16.2 17.7	131.4	113.0 111.6	101.5	P				
731	Intercell Berm	4				17.1 18.8	126.8	108.3 106.7	97.0		F	753		F
732		5				20.4 est. 22.5	125.2	103.9 102.2	92.9		F	742		F
733		4				15.8 17.3	125.8	108.6 107.2	97.5		F	743		F
734	NE ~~Slope~~, Cell 2 Bench	2				20.1 est. 22.2	124.1	103.5 101.6	92.4		F	736		F
735	NE ~~bench~~, Cell 2 slope	2				17.4 19.1	127.3	108.5 106.9	97.1		F	738		F
736	NE Bench Cell 2	2				17.3 19.0	125.5	107.0 105.5	95.9		F	737	P	
737		2				18.6 20.4	127.9	107.9 106.2	96.5	P				
738	NE Slope, Cell 2	2				23.3 N/A	121.6	98.7 N/A	89.7		F	739	P	
739		2				18.4 20.2	127.9	108.0 106.4	96.7	P				

COMMENTS: *APZ → Acceptable Permeability Zone Section 02225 Part 3.02A of project specifications

Retests performed in general vicinity of original test

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1262

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction Thursday DATE: 9 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ≈8"

% COMPACTION: 95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: Moisture Correlation QA ID: PJP/WH/SO/KW

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
740	24' NORTH, 24' EAST OF PT. # 1169	6"	L5	LP-299	18.0	110.0	17.8	127.5	108.2	98.4		F	~~742~~ 765 @ 10/10/97	P	@ 10/10/97 F *
741	N.E. SLOPE OF CELL II	6"	L2	↓	↓	↓	18.7	127.7	107.6	97.8		F	751	P	
742	21' NORTH, 8' EAST OF PT. # 1148	6"	L5				22.5	124.2	101.4	92.2		F	764	P	*
743	60' W 22' N OF PT # 1360	6"	L4				18.4	128.5	108.5	98.6		F	749		F
744	30' S 37' W OF PT # 587	6"	L3	LP-269	19.2	107.0	22.6	125.5	102.4	95.7	P	~~F~~ @ 10/14/97			
745	18' S 12' W OF PT # 587	6"	L3	LP-299	18.0	110.0	18.5	125.4	105.8	96.2		F	746		F
746	20' S 10' W OF PT # 587	6"	L3	↓	↓	↓	20.0	126.4	105.3	95.7		F	747		F
747	11' W 20' S OF PT # 587	6"	L3				17.8	129.3	109.8	99.8		F	748	P	
748	10' W 23' S OF PT # 587	6"	L3				19.2	127.9	107.3	97.5	P	~~F~~ @ 10/14/97			
749	15' E 25' N OF PT # 1360	6"	L4				20.4	122.4	101.7	92.5		F	752	P	

COMMENTS: *APZ → Acceptable Permeability Zone Section 02225 Part 3.02A of project specifications

Retests performed in general vicinity of original test

1262

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 09 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ 11/22/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: PP/SQ

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
750	19' N OF #1351	6"	L3	LP-37	15.5	114.2	16.6	132.7	113.8	99.6	P				
751	4' E 42' N OF PT #1351	6"	L2	LP-299	18.0	110.0	19.5	129.1	108.0	98.2	P				
752	17' W 19' N OF PT # 1355	6"	L4	↓	↓	↓	20.3	128.2	106.6	96.9	P				
753	16' E 20' N OF PT # 1357	6"	L4	LP-269	19.2	107.0	20.1	125.2	104.2	97.4		F	754	P	
754	16' E 25' N OF PT # 1357	6"	L4	LP-269	19.2	107.0	21.4	126.8	104.4	97.6	P				
755	W. PERIMETER BERM SLOPE - CELL I	6"	L1	LP-37	15.5	114.2	15.8	130.3	112.5	98.5		F	757		F
756	↓	6"	L1	LP-299	18.0	110.0	18.1	130.6	110.6	100.5	P				
757	↓	6"	L1	↓	↓	↓	18.8	124.8	105.1	95.5		F	762A	P	
758	↓	6"	L3	↓	↓	↓	19.6	126.4	105.7	96.1		F	762	P	
759	↓	6"	L1	↓	↓	↓	18.8	128.8	108.4	98.5	P				

COMMENTS: *APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 302A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 09 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: ±8" LIFT THICKNESS (LOOSE/COMPACTED): 8"

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: PP/SQ

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
760	W. BERM BENCH LCS→N. BERM	6" L1	LP-299	18.0	110.0	18.6	120.6	101.7	92.5		F	761	P	
761	W. BERM BENCH LCS→N. BERM	6" L1	↓	↓	↓	18.4	130.4	110.1	100.1	P				
762	W. BERM SLOPE LCS→INTERCELL	6" L3	↓	↓	↓	18.9	128.9	108.4	98.5	P				
762A	W. BERM SLOPE LCS→N. BERM	6" L1	LP-299	18.0	110.0	18.7	129.1	108.8	98.9	P				

10/10/97

COMMENTS: *APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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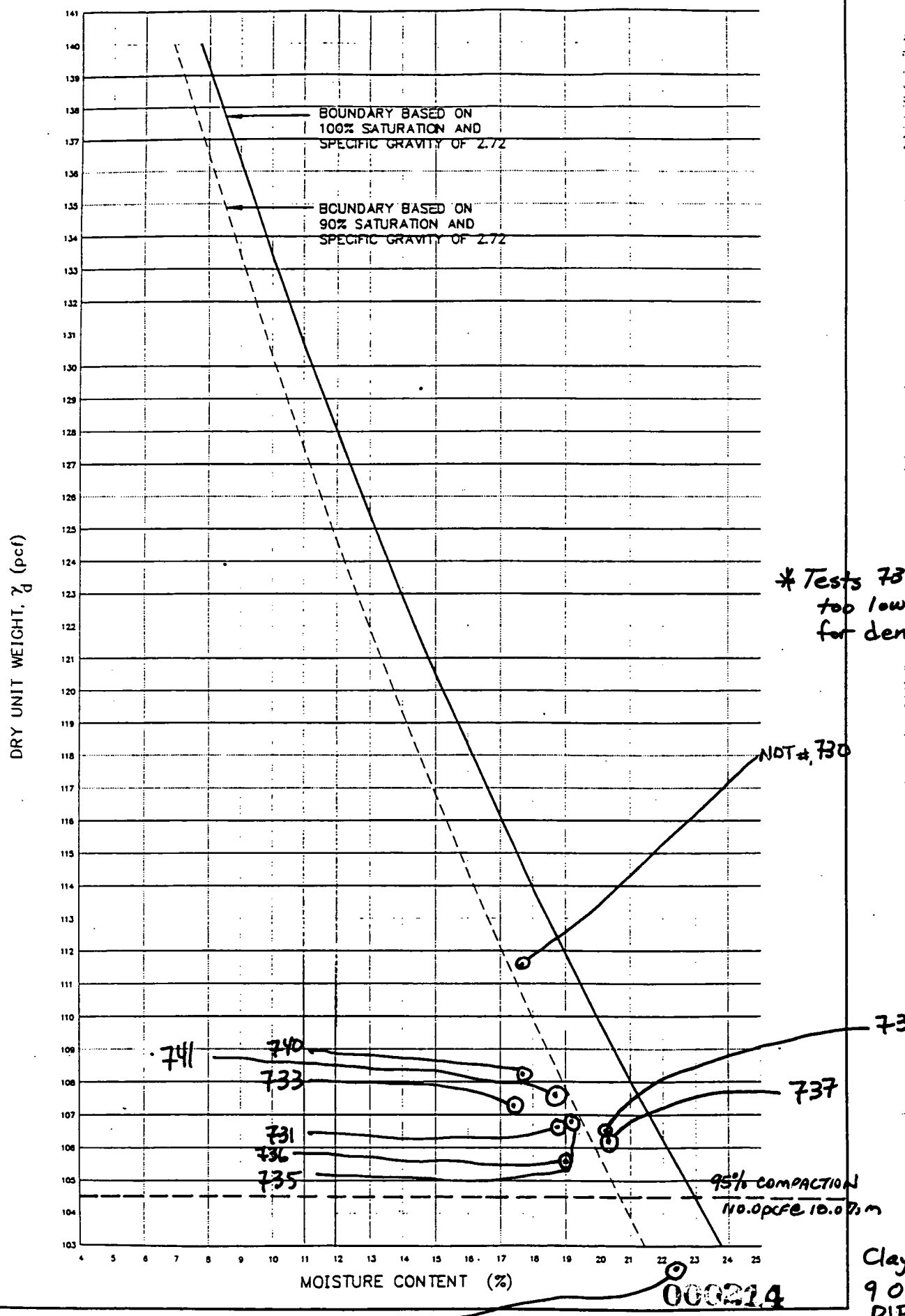
1267

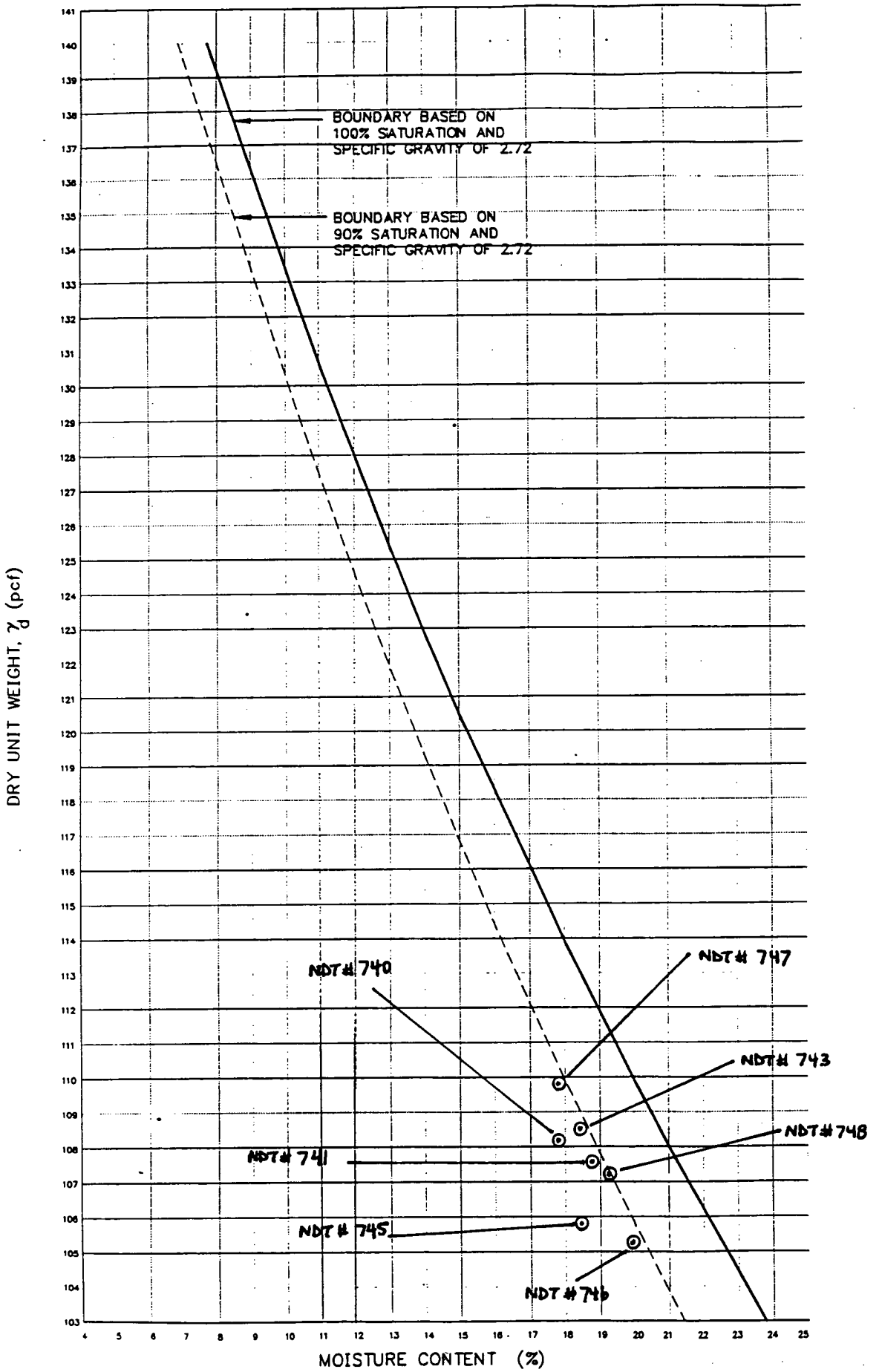
THURSDAY 09 OCT 1997



* Tests 734 and 738 too low to plot for density

Clay NDT Log
9 Oct 1997
RJP

THURSDAY 09 OCT 1997

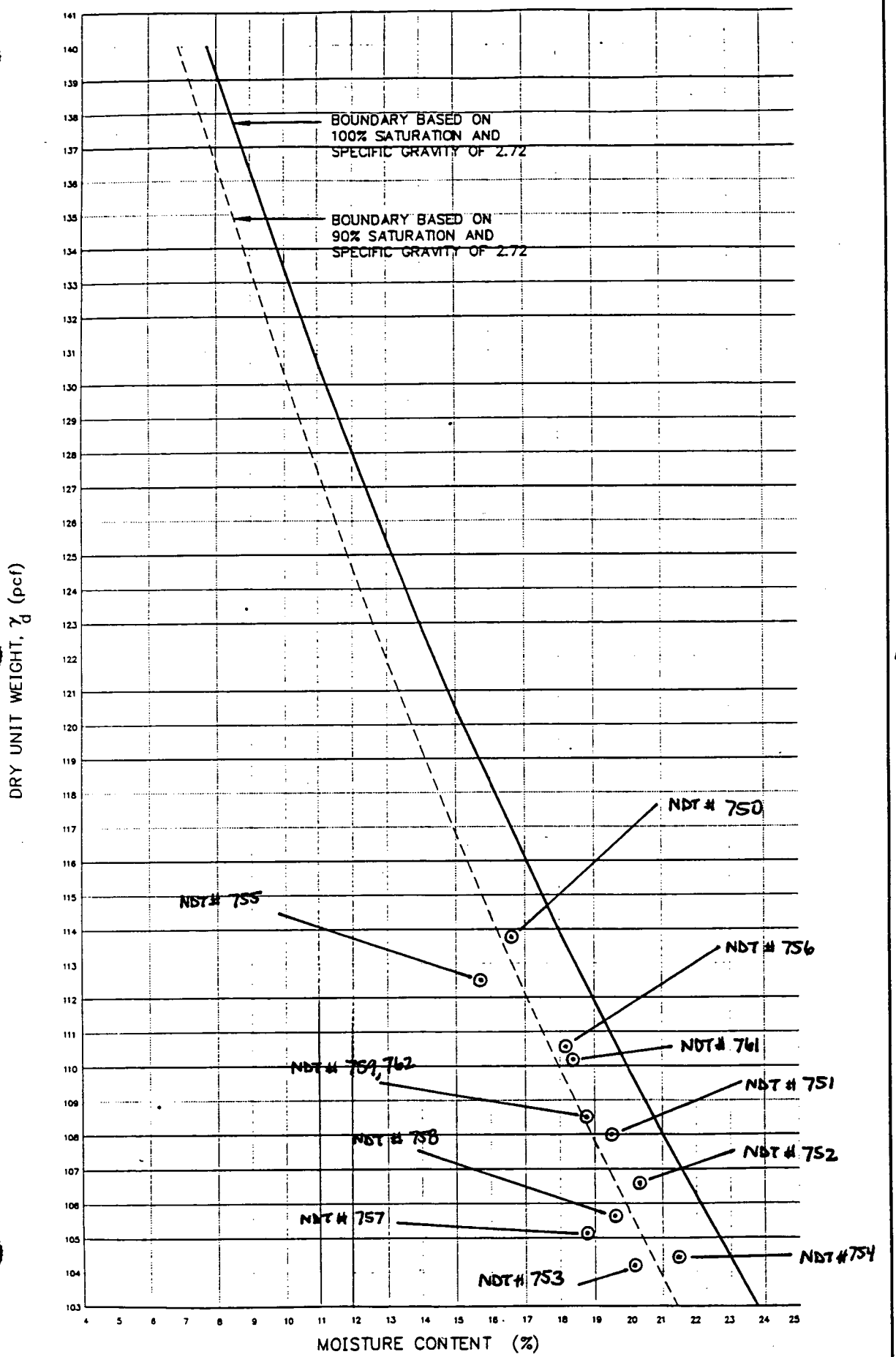


NOTE:
NDT #'S 744, 749, 742 DO NOT PLOT ON PAGE

000215

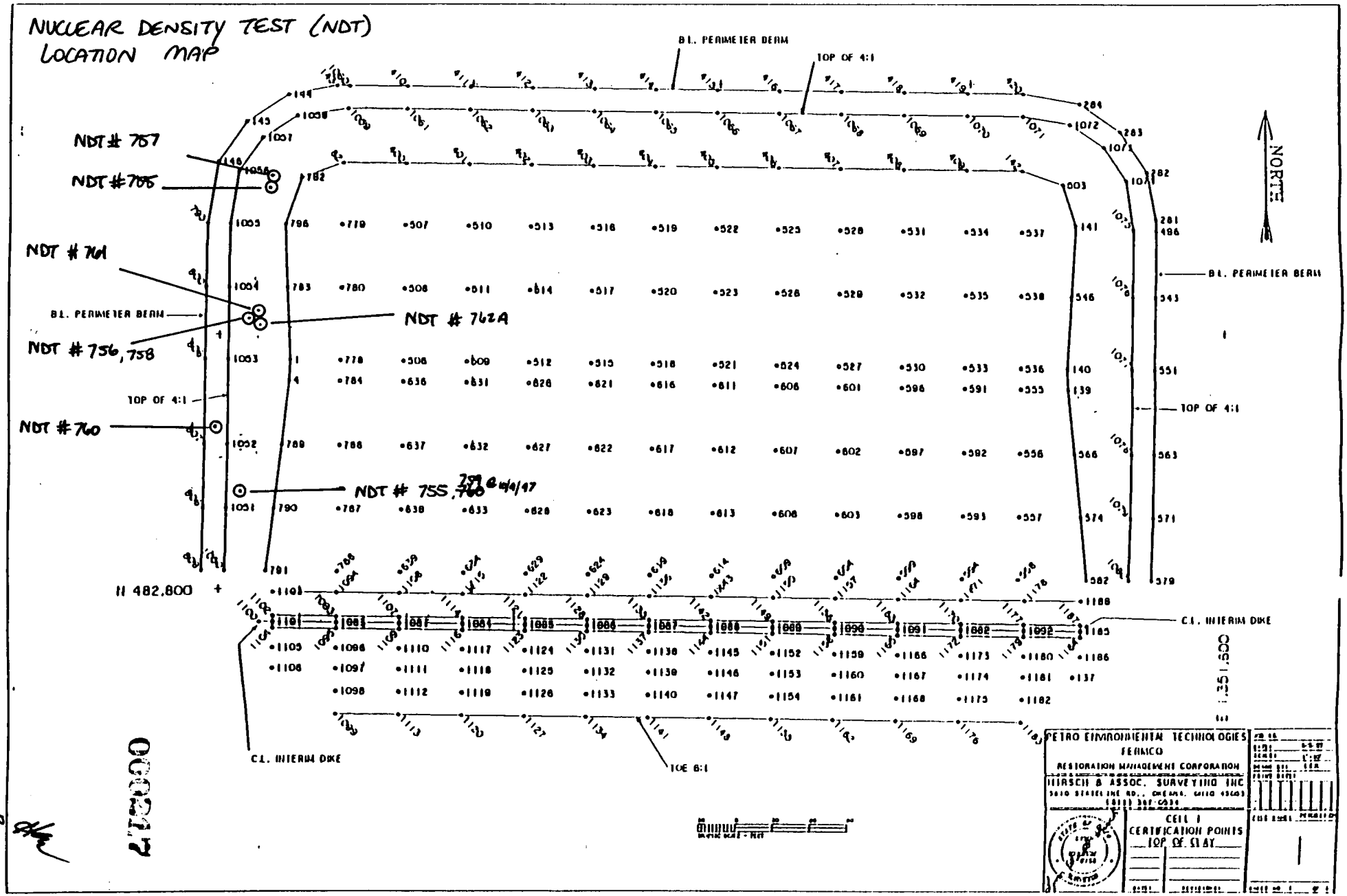
SHEET NO. 6 OF 10

THURSDAY 09 OCT 97



NOTE:
NDT # 760
DOES NOT PLOT
ON PAGE

NUCLEAR DENSITY TEST (NDT)
LOCATION MAP

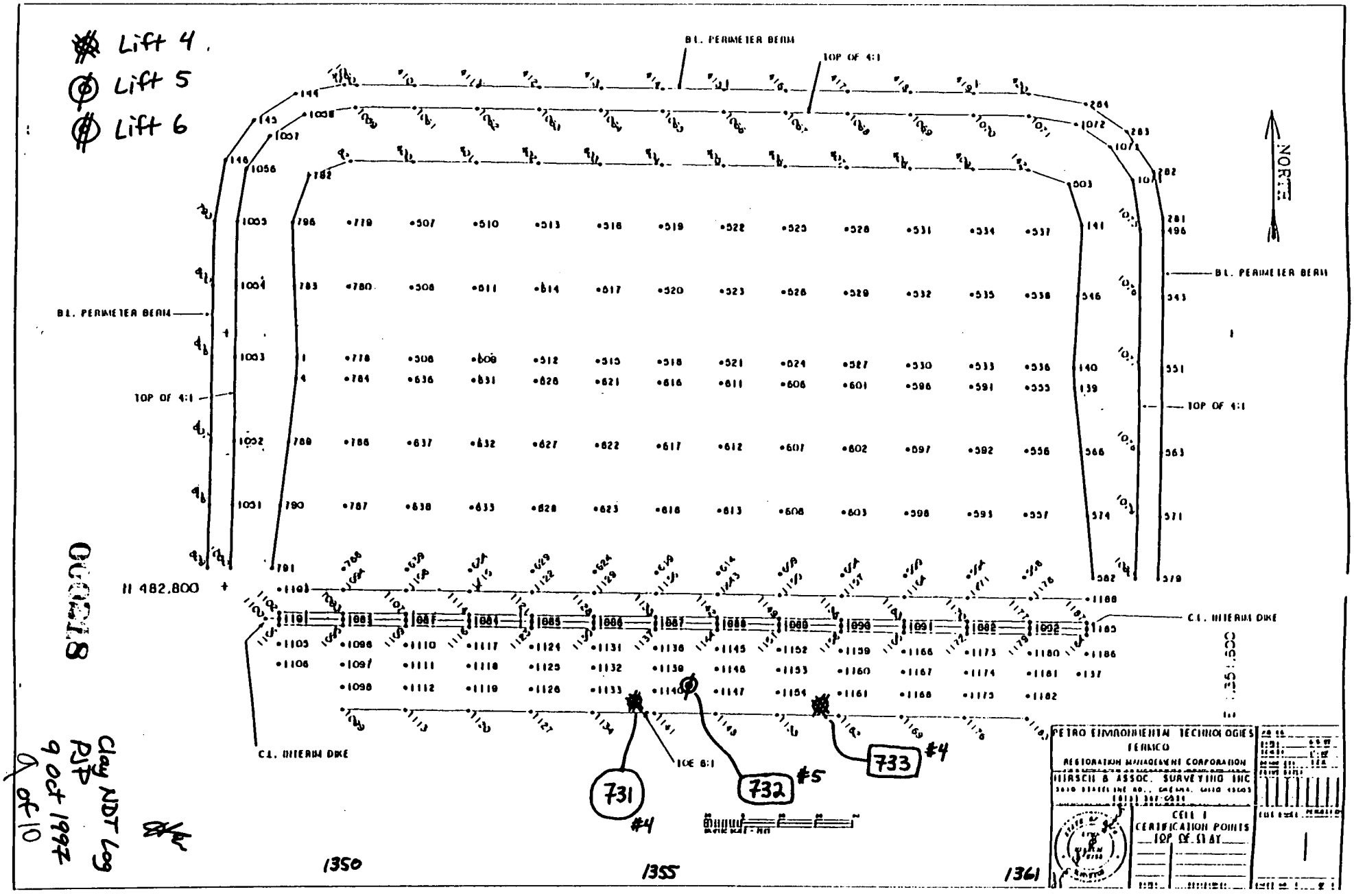


09 OCTOBER 1997

12677

SHEET NO. 8 OF 10

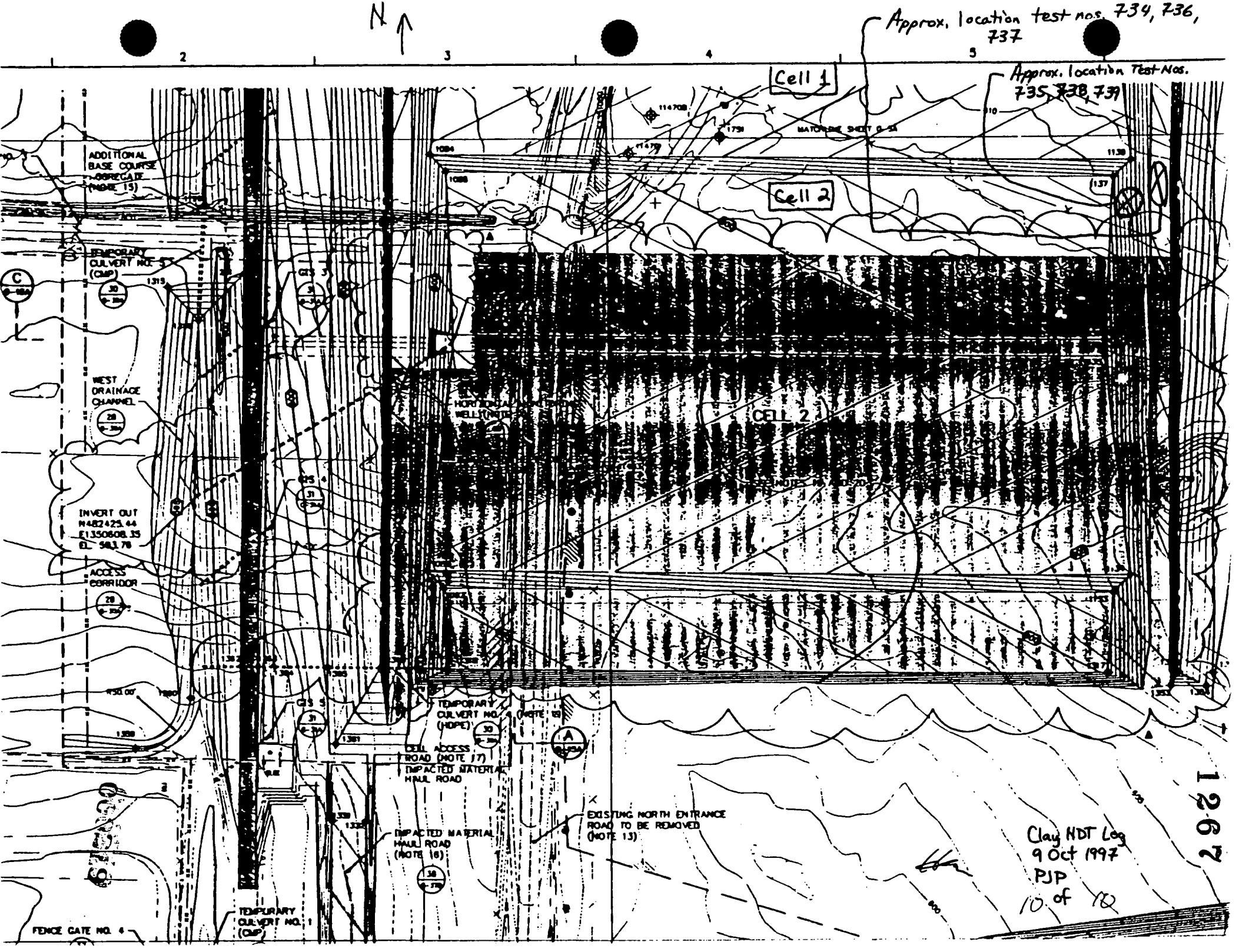
000217



Clay NDT Log
PJP
9 Oct 1997
9 of 10

OU5-18

262


N
Approx. location test nos. 734, 736, 737
Approx. location Test Nos. 735, 738, 739
Cell 1
Cell 2
CELL 2
ADDITIONAL BASE COURSE AGGREGATE (NOTE 15)
TEMPORARY CULVERT NO. 5 (CMP)
WEST DRAINAGE CHANNEL
INVERT OUT N482425.44 E1350608.35 EL. 583.78
ACCESS CORRIDOR
HORIZONTAL WELL (NOTE 7)
TEMPORARY CULVERT NO. 4 (NOTE 10) (HDPE)
CELL ACCESS ROAD (NOTE 17)
IMPACTED MATERIAL HAUL ROAD
EXISTING NORTH ENTRANCE ROAD TO BE REMOVED (NOTE 13)
IMPACTED MATERIAL HAUL ROAD (NOTE 16)
TEMPORARY CULVERT NO. 1 (CMP)
FENCE GATE NO. 4
Clay NDT Log
9 Oct 1997
PJP
10 of 10
1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION FRIDAY DATE: 10 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ ±8" KGM 10/14/97 (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/AZ

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
763	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L5	**	17.7	108.6	17.8	130.2	110.5	101.7	P				
764	↓	6" L5	↓	↓	↓	18.8	129.1	108.7	100.1	P				
765	EAST BERM SLOPE AREA (NE CORNER OF CELL II)	6" L4				18.8	127.9	107.7	99.2		F	767		F
766	EAST BERM BENCH AREA (NE CORNER OF CELL II)	6" L4				20.0	124.4	103.7	95.5		F	768		F
767	EAST BERM SLOPE AREA (NE CORNER OF CELL II)	6" L4				18.9	126.1	106.1	97.7		F	770		F
768	EAST BERM BENCH AREA (NE CORNER OF CELL II)	6" L4				19.6	125.8	105.2	96.9		F	769	P	
769	↓	6" L4				20.6	126.4	104.8	96.5	P				
770	EAST BERM BENCH AREA (NE CORNER OF CELL II)	6" L4				18.9	125.5	105.6	97.2		F	771	P	
771	↓	6" L4				20.6	128.2	106.3	97.9	P				
*772	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6" L4				16.8	132.4	113.4	104.4	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** SANDCONE TEST LOCATION *** AVERAGE VALUES FOR STOCKPILE II SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

©GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: KGM SHEET NO. 1 OF 4

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

FRIDAY DATE: 10 day OCT. month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ HEM 10/14/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/AZ

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	FIELD TEST RESULTS: PASS	FIELD TEST RESULTS: FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
773	EAST BERM BENCH AREA (NE CORNER OF CELL II)	6" L5	**	17.7	108.6	18.7	126.0	106.1	97.7		F	774	P	
774	↓	6" L5	↓	↓	↓	18.8	128.4	108.1	99.5	P				
775	EAST BERM SLOPE AREA (NE CORNER OF CELL II)	6" L5				22.8	124.1	101.1	93.1		F	776		F
776	↓	6" L5				21.8	119.8	98.4	90.6		F	777		F
777		6" L5				22.9	123.4	100.4	92.4		F	778	P	
778		6" L5				20.7	127.1	105.3	97.0	P				

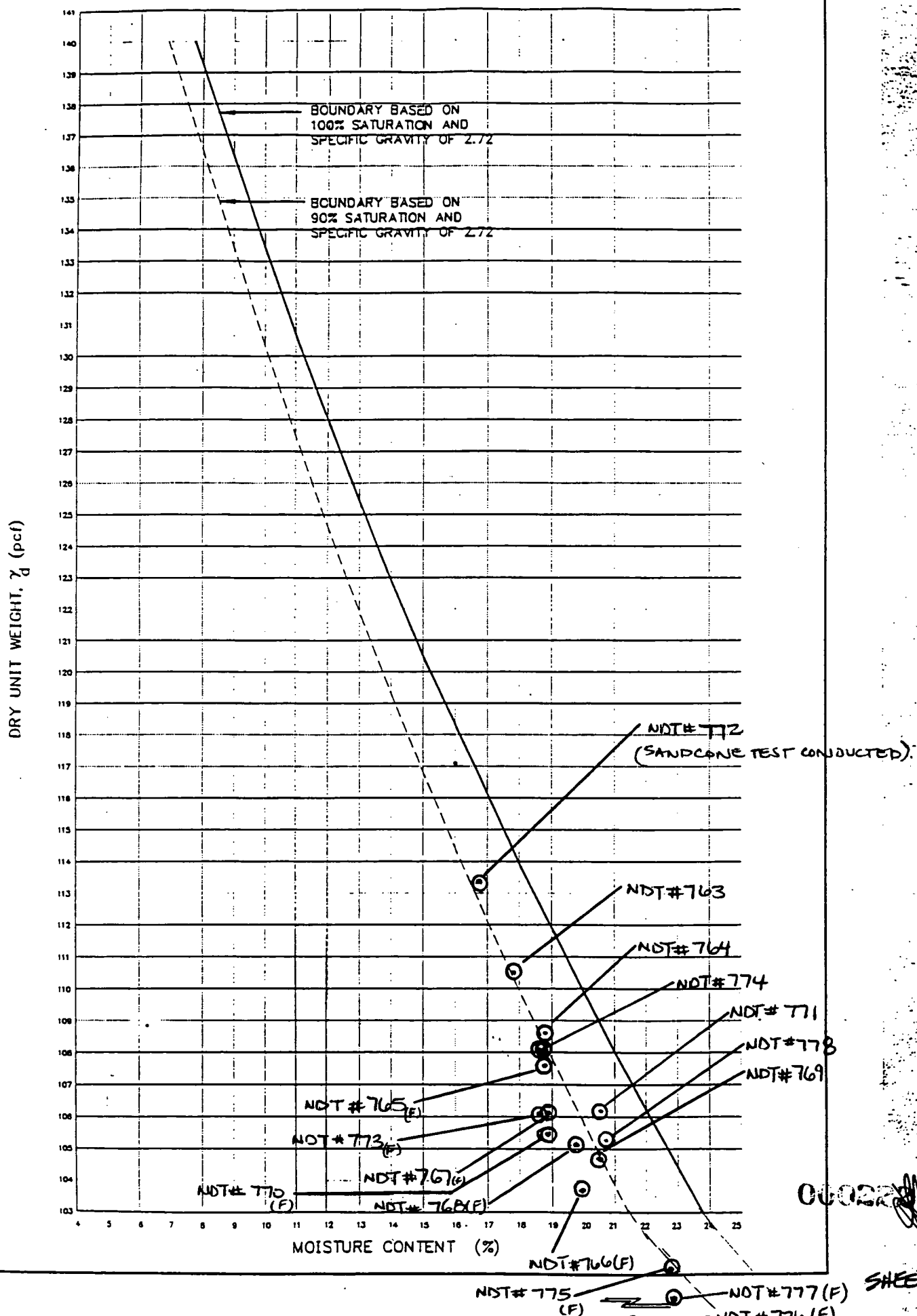
COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 302A OF PROJECT SPECIFICATION

** AVERAGE VALUES FOR STOCKPILE II SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

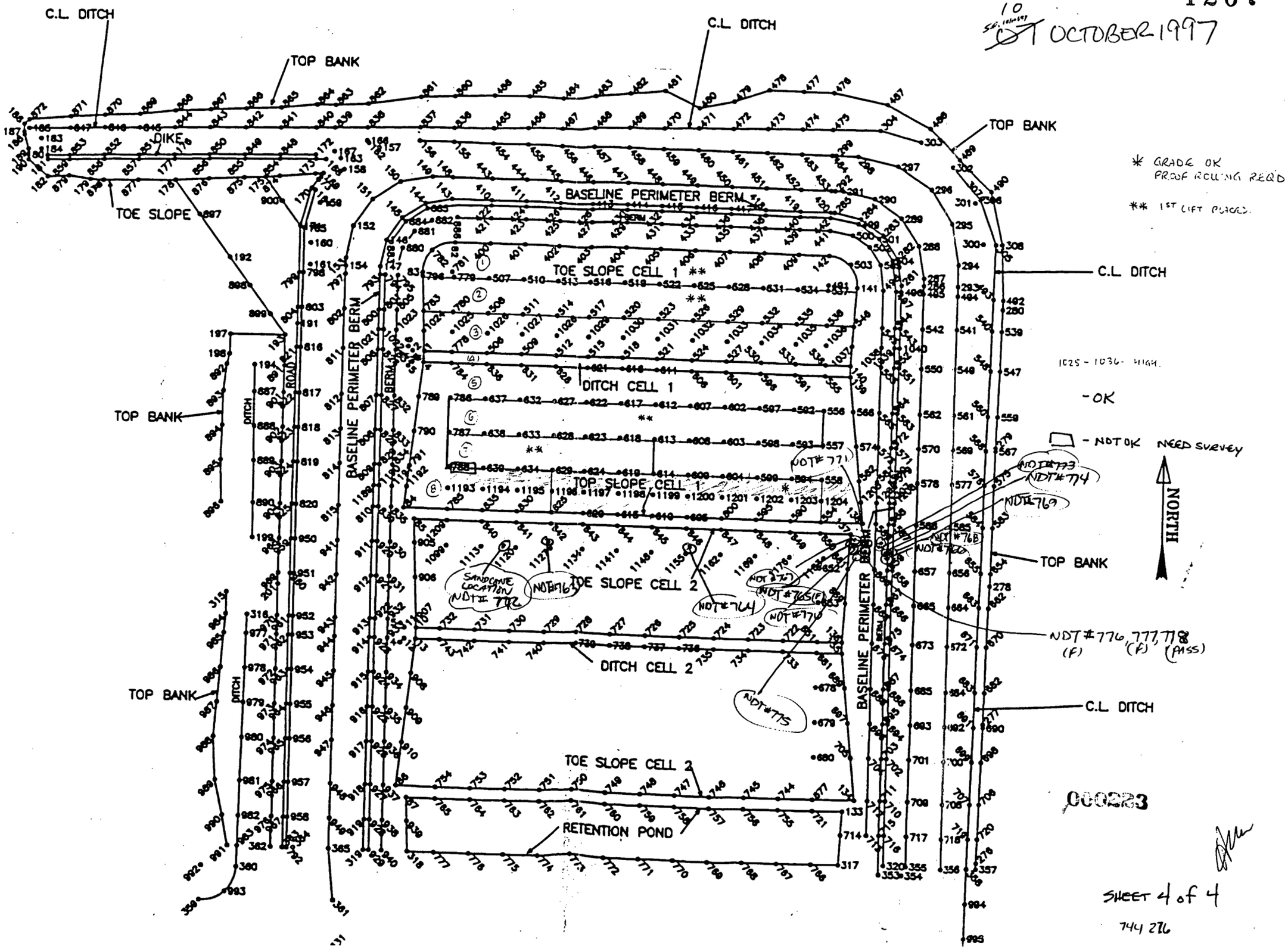
1267

OCTOBER 10, 1997



SHEET 3 of 4

10 OCTOBER 1997



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SHEET 4 of 4

744 276

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE 1 CONSTRUCTION DATE: 10 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~8"~~ Hem 10/14/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: ≥ 95% STD. PROCTOR / APZ* MOISTURE RANGE: + 3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: SQ/PP

TEST NO. NDT#	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
779	WEST BERM BENCH CELL 1	6" L1	**	17.7	108.6	19.6	123.7	103.4	95.2		F	783		F
780		6" L2	LP-269	19.2	107.0	21.9	127.4	104.5	97.7	P				
781		6" L2	**	17.7	108.6	19.6	126.4	105.7	97.3		F	784		F
782		6" L3				18.5	130.7	110.3	101.6	P				
783		6" L1				17.5	126.3	107.5	99.0		F	785	P	
784		6" L2				22.3	109.7	89.7	82.6		F	786	P	
785		6" L1				18.0	132.6	112.4	103.5	P				
786		6" L2				20.0	127.1	105.9	97.5	P				
787	WEST BERM SLOPE CELL 1	6" L3				23.2	125.0	101.7	93.6		F	789		F
788		6" L3				23.6	~~119.5~~ 123.0	99.7	91.8		F	790		F

SJL 10/10/97

COMMENTS: * APZ = ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02 A of PROJECT SPECIFICATION

** AVERAGE VALUES FOR STOCKPILE 11 SAMPLES

RESULTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST LOCATION.

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION FRIDAY DATE: 10 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~~8IN~~ HGM 10/14/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: ≥95% STD PROCTOR / APZ* MOISTURE RANGE: + 3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: SPI/P.P.

TEST NO.	TEST LOCATION (SEE ATTACHED MAP)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
789	WEST BERM SLOPE CELL 1	6" L3	**	17.7	108.6	21.0	123.6	102.1	94.0		F	791	P	
790	↓	6" L2	**	17.7	108.6	23.2	124.3	100.9	92.9		F	792	P	

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE. SECTION 02225 PART 3.02A PROJECT SPECIFICATION.

** AVERAGE VALUES FOR STOCKPILE 11 SAMPLES

RETESTS PERFORMED ~~GENERALLY~~ IN GENERAL VICINITY OF ORIGINAL TEST LOCATION

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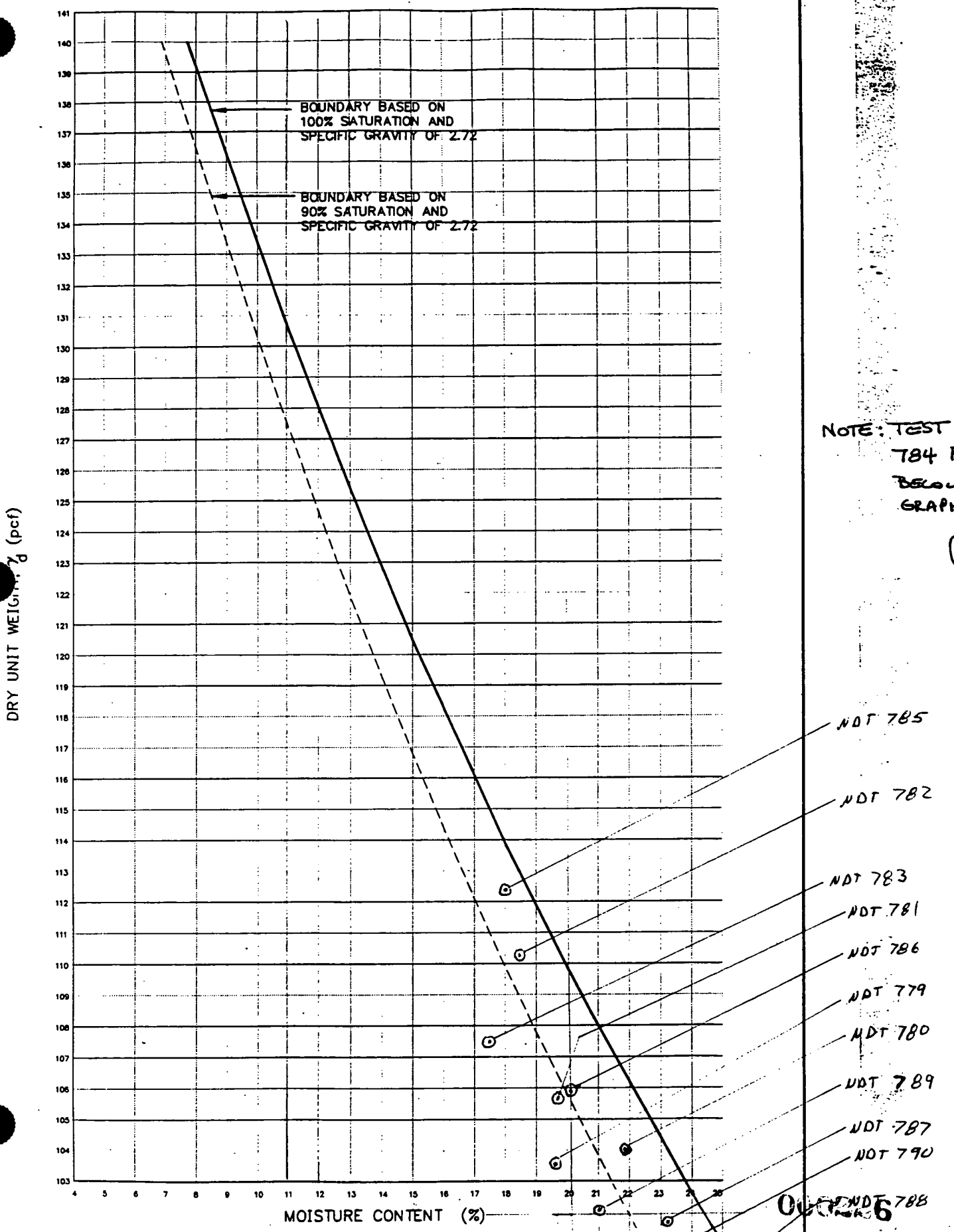
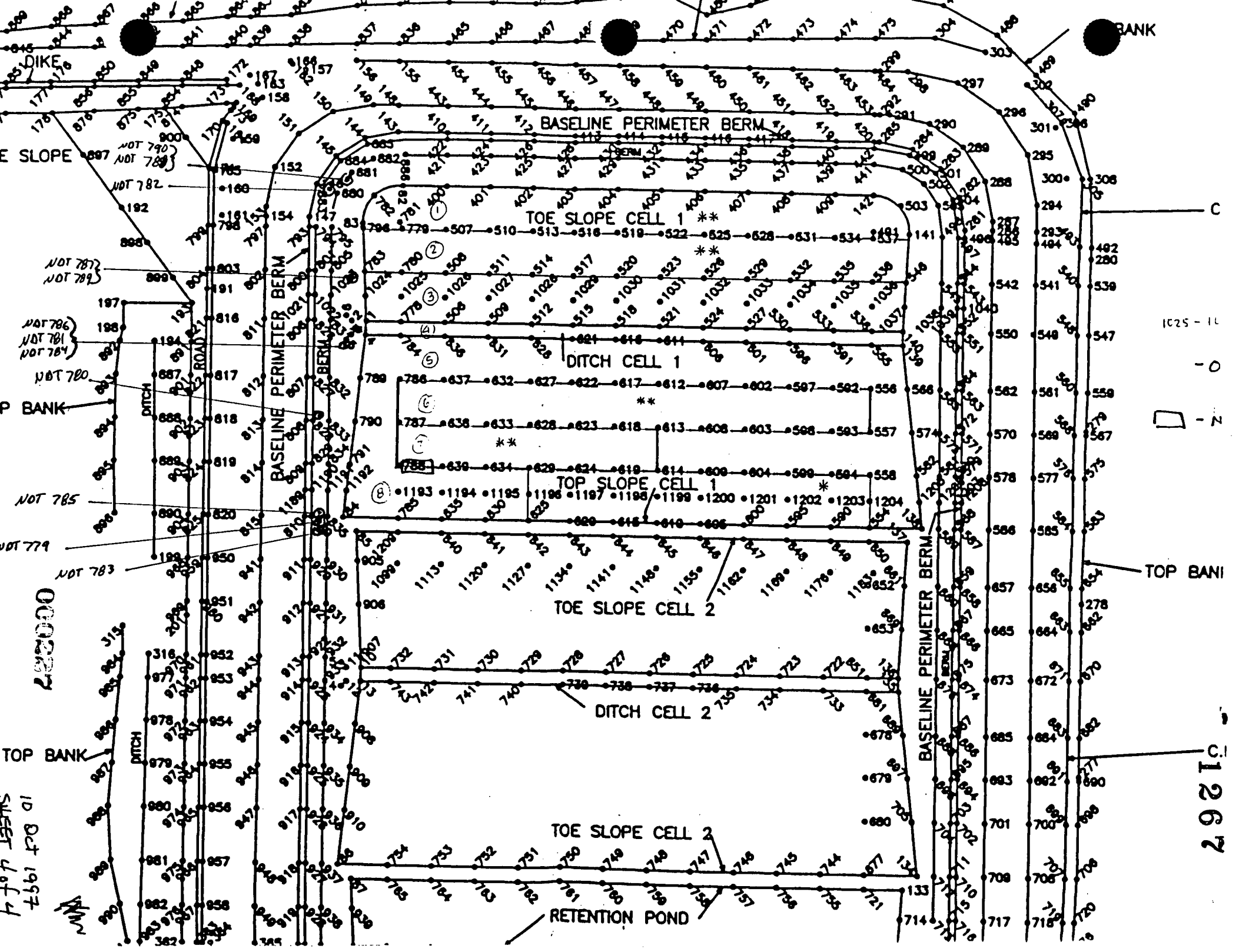
10 OCTOBER 1997



NOTE: TEST NO. 784 PLOTS BELOW GRAPH.

NOTE: NDT 784 IS OFF THE SCALE AND PAGE.

SHEET 3 of 4



SHEET 4 of 4
10 Oct 1977

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 11 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: on site Stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ±8" (HEM 10/14/97) LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% standard proctor AP2 ⊗ MOISTURE RANGE: ±3% AP2 ⊗ ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: SQ/BN

TEST NO. NOT #	TEST LOCATION see Attached MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NOT #	RETEST PASS	RETEST FAIL
791	WEST BERM SLOPE CELL I	6" L3	**	17.7	108.6	21.2	129.0	106.4	98.0	P				
792		6" L3				18.8	129.1	108.7	100.1	P				
793		6" L3				20.5	126.4	104.9	96.6	P				
794		6" L4				18.6	129.6	109.3	100.6	P				
795		6" L4				20.5	126.3	104.8	96.5		F	796	P	
796		6" L4				19.2	127.9	107.3	98.8	P				
797	EAST BERM BENCH CELL 2 AREA	6" L6	**	19.3	106.0	17.6	131.1	111.5	105.2	P				
798	EAST BERM SLOPE CELL 2 AREA	6" L6				17.8	128.9	109.4	103.2		F	799	P	
799		6" L6				19.7	128.1	107.0	100.9	P				
800	WEST BERM BENCH CELL I	6" L1				19.6	122.8	102.7	96.9		F	** N/A		

** → MATERIALS PLACED AT WRONG LOCATION AND WERE PUSHED INTO PLACE AS PART OF THE NEXT LIFT.

COMMENTS: ⊗ AP2 → Acceptable Permeability Zone Section 02225 Part 3.02A of Project Specification

** → AVERAGE VALUES FOR STOCKPILE 11 SAMPLES ** → AVERAGE VALUES FOR STOCKPILE 10/13 SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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12667

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 11 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: on site Stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ HEM 10/16/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% standard Proctor APZ(*) MOISTURE RANGE: ±3% APZ(*) ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: SQ/B.U

TEST NO.	TEST LOCATION see attached map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
801	WEST BERM BENCH CELL 1	6" L2	**	19.3	106.0	17.5	128.2	109.1	102.9		F	807		F
802	↓	6" L3	↓	↓	↓	21.4	124.4	102.5	96.7		F	805		F
803	↓	6" L3	↓	↓	↓	19.5	128.8	107.8	101.7	P				
804	↓	6" L4	↓	↓	↓	17.6	130.6	111.1	104.8	P				
805	↓	6" L3	↓	↓	↓	18.3	129.2	109.2	103.0		F	806	P	
806	↓	6" L3	↓	↓	↓	19.9	127.8	106.6	100.6	P				
807	↓	6" L2	↓	↓	↓	15.4	119.7	103.7	97.8		F	810	P	

COMMENTS: (*) APZ → Acceptable Permeability Zone Section 02225 Part 3.02A of Project Specification

** → AVERAGE VALUES FOR STOCK PILE 10/13 SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINALS

©GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 2 OF 4

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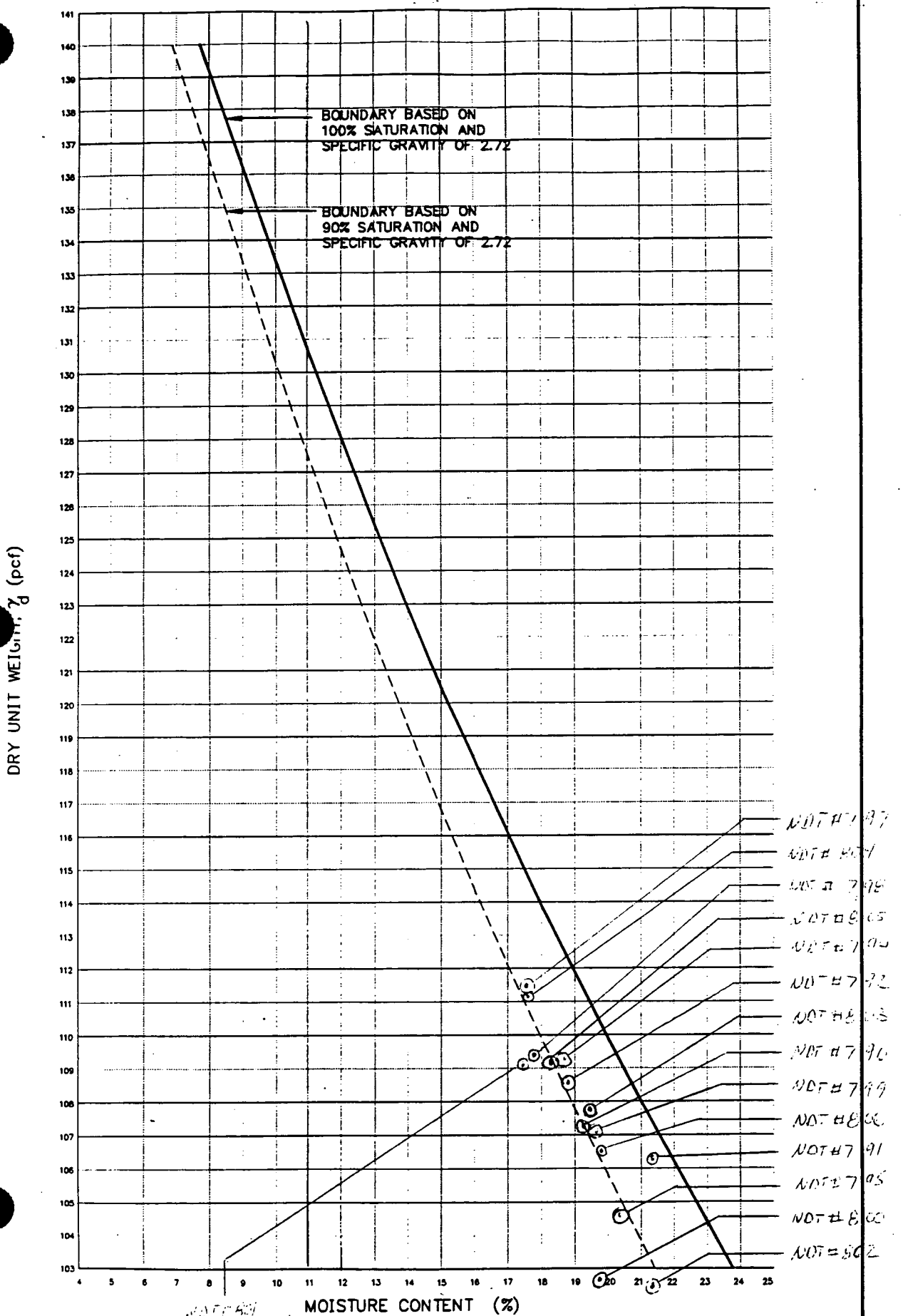
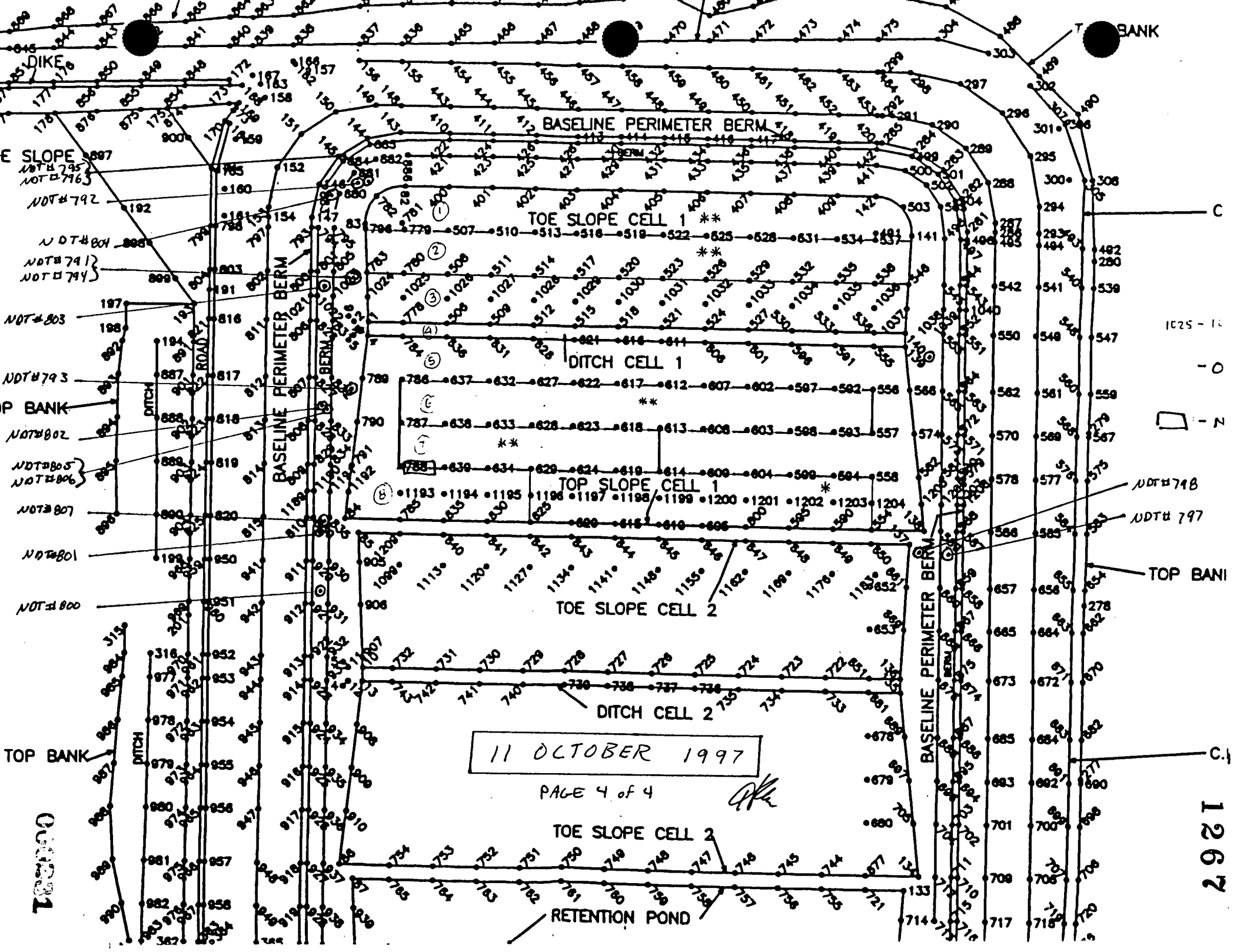
000269

11 OCTOBER 1997




DIKE
BANK
BASELINE PERIMETER BERM
TOE SLOPE CELL 1
DITCH CELL 1
TOP SLOPE CELL 1
TOE SLOPE CELL 2
DITCH CELL 2
TOE SLOPE CELL 2
RETENTION POND
BASELINE PERIMETER BERM
BASELINE PERIMETER BERM
ROAD
DITCH
TOP BANK
TOP BANK
NDT#792
NDT#804
NDT#803
NDT#793
NDT#802
NDT#807
NDT#801
NDT#800
NDT#798
NDT#797
11 OCTOBER 1997
PAGE 4 of 4

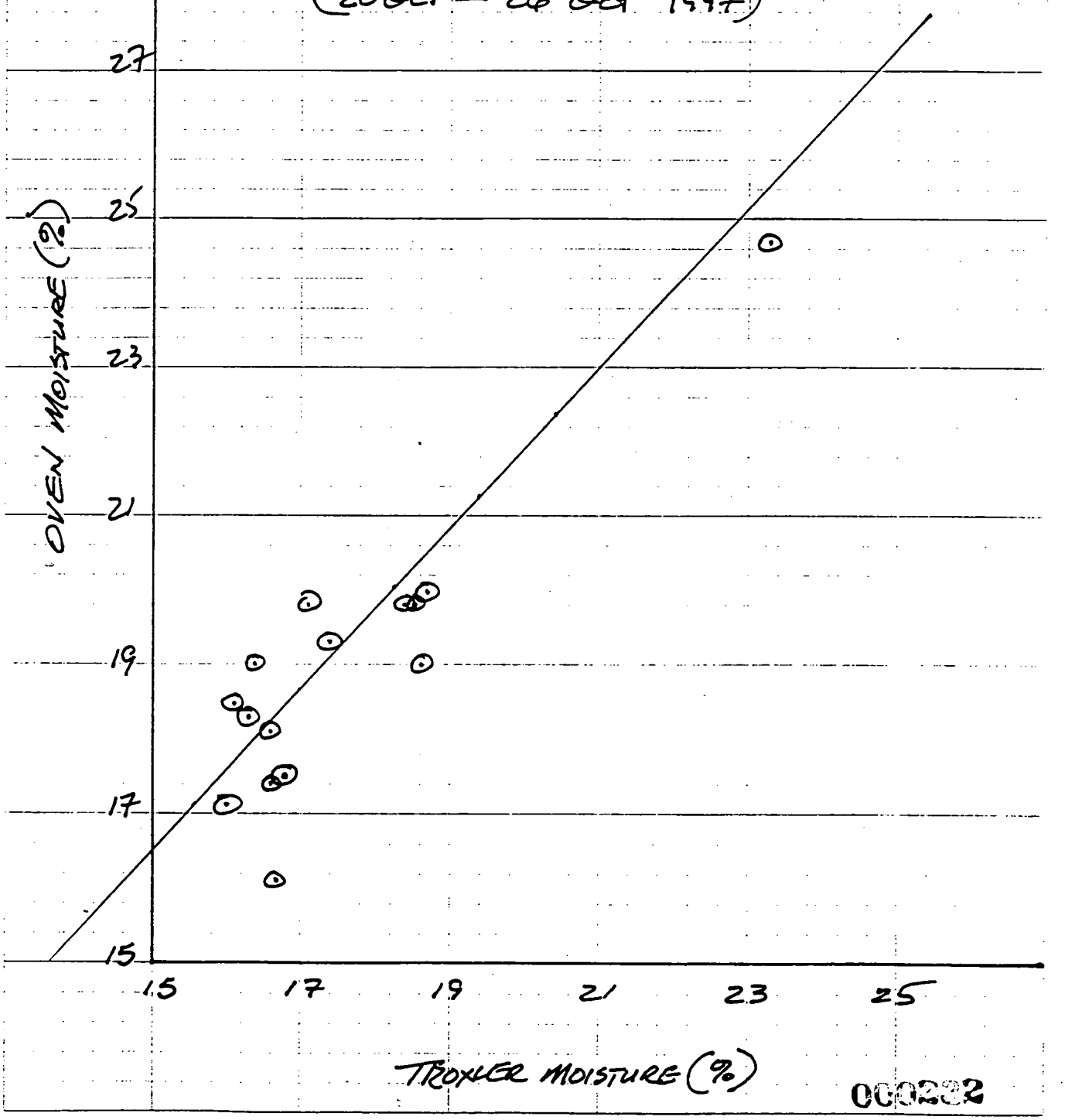
GEOSYNTEC CONSULTANTS

Written by: KEM Date: 97 / 10 / 13 (YY MM DD) Reviewed by: Date: / / (YY MM DD)

Client: FDF Project: OSDF Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR USE WEEK OF 13 OCTOBER, 1997 (13 OCT – 19 OCT '97)

CONTINUE FOR USE WEEK OF 20 OCTOBER, 1997 (20 OCT – 26 OCT 1997)



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 13 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: on site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~18"~~ Hem 10/16/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% standard proctor AP2 ⊛ MOISTURE RANGE: ±3% AP2 ⊛ ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. ~~27418~~ 24487 SRI 13/097 COR. FACTOR: Moisture Correlation QA ID: SRI / RP

TEST NO. NDT#	TEST LOCATION see attached map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
808	WEST BERM SLOPE CELL 1	6" L5	**	19.3	106.0	22.7	127.3	103.7	97.8		F	809	P	
809	↓	6" L5	↓	↓	↓	22.2	125.9	103.0	97.2	P				
810	WEST BERM BENCH CELL 1 AND NORTH CELL 2	6" L2	LP262	18.5	107.7	17.6	131.7	112.0	104.0	P				
811	↓	6" L3	**	19.3	106.0	18.4	128.7	108.7	102.5		F	812		F
812		6" L3				19.4	122.3	102.4	96.6		F	813		F
813		6" L3				18.0	123.9	105.0	99.1		F	818	P	
814	↓	6" L4				18.2	129.3	109.4	103.2	P				
815	WEST BERM SLOPE CELL 1	6" L4				16.7	122.8	105.2	99.2		F	820	P	
816	↓	6" L4	↓	↓	↓	18.5	130.3	110.0	103.8	P				
817	WEST BERM BENCH CELL 1	6" L5	LP262	18.5	107.7	16.5	131.3	112.7	104.6		F	819		F

COMMENTS: ⊛ AP2 → Acceptable Permeability Zone Section 02225 Part 3.02A of Project Specification

** AVERAGE VALUES FOR STOCKPILE 10/13 SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 13 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR/APZ* MOISTURE RANGE: ±3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. ~~27418~~ 24407 S.C.L. 12/10/97 COR. FACTOR: MOISTURE CORRELATION QA ID: SO/RP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
818	WEST BERM BENCH CELL 1	6" L3	**	19.3	106.0	19.1	130.2	109.3	103.1	P				
819	↓	6" L5	↓	↓	↓	15.9	133.6	115.3	108.7 ~~107.~~		F	821	P	
820	WEST BERM SLOPE CELL 1	6" L4	↓	↓	↓	21.0	128.6	106.3	100.3	P				
821	WEST BERM BENCH CELL 1	6" L5	LP 262	18.5	107.7	17.2	132.2	112.8	104.7	P				
822	↓	6" L4	**	19.3	106.0	18.1	126.3	106.9	100.8		F	824		F
823	WEST BERM SLOPE CELL 1	6" L5	↓	↓	↓	18.7	125.6	105.8	99.8		F	825		F
824	WEST BERM BENCH CELL 1	6" L4	↓	↓	↓	17.2	123.8	105.6	99.6		F	828		F
825	WEST BERM SLOPE CELL 1	6" L5	↓	↓	↓	16.9	128.1	109.6	103.4		F	826		F
826	↓	6" L5	↓	↓	↓	20.2	125.4	104.3	98.4		F	827	P	
827	↓	6" L5	↓	↓	↓	20.2	128.7	107.1	101.0	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02.A of PROJECT SPECIFICATION

** AVERAGE VALUES FOR STOCK PILE 10/13 SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY of ORIGINAL TEST

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE 1 CONSTRUCTION DATE: 13 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ONSITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR / APZ* MOISTURE RANGE: ±3%, APZ* ASTM D 698 (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. ~~27418~~ 24487 SG, 13/16/77 COR. FACTOR: MOISTURE CORRELATION QA ID: SJ/R.P.

TEST NO. NOT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NOT#	RETEST PASS	RETEST FAIL
828	WEST BERM BENCH CELL 1	6" L4	**	19.3	106.0	17.5	128.6	109.4	103.2		F	831	P	
829		6" L3				18.1	128.4	108.7	102.5		F	832	P	
830		6" L5				17.7	128.5	109.2	103.0		F	833		F
831		6" L4				18.0	129.8	110.0	103.8	P				
832		6" L3	LP 262	18.5	107.7	17.0	131.1	112.1	104.1	P				
833		6" L5	**	19.3	106.0	16.8	129.6	111.0	104.7		F	835		F
834		6" L6				18.1	127.5	108.0	101.9		F	836		F
835		6" L5				19.5	125.6	105.1	99.2		F	837	P	
836		6" L6				18.5	128.1	108.1	102.0		F	838		F
837		6" L5				19.6	127.7	106.8	100.7	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** → AVERAGE VALUES FOR STOCK PILE 10/13 SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

12672

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE 1 CONSTRUCTION DATE: 13 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ONSITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR / APZ* MOISTURE RANGE: ±3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. ~~27418~~ 24487 SS 13/10/97 COR. FACTOR: MOISTURE CORRELATION QA ID: SAI/RP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
838	WEST BERM BENCH CELL 1	6" L6	**	19.3	106.0	17.5	129.1	109.9	103.7		F	839	P	
839	↓	6" L6	↓	↓	↓	20.6	127.2	105.5	99.5	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02 A of PROJECT SPECIFICATION

** → AVERAGE VALUES FOR STOCKPILE 10/13 SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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1262

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION TUESDAY DATE: 13 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ HEW 10/10/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: ON/PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
840	SOUTH SLOPE OF CELL I/II INTERCELL BERM (CELL II)	6" / L5	**	17.7	108.6	16.6	129.1	110.7	101.9		F	844		F
841	↓	6" / L6	↓	↓	↓	17.7	131.6	111.8	102.9	P				
842	↓	6" / L6	↓	↓	↓	16.7	131.4	112.6	103.7		F	845		F
843	↓	6" / L6	↓	↓	↓	17.4	130.4	111.1	102.3	P				
844	↓	6" / L5	↓	↓	↓	17.3	130.3	111.1	102.3		F	846		F
845	↓	6" / L6	↓	↓	↓	17.3	129.5	110.4	101.7		F	847		F
846	↓	6" / L5	↓	↓	↓	17.4	128.8	109.7	101.0		F	850	P	
847	↓	6" / L6	↓	↓	↓	17.5	129.1	109.9	101.2		F	848		F
848	↓	6" / L6	↓	↓	↓	16.5	131.6	113.0	104.1		F	849	P	
849	↓	6" / L6	↓	↓	↓	17.0	131.7	112.6	103.7	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** → AVERAGE VALUES FOR STOCKPILE II SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION TUESDAY DATE: 13 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ HCM 10/16/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: BN/PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
850	SOUTH SLOPE OF CELL I/II INTERCELL BERM (CELL II)	6" / L5	**	17.7	108.6	19.1	129.1	108.4	99.8	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** → AVERAGE VALUES FOR STOCK PILE 11 SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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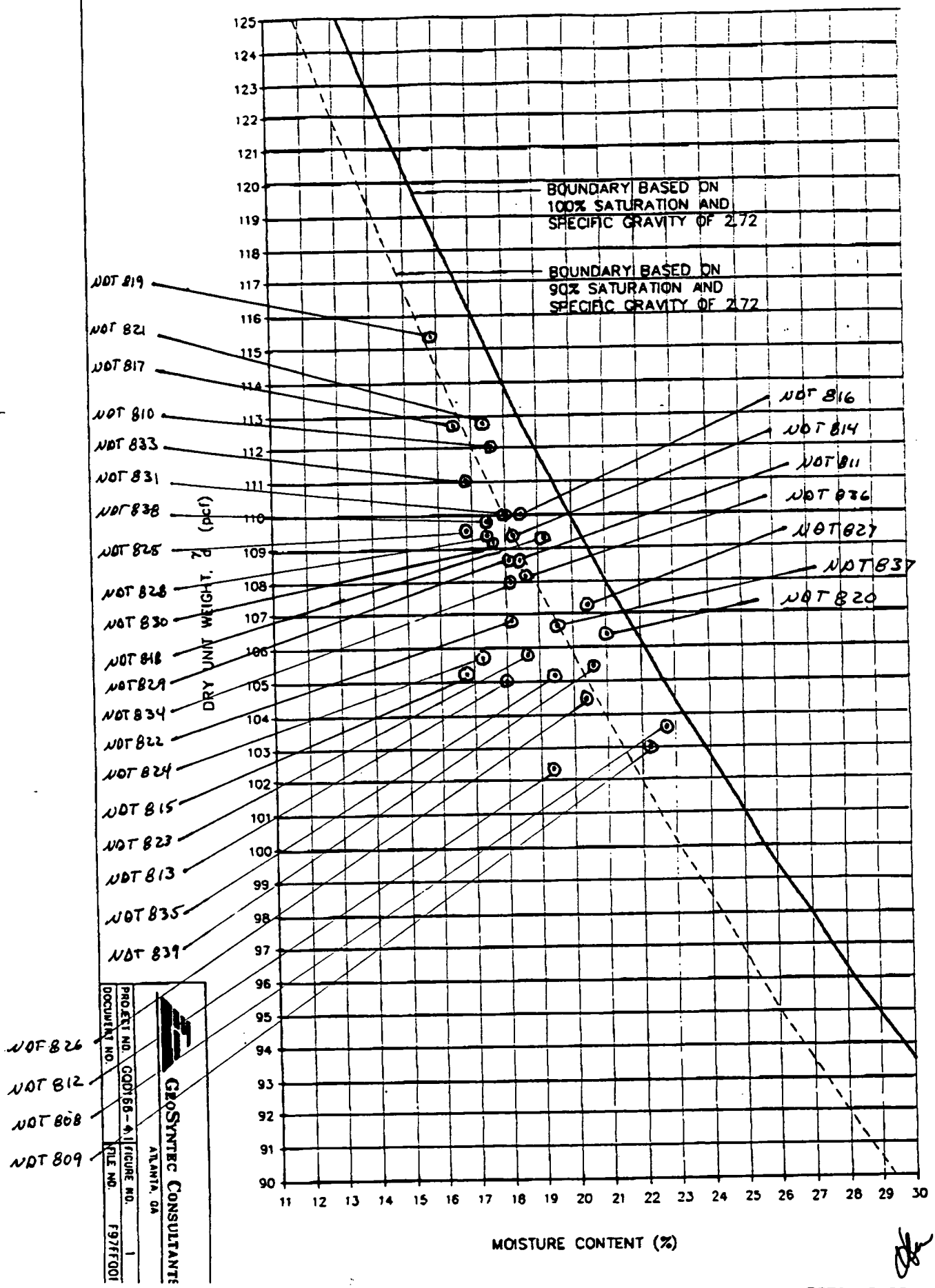
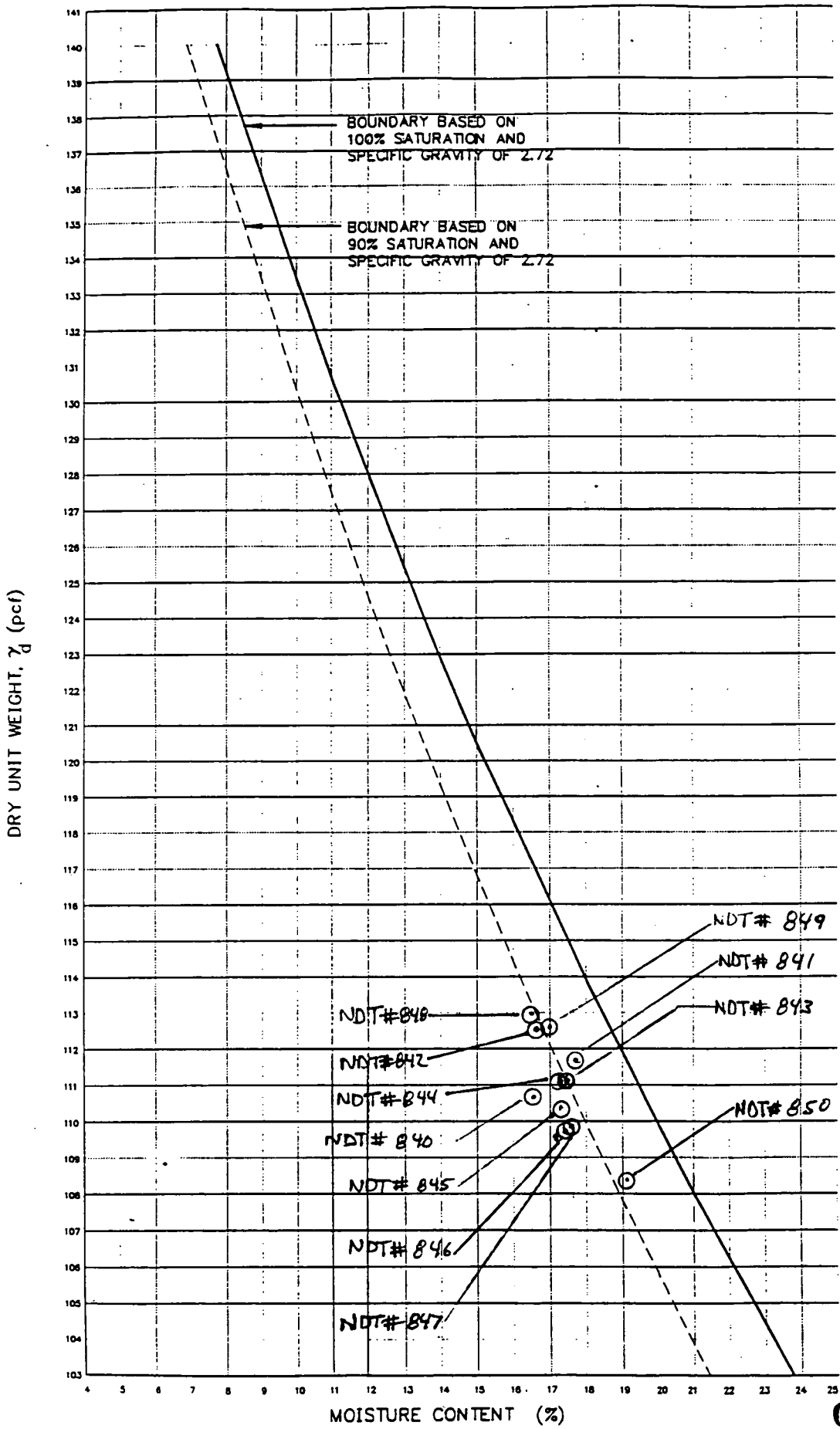
13 OCTOBER 1997



TUESDAY 13 OCTOBER 1997



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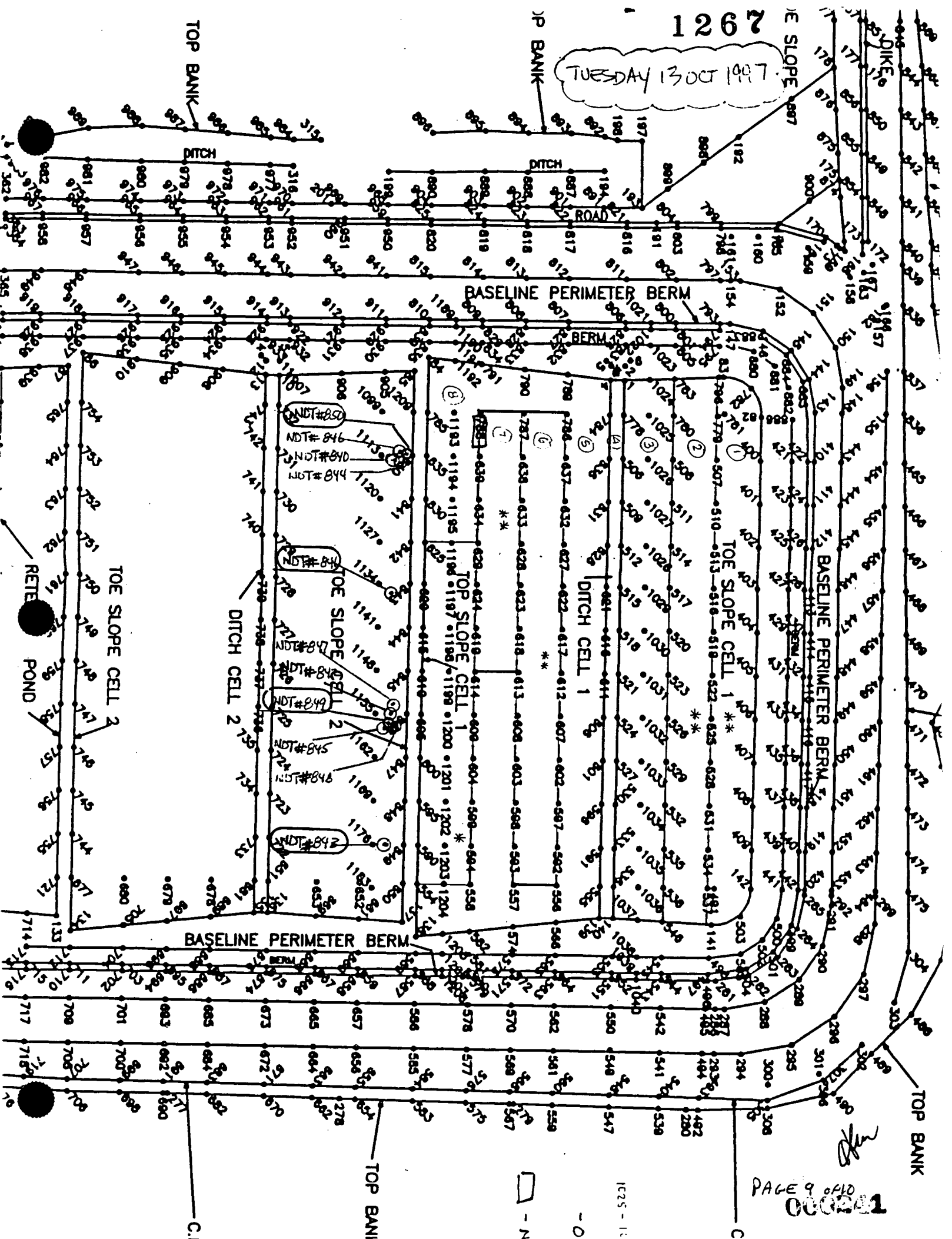

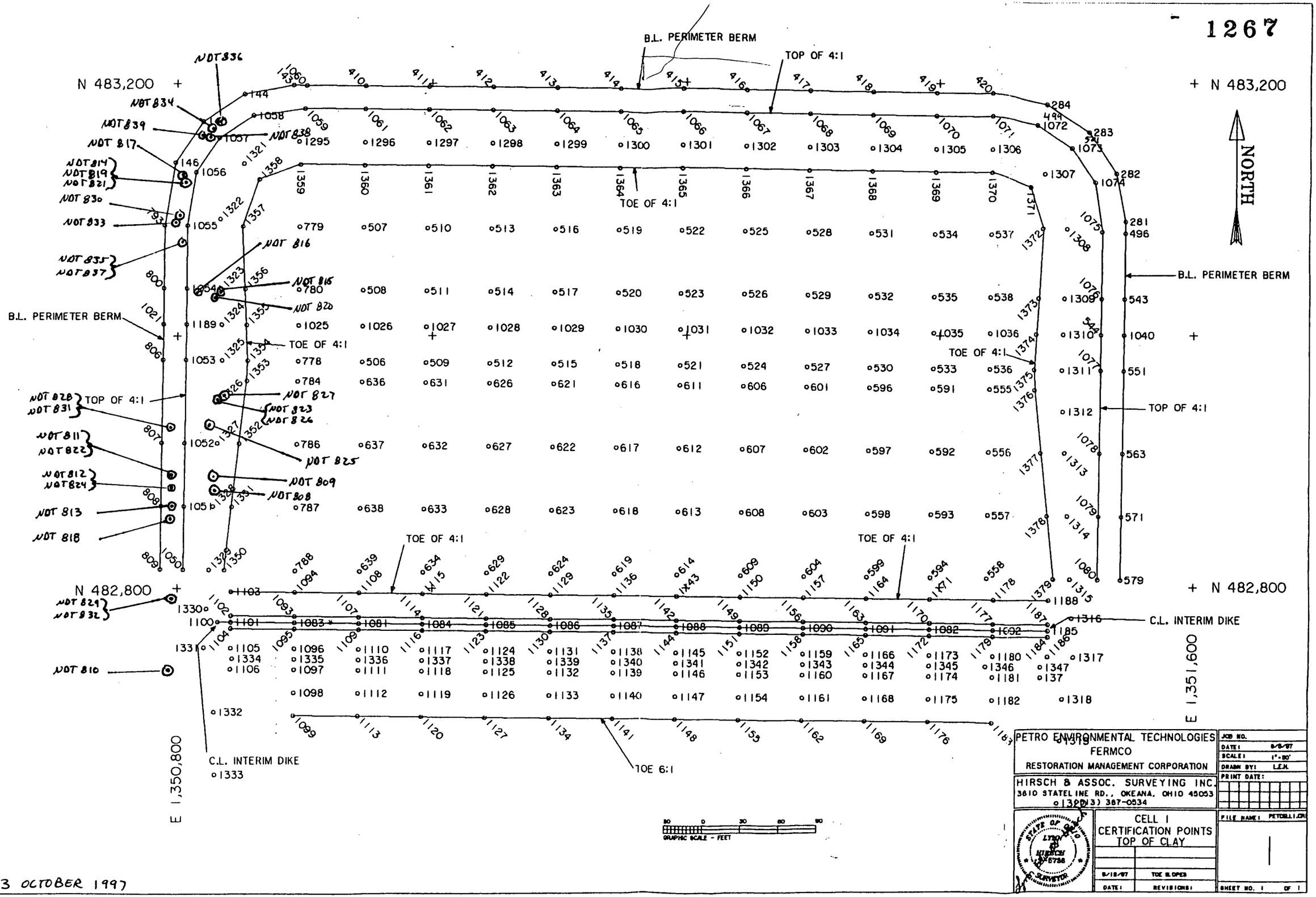

PETRO ENVIRONMENTAL TECHNOLOGIES
FERMCO
RESTORATION MANAGEMENT CORPORATION

HIRSCH & ASSOC. SURVEYING INC.
3610 STATELINE RD., OKEANA, OHIO 45053
(513) 387-0534

JOB NO.
DATE: 8-18-97
SCALE: 1"=80'
DRAWN BY: L.E.H.
PRINT DATE:

CELL I
CERTIFICATION POINTS
TOP OF CLAY

8/18/97 TOE SLOPES
DATE: REVISIONS:

FILE NAME: PETCELL1.DWG

SHEET NO. 1 OF 1

13 OCTOBER 1997

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

DATE: 14 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ONSITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR / APZ* MOISTURE RANGE: ±3% APZ* ASTM D 698: (CIRCLE ONE) (A) B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 24487 COR. FACTOR: MOISTURE CORRELATION QA ID: AP/SG/BN

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
851	WEST BERM BENCH CELL 1	6" L4	**	19.3	106.0	19.0	124.9	105.0	99.1 -		F	855	P	
852	↓	6" L3	↓	↓	↓	18.7	127.7	107.6	101.5 -		F	856	P	
853		6" L5				20.4	127.9	106.2	100.2 -	P				
854		6" L6				19.2	128.4	107.7	101.6 -	P				
855		6" L4				18.8	130.9	110.2	104.0 -	P				
856		6" L3				19.5	128.7	107.7	101.6 -	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02.4 of PROJECT SPECIFICATION

** → AVERAGE VALUES FOR STOCK PILE 10/13 SAMPLES

RETESTS PERFORMED IN GENERAL VICINITY of ORIGINAL TEST

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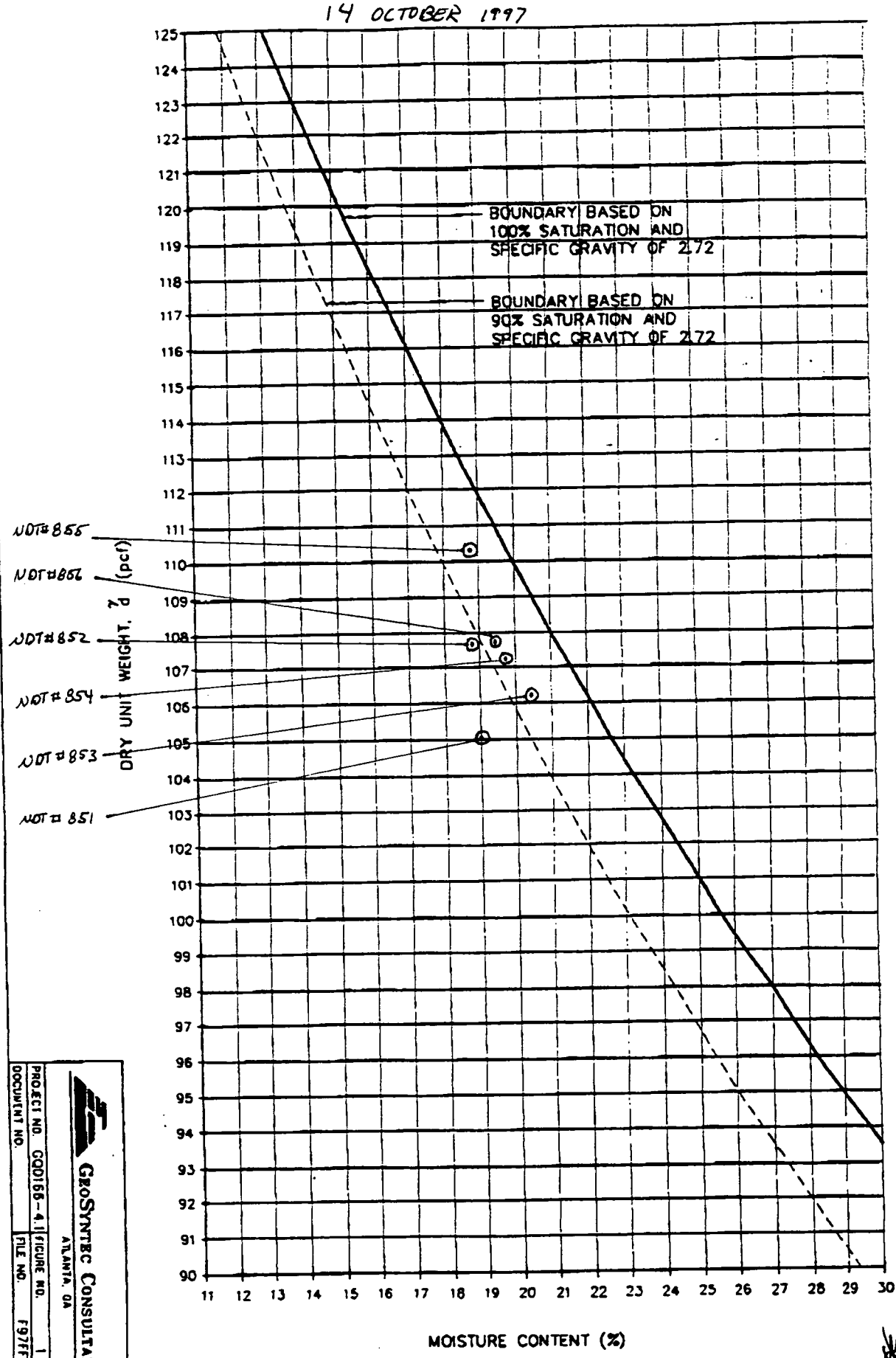
14 OCTOBER 1997



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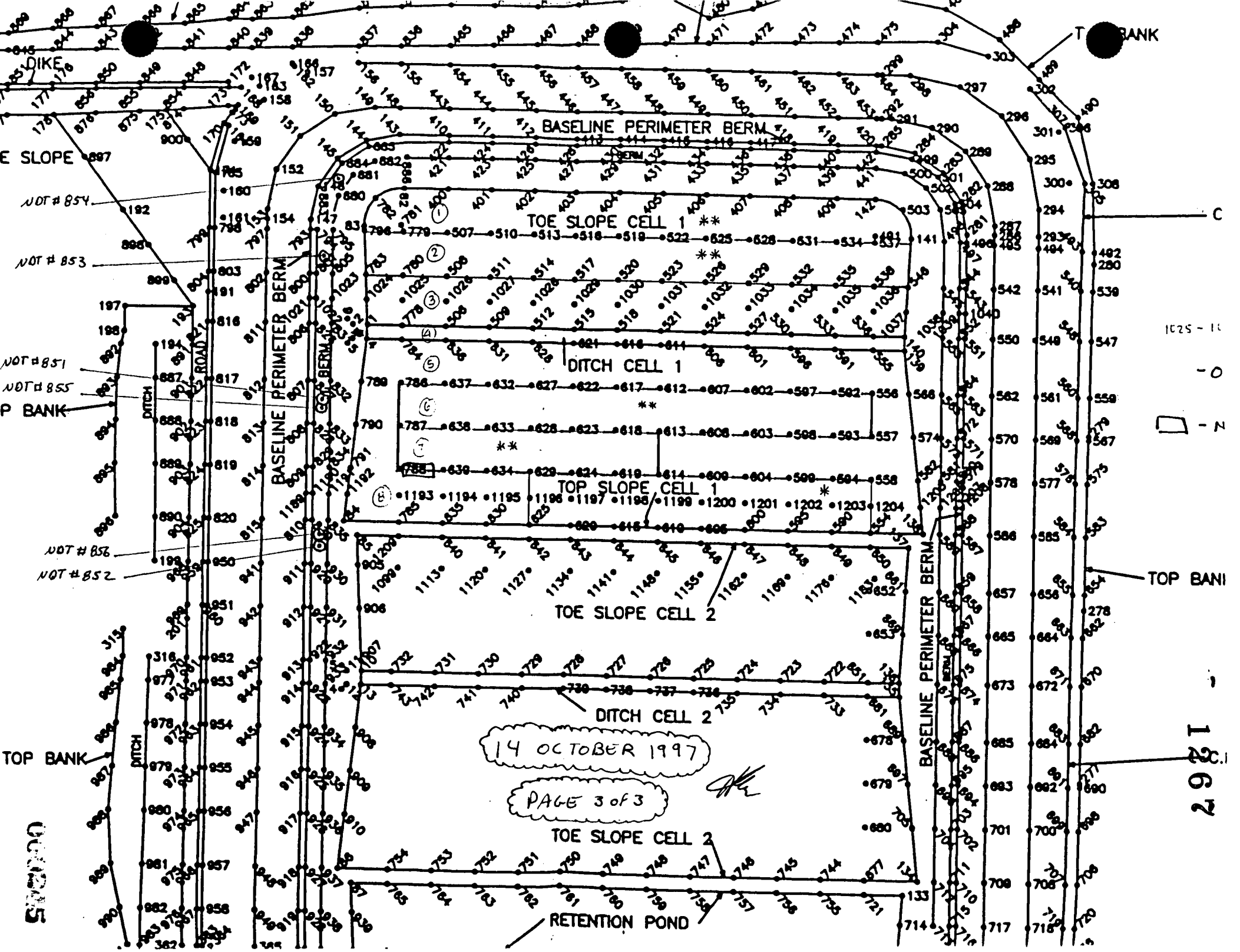
ATLANTA, GA

PROJECT NO. GD0166-4.1	FIGURE NO. 1
DOCUMENT NO.	FILE NO. F97FF001

PAGE 2 OF 3

TOTAL P.02


DIKE
E SLOPE
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NOT # 853
NOT # 851
NOT # 855
P BANK
NOT # 856
NOT # 852
TOP BANK
DITCH
ROAD
BASELINE PERIMETER BERM
BERM
TOE SLOPE CELL 1 **
DITCH CELL 1
TOP SLOPE CELL 1
TOE SLOPE CELL 2
DITCH CELL 2
TOE SLOPE CELL 2
RETENTION POND
BASELINE PERIMETER BERM
TOP BANK
14 OCTOBER 1997
PAGE 3 of 3

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: FRIDAY 17 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8"~~ 10/24/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430/3440 NUCLEAR GAUGE SERIAL NO. 27418 /20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BN/PP

	TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.		LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
**	857	CELL I W. BERM BENCH	6"	L5	LP-263	17.3	114.1	17.3/19.0	129.3	110.1/108.7	95.3	P				
**	858	W. BERM BENCH	6"	L6	LP-263	17.3	114.1	17.2/18.9	131.7	112.4/110.8	97.1	P				
**	859	W. BERM BENCH	6"	L2	LP-263	17.3	114.1	15.9/17.5	130.4	112.6/111.0	97.3	P				
	860	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6"	L6	LP-263	17.3	114.1	15.6/17.2	131.2	113.4/111.9	98.1	P				
	861	↓	6"	L7	LP-263	17.3	114.1	18.4/20.3	127.6	107.9/106.1	93.0		F	864	P	
	862	↓	6"	L7	LP-263	17.3	114.1	16.4/18.1	127.9	109.8/108.3	94.9		F	863		F
	863	↓	6"	L7	LP-263	17.3	114.1	17.5/19.1	128.2	109.1/107.6	94.3		F	865		F
	864	↓	6"	L7	LP-263	17.3	114.1	17.8/19.5	131.5	111.7/110.0	96.4	P				
	865	SOUTH SLOPE OF CELL I/II INTERCELL BERM	6"	L7	↓	↓	↓	20.8/22.8	128.4	106.3/104.6	91.7		F	866		F
	866	↓	6"	L7	↓	↓	↓	16.2/17.8	129.1	111.0/109.6	96.1		F	867	P	

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** TROXLER 3440 GAUGE # 20979 USED.

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

FRIDAY DATE: 17 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: ~~±8~~ 10/20/97 LIFT THICKNESS (LOOSE/COMPACTED): ±8"

% COMPACTION: 95% STANDARD PROCTOR APZ * MOISTURE RANGE: +3% APZ * ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRELATION QA ID: KW/BW/PP

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
867	S. SLOPE OF CELL I/II. INTERCELL BERM	6" L7	LP-263	17.3	114.1	16.6/18.2	130.7	112.2/110.6	96.9	P				
868	W. BERM BENCH CELL I	6" L3				16.0/17.6	128.8	111.1/109.5	96.0		F	872		F
869		6" L5				15.5/17.1	129.5	112.1/110.6	96.9		F	870	P	
870		6" L5				15.6/17.2	131.5	113.7/112.2	98.3	P				
871		6" L6				17.6/19.4	~~128.2~~ 130.0 10/17/97	~~109.1~~ 110.5/108.9	95.0	P				
872		6" L3				17.4/19.2	127.6	108.7/107.0	93.8 10/17/97		F	873	P	
873	W. BERM BENCH CELL I	6" L3				16.8/18.4	129.6	110.9/109.5	96.0	P				
10/17/97														

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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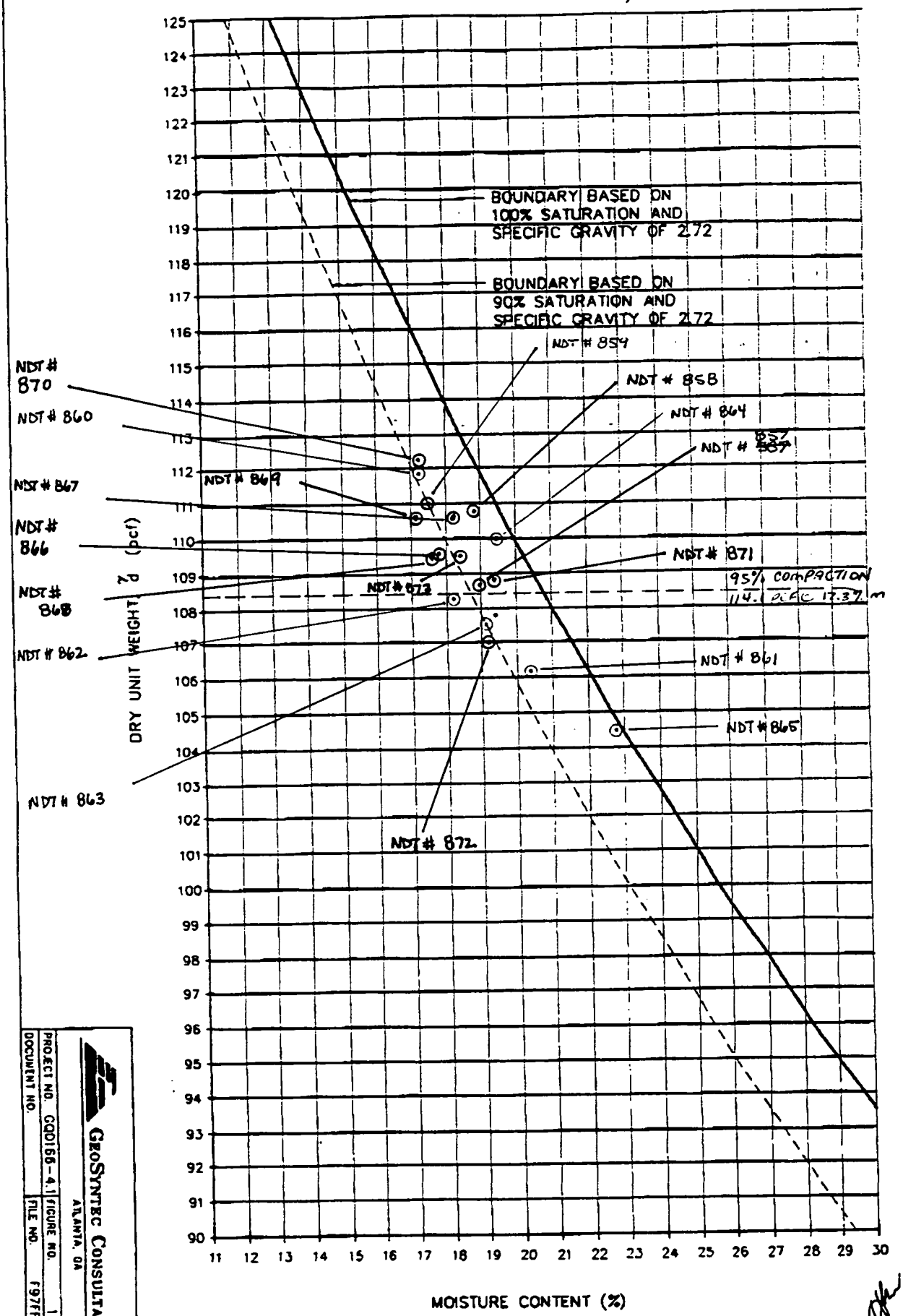
FRIDAY 17 OCT 97



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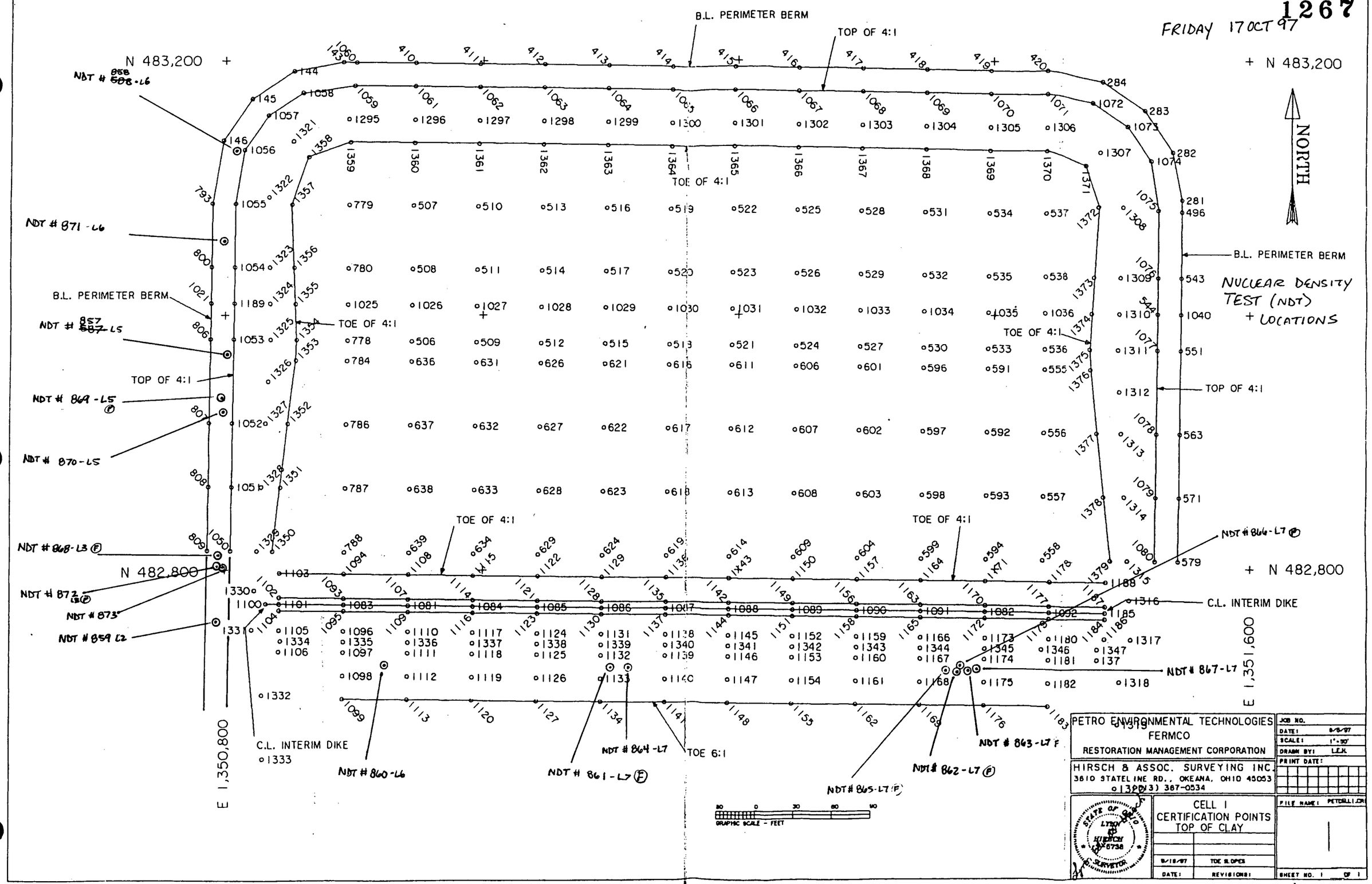
ATLANTA, GA

PROJECT NO. GQD166-4.1 FIGURE NO. 1
DOCUMENT NO. FILE NO. F97FF001

TOTAL P.02

SHEET NO. 3 OF 4

FRIDAY 17 OCT 97



SHEET NO. 4 OF 4

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: MONDAY 20 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ±8"
(CIRCLE ONE)

% COMPACTION: 95% STANDARD PROCTOR APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRELATION QA ID: KW

TEST NO. NDT #	TEST LOCATION SEE ATTACHED MAP	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT #	RETEST PASS	RETEST FAIL
874	N.E. QUADRANT OF CELL # I	4" TOP	LP-02	13.0	119.8	14.6	135.8	118.5	98.9	P				
875	↓	↓	↓	↓	↓	15.7	133.4	115.3	96.2	P				
876	↓	↓	↓	↓	↓	15.9	133.7	115.4	96.3	P				

COMMENTS: * APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

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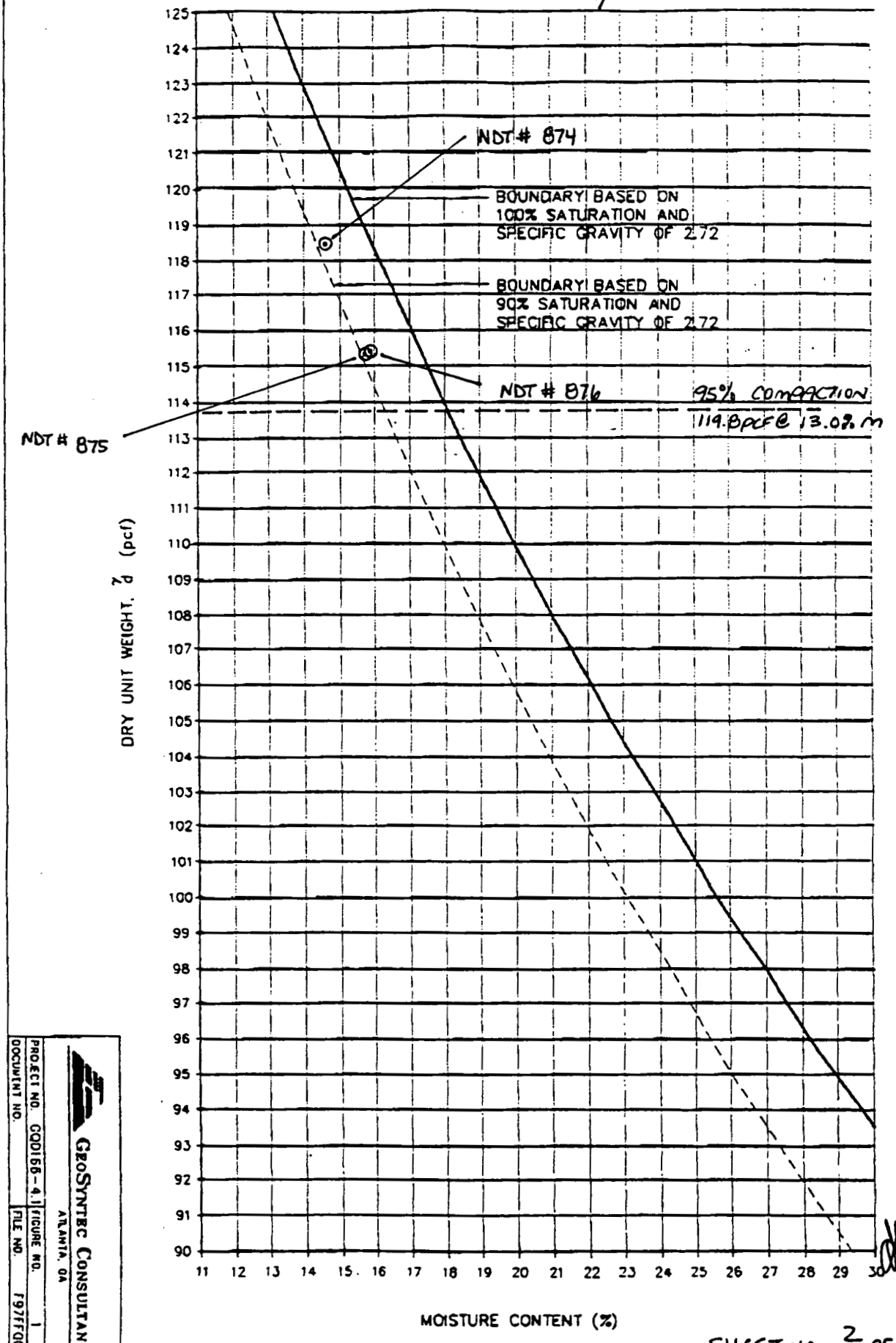
MONDAY 20 OCT 97



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ATLANTA, GA

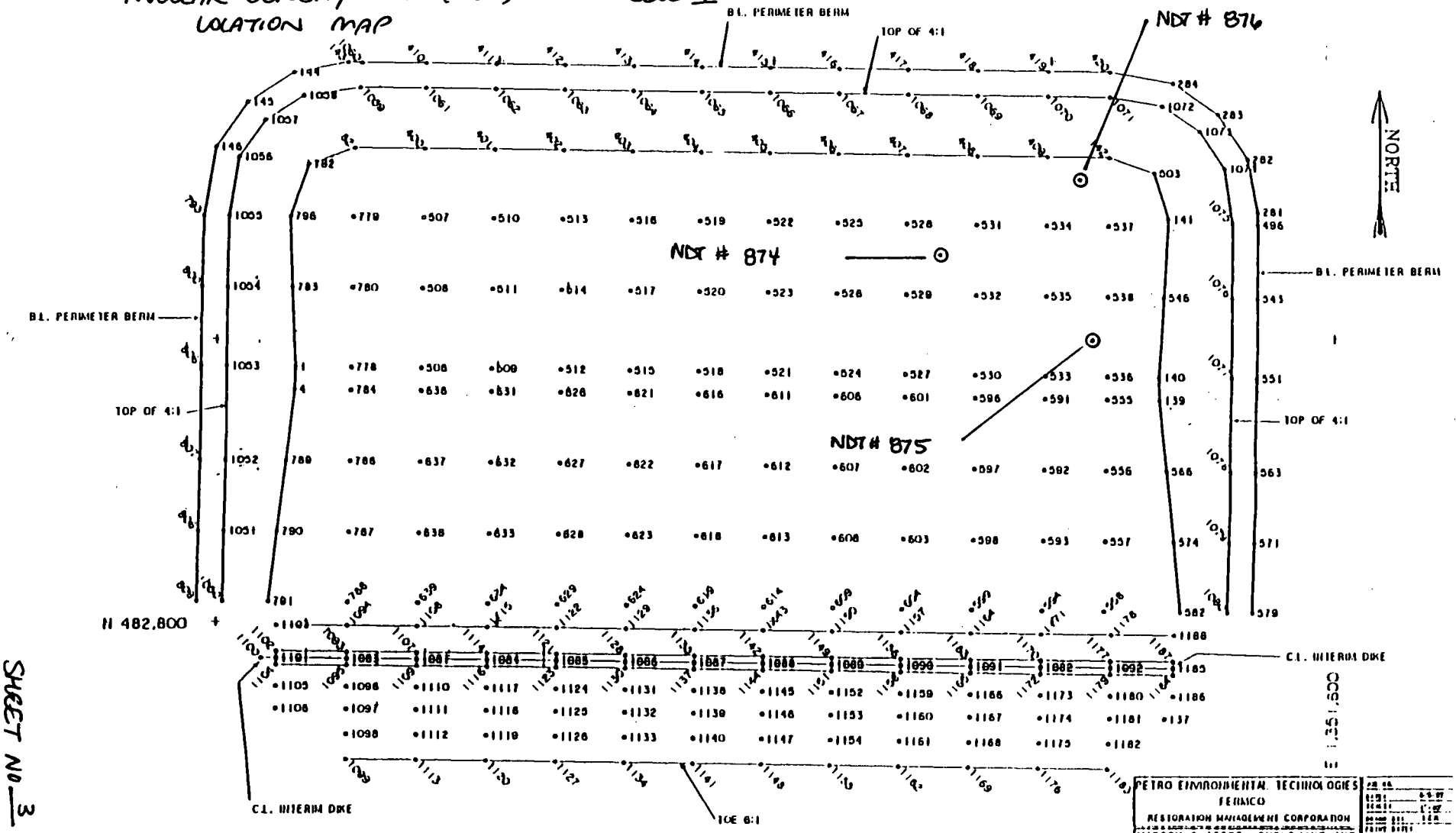
PROJECT NO. GQ0166-4.1	FIGURE NO. 1
DOCUMENT NO.	FILE NO. F97FF001

SHEET NO. 2 OF 3

TOTAL P.02

NUCLEAR DENSITY TEST (NDT) LOCATION MAP

CELL I



PETRO ENVIRONMENTAL TECHNOLOGIES
FERNCO
RESTORATION MANAGEMENT CORPORATION
HIRSCH & ASSOC. SURVEYING INC

CELL I
CERTIFICATION POINTS
TOP OF CLAY

SHEET NO 3 OF 3

MONDAY 20 OCT 1997

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction Tuesday DATE: 21 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 8"±

% COMPACTION: 95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: PJP/RP

TEST NO. NDT#	TEST LOCATION See attached map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
877	West berm, Cell 1	6" / L 4	LP-263	17.3	114.1	15.4 17.0	131.4	113.9 112.3	98.4	P				
878	↓	L 5	↓	↓	↓	16.5 18.2	129.7	111.4 109.7	96.1	P				
879	↓	L 6	↓	↓	↓	17.2 18.8	130.3	111.2 109.7	96.1	P				
880	Northwest Slope, Cell 2	L 1	↓	↓	↓	15.3 16.9	131.6	114.1 112.6	98.7	P				
881	↓	L 2	↓	↓	↓	16.2 17.8	126.5	108.8 107.4	94.1		F	882	P	
882	↓	↓ L 2	↓	↓	↓	17.4 19.1	130.7	111.3 109.7	96.1	P				

COMMENTS: *APZ → Acceptable Permeability Zone Section 02225 Part 3.02A of Project Specification

Retests performed in general vicinity of original test

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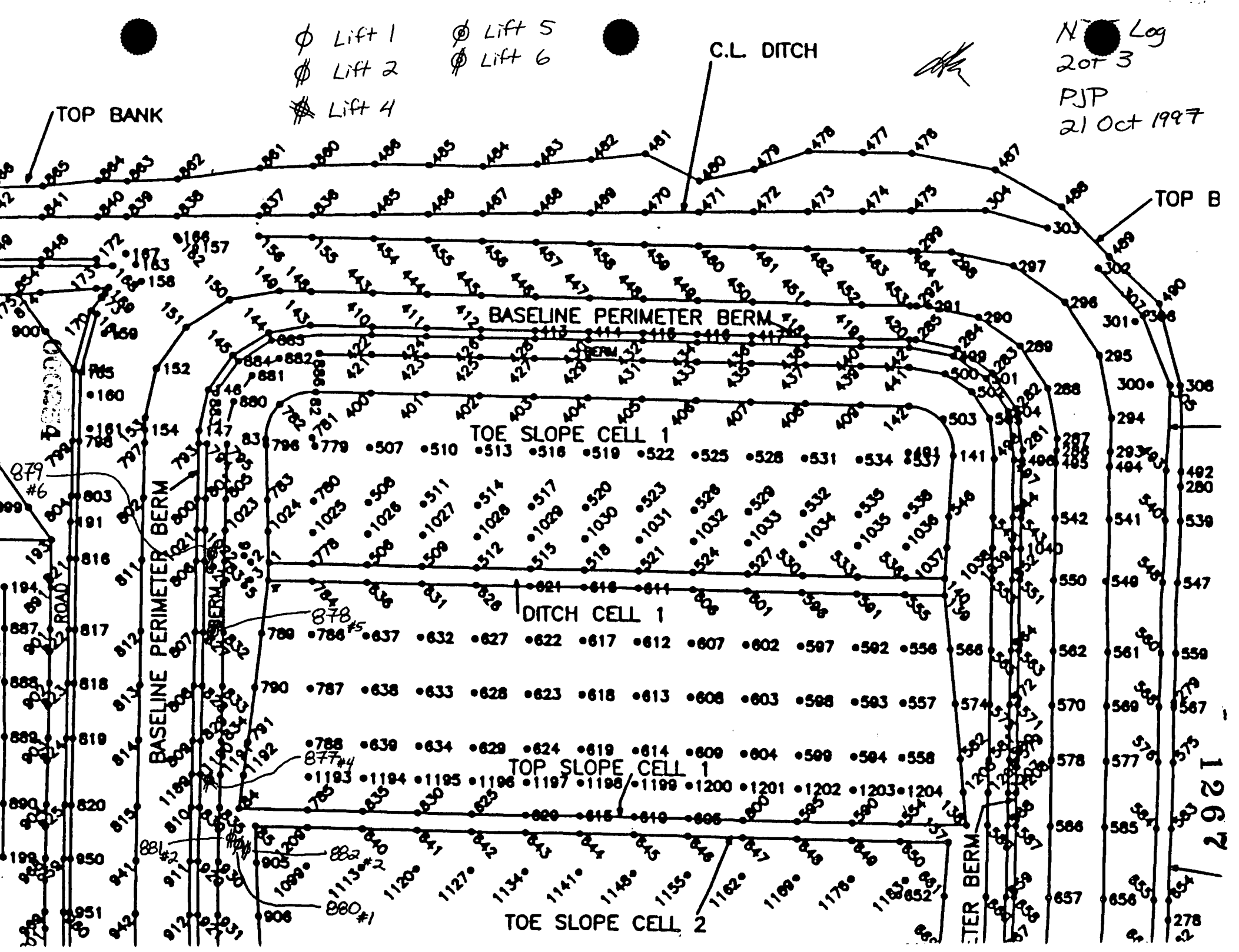

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2 of 3
PJP
21 Oct 1997

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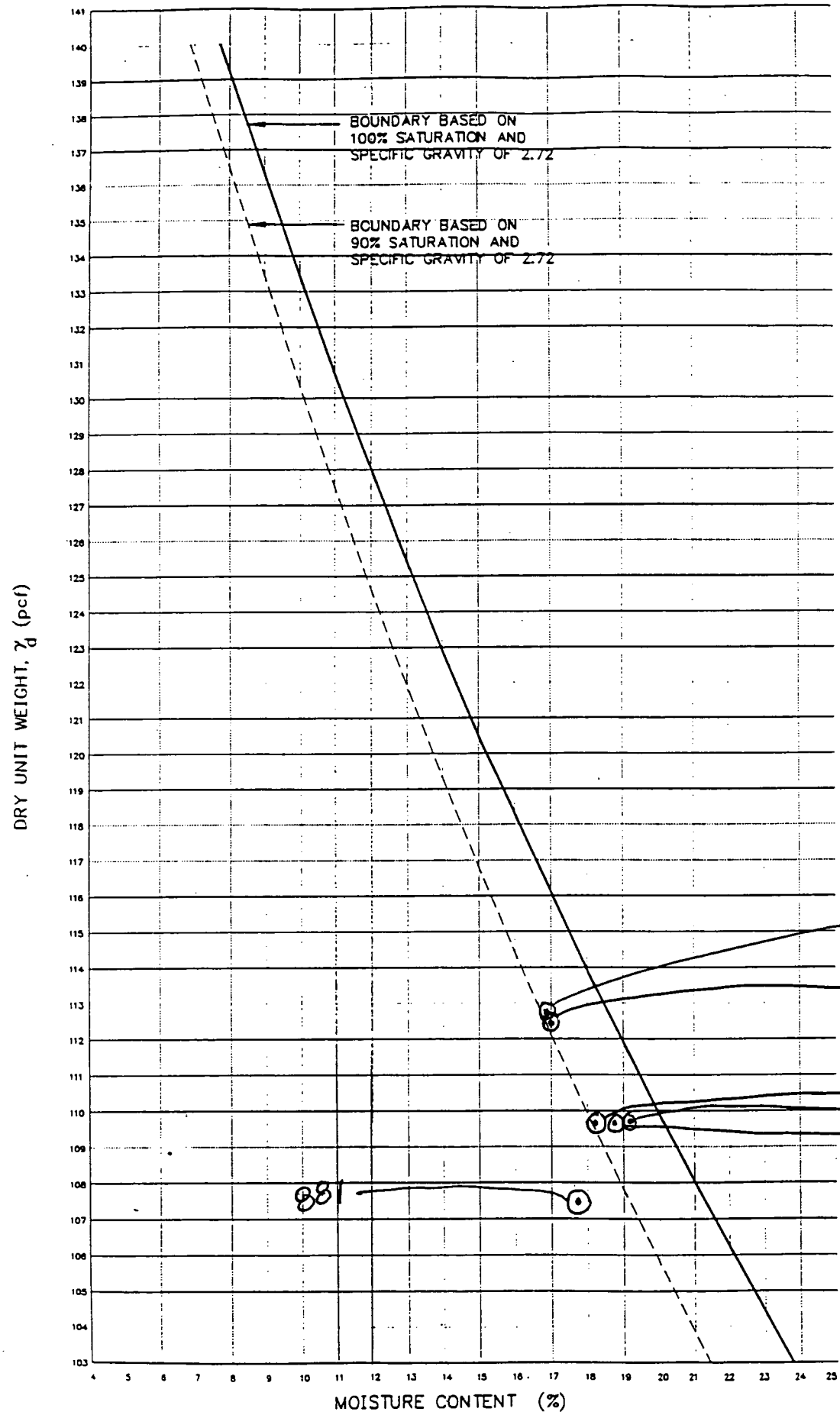


NDT Log
21 Oct 97
PJP
3 of 3

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase 1 Construction Wednesday DATE: 22 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 8" ±

% COMPACTION: >95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C (CIRCLE ONE) / ASTM D 1557: A B C _____

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: MOISTURE CORRECTION QA ID: PJP

TEST NO.	TEST LOCATION (See attached map)	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
883	Northwest Flat, Cell 1	6" / 7	LP-263	17.3	114.1	15.7 / 17.3	132.8	114.8 / 113.2	99.2	P				
884	↓	6" / 7	↓	↓	↓	14.2 / 15.7	130.6	114.3 / 112.9	98.9		F	885	P	
885	↓	6" / 7	↓	↓	↓	14.5 / 16.0	134.8	117.8 / 116.2	101.8	P				
886	West berm bench, Cell 1	6" / 5	LP-326	17.5	110.0	17.6 / 19.4	130.6	111.1 / 109.4	99.5	P				
887	↓	6" / 6	LP-325	16.1	114.0	15.0 / 16.5	131.4	114.3 / 112.8	98.9		F	889	P	
888	↓	6" / 7	↓	↓	↓	15.4 / 17.0	131.0	113.5 / 112.0	98.2	P				
889	↓	6" / 6	↓	↓	↓	15.0 / 16.5	132.0	114.8 / 113.3	99.4	P				
890	Northwest slope, Cell 2	6" / 3	↓	↓	↓	16.3 / 17.9	126.6	108.9 / 107.4	94.2		F	891	P	
891	↓	6" / 3	↓	↓	↓	14.5 / 16.0	133.2	116.3 / 114.8	100.7	P				
892	West berm bench, Cell 1	6" / 6	LP-326	17.5	110.0	17.6 / 19.3	129.7	110.3 / 108.7	98.8	P				

COMMENTS: *APZ → Approved Permeability Zone Section 02225 Part 3.02A of Project Specifications

Retests performed in general vicinity of original test

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase 1 Construction Wednesday DATE: 22 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): 8"±

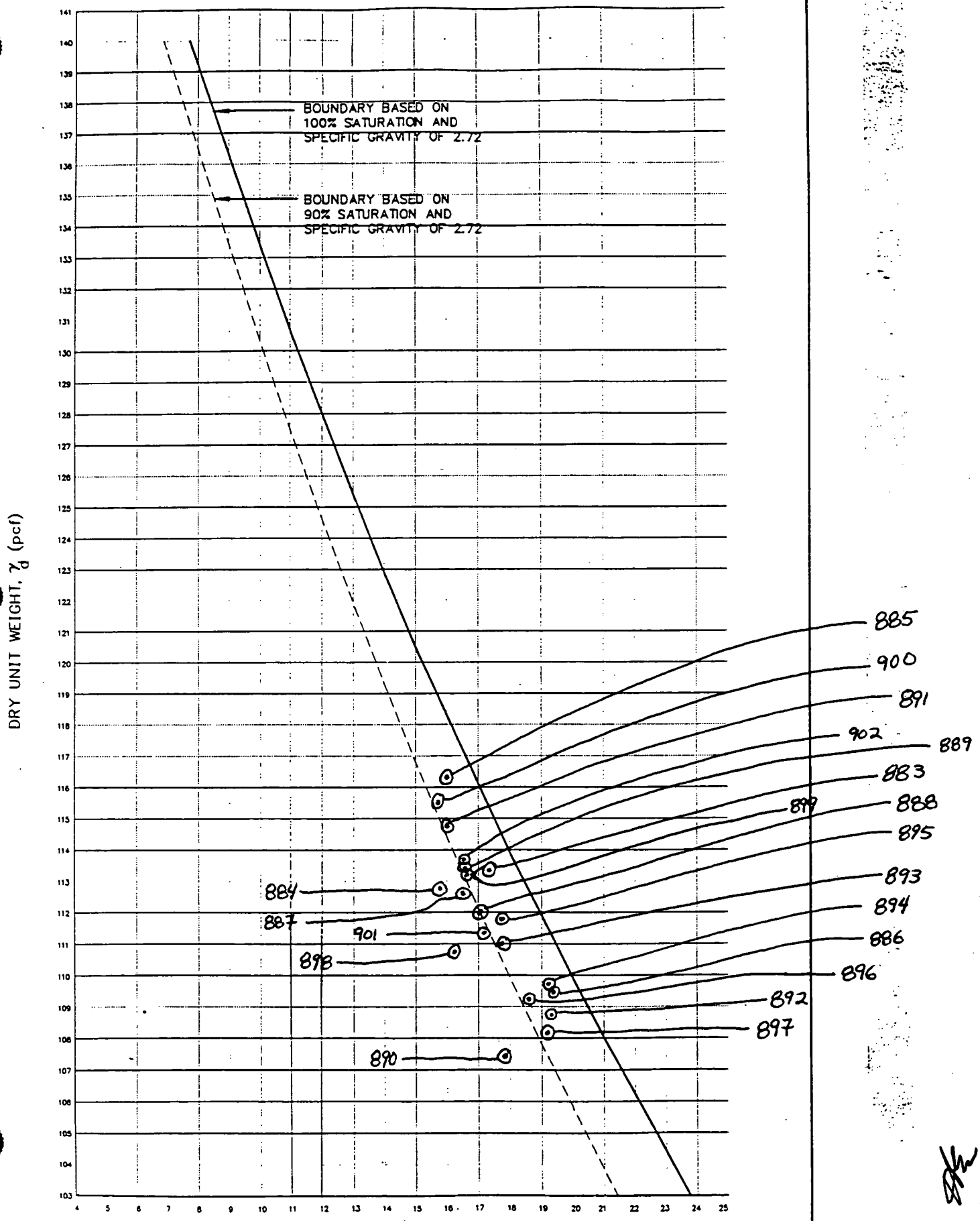
% COMPACTION: >95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: BJP

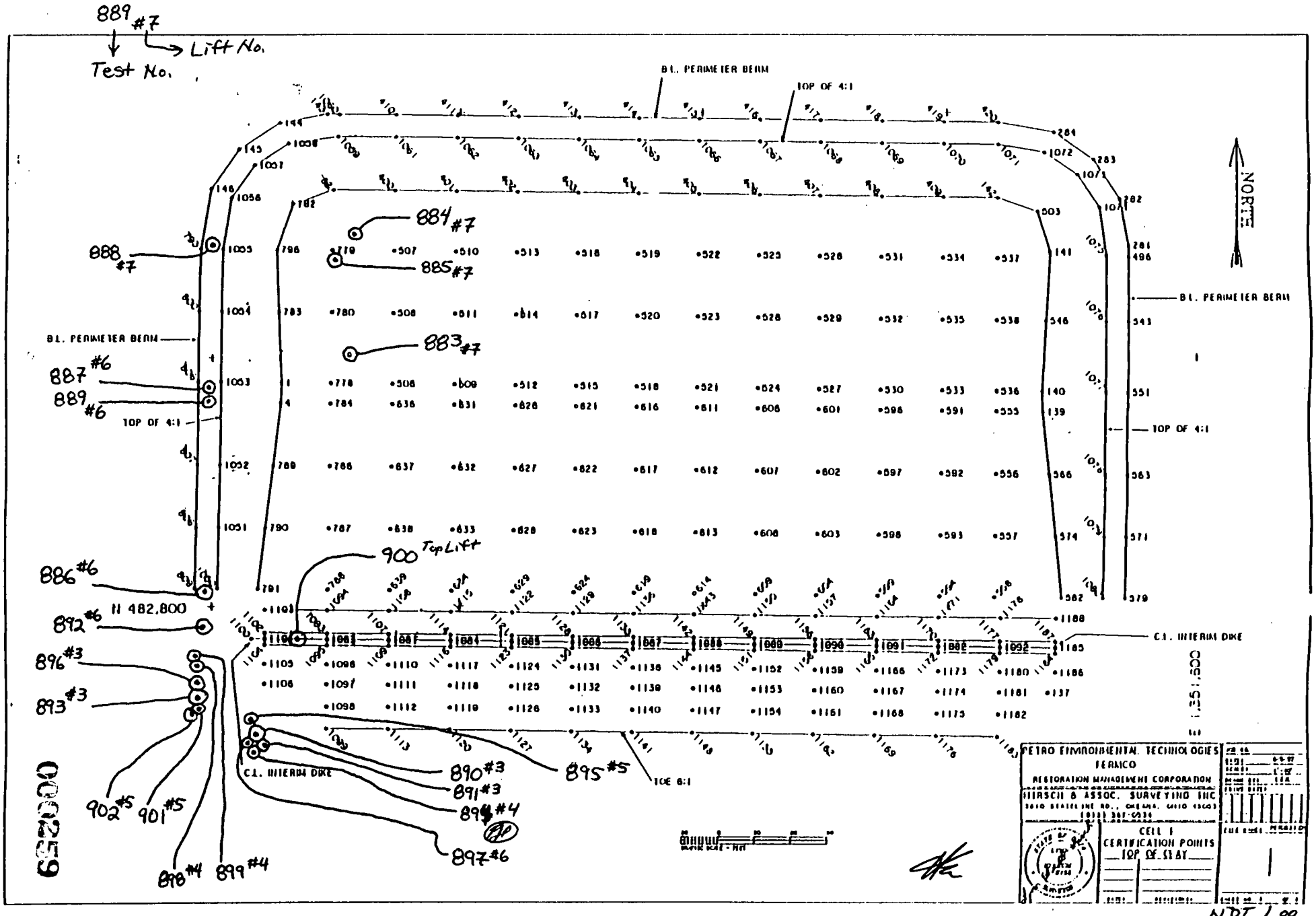
TEST NO. NDT#	TEST LOCATION See Attached Map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
893	West berm bench, Cell 2	6" / 3	LP-325	16.1	114.0	16.2 17.8	130.8	112.6 111.0	97.4	P				
894	Northwest Slope, Cell 2	6" / 4	LP-326	17.5	110.0	17.6 19.3	130.8	111.2 109.6	99.6	P				
895	Northwest Slope, Cell 2	6" / 5	LP-325	16.1	114.0	16.0 17.6	131.6	113.4 111.9	98.2	P				
896	West berm bench, Cell 2	6" / 3	↓	↓	↓	17.1 18.7	129.5	110.5 109.1	95.7	P				
897	Northwest Slope, Cell 2	6" / 6	LP-326	17.5	110.0	17.4 19.1	128.7	109.7 108.1	98.3	P				
898	West berm bench, Cell 2	6" / 4	LP-325	16.1	114.0	14.7 16.2	128.7	112.2 110.8	97.2		F	899	P	
899	West berm bench Cell 2	6" / 4	↓	↓	↓	15.0 16.5	131.9	114.7 113.2	99.3	P				
900	Top (bench) of interim 1/2 berm at west end	6" / Top Lift	↓	↓	↓	14.2 15.6	133.3	116.8 115.3	101.1	P				
901	West berm bench Cell 2	6" / 5	LP-325	16.1	114.0	15.6 17.2	130.6	112.9 111.4	97.7		F	902	P	
902	↓	6" / 5	↓	↓	↓	15.0 16.5	132.3	115.0 113.6	99.6	P				

COMMENTS: *APZ → Approved Permeability Zone Section 02225 Part 3.02A of Project Specifications

Retests performed in general vicinity of original test



NDT Log
22 Oct 97
PJP
2 of 4



NDT Log
22 Oct 97
4 of 4

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase 1 Construction Thursday DATE: 23 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 8"±

% COMPACTION: >95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: PJP

TEST NO. NDT#	TEST LOCATION See attached map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
903	Northwest Slope, Cell 2	6" / 7	LP-325	16.1	114.0	15.5 17.0	132.4	114.6 113.2	99.3	P				
904	West berm bench, Cell 2	6				17.3 19.0	127.7	108.8 107.3	94.1		F	905		F
905		6				16.4 18.0	127.5	109.5 108.1	94.8		F	906	P	
906		6				15.4 17.0	131.1	113.6 112.1	98.3	P				
907	Northwest Slope, Cell 2	8				15.2 16.7	132.1	114.6 113.2	99.3	P				
908	West berm bench, Cell 2	7				16.0 17.6	129.4	111.6 110.0	96.5		F	909	P	
909		7				16.6 18.2	129.3	110.9 109.4	96.0	P				
910	North Floor, Cell 1	4" / Top Lift	LP-24	15.5	117.5	11.5 14.1	139.8	125.4 122.5	104.3	P				
911						10.9 13.7	138.4	124.8 121.7	103.6	P				
912						13.2 14.2	137.1	121.1 120.1	102.2	P				

COMMENTS: *APZ → Approved Permeability Zone Section 02225 Part 3.02A of Project Specifications

Retests performed in general vicinity of original test

PJP

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase 1 Construction Thursday DATE: 23 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: On-Site Stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 8"±
(CIRCLE ONE)

% COMPACTION: >95% Standard Proctor APZ* MOISTURE RANGE: +3% APZ* ASTM D 698: (A) B C / ASTM D 1557: A B C
(CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: Moisture Correlation QA ID: RJP

TEST NO. NDT#	TEST LOCATION See Attached Map	PROBE DEPTH/ LIFT NO.	LAB RESULTS SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO. NDT#	RETEST PASS	RETEST FAIL
913	North Floor, Cell 1	4" / Top Lift	LP-24	15.5	117.5	12.9 / 14.9	132.2	117.1 / 115.1	97.9		F	915	P	
914	↓	↓	↓	↓	↓	12.8 / 14.8	135.2	119.8 / 117.8	100.2	P				
915						14.4 / 15.9	135.1	118.1 / 116.6	99.2	P				
916						14.0 / 15.5	134.1	117.6 / 116.1	98.8	P				
917						12.2 / 14.2	138.9	123.9 / 121.6	103.5	P				

COMMENTS: *APZ → Approved Permeability Zone Section 02225 Part 3.02A of Project Specifications

Rests performed in general vicinity of original test

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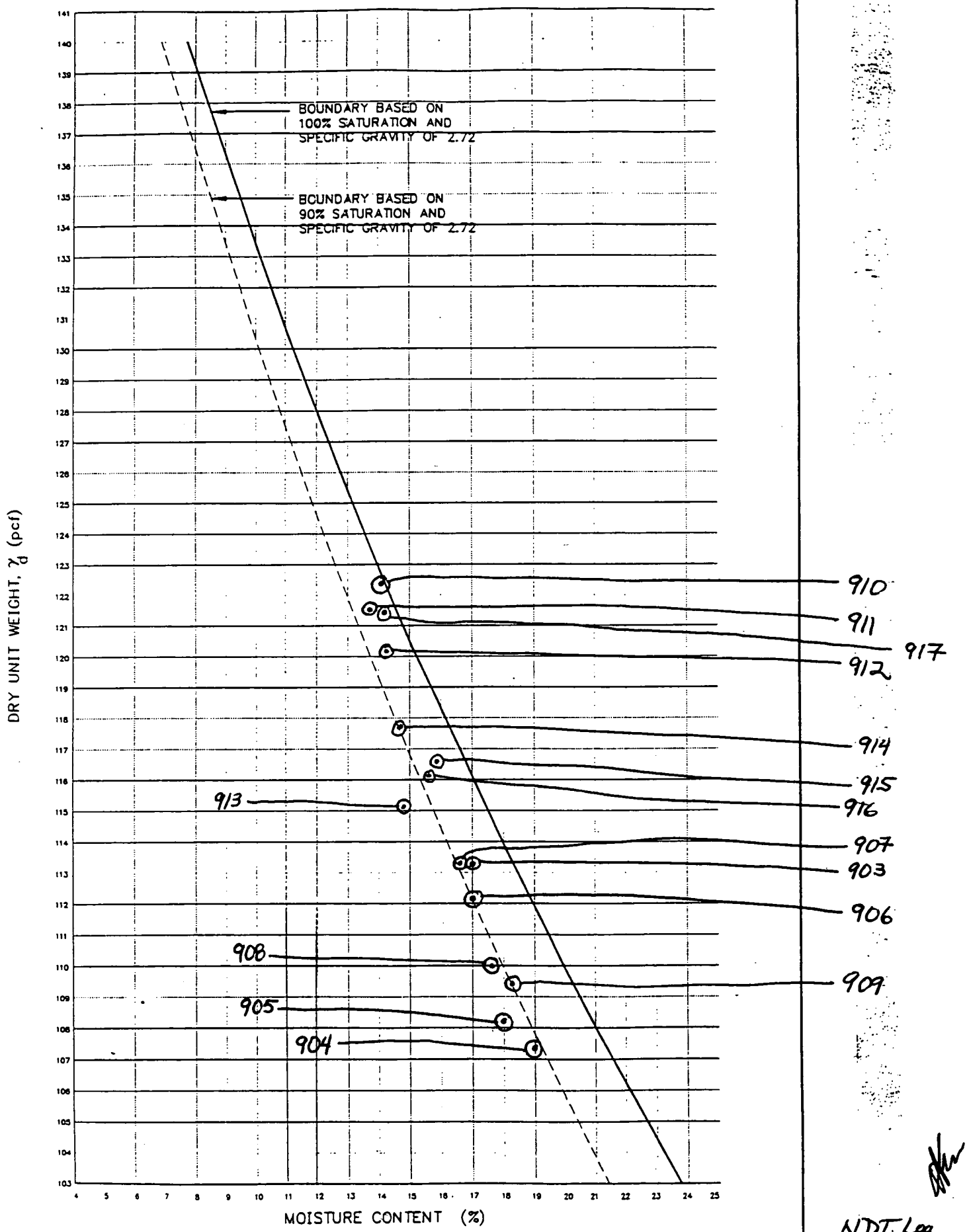
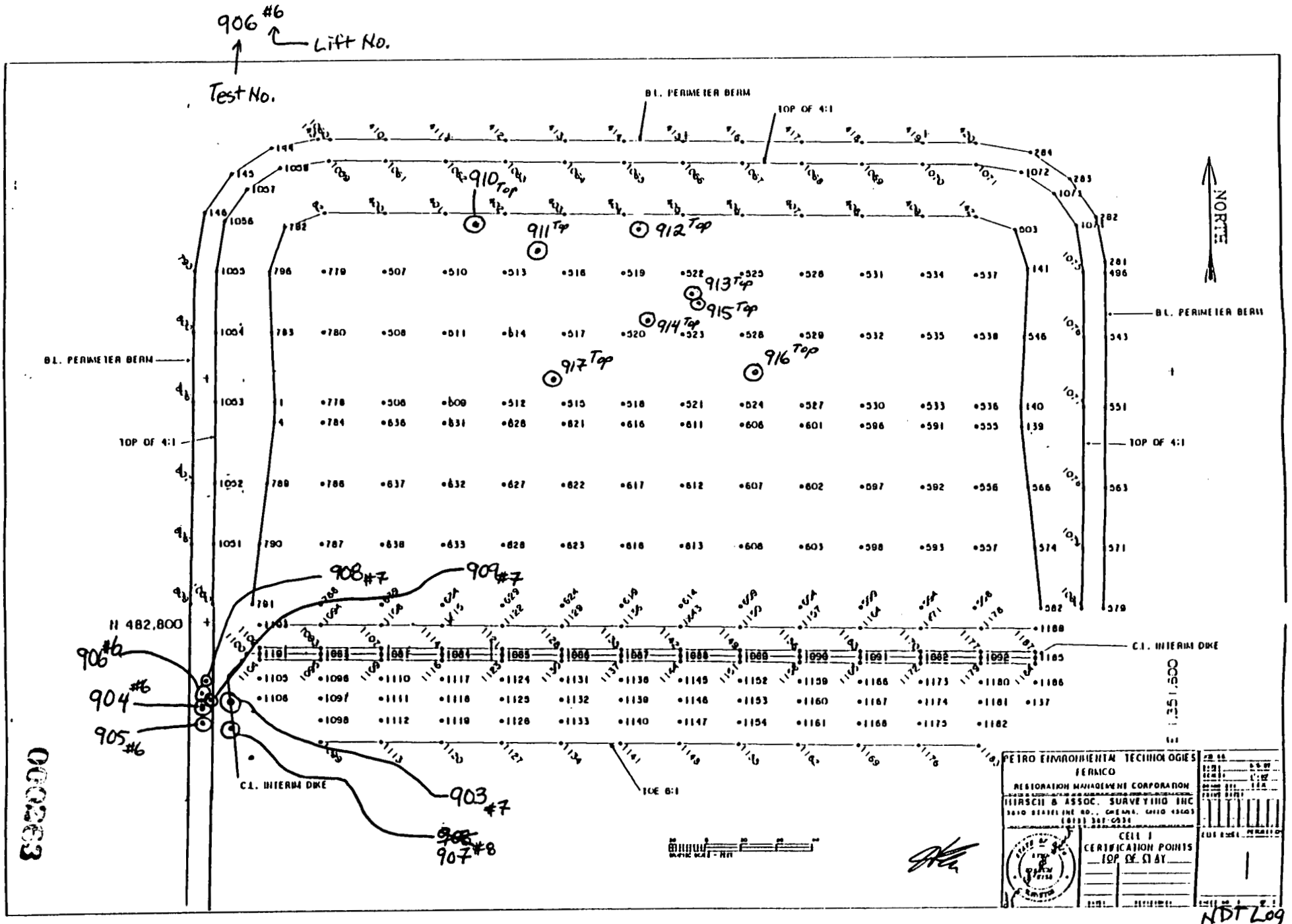


NDT Log
23 Oct 97
3 of 4



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE / CONSTRUCTION DATE: 18 day 11 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: NORTH TRENCH EXCAVATION MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 12" (CIRCLE ONE)

% COMPACTION: >95% , APZ ⊗ MOISTURE RANGE: +3% APZ ⊗ ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: +2% QA ID: SBI

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
918	SEE ATTACHED MAP	4" / 1	CP 243	20.0	104.2	22.4	125.3	102.4	98.3	P				
919		/				18.9	126.7	106.6	102.3		F	920		F
920		/				20.7	125.7	104.1	99.9		F	921	P	
921		/				20.2	128.8	107.2	102.9	P				
922		/				22.2	126.3	103.4	99.2	P				
923		/				19.5	120.6	100.9	96.8		F	924	P	
924		/				21.2	126.4	104.3	100.1	P				

COMMENTS: ⊗ APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A of PROJECT SPECIFICATIONS

RETESTS PERFORMED IN GENERAL VICINITY of ORIGINAL TEST

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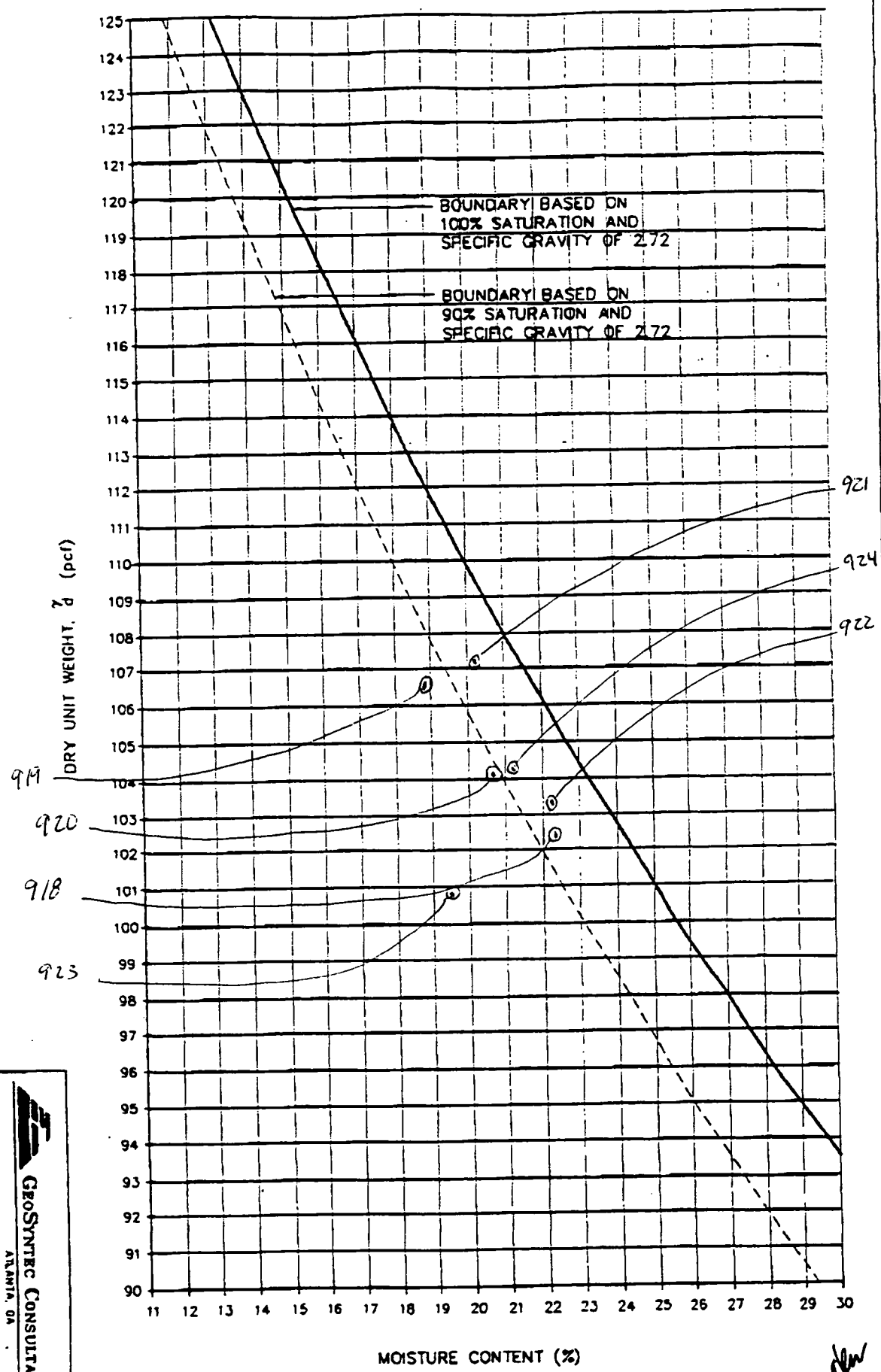
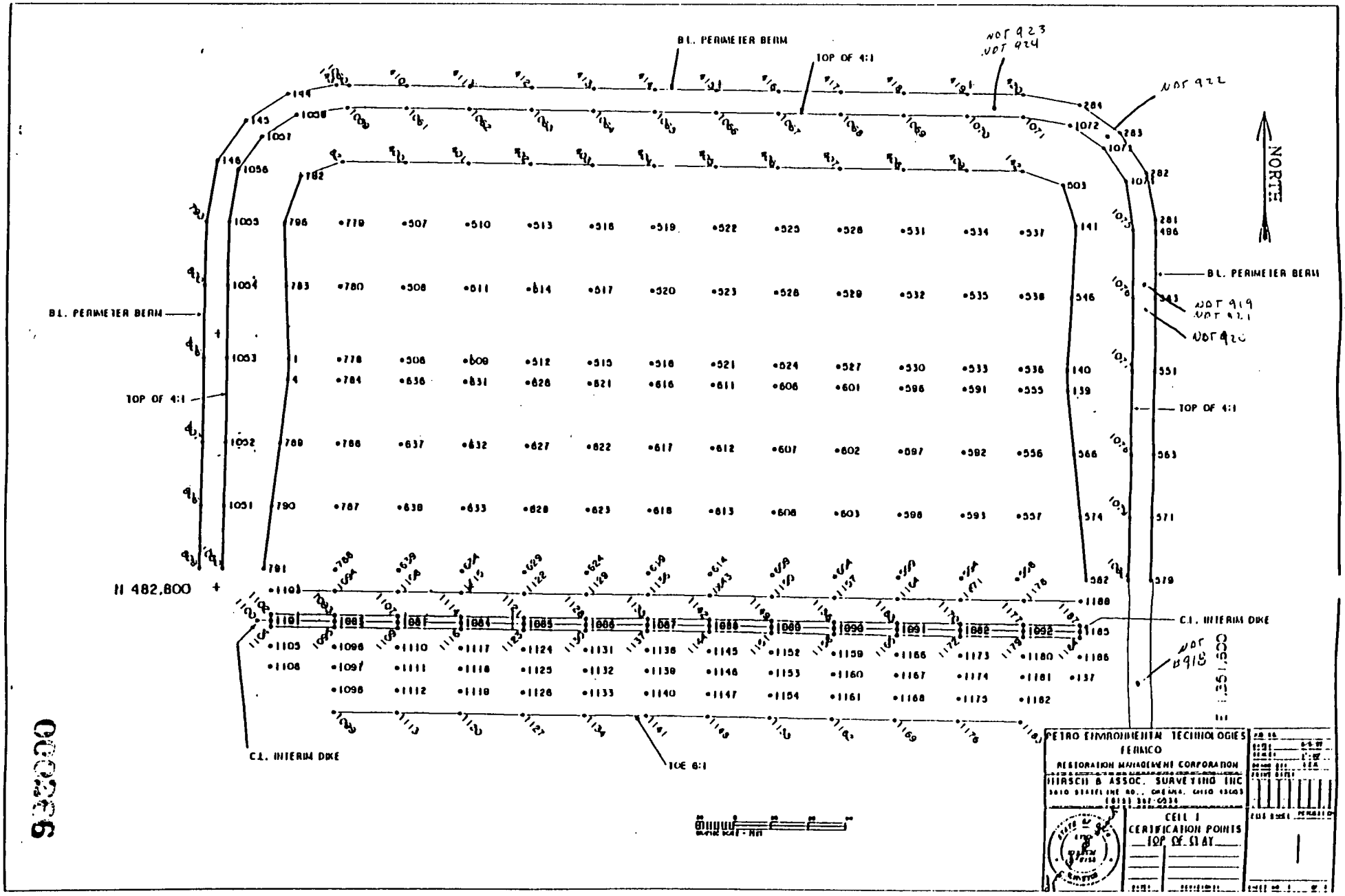


GEOSYNTEC CONSULTANTS
ATLANTA, GA

PROJECT NO. GQD166-4.1	FIGURE NO. 1
DOCUMENT NO.	FILE NO. F97FF001



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SHEET 3 of 3

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 19 day 11 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: ANCHOR TRENCH EXCAVATION MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): 6"

% COMPACTION: >95%, APZ ⊛ MOISTURE RANGE: +3% APZ ⊛ ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: +2% QA ID: 5Q1

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
925	SEE ATTACHED MAP	6" / 2	LP243	20.0	104.2	20.2	123.4	102.7	98.6		F	926	P	
926	↓	↓	↓	↓	↓	22.6	124.4	101.5	97.4	P				
927	↓	↓	↓	↓	↓	19.6	121.3	101.4	97.3		F	928		F
928	↓	↓	↓	↓	↓	19.5	117.0	97.9	94.0		F	929		F
929	↓	↓	↓	↓	↓	19.9	121.1	101.0	96.9		F	930		F
930	↓	↓	↓	↓	↓	19.2	123.0	103.2	99.0		F	931		F
931	↓	↓	↓	↓	↓	20.5	119.4	99.1	95.1		F	932		F
932	↓	↓	↓	↓	↓	20.4	120.9	100.4	96.4		F	933	P	~~P~~
933	↓	↓	↓	↓	↓	19.7	128.5	107.4	103.1	P	~~P~~			
934	↓	↓	↓	↓	↓	~~19.9~~ 20.4	123.9	102.9	98.8		F	935	P	

COMMENTS: ⊛ APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02 A of PROJECT SPECIFICATIONS

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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12667

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE 1 CONSTRUCTION

DATE: 17 day 11 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: ANCHOR TRENCH EXCAVATION MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 6"

% COMPACTION: >95%, APZ ⊛ MOISTURE RANGE: +3% APZ ⊛ ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: TRAXLER 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: +2% QA ID: SFi

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
935	SEE ATTACHED MAP	6" / 2	LP-243	20.0	104.2	19.3	130.7	109.6	105.1	P				

COMMENTS: ⊛ APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A of PROJECT SPECIFICATION

RETESTS PERFORMED IN GENERAL VICINITY of ORIGINAL TEST

©GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: HSm SHEET NO. 2 OF 4

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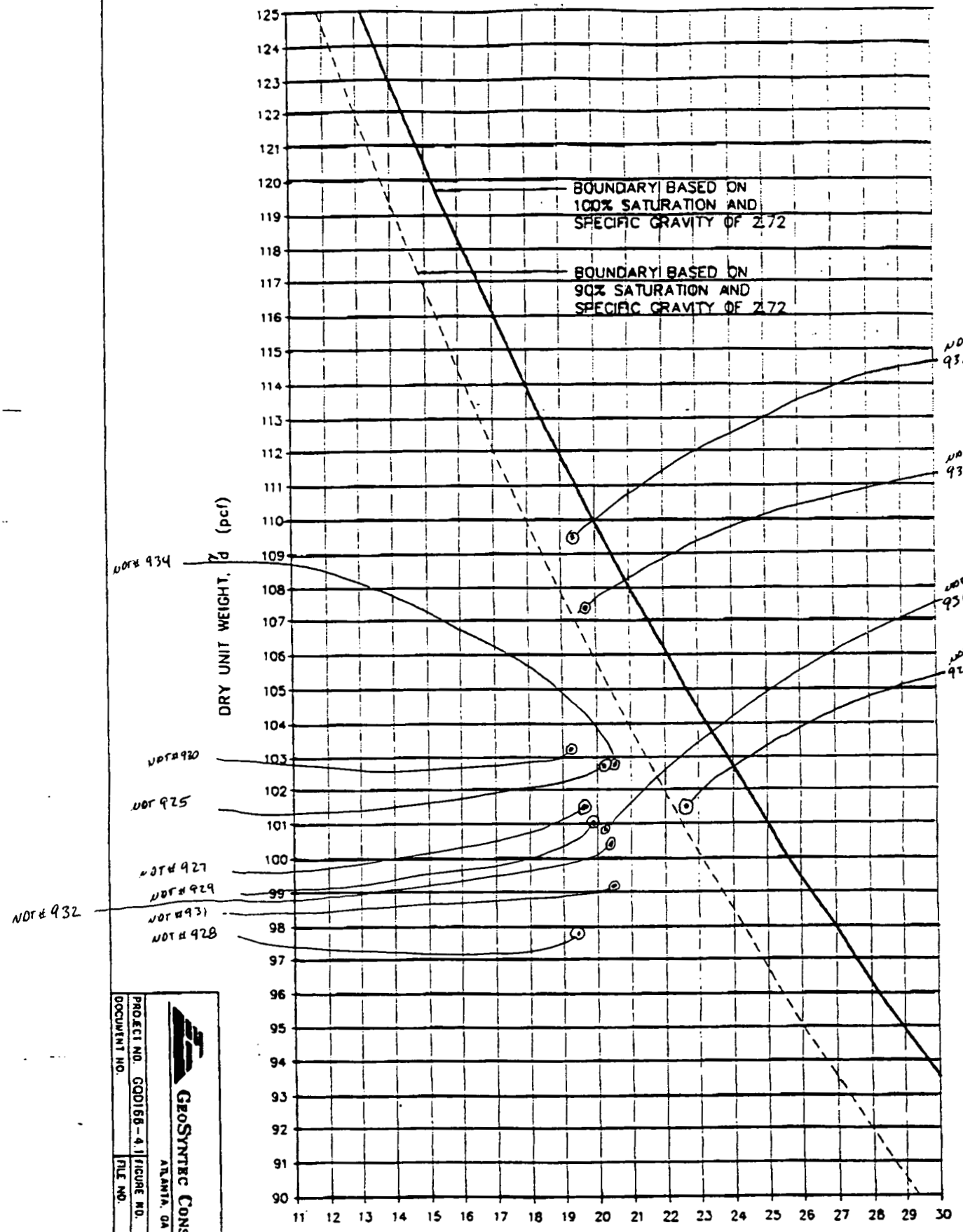

GEOSYNTEC CONSULTANTS
ATLANTA, GA

PROJECT NO.	GQ0168-4.1
FIGURE NO.	1
DOCUMENT NO.	
FILE NO.	F97FF001

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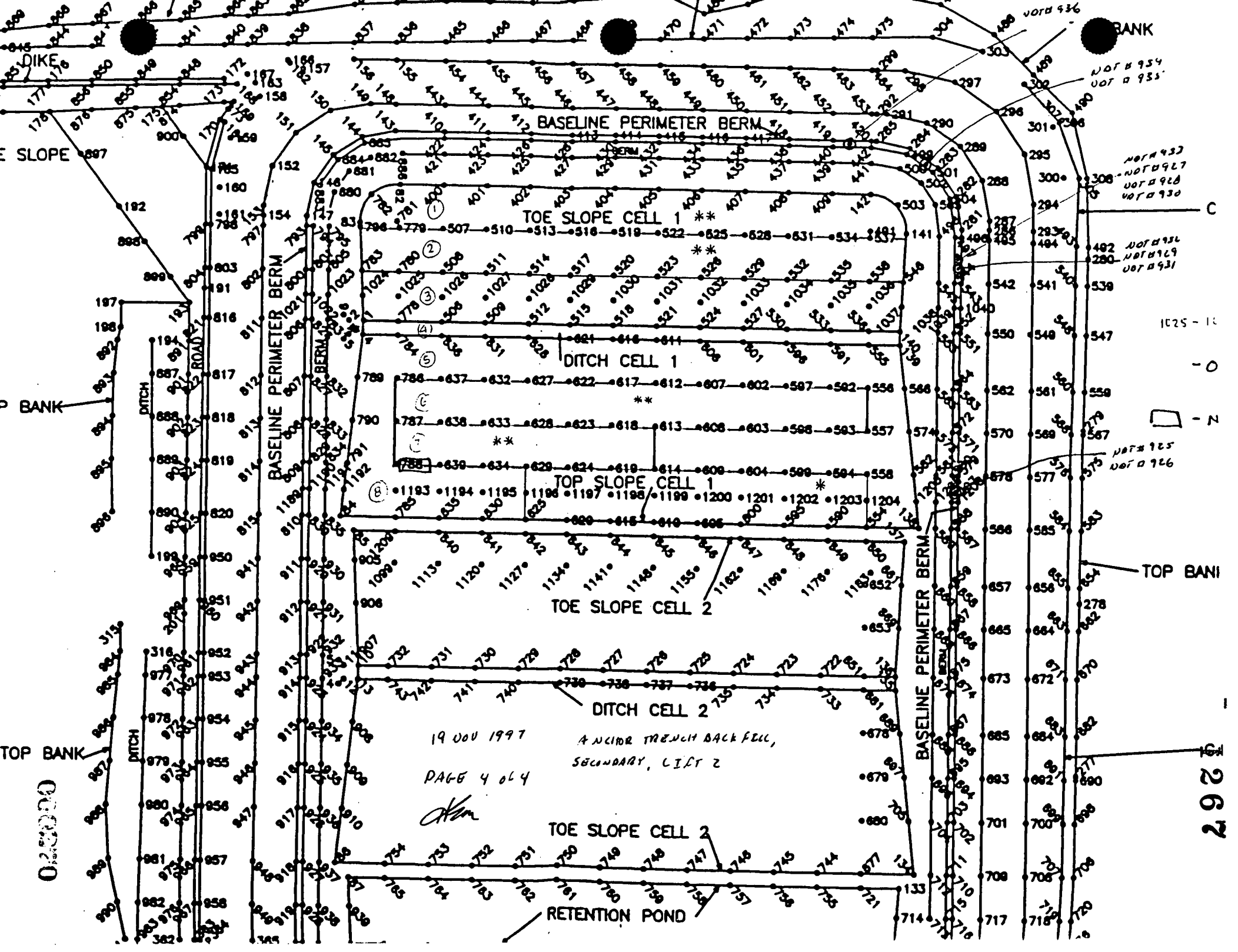
19 NOV 1997 PAGE 3 of 9

TOTAL P.02


BANK
DIKE
BASELINE PERIMETER BERM
TOE SLOPE CELL 1
DITCH CELL 1
TOP SLOPE CELL 1
TOE SLOPE CELL 2
DITCH CELL 2
TOE SLOPE CELL 2
RETENTION POND
BASELINE PERIMETER BERM
TOP BANK
TOP BANK
19 NOV 1997
ANCHOR TRENCH BACK FILL,
SECONDARY, LIFT 2
PAGE 4 of 4

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE 1 CONSTRUCTION DATE: 20 day 11 month 92 year

SPECIFICATION REQUIREMENTS

SOURCE: ANCHOR TRENCH EXCAVATION MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/(COMPACTED)): L1-12" L2-3-6"

% COMPACTION: ≥ 95%, APZ ⊛ MOISTURE RANGE: +3%, APZ ⊛ ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: +2% QA ID: SQ

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
	SECONDARY ANCHOR TRENCH		SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
937	SEE ATTACHED MAP	6" / 2	LP-243	20.0	104.2	19.8	126.5	105.6	101.3		F	938		F
938	↓	6" / 2	↓	↓	↓	22.8	120.8	98.4	94.4		F	939		F
939	↓	6" / 2	↓	↓	↓	19.6	124.4	104.0	99.8		F	940	P	
940	↓	6" / 2	↓	↓	↓	19.4	129.2	108.2	103.8	P				
941	↓	4" / 1	↓	↓	↓	22.0	120.9	99.1	95.1		F	~~949~~ ⊛⊛	P	
942	↓	6" / 3	↓	↓	↓	17.9	130.5	110.7	106.2	P				
943	↓	6" / 3	↓	↓	↓	17.0	129.7	110.9	94.0		F	944		F
944	↓	6" / 3	↓	↓	↓	16.8	130.8	112.0	107.5		F	945		F

COMMENTS: ⊛ APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A of PROJECT SPECIFICATION

⊛⊛ → FAILED AREA MATERIALS REWORKED AND ADDED TO AFTER TESTING

RETESTS PERFORMED IN GENERAL VICINITY OF ORIGINAL TEST

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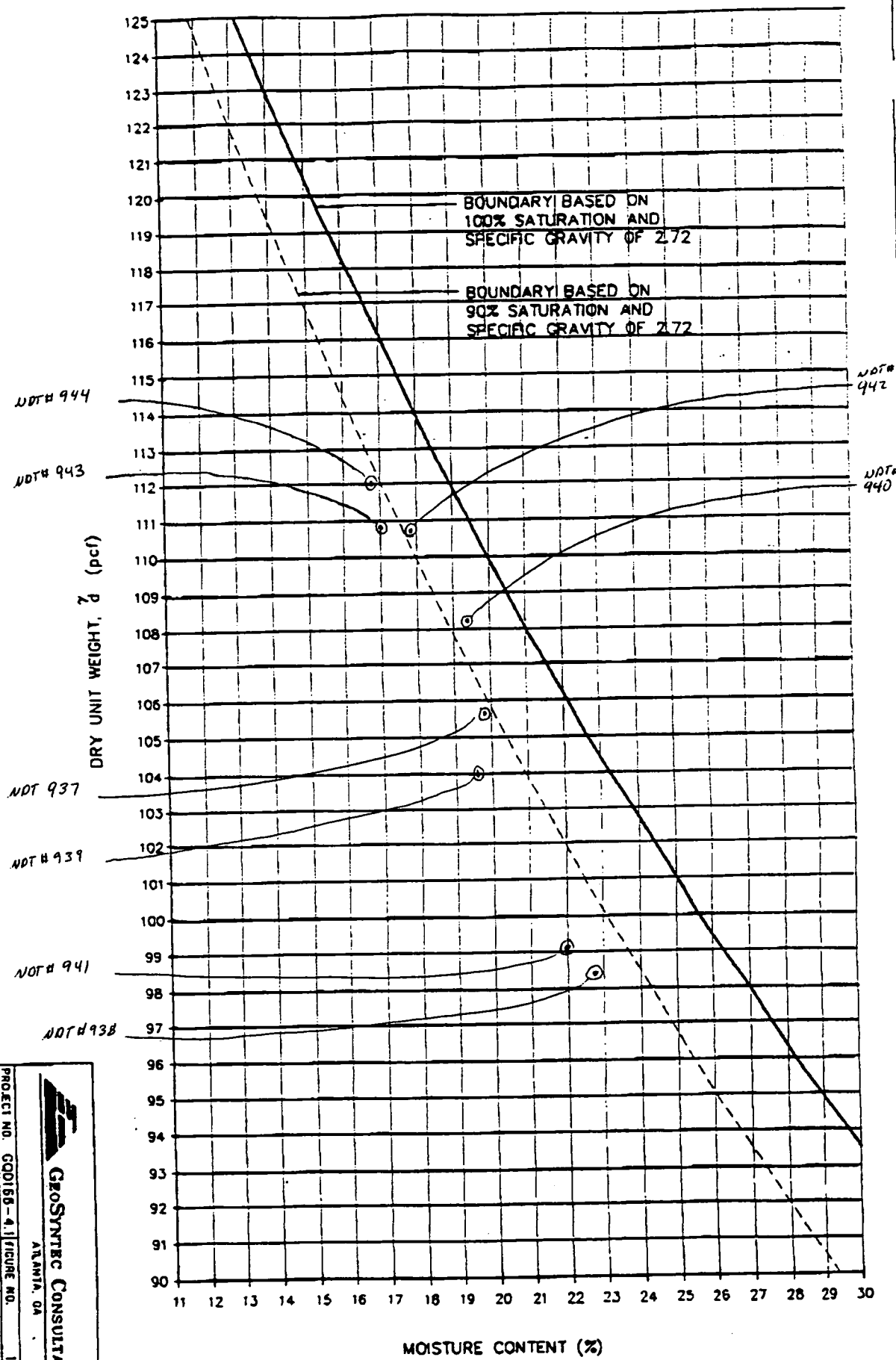

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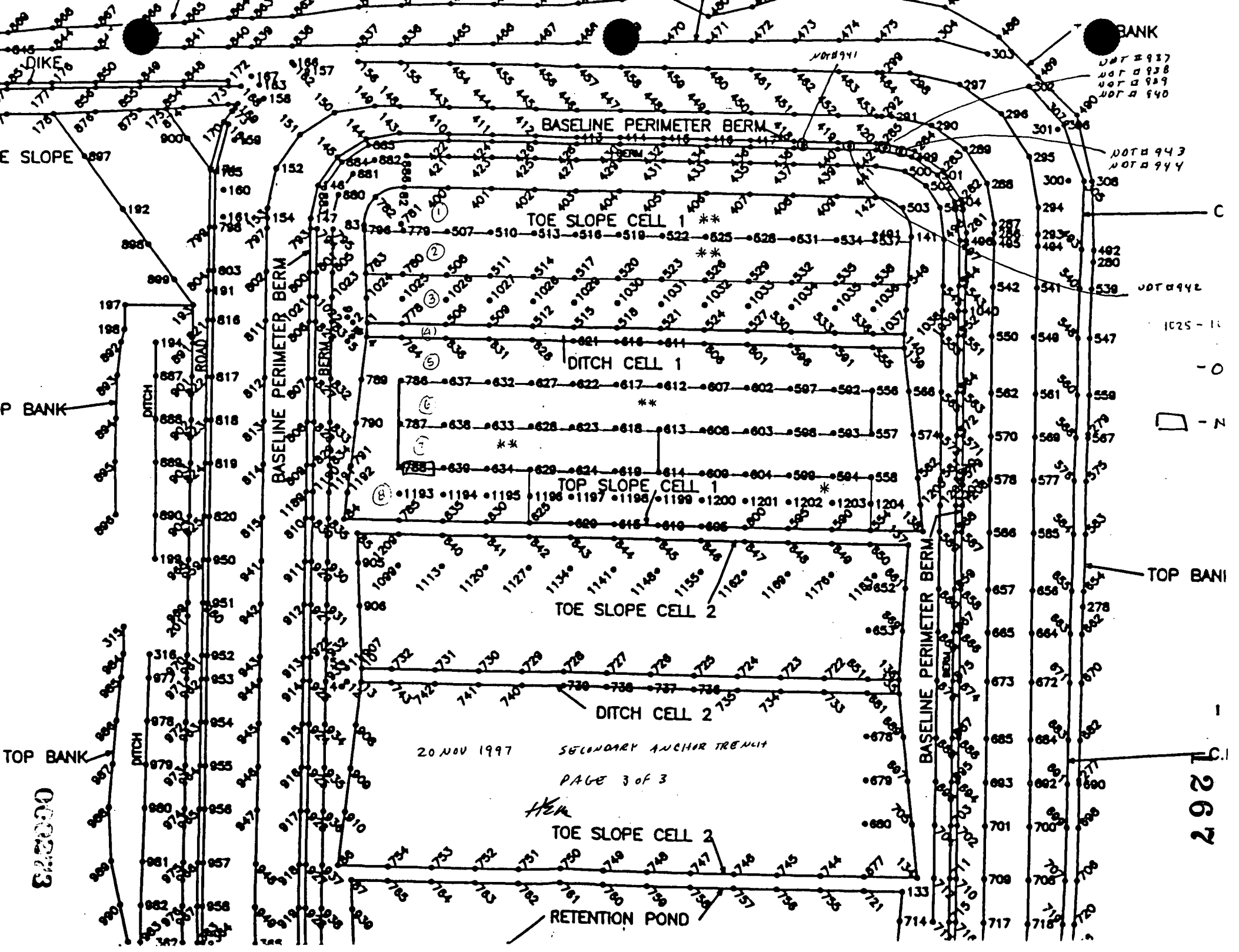
PROJECT NO.	GD0166-4.1
FIGURE NO.	1
DOCUMENT NO.	
FILE NO.	F97FF001

20 NOV 1997

PAGE 2 of 3

TOTAL P.02


DIKE
BANK
BASELINE PERIMETER BERM
TOE SLOPE CELL 1 **
DITCH CELL 1
TOP SLOPE CELL 1
TOE SLOPE CELL 2
DITCH CELL 2
TOE SLOPE CELL 2
RETENTION POND
BASELINE PERIMETER BERM
TOP BANK
TOP BANK
ROAD
DITCH
20 NOV 1997
SECONDARY ANCHOR TRENCH
PAGE 3 of 3
HEM

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 21 day Nov month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: on site stockpile MATERIAL TYPE: (CIRCLE ONE) ~~FILL~~ / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ±6"

% COMPACTION: ≥95% MOISTURE RANGE: ±3% APZ ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: +2% QA ID: RP

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
NDT-945	see sketch	6"/3	LP-263	20.0	104.2	20.0	120.9	100.8	96.7		F	NDT-946	P	
NDT-946	↓	↓	↓	↓	↓	21.6	127.5	104.9	100.6	P				
NDT-947	↓	↓	↓	↓	↓	17.3	131.5	112.1	107.5	P				
NDT-948	↓	↓	↓	↓	↓	18.6	129.7	109.4	104.9	P				
NDT-949	↓	4"/1	↓	↓	↓	18.3	130.3	110.1	105.7	P				
NDT-950	↓	6"/2	↓	↓	↓	19.7	128.6	107.4	103.1	P				

COMMENTS: APZ = Approved Permeability Zone SECTION 02225 PART 3.02 A OF PROJ. SPEC.

RETESTS PERFORMED IN GENERAL VACINITY OF ORIGINAL TEST

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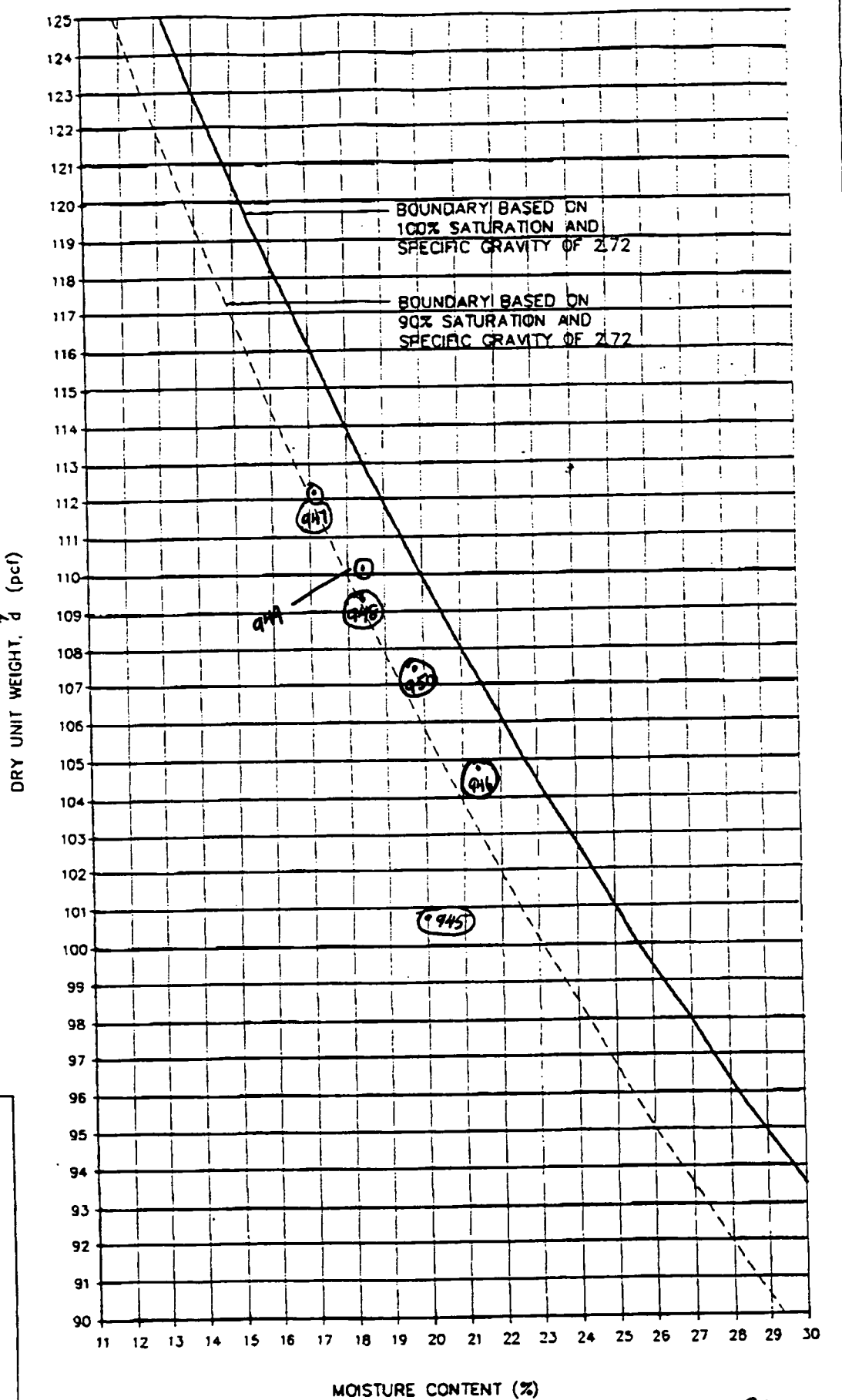

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ATLANTA, GA

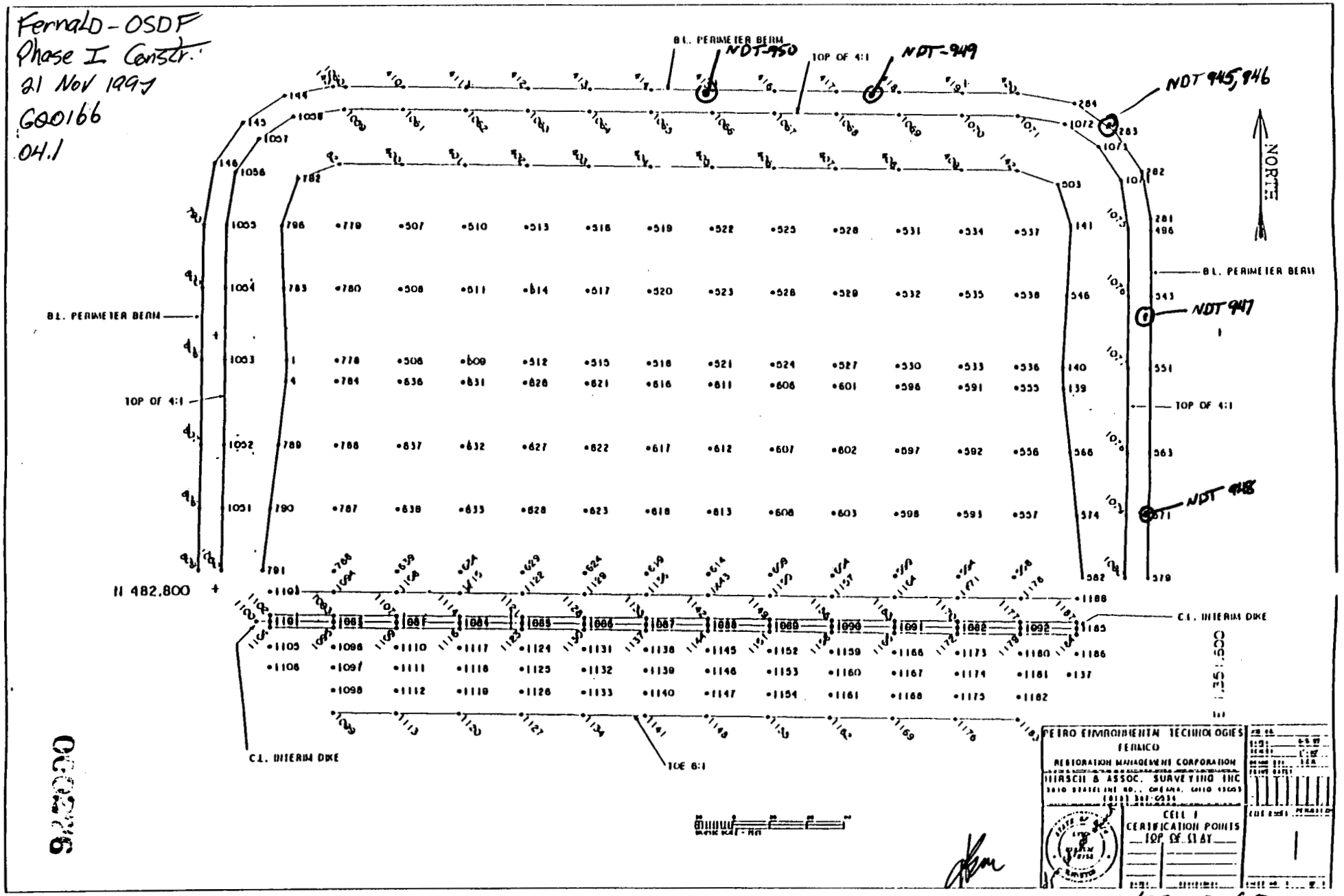
PROJECT NO. GD0166-4.1	FIGURE NO. 1
DOCUMENT NO.	FILE NO. F97FF001

21 Nov 1997
OSDF - Phase I

SHEET 2 of 3

TOTAL P.02

Fernald - OSDF
Phase I Constr.
21 Nov 1997
GQ0166
04.1



SHEET 3 of 3

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: OSDF Phase I Construction DATE: 24 day Nov month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: on site stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE / COMPACTED) 6"

HEM 11/25/97

% COMPACTION: ≥ 95% APZ MOISTURE RANGE: -3% APZ ASTM D 698 (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 27418 COR. FACTOR: +2% QA ID: RP

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	FIELD TEST RESULTS: PASS	FIELD TEST RESULTS: FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
~~NDT 951~~	See sketch: Cell-1	4"/1	HEM 11/25/97 LP ~~263269~~	~~19.2~~ ~~20.0~~	~~108.9~~ ~~104.2~~	18.0	131.6	111.5	104.2	P				
NDT 952	↓	6"/2	↓	↓	↓	20.1	129.2	107.5	100.5	P				
NDT 953	↓	6"/2	↓	↓	↓	20.6	129.5	107.4	100.4	P				
NDT 954	↓	6"/3	↓	↓	↓	19.1	131.1	110.1	102.9	P				
NDT 955	↓	6"/3	↓	↓	↓	18.1	133.0	112.6	105.2	P				
NDT 956	↓	4"/1	↓	↓	↓	19.4	130.5	109.3	102.1	P				
NDT 957	↓	4"/1	↓	↓	↓	20.5	127.4	105.7	98.8	P				

COMMENTS: APZ- Approved permeability zone

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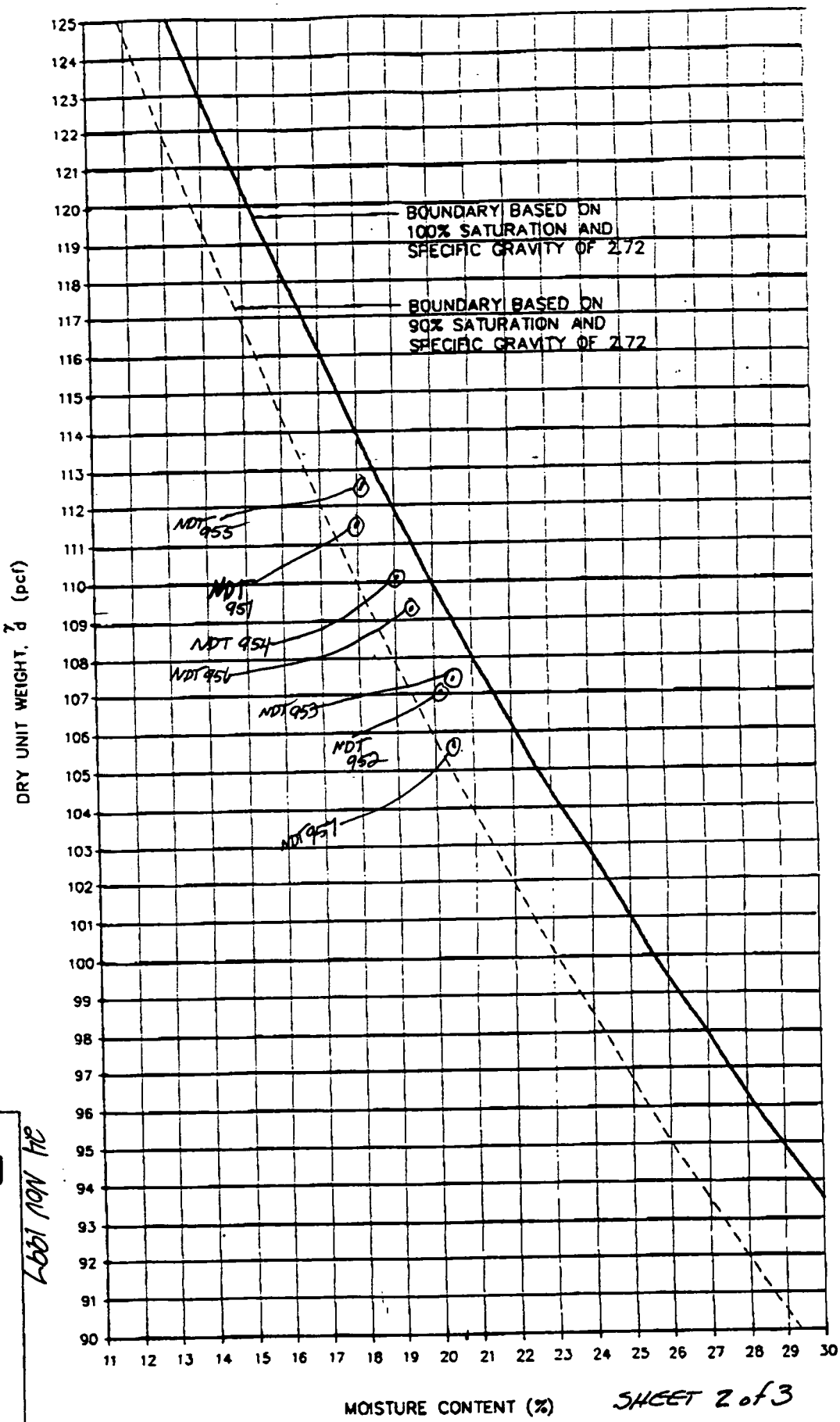


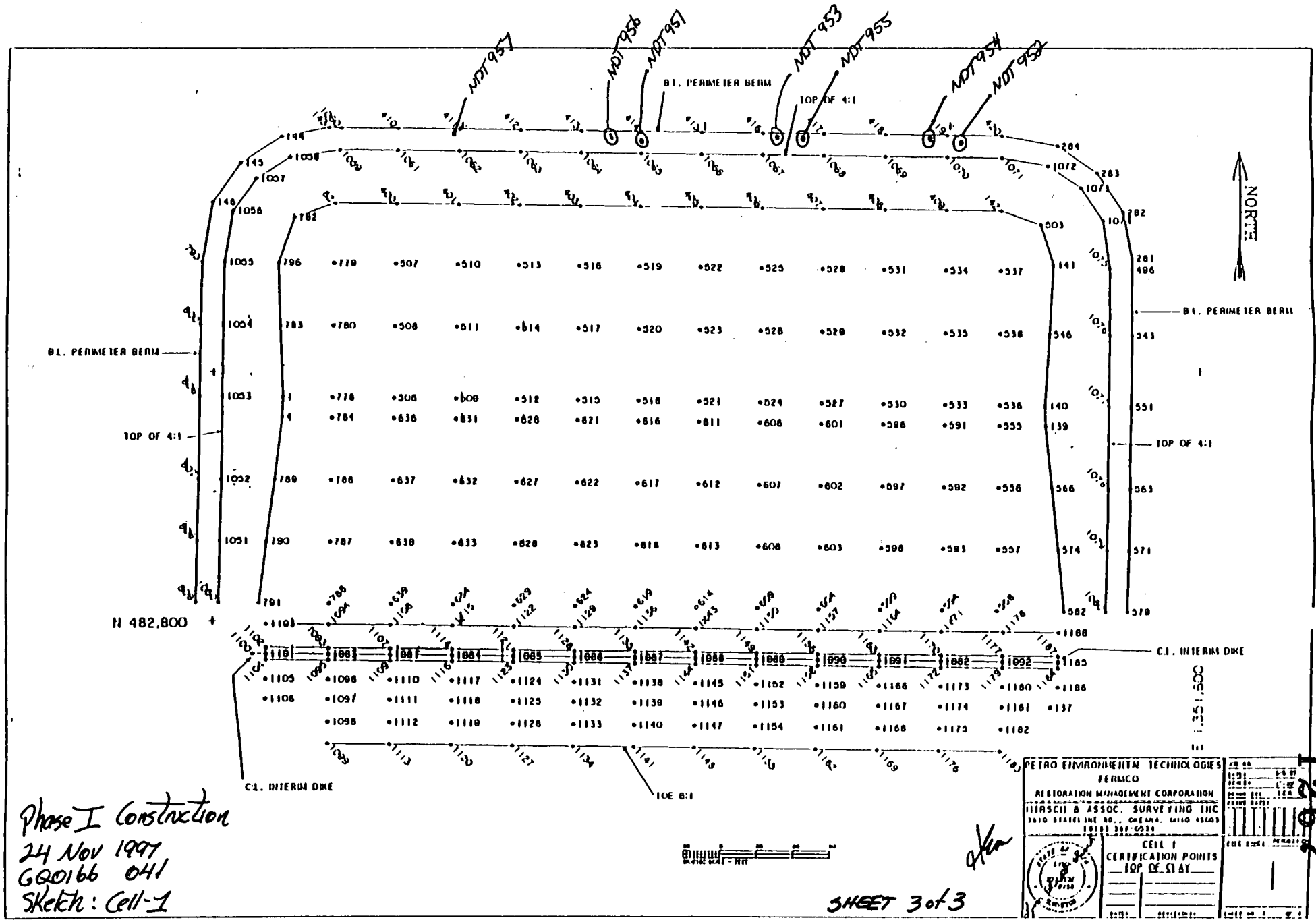
SHEET 2 of 3

24 Nov 1997

GEOSYNTEC CONSULTANTS
ATLANTA, GA

PROJECT NO. GQ0168-4.1	FIGURE NO. 1
DOCUMENT NO.	FILE NO. F97FF001

TOTAL P.02



Phase I Construction
24 Nov 1997
GQ0166 041
Sketch: Cell-1

SHEET 3 of 3

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 29 day NOV month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: on site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE / (COMPACTED)) 6"

% COMPACTION: ≥ 95% MOISTURE RANGE: ±3% inside APZ* ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. _____ COR. FACTOR: +2 QA ID: RP

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS: SAMPLE NO.	LAB RESULTS: OMC (%)	LAB RESULTS: MAX DRY UNIT WT (PCF)	FIELD TEST RESULTS: FMC (%)	FIELD TEST RESULTS: WET UNIT WT (PCF)	FIELD TEST RESULTS: DRY UNIT WT (PCF)	FIELD TEST RESULTS: PERCENT COMPACT (%)	PASS	FAIL	RETEST NO.	RETEST PASS	RETEST FAIL
NDT 958	See sketch	6"/2	LP-269	19.2	107.0	17.5	126.8	107.9	100		(*) F	NDT 959	P	
959		↓				20.8	126.8	104.9	98	P				
960		4"/1				18.8	129.1	108.7	101.5	P				
961		6"/2				18.7	126.3	106.4	99		(*) F	NDT 962	P	
962		↓				19.4	131.3	109.9	102.7	P				
963		6"/3				20.2	130.1	108.2	102.8	P				
964			LP-321	19.0	108.2	16.5	130.5	112.0	103.5		(*) F	NDT 965		F
965			LP-269	19.2	107	19.6	126.8	106.0	99		(*) F	NDT 966	P	
966		↓				20.8	129.9	107.5	100.5	P				
967		4"/1				19.0	129.5	108.8	101.6	P				

COMMENTS: * Approved Permeability Zone
(*) Test failed due to not being in APZ

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 29 day NOV month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: on site stockpile MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: _____ LIFT THICKNESS (LOOSE/(COMPACTED)) 6"

% COMPACTION: ≥95% MOISTURE RANGE: +3%, inside APZ* ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. _____ COR. FACTOR: +2% QA ID: RP

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
NDT ~~968~~	see sketch	4"/1	LP-269	19.2	107.0	20.3	127.2	105.7	99	P				
↓ 969	↓	6"/2	↓	↓	↓	21.2	128.0	105.6	99	P				

COMMENTS: * Approved Permeability Zone

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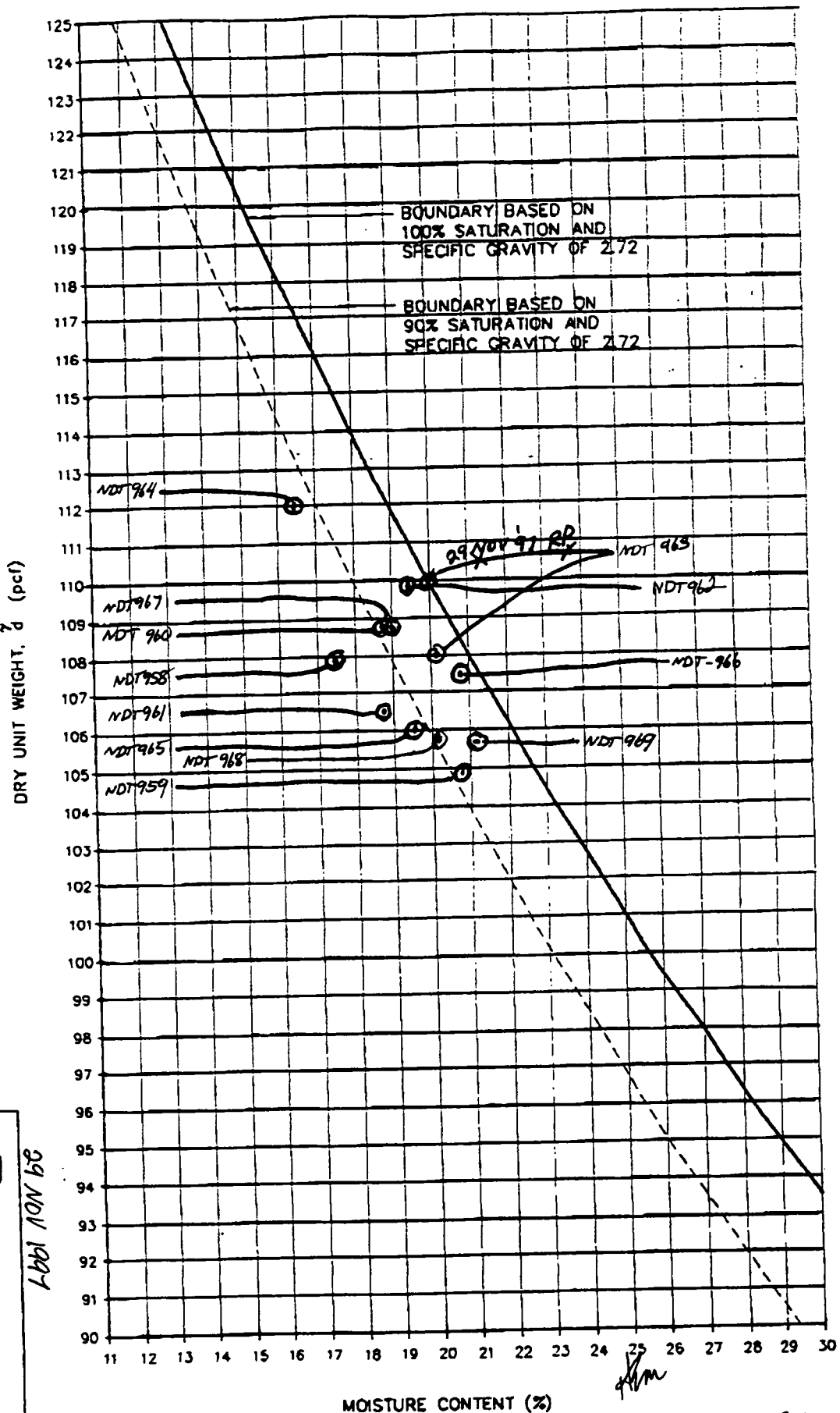

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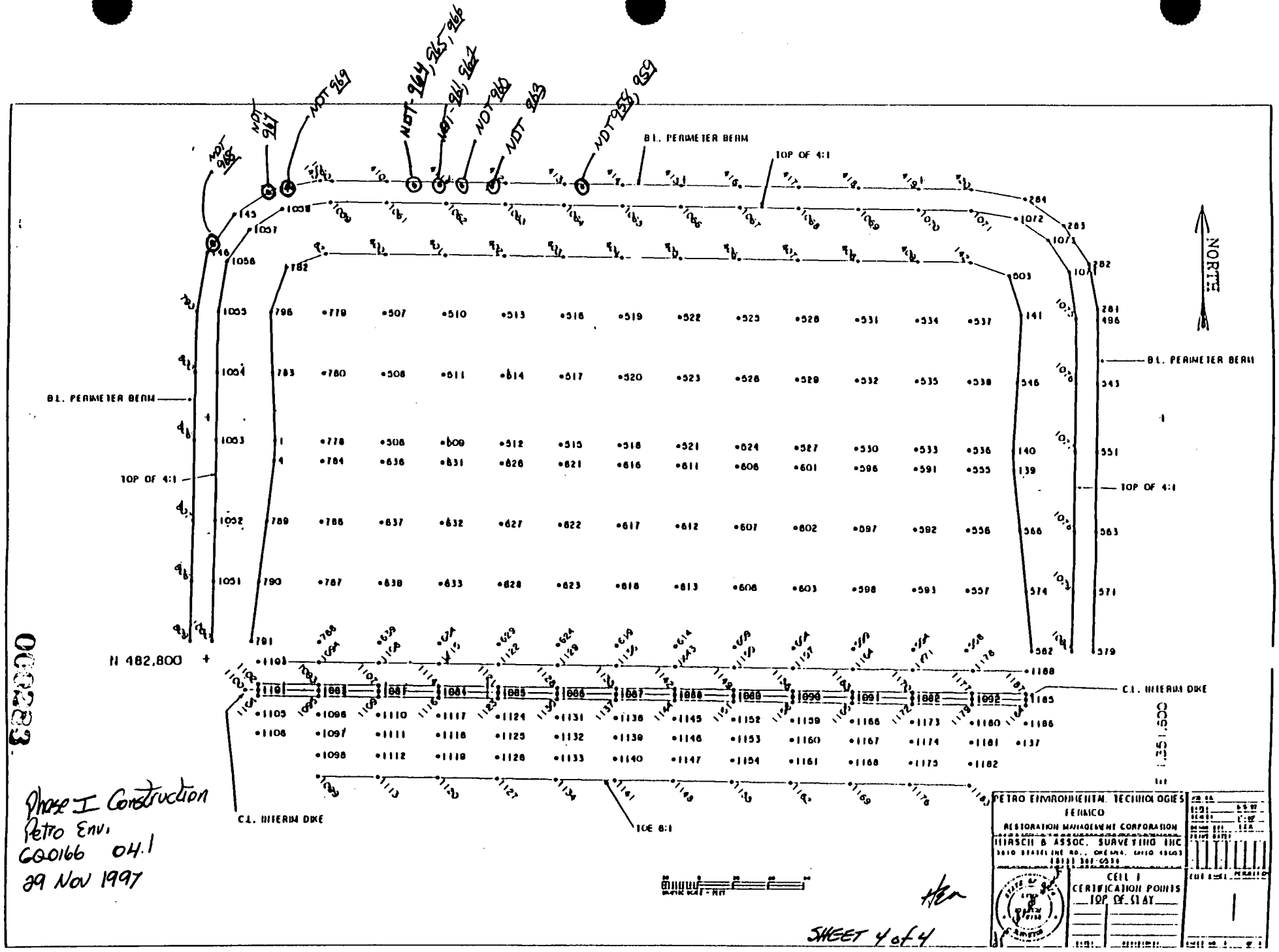
PROJECT NO. CQD168-4.1 | FIGURE NO. 1
DOCUMENT NO. | FILE NO. F97FFQ01

24 NOV 1997

SHEET 3 of 4

TOTAL P.02



Phase I Construction
Petro Env.
CQ0166 04.1
29 Nov 1997

GeoSyntec Consultants

Written by: NED MEEKINS Date: ___/___/___ (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ 0166 Task No.: 04.1

TEST No.	ASTM D4643 MICROWAVE % MOIST	ASTM D2216 OVEN % MOIST	MW/OVEN DELTA % MOIST	ASTM D3017 TROXLER % MOIST	MW/TROXLER DELTA % MOIST.	COMMENTS
21	15.4	15.4	Ø	13.6	1.8	
22	15.2	14.9	0.3	12.6	2.6	
23	15.3	15.7	-0.4	13.4	1.9	
24	15.6	15.7	-0.1			
25	15.1	14.3	0.8	12.4	2.7	
26	15.5	15.3	0.2	13.1	2.4	
27	15.1	14.5	0.6	12.3	2.8	
28	14.8	14.6	0.2	13.5	1.3	
29	14.2	13.7	0.5	11.7	2.5	
30	14.2	13.8	0.4	12.1	2.1	
31	13.8	14.3	-0.5	12.1	1.7	
32	16.6	17.2	-0.6	15.4	1.2	
33	18.1	18.1	Ø	15.0	3.1	
34	15.2	14.9	0.3	12.7	2.5	
35	17.7	17.2	0.5	15.7	2.0	
36	17.4	16.2	1.2	15.4	2.0	
37	15.2	14.0	1.2	12.0	3.2	
38	15.0	15.1	-0.1	12.9	2.1	
39	16.6	16.4	0.2	12.4	4.2	
40	16.2	16.0	0.2	13.7	2.5	
41	14.9	14.5	0.4	11.5	3.4	
42	15.0	15.0	Ø	12.3	2.7	
43	16.6	15.8	0.8	13.3	3.3	
44	15.7	15.3	0.4	13.6	2.1	
45	15.6	15.2	0.4	13.3	2.3	
46	15.6	16.1	-0.5	13.5	2.1	
47	14.5	14.9	-0.4	12.3	2.2	
48	14.6	14.9	-0.3	11.8	2.8	
49	19.0	18.8	0.2	16.2	2.8	
50	15.2	15.0	0.2	14.5	0.7	
51	12.6	12.5	0.1	11.2	1.4	
52	15.6	14.4	1.2	12.3	3.3	
53	16.7	16.0	0.7	13.6	3.1	
54	16.3	16.6	-0.3	13.2	3.1	
55	15.8	15.3	0.5	11.5	4.3	
56	15.5	14.8	0.7	13.4	2.1	
57	15.8	15.3	0.5			
58	16.0	15.7	0.3			
59	16.6	16.0	0.6			
60	16.9	17.0	-0.1			
61	17.0	16.6	0.4			

GeoSyntec Consultants

Written by: NED MEEKINS Date: ___/___/___ (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

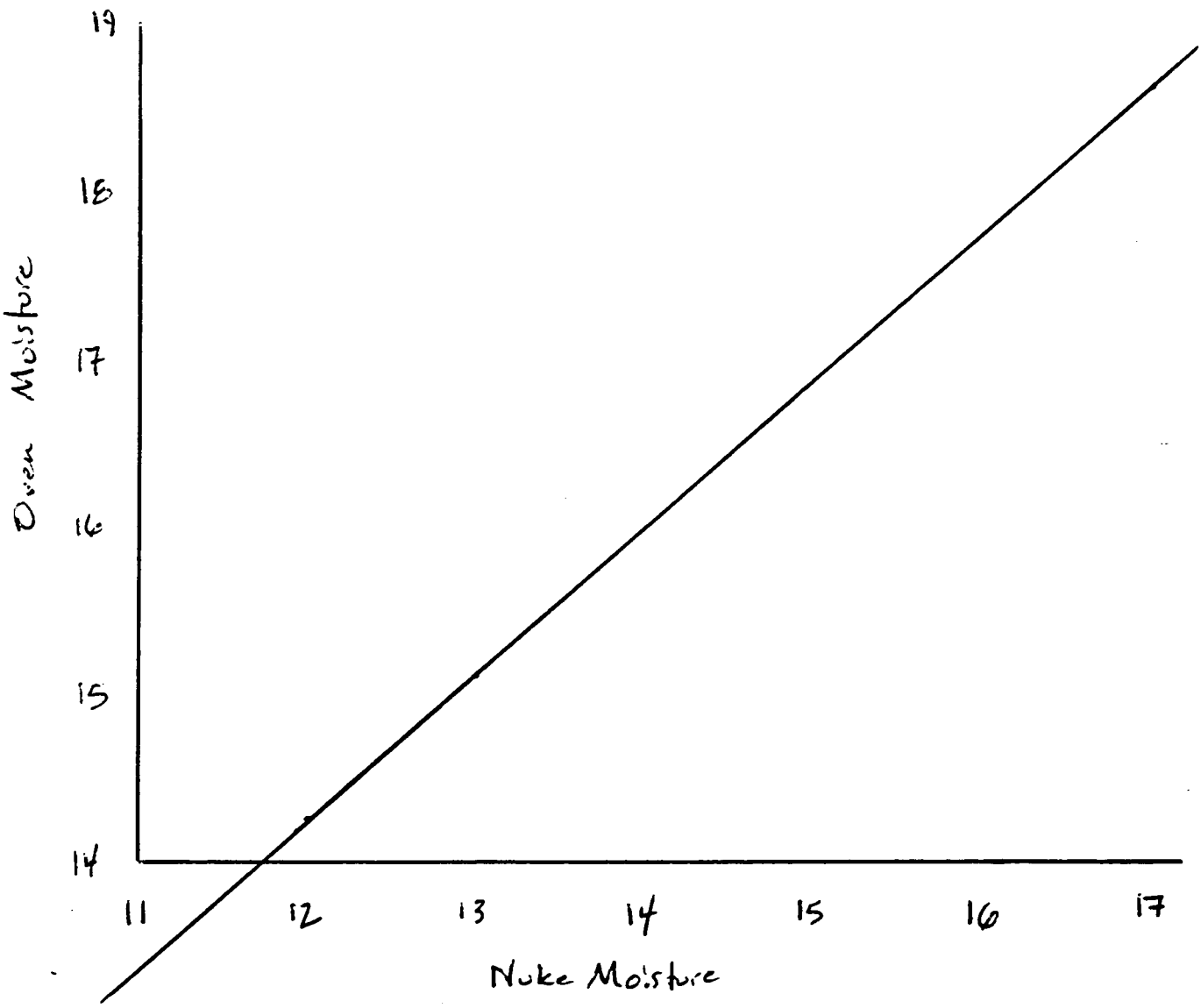
Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

TEST NO.	ASTM D4643 MICROWAVE % MOIST	ASTM D2216 OVEN % MOIST	MW/OVEN DELTA % MOIST.	ASTM D3017 TROXLER % MOIST	MW/TROXLER DELTA % MOIST.	COMMENTS
62	16.1	16.8	-0.7			
63	16.7	16.7	Ø			
64	16.6	16.5	0.1			
65	15.8	15.7	0.1			

Written by: KWC Date: 97/08/26 (YY/MM/DD) Reviewed by: _____ Date: __/__/__ (YY/MM/DD)

Client: FDF Project: OSDF - PHASE I Project/~~Proposal~~ No.: GQ01666 Task No.: 04.1

Moisture Adjustment for Nuke to Oven for use week of 26 Aug 97



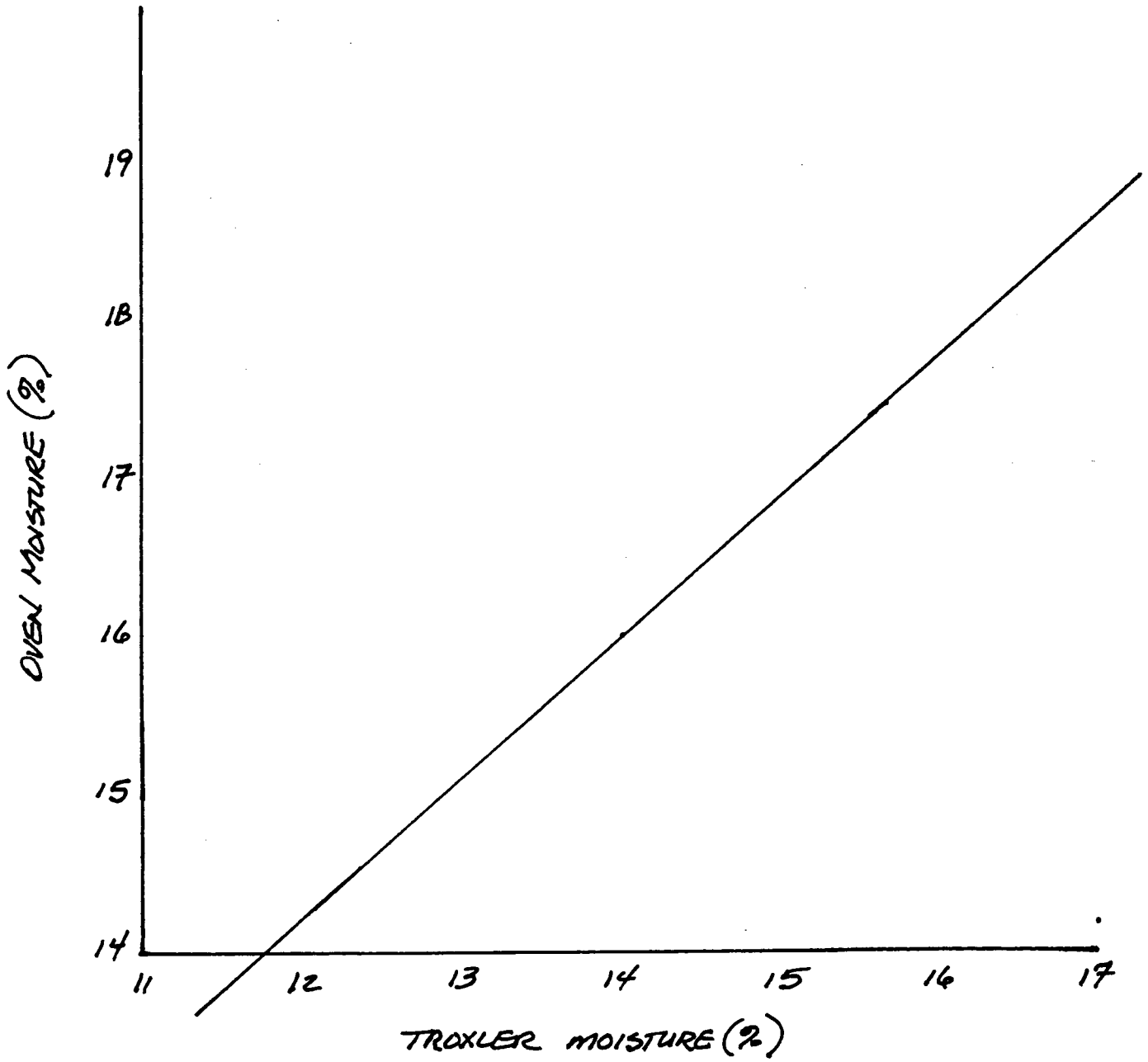
GEOSYNTEC CONSULTANTS

Written by: KWC Date: 97 / 08 / 26 (YY / MM / DD) Reviewed by: Date: / / (YY / MM / DD)

Client: FDF Project: OSDF - PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR USE WEEK OF 26 AUG. '97

(26 AUG. — 31 AUG. 1997)



GEOSYNTEC CONSULTANTS

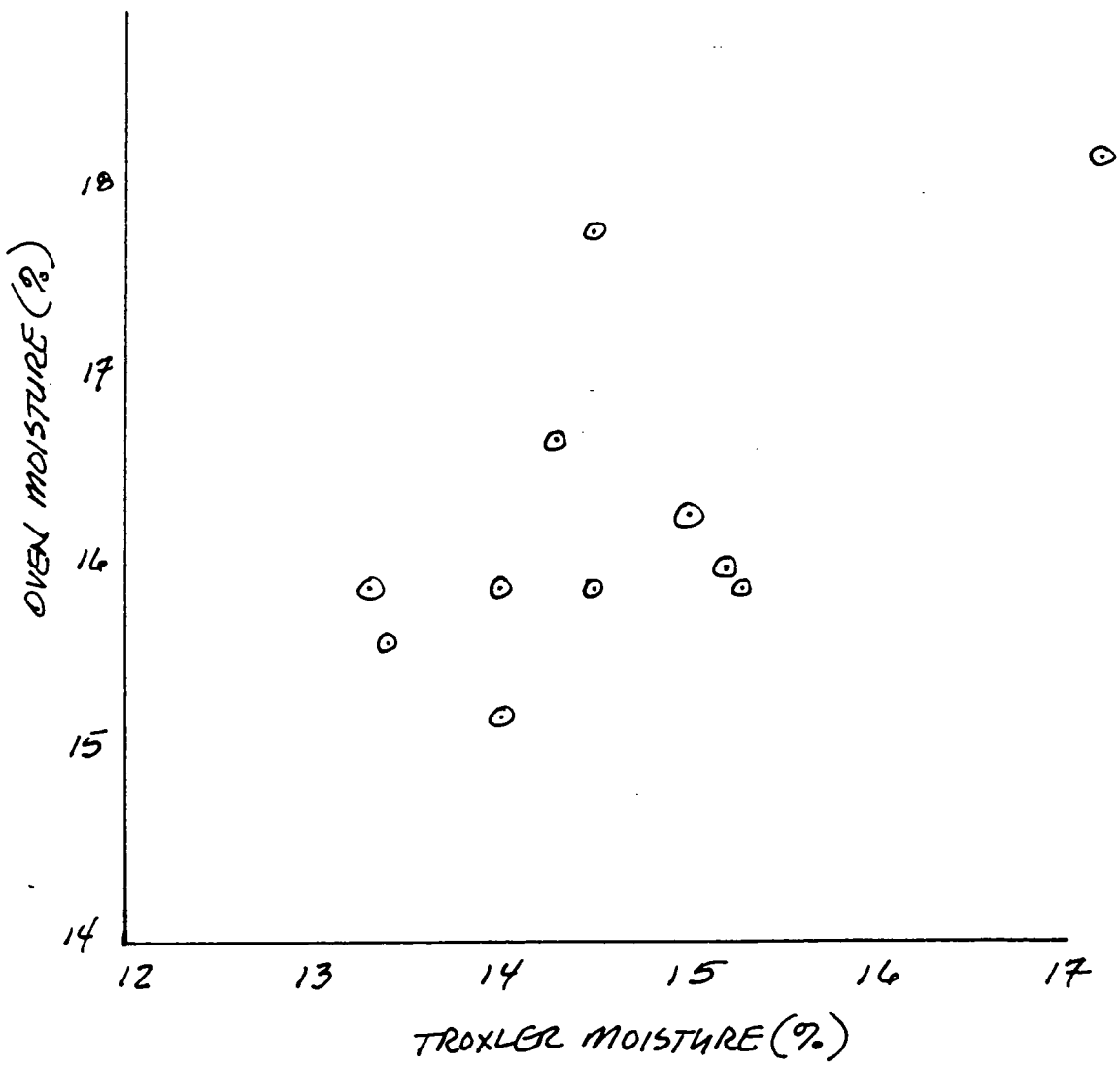
Written by: HEM Date: 97 / 08 / 30 (YY MM DD) Reviewed by: Date: / / (YY MM DD)

Client: FDF Project: OSDF - PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

SAMP. NO	OVEN MC	GAUGE MC	Δ MC
LP-142	16.0	15.2	0.8
143	16.3	15.0	1.3
144	15.9	13.3	2.6
145	16.7	14.3	2.4
146	17.8	14.5	3.3
~~149~~	~~15.9~~		
~~147~~	~~17.2~~	15.3	0.6
~~150~~			
~~148~~	15.2	14.0	1.2
151	18.2	17.2	1.0
152	15.6	13.4	2.2
153	15.9	14.5	1.4
154	15.9	14.0	1.9

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR WEEK OF 01 SEPT. '97

(01 SEPT. — 07 SEPT. 1997)



GEOSYNTEC CONSULTANTS

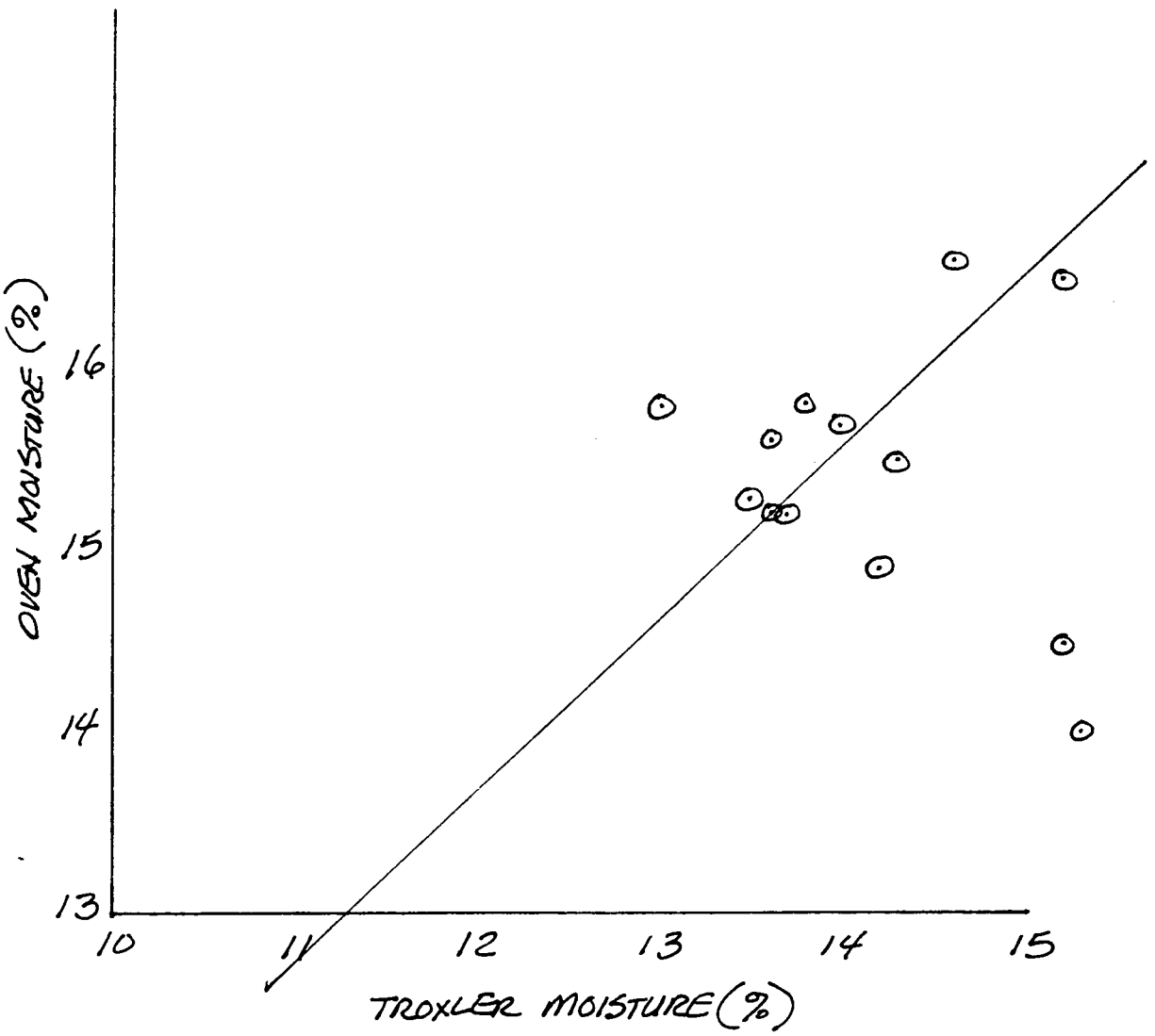
Written by: HEM Date: 97/09/08 (YY/MM/DD) Reviewed by: Date: / / (YY/MM/DD)

Client: FDF Project: OSDF - PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

SAMP NO	OVEN MC	GAUGE MC	Δ MC
LP-155	14.0	15.3	-1.3
LP-156	14.5	15.2	-0.7
LP-157	15.5	14.3	1.2
LP-159	15.8	13.8	2.0
LP-160	15.8	13.0	2.8
LP-161	15.3	13.5	1.8
LP-162	15.2	13.7	1.5
LP-163	14.9	14.2	0.7
LP-164	16.6	14.6	2.0
LP-165	15.6	13.6	2.0
LP-166	16.5	15.2	1.3
LP-167	15.2	13.6	1.6
LP-169	15.7	14.0	1.7

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN MOIST. FOR WEEK OF 08 Sept. 97

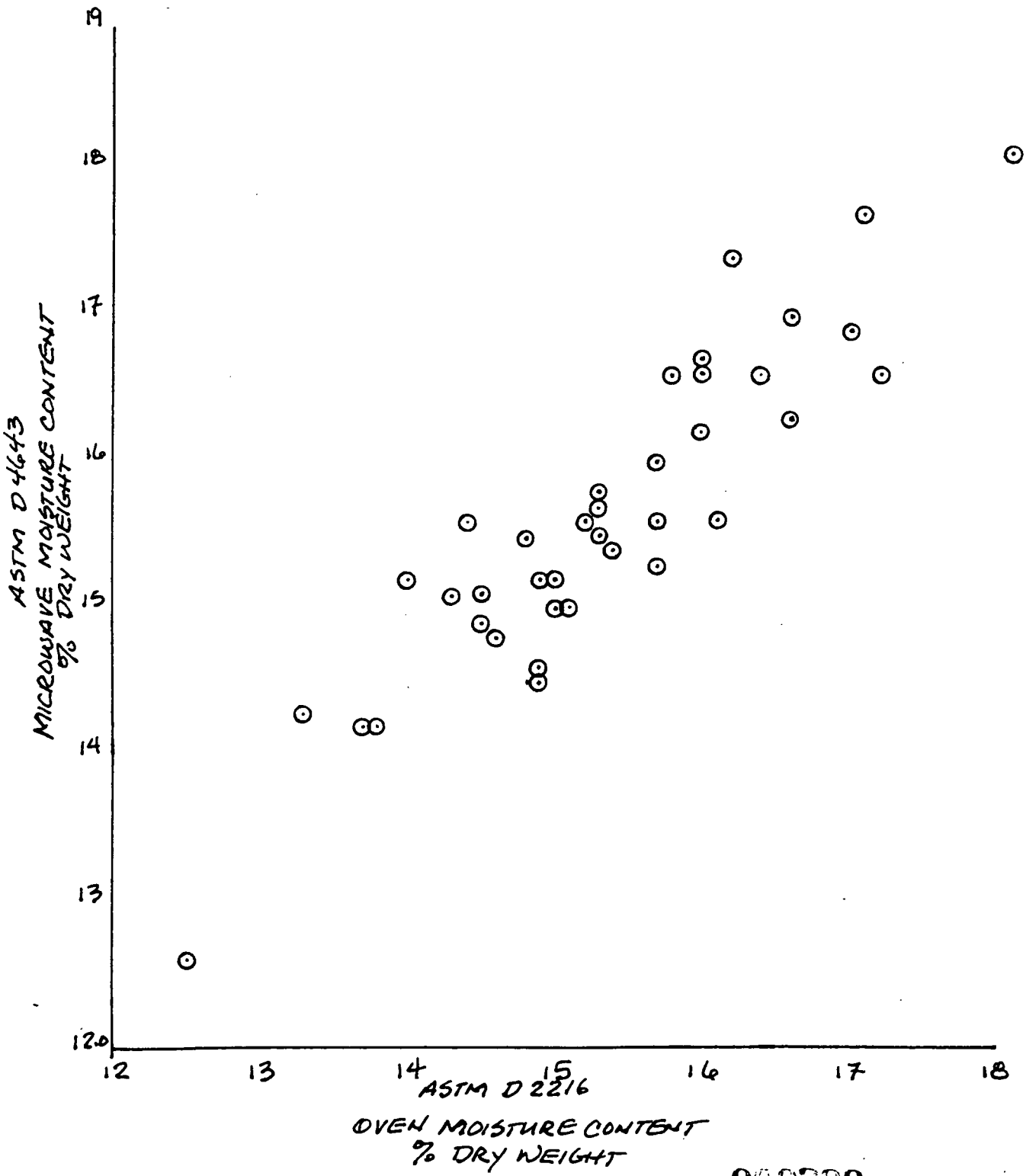
08 SEPT. — 14 SEPT. 1997



GEOSYNTEC CONSULTANTS

Written by: NED MEEKINS Date: 97 / 08 / 26 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

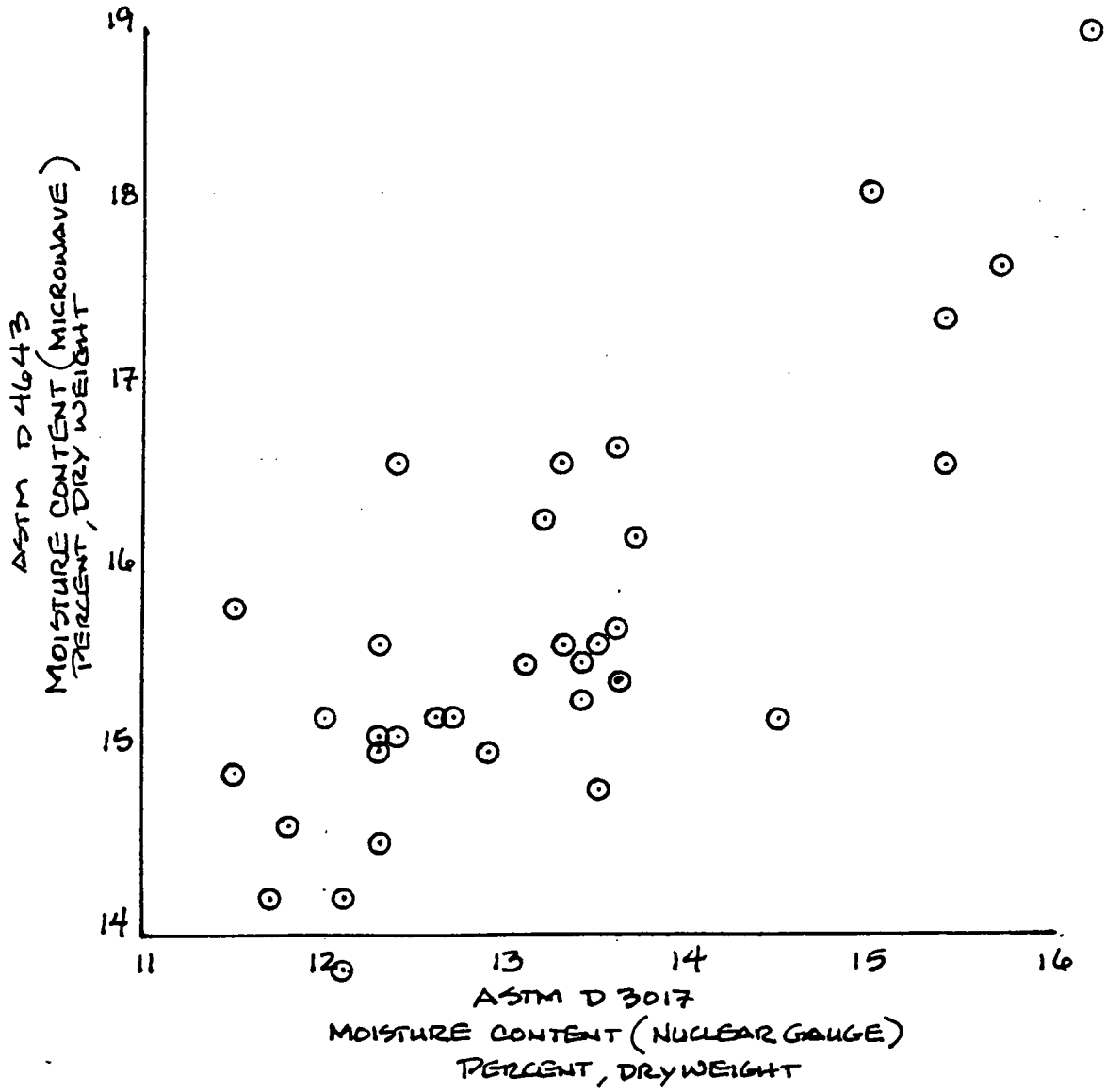
Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ 0166 Task No.: 04.1



Written by: NED MEEKINS Date: 97 / 08 / 25 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

MOISTURE



Written by: RBN Date: 97 / 09 / 15 (YY MM DD) Reviewed by: _____ Date: ___ / ___ / ___ (YY MM DD)

Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ01666 Task No.: 04.1

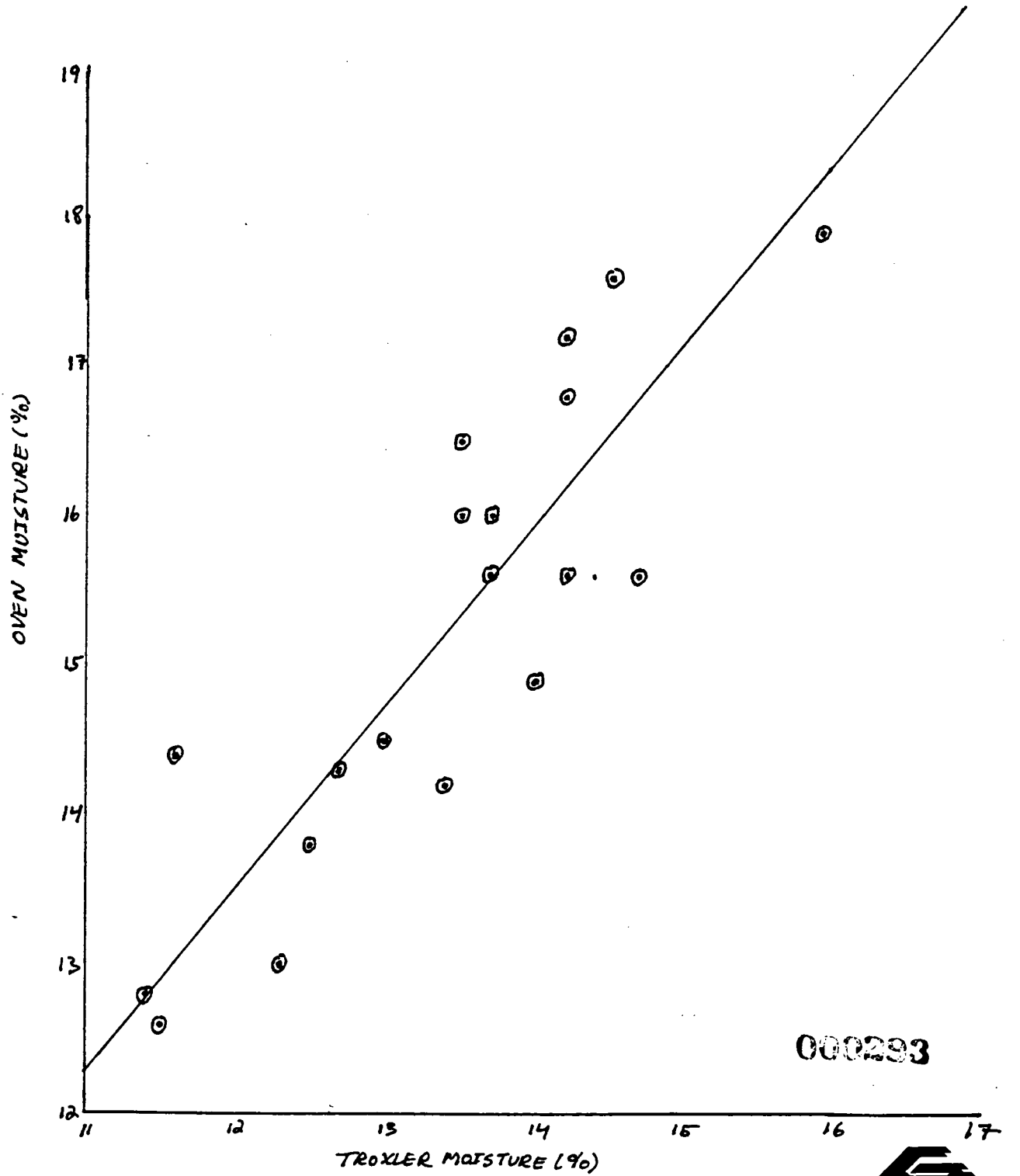
Sample No.	OVEN MC	GAUGE MC	Δ MC
LP-171	14.3	12.7	
LP-172	14.9	14.0	
LP-179	17.9	15.9	
LP-180	16.8	14.2	
LP-181	16.0	13.5	
LP-182	17.2	14.2	
LP-185	14.5	13.0	
LP-186	16.5	13.5	
LP-187	17.6	14.5	
LP-188	16.0	13.7	
LP-189	15.6	14.7	
LP-190	12.6	11.5	
LP-191	13.0	12.3	
LP-192	14.2	13.4	
LP-193	12.8	11.4	
LP-197	13.8	12.5	
LP-198	15.6	13.7	
LP-199	14.4	11.6	
LP-200	15.6	14.2	

Written by: RBN Date: 97 / 09 / 15 (YY MMM DDD) Reviewed by: Date: / / (YY MMM DDD)

Client: FDF Project: OSDF - PHASE T Project/Proposal No.: GQ0166 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR USE WEEK OF 15 SEPT. '97

(15 SEPT. — 21 SEPT. 1997)



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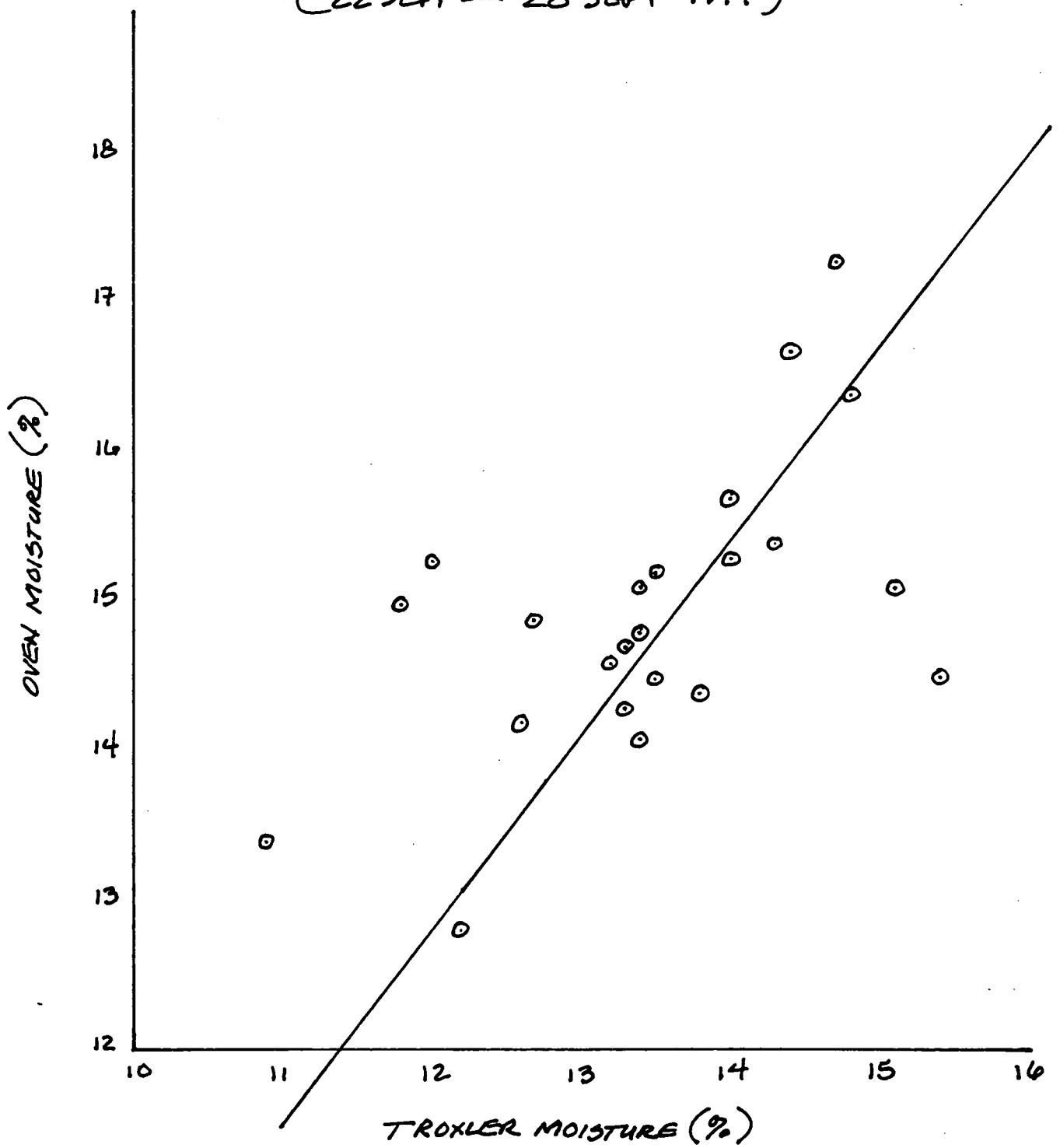
GEOSYNTEC CONSULTANTS

Written by: KM Date: 97 / 09 / 22 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: OSDF - PHASE I Project/~~Proposal~~ No.: GQ01666 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR USE WEEK OF 22 SEPT. 1997

(22 SEPT — 28 SEPT 1997)



GeoSyntec Consultants

Written by: HEM (24) Date: 97 / 09 / 22 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: OSDF - PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

	NDT-NO.	OVEN	GAUGE
	316	14.4	13.8
	315	15.2	13.5
9/15	298	15.4	14.3
	307	16.4	14.8
	299	14.3	13.3
	297	12.8	12.2
	313	14.6	13.2
	327	14.5	15.4
	331	15.1	13.4
	331	14.1	13.4
	342	14.7	13.3
9/16	341	17.3	14.7
	343	13.4	10.9
	347	15.3	12.0
	357	15.1	15.1
	359	14.5	13.5
	367	15.3	14.0
	369	15.0	11.8
9/17	375	16.7	14.4
	384	15.7	14.0
	417	14.2	12.6
	418	15.2	13.5
9/18	407	14.8	13.4
	398	14.9	12.7

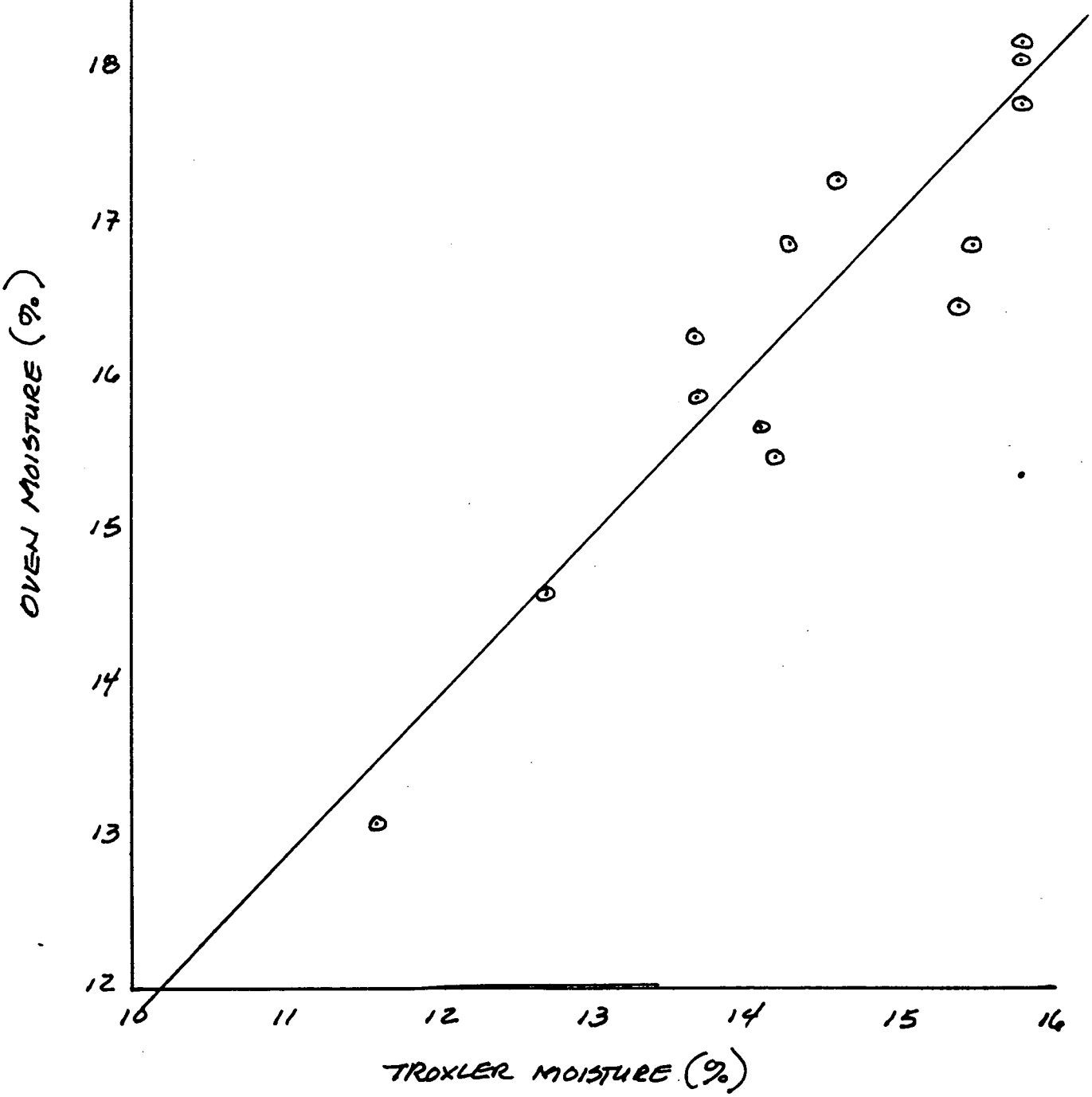
GEOSYNTEC CONSULTANTS

Written by: HEM Date: 97 / 09 / 27 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR WEEK OF 29 SEPTEMBER 1997

(29 SEPT — 05 OCT. 1997)



GeoSyntec Consultants

Written by: HEM Date: 97 / 09 / 27 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: OSDF - PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

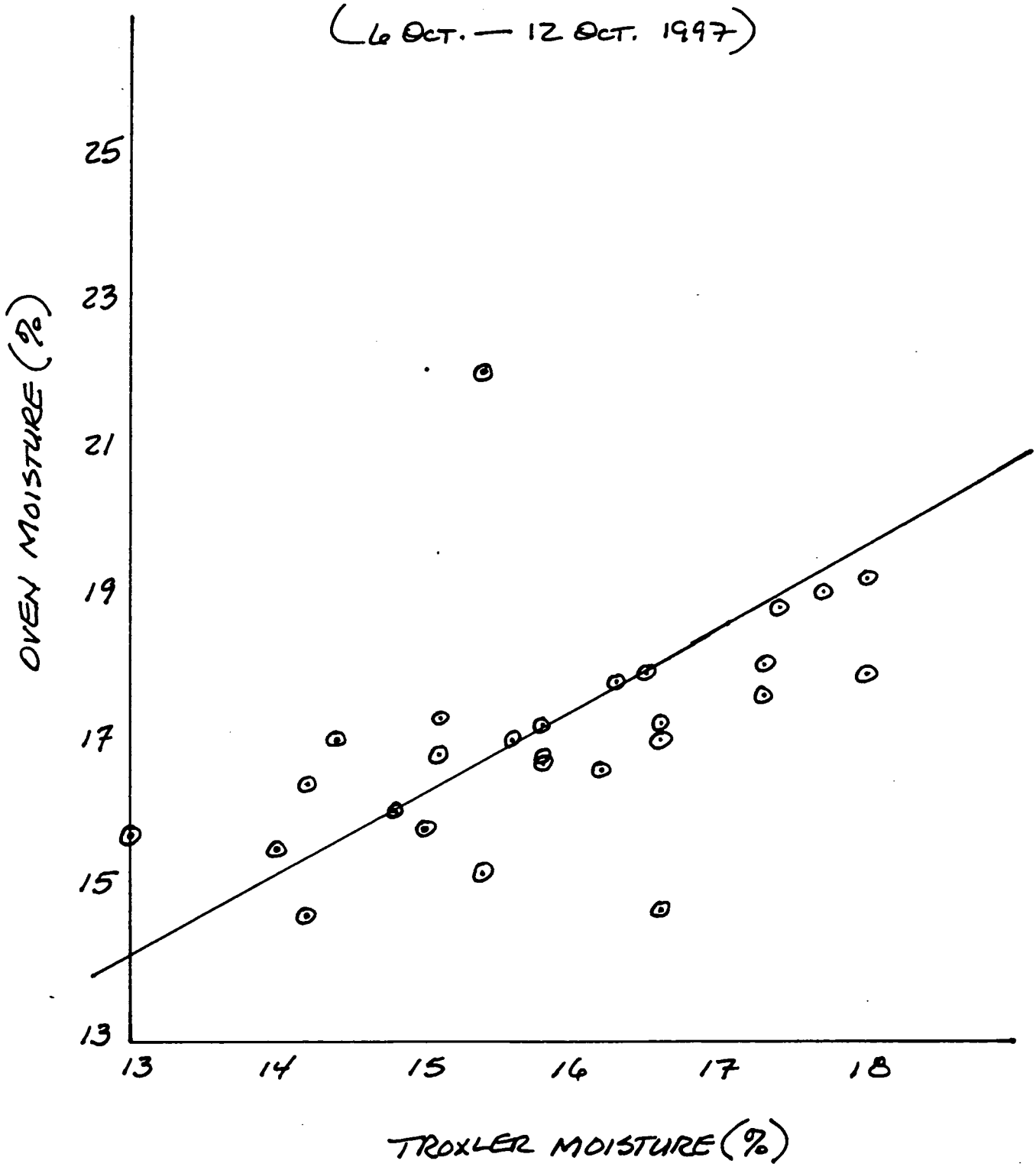
	SAMP NO.	NDT-NO.	OVEN	TROXLER
—	LP-244	470	13.1	11.6
	245	490	18.2	15.8
9/22	246	492	15.7	14.1
	247	493	15.5	14.2
	248	494	16.5	15.4
—	250	534	16.9	14.3
	252	551	16.3	13.7
★	253	547	18.1	15.8
9/24	254	555	15.9	13.7
	255	557	18.4	16.4
	256	558	15.9	13.7
	257	562	17.8	15.8
—	258	564	14.6	12.7
9/25	259	567	17.3	14.6
	260	569	16.9	15.5
—				

Written by: HEM Date: 97 / 10 / 04 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: OSDF PHASE I Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR WEEK OF 06 OCTOBER, 1997

(6 OCT. — 12 OCT. 1997)



GeoSyntec Consultants

Written by: HEM Date: 97 / 10 / 04 (YY MM DD) Reviewed by: _____ Date: ___/___/___ (YY MM DD)

Client: FDF Project: DSDF - Phase I Project/~~Proposal~~ No.: GQ0166 Task No.: 04-1

	Samp. No.	Oven mc	Gauge mc	Δ mc
29 Sept	LP-268	15.6	14.0	1.6
	LP-270	16.7	16.2	0.5
	LP-271	15.8	13.0	2.8
	LP-272	17.1	14.4	2.7
	LP-273	22.1	15.4	6.7
	LP-274	15.9	15.0	0.9
30 Sept	LP-275	16.1	14.8	1.3
	LP-276	17.1	15.6	1.5
02 Oct	LP-281	15.3	15.4	-0.1
	LP-282	14.7	14.2	0.5
	LP-283	16.6	14.8	1.8
	LP-284	16.9	15.1	1.8
	LP-285	16.9	15.8	1.1
	LP-286	17.1	16.6	0.5
	LP-287	17.3	15.8	1.5
	LP-288	16.1	14.8	1.3
	LP-289	17.7	17.3	0.4
	LP-290	18.9	17.4	1.5
	LP-291	16.8	15.8	1.0
	LP-292	17.9	16.3	1.6
	LP-293	17.4	15.1	2.3
	LP-294	18.0	16.5	1.5
	LP-295	19.1	17.7	1.4
	LP-296	19.3	18.0	1.3
	LP-298	16.5	14.2	2.3
	LP-301	18.1	17.3	0.8
	LP-302	17.3	16.6	0.7
	LP-303	18.0	18.0	Ø

28 tests

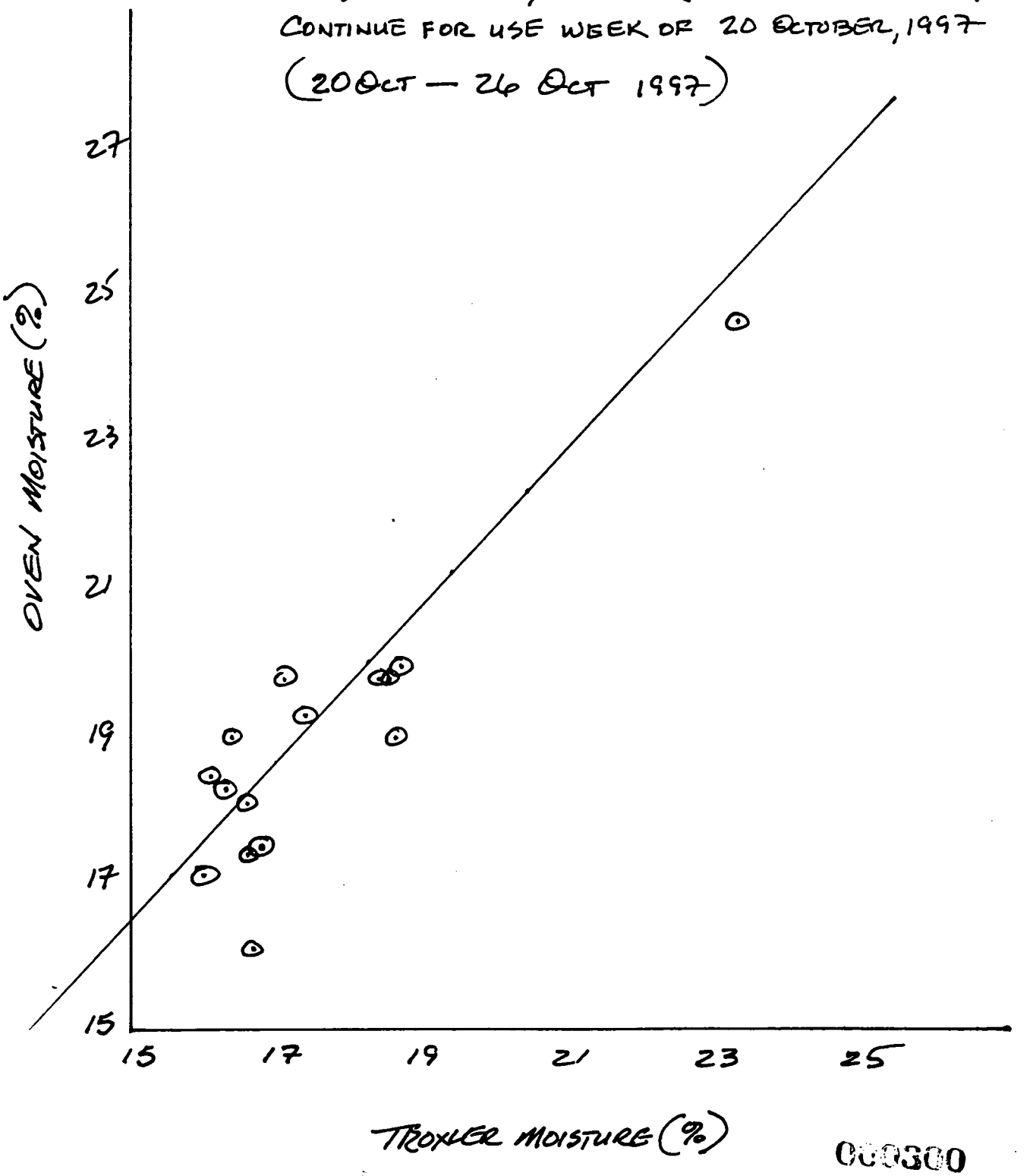
1.5 Avg Δ

GEOSYNTEC CONSULTANTS

Written by: HEM Date: 97 / 10 / 13 (YY / MM / DD) Reviewed by: _____ Date: ___/___/___ (YY / MM / DD)

Client: FDF Project: OSDF Project/~~Proposal~~ No.: GE0166 Task No.: 04.1

MOISTURE ADJUSTMENT FOR TROXLER NUCLEAR GAUGE TO OVEN FOR USE WEEK OF 13 OCTOBER, 1997 (13 OCT – 19 OCT 97)
CONTINUE FOR USE WEEK OF 20 OCTOBER, 1997 (20 OCT – 26 OCT 1997)



GeoSyntec Consultants

Written by: JL Date: 97/10/13 (YY/MM/DD) Reviewed by: _____ Date: __/__/__ (YY/MM/DD)

Client: FDF Project: OSDF Project/~~Proposal~~ No.: GQ0166 Task No.: 04.1

SAMP. No.	OVEN MC	TROXLER MC	Δ MC
LP 304	17.5	16.8	.7
LP 305	18.5	16.1	2.4
LP 306	19.0	16.4	2.6
LP 307	—	—	—
LP 308	16.1	16.7	.6
LP 309	19.8	18.4	1.4
LP 310	18.1	16.6	1.5
LP 311	17.4	16.6	.8
LP 312	19.3	17.4	1.9
LP 313	~~18.~~ 19.0	18.6	.4
LP 314	24.7	23.3	1.4
LP 315	—	—	—
LP 316	19.8	18.5	1.3
LP 317	18.3	16.3	2.0
LP 318	20.0	18.7	1.3
LP 319	17.1	16.0	1.1
LP 320	19.8	17.1	2.7

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION MONDAY DATE: 29 day DEC month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE STOCKPILE MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: 1ST LIFT THICKNESS (LOOSE/COMPACTED): 12-in

% COMPACTION: ≥ 95% STD. PROCTOR MOISTURE RANGE: + 3% APZ* ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: TROXLER 3430 NUCLEAR GAUGE SERIAL NO. _____ COR. FACTOR: +2% MOISTURE CORRELATION QA ID: RP/BN

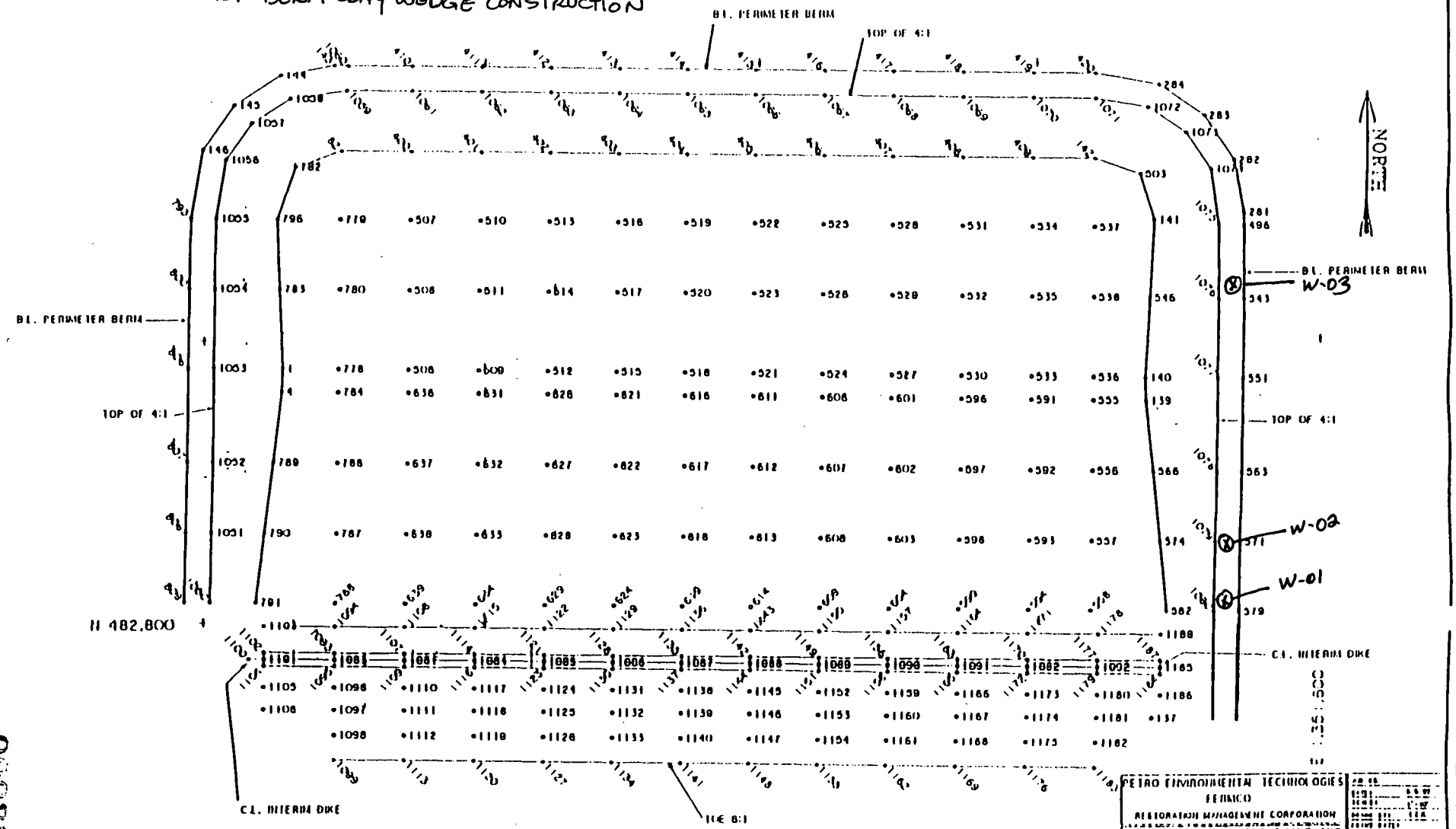
TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
W-01	EAST BERM WEDGE (SEE ATTACHED SKETCH)	6-in / L1	LP-325	16.1	114.0	19.0	128.9	108.3	95.0	P				
W-02	↓	6-in / L1	↓	↓	↓	18.3	130.7	110.5	96.9	P				
W-03	↓	6-in / L1	↓	↓	↓	17.6	132.7	112.8	98.9	P				

COMMENTS: * APZ - APPROVED PERMEABILITY ZONE

000302

MONDAY 29 DECEMBER 1997

EAST BERM CLAY WEDGE CONSTRUCTION



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD NUCLEAR MOISTURE/DENSITY TEST LOG (ASTM D 3017 AND ASTM D 2922)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 30 day Dec month 1991 year

SPECIFICATION REQUIREMENTS

SOURCE: on site stockpile MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER: (CIRCLE ONE) 1ST LIFT THICKNESS ((LOOSE)/COMPACTED): 6"

% COMPACTION: 95% MOISTURE RANGE: N/A ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler NUCLEAR GAUGE SERIAL NO. COR. FACTOR: +2% MOISTURE CORRELATION QA ID: RP

TEST NO.	TEST LOCATION	PROBE DEPTH/ LIFT NO.	LAB RESULTS			FIELD TEST RESULTS						RETEST NO.	RETEST	
			SAMPLE NO.	OMC (%)	MAX DRY UNIT WT (PCF)	FMC (%)	WET UNIT WT (PCF)	DRY UNIT WT (PCF)	PERCENT COMPACT (%)	PASS	FAIL		PASS	FAIL
W-04	Anchor trench wedge see accompanying sketch	6"/1	LP-325	16.1	114.0	20.2	130.9	108.9	98%	P				
W-05	↓	↓	LP 325	16.1	114.0	17.2	133.5	113.9	100%	P				
W-06	↓	↓	LP 325	16.1	114.0	16.6	131.2	112.5	99%	P				
W-07	↓	↓	↓	↓	↓	18.4	130.3	110.1	97%	P				
W-08	↓	↓	↓	↓	↓	19.5	130.3	109.0	96%	P				
W-09	↓	↓	↓	↓	↓	16.9	132.5	113.3	99%	P				
W-10	↓	↓	↓	↓	↓	20.1	130.7	108.8	95%	P				
W-11	↓	↓	↓	↓	↓	17.3	131.2	111.8	98%	P				

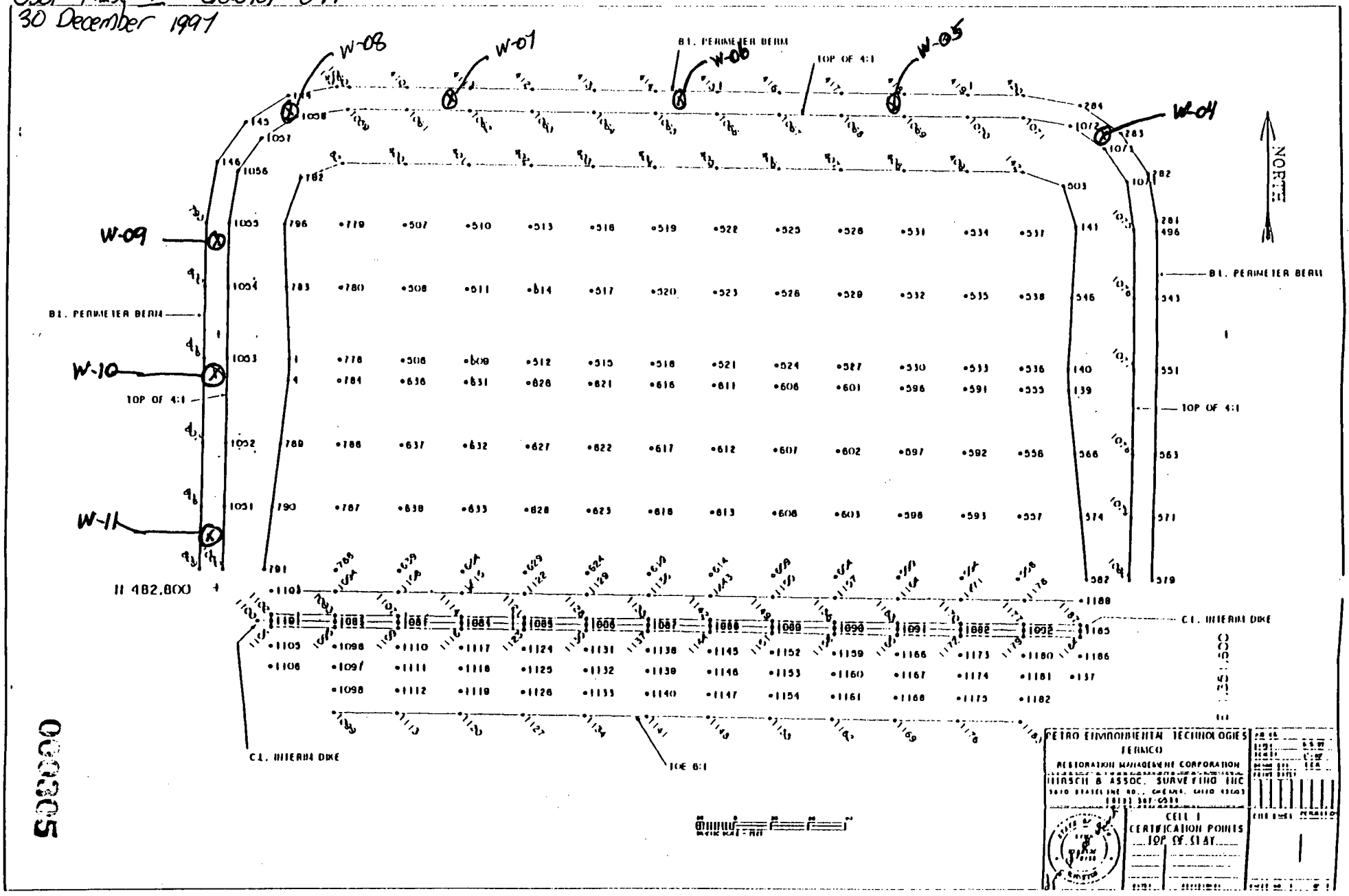
COMMENTS:

©GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: BN SHEET NO. ____ OF ____

1267

000004

OSDF Phase I 660409 041
30 December 1991



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD A)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION (CHECK PLUG: 1-POINT PROCTOR) — DATE: 30 day DEC month 1997 year

MATERIAL TYPE: CLAY LINER MATERIAL - SCREENED { CLAY WEDGE CONSTRUCTION } (1ST LIFT) — SAMPLE NO.:

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, AND IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS LESS THAN 20%
ALL MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 5.5-lb RAMMER / 12-in. DROP / 3 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL (USING SCM-01 MOLD)

QA ID: BN

	WATER ADDED	(ml)	0.0				
A	WT. OF SOIL & MOLD (SCM-01)	~~(grams)~~ lb (BN 12/31)	13.55				
B	WT. OF MOLD (SCM-01)	~~(grams)~~ lb (BN 12/31)	9.27				
C	WT. OF SOIL = A - B	~~(grams)~~ lb (BN 12/31)	4.28				
D	WET UNIT WT.(1) = C X ~~0.066~~ 1/30 ft³ (BN) 12/30/97	(pcf)	128.4				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.7 *				

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID:

	TARE NO.		Q				
F	WT. OF TARE	(grams)	15.46				
G	WT. OF WET SOIL & TARE	(grams)	369.30				
H	WT. OF DRY SOIL & TARE	(grams)	323.19				
I	WT. OF WATER = G - H	(grams)	46.11				
J	WT. DRY SOIL = H - F	(grams)	307.73				
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.0				

GEO SYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: SHEET NO. OF

* ESTIMATED AT 112.0 WITH MOISTURE CONTENT DETERMINATION USING MICROWAVE METHOD (ASTM D 4643)

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 30 day DEC month 1997 year

MATERIAL TYPE: CLAY LINER MATERIAL - SCREENED (4FT1) (CLAY WEDGE CONSTRUCTION) SAMPLE NO.:

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: BN

100% PASING THE NO. 10 (2-mm) SIEVE	20 grams
100% PASSING THE NO. 4 (4.75-mm) SIEVE	100 grams
100% PASSING THE NO. 3/8-in. (9.5-mm) SIEVE	500 grams
100% PASSING THE NO. 3/4-in. (19-mm) SIEVE	2.5 kilograms

	TARE NO. Q	Q				
A	WT. OF TARE	15.46 g				
B	WT. OF WET SOIL & TARE	369.30 g				
C	WT. OF DRY SOIL & TARE	323.19 g				
D	WT. OF WATER = B-C	46.11 g				
E	WT. OF DRY SOIL = C-A	307.73 g				
F	MOISTURE CONTENT = (D/E) X 100	15.0%				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID:

90% PASSING THE NO. 10 (2-mm) SIEVE	100 TO 200 grams
90% PASSING THE NO. 4 (4.75-mm) SIEVE	200 TO 500 grams
90% PASSING THE 3/4-in. (19-mm) SIEVE	500 TO 1000 grams

INITIAL SETTING TO BE AT 3.0 MINUTES, CONTINUE DRYING SAMPLE AT 1.0 MINUTE SETTING UNTIL MOISTURE CONTENT VARIATION BETWEEN SETTINGS IS LESS THAN 0.1%

	TARE NO.	I				
A	WT. OF TARE	132.12 g				
B	WT. OF WET SOIL & TARE	377.14 g				
C	WT. OF DRY SOIL & TARE	345.84 g				
D	WT. OF WATER = B-C	31.3 g				
E	WT. OF DRY SOIL = C-A	213.72 g				
F	MOISTURE CONTENT = (D/E) X 100	14.6 %				

- **Field Sand Cone Density Test**

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 08 day AUG month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) OTHER:

% COMPACTION: 95% within 90% sat. MOISTURE CONTENT RANGE: <3% ABOVE OMC

TEST LOCATION: NW CORNER CELL 1 (TEST AREA) TEST NO.: SC-1

FIELD TEST DATA – ASTM D 1556

QA ID: NM

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	6.10
B	INITIAL WT. OF SAND & JAR	(lbs)	15.02	I	WT. OF TARE NO.: X	(lbs)	.42
C	FINAL WT. OF SAND & JAR	(lbs)	7.21	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	5.68
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	7.81	K	WET UNIT WT. = J/G	(pcf)	138.5
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	125.2
F	WT. OF SAND IN HOLE = D-E	(lbs)	3.91	N	PERCENT COMPACTION = ~~M/U~~	(%)	101
G	VOLUME OF HOLE = F/A	(ft^3)	0.041				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: NM

O	WT. OF TARE NO. 10	(grams)	7.4	R	WT. OF WATER = P-Q	(grams)	24.8
P	WT. OF WET SOIL & TARE	(grams)	266.1	S	WT. OF DRY SOIL = Q-O	(grams)	233.9
Q	WT. OF DRY SOIL & TARE	(grams)	241.3	T	MOISTURE CONTENT = (R/S)X100	(%)	10.6

PROCTOR TEST DATA LP-21 MAXIMUM DRY UNIT WT. (pcf) 123.8 OPTIMUM MOISTURE CONTENT (%) 12.5

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: NM

TEST NO.		*	U	MOISTURE CONTENT	(%)	10.0
WET UNIT WT.	(pcf)	140.5	V	DRY UNIT WT.	(pcf)	127.7
DELTA DRY UNIT WT. = M – V		+2.5		DELTA MOISTURE CONTENT = T – U		-0.6

COMMENTS: * TEST AREA, NOT RECORDED IN TEST LOG.

000809

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 22 day AUG month 1997 year

SOURCE: ON-SITE CLAY LINER STOCKPILE

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% APZ * MOISTURE CONTENT RANGE: +3%

TEST LOCATION: CELL # LANE # 1 TEST NO.: SC-02

FIELD TEST DATA – ASTM D 1556

QA ID: KW

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	6.65
B	INITIAL WT. OF SAND & JAR	(lbs)	14.4	I	WT. OF TARE NO.: —	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	6.1	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	6.23
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	8.3	K	WET UNIT WT. = J/G	(pcf)	135.4
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	120.6
F	WT. OF SAND IN HOLE = D–E	(lbs)	4.40	N	PERCENT COMPACTION = ~~M/A~~	(%)	97.4
G	VOLUME OF HOLE = F/A	(ft^3)	0.046				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: KW

O	WT. OF TARE NO. 8	(grams)	7.3	R	WT. OF WATER = P–Q	(grams)	35.1
P	WT. OF WET SOIL & TARE	(grams)	327.1	S	WT. OF DRY SOIL = Q–O	(grams)	284.8
Q	WT. OF DRY SOIL & TARE	(grams)	292.1	T	MOISTURE CONTENT = (R/S)X100	(%)	12.3

PROCTOR TEST DATA LP-42 MAXIMUM DRY UNIT WT. (pcf) 123.8 OPTIMUM MOISTURE CONTENT (%) 12.5

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: KW

TEST NO.		31A	U	MOISTURE CONTENT	(%)	11.0
WET UNIT WT.	(pcf)	133.4	V	DRY UNIT WT.	(pcf)	120.2
DELTA DRY UNIT WT. = M – V		0.4		DELTA MOISTURE CONTENT = T – U		1.3

COMMENTS:

* ACCEPTABLE PERMEABILITY ZONE

CC0310

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE 1 CONSTRUCTION DATE: 27 day 8 month 92 year

SOURCE: ONSITE STOCKPILE

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: >95% MOISTURE CONTENT RANGE: <3% OVER OPTIMUM

TEST LOCATION: CELL 1, LANE 5, LIFT 2 TEST NO.: SC-3

FIELD TEST DATA – ASTM D 1556

QA ID: SR

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	6.88
B	INITIAL WT. OF SAND & JAR	(lbs)	14.06	I	WT. OF TARE NO.: ____	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	5.72	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	6.46
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	8.34	K	WET UNIT WT. = J/G	(pcf)	137.4
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	119.0
F	WT. OF SAND IN HOLE = D–E	(lbs)	4.44	N	PERCENT COMPACTION = ~~M/U~~	(%)	105
G	VOLUME OF HOLE = F/A	(ft^3)	0.047				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: NM

O	WT. OF TARE NO. 10	(grams)	7.4	R	WT. OF WATER = P–Q	(grams)	27.2
P	WT. OF WET SOIL & TARE	(grams)	210.6	S	WT. OF DRY SOIL = Q–O	(grams)	176.0
Q	WT. OF DRY SOIL & TARE	(grams)	183.4	T	MOISTURE CONTENT = (R/S)X100	(%)	15.5

PROCTOR TEST DATA * MAXIMUM DRY UNIT WT. (pcf) 112.8 OPTIMUM MOISTURE CONTENT (%) 16.7

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: NM

TEST NO.	~~1~~ 78 ~~77~~	U	MOISTURE CONTENT	(%)	~~14.7~~ 16.2
WET UNIT WT.	~~129.7~~ 135.2 (pcf) ~~133.9~~	V	DRY UNIT WT.	(pcf)	~~116.8~~ 116.4
DELTA DRY UNIT WT. = M – V	2.6 ~~2.2~~		DELTA MOISTURE CONTENT = T – U	-0.7 ~~0.8~~	NEM 8/28/92

COMMENTS: * STOCKPILE 5 AVG VALUE

000311

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 28 day AUG month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) OTHER:

% COMPACTION: 95 MOISTURE CONTENT RANGE: +3% omc or less

TEST LOCATION: CELL 1, LANE 2, LIFT 3 TEST NO.: SC-4

FIELD TEST DATA - ASTM D 1556

QA ID: SQ

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	7.39
B	INITIAL WT. OF SAND & JAR	(lbs)	16.08	I	WT. OF TARE NO.: ———	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	7.25 ~~5.87~~	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	6.97
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	8.83 ~~10.21~~	K	WET UNIT WT. = J/G	(pcf)	134.0
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	119.5
F	WT. OF SAND IN HOLE = D-E	(lbs)	4.93 ~~6.31~~	N	PERCENT COMPACTION = ~~M/U~~	(%)	106
G	VOLUME OF HOLE = F/A	(ft^3)	0.052 ~~0.067~~				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT - ASTM D 2216

QA ID: SQ

O	WT. OF TARE NO. 22	(grams)	8.4	R	WT. OF WATER = P-Q	(grams)	31.7
P	WT. OF WET SOIL & TARE	(grams)	302.3	S	WT. OF DRY SOIL = Q-O	(grams)	262.2
Q	WT. OF DRY SOIL & TARE	(grams)	270.6	T	MOISTURE CONTENT = (R/S)X100	(%)	12.1

PROCTOR TEST DATA * MAXIMUM DRY UNIT WT. (pcf) 112.8 OPTIMUM MOISTURE CONTENT (%) 16.7

COMPARISON WITH NUCLEAR GAUGE - ASTM D 2922 AND D 3017

QA ID: BN

TEST NO.			88	U	MOISTURE CONTENT	(%)	15.7
WET UNIT WT.		(pcf)	135.1	V	DRY UNIT WT.	(pcf)	116.8
DELTA DRY UNIT WT. = M - V			2.7		DELTA MOISTURE CONTENT = T - U		-3.6

COMMENTS: * AVG VALUE FROM STOCKPILE NO. 5

000322

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 30 day AUG month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95 MOISTURE CONTENT RANGE: +3% omc or less

TEST LOCATION: Cell One. Lift 3. 21' W pt #524 30' n pt #524 TEST NO.: SC-5

FIELD TEST DATA - ASTM D 1556

QA ID: RP

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	95.5	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	7.61
B	INITIAL WT. OF SAND & JAR	(lbs)	15.48	I	WT. OF TARE NO.: ____	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	6.45	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	7.19
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	9.03	K	WET UNIT WT. = J/G	(pcf)	131.2
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.79	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	115.0
F	WT. OF SAND IN HOLE = D-E	(lbs)	5.24	N	PERCENT COMPACTION = ~~M/U~~	(%)	102
G	VOLUME OF HOLE = F/A	(ft^3)	.0548				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT - ASTM D 2216

QA ID: RP/Nm

O	WT. OF TARE NO. 7	(grams)	7.3	R	WT. OF WATER = P-Q	(grams)	23.5
P	WT. OF WET SOIL & TARE	(grams)	197.4	S	WT. OF DRY SOIL = Q-O	(grams)	166.6
Q	WT. OF DRY SOIL & TARE	(grams)	173.9	T	MOISTURE CONTENT = (R/S)X100	(%)	14.1

PROCTOR TEST DATA * MAXIMUM DRY UNIT WT. (pcf) 112.8 OPTIMUM MOISTURE CONTENT (%) 16.7

COMPARISON WITH NUCLEAR GAUGE - ASTM D 2922 AND D 3017

QA ID: RP

TEST NO.		#110	U	MOISTURE CONTENT	(%)	14.5
WET UNIT WT.	(pcf)	134.6	V	DRY UNIT WT.	(pcf)	117.5
DELTA DRY UNIT WT. = M - V	-2.5	~~117.5~~		DELTA MOISTURE CONTENT = T - U		-0.4

COMMENTS: * STOCKPILE 5 AVG. VALUE 8/31/97

000023

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 02 day SEPT month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER:

% COMPACTION: >95% MOISTURE CONTENT RANGE: NOT GREATER THAN 3% OVER OPT.

TEST LOCATION: CELL 1, LANE 5, LIFT 3 TEST NO.: SC-06

FIELD TEST DATA - ASTM D 1556

QA ID: SQ.

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	95.5	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	7.02
B	INITIAL WT. OF SAND & JAR	(lbs)	15.54	I	WT. OF TARE NO.: ———	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	6.91	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	6.60
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	8.63	K	WET UNIT WT. = J/G	(pcf)	132.0
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.84	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	113.9
F	WT. OF SAND IN HOLE = D-E	(lbs)	4.79	N	PERCENT COMPACTION = ~~MAU~~	(%)	98
G	VOLUME OF HOLE = F/A	(ft^3)	0.050				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT - ASTM D 2216

QA ID: BN

O	WT. OF TARE NO. 7	(grams)	7.3	R	WT. OF WATER = P-Q	(grams)	31.0
P	WT. OF WET SOIL & TARE	(grams)	232.7	S	WT. OF DRY SOIL = Q-O	(grams)	194.4
Q	WT. OF DRY SOIL & TARE	(grams)	201.7	T	MOISTURE CONTENT = (R/S)X100	(%)	15.9

PROCTOR TEST DATA * MAXIMUM DRY UNIT WT. (pcf) 115.9 OPTIMUM MOISTURE CONTENT (%) 14.6

COMPARISON WITH NUCLEAR GAUGE - ASTM D 2922 AND D 3017

QA ID: BN

TEST NO.		127	U	MOISTURE CONTENT	(%)	16.1
WET UNIT WT.	(pcf)	133.2	V	DRY UNIT WT.	(pcf)	114.7
DELTA DRY UNIT WT. = M - V		-0.8		DELTA MOISTURE CONTENT = T - U		-0.2

COMMENTS: * STOCKPILE 4 AVG. value

000024

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 02 day SEPT month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: >95% MOISTURE CONTENT RANGE: NOT GREATER THAN 3% OVER OMC

TEST LOCATION: CELL 1, LANE 5, LIFT 3 TEST NO.: SC-07

FIELD TEST DATA - ASTM D 1556

QA ID: RP

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	95.5	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	8.31
B	INITIAL WT. OF SAND & JAR	(lbs)	16.09	I	WT. OF TARE NO.: ____	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	6.70	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	7.89
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	9.39	K	WET UNIT WT. = J/G	(pcf)	134.6
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.79	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	119.5
F	WT. OF SAND IN HOLE = D-E	(lbs)	5.6	N	PERCENT COMPACTION = ~~M/U~~	(%)	103
G	VOLUME OF HOLE = F/A	(ft^3)	.0586				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT - ASTM D 2216

QA ID: RP

O	WT. OF TARE NO. 31	(grams)	8.3	R	WT. OF WATER = P-Q	(grams)	22.5
P	WT. OF WET SOIL & TARE	(grams)	209.2	S	WT. OF DRY SOIL = Q-O	(grams)	178.4
Q	WT. OF DRY SOIL & TARE	(grams)	186.7	T	MOISTURE CONTENT = (R/S)X100	(%)	12.6

PROCTOR TEST DATA * MAXIMUM DRY UNIT WT. (pcf) 115.9 OPTIMUM MOISTURE CONTENT (%) 14.6

COMPARISON WITH NUCLEAR GAUGE - ASTM D 2922 AND D 3017

QA ID: BH

TEST NO.		130	U	MOISTURE CONTENT	(%)	16.6
WET UNIT WT.	(pcf)	135.9	V	DRY UNIT WT.	(pcf)	116.6
DELTA DRY UNIT WT. = M - V		2.9		DELTA MOISTURE CONTENT = T - U		-4.0

COMMENTS: * STOCKPILE 4 AVG. VALUE

SC-2

1267

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 05 day SEPT month 1997 year

SOURCE: ON SITE STOCKPILE

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER:

% COMPACTION: ≥95 MOISTURE CONTENT RANGE: UP TO 3% ABOVE OMC

TEST LOCATION: Lane 7, Lift 3 S/E corner Cell 1 TEST NO.: SC-8

FIELD TEST DATA – ASTM D 1556

QA ID: ~~JE~~

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	95.5	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	6.28
B	INITIAL WT. OF SAND & JAR	(lbs)	15.63	I	WT. OF TARE NO.: ———	(lbs)	.42
C	FINAL WT. OF SAND & JAR	(lbs)	7.67	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	5.86
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	7.96	K	WET UNIT WT. = J/G	(pcf)	133.2
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.79	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	116.1
F	WT. OF SAND IN HOLE = D–E	(lbs)	4.17	N	PERCENT COMPACTION = ~~M/U~~	(%)	102
G	VOLUME OF HOLE = F/A	(ft^3)	0.044				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: NM

O	WT. OF TARE NO. 13	(grams)	7.7	R	WT. OF WATER = P–Q	(grams)	39.4 ~~7.7~~ KMW 9/4/97
P	WT. OF WET SOIL & TARE	(grams)	315.1	S	WT. OF DRY SOIL = Q–O	(grams)	268.0
Q	WT. OF DRY SOIL & TARE	(grams)	275.7	T	MOISTURE CONTENT = (R/S)X100	(%)	14.7

PROCTOR TEST DATA * MAXIMUM DRY UNIT WT. (pcf) 113.7 OPTIMUM MOISTURE CONTENT (%) 15.9

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: NM

TEST NO.		WDT-178	U	MOISTURE CONTENT	(%)	16.1
WET UNIT WT.	(pcf)	135.1	V	DRY UNIT WT.	(pcf)	116.4
DELTA DRY UNIT WT. = M – V		~~116.4~~ −0.3 KM 9/6/97		DELTA MOISTURE CONTENT = T – U		−1.4

COMMENTS: * Stockpile No. 6 clay liner material average value used for std. proctor lab results.

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

DETERMINATION OF DENSITY (DRIVE CYLINDER) (ASTM D 2937)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04

DESCRIPTION: PHASE I CONSTRUCTION DATE: SATURDAY 13 day SEPT month 1997 year

SOURCE: ON-SITE CLAY LINER STOCKPILE QA ID: BE

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% APZ * MOISTURE CONTENT RANGE: +3% APZ *

TEST LOCATION: N. PERIMETER BERM SLOPE LIFT #2 TEST NO.: DT-1

FIELD TEST DATA – ASTM D 2937

QA ID: BE

A	CYLINDER NO. 1 VOLUME(1) (cf)	57.41 in³ 0.034	D	WEIGHT OF WET SAMPLE = B–C (lbs)	4.48
B	WEIGHT OF SAMPLE & CYLINDER (lbs)	5.79	E	WET UNIT WEIGHT = D/A (lbs)	131.8
C	WEIGHT OF CYLINDER (lbs)	1.31	F	DRY UNIT WEIGHT = E/[1+(T/100)] (pcf)	114.3

NOTE: CYLINDER VOLUME IS OBTAINED BY MEASURING THE HEIGHT AND DIAMETER, OF FOUR EQUALLY SPACED POINTS, TO 0.01 in AND CALCULATING VOLUME USING AVERAGE HEIGHT AND DIAMETER.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: BN

O	WT. OF TARE NO. 2 (grams)	7.6	R	WT. OF WATER = P–Q (grams)	34.2
P	WT. OF WET SOIL & TARE (grams)	265.6	S	WT. OF DRY SOIL = Q–O (grams)	223.8
Q	WT. OF DRY SOIL & TARE (grams)	231.4	T	MOISTURE CONTENT = (R/S)X100 (%)	15.3%

PROCTOR TEST DATA AVG. STOCKPILE #4 MAXIMUM DRY UNIT WT. (pcf) 115.9 OPTIMUM MOISTURE CONTENT (%) 14.6%

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: KW

TEST NO.	NOT # 277	U	MOISTURE CONTENT (%)	14.9% **
WET UNIT WT. (pcf)	135.2	V	DRY UNIT WT. (pcf)	117.7
DELTA DRY UNIT WT. = F – V	-3.4		DELTA MOISTURE CONTENT = T – U	+0.4

COMMENTS:

* – ACCEPTABLE PERMEABILITY ZONE (APZ) SECTION 02225 PART 3.02A

** – CORRECTED MOISTURE CONTENT USING MOISTURE CORRELATION

NOTE: SOME VOIDS OBSERVED IN SAMPLE SIDES. PROBABLE ROCK INTERFERENCE.

000217

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

DETERMINATION OF DENSITY (DRIVE CYLINDER) (ASTM D 2937)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04

DESCRIPTION: PHASE I CONSTRUCTION DATE: SATURDAY 13 day SEPT month 1997 year

SOURCE: ON-SITE CLAY LINER STOCKPILE QA ID: BE

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) OTHER:

% COMPACTION: 95% * APZ MOISTURE CONTENT RANGE: +3% APZ *

TEST LOCATION: N. PERIMETER BERM BENCH LIFT #2 TEST NO.: DT-2

FIELD TEST DATA – ASTM D 2937

QA ID: BE

A	CYLINDER NO. 2 VOLUME[1] (cf)	0.034	D	WEIGHT OF WET SAMPLE = B–C (lbs)	4.48
B	WEIGHT OF SAMPLE & CYLINDER (lbs)	5.81	E	WET UNIT WEIGHT = D/A (lbs)	131.8
C	WEIGHT OF CYLINDER (lbs)	1.33	F	DRY UNIT WEIGHT = E/[1+(T/100)] (pcf)	114.2

NOTE: CYLINDER VOLUME IS OBTAINED BY MEASURING THE HEIGHT AND DIAMETER, OF FOUR EQUALLY SPACED POINTS, TO 0.01 in AND CALCULATING VOLUME USING AVERAGE HEIGHT AND DIAMETER.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: BN

O	WT. OF TARE NO. 13 (grams)	8.2	R	WT. OF WATER = P–Q (grams)	36.6
P	WT. OF WET SOIL & TARE (grams)	281.9	S	WT. OF DRY SOIL = Q–O (grams)	237.1
Q	WT. OF DRY SOIL & TARE (grams)	245.3	T	MOISTURE CONTENT = (R/S)X100 (%)	15.4%

PROCTOR TEST DATA AVG. STOCKPILE #4 MAXIMUM DRY UNIT WT. (pcf) 115.9 OPTIMUM MOISTURE CONTENT (%) 14.6%

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: KW

TEST NO.	NDT # 279	U	MOISTURE CONTENT (%)	15.5	**
WET UNIT WT. (pcf)	132.8	V	DRY UNIT WT. (pcf)	115.0	
DELTA DRY UNIT WT. = F – V	-0.8		DELTA MOISTURE CONTENT = T – U	-0.1	

COMMENTS:

* - APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A

** - CORRECTED MOISTURE CONTENT USING MOISTURE CORRELATION

000318

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04

DESCRIPTION: PHASE I CONSTRUCTION DATE: THURSDAY 18 day SEPT month 1997 year

SOURCE: ON-SITE CLAY LINER STOCKPILE

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% APZ * MOISTURE CONTENT RANGE: +3% APZ *

TEST LOCATION: EAST PERIMETER BERM (BENCH) LIFT #3 TEST NO.: SC-9

FIELD TEST DATA – ASTM D 1556

QA ID: KW

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	5.9
B	INITIAL WT. OF SAND & JAR	(lbs)	14.1	I	WT. OF TARE NO.: ____	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	6.5	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	5.48
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	7.6	K	WET UNIT WT. = J/G	(pcf)	137.0
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.9	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	118.6
F	WT. OF SAND IN HOLE = D–E	(lbs)	3.7	N	PERCENT COMPACTION = ~~M/U~~	(%)	98.8
G	VOLUME OF HOLE = F/A	(ft³)	0.04				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: KW/JL

O	WT. OF TARE NO. 11	(grams)	7.4	R	WT. OF WATER = P–Q	(grams)	36.9
P	WT. OF WET SOIL & TARE	(grams)	282.6	S	WT. OF DRY SOIL = Q–O	(grams)	238.3
Q	WT. OF DRY SOIL & TARE	(grams)	245.7	T	MOISTURE CONTENT = (R/S)X100	(%)	15.5

PROCTOR TEST DATA LP-22 STOCKPILE # 4 MAXIMUM DRY UNIT WT. (pcf) 120.0 OPTIMUM MOISTURE CONTENT (%) 13.5

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: KW

TEST NO.		NDT# 413	U	MOISTURE CONTENT	(%)	15.1	**
WET UNIT WT.	(pcf)	135.3	V	DRY UNIT WT.	(pcf)	117.5	
DELTA DRY UNIT WT. = M – V		1.1		DELTA MOISTURE CONTENT = T – U		0.4	

COMMENTS: * APZ – ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A OF PROJECT SPECIFICATION

** CORRECTED MOISTURE USING MOISTURE CORRELATION

000319

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04

DESCRIPTION: PHASE I CONSTRUCTION DATE: FRIDAY 19 day SEPT month 1997 year

SOURCE: ON-SITE CLAY LINER STOCKPILE

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% APZ * MOISTURE CONTENT RANGE: +3% APZ *

TEST LOCATION: E. PERIMETER BERM BENCH TEST NO.: SC-10

FIELD TEST DATA – ASTM D 1556

QA ID: KW

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	6.7
B	INITIAL WT. OF SAND & JAR	(lbs)	14.5	I	WT. OF TARE NO.: ____	(lbs)	.4 RBW 9/19/97
C	FINAL WT. OF SAND & JAR	(lbs)	6.2	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	6.3
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	8.3	K	WET UNIT WT. = J/G	(pcf)	135.8
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.9	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	118.4
F	WT. OF SAND IN HOLE = D–E	(lbs)	4.4	N	PERCENT COMPACTION = ~~M/U~~	(%)	99.7
G	VOLUME OF HOLE = F/A	(ft³)	0.464				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: RBW

O	WT. OF TARE NO. 33	(grams)	8.3	R	WT. OF WATER = P–Q	(grams)	37.9
P	WT. OF WET SOIL & TARE	(grams)	304.1	S	WT. OF DRY SOIL = Q–O	(grams)	257.9
Q	WT. OF DRY SOIL & TARE	(grams)	266.2	T	MOISTURE CONTENT = (R/S)X100	(%)	14.7

PROCTOR TEST DATA UP-17 MAXIMUM DRY UNIT WT. (pcf) 118.8 OPTIMUM MOISTURE CONTENT (%) 13.2%

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: ____

TEST NO.		NDT#449	U	MOISTURE CONTENT	(%)	14.4	**
WET UNIT WT.	(pcf)	135.5	V	DRY UNIT WT.	(pcf)	118.4	
DELTA DRY UNIT WT. = M – V		~~+0.5~~ 0 9/24/97		DELTA MOISTURE CONTENT = T – U		+0.3	

COMMENTS: * APZ - ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A

** CORRECTED MOISTURE CONTENT USING MOISTURE CORRELATION

000320

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

DETERMINATION OF DENSITY (DRIVE CYLINDER) (ASTM D 2937)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04

DESCRIPTION: PHASE I CONSTRUCTION DATE: 19 day SEPT month 1997 year

SOURCE: ON-SITE CLAY LINER STOCKPILE QA ID: BE

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) OTHER:

% COMPACTION: 95% APZ * MOISTURE CONTENT RANGE: +3% APZ

TEST LOCATION: N. PERIMETER BERM BENCH LIFT #6 TEST NO.: DT-3

FIELD TEST DATA – ASTM D 2937

QA ID: PP

A	CYLINDER NO. 1 VOLUME(1) @ (cf)	57.91 in³	D	WEIGHT OF WET SAMPLE = B–C (lbs)	4,518
B	WEIGHT OF SAMPLE & CYLINDER (lbs)	5.836	E	WET UNIT WEIGHT = D/A (lbs)	134.8
C	WEIGHT OF CYLINDER (lbs)	1.318	F	DRY UNIT WEIGHT = E/[1+(T/100)] (pcf)	117.1

NOTE: CYLINDER VOLUME IS OBTAINED BY MEASURING THE HEIGHT AND DIAMETER, OF FOUR EQUALLY SPACED POINTS, TO 0.01 in AND CALCULATING VOLUME USING AVERAGE HEIGHT AND DIAMETER.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: PP

O	WT. OF TARE NO. 20 (grams)	8.3	R	WT. OF WATER = P–Q (grams)	39.3
P	WT. OF WET SOIL & TARE (grams)	308.0	S	WT. OF DRY SOIL = Q–O (grams)	260.4
Q	WT. OF DRY SOIL & TARE (grams)	268.7	T	MOISTURE CONTENT = (R/S)X100 (%)	15.1%

PROCTOR TEST DATA LP-17 MAXIMUM DRY UNIT WT. (pcf) 118.8 OPTIMUM MOISTURE CONTENT (%) 13.2%

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: SQ

TEST NO.	NDT #429	U	MOISTURE CONTENT (%)	14.9	**
WET UNIT WT. (pcf)	134.4	V	DRY UNIT WT. (pcf)	117.8	
DELTA DRY UNIT WT. = F – V	-0.7		DELTA MOISTURE CONTENT = T – U	+0.2	

COMMENTS:

* APZ → ACCEPTABLE PERMEABILITY ZONE SECTION 02225 PART 3.02A

** CORRECTED MOISTURE CONTENT USING MOISTURE CORRELATION

000321

SC-1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 22 day SEPT month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) OTHER:

% COMPACTION: >95 MOISTURE CONTENT RANGE: NOT OVER 3% ABOVE OMC

TEST LOCATION: stockpile #8 MTL lane #8 - intrvll berm TEST NO.: SC-11

FIELD TEST DATA - ASTM D 1556

QA ID: RBN

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	659
B	INITIAL WT. OF SAND & JAR	(lbs)	15.41	I	WT. OF TARE NO.: ____	(lbs)	.42
C	FINAL WT. OF SAND & JAR	(lbs)	7.18	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	6.17
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	8.23	K	WET UNIT WT. = J/G	(pcf)	135.31
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	116.9
F	WT. OF SAND IN HOLE = D-E	(lbs)	4.33	N	PERCENT COMPACTION = ~~M/U~~	(%)	105
G	VOLUME OF HOLE = F/A	(ft^3)	.0456				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT - ASTM D 2216

QA ID: RBN

O	WT. OF TARE NO. 2	(grams)	7.7	R	WT. OF WATER = P-Q	(grams)	43.4
P	WT. OF WET SOIL & TARE	(grams)	326.8	S	WT. OF DRY SOIL = Q-O	(grams)	275.7
Q	WT. OF DRY SOIL & TARE	(grams)	283.4	T	MOISTURE CONTENT = (R/S)X100	(%)	15.7

PROCTOR TEST DATA * MAXIMUM DRY UNIT WT. (pcf) 111.6 OPTIMUM MOISTURE CONTENT (%) 17.0

COMPARISON WITH NUCLEAR GAUGE - ASTM D 2922 AND D 3017

QA ID: RBN

TEST NO.		498	U	MOISTURE CONTENT	(%)	16.4
WET UNIT WT.	(pcf)	134.8	V	DRY UNIT WT.	(pcf)	115.8
DELTA DRY UNIT WT. = M - V		1.1		DELTA MOISTURE CONTENT = T - U		-0.7

COMMENTS: * AVG. VALUES FOR STOCKPILE 8

000322

SC-1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 30 day SEPT month 1997 year

SOURCE: CLAY LINER

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: ≥95 MOISTURE CONTENT RANGE: NOT MORE THAN 3% ABOVE OMC

TEST LOCATION: SOUTH SLOPE OF INTERCELL BERM 40' N OF STAKE # 1099 LIFT # 8 TEST NO.: SC-12

FIELD TEST DATA – ASTM D 1556

QA ID: KW

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	6.19
B	INITIAL WT. OF SAND & JAR	(lbs)	14.96	I	WT. OF TARE NO.: ____	(lbs)	.42
C	FINAL WT. OF SAND & JAR	(lbs)	6.78	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	5.77
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	8.18	K	WET UNIT WT. = J/G	(pcf)	128.22
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	109.9
F	WT. OF SAND IN HOLE = D–E	(lbs)	4.98	N	PERCENT COMPACTION = ~~M/U~~	(%)	95
G	VOLUME OF HOLE = F/A	(ft^3)	0.045				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: JL

O	WT. OF TARE NO. 9	(grams)	97.2	R	WT. OF WATER = P–Q	(grams)	25.7
P	WT. OF WET SOIL & TARE	(grams)	187.3	S	WT. OF DRY SOIL = Q–O	(grams)	154.4
Q	WT. OF DRY SOIL & TARE	(grams)	161.6	T	MOISTURE CONTENT = (R/S)X100	(%)	16.6

PROCTOR TEST DATA ** LP-42 MAXIMUM DRY UNIT WT. (pcf) 116.0 OPTIMUM MOISTURE CONTENT (%) 15.4

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: ____

TEST NO.		NDT-635	U	MOISTURE CONTENT (%)	16.5*
WET UNIT WT.	(pcf)	131.8	V	DRY UNIT WT. (pcf)	113.1
DELTA DRY UNIT WT. = M – V		-3.2		DELTA MOISTURE CONTENT = T – U	0.1

COMMENTS:

000023

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SC-1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 10 day OCT month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY OTHER:

% COMPACTION: 95 MOISTURE CONTENT RANGE: UPTO 3% ABOVE OMC

TEST LOCATION: NDT-772 TEST NO.: SC-13

FIELD TEST DATA - ASTM D 1556

QA ID: JL

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	8.62
B	INITIAL WT. OF SAND & JAR	(lbs)	15.51	I	WT. OF TARE NO.: ____	(lbs)	.84
C	FINAL WT. OF SAND & JAR	(lbs)	6.06	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	7.78
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	9.45	K	WET UNIT WT. = J/G	(pcf)	134.1
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	114.4
F	WT. OF SAND IN HOLE = D-E	(lbs)	5.55	N	PERCENT COMPACTION = ~~M/U~~	(%)	105
G	VOLUME OF HOLE = F/A	(ft^3)	.058				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT - ASTM D 2216

QA ID: JL

O	WT. OF TARE NO. 2	(grams)	8.2	R	WT. OF WATER = P-Q	(grams)	38.7
P	WT. OF WET SOIL & TARE	(grams)	271.6	S	WT. OF DRY SOIL = Q-O	(grams)	224.7
Q	WT. OF DRY SOIL & TARE	(grams)	232.9	T	MOISTURE CONTENT = (R/S)X100	(%)	17.2

PROCTOR TEST DATA * MAXIMUM DRY UNIT WT. (pcf) 108.6 OPTIMUM MOISTURE CONTENT (%) 17.7

COMPARISON WITH NUCLEAR GAUGE - ASTM D 2922 AND D 3017

QA ID: BH/AZ

TEST NO.		772	U	MOISTURE CONTENT	(%)	16.8
WET UNIT WT.	(pcf)	132.4	V	DRY UNIT WT.	(pcf)	113.4
DELTA DRY UNIT WT. = M - V		1.0	1.0	DELTA MOISTURE CONTENT = T - U		0.4

COMMENTS: * Avg values of Stockpile 11

000024

1267 SC-2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Const. DATE: 11 day Oct month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% Std. MOISTURE CONTENT RANGE: 3.0%

TEST LOCATION: EAST BERM 15'S, 65' W of N.E. Corner toe, Cell #2 TEST NO.: SC-14

FIELD TEST DATA - ASTM D 1556

QA ID: A.Z.

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	6.68
B	INITIAL WT. OF SAND & JAR	(lbs)	15.54	I	WT. OF TARE NO.: ____	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	6.53	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	6.26
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	9.01	K	WET UNIT WT. = J/G	(pcf)	113.8
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.79	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	97.5
F	WT. OF SAND IN HOLE = D-E	(lbs)	5.22	N	PERCENT COMPACTION = M/U	(%)	* ~~8.2~~ HKM 10/14/97
G	VOLUME OF HOLE = F/A	(ft³)	.0550				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT - ASTM D 2216

QA ID: A.Z.

O	WT. OF TARE NO. 33	(grams)	9.0	R	WT. OF WATER = P-Q	(grams)	28.6
P	WT. OF WET SOIL & TARE	(grams)	209.0	S	WT. OF DRY SOIL = Q-O	(grams)	171.4
Q	WT. OF DRY SOIL & TARE	(grams)	180.4	T	MOISTURE CONTENT = (R/S)X100	(%)	16.7

PROCTOR TEST DATA ~~115.9~~ MAXIMUM DRY UNIT WT. (pcf) ~~116.4~~ OPTIMUM MOISTURE CONTENT (%) ____

COMPARISON WITH NUCLEAR GAUGE - ASTM D 2922 AND D 3017

QA ID: A.Z.

TEST NO.		'A'	U	MOISTURE CONTENT	(%)	~~11.9~~ 12.9
WET UNIT WT.	(pcf)	117.5	V	DRY UNIT WT.	(pcf)	~~104.0~~ ~~105.0~~ HKM 10/13/97
DELTA DRY UNIT WT. = M - V		~~7.5~~ ~~6.5~~ HKM 10/13/97		DELTA MOISTURE CONTENT = T - U		~~4.8~~ 3.8

COMMENTS:

COMPARISON TO UNIT WEIGHTS.

000325

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1267 SC-1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Const. Sub. DATE: 11 day Oct. month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% Std MOISTURE CONTENT RANGE: 3.0%

TEST LOCATION: 75'N, 135'W of toe from S.E. Corner, Cell #1 TEST NO.: SC-15

FIELD TEST DATA – ASTM D 1556

QA ID: AZ

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	6.22
B	INITIAL WT. OF SAND & JAR	(lbs)	15.84	I	WT. OF TARE NO.: ____	(lbs)	.02
C	FINAL WT. OF SAND & JAR	(lbs)	7.47	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	6.20
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	8.37	K	WET UNIT WT. = J/G	(pcf)	128.4
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.79	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	114.7
F	WT. OF SAND IN HOLE = D-E	(lbs)	4.58	N	PERCENT COMPACTION = M/U	(%)	*~~9.6~~ HGM 11/23/97
G	VOLUME OF HOLE = F/A	(ft³)	0.0483				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: AZ

O	WT. OF TARE NO. 29	(grams)	7.50	R	WT. OF WATER = P-Q	(grams)	21.2
P	WT. OF WET SOIL & TARE	(grams)	207.0	S	WT. OF DRY SOIL = Q-O	(grams)	178.3
Q	WT. OF DRY SOIL & TARE	(grams)	185.8	T	MOISTURE CONTENT = (R/S)X100	(%)	11.9

PROCTOR TEST DATA ~~115.9~~ MAXIMUM DRY UNIT WT. (pcf) ~~115.9~~ OPTIMUM MOISTURE CONTENT (%) ____

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: AZ

TEST NO.		'B'	U	MOISTURE CONTENT	(%)	~~11.9~~ 12.9	HGM 11/13/97
WET UNIT WT.	(pcf)	136.0	V	DRY UNIT WT.	(pcf)	120.5 ~~121.5~~	
DELTA DRY UNIT WT. = M – V		~~-6.8~~ -5.8 HGM 11/13/97		DELTA MOISTURE CONTENT = T – U		1.0	

COMMENTS:

* COMPARISON TO UNIT WEIGHTS.

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1267 SC-2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Const. Sat. DATE: 11 day Oct month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% Std. MOISTURE CONTENT RANGE: 3.0%

TEST LOCATION: Cell #1, West bend, 12'E of Stat. 808 TEST NO.: SC-16

FIELD TEST DATA – ASTM D 1556

QA ID: A.Z.

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	7.85
B	INITIAL WT. OF SAND & JAR	(lbs)	15.35	I	WT. OF TARE NO.: ____	(lbs)	0.06
C	FINAL WT. OF SAND & JAR	(lbs)	5.70	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	7.79
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	9.65	K	WET UNIT WT. = J/G	(pcf)	126.3
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.79	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	105.2
F	WT. OF SAND IN HOLE = D–E	(lbs)	5.86	N	PERCENT COMPACTION = M/U	(%)	* HKM 11/23/97 ~~5.8~~
G	VOLUME OF HOLE = F/A	(ft^3)	0.0617				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: A.Z.

O	WT. OF TARE NO. 104	(grams)	8.3	R	WT. OF WATER = P–Q	(grams)	30.2
P	WT. OF WET SOIL & TARE	(grams)	189.1	S	WT. OF DRY SOIL = Q–O	(grams)	150.6
Q	WT. OF DRY SOIL & TARE	(grams)	158.9	T	MOISTURE CONTENT = (R/S)X100	(%)	20.1

PROCTOR TEST DATA ____ MAXIMUM DRY UNIT WT. (pcf) ~~115.9~~ OPTIMUM MOISTURE CONTENT (%) ____

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: A.Z.

TEST NO.		'C'	U	MOISTURE CONTENT	(%)	~~18.0~~ 19.8
WET UNIT WT.	(pcf)	127.1	V	DRY UNIT WT.	(pcf)	106.1 ~~107.7~~
DELTA DRY UNIT WT. = M – V		~~2.5~~ -0.9 HKM 10/27/97		DELTA MOISTURE CONTENT = T – U		~~2.1~~ 0.3 HKM 10/28/97

COMMENTS:

* COMPARISON TO UNIT WEIGHTS

000027

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1267 SC-1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Const. DATE: 11 day Oct month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% Std. MOISTURE CONTENT RANGE: 3.0%

TEST LOCATION: 25'S, 230'W of toe from N.E. Corner Cell #1 TEST NO.: SC-17

FIELD TEST DATA – ASTM D 1556

QA ID: A.2

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	7.47
B	INITIAL WT. OF SAND & JAR	(lbs)	14.44	I	WT. OF TARE NO.: ____	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	4.86	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	7.05
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	9.58	K	WET UNIT WT. = J/G	(pcf)	117.7
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	106.5
F	WT. OF SAND IN HOLE = D–E	(lbs)	5.68	N	PERCENT COMPACTION = M/U	(%)	~~12.8~~ *KHem 4/22/97
G	VOLUME OF HOLE = F/A	(ft^3)	0.0599				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: A.2

O	WT. OF TARE NO. 2	(grams)	8.2	R	WT. OF WATER = P–Q	(grams)	21.0
P	WT. OF WET SOIL & TARE	(grams)	229.2	S	WT. OF DRY SOIL = Q–O	(grams)	200.0
Q	WT. OF DRY SOIL & TARE	(grams)	208.2	T	MOISTURE CONTENT = (R/S)X100	(%)	10.5

PROCTOR TEST DATA ____ MAXIMUM DRY UNIT WT. (pcf) ~~115.9~~ OPTIMUM MOISTURE CONTENT (%) ____

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: A.2

TEST NO.		'D'	U	MOISTURE CONTENT	(%)	~~9.2~~ 10.2	
WET UNIT WT.	(pcf)	125.9	V	DRY UNIT WT.	(pcf)	114.2 ~~115.3~~	*KHem 10/13/97
DELTA DRY UNIT WT. = M – V		~~-8.6~~ -7.7 *KHem 10/13/97		DELTA MOISTURE CONTENT = T – U		~~1.3~~ 0.3	

COMMENTS: *COMPARISON TO UNIT WEIGHTS

Outlier 8

1267 SC-1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Const. DATE: 13 day Oct month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% Std MOISTURE CONTENT RANGE: 3.0%

TEST LOCATION: Cell #1, ≈ 270' N, 20' E of Control Pt. #808 TEST NO.: SC-18

FIELD TEST DATA – ASTM D 1556

QA ID: A.Z.

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	9.35 ~~7.40~~
B	INITIAL WT. OF SAND & JAR	(lbs)	14.94	I	WT. OF TARE NO.: G	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	4.50	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	8.93
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	10.44	K	WET UNIT WT. = J/G	(pcf)	129.6
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	108.5
F	WT. OF SAND IN HOLE = D–E	(lbs)	6.54	N	PERCENT COMPACTION = M/U	(%)	100.7 ~~5.3~~ 10/14/97
G	VOLUME OF HOLE = F/A	(ft^3)	.0689				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: A.Z.

O	WT. OF TARE NO. 28	(grams)	8.2	R	WT. OF WATER = P–Q	(grams)	34.8
P	WT. OF WET SOIL & TARE	(grams)	222.4	S	WT. OF DRY SOIL = Q–O	(grams)	179.4
Q	WT. OF DRY SOIL & TARE	(grams)	187.6	T	MOISTURE CONTENT = (R/S)X100	(%)	19.4

PROCTOR TEST DATA _____ MAXIMUM DRY UNIT WT. (pcf) 107.7 OPTIMUM MOISTURE CONTENT (%) 18.5

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: A.Z.

TEST NO.			U	MOISTURE CONTENT	(%)	20.3
WET UNIT WT.	(pcf)	129.1	V	DRY UNIT WT.	(pcf)	107.3
DELTA DRY UNIT WT. = M – V		1.2		DELTA MOISTURE CONTENT = T – U		-.9

COMMENTS:

000329

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Const. DATE: 13 day Oct. month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% Std. MOISTURE CONTENT RANGE: ≥ 3.0%

TEST LOCATION: Cell #2, E. Bench, 20'S, 60'E of toe from N.E. Corner TEST NO.: SC-19

FIELD TEST DATA – ASTM D 1556

QA ID: A.Z.

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	8.23
B	INITIAL WT. OF SAND & JAR	(lbs)	13.84	I	WT. OF TARE NO.: ____	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	4.03	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	7.81
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	9.81	K	WET UNIT WT. = J/G	(pcf)	125.4
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	105.5
F	WT. OF SAND IN HOLE = D–E	(lbs)	5.91	N	PERCENT COMPACTION = M/U	(%)	5.4
G	VOLUME OF HOLE = F/A	(ft^3)	.0623				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: A.Z.

O	WT. OF TARE NO. 12	(grams)	7.4	R	WT. OF WATER = P–Q	(grams)	26.6
P	WT. OF WET SOIL & TARE	(grams)	174.8	S	WT. OF DRY SOIL = Q–O	(grams)	140.8
Q	WT. OF DRY SOIL & TARE	(grams)	148.2	T	MOISTURE CONTENT = (R/S)X100	(%)	18.9

PROCTOR TEST DATA ____ MAXIMUM DRY UNIT WT. (pcf) 107.7 OPTIMUM MOISTURE CONTENT (%) 18.5

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: A.Z.

TEST NO.			U	MOISTURE CONTENT	(%)	19.6
WET UNIT WT.	(pcf)	124.8	V	DRY UNIT WT.	(pcf)	104.3
DELTA DRY UNIT WT. = M – V		1.2		DELTA MOISTURE CONTENT = T – U		-.7

COMMENTS:

00030

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1267 SC-1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Const. DATE: 13 day Oct. month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% Std MOISTURE CONTENT RANGE: 3.0%

TEST LOCATION: 15'E of Control Pt. #808, Cell #1 NDT-808 TEST NO.: SC-20

FIELD TEST DATA - ASTM D 1556

QA ID: A.Z.

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	9.22
B	INITIAL WT. OF SAND & JAR	(lbs)	14.10	I	WT. OF TARE NO.: 0.42 + 0.42	(lbs)	0.84
C	FINAL WT. OF SAND & JAR	(lbs)	4.08	J	WT. OF WET SOIL FROM HOLE = H-I	(lbs)	8.38
D	WT. OF SAND IN FUNNEL & HOLE = B-C	(lbs)	10.02	K	WET UNIT WT. = J/G	(pcf)	130.5
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.90	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	109.3
F	WT. OF SAND IN HOLE = D-E	(lbs)	6.12	N	PERCENT COMPACTION = M/U	(%)	5.7
G	VOLUME OF HOLE = F/A	(ft^3)	.0642				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT - ASTM D 2216

QA ID: A.Z.

O	WT. OF TARE NO. 1	(grams)	7.2	R	WT. OF WATER = P-Q	(grams)	33.4
P	WT. OF WET SOIL & TARE	(grams)	213.0	S	WT. OF DRY SOIL = Q-O	(grams)	172.4
Q	WT. OF DRY SOIL & TARE	(grams)	179.6	T	MOISTURE CONTENT = (R/S)X100	(%)	19.4

PROCTOR TEST DATA _____ MAXIMUM DRY UNIT WT. (pcf) 107.7 OPTIMUM MOISTURE CONTENT (%) 18.5

COMPARISON WITH NUCLEAR GAUGE - ASTM D 2922 AND D 3017

QA ID: A.Z.

TEST NO.				U	MOISTURE CONTENT (Corrected)	(%)	19.1
WET UNIT WT.		(pcf)	130.2	V	DRY UNIT WT.	(pcf)	109.3
DELTA DRY UNIT WT. = M - V			0		DELTA MOISTURE CONTENT = T - U		.3

COMMENTS:

00001

1267 SC-2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD SAND CONE DENSITY TEST (ASTM D 1556)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Const. DATE: 13 day Oct month 1997 year

SOURCE:

SPECIFICATION REQUIREMENTS:

MATERIAL TYPE: (CIRLCLE ONE) FILL / SUBGRADE / SUBBASE / (CLAY) / OTHER:

% COMPACTION: 95% Std MOISTURE CONTENT RANGE: 3.0 %

TEST LOCATION: 80'S, 35'W of Control Pt. #145 TEST NO.: SC-21

FIELD TEST DATA – ASTM D 1556

QA ID: A.Z.

A	BULK UNIT WT. OF SAND (SEE CALIBARTION FORM)	(pcf)	94.9	H	WT. OF WET SOIL & TARE FROM HOLE	(lbs)	8.41
B	INITIAL WT. OF SAND & JAR	(lbs)	15.75	I	WT. OF TARE NO.: ____	(lbs)	0.42
C	FINAL WT. OF SAND & JAR	(lbs)	6.12	J	WT. OF WET SOIL FROM HOLE = H–I	(lbs)	7.99
D	WT. OF SAND IN FUNNEL & HOLE = B–C	(lbs)	9.67	K	WET UNIT WT. = J/G	(pcf)	128.9
E	WT. OF SAND IN FUNNEL (1)	(lbs)	3.79	M	DRY UNIT WT. = K/[1+(T/100)]	(pcf)	107.4
F	WT. OF SAND IN HOLE = D–E	(lbs)	5.88	N	PERCENT COMPACTION = M/U	(%)	5.4
G	VOLUME OF HOLE = F/A	(ft^3)	0.0620				

NOTE: THE WEIGHT OF SAND IN FUNNEL (E) IS OBTAINED BY WEIGHING THE SAND, A MINIMUM OF THREE TIMES, IN THE APPARATUS BEFORE AND AFTER THE APPARATUS HAS BEEN TURNED OVER ON THE BASE PLATE ALONG A FLAT SURFACE WITH THE SAND BEING EXPENDED.

FIELD MOISTURE CONTENT – ASTM D 2216

QA ID: A.Z.

O	WT. OF TARE NO. 33	(grams)	8.3	R	WT. OF WATER = P–Q	(grams)	32.3
P	WT. OF WET SOIL & TARE	(grams)	202.2	S	WT. OF DRY SOIL = Q–O	(grams)	161.6
Q	WT. OF DRY SOIL & TARE	(grams)	169.9	T	MOISTURE CONTENT = (R/S)X100	(%)	20.0

PROCTOR TEST DATA ____ MAXIMUM DRY UNIT WT. (pcf) 107.7 OPTIMUM MOISTURE CONTENT (%) 18.5

COMPARISON WITH NUCLEAR GAUGE – ASTM D 2922 AND D 3017

QA ID: A.Z.

TEST NO.				U	MOISTURE CONTENT	(%)	19.8
WET UNIT WT.		(pcf)	129.4	V	DRY UNIT WT.	(pcf)	108.0
DELTA DRY UNIT WT. = M – V			-.6		DELTA MOISTURE CONTENT = T – U		.2

COMMENTS:

000302

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APPENDIX H:

MANUFACTURER'S QUALITY CONTROL DOCUMENTATION

OSDF Phase I
- Geosynthetic Clay Liner
- Geomembrane
- Geotextile
- HDPE Pipes and Manholes
- Liner Penetration Boxes

Leachate Conveyance System
- HDPE Pipes and Fittings
- Cleanouts
- Manholes and Permanent Life Station

OSDF Phase I

Geosynthetic Clay Liner

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 09-09-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4467

ORDER NUMBER: 3G88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. [40,000 sq. ft.].

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. [40,000 sq. ft.] for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. [100,000 sq. ft.] for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

GCL-21

LOT# 97080802
ROLL# 34405,34406,34407,34408,34409,34410

LOT# 97082602
ROLL# 36256,36261

LOT# 97090402
ROLL# 37273,37274,37275,37276,37277,37280,37281,37283,37286

KEVIN NEWMAN
Quality Control Manager

09/10/1997
DATE

Date:09/10/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4467 Shipment Date: 09/09/97

	Roll #	Length	Width
Lot #: 97080802			
	34405	150.00	15.5
	34406	150.00	15.5
	34407	150.00	15.5
	34408	150.00	15.5
	34409	150.00	15.5
	34410	150.00	15.5
* Subtotal [ft]		900.00	
Lot #: 97082602			
	36256	150.00	15.5
	36261	150.00	15.5
* Subtotal [ft]		300.00	
Lot #: 97090402			
	37273	150.00	15.5
	37274	150.00	15.5
	37275	150.00	15.5
	37276	150.00	15.5
	37277	150.00	15.5
	37280	150.00	15.5
	37281	150.00	15.5
	37283	150.00	15.5
	37286	150.00	15.5
* Subtotal [ft]		1350.00	
* Total [ft]		2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	SOL# 4467
97080802	34405	08/08/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.105	108	218	180	174	<5E-9	9.1

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708062058-1	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7027762	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
307592	90	32	9.1	787	1.033

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	EOL# 4467
97082602	36256	08/26/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.111	104	214	177	100	<5E-9	8.4

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
97C824205B-1	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7028918	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
453477	90	27	8.4	777	1.039

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4467
97090402	37273	09/04/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.107	110	220	100	100	<5E-9	8.5

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9709022058	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7047946	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
830	90	29	8.4	792	1.034

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO.

SHIP DATE: 09-08-1997

PROJECT: FLUOR DANIELS FERNALD

NO.ROLLS/B.O.L.NO.: 17/4450

ORDER NUMBER: 3088/1F

PRODUCT TYPE: BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. [40,000 sq. ft.].

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. [40,000 sq. ft.] for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. [100,000 sq. ft.] for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97090612

ROLL# ~~37601~~,37603,37604,~~37605~~ GCL-18

LOT# 97090702

ROLL# 37612,37618,37619,37621,37622,37623,37624,37625,37626,37627,~~37628~~

37629,37630

GCL-19

KEVIN NEWMAN
Quality Control Manager

09/08/1997
DATE

Date:09/08/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4450 Shipment Date: 09/08/97

	Roll #	Length	Width
Lot #: 97090512			
	37601	150.00	15.5
	37603	127.95	15.5
	37604	150.00	15.5
	37605	150.00	15.5
* Subtotal [ft]		577.95	
Lot #: 97090702			
	37612	150.00	15.5
	37618	150.00	15.5
	37619	150.00	15.5
	37621	150.00	15.5
	37622	150.00	15.5
	37623	150.00	15.5
	37624	150.00	15.5
	37625	150.00	15.5
	37626	144.36	15.5
	37627	150.00	15.5
	37628	150.00	15.5
	37629	150.00	15.5
	37630	150.00	15.5
* Subtotal [ft]		1944.36	
* Total [ft]		2522.31	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4450
97030612	37601	09/07/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.106	117	260	107	140	<5E-9	8.3

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
97090320SB	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
582640	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
446-8	90	28	7.8	840	1.034

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97090702	37612	09/07/97

BCL# 4450

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.197	108	245	129	132	<5E-9	8.0

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9709032C5B	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
586190	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
21	90	30	8.0	781	1.126

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 09-05-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4436

ORDER NUMBER: 3G88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. [40,000 sq. ft.].

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. [40,000 sq. ft.] for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. [100,000 sq. ft.] for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97090502

SAMPLE GCL-16

ROLL# ~~37357,37359,37360~~

LOT# 97090512

SAMPLE GCL-17

ROLL# ~~37380,37381,37382,37383,37384,37385,37386,37387,37388,37389,37390~~

~~37391,37392,37393~~

KEVIN NEWMAN
Quality Control Manager

09/05/1997
DATE

Date:09/05/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4436 Shipment Date: 09/05/97

Roll #	Length	Width
Lot #: 97090502		
37357	150.00	15.5
37359	150.00	15.5
37360	150.00	15.5
* Subtotal [ft]	450.00	
Lot #: 97090512		
37380	150.00	15.5
37381	150.00	15.5
37382	150.00	15.5
37383	150.00	15.5
37384	150.00	15.5
37385	150.00	15.5
37386	150.00	15.5
37387	150.00	15.5
37388	150.00	15.5
37389	150.00	15.5
37390	60.70	15.5
37391	150.00	15.5
37392	150.00	15.5
37393	150.00	15.5
* Subtotal [ft]	2010.70	
* Total [ft]	2460.70	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL#
97090502	37357	09/04/97	4436

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.112	110	284	128	109	<5E-9	8.3

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708302058-1	0.053

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7048567	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
455352	90	29	8.3	807	1.037

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL#
97090512	37380	09/04/97	4436

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.154	128	269	136	102	<5E-9	8.6

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970830205B-1	0.053

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7048567	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
454557	90	26	8.6	658	1.079

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO.

SHIP DATE: 09-04-1997

PROJECT: FLUOR DANIELS FERNALD

NO.ROLLS/B.O.L.NO.: 17/4427

ORDER NUMBER: 3G88/1F

PRODUCT TYPE: BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97080802
ROLL# ~~34412,34438~~
LOT# 97081302
ROLL# ~~34941~~ GCL-20
LOT# 97082602 DAMAGED DURING UNLOAD, etc.
ROLL# ~~36262,36269,36272~~
LOT# 97090202 SAMPLE-GCL-15
ROLL# ~~37057,37058,37060~~,37061,37062,37066,37067,~~37068~~
LOT# 97090302
ROLL# ~~37070~~
LOT# 97090402
ROLL# ~~37260,37269~~

KEVIN NEWMAN
Quality Control Manager

09/04/1997
DATE

Date:09/04/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4427 Shipment Date: 09/04/97

	Roll #	Length	Width
Lot #: 97080802			
	34412	150.00	15.5
	34438	150.00	15.5
* Subtotal [ft]		300.00	
Lot #: 97081302			
	34941	150.00	15.5
* Subtotal [ft]		150.00	
Lot #: 97082602			
	36262	150.00	15.5
	36269	150.00	15.5
	36272	150.00	15.5
* Subtotal [ft]		450.00	
Lot #: 97090202			
	37057	150.00	15.5
	37058	150.00	15.5
	37060	150.00	15.5
GCL-15	37061	150.00	15.5
	37062	150.00	15.5
	37066	150.00	15.5
	37067	150.00	15.5
	37068	150.00	15.5
* Subtotal [ft]		1200.00	
Lot #: 97090302			
	37070	150.00	15.5
* Subtotal [ft]		150.00	
Lot #: 97090402			
	37260	100.07	15.5
	37269	150.00	15.5
* Subtotal [ft]		250.07	
* Total [ft]		2500.07	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4427
97080802	34412	08/08/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.105	108	218	180	174	<5E-9	9.1

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970806205B-1	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7027762	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
307592	90	32	9.1	787	1.033

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97081302	34941	08/13/97

BOL# 4427

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.104	104	234	169	104	<5E-9	8.4

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708172059	0.053

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
3550933	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
454814	90	30	8.3	807	1.028

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082602	36262	08/26/97

BOL# 4427

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.111	104	214	177	100	<5E-9	8.4

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
97082420SB-1	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7028918	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
453477	90	27	8.4	777	1.039

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4427
97090202	37057	09/02/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.107	106	295	166	92	<5E-9	8.4

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708232058-1	0.052

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
585380	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
511	90	29	7.5	777	1.032

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97090302	37070	09/02/97

BOL# 4427

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.106	108	311	151	149	<5E-9	9.0

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970902205B	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
58528C	0.023

4. BENTONITE TYPE : 16 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
47014	90	32	9.0	802	1.034

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

BOL# 4427

LOT#	ROLL #	DATE
97090402	37260	09/04/97

PRODUCT: BENTOFIX NS

DIMENSIONS: 100.07 ft x 15.5 ft
30.5 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.107	110	220	100	100	<5E-9	8.5

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970902205B	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7047946	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
830	90	29	8.4	792	1.034

1267

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 09-03-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 18/4418

ORDER NUMBER: 3088/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97090302 Sheet

GCL-13

ROLL# ~~37090,37092,37093,37094,37095,37096,37097~~,37098,~~37099,37104,37105~~

37106,~~37107,37108,37109,37120,37133,37135~~

KEVIN NEWMAN
Quality Control Manager

09/03/1997
DATE

Date:09/03/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4418 Shipment Date: 09/03/97

Lot #: 97090302

Roll #	Length	Width
37090	150.00	15.5
37092	150.00	15.5
37093	150.00	15.5
37094	150.00	15.5
37095	150.00	15.5
37096	150.00	15.5
37097	150.00	15.5
37098	150.00	15.5
37099	150.00	15.5
37104	150.00	15.5
37105	150.00	15.5
37106	150.00	15.5
37107	150.00	15.5
37108	150.00	15.5
37109	150.00	15.5
37120	62.34	15.5
37133	49.21	15.5
37135	150.00	15.5
* Subtotal [ft]	2511.55	
* Total [ft]	2511.55	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4418
97090302	37090	09/03/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.105	108	311	151	149	<5E-9	9.0

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9709022058	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
585280	0.023

4. BENTONITE TYPE : 16 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
47014	90	32	9.0	802	1.034

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 09-03-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4424

ORDER NUMBER: 3088/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97090102 NO SAMPLE NE RECORD
ROLL# ~~36903,36904,36905,36906,36907,36908,36909~~
LOT# 97090202
ROLL# ~~37052~~ SAMPLE
LOT# 97090302
ROLL# 37071,~~37089~~ GCL-14
LOT# 97090402
ROLL# ~~37171,37172,37173,37174,37175,37176,37177~~

KEVIN NEWMAN
Quality Control Manager

09/03/1997
DATE

Date:09/03/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4424 Shipment Date: 09/03/97

	Roll #	Length	Width
Lot #: 97090102			
	36903	150.00	15.5
	36904	150.00	15.5
	36905	150.00	15.5
	36906	150.00	15.5
	36907	150.00	15.5
	36908	150.00	15.5
	36909	150.00	15.5
* Subtotal [ft]		1050.00	
Lot #: 97090202			
	37052	150.00	15.5
* Subtotal [ft]		150.00	
Lot #: 97090302			
	37071	150.00	15.5
	37089	150.00	15.5
* Subtotal [ft]		300.00	
Lot #: 97090402			
	37171	150.00	15.5
	37172	150.00	15.5
	37173	150.00	15.5
	37174	150.00	15.5
	37175	150.00	15.5
	37176	150.00	15.5
	37177	150.00	15.5
* Subtotal [ft]		1050.00	
* Total [ft]		2550.00	

1267

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4424
97090102	36903	09/01/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.123	104	223	173	105	<5E-9	7.7

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708282058	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7042428	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
141	90	30	7.7	754	1.049

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4424
97090202	37052	09/02/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.107	106	295	166	92	<5E-9	8.4

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970823205B-1	0.052

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
585380	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
511	90	29	7.5	777	1.032

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4424
97090302	37071	09/02/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.106	108	311	151	148	<5E-9	9.0

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970902205B	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
585280	0.023

4. BENTONITE TYPE : 16 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
47014	90	32	9.0	802	1.034

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97090402	37171	09/03/97

BOL# 4424

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.107	110	220	100	100	<5E-9	9.5

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9709022058	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7047946	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
314752	90	33	8.5	822	1.034

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO.

SHIP DATE: 09-02-1997

PROJECT: FLUOR DANIELS FERNALD

NO.ROLLS/B.O.L.NO.: 17/4407

ORDER NUMBER: 3G88/1F

PRODUCT TYPE: BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97090102

GCL-11

ROLL# 36931,36932,36933,36934,36935,36937,36942,36943,36944,36945,36947

36948,36949,36950,36951,36952,36953

KEVIN NEWMAN
Quality Control Manager

09/03/1997
DATE

Date:09/03/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4407 Shipment Date: 09/02/97

Lot #: 97090102

Roll #	Length	Width
36931	150.00	15.5
36932	150.00	15.5
36933	150.00	15.5
36934	150.00	15.5
36935	150.00	15.5
36937	150.00	15.5
36942	150.00	15.5
36943	150.00	15.5
36944	150.00	15.5
36945	150.00	15.5
36947	150.00	15.5
36948	150.00	15.5
36949	150.00	15.5
36950	150.00	15.5
36951	150.00	15.5
36952	150.00	15.5
36953	150.00	15.5
* Subtotal [ft]	2550.00	
* Total [ft]	2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4407
97090102	36931	09/01/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.123	104	223	173	105	<5E-9	7.7

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708282058	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7042428	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
141	90	30	7.7	754	1.049

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO.

SHIP DATE: 09-02-1997

PROJECT: FLUOR DANIELS FERNALD

NO.ROLLS/B.O.L.NO.: 17/4408

ORDER NUMBER: 3G88/1F

PRODUCT TYPE: BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082602

ROLL# ~~36249,36270,36271~~

LOT# 97090102

ROLL# ~~36910,36911~~,~~36912,36913~~,36914,~~36915~~,~~36916~~,36918,~~36919~~,~~36920~~,~~36927~~

~~36928,36929,36930~~

KEVIN NEWMAN
Quality Control Manager

09/03/1997
DATE

Date:09/03/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4408 Shipment Date: 09/02/97

	Roll #	Length	Width
Lot #: 97082602			
	36249	150.00	15.5
	36270	150.00	15.5
	36271	150.00	15.5
* Subtotal [ft]	3	450.00	
Lot #: 97090102			
	36910	150.00	15.5
	36911	150.00	15.5
	36912	150.00	15.5
	36913	150.00	15.5
	36914	150.00	15.5
	36915	150.00	15.5
	36916	150.00	15.5
	36918	150.00	15.5
	36919	150.00	15.5
	36920	150.00	15.5
	36927	150.00	15.5
	36928	150.00	15.5
	36929	150.00	15.5
	36930	150.00	15.5
* Subtotal [ft]	14	2100.00	
* Total [ft]		2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4408
97082602	36249	08/26/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.111	104	214	177	100	<5E-9	8.4

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708242058-1	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7028918	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
453477	90	27	8.4	777	1.039

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4408
97090102	36910	09/01/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.123	104	223	173	105	<5E-9	7.7

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970828205B	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7042428	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
141	90	30	7.7	754	1.049

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-28-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 16/4390

ORDER NUMBER: 3C88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082802 GCL-12

ROLL# ~~36429,36430,36431,36432,36433,36435,36441~~,~~36442,36443,36445,36446~~

~~36447,36448,36449,36450,36459~~

KEVIN NEWMAN
Quality Control Manager

08/29/1997
DATE

Date:08/28/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4390 Shipment Date: 08/28/97

Lot #: 97082802

Roll #	Length	Width
36429	150.00	15.5
36430	150.00	15.5
36431	150.00	15.5
36432	150.00	15.5
36433	150.00	15.5
36435	150.00	15.5
36441	150.00	15.5
36442	150.00	15.5
36443	150.00	15.5
36445	150.00	15.5
36446	150.00	15.5
36447	150.00	15.5
36448	150.00	15.5
36449	150.00	15.5
36450	150.00	15.5
36459	150.00	15.5
* Subtotal [ft]	2400.00	
* Total [ft]	2400.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082802	36429	08/27/97

BOL# 4390

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.108	110	227	117	105	<5E-9	8.5

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708262058	0.054

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
562500	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
311905	90	27	8.5	794	1.032

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-29-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4391

ORDER NUMBER: 3088/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082812 GCL-10

ROLL# 36516 ~~36552,36553,36554,36555,36556,36557,36558,36559,36560,36562,36563~~

~~36564,36565,36566,36568,36569,36570~~

36546

KEVIN NEWMAN
Quality Control Manager

08/29/1997
DATE

Date:08/29/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4391 Shipment Date: 08/29/97

Lot #: 97082812

Roll #	Length	Width
36552	150.00	15.5
36553	150.00	15.5
36554	150.00	15.5
36555	150.00	15.5
36556	150.00	15.5
36557	150.00	15.5
36558	150.00	15.5
36559	150.00	15.5
36560	150.00	15.5
36562	150.00	15.5
36563	150.00	15.5
36564	150.00	15.5
36565	150.00	15.5
36566	150.00	15.5
36568	150.00	15.5
36569	150.00	15.5
36570	125.00	15.5
Subtotal [ft]	2525.00	
* Total [ft]	2525.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082812	36552	08/28/97

BOL# 4391

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.106	123	331	131	91	<5E-9	9.1

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970825205B	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
582030	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
315118-1	90	30	9.1	803	1.033

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-29-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4400

ORDER NUMBER: 3088/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. [40,000 sq. ft.].

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. [40,000 sq. ft.] for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. [100,000 sq. ft.] for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082812

ROLL# 36516,~~36533,36534,36537,36538,36539,36540,36542,36543,36544,36545~~

~~36546,36547,36548,36549,36550,36567~~

KEVIN NEWMAN
Quality Control Manager

08/29/1997
DATE

Date:08/29/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4400 Shipment Date: 08/29/97

Lot #: 97082812

Roll #	Length	Width
36516	150.00	15.5
36533	150.00	15.5
36534	150.00	15.5
36537	150.00	15.5
36538	150.00	15.5
36539	150.00	15.5
36540	150.00	15.5
36542	150.00	15.5
36543	150.00	15.5
36544	150.00	15.5
36545	150.00	15.5
36546	150.00	15.5
36547	150.00	15.5
36548	150.00	15.5
36549	150.00	15.5
36550	150.00	15.5
36567	150.00	15.5
* Subtotal [ft]	2550.00	
* Total [ft]	2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082812	36516	08/28/97

BOL# 4400

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.106	123	331	131	91	<5E-9	9.1

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708252058	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
582030	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
315118-1	90	30	9.1	803	1.033

1267

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-27-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4379

ORDER NUMBER: 3G88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082602

ROLL# ~~36311~~,36312,36313,~~36314~~,~~36315~~ SAMPLE GCL-08

LOT# 97082702

ROLL# ~~36318~~,~~36332~~,~~36333~~,~~36334~~,~~36335~~,~~36336~~,36337,~~36338~~,36339,~~36342~~,~~36343~~

36344 SAMPLE GCL-09

KEVIN NEWMAN
Quality Control Manager

08/28/1997
DATE

Date:08/27/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4379 Shipment Date: 08/27/97

	Roll #	Length	Width
Lot #: 97082602			
	36311	150.00	15.5
	36312	150.00	15.5
	36313	150.00	15.5
	36314	150.00	15.5
	36315	150.00	15.5
* Subtotal [ft]		750.00	
Lot #: 97082702			
	36318	150.00	15.5
	36332	150.00	15.5
	36333	150.00	15.5
	36334	150.00	15.5
	36335	150.00	15.5
	36336	150.00	15.5
	36337	125.00	15.5
	36338	150.00	15.5
	36339	150.00	15.5
	36342	150.00	15.5
	36343	150.00	15.5
	36344	150.00	15.5
* Subtotal [ft]	17	1775.00	
* Total [ft]		2525.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082602	36311	08/27/97

BOL# 4379

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.111	104	214	177	100	<5E-9	8.4

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970824205B-1	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7028918	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
453477	90	27	8.4	777	1.039

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082702	36318	08/27/97

BOL# 4379

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.122	108	196	171	80	<5E-9	8.0

2. TCP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708252058-1	0.056

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7031996	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
454685-1	90	31	8.0	827	1.044

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-26-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4380

ORDER NUMBER: 3088/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082702

ROLL# ~~36322~~,~~36323~~,~~36324~~,36325,~~36326~~,~~36328~~,36385,~~36387~~,~~36388~~,~~36389~~,~~36390~~

~~36391~~,~~39392~~,~~36394~~,~~36395~~,~~39396~~,~~39397~~

KEVIN NEWMAN
Quality Control Manager

08/28/1997
DATE

Date:08/27/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4380 Shipment Date: 08/27/97

Lot #: 97082702

Roll #	Length	Width
36322	150.00	15.5
36323	150.00	15.5
36324	150.00	15.5
36325	150.00	15.5
36326	150.00	15.5
36328	150.00	15.5
36385	150.00	15.5
36387	150.00	15.5
36388	150.00	15.5
36389	150.00	15.5
36390	150.00	15.5
36391	150.00	15.5
36392	150.00	15.5
36394	150.00	15.5
36395	150.00	15.5
36396	150.00	15.5
36397	150.00	15.5
Subtotal [ft] 17	2550.00	
* Total [ft]	2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082702	36322	08/27/97

BOL# 4380

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.122	108	196	171	80	<5E-9	8.0

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
97C825205B-1	0.056

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7031996	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
454685-1	90	31	8.0	827	1.044

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-25-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4370

ORDER NUMBER: 3G88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082302

ROLL# 36059,36068

LOT# 97082502

ROLL# 36076,36077,36078,36080,36081,36082,36083,36084,36085,36094,36095

GCL-06

36096,36104,36110,36114

DATE

Date:08/25/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4370 Shipment Date: 08/25/97

Roll #	Length	Width
Lot #: 97082302		
36059	150.00	15.5
36068	150.00	15.5
* Subtotal [ft]	300.00	
Lot #: 97082502		
36076	150.00	15.5
36077	150.00	15.5
36078	150.00	15.5
36080	150.00	15.5
36081	150.00	15.5
36082	150.00	15.5
36083	150.00	15.5
36084	150.00	15.5
36085	150.00	15.5
36094	150.00	15.5
36095	150.00	15.5
36096	150.00	15.5
36104	150.00	15.5
36110	150.00	15.5
36114	150.00	15.5
* Subtotal [ft]	2250.00	
* Total [ft]	2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4370
97082302	36059	08/25/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.105	130	287	135	100	<5E9	9.3

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970821205B	0.048

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7045038	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
454230-1	90	26	9.3	830	1.034

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4370
97082502	36076	08/25/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.112	121	234	167	90	<5E9	8.9

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708162058-2	0.054

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7028920	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
458621	90	29	8.9	746	1.036

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-25-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4371

ORDER NUMBER: 3G88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082302

ROLL# 36045,36046,36047,36048,36049,36050,36060,36061,36062,36063,36064
GCL-07
36065,36066,36069,36074,36073

LOT# 97082502

ROLL# 36075

DATE

Date:08/25/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4371 Shipment Date: 08/25/97

	Roll #	Length	Width
Lot #: 97082302			
	36045	150.00	15.5
	36046	150.00	15.5
	36047	150.00	15.5
	36048	150.00	15.5
	36049	150.00	15.5
	36050	150.00	15.5
	36060	150.00	15.5
	36061	150.00	15.5
	36062	150.00	15.5
	36063	150.00	15.5
	36064	150.00	15.5
	36065	150.00	15.5
	36066	150.00	15.5
	36069	134.51	15.5
	36074	150.00	15.5
	36073	150.00	15.5
* Subtotal [ft]		2384.51	
Lot #: 97082502			
	36075	150.00	15.5
* Subtotal [ft]		150.00	
* Total [ft]		2534.51	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082302	36045	08/23/97

BOL# 4371

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.105	130	287	135	100	<5E9	9.3

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708212058	0.048

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7045038	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
454230-1	90	26	9.3	830	1.034

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082502	36075	08/25/97

BOL# 54371

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.112	121	234	167	90	<5E9	8.9

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708162058-2	0.054

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7028920	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
458621	90	29	8.9	746	1.036

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO.

SHIP DATE: 08-22-1997

PROJECT: FLUOR DANIELS FERNALD

NO.ROLLS/B.O.L.NO.: 17/4336

ORDER NUMBER: 3G88/1F

PRODUCT TYPE: BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. [40,000 sq. ft.].

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. [40,000 sq. ft.] for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. [100,000 sq. ft.] for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082012

ROLL# 35730,~~35731~~,~~35733~~,~~35748~~,~~35750~~,~~35751~~,~~35752~~,~~35753~~,~~35755~~,~~35756~~,~~35757~~ *

GCL-04

LOT# 97082102

ROLL# ~~35807~~,~~35810~~,~~35809~~,35811,~~35812~~,~~35813~~

GCL-05

DATE

Date:08/22/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : [redacted]

Shipment Date: 08/22/97

	Roll #	Length	Width
Lot #: [redacted]			
	35730	150.00	15.5
	35731	150.00	15.5
	35733	150.00	15.5
	35748	150.00	15.5
	35750	150.00	15.5
	35751	150.00	15.5
	35752	150.00	15.5
	35753	150.00	15.5
	35755	150.00	15.5
	35756	150.00	15.5
	35757	150.00	15.5
* Subtotal [ft]		1650.00	
Lot #:[redacted]97082102			
	35807	150.00	15.5
	35810	150.00	15.5
	35809	150.00	15.5
	35811	150.00	15.5
	35812	150.00	15.5
	35813	150.00	15.5
* Subtotal [ft]		900.00	
* Total [ft]		2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082012	35730	08/20/97

BCL# 4336

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.115	104	218	147	79	<5E9	9.2

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708192058	0.056

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7034838	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
314279	90	27	9.2	766	1.037

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082102	35807	08/21/97

BOL# 4336

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.123	143	245	130	109	<5E9	8.7

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708182058-1	0.054

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7042429	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
446119	90	29	8.7	804	1.046

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO.

SHIP DATE: 08-19-1997

PROJECT: FLUOR DANIELS FERNALD

NO.ROLLS/B.O.L.NO.: 18/4337 17

ORDER NUMBER: 3C88/1F

PRODUCT TYPE: BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97082012

ROLL# ~~35725,35726,35727,35728,35729,35734,35735,35736,35737,35738,35739~~

~~35740,35741,35743,35744,35745,35746~~

DATE

Date:08/22/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4337 Shipment Date: 08/22/97

Lot #: 97082012

Roll #	Length	Width
35725	150.00	15.5
35726	150.00	15.5
35727	150.00	15.5
35728	150.00	15.5
35729	150.00	15.5
35734	150.00	15.5
35735	150.00	15.5
35736	150.00	15.5
35737	150.00	15.5
35738	150.00	15.5
35739	150.00	15.5
35740	150.00	15.5
35741	150.00	15.5
35743	150.00	15.5
35744	150.00	15.5
35745	150.00	15.5
35746	150.00	15.5
* Subtotal [ft] 17	2550.00	
* Total [ft]	2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97082012	35725	08/20/97

BOL# 4337

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.115	104	218	147	79	<5E9	9.2

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708192058	0.056

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7034838	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
314279	90	27	9.2	766	1.037

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-15-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4312

ORDER NUMBER: 3G88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. [40,000 sq. ft.].

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. [40,000 sq. ft.] for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. [100,000 sq. ft.] for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97062902
ROLL# 29968 GCL-03

LOT# 97081402 DAMAGED DAMAGED DAMAGED
ROLL# 35047,35048,35049,35050,35051,35053,35059,35060,35061,35063,35065
35067

LOT# 97081502
ROLL# 35154,35155,35157,35158

KEVIN NEWMAN
Quality Control Manager

08/16/1997
DATE

Date:08/16/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4312 Shipment Date: 08/15/97

	Roll #	Length	Width
Lot #: 97062902			
	29968	125.00	15.5
* Subtotal [ft]		125.00	
Lot #: 97081402			
	35047	150.00	15.5
	35048	150.00	15.5
	35049	150.00	15.5
	35050	150.00	15.5
	35051	150.00	15.5
	35053	150.00	15.5
	35059	150.00	15.5
	35060	150.00	15.5
	35061	150.00	15.5
	35063	150.00	15.5
	35065	150.00	15.5
	35067	150.00	15.5
* Subtotal [ft]		1800.00	
Lot #: 97081502			
	35154	150.00	15.5
	35155	150.00	15.5
	35157	150.00	15.5
	35158	150.00	15.5
* Subtotal [ft]		600.00	
* Total [ft]		2525.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL#
97062902	29968	06/30/97	4312

PRODUCT: BENTOFIX NS

DIMENSIONS: 125.00 ft x 15.5 ft
38.10 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

REQUIREMENTS UNWELD

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s) (≤ 5x10^-9 cm/s)	MOISTURE CONTENT (%) (≤ 25%)
1.143	126	247	128	178	<5E9	8.6

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9706242058-1	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
724370	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml) (≥ 24 ml/2g)	MOISTURE CONTENT (%) (≤ 25%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2) (≥ 1.0 PSF)
458406	90	33	8.6	772	1.070

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4312
97081402	35047	08/14/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.118	112	236	189	76	<5E9	9.1

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708122056-1	0.053

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7028915	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
453688	90	31	9.1	868	1.043

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4312
97081502	35154	08/15/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.107	110	220	100	100	<5E9	9.2

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9708132058	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
581400	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
449525-1	90	29	9.2	875	1.035

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 08-15-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4313

ORDER NUMBER: 3G88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets or exceeds Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97081402 DAMAGED
ROLL# 35029,35030,35031,35032,35033,35034,35035,35037,35038,35043,35044
35046,35056,35057,35058
GCL-01
LOT# 97081502
ROLL# 35159,35160
GCL-02

KEVIN NEWMAN
Quality Control Manager

08/16/1997
DATE

Date:08/16/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4313 Shipment Date: 08/15/97

	Roll #	Length	Width
Lot #: 97081402			
	35029	150.00	15.5
	35030	150.00	15.5
	35031	150.00	15.5
	35032	150.00	15.5
	35033	150.00	15.5
	35034	150.00	15.5
	35035	150.00	15.5
	35037	150.00	15.5
	35038	150.00	15.5
	35043	150.00	15.5
	35044	150.00	15.5
	35046	150.00	15.5
	35056	150.00	15.5
	35057	150.00	15.5
	35058	150.00	15.5
* Subtotal [ft]		2250.00	
Lot #: 97081502			
	35159	150.00	15.5
	35160	150.00	15.5
* Subtotal [ft]		300.00	
* Total [ft]		2550.00	

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97081402	35029	08/14/97

BOL# 4313

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

SPEC.

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.118	112	236	189	78	<5E9	9.1

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970812205B-1	0.053

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7028915	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
453688	90	31	9.1	868	1.043

1267

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97081502	35159	08/15/97

BOL# 4313

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.107	110	220	100	100	<5E9	9.2

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970813205B	0.050

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
581400	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
449525-1	90	29	9.2	875	1.035

1267

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BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO.

SHIP DATE: 11-12-1997

PROJECT: FLUOR DANIEL FERNALD

NO.ROLLS/B.O.L.NO.: 16/4757

ORDER NUMBER: 3088/1F

PRODUCT TYPE: BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97101002

ROLL# 40652,40659,40666,40674,40696,40701,40722,40723,40727,40728,40730
40731,40732,40733,40734,40735

KEVIN NEWMAN
Quality Control Manager

11/13/1997
DATE

1267

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Date:11/12/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4757 Shipment Date: 11/12/97

Lot #: 97101002

Roll #	Length	Width
40652	150.00	15.5
40659	150.00	15.5
40666	150.00	15.5
40674	150.00	15.5
40696	150.00	15.5
40701	150.00	15.5
40722	150.00	15.5
40723	150.00	15.5
40727	150.00	15.5
40728	150.00	15.5
40730	150.00	15.5
40731	150.00	15.5
40732	150.00	15.5
40733	150.00	15.5
40734	150.00	15.5
40735	150.00	15.5
* Subtotal [ft]	2400.00	
* Total [ft]	2400.00	

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BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97101002	40652	10/09/97

BOL# 4757

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.166	117	207	176	32	<5E-9	8.6

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9709292058	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7032361	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
458643-1	90	29	8.6	807	1.094

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BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 11-17-1997

PROJECT: FLUOR DANIELS FERNALD **NO.ROLLS/B.O.L.NO.:** 16/4771

ORDER NUMBER: 3088/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97101002

ROLL# 40665,40667,40669,40670,40693,40700,40702,40703,40704,40706,40726

40729,40736,40737,40738,40739

KEVIN NEWMAN
Quality Control Manager

11/18/1997
DATE

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NOV 18 1997
1635 hrs

Date:11/18/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4771 Shipment Date: 11/18/97

	Roll #	Length	Width
Lot #: 97101002			
	40665	150.00	15.5
	40667	150.00	15.5
	40669	150.00	15.5
	40670	150.00	15.5
	40693	150.00	15.5
	40700	150.00	15.5
	40702	150.00	15.5
	40703	150.00	15.5
	40704	150.00	15.5
	40706	150.00	15.5
	40726	150.00	15.5
	40729	150.00	15.5
	40736	150.00	15.5
	40737	150.00	15.5
	40738	150.00	15.5
	40739	150.00	15.5
* Subtotal [ft]		2400.00	
* Total [ft]		2400.00	

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NOV 18 1997
1635 ...

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97101002	40665	10/10/97

BOL# 4771

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%
1.166	117	207	176	82	<5E-9	8.6

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9709252058	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7032361	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
453643-1	90	29	8.6	807	1.094

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NOV 20 1997

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 11-19-1997

PROJECT: FLUOR DANIEL FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4776

ORDER NUMBER: 3G88/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97101002

ROLL# 40651,40660,40662,40664,40668,40671,40672,40675,40676,40678,40679

40707,40708,40711,40712,40724,40725

KEVIN NEWMAN
Quality Control Manager

11/20/1997
DATE

1267

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Date:11/20/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4776 Shipment Date: 11/19/97

	Roll #	Length	Width
Lot #: 97101002			
	40651	150.00	15.5
	40660	150.00	15.5
	40662	150.00	15.5
	40664	150.00	15.5
	40668	150.00	15.5
	40671	150.00	15.5
	40672	150.00	15.5
	40675	150.00	15.5
	40676	150.00	15.5
	40678	150.00	15.5
	40679	150.00	15.5
	40707	150.00	15.5
	40708	150.00	15.5
	40711	150.00	15.5
	40712	150.00	15.5
	40724	150.00	15.5
	40725	150.00	15.5
* Subtotal [ft]		2550.00	
* Total [ft]		2550.00	

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BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97101002	40651	10/09/97

BOL# 4776

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.166	117	207	176	92	<5E-9	8.6

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9709292C5B	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7C32361	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
158643-1	90	29	8.6	607	1.094

1267

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BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 11-19-1997

PROJECT: FLUOR DANIEL FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4777

ORDER NUMBER: 3H90/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97102302

ROLL# 41651,41667,41676,41683,41686,41687,41689,41691,41693,41694,41695

41696,41697,41698,41699,41700,41701

GCL-25

KEVIN NEWMAN
Quality Control Manager

11/20/1997
DATE

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Date:11/20/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

Shipment Date: 11/19/97

BOL # : 4777

Lot #: 97102302

Roll #	Length	Width
41651	150.00	15.5
41657	150.00	15.5
41676	150.00	15.5
41683	150.00	15.5
41686	150.00	15.5
41687	150.00	15.5
41689	150.00	15.5
41691	150.00	15.5
41693	150.00	15.5
41694	150.00	15.5
41695	111.55	15.5
41696	150.00	15.5
41697	150.00	15.5
41698	111.55	15.5
41699	150.00	15.5
41700	150.00	15.5
41701	150.00	15.5
* Subtotal [ft]	2473.10	
* Total [ft]	2473.10	

RECEIVED
NOV 20 1997

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97102302	41651	10/23/97

BOL# 4777

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.112	99	243	141	78	<5E-9	8.3

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9710212058-1	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
552520	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
458416	90	27	8.3	775	1.039

1267

RECEIVED
NOV 22 1997

Item 1032 Nos.

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 11-20-1997

PROJECT: FLUOR DANIEL FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4778

ORDER NUMBER: 3H90/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97102302

ROLL# 41652,41664,41669,41670,41671,41673,41674,41675,41677,41678,41679

41680,41682,41684,41688,41690,41692

KEVIN NEWMAN
Quality Control Manager

11/21/1997
DATE

RECEIVED NOV 22 1997

Date:11/21/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

Kim 1030 hrs

BOL # : 4778 Shipment Date: 11/20/97

Lot #: 97102302

Roll #	Length	Width
41652	150.00	15.5
41664	104.99	15.5
41669	150.00	15.5
41670	150.00	15.5
41671	150.00	15.5
41673	150.00	15.5
41674	150.00	15.5
41675	150.00	15.5
41677	150.00	15.5
41678	150.00	15.5
41679	150.00	15.5
41680	150.00	15.5
41682	150.00	15.5
41684	150.00	15.5
41688	150.00	15.5
41690	118.11	15.5
41692	150.00	15.5
* Subtotal [ft]	2473.10	
* Total [ft]	2473.10	

RECEIVED
NOV 22 1997
HGM 1030 Hrs

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
971C2302	41652	10/23/97

BOL# 4776

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.112	99	243	141	78	<5E-9	8.3

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9710212058-1	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
692520	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
458416	90	27	8.3	775	1.039

RECEIVED
NOV 22 1997
1030 HRS

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 11-20-1997

PROJECT: FLUOR DANIEL FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4779

ORDER NUMBER: 3H90/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97102302

ROLL# 41626,41627,41628,41629,41631,41633,41640,41643,41646,41647,41648

41649,41661,41663,41665,41666,41668

KEVIN NEWMAN
Quality Control Manager

11/21/1997
DATE

1267

RECEIVED
NOV 22 1997
10:30 HRS

Date:11/21/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4779

Shipment Date: 11/20/97

Lot #: 97102302

Roll #	Length	Width
41626	150.00	15.5
41627	150.00	15.5
41628	116.47	15.5
41629	150.00	15.5
41631	150.00	15.5
41633	150.00	15.5
41640	150.00	15.5
41643	150.00	15.5
41646	150.00	15.5
41647	141.08	15.5
41648	150.00	15.5
41649	150.00	15.5
41661	150.00	15.5
41663	150.00	15.5
41665	150.00	15.5
41666	150.00	15.5
41668	150.00	15.5
* Subtotal (ft)	2507.55	
* Total (ft)	2507.55	

RECEIVED
NOV 22 1997
1030 HRS

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4779
97102302	41626	10/23/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.112	99	243	14[illegible]	78	<5E-9	8.3

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
971021205B-1	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
592520	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
458416	90	27	8.3	775	1.039

NOV 2

OYB @ 1600

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 11-28-1997

PROJECT: FLUOR DANIEL FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4786

ORDER NUMBER: 3088/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97101002

ROLL# 40657,40661,40663,40677,40682,40683,40684,40689,40697,40699,40710 (GCL-28 ↓ ↑ GCL-29)

40713,40714,40718,40719,40720,40721

KEVIN NEWMAN
Quality Control Manager

11/28/1997
DATE

1267

RECEIVED NOV 28 1997 JKM 1600 Hrs

Date:11/28/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4786 Shipment Date: 11/28/97

	Roll #	Length	Width
Lot #: 97101002			
	40657	150.00	15.5
	40661	150.00	15.5
	40663	150.00	15.5
	40677	150.00	15.5
	40682	150.00	15.5
	40683	150.00	15.5
	40684	150.00	15.5
	40689	150.00	15.5
	40697	150.00	15.5
	40699	150.00	15.5
	40710	150.00	15.5
	40713	150.00	15.5
	40714	150.00	15.5
	40718	150.00	15.5
	40719	144.36	15.5
	40720	150.00	15.5
	40721	150.00	15.5
* Subtotal [ft]		2544.36	
* Total [ft]		2544.36	

RECEIVED
NOV 28 1997
KCM 1600 Hrs

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97101002	40657	10/09/97

BOL# 4786

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.166	217	207	176	82	<5E-9	8.6

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
970929205B	0.049

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
7032361	0.023

4. BENTONITE TYPE : 12 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
458643-1	90	29	8.6	807	1.094

1267

RECEIVED
DEC 03 1997
1700 HRS

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO.

SHIP DATE: 12-03-1997

PROJECT: FLUOR DANIEL FERNALD

NO.ROLLS/B.O.L.NO.: 18/4795

ORDER NUMBER: 3H90/1F

PRODUCT TYPE: BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method GRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97102302

ROLL# 41621,41622,41623,41624,41625,41630,41650,41653,41658,41659

LOT# 97102402

ROLL# 41705,41708,41712,41717,41718,41719,41725,41726

KEVIN NEWMAN
Quality Control Manager

12/03/1997
DATE

1267

RECEIVED DEC 03 1997

Date:12/03/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC.

BOL # : 4795

Shipment Date: 12/03/97

Roll #	Length	Width
Lot #: 97102302		
41621	150.00	15.5
41622	150.00	15.5
41623	150.00	15.5
41624	150.00	15.5
41625	150.00	15.5
41630	150.00	15.5
41650	124.67	15.5
41653	150.00	15.5
41658	150.00	15.5
41659	150.00	15.5
* Subtotal (ft)	1474.67	
Lot #: 97102402		
41705	131.23	15.5
41706	150.00	15.5
41712	150.00	15.5
41717	150.00	15.5
41718	150.00	15.5
41719	150.00	15.5
41725	131.23	15.5
41726	108.27	15.5
* Subtotal (ft)	1120.73	
* Total (ft)	2595.40	

RECEIVED
DEC 03 1997
Ken 1700 HRS

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
971C2302	41621	10/23/97

BOL# 4795

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.112	99	243	141	78	<5E-9	8.3

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
971021205B-1	0.051

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
592520	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
458416	90	27	8.3	775	1.039

1267

RECEIVED
DEC 03 1997
Kim 1702 Hrs

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE
97102402	41705	10/24/97

BOL# 4795

PRODUCT: BENTOFIX NS

DIMENSIONS: 131.23 ft x 15.5 ft
40.00 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.118	119	247	169	94	<5E-9	7.8

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
9710212058	0.054

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
593730	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
464512	90	27	7.6	724	1.041

1267

RECEIVED
DEC 04 1997

BENTOFIX TECHNOLOGIES, INC.

BENTOFIX MANUFACTURING CERTIFICATION

CUSTOMER: NATIONAL SEAL CO. **SHIP DATE:** 12-04-1997

PROJECT: FLUOR DANIEL FERNALD **NO.ROLLS/B.O.L.NO.:** 17/4797

ORDER NUMBER: 3H90/1F **PRODUCT TYPE:** BENTOFIX NS

Bentofix Technologies, Inc. hereby certifies that the Bentofix Geosynthetic Clay Liner purchased and shipped for the above referenced project meets all project specifications and generally meets Bentofix Technologies, Inc.'s specifications for Bentofix.

The Bentofix product has been continuously inspected for the presence of needles and is certified to be needle free.

The tests listed for the bentonite component have been performed on each batch of bentonite. The Bentonite Moisture Content according to method ASTM D4643 and the Bentonite Free Swell according to method ASTM D5890 were tested at least every 3,716 sq. mt. (40,000 sq. ft.).

The tests listed for the finished geocomposite product have been performed on at least every 3,716 sq. mt. (40,000 sq. ft.) for the Bentonite Content according to method ASTM D5261 and for the Grab Tensile according to method ASTM D4632. The tests listed for the finished geocomposite product have been performed on at least every 9,290 sq. mt. (100,000 sq. ft.) for the geotextile component and the Bentonite Hydraulic Conductivity according to method CRI GCL-2.

The lot and roll numbers for this project are as follows:

LOT# 97102402

ROLL# 41703,41704,41706,41707,41709,41711,41713,41714,41715,41721,41724,41727,41730,41731,41734,41743,41744

KEVIN NEWMAN
Quality Control Manager

12/04/1997
DATE

1267

RECEIVED DEC 04 1997

Date:12/04/97
PAGE 1

BENTOFIX TECHNOLOGIES, INC 1710 HRS

BOL # : 4797

Shipment Date: 12/04/97

Lot #: 97102402

Roll #	Length	Width
41703	150.00	15.5
41704	150.00	15.5
41706	150.00	15.5
41707	150.00	15.5
41709	150.00	15.5
41711	150.00	15.5
41713	150.00	15.5
41714	150.00	15.5
41715	150.00	15.5
41721	150.00	15.5
41724	150.00	15.5
41727	150.00	15.5
41730	150.00	15.5
41731	150.00	15.5
41734	150.00	15.5
41743	150.00	15.5
41744	150.00	15.5
* Subtotal (ft)	2550.00	
* Total (ft)	2550.00	

RECEIVED
DEC 04 1997
1710 Hrs

BENTOFIX TECHNOLOGIES, INC.

QUALITY CONTROL CERTIFICATE

LOT#	ROLL #	DATE	BOL# 4797
97102402	41703	10/24/97	

PRODUCT: BENTOFIX NS

DIMENSIONS: 150.00 ft x 15.5 ft
45.72 m x 4.72 m

1. FINISHED PRODUCT TYPE : BENTOFIX NS

MASS(lb/ft2)	TENSILE (lb) LENGTH	TENSILE (lb) CROSS	ELONGATION (%) LENGTH	ELONGATION (%) CROSS	PERMEABILITY, K (cm/s)	MOISTURE CONTENT (%)
1.118	119	247	169	94	<5E-9	7.8

2. TOP LAYER TYPE : NON-WOVEN

LAYER #	MASS(lb/ft2)
971021205B	0.054

3. BOTTOM LAYER TYPE : WOVEN

LAYER #	MASS(lb/ft2)
593730	0.023

4. BENTONITE TYPE : 30 MESH

SHIPMENT #	% MONTMORILLONITE	SWELL INDEX (ml)	MOISTURE CONTENT (%)	MOISTURE ABSORPTION (%)	MASS OF BENTONITE(lb/ft2)
464512	90	27	7.8	724	1.041

MANUFACTURER'S TESTING SUMMARY

GCL INTERNAL SHEAR STRENGTH

(Testing Reports Attached)

QC Sample No.	QC Sample Roll No.	QA Sample No.	Lot No.	Measured Peak Shear Strength for Conformance Shear Tests (psi)			Measured Large-Displacement Shear Strength for Conformance Shear Tests (psi)		
				5psi	20psi	45psi	5psi	20psi	45psi
PET-01	29968	GCL-03	97062902	2.85[1]	5.14[1]	5.45[1]	3.65[1]	9.11[1]	18.00[1]
PET-02	35757	GCL-04	97082002	3.81	9.27	17.18/ 18.05	3.25	2.69	3.10/ 3.98
PET-03	36114	GCL-06	97082502	3.06[2]	7.40[2]	15.76	2.50[2]	4.83[2]	3.35
PET-04	36344	GCL-09	97082702	3.55	9.12	17.47	2.53	2.41	4.17
PET-05	36262	GCL-08	97082602	2.93	4.97	14.46	1.78	2.49	3.75
PET-06	37061	GCL-15	97090202	6.99	7.94	9.20	1.54[2]	1.76[2]	2.92
PET-07	37386	GCL-17	97090512	15.60	16.40	18.85	6.42	5.24	4.51
PET-08	40667	GCL-22	97101002	3.56	13.15	17.76	2.28	5.86	3.85
PET-09	40698	GCL-23	97101002	4.44	13.90	21.42	3.02	3.11	4.53
NA	41651	GCL-24	97102302	8.06	11.94	22.01	2.08	3.13	5.97
NA	41676	GCL-25	97102302	9.17	10.69	19.51	1.67	2.64	5.56
NA	41729	GCL-26	97102402	6.94	9.86	15.00	1.60	2.36	4.31
NA	41753	GCL-27	97102402	7.36	12.92	20.14	1.74	2.78	5.28

[1] Testing report for PET-01 is not attached.
[2] Value based on GeoSyntec Consultants interpretation of test results.

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SUPPLIER SUBMITTAL No.: 057 (Rev. 2)

INTERNAL SHEAR STRENGTH TEST RESULTS
Sections 02772-1.04.B

FLUOR DANIEL FERNALD SUBCONTRACT No. FSC 597
ON-SITE DISPOSAL FACILITY (PHASE I) PROJECT

Document No. PET-065 (Rev. 2)

November 10, 1997

Fernald Site Office: P.O. Box 538704 • Mail Stop 44 • Cincinnati, Ohio 45253-8704 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
3200 Seville Road • Seville, Ohio 44273 • 330.948.1494 • Fax 948.1933

AGP LABORATORIES, INC.

Roll No. 36114
(5 and 20 PSI)

PETRO
environmental
technologies

AGP Laboratories, Inc.
2004 E. Randol Mill, Suite 512
Arlington, Texas 76011
(817) 861-9090 • (800) AGP-6030
Fax: (817) 861-5400

October 16, 1997

Petro Environmental Technologies
Attn: Mr. Steve Brandstetter
7400 Wiley Rd., Mail Stop 44
Harrison, OH 45038

RE: Client Project Number WC7-024
AGP Project Number: PET3101.001

Dear Mr. Brandstetter:

One (1) sample was received for testing 10/01/97. The sample was identified as follows:

SAMPLE I.D.	AGP COMMENTS
Roll # 36114	GCL

The sample was tested in accordance with the test methods listed below:

ASTM D 5321 " Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method"

All tests were performed at 73° F ± 3° with a relative humidity of 50% ± 5. Conditioning of the samples, before testing, is standard 40 hours at test temperature and relative humidity unless waived by the client.

The sample material was submitted by Petro Environmental Technologies. AGP Laboratories, Inc. has no specific knowledge as to conditioning, origin, sampling procedure, special use of material, or purpose of material. The testing listed herein is based upon accepted industry practice as well as by the test method listed. AGP Laboratories, neither accepts nor makes claim as to final use and purpose of the material. Results presented apply only to the items tested.

DIRECT SHEAR
ASTM D 5321

12-in. x 12-in. boxes
Hydraulic loading ram with load gauges for normal force
Load cell with dial indication for shear force
Bolted flat plate clamping device
Friction table attached to CRE

Tested
10/15/97

Configuration:

1. Steel Plate
2. GCL - Roll # 36114
3. Steel Plate

Internal shear of Geosynthetic clay liner.

Strain Rate, in. / min.	0.04	0.04
Normal Stress, psi	5.0	20.0
Peak Shear Stress, psi	3.20	7.53
Adhesion, psi	1.681	
Friction Angle, deg.	24.2	
Residual Shear Stress, psi	2.79	5.58
Adhesion, psi	1.685	
Friction Angle, deg.	16.1	

Plot of results are presented in Figure 1.
Force - displacement plots are shown in Figure 2.

SPECIAL TEST CONDITION : The GCL specimens were hydrated for a 7- day period prior to testing of normal stress of 3 psi. After hydration, the specimens were consolidated for 48 hours at the specified normal stress which is 5 psi and 20 psi.

Figure 1: Friction Angle Plot
Interface: GCL Internal Shear Strenth - Roll# 36114

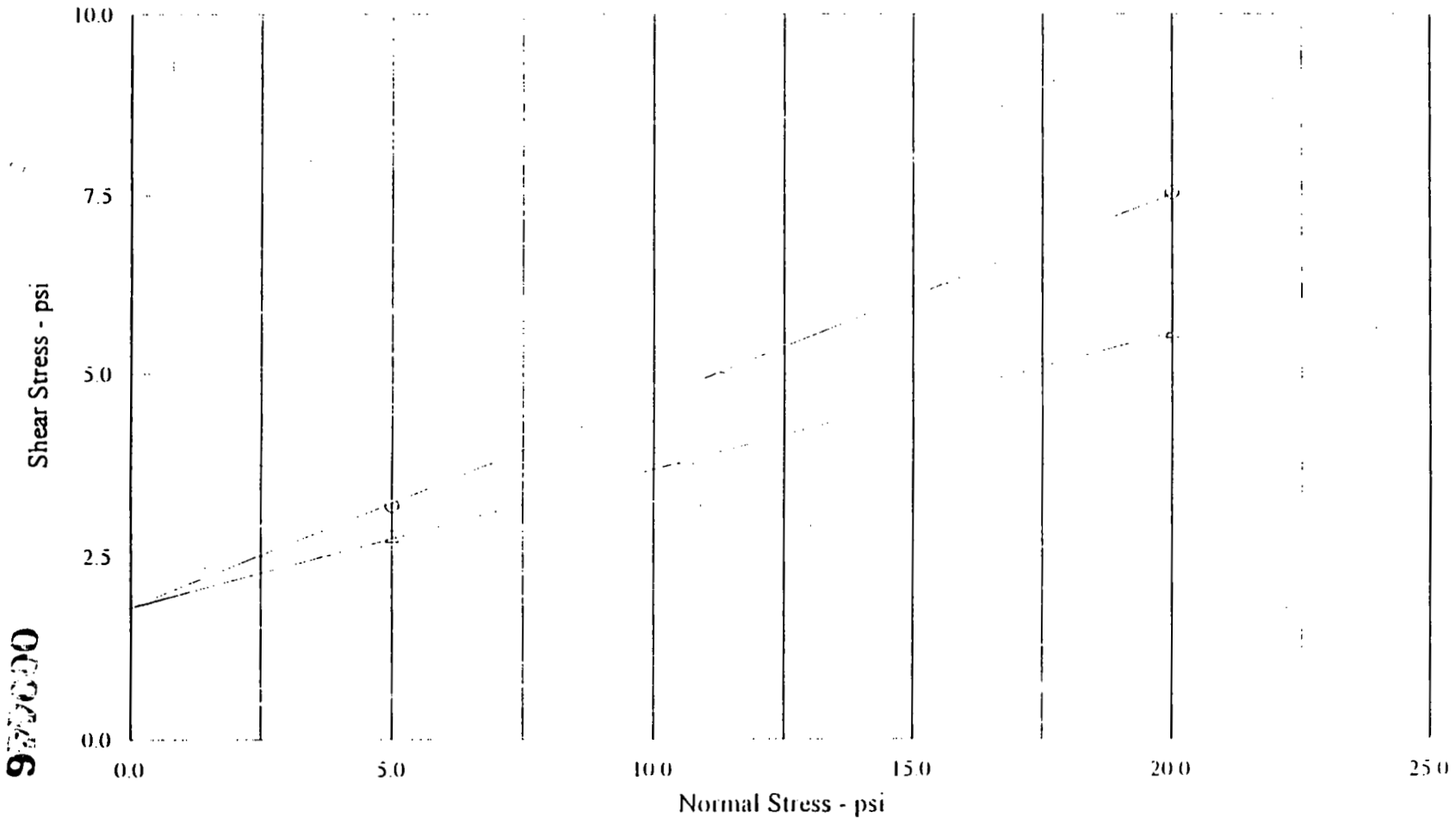
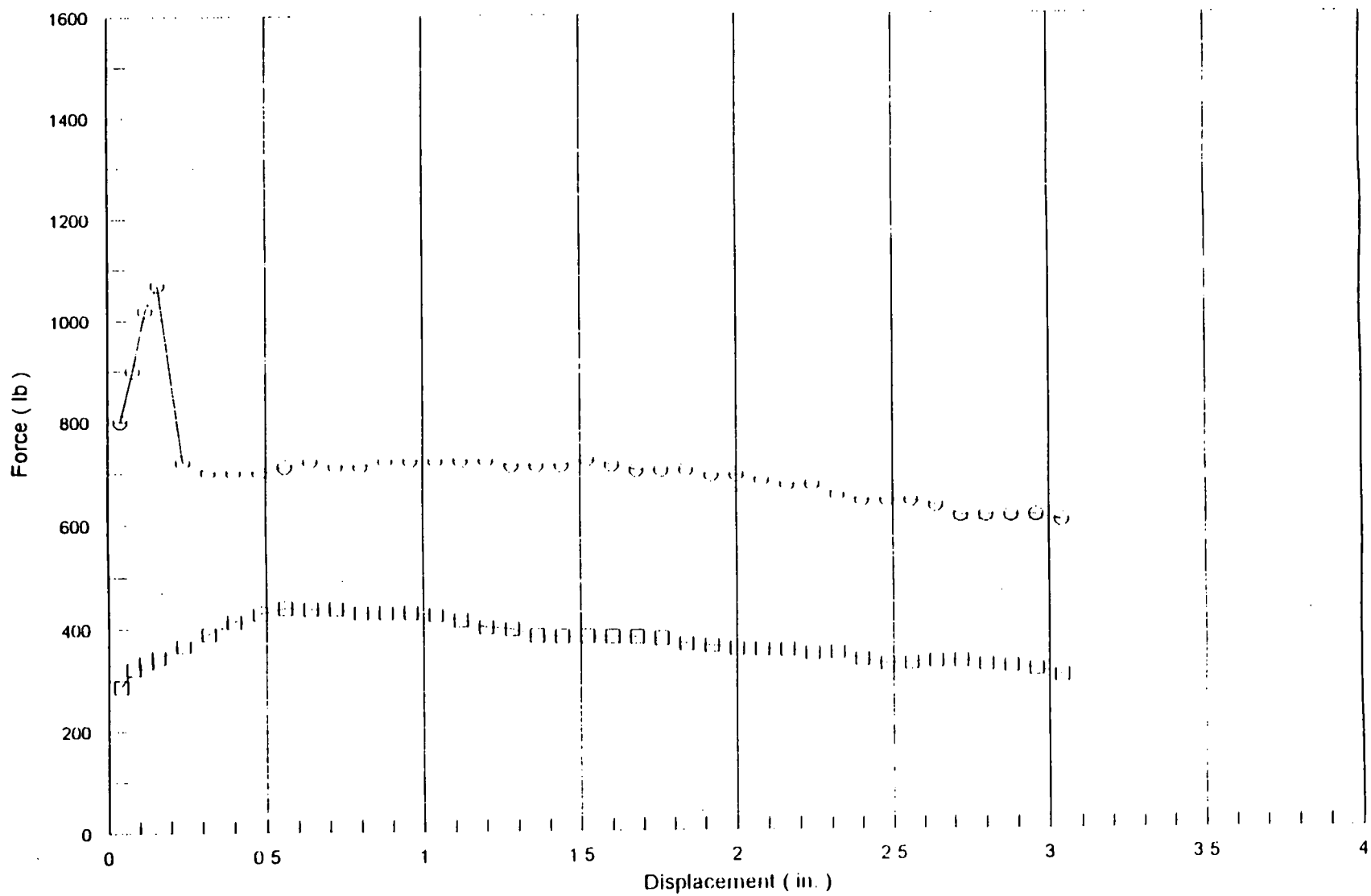


Figure 2: Force vs. Displacement
Interface: GCL Internal Shear Strenth - Roll# 36114



This report shall not be reproduced except in full, without written approval from this laboratory.

If there are any questions, please contact us.

Respectfully,

Neelam Asher

Neelam Asher
Laboratory Supervisor

GEOTECHNICS

Roll No. 36262
(5 and 20 PSI)

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..... GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

LABORATORY TEST REPORT

October 14, 1997

Mr. Steve Brandstetter
Petro Environmental Technologies c/o FDF
7400 Willey Road
Harrison, OH 45030

PROJ. NO.: L97212-01

RE: GCL INTERNAL SHEAR TEST RESULTS
NSC BENTOFIX
JOB NO. WC7-024

Transmitted herein are the results of the GCL internal shear tests performed Petro Environmental Technologies as directed and authorized by Mr. Brandstetter. The subject shear testing was performed in accordance with the ASTM D 5321-92 and the latest draft of the ASTM standard under development for this purpose. The project-specific details are described on the attached page 2. The GCL samples were submitted by NTH Consultants on September 30, 1997.

We are pleased to be of service and trust that our efforts have contributed to the success of your project. Should you have any questions or if we may be of any further assistance, please do not hesitate to call.

Respectfully submitted,

Richard S. Lacey

Richard S. Lacey, P.E.
Laboratory Director

attachments: 6 Data Pages

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Geotechnics

GCL INTERNAL SHEAR (DIRECT SHEAR) TEST REPORT

Supplementary Test Report Information

GCL Internal Shear Testing

The GCL specimens were placed in a container where they were hydrated under 3 psi dead loading for seven days. A layer of thick nonwoven geotextile was placed above and below each specimen to assure water access to the GCL surface during hydration.

The specimens were then transferred to a load frame where they were preconsolidated for 48 hours under the test load. The loading was by an air over oil hyrdraulic system to assure constant loading.

Then the specimens were quickly transferred to the shear apparatus and placed on a the substrate platen consisting of metal wood rasps. A similar platen was placed against the upper surface of the specimen. The horizontal displacement rate was 0.004 in/min.

Direct Shear Apparatus

The tests were performed using a pneumatic-hydraulic apparatus, the Geotest Model S2459 Large Direct Shear unit, which uses an air over oil system for advancing the shear box base. The upper box, which is 0.95625 s.f. in area, is fixed against load cells which measure the shear force. The normal load is applied using pneumatic cylinders.

Calculation of Friction Angles

The friction angles (secant shear strength angles) were calculated by plotting the shear stresses at peak and at 2 inch displacement versus the corresponding normal stresses then constructing a strainght line through each point directly to the origin.

Comments

The specimens sheared internally between the woven textile carrier and the hydrated bentonite.

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CAVEAT

The tests were performed in general accordance with the procedures referenced on the data tables as well as industry practice on test specimens believed to be representative of the samples submitted. The test results are indicative only of the specimens which were actually evaluated. There were no sample remnants.

Geotechnics has no direct knowledge of the origin of the samples submitted, implies no position with regard to the disposition of the test results, i.e. pass/fail, and makes no claims as to the suitability of the material for its intended end use.

The test data and all associated project information provided shall be held in confidence and disclosed to other parties only with the authorization of Client and Geotechnics.

The test data transmitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics.

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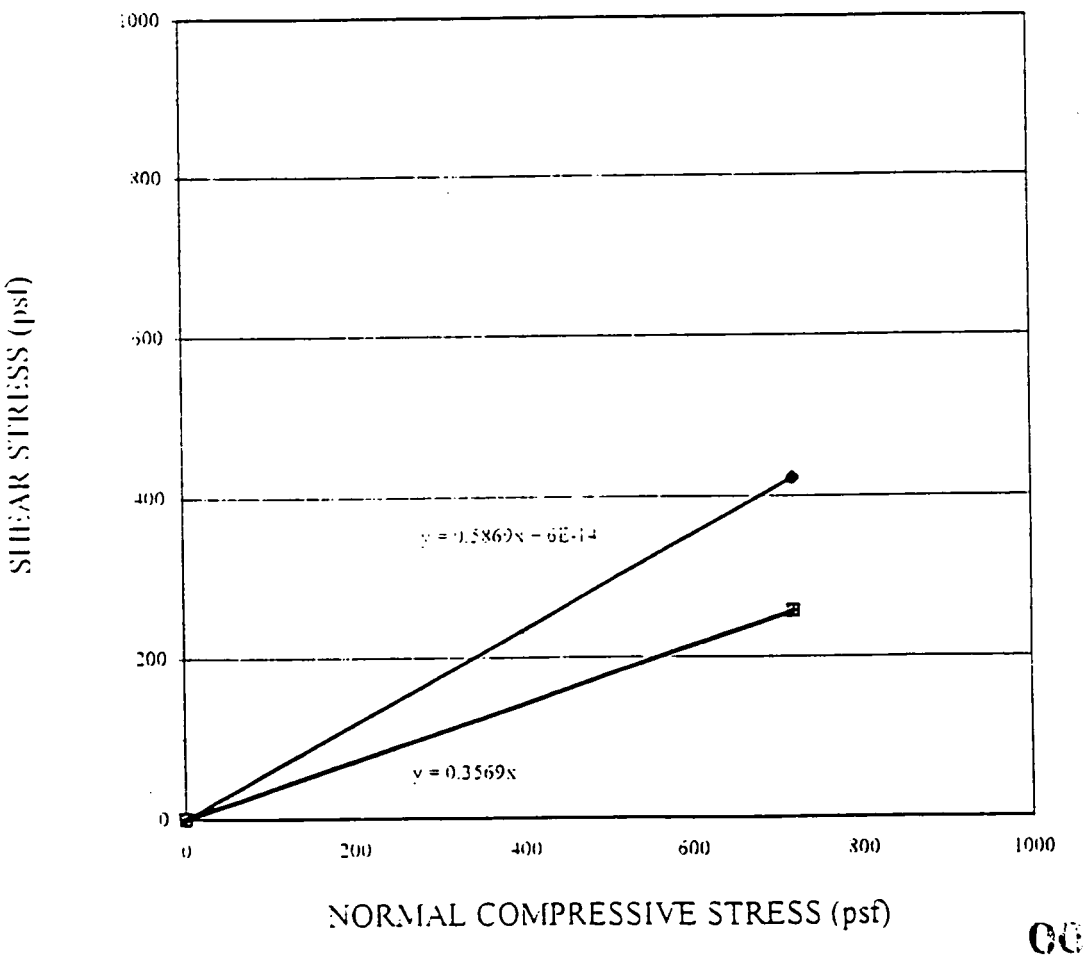
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT	PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT	GCL INTERNAL SHEAR TESTING
PROJECT NO.	L97212-01
LAB I. D. NO.	BENTOFIX GCL (roll= 36262) : L97212-01-01
INTERFACE	BENTOFIX GCL (ROLL NO. 36262) INTERNAL SHEAR

	PEAK SHEAR	SHEAR DATA (at 2" displacement)
FRICTION ANGLE (deg)	Φ = 30.4	Φ = 19.6
COEFFICIENT OF FRICTION	= 0.59	= 0.36
ADHESION (Calculated) (psf):	a = 0	a = 0

NOTES
1. A component of the adhesion values reported may be an anomaly of the laboratory procedure and calculation algorithm.
2. The friction angle was calculated using linear regression basing on original data.
3. The GCL specimen was pre-hydrated under 3 psi for 7 days and consolidated under the test load for 2 days



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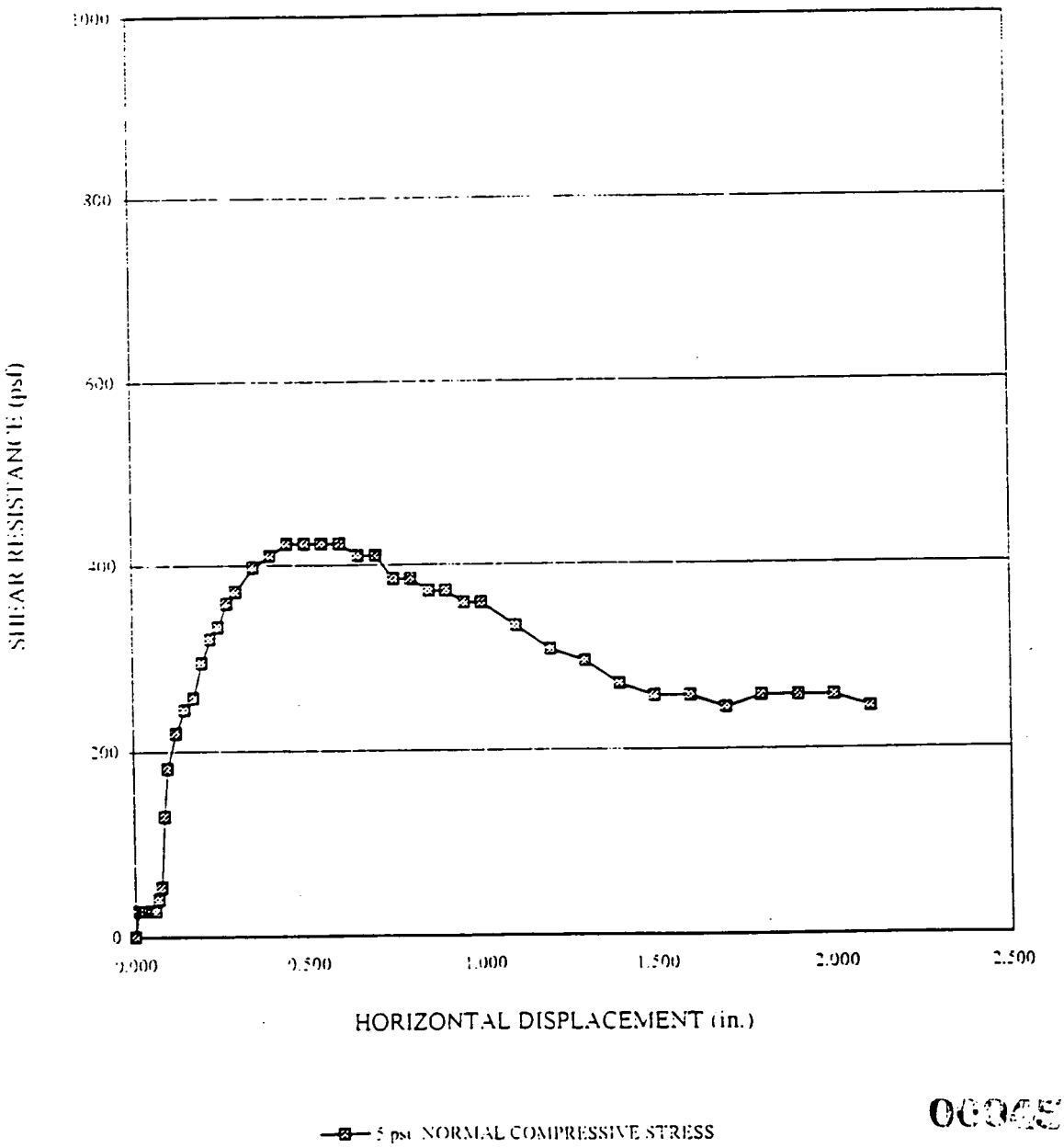
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT	PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT	GCL INTERNAL SHEAR TESTING
PROJECT NO	L97212-01
LAB I. D. NO.	BENTOFIX GCL (roll# 36262) : L97212-01-01
INTERFACE	BENTOFIX GCL (ROLL NO. 36262) INTERNAL SHEAR

SHEAR RESISTANCE VS HORIZONTAL DISPLACEMENT



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INTERFACE FRICTION TEST RESULTS

ASTM D 5321-92

CLIENT: PETRO ENVIRONMENTAL TECHNOLOGIES — DIRECT SHEAR UNIT: GEOTEST S2450
CLIENT PROJECT: GCL INTERNAL SHEAR TESTING
PROJECT NO: L97212-01
LAB I. D. NO.: BENTOFIX GCL (roll# 36262) : L97212-01-01

INTERFACE: BENTOFIX GCL (ROLL NO. 36262) INTERNAL SHEAR

STRAIN RATE (in/min): 0.004 — NORMAL LOAD: PNEUMATIC CYLINDERS

TEST DATA

NORMAL LOAD (psf)	720
NORMAL LOAD (psf)	500
PEAK SHEAR STRESS (psf)	423
SHEAR DATA (at 2") (psf)	257

HORIZONTAL

DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)
0.000	1	2
0.010	27	28
0.020	27	28
0.030	27	28
0.040	27	28
0.050	27	28
0.060	27	28
0.070	39	41
0.080	51	53
0.090	124	130
0.100	173	181
0.125	209	219
0.150	234	244
0.175	246	257
0.200	282	295
0.225	307	321
0.250	319	334
0.275	343	359
0.300	355	372
0.350	380	397
0.400	392	410
0.450	404	423
0.500	404	423
0.550	404	423
0.600	404	423
0.650	392	410
0.700	392	410
0.750	368	385
0.800	368	385
0.850	355	372
0.900	355	372
0.950	343	359
1.000	343	359
1.100	319	334
1.200	295	308
1.300	282	295
1.400	258	270
1.500	246	257
1.600	246	257
1.700	234	244
1.800	246	257
1.900	246	257
2.000	246	257
2.100	234	244

000455

CHECKED BY: PC DATE: 10-13-97

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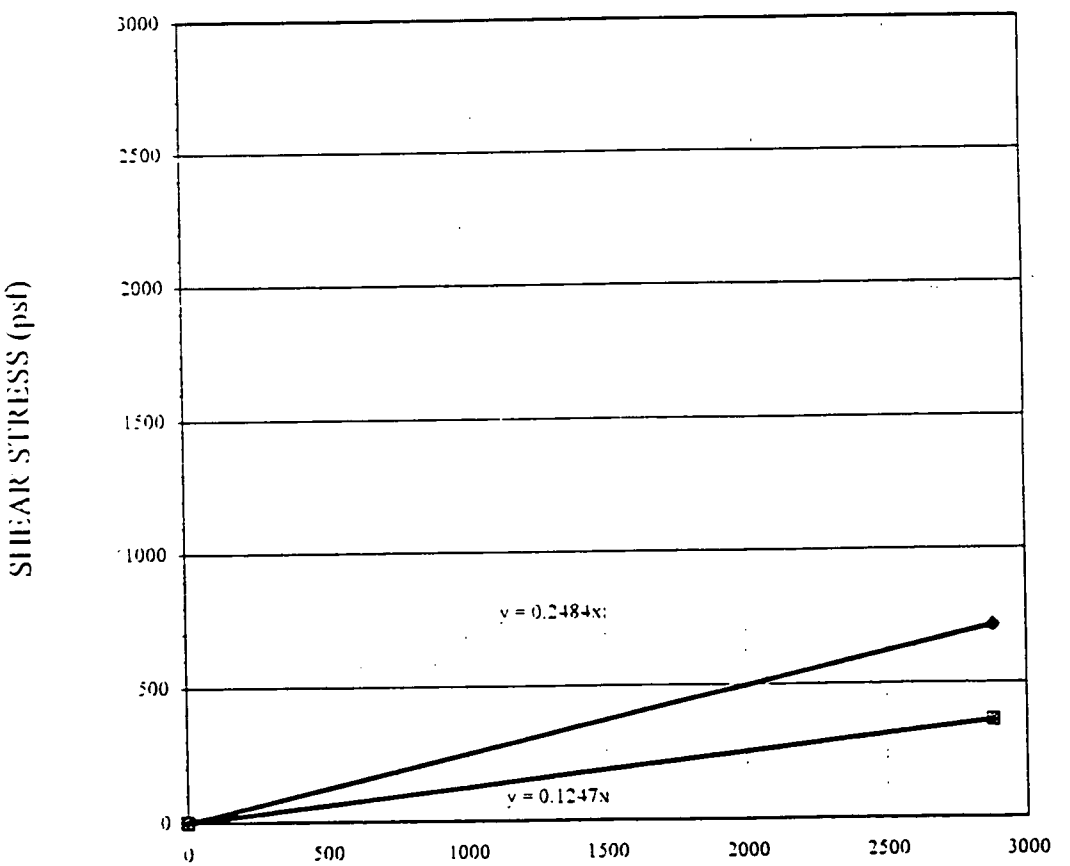
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT	PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT :	GCL INTERNAL SHEAR TESTING
PROJECT NO. :	L97212-01
LAB I. D. NO.:	BENTOFIX GCL (roll# 36262) : L97212-01-01
INTERFACE	**BENTOFIX GCL (ROLL NO. 36262) INTERNAL SHEAR**

	PEAK SHEAR	SHEAR DATA (at 2" displacement)
FRICTION ANGLE (deg) :	Φ = 13.9	Φ = 7.1
COEFFICIENT OF FRICTION :	= 0.25	= 0.12
ADHESION [Calculated] (psf):	a = 0	a = 0

NOTES:
1.)A component of the adhesion values reported may be an anomaly of the laboratory procedure and calculation algorithm.
2.)The friction angle was calculated using linear regression basing on original data .
3.)The GCL specimen was pre-hydrated under 3 psi for 7 days and consolidated under the test load for 2 days .



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● PEAK SHEAR DATA ■ SHEAR DATA (at 2 inches displacement)

CHECKED BY : RM DATE : 10-9-97

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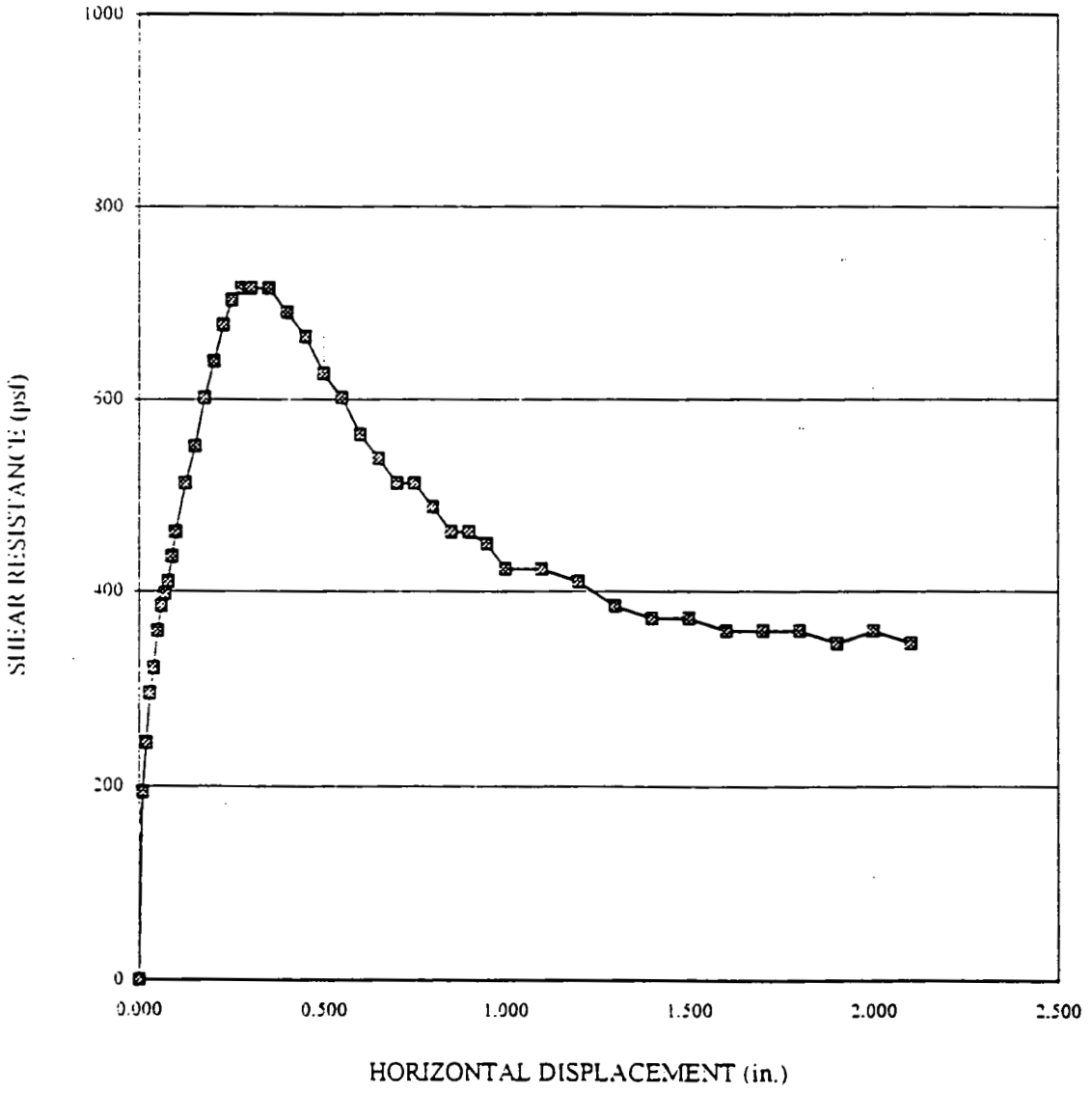
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT	PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT	GCL INTERNAL SHEAR TESTING
PROJECT NO. :	L97212-01
LAB I. D. NO.:	BENTOFIX GCL (roll# 36262) : L97212-01-01
INTERFACE	**BENTOFIX GCL (ROLL NO. 36262) INTERNAL SHEAR**

SHEAR RESISTANCE VS HORIZONTAL DISPLACEMENT



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INTERFACE FRICTION TEST RESULTS

ASTM D 5321-92

CLIENT: PETRO ENVIRONMENTAL TECHNOLOGIES — DIRECT SHEAR UNIT: GEOTEST S2450
CLIENT PROJECT: GCL INTERNAL SHEAR TESTING
PROJECT NO.: L97212-01
LAB I. D. NO.: BENTOFIX GCL (roll# 36262) : L97212-01-01

INTERFACE: **BENTOFIX GCL (ROLL NO. 36262) INTERNAL SHEAR**

STRAIN RATE (in. min): 0.004 — NORMAL LOAD: PNEUMATIC CYLINDERS

TEST DATA

NORMAL LOAD (psf)	2880
NORMAL LOAD (psi)	20.0
PEAK SHEAR STRESS (psf)	715
SHEAR DATA (at 2") (psf)	359

HORIZONTAL		
DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)
0.000	0	0
0.010	185	193
0.020	234	244
0.030	282	295
0.040	307	321
0.050	343	359
0.060	368	385
0.070	380	397
0.080	392	410
0.090	416	435
0.100	441	461
0.125	489	512
0.150	526	550
0.175	575	601
0.200	611	639
0.225	648	677
0.250	672	703
0.275	684	715
0.300	684	715
0.350	684	715
0.400	660	690
0.450	636	665
0.500	599	627
0.550	575	601
0.600	538	563
0.650	514	537
0.700	489	512
0.750	489	512
0.800	465	486
0.850	441	461
0.900	441	461
0.950	429	448
1.000	404	423
1.100	404	423
1.200	392	410
1.300	368	385
1.400	355	372
1.500	355	372
1.600	343	359
1.700	343	359
1.800	343	359
1.900	331	346
2.000	343	359
2.100	331	346

000458

CHECKED BY: PC DATE: 10-9-97

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GEOTECHNICS

Roll No. 40698
(5, 20 and 45 PSI)

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..... GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

LABORATORY TEST REPORT

October 31, 1997

Mr. Steve Brandstetter
Petro Environmental Technologies c/o FDF
7400 Willey Road
Harrison, OH 45030

PROJ. NO.: L97212-02

RE: GCL INTERNAL SHEAR TEST RESULTS
NSC BENTOFIX ROLL NO. 40698
JOB NO. WC7-024

Transmitted herein are the results of the GCL internal shear tests performed Petro Environmental Technologies as directed and authorized by Mr. Brandstetter. The subject shear testing was performed in accordance with the ASTM D 5321-92 and the latest draft of the ASTM standard under development for this purpose. The project-specific details are described on the attached page 2. The GCL samples were submitted direct from the manufacturer on October 13, 1997.

We are pleased to be of service and trust that our efforts have contributed to the success of your project. Should you have any questions or if we may be of any further assistance, please do not hesitate to call.

Respectfully submitted,

Richard S. Lacey

Richard S. Lacey, P.E.
Laboratory Director

attachments: 9 Data Pages

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geotechnics

GCL INTERNAL SHEAR (DIRECT SHEAR) TEST REPORT

Supplementary Test Report Information

GCL Internal Shear Testing

The GCL specimens were placed in a container where they were hydrated under 3 psi dead loading for seven days. A layer of thick nonwoven geotextile was placed above and below each specimen to assure water access to the GCL surface during hydration.

The specimens were then transferred to a load frame where they were preconsolidated for 48 hours under the test load. The loading was by an air over oil hyrdraulic system to assure constant loading.

Then the specimens were quickly transferred to the shear apparatus and placed on a the substrate platen consisting of metal wood rasps. A similar platen was placed against the upper surface of the specimen. The horizontal displacement rate was 0.004 in/min.

Direct Shear Apparat.us

The tests were performed using a pneumatic-hydraulic apparatus, the Geotest Model S2459 Large Direct Shear unit, which uses an air over oil system for advancing the shear box base. The upper box, which is 0.95625 s.f. in area, is fixed against load cells which measure the shear force. The normal load is applied using pneumatic cylinders.

Calculation of Friction Angles

The friction angles (secant shear strength angles) were calculated by plotting the shear stresses at peak and at 2 inch displacement versus the corresponding normal stresses then constructing a strainght line through each point directly to the origin.

Comments

The 20 psi and 45 psi specimens sheared internally between the woven textile carrier and the hydrated bentonite. The rasp platen slid across the woven geotextile carrier at the 5 psi normal load and the specimen did not shear internally.

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CAVEAT

The tests were performed in general accordance with the procedures referenced on the data tables as well as industry practice on test specimens believed to be representative of the samples submitted. The test results are indicative only of the specimens which were actually evaluated. There were no sample remnants.

Geotechnics has no direct knowledge of the origin of the samples submitted, implies no position with regard to the disposition of the test results, i.e. pass/fail, and makes no claims as to the suitability of the material for its intended end use.

The test data and all associated project information provided shall be held in confidence and disclosed to other parties only with the authorization of Client and Geotechnics.

The test data transmitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics.

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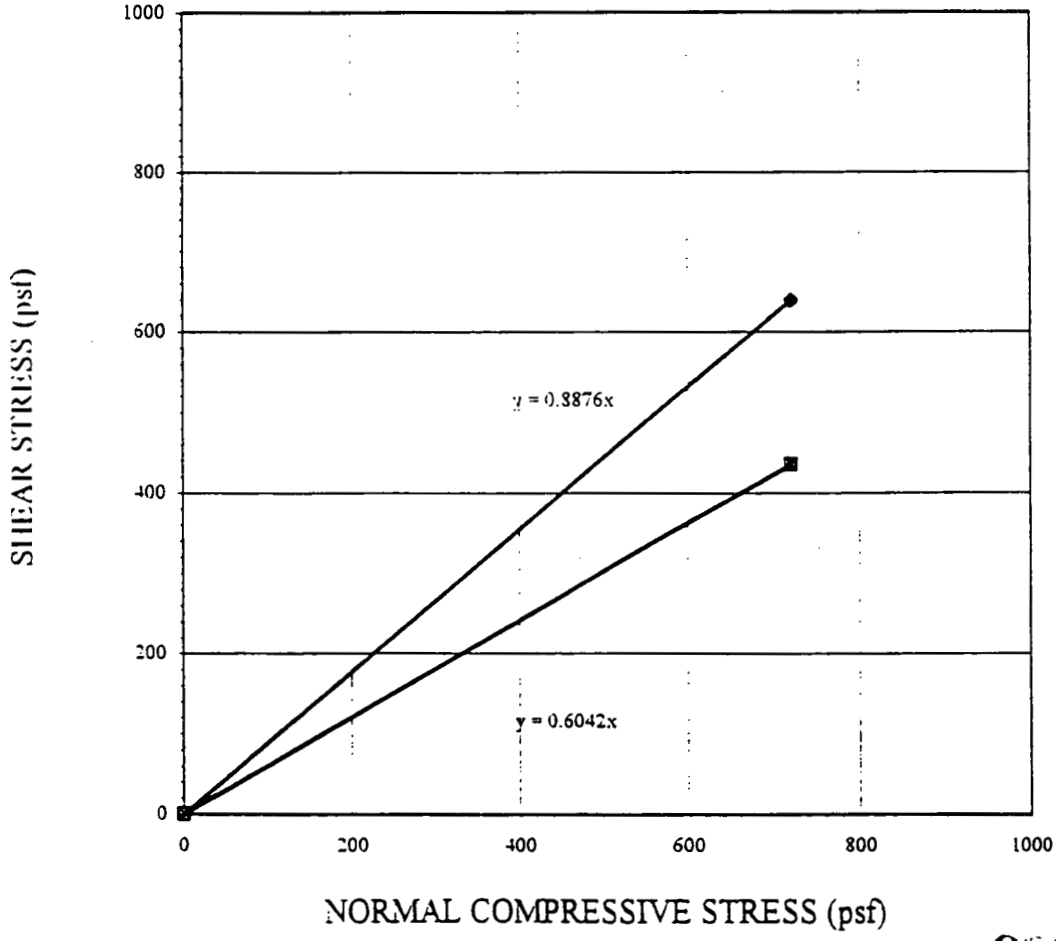
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT : PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT : GCL INTERNAL SHEAR TESTING
PROJECT NO. : L97212-02
LAB I. D. NO.: BENTOFIX GCL (roll# 40698) : L97212-02-01

INTERFACE : **BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

	PEAK SHEAR	SHEAR DATA (at 2" displacement)
FRICTION ANGLE (deg) :	Φ = 41.6	Φ = 31.1
COEFFICIENT OF FRICTION :	= 0.89	= 0.60
ADHESION [Calculated] (psf):	a = 0	a = 0

NOTES:
1.)A component of the adhesion values reported may be an anomaly of the laboratory procedure and calculation algorithm.
2.)The friction angle was calculated using linear regression basing on original data .
3.)The GCL specimen was pre-hydrated under 3 psi for 7 days and consolidated under the test load for 2 days .
4.)Platen slid across woven geotextile, the specimen did not shear internaly.



000463

◆ PEAK SHEAR DATA ■ SHEAR DATA (at 2 inches displacement)

5psi

CHECKED BY : RAJ DATE : 10-29-97

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1267

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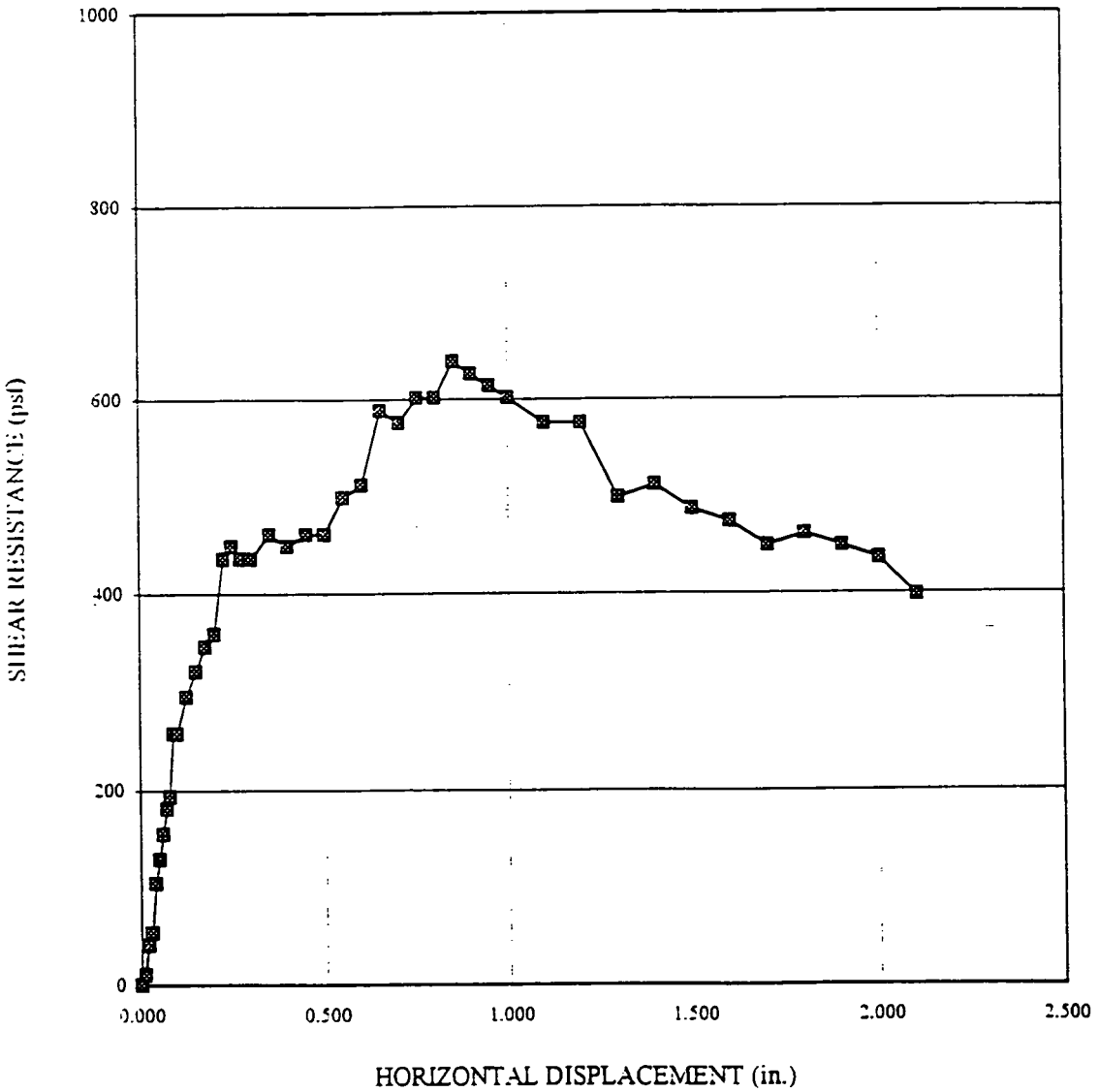
INTERFACE FRICTION TEST RESULTS

ASTM D 5321-92

CLIENT: PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT: GCL INTERNAL SHEAR TESTING
PROJECT NO.: L97212-02
LAB I. D. NO.: BENTOFIX GCL (roll# 40698) : L97212-02-01

INTERFACE: **BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

SHEAR RESISTANCE VS HORIZONTAL DISPLACEMENT



000664

5psi
PAGE 2 OF 3

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INTERFACE FRICTION TEST RESULTS

ASTM D 5321-92

CLIENT : PETRO ENVIRONMENTAL TECHNOLOGIES DIRECT SHEAR UNIT: GEOTEST S2450
CLIENT PROJECT : GCL INTERNAL SHEAR TESTING
PROJECT NO. : L97212-02
LAB I. D. NO.: BENTOFIX GCL (roll# 40698) : L97212-02-01

INTERFACE : **BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

STRAIN RATE (in / min) : 0.004 NORMAL LOAD: PNEUMATIC CYLINDERS

TEST DATA

NORMAL LOAD (psi)	720
NORMAL LOAD (psi)	5.0
PEAK SHEAR STRESS (psi)	639
SHEAR DATA (at 2") (psi)	435

HORIZONTAL		
DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psi)
0.000	5	5
0.010	10	10
0.020	39	41
0.030	51	53
0.040	100	104
0.050	124	130
0.060	148	155
0.070	173	181
0.080	185	193
0.090	246	257
0.100	246	257
0.125	282	295
0.150	307	321
0.175	331	346
0.200	343	359
0.225	416	435
0.250	429	448
0.275	416	435
0.300	416	435
0.350	441	461
0.400	429	448
0.450	441	461
0.500	441	461
0.550	477	499
0.600	489	512
0.650	562	588
0.700	550	575
0.750	575	601
0.800	575	601
0.850	611	639
0.900	599	627
0.950	587	614
1.000	575	601
1.100	550	575
1.200	550	575
1.300	477	499
1.400	489	512
1.500	465	486
1.600	453	474
1.700	429	448
1.800	441	461
1.900	429	448
2.000	416	435
2.100	380	397

000285

5psi

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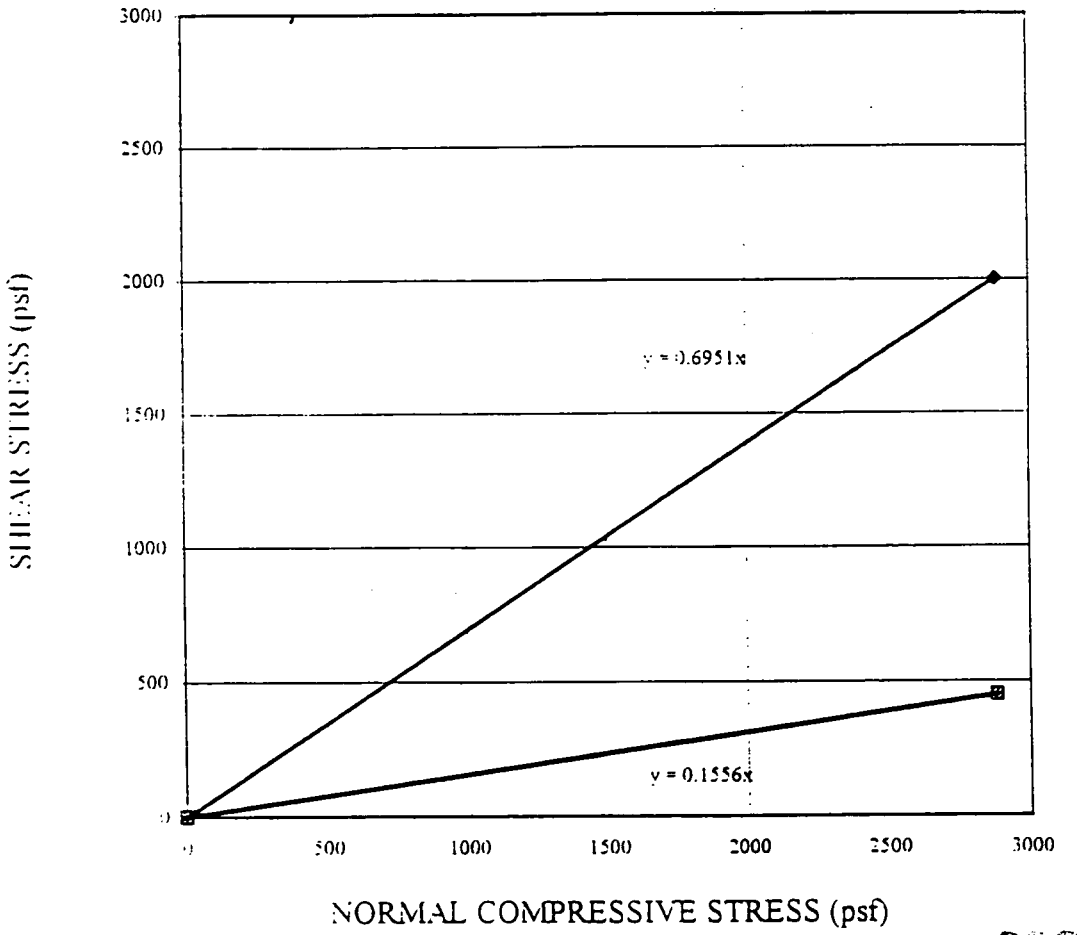
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT	PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT	GCL INTERNAL SHEAR TESTING
PROJECT NO.	L97212-02
LAB I. D. NO.	BENTOFIX GCL (roll# 40698) : L97212-02-01
INTERFACE	**BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

	PEAK SHEAR	SHEAR DATA (at 2" displacement)
FRICTION ANGLE (deg)	Φ = 34.8	Φ = 8.8
COEFFICIENT OF FRICTION	= 0.70	= 0.16
ADHESION [Calculated] (psf):	a = 0	a = 0

NOTES:
1.)A component of the adhesion values reported may be an anomaly of the laboratory procedure and calculation algorithm.
2.)The friction angle was calculated using linear regression basing on original data .
3.)The GCL specimen was pre-hydrated under 3 psi for 7 days and consolidated under the test load for 2 days



000086

◆ PEAK SHEAR DATA ■ SHEAR DATA (at 2 inches displacement)

20psi

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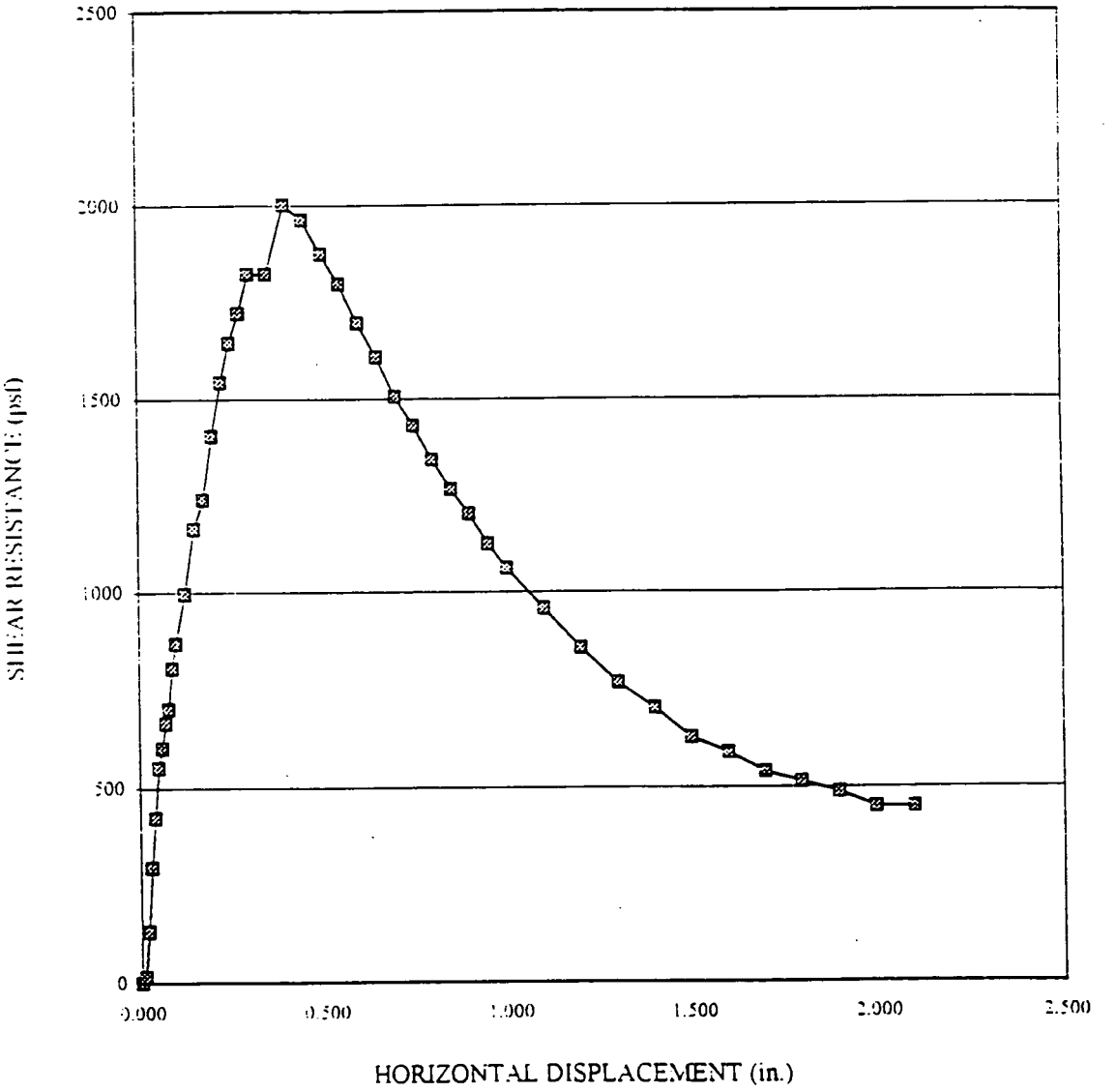
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT	PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT	GCL INTERNAL SHEAR TESTING
PROJECT NO.	L97212-02
LAB I. D. NO.	BENTOFIX GCL (roll# 40698) . L97212-02-01
INTERFACE	**BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

SHEAR RESISTANCE VS HORIZONTAL DISPLACEMENT



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20psi

CHECKED BY: RJ DATE: 10-24-97

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INTERFACE FRICTION TEST RESULTS

ASTM D 5321-92

CLIENT: PETRO ENVIRONMENTAL TECHNOLOGIES — DIRECT SHEAR UNIT GEOTEST S2450
CLIENT PROJECT: GCL INTERNAL SHEAR TESTING
PROJECT NO: L97212-02
LAB I.D. NO.: BENTOFIX GCL (roll# 40698) - L97212-02-01

INTERFACE: **BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

STRAIN RATE (in./min.): 0.004 — NORMAL LOAD: PNEUMATIC CYLINDERS

TEST DATA

NORMAL LOAD (psf)	2880
NORMAL LOAD (psi)	20.0
PEAK SHEAR STRESS (psf)	2002
SHEAR DATA (at 2") (psf)	448

HORIZONTAL

DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)
0.000	0	0
0.010	15	15
0.020	124	130
0.030	282	295
0.040	404	423
0.050	526	550
0.060	575	601
0.070	636	665
0.080	672	703
0.090	769	805
0.100	830	868
0.125	952	996
0.150	1110	1161
0.175	1183	1238
0.200	1342	1403
0.225	1476	1543
0.250	1573	1645
0.275	1646	1722
0.300	1744	1823
0.350	1744	1823
0.400	1914	2002
0.450	1878	1964
0.500	1793	1875
0.550	1719	1798
0.600	1622	1696
0.650	1537	1607
0.700	1439	1505
0.750	1369	1429
0.800	1281	1340
0.850	1208	1263
0.900	1147	1200
0.950	1074	1123
1.000	1013	1059
1.100	916	958
1.200	818	856
1.300	733	767
1.400	672	703
1.500	599	627
1.600	562	588
1.700	514	537
1.800	489	512
1.900	463	486
2.000	429	448
2.100	429	448

000488

20psi

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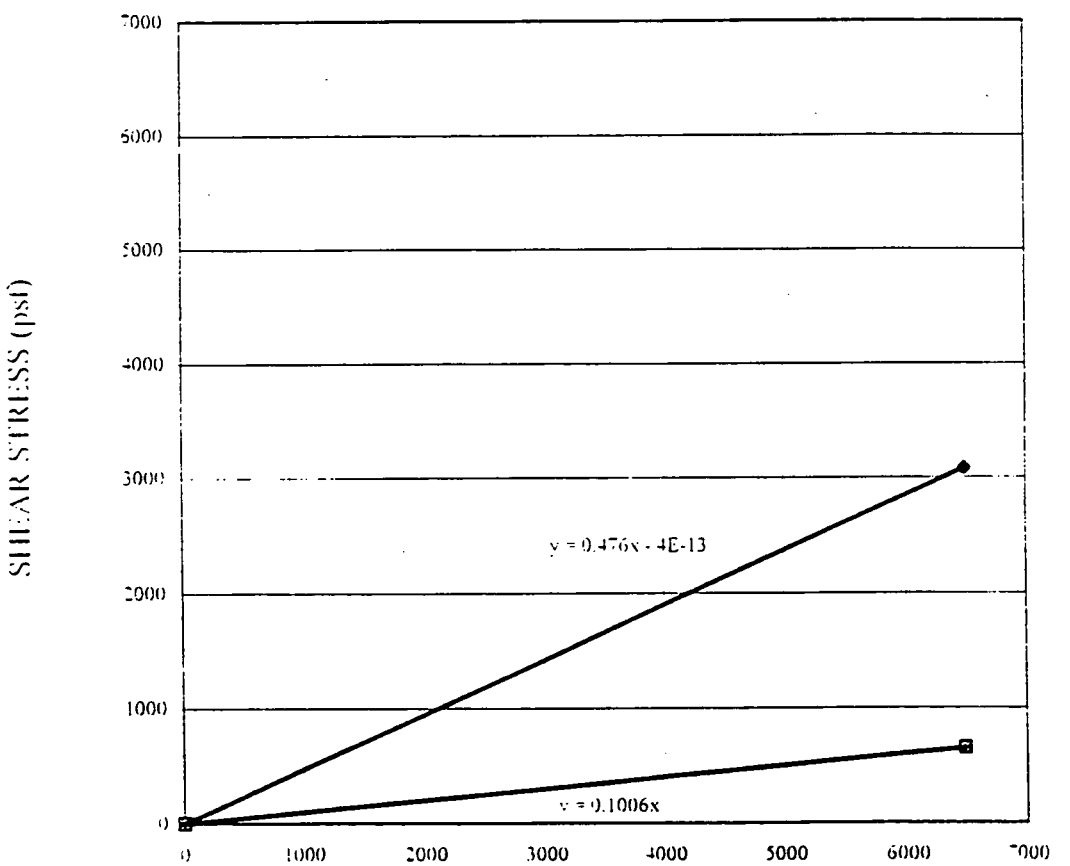
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT: PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT: GCL INTERNAL SHEAR TESTING
PROJECT NO: L97212-02
LAB I.D. NO: BENTOFIX GCL (roll# 40698) L97212-02-01

INTERFACE: **BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

	PEAK SHEAR	SHEAR DATA (at 2" displacement)
FRICTION ANGLE (deg):	Φ = 25.5	Φ = 5.7
COEFFICIENT OF FRICTION	= 0.48	= 0.10
ADHESION (Calculated) (psf):	a = 0	a = 0

NOTES
1.) A component of the adhesion values reported may be an anomaly of the laboratory procedure and calculation algorithm.
2.) The friction angle was calculated using linear regression basing on original data.
3.) The GCL specimen was pre-hydrated under 3 psi for 7 days and consolidated under the test load for 2 days



000069

45 psi

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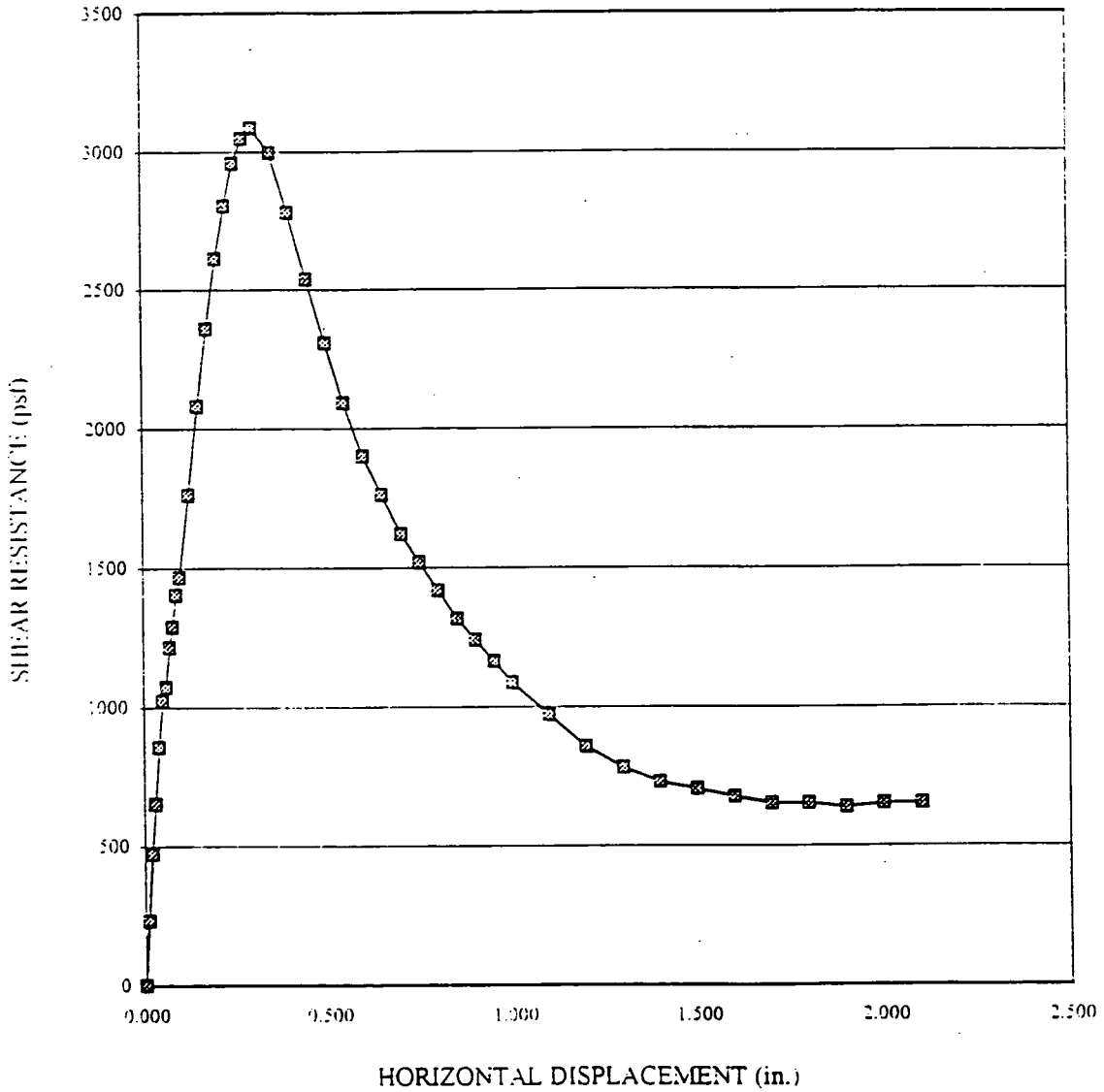
INTERFACE FRICTION TEST RESULTS
ASTM D 5321-92

CLIENT	PETRO ENVIRONMENTAL TECHNOLOGIES
CLIENT PROJECT	GCL INTERNAL SHEAR TESTING
PROJECT NO	L97212-02
LAB I.D. NO	BENTOFIX GCL (roll# 40698) : L97212-02-01
INTERFACE	**BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

SHEAR RESISTANCE VS HORIZONTAL DISPLACEMENT



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45psi

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INTERFACE FRICTION TEST RESULTS

ASTM D 5321-92

CLIENT: PETRO ENVIRONMENTAL TECHNOLOGIES — DIRECT SHEAR UNIT GEOTEST S2450
CLIENT PROJECT: GCL INTERNAL SHEAR TESTING
PROJECT NO.: L97212-02
LAB I. D. NO.: BENTOFIX GCL (roll# 40698) : L97212-02-01

INTERFACE: **BENTOFIX GCL (ROLL NO. 40698) INTERNAL SHEAR**

STRAIN RATE (in./min.): 0.004 — NORMAL LOAD: PNEUMATIC CYLINDERS

TEST DATA

NORMAL LOAD (psf)	6480
NORMAL LOAD (psi)	45.0
PEAK SHEAR STRESS (psf)	3084
SHEAR DATA (at 2") (psf)	652

HORIZONTAL

DISPLACE (in.)	SHEAR FORCE (lbs)	STRESS (psf)
0.000	0	0
0.010	222	232
0.020	453	474
0.030	623	652
0.040	818	856
0.050	976	1021
0.060	1025	1072
0.070	1159	1212
0.080	1232	1289
0.090	1342	1403
0.100	1403	1467
0.125	1683	1760
0.150	1987	2078
0.175	2255	2358
0.200	2499	2613
0.225	2681	2804
0.250	2828	2957
0.275	2913	3046
0.300	2949	3084
0.350	2864	2995
0.400	2657	2779
0.450	2426	2537
0.500	2207	2307
0.550	2000	2091
0.600	1817	1900
0.650	1683	1760
0.700	1549	1620
0.750	1452	1518
0.800	1354	1416
0.850	1257	1314
0.900	1183	1238
0.950	1110	1161
1.000	1037	1085
1.100	928	970
1.200	818	856
1.300	745	779
1.400	696	728
1.500	672	703
1.600	648	677
1.700	623	652
1.800	623	652
1.900	611	639
2.000	623	652
2.100	623	652

000471

45 psi

CHECKED BY: PC DATE: 10-22-97

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GEOTESTING EXPRESS

Roll No. 37386
(5 and 20 PSI)

PETRO
environmental
technologies

GeoTesting Express

1145 MASSACHUSETTS AVE.
BOXBOROUGH, MA 01719
508-635-0424 (FAX) 508-635-0266

October 23, 1997

Mr. Steve Brandstetter
Petro Environmental Technologies
7851 Palace Drive
Cincinnati, OH 45249

RE: OSDF Phase I (GTX-1606)

Dear Mr. Brandstetter:

We have reviewed our test results and confirm that the values reported represent what was measured in the two tests. We agree that the trend of residual strengths for the three normal stresses does not follow the normally expected result of residual strength increasing with normal stress. We think this may be due to problems with the setup of the samples in the large shear box.

Our shear box has a bottom area of 12" x 15" and a top area of 12" x 12". When testing GCLs, we place the GCL over the bottom area. This provides a GCL material for slip to occur on for the full amount of shear box displacement, i.e. 3". As the GCL begins to fail, the top box pulls the upper part of the GCL within the box over the lower part. However the top part of the GCL outside the box does not slip. This creates a tendency for the upper part of the GCL outside the moving front of the box to bunch up in front of the box, sometimes called "snow-plowing." We expect that this bunched up GCL material in front of the box adds to the shear force measured at larger displacements. Since this bunched up material lies outside the shear box, the magnitude of the resistive force it contributes is relatively independent of the magnitude of the normal force. This problem should not significantly affect the peak shear stress results.

We have examined the specimens used for the two tests. Both specimens show GCL material bunched up at the front of where the top box was. Both specimens show a distinct shear plane between the bentonite and the bottom geotextile. Additionally, the top geotextile was easily pulled away from the bentonite, indicating that most of the stitching fibers were broken by the shearing process. Based on these observations, we expect that the shear stress we measured at 2 inches of displacement is higher than the residual shear strength of the material.

We don't know what the setup used by the lab for the test at 45 psi was. Based on their results, we expect that their box tested a 12" x 12" sample and did not experience snow-plowing.

We are not clear on the reason for rejection of the material. Usually materials are not rejected because the shear strength is too high. We do not believe that a problem associated with the mechanical aspects of the shear box should necessarily result in a rejection of the material. We will do whatever we can to help resolve this issue. We can discuss the matter directly with GeoSyntec if you think it worthwhile.

Respectfully yours;

Gary T. Torosian
Laboratory Manager

Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method by ASTM D 5321

procedure A: Geosynthetic and Geosynthetic Friction

Client: Petro Environmental
Project Name: OSDF Phase 1
Project Location: Fernald, OH

GTX#: 1606
Test Date: 10/10 & 10/13/97
Page: 1 of 2

Test Profile: steel plate with texturing / GCL / steel plate with texturing

Geosynthetic Sample ID & Descriptions: GCL Roll #: 37386

Test Equipment: Top box = 12 in x 12 in; Bottom box = 15 in x 12 in; Load cells and LVDTs connected to data acquisition system for shear force, normal load, and horizontal displacement; Flat plate clamping device: surface area = 144 in^2

Test Condition: samples inundated under normal load of 3 psi for seven days, normal load then increased to test conditions for two days prior to shearing

Parameter	Point 1	Point 2	Point 3
Nominal Rate of Horizontal Displacement, in/min	0.004	0.004	—
Normal Compressive Stress, psi	5	20	—
Peak Shear Stress, psi	15.6	16.4	—
Shear Stress @ 2 inches displacement, psi	6.42	5.24	—

Friction Angle: — **degrees**
Cohesion: — **psf**

Comments: Tested By: gph Checked By: gtt

Shear force vs. displacement plot is presented in Figure 1

Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

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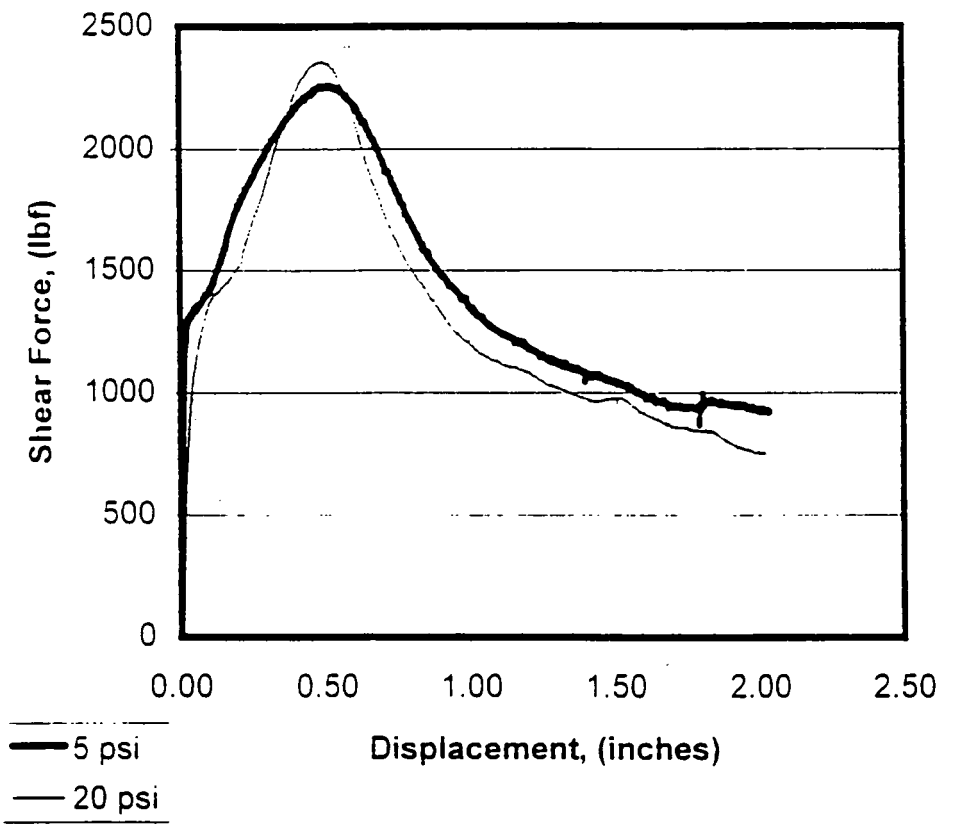
Direct Shear Test Series by ASTM D 5321

Client: Petro Environmental
Project: OSDF Phase 1
Location: Fernald, OH
Sample ID: GCL Roll #: 37386

GTX No: 1606
Test Date: 10/11/97 &10/13/97
Tested by: gph
Checked by: gtt
Page: 2 of 2

Figure 1. Shear Force vs. Horizontal Displacement



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STS CONSULTANTS LTD.

Roll No. 37061
(5 and 20 PSI)

Roll No. 40667
(20 PSI)

PETRO
environmental
technologies

October 21, 1997

Mr. Rick Scheirbaum
PETRO Environmental Technologies
7400 Willey Road
Cincinnati, Ohio 45030

RE: Laboratory Testing Program of GCL Samples - STS Project No. 29550

Dear Mr. Scheirbaum:

We are pleased to submit, two (2) copies of our laboratory test report that pertain to the testing of two (2) geosynthetic clay liner samples. The samples were received at our Northbrook, Illinois testing facility on September 29,1997 and October 11,1997. The samples were labeled as Roll Number 37061 and 40667.

In accordance with your instructions, STS performed internal shear tests on both samples following ASTM D 5321. Normal stresses of 740 and 2880 pounds per square foot (psf) were used for roll 37061 and a normal stress of 2880 psf was used for roll 40667. Each specimen was hydrated for 7 days under a 3 pounds per square inch (psi) vertical stress. The testing normal loads were applied to the test specimens for 48 hours prior to shearing the specimens.

The test data included in this report, only represent the samples tested and may not reflect actual site materials and/or conditions. The scope of services provided by STS Consultants, Ltd. did not include interpretation of the laboratory test data, and therefore, we are not liable for any interpretation performed by others. If you wish us to provide you with this service, we would be happy to discuss this matter with you at your convenience. Any reproduction of this report, must be done in it's entirety.

We are pleased to have the opportunity to provide you with our testing services. Should you have any questions, or require additional assistance, please feel free to contact us at any time.

Respectfully,

STS CONSULTANTS LTD.

William P. Quinn
Laboratory Manager

Charles W. Pfingsten, P.E.
Principal Engineer

STS CONSULTANTS LTD.
Laboratory Services

1869 Techny Road
Northbrook, Illinois 60062
847.267.8030/Fax 847.272.8320

Consulting Engineers
Laboratory Services Group 1869 Techny Road Northbrook, Illinois 60062 Phone: (847) 267-8030 Fax: (847) 272-8320

Determining the Internal Shear Strength of Geosynthetics By the Direct Shear Method ASTM D 5321

Project Name: Petro Enviromental Technologies
Date Tested: 10-14-97

STS Project # 29550

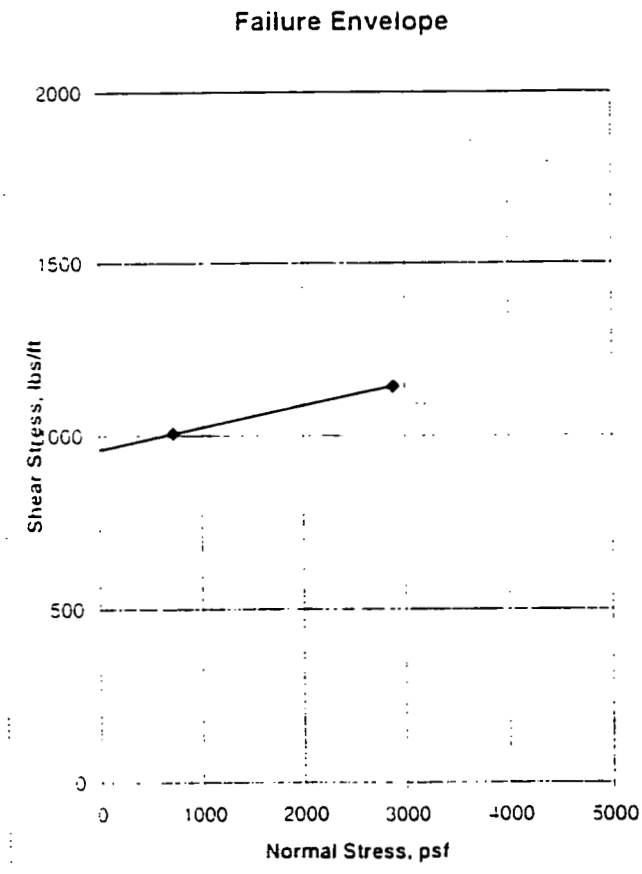
Test Parameters
Material Tested: Geosynthetic Clay Liner
Shear Rate: 0.004 in/min
7 Day Hydration 48 hour Consolication

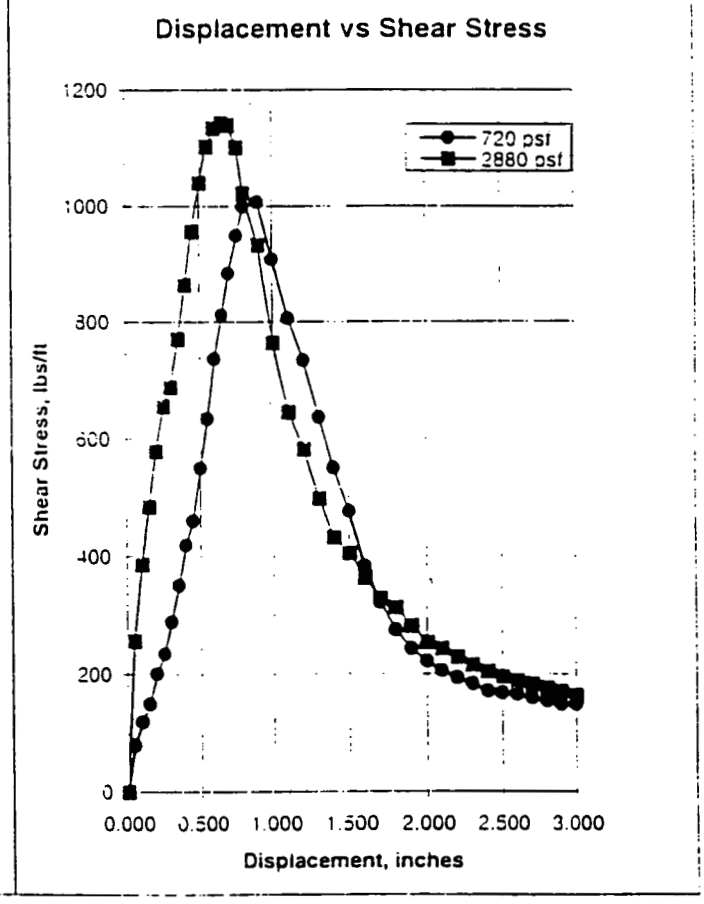
Sample ID Roll No. 37061

Test Results

Normal Stress psf	Shear Stress lbs/ft
720	1006
2880	1143

Summary of Results
Peak Friction Angle: 3.6 Degrees
Adhesion: 960 lbs





29550-1.xls

Consulting Engineers
Laboratory Services Group 1369 Techny Road Northbrook, Illinois 60062 Phone: (847) 267-8030 Fax:(847) 272-8320

Determining the Internal Shear Strength of Geosynthetics By the Direct Shear Method ASTM D 5321

Project Name: Petro Enviromental Technologies
Date Tested: 10-14-97

STS Project # 29550

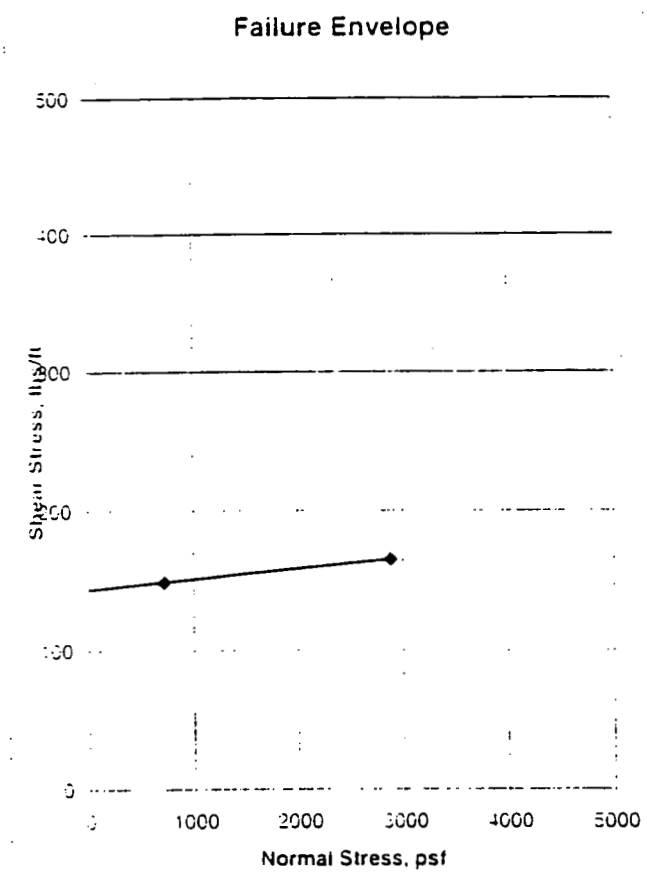
Test Parameters
Material Tested: Geosynthetic Clay Liner
Shear Rate: 0.004 in/min
7 Day Hydration 48 hour Consolidation

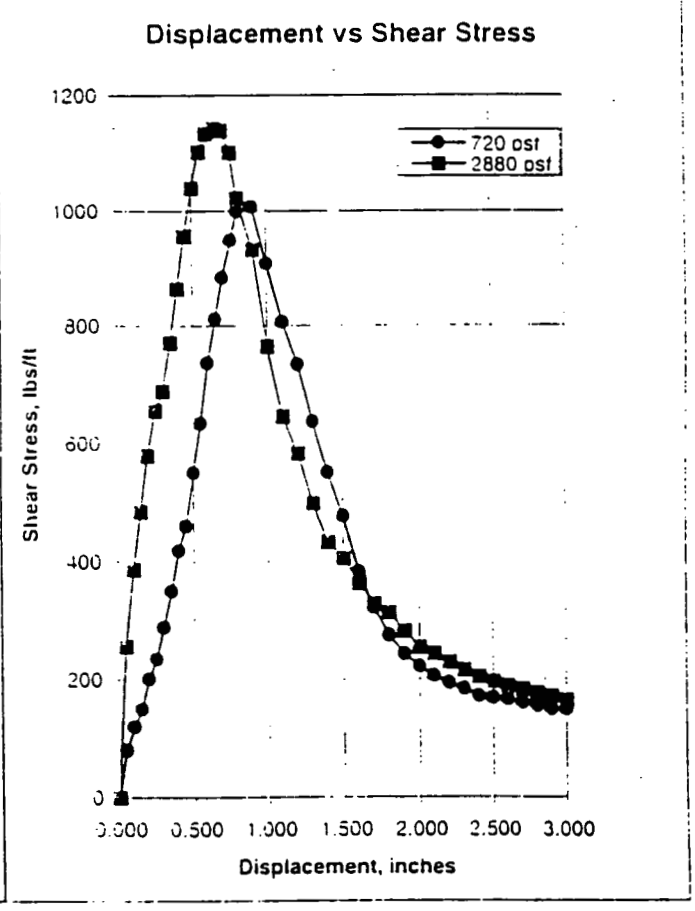
Sample ID Roll No. 37061

Test Results

Normal Stress psf	Residual Stress lbs/ft
720	149
2880	165

Summary of Results
Residual Friction Angle: 0.5 Degrees
Adhesion: 143 lbs





29550-1.xls

Determining the Internal Shear Strength of Geosynthetics
By the Direct Shear Method
ASTM D 5321

Sample ID Roll No.37061

STS Project # 29550
Date Tested: 10-14-97

Displacement inches	Shear Stress 720psf lbs/ft	Shear Stress 2880psf lbs/ft
0.000	0	0
0.050	80	256
0.100	120	386
0.150	150	485
0.200	202	579
0.250	235	655
0.300	289	689
0.350	350	771
0.400	419	864
0.450	460	956
0.500	550	1040
0.550	634	1103
0.600	737	1134
0.650	812	1143
0.700	883	1139
0.755	948	1102
0.800	998	1022
0.900	1006	933
1.000	908	764
1.100	806	645
1.200	733	582
1.300	636	498
1.400	550	432
1.500	476	405
1.600	382	363
1.700	321	328
1.800	274	313
1.900	243	282
2.000	222	254
2.100	206	244
2.200	194	230
2.300	184	216
2.400	171	205
2.500	168	196
2.600	166	189
2.700	160	184
2.800	155	177
2.900	149	171
3.000	149	165

Consulting Engineers
Laboratory Services Group 1869 Techny Road Northbrook, Illinois 60062 Phone: (847) 267-8030 Fax:(847) 272-8320

Determining the Internal Shear Strength of Geosynthetics By the Direct Shear Method ASTM D 5321

Project Name: Petro Enviromental Technclogies
Date Tested: 10-20-97

STS Project # 29550

Test Parameters

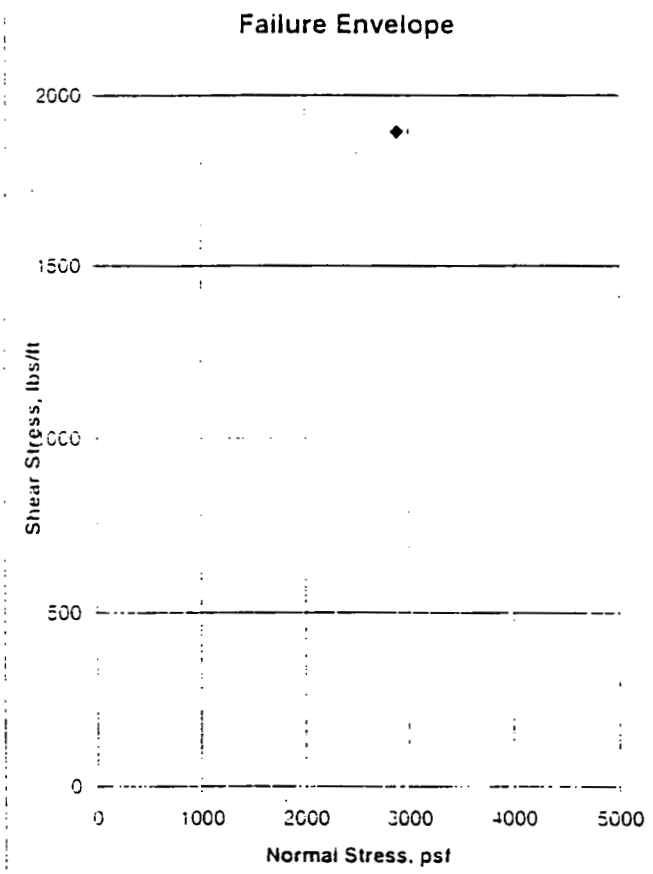
Material Tested: Geosynthetic Clay Liner
Shear Rate: 0.004 in/min
7 Day Hycration 48 hour Consolidation

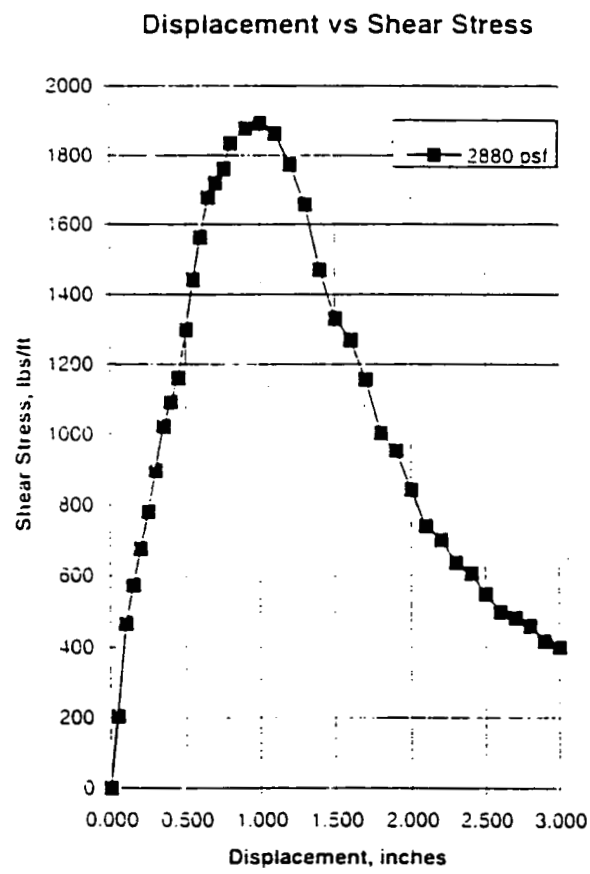
Sample ID Roll No.40667

Test Results

Normal Stress psf	Shear Stress lbs/ft
2880	1894

Summary of Results
Peak Friction Angle: --
Adhesion: --





29550-1.xls

Determining the Internal Shear Strength of Geosynthetics
By the Direct Shear Method
ASTM D 5321

Sample ID Roll No.40667

STS Project # 29550
Date Tested: 10-20-97

Displacement inches	Shear Stress 2880psf lbs/ft
0.000	0
0.050	203
0.100	467
0.150	574
0.200	677
0.250	782
0.300	897
0.350	1025
0.400	1092
0.450	1160
0.500	1299
0.550	1442
0.600	1564
0.650	1679
0.700	1720
0.755	1762
0.800	1835
0.900	1879
1.000	1894
1.100	1864
1.200	1775
1.300	1659
1.400	1471
1.500	1331
1.600	1269
1.700	1157
1.800	1003
1.900	954
2.000	844
2.100	741
2.200	702
2.300	636
2.400	607
2.500	548
2.600	499
2.700	481
2.800	459
2.900	416
3.000	400

PETRO
environmental
technologies

SUPPLIER SUBMITTAL No.: 057 (Rev. 3)

INTERNAL SHEAR STRENGTH TEST RESULTS
Sections 02772-1.04.B

FLUOR DANIEL FERNALD SUBCONTRACT No. FSC 597
ON-SITE DISPOSAL FACILITY (PHASE I) PROJECT

Document No. PET-065 (Rev. 3)

December 1, 1997

Fernald Site Office: P.O. Box 538704 • Mail Stop 44 • Cincinnati, Ohio 45253-8704 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
3200 Seville Road • Seville, Ohio 44273 • 330.948.1494 • Fax 948.[illegible]933

NTH CONSULTANTS, LTD.

Roll Nos. 35757, 36344, 36114, 37386,
36262, 37061, and 40667
(5, 20. and/or 45 PSI)

PETRO
environmental
technologies

NTH Consultants, Ltd.
Professional Engineering and
Environmental Services

150 Springdale Drive
Exton, PA [illegible]
610-524-2300
610-524-[illegible]

Petro Environmental Technologies, Inc.
7400 Willey Road
Cincinnati, OH 45030

November 18, 1997
54-7239-01

Attn: Mr. Rick Schairbaum

RE: **INTERFACE DIRECT SHEAR TESTING**
Addendum No. 2
Petro-Fernald Site

Dear Mr. Schairbaum:

Enclosed are the supplemental test results regarding the interface direct shear testing performed for the Petro-Fernald Site, On-Site Disposal Facility, Phase I. The additional test results were obtained from the seven test series (#3 to #9) for the internal strength of a hydrated geosynthetic clay liner at the normal pressures of 5 psi, 20 psi, or 45 psi. Included are the additional Figures to the original report (Figures 3 to 9), as well as an updated Table 1. Please incorporate these results into your report dated August 6, 1997. The testing was performed in general accordance with ASTM D 5321 "Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method," as well as additional specifications supplied to NTH Consultants, Ltd. Please contact us if you have any questions.

Sincerely,

NTH Consultants, Ltd.

Robert M. Sabanas
Geosynthetics Laboratory Coordinator

Philip E. Gauffreau, P.E.
Project Manager
Geotechnical Services

RMS:PEG:bd

G:\547\547239\REPORT.R2

NTH

TABLE 1
INTERFACE DIRECT SHEAR TESTING
PETRO-FERNALD SITE
SUMMARY OF TEST RESULTS

Test Series	Interface	Normal Stress Applied (psi)	Measured Shear Strength				Strain Rate (in/min)
			Peak Strength (psi)	Calculated Secant Friction Angle	Residual Strength (psi)	Calculated Secant Friction Angle	
3	Internal Shear Strength of a Hydrated Geosynthetic Clay Liner (1) Roll #035557	5	3.81	37.3°	3.25	33.0°	0.04
		20	9.27	24.9°	2.69	7.7°	
		45	17.18	20.9°	3.10	3.9°	
		45 (dup)	18.05	21.9°	3.98	5.1°	0.005
4	Internal Shear Strength of a Hydrated Geosynthetic Clay Liner (1) Roll #36344	5	3.55	35.4°	2.53	26.8°	0.005
		20	9.12	24.5°	2.41	6.9°	
		45	17.47	21.2°	4.17	5.3°	
5	Internal Shear Strength of a Hydrated Geosynthetic Clay Liner (1) Roll #36114	45	15.76	19.3°	3.36	4.3°	0.005

NOTES: (1) GCL hydrated for 7 days under 3 psi and consolidated for 48 hours under the specified normal pressure for testing.

002228

NTH

TABLE 1
INTERFACE DIRECT SHEAR TESTING
PETRO-FERN ALD SITE
SUMMARY OF TEST RESULTS

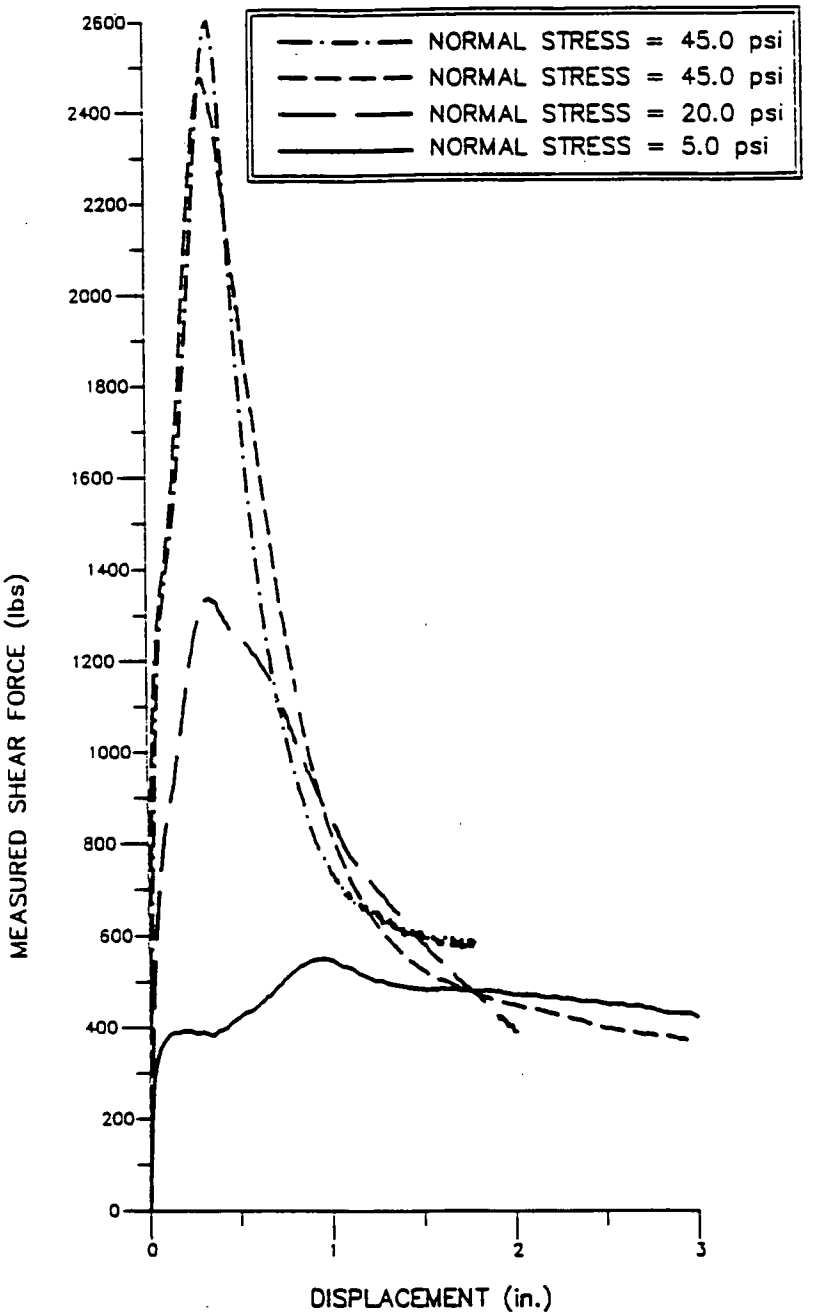
Test Series	Interface	Normal Stress Applied (psi)	Measured Shear Strength				Strain Rate (in/min)
			Peak Strength (psi)	Calculated Secant Friction Angle	Residual Strength (psi)	Calculated Secant Friction Angle	
6	Internal Shear Strength of a Hydrated Geosynthetic Clay Liner (1) Roll #37386	45	18.85	22.7°	4.51	5.7°	0.005
7	Internal Shear Strength of a Hydrated Geosynthetic Clay Liner (1) Roll #36262	45	14.46	17.8°	3.75	4.8°	0.005
8	Internal Shear Strength of a Hydrated Geosynthetic Clay Liner (1) Roll #37061	45	9.20	11.6°	2.92	3.7°	0.005
9	Internal Shear Strength of a Hydrated Geosynthetic Clay Liner (1) Roll #40667	5	3.56	35.4°	2.28	24.6°	0.005
		45	17.76	21.5°	3.85	4.9°	

NOTES: (1) GCL hydrated for 7 days under 3 psi and consolidated for 48 hours under the specified normal pressure for testing.

002227

TEST SERIES 3

INTERNAL SHEAR STRENGTH OF A HYDRATED GCL



NOTES:
1. THE GCL WAS HYDRATED FOR 7 DAYS UNDER A 3 psi LOAD, PRIOR TO TESTING.
2. THE GCL WAS CONSOLIDATED UNDER THE NORMAL PRESSURE FOR TESTING FOR 48-HOURS.

ROLL #03557

J:\59\4444\72390001.DWG
10-29-97

Scale:	AS SHOWN
Date:	10-29-97
Drawn:	J.M.R.
Checked:	RMS

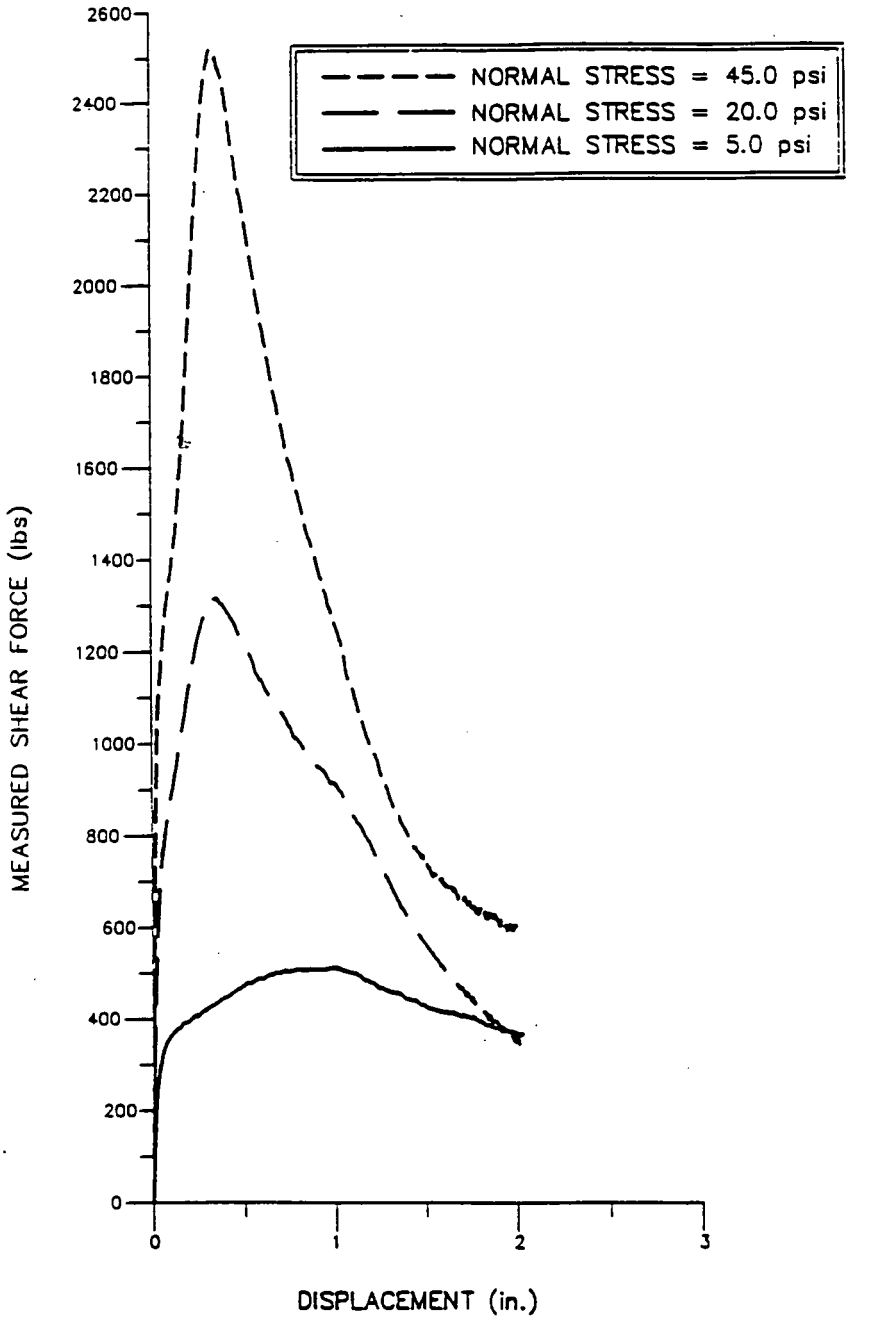
INTERFACE DIRECT SHEAR TESTING
ASTM D5321
PETRO – FERNALD SITE
ON-SITE DISPOSAL FACILITY, PHASE I

NTH CONSULTANTS, LTD.
Professional Engineering & Environmental Services
860 SPRINGDALE DRIVE, EXTON, PENNSYLVANIA 19341
(610) 524-2300

Project No.: 54-7239-01

FIGURE 3

TEST SERIES 4
INTERNAL SHEAR STRENGTH OF HYDRATED GCL



NOTES:
1. THE GCL WAS HYDRATED FOR 7 DAYS UNDER A 3 psi LOAD, PRIOR TO TESTING.
2. THE GCL WAS CONSOLIDATED UNDER THE NORMAL PRESSURE FOR TESTING FOR 48-HOURS.

ROLL #36344

Scale: AS SHOWN
Date: 10-29-97
Drawn: J.M.R.
Checked: RMS

INTERFACE DIRECT SHEAR TESTING
ASTM D5321

PETRO – FERNALD SITE
ON-SITE DISPOSAL FACILITY, PHASE I

NTH CONSULTANTS, LTD.
Professional Engineering & Environmental Services
860 SPRINGDALE DRIVE, EXTON, PENNSYLVANIA 19341
(610) 524-2300

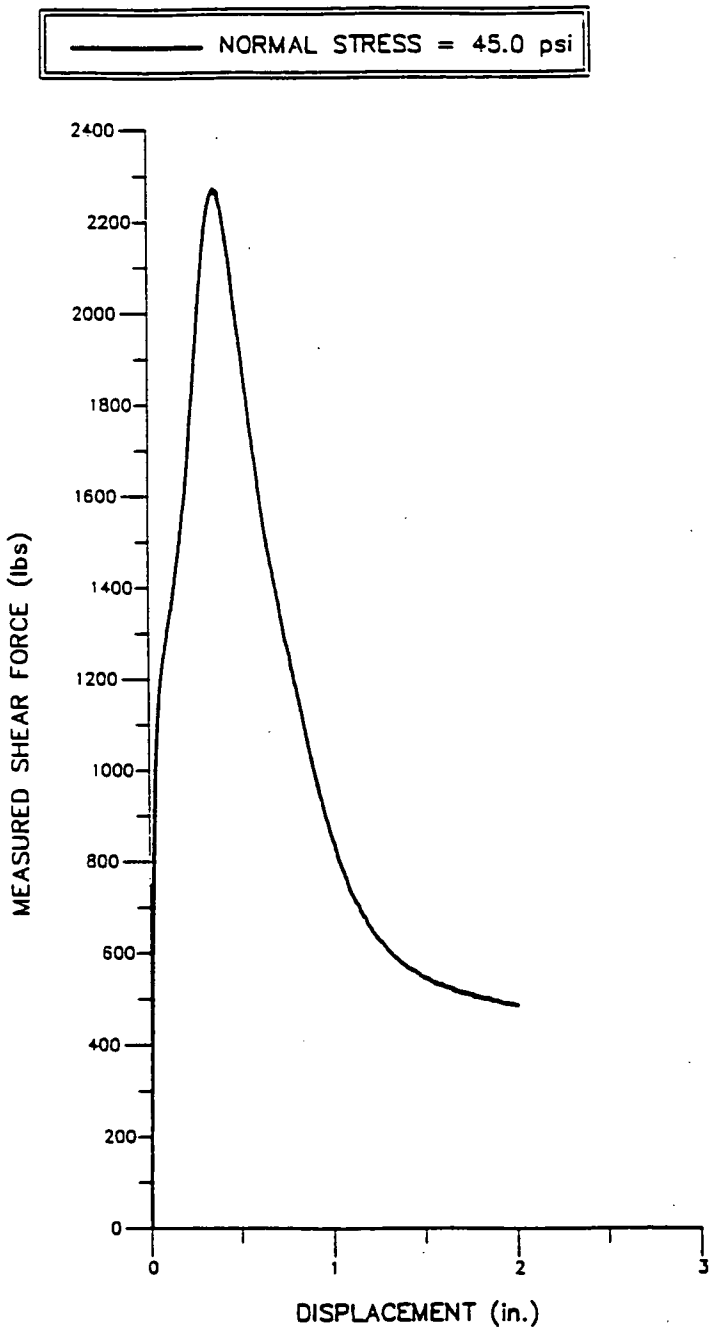
Project No.: 54-7239-01

FIGURE 4

J:\59\4444\72390002.DWG
10-29-97

TEST SERIES 5

INTERNAL SHEAR STRENGTH OF A HYDRATED GCL



NOTES:
1. THE GCL WAS HYDRATED FOR 7 DAYS UNDER A 3 psi LOAD, PRIOR TO TESTING.
2. THE GCL WAS CONSOLIDATED UNDER THE NORMAL PRESSURE FOR TESTING FOR 48-HOURS.

ROLL #36114

J:\59\4444\7239003.DWG
10-29-97

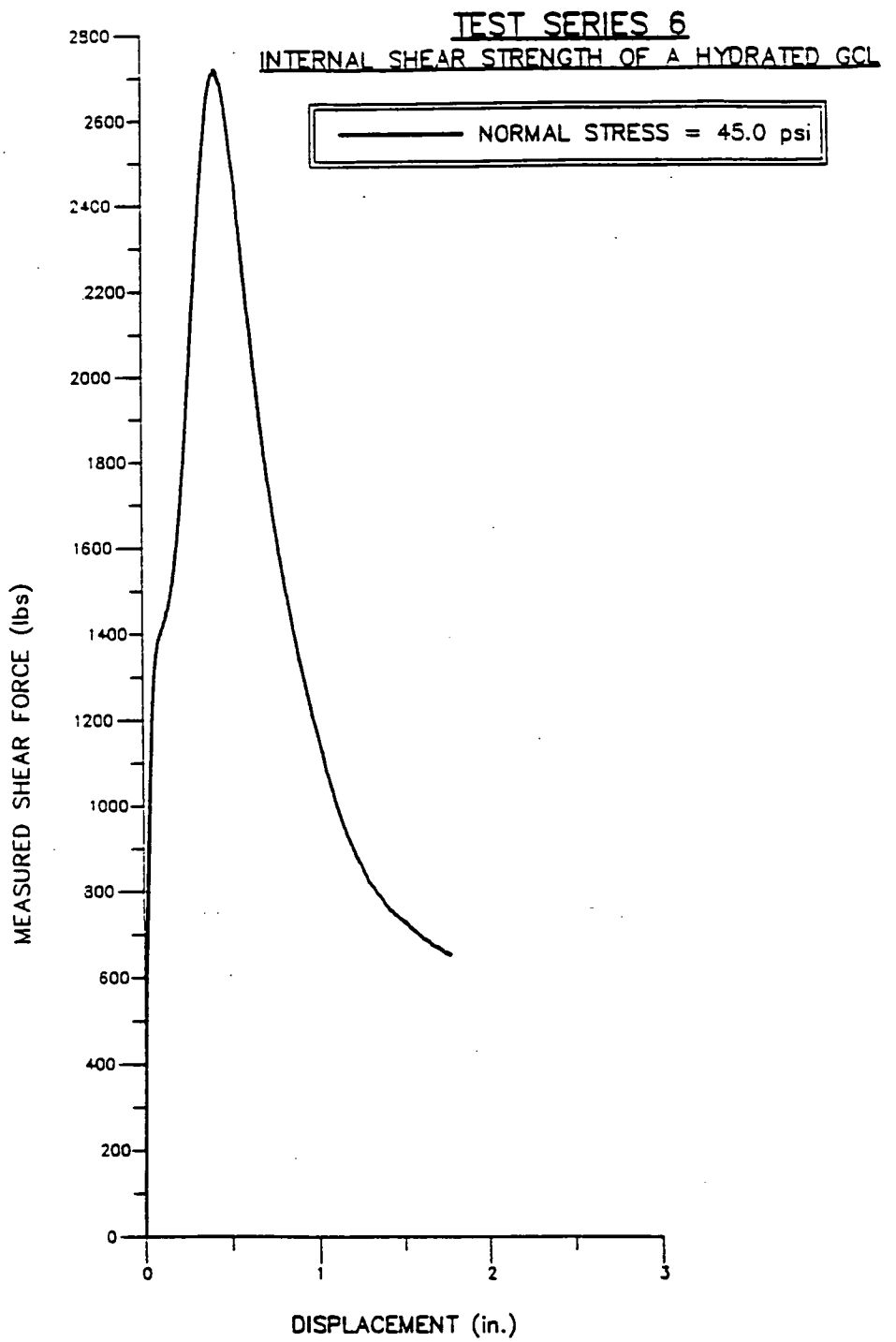
Scale: AS SHOWN
Date: 10-29-97
Drawn: J.M.R.
Checked: RMS

INTERFACE DIRECT SHEAR TESTING
ASTM D5321
PETRO - FERNALD SITE
ON-SITE DISPOSAL FACILITY, PHASE I

NTH CONSULTANTS, LTD.
Professional Engineering & Environmental Services
860 SPRINGDALE DRIVE, EXTON, PENNSYLVANIA 19341
(610) 524-2300

Project No.: 54-7239-01

FIGURE 5



NOTES:
1. THE GCL WAS HYDRATED FOR 7 DAYS UNDER A 3 psi LOAD, PRIOR TO TESTING.
2. THE GCL WAS CONSOLIDATED UNDER THE NORMAL PRESSURE FOR TESTING FOR 48-HOURS.

ROLL #37386

J:\59\4444\72390004.DWG
10-29-97

Scale:	AS SHOWN
Date:	10-29-97
Drawn:	J.M.R.
Checked:	RMB

INTERFACE DIRECT SHEAR TESTING
ASTM D5321
PETRO - FERNALD SITE
ON-SITE DISPOSAL FACILITY, PHASE I

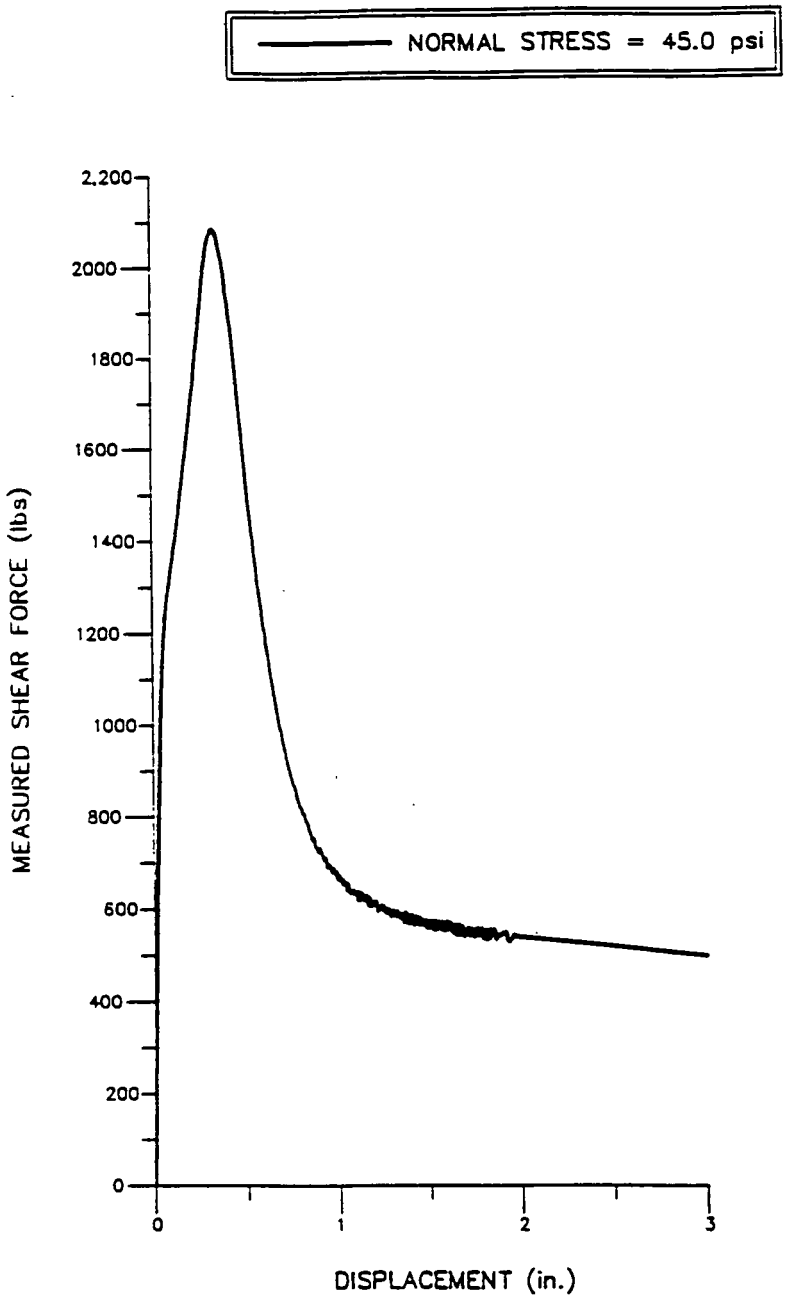
NTH CONSULTANTS, LTD.
Professional Engineering & Environmental Services
860 SPRINGDALE DRIVE, EXTON, PENNSYLVANIA 19341
(610) 524-2300

Project No.: 54-7239-01

FIGURE 6

TEST SERIES 7

INTERNAL SHEAR STRENGTH OF A HYDRATED GCL



NOTES:
1. THE GCL WAS HYDRATED FOR 7 DAYS UNDER A 3 psi LOAD, PRIOR TO TESTING.
2. THE GCL WAS CONSOLIDATED UNDER THE NORMAL PRESSURE FOR TESTING FOR 48-HOURS.

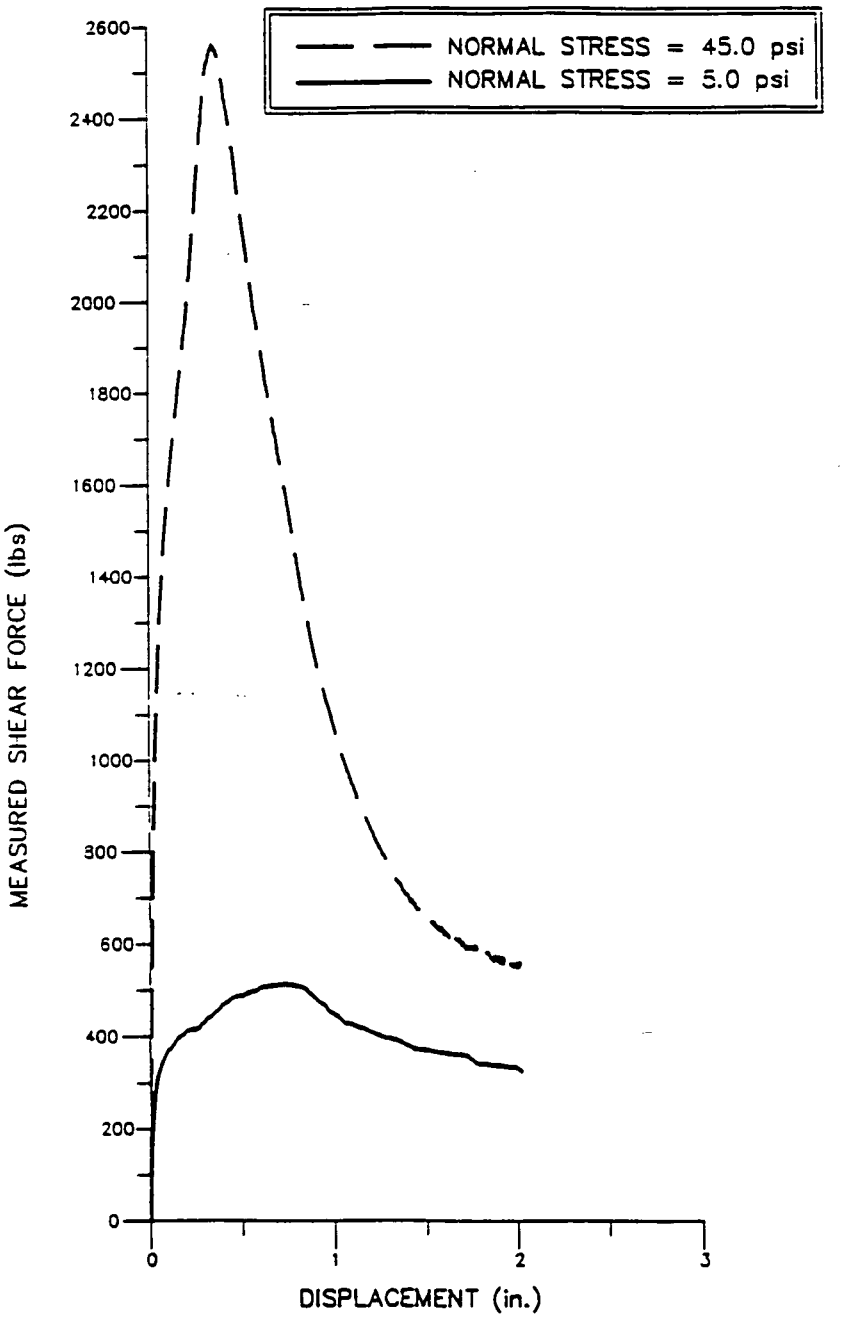
ROLL #36262

J:\59\4444\72390005.DWG
10-29-97

Scale: AS SHOWN	INTERFACE DIRECT SHEAR TESTING ASTM D5321
Date: 10-29-97	PETRO - FERNALD SITE
	ON-SITE DISPOSAL FACILITY, PHASE I
Drawn: J.M.R.	NTH CONSULTANTS, LTD. Professional Engineering & Environmental Services 860 SPRINGDALE DRIVE, EXTON, PENNSYLVANIA 19341 (610) 524-2300
Checked: lrs	Project No.: 54-7239-01 — FIGURE 7

TEST SERIES 9

INTERNAL SHEAR STRENGTH OF A HYDRATED GCL



NOTES:
1. THE GCL WAS HYDRATED FOR 7 DAYS UNDER A 3 psi LOAD, PRIOR TO TESTING.
2. THE GCL WAS CONSOLIDATED UNDER THE NORMAL PRESSURE FOR TESTING FOR 48-HOURS.

ROLL #40667

J:\59\4444\72390007.DWG
10-29-97

Scale: AS SHOWN	INTERFACE DIRECT SHEAR TESTING ASTM D5321
Date: 10-29-97	PETRO – FERNALD SITE
	ON-SITE DISPOSAL FACILITY, PHASE I
Drawn: J.M.R.	NTH CONSULTANTS, LTD. Professional Engineering & Environmental Services 860 SPRINGDALE DRIVE, EXTON, PENNSYLVANIA 19341 (610) 524-2300
Checked: RMS	Project No.: 54-7239-01 — FIGURE 9

VECTOR ENGINEERING, INC.
13438 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax: (916) 272-8553

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal

Project Name: Research; No.: 973015.01-698A

Material 1: <--- Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41651)

Material 2: ---> Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41651)

Substrate: ---> <concrete board>

PEAK STRENGTH

(0.0-1.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	1160	58
2.	20.0	2880	1720	31
3.	45.0	6480	3170	26
4.	0.0	0	0	0

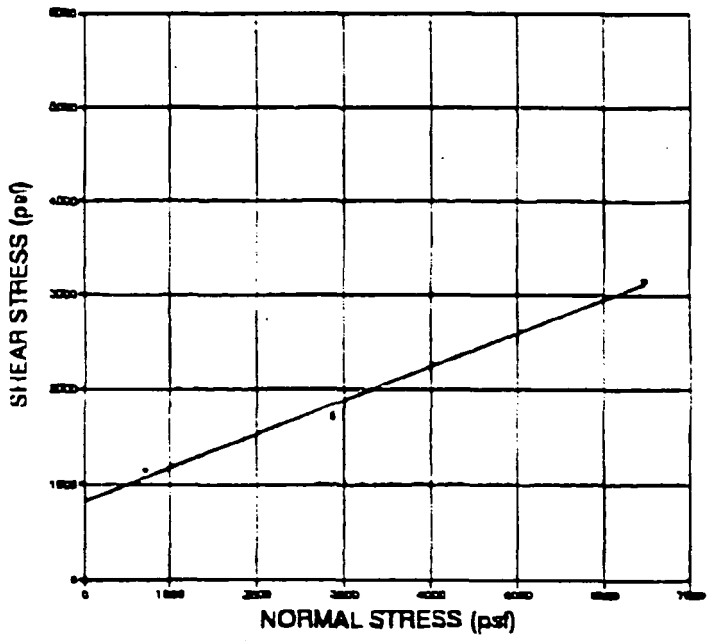
Adhesion: 820 psf

Friction Angle: 20 degrees

* Arc tan of Shear/Normal Stress (degrees)

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	300	23
2.	20.0	2880	450	9
3.	45.0	6480	860	8
4.	0.0	0	0	0

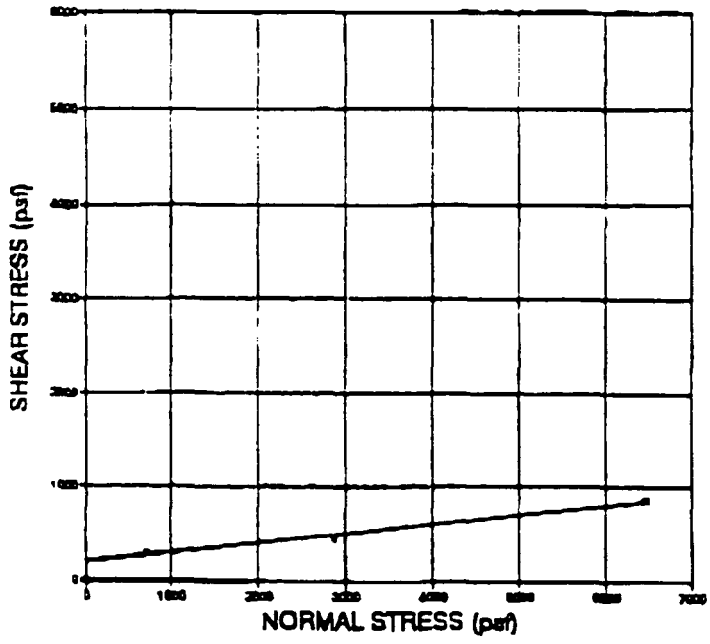
Adhesion: 200 psf

Friction Angle: 6 degrees

* Arc tan of Shear/Normal Stress (degrees)

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based upon a mathematically determined "best fit" line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and results represented on this page, Client agrees to shift the liability of Vector Engineering, Inc. from Client and all other parties for events arising out of the use of the data to the user for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned fees.

Report Date 11/16/97 Reviewed by:

PLATE 1.

VECTOR ENGINEERING INC.
12458 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax: (916) 272-8533

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal Project Name: Research; No.: 973015.01-698A

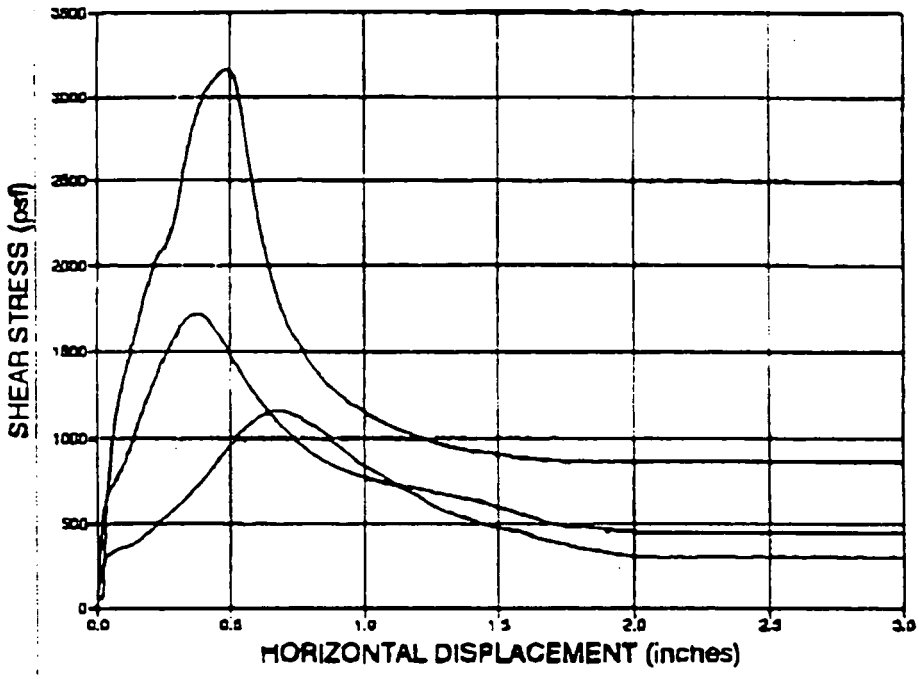
Material 1: <--- Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41651)

Material 2: ---> Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41651)

Substrate: ---> <concrete board>

DISPLACEMENT vs SHEAR STRESS

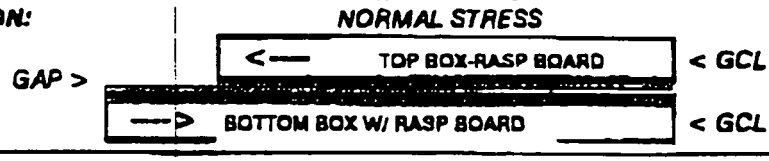
Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3	45.0	6480
4.	0.0	0



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 1/4".
2. The test specimens were flooded during testing unless noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5 psi) was applied using dead weights
5. The tests were terminated 3.0" displacement unless noted.
6. Tests were performed in general accordance with ASTM procedure D 5321-92 Method A using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12 in. x 12 in. (Machine C)

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The non-woven portion of the GCL was wrapped around a 12"x 15.5" rasp board in the lower box.
2. The woven portion of the GCL was wrapped around a 12"x 12" rasp board in the upper box.
3. Each test point was hydrated under 3 psi approximately 7 days.
4. After hydration, each point was consolidated under specified Normal Stress app. 48 hours prior to shearing.
5. The test was performed in a "Wet" or "flooded" condition.
6. Shearing occured at the contact between the woven and non-woven portion of the GCL.

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data to the cost for the respective test(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

VECTOR ENGINEERING, INC.
12438 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax: (916) 272-8553

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal

Project Name: Research; No.: 973015.01-698B

Material 1:	<---	Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41676)
Material 2:	--->	Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41676)
Substrate:	--->	<concrete board>

PEAK STRENGTH

(0.0-1.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	1320	61
2.	20.0	2880	1540	28
3.	45.0	6480	2810	23
4.	0.0	0	0	0

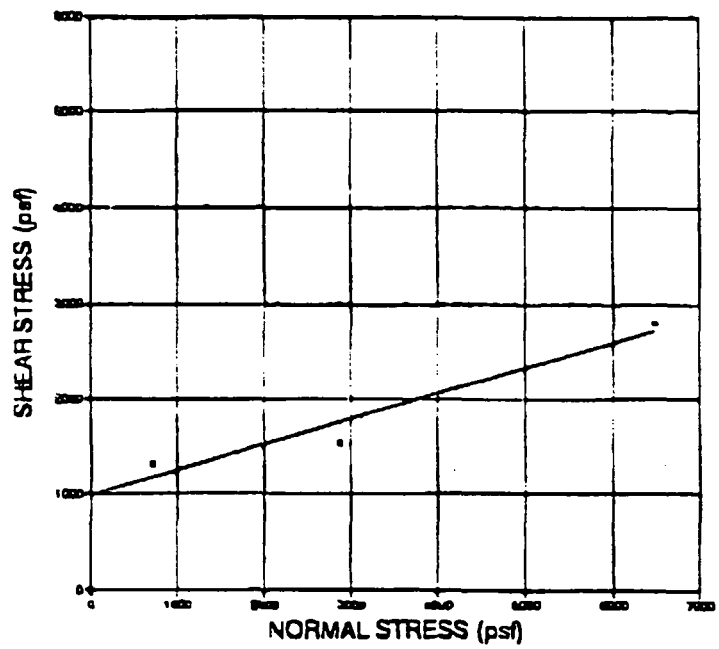
Adhesion: 990 psf

Friction Angle: 15 degrees

** Arc tan of Shear/Normal Stress (degrees)*

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	240	18
2.	20.0	2880	380	8
3.	45.0	6480	800	7
4.	0.0	0	0	0

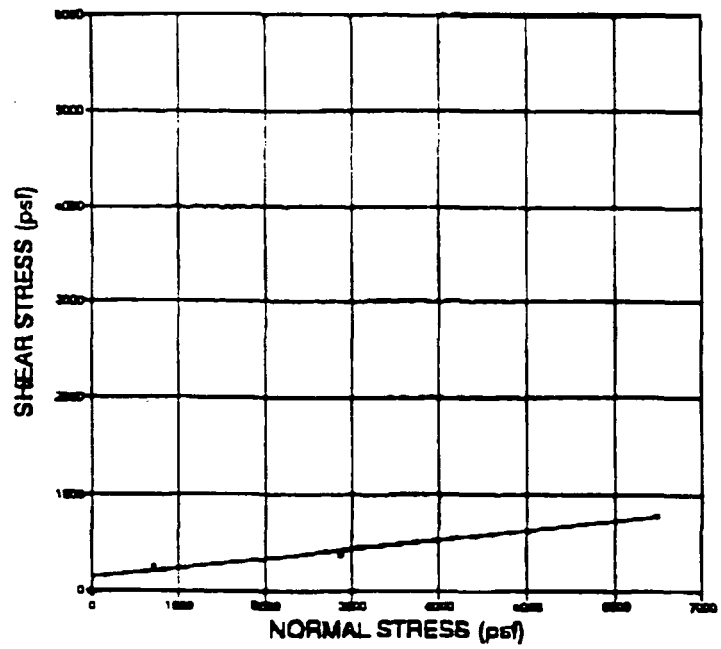
Adhesion: 140 psf

Friction Angle: 6 degrees

** Arc tan of Shear/Normal Stress (degrees)*

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based upon a mathematically determined "best fit" line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data to the cost for the respective test(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of this aforementioned limit.

Report Date 11/14/97 Reviewed by:

VECTOR ENGINEERING INC.
12438 Lone Hill Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax (916) 272-8533

LARGE SCALE DIRECT SHEAR REPORT

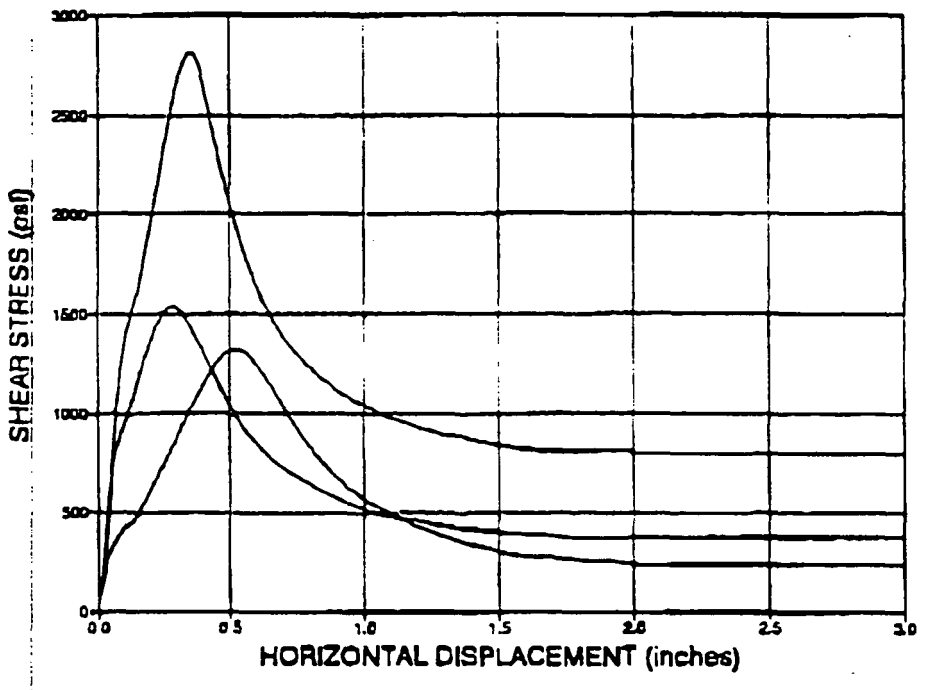
HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal Project Name: Research; No.: 973015.01-688B

Material 1:	<---	Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41676)
Material 2:	--->	Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41676)
Substrate:	--->	<concrete board>

DISPLACEMENT vs SHEAR STRESS

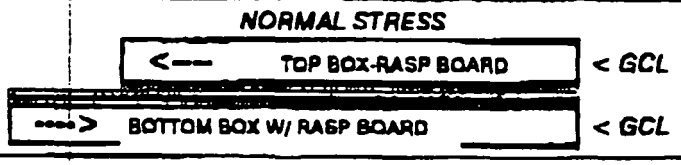
Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3	45.0	6480
4.	0.0	0



STANDARD CONDITIONS:

1. The "gap" between shearboxes was set at 1/4".
2. The test specimens were flooded during testing unless noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5 psi) was applied using dead weights
5. The tests were terminated 3.0" displacement unless noted.
6. Tests were performed in general accordance with ASTM procedure D 5321-92 Method A using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12 in. x 12 in. (Machine A)

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The non-woven portion of the GCL was wrapped around a 12"x 15.5" rasp board in the lower box.
2. The woven portion of the GCL was wrapped around a 12"x 12" rasp board in the upper box.
3. Each test point was hydrated under 5 psi approximately 7 days.
4. After hydration, each point was consolidated under specified Normal Stress app. 48 hours prior to shearing.
5. The test was performed in a "Wet" or "flooded" condition.
6. Shearing occured at the contact between the woven and non-woven portion of the GCL.

By accepting the data and results represented on this page, Client agrees to shift the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data to the code for the respective site(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

VECTOR ENGINEERING, INC.
12438 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax: (916) 272-8553

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal Project Name: Research; No.: 973015.01-698D

Material 1: <--- Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41729)

Material 2: ---> Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41729)

Substrate: ---> <concrete board>

PEAK STRENGTH

(0.0-1.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle •
1.	5.0	720	1000	54
2.	20.0	2880	1420	26
3.	45.0	6480	2160	18
4.	0.0	0	0	0

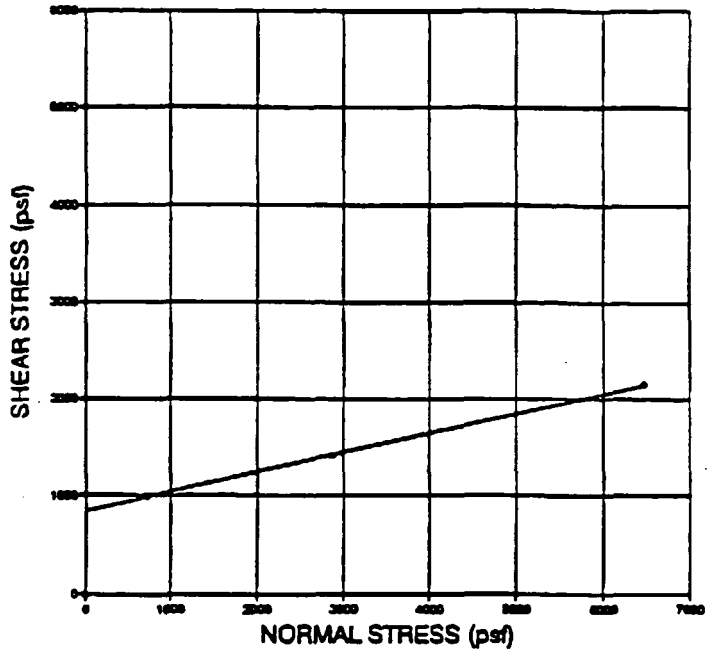
Adhesion: 850 psf

Friction Angle: 11 degrees

• *Arc tan of Shear/Normal Stress (degrees)*

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle •
1.	5.0	720	230	18
2.	20.0	2880	340	7
3.	45.0	6480	620	5
4.	0.0	0	0	0

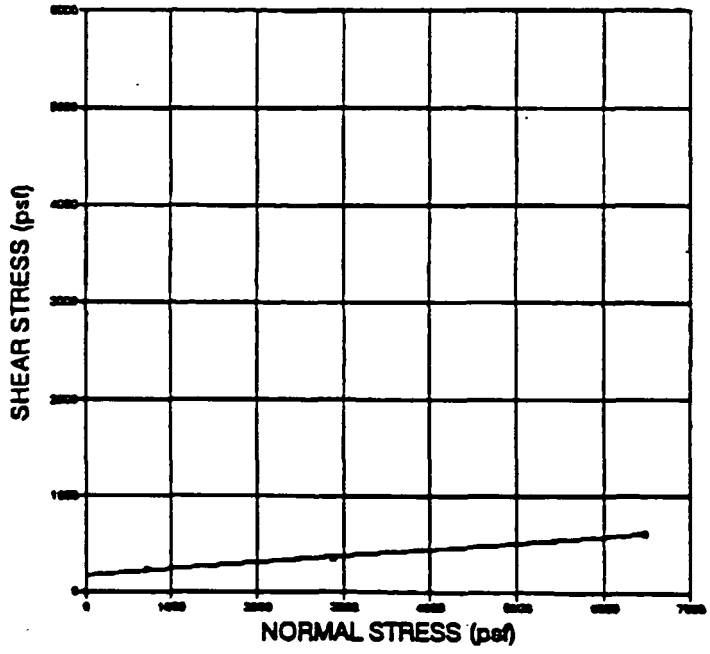
Adhesion: 170 psf

Friction Angle: 4 degrees

• *Arc tan of Shear/Normal Stress (degrees)*

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based upon a mathematically determined "best fit" line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data to the cost for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Report Date 12/01/97 Reviewed by: KRL

VECTOR ENGINEERING, INC.
12438 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax (916) 272-8533

LARGE SCALE DIRECT SHEAR REPORT

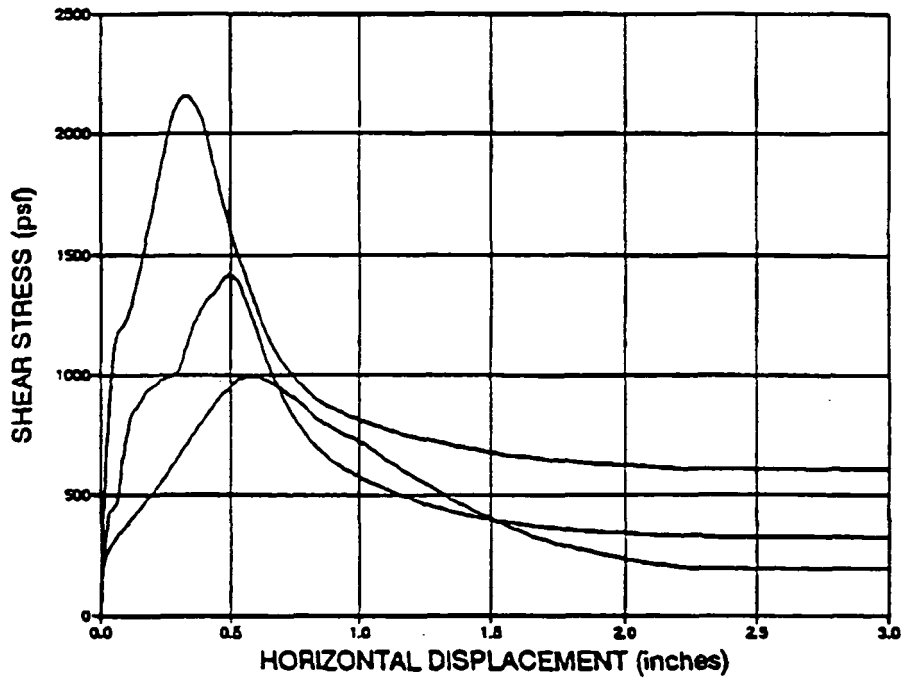
HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal Project Name: Research; No.: 973015.01-698D

Material 1:	<---	Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41729)
Material 2:	--->	Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41729)
Substrate:	--->	<concrete board>

DISPLACEMENT vs SHEAR STRESS

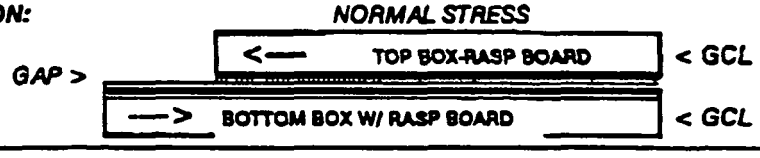
Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3	45.0	6480
4.	0.0	0



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 1/4".
2. The test specimens were flooded during testing unless noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5 psi) was applied using dead weights
5. The tests were terminated 3.0" displacement unless noted.
6. Tests were performed in general accordance with ASTM procedure D 5321-92 Method A using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12 in. x 12 in. (Machine A)

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The non-woven portion of the GCL was wrapped around a 12"x 15.5" rasp board in the lower box.
2. The woven portion of the GCL was wrapped around a 12"x 12" rasp board in the upper box.
3. Each test point was hydrated under 3 psi approximately 7 days.
4. After hydration, each point was consolidated under specified Normal Stress app. 48 hours prior to shearing.
5. The test was performed in a "Wet" or "flooded" condition.
6. Shearing occured at the contact between the bentonite and woven portion of the GCL.

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data to the cost for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

VECTOR ENGINEERING, INC.
12438 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax: (916) 272-8353

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal Project Name: Research; No.: 973015.01-698C

Material 1:	<---	Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41753)
Material 2:	--->	Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41753)
Substrate:	--->	<concrete board>

PEAK STRENGTH

(0.0-1.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	1060	56
2.	20.0	2880	1860	33
3.	45.0	6480	2900	24
4.	0.0	0	0	0

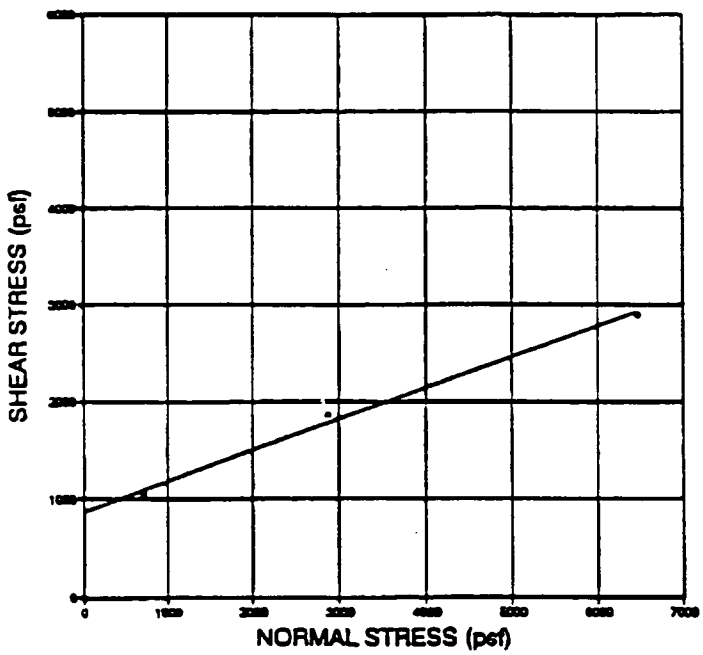
Adhesion: 880 psf

Friction Angle: 18 degrees

* Arc tan of Shear/Normal Stress (degrees)

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	250	19
2.	20.0	2880	400	8
3.	45.0	6480	760	7
4.	0.0	0	0	0

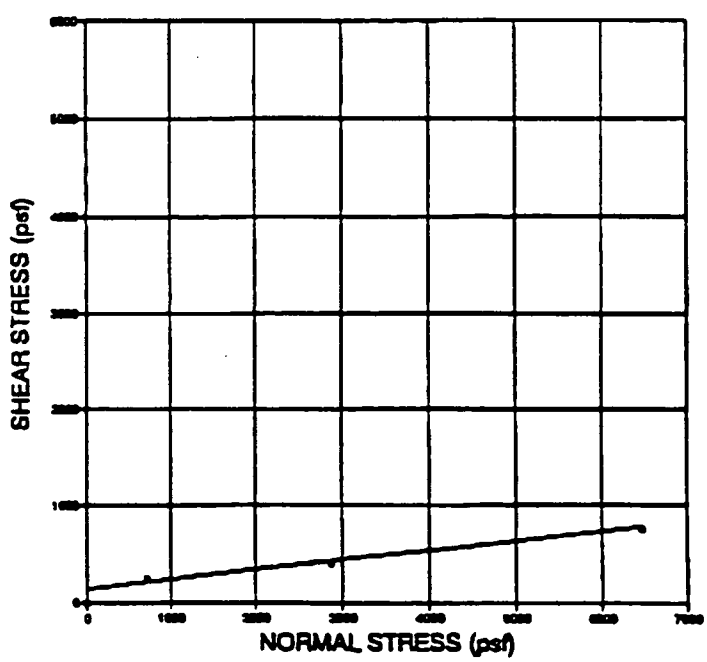
Adhesion: 140 psf

Friction Angle: 6 degrees

* Arc tan of Shear/Normal Stress (degrees)

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based upon a mathematically determined "best fit" line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

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Report Date 11/16/97 Reviewed by: KRL

PLATE 1.

VECTOR ENGINEERING, INC.
12438 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-2448 Fax: (916) 272-8553

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal Project Name: Research; No.: 973015.01-698C

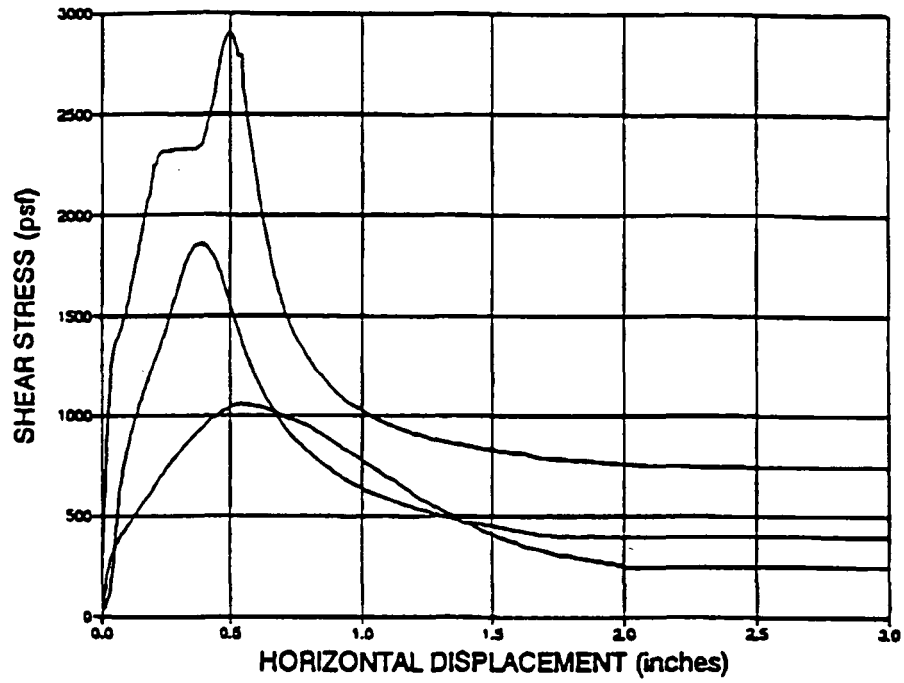
Material 1: <--- Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41753)

Material 2: ---> Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41753)

Substrate: ---> <concrete board>

DISPLACEMENT vs SHEAR STRESS

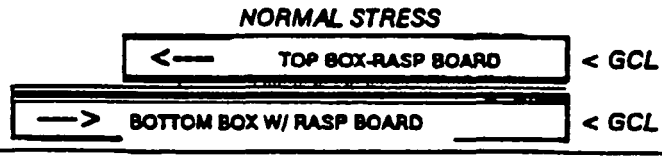
Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3	45.0	6480
4.	0.0	0



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 1/4".
2. The test specimens were flooded during testing unless noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5 psi) was applied using dead weights
5. The tests were terminated 3.0" displacement unless noted.
6. Tests were performed in general accordance with ASTM procedure D 5321-92 Method A using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12 in. x 12 in. (Machine A)

TEST ORIENTATION:



SPECIAL TEST NOTES:

1. The non-woven portion of the GCL was wrapped around a 12"x 15.5" rasp board in the lower box.
2. The woven portion of the GCL was wrapped around a 12"x 12" rasp board in the upper box.
3. Each test point was hydrated under 3 psi approximately 7 days.
4. After hydration, each point was consolidated under specified Normal Stress app. 48 hours prior to shearing.
5. The test was performed in a "Wet" or "flooded" condition.
6. Shearing occured at the contact between the bentonite and woven portion of the GCL.

By accepting the data and results represented on this page, Client agrees to limit the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data to the cost for the respective test(s) represented hereon, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

Sheet3

Day	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Date, nov	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	A1			Start Cons @ 14:30 Sat							6	<—Finish @ 3:30 Am																		
2	A2			Start Cons @ 14:30 Sat							20	<—Finish @ 3:30 Am																		
3				A1			Start Cons @ 14:30 Tue							45	<—Finish @ 3:30 Am Fri															
4				B1			Start Cons @ 14:30 Tue							15	<—Finish @ 3:30 Am Fri															
5								B2			Start Cons @ 14:30 Sat							20	<—Finish @ 3:30 Am Tues											
6								B3			Start Cons @ 14:30 Sat							45	<—Finish @ 3:30 Am Tues											
7											C1		Start Cons @ 18:30 Tue								6	<—Finish @ 3:30 Am Fri									
8											C2		Start Cons @ 18:30 Tue								20	<—Finish @ 3:30 Am Fri									
9															D2		Start Cons @ ____ Fri								45	<—Finish @ 3:30 Am Tues				
10															D1		Start Cons @ ____ Fri								5	<—Finish @ 3:30 Am Tues				
11																		D2	Start Cons @ ____ Mon									20		
12																		D3	Start Cons @ ____ Mon									45		

1267

000502

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Ken, Have provided copy to Gary S. Dave P 19 Nov 97

NSC FAX TRANSMISSION

NATIONAL SEAL COMPANY • FARNSWORTH CENTER • 1245 CORPORATE BLVD. • SUITE 300 • AURORA, IL 60504

To:	Dave Sablosky – Fluor Ken Cargill - GeoSyntec	From:	Tom Stam
Company:			Bentofix Product Manager
Address:		Phone:	(630) 898-1161 / (800) 323-3820
		Fax:	(630) 898-2567
Phone:		File:	Fax 971
Fax:		Pages:	5
Re:	Shear test Results	Date:	November 18, 1997

The direct shear test results are attached for rolls #41651 and #41676 from lot number 97102302. A quick review indicates all is well in "Mudville".

The laboratory indicates the two tests on lot number 971002402, should be completed by November 28th as the enclosed chart indicates. I will forward these as soon as they are completed.

Thanks for your patience. Please let me know if you have any questions or if I can be of further assistance.

Best Regards,

Tom

	Roll No	QA I.D.
LOT 97102302	41651	GCL-24
	41676	GCL-25
LOT 97102402	41729	GCL-26
	41753	GCL-21

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000503

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VECTOR ENGINEERING, INC.
(916) 272-3440 Fax: (916) 272-8353

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal

Project Name. Research; No.: 973015.01-696A

Material 1: <--- Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41651)

Material 2: ---> Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41651)

Substrate: ---> <concrete board>

PEAK STRENGTH

(0.0-1.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	1180	58
2.	20.0	2880	1720	31
3.	45.0	6480	3170	26
4.	0.0	0	0	0

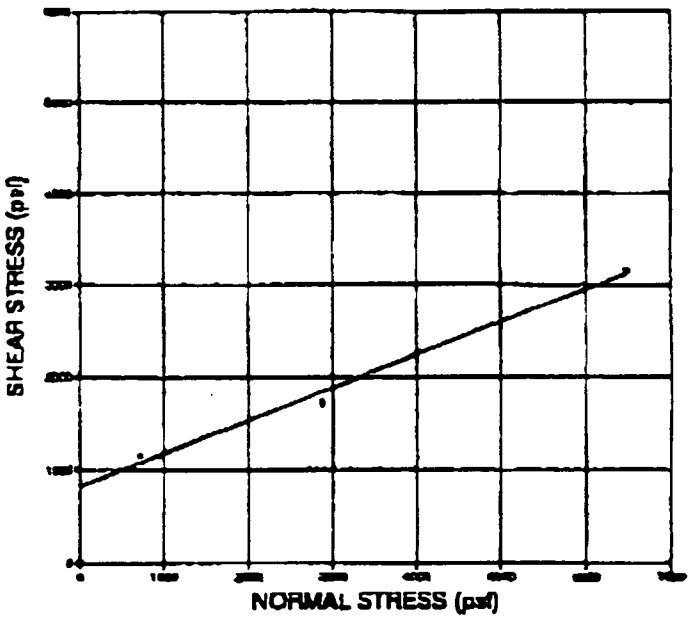
Adhesion: 820 psf

Friction Angle: 20 degrees

* Arc tan of Shear/Normal Stress (degrees)

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	300	23
2.	20.0	2880	450	9
3.	45.0	6480	850	8
4.	0.0	0	0	0

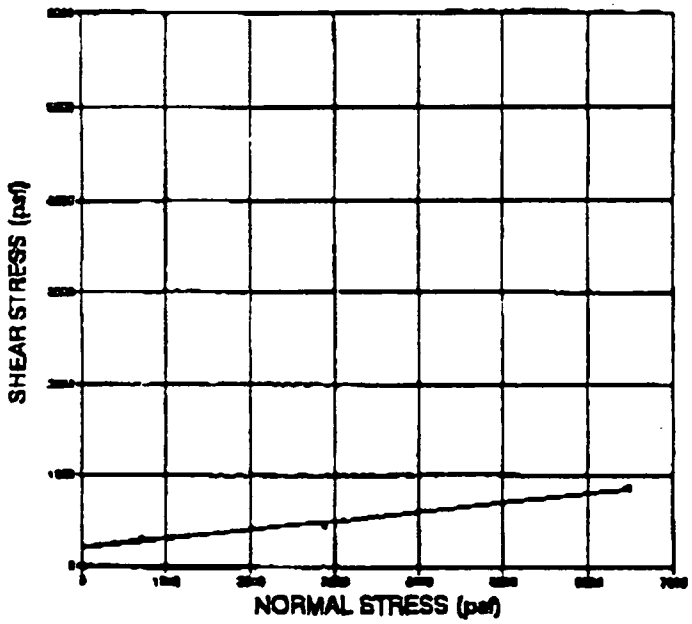
Adhesion: 200 psf

Friction Angle: 6 degrees

* Arc tan of Shear/Normal Stress (degrees)

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



NOTE: The Friction Angle and Adhesion (or Cohesion) results given here are based upon a mathematically determined "best fit" line. Further interpretation should be conducted by a qualified professional experienced in geosynthetic and geotechnical engineering.

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Report Date 11/14/97 Reviewed by

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000504 PLATE 1.

VECTOR ENGINEERING INC.
12655 Lower Sioux Dr., Suite C Glen Valley, CA 92013
(916) 272-3448 Fax: (916) 272-8553

1267

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal

Project Name: Research; No.: 973015.01-698A

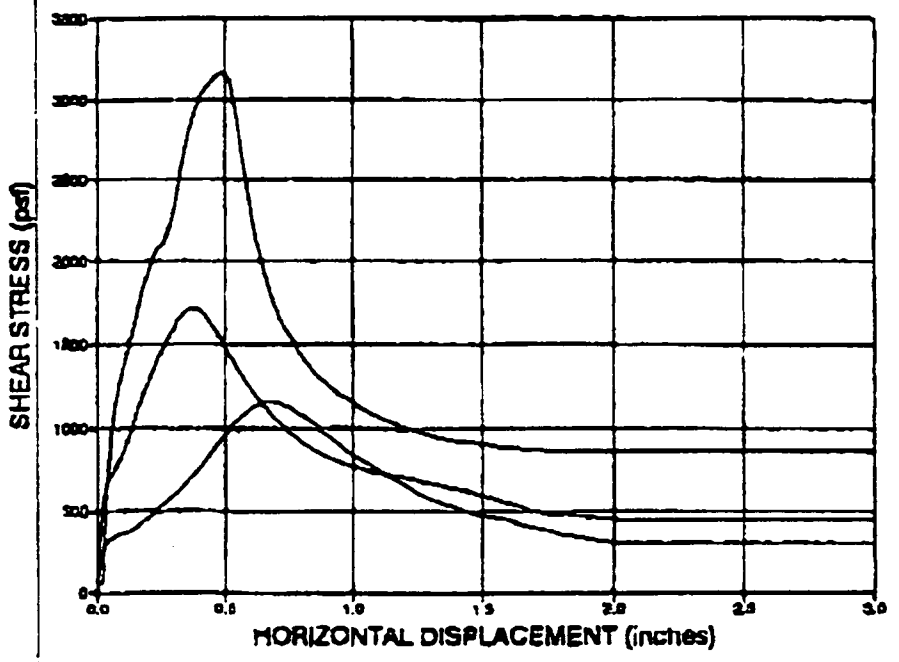
Material 1: <--- Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41651)

Material 2: ---> Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41651)

Substrate: ---> <concrete board>

DISPLACEMENT vs SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3	45.0	6480
4.	0.0	0



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 1/4".
2. The test specimens were flooded during testing unless noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5 psi) was applied using dead weights
5. The tests were terminated 3.0" displacement unless noted.
6. Tests were performed in general accordance with ASTM procedure D 5321-92 Method A using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12 in. x 12 in. (Machine C)

TEST ORIENTATION:

NORMAL STRESS

GAP >

<— TOP BOX-RASP BOARD < GCL

—> BOTTOM BOX W/ RASP BOARD < GCL

SPECIAL TEST NOTES:

1. The non-woven portion of the GCL was wrapped around a 12"x 15.5" rasp board in the lower box.
2. The woven portion of the GCL was wrapped around a 12"x 12" rasp board in the upper box.
3. Each test point was hydrated under 3 psi approximately 7 days.
4. After hydration, each point was consolidated under specified Normal Stress app. 48 hours prior to shearing.
5. The test was performed in a "Wet" or "flooded" condition.
6. Shearing occured at the contact between the woven and non-woven portion of the GCL.

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job file: 698A-DSB.WQ print date: 11/18/97

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PLATE 2.

VECTOR ENGINEERING INC.
13438 Loma Rica Dr., Suite C, Grass Valley, CA 95945
(916) 272-3448 Fax: (916) 272-8553

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: National Seal

Project Name: Research; No.: 973015.01-698B

Material 1: <--- Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41676)

Material 2: ---> Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41676)

Substrate: ---> <concrete board>

PEAK STRENGTH

(0.0-1.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	1320	61
2.	20.0	2880	1540	28
3.	45.0	6480	2810	23
4.	0.0	0	0	0

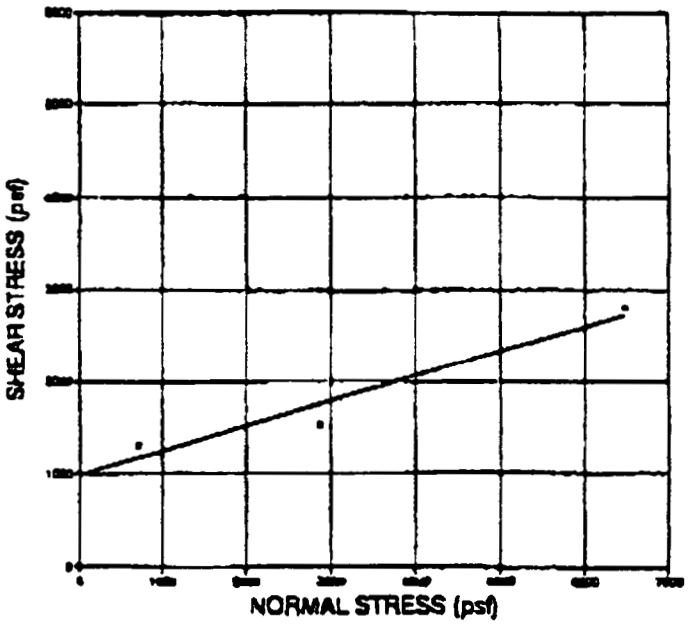
Adhesion: 990 psf

Friction Angle: 15 degrees

* Arc tan of Shear/Normal Stress (degrees)

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



STRENGTH ENVELOPE

(at 2.0 in. displacement)

Test Point	Normal Stress psi	Normal Stress psf	Shear Stress psf	Friction Angle *
1.	5.0	720	240	18
2.	20.0	2880	360	8
3.	45.0	6480	800	7
4.	0.0	0	0	0

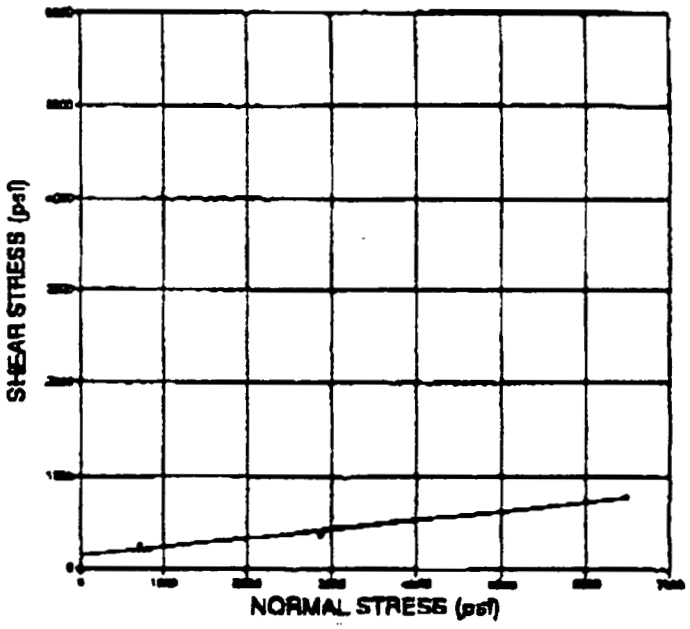
Adhesion: 140 psf

Friction Angle: 6 degrees

* Arc tan of Shear/Normal Stress (degrees)

Displ. Rate: 0.004 in./min.

NOTE: GRAPH NOT TO SCALE



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Reviewed by:

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NOV 19 1997

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VECTOR ENGINEERING INC.
(916) 272-2448 Fax (916) 272-8333

LARGE SCALE DIRECT SHEAR REPORT

HYDRATED TEST - INTERNAL STRENGTH

Client Name: Nasional Seal

Project Name: Research; No.: 973015.01-698B

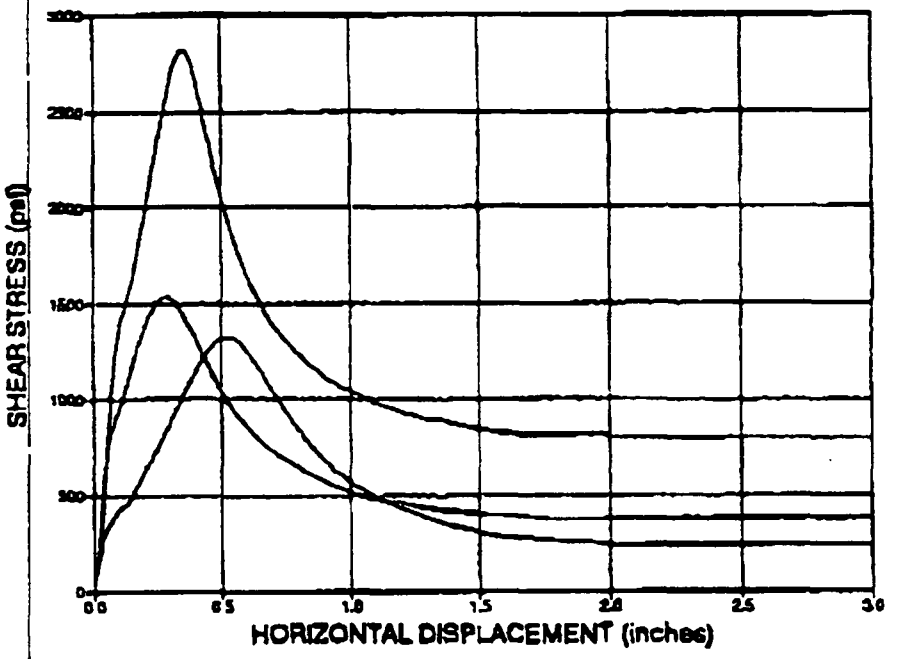
Material 1: <--- Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41676)

Material 2: ---> Geosynthetic Clay Liner (GCL), Bentofix NS (NSC #41676)

Substrate: ---> <concrete board>

DISPLACEMENT vs SHEAR STRESS

Test Point	Normal Stress psi	Normal Stress psf
1.	5.0	720
2.	20.0	2880
3	45.0	6480
4.	0.0	0



STANDARD CONDITIONS:

1. The "gap" between shear boxes was set at 1/4".
2. The test specimens were flooded during testing unless noted.
3. High Normal Stress (>5psi) was applied using air pressure.
4. Low Normal Stress (<5 psi) was applied using dead weights
5. The tests were terminated 3.0" displacement unless noted.
6. Tests were performed in general accordance with ASTM procedure D 5321-92 Method A using a Brainard-Kilman LG-112 direct shear machine with an effective area of 12 in. x 12 in. (Machine A)

TEST ORIENTATION:

NORMAL STRESS

GAP >

<--- TOP BOX-RASP BOARD < GCL

---> BOTTOM BOX W/ RASP BOARD < GCL

SPECIAL TEST NOTES:

1. The non-woven portion of the GCL was wrapped around a 12"x 15.5" rasp board in the lower box.
2. The woven portion of the GCL was wrapped around a 12"x 12" rasp board in the upper box.
3. Each test point was hydrated under 5 psi approximately 7 days.
4. After hydration, each point was consolidated under specified Normal Stress app. 48 hours prior to shearing.
5. The test was performed in a "Wet" or "flooded" condition.
6. Shearing occured at the contact between the woven and non-woven portion of the GCL.

By accepting the data and results represented on this page, Client agrees to hold the liability of Vector Engineering, Inc. from Client and all other parties for claims arising out of the use of this data in any way for the respective test(s) represented herein, and Client agrees to indemnify and hold harmless Vector from and against all liability in excess of the aforementioned limit.

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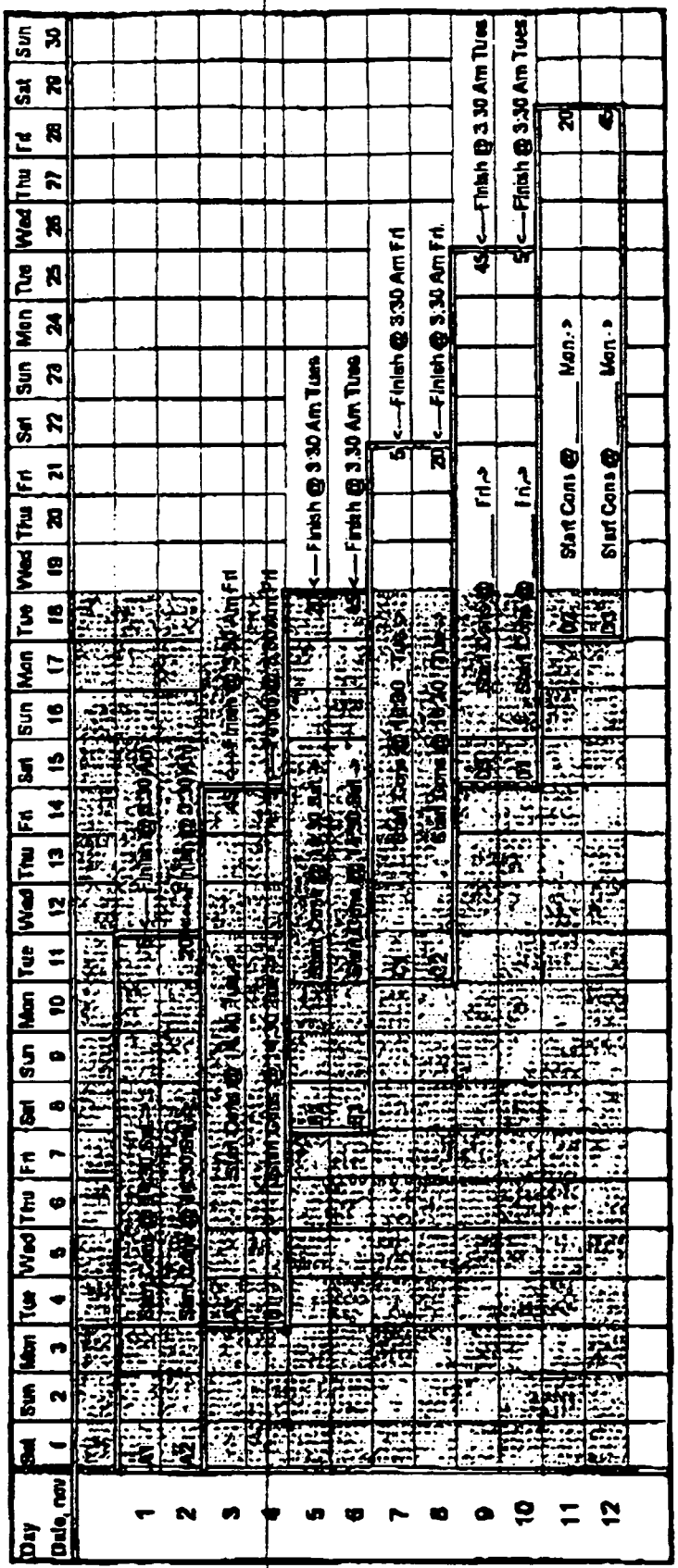
003507 PLATE 2.

1267

Sheet3



Page 1

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NOV 19 1997

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NOV 19 1997

000508

11/18/97 TUE 16:23 FAX 818 772 9922

Geomembrane

NSC ROLL NUMBERING

The NSC roll number is an 18 position combination of letters and numbers (note: 9th position is a hyphen) which gives the users information on material type and manufacturing date. Although the first eight characters may be common to any number of rolls, the last nine characters are roll-specific making the 18 character number unique to each roll. Below is an explanation for each position and a list of possible values.

S | 06 | L | 106B | - | 5 | G | 20 | 00 | 15 | 2

RESIN TYPE
- S - Solvay
- C - UCC 1527
- R - Chevron LL
- E - Chevron HD
- P - Phillips
- O - OPE
- M - MPE
- G - GPE
- V - VLDPE
- X - Coex: Solvay/UCC 1506
- T - Coex: UCC 1527/UCC 1506
- N - Nova 2040HD
- A - Nova 2120HD
- B - Nova 2124LL
- L - Nova 2113LL
- H - Nova 2085HD
- J - Nova 2107HD

PRODUCT THICKNESS
- 00 - 35 mil
- 04 - 40 mil
- 06 - 60 mil
- 08 - 80 mil
- 10 - 100 mil
- 12 - 120 mil
- 20 - PN2000
- 30 - PN3000
- 3C - 3000CN

PRODUCT TYPE
- L - Smooth
- F - Friction
- N - Net
- C - Cap Net
- T - TexNet

RESIN (raw material) BATCH NUMBER

YEAR PRODUCED
- 5 - 1995
- 6 - 1996
- ... etc.

MONTH PRODUCED
- A - January
- B - February
- ... etc.

DAY OF MONTH PRODUCED

PLACE HOLDERS
Explained below

ROLL NUMBER FOR THE DAY

LINE NUMBER
- 0 - Sheet Line 3
- 1 - Sheet Line 1
- 2 - Sheet Line 2
- 3 - Friction Line 1
- 4 - Net line 2
- 5 - Net Line 1
- 6 - Friction line 2
- 7 - Laminator
- 8 - Rod line
- 9 - Boxes

* The "00" in the example (position 14 & 15) is a place holder for smooth liner. For friction sheet, both positions are filled by the ROLL NUMBER FOR THE DAY and position 16 & 17 are used to designate the texturing type (e.g. single or double-sided). For lamination, positions 15 & 16 are filled by the ROLL NUMBER OF THE DAY and position 17 is used to designate the lamination type (e.g. single or double-sided).

For example: a friction roll labeled S06F106B-5G2015AQ2 has texturing on one side only. A roll labeled S06F106B-5G2015AA2 is made from the same base sheet as the single sided roll but has texturing on both sides. A roll labeled S06F106B-5G20015AB2 is the second roll made from the original base sheet and has texturing on both sides; S06F106B 5G2015AC2 is the third roll made from the original base sheet and has texturing on both sides; and so on.

Another example: a lamination roll labeled S30T106B-5G2015A7 has a textile layer on one side only while the double-sided production is labeled S30T106B-5G20015B7

CONTROLLED DOCUMENT

NATIONAL SEAL COMPANY
GAINESVILLE

NSC

12667

Textured sheet inventory 8/4/97

Saved F	Number	Order	Lngth	Area	Wght	Basesheet
3G88	S08F915D-6K0405AA3	TMPM	750	11,250	4735	S08L915D-6K0400012
3G88	S08F915D-6K0406AA3	TMPM	375	5,625	2480	S08L915D-6K0400042
3G88	S08F915D-6K0407AB3	TMPM	375	5,625	2485	S08L915D-6K0400042
3G88	S08F915D-6K0408AA3	TMPM	375	5,625	2465	S08L915D-6K0400052
3G88	S08F915D-6K0504AA3	TMPM	750	11,250	4885	S08L915D-6K0400142
3G88	S08F915D-6K0601AA3	TMPM	765	11,475	4900	S08L915D-6K0400112
3G88	S08F916D-6K0711BA3	TMPM	625	9,375	4095	S08L916D-6K0700072
3G88	S08F917B-6K0908AA3	TMPM	820	12,300	5210	S08L917B-6K0900062
3G88	S08F917B-6K0909AA3	TMPM	760	11,400	4920	S08L917B-6K0900072
3G88	S08F917B-6K0910AA3	TMPM	760	11,400	4915	S08L917B-6K0800132
3G88	S08F917B-6K0911AA3	TMPM	760	11,400	4905	S08L917B-6K0300092
3G88	S08F917B-6K0912AA3	TMPM	760	11,400	4890	S08L917B-6K0900012
3G88	S08F103A-7B0803AB3	TMPM	735	11,025	4705	S08L103A-7A2800122
3G88	S08F103A-7B0804AA3	TMPM	751	11,265	4783	S08L103A-7A2800092
3G88	S08F103A-7B0806AA3	TMPM	707	10,605	4565	S08L103A-7A2800062
3G88	S08F103A-7B0807AA3	TMPM	755	11,325	4865	S08L103A-7A2900022
3G88	S08F103A-7B0808AA3	TMPM	758	11,370	4855	S08L103A-7A2800112
3G88	S08F103A-7B0809AA3	TMPM	760	11,400	4875	S08L103A-7A2800072
3G88	S08F103A-7B0810AA3	TMPM	759	11,385	4875	S08L103A-7A2900042
3G88	S08F103A-7B0811AA3	TMPM	760	11,400	4875	S08L103A-7A2800142
3G88	S08F103A-7B0812AA3	TMPM	746	11,190	4785	S08L103A-7A2900082
3G88	S08F103A-7B0813AA3	TMPM	755	11,325	4850	S08L103A-7A2800102
3G88	S08F103A-7B0814AA3	TMPM	758	11,370	4885	S08L103A-7A2800132
3G88	S08F103A-7B0901AA3	TMPM	759	11,385	4860	S08L103A-7A2900082
3G88	S08F103A-7B0902AA3	TMPM	758	11,370	4855	S08L103A-7A2900012
3G88	S08F103A-7B0903AA3	TMPM	752	11,280	4825	S08L103A-7A2900032
3G88	S08F103A-7B0904AA3	TMPM	759	11,385	4835	S08L103A-7A2900092
3G88	S08F103A-7B0905AA3	TMPM	759	11,385	4835	S08L103A-7A2900052
3G88	S08F102A-7B0907AA3	TMPM	757	11,355	4835	S08L102A-7A2900102
3G88	S08F116B-7C0808BA6	TMPM	635	9,525	4120	S08L116B-7C0700021
3G88	S08F116B-7C0809AA6	TMPM	769	11,535	5035	S08L116B-7C0700011
3G88	S08F116B-7C0810AA6	TMPM	769	11,535	5035	S08L116B-7C0600131
3G88	S08F116C-7C0911AA6	TMPM	644	9,660	3900	S08L116C-7C0700041
3G88	S08F116C-7C1101AA6	TMPM	700	10,500	4740	S08L116C-7C1000101
3G88	S08F116C-7C1103BA6	TMPM	388	5,790	2535	S08L116C-7C1000091
3G88	S08F116C-7C1512AA6	TMPM	760	11,400	4960	S08L116C-7C0800011
3G88	S08F116C-7C1513AA6	TMPM	760	11,400	5100	S08L116C-7C0900051
3G88	S08F116C-7C1514AA6	TMPM	755	11,325	4900	S08L116C-7C1000051
3G88	S08F116C-7C1603AA3	TMPM	755	11,325	4835	S03L116C-7C0700101
3G88	S08F116C-7C1604AA3	TMPM	755	11,325	4835	S08L116C-7C1000071
3G88	S08F116C-7C1605AA3	TMPM	755	11,325	4835	S08L116C-7C0700091
3G88	S08F117C-7C1606AA3	TMPM	645	9,675	4135	S08L117C-7C1200031
3G88	S08F117A-7C1704AA6	TMPM	760	11,400	5060	S08L117A-7C1600021
3G88	S08F117A-7C1705AA6	SENT	590	8,850	4260	S08L117A-7C1500101
3G88	S08F117A-7C1708AA6	TMPM	765	11,475	5065	S08L117A-7C1600081
3G88	S08F117A-7C1710AA6	TMPM	755	11,475	5070	S08L117A-7C1500081
3G88	S08F117A-7C1712AB6	TMPM	576	8,640	3830	S08L117A-7C1700081
3G88	S08F305A-7C1801AA3	TMPM	758	11,370	4820	S08L305A-7C1700102
3G88	S08F305A-7C1802AA3	TMPM	762	11,430	4865	S08L305A-7C1700022
3G88	S08F305A-7C1803AA3	TMPM	760	11,400	4850	S08L305A-7C1700112
3G88	S08F305A-7C1804AA3	TMPM	763	11,445	4880	S08L305A-7C1800012
3G88	S08F304A-7C1812AA6	TMPM-US	384	5,760	2480	S08L117A-7C1700141

Textured sheet inventory 8/4/97

Saved F	Number	Order	Lngth	Area	Wght	Basesheet
3G88	S08F304A-7C1813AB6	TMPM-US	382	5,730	2510	S08L117A-7C1700141
3G88	S08F304A-7C1814AA6	TMPM-US	383	5,745	2500	S08L117A-7C1800011
3G88	S08F304A-7C1815AB6	TMPM-US	383	5,745	2505	S08L117A-7C1800011
3G88	S08F304A-7C1816AA6	TMPM-US	383	5,745	2510	S08L117A-7C1800021
3G88	S08F304A-7C1817AB6	TMPM-US	384	5,760	2540	S08L117A-7C1800021
3G88	S08F304A-7C1818AA6	TMPM-US	385	5,775	2505	S08L117A-7C1800071
3G88	S08F304A-7C1819AB6	TMPM-US	385	5,775	2525	S08L117A-7C1800071
3G88	S08F304A-7C1820AA6	TMPM-US	385	5,775	2555	S08L117A-7C1800081
3G88	S08F304A-7C1821AB6	TMPM-US	385	5,775	2530	S08L117A-7C1800081
3G88	S08F304A-7C1822AA6	TMPM-US	385	5,775	2525	S08L117A-7C1800051
3G88	S08F304A-7C1823AB6	TMPM-US	385	5,775	2555	S08L117A-7C1800051
3G88	S08F304A-7C1824AA6	TMPM-US	765	11,475	4940	S08L117A-7C1800091
3G88	S08F304A-7C1825AA6	TMPM-US	762	11,430	4905	S08L304A-7C1800101
3G88	S08F304A-7C1826AA6	TMPM-US	765	11,475	5005	S08L304A-7C1800031
3G88	S08F304A-7C1901AA6	TMPM-US	763	11,445	4910	S08L304A-7C1800121
3G88	S08F304A-7C1902AA6	TMPM-US	765	11,475	4950	S08L304A-7C1800111
3G88	S08F304A-7C1903AA6	TMPM-US	748	11,220	4860	S08L304A-7C1800131
3G88	S08F304A-7C1904AA6	TMPM-US	765	11,475	4985	S08L304A-7C1800041
3G88	S08F117A-7C2104AA3	TMPM	730	10,950	4590	S08L117A-7C1600121
3G88	S08F307A-7C2507AA3	TMPM	775	11,625	4930	S08L307A-7C2400012
3G88	S08F307A-7C2604AA3	TMPM	400	6,000	2590	S08L307A-7C2500132
3G88	S08F307A-7C2707AA3	TMPM	760	11,400	4935	S08L307A-7C2400112
3G88	S08F307A-7C2708AA3	TMPM	690	10,350	4850	S08L307A-7C2400122
3G88	S08F307A-7C2709AA3	TMPM	766	11,490	4950	S08L307A-7C2400062
3G88	S08F304A-7C2710AA3	TMPM	759	11,385	4960	S08L304A-7C1900061
3G88	S08F116C-7C2804AA3	TMPM	760	11,400	4910	S08L115C-7C0700031
3G88	S08F308A-7C2805AA3	TMPM	757	11,355	4885	S08L308A-7C2100082

NSC

08/04/97

GEOMEMBRANE CERTIFICATION OF ANALYSIS

Customer: Ground Safe, Inc. Number of Rolls Shipped: 79

Project Name: Fernald, OH Nominal Thickness: 80 mil

Project Number: 3G88-100 FOR INFORMATION ONLY

Bill of Lading: To Be Shipped

We hereby certify that the polyethylene geomembrane for the above identified shipment meets or exceeds the project's specifications, below. Testing was performed at the frequency indicated.

The raw polymeric material is first quality polyethylene resin containing no reworked plastic. Thickness was measured according to ASTM D 5199. Tensile properties were determined in accordance with ASTM D 638, NSF modified, using Type IV dumbbell specimens, a strain rate of two inches per minute, and a grip movement for strain determinations. Carbon black dispersion was determined according to ASTM D 5596. Carbon black content was determined according to ASTM D 1603. Dimensional stability was determined according to ASTM D 1204 at 100°C for one hour. Tear resistance was determined according to ASTM D 1004. Density was determined according to ASTM D 1505. Low temperature brittleness was determined according to ASTM D 746. Environmental stress crack was determined according to ASTM D 5397.

A database listing of all test values follows.

GEOMEMBRANE SPECIFICATIONS

Thickness (ASTM D 5199)	80.0 mil Minimum Avg. (76 mil Min.) OK		at least every 40,000 ft²
Stress at Yield (ASTM D 638 NSF MODIFIED)	2000 psi Minimum Avg. ≥160 PPI OK		at least every 40,000 ft²
Stress at Break	2000 psi Minimum Avg. ≥100 PPI		at least every 40,000 ft²
Strain at Yield	1250 psi 12.0 % Minimum Avg. ≥12% OK		at least every 40,000 ft²
Strain at Break	200 % Minimum Avg. ≥200% OK		at least every 40,000 ft²
Tear Resistance (ASTM D 1004)	650 ppi Minimum Avg. ≥52 lb OK		at least every 40,000 ft²
Carbon Black Dispersion (ASTM D 5596)	Category 1 or Category 2 OK		at least every 40,000 ft²
Carbon Black Content (ASTM D 1603)	2.0 % to 3.0 % OK		at least every 40,000 ft²
Density (ASTM D 1505)	0.940 g/cm³ Minimum Avg. OK		at least every 40,000 ft²
Dimensional Stability (ASTM D 1204)	+/- 2.0 % MAX CHANGE OK		at least every 400,000 ft²
* Low Temperature Brittleness (ASTM D 746)	-60 °C MAX. OK		at least every 400,000 ft²
* Environmental Stress Crack (ASTM D 5397)	500 hours MIN OK		at least every 400,000 ft²

* Indicates testing in progress

National Seal Company

THICKNESS (SPECIFICATIONS) GRI-GM8

Jane Allen
Quality Control Manager

This Certificate of Analysis shall not be reproduced except in full, without the written approval of the laboratory. National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

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$160 \frac{lb}{in}\left(\frac{1}{\frac{80}{1000} in}\right) = 2000$ psi ✓ $100 \frac{lb}{in}\left(\frac{1}{\frac{80}{1000} in}\right) = 1250$ psi ✗ $52 lb\left(\frac{1}{\frac{80}{1000} in}\right) = 650$ psi ✓

RESIN SOLVAY BATCH RESIN CERTS

NO. ROLLS IN CORRESPONDING LOT.

Textured sheet inventory

8/4/97

	Saved F	TEXTURED ROLL Number	Order	Lngth	Area	Wght	SMOOTH (BASESHEET) ROLL NO. Basesheet	
	3G88	✓ S08F915D-6K0405AA3	TMPM	750	11,250	4735	S08L915D-6K0400012	✓
	3G88	S08F915D-6K0406AA3	TMPM	375	5,625	2480	S08L915D-6K0400042	
	3G88	S08F915D-6K0407AB3	TMPM	375	5,625	2485	S08L915D-6K0400042	
6	3G88	S08F915D-6K0408AA3	TMPM	375	5,625	2465	S08L915D-6K0400052	
	3G88	✓ S08F915D-6K0504AA3	TMPM	750	11,250	4885	S08L915D-6K0400142	✓
	3G88	✓ S08F915D-6K0601AA3	TMPM	765	11,475	4900	S08L915D-6K0400112	✓
1	3G88	✓ S08F916D-6K0711BA3	TMPM	625	9,375	4095	S08L916D-6K0700072	✓
	3G88	✓ S08F917B-6K0908AA3	TMPM	820	12,300	5210	S08L917B-6K0900062	✓
	3G88	S08F917B-6K0909AA3	TMPM	760	11,400	4920	S08L917B-6K0900072	
5	3G88	✓ S08F917B-6K0910AA3	TMPM	760	11,400	4915	S08L917B-6K0800132	✓
	3G88	S08F917B-6K0911AA3	TMPM	760	11,400	4905	S08L917B-6K0800092	✓
	3G88	✓ S08F917B-6K0912AA3	TMPM	760	11,400	4890	S08L917B-6K0900012	✓
	3G88	✓ S08F103A-7B0803AB3	TMPM	735	11,025	4705	S08L103A-7A2800122	✓
	3G88	S08F103A-7B0804AA3	TMPM	751	11,265	4783	S08L103A-7A2800092	
	3G88	S08F103A-7B0806AA3	TMPM	707	10,605	4565	S08L103A-7A2800062	
	3G88	S08F103A-7B0807AA3	TMPM	755	11,325	4865	S08L103A-7A2900022	✓
	3G88	✓ S08F103A-7B0808AA3	TMPM	758	11,370	4855	S08L103A-7A2800112	✓
	3G88	S08F103A-7B0809AA3	TMPM	760	11,400	4875	S08L103A-7A2800072	
	3G88	✓ S08F103A-7B0810AA3	TMPM	759	11,385	4875	S08L103A-7A2900042	✓
16	3G88	S08F103A-7B0811AA3	TMPM	760	11,400	4875	S08L103A-7A2800142	
	3G88	✓ S08F103A-7B0812AA3	TMPM	746	11,190	4785	S08L103A-7A2900082	✓
	3G88	S08F103A-7B0813AA3	TMPM	755	11,325	4850	S08L103A-7A2800102	
	3G88	✓ S08F103A-7B0814AA3	TMPM	758	11,370	4885	S08L103A-7A2800132	✓
	3G88	S08F103A-7B0901AA3	TMPM	759	11,385	4860	S08L103A-7A2900062	✓
	3G88	✓ S08F103A-7B0902AA3	TMPM	758	11,370	4855	S08L103A-7A2900012	
	3G88	✓ S08F103A-7B0903AA3	TMPM	752	11,280	4825	S08L103A-7A2900032	✓
	3G88	S08F103A-7B0904AA3	TMPM	759	11,385	4835	S08L103A-7A2900092	
	3G88	S08F103A-7B0905AA3	TMPM	759	11,385	4835	S08L103A-7A2900052	
1	3G88	S08F102A-7B0907AA3	TMPM	757	11,355	4835	S08L102A-7A2900102	
	3G88	✓ S08F116B-7C0808BA6	TMPM	635	9,525	4120	S08L116B-7C0700021	✓
3	3G88	S08F116B-7C0809AA6	TMPM	769	11,535	5035	S08L116B-7C0700011	
	3G88	✓ S08F116B-7C0810AA6	TMPM	769	11,535	5035	S08L116B-7C0600131	✓
	3G88	✓ S08F116C-7C0911AA6	TMPM	644	9,660	3900	S08L116C-7C0700041	✓
	3G88	✓ S08F116C-7C1101AA6	TMPM	700	10,500	4740	S08L116C-7C1000101	✓
	3G88	✓ S08F116C-7C1103BA6	TMPM	386	5,790	2535	S08L116C-7C1000091	✓
	3G88	✓ S08F116C-7C1512AA6	TMPM	760	11,400	4960	S08L116C-7C0800011	✓
9+1=10	3G88	S08F116C-7C1513AA6	TMPM	760	11,400	5100	S08L116C-7C0900051	✓
	3G88	S08F116C-7C1514AA6	TMPM	755	11,325	4900	S08L116C-7C1000051	
	3G88	✓ S08F116C-7C1603AA3	TMPM	755	11,325	4835	S03L116C-7C0700101	✓
	3G88	S08F116C-7C1604AA3	TMPM	755	11,325	4835	S08L116C-7C1000071	
	3G88	S08F116C-7C1605AA3	TMPM	755	11,325	4835	S08L116C-7C0700091	✓
1	3G88	✓ S08F117C-7C1606AA3	TMPM	645	9,675	4135	S08L117C-7C1200031	✓
	3G88	✓ S08F117A-7C1704AA6	TMPM	760	11,400	5060	S08L117A-7C1600021	✓
	3G88	✓ S08F117A-7C1705AA6	SENT E.S.C.	590	8,850	4260	S08L117A-7C1500101	✓
5+1=6	3G88	✓ S08F117A-7C1708AA6	TMPM	765	11,475	5065	S08L117A-7C1600081	✓
	3G88	S08F117A-7C1710AA6	TMPM	765	11,475	5070	S08L117A-7C1500081	✓
	3G88	✓ S08F117A-7C1712AB6	TMPM	576	8,640	3830	S08L117A-7C1700081	✓
	3G88	✓ S08F305A-7C1801AA3	TMPM	758	11,370	4820	S08L305A-7C1700102	✓
	3G88	S08F305A-7C1802AA3	TMPM	762	11,430	4865	S08L305A-7C1700022	
4	3G88	S08F305A-7C1803AA3	TMPM	760	11,400	4850	S08L305A-7C1700112	
	3G88	✓ S08F305A-7C1804AA3	TMPM	763	11,445	4880	S08L305A-7C1800012	✓
	3G88	✓ S08F304A-7C1812AA6	TMPM-US	384	5,760	2480	S08L117A-7C1700141	

RESIN BATCH NUMBER = LOT NUMBER

KEY:

✓ ON-SITE ROLL NUMBER WITH ATTACHED DATA / DOCUMENTATION

ESC ENVIRONMENTAL STRESS CRACKING TEST PERFORMED

Textured sheet inventory

8/4/97

TEXTURED ROLL

SMOOTH (BASE SHEET) ROLL NO.

NO. ROLLS IN CORRESPONDING LOT.

Saved F	Number	Order	Lngth	Area	Wght	Basesheet	
3G88	S08F304A-7C1813AB6	TMPM-US	382	5,730	2510	S08L117A-7C1700141	
3G88	S08F304A-7C1814AA6	TMPM-US	383	5,745	2500	S08L117A-7C1800011	
3G88	S08F304A-7C1815AB6	TMPM-US	383	5,745	2505	S08L117A-7C1800011	
3G88	S08F304A-7C1816AA6	TMPM-US	383	5,745	2510	S08L117A-7C1800021	
3G88	S08F304A-7C1817AB6	TMPM-US	384	5,760	2540	S08L117A-7C1800021	
3G88 ✓	S08F304A-7C1818AA6	TMPM-US	385	5,775	2505	S08L117A-7C1800071	
3G88	S08F304A-7C1819AB6	TMPM-US	385	5,775	2525	S08L117A-7C1800071	
3G88	S08F304A-7C1820AA6	TMPM-US	385	5,775	2555	S08L117A-7C1800081	
3G88	S08F304A-7C1821AB6	TMPM-US	385	5,775	2530	S08L117A-7C1800081	
3G88	S08F304A-7C1822AA6	TMPM-US	385	5,775	2525	S08L117A-7C1800051	
3G88	S08F304A-7C1823AB6	TMPM-US	385	5,775	2555	S08L117A-7C1800051	
3G88 ✓	S08F304A-7C1824AA6	TMPM-US	765	11,475	4940	S08L117A-7C1800091	
3G88	S08F304A-7C1825AA6	TMPM-US	762	11,430	4905	S08L304A-7C1800101	
3G88	S08F304A-7C1826AA6	TMPM-US	765	11,475	5005	S08L304A-7C1800031	✓
3G88 ✓	S08F304A-7C1901AA6	TMPM-US	763	11,445	4910	S08L304A-7C1800121	✓
3G88 ✓	S08F304A-7C1902AA6	TMPM-US	765	11,475	4950	S08L304A-7C1800111	✓
3G88	S08F304A-7C1903AA6	TMPM-US	748	11,220	4860	S08L304A-7C1800131	
3G88 ✓	S08F304A-7C1904AA6	TMPM-US	765	11,475	4985	S08L304A-7C1800041	✓
3G88 ✓	S08F117A-7C2104AA3	TMPM	730	10,950	4590	S08L117A-7C1600121	✓
3G88 ✓	S08F307A-7C2507AA3	TMPM	775	11,625	4930	S08L307A-7C2400012	✓
3G88 ✓	S08F307A-7C2604AA3	TMPM	400	6,000	2590	S08L307A-7C2500132	
3G88	S08F307A-7C2707AA3	TMPM ESC	760	11,400	4935	S08L307A-7C2400112	
3G88	S08F307A-7C2708AA3	TMPM	690	10,350	4850	S08L307A-7C2400122	
3G88	S08F307A-7C2709AA3	TMPM	766	11,490	4950	S08L307A-7C2400062	
3G88 ✓	S08F304A-7C2710AA3	TMPM	759	11,385	4960	S08L304A-7C1900061	✓
3G88 ✓	S08F116C-7C2804AA3	TMPM	760	11,400	4910	S08L116C-7C0700031	✓ ✓
3G88 ✓	S08F308A-7C2805AA3	TMPM	757	11,355	4885	S08L308A-7C2100082	✓

18+1+1 = 20

PREVIOUSLY COUNTED

5

PREVIOUSLY COUNTED

PREVIOUSLY COUNTED

1

(40) (41)

KEY:

RESIN BATCH NUMBER = LOT NUMBER

✓ ON-SITE ROLL NUMBER WITH ATTACHED DATA/DOCUMENTATION

ESC = ENVIRONMENTAL STRESS CRACKING TEST PERFORMED

000515

NSC

TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 08/04/97 Page: 1

FOR INFORMATION ONLY

Bill(s) of Lading: To Be Shipped

SPEC:	≥160		≥100		≥12		≥200		INDEX		≥52		
	STRESS AT YIELD (psi)		STRESS AT BREAK (psi)		STRAIN AT YIELD (%)		STRAIN AT BREAK (%)		FRICTION ANGLE (o)		TEAR RESIS (ppi)		BASE SHEET ROLL NUMBER
ROLL NUMBER	MD	TD	MD	TD	MD	TD	MD	TD	TOP	BOT.	MD	TD	
S08F915D-6K0405AA3	2550	2420	3690	2660	16.2	15.7	713	550	44	43	842	819	S08L915D-6K0400012
S08F915D-6K0412AA3	2460	2570	3590	3280	16.3	15.6	692	671	42	45			S08L915D-6K0400092
S08F915D-6K0504AA3	2600	2650	3820	3260	16.3	15.4	703	621	47	44	853	826	S08L915D-6K0400142
S08F916D-6K0508AA3	2550	2620	3930	2280	18.7	17.1	743	411	47	45			S08L916D-6K0500062
S08F915D-6K0601AA3	2560	2630	3760	3110	16.3	16.1	696	589	47	44	860	822	S08L915D-6K0400112
S08F915D-6K0605AA3	2510	2590	3750	3360	18.0	17.0	690	654	45	41			S08L915D-6K0400082
S08F915D-6K0609AA3	2430	2530	3630	3380	18.1	17.9	716	668	45	43			S08L915D-6K0300042
S08F916D-6K0701AA3	2590	2620	4120	3530	16.9	16.6	764	691	44	42			S08L916D-6K0600122
S08F916D-6K0707AA3	2540	2550	3620	3050	16.8	16.1	689	611	44	44			S08L916D-6K0700032
S08F916D-6K0711BA3	2590	2640	3720	3520	16.6	15.7	681	683	43	40	883	829	S08L916D-6K0700072
S08F916D-6K0802AA3	2600	2610	4070	3090	16.4	16.0	749	605	48	44			S08L916D-6K0700112
S08F917B-6K0806AA3	2680	2730	4040	3730	16.9	17.4	726	705	46	44			S08L917B-6K0800042
S08F917B-6K0810AA3	2610	2610	3760	3240	16.4	15.7	691	646	46	46			S08L917B-6K0700122
S08F917B-6K0904AA3	2580	2570	3880	3650	17.1	16.3	710	709	44	43			S08L917B-6K0800082
S08F917B-6K0908AA3	2630	2690	4120	3700	16.1	16.4	730	706	44	46	841	822	S08L917B-6K0900062
S08F917B-6K0910AA3	2650	2680	3630	2640	17.3	16.8	692	469	52	48	860	868	S08L917B-6K0800132
S08F917B-6K0912AA3	2610	2620	4010	3300	16.6	15.6	735	631	43	43	825	854	S08L917B-6K0900012

Jane Allen
Quality Control Manager

8-04-97
Date

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✓ = ON SITE ROLL NO.

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TEXTURED GEONEMBRANE STANDARD TESTING

Date: 08/04/97 Page: 2

FOR INFORMATION ONLY

Bill(s) of Lading: To Be Shipped

Spec.		≥160		≥100		≥12		≥200		INDEX		≥52		
VALUE/THICKNESS		≥2000		≥1250								≥650		
ROLL NUMBER		STRESS AT YIELD (psi) MD	TD	STRESS AT BREAK (psi) MD	TD	STRAIN AT YIELD (%) MD	TD	STRAIN AT BREAK (%) MD	TD	FRICTION ANGLE (o) TOP	BOT.	TEAR RESIS (pci) MD	TD	BASE SHEET ROLL NUMBER
S08F103A-7B0803AA3		2430	2420	4340	3240	17.6	17.5	814	641	44	41	825	806	S08L103A-7A2800122
S08F103A-7B0808AA3		2450	2390	3850	2490	16.7	16.4	731	542	36	39	844	824	S08L103A-7A2800112
S08F103A-7B0810AA3		2540	2600	3560	2960	16.9	17.1	672	585	48	46	835	822	S08L103A-7A2900042
S08F103A-7B0812AA3		2480	2410	3970	3530	17.1	16.4	744	691	39	40	835	811	S08L103A-7A2900082
S08F103A-7B0814AA3		2570	2550	3240	2840	17.4	17.4	611	502	43	42	845	836	S08L103A-7A2800132
S08F103A-7B0902AA3		2360	2430	3610	2820	19.0	17.6	688	541	41	37			S08L103A-7A2900012
S08F103A-7B0903AA3		2580	2560	3660	3040	17.0	17.2	684	600	43	40	842	827	S08L103A-7A2900032
S08F103A-7B0907AA3		2370	2400	3770	3190	18.4	18.0	730	634	40	38	852	825	S08L103A-7A2900102
S08F116B-7C0808BA6		2570	2570	3650	3170	18.2	18.5	665	582	43	39	878	861	S08L116B-7C0700021
S08F116B-7C0810AA6		2750	2780	3570	3380	17.1	16.2	651	573	45	48	890	858	S08L116B-7C0600131
S08F116B-7C0811AA6		2580	2610	3110	2690	18.3	17.7	568	476	42	41	876	853	S08L116B-7C0600121
S08F116B-7C0815AB6		2620	2550	3740	3350	18.0	16.6	679	656	44	42	890	835	S08L116B-7C0600091
S08F116C-7C0902AB6		2570	2580	3790	3650	18.2	17.2	696	713	46	49	859	836	S08L116C-7C0800031
S08F116C-7C0911AA6		2590	2660	3560	2990	19.0	18.0	645	562	41	38	860	830	S08L116C-7C0700041
S08F116C-7C0917AA6		2600	2580	2990	3150	18.9	17.3	549	598	41	43	876	831	S08L116C-7C0800121
S08F116C-7C1001AA6		2600	2660	3870	3330	18.2	17.4	708	647	41	40	928	855	S08L116C-7C0900081
S08F116C-7C1005AA6		2660	2680	3700	3540	18.3	18.0	657	672	43	43	912	861	S08L116C-7C1000021

Jane Allen

Jane Allen
Quality Control Manager

8-04-97
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TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 08/04/97 Page: 3

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SPEC/THICKNESS	≥2000		≥1250								≥650		
SPEC.	≥160		≥100		≥12		≥200		INDEX		≥52		
ROLL NUMBER	STRESS AT YIELD (psi) MD	TD	STRESS AT BREAK (psi) MD	TD	STRAIN AT YIELD (%) MD	TD	STRAIN AT BREAK (%) MD	TD	FRICTION ANGLE (o) TOP	BOT.	TEAR RESIS (ppi) MD	TD	BASE SHEET ROLL NUMBER
S08F116C-7C1009AA6	2600	2590	3750	2790	17.4	17.0	702	541	41	42	864	832	S08L116C-7C0800101
S08F116C-7C1012AA6	2560	2530	3300	2850	18.9	17.1	610	530	43	41	899	842	S08L116C-7C1000061
✓ S08F116C-7C1101AA6	2490	2500	3570	2970	18.5	17.6	651	556	39	44	860	839	S08L116C-7C1000101
✓ S08F116C-7C11038A6	2640	2620	3310	2860	17.1	16.7	604	564	45	49	868	843	S08L116C-7C1000091
S08F117C-7C1108AA6	2580	2570	3610	3010	18.2	17.0	650	583	46	48	884	840	S08L117C-7C1000131
S08F117C-7C1111AA6	2500	2570	3440	2980	19.8	17.8	629	586	47	48	884	855	S08L117C-7C1100021
S08F116C-7C1113AA6	2510	2590	3360	3090	16.2	15.3	618	616	42	43	864	808	S08L116C-7C0800071
S08F117C-7C1117AA6	2540	2540	3390	3130	18.4	17.1	619	600	41	40	863	816	S08L117C-7C1100061
S08F117C-7C1120AA6	2640	2650	3400	2910	15.9	15.2	580	572	44	43	858	826	S08L117C-7C1100091
S08F117C-7C1501AA6	2660	2660	3670	3460	18.7	18.2	656	663	47	50	895	855	S08L117C-7C1300021
S08F116D-7C1504AA6	2620	2590	3090	3660	18.2	17.5	521	713	45	43	909	858	S08L116D-7C1400131
S08F116D-7C1507AA6	2610	2620	4060	3650	15.7	15.3	729	700	47	47	904	858	S08L116D-7C1400101
S08F116D-7C1510AA6	2550	2580	3610	3860	18.6	17.2	652	734	46	49	924	877	S08L116D-7C1400091
✓ S08F116C-7C1512AA6	2600	2610	3290	2610	18.2	17.1	626	470	44	49	899	884	S08L116C-7C0800011
S08F117C-7C1515AA6	2590	2570	3240	2610	19.3	18.1	593	480	45	48	883	833	S08L117C-7C1300011
✓ S08F116C-7C1603AA3	2440	2530	4030	3430	17.9	17.5	746	680	36	37	878	846	S08L116C-7C0700101
✓ S08F117C-7C1606AA3	2470	2440	4010	3690	17.8	17.2	756	723	35	35	852	829	S08L117C-7C1200031

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TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 08/04/97

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Page: 4

Bill(s) of Lading: To Be Shipped

SPEC/THICKNESS	≥2000		≥1250								≥650		
SPEC	≥160		≥100		≥12		≥200		INDEX		≥52		
ROLL NUMBER	STRESS AT YIELD (psi) MD	TD	STRESS AT BREAK (psi) MD	TD	STRAIN AT YIELD (%) MD	TD	STRAIN AT BREAK (%) MD	TD	FRICTION ANGLE (o) TOP	BOT.	TEAR RESIS (ppi) MD	TD	BASE SHEET ROLL NUMBER
S08F117C-7C1603AA6	2670	2650	3890	3630	19.0	17.5	689	686	47	46	915	867	S08L117C-7C1200071
S08F117A-7C1611AA6	2650	2700	3520	3360	18.1	17.2	646	646	44	44			S08L117A-7C1600061
S08F117A-7C1613AA6	2570	2560	2930	2570	18.7	17.2	516	494	43	43	927	864	S08L117A-7C1600091
S08F117A-7C1614AA6	2510	2550	3240	3130	18.1	17.5	606	635	45	43	905	844	S08L117A-7C1600101
S08F305A-7C1706AA3	2420	2380	3230	3250	17.9	18.0	627	652	47	46	849	837	S08L305A-7C1600052
S08F305A-7C1707AA3									50	53			S08L305A-7C1600032
S08F305A-7C1708AA3									50	50			S08L305A-7C1700012
S08F117A-7C1712AA6	2670	2720	4370	3770	18.6	17.5	770	717	58	59	930	860	S08L117A-7C1700061
S08F117A-7C1704AA6	2640	2680	3750	3690	19.2	17.6	678	715	48	43	901	850	S08L117A-7C1600021
S08F117A-7C1705AA6	2630	2590	4010	3260	18.6	17.1	722	629	43	42	929	903	S08L117A-7C1500101
S08F117A-7C1708AA6	2670	2650	3440	3260	18.9	17.8	616	719	49	48	900	847	S08L117A-7C1600081
S08F117A-7C1713AA6	2470	2540	3670	3730	18.2	17.9	665	717	49	42	874	874	S08L117A-7C1700071
S08F117A-7C1715AA6	2630	2610	3880	3800	19.5	18.1	680	720	43	42	898	875	S08L117A-7C1700051
S08F305A-7C1801AA3	2480	2420	3530	2900	17.2	16.5	678	555	40	37	843	832	S08L305A-7C1700102
S08F305A-7C1804AA3	2430	2445	3710	3310	17.0	16.7	707	660	39	37	853	849	S08L305A-7C1800012
S08F305A-7C1807AA3	2520	2430	3440	2730	17.2	17.7	661	446	45	45	837	898	S08L305A-7C1800042
S08F305A-7C1811AA3	2490	2510	3220	3470	18.3	17.8	540	673	42	44	849	846	S08L305A-7C1800092

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TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 08/04/97 Page: 5

Bill(s) of Lading: To Be Shipped

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ROLL NUMBER	STRESS AT YIELD (psi) MD	STRESS AT YIELD (psi) TD	STRESS AT BREAK (psi) MD	STRESS AT BREAK (psi) TD	STRAIN AT YIELD (%) MD	STRAIN AT YIELD (%) TD	STRAIN AT BREAK (%) MD	STRAIN AT BREAK (%) TD	INDEX FRICTION ANGLE (o) TOP	INDEX FRICTION ANGLE (o) BOT.	TEAR RESIS (ppi) MD	TEAR RESIS (ppi) TD	BASE SHEET ROLL NUMBER
SPEC/THICKNESS	≥2000		≥1250								≥650		
SPEC.	≥160		≥100		≥12		≥200				≥52		
S08F117A-7C1801BA6	2670	2670	3560	3240	19.0	17.8	637	626	50	45	890	861	S08L117A-7C1500031
S08F117A-7C1806AA6	2670	2700	3800	3360	18.9	17.9	685	653	42	42	926	839	S08L117A-7C1700021
✓ S08F304A-7C1812AA6	2620	2580	3570	3170	17.1	16.9	645	620	47	44	904	879	S08L304A-7C1700141
✓ S08F304A-7C1818AA6	2570	2580	3450	3620	16.3	16.1	622	697	48	46	881	864	S08L304A-7C1800071
✓ S08F304A-7C1824AA6	2500	2460	3550	3690	17.9	17.6	655	728	43	44	875	830	S08L304A-7C1800091
S08F305A-7C1902AA3	2490	2480	3960	3340	18.2	18.6	741	658	45	45	858	844	S08L305A-7C1800122
✓ S08F304A-7C1902AA6	2700	2700	3820	3210	17.6	16.5	677	607	46	48	871	855	S08L304A-7C1800111
S08F305A-7C1905AA3	2470	2530	3310	3190	17.7	18.0	630	633	42	42	827	813	S08L305A-7C1900032
S08F305A-7C1908AA3	2540	2530	3490	3620	18.2	18.6	554	698	41	43	846	848	S08L305A-7C1900042
S08F305A-7C1911AA3	2610	2600	3960	3610	17.7	17.3	748	710	44	40	859	837	S08L305A-7C1900082
✓ S08F304A-7C1901AA6	2600	2500	3520	3770	16.2	15.4	622	712	46	48	900	857	S08L304A-7C1800121
✓ S08F304A-7C1904AA6	2650	2650	4040	3330	19.5	18.1	708	639	48	46	901	840	S08L304A-7C1800041
S08F304A-7C1907AA6	2660	2560	3940	3510	19.2	17.4	700	677	50	55			S08L304A-7C1900041
S08F304A-7C1911AA6	2490	2430	3790	3510	18.3	17.8	686	666	51	46	859	831	S08L304A-7C1800061
S08F117A-7C1915AA6	2780	2760	3560	3110	18.2	17.3	624	532	47	58	913	884	S08L117A-7C1700031
S08F308A-7C2101AA3	2500	2540	3890	3290	17.7	17.5	738	654	44	41	842	836	S08L308A-7C2000022
S08F305A-7C2103AA3	2370	2370	3900	3260	18.3	17.7	744	659	42	42	819	818	S08L305A-7C1700092

Jane Allen
Quality Control Manager

8-04-97
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TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 08/04/97 Page: 6

FOR INFORMATION ONLY

Bill(s) of Lading: To Be Shipped

SPEC/THICKNESS	7/2000		7/250								7/650		
SPEC.	7/160		7/100		7/12		7/200		INDEX		7/52		
ROLL NUMBER	STRESS AT YIELD (psi) MD	TD	STRESS AT BREAK (psi) MD	TD	STRAIN AT YIELD (%) MD	TD	STRAIN AT BREAK (%) MD	TD	FRICTION ANGLE (o) TOP	BOT.	TEAR RESIS (ppi) MD	TD	BASE SHEET ROLL NUMBER
S08F117A-7C2104AA3	2500	2480	3070	2800	18.3	17.3	665	545	41	42	848	804	S08L117A-7C1600121
S08F307A-7C2501AA3	2600	2590	3600	3180	18.1	18.1	679	619	43	41	865	864	S08L307A-7C2400072
S08F307A-7C2504AA3	2610	2630	3810	3220	19.0	18.3	706	621	48	42	889	896	S08L307A-7C2500032
S08F307A-7C2506AA3									44	48			S08L307A-7C2500042
S08F307A-7C2507AA3	2500	2520	3650	3020	17.6	18.1	697	599	43	39	885	856	S08L307A-7C2400012
S08F307A-7C2508AA3										42			S08L307A-7C2400032
S08F307A-7C2509AA3									41	44			S08L307A-7C2400102
S08F307A-7C2510AA3	2630	2590	3130	2970	18.4	18.1	531	565	45	43	866	845	S08L307A-7C2500062
S08F307A-7C2604AA3	2650	2620	4050	3500	17.9	18.2	749	686	42	38	869	835	S08L307A-7C2500132
S08F307A-7C2605AB3										41			S08L307A-7C2500132
S08F307A-7C2610AA3	2640	2610	4210	3020	18.5	17.8	786	584	45	42	888	862	S08L307A-7C2600022
S08F307A-7C2615AA3	2540	2530	3550	3520	15.9	15.6	667	611	46	43	863	839	S08L307A-7C2600052
S08F307A-7C2701AA3	2590	2630	3610	3570	18.8	18.2	684	698	48	48	869	849	S08L307A-7C2600072
S08F307B-7C2704AA3	2650	2620	3770	3610	18.1	17.9	707	698	44	46	877	899	S08L307B-7C2600122
~~S08F307B-7C2707AA3~~	2670	2670	4130	3480	17.8	17.7	770	663	43	43	863	872	S08L307B-7C2400112
S08F304A-7C2710AA3	2440	2500	3910	4040	16.3	15.6	703	777	44	43	857	838	S08L304A-7C1900061
S08F117C-7C2711AA3	2600	2650	3420	3310	18.4	17.4	624	637	43	41	911	883	S08L117C-7C1200041

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TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 08/04/97 Page: 7

FOR INFORMATION ONLY

Bill(s) of Lading: To Be Shipped

SPEC/THICKNESS	≥2000		≥1250								≥650		
SPEC.	≥160		≥100		≥12		≥200		INDEX		≥52		
ROLL NUMBER	STRESS AT YIELD (psi) MD	TD	STRESS AT BREAK (psi) MD	TD	STRAIN AT YIELD (%) MD	TD	STRAIN AT BREAK (%) MD	TD	FRICTION ANGLE (o) TOP	BOT.	TEAR RESIS (ppi) MD	TD	BASE SHEET ROLL NUMBER
S08F307A-7C2801AA3	2600	2560	3940	3320	17.6	17.3	745	623	44	40	885	863	S08L307A-7C2500052
S08F116C-7C2804AA3	2560	2570	3840	3340	19.2	17.8	707	646	44	38	880	864	S08L116C-7C0700031
S08F308A-7C2805AA3	2530	2500	3620	3230	15.4	15.3	688	637	42	44	868	861	S08L308A-7C2100082

40

(~~38~~ 39 COMPLETE, ~~2~~ 1 LACK TEAR RESISTANCE. 12/12/97

12/12/97

Jane Allen

Jane Allen
Quality Control Manager

8-04-97
Date

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

NSC

BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 08/04/97

Page: 1

FOR INFORMATION ONLY

Bill(s) of Lading: To Be Shipped

SPEC:	60 MIL AVE	CAT. 1 OR 2	≥0.94	2 TO 3	± 2 % MAX	
BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm³)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY MD (% CHANGE)	TD
S08L103A-7A2800042	80.2	1	0.944	2.36	-0.4	0.4
S08L103A-7A2800082	80.6	1	0.944	2.31	-0.2	0.4
✓ S08L103A-7A2800112	80.1	1		2.29		
✓ S08L103A-7A2800122	80.2	1	0.944	2.28		
✓ S08L103A-7A2800132	80.6	1		2.28		
✓ S08L103A-7A2900022	81.4	1	0.943	2.28	-0.4	0.4
✓ S08L103A-7A2900032	80.2	1		2.28		
✓ S08L103A-7A2900042	80.7	1		2.22		
✓ S08L103A-7A2900062	81.7	1	0.944	2.22	0.0	0.4
✓ S08L103A-7A2900082	81.1	1		2.25		
S08L103A-7A2900102	80.2	1		2.20		
S08L102A-7A2900112	80.6	1	0.944	2.30		
S08L116B-7C0600041	82.1	1	0.947	2.38		
S08L116B-7C0600071	82.1	1	0.946	2.38		
S08L116B-7C0600101	82.4	1	0.947	2.42	-0.4	0.4
✓ S08L116B-7C0600131	82.2	1	0.947	2.44	-0.2	0.4
✓ S08L116B-7C0700021	83.0	1	0.947	2.40		
✓ S08L116C-7C0700031	83.5	1	0.947	2.43	-0.6	0.6
✓ S08L116C-7C0700041	80.7	1	0.946	2.39		
S08L116C-7C0700061	82.4	1	0.947	2.39	-0.6	0.4
✓ S08L116C-7C0700091	81.3	1	0.947	2.41		
✓ S08L116C-7C0700101	80.8	1		2.44		
S08L116C-7C0700121	81.3	1	0.946	2.34	-0.4	0.4
✓ S08L116C-7C0800011	82.7	1		2.42		
S08L116C-7C0800031	81.4	1	0.946	2.42	-0.6	0.6
S08L116C-7C0800061	82.2	1	0.946	2.38	-0.2	0.4
S08L116C-7C0800091	80.9	1	0.946	2.44		
S08L116C-7C0800121	82.3	1	0.946	2.40	0.0	0.4
S08L116C-7C0900031	82.3	1	0.946	2.46		
✓ S08L116C-7C0900051	83.3	1	0.944	2.62	-0.2	0.4
S08L116C-7C0900081	82.2	1	0.946	2.41		
S08L116C-7C1000031	83.9	1	0.946	2.42	-0.6	0.4
S08L116C-7C1000061	82.5	1	0.945	2.38		
✓ S08L116C-7C1000091	82.7	1	0.945	2.31	-0.6	0.4
S08L117C-7C1000121	82.6	1	0.946	2.44		
S08L117C-7C1100021	81.4	1	0.945	2.36	-0.6	0.4
S08L117C-7C1100051	82.7	1	0.946	2.43		
17	17	17	10	17	6	6

Jane Allen

Jane Allen
Quality Control Manager

8-04-97
Date

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NSC

BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 08/04/97 Page: 2

FOR INFORMATION ONLY

Bill(s) of Lading: To Be Shipped

SPEC.	80 MIL AVE	CAT 1 OR 2	≥0.94	2 TO 3	±2 % AVG	
BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm³)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY (% CHANGE) MD	TD
S08L117C-7C1100081	81.0	1	0.946	2.42	-0.6	0.4
S08L117C-7C1100111	82.0	1	0.945	2.40		
S08L117C-7C1200021	81.0	1	0.945	2.44	-0.4	0.4
✓ S08L117C-7C1200031	82.6					
S08L117C-7C1200051	83.8	1	0.945	2.38		
S08L117C-7C1200081	82.5	1	0.947	2.42	-0.6	0.4
S08L117C-7C1200121	81.9	1	0.946	2.42		
S08L117C-7C1300021	82.2	1	0.947	2.28	-0.8	0.2
S08L117C-7C1300051	81.4	1	0.947	2.36		
S08L117C-7C1300081	83.2	1	0.946	2.38	-0.4	0.4
S08L117C-7C1300121	83.3	1	0.946	2.38		
S08L117C-7C1400031	82.1	1	0.946	2.33	-0.4	0.2
S08L116D-7C1400071	83.3	1	0.945	2.38		
S08L116D-7C1400101	82.9	1	0.947	2.44	-0.6	0.4
S08L116D-7C1400131	84.4	1	0.947	2.40		
S08L117A-7C1500031	83.3	1	0.947	2.40	-0.6	0.4
✓ S08L117A-7C1500081	82.7	1	0.946	2.40	-0.4	0.4
✓ S08L117A-7C1500101	84.3	1		2.39		
S08L117A-7C1500111	82.8	1	0.946	2.41		
✓ S08L117A-7C1600021	82.3	1	0.946	2.36	-0.4	0.2
S08L305A-7C1600032	80.9	1	0.943	2.20	-0.2	0.4
S08L117A-7C1600051	81.7	1	0.946	2.38		
S08L305A-7C1600062	80.6	1	0.944	2.30		
✓ S08L117A-7C1600081	82.0	1	0.945	2.34	-0.6	0.4
S08L117A-7C1600111	82.1	1	0.946	2.38		
✓ S08L117A-7C1600121	81.2					
S08L305A-7C1700012	81.2	1	0.944	2.30	-0.2	0.4
S08L117A-7C1700021	83.2	1	0.945	2.29	-0.4	0.4
S08L305A-7C1700042	81.2	1	0.944	2.25		
✓ S08L117A-7C1700061	82.9	1	0.945	2.26		
S08L305A-7C1700072	81.2	1	0.943	2.28	-0.2	0.4
S08L305A-7C1700082						
S08L117A-7C1700091	83.8	1	0.943	2.15	-0.2	0.4
✓ S08L305A-7C1700102	81.5	1	0.943	2.16		
S08L304A-7C1700111	82.9	1	0.944	2.28	-0.2	0.4
S08L304A-7C1700141	83.4	1	0.944	2.30		
✓ S08L305A-7C1800012	81.6	1	0.944	2.31	-0.2	0.2
9	9	7	6	7	4	4

Jane Allen

Jane Allen
Quality Control Manager

8-04-97
Date

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BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 08/04/97 Page: 3

FOR INFORMATION ONLY

Bill(s) of Lading: To Be Shipped

SPEC:	80 MIL AVE	CAT 1 OR 2	≥0.94	2 TO 3	±2% MAX	
BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm³)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY MD (% CHANGE)	TD
S08L304A-7C1800031	83.2	1	0.945	2.34	-0.4	0.4
S08L305A-7C1800032	82.2	1	0.944	2.16	-0.2	0.2
S08L304A-7C1800041	84.1	1		2.29		
S08L304A-7C1800061	83.1	1	0.944	2.30		
S08L305A-7C1800062	81.0	1	0.943	2.14		
S08L304A-7C1800071	82.5	1		2.37		
S08L305A-7C1800082	80.0					
S08L304A-7C1800091	80.6	1	0.943	2.26	-0.6	0.4
S08L305A-7C1800092	81.7	1	0.943	2.18	-0.2	0.4
S08L304A-7C1800111	80.8	1		2.33		
S08L304A-7C1800121	82.6	1	0.944	2.39		
S08L305A-7C1800122	81.6	1	0.944	2.15		
S08L304A-7C1900021	81.5	1	0.944	2.31	-0.6	0.4
S08L305A-7C1900022	82.2	1	0.944	2.20	-0.2	0.2
S08L304A-7C1900051	82.4	2	0.944	2.29		
S08L305A-7C1900052	81.8	1	0.944	2.18		
S08L304A-7C1900061	82.6	2	0.945	2.34		
S08L305A-7C1900082	81.3	1	0.944	2.12		
S08L308A-7C1900112	82.5	1	0.945	2.14		
S08L308A-7C2000012	81.5	1	0.945	2.05	-0.2	0.2
S08L308A-7C2000042	81.6	1	0.947	2.32		
S08L308A-7C2100022	81.0	1	0.946	2.61	-0.2	0.2
S08L308A-7C2100052	81.0	1	0.945	2.70		
S08L308A-7C2100082	81.0	1	0.950	2.68	-0.2	0.4
S08L308A-7C2100112	81.9	1	0.950	2.73		
S08L307A-7C2400012	80.8	1	0.950	2.68	-0.2	0.2
S08L307A-7C2400042	80.6	1	0.951	2.75		
S08L307A-7C2400072	80.3	1	0.950	2.76	-0.2	0.4
S08L307A-7C2400102	80.9	1	0.950	2.75		
S08L307A-7C2500012	82.1	1	0.950	2.74	0.0	0.4
S08L307A-7C2500052	81.6	1	0.951	2.74	-0.4	0.4
S08L307A-7C2500092	81.5	1	0.949	2.72	-0.2	0.4
S08L307A-7C2500122	81.3	1	0.950	2.66		
S08L307A-7C2600022	81.2	1	0.950	2.69	0.0	0.4
S08L307A-7C2600052	81.1	1	0.950	2.66		
S08L307A-7C2600092	80.5	1	0.948	2.64	-0.2	0.2
S08L307A-7C2600122	80.6	1	0.950	2.63		
	7	7	5	7	3	3

Jane Allen

Jane Allen
Quality Control Manager

8-04-97
Date

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BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 08/04/97 Page: 4

FOR INFORMATION ONLY

Bill(s) of Lading: To Be Shipped

SPEC: BASE SHEET ROLL NUMBER	80 MIL THICKNESS (mils)	CAT. 1 OR 2 CARBON BLACK DISPERSION (category)	≥0.94 DENSITY (g/cm³)	2 TO 3 CARBON BLACK CONTENT (%)	±2% MAX DIMENSIONAL STABILITY MD (% CHANGE)	TD
S08L915D-6K0300042	80.9	1	0.943	2.19	-0.4	0.4
S08L915D-6K0300082	81.3	1	0.943	2.08	-0.2	0.2
S08L915D-6K0300132	80.9	1	0.943	2.14		
S08L915D-6K0400012	80.2	1	0.946	2.60		
S08L915D-6K0400032	81.4	1	0.945	2.12	-0.4	0.4
S08L915D-6K0400072	80.5	1	0.945	2.20	-0.4	0.4
S08L915D-6K0400112	80.7	1	0.945	2.24		
S08L915D-6K0400142	80.7	1		2.27		
S08L916D-6K0500022	80.4	1	0.945	2.42	0.0	0.2
S08L916D-6K0500082	81.6	1	0.945	2.26	-0.4	0.4
S08L916D-6K0500132	81.3	1	0.945	2.25		
S08L916D-6K0600032	81.3	1	0.945	2.24	-0.2	0.4
S08L916D-6K0600082	80.7	1	0.944	2.24		
S08L916D-6K0600132	81.0	1	0.946	2.25		
S08L916D-6K0700022	80.4	1	0.944	2.31	-0.4	0.4
S08L916D-6K0700062	80.9	1	0.945	2.24		
S08L916D-6K0700102	80.7	1	0.945	2.27	-0.4	0.4
S08L916D-6K0700072	81.5	1		2.23		
S08L917B-6K0800012	81.3	1	0.946	2.26	-0.4	0.4
S08L917B-6K0800052	80.7	1	0.945	2.26		
S08L917B-6K0800092	81.2	1	0.945	2.22	-0.4	0.4
S08L917B-6K0800132	81.3	1	0.946	2.26		
S08L917B-6K0900012	80.6	1	0.946	2.27		
S08L917B-6K0900042	81.1	1	0.945	2.30	-0.2	0.4
S08L917B-6K0900062	80.2	1		2.27		
S08L917B-6K0900092	81.1	1	0.945	2.25	-0.2	0.4
S08L917B-6K0900142	81.5	1	0.944	2.15		
PAGE TOTALS: 8	8	8	5	8	1	1
TOTALS: 41	41	39	26	39	14	14

Jane Allen
Quality Control Manager

8-04-97
Date

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NSC

August 4, 1997

CERTIFICATION

Customer: Ground Safe, Inc.

Project Name: Fernald, OH

Project Number: 3G88-100

FOR INFORMATION ONLY

We hereby certify the following roll(s) of geomembrane was/were tested for environmental stress crack resistance (ESCR). ESCR was determined according to ASTM D 5397, single point. Individual test results follow:

Roll Number	Units	Value
SPEC		≥500
S08F307A-7C2707AA3	HOURS	>600
S08F117A-7C1705AA6	HOURS	>600

NATIONAL SEAL COMPANY

Jane Allen
Quality Control Manager

8-04-97
Date

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NSC

08/04/97

POLYETHYLENE CERTIFICATE OF ANALYSIS

Customer: Ground Safe, Inc.

Resin Type: Solvay

Project Name: Fernalc, OH

Project Number: 3088-100

Bill of Lading: To Be Shipped

FOR INFORMATION ONLY

We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds National Seal Company's specifications, below. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238 Condition 190/2.16. Density was determined according to ASTM D 1505. Where appropriate, carbon black content was determined according to ASTM D 4218. The average test results are listed in the table below.

ASTM D 1603 MODIFIED BY NSF ANNEX A

RESIN SPECIFICATIONS

Density (with carbon black) 0.94 grams/cm³ Minimum

Carbon Black Content 2% to 3% Range

SPEC.

BLEND NUMBER	MELT FLOW INDEX (≤1.0 g/10min.)	RESIN DENSITY (≥0.935 g/cm³)	CARBON BLACK CONTENT
307A	0.25	0.937	0.0
308A	0.27	0.937	0.0
9150	0.30	0.944	2.22
9160	0.28	0.945	2.26
917B	0.30	0.945	2.25

CHECK ASTM STD. USED - MAY BE INAPPROPRIATE

Jane Allen

Jane Allen
Quality Control Manager

8-04-97
Date:

Note: When no carbon black content value is listed, the resin contained no carbon black.

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

NSC

08/04/97

POLYETHYLENE CERTIFICATE OF ANALYSIS

Customer: Ground Safe, Inc.

Resin Type: Solvay

Project Name: Fernald, OH

Project Number: 3G88-100

FOR INFORMATION ONLY

Bill of Lading: To Be Shipped

We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds National Seal Company's specifications, below. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238 Condition 190/2.16. Density was determined according to ASTM D 1505. Where appropriate, carbon black content was determined according to ASTM D 4218. The average test results are listed in the table below.

E

ASTM D1603 MODIFIED BY NSF ANNEX A

RESIN SPECIFICATIONS

Density (with carbon black) 0.94 grams/cm3 Minimum

Carbon Black Content 2% to 3% Range

CHECK ASTM STD USED MAY BE INAPPROPRIATE

BLEND NUMBER	MELT FLOW INDEX (≤1.0 g/10min)	RESIN DENSITY (≥0.935 g/cm3)	CARBON BLACK CONTENT
102A	0.23	0.944	2.24
103A	0.24	0.944	2.26
116B	0.26	0.946	2.38
116C	0.26	0.946	2.41
117A	0.24	0.946	2.40
117C	0.23	0.947	2.40
304A	0.23	0.935	0.0
305A	0.28	0.936	0.0

Jane Allen
Quality Control Manager

8-04-97
Date:

Note: When no carbon black content value is listed, the resin contained no carbon black.

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

SOLVAY POLYMERS

FOR INFORMATION ONLY

October 11, 1996

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C7513
Customer PO:	G1145
Date Shipped:	10/10/96
Shipped To:	GALESBURG, IL
Lot Number:	C60917P01A
Hopper Car Number:	ELTX 1892
Weight, Lbs.:	190,150

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.290	G/10M	1.0 max
HLMI	D 1238-90b	24.2	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9377	G/CC	.935 MIN
CARBON	D 189-88	2.3	WT%	
VOLATILES	A57Y-44-304	0.052	WT%	
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	130	MIN.	
GELS	A57Y-74-305	9.00	16IN2	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-5 24

sab

NSC Batch #917B

THIS REPORT CANNOT BE COPIED OR REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF THE SOLVAY POLYMERS ANALYTICAL AND QUALITY SERVICES DEPARTMENT

Solvay Polymers, Inc. Technical Center
7800 Bellaire Boulevard, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
Tel: 713/930-3800 Fax: 713/930-3811

ACCREDITED

SOLVAY POLYMERS

FOR INFORMATION ONLY

October 10, 1995

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	OC7512
Customer PO:	31145
Date Shipped:	10/09/95
Shipped To:	GALESBURG, IL
Lot Number:	C60916P03A
Hopper Car Number:	ELTX 1141
Weight, Lbs.:	191,850

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.260	G/10M	≤1.0 MAX
HLMI	D 1238-90b	23.1	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89 X	0.9383	G/CC	≥0.935 MIN
CARBON	D 189-88	2.3	WT%	
VOLATILES	A57Y-44-304	0.015	WT%	
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	130	MIN.	
GELS	A57Y-74-305	8.00	16IN2	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3 74

sab

NSC Batch #916D

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Technical Center
Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000

SOLVAY POLYMERS

FOR INFORMATION ONLY

October 11, 1996

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C7537
Customer PO:	G974
Date Shipped:	10/10/96
Shipped To:	GALESBURG, IL
Lot Number:	C60915P02A
Hopper Car Number:	ELTX 1474
Weight, Lbs.:	190,600

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.300 ✓	G/10M	1.0 MAX
HLMI	D 1238-90b	24.9	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9370 ✓	G/CC	0.935 MIN
CARBON	D 189-88	2.1	WT%	
VOLATILES	A57Y-44-3C4	0.070	WT%	
OXIDATIVE INDUCTION TIME @200	A57Y-44-3C2	110	MIN.	
GELS	A57Y-74-3C5	4.00	16IN2	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3 74

sab

NSC Batch #915D

THIS REPORT CANNOT BE COPIED OR REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF THE SOLVAY POLYMERS ANALYTICAL AND QUALITY SERVICES DEPARTMENT

Solvay Polymers, Inc. - Technical Center
1000 Bullyard Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
(800) 338-0443 Fax: (713) 307-3074

ACCREDITED

SOLVAY POLYMERS

FOR INFORMATION ONLY March 11, 1997

National Seal Company
Jane Allen
P. O. Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-150 shipments:

Solvay Order Number:	0C8918
Customer PO:	G2053
Date Shipped:	03/10/97
Shipped To:	GALESBURG, IL
Lot Number:	C70308F01A
Hopper Car Number:	ELTX 3180
Weight, Lbs.:	187,850

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.260 ✓	G/10M	1.0 MAX
HLMI	D 1238-90b	21.8	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9384 ✓	G/CC	0.935 MIN
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	140	MIN.	
GELS >.8mm	A57Y-74-305	0	236IN	
GELS >.4mm-<.8mm	A57Y-74-305	1.00	236IN	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #308A

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Solvay Polymers, Inc. - Technical Center
1100 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
1-800-318-0488 Fax 713/307-3521

ACCREDITED

000523

SOLVAY POLYMERS

March 7, 1997

FOR INFORMATION ONLY

National Seal Company
Jane Allen
P. O. Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-150 shipments:

Solvay Order Number:	0C8893
Customer PO:	G2030
Date Shipped:	03/06/97
Shipped To:	GALESBURG, IL
Lot Number:	C70304F01A
Hopper Car Number:	ELTX 1309
Weight, Lbs.:	187,800

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.230 ✓	G/10M	1.0 max
HLMI	D 1238-90b	19.3	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9366 ✓	G/CC	0.935 MIN
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	130	MIN.	
GELS >.8mm	A57Y-74-305	0	236IN	
GELS >.4mm-<.8mm	A57Y-74-305	0	236IN	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #304A

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Solvay Polymers Inc. Technology Center
[illegible] Pelican Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
[illegible] Fax [illegible]

SOLVAY POLYMERS

March 7, 1997

FOR INFORMATION ONLY

National Seal Company
Jane Allen
P. O. Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-150 shipments:

Solvay Order Number:	0C8894
Customer PO:	2030
Date Shipped:	03/06/97
Shipped To:	GALESBURG, IL
Lot Number:	C70305F01A
Hopper Car Number:	ELTX 2328
Weight, Lbs.:	192,450

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.270	G/10M	1.0 MAX
HLMI	D 1238-90b	23.5	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9363	G/CC	0.935 MIN
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	110	MIN.	
GELS >.8mm	A57Y-74-305	0	236IN	
GELS >.4mm-<.8mm	A57Y-74-305	0	236IN	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #305A

THIS REPORT CANNOT BE COPIED OR REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF THE SOLVAY POLYMERS ANALYTICAL AND QUALITY SERVICES DEPARTMENT

Solvay Polymers Inc. - Technical Center

SOLVAY POLYMERS

March 11, 1997

FOR INFORMATION ONLY

National Seal Company
Jane Allen
P. O. Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-150 shipments:

Solvay Order Number:	0C8919
Customer PO:	G2053
Date Shipped:	03/10/97
Shipped To:	GALESBURG, IL
Lot Number:	C70307F02A
Hopper Car Number:	ELTX 3068
Weight, Lbs.:	188,550

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.250	G/10M	1.0 max
HLMI	D 1238-90b	22.1	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9384	G/CC	0.935 MIN
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	130	MIN.	
GELS >.8mm	A57Y-74-305	0	236IN	
GELS >.4mm-<.8mm	A57Y-74-305	3.00	236IN	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #307A

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Solvay Polymers, Inc. - Technical Center
2310 Hallmark Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
800-338-0408 Fax 713/307-3571

ACCREDITED

000526

1267

SOLVAY POLYMERS

February 25, 1997

FOR INFORMATION ONLY

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401
309-343-5937

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C8015
Customer PO:	G1610
Date Shipped:	02/24/97
Shipped To:	GALESBURG, IL
Lot Number:	C70117P01A
Hopper Car Number:	ELTX 1128
Weight, Lbs.:	187,150

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.240	G/10M	1.0 MAX
HLMI	D 1238-90b	20.1	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9380	G/CC	0.935 MIN
CARBON	D 189-88	2.4	WT%	
VOLATILES	A57Y-44-304	0.051	WT%	
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	140	MIN.	
GELS	A57Y-74-305	9.00	16IN2	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #117A

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Solvay Polymers, Inc. - Technical Center
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
Tel: 800-335-0489 Fax: 713-307-3531

ACCREDITED

0095327

SOLVAY POLYMERS

February 26, 1997

FOR INFORMATION ONLY

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C8103
Customer PO:	G1610
Date Shipped:	02/25/97
Shipped To:	GALESBURG, IL
Lot Number:	C70117P02A
Hopper Car Number:	ELTX 1450
Weight, Lbs.:	195,300

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.237	G/10M	1.0 MAX
HLMI	D 1238-90b	20.7	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9382	G/CC	0.935 MIN
CARBON	D 189-88	2.4	WT%	
VOLATILES	A57Y-44-304	0.041	WT%	
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	120	MIN.	
GELS	A57Y-74-305	1.00	16IN2	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #117C

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Solvay Polymers, Inc. Technical Center
1150 Hallbrook Road, Deer Park, Texas 77536 Mailing Address P.O. Box 1000 Deer Park, Texas 77536-1000
800-333-0483 Fax 713/307-3537

ACCREDITED

SOLVAY POLYMERS

February 24, 1997

FOR INFORMATION ONLY

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C8013
Customer PO:	G1610
Date Shipped:	02/21/97
Shipped To:	GALESBURG, IL
Lot Number:	C70115P02A
Hopper Car Number:	ACFX 96792
Weight, Lbs.:	187,850

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.264 ✓	G/10M 1.0 MAX
HLMI	D 1238-90b	21.5	G/10M
DENSITY (NATURAL RESIN)	D 4883-89	0.9378 ✓	G/CC 0.935 MIN.
CARBON	D 189-88	2.4	WT%
VOLATILES	A57Y-44-304	0.063	WT%
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	130	MIN.
GELS	A57Y-74-305	1.00	16IN2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #116B

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Solvay Polymers, Inc. - Technical Center
1200 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000 Deer Park, Texas 77536-1000
(800) 365-0445 Fax: (713) 307-3527

ACCREDITED

Responsible Care

1267

SOLVAY POLYMERS

FOR INFORMATION ONLY

February 25, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C8014
Customer PO:	G1610
Date Shipped:	02/24/97
Shipped To:	GALESBURG, IL
Lot Number:	C70116P03A
Hopper Car Number:	ELTX 1353
Weight, Lbs.:	195,000

TEST	METHOD	RESULT	UNITS	
MELT INDEX	D 1238-90b	0.238	G/10M	1.0 MAX.
HLMI	D 1238-90b	20.4	G/10M	
DENSITY (NATURAL RESIN)	D 4883-89	0.9381	G/CC	0.935 MIN.
CARBON	D 189-88	2.4	WT%	
VOLATILES	A57Y-44-304	0.065	WT%	
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	130	MIN.	
GELS	A57Y-74-305	4.00	16IN2	

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #116C

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Solvay Polymers, Inc. - Technical Center
[illegible] Rollingground Road, Deer Park, Texas [illegible] Mailing Address: P.O. Box 1000, Deer Park, Texas [illegible]
[illegible] Fax [illegible]

ACCREDITED

000340

SOLVAY POLYMERS

FOR INFORMATION ONLY

January 21, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C7996
Customer PO:	G1608
Date Shipped:	01/20/97
Shipped To:	GALESBURG, IL
Lot Number:	C70103P02A
Hopper Car Number:	ELTX 2314
Weight, Lbs.:	191,950

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.247	G/10M 1.0 MAX
HLMI	D 1238-90b	20.1	G/10M
DENSITY (NATURAL RESIN)	D 4883-89	0.9375	G/CC 0.935 MIN.
CARBON	D 189-88	2.3	WT%
VOLATILES	A57Y-44-304	0.043	WT%
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	130	MIN.
GELS	A57Y-74-305	1.00	16IN2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #103A

0039541

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Solvay Polymers Inc. - Technical Center
1200 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000 Deer Park, Texas 77536-1000
1-800 338 5468 Fax: 713/887-5501

ACCREDITED
Responsible Care

SOLVAY POLYMERS

FOR INFORMATION ONLY

January 15, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C8196
Customer PO:	G1670
Date Shipped:	01/14/97
Shipped To:	GALESBURG, IL
Lot Number:	C70102P01A
Hopper Car Number:	ELTX 1646
Weight, Lbs.:	191,400

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.248 ✓	G/10M 1.0 max
HLMI	D 1238-90b	20.9	G/10M
DENSITY (NATURAL RESIN)	D 4883-89	0.9384 ✓	G/CC 0.935 MIN.
CARBON	D 189-86	2.3	WT%
VOLATILES	A57Y-44-304	0.037	WT%
OXIDATIVE INDUCTION TIME @200	A57Y-44-302	130	MIN.
GELS	A57Y-74-305	4.00	16IN2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC Batch #102A

000542

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Solvay Polymers, Inc. - Technical Center
1920 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
(800) 736-3189 Fax: 713/307-3521

ACCREDITED
Registration # 0-0-0-0

RECEIVED
DEC 03 1997
1100 Hrs

FAX TRANSMISSION

NATIONAL SEAL COMPANY
1255 Monmouth Blvd.
Galesburg, IL 61401
(309) 343-3418
Fax: (309) 343-2981

To:	Rick Schairbaum	**Date:**	December 2, 1997
Fax #:	513 648 3407	**Pages:**	6, including this cover sheet.
From:	Jane Allen		
Subject:	Certifications - Fernald, OH		

COMMENTS:

An additional roll of 80 mil double-sided textured liner was shipped today to the Fernald, Ohio jobsite. The roll number is S08F926A-7J1203AA3. The Low temperature brittleness and stress crack testing are still in progress. I will forward this testing when it is complete.

If you have questions, please call.

RECEIVED
DEC 03 1997
1300 Hrs

NSC

12/03/97

POLYETHYLENE CERTIFICATE OF ANALYSIS

Customer: Petro Environmental

Resin Type: Solvay

Project Name: Fernald, OH

Project Number: 3130-100

Bill of Lading: 14849

We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds National Seal Company's specifications. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238 Condition 190/2.16. Density was determined according to ASTM D 1505. Where appropriate, carbon black content was determined according to ASTM D 1603. The average test results are listed in the table below.

RESIN PROPERTIES

BLEND NUMBER	MELT FLOW INDEX (g/10 min)	DENSITY (g/cm3)	CARBON BLACK CONTENT (%)
926A	0.21	0.944	2.19

Jane Allen
Quality Control Manager

12-03-97
Date:

Note: When no carbon black content value is listed, the resin contained no carbon black.

This Certificate of Analysis shall not be reproduced except in full, without the written approval of the laboratory.
National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

RECEIVED
DEC 03 1997
HGM 1300 Hrs

NSC

12/03/97

GEOMEMBRANE CERTIFICATION OF ANALYSIS

Customer: Petro Environmental

Number of Rolls Shipped: 1

Project Name: Fernald, OH

Nominal Thickness: 80 mil

Project Number: 3G88-100

Bill of Lading: 14849

We hereby certify the polyethylene geomembrane for the above identified shipment meets or exceed the project specifications, below. Testing waas performed at the frequency indicated.

The raw polymeric material is first quality polyethylene resin containing no reworked plastic. Thickness was measured according to ASTM D 5199. Tensile properties were determined in accordance with ASTM D 638, NSF modified, using Type IV dumbbell specimens, a strain rate of two inches per minute, and a grip movement for strain determinations. Carbon black dispersion was determined according to ASTM D 5596. Carbon black content was determined according to ASTM D 1603. Dimensional stability was determined according to ASTM D 1204 at 100° C for one hour. Tear resistance was determined according to ASTM D 1004. Density was determined according to ASTM D 1505. Low temperature brittleness was determined according to ASTM D 746. Environmental stress crack was determined according to ASTM D 5397.

A database listing of all test values follows:

GEOMEMBRANE SPECIFICATIONS

Thickness	80.0 mil Minimum Avg.	at least every 40,000 ft^2
Stress at Yield	2000 psi Minimum Avg.	at least every 40,000 ft^2
Stress at Break	2000 psi Minimum Avg.	at least every 40,000 ft^2
Strain at Yield	12.0% Minimum Avg.	at least every 40,000 ft^2
Strain at Break	200% Minimum Avg.	at least every 40,000 ft^2
Tear Resistance	650 ppi Minimum Avg.	at least every 40,000 ft^2
Carbon Black Dispersion	Category 1 or Category 2	at least every 40,000 ft^2
Carbon Black Content	2.0% to 3.0%	at least every 40,000 ft^2
Density	0.940 g/cm^3	at least every 400,000 ft^2
Dimensional Stability	+/-2.0%	at least every 400,000 ft^2
*Environmental Stress Crack	500 hours	at least every 400,000 ft^2
*Low Temperature Brittleness	-60° C	at least every 400,000 ft^2

*Indicates testing in progress

NATIONAL SEAL COMPANY

Jane Allen

Jane Allen
Quality Control Manager

This Certificate of Analysis shall not be reproduced except in full, without the written approval of the laboratory.
National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

NSC

TEXTURED GEOMEMBRANE STANDARD TESTING

RECEIVED DEC 03 1997 1100 Hrs

Date: 12/02/97

Page: 1

Bill(s) of Lading: 14849

ROLL NUMBER	STRESS AT YIELD (psi) MD	STRESS AT YIELD (psi) TD	STRESS AT BREAK (psi) MD	STRESS AT BREAK (psi) TD	STRAIN AT YIELD (%) MD	STRAIN AT YIELD (%) TD	STRAIN AT BREAK (%) MD	STRAIN AT BREAK (%) TD	TEAR RES(ppi) MD	TEAR RES(ppi) TD	FTMS PUNCT (ppi)	BASE SHEET ROLL NUMBER
+ S08F926A-7J1203AA3	2490	2550	2870	2600	18.0	17.0	557	467	853	842		S08L926A-7J1000062
R08F359E-7J1204AA3			2540	3040			551	670				R08L359E-7J0900091

Jane Allen
Quality Control Manager

12-02-97
Date

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National Seal Company - 1235 Monmouth Blvd. - Galesburg, IL - 61401

003526

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NSC

RECEIVED DEC 03 1997 1100 hrs

BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 12/02/97 Page: 1

Bill(s) of Lading: 14849

BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm^3)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY MD (% change)	TD
R08L359E-7J0900021	83.2					
R08L359E-7J0900041	82.4	1	0.931	2.58	-1.4	0.4
R08L359E-7J0900091	80.9	1	0.930	2.57		
R08L359E-7J0900151	81.2	1	0.930	2.56	-1.5	0.4
S08L926A-7J1000022	81.0	1	0.947	2.60	-0.4	0.4
+ S08L926A-7J1000062	80.6	1	0.948	2.60	-0.1	0.2
S08L926A-7J1000072	81.7	1	0.947	2.68	-0.2	0.2

Jane Allen
Quality Control Manager

12-02-97
Date

This Certificate of Analysis shall not be reproduced except in full, without the written approval of the laboratory. - National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL 61401

+ RECEIVED ON-SITE

SOLVAY POLYMERS

RECEIVED DEC 03 1997 1100 Hrs

October 2, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C0011
Customer PO:	G2948
Date Shipped:	10/01/97
Shipped To:	GALESBURG, IL
Lot Number:	C70926P01A
Hopper Car Number:	ELTX 2344
Weight, Lbs.:	193,050

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.243	grams/10 min
HLMI	D 1238-90b	19.5	grams/10 min
DENSITY (NATURAL RESIN)	D 4883-89	0.9367	grams/cc
CARBON	D4218-91	2.1	wt%
VOLATILES	A57Y-44-304	0.035	wt%
OXIDATIVE INDUCTION TIME @200	D3895-80	140	MINUTES
GELS	A57Y-74-305	6.00	#/16 in2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC BATCH #926A

000528

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Solvay Polymers, Inc.
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
713/307-3000 Fax: 713/307-3469

Responsible Care

RECEIVED
DEC 04 1997
1710 HRS

NSC

12/04/97

POLYETHYLENE CERTIFICATE OF ANALYSIS

Customer: Petro Environmental

Resin Type: Solvay

Project Name: Fernald, OH

Project Number: 3133-100

Bill of Lading: 14875

We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds National Seal Company's specifications. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238 Condition 190/2.16. Density was determined according to ASTM D 1505. Where appropriate, carbon black content was determined according to ASTM D 1603. The average test results are listed in the table below.

RESIN PROPERTIES

BLEND NUMBER	MELT FLOW INDEX (g/10 min)	DENSITY (g/cm3)	CARBON BLACK CONTENT (%)
923A	0.29	0.946	2.40

Jane Allen
Jane Allen
Quality Control Manager

12-04-97
Date:

003529

Note: When no carbon black content value is listed, the resin contained no carbon black.

This Certificate of Analysis shall not be reproduced except in full, without the written approval of the laboratory.
National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

RECEIVED DEC 04 1997 NSC

12/04/97

GEOMEMBRANE CERTIFICATION OF ANALYSIS

Customer: Petro Environmental

Number of Rolls Shipped: 1

Project Name: Fernald, OH

Nominal Thickness: 80 mil

Project Number: 3G88-100

Bill of Lading: 14875

We hereby certify the polyethylene geomembrane for the above identified shipment meets or exceed the project specifications, below. Testing waas performed at the frequency indicated.

The raw polymeric material is first quality polyethylene resin containing no reworked plastic. Thickness was measured according to ASTM D 5199. Tensile properties were determined in accordance with ASTM D 638, NSF modified, using Type IV dumbbell specimens, a strain rate of two inches per minute, and a grip movement for strain determinations. Carbon black dispersion was determined according to ASTM D 5596. Carbon black content was determined according to ASTM D 1603. Dimensional stability was determined according to ASTM D 1204 at 100° C for one hour. Tear resistance was determined according to ASTM D 1004. Density was determined according to ASTM D 1505. Low temperature brittleness was determined according to ASTM D 746. Environmental stress crack was determined according to ASTM D 5397.

A database listing of all test values follows:

GEOMEMBRANE SPECIFICATIONS

Thickness	80.0 mil Minimum Avg.	at least every 40,000 ft^2
Stress at Yield	2000 psi Minimum Avg.	at least every 40,000 ft^2
Stress at Break	2000 psi Minimum Avg.	at least every 40,000 ft^2
Strain at Yield	12.0% Minimum Avg.	at least every 40,000 ft^2
Strain at Break	200% Minimum Avg.	at least every 40,000 ft^2
Tear Resistance	650 ppi Minimum Avg.	at least every 40,000 ft^2
Carbon Black Dispersion	Category 1 or Category 2	at least every 40,000 ft^2
Carbon Black Content	2.0% to 3.0%	at least every 40,000 ft^2
Density	0.940 g/cm^3	at least every 400,000 ft^2
Dimensional Stability	+/-2.0%	at least every 400,000 ft^2
*Environmental Stress Crack	500 hours	at least every 400,000 ft^2
*Low Temperature Brittleness	-60° C	at least every 400,000 ft^2

*Indicates testing in progress

NATIONAL SEAL COMPANY

Jane Allen

Jane Allen
Quality Control Manager

002550

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

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DEC 04 1997

NSC

TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 12/04/97

Bill(s) of Lading: 14875

ROLL NUMBER	STRESS AT YIELD (psi) MD	STRESS AT YIELD (psi) TD	STRESS AT BREAK (psi) MD	STRESS AT BREAK (psi) TD	STRAIN AT YIELD (%) MD	STRAIN AT YIELD (%) TD	STRAIN AT BREAK (%) MD	STRAIN AT BREAK (%) TD	INDEX FRICTION ANGLE (o) TOP	INDEX FRICTION ANGLE (o) BOT.	TEAR RESIS (ppi) MD	TEAR RESIS (ppi) TD	BASE SHEET ROLL NUMBER
+ S08F923A-7J0801AA3	2580	2650	3580	3170	17.5	16.5	700	630	54	49	892	882	S08L923A-7J0700072
S08F923A-7J0805AA3	2510	2560	3520	3360	18.0	17.7	665	659	50	47			S08L923A-7J0800022

+ ROLL DELIVERED

Jane Allen
Quality Control Manager

12-04-97
Date

069551

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DEC 04 1997

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BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 12/04/97

Page: 1

Bill(s) of Lading: 14875

BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm^3)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY (% CHANGE) MD	TD
S08L517B-7J0700022	81.8	1	0.945	2.26	-0.5	0.4
S08L923A-7J0700062	82.4	1	0.946	2.46	-0.5	0.1
+ S08L923A-7J0700072	83.5	1	0.948	2.44	-0.2	0.4
S08L923A-7J0800012	82.2	1	0.947	2.46	-0.5	0.2
S08L923A-7J0800052	81.6	1	0.947	2.64	-0.3	0.2
S08L926A-7J0800092	82.0	1	0.947	2.76		

+ ROLL DELIVERED

Jane Allen
Quality Control Manager

12-04-97
Date

00052

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SOLVAY POLYMERS

RECEIVED DEC 04 1997

October 1, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0J0396
Customer PO:	G3052
Date Shipped:	09/30/97
Shipped To:	GALESBURG, IL
Lot Number:	C70923P01A
Hopper Car Number:	ELTX 1365
Weight, Lbs.:	107,950

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.285	grams/10 min
HLMI	D 1238-90b	24.5	grams/10 min
DENSITY (NATURAL RESIN)	D 4833-89	0.9369	grams/cc
CARBON	D4218-91	2.5	wt%
VOLATILES	A57Y-44-304	0.051	wt%
OXIDATIVE INDUCTION TIME @200	D3895-80	160	MINUTES
GELS	A57Y-74-305	6.00	#/16 in2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC BATCH #923A

000553

THIS REPORT CANNOT BE COPIED OR REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF THE SOLVAY POLYMERS ANALYTICAL AND QUALITY SERVICES DEPARTMENT

Solvay Polymers, Inc. - Technical Center
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
1-800-338-0489 Fax: 713/307-3521

ACCREDITED

Responsible Care

PRIME PLASTICS

prime plastics incorporated • 5762 golf course drive • ravenna, ohio 44266 • (216) 325-3461 • Fax (216) 325-3305

RECEIVED
JUL 14 1997

July 9, 1997

ISCO INDUSTRIES, INC.
P.O. Box 4545
Louisville, KY 40204

ATTENTION: Scott (FAX NO. 513-871-9514)

We certify that the 5/32" x 40# REELS HDPE 3407B PRIMEWELD ARE manufactured from FINA High Density Polyethylene 3407B.

PRIME PLASTICS, INC.

Robert L. Miller
President

mm

Mfg. QC
for WELDING
ROD

FINA® High Density Polyethylene

3407B
BLACK

Resin Properties[1]	Typical Value	ASTM Method
Melt Flow Index, g/10 min		D 1238
190° C, 5 kg	0.38	
190° C, 21.6 kg (HLMI)	11.0	
Density, g/cm³	0.957	D 792
Melting Point, °F	268	D 3417
Carbon Black Content, %	2.5	D 1603
Mechanical Properties[1]		
Notched Izod Impact Strength, ft lb/in notched	8	D 256, A 1/8 in thick specimen
Tensile Strength at Yield, psi	>3,300	D 638, Type IV specimen, 2 in/min
Elongation at Break, %	>800	D 638, Type IV specimen, 2 in/min
Secant Modulus of Elasticity, psi @ 2% strain	115,000	D 638, Type IV specimen, 2 in/min
Flexural Modulus @ 2% Strain, psi	125,000	D 790
Rockwell Hardness, L Scale	49	D 785
Shore Hardness, D Scale	63	D 2240
ESCR[3], hrs	>6,000, no failures	D 1693, cond. C
Thermal Properties[1][2]		
Vicat Softening Temperature, °F	255	D 1525
Brittleness Temperature, °F	-180	D 746
Heat Distortion Temperature, °F	172	D 648
Thermal Expansion, in/in/°F	1×10^{-4}	D 696
Pipe Properties		
Hydrostatic Design Basis, psi	1,600	D 2837, 100,000 hrs 73° (23°C)
Compressed Ring ESCR[3], hrs 50°C/25% Igepal	>1,000, no failures	F 1248
Classification Type/Class/Cat./Grade	III/C/5/P34	D 1248
Cell Classification	345434C	D 3350
PPI Recommended Designation	PE 3408[4]	

(1) Data developed under laboratory conditions and are not to be used as specification, maxima or minima.
(2) This data was developed on press molded test specimens and may, therefore, vary from specimens taken from pipes.
(3) Environmental Stress Crack Resistance (ESCR)
(4) Previously listed as Hostalen® GM 5010 T2

HIGH MOLECULAR WEIGHT HDPE PIPE GRADE

Characteristics
- Outstanding high temperature creep rupture strength
- Excellent compressed ring ESCR
- Field performance history since 1987[4]
- NSF approved[4] for potable water

Applications
- Industrial and mining
- Gas distribution
- Potable water
- Sewer and sewer relining
- Gas and oil gathering
- Fiberoptic innerduct
- General pipe relining

RECEIVED
JUL 14 1997

FINA OIL AND CHEMICAL COMPANY
1-800-344-FINA
8350 North Central Expressway
P.O. Box 2159
Dallas, TX 75221
Phone: 214-750-2400
Fax: 214-750-2392

Rev. 93/94

All data were for under laboratory conditions. ASTM [illegible] FINA OIL AND CHEMICAL COMPANY [illegible] FINA MAKES NO WARRANTY OF MERCHANTABILITY AND THERE IS NO WARRANTY THAT GOODS SUPPLIED SHALL BE FIT FOR ANY PARTICULAR PURPOSE [illegible]

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO	1702	CONTRACT NO.:	FSC 597	TTAL NO.: 056	REV.: #3	DATE: December 23,1997	PAGE 1 OF 1

FROM: Petro Environmental Technologies, Inc.
7851 Palace Drive
Cincinnati, Ohio 45249

SIGNATURE: J. Richard Lehrsbaum

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

RECEIVED BY: Erika Jarrett DATE: 12/29/97

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 ERG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
5	PET-064A	1							X		X	Resin Vendor's QC Certificates	X		02770-1.05.B.1	X		
5	PET-064B	1							X		X	Mfg's QC Test Results of Resin Certs.	X		02770-1.05.B.2	X		
5	PET-064C	3							X		X	Reclaimed Polymer Cert. & Mfg's Shift	X		02770-1.05.B.3 & 02770-1.05.C	X		
												Production Certificates						

DISTRIBUTION

REVIEW DISTRIBUTION

Distribution	MS	Distribution	MS
Mike Godber	64	Dyan Rhea	52-7
Don Goetz	64		
Rick Heath	64		
Dan Bodine	38		

CFC DISTRIBUTION

Distribution	MS	Distribution	MS
Lou Wehlitz	64	Mike Godber	64
Don Goetz	64	Gregg Johnson	64
Bill Zebick	64	Dan Bodine	38
Rick Heath	64	Tracy Russell	64

RECEIVED JAN 06 1997

RECEIVED BY: Daniel Bodine DATE: NO COMMENTS ____ COMMENTS ATTACHED below

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS
See below
National Seal is still testing the Environmental Stress Crack for batches 923A and 926A.
As soon as these results become available, they will be submitted.
also submittal Cover Sheet has wrong Nt. Shield
~~and density Reg. should be 56 R3.~~ not 1400, 000

SUBMITTAL ACTION CODE: (BY SUPPLIER)
CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE
A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

1267

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56

SUPPLIER SUBMITTAL No.: 024 (Rev. 3)

HDPE GEOMEMBRANE QUALITY CONTROL CERTIFICATES
Sections 02770-1.05.B (1-3) & 02770-1.05.C

FLUOR DANIEL FERNALD SUBCONTRACT No. FSC 597
ON-SITE DISPOSAL FACILITY (PHASE I) PROJECT

Document No. PET-064A (Rev. 1)
Document No. PET-064B (Rev. 1)
Document No. PET-064C (Rev. 3)

December 23, 1997

Fernald Site Office: P.O. Box 538704 • Mail Stop 44 • Cincinnati, Ohio 45253-8704 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Seville, Ohio 44273 • 330.948.1494 • Fax 948.1933

RESIN VENDOR'S QC CERTIFICATES

Document No. PET-064A

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SOLVAY POLYMERS

October 1, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0J0396
Customer PO:	G3052
Date Shipped:	09/30/97
Shipped To:	GALESBURG, IL
Lot Number:	C70923P01A
Hopper Car Number:	ELTX 1365
Weight, Lbs.:	107,950

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.265	grams/10 min
HLMI	D 1238-90b	24.5	grams/10 min
DENSITY (NATURAL RESIN)	D 4883-89	0.9369	grams/cc
CARBON	D4218-91	2.5	wt%
VOLATILES	A57Y-44-304	0.051	wt%
OXIDATIVE INDUCTION TIME @200	D3895-80	160	MINUTES
GELS	A57Y-74-305	6.00	#/16 in2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC BATCH #923A

000559

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Solvay Polymers Inc. - Technical Center
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
1-800-338-0489 Fax: 713/307-3521

ACCREDITED

Responsible Care

SOLVAY POLYMERS

October 2, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C0011
Customer PO:	G2946
Date Shipped:	10/01/97
Shipped To:	GALESBURG, IL
Lot Number:	C70926P01A
Hopper Car Number:	ELTX 2344
Weight, Lbs.:	193,050

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.243	grams/10 min
HLMI	D 1238-90b	19.5	grams/10 min
DENSITY (NATURAL RESIN)	D 4883-89	0.9367	grams/cc
CARBON	D4218-91	2.1	wt%
VOLATILES	A57Y-44-304	0.035	wt%
OXIDATIVE INDUCTION TIME @200	D3895-80	140	MINUTES
GELS	A57Y-74-305	6.00	#/16 in2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC BATCH #926A

001560

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Solvay Polymers, Inc.
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536-1000
713/307-3000 Fax: 713/307-3469

Responsible Care

MANUFACTURER'S QC TEST CERTIFICATES

Document No. PET-064B

PETRO
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12/03/97

POLYETHYLENE CERTIFICATE OF ANALYSIS

Customer: Petro Environmental

Resin Type: Solvay

Project Name: Fernald, OK

Project Number: 3130-100

Bill of Lading: 14849

We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds National Seal Company's specifications. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238 Condition 190/2.16. Density was determined according to ASTM D 1505. Where appropriate, carbon black content was determined according to ASTM D 1603. The average test results are listed in the table below.

RESIN PROPERTIES

BLEND NUMBER	MELT FLOW INDEX (g/10 min)	DENSITY (g/cm3)	CARBON BLACK CONTENT (%)
926A	0.21	0.944	2.19

Jane Allen
Quality Control Manager

12-03-97
Date:

Note: When no carbon black content value is listed, the resin contained no carbon black.

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

NSC

12/04/97

POLYETHYLENE CERTIFICATE OF ANALYSIS

Customer: Petro Environmental

Resin Type: Solvay

Project Name: Fernald, OH

Project Number: 3133-100

Bill of Lading: 14875

We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds National Seal Company's specifications. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238 Condition 190/2.16. Density was determined according to ASTM D 1505. Where appropriate, carbon black content was determined according to ASTM D 1603. The average test results are listed in the table below.

RESIN PROPERTIES

BLEND NUMBER	MELT FLOW INDEX (g/10 min)	DENSITY (g/cm3)	CARBON BLACK CONTENT (%)
923A	0.29	0.946	2.40

Jane Allen

Jane Allen
Quality Control Manager

12-04-97
Date:

Note: When no carbon black content value is listed, the resin contained no carbon black.

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RECLAIMED POLYMER CERTIFICATION &

MANUFACTURER'S SHIFT PRODUCTION

CERTIFICATES

Document No. PET-064C

PETRO
environmental
technologies

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NSC

12/03/97

GEOMEMBRANE CERTIFICATION OF ANALYSIS

Customer: Petro Environmental

Number of Rolls Shipped: 1

Project Name: Fernald, OH

Nominal Thickness: 80 mil

Project Number: 3G88-100

Bill of Lading: 14849

We hereby certify the polyethylene geomembrane for the above identified shipment meets or exceed the project specifications, below. Testing waas performed at the frequency indicated.

The raw polymeric material is first quality polyethylene resin containing no reworked plastic. Thickness was measured according to ASTM D 5199. Tensile properties were determined in accordance with ASTM D 638, NSF modified, using Type IV dumbbell specimens, a strain rate of two inches per minute, and a grip movement for strain determinations. Carbon black dispersion was determined according to ASTM D 5596. Carbon black content was determined according to ASTM D 1603. Dimensional stability was determined according to ASTM D 1204 at 100° C for one hour. Tear resistance was determined according to ASTM D 1004. Density was determined according to ASTM D 1505. Low temperature brittleness was determined according to ASTM D 746. Environmental stress crack was determined according to ASTM D 5397.

A database listing of all test values follows:

GEOMEMBRANE SPECIFICATIONS

Thickness	80.0 mil Minimum Avg.	at least every 40,000 ft²
Stress at Yield	2000 psi Minimum Avg.	at least every 40,000 ft²
Stress at Break	2000 psi Minimum Avg.	at least every 40,000 ft²
Strain at Yield	12.0% Minimum Avg.	at least every 40,000 ft²
Strain at Break	200% Minimum Avg.	at least every 40,000 ft²
Tear Resistance	650 ppi Minimum Avg.	at least every 40,000 ft²
Carbon Black Dispersion	Category 1 or Category 2	at least every 40,000 ft²
Carbon Black Content	2.0% to 3.0%	at least every 40,000 ft²
Density	0.940 g/cm³	at least every 400,000 ft²
Dimensional Stability	+/-2.0%	at least every 400,000 ft²
*Environmental Stress Crack	500 hours	at least every 400,000 ft²
*Low Temperature Brittleness	-60° C	at least every 400,000 ft²

*Indicates testing in progress

NATIONAL SEAL COMPANY

Jane Allen

Jane Allen
Quality Control Manager

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

NSC

TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 12/02/97

Page: 1

Bill(s) of Lading: 14849

ROLL NUMBER	STRESS AT YIELD (psi) MD	STRESS AT YIELD (psi) TD	STRESS AT BREAK (psi) MD	STRESS AT BREAK (psi) TD	STRAIN AT YIELD (%) MD	STRAIN AT YIELD (%) TD	STRAIN AT BREAK (%) MD	STRAIN AT BREAK (%) TD	TEAR RES(ppi) MD	TEAR RES(ppi) TD	FTMS PUNCT (ppi)	BASE SHEET ROLL NUMBER
+ S08F926A-7J1203AA3	2490	2550	2870	2600	18.0	17.0	557	467	853	842		S08L926A-7J1000062
R08F359E-7J1204AA3			2540	3040			551	675				R08L359E-7J0900091

Jane Allen

Jane Allen
Quality Control Manager

12-02-97
Date

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000566

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NSC

BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 12/02/97

Page: 1

Bill(s) of Lading: 14849

BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm^3)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY (% change) MD	TD
R08L359E-7J0900021	83.2					
R08L359E-7J0900041	82.4	1	0.931	2.58	-1.6	0.4
R08L359E-7J0900091	80.9	1	0.930	2.57		
R08L359E-7J0900151	81.2	1	0.930	2.56	-1.5	0.4
S08L926A-7J1000022	81.0	1	0.947	2.60	-0.4	0.4
+ S08L926A-7J1000062	80.6	1	0.948	2.60	-0.1	0.2
S08L926A-7J1000072	81.7	1	0.947	2.68	-0.2	0.2

Jane Allen

Jane Allen
Quality Control Manager

12-02-97
Date

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS
National Seal Company
Low Temperature Brittleness (ASTM D 746 @ -60 C)

Material: textured 80 mil HDPE geomembrane

NSC Job #: 3G88-3130
TRI Log #: E2059-71-06

Roll #: S0BF926A-7J1203AA3	TEST REPLICATE NUMBER 1	2	3	4	5	AVG % passing
MD Pass/Fail	Pass	Pass	Pass	Pass	Pass	100
TD Pass/Fail	Pass	Pass	Pass	Pass	Pass	100

MON 12-04-97
Quality Review/Date

MD Machine Direction
TD Transverse Direction
The testing herein is based upon accepted industry practice as well as the test method listed.
TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material.

9063 Bee Caves Road • Austin, TX 78733-6201 • (512) 263-2101 • FAX (512) 263-2558

NSC

12/04/97

GEOMEMBRANE CERTIFICATION OF ANALYSIS

Customer: Petro Environmental

Number of Rolls Shipped: 1

Project Name: Fernald, OH

Nominal Thickness: 80 mil

Project Number: 3G88-100

Bill of Lading: 14875

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A database listing of all test values follows:

GEOMEMBRANE SPECIFICATIONS

Thickness	80.0 mil Minimum Avg.	at least every 40,000 ft²
Stress at Yield	2000 psi Minimum Avg	at least every 40,000 ft²
Stress at Break	2000 psi Minimum Avg.	at least every 40,000 ft²
Strain at Yield	12.0% Minimum Avg.	at least every 40,000 ft²
Strain at Break	200% Minimum Avg.	at least every 40,000 ft²
Tear Resistance	650 ppi Minimum Avg.	at least every 40,000 ft²
Carbon Black Dispersion	Category 1 or Category 2	at least every 40,000 ft²
Carbon Black Content	2.0% to 3.0%	at least every 40,000 ft²
Density	0.940 g/cm³	at least every 400,000 ft²
Dimensional Stability	+/-2.0%	at least every 400,000 ft²
*Environmental Stress Crack	500 hours	at least every 400,000 ft²
*Low Temperature Brittleness	-60° C	at least every 400,000 ft²

*Indicates testing in progress

NATIONAL SEAL COMPANY

Jane Allen

Jane Allen
Quality Control Manager

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

NSC

TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 12/04/97

Page: 1

Bill(s) of Lading: 14875

ROLL NUMBER	STRESS AT YIELD (psi) MD	STRESS AT YIELD (psi) TD	STRESS AT BREAK (psi) MD	STRESS AT BREAK (psi) TD	STRAIN AT YIELD (%) MD	STRAIN AT YIELD (%) TD	STRAIN AT BREAK (%) MD	STRAIN AT BREAK (%) TD	INDEX FRICTION ANGLE (°) TOP	INDEX FRICTION ANGLE (°) BOT.	TEAR RESIS (ppi) MD	TEAR RESIS (ppi) TD	BASE SHEET ROLL NUMBER
+ S08F923A-7J0801AA3	2580	2650	3580	3170	17.5	16.5	700	630	54	49	392	882	S08L923A-7J0700072
S08F923A-7J0805AA3	2510	2560	3520	3360	18.0	17.7	665	659	50	47			S08L923A-7J0800022

Jane Allen

Jane Allen
Quality Control Manager

12-04-97
Date

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

000070

+ Received on-site

NSC

BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 12/04/97

Page: 1

Bill(s) of Lading: 14875

BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm^3)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY (% CHANGE) MD	TD
S08L517B-7J0700022	81.8	1	0.945	2.26	-0.5	0.4
S08L923A-7J0700062	82.4	1	0.946	2.46	-0.5	0.1
+ S08L923A-7J0700072	83.5	1	0.948	2.44	-0.2	0.4
S08L923A-7J0800012	82.2	1	0.947	2.46	-0.5	0.2
S08L923A-7J0800052	81.6	1	0.947	2.64	-0.3	0.2
S08L926A-7J0800092	82.0	1	0.947	2.76		

Jane Allen

Jane Allen
Quality Control Manager

12-04-97
Date

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS
National Seal Company
Low Temperature Brittleness (ASTM D 746 @ -60 C)

Material: textured 80 mil HDPE geomembrane

NSC Job #: 3133
TRI Log #: E2059-73-04

Roll #: S08F923A-7J0801AA3	TEST REPLICATE NUMBER 1	2	3	4	5	AVG % passing
MD Pass/Fail	Pass	Pass	Pass	Pass	Pass	100
TD Pass/Fail	Pass	Pass	Pass	Pass	Pass	100

MON 12-08-97
Quality Review/Date

MD Machine Direction
TD Transverse Direction
The testing herein is based upon accepted industry practice as well as the test method listed.
TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material.

9063 Bee Caves Road • Austin, TX 78733-6201 • (512) 263-2101 • FAX (512) 263-2558

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO.	CONTRACT NO.	SUBMITTAL NO.	REV.	DATE	PAGE
1702	FSC 597	056	#3	December 23,1997	1 OF 1

FROM: Petro Environmental Technologies, Inc.
7851 Palace Drive
Cincinnati, Ohio 45249

SIGNATURE: J. Richard Schainbaum

TO: FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44

RECEIVED BY: Erika Jarrett DATE: 12/29/97

QTY	DOCUMENT NUMBER	REV	DOCUMENT FAMILY 1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	RESUBMITTAL YES	NO	TITLE/DESCRIPTION	SUBMITTAL TYPE CFC	INF	ASSOCIATED SPECIFICATION	SUBMITTAL ACTION A	B	C
5	PET-064A	1							X		X	Resin Vendor's QC Certificates	X		02770-1.05.B.1	X		
5	PET-064B	1							X		X	Mfg's QC Test Results of Resin Certs.	X		02770-1.05.B.2	X		
5	PET-064C	3							X		X	Reclaimed Polymer Cert. & Mfg's Shift Production Certificates	X		02770-1.05.B.3 & 02770-1.05.C	X		

DISTRIBUTION

REVIEW DISTRIBUTION

Distribution	MS	Distribution	MS
Mike Godber	64	Dyan Rhea	52-7
Don Goetz	64		
Rick Heath	64		
Dan Bodine	38		

CFC DISTRIBUTION

Distribution	MS	Distribution	MS
Lou Wehlitz	64	Mike Godber	64
Don Goetz	64	Gregg Johnson	64
Bill Zebick	64	Dan Bodine	38
Rick Heath	64	Tracy Russell	64

ORIGINAL

RECEIVED BY: Michael W. Poller DATE: NO COMMENTS ___ COMMENTS ATTACHED X
(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

National Seal is still testing the Environmental Stress Crack for batches 923A and 926A.

As soon as these results become available, they will be submitted.

SUBMITTAL SHOWS THE GMLT TO BE TESTED FOR DENSITY AT 400,000 SF IN LEAU OF 40,000. TYPO.

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION

INF - INFORMATION/RECORD

"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS, REVISE AND RESUBMIT AS CFC OR INF

C - REVISE AND RESUBMIT

1267

1267

PETRO
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technologies

SUPPLIER SUBMITTAL No.: 024 (Rev. 3)

HDPE GEOMEMBRANE QUALITY CONTROL CERTIFICATES
Sections 02770-1.05.B (1-3) & 02770-1.05.C

FLUOR DANIEL FERNALD SUBCONTRACT-No. FSC 597
ON-SITE DISPOSAL FACILITY (PHASE I) PROJECT

Document No. PET-064A (Rev. 1)
Document No. PET-064B (Rev. 1)
Document No. PET-064C (Rev. 3)

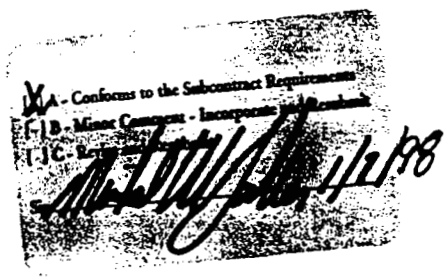
December 23, 1997

0009574

Fernald Site Office: P.O. Box 538704 • Mail Stop 44 • Cincinnati, Ohio 45253-8704 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.5789 • Fax 489.7208
8200 Seville Road • Seville, Ohio 44273 • 330.948.1494 • Fax 948.1933

RESIN VENDOR'S QC CERTIFICATES

Document No. PET-064A



PETRO
environmental
technologies

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS
National Seal Company
Low Temperature Brittleness (ASTM D 746 @ -60 C)

Material: textured 80 mil HDPE geomembrane

NSC Job #: 3133
TRI Log #: E2059-73-04

Roll #: S08F923A-7J0801AA3	TEST REPLICATE NUMBER 1	2	3	4	5	AVG % passing
MD Pass/Fail	Pass	Pass	Pass	Pass	Pass	100
TD Pass/Fail	Pass	Pass	Pass	Pass	Pass	100

MOW 12-08-97
Quality Review/Date

MD Machine Direction
TD Transverse Direction
The testing herein is based upon accepted industry practice as well as the test method listed.
TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material.

9063 Bee Caves Road • Austin, TX 78733-6201 • (512) 263-2101 • FAX (512) 263-2558

SOLVAY POLYMERS

October 2, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0C0011
Customer PO:	G2948
Date Shipped:	10/01/97
Shipped To:	GALESBURG, IL
Lot Number:	C70926P01A
Hopper Car Number:	ELTX 2344
Weight, Lbs.:	193,050

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.243	grams/10 min
HLMI	D 1238-90b	19.5	grams/10 min
DENSITY (NATURAL RESIN)	D 4883-89	0.9367	grams/cc
CARBON	D4218-91	2.1	wt%
VOLATILES	A57Y-44-304	0.035	wt%
OXIDATIVE INDUCTION TIME @200	D3895-80	140	MINUTES
GELS	A57Y-74-305	6.00	#/16 in2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC BATCH #926A

000577

THIS REPORT CANNOT BE COPIED OR REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF THE SOLVAY POLYMERS ANALYTICAL AND QUALITY SERVICES DEPARTMENT

Solvay Polymers, Inc.
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address P.O. Box 1000 Deer Park, Texas 77536-1000
713/307-3000 Fax: 713/307-3469

Responsible Care®

1267

SOLVAY POLYMERS

October 1, 1997

National Seal Company
Jane Allen
P O Box 1448
Galesburg, IL 61401

Listed below are the data on G36-24-149 shipments:

Solvay Order Number:	0J0396
Customer PO:	G3052
Date Shipped:	09/30/97
Shipped To:	GALESBURG, IL
Lot Number:	C70923P01A
Hopper Car Number:	ELTX 1365
Weight, Lbs.:	107,950

TEST	METHOD	RESULT	UNITS
MELT INDEX	D 1238-90b	0.285	grams/10 min
HLMI	D 1238-90b	24.5	grams/10 min
DENSITY (NATURAL RESIN)	D 4883-89	0.9369	grams/cc
CARBON	D4218-91	2.5	wt%
VOLATILES	A57Y-44-304	0.051	wt%
OXIDATIVE INDUCTION TIME @200	D3895-80	160	MINUTES
GELS	A57Y-74-305	6.00	#/16 in2

Sincerely,

Sam J. Valenti III

Sam J. Valenti III
Regulatory Coordinator
Phone: (713) 307-3774

sab

NSC BATCH #923A

000578

THIS REPORT CANNOT BE COPIED OR REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF THE SOLVAY POLYMERS ANALYTICAL AND QUALITY SERVICES DEPARTMENT

Solvay Polymers, Inc. - Technical Center
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000 Deer Park, Texas 77536-1000
1-800-338-0489 Fax: 713/307-3521

ACCREDITED

Responsible Care

NSC

January 6, 1998

CERTIFICATION

Customer: Petro Environmental

Project: Fernald, OH

Project Number: 3133-100

I certify, the following rolls of 80 mil Textured geomembrane were tested for Constant Load ESCR according to ASTM D 5397 for 500 hours and passed:

S08F923A-7J0801AA3
S08F926A-7J1203AA3

NATIONAL SEAL COMPANY

Jane Allen

Jane Allen
Quality Control Manager

MANUFACTURER'S QC TEST CERTIFICATES

Document No. PET-064B

PETRO
environmental
technologies

NSC

12/03/97

POLYETHYLENE CERTIFICATE OF ANALYSIS

Customer: Petro Environmental

Resin Type: Solvay

Project Name: Fernald, OH

Project Number: 3130-100

Bill of Lading: 14849

We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds National Seal Company's specifications. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238 Condition 190/2.16. Density was determined according to ASTM D 1505. Where appropriate, carbon black content was determined according to ASTM D 1603. The average test results are listed in the table below.

RESIN PROPERTIES

BLEND NUMBER	MELT FLOW INDEX (g/10 min)	DENSITY (g/cm^3)	CARBON BLACK CONTENT (%)
926A	0.21	0.944	2.19

Jane Allen
Quality Control Manager

12-03-97
Date:

Note: When no carbon black content value is listed, the resin contained no carbon black.

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

1267

NSC

12/04/97

POLYETHYLENE CERTIFICATE OF ANALYSIS

Customer: Petro Environmental

Resin Type: Solvay

Project Name: Fernald, OH

Project Number: 3133-100

Bill of Lading: 14875

We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds National Seal Company's specifications. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238 Condition 190/2.16. Density was determined according to ASTM D 1505. Where appropriate, carbon black content was determined according to ASTM D 1603. The average test results are listed in the table below.

RESIN PROPERTIES

BLEND NUMBER	MELT FLOW INDEX (g/10 min)	DENSITY (g/cm3)	CARBON BLACK CONTENT (%)
923A	0.29	0.946	2.40

Jane Allen

Jane Allen
Quality Control Manager

12-04-97
Date:

Note: When no carbon black content value is listed, the resin contained no carbon black.

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RECLAIMED POLYMER CERTIFICATION & MANUFACTURER'S SHIFT PRODUCTION CERTIFICATES

Document No. PET-064C

000583

PETRO
environmental
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12/03/97

GEOMEMBRANE CERTIFICATION OF ANALYSIS

Customer: Petro Environmental

Number of Rolls Shipped: 1

Project Name: Fernald, OH

Nominal Thickness: 80 mil

Project Number: 3G88-100

Bill of Lading: 14849

We hereby certify the polyethylene geomembrane for the above identified shipment meets or exceed the project specifications, below. Testing waas performed at the frequency indicated.

The raw polymeric material is first quality polyethylene resin containing no reworked plastic. Thickness was measured according to ASTM D 5199. Tensile properties were determined in accordance with ASTM D 638, NSF modified, using Type IV dumbbell specimens, a strain rate of two inches per minute, and a grip movement for strain determinations. Carbon black dispersion was determined according to ASTM D 5596. Carbon black content was determined according to ASTM D 1603. Dimensional stability was determined according to ASTM D 1204 at 100° C for one hour. Tear resistance was determined according to ASTM D 1004. Density was determined according to ASTM D 1505. Low temperature brittleness was determined according to ASTM D 746. Environmental stress crack was determined according to ASTM D 5397.

A database listing of all test values follows:

GEOMEMBRANE SPECIFICATIONS

Thickness	80.0 mil Minimum Avg.	at least every 40,000 ft²
Stress at Yield	2000 psi Minimum Avg.	at least every 40,000 ft²
Stress at Break	2000 psi Minimum Avg.	at least every 40,000 ft²
Strain at Yield	12.0% Minimum Avg.	at least every 40,000 ft²
Strain at Break	200% Minimum Avg.	at least every 40,000 ft²
Tear Resistance	650 ppi Minimum Avg.	at least every 40,000 ft²
Carbon Black Dispersion	Category 1 or Category 2	at least every 40,000 ft²
Carbon Black Content	2.0% to 3.0%	at least every 40,000 ft²
Density	0.940 g/cm³	at least every ~~400,000 ft²~~
Dimensional Stability	+/-2.0%	at least every 400,000 ft²
*Environmental Stress Crack	500 hours	at least every 400,000 ft²
*Low Temperature Brittleness	-60° C	at least every 400,000 ft²

*Indicates testing in progress

NATIONAL SEAL COMPANY

Jane Allen
Quality Control Manager

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NSC

TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 12/02/97

Page: 1

Bill(s) of Lading: 14849

ROLL NUMBER	STRESS AT YIELD (psi) MD	STRESS AT YIELD (psi) TD	STRESS AT BREAK (psi) MD	STRESS AT BREAK (psi) TD	STRAIN AT YIELD (%) MD	STRAIN AT YIELD (%) TD	STRAIN AT BREAK (%) MD	STRAIN AT BREAK (%) TD	TEAR RES(ppi) MD	TEAR RES(ppi) TD	FTMS PUNCT (ppi)	BASE SHEET ROLL NUMBER
+ S08F926A-7J1203AA3	2490	2550	2870	2600	18.0	17.0	557	467	853	842		S08L926A-7J1000062
R08F359E-7J1204AA3			2540	3040			551	670				R08L359E-7J0900091

Jane Allen

Jane Allen
Quality Control Manager

12-02-97
Date

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NSC

BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Date: 12/02/97 Page: 1

Bill(s) of Lading: 14849

BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm^3)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY (% change) MD	TD
R08L359E-7J0900021	83.2					
R08L359E-7J0900041	82.4	1	0.931	2.58	-1.4	0.4
R08L359E-7J0900091	80.9	1	0.930	2.57		
R08L359E-7J0900151	81.2	1	0.930	2.56	-1.5	0.4
S08L926A-7J1000022	81.0	1	0.947	2.60	-0.4	0.4
+ S08L926A-7J1000062	80.6	1	0.948	2.60	-0.1	0.2
S08L926A-7J1000072	81.7	1	0.947	2.68	-0.2	0.2

Jane Allen
Quality Control Manager

12-02-97
Date

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS
National Seal Company
Low Temperature Brittleness (ASTM D 746 @ -60 C)

NSC Job #: 3G88-3130
TRI Log #: E2059-71-06

Material: textured 80 mil HDPE geomembrane

Roll #: S08F926A-7J1203AA3	TEST REPLICATE NUMBER 1	2	3	4	5	AVG % passing
MD Pass/Fail	Pass	Pass	Pass	Pass	Pass	100
TD Pass/Fail	Pass	Pass	Pass	Pass	Pass	100

MON 12-04-97
Quality Review/Date

MD Machine Direction
TD Transverse Direction
The testing herein is based upon accepted industry practice as well as the test method listed.
TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material

9063 Bee Caves Road • Austin, TX 78733-6201 • (512) 263-2101 • FAX (512) 263-2558

NSC

12/04/97

GEOMEMBRANE CERTIFICATION OF ANALYSIS

Customer: Petro Environmental

Number of Rolls Shipped: 1

Project Name: Fernald, OH

Nominal Thickness: 80 mil

Project Number: 3G88-100

Bill of Lading: 14875

We hereby certify the polyethylene geomembrane for the above identified shipment meets or exceed the project specifications, below. Testing waas performed at the frequency indicated.

The raw polymeric material is first quality polyethylene resin containing no reworked plastic. Thickness was measured according to ASTM D 5199. Tensile properties were determined in accordance with ASTM D 638, NSF modified, using Type IV dumbbell specimens, a strain rate of two inches per minute, and a grip movement for strain determinations. Carbon black dispersion was determined according to ASTM D 5596. Carbon black content was determined according to ASTM D 1603. Dimensional stability was determined according to ASTM D 1204 at 100° C for one hour. Tear resistance was determined according to ASTM D 1004. Density was determined according to ASTM D 1505. Low temperature brittleness was determined according to ASTM D 746. Environmental stress crack was determined according to ASTM D 5397.

A database listing of all test values follows:

GEOMEMBRANE SPECIFICATIONS

Thickness	80.0 mil Minimum Avg.	at least every 40,000 ft²
Stress at Yield	2000 psi Minimum Avg.	at least every 40,000 ft²
Stress at Break	2000 psi Minimum Avg.	at least every 40,000 ft²
Strain at Yield	12.0% Minimum Avg.	at least every 40,000 ft²
Strain at Break	200% Minimum Avg.	at least every 40,000 ft²
Tear Resistance	650 ppi Minimum Avg.	at least every 40,000 ft²
Carbon Black Dispersion	Category 1 or Category 2	at least every 40,000 ft²
Carbon Black Content	2.0% to 3.0%	at least every 40,000 ft²
Density	0.940 g/cm³	at least every ~~400,000~~ ft² 40,000
Dimensional Stability	+/-2.0%	at least every 400,000 ft²
*Environmental Stress Crack	500 hours	at least every 400,000 ft²
*Low Temperature Brittleness	-60° C	at least every 400,000 ft²

*Indicates testing in progress

NATIONAL SEAL COMPANY

Jane Allen

Jane Allen
Quality Control Manager

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

1267

NSC

TEXTURED GEOMEMBRANE STANDARD TESTING

Date: 12/04/97

Bill(s) of Lading: 14875

ROLL NUMBER	STRESS AT YIELD (psi) MD	STRESS AT YIELD (psi) TD	STRESS AT BREAK (psi) MD	STRESS AT BREAK (psi) TD	STRAIN AT YIELD (%) MD	STRAIN AT YIELD (%) TD	STRAIN AT BREAK (%) MD	STRAIN AT BREAK (%) TD	INDEX FRICTION ANGLE (g) TOP	INDEX FRICTION ANGLE (g) BOT.	TEAR RESIS (ppi) MD	TEAR RESIS (ppi) TD	BASE SHEET ROLL NUMBER
+ S08F923A-7J0801AA3	2580	2650	3580	3170	17.5	16.5	700	630	54	69	892	882	S08L923A-7J0700072
S08F923A-7J0805AA3	2510	2560	3520	3360	18.0	17.7	665	659	50	67			S08L923A-7J0800022

Jane Allen

Jane Allen
Quality Control Manager

12-04-97
Date

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National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

+ Received on-site

003529

NSC

BASE SHEET TEST RESULTS FOR TEXTURED GEOMEMBRANE

Page: 1

Date: 12/04/97

Bill(s) of Lading: 14875

BASE SHEET ROLL NUMBER	THICKNESS (mils)	CARBON BLACK DISPERSION (category)	DENSITY (g/cm^3)	CARBON BLACK CONTENT (%)	DIMENSIONAL STABILITY (% CHANGE) MD	TD
S08L517B-7J0700022	81.8	1	0.945	2.26	-0.5	0.4
S08L923A-7J0700062	82.4	1	0.946	2.46	-0.5	0.1
+ S08L923A-7J0700072	83.5	1	0.948	2.44	-0.2	0.4
S08L923A-7J0800012	82.2	1	0.947	2.46	-0.5	0.2
S08L923A-7J0800052	81.6	1	0.947	2.64	-0.3	0.2
S08L926A-7J0800092	82.0	1	0.947	2.76		

Jane Allen

Jane Allen
Quality Control Manager

12-04-97
Date

This Certificate of Analysis shall not be reproduced except in full, without the written approval of the laboratory. - National Seal Company - 1255 Monmouth Blvd. - Galesburg, IL - 61401

+ Received on-site

Geotextile

- Nonwoven Geotextile – Filter

TNS
ADVANCED TECHNOLOGIES

681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

August 28, 1997
REF: TNS E070
BOL 11155
Ship Date: 8/27/97
Test Date: 8/26/97
Location: Fluor Daniel, Fernald, OH
No. of rolls: 4
Lot #: 842

Ground Safe Inc.
Dear Sir/Madam:

This is to certify that TNS E070 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E070 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E070 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D ~~3776~~ 5261	oz/sy	7.0
Thickness	ASTM D ~~1777~~ 5199	mils	90
Grab Tensile	ASTM D 4632	lbs	200
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	75
Puncture	ASTM D 4833	lbs	115
Mullen Burst	ASTM D 3786	psi	400
A.O.S.	ASTM D 4751	U.S. Sieve	80
Permitivity	ASTM D 4491	1/sec	1.41
Water Flow	ASTM D 4491	gpm/sq.ft.	110
U.V. Resistance	ASTM D 4355	% retained	70
Permeability	ASTM D 4491	cm/sec	.32

Sincerely,

Monte R. Thomas
Vice President
TNS Advanced Technologies

7.02

TNS Mills, Inc.

Nonwoven Quality Data

B.O.L. #: 11155

08/26/97 Page 1

CONFORMANCE SAMPLES

Roll #	Styl	Wdt	Lng	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm -abl	Perm -ity	AOS
972981	E070	180	780	7.5	124	203	205	72	115	90	99	147	430	133	.44	1.7	80
972982*	E070	180	780	7.5	124	203	205	72	115	90	99	147	430	133	.44	1.7	80
972983	E070	180	780	7.5	124	203	205	72	115	90	99	147	430	133	.44	1.7	80
GT-07-03 972984*	E070	180	780	7.5	124	203	205	72	115	90	99	147	430	133	.44	1.7	80

4 ROLLS

TNS
ADVANCED TECHNOLOGIES

681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free (800) 887-5181

RECEIVED
JUN 25 1997

June 19, 1997
REF: TNS E070
Location: Fernald, Ohio/OSDF Phase I Project
Date Shipped: 06-17-97
Test Date: 06-17-97
Qty. Shipped: 12 rolls
BOL#: 10806
Lot#: 740
Lab Name: TNS Advanced Technologies
681 DeYoung Road
Greer, SC 29651

Petro Environmental Technologies Inc.

Dear Sir/Madam:

This is to certify that TNS E070 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E070 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E070 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V	SPEC	
Weight (MASS PER UNIT AREA)	ASTM D 5261	oz/sy	7.1	≥7.0	
Thickness	ASTM D 1777	mils	90	NA	
Grab Tensile	ASTM D 4632	lbs	200	≥180	
Grab Elongation	ASTM D 4632	%	50	NA	
Trap Tear	ASTM D 4533	lbs	75	≥75	← TIGHT
Puncture	ASTM D 4833	lbs	115	≥75	
Mullen Burst	ASTM D 3786	psi	400	≥350	
A.O.S.	ASTM D 4751	U.S. Sieve	80 = 0.18mm	≤ 0.21	← CONVERSION 80 = 0.18 MM
Permittivity	ASTM D 4491	1/sec	1.41	≥0.5	
Water Flow	ASTM D 4491	gpm/sq.ft	110	NA	
U.V. Resistance	ASTM D 4355	% retained	70	≥70	
Permeability	ASTM D 4491	cm/sec	.32	NA	

Sincerely,

Monte R. Thomas
Vice President
TNS Advanced Technologies

7-oz/yd² FILTER GEOTEXTILE

GRAB

TNS Mills, Inc.

Nonwoven Quality Data

B.O.L. #: 18866

06/19/97 Page 1

Roll #	Style	Wgt	Ind	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Puncture	Burst	Flow Rate	Perm -SDI	Perm -SLV	AOS
SPECS:				≥7 oz/yd²		≥200		NA		≥75	≥75	≥350					≤0.21
965579	E070	180	780	7.4	114	212	208	74	118	94	112	125	452	119	.38	1.6	80
965580	E070	180	780	7.4	114	212	208	74	118	94	112	125	452	121	.36	1.6	80
965581	E070	180	780	7.4	114	212	208	74	118	94	112	125	452	121	.36	1.6	80
965582	E070	180	780	7.4	114	212	208	74	118	94	112	125	452	121	.36	1.6	80
965583	E070	180	780	7.4	114	212	208	74	118	94	112	125	452	121	.36	1.6	80
965584	E070	180	780	7.4	114	212	208	74	118	94	112	125	452	121	.36	1.6	80
965585	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.6	80
965586	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.6	80
965587	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.6	80
965588	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.6	80
965589	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.6	80
965591	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.6	80

0.18mm

NEED U.V. RESISTANCE DATA

SEE PREVIOUS SHEET

12 ROLLS

RECEIVED JUN 25 1997

1267

PAGE 2 OF 6

TNS ADVANCED TECH. ID:8675734676 JUN 19 97 11:25 NO. 000 P.04

7-oz GEOTEXTILE

TNS Mills, Inc. Nonwoven Quality Data 06/19/97 Page 1

S.O.L. #: 10885

Roll #	Styl	Wdt	Lng	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm -abl	Perm -ity	AOS
965579	E070	180	780	7.4	114	212	200	74	118	94	112	125	452	119	.38	1.6	80
965580	E070	180	780	7.4	114	212	200	74	118	94	112	125	452	121	.36	1.5	80
965581	E070	180	780	7.4	114	212	200	74	118	94	112	125	452	121	.36	1.5	80
965582	E070	180	780	7.4	114	212	200	74	118	94	112	125	452	121	.36	1.5	80
965583	E070	180	780	7.4	114	212	200	74	118	94	112	125	452	121	.36	1.5	80
965584	E070	180	780	7.4	114	212	200	74	118	94	112	125	452	121	.36	1.5	80
965585	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.5	80
965586	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.5	80
965587	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.5	80
965588	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.5	80
965589	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.5	80
965591	E070	180	780	7.6	111	225	205	71	98	94	112	125	452	122	.36	1.5	80

- 12 ROLLS (140,400 ft²) LOT 740

TNS ADVANCED TECHNOLOGIES
681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

1267

TNS
ADVANCED TECHNOLOGIES

681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

December 12, 1997
REF: TNS E071
Date Shipped: 12/12/97
Qty. Shipped: 26 rolls
BOL#: 11647
Lab Name: TNS Advanced Technologies
681 DeYoung Road
Greer, SC 29651

RECEIVED
DEC 12 1997
1710

Petro Environmental Technologies, Inc.

Dear Sir/Madam:

This is to certify that TNS E071 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E071 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E071 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	7.1
Thickness	ASTM D 1777	mils	90
Grab Tensile	ASTM D 4632	lbs	200
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	75
Puncture	ASTM D 4833	lbs	115
Mullen Burst	ASTM D 3786	psi	400
A.O.S.	ASTM D 4751	U.S. Sieve	80
Permitivity	ASTM D 4491	1/sec	1.41
Water Flow	ASTM D 4491	gpm/sq.ft.	110
U.V. Resistance	ASTM D 4355	% retained	70
Permeability	ASTM D 4491	cm/sec	.32

Sincerely,

Paul M. Mosley

Paul M. Mosley
TNS Advanced Technologies

LOT NO. 987

TNS Mills, Inc. Nonwoven Quality Data 12/12/97 Page 1
S.O.t. # 11647

Roll #	Styl	Wdt	Lng	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rwst	Brst Strg	Flow Rate	Perm Abl	Perm Ity	AOS
980765	E071	180	780	7.4	114	206	200	79	91	119	143	129	402	122	.46	1.8	80
~~980766*~~	~~E071~~	~~180~~	~~780~~	~~7.4~~	~~114~~	~~206~~	~~200~~	~~79~~	~~91~~	~~119~~	~~143~~	~~129~~	~~402~~	~~122~~	~~.46~~	~~1.8~~	~~80~~
980767*	E071	180	780	7.4	114	206	200	79	91	119	143	129	402	122	.46	1.8	80
980768	E071	180	780	7.1	118	208	203	77	90	75	76	121	418	122	.46	1.8	80
~~980769*~~	~~E071~~	~~180~~	~~780~~	~~7.1~~	~~118~~	~~208~~	~~203~~	~~77~~	~~90~~	~~75~~	~~76~~	~~121~~	~~418~~	~~122~~	~~.46~~	~~1.8~~	~~80~~
980774	E071	180	780	7.5	183	216	220	69	75	88	102	130	415	122	.46	1.8	80
980783	E071	180	780	8.5	121	244	268	86	87	116	173	146	463	122	.46	1.8	80
~~980784~~	~~E071~~	~~180~~	~~780~~	~~8.5~~	~~121~~	~~244~~	~~268~~	~~86~~	~~87~~	~~116~~	~~173~~	~~146~~	~~463~~	~~122~~	~~.46~~	~~1.8~~	~~80~~
980792	E071	180	780	8.0	100	206	227	73	93	75	76	116	408	122	.46	1.8	80
980794	E071	180	780	8.0	90	208	224	72	89	84	149	116	412	122	.46	1.8	80
~~980795*~~	~~E071~~	~~180~~	~~780~~	~~8.0~~	~~90~~	~~208~~	~~224~~	~~72~~	~~89~~	~~84~~	~~149~~	~~116~~	~~412~~	~~122~~	~~.46~~	~~1.8~~	~~80~~
980796*	E071	180	780	8.0	90	208	224	72	89	84	149	116	412	122	.46	1.8	80
980797*	E071	180	780	8.0	90	208	224	72	89	84	149	116	412	122	.46	1.8	80
~~980798*~~	~~E071~~	~~180~~	~~780~~	~~8.0~~	~~90~~	~~208~~	~~224~~	~~72~~	~~89~~	~~84~~	~~149~~	~~116~~	~~412~~	~~122~~	~~.46~~	~~1.8~~	~~80~~
980799*	E071	180	780	8.0	90	208	224	72	89	84	149	116	412	122	.46	1.8	80
980802	E071	180	780	7.6	110	206	200	76	70	88	91	126	426	117	.41	1.7	80
~~980803~~	~~E071~~	~~180~~	~~780~~	~~8.0~~	~~116~~	~~206~~	~~241~~	~~73~~	~~74~~	~~85~~	~~142~~	~~115~~	~~414~~	~~117~~	~~.41~~	~~1.7~~	~~80~~
980804*	E071	180	780	8.0	116	206	241	73	74	85	142	115	414	117	.41	1.7	80
980805	E071	180	780	7.4	105	208	212	66	79	82	143	133	422	117	.41	1.7	80
~~980806*~~	~~E071~~	~~180~~	~~780~~	~~7.4~~	~~105~~	~~208~~	~~212~~	~~66~~	~~79~~	~~82~~	~~143~~	~~133~~	~~422~~	~~117~~	~~.41~~	~~1.7~~	~~80~~
980807	E071	180	780	8.0	117	208	247	64	94	87	137	115	419	117	.41	1.7	80
980808*	E071	180	780	8.0	117	208	247	64	94	87	137	115	419	117	.41	1.7	80
~~980809*~~	~~E071~~	~~180~~	~~780~~	~~8.0~~	~~117~~	~~208~~	~~247~~	~~64~~	~~94~~	~~87~~	~~137~~	~~115~~	~~419~~	~~117~~	~~.41~~	~~1.7~~	~~80~~
980810*	E071	180	780	8.0	117	208	247	64	94	87	137	115	419	117	.41	1.7	80
980811	E071	180	780	7.6	107	206	225	66	88	91	111	121	435	117	.41	1.7	80
~~980812*~~	~~E071~~	~~180~~	~~780~~	~~7.6~~	~~107~~	~~206~~	~~225~~	~~66~~	~~88~~	~~91~~	~~111~~	~~121~~	~~435~~	~~117~~	~~.41~~	~~1.7~~	~~80~~

- **Nonwoven Geotextile Cushion**

1267

TNS
ADVANCED TECHNOLOGIES

681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

August 28, 1997
REF: TNS E100
BOL 11159
Ship Date: 8/28/97
Test Date: 8/27/97
Location: Fluor Daniel, Fernald, OH
No. rolls: 9
Lot #: 843

Ground Safe Inc.
Dear Sir/Madam:

This is to certify that TNS E100 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E100 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E100 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	10.0
Thickness	ASTM D 5199	mils	110
Grab Tensile	ASTM D 4632	lbs	270
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	100
Puncture	ASTM D 4833	lbs	165
Mullen Burst	ASTM D 3786	psi	560
A.O.S.	ASTM D 4751	U.S. Sieve	100
Permitivity	ASTM D 4491	1/sec	.94
Water Flow	ASTM D 4491	gpm/sq.ft.	75
U.V. Resistance	ASTM D 4355	% retained	70
Permeability	ASTM D 4491	cm/sec	.30

Sincerely,

Munto R. Thomas
Vice President
TNS Advanced Technologies

CQA CONFORMANCE SAMPLE

TNS Mills, Inc.

Nonwoven Quality Data
B.O.L. #: 11159

08/28/97 Page 1

	Roll #	Styl	Wgt	Lng	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm -abl	Perm -ity	AOS
GT-10-08	973025	E100	180	570	10.8	132	323	307	63	87	126	168	192	590	92	.35	1.2	100
	973027	E100	180	570	11.3	134	363	320	70	89	100	100	204	593	92	.35	1.2	100
	973028*	E100	180	570	11.3	134	363	320	70	89	100	100	204	593	92	.35	1.2	100
	973029*	E100	180	570	11.3	134	363	320	70	89	100	100	204	593	92	.35	1.2	100
	973030*	E100	180	570	11.3	134	363	320	70	89	100	100	204	593	92	.35	1.2	100
	973031	E100	180	570	10.8	128	319	307	71	97	125	145	188	587	92	.35	1.2	100
	973032*	E100	180	570	10.8	128	319	307	71	97	125	145	188	587	92	.35	1.2	100
GT-10-09	973033*	E100	180	570	10.8	128	319	307	71	97	125	145	188	587	92	.35	1.2	100
	973034*	E100	180	570	10.8	128	319	307	71	97	125	145	188	587	92	.35	1.2	100

9 Rolls

1267

TNS
ADVANCED TECHNOLOGIES

681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

August 28, 1997
REF: TNS E100
BOL 11155
Ship Date: 8/27/97
Test Date: 8/26/97
Location: Fluor Daniel, Fernald, OH
No. rolls: 29
Lot #: 843

Ground Safe Inc.
Dear Sir/Madam:

This is to certify that TNS E100 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E100 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E100 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D ~~3776~~ 5261	oz/sy	10.0 ✓
Thickness	ASTM D ~~1777~~ 5199	mils	110
Grab Tensile	ASTM D 4632 ✓	lbs	270
Grab Elongation	ASTM D 4632 ✓	%	50
Trap Tear	ASTM D 4533	lbs	100
Puncture	ASTM D 4833 ✓	lbs	165
Mullen Burst	ASTM D 3786 ✓	psi	560 ✓
A.O.S.	ASTM D 4751	U.S. Sieve	100
Permitivity	ASTM D 4491	1/sec	.94
Water Flow	ASTM D 4491	gpm/sq.ft.	75
U.V. Resistance	ASTM D 4355 ✓	% retained	70
Permeability	ASTM D 4491	cm/sec	.30

Sincerely,

Monte R. Thomas
Vice President
TNS Advanced Technologies

10 .02

CONF. SAMPLE

TNS Mills, Inc. Nonwoven Quality Data 08/27/97 Page 1

S.O.L. #: 11155

Roll #	Styl	Wdt	Lng	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm -abl	Perm -ity	AOS
962253	E100	180	570	11.9	159	330	371	83	94	153	203	215	605	82	.33	1.2	100
972997	E100	180	570	11.3	130	343	329	74	87	134	183	179	596	86	.34	1.3	100
972998*	E100	180	570	11.3	130	343	329	74	87	134	183	179	595	86	.34	1.3	100
972999	E100	180	570	10.9	131	338	318	69	89	121	149	174	597	86	.34	1.3	100
973000*	E100	180	570	10.9	131	338	318	69	89	121	149	174	597	86	.34	1.3	100
973001*	E100	180	570	10.9	131	338	318	69	89	121	149	174	597	86	.34	1.3	100
973002*	E100	180	570	10.9	131	338	318	69	89	121	149	174	597	86	.34	1.3	100
973003	E100	180	570	10.5	124	343	286	66	79	121	137	180	579	86	.34	1.3	100
973004*	E100	180	570	10.5	124	343	286	66	79	121	137	180	579	86	.34	1.3	100
973005*	E100	180	570	10.5	124	343	286	66	79	121	137	180	579	86	.34	1.3	100
973006*	E100	180	570	10.5	124	343	286	66	79	121	137	180	579	86	.34	1.3	100
GT-10-07 973007	E100	180	570	10.0	121	331	281	66	78	113	126	168	569	86	.34	1.3	100
973008*	E100	180	570	10.0	121	331	281	66	78	113	126	168	569	86	.34	1.3	100
973009*	E100	180	570	10.0	121	331	281	66	78	113	126	168	569	86	.34	1.3	100
973010*	E100	180	570	10.0	121	331	281	66	78	113	126	168	569	86	.34	1.3	100
973011	E100	180	570	10.9	129	347	297	65	89	126	144	168	616	86	.34	1.3	100
973012*	E100	180	570	10.9	129	347	297	65	89	126	144	168	616	86	.34	1.3	100
973013*	E100	180	570	10.9	129	347	297	65	89	126	144	168	616	86	.34	1.3	100
973014*	E100	180	570	10.9	129	347	297	65	89	126	144	168	616	86	.34	1.3	100
973015	E100	180	570	10.5	127	337	272	67	78	115	134	171	591	86	.34	1.3	100
973016*	E100	180	570	10.5	127	337	272	67	78	115	134	171	591	86	.34	1.3	100
973017*	E100	180	570	10.5	127	337	272	67	78	115	134	171	591	86	.34	1.3	100
GT-10-06 973018*	E100	180	570	10.5	127	337	272	67	78	115	134	171	591	86	.34	1.3	100
973019	E100	180	570	10.8	129	336	301	65	101	122	149	183	626	86	.34	1.3	100
973020*	E100	180	570	10.8	129	336	301	65	101	122	149	183	626	86	.34	1.3	100
973021*	E100	180	570	10.8	129	336	301	65	101	122	149	183	626	86	.34	1.3	100
973022*	E100	180	570	10.8	129	336	301	65	101	122	149	183	626	86	.34	1.3	100
973023	E100	180	570	10.8	132	323	307	63	87	120	168	192	590	86	.34	1.3	100
973024*	E100	180	570	10.8	132	323	307	63	87	120	168	192	590	86	.34	1.3	100

1267

000064

TNS
ADVANCED TECHNOLOGIES

681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

August 11, 1997
REF: TNS E100
Location: Fluor Daniels Fernald
Date Shipped: 8-11-97
Test Date: 8-10-97
Quantity Shipped: 36 rolls
BOL#: 11070
Lot#:809
Lab Name: TNS Advanced Technologies
681 DeYoung Road
Greer, SC 29651

Ground Safe Inc.

Dear Sir/Madam:

This is to certify that TNS E100 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E100 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E100 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	10.0
Thickness	ASTM D 5199	mils	110
Grab Tensile	ASTM D 4632	lbs	270
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	100
Puncture	ASTM D 4833	lbs	165
Mullen Burst	ASTM D 3786	psi	560
A.O.S.	ASTM D 4751	U.S. Sieve	100
Permitivity	ASTM D 4491	1/sec	.94
Water Flow	ASTM D 4491	gpm/sq.ft.	75
U.V. Resistance	ASTM D 4355	% retained	70
Permeability	ASTM D 4491	cm/sec	.30

Sincerely,

Monte R. Thomas
Vice President
TNS Advanced Technologies

10 oz. CUSHION (CLEAR/CLEAN COPY)

SEE NEXT

SAMPLE NO

TNS Mills, Inc. — Nonwoven Quality Data — 08/09/97 — Page 1

~~B.O.L. #: 11070~~

SPECS:

	Roll #	Styl	15' Wdt	Lng	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm abl	Perm ity	AOS
	971261	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
	971262	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
	971263	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
	971264	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
	971265	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
	971266	E100	180	570	11.0	144	297	318	72	104	100	100	188	594	90	.55	1.4	100
	971267	E100	180	570	11.0	144	297	318	72	104	100	100	188	594	90	.55	1.4	100
IT-10-02	971268	E100	180	570	11.0	144	297	318	72	104	100	100	188	594	90	.55	1.4	100
	971269	E100	180	570	11.0	144	297	318	72	104	100	100	188	594	90	.55	1.4	100
	971271	E100	180	570	10.8	143	305	306	83	99	134	182	189	585	83	.50	1.3	100
	971272	E100	180	570	10.8	143	305	306	83	99	134	182	189	585	83	.50	1.3	100
	971273	E100	180	570	10.8	143	305	306	83	99	134	182	189	585	83	.50	1.3	100
	971274	E100	180	570	10.5	137	309	295	78	97	124	132	187	580	90	.55	1.3	100
	971275	E100	180	570	10.5	137	309	295	78	97	124	132	187	580	90	.55	1.3	100
	971276	E100	180	570	10.5	137	309	295	78	97	124	132	187	580	90	.55	1.3	100
	971277	E100	180	570	10.5	137	309	295	78	97	124	132	187	580	90	.55	1.3	100
	971278	E100	180	570	10.6	138	289	303	78	98	127	172	186	572	83	.50	1.3	100
	971279	E100	180	570	10.6	138	289	303	78	98	127	172	186	572	83	.50	1.3	100
	971280	E100	180	570	10.6	138	289	303	78	98	127	172	186	572	83	.50	1.3	100
	971282	E100	180	570	10.1	135	279	270	84	97	134	182	166	563	88	.52	1.3	100
IT-10-05	971283	E100	180	570	10.1	135	279	270	84	97	134	182	166	563	88	.52	1.3	100
	971284	E100	180	570	10.1	135	279	270	84	97	134	182	166	563	88	.52	1.3	100
	971285	E100	180	570	10.1	135	279	270	84	97	134	182	166	563	88	.52	1.3	100
	971286	E100	180	570	10.6	144	317	306	88	98	126	161	188	580	83	.56	1.3	100
	971287	E100	180	570	10.6	144	317	306	88	98	126	161	188	580	83	.56	1.3	100
	971288	E100	180	570	10.6	144	317	306	88	98	126	161	188	580	83	.56	1.3	100
	971291	E100	180	570	11.1	141	318	321	83	91	129	111	195	623	83	.55	1.3	100
	971292	E100	180	570	11.1	141	318	321	83	91	129	111	195	623	83	.55	1.3	100
	971293	E100	180	570	11.1	141	318	321	83	91	129	111	195	623	83	.55	1.3	100
IT-10-03	971294	E100	180	570	10.6	135	302	317	80	94	116	171	183	567	83	.55	1.3	100
	971295	E100	180	570	10.6	135	302	317	80	94	116	171	183	567	83	.55	1.3	100
	971296	E100	180	570	10.6	135	302	317	80	94	116	171	183	567	83	.55	1.3	100
	971297	E100	180	570	10.6	135	302	317	80	94	116	171	183	567	83	.55	1.3	100
	971298	E100	180	570	10.0	129	300	292	80	93	129	111	168	563	83	.55	1.3	100
	971300	E100	180	570	10.0	129	300	292	80	93	129	111	168	563	83	.55	1.3	100
	971310	E100	180	570	10.6	147	298	290	80	102	100	100	191	580	96	.54	1.5	100

36 ROLLS

1267

10 OZ CUSHION GEOTEXTILE

TNS Mills, Inc. — Nonwoven Quality Data — 08/05/97 — Page 1

NEED UNITS

SPECS: Roll #	Styl	Wdt	15' Lng	≥10 oz/yd Fabr Wght	Thck	GRAB ≥225 Strg MD	Strg XMD	NA Elng MD	Elng XMD	≥90 Trap MD	Trap XMD	≥120 Punc Rest	≥450 Brst Strg	Flow Rate	Perm abl	Perm ity	AOS
971261	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
971262	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
971263	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
971264	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
971265	E100	180	570	12.0	152	332	346	88	108	100	100	208	623	90	.55	1.4	100
971266	E100	180	570	11.0	144	297	318	72	104	100	100	188	594	90	.55	1.4	100
971267	E100	180	570	11.0	144	297	318	72	104	100	100	188	594	90	.55	1.4	100
971268	E100	180	570	11.0	144	297	318	72	104	100	100	188	594	90	.55	1.4	100
971269	E100	180	570	11.0	144	297	318	72	104	100	100	188	594	90	.55	1.4	100
971271	E100	180	570	10.8	143	305	306	83	99	134	182	189	585	83	.50	1.3	100
971272	E100	180	570	10.8	143	305	306	83	99	134	182	189	585	83	.50	1.3	100
971273	E100	180	570	10.8	143	305	306	83	99	134	182	189	585	83	.50	1.3	100
971274	E100	180	570	10.5	137	309	296	78	97	124	132	187	580	90	.55	1.3	100
971275	E100	180	570	10.5	137	309	296	78	97	124	132	187	580	90	.55	1.3	100
971276	E100	180	570	10.5	137	309	296	78	97	124	132	187	580	90	.55	1.3	100
971277	E100	180	570	10.5	137	309	296	78	97	124	132	187	580	90	.55	1.3	100
971278	E100	180	570	10.6	138	289	303	78	98	127	172	186	572	83	.50	1.3	100
971279	E100	180	570	10.6	138	289	303	78	98	127	172	186	572	83	.50	1.3	100
971280	E100	180	570	10.6	138	289	303	78	98	127	172	186	572	83	.50	1.3	100
971282	E100	180	570	10.1	135	279	270	84	97	134	182	166	563	88	.52	1.3	100
971283	E100	180	570	10.1	135	279	270	84	97	134	182	166	563	88	.52	1.3	100
971284	E100	180	570	10.1	135	279	270	84	97	134	182	166	563	88	.52	1.3	100
971285	E100	180	570	10.1	135	279	270	84	97	134	182	166	563	88	.52	1.3	100
971286	E100	180	570	10.6	144	317	305	88	98	126	161	188	588	83	.56	1.3	100
971287	E100	180	570	10.6	144	317	305	88	98	126	161	188	588	83	.56	1.3	100
971288	E100	180	570	10.6	144	317	306	88	98	126	161	188	588	83	.56	1.3	100
971291	E100	180	570	11.1	141	318	321	83	91	129	111	195	623	83	.55	1.3	100
971292	E100	180	570	11.1	141	318	321	83	91	129	111	195	623	83	.55	1.3	100
971293	E100	180	570	11.1	141	318	321	83	91	129	111	195	623	83	.55	1.3	100
971294	E100	180	570	10.6	135	302	317	80	94	116	171	183	567	83	.55	1.3	100
971295	E100	180	570	10.6	135	302	317	80	94	116	171	183	567	83	.55	1.3	100
971296	E100	180	570	10.6	135	302	317	80	94	116	171	183	567	83	.55	1.3	100
971297	E100	180	570	10.6	135	302	317	80	94	116	171	183	567	83	.55	1.3	100
971298	E100	180	570	10.0	129	300	292	80	93	129	111	168	563	83	.55	1.3	100
971300	E100	180	570	10.0	129	300	292	80	93	129	111	168	563	83	.55	1.3	100
971310	E100	180	570	10.6	147	298	298	80	102	100	100	191	580	96	.54	1.5	100

GRAB?

NEED ASTM TEST NOS. FOR TESTING PERFORMED

NEED U.V. RESISTENCE (ASTM D4355) ≥70%

NEED NON-WOVEN NEEDLEPUNCHED POLYMER COMPOSITION ≥95%

CLAT LETTER?

SUPERCEDED - SEE PREVIOUS PAGE

1267

10-oz GEOTEXTILE

1267

IN135R TNS Packing List - 14:39, 08/07/97 Page 1

l #	Styl-Wth-Yds	Gross	Tare	Net
Location "GRS11D" Available, Only				
-971261	E100 180 570	733	18	715
-971262	E100 180 570	730	18	712
-971263	E100 180 570	712	18	694
-971264	E100 180 570	671	18	653
-971265	E100 180 570	685	18	667
-971266	E100 180 570	653	18	635
-971267	E100 180 570	665	18	647
-971268	E100 180 570	648	18	630
-971269	E100 180 570	656	18	638
-971271	E100 180 570	660	18	642
-971272	E100 180 570	651	18	633
-971273	E100 180 570	660	18	642
-971274	E100 180 570	654	18	636
-971275	E100 180 570	654	18	636
-971276	E100 180 570	668	18	650
-971277	E100 180 570	666	18	648
-971278	E100 180 570	652	18	634
-971279	E100 180 570	660	18	642
-971280	E100 180 570	654	18	636
-971282	E100 180 570	656	18	638
-971283	E100 180 570	658	18	640
-[illegible]284	E100 180 570	658	18	640
-[illegible]285	E100 180 570	653	18	635
-971286	E100 180 570	654	18	636
-971287	E100 180 570	652	18	634
-971288	E100 180 570	655	18	637
-971291	E100 180 570	651	18	633
-971292	E100 180 570	659	18	641
-971293	E100 180 570	654	18	636
-971294	E100 180 570	665	18	647
-971295	E100 180 570	657	18	639
-971296	E100 180 570	683	18	665
-971297	E100 180 570	670	18	652
-971298	E100 180 570	661	18	643
-971300	E100 180 570	660	18	642
-971310	E100 180 570	656	18	638
"GRS11D" Totals:		23,934	648	23,286

36 Rolls----

Selected Rolls - Styles "TNS " thru "TNS9999999999",
Locations "GRS11D" thru "GRS11D", Batches " " thru "99999"

10 oz GEOTEXTILE - 36 ROLLS (307,800 ft²) LOT 809

BILL OF LADING # 11070

TNS ADVANCED TECHNOLOGIES

681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

August 11, 1997
REF: TNS E100
Location: Fluor Daniels Fernald
Date Shipped: 8-11-97
Test Date: 8-10-97
Quantity Shipped: 21 rolls
BOL#: 11068
Lot#:809
Lab Name: TNS Advanced Technologies
681 DeYoung Road
Greer, SC 29651

Ground Safe Inc.

Dear Sir/Madam:

This is to certify that TNS E100 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E100 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E100 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	10.0
Thickness	ASTM D 5199	mils	110
Grab Tensile	ASTM D 4632	lbs	270
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	100
Puncture	ASTM D 4833	lbs	165
Mullen Burst	ASTM D 3786	psi	560
A.O.S.	ASTM D 4751	U.S. Sieve	100
Permitivity	ASTM D 4491	1/sec	.94
Water Flow	ASTM D 4491	gpm/sq.ft.	75
U.V. Resistance	ASTM D 4355	% retained	70
Permeability	ASTM D 4491	cm/sec	.30

Sincerely,

Monte R. Thomas
Vice President
TNS Advanced Technologies

10-OZ CUSHION GEOTEXTILE

GRAB?

TNS Mills, Inc. — Nonwoven Quality Data — 08/09/97 — Page 1

B.O.L. #: 11068

NEED UNITS

NEED ASTM TEST NUS. FOR TESTING PERFORMED

SPEC:				≥10 oz/yd		GRAB ≥225		NA		≥90		≥120	≥450				
Roll #	Style	15' Wdt	Lng	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm abl	Perm itv	AOS
971289	E100	180	570	10.6	144	317	306	88	90	126	161	188	580	83	.58	1.3	100
971290	E100	180	570	11.1	141	318	321	83	91	129	132	195	623	96	.54	1.5	100
971299	E100	180	570	10.0	129	300	292	80	93	129	111	168	562	83	.55	1.3	100
971301	E100	180	570	10.0	129	300	292	80	93	129	111	168	563	83	.55	1.3	100
971302	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971303	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971304	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971305	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971306	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971307	E100	180	570	10.6	147	298	290	80	102	100	100	191	580	96	.54	1.5	100
971308	E100	180	570	10.6	147	298	290	80	102	100	100	191	580	96	.54	1.5	100
971309	E100	180	570	10.6	147	298	290	80	102	100	100	191	580	96	.54	1.5	100
971311	E100	180	570	10.6	143	287	294	75	108	133	153	175	568	96	.54	1.5	100
971312	E100	180	570	10.6	143	287	294	75	108	133	153	175	568	96	.54	1.5	100
971313	E100	180	570	10.6	143	287	294	75	108	133	153	175	568	96	.54	1.5	100
971314	E100	180	570	10.6	143	287	294	75	108	133	153	175	568	96	.54	1.5	100
971315	E100	180	570	11.0	148	326	327	85	113	133	153	178	580	96	.54	1.5	100
971316	E100	180	570	11.0	148	326	327	85	113	133	153	178	660	96	.54	1.5	100
971317	E100	180	570	11.0	148	326	327	85	113	133	153	178	572	96	.54	1.5	100
971318	E100	180	570	11.0	148	326	327	85	113	133	153	178	572	96	.54	1.5	100
971319	E100	180	570	11.0	148	326	327	86	113	133	153	178	572	96	.54	1.5	100

NEED U.V. RESISTENCE ≥70% (ASTM D4355)

NEED NON-WOVEN NEEDLEPUNCHED POLYMER COMPOSITION 7.95%

CERT LETTER?

GT-10-04

21 ROLLS

57 = LOT TOTAL

070000

1267

10 OZ GEOTEXTILE

TNS Mills, Inc. Nonwoven Quality Data 08/09/97 Page 1

B.O.L. #: 11068

Roll #	Styl	Wdt	Lng	Fabr Wght	Thck	Strg MD	Strg XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm -abl	Perm -ity	AOS
971289	E100	180	570	10.6	144	317	306	88	98	126	161	188	580	83	.56	1.3	100
971298	E100	180	570	11.1	141	318	321	83	91	129	132	195	623	96	.54	1.5	100
971299	E100	180	570	10.8	129	300	292	80	93	129	111	168	563	83	.55	1.3	100
971301	E100	180	570	10.0	129	300	292	80	93	129	111	168	563	83	.55	1.3	100
971302	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971303	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971304	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971305	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971306	E100	180	570	10.4	139	319	288	84	99	170	174	191	567	96	.54	1.5	100
971307	E100	180	570	10.6	147	298	290	80	102	100	100	191	580	96	.54	1.5	100
971308	E100	180	570	10.6	147	298	290	80	102	100	100	191	580	96	.54	1.5	100
971309	E100	180	570	10.6	147	298	290	80	102	100	100	191	580	96	.54	1.5	100
971311	E100	180	570	10.6	143	287	294	75	108	133	153	175	568	96	.54	1.5	100
971312	E100	180	570	10.6	143	287	294	75	108	133	153	175	568	96	.54	1.5	100
971313	E100	180	570	10.6	143	287	294	75	108	133	153	175	568	96	.54	1.5	100
971314	E100	180	570	10.6	143	287	294	75	108	133	153	175	568	96	.54	1.5	100
971315	E100	180	570	11.0	148	325	327	85	113	133	153	178	560	96	.54	1.5	100
971316	E100	180	570	11.0	148	325	327	85	113	133	153	178	560	96	.54	1.5	100
971317	E100	180	570	11.0	148	325	327	85	113	133	153	178	572	96	.54	1.5	100
971318	E100	180	570	11.0	148	325	327	85	113	133	153	178	572	96	.54	1.5	100
971319	E100	180	570	11.0	148	325	327	85	113	133	153	178	572	96	.54	1.5	100

21 ROLLS

BILL OF LADING # 11068 LOT 809 179,550 ft² 10-OZ GEOTEXTILE

TNS ADVANCED TECHNOLOGIES
681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

1267

- Nonwoven Geotextile Supplemental Cushion Separator

TNS
ADVANCED TECHNOLOGIES

681 DeYoung Road
Greer, South Carolina 29651
Tel: (864) 968-0592
Fax: (864) 879-4639
Toll Free: (800) 867-5181

August 11, 1997
REF: TNS E160
Quantity Shipped: 12 rolls
BOL#: 11068 Lot#:810
Project: Fluor Daniels Fernald
Date Shipped: 8-11-97
Test Date: 8-10-97
Lab Name: TNS Advanced Technologies
681 DeYoung Road
Greer, SC 29651

Ground Safe

Dear Sir/Madam:

This is to certify that TNS E160 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E160 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E160 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	MINIMUM	SPEC
Weight	ASTM D 3776	oz/sy	16.	≥16
Thickness	ASTM D 5199	mils	170	
Grab Tensile	ASTM D 4632	lbs	425	≥350
Grab Elongation	ASTM D 4632	%	50	
Trap Tear	ASTM D 4533	lbs	150	≥120
Mullen Burst	ASTM D 3786	psi	800	≥700
Puncture	ASTM D 4833	lbs.	240	≥180
Water Flow	ASTM D 4491	gpm/sq ft.	45	
Permeability	ASTM D 4491	cm/sec	.25	
Permitivity	ASTM D 4491	1/sec	.57	≥70
U.V. Resistance	ASTM D 4355	%	70	
A.O.S.	ASTM D 4751	U.S. Sieve	100	≤0.21

Sincerely,

Monte R. Thomas
Vice President
TNS Advanced Technologies

(NEED [illegible])

(16.0Z SUPPLEMENTAL CUSHION GEOTEXTILE)

(GRAB?)

TNS Mills, Inc.

Nonwoven Quality Data

~~B.O.L. # 11068~~

08/09/97 Page 1

(NEED UNITS)

SPEC: Roll #	Styl	Wdt 15'	Lng	≥16oz/yd Fabr Wght	Thck	Strg MD (GRAB ≥350)	Strg XMD	Elng MD (MD)	Elng XMD	Trap MD (≥120)	Trap XMD	Punc Rest (≥180)	Brst Strg (≥700)	Flow Rate	Perm -ebl	Perm -ltv	AOS
971320	E160	180	360	17.5	205	473	497	87	103	167	305	298	960	54	.54	1.0	100
971321	E160	180	360	17.5	205	473	492	87	103	167	305	298	960	54	.54	1.0	100
971322	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971323	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971324	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971325	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971326	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971327	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971328	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971329	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971330	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100
971331	E160	180	360	16.9	209	455	507	88	119	167	305	297	800	54	.54	1.0	100

(NEED ASTM TEST NOS. FOR ABOVE PERFORMED)

CONF AMPLE

GT-16-01

+971324 = CQA CONF SAMPLE (GT-16-01)

(NEED U.V. RESISTENCE (ASTM D4355) ≥70%)

(NEED NONWOVEN NEEDLEPUNCHED POLYMER COMPOSITION ≥75%)

(12 Rolls)

(CERT LETTER?)

1267

16 OZ. GEOTEXTILE

N135R TNS Packing List - 08:32, 08/11/97 Page 1

Roll #	Styl-Wth-Yds			Gross	Tare	Net
Location "W00001" Available, Only						
971320	E160	180	360	647	18	629
971321	E160	180	360	650	18	632
971322	E160	180	360	644	18	626
971323	E160	180	360	637	18	619
971324	E160	180	360	648	18	630
971325	E160	180	360	650	18	632
971326	E160	180	360	654	18	636
971327	E160	180	360	641	18	623
971328	E160	180	360	652	18	634
971329	E160	180	360	642	18	624
971330	E160	180	360	650	18	632
971331	E160	180	360	642	18	624
W00001" Totals:				7,757	216	7,541 12 Rolls----

elected Rolls - Styles "TNS " thru "TNS9999999999",
Locations " " thru "999999", Batches "00810" thru "00810"

BILL OF LADING # 11068 LOT 810 64,800 ft² 16-OZ GEOTEXTILE

12967

00025

HDPE Pipes and Manholes

#66 R1

SUPPLIER SUBMITTAL

WORK ORDER NO.: 1702	SUBCONTRACT NO.: FSC 597	SUPPLIER SUBMITTAL NO.: 066 REV. 1	DATE: September 30, 1997

FROM:
PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SIGNATURE: J. Richard Schairbaum
J. Richard Schairbaum, Quality Control Manager

TO: FERMCO CONSTRUCTION DOCUMENT CONTROL, ms44, T-57

RECEIVED BY: Melissa Crews DATE: 9/30/97

DOCUMENT FAMILY | X X RESUBMITTAL | SUBMITTAL ACTION | SUPPLIER ACTION

QTY.	DOCUMENT NUMBER	REV	H&S	MED	PRO	QAC	TRG	CON	ENG	YES	NO	TITLE / DESCRIPTION	INF	CFC	REC	ASSOCIATED SPECIFICATION	A	B	C
5	PET-076B.1	0				X					X	Resin Supplier QC Certs. (HDPE Manhole)		X		02605-1.04.B.1	X		
5	PET-076B.2	0				X					X	Certification of Compliance (Manhole)		X		02605-1.04.C.1	X		

REMARKS

DOCUMENT FAMILY CODE: (BY SUPPLIER)
H&S - HEALTH AND SAFETY TRG - TRAINING MED - MEDICAL
CON - CONSTRUCTION PRO - PROCUREMENT
ENG - ENGINEERING QAC - QUALITY ASSURANCE/CONTROL
X APPROPRIATE DOCUMENT FAMILY ABOVE

SUBMITTAL ACTION CODE: (BY SUPPLIER)
INF - INFORMATION
CFC - CERTIFIED FOR CONSTRUCTION
REC - CERTIFIED RECORD
X APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (CDC) SUPPLIER ACTION ABOVE
A - ACCEPTED CFC DOCUMENTS: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: SUBMIT AS INF, CFC, OR REC
C - REVISE AND RESUBMIT

1262

ORIGINAL

FERMCO DISTRIBUTION ON REVERSE SIDE

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SUPPLIER SUBMITTAL No.: 066 (Rev. 1)

HDPE MANHOLES -
RESIN SUPPLIER QC CERTIFICATES &
CERTIFICATION OF COMPLIANCE
Sections 02605-1.04.B.1 & 02605-1.04.C.1

FLUOR DANIEL FERNALD SUBCONTRACT No. FSC 597
ON-SITE DISPOSAL FACILITY (PHASE I) PROJECT

Document No. PET-076B.1 (Rev. 0)
Document No. PET-076B.2 (Rev. 0)

September 30, 1997

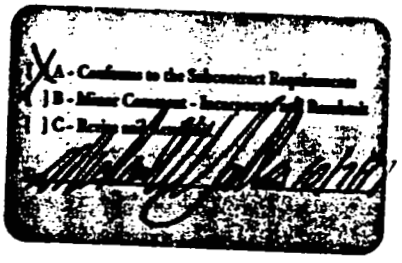
069618

Fernald Site Office: PO. Box 538704 • Mail Stop 44 • Cincinnati, Ohio 45253-8704 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Seville, Ohio 44273 • 330.948.1494 • Fax 948.1933

APPENDIX A.

RESIN SUPPLIER QC CERTIFICATES

Document No. PET-076B.1



INFORMATION ONLY

PETRO
environmental
technologies

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 1080, CAMP BOWIE INDUSTRIAL PARK
BROWNWOOD, TEXAS 76804
(915) 646-6561

September 10, 1997

CUSTOMER: Lee Supply Co., Inc.
P.O. Box 35
Charleroi, PA 15022
Attn: Jerry Biagini

Customer Order No: 4356

Phillips Order No: 10380

Shipping Date(s): 08/13/97

Product	Quantity
54" DR-32.5 1000	40 Ft.

This is to certify that the product described above and shipped on the above order from the Brownwood, TX. Plant, has been sampled according to statistical sampling plans in compliance with "Recommended In-Plant Quality Assurance Program for Plastic Pipe." Manufactured from resin that meets the Polyethylene Plastics Standard in ASTM D-1248 and was manufactured to the specifications of ASTM F-714 and has a cell classification of 345434C as specified in ASTM D-3350.

Leo D. Karnes
Leo D. Karnes,
Q.A. Supervisor

LDK/ldk

cc: Certification File

wp\leesupp4

PHILLIPS DRISCOPIPE
PLANT BW
SAMPLE DETAIL BY PRODUCT 1DP5403255040B

DATE	OPR	EXT	SAMP NO.	LOT	RING TNSL	O.D.	MIN WALL	MAX WALL	COND PRT	APPEARANCE	MEET SPEC	QC OPR	REMARK
082697	JAH	05	1	71-6-1101	3662	54.000	0.887	1.700	Y	Y	Y	JAH	CD-L-TI-OVAL/ECC-RB OK

TOTAL P.03

OCCASIA

APPENDIX B.

CERTIFICATION OF COMPLIANCE

Document No. PET-076B.2

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit

Sig. [illegible] Date 10/8/97

INFORMATION ONLY

PETRO environmental technologies

1267

LEE SUPPLY CO. INC.
• DIVERSIFIED PIPE & PUMP SYSTEMS
• INDUSTRIAL • MINING • ENVIRONMENTAL PRODUCTS
Mailing Address: Box 35, Charleroi, PA 15022 Shipping Address: 1st & Lincoln Ave., Charleroi, PA 15022
• Phone: 412-483-3543 • Fax: 412-483-0577

LEE SUPPLY MANHOLE FABRICATION

Completion of HDPE manhole assemblies are tested based on following criteria:

1. Manhole is filled with water after completion and total cooldown of HDPE.

2. Water is to be contained in manhole for time duration.

3. Penetrations and fused joints are viewed and tested for any leak points. (i.e. Extrusion welds, and HDPE butt fusion areas)

   After procedures of inspection and review are complete, manhole is then drained and approved for shipment.

1267

LEE SUPPLY CO. INC. • DIVERSIFIED PIPING SYSTEMS
• INDUSTRIAL • MINING • ENVIRONMENTAL PRODUCTS

Mailing Address: Box 35, Charleroi, PA 15022 Shipping Address: 1st & Lincoln Ave., Charleroi, PA 15022
• Phone: 412-483-3543 • Fax: 412-483-0577

MANHOLE WATER LEAKAGE TEST - NON PRESSURIZED

CUSTOMER: PETRO ENVIRONMENTAL TECH
C/O FLUOR DANIAL FERNALD
7400 WILLEY ROAD
CINCINNATI, OH 45030

DATE TEST PERFORMED: 9-7-97 THRU 9-8-97

DESCRIPTION OF PRODUCT: 54" - 32.5 X 6' HDPE MANHOLE

PENETRATIONS: TWO - 6" SDR 11 X 18"

PROCEDURE: WATER PLACED IN MANHOLE AT 7:00 AM 9-7-97.
WATER RELEASED FROM MANHOLE AT 7:00 AM 9-8-97.

I CERTIFY THAT NO EVIDENCE OF LEAKAGE APPEARED ON THIS PRODUCT DURING THE ABOVE TESTING PROCEDURE.

William Sparrow
(FUSION TECHNICIAN)

SUPPLIER SUBMITTAL

WORK ORDER NO.: 1702	SUBCONTRACT NO.: FSC 597	SUPPLIER SUBMITTAL NO.: 066 REV. 0	DATE: September 11, 1997

FROM:
PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SIGNATURE: J. Richard Schairbaum
J. Richard Schairbaum, Quality Control Manager

TO: FERMCO CONSTRUCTION DOCUMENT CONTROL, ms44, T-57

RECEIVED BY: Pauline Farmer DATE: 9/11/97

DOCUMENT FAMILY | X X RESUBMITTAL | SUBMITTAL ACTION | SUPPLIER ACTION

QTY.	DOCUMENT NUMBER	REV	H&S	MED	PRO	QAC	TRG	CON	ENG	YES	NO	TITLE / DESCRIPTION	INF	CFC	REC	ASSOCIATED SPECIFICATION	A	B	C
5	PET-076	0				X					X	Resin Supplier QC Certs., Mfg's Resin Test		X		02605-1.04.B (1-3) & 02605-1.04.C	X		
												Results, Reclaimed Polymer Cert., & Cert.							
												of Compliance							

REMARKS

ORIGINAL

PLEASE PROVIDE DOCUMENTATION OF GRADE OF COUPLINGS (ELECTROFUSION) SHOULD BE PE 3408 PER SPEC.

DOCUMENT FAMILY CODE: (BY SUPPLIER)

H&S - HEALTH AND SAFETY TRG - TRAINING MED - MEDICAL

CON - CONSTRUCTION PRO - PROCUREMENT

ENG - ENGINEERING QAC - QUALITY ASSURANCE/CONTROL

X APPROPRIATE DOCUMENT FAMILY ABOVE

SUBMITTAL ACTION CODE: (BY SUPPLIER)

INF - INFORMATION

CFC - CERTIFIED FOR CONSTRUCTION

REC - CERTIFIED RECORD

X APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (CDC) SUPPLIER ACTION ABOVE

A - ACCEPTED CFC DOCUMENTS: CONFORMS WITH REQUIREMENTS

B - MINOR COMMENTS: SUBMIT AS INF, CFC, OR REC

C - REVISE AND RESUBMIT

2967

FERMCO DISTRIBUTION ON REVERSE SIDE

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technologies

SUPPLIER SUBMITTAL No.: 066 (Rev. 0)

RESIN SUPPLIER QC CERTIFICATES, MFG.'S RESIN TEST RESULTS, RECLAIMED POLYMER CERTIFICATION & CERTIFICATION OF COMPLIANCE
Section 02605-1.04.B (1-3) & 02605-1.04.C

FLUOR DANIEL FERNALD SUBCONTRACT No. FSC 597
ON-SITE DISPOSAL FACILITY (PHASE I) PROJECT

Document No. PET-076 (Rev. 0)

September 11, 1997

INFORMATION ONLY

009826

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comments Incorporated and Resubmit
[ ] C - Revise and Resubmit
Date 9/9/97

Fernald Site Office: P.O. Box 538704 • Mail Stop 44 • Cincinnati, Ohio 45253-8704 • 513.648.3402 • Fax 648.34[illegible]
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Seville, Ohio 44273 • 330.948.1494 • Fax 948.1933

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
2990 NAZARETH ROAD
WELLFORD, SOUTH CAROLINA 29385
(864) 439-3098

09/08/97

TO: Lee Supply
Kim Witcherman
PO Box 35
Charleroi, PA 15022

PRODUCT		PRODUCTION DATE
10"IPS DR 11	1000	04/30/97

This is to certify that the product described above and shipped from the Startex, South Carolina Plant, has been sampled according to statistical sampling plans in compliance with "Recommended In-Plant Quality Assurance Program for Plastic Pipe." Manufactured from resin that meets the Polyethylene Plastics Standard in ASTM D-1248 and was manufactured to the specifications of ASTM F-714 and had a cell classification of 345434C as specified in ASTM D-3350. This product was produced from resin lots 71-7-0376 Melt Index of 0.10. The MI specification range from this resin is 0.07-0.14 G.10 MIN. The melt index on the In-Process Inspection and Testing was also tested with the test result of 0.10 AVG. G/10 MIN. The specification for this test is a maximum of 0.18 G/10 MIN. If you have any questions, please do not hesitate to give me a call.

Services Supervisor

cc: Certification File

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3666
PASADENA, TEXAS 77501-0792
PHILLIPS PLASTICS
Houston Chemical Complex

RECEIVED
APR 14 1997

April 11, 1997

JHV# 7300-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

4/25/97

Type:	HHM TR-480Z
Lot Number:	7170376
P.O. Number:	REL 76
Date Shipped:	04/10/97
Package:	PSPX 5726
Quantity:	179800 LBS.
Melt Index, ASTM D1238:	.10 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

323-99-01
4900052439

4/29/97

321-01
4900052630

10
4-30-

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
2960 NAZARETH ROAD
WELLFORD, SOUTH CAROLINA 29385
(864) 439-3068

09/08/97

TO: Lee Supply
Kim Witcherman
PO Box 35
Charleroi, PA 15022

PRODUCT		PRODUCTION DATE
10"IPS DR 11	1000	07/02/97

This is to certify that the product described above and shipped from the Startex, South Carolina Plant, has been sampled according to statistical sampling plans in compliance with "Recommended In-Plant Quality Assurance Program for Plastic Pipe." Manufactured from resin that meets the Polyethylene Plastics Standard in ASTM D-1248 and was manufactured to the specifications of ASTM F-714 and had a cell classification of 345434C as specified in ASTM D-3350. This product was produced from resin lots 81-7-0598 Melt Index of 0.06 81-7-0602 Melt Index of 0.08 . The MI specification range from this resin is 0.07-0.14 G.10 MIN. The melt index on the In-Process Inspection and Testing was also tested with the test result of 0.08 AVG. G/10 MIN. The specification for this test is a maximum of 0.18 G/10 MIN. If you have any questions, please do not hesitate to give me a call.

Services Supervisor

cc: Certification File

1267

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3666
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

RECEIVED JUN 2 1997

May 30, 1997

JHV# 10652-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

#4

Type:	HHM TR-480Z
Lot Number:	8170598
P.O. Number:	REL 119
Date Shipped:	05/29/97
Package:	PSPX 8144
Quantity:	191850 LBS.
Melt Index, ASTM D1238:	.08 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

7-1-97 LP

323-99-01
49000 90192

321-01
49000 90193

10"
1/2

1267

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3605
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

RECEIVED JUN 2 1997

May 30, 1997

INV# 10653-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-480Z
Lot Number:	8170602
P.O. Number:	REL 120
Date Shipped:	05/29/97
Package:	PSPX 3103
Quantity:	194050 LBS.
Melt Index, ASTM D1238:	.13 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

#5

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

7-1-97
LP

323-99-01
49000 96190
321-01
49000 96192

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
2980 NAZARETH ROAD
WELLFORD, SOUTH CAROLINA 29385
(864) 439-3066

09/08/97

TO: Lee Supply
Kim Witcherman
PO Box 35
Charleroi, PA 15022

PRODUCT	PRODUCTION DATE
6"IPS DR 11 1000	05/06/97

This is to certify that the product described above and shipped from the Startex, South Carolina Plant, has been sampled according to statistical sampling plans in compliance with "Recommended In-Plant Quality Assurance Program for Plastic Pipe." Manufactured from resin that meets the Polyethylene Plastics Standard in ASTM D-1248 and was manufactured to the specifications of ASTM F-714 and had a cell classification of 345434C as specified in ASTM D-3350. This product was produced from resin lots 71-7-0507 Melt Index of 0.08 61-7-0392 Melt Index of 0.10 . The MI specification range from this resin is 0.07-0.14 G.10 MIN. The melt index on the In-Process Inspection and Testing was also tested with the test result of Avg. of 0.07 G/10 MIN. The specification for this test is a maximum of 0.18 G/10 MIN. If you have any questions, please do not hesitate to give me a call.

Services Supervisor

cc: Certification File

1267

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE 713 475-3000
PASADENA, TEXAS 77501-0792
PHILLIPS PLASTICS RESINS
Houston Chemical Complex

RECEIVED MAY 12 1997

May 07, 1997

JHV# 9150-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

5-29-97

Type:	HDM TR-4802
Lot Number:	7170507
P.O. Number:	REL 103
Date Shipped:	05/06/97
Package:	PSPX 2212
Quantity:	162750 LBS.
Melt Index, ASTM D1238:	.10 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

323-99-01 — 4900061908
321-01-01 — 4900061909

5-29-97

6 5/6

RECEIVED
MAY - 5 1997

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3666
PASADENA TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

April 30, 1997

JHV# 8526-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

5-29-97

Type:	HHM TR-480Z
Lot Number:	6170392
P.O. Number:	REL 100
Date Shipped:	04/29/97
Package:	PSPX 6993
Quantity:	177100 LBS.
Melt Index, ASTM D1238:	.11 G/10 MIN
Density, ASTM D1505:	.944 G/CC
ESCR, F/20:	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

323-99-01 — 4900061960
321-01-01 — 4900061961

5-29-97
CR

6" 5/6

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
2950 NAZARETH ROAD
WELLFORD, SOUTH CAROLINA 29385
(864) 439-3066

09/08/97

TO: Lee Supply
Kim Witcherman
PO Box 35
Charleroi, PA 15022

PRODUCT		PRODUCTION DATE
10"IPS DR 11	1000	06/06/97 & 06/07/97

This is to certify that the product described above and shipped from the Startex, South Carolina Plant, has been sampled according to statistical sampling plans in compliance with "Recommended In-Plant Quality Assurance Program for Plastic Pipe." Manufactured from resin that meets the Polyethylene Plastics Standard in ASTM D-1248 and was manufactured to the specifications of ASTM F-714 and had a cell classification of 345434C as specified in ASTM D-3350. This product was produced from resin lots 71-7-0507 Melt Index of 0.08 71-7-0518 Melt Index of 0.09 . The MI specification range from this resin is 0.07-0.14 G.10 MIN. The melt index on the In-Process Inspection and Testing was also tested with the test result of Avg. of 0.08 G/10 MIN. The specification for this test is a maximum of 0.18 G/10 MIN. If you have any questions, please do not hesitate to give me a call.

Services Supervisor

cc: Certification File

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE 713 475-3666
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

RECEIVED MAY 12 1997

May 07, 1997

JHV# 9150-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

5-29-97

Type:	HHM TR-480Z
Lot Number:	7170507
P.O. Number:	REL 103
Date Shipped:	05/06/97
Package:	PSPX 2212
Quantity:	162750 LBS.
Melt Index, ASTM D1238:	.10 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

323-99-01 — 4900061908
321-01-01 — 4900061909

5-29-97

10" 6/6
6/7

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3000
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

RECEIVED MAY 12 1997

May 07, 1997

JHV# 9151-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-480Z	6-4-97
Lot Number:	7170518	
P.O. Number:	REL 104	
Date Shipped:	05/06/97	#1
Package:	PSPX 3183	
Quantity:	194100 LBS.	
Melt Index, ASTM D1238:	.11 G/10 MIN	
Density, ASTM D1505:	.943 G/CC	
ESCR, F/20:	>192 HOURS **	

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

323-99-01 6/9/97 RP
Doc. 4900064781

321-01
Doc # 4900064781

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
2990 NAZARETH ROAD
WELLFORD, SOUTH CAROLINA 29385
(864) 439-3088

09/08/97

TO: Lee Supply
Kim Witcherman
PO Box 35
Charleroi, PA 15022

PRODUCT	PRODUCTION DATE
10"IPS DR 11 1000	05/01/97 & 05/02/97 & 05/03/97

This is to certify that the product described above and shipped from the Startex, South Carolina Plant, has been sampled according to statistical sampling plans in compliance with "Recommended In-Plant Quality Assurance Program for Plastic Pipe." Manufactured from resin that meets the Polyethylene Plastics Standard in ASTM D-1248 and was manufactured to the specifications of ASTM F-714 and had a cell classification of 345434C as specified in ASTM D-3350. This product was produced from resin lots 71-7-0389 Melt Index of 0.10 71-7-0374 Melt Index of 0.09 71-7-0375 Melt Index of 0.09. The MI specification range from this resin is 0.07-0.14 G.10 MIN. The melt index on the In-Process Inspection and Testing was also tested with the test result of Avg. of 0.10 G/10 MIN. The specification for this test is a maximum of 0.18 G/10 MIN. If you have any questions, please do not hesitate to give me a call.

B. J. [illegible]
Services Supervisor

cc: Certification File

1267

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3666
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

RECEIVED APR 14 1997

April 11, 1997

JHV# 7299-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-480Z	#6
Lot Number:	7170375	4-29-97
P.O. Number:	REL 75	
Date Shipped:	04/10/97	
Package:	PSPX 6605	A. .09
Quantity:	180400 LBS.	.943
Melt Index, ASTM D1238:	.12 G/10 MIN	B. .09
Density, ASTM D1505:	.943 G/CC	
ESCR, F/20:	>192 HOURS **	

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

328-99-01
Doc # 49000 53522
321-01
Doc. # 49000 53523

5/1/97 LP

10
5/1
5/2
5/3

1267

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3666
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

RECEIVED APR 14 1997

April 11, 1997

JHV# 7298-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-480Z	#5
Lot Number:	7170374	
P.O. Number:	REL 74	
Date Shipped:	04/10/97	4-29-97
Package:	PSPX 1137	
Quantity:	179200 LBS.	
Melt Index, ASTM D1238:	.12 G/10 MIN	A .09 .943
Density, ASTM D1505:	.943 G/CC	
ESCR, F/20:	>192 HOURS **	B .10

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

323-99-01
Doc # 4900062520
321-01
Doc # 4900053521

5/1/97 EP

1267

RECEIVED APR 18 1997

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3668
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

April 14, 1997

JHV# 7400-97

FAX: 864-439-7918

Phillips Driscopipe
Startex Plant
2950 Nazareth Road
Wellford, SC 29385

Dave Nettles

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

4/29/97
#4

Type:	HHM TR-480Z
Lot Number:	7170389
P.O. Number:	REL 78
Date Shipped:	04/11/97
Package:	PSPX 3178
Quantity:	192700 LBS.
Melt Index, ASTM D1238:	.11 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

A .11 .943
B .10

2.

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

323-99-01
49000 52681 4/29/97
321-01 EP
49000 52682

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
RT. 3, BOX 68-3 • M.A.I.P. 64
PRYOR, OKLAHOMA 74361
(918) 825-0394

QUALITY CERTIFICATION

CUSTOMER: Lee Supply Company
Box 35
Charleroi, PA 15022

ATTENTION: Jerry Biagini

CUSTOMER ORDER NO:
PHILLIPS ORDER NO:
SHIPPING DATE:
QUANTITY: FT
DATE(S) EXTRUDED: 05/01/97 and 05/02/97

PRODUCT: 6" IPS SDR-11 DRISCOPIPE 1000 PE3408 ASTM F714
(40 FT JOINTS)

This letter certifies Driscopipe 1000 series pipe is manufactured from Phillips Marlex TR-480 feedstock resin. The resin has a cell class of PE 345444C (1997) according to ASTM D3350. This is a high density, high molecular weight polyethylene resin which is meets the criteria for a Type III, Class C, Category 5, Grade P34 piping material in accordance with ASTM D-1248. Driscopipe 1000 pipe, has a Plastic Pipe Institute recommended hydrostatic basis of 1600 psi at 23° C and 800 psi at 60°C based on TR/3 as derived from ASTM D-2837 test methodology.

The polyethylene material designation code is PE 3408 CDD

The dimensional characteristics and pressure capabilities of Driscopipe 1000 are established in accordance with the guidelines set forth in ASTM F714, D3035 and D3261. These standards are referenced in the print line, and repeated every two feet along the entire length of pipe.

R. E. PRITCHETT
SERVICES SUPERVISOR

PHILLIPS 66
PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 700 • PHONE: 713 476-3000
PASADENA, TEXAS 77501-0700
PHILLIPS PLASTICS PIPING
Houston Chemical Complex

March 20, 1997

JHV# 5694-97

FAX: 918-825-0425

Phillips Driscopipe
Route 3, Box 68-3
Pryor, OK 74361

Mr. Danny McDonald

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	KHM TR-480Z
Lot Number:	8170237
P.O. Number:	REL 23
Date Shipped:	03/19/97
Package:	PSPX 3054
Quantity:	192650 LBS.
Melt Index, ASTM D1238:	.11 G/10 MIN
Density, ASTM D1505:	.942 G/CC
ESCR, F/20:	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 PHONE: 713-475-0000
PASADENA, TEXAS 77501-0792
PHILLIPS PLASTICS RESINS
Houston Chemical Complex

March 26, 1997

JHV# 6113-97

FAX: 918-825-0425

Phillips Drilcopipe
Route 3, Box 68-3
Pryor, OK 74361

Mr. Danny McDonald

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-480Z
Lot Number:	7170356
P.O. Number:	REL 24
Date Shipped:	03/25/97
Packages:	PSPX 3045
Quantity:	192300 LBS.
Melt Index: ASTM D1238:	.11 G/10 MIN
Density: ASTM D1505:	.943 G/CC
ESCR: F/20%	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

QC120APO-A
PLANT PR

PHILLIPS DRISCOPIPE INC.

RUN DATE 09/08/97
PAGE 1

LEE SUPPLY CO

CUSTOMER ORDER:

SAMPLE STATISTICS BY PRODUCT 00X0001000635X

MIN. WALL	.603	MIN. HOOPSTRESS	3508
MAX. WALL	.668	MAX. HOOPSTRESS	3810
MIN. O.D.	5.608	MIN. QR	50
MAX. O.D.	5.636	MAX. QR	92
MIN. BURST	670		
MAX. BURST	710	RESIN LOTS USED	81-7-0287 71-7-0356

1267

QC120AP0-B
PLANT PR

PHILLIPS DRISCOPIPE INC.

RUN DATE 09/08/97
PAGE 1

LEE SUPPLY CO
SAMPLE DETAIL BY PRODUCT 00X000100B425X

CUSTOMER ORDER:

DATE	OPR	EXT	SAMP NO.	RESIN	LOT	RING TWIST	CONTROL DIM O.D.	CONTROL DIM I.D.	OR	WALL THICK MIN WALL	WALL THICK MAX WALL	COMB PRT	APP-EAR-ANCE	BURST PRESS	BURST TIME /SEC	TYPE BRK	MEET SPEC	QC OPR	REMARK
050197	35	04	548	TR-480	81-7-0237	0	6.639	5.381	79	.617	.635	Y	Y		0	D	Y	BDW	OR,TI,OV,PRT,FAC CHK
050197	35	04	553	TR-480	81-7-0237	0	6.632	5.373		.621	.638	Y	Y	700	61	D	Y	BDW	
050197	35	04	557	TR-480	81-7-0237	0	6.630	5.367		.621	.642	Y	Y		0	D	Y	BDW	
050197	35	04	564	TR-480	81-7-0237	0	6.627	5.366		.622	.639	Y	Y		0	D	Y	BDW	
050197	35	04	567	TR-480	81-7-0237	0	6.631	5.374		.617	.640	Y	Y		0	D	Y	BDW	
050197	35	04	570	TR-480	81-7-0237	0	6.630	5.371		.620	.639	Y	Y		0	D	Y	BDW	
050197	35	04	575	TR-480	81-7-0237	0	6.636	5.371		.621	.644	Y	Y		0	D	Y	BDW	JT LGH-40'3/4"
050197	35	04	579	TR-480	81-7-0237	0	6.632	5.377		.616	.639	Y	Y		0	D	Y	JDS	
050197	35	04	581	TR-480	81-7-0237	0	6.632	5.382		.615	.635	Y	Y		0	D	Y	JDS	
050197	35	04	587	TR-480	81-7-0237	0	6.635	5.395	77	.610	.630	Y	Y	670	70	D	Y	JDS	OR,OV,TI
050197	35	04	589	TR-480	81-7-0237	0	6.634	5.382		.615	.637	Y	Y		0	D	Y	JDS	FAC CARBON-2.50%
050197	35	04	594	TR-480	81-7-0237	0	6.634	5.399		.607	.628	Y	Y		0	D	Y	JDS	
050197	35	04	598	TR-480	81-7-0237	0	6.631	5.377		.616	.638	Y	Y		0	D	Y	JDS	
050197	23	04	602	TR-480	81-7-0237	0	6.608	5.360		.619	.635	Y	Y		0	D	Y	JDS	PRTCHK,JT LTH 48'1"
050197	23	04	606	TR-480	81-7-0237	0	6.610	5.375		.608	.627	Y	Y		0	D	Y	JDS	
050197	23	04	611	TR-480	81-7-0237	0	6.615	5.370	66	.608	.629	Y	Y	679	70	D	Y	JDS	OR,OV,TI
050197	23	04	615	TR-480	81-7-0237	0	6.620	5.376		.609	.635	Y	Y		0	D	Y	JDS	
050197	23	04	620	TR-480	81-7-0237	0	6.615	5.362		.609	.644	Y	Y		0	D	Y	JDS	
050197	23	04	624	TR-480	81-7-0237	0	6.615	5.364		.605	.646	Y	Y		0	D	Y	JDS	
050197	23	04	629	TR-480	81-7-0237	0	6.620	5.365		.608	.647	Y	Y		0	D	Y	JDS	
050197	23	04	633	TR-480	81-7-0237	0	6.618	5.356		.610	.652	Y	Y		0	D	Y	BDW	CARBON-2.47%
050197	23	04	638	TR-480	81-7-0237	0	6.618	5.355		.614	.649	Y	Y		0	D	Y	BDW	
050197	23	04	641	TR-480	81-7-0237	0	6.617	5.354		.614	.649	Y	Y		0	D	Y	BDW	
050197	23	04	645	TR-480	81-7-0237	0	6.620	5.354		.614	.652	Y	Y		0	D	Y	BDW	
050297	35	04	651	TR-480	81-7-0237	0	6.623	5.363		.608	.652	Y	Y		0	D	Y	BDW	PRINT CHK
050297	35	04	654	TR-480	81-7-0237	0	6.619	5.365	66	.611	.643	Y	Y		0	D	Y	BDW	OR,TI,OV,FAC CHK
050297	35	04	658	TR-480	81-7-0237	0	6.616	5.367		.610	.639	Y	Y	679	70	D	Y	BDW	
050297	35	04	664	TR-480	81-7-0237	0	6.617	5.351		.614	.652	Y	Y		0	D	Y	BDW	
050297	35	04	668	TR-480	81-7-0237	0	6.620	5.373		.608	.639	Y	Y		0	D	Y	BDW	
050297	35	04	670	TR-480	81-7-0237	0	6.620	5.373		.613	.634	Y	Y		0	D	Y	BDW	
050297	35	04	678	TR-480	81-7-0237	0	6.620	5.359		.612	.649	Y	Y		0	D	Y	BDW	
050297	35	04	681	TR-480	81-7-0237	0	6.619	5.369		.614	.636	Y	Y		0	D	Y	BDW	
050297	35	04	689	TR-480	81-7-0237	0	6.623	5.393	92	.607	.623	Y	Y		0		Y	JLL	OR,TI,OV,PRT+FAC OK,
050297	13	04	695	TR-480	81-7-0237	0	6.628	5.397		.606	.623	Y	Y	678	70	D	Y	JLL	
050297	13	04	697	TR-480	81-7-0237	0	6.620	5.392		.605	.623	Y	Y		0	D	Y	JLL	
050297	13	04	701	TR-480	81-7-0237	0	6.616	5.376		.612	.628	Y	Y		0	D	Y	JLL	
050297	13	04	707	TR-480	81-7-0237	0	6.628	5.390		.610	.628	Y	Y		0	D	Y	JLL	
050297	13	04	711	TR-480	71-7-0356	0	6.625	5.380		.615	.630	Y	Y		0	D	Y	JLL	LOT CHANGE
050297	13	04	715	TR-480	71-7-0356	0	6.623	5.382		.603	.638	Y	Y		0	D	Y	JLL	
050297	13	04	719	TR-480	71-7-0356	0	6.612	5.329	50	.620	.663	Y	Y		0	D	Y	JLL	OR,TI,OV LENGTH-40'
050297	13	04	721	TR-480	71-7-0356	0	6.612	5.337		.612	.663	Y	Y		0	D	Y	JLL	
050297	13	04	725	TR-480	71-7-0356	0	6.619	5.337		.624	.650	Y	Y	710	70	D	Y	JLL	
050297	13	04	732	TR-480	71-7-0356	0	6.620	5.338		.629	.653	Y	Y		0	D	Y	JLL	
050297	13	04	736	TR-480	71-7-0356	0	6.618	5.338		.626	.634	Y	Y		0	D	Y	JLL	
050297	13	04	741	TR-480	71-7-0356	0	6.621	5.363		.620	.638	Y	Y		0	D	Y	CRJ	CARBON-2.62%
050297	6	04	747	TR-480	71-7-0356	0	6.620	5.357		.623	.638	Y	Y		0	D	Y	CRJ	
050297	6	04	750	TR-480	71-7-0356	0	6.625	5.367		.619	.639	Y	Y		0	D	Y	CRJ	
050297	6	04	754	TR-480	71-7-0356	0	6.628	5.386		.610	.632	Y	Y		0	D	Y	CRJ	END OF ORDER

QC128AP8-C
PLANT PA

PHILLIPS DRISCOPIPE INC.

RUN DATE 09/08/97
PAGE 1

LEE SUPPLY CO

PRODUCT [illegible]

CUSTOMER ORDER:

CERTIFICATION SAMPLES	LINE	FROM DATE	TO DATE	NO SAMPLES
	04	05/01/97	05/02/97	48

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3000
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

March 26, 1997

JHV# 6113-97

FAX: 918-825-0425

Phillips Driscopipe
Route 3, Box 68-3
Pryor, OR 74361

Mr. Danny McDonald

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-480Z
Lot Number:	7170356
P.O. Number:	REL 24
Date Shipped:	03/25/97
Package:	PSPX 3045
Quantity:	192300 LBS.
Melt Index, ASTM D1238:	.11 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

QC120APO-A
PLANT PR

PHILLIPS DRISCOPIPE INC.

RUN DATE 09/08/97
PAGE 1

LEE SUPPLY CO

CUSTOMER ORDER:

SAMPLE STATISTICS BY PRODUCT 6DX0001800425X

MIN. WALL	.609	MIN. HOOPSTRESS	3508
MAX. WALL	.663	MAX. HOOPSTRESS	5410
MIN. O.D.	6.600	MIN. DR	50
MAX. O.D.	6.636	MAX. DR	92
MIN. BURST	670		
MAX. BURST	710	RESIN LOTS USED	81-7-0237 71-7-0356

QC020APO-B
PLANT PR

PHILLIPS DRISCOPIPE INC.

RUN DATE 09/08/97
PAGE 1

LEE SUPPLY CO

CUSTOMER ORDER:

SAMPLE DETAIL BY PRODUCT 00X0001000425X

DAT:	OPR	EXT	SAMP NO.	RESIN	LOT	RING TNSL	CONTROL DIM O.D.	CONTROL DIM I.D.	OR	WALL THICK MIN WALL	WALL THICK MAX WALL	COND PRT	APP-EAR-ANCE	BURST PRESS	BURST TIME /SEC	TYPE BRK	HEAT SPEC	QC OPR	REMARK
050197	33	04	548	TR-480	81-7-0237	0	6.633	5.381	79	.617	.635	Y	Y		0	B	Y	BDW	OR,TI,OV,PRT,FAC CHR
050197	33	04	553	TR-480	81-7-0237	0	6.632	5.373		.621	.688	Y	Y	700	61	D	Y	BDW	
050197	33	04	557	TR-480	81-7-0237	0	6.630	5.367		.621	.642	Y	Y		0	B	Y	BDW	
050197	33	04	564	TR-480	81-7-0237	0	6.627	5.366		.622	.639	Y	Y		0	B	Y	BDW	
050197	33	04	567	TR-480	81-7-0237	0	6.631	5.374		.617	.640	Y	Y		0	B	Y	BDW	
050197	33	04	570	TR-480	81-7-0237	0	6.630	5.371		.620	.639	Y	Y		0	B	Y	BDW	
050197	33	04	575	TR-480	81-7-0237	0	6.636	5.371		.621	.644	Y	Y		0	B	Y	BDW	JT LGH=40'3/4"
050197	33	04	579	TR-480	81-7-0237	0	6.632	5.377		.616	.639	Y	Y		0	B	Y	JDS	
050197	33	04	581	TR-480	81-7-0237	0	6.632	5.382		.615	.635	Y	Y		0	B	Y	JDS	
050197	33	04	587	TR-480	81-7-0237	0	6.635	5.395	77	.610	.630	Y	Y	670	70	D	Y	JDS	OR,OV,TI
050197	33	04	589	TR-480	81-7-0237	0	6.634	5.382		.615	.637	Y	Y		0	B	Y	JDS	FAC CARBON=2.50%
050197	33	04	594	TR-480	81-7-0237	0	6.634	5.399		.607	.628	Y	Y		0	B	Y	JDS	
050197	33	04	598	TR-480	81-7-0237	0	6.631	5.377		.616	.638	Y	Y		0	B	Y	JDS	
050197	23	04	602	TR-480	81-7-0237	0	6.608	5.360		.613	.635	Y	Y		0	B	Y	JDS	PRTCHK,JT LTH 40'1"
050197	23	04	606	TR-480	81-7-0237	0	6.610	5.375		.608	.627	Y	Y		0	B	Y	JDS	
050197	23	04	611	TR-480	81-7-0237	0	6.615	5.378	66	.608	.629	Y	Y	679	70	D	Y	JDS	OR,OV,TI
050197	23	04	615	TR-480	81-7-0237	0	6.620	5.376		.609	.635	Y	Y		0	B	Y	JDS	
050197	23	04	620	TR-480	81-7-0237	0	6.615	5.362		.609	.644	Y	Y		0	B	Y	JDS	
050197	23	04	624	TR-480	81-7-0237	0	6.615	5.364		.605	.646	Y	Y		0	B	Y	JDS	
050197	23	04	629	TR-480	81-7-0237	0	6.620	5.365		.608	.647	Y	Y		0	B	Y	JDS	
050197	23	04	633	TR-480	81-7-0237	0	6.618	5.356		.610	.652	Y	Y		0	B	Y	BDW	CARBON=2.47%
050197	23	04	638	TR-480	81-7-0237	0	6.618	5.355		.614	.652	Y	Y		0	B	Y	BDW	
050197	23	04	641	TR-480	81-7-0237	0	6.617	5.354		.614	.649	Y	Y		0	B	Y	BDW	
050197	23	04	645	TR-480	81-7-0237	0	6.620	5.354		.614	.652	Y	Y		0	B	Y	BDW	
050297	33	04	651	TR-480	81-7-0237	0	6.623	5.369		.608	.652	Y	Y		0	B	Y	BDW	PRINT CHK
050297	33	04	654	TR-480	81-7-0237	0	6.619	5.365	66	.611	.643	Y	Y		0	B	Y	BDW	OR,TI,OV,FAC CHR
050297	33	04	658	TR-480	81-7-0237	0	6.616	5.367		.610	.639	Y	Y	679	70	D	Y	BDW	
050297	33	04	664	TR-480	81-7-0237	0	6.617	5.351		.614	.652	Y	Y		0	B	Y	BDW	
050297	33	04	668	TR-480	81-7-0237	0	6.620	5.373		.608	.639	Y	Y		0	B	Y	BDW	
050297	33	04	670	TR-480	81-7-0237	0	6.620	5.373		.613	.634	Y	Y		0	B	Y	BDW	
050297	33	04	678	TR-480	81-7-0237	0	6.620	5.359		.612	.649	Y	Y		0	B	Y	BDW	
050297	33	04	681	TR-480	81-7-0237	0	6.619	5.369		.614	.636	Y	Y		0	B	Y	BDW	
050297	33	04	689	TR-480	81-7-0237	0	6.623	5.393	92	.607	.623	Y	Y		0		Y	JLL	OR,TI,OV,PRT+FAC OK.
050297	13	04	695	TR-480	81-7-0237	0	6.628	5.397		.606	.625	Y	Y	678	70	D	Y	JLL	
050297	13	04	697	TR-480	81-7-0237	0	6.620	5.392		.605	.623	Y	Y		0	B	Y	JLL	
050297	13	04	701	TR-480	81-7-0237	0	6.616	5.376		.612	.628	Y	Y		0	B	Y	JLL	
050297	13	04	707	TR-480	81-7-0237	0	6.628	5.390		.610	.628	Y	Y		0	B	Y	JLL	
050297	13	04	711	TR-480	71-7-0356	0	6.625	5.380		.615	.630	Y	Y		0	B	Y	JLL	LOT CHANGE
050297	13	04	715	TR-480	71-7-0356	0	6.623	5.382		.603	.630	Y	Y		0	B	Y	JLL	
050297	13	04	719	TR-480	71-7-0356	0	6.612	5.329	50	.620	.663	Y	Y		0	B	Y	JLL	OR,TI,OV LENGTH=40'
050297	13	04	721	TR-480	71-7-0356	0	6.612	5.337		.612	.663	Y	Y		0	B	Y	JLL	
050297	13	04	725	TR-480	71-7-0356	0	6.619	5.337		.624	.658	Y	Y	710	70	D	Y	JLL	
050297	13	04	732	TR-480	71-7-0356	0	6.620	5.330		.629	.653	Y	Y		0	B	Y	JLL	
050297	13	04	736	TR-480	71-7-0356	0	6.618	5.336		.626	.654	Y	Y		0	B	Y	JLL	
050297	13	04	741	TR-480	71-7-0356	0	6.621	5.363		.620	.638	Y	Y		0	B	Y	CRJ	CARBON=2.42%
050297	6	04	747	TR-480	71-7-0356	0	6.620	5.357		.625	.638	Y	Y		0	B	Y	CRJ	
050297	6	04	750	TR-480	71-7-0356	0	6.625	5.367		.619	.639	Y	Y		0	B	Y	CRJ	
050297	6	04	754	TR-480	71-7-0356	0	6.628	5.386		.610	.632	Y	Y		0	B	Y	CRJ	END OF ORDER

1267

QC120APO-C
PLANT PR

PHILLIPS GRISCOPIPE INC.

RUN DATE 09/08/97
PAGE 1

LEE SUPPLY CO
PRODUCT 00X0001000APSX

CUSTOMER ORDER:

CERTIFICATION SAMPLES	LINE	FROM DATE	TO DATE	NO SAMPLES
	04	05/01/97	05/02/97	08

PHILLIPS DRISCOPIPE
A DIVISION OF PHILLIPS PETROLEUM COMPANY
11711 HOPEWELL
HAGERSTOWN, MD 21740
P.O. BOX 1389
HAGERSTOWN, MD 21741-1389

September, 9 1997

ATTN: JERRYBIAGINI
LEE SUPPLY CO., INC.
P.O. BOX 35
CHARLEROI, PA 15022

1000 Series
CERTIFICATION LETTER

CUSTOMER ORDER NO	5074 HG
PHILLIPS ORDER NO:	11125
DATE SHIPPED:	08/28/1997
SHIPPED TO:	Lee Supply / Charleroi, Pa.
QUANTITY:	7,280'
DATE EXTRUDED:	07/1997 - 08/1997
PRODUCT:	6" dr 11 Driscopipe 1000

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED ABOVE AND SHIPPED ON THE ABOVE ORDER HAS BEEN SAMPLED ACCORDING TO STATISTICAL SAMPLING PLANS IN COMPLIANCE WITH THE "RECOMMENDED IN-PLANT QUALITY CONTROL PROGRAM FOR PLASTIC PIPE, TUBING AND FITTINGS. THE PRODUCT MEETS THE APPLICABLE REQUIREMENTS FOR PIPE, TUBING AND/OR FITTINGS MADE FROM TR 480 POLYETHYLENE DEFINED IN THE APPLICABLE SPECIFICATIONS INDICATED BELOW;

ASTM F714:	- SPECIFICATIONS OF POLYETHYLENE (PE) PLASTIC PIPE (SDR-PR) BASED ON OUTSIDE DIAMETER.
ASTM D1248 & D3350	- SPECIFICATIONS FOR PE RESINS.
OTHER:	

B. Andrew Mason
Services Supervisor , Hagerstown Md.

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3600
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

June 02, 1997

JHV# 10876-97

FAX: 301-582-6670

Phillips Driscopipe
11711 Hopewell Road
Hagerstown, MD 21741

Quality Control

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	MHM TR-480Z
Lot Number:	7170480
P.O. Number:	REL 3
Date Shipped:	04/23/97
Package:	PSPX 3039
Quantity:	201450 LBS.
Melt Index, ASTM D1238:	.12 G/10 MIN
Density, ASTM D1505:	.943 G/CC
ESCR, F/20:	>192 HOURS **

MI

A	B
0.147	0.144

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

000053

QC120AP0-A
PLANT NO

PHILLIPS DRISCOPIPE INC.

RUN DATE 09/04/97
PAGE 1

LEE SUPPLY 7280 CUSTOMER ORDER: 5074 NO
SAMPLE STATISTICS BY PRODUCT 0000001000A250

MIN. WALL	.603	MIN. HOOPSTRESS	3213
MAX. WALL	.670	MAX. HOOPSTRESS	3943
MIN. O.D.	6.600	MIN. DR	52
MAX. O.D.	6.635	MAX. DR	86
MIN. BURST	666		
MAX. BURST	729	RESIN LOTS USED	71-7-0980

QC120APO-C
PLANT NO

PHILLIPS DRISCOPIPE INC.

RUN DATE 09/09/97
PAGE 1

LEE SUPPLY 7260

CUSTOMER ORDER: 5074 HO

PRODUCT 000000100004250

CERTIFICATION SAMPLES	LINE	FROM DATE	TO DATE	NO SAMPLES
	03	07/11/97	08/23/97	07

TOTAL P.05

1267

Liner Penetration Boxes

SUPPLIER DOCUMENT SUBMITTAL

FDF PROJECT NO	1702	CONTRACT NO.: FSC 597	TTAL NO.: 035	REV.: 6	DATE: November 5,1997
FROM	Petro Environmental Technologies, Inc. 7851 Palace Drive Cincinnati, Ohio 45249		FDF ENGINEERING/CONSTRUCTION DOCUMENT CONTROL, MS 44		PAGE 1 OF 1
SIGNATURE: J. Richard Schaubman			RECEIVED BY: Melissa Reeves	DATE: 11/5/97	

			DOCUMENT FAMILY							RESUBMITTAL				SUBMITTAL TYPE			SUBMITTAL ACTION		
QTY	DOCUMENT NUMBER	REV	1 PRO	2 H&S	3 MED	4 TRG	5 CON	6 ENG	7 QAC	YES	NO	TITLE/DESCRIPTION	CFC	INF	ASSOCIATED SPECIFICATION	A	B	C
5	PET-034K	0							X		X	Fabricator's Test Results	X		13005-1.04.D.1	X		
5	PET-034L	0							X		X	HDPE Piping QC Certifications	X		13005-1.04.B	X		

DISTRIBUTION

REVIEW DISTRIBUTION			
Distribution	MS	Distribution	MS
Mike Godber	64		
Don Goetz	64		
Rick Heath	64		
Dan Bodine	64		
Dyan Rhea	44		

CFC DISTRIBUTION			
Distribution	MS	Distribution	MS
Lou Wehlitz	64	Dan Bodine	64
Don Goetz	64	Tracy Russell	64
Bill Zebick	64		
Rick Heath	64		
Mike Godber	64		
Gregg Johnson	64		

ORIGINAL

RECEIVED BY: Michael W. Godber 11/12/97 DATE: _____ NO COMMENTS X COMMENTS ATTACHED ____

(SIGN/DATE AND RETURN A COPY TO ECDC, MS 44)

COMMENTS

SUBMITTAL ACTION CODE: (BY SUPPLIER)

CFC - CERTIFIED FOR CONSTRUCTION
INF - INFORMATION/RECORD
"X" APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (ECDC) SUPPLIER ACTION ABOVE

A - ACCEPTED DOCUMENT: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: REVISE AND RESUBMIT AS CFC OR INF
C - REVISE AND RESUBMIT

ENTERED

1296

1267

PETRO
environmental
technologies

SUPPLIER SUBMITTAL No.: 035 (Rev. 6)

FABRICATOR'S QC TEST RESULTS &
HDPE PIPING QC CERTIFICATES
Sections 13005-1.04.B and 13005-1.04.D.1

FLUOR DANIEL FERNALD SUBCONTRACT No. FSC 597
ON-SITE DISPOSAL FACILITY (PHASE I) PROJECT

Document No. PET-034K (Rev. 0)
Document No. PET-034L (Rev. 0)

November 5, 1997

000[illegible]3

Fernald Site Office: P.O. Box 538704 • Mail Stop 44 • Cincinnati, Ohio 45253-8704 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Seville, Ohio 44273 • 330.948.1494 • Fax 948.1933

APPENDIX A.

FABRICATOR'S QC TEST RESULTS

Document No. PET-034K

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 11/12/97

INFORMATION ONLY

PETRO environmental technologies

PLASTEK WERKS, INC.
2401 Franklin Blvd.
P.O. Box 5906
Gainesville, Georgia 30504
Phone (770) 287-8286
Fax (770) 287-3284

I, Pat Reyna, have witnessed the air pressure test on Penetration Box #1. It was tested at 15 psi for a period of 30 minutes and had zero leaks.

Date Oct. 21, 1997

Time From: 10:15 Am To: 10:45 Am

Location Plastek Werks, Inc.
2401 Franklin Boulevard
Gainesville, Georgia 30504

Signature PAT Rey

Title

PLASTEK WERKS, INC.
2401 Franklin Blvd.
P.O. Box 5906
Gainesville, Georgia 30504
Phone (770) 287-8286
Fax (770) 287-3284

I, Pat Reyna, have witnessed the air pressure test on Penetration Box #2-A. It was tested at 15 psi for a period of 30 minutes and had zero leaks.

Date OCT. 23, 1997

Time From: 2:45 pm To: 3:15 pm

Location Plastek Werks, Inc.
2401 Franklin Boulevard
Gainesville, Georgia 30504

Signature PAT Reyna

Title

PLASTEK WERKS, INC.
2401 Franklin Blvd.
P.O. Box 5906
Gainesville, Georgia 30504
Phone (770) 287-8286
Fax (770) 287-3284

I, Pat Reyna, have witnessed the air pressure test on Penetration Box #2-B. It was tested at 15 psi for a period of 30 minutes and had zero leaks.

Date 10-30-97

Time From: 9:30 AM To: 10:00 AM

Location Plastek Werks, Inc.
2401 Franklin Boulevard
Gainesville, Georgia 30504

Signature PAT Reyna

Title

PLASTEK WERKS, INC.
2401 Franklin Blvd.
P.O. Box 5906
Gainesville, Georgia 30504
Phone (770) 287-8286
Fax (770) 287-3284

I, Pat Reyna, have witnessed the air pressure test on Penetration Box #3. It was tested at 15 psi for a period of 30 minutes and had zero leaks.

Date 10-30-97

Time From: 7:30 AM To: 8:00 AM

Location Plastek Werks, Inc.
2401 Franklin Boulevard
Gainesville, Georgia 30504

Signature PAT Rgn

Title

PLASTEK WERKS, INC.
2401 Franklin Blvd.
P.O. Box 5906
Gainesville, Georgia 30504
Phone (770) 287-8286
Fax (770) 287-3284

I, Pat Reyna, have witnessed the air pressure test on Penetration Box #4. It was tested at 15 psi for a period of 30 minutes and had zero leaks.

Date 10CT. 23, 1997

Time From: 9:45 AM To: 10:15 AM

Location Plastek Werks, Inc.
2401 Franklin Boulevard
Gainesville, Georgia 30504

Signature PAT Rg

Title

APPENDIX B.

HDPE PIPING QC CERTIFICATES

Document No. PET-034L

A - Conforms to the Subcontract Requirements
B - Minor Comment - Incorporate and Resubmit
C - Revise and Resubmit

INFORMATION ONLY

PETRO environmental technologies

HDPE EHMW PE3408 Pipe

High Density Polyethylene, Extra High Molecular Weight PolyPipe™ can be manufactured in accordance with: ASTM D2513, D3035, F714, API 15LE and/or AWWA C901/C906

CSR PolyPipe

Approved by NSF Standard 61 for potable water.

Other dimensional standards or custom requirements are acceptable as agreed upon between the buyer and manufacturer.

TYPICAL PHYSICAL PROPERTIES

PROPERTY	ASTM TEST METHOD	*NOMINAL VALUES SI UNITS	ENGLISH UNITS
Density (Natural)	D1505	0.946g/cc	--
Density (Black)	D1505	0.957g/cc	--
Flow Rate (190/21.6)	D1238	8.5 gm/10 min.	--
Tensile Strength @ Ultimate	D638	34.5 MPa	5,000 psi
Tensile Strength @ Yield	D638	24.1 MPa	3,500 psi
Ultimate Elongation	D638	>800%	>800%
Flexural Modulus 2% Secant	D790	938 MPa	136,000 psi
Environmental Stress Crack Resistance (ESCR) F_0, Cond. C	D1693	> 10,000 hrs.	> 10,000 hrs.
Compressed Ring ESCR, F_0	F1248	> 10,000 hrs.	> 10,000 hrs.
Brittleness Temperature	D746	< -117°C	<-180°F
Vicat Softening Temperature	D1525	124°C	255°F
Hardness, Shore D	D2240	64	64
Vicat Softening Temperature	D1525	124°C	255°F
Volume Resistivity	D991	>10^{15}ohm-cm	
CELL CLASSIFICATION:	D3350	345444C	Grade PE34
MATERIAL CLASSIFICATION:	D1248	TYPE III Category 5	Class C
PPI HYDROSTATIC DESIGN BASIS: (As listed in PPI TR-4):	D2837	11.0 MPa @ 23°C 5.5 MPa @ 60°C	1600 psi @ 73.4°F 800 psi @ 140°F

* Nominal values are intended to be guides only, and not as specification limit.

CSR PolyPipe
P.O. Box 390
Gainesville, Texas 76241-0390

Distribution address here

(940) 665-1721, (800) 433-5632
Fax (940) 668-8612
Sales Fax (940) 668-2704

CSR PolyPipe
P.O. Box 390
Gainesville, Texas 76241-0390

Phone: 940/665-1721 Fax: 940/668-8612

PRODUCT CERTIFICATION

Invoice No.: XXXXXXX

Customer: Plastics Works
Gainesville, Ga.

Phone: (770) 287-3284
Fax #: (770) 287-8286

Dear Customer:

Attn: Mark Purvis

CSR PolyPipe certifies that the listed piping products were produced from resins and concentrates as determined by and defined in ASTM D3350. Routine inplant inspection, quality control sampling, and long term testing meets or exceeds the customer specifications or standards listed below:

	API Spec 15LE	X	PPI Rating for PE 3408
	CFR Title 49, Part 192		
	AWWA C901/C906		PE2406 Type II, Grade P24 Category 5 with Cell Classification of 234433C, D, or E HDB 1250 @ 23°c
	ASME B31.8		
	NSF 14/16		
	CSA		
	IAPMO		
X	ASTM D2513		
	Customer Specification	X	PE3408 Type III, Grade P34 Category 5 with Cell Classification of 345444C, D, or E HDB 1600 @ 23°c

* All blocks that apply to this shipment

Products: 6" SDR11 Black Gas Pipe
10" SDR11 Black Gas Pipe

Certified By: L.R. Trumbull Position: QA Inspector Date: 10-31-97

Level
4-11-97
L.T.

PRODUCTION REPORT

DATE 09-25-97 DAY OF THE WEEK Thursday HOURS 8pm, 8AM SHIFT D LINE 3

SIZE 6" SDR 11 LENGTH 40' GRADE 3408 MFR'R DRISCO COLOR Black

ORDER Stock Inject RUN NO. 9-215 STICK LENGTH 40' NO. OF UNITS 7

PROD. IN FT. 280' SCRAP PRODUCED 151 CODE 3

PROD. IN LBS 1358 SCRAP PRODUCED 5 CODE 5

THEO. LBS. PROD. 1374 SCRAP RECLAIMED 151 LBS REBN LOST 5

THEO. WT/FT 4.907 MINMAX WALL .621/.674 TARGET .614/.644

% WT. (LOSS) GAIN — O.D. TOLERANCE .625 ± .011 I.D. TOLERANCE 5

DOWNTIME HOURS 10 MINUTES 8 QUALITY X

RUNNING IN SPEC
RUNNING OUT OF SPEC
LINE DOWN

COIL NUMBERS	ACTUAL O.D.	WALL MINIMUM	WALL MAXIMUM	ACT. WT. PER FT.	COIL/STALK WEIGHT	WALL MONITOR CAVOFF	WALL MONITOR AUTO	WALL MONITOR CAL	OVALITY (O.D.)
22/26	6.625	.615	.623	4.949	193.96	7/0			2.35%
27/28	6.626	.611	.619						2.35%
	6.623		.621						

PROCESS DATA:

EXTRUSION RATE FT/MIN 29" AMPS 703 SCREW SPEED 61.7 VAC SETTING 15, 16

DRIVE AMPS 215 HEAD PRESSURE 3350 STOCK TEMP 443° PIPE TEMP 229°

PRINT LINE OK G.S. TAPES OK MICROMETERS OK MICROSCAN UNIT 10

DIE HEATS TO SET POINT yes ZONE HEATS TO SET POINT yes

RIBBON CODE N72 RESIN ENTRY'S CODE 4224 SEND BACK (NO) OR RECLAIM

NOTES Lost line when water pump quit had to replace pump and flushing water.

OVER

SUPERVISOR John Stier OPERATOR Jack Foster

///QC LAB USE ONLY///

DATE INSPECTED: 9-26-97 INSPECTED BY: MB TESTED BY:

QUICK BURST ☒ RING TENSILE ☐ NOT APPLICABLE ☐

COIL/STALK NO.	SIZE	O.D.	MIN WALL	TIME	BURST	HOOP STRESS	TYPE
22	6"	6.625	.615	64 SEC.	720 PSI	3518 PSI	DUCTILE
				SEC.	PSI	PSI	DUCTILE

PRINT CSR POLY PE4710 GAS 6" 3406 DR 11 SF MD 2513 2 X HDB 1514 LADDIN 72 W 1836 C 097597

MO

PRODUCTION REPORT

DATE 9-26-97 DAY OF THE WEEK FRI HOUR 8-8 SHIFT C LINE #5

SIZE 10" SDR 11 LENGTH 40' O.F. 3408 ASTM D2513 COLOR BLACK

ORDER GATESKE RUN NO 5-245 NO. STICK LENGTH 40' NO. OF UNITS 26 EA

PROD. IN FT 1040 SCRAP PRODUCED Ø CODE Ø

PROD. IN LBS 13424 SCRAP PRODUCED Ø CODE Ø

THEO. LBS. PROD 13436 SCRAP REGRAINED LBS. RESIN LOST

THEO. WT/FT 12.919 LBS MINIMUM WALL .978-1.085 TARGET .997-1.047

% WT. & DSB (SAN) 0.09 % O.D. TOLERANCE 10.750 (±).015 I.D. TOLERANCE Ø

DOWNTIME HOURS Ø MINUTES Ø QUALITY ✓

	8 AM													8 PM											
	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7		
RUNNING IN SPEC.																									
RUNNING OUT OF SPEC																									
LINE DOWN																									

COIL NUMBERS	ACTUAL O.D.	WALL MINIMUM	WALL MAXIMUM	ACT. WT. PER FT.	COIL/STALK WEIGHT	WALL MONITOR ON/OFF	WALL MONITOR AUTO	WALL MONITOR CAL.	QUALITY GOOD/GO
67-68	10.747	1.038	1.021	12.908	516#	—	NA	—	1.04 GO
69-70	10.749	1.038	1.017						.997 GO
71	10.747	1.038	1.021						1.02% GO
72-73	10.747	1.037	1.021						0.98% GO
74-76	10.748	1.038	1.020						1.04 GO
77-79	10.750	1.036	1.016						1.04 GO
80-81	10.750	1.035	1.016						0.98 GO
82-83	10.750	1.036	1.024						1.12 GO
84-86	10.750	1.038	1.022						1.19% GO
87-88	10.750	1.037	1.021						1.11% GO
89-90	10.751	1.036	1.021						1.04% GO
91-92	10.750	1.038	1.024						1.01% GO
	10.750		1.020						

PROCESS DATA

EXTRUSION RATE (FT/MIN) 18" AMP 1162 SCREW SPEED 35 MAC. SETTING 14½ + 18 + 17

DRIVE AMPS 95 HEAD PRESSURE 1360# STRICK TEMP 460° PIPE TEMP 137°

PRINT LINE ✓ O.D. TAPES ✓ MICROMETERS ✓ INTRODUCER 40

DIE HEATS TO SET POINT 362°-373° SIZING HEATS TO SET POINT 368°-390°

RESIN CODE W72 CONCENTRATE CODE W24 SEND BACK NO. 03.06

NOTES

OVER

SUPERVISOR Chris B. OPERATOR Scott Carpi

QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC QC

///QC LAB USE ONLY///

DATE INSPECTED: 9-29-97 INSPECTED BY: MB TESTED BY: [illegible]

QUICK BURST ☐ RING TENSILE ☐ NOT APPLICABLE ☐

COIL/STALK NO.	SIZE	O.D.	MIN WALL	TIME	BURST	HOOP STRESS	TYPE
67	10" 11	10.747	1.043	— SEC.	— PSI	2972 PSI	DUCTILE
				SEC.	PSI	PSI	DUCTILE

PRINT LINE CSR Poly Gainesville PE 10 SDR 11 SPS 30 A N.U. ASTM D2513 CLASS A TYPE II 22 W 24 fgC 092697

NOVA Chemicals

Post Office Box 3042
Sarnia, Ontario, Canada N7T 8C9
Offices and Plant: 510 Moore Line Road
Mooretown, Ontario, Canada N0N 1M0
Telephone: (519) 862 2061

CERTIFICATE OF ANALYSIS

August 15, 1997

QC 1

CSR POLYPIPE
W HIGHWAY 82
DRAWER HH
GAINESVILLE,TX
US

NOVA CHEMICALS LTD., certifies that the polyethylene product described herein, meets the requirements of Nova's product specification(s) for such product.

N72

Customer P.O. Number:	CSRGAINESCONSIGN
Nova Product Designation:	HD2007H HOPPER CAR
Nova Batch Number:	MP00005702
Container Number:	NCIX1389
Product Weight(LB):	190617
Nova Order Number	300003600
Delivery Note Number/Item No.	400052126/10
Shipment Date	15-Aug-97

THE FOLLOWING TEST RESULTS WERE OBTAINED:

CHARACTERISTIC NAME	UNITS	RESULTS
Density	G/CM3	0.9449 .945
Bulk Density	LB/FT3	34.7
Flow Rate 190/5.0	G/10 MIN	0.35
Flow Rate 190/21.6	G/10 MIN	8.0 8.9
Melt Flow Ratio 21.6/5.0	RATIO	22.9
Colour Code	-	B
Colour	-	109
Gel Count	-	110

Joe Gravel
Quality Control Coordinator

CONTACT(S):
LARRY TRUMBULL
817-668-8612

Southwest Chemical Services

DATE: SEPTEMBER 19, 1997

TO: CSR POLY PIPE
HIGHWAY 82 WEST
GAINESVILLE, TX

ATTN: LARRY TRUMBULL FAX: (940) 668-8612

W24

FROM: SOUTHWEST CHEMICAL SERVICES

RE: CERTIFICATE OF ANALYSIS

PRODUCT TYPE:	2153
LOT NUMBER:	1171446-1
CUSTOMER P/O #:	CONSIGNMENT
POUNDS SHIPPED	10,000
PELLET WEIGHT	2.5
CARBON BLACK %	34.9 34.8
MELT INDEX 10X	12.4 13.5
MOISTURE	0.03

THANK YOU,

GERRY ALTMAN
CUSTOMER SERVICE

Continual Quality

P.O. Box 478 (Highway 146)
4 Miles South of La Porte
Seabrook, Texas 77586

SUPPLIER SUBMITTAL

WORK ORDER NO.: 1702	SUBCONTRACT NO.: FSC 597	SUPPLIER SUBMITTAL NO.: 035 REV. 5	DATE: October 15, 1997

FROM:

PETRO ENVIRONMENTAL TECHNOLOGIES, INC.
7851 PALACE DRIVE
CINCINNATI, OHIO 45249

SIGNATURE: J. Richard Schairbaum
J. Richard Schairbaum, Quality Control Manager

TO: FERMCO CONSTRUCTION DOCUMENT CONTROL, ms44, T-57

RECEIVED BY: Melissa Crews DATE: 10/15/97

DOCUMENT FAMILY | X X RESUBMITTAL | SUBMITTAL ACTION | SUPPLIER ACTION

QTY.	DOCUMENT NUMBER	REV	H&S	MED	PRO	QAC	TRG	CON	ENG	YES	NO	TITLE / DESCRIPTION	INF	CFC	REC	ASSOCIATED SPECIFICATION	A	B	C
5	PET-0341.1	1				X				X		Resin Supplier's QC/Reclaimed Polymer Certs. for Flat Stock Material		X		13005-1.04.B.1 & 13005-1.04.B.3	X		
5	PET-0341.3	0				X					X	Resin Supplier's QC Certs. (Welding Rod)		X		13005-1.04.B.1	X		
5	PET-0341.2	1				X				X		Mfg's Test Results		X		13005-1.04.B.3	X		

RECEIVED OCT 29 1997

REMARKS

DOCUMENT FAMILY CODE: (BY SUPPLIER)

H&S - HEALTH AND SAFETY TRG - TRAINING MED - MEDICAL
CON - CONSTRUCTION PRO - PROCUREMENT
ENG - ENGINEERING QAC - QUALITY ASSURANCE/CONTROL
X APPROPRIATE DOCUMENT FAMILY ABOVE

SUBMITTAL ACTION CODE: (BY SUPPLIER)

INF - INFORMATION
CFC - CERTIFIED FOR CONSTRUCTION
REC - CERTIFIED RECORD
X APPROPRIATE SUBMITTAL ACTION ABOVE

SUPPLIER ACTION CODE: (CDC) SUPPLIER ACTION ABOVE

A - ACCEPTED CFC DOCUMENTS: CONFORMS WITH REQUIREMENTS
B - MINOR COMMENTS: SUBMIT AS INF, CFC, OR REC
C - REVISE AND RESUBMIT

ORIGINAL

FERMCO DISTRIBUTION ON REVERSE SIDE

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1267

SUPPLIER SUBMITTAL No.: 035 (Rev. 5)

**LINER PENETRATION BOXES -
RESIN QUALITY CONTROL CERTIFICATE,
MANUFACTURER'S TEST RESULTS, &
RECLAIMED POLYMER CERTIFICATE
Section 13005-1.04.B (1-3)**

FLUOR DANIEL FERNALD SUBCONTRACT No. FSC 597
ON-SITE DISPOSAL FACILITY (PHASE I) PROJECT

Document No. PET-034I.1 (Rev. 1)
Document No. PET-034I.2 (Rev. 1)
Document No. PET-034I.3 (Rev. 0)

October 15, 1997

060973

Fernald Site Office: P.O. Box 538704 • Mail Stop 44 • Cincinnati, Ohio 45253-8704 • 513.648.3402 • Fax 648.3407
7851 Palace Drive • Cincinnati, Ohio 45249 • 513.489.6789 • Fax 489.7208
8200 Seville Road • Seville, Ohio 44273 • 330.948.1494 • Fax 948.1933

APPENDIX A.

RESIN QUALITY CONTROL CERTIFICATES

FLAT STOCK RESIN CERTIFICATE/
RECLAIMED POLYMER CERTIFICATE

Document No. PET-034I.1

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comments - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig. Michael Yoder Date 10/13/

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POLY HI SOLIDUR

A MENASHA SUBSIDIARY

Piedmont Plastics Inc.
5025 South Royal Atlanta Drive
Tucker, Ga 30085
Attn: Kevin Miller

Dear Sir:

The material proposed to ship under your order #28619 for the 1 x 48 x 96 black high density polyethylene pipe grade was manufactured from Union Carbide resin DGDB-2480-Black 4865 which according to the resin supplier meets PE 3408.

We can obtain a certificate of analysis from the resin manufacture on future shipments of resin. Since this sheet was produced from resin already received, we are not certain, at this time, to what the resin manufacture will certify. The resin used was prime resin and will meet the manufactures published specifications

In regard to the certification of regrind, we are not sure what you mean by regrind. We do not purchase recycled resin nor do we use " Post Consumer Waste ". We do, however make use of a common practice in the industry and use the trim and line cuttings back into our process.

Please advise if this meets your expectations.

Best Regards,

Daniel Keisling

Daniel Keisling

Customer Service Representative
Poly Hi Solidur

Jeannette Plant
Poly Hi Solidur, Inc.
[illegible]
[illegible]
Jeannette PA [illegible]
USA

[illegible]
[illegible] (FAX)

ATT: Mark Johnson

WORLDWIDE

TECHNICAL INFORMATION

Chemical and Corrosion Resistant Polymers
High Molecular Weight Polyethylene (Black Pipe Grade)

Physical Properties

Property	ASTM Test Method	Units	Value
Density	D-1505	g/cm³	0.955
Melting Point	DSC	°F	261
RSV	D-1601	dl/g	3.0
Melt Index	D-1238 (E)	gms/10 min	0.14
ESCR, Bell Test	D-1693 (C)	F 50 hrs	>1500
Tensile Yield Strength	D-638	psi	>3500
Tensile Elongation @ Yield	D-638, Spec 1	%	800
Tensile Modulus	D-638	psi	113,000
Flexural Modulus	D-790	psi	136,000
Vicat Softening Temp	D-1525	°F	255
Brittleness Temp	D-746	°F	-180
Heat Deflection Temperature	D-648	°F	172
Mean Coefficient of Linear Thermal Expansion	D-696	in/in/° F	1×10^{-4}
Hardness-Shore D	D-2240		61

The data listed was determined on press molded test specimens.

WARRANTY: Characteristics and suggested applications for our products are shown for your information only and should not be treated as recommendations to use our products in any particular application. Write to Poly Hi Solidur for warranty details.

IMPORTANT: Most plastics will ignite and sustain flame under certain conditions. Caution is urged where any materials may be exposed to open flame or heating/melting equipment. Use Material Safety Data Sheets to determine combustion and flashpoint temperatures of materials, or consult Poly Hi Solidur, Fort Wayne, Indiana, if additional information is needed.

The information contained herein is believed to be reliable, but no representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications or the results to be obtained therefrom. The information is based on laboratory work with small-scale equipment and does not necessarily indicate end product performance. Because of the variations in methods, conditions and equipment used commercially in processing these materials, no warranties or guarantees are made as to the suitability of the products for the applications discussed. Adequate testing and end product performance are the responsibility of the user. Poly Hi Solidur Division of Monsanto Corporation shall not be liable and the customer assumes all risk and liability of any use or handling of any material beyond Poly Hi Solidur Division of Monsanto Corporation's direct control. THE SELLER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Nothing contained herein is to be considered as permission, recommendation, nor an inducement to practice any patented invention without permission of the patent owner.

POLY HI SOLIDUR

MONSANTO CORPORATION

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Form No. 032 June 1990

UNION CARBIDE CORPORATION
P.O. Box 186, Port Lavaca, TX 77979

Fax: 1800-673-2413

Menasha Corporation
Poly-Hi Division
P. O. Box 1449
Scranton, PA 18503
Attn: J. Keiser

PRODUCT CERTIFICATE OF ANALYSIS

10/07/97

Product Name: DGDB-2483 BK 3408

Customer Order No.: 4500013860
Internal Order No.: 443352

Shipped To: Menasha Corporation
Poly-Hi Division
900 N. South Road
Scranton, PA 18503

Blend	Quantity	Container Id	Ship Date
443352	41850	N/A	10/03/97

We certify that the material shipped meets UCC&P specifications.

The following test data was obtained :

Blend : 443352
Sample Id : P6658366
Date of Manufacture : 08/16/97

Test Description	Unit	Results
Melt Flow Index (190C/21.6kg)	g/10min	11.14
Density	g/cu cm	.9351
Carbon Black Content	wt %	2.33
Tens.Strength Orig,2"/M,SC15/M	psi	3513
Elongation Orig,2"/M, SC 15C/M	%	650

Wayne Tutt, Lab Supervisor

Wayne Tutt

Quality Assurance Department

WELDING ROD RESIN

Document No. PET-034I.3

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 10/23/97

INFORMATION ONLY

PETRO environmental technologies

V & A Process, Inc.
1230 Colorado Avenue
Lorain, OH 44052

Specification Sheet for Plastic Welding Rods

Material- HIGH MOLECULAR WEIGHT HDPE

Typical Properties	ASTM Test Method	
Melt Index. g/cm3	D 1238	0.4
Density, g/cm3	D 1505	0.956
Tensile Strength @ Break. psi	D 638	>3,300
Elongation @ Break, %	D 638	>800
Flexural Modulus, psi	D 790	125,000
1% Secant Modulus. psi	D 638	115,000
Heat Distortion Temp. @ 66 psi, C	D 648	172
Vicat Softening Point, C	D 1525	124
Hardness, Shore D	D 2240	63
Carbon Black Content, %	D 1603	2.5
Melting Point, F	D 3417	260

FEATURES

Outstanding high temperature creep rupture strength.
Excellent compressed ring ESCR results
NSF approved for potable water.

Phone-216-288-8137
Fax -216-288-2323

Resin MAKE - FINA
LOT # 65903

APPENDIX B.

MANUFACTURER'S TEST RESULTS

Document No. PET-034I.2

[X] A - Conforms to the Subcontract Requirements
[ ] B - Minor Comment - Incorporate and Resubmit
[ ] C - Revise and Resubmit
Sig: Date: 10/23/97

INFORMATION ONLY

PETRO
environmental technologies

PLASTEK WERKS, INC.
2401 Franklin Blvd.
P.O. Box 5906
Gainesville, Georgia 30504
Phone (770) 287-8286
Fax (770) 287-3284

September 18, 1997

Mr. Dan Morrow
GROUND SAFE, INC.
2091 Clary Connector
Eastanollee, GA 30538

Dear Mr. Morrow:

As part of the submittals, please note Section 1.04, Paragraph A, Item 4: the resin was manufactured by Union Carbide, Taft Plant located in Taft, Louisiana. The resin DGDB-2480-Black-4865 was used to manufacture flat sheet stock.

Referencing paragraph B, Item 1, 2, and 3, addressing the enclosed letter to our supplier from the sheet manufacturer.

Item No. 1: See attachment.

Item No. 2: Poly Hi does not perform testing.

Item No. 3: See attachment. The ASTM D-3350 is referenced in the job specification allows for the use of the trim and line cuttings from the sheet manufacturing process. See ASTM D-3350, Section 5.2 and ASTM D-1258, Section 6.2, both headings "Materials and Manufacture."

Please feel free to contact our office with any further questions or comments you may have.

Sincerely,

Gary Hopkins
Plastek Werks, Inc.

Enclosure

WELDER: AUSTIN HONEYCUTT
COMPANY: PLASTEK WERKS
DATE SPECIMENS MADE: 7/21/97
WELD TEST NUMBER:

AIR FLOW RATE:
SHEET MATL: BEKAPLAST PE
ROD MATERIAL: SAME

TYPE OF WELD: HAND
HAND WELD: Air Flow Rate:
EXTRUSION WELD: Pre-heat Temperature:
Material Temperature:

CONTROL SPECIMENS

Specimen Number	Width (in)	Thickness (in)	Area (in^2)	Machine Reading	PSI	CONTROL STRENGTH AVERAGE
A	1.042	0.188	0.1959	615.8	3143.5	3138.7
B	1.053	0.189	0.1990	627.7	3154.0	
C	1.050	0.189	0.1985	626.7	3158.0	
D	1.050	0.193	0.2027	628.1	3099.4	

TEST SPECIMENS

Specimen Number	Failure Code	Width (in)	Thickness (in)	Area (in^2)	Machine Reading	PSI	% Strength
1	1	1.042	0.18975	0.1977	614.1	3105.9	99.0
2	1	1.046	0.18975	0.1985	622.7	3137.4	100.0
3	1	1.059	0.18975	0.2009	624.0	3105.3	98.9
4	1	1.083	0.18975	0.2017	626.1	3104.0	98.9
5	1	1.054	0.18975	0.2000	626.0	3130.1	99.7
6	1	1.056	0.18975	0.2004	629.0	3139.1	100.0
7	1	1.059	0.18975	0.2009	627.7	3123.7	99.5
8	1	1.065	0.18975	0.2021	633.1	3132.9	99.8
9	1	1.064	0.18975	0.2019	624.2	3091.7	98.5
10	1	1.057	0.18975	0.2006	630.7	3144.6	100.2
11							
12							
13							
14							
15							
16							
17							
18							

REQUIRED TO PASS:
10 @ 80% control strength

PASS

COMMENTS:

TESTER: RB
DATE: 8/22/97

006903

126