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

REVISION 0
JANUARY 1998
VOLUME IV

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

- **Laboratory Testing (Continued)**

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-21

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 37,435.6 gms
> #4 SAMPLE WT = 11,140.4 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		25	25
WT. OF DRY SAMPLE PLUS TARE	(grams)	170.3	56.2
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	162.1	48.5

SIEVE ANALYSIS QA ID: [illegible]

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3"	75.0	1443.2	3.8	96.2		100
[illegible]	[illegible]	[illegible]	6.6	93.4		
[illegible]	32.5	[illegible]	8.1	91.9		
1"	[illegible]	[illegible]	10.5	89.5		
3/4	19.0	[illegible]	12.2	87.9		90-100
[illegible]	12.5	5612.2	15.0	85.0		
[illegible]	9.5	6735.8	18.0	82.0		
4	4.75	[illegible]	26.8	73.2		
10	2.00	12.00	7.4	92.6	67.8	
20	0.85	18.82	11.6	88.4	64.7	
40	0.425	24.92	15.3	84.7	62.0	
60	[illegible]	30.35	18.8	81.2	59.5	
[illegible]	[illegible]	37.95	23.4	76.6	56.1	
[illegible]	[illegible]	48.06	29.6	70.4	51.5	50-100

%FINER = 100 − Σ % RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

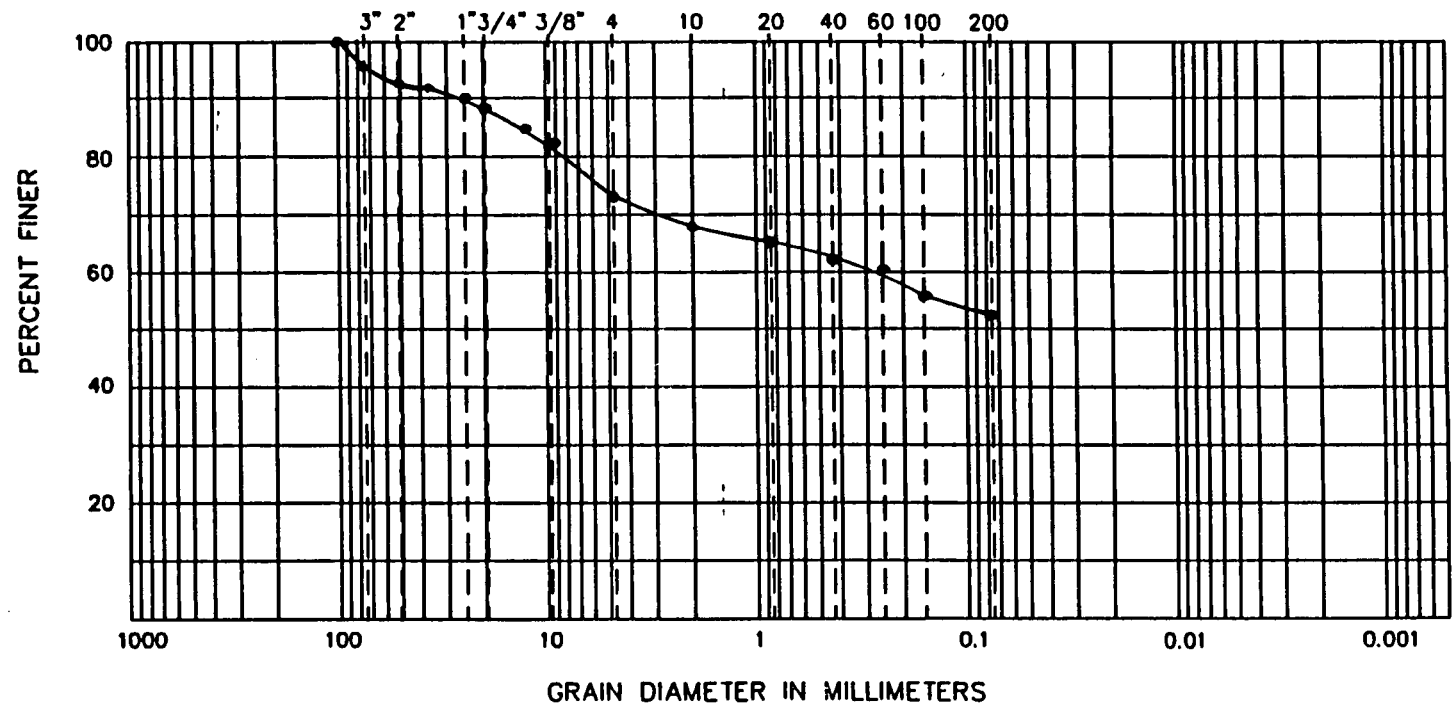
DATE: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-21 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES
U.S. STANDRARD SIEVE SIZES								



ATTERBERG LIMITS

(LL) 23

(PL) 15

(PI) 8

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	96.2
2-in.	93.4
1 1/2-in.	91.9
1-in.	89.5
3/4-in.	87.8
1/2-in.	85.0
3/8-in.	82.0
NO. 4	73.2
NO. 10	67.8
NO. 20	64.7
NO. 40	62.0
NO. 60	59.5
NO. 100	56.1
NO. 200	51.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN/GRAY SANDY LEAN CLAY (CL) W/ SOME GVL

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

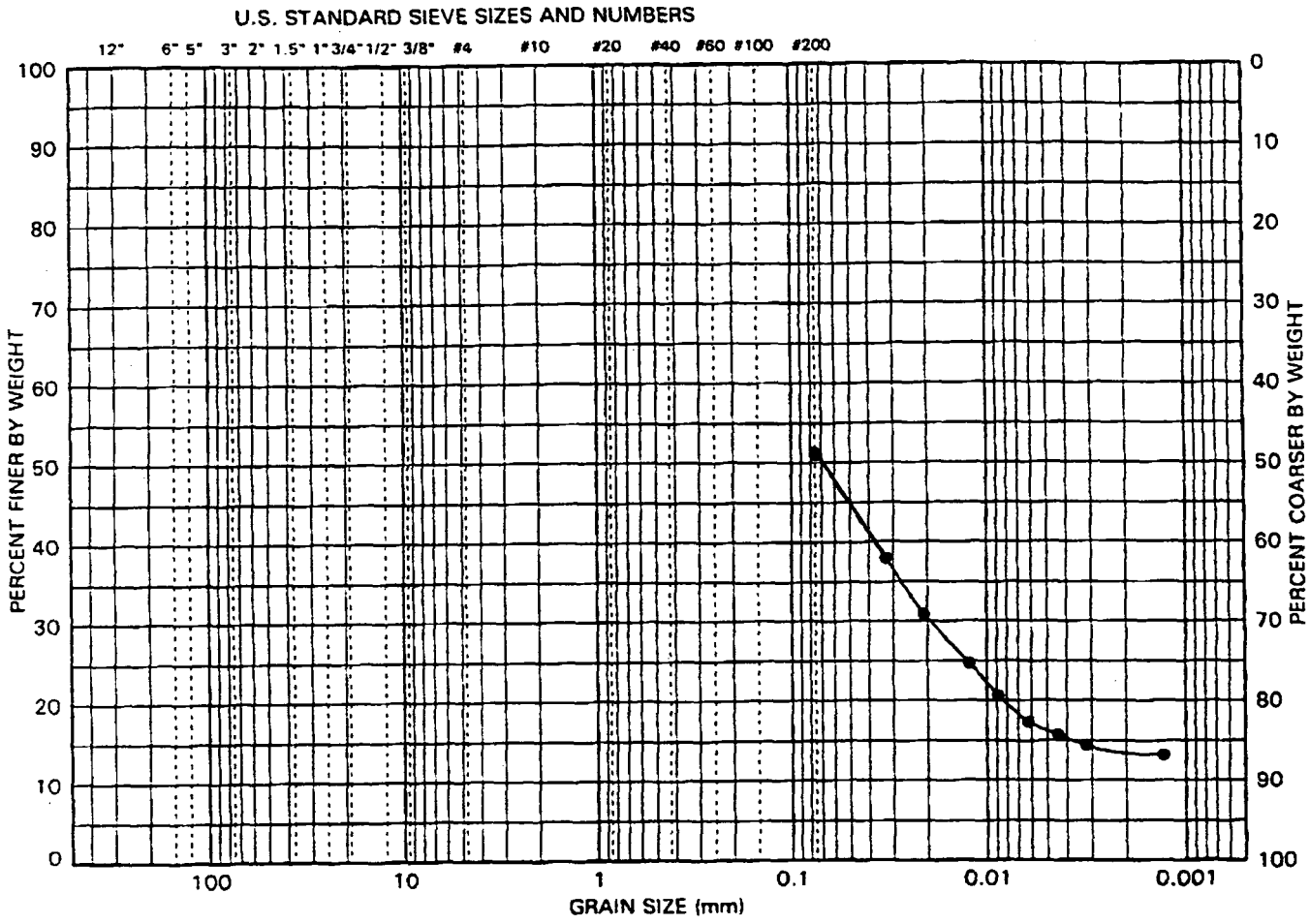
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID LP-21	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO. 97G221	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:			SILT (%)
			CLAY(%) 13.8
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															30	16	14	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 28 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-21

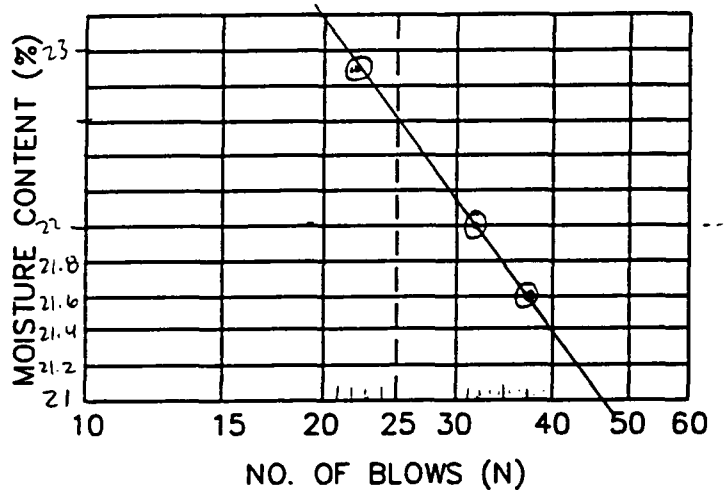
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.3	3.9	3.4	
A	WT. OF TARE	(grams)	21.36	21.01	21.40	
B	WT. OF WET SOIL & TARE	(grams)	33.22	34.61	33.23	
C	WT. OF DRY SOIL & TARE	(grams)	31.01	32.16	31.13	
D	WT. OF WATER = B-C	(grams)	2.21	2.45	2.1	
E	WT. OF DRY SOIL = C-A	(grams)	9.65	11.15	9.73	
F	MOISTURE CONTENT = (D/E)X100	(%)	22.9 ✓	22.0 ✓	21.6 ✓	
N	NUMBER OF BLOWS		23	32	38	

DRYING TARE NO.

E



CURING TARE NO.

1-F

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.0	3.6		
A	WT. OF TARE	(grams)	21.11	21.44		
B	WT. OF WET SOIL & TARE	(grams)	27.92	34.05		
C	WT. OF DRY SOIL & TARE	(grams)	27.03	32.37		
D	WT. OF WATER = B-C	(grams)	.89	1.68		
E	WT. OF DRY SOIL = C-A	(grams)	5.92	10.93		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.0 ✓	15.4 ✓		

LIQUID LIMIT (LL) = 23 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 8

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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 — DATE: 23 day 7 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-21

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

QA ID: JW

	WATER ADDED	(ml)	[illegible]	[illegible]	[illegible]	[illegible]	
A	WT. OF SOIL & MOLD	(grams)	6187.1	6296.0	6300.5	6223.4	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1977.5	2086.6	2091.1	2014.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.5	137.7	138.0	132.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.9	123.8	121.2	114.7	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.		12	13	21	103	
F	WT. OF TARE	(grams)	7.27	7.67	8.37	8.33	
G	WT. OF WET SOIL & TARE	(grams)	267.48	204.49	199.81	296.49	
H	WT. OF DRY SOIL & TARE	(grams)	244.22	183.93	175.64	256.88	
I	WT. OF WATER = G - H	(grams)	23.26	20.56	23.17	39.61	
J	WT. DRY SOIL = H - F	(grams)	236.95	176.26	167.27	248.55	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.8	11.7	13.9	15.9	

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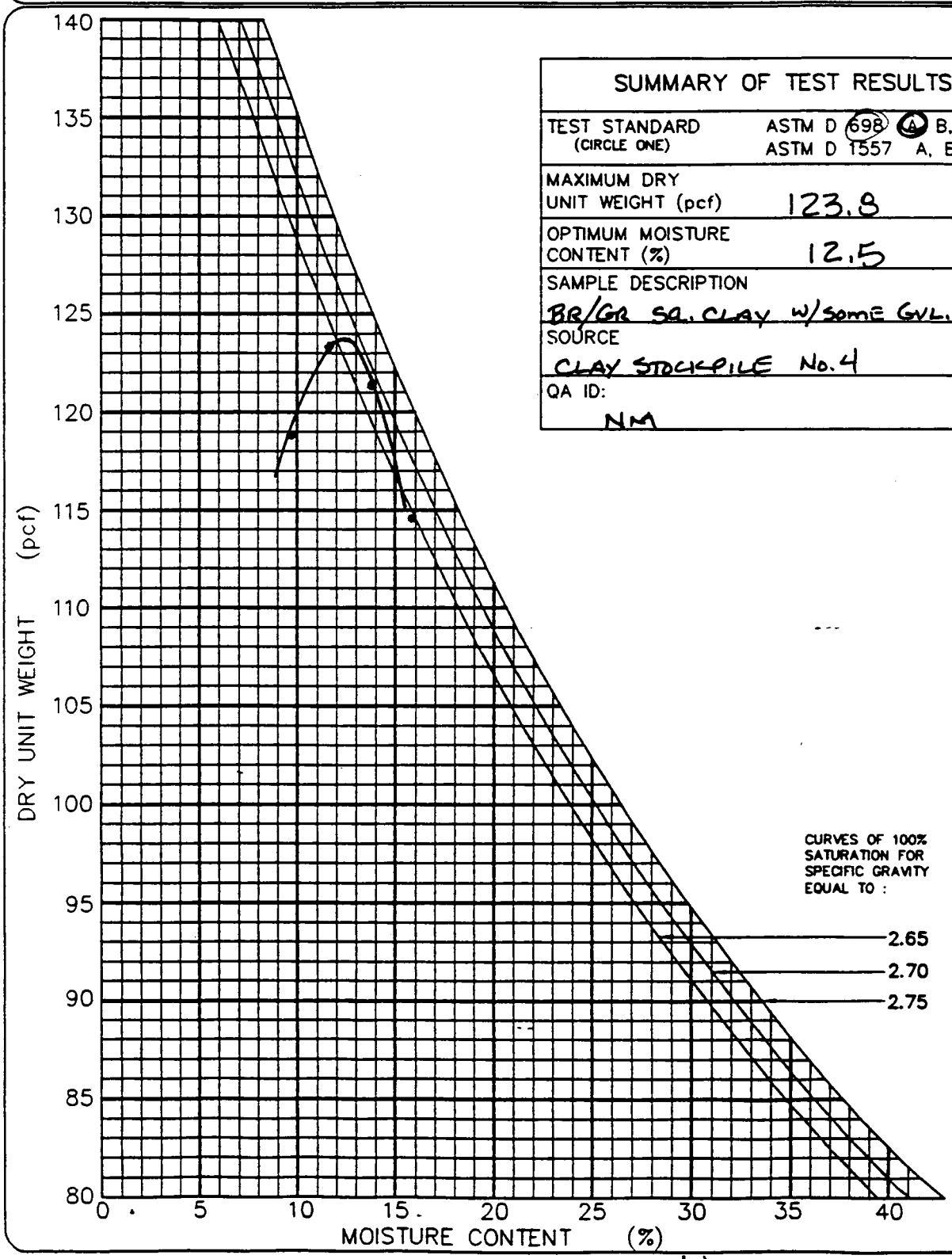
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 23 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-21



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	123.8
OPTIMUM MOISTURE CONTENT (%)	12.5
SAMPLE DESCRIPTION	BR/GR SA. CLAY W/SOME GVL.
SOURCE	CLAY STOCKPILE No. 4
QA ID:	NM

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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: 21 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-22

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	14				
A	WT. OF TARE	7.7				
B	WT. OF WET SOIL & TARE	197.80				
C	WT. OF DRY SOIL & TARE	173.9				
D	WT. OF WATER = B-C	23.9				
E	WT. OF DRY SOIL = C-A	166.2				
F	MOISTURE CONTENT = (D/E) X 100	14.4				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	324.9				
C	WT. OF DRY SOIL & TARE	301.5				
D	WT. OF WATER = B-C	23.4				
E	WT. OF DRY SOIL = C-A	169.5				
F	MOISTURE CONTENT = (D/E) X 100	13.8				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-22

SOIL SAMPLE SIZE TOTAL SAMPLE WT. = 32,187.5 grams
> #4 SAMPLE WT. = 7067.1 grams

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		14	14
WT. OF DRY SAMPLE PLUS TARE	(grams)	173.9	75.0
WT. OF TARE	(grams)	7.7	7.7
WT. OF DRY SAMPLE	(grams)	166.2 ✓	67.3 ✓

SIEVE ANALYSIS QA ID: PKO/KW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	654.5	2.0	98.0		100
1½"	37.5	1061.0	3.3	96.7		
1"	25.0	2193.3	6.8	93.2		
3/4"	19.0	2823.1	8.8	91.2		90-100
1/2"	12.5	3750.3	11.7	88.3		
3/8"	9.5	4423.0	13.7	86.3		
4	4.75	6515.3	20.2	79.8		
10	2.00	25.0	15.0	85.0	67.8	
20	0.850	34.1	20.5	79.5	63.4	
40	0.425	42.8	25.8	74.2	59.2	
60	0.250	49.7	29.9	70.1	55.9	
100	0.150	58.0	34.9	65.1	52.0	
200	0.075	67.1	40.3	59.7	47.6 *	50-100

* DOES NOT COMPLY WITH SPECIFICATION SECTION 02225 PART 2.01.C.3.c

%FINER = 100 − Σ % RETAINED

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PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

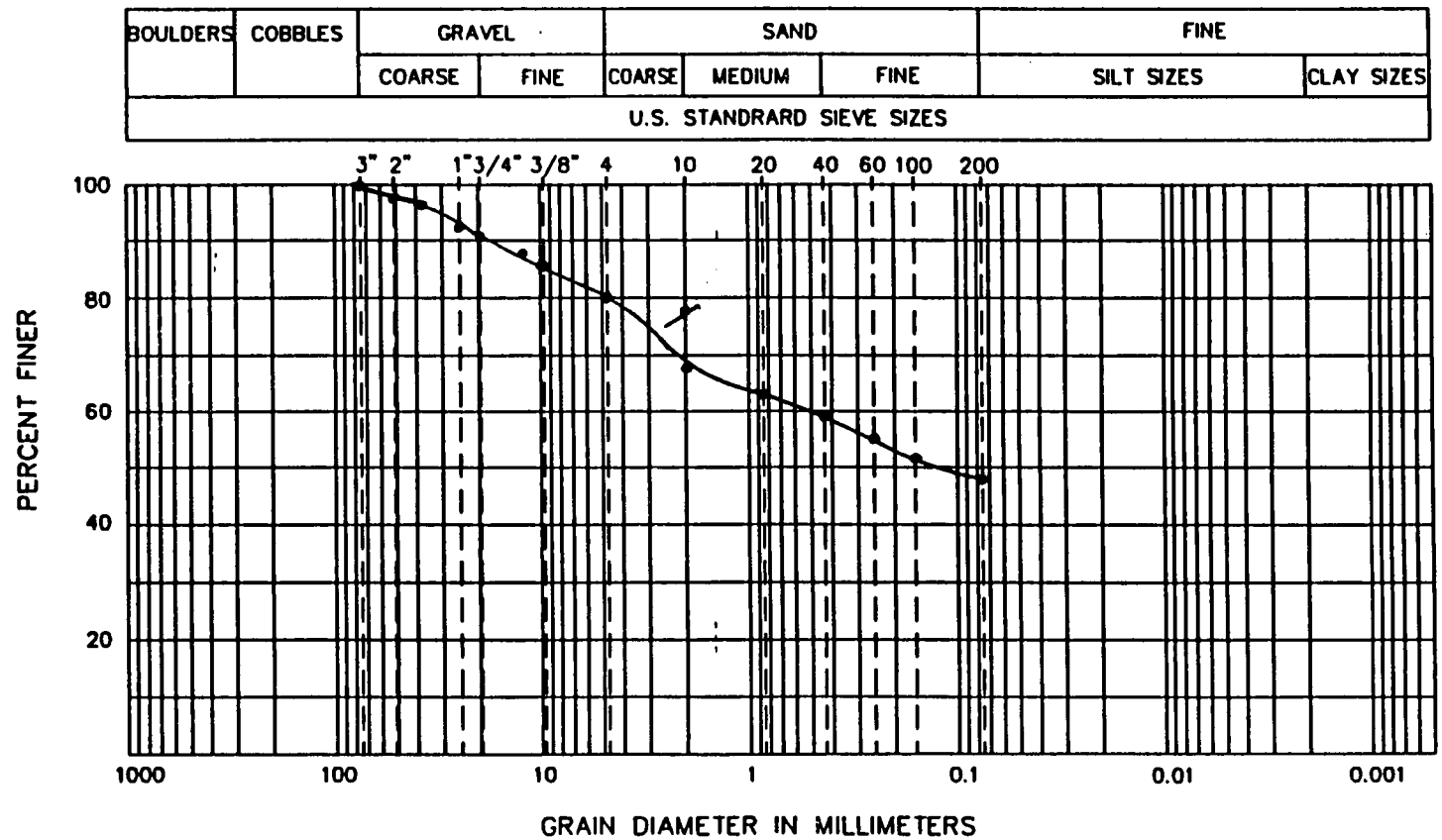
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-22 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 29

(PL) 14

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100.0
2-in.	98.0
1 1/2-in.	96.7
1-in.	93.2
3/4-in.	91.2
1/2-in.	88.3
3/8-in.	86.3
NO. 4	79.8
NO. 10	67.8
NO. 20	63.4
NO. 40	59.2
NO. 60	55.9
NO. 100	52.0
NO. 200	47.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN CLAYEY SAND (SC) W/ SOME GVL.

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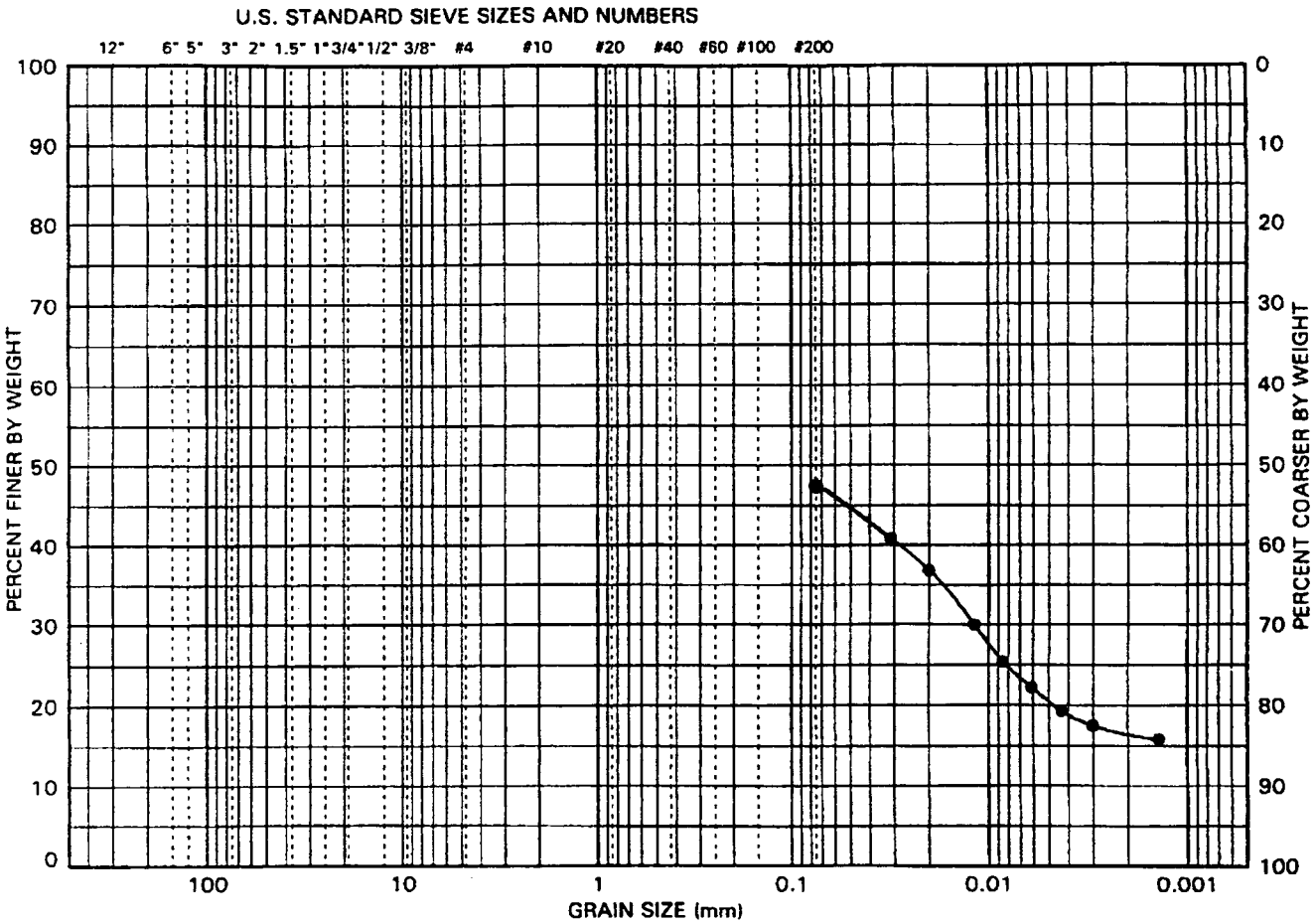
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-22	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97G222	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:				SILT (%)	
				CLAY(%)	16.6
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

RECEIVED JUL 31 1997

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															37	21	17	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 28 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-22

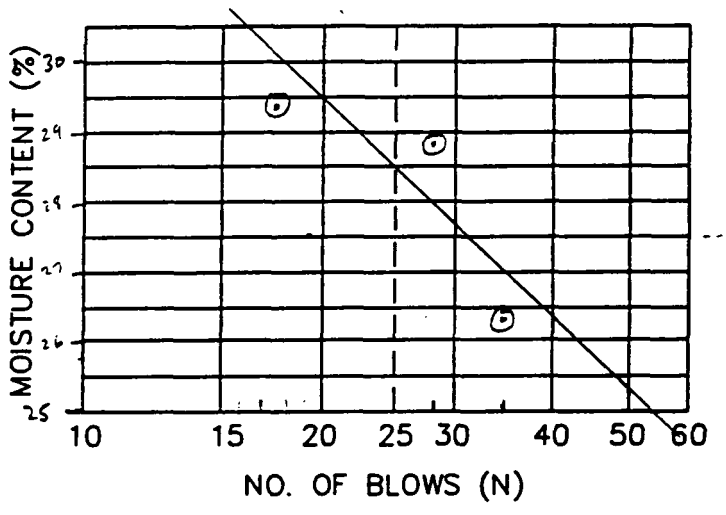
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.1	3.5	3.3	4.2
A	WT. OF TARE	(grams)	21.07	21.20	21.44	21.19
B	WT. OF WET SOIL & TARE	(grams)	36.17	33.70	35.21	35.87
C	WT. OF DRY SOIL & TARE	(grams)	33.03	30.99	32.13	32.54
D	WT. OF WATER = B-C	(grams)	3.14	2.71	3.08	3.33
E	WT. OF DRY SOIL = C-A	(grams)	11.96	9.79	10.69	11.35
F	MOISTURE CONTENT = (D/E)X100	(%)	26.3 ✓	27.7	28.8 ✓	29.3 ✓
N	NUMBER OF BLOWS		35	31	28	17

DRYING TARE NO.

A



CURING TARE NO.

1-B

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		3.2	4.2		
A	WT. OF TARE	(grams)	27.82	21.19		
B	WT. OF WET SOIL & TARE	(grams)	37.09	27.92		
C	WT. OF DRY SOIL & TARE	(grams)	35.91	27.13		
D	WT. OF WATER = B-C	(grams)	1.18	.79		
E	WT. OF DRY SOIL = C-A	(grams)	8.09	5.94		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.6 ✓	13.3 ✓		

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 14 PLASTICITY INDEX (PI) = 15

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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 — DATE: 24 day 7 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-22

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.

16.7

COMPACTION OF SOIL

QA ID: JW

				10.7	12.8	14.7	16.7
	WATER ADDED	(ml)		100	150	200	[illegible]
A	WT. OF SOIL & MOLD	(grams)		6123.6	6223.4	6268.7	6209.8
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1914.2	2014.0	2059.3	2000.4
D	WET UNIT WT.(1) = C X 0.066	(pcf)		126.3	132.9	135.9	132.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		114.2	118.3	118.9	113.1

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			20	11	29	31
F	WT. OF TARE	(grams)		7.22	7.34	8.33	8.76
G	WT. OF WET SOIL & TARE	(grams)		217.21	194.83	174.32	225.03
H	WT. OF DRY SOIL & TARE	(grams)		197.25	174.36	162.36	194.09
I	WT. OF WATER = G - H	(grams)		19.96	20.47	21.96	30.95
J	WT. DRY SOIL = H - F	(grams)		188.92	167.02	154.03	185.82
K	MOISTURE CONTENT = (I/J) X 100	(%)		10.6	12.3	14.3	16.7

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

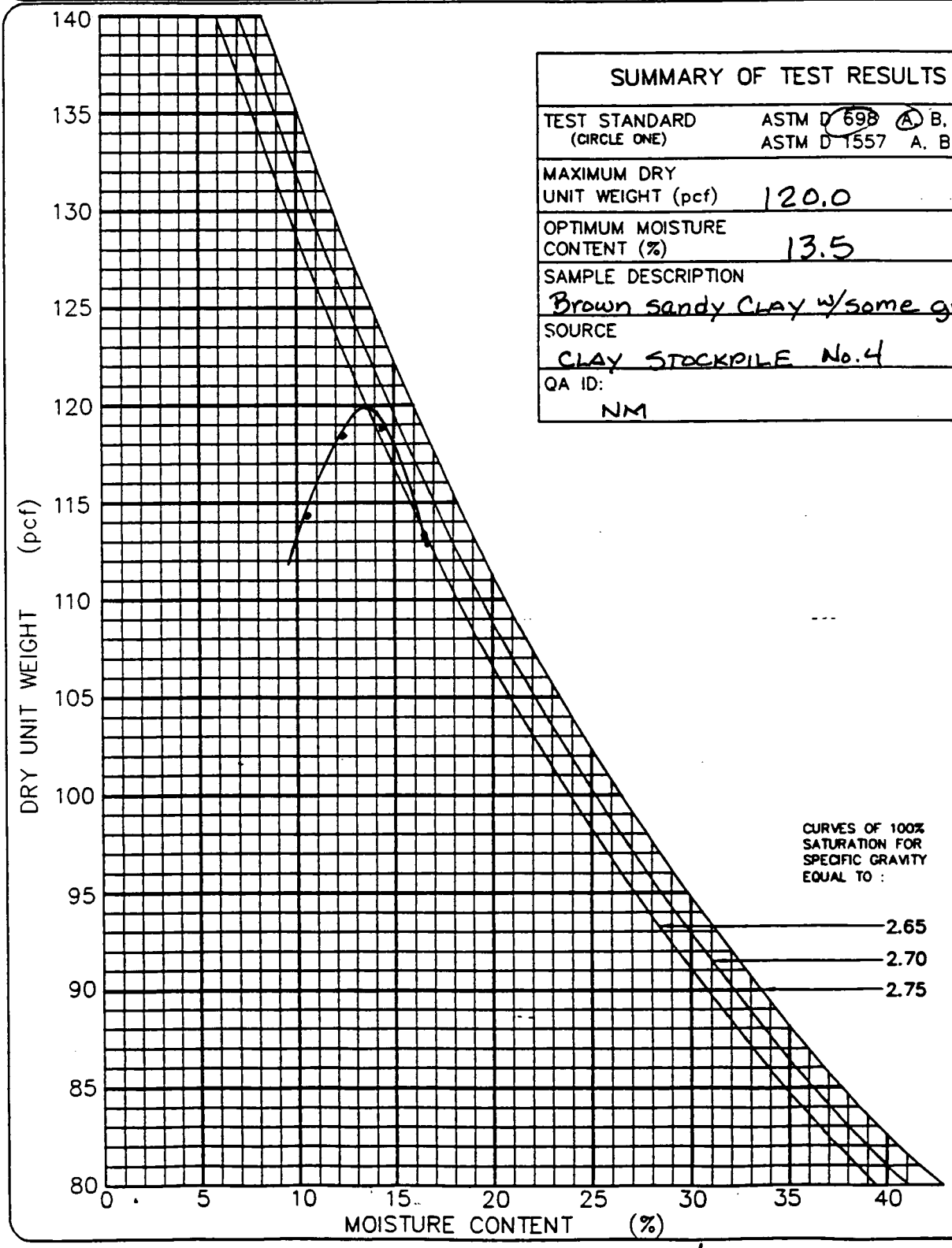
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-22



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	120.0
OPTIMUM MOISTURE CONTENT (%)	13.5
SAMPLE DESCRIPTION	Brown sandy CLAY w/some gvl.
SOURCE	CLAY STOCKPILE No.4
QA ID:	NM

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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: 22 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-23

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	10				
A	WT. OF TARE	7.2				
B	WT. OF WET SOIL & TARE	196.3				
C	WT. OF DRY SOIL & TARE	162.5				
D	WT. OF WATER = B-C	33.8				
E	WT. OF DRY SOIL = C-A	155.3				
F	MOISTURE CONTENT = (D/E) X 100	21.8 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	11				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	306.8				
C	WT. OF DRY SOIL & TARE	275.6				
D	WT. OF WATER = B-C	31.2				
E	WT. OF DRY SOIL = C-A	143.6				
F	MOISTURE CONTENT = (D/E) X 100	21.7 ✓				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-23

SOIL SAMPLE SIZE TOTAL SAMP. WT. = 26,685.3 grams
#4 SAMP. WT. = 2,172.7 grams

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		10	10
WT. OF DRY SAMPLE PLUS TARE	(grams)	162.5	33.5
WT. OF TARE	(grams)	7.2	7.2
WT. OF DRY SAMPLE	(grams)	155.3	26.3

SIEVE ANALYSIS QA ID: KW/PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	217.6	0.8	99.2		100
1½"	37.5	385.1	1.4	98.6		
1"	25.0	569.9	2.1	97.9		
¾"	19.0	682.2	2.6	97.4		90-100
½"	12.5	980.3	3.7	96.3		
⅜"	9.5	1211.3	4.5	95.5		
4	4.75	1926.1	7.2	92.8		
10	2.00	5.6	3.6	96.4	89.5	
20	0.850	9.0	5.8	94.2	87.4	
40	0.425	12.5	8.0	92.0	85.4	
60	0.250	15.6	10.0	90.0	83.5	
100	0.150	19.8	12.7	87.3	81.0	
200	0.075	25.6	16.5	83.5	77.5	>50

%FINER = 100 − Σ% RETAINED

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 SHEET NO. 1 OF 2

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

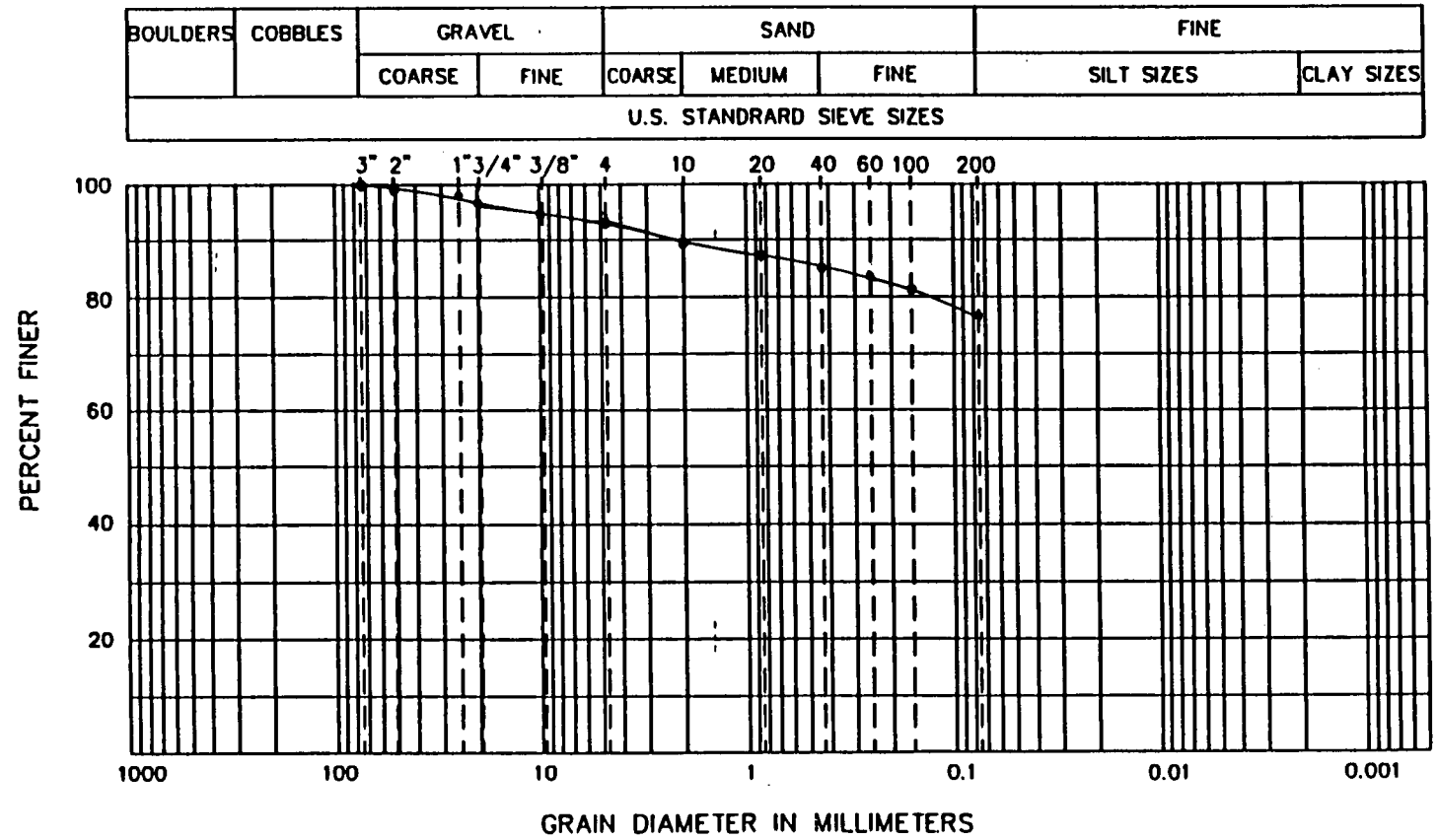
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 28 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-23 QA ID: KW

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 39

(PL) 16

(PI) 23

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	~~100~~ 99.2
1 1/2-in.	98.6
1-in.	97.9
3/4-in.	97.4
1/2-in.	96.3
3/8-in.	95.5
NO. 4	92.8
NO. 10	89.5
NO. 20	87.4
NO. 40	85.4
NO. 60	83.5
NO. 100	81.0
NO. 200	77.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN/GRAY Sandy LEAN CLAY (CL) w/ some Gravel

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SHEET NO. 2 OF 2

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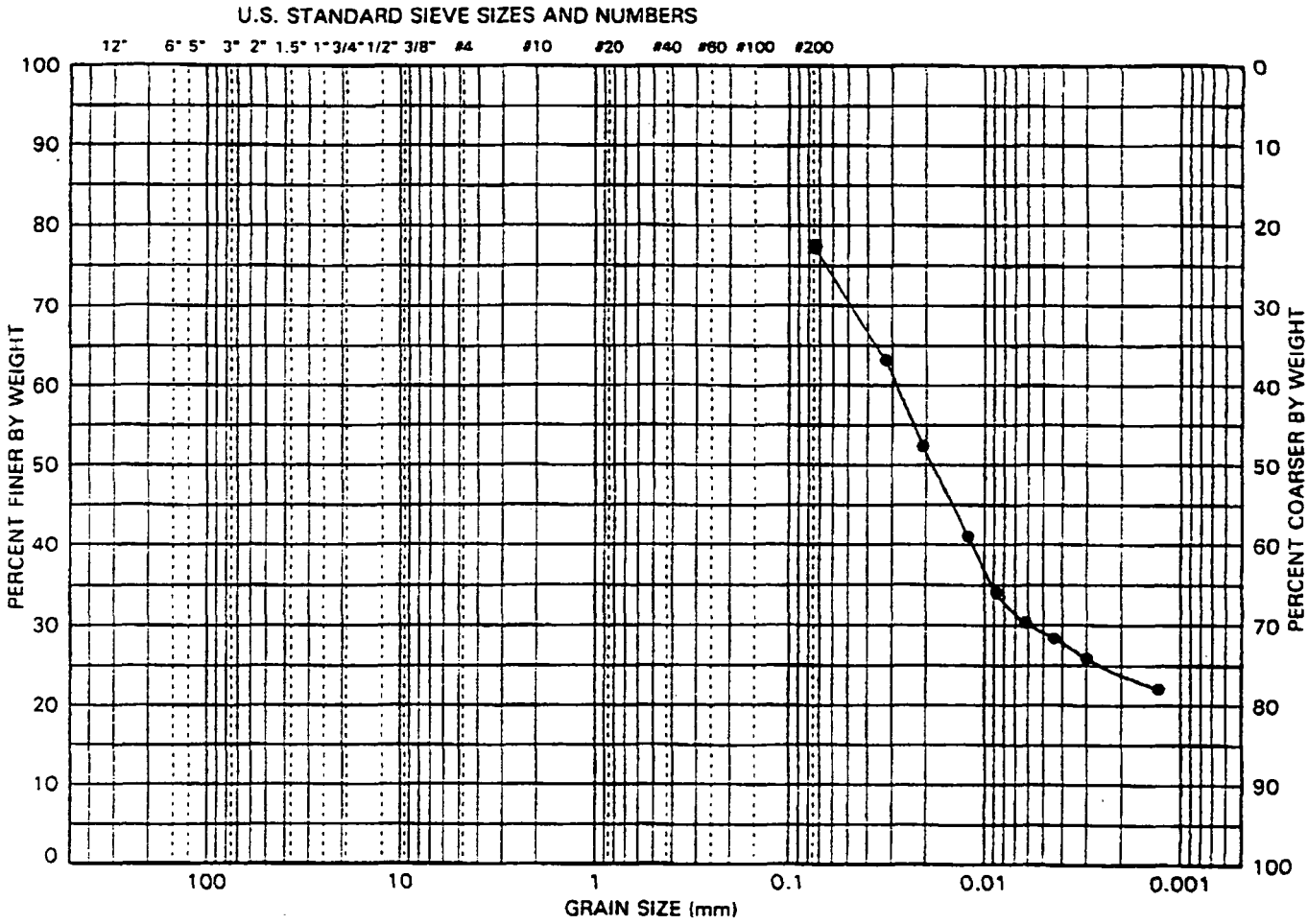
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID LP-23	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO. 97G227	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:			SILT (%)	
			CLAY(%)	24.1
			COEFF. UNIFORMITY (Cu)	
			COEFF. CURVATURE (Cc)	

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AUG 01 1997

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															51	29	24	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 2 day 8 month 97 year

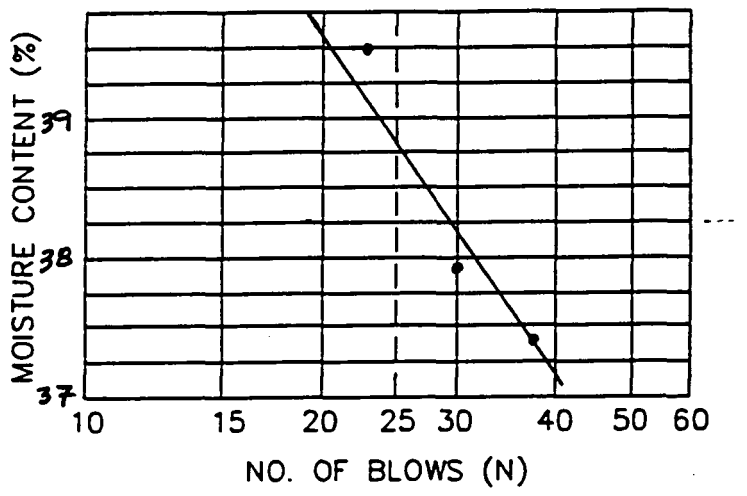
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-23

LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.9	1.2	1.8	
A	WT. OF TARE	(grams)	31.46	28.50	28.81	
B	WT. OF WET SOIL & TARE	(grams)	43.88	42.10	42.08	
C	WT. OF DRY SOIL & TARE	(grams)	40.50	38.36	38.32	
D	WT. OF WATER = B-C	(grams)	3.38	3.74	3.76	
E	WT. OF DRY SOIL = C-A	(grams)	9.04	9.86	9.51	
F	MOISTURE CONTENT = (D/E)X100	(%)	37.4	37.9	39.5	
N	NUMBER OF BLOWS		38	30	23	

DRYING TARE NO.



CURING TARE NO.

2-B

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.6	2.8		
A	WT. OF TARE	(grams)	28.87	28.45		
B	WT. OF WET SOIL & TARE	(grams)	32.18	36.37		
C	WT. OF DRY SOIL & TARE	(grams)	31.75	35.22		
D	WT. OF WATER = B-C	(grams)	0.43	1.15		
E	WT. OF DRY SOIL = C-A	(grams)	2.88	6.77		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.9	17.0		

LIQUID LIMIT (LL) = 39 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 23

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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 DATE: 25 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-23

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

QA ID: JW

	WATER ADDED	(ml)	100	150	200	250	300
A	WT. OF SOIL & MOLD	(grams)		6078.2	6173.5	6159.9	6114.5
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1868.8	1964.1	1950.5	1905.1
D	WET UNIT WT.(1) = C X 0.066	(pcf)		123.3	129.6	128.7	125.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		107.2 ✓	109.8 ✓	108.2 ✓	102.5 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			13	29	20	11
F	WT. OF TARE	(grams)		7.70	8.36	8.39	5.7
G	WT. OF WET SOIL & TARE	(grams)		202.37	200.19	236.05	230.97
H	WT. OF DRY SOIL & TARE	(grams)		176.94	170.85	199.70	189.57
I	WT. OF WATER = G - H	(grams)		25.43	29.34	36.35	40.91
J	WT. DRY SOIL = H - F	(grams)		169.24	162.59	191.32	191.37
K	MOISTURE CONTENT = (I/J) X 100	(%)		15.0 ✓	18.0 ✓	19.0 ✓	22.6 ✓

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GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: KW SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

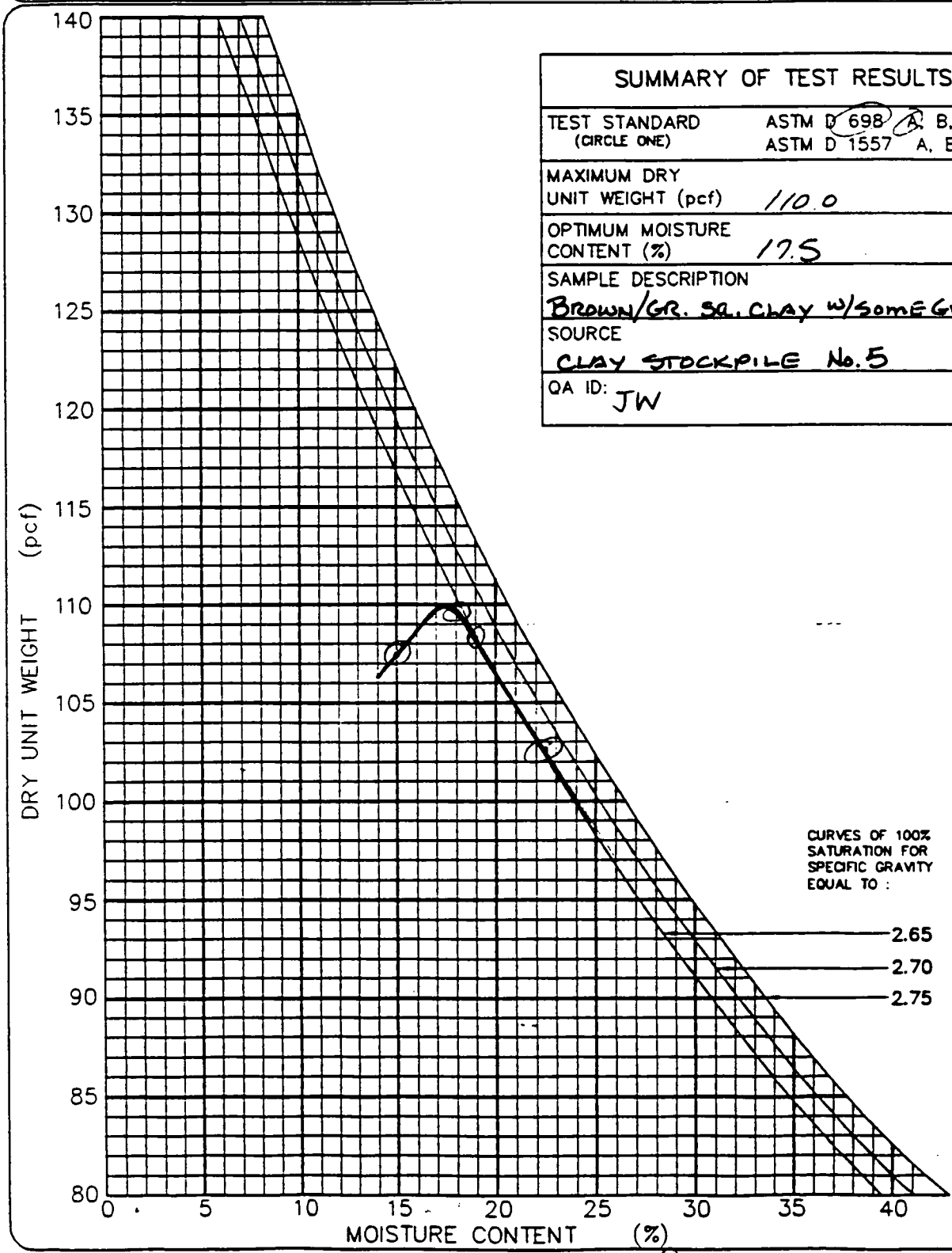
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-23



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	110.0
OPTIMUM MOISTURE CONTENT (%)	17.5
SAMPLE DESCRIPTION	BROWN/GR. SA. CLAY W/SOME GVL
SOURCE	CLAY STOCKPILE No. 5
QA ID:	JW

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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: 23 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-24

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: PKO

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. _____	26				
A	WT. OF TARE	8.30				
B	WT. OF WET SOIL & TARE	198.3				
C	WT. OF DRY SOIL & TARE	173.6				
D	WT. OF WATER = B-C	24.7				
E	WT. OF DRY SOIL = C-A	165.3				
F	MOISTURE CONTENT = (D/E) X 100	14.9				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	323.7				
C	WT. OF DRY SOIL & TARE	298.8				
D	WT. OF WATER = B-C	24.9				
E	WT. OF DRY SOIL = C-A	166.8				
F	MOISTURE CONTENT = (D/E) X 100	14.9				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-24

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 30,032.8 g
> #4 SAMPLE WT = 3,025.5 g

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		26	26
WT. OF DRY SAMPLE PLUS TARE	(grams)	173.6	57.8
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	165.3	49.5

SIEVE ANALYSIS QA ID: KW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	221.9	0.7	99.3		100
1½"	37.5	221.9	0.7	99.3		
1"	25.0	498.4	1.7	98.3		
¾"	19.0	842.5	2.8	97.2		90-100
½"	12.5	1276.4	4.3	95.7		
⅜"	9.5	1635.0	5.4	94.6		
4	4.75	2772.2	9.2	90.8		
10	2.00	15.8	9.6	90.4	82.1	
20	0.850	23.0	13.9	86.1	78.2	
40	0.425	29.4	17.8	82.2	74.6	
60	0.250	34.6	20.9	79.1	71.8	
100	0.150	41.2	24.9	75.1	68.2	
200	0.075	49.2	29.8	70.2	63.7	50-100

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

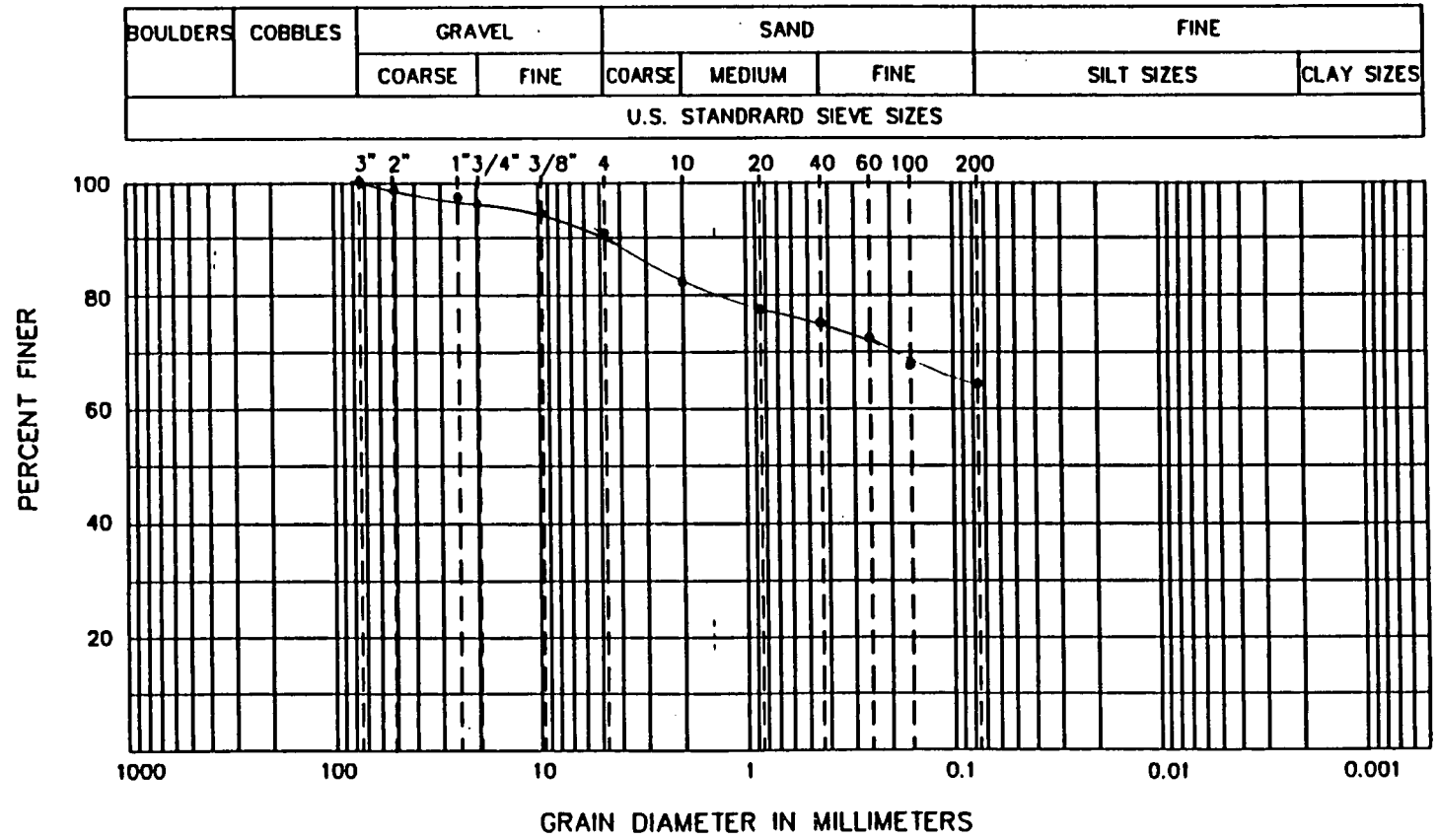
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 28 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-24 QA ID: KW

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 28

(PL) 16

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	99.3
1 1/2-in.	99.3
1-in.	98.3
3/4-in.	97.2
1/2-in.	95.7
3/8-in.	94.6
NO. 4	90.8
NO. 10	82.1
NO. 20	78.2
NO. 40	74.6
NO. 60	71.8
NO. 100	68.2
NO. 200	63.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) w/ SOME GVL.

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SHEET NO. 2 OF 2

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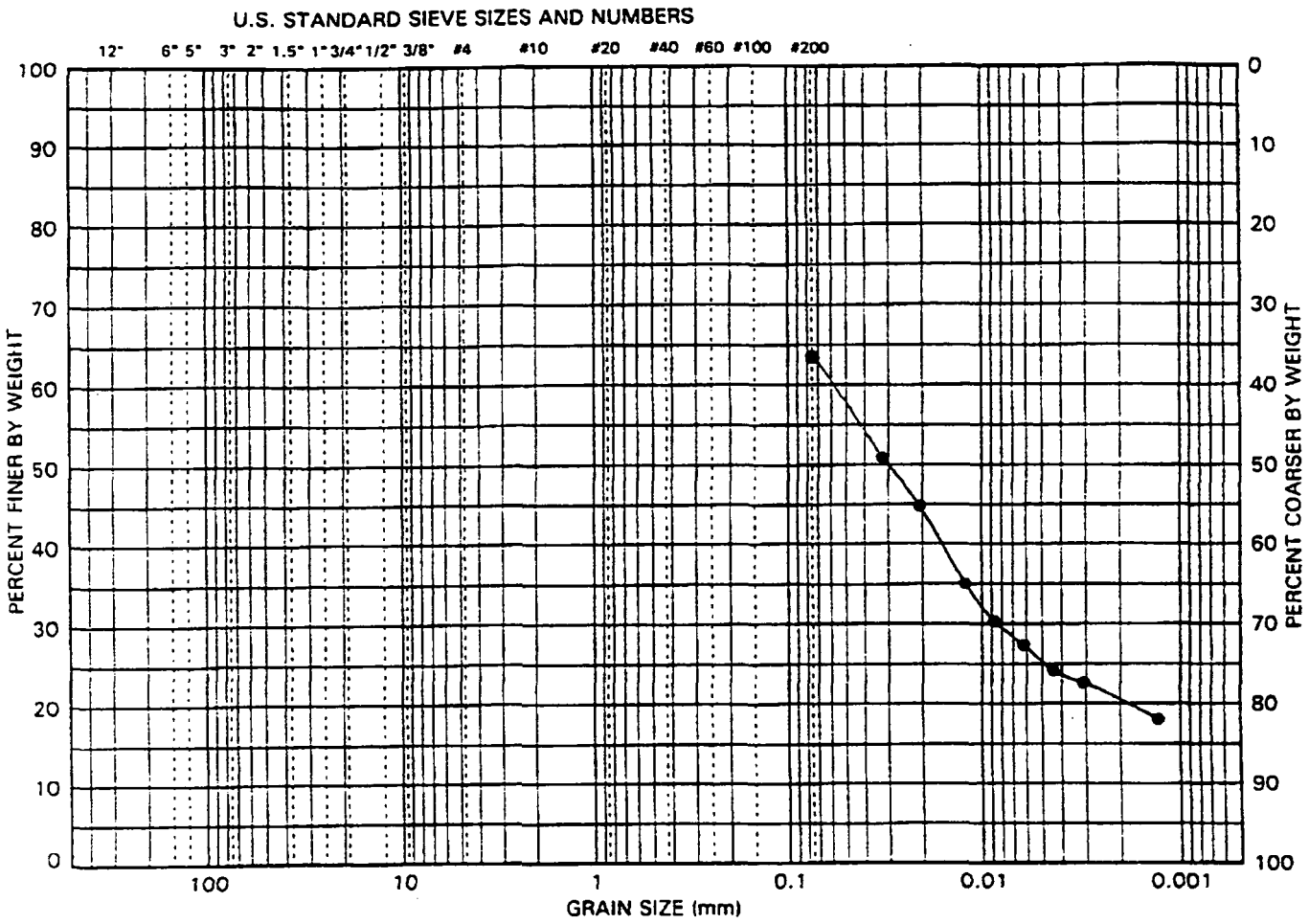
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-24	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G228	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 20.3
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

RECEIVED AUG 01 1997

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															44	25	20	

NOTES:

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

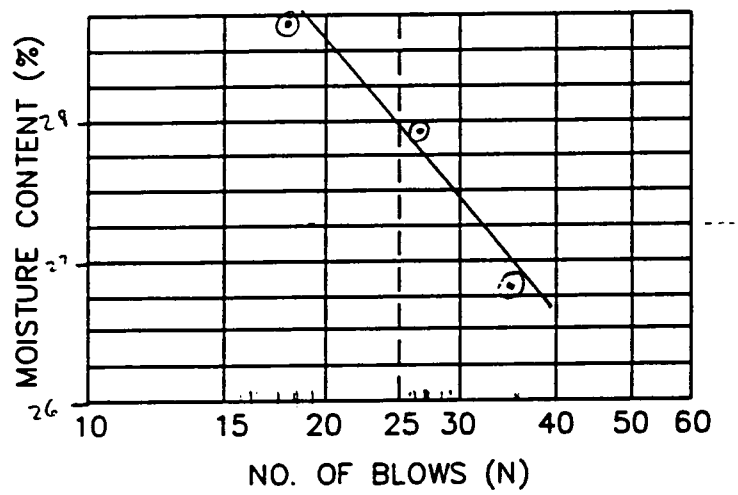
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-24

LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.5	3.1	1.5	
A	WT. OF TARE	(grams)	28.42	28.38	28.61	
B	WT. OF WET SOIL & TARE	(grams)	40.45	42.22	42.33	
C	WT. OF DRY SOIL & TARE	(grams)	37.91	39.20	39.28	
D	WT. OF WATER = B-C	(grams)	2.54	3.02	3.05	
E	WT. OF DRY SOIL = C-A	(grams)	9.49	10.82	10.67	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.8 ✓	27.9 ✓	28.6 ✓	
N	NUMBER OF BLOWS		36	27	18	

DRYING TARE NO.



CURING TARE NO.

1-C

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.8	26		
A	WT. OF TARE	(grams)	28.45	28.56		
B	WT. OF WET SOIL & TARE	(grams)	35.05	35.44		
C	WT. OF DRY SOIL & TARE	(grams)	34.13	34.46		
D	WT. OF WATER = B-C	(grams)	.92	.98		
E	WT. OF DRY SOIL = C-A	(grams)	5.68	5.9		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.2 ✓	16.6 ✓		

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 12

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 — DATE: 25 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-24

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

QA ID: JW

	WATER ADDED	(ml)	50	100	150	200	250
A	WT. OF SOIL & MOLD	(grams)		6146.3	6250.6	6205.2	6146.3
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1936.9	2041.2	1995.8	1936.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)		127.8	134.7	131.7	127.8
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		113.0 ✓	117.6 ✓	111.9 ✓	107.3 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			31	12	9	10
F	WT. OF TARE	(grams)		8.24	7.25	[illegible]	7.24
G	WT. OF WET SOIL & TARE	(grams)		230.03	260.56	222.28	188.01
H	WT. OF DRY SOIL & TARE	(grams)		204.39	228.46	190.11	159.02
I	WT. OF WATER = G - H	(grams)		25.64	32.1	32.17	28.99
J	WT. DRY SOIL = H - F	(grams)		196.15	221.21	182.11	151.78
K	MOISTURE CONTENT = (I/J) X 100	(%)		13.1 ✓	14.5 ✓	17.7 ✓	19.1 ✓

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC — CHECKED BY: [illegible] — SHEET NO. 1 OF 2

000027

1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

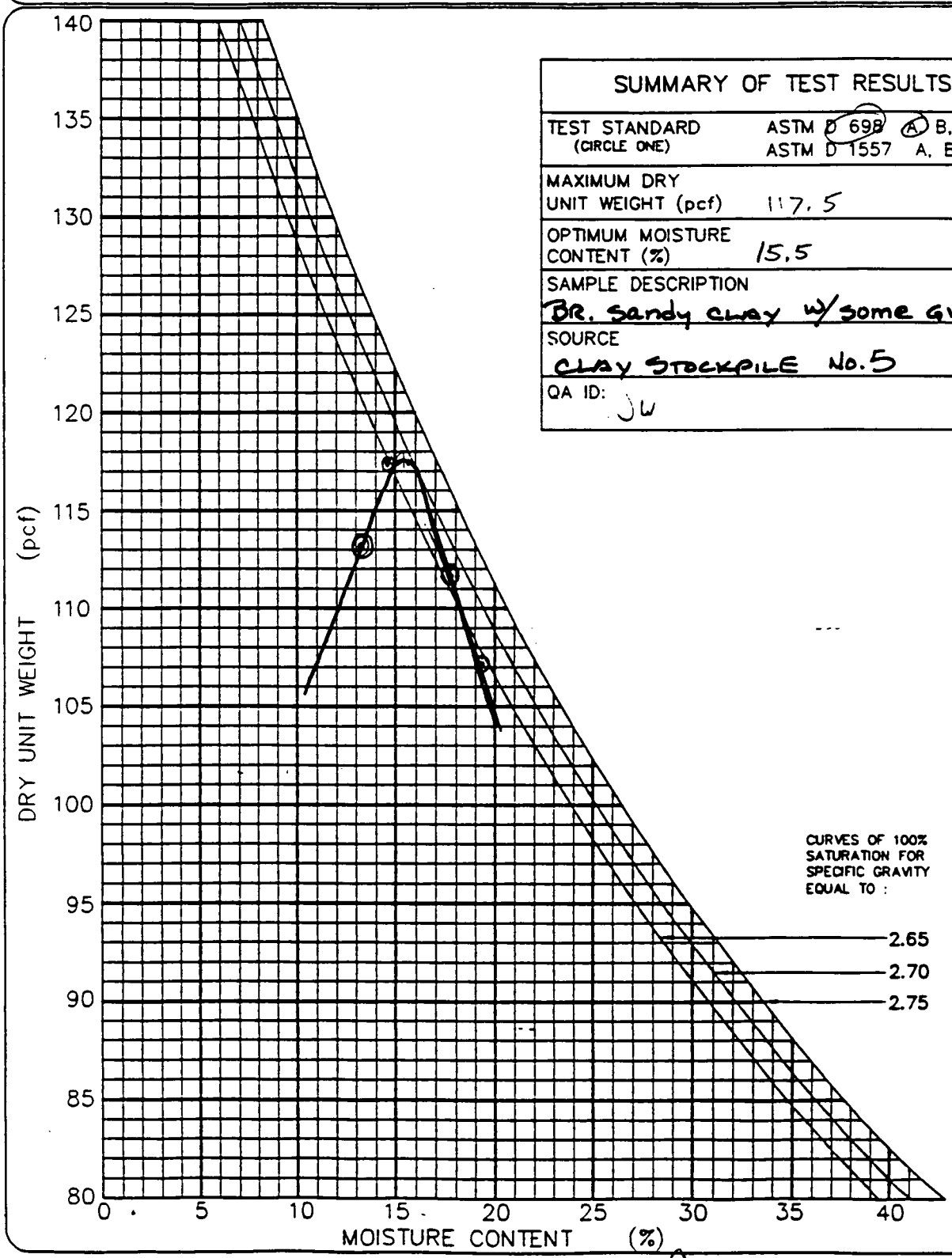
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-24



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	117.5
OPTIMUM MOISTURE CONTENT (%)	15.5
SAMPLE DESCRIPTION	BR. sandy clay w/some GVL
SOURCE	CLAY STOCKPILE No.5
QA ID:	JW

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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: 23 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-25

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	5				
A	WT. OF TARE	7.5				
B	WT. OF WET SOIL & TARE	199.9				
C	WT. OF DRY SOIL & TARE	175.6				
D	WT. OF WATER = B-C	24.3				
E	WT. OF DRY SOIL = C-A	168.1				
F	MOISTURE CONTENT = (D/E) X 100	14.5 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	363.9				
C	WT. OF DRY SOIL & TARE	335.2				
D	WT. OF WATER = B-C	28.7				
E	WT. OF DRY SOIL = C-A	203.2				
F	MOISTURE CONTENT = (D/E) X 100	14.1 ✓				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-25

SOIL SAMPLE SIZE TOTAL SAMPLE WGHT = 23,922.9 gms
> #4 SAMPLE WGHT = 3057.3 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		5	5
WT. OF DRY SAMPLE PLUS TARE	(grams)	175.6	62.2
WT. OF TARE	(grams)	7.5	7.5
WT. OF DRY SAMPLE	(grams)	168.1	54.7

SIEVE ANALYSIS QA ID: PKO/KW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	0	100		100
1½"	37.5	644.2	2.7	97.3		
1"	25.0	805.5	3.4	96.6		
¾"	19.0	1035.9	4.3	95.7		90-100
½"	12.5	1374.2	5.7	94.3		
⅜"	9.5	1670.2	7.0	93.0		
4	4.75	2692.5	11.3	88.7		
10	2.00	18.0	10.7	89.3	79.2	
20	0.850	25.7	15.3	84.7	75.1	
40	0.425	32.8	19.5	80.5	71.4	
60	0.250	38.7	23.0	77.0	68.3	
100	0.150	45.8	27.2	72.8	64.6	
200	0.075	54.2	32.2	67.8	60.1	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

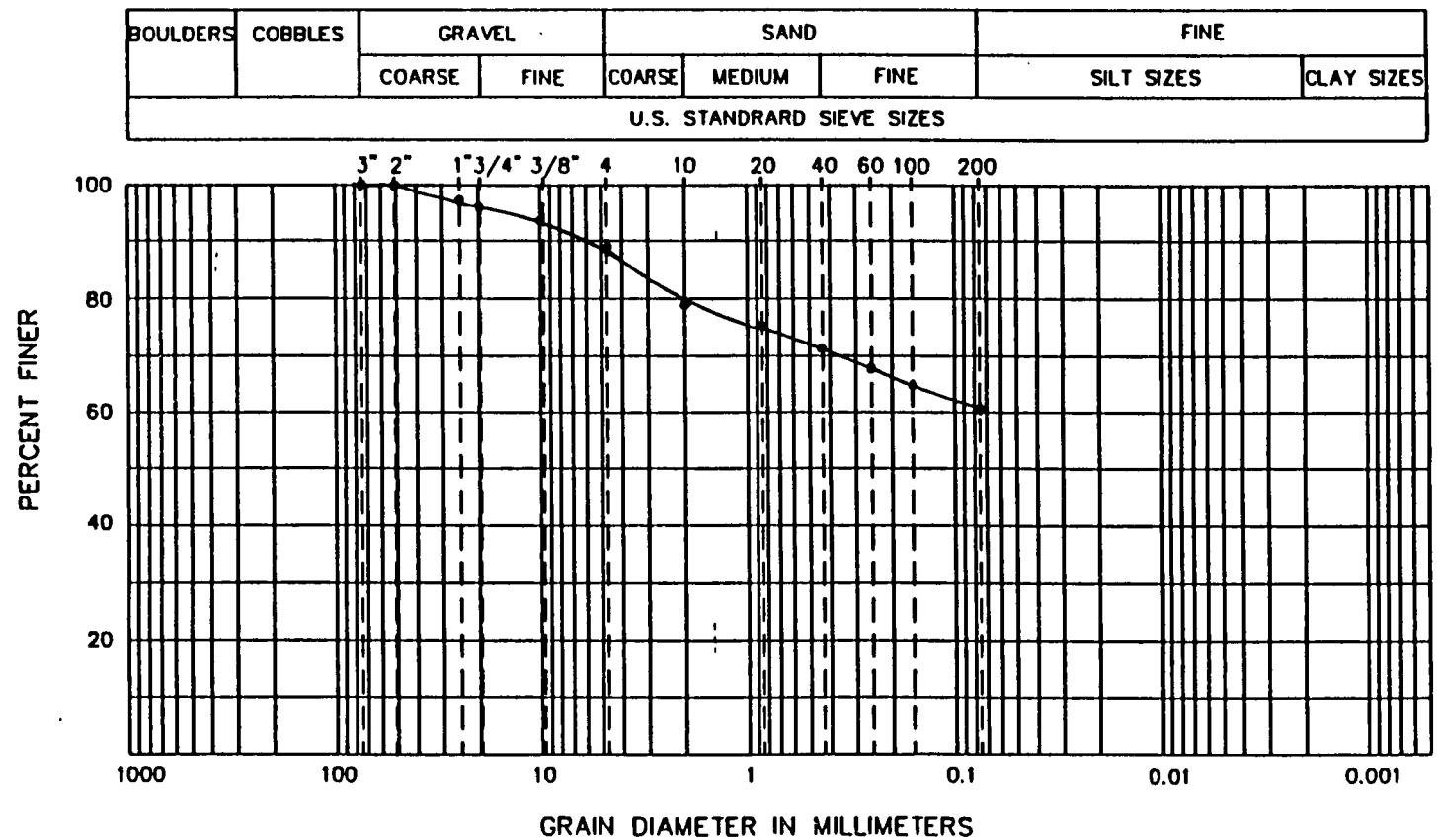
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 28 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-25 QA ID: KW

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	97.3
1-in.	96.6
3/4-in.	95.7
1/2-in.	94.3
3/8-in.	93.0
NO. 4	88.7
NO. 10	79.2
NO. 20	75.1
NO. 40	71.4
NO. 60	68.3
NO. 100	64.6
NO. 200	60.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY W/ SOME GVL.

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CHECKED BY: BN

SHEET NO. 2 OF 2

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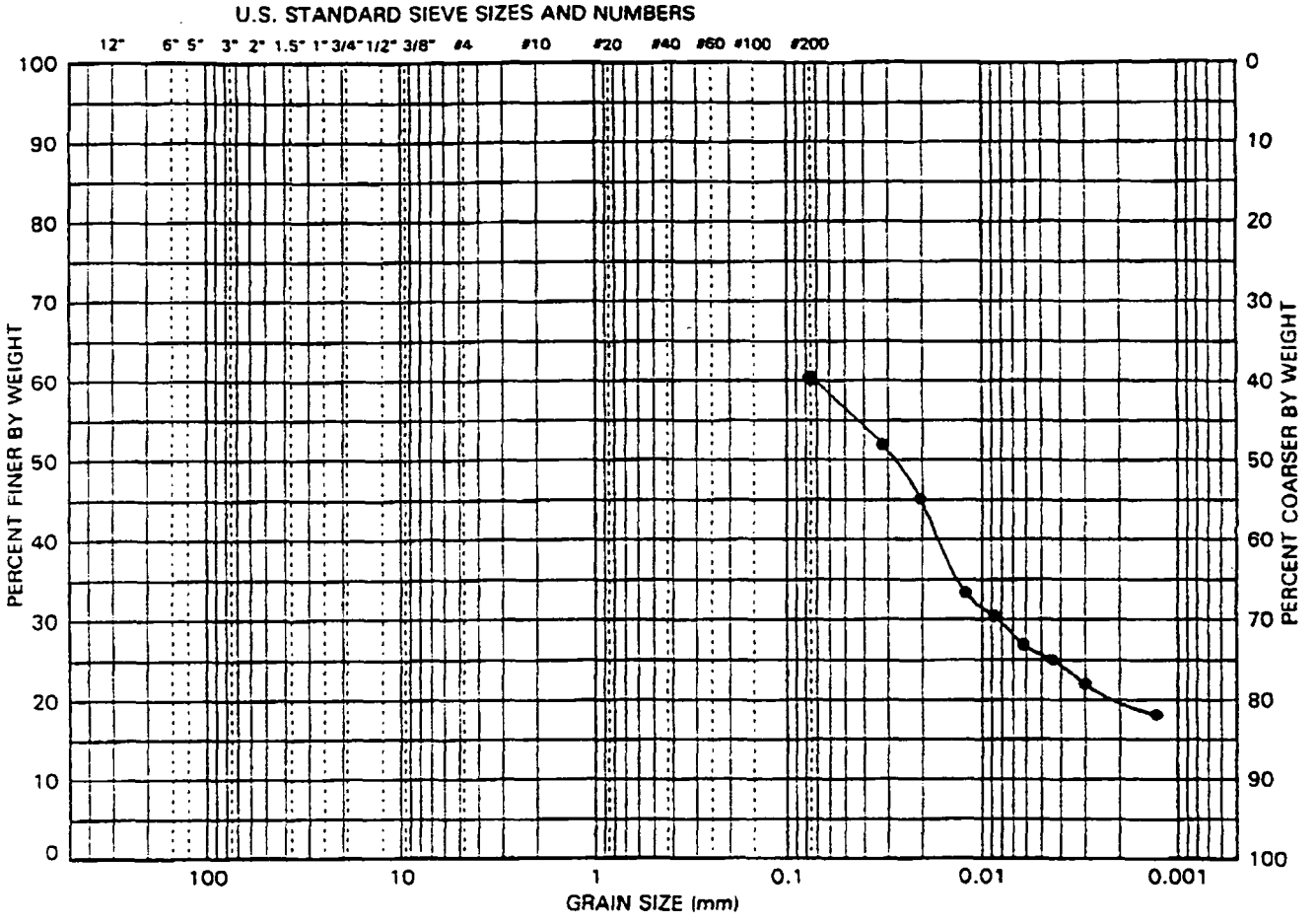
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID LP-25	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO. 97G229	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:			SILT (%)
			CLAY(%) 20.1
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

RECEIVED AUG 01 1997

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															44	26	20	

NOTES:

TOTAL P.12

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

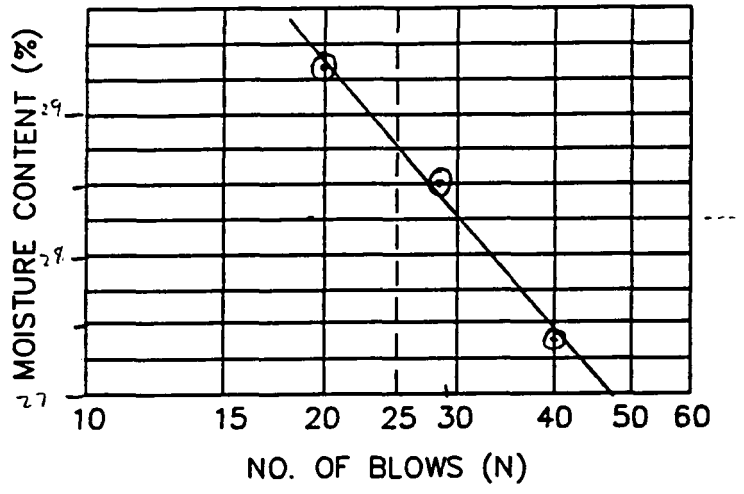
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-25

LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.1	3.9	4.3	
A	WT. OF TARE	(grams)	21.07	21.01	21.36	
B	WT. OF WET SOIL & TARE	(grams)	34.75	32.74	33.05	
C	WT. OF DRY SOIL & TARE	(grams)	31.81	30.14	30.40	
D	WT. OF WATER = B-C	(grams)	2.94	2.6	2.65	
E	WT. OF DRY SOIL = C-A	(grams)	10.74	9.13	9.04	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.4 ✓	28.5 ✓	29.3 ✓	
N	NUMBER OF BLOWS		40	29	20	

DRYING TARE NO.



CURING TARE NO.

1-J

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.0	3.7		
A	WT. OF TARE	(grams)	21.11	21.29		
B	WT. OF WET SOIL & TARE	(grams)	27.52	26.94		
C	WT. OF DRY SOIL & TARE	(grams)	26.63	26.19		
D	WT. OF WATER = B-C	(grams)	.89	.75		
E	WT. OF DRY SOIL = C-A	(grams)	5.52	4.9		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.1 ✓	15.3 ✓		

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 13

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 DATE: 26 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-25

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

QA ID: SQ

	WATER ADDED	(ml)	50	100	150	200	250
A	WT. OF SOIL & MOLD	(grams)	3929.2	4019.0	4096.0	4059.7	
B	WT. OF MOLD	(grams)	2047.3	2047.3	2047.3	2047.3	2047.3
C	WT. OF SOIL = A - B	(grams)	1,880.9	1971.7	2048.7	2012.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.1	130.1	135.2	132.8	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.8 ✓	115.7 ✓	118.4 ✓	113.8 ✓	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: SQ

	TARE NO.		28	6	34	104	
F	WT. OF TARE	(grams)	8.2	7.6	8.3	8.3	
G	WT. OF WET SOIL & TARE	(grams)	202.12	202.5	200.4	199.6	
H	WT. OF DRY SOIL & TARE	(grams)	184.54	181.03	176.47	172.27	
I	WT. OF WATER = G - H	(grams)	17.58	21.47	23.93	27.33	
J	WT. DRY SOIL = H - F	(grams)	176.34	173.43	168.17	163.97	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.0 ✓	12.4 ✓	14.2 ✓	16.7 ✓	

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: [illegible] SHEET NO. 1 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

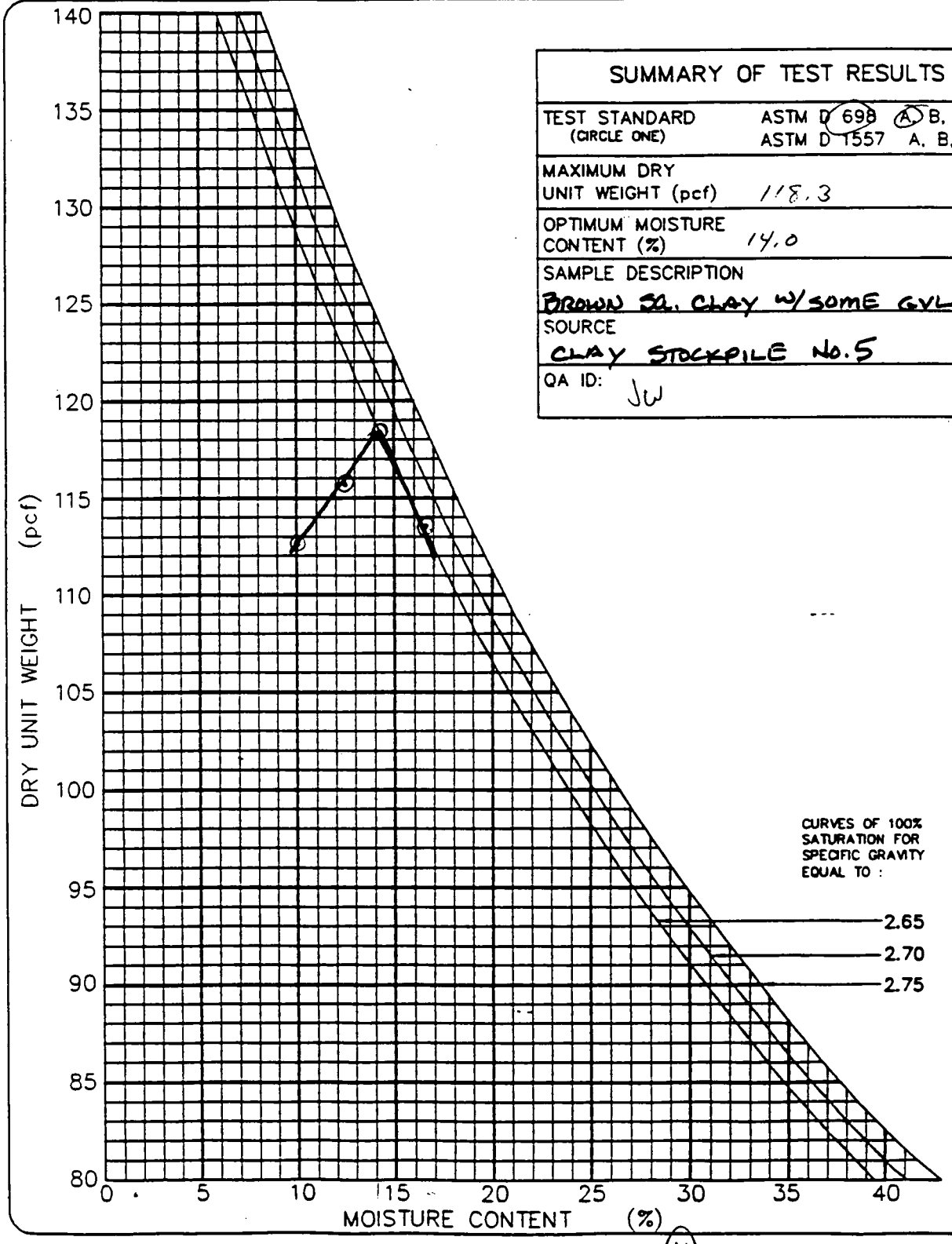
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-25



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	118.3
OPTIMUM MOISTURE CONTENT (%)	14.0
SAMPLE DESCRIPTION	BROWN SA. CLAY W/SOME GVL
SOURCE	CLAY STOCKPILE NO.5
QA ID:	JW

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

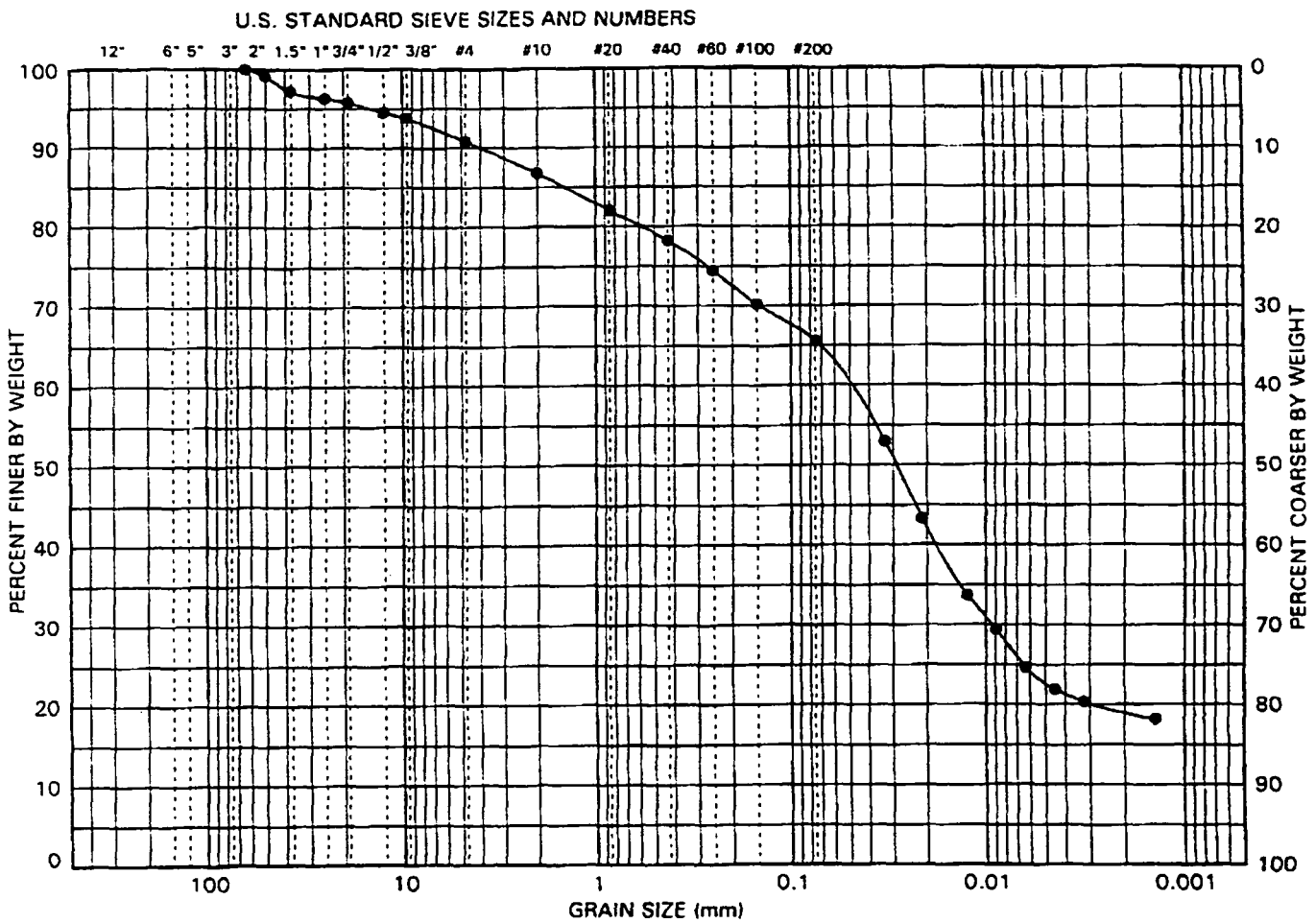
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/04/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-25A	LIQUID LIMIT (%)	32	SOIL FRACTIONS: GRAVEL (%)	9.2
LAB. SAMPLE NO.	97G225	PLASTIC LIMIT (%)	18	SAND (%)	25.3
SAMPLE DEPTH (ft)		PLASTICITY INDEX	14	FINES (%)	65.5
SOIL CLASSIFICATION:				SILT (%)	46.4
CL - Sandy Lean Clay				CLAY(%)	19.1
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	99	97	96	96	95	94	91	87	82	78	74	70	66	59	42	23	19	

NOTES:

GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

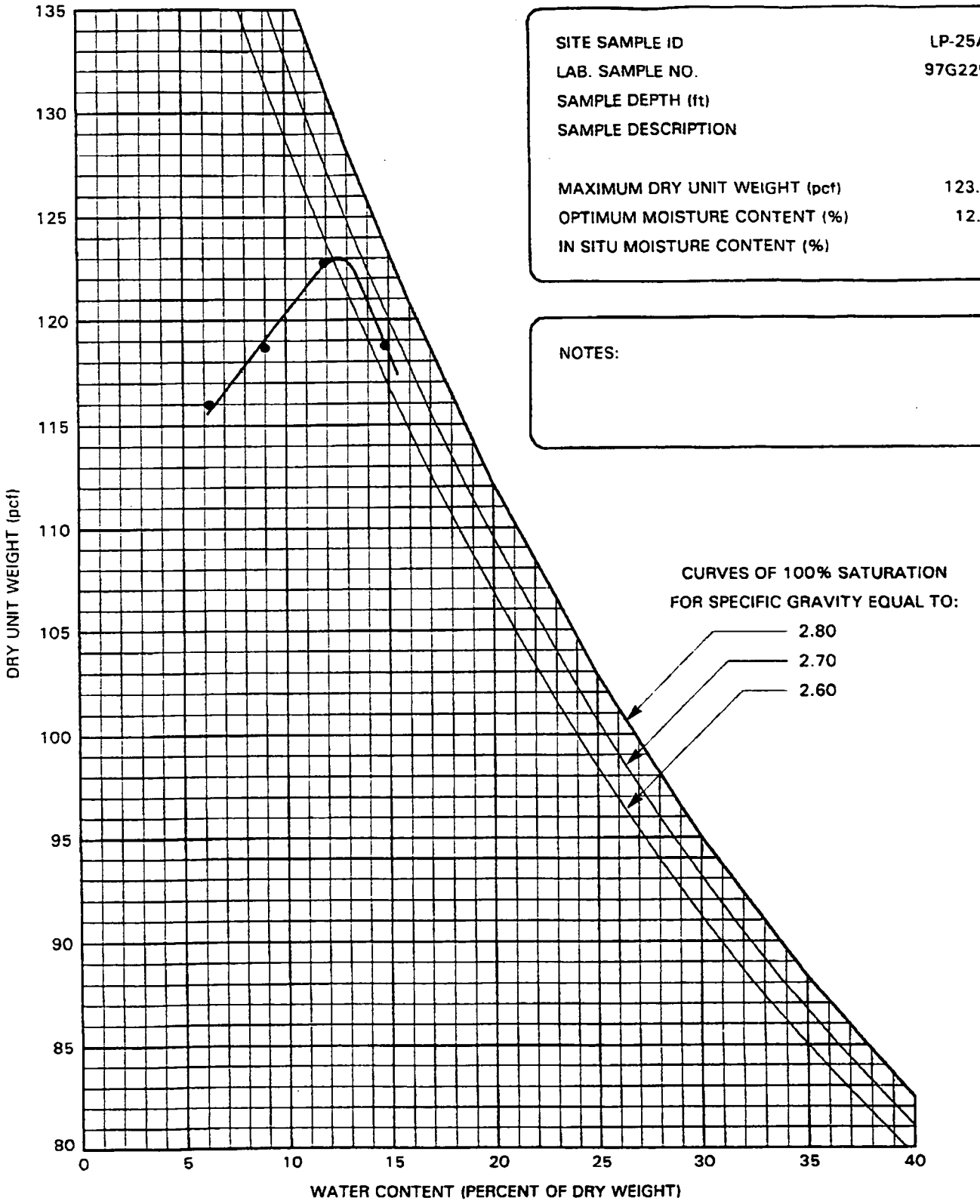
GS FORM: 4MD1 08/04/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-25A
LAB. SAMPLE NO.	97G225
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	123.0
OPTIMUM MOISTURE CONTENT (%)	12.7
IN SITU MOISTURE CONTENT (%)	

NOTES:



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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: 23 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-26

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	27				
A	WT. OF TARE	8.2				
B	WT. OF WET SOIL & TARE	198.6				
C	WT. OF DRY SOIL & TARE	168.0				
D	WT. OF WATER = B-C	30.6				
E	WT. OF DRY SOIL = C-A	159.8				
F	MOISTURE CONTENT = (D/E) X 100	19.1 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	344.5				
C	WT. OF DRY SOIL & TARE	313.9				
D	WT. OF WATER = B-C	30.6				
E	WT. OF DRY SOIL = C-A	181.9				
F	MOISTURE CONTENT = (D/E) X 100	16.8 ✓				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-26

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 28,158.0 gms
>#4 SAMPLE WT = 1549.8 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		27	27
WT. OF DRY SAMPLE PLUS TARE	(grams)	168.0	48.9
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	159.8	40.7

SIEVE ANALYSIS QA ID: KW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	184.2	0.7	99.3		
1"	25.0	359.0	1.3	98.7		
¾"	19.0	467.5	1.7	98.3		90-100
½"	12.5	649.6	2.3	97.7		
⅜"	9.5	822.6	2.9	97.1		
4	4.75	1393.7	4.9	95.1		
10	2.00	8.2	5.1	94.9	90.2	
20	0.850	13.1	8.2	91.8	87.3	
40	0.425	17.8	11.1	88.9	84.5	
60	0.250	22.5	14.1	85.9	81.7	
100	0.150	30.5	19.1	80.9	76.9	
200	0.075	40.5	25.3	74.7	71.0	50-100

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

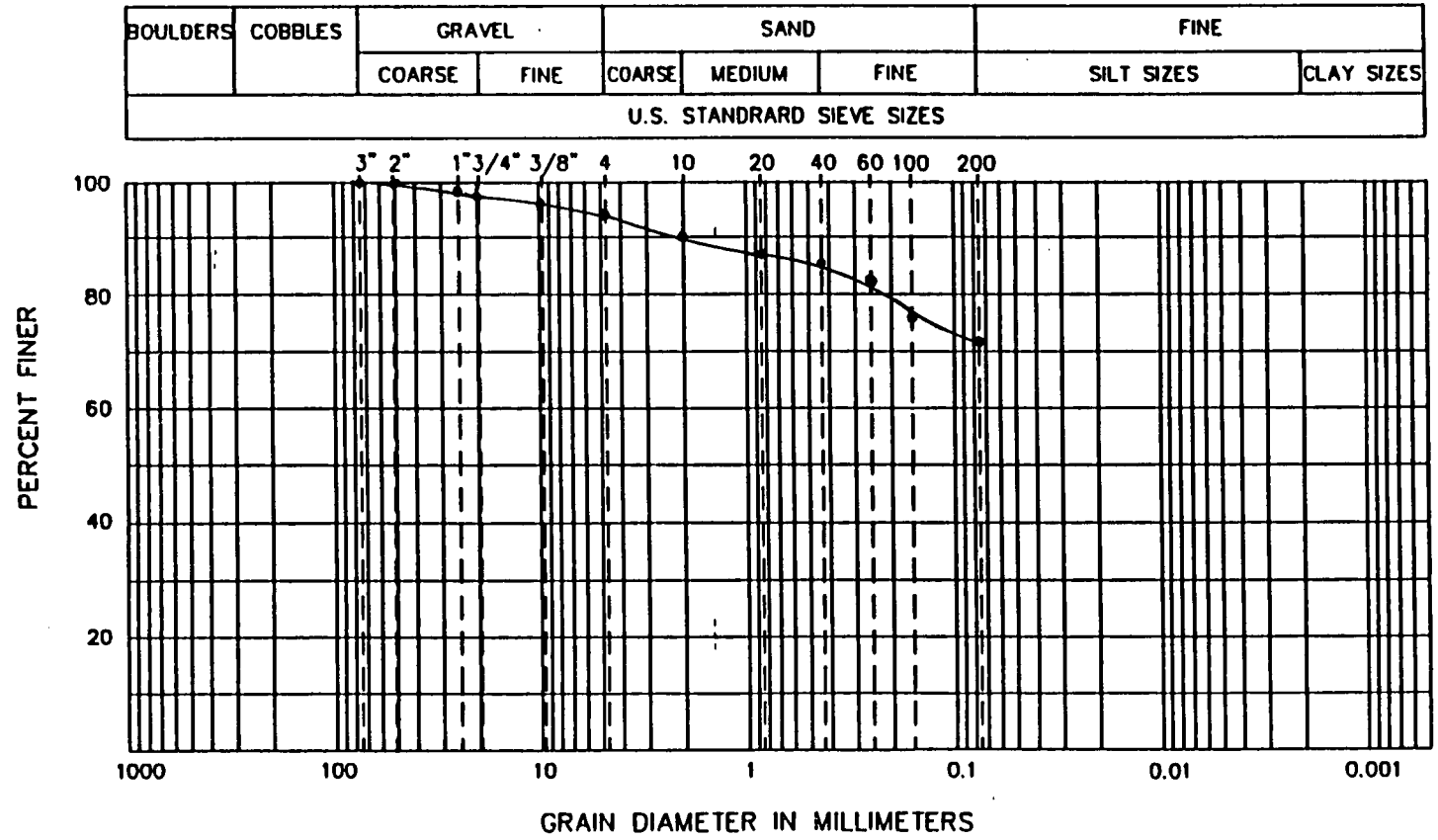
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 28 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-26 QA ID: KW

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 28

(PL) 16

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.3
1-in.	98.7
3/4-in.	98.3
1/2-in.	97.7
3/8-in.	97.1
NO. 4	95.1
NO. 10	90.2
NO. 20	87.3
NO. 40	84.5
NO. 60	81.7
NO. 100	76.4
NO. 200	71.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN LEAN CLAY (CL) W/ SAND

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SHEET NO. 2 OF 2

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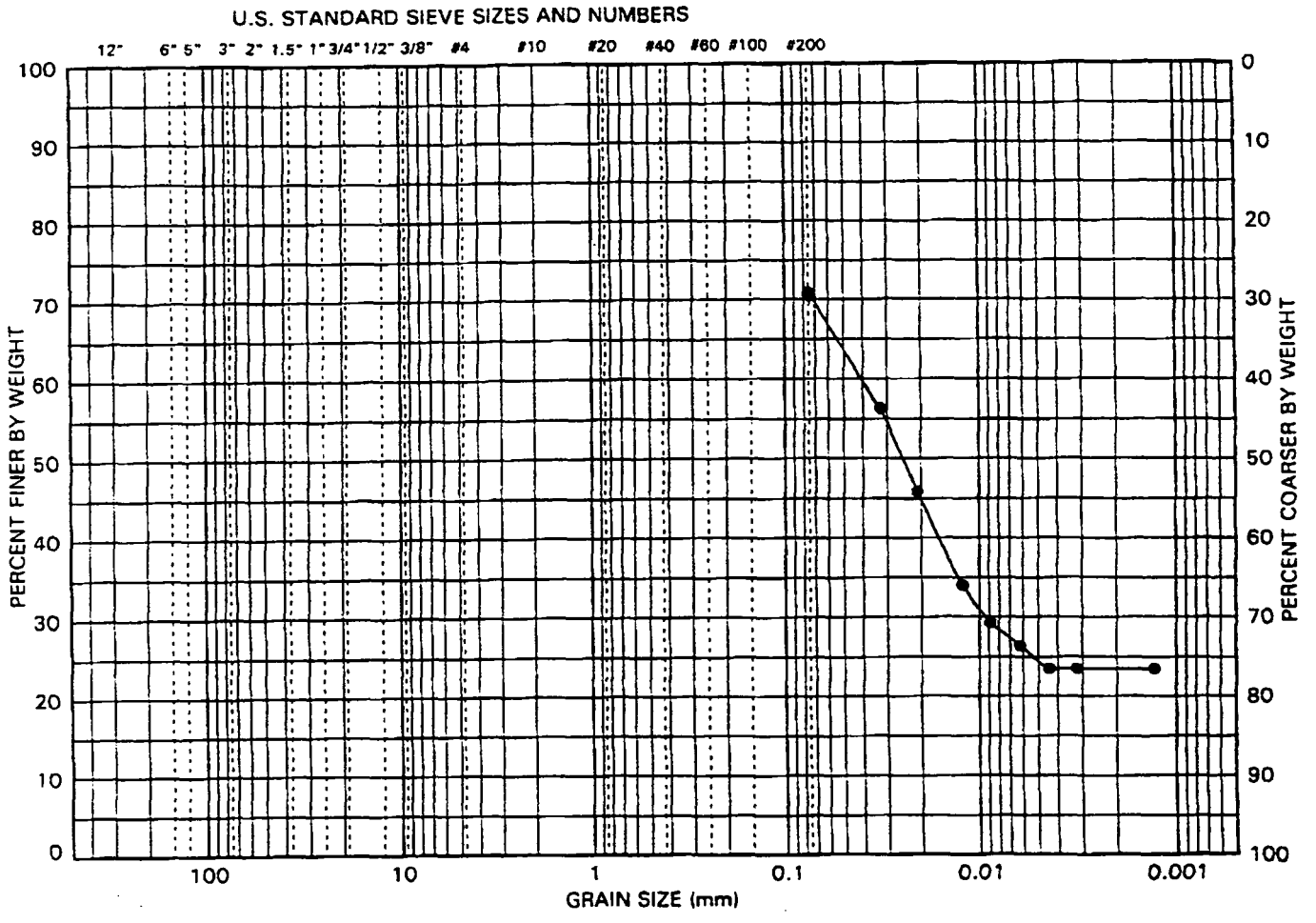
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: G00166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-26	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G231	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 23.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															45	25	24	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 7 day 31 month 97 year

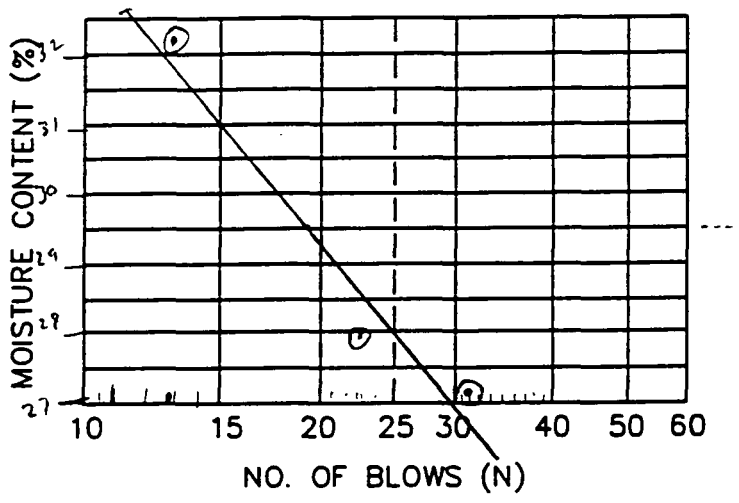
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-26

LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		3.5	2.1	1.4	2.9
A	WT. OF TARE	(grams)	21.20	28.24	28.52	31.46
B	WT. OF WET SOIL & TARE	(grams)	33.77	41.80	39.90	44.71
C	WT. OF DRY SOIL & TARE	(grams)	31.08	38.56	37.42	41.48
D	WT. OF WATER = B-C	(grams)	2.69	3.24	2.48	3.23
E	WT. OF DRY SOIL = C-A	(grams)	9.88	10.32	8.90	10.02
F	MOISTURE CONTENT = (D/E)X100	(%)	27.2 ✓	27.7	27.9 ✓	32.2 ✓
N	NUMBER OF BLOWS		32	15	23	13

DRYING TARE NO.



CURING TARE NO.

1-H

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.8	1.1		
A	WT. OF TARE	(grams)	28.81	28.76		
B	WT. OF WET SOIL & TARE	(grams)	35.79	35.58		
C	WT. OF DRY SOIL & TARE	(grams)	34.87	34.63		
D	WT. OF WATER = B-C	(grams)	.92	.95		
E	WT. OF DRY SOIL = C-A	(grams)	6.06	5.87		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.2 ✓	16.2 ✓		

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 12

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 — DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-26

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

QA ID: JW

	WATER ADDED	(ml)	100	150	200	250	300
A	WT. OF SOIL & MOLD	(grams)		6100.9	6182.6	6178.0	6123.5
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1891.5	1973.2	1968.6	1914.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)		124.8	130.2	129.9	126.3
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		108.2 ✓	111.5 ✓	109.9 ✓	105.2 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			34	13	31	12
F	WT. OF TARE	(grams)		8.33	7.54	8.00	7.25
G	WT. OF WET SOIL & TARE	(grams)		166.70	[illegible]	186.86	213.36
H	WT. OF DRY SOIL & TARE	(grams)		145.72	198.73	159.33	178.93
I	WT. OF WATER = G - H	(grams)		20.98	32.12	27.53	34.43
J	WT. DRY SOIL = H - F	(grams)		137.39	191.19	151.33	171.68
K	MOISTURE CONTENT = (I/J) X 100	(%)		15.3 ✓	16.8 ✓	18.2 ✓	20.1 ✓

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1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

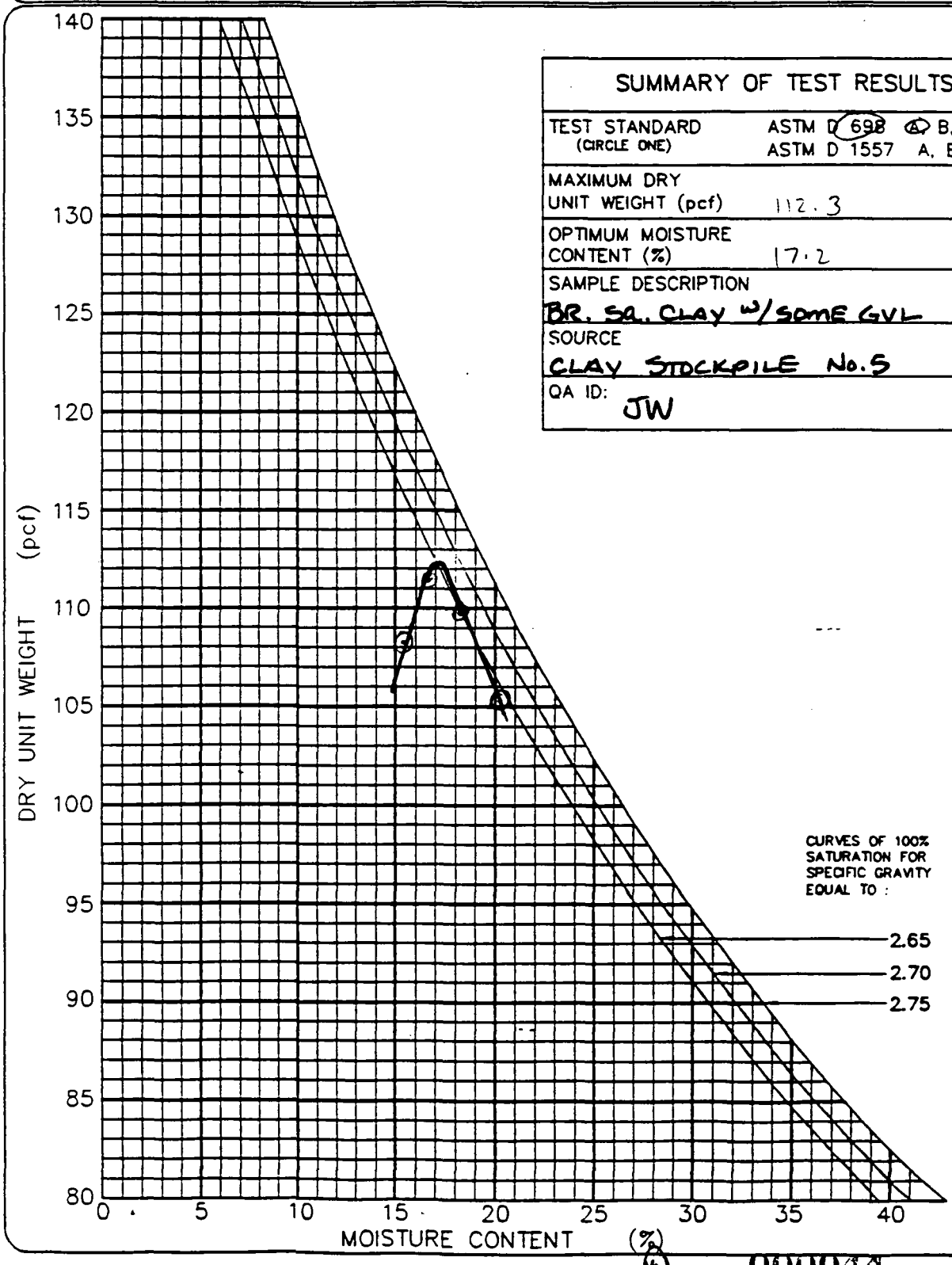
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-26



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	112.3
OPTIMUM MOISTURE CONTENT (%)	17.2
SAMPLE DESCRIPTION	BR. SA. CLAY w/SOME GVL
SOURCE	CLAY STOCKPILE No.5
QA ID:	JW

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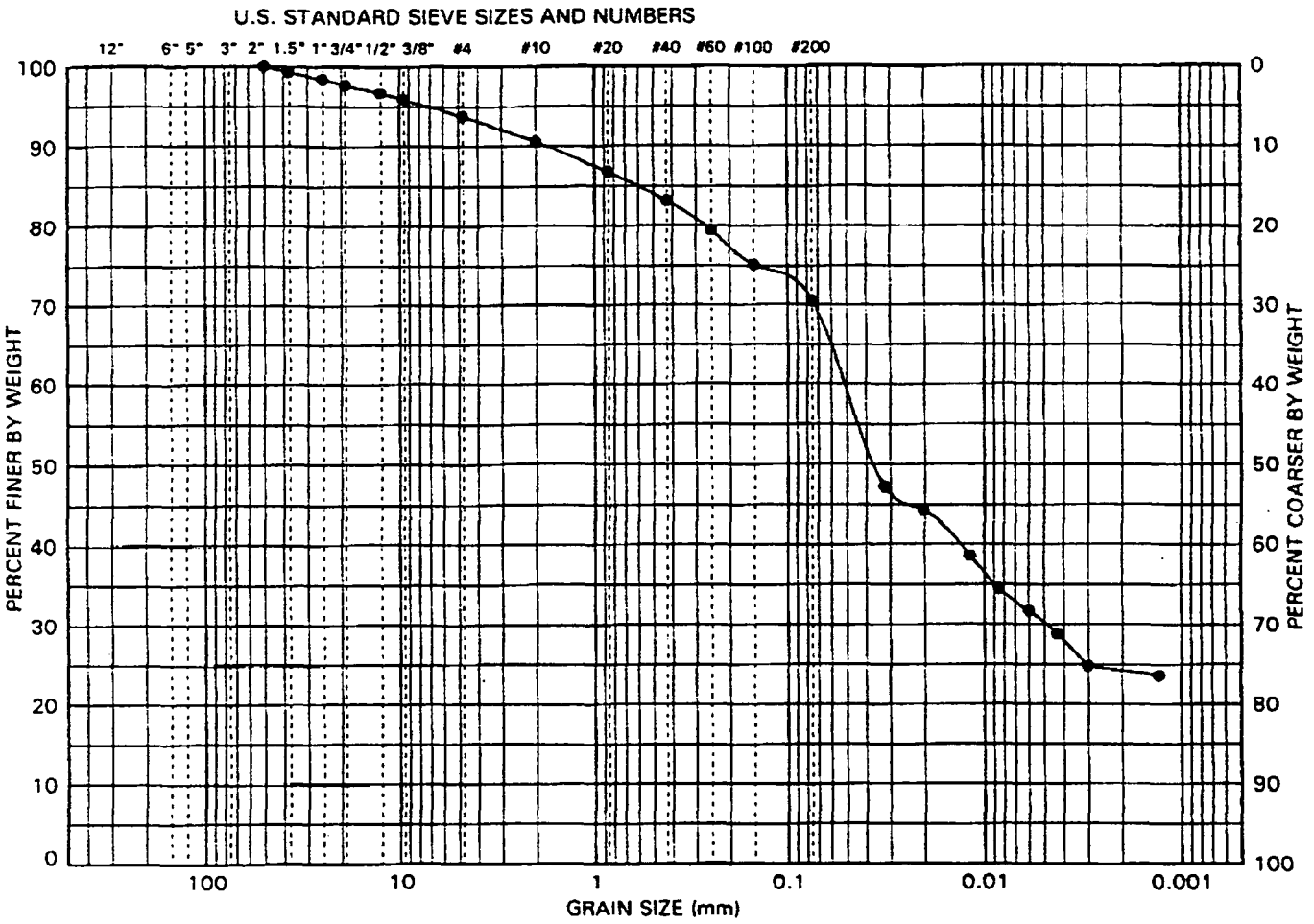
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/04/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-07.1	LIQUID LIMIT (%)	38	SOIL FRACTIONS	GRAVEL (%) 6.3
LAB. SAMPLE NO.	97G223	PLASTIC LIMIT (%)	18		SAND (%) 23.2
SAMPLE DEPTH (ft)		PLASTICITY INDEX	20		FINES (%) 70.5
SOIL CLASSIFICATION: CL - Sandy Lean Clay					SILT (%) 46.3
					CLAY(%) 24.2
					COEFF. UNIFORMITY (Cu)
					COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	99	98	98	97	96	94	91	87	83	79	75	71	59	44	30	24	

NOTES:

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Atlanta, Georgia

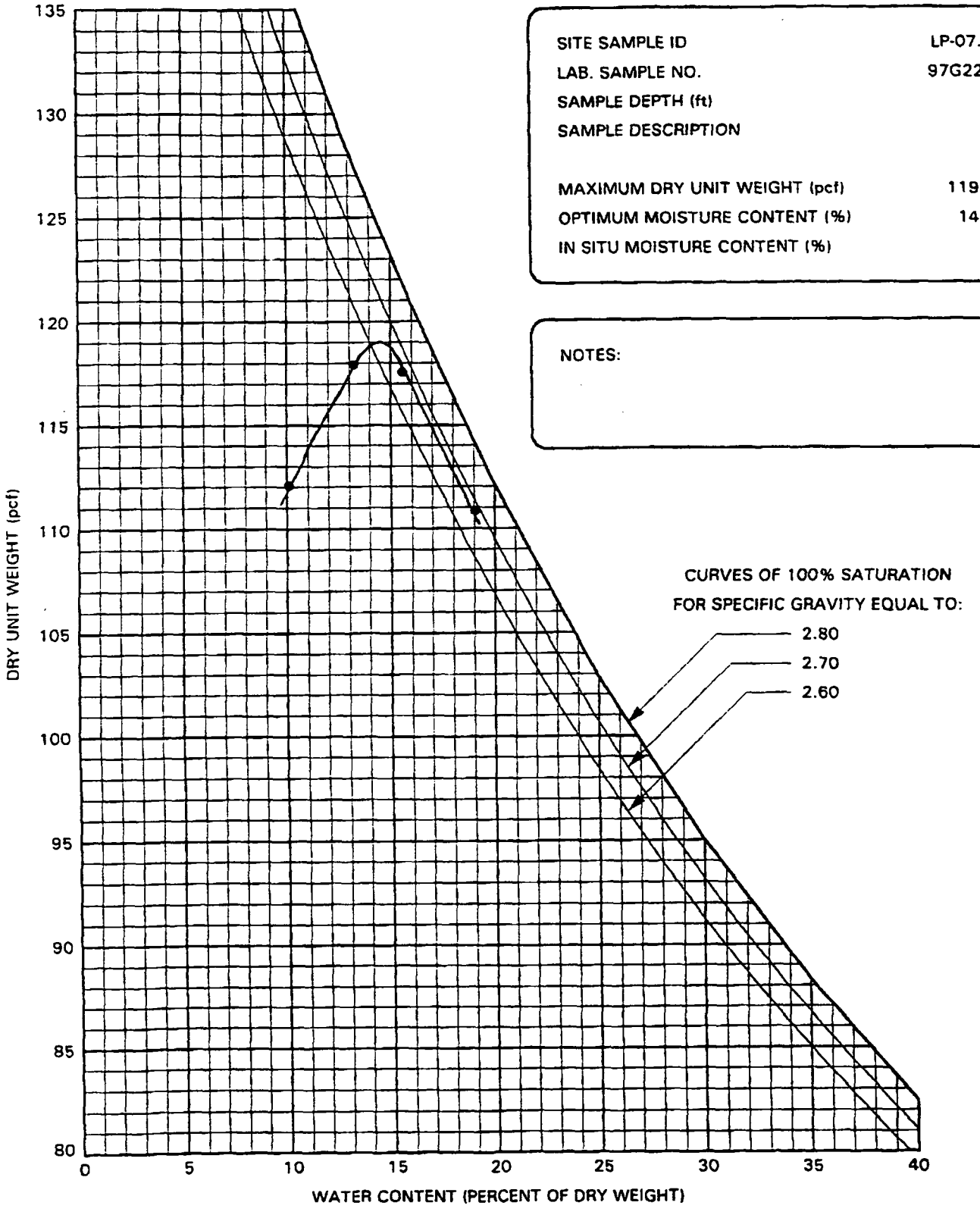
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 08/05/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A / D 4718



SITE SAMPLE ID	LP-07.1
LAB. SAMPLE NO.	97G223
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	119.0
OPTIMUM MOISTURE CONTENT (%)	14.5
IN SITU MOISTURE CONTENT (%)	

NOTES:

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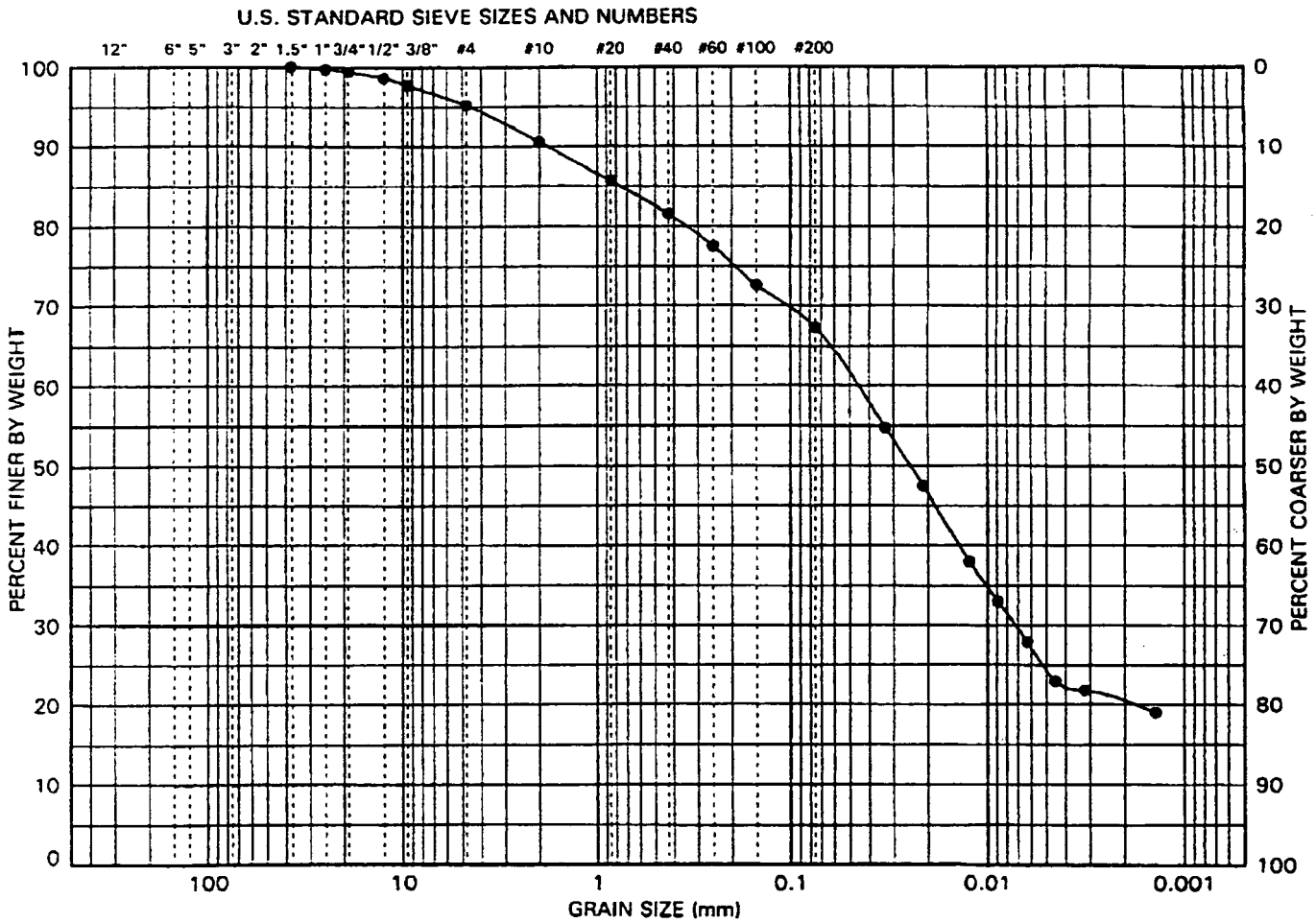
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/04/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	GRAVEL: COARSE	GRAVEL: FINE	SAND: COARSE	SAND: MEDIUM	SAND: FINE	FINES: SILT	FINES: CLAY

SITE SAMPLE ID	LP-07.2	LIQUID LIMIT (%)	35	SOIL FRACTIONS: GRAVEL (%)	4.8
LAB. SAMPLE NO.	97G224	PLASTIC LIMIT (%)	19	SAND (%)	27.9
SAMPLE DEPTH (ft)		PLASTICITY INDEX	16	FINES (%)	67.3
SOIL CLASSIFICATION: CL - Sandy Lean Clay				SILT (%)	47.1
				CLAY(%)	20.2
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	99	99	98	95	91	86	82	77	73	67	61	46	24	20	

NOTES:

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Atlanta, Georgia

FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

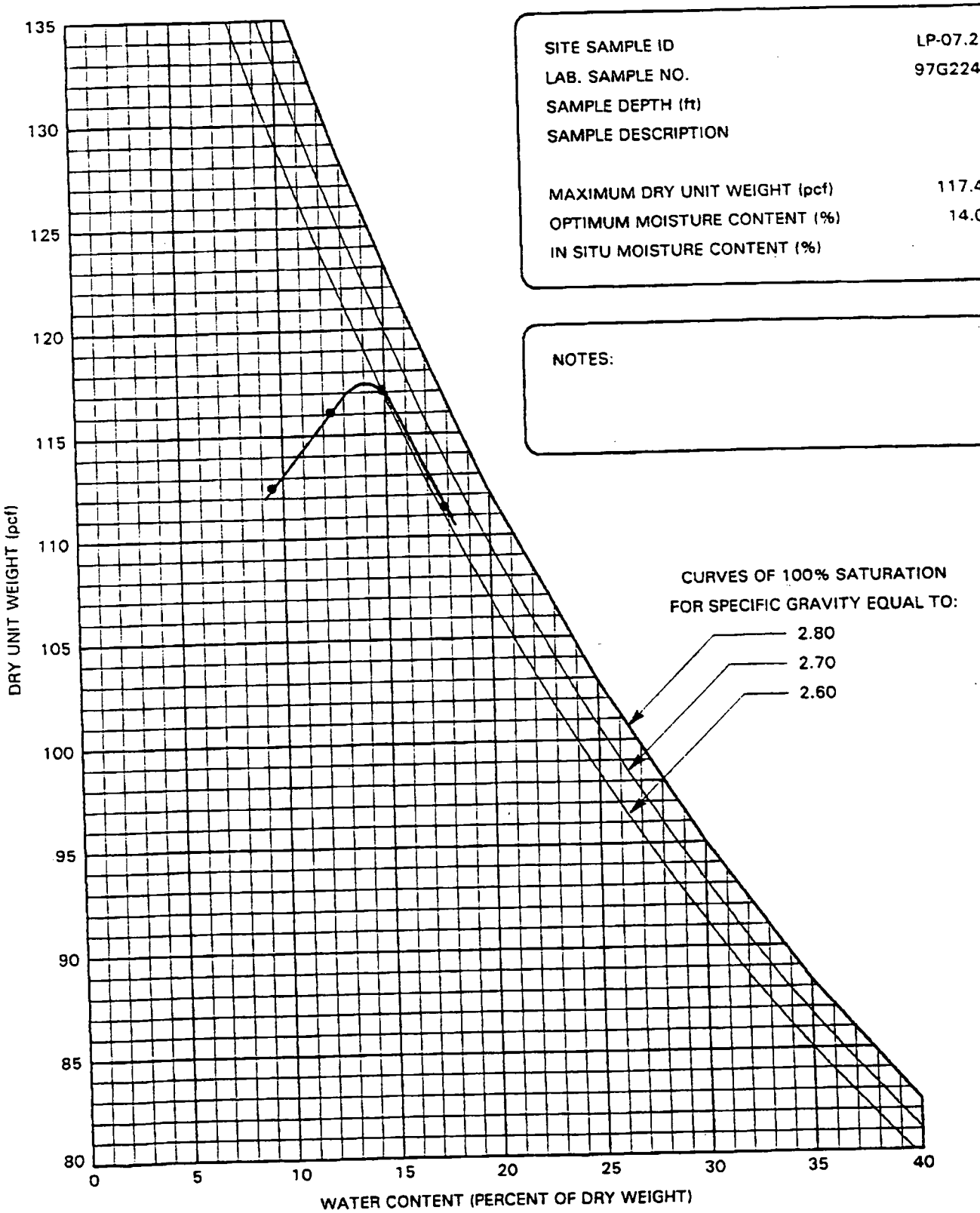
GS FORM: 4MD1 08/04/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-07.2
LAB. SAMPLE NO.	97G224
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	117.4
OPTIMUM MOISTURE CONTENT (%)	14.0
IN SITU MOISTURE CONTENT (%)	

NOTES:



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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: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-27

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	33				
A	WT. OF TARE	8.3				
B	WT. OF WET SOIL & TARE	196.8				
C	WT. OF DRY SOIL & TARE	172.0				
D	WT. OF WATER = B-C	24.8				
E	WT. OF DRY SOIL = C-A	163.7				
F	MOISTURE CONTENT = (D/E) X 100	~~15.71~~ 15.1 ✓	P 9/28/97			

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	287.4				
C	WT. OF DRY SOIL & TARE	265.9				
D	WT. OF WATER = B-C	21.5				
E	WT. OF DRY SOIL = C-A	133.9				
F	MOISTURE CONTENT = (D/E) X 100	16.1 ✓				

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 25 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-27

SOIL SAMPLE SIZE > TOTAL SAMPLE WT = 33,171.8 gms
#4 SAMPLE WT = 3080.0 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		33	33
WT. OF DRY SAMPLE PLUS TARE	(grams)	172.0	57.3
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	163.7	49.0

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	200.6	0.6	99.4		100
1½"	37.5	770.3	2.3	97.7		
1"	25.0	1080.6	3.3	96.7		
¾"	19.0	1398.2	4.2	95.8		90-100
½"	12.5	1829.7	5.5	94.5		
⅜"	9.5	2097.2	6.3	93.7		
4	4.75	2982.5	9.0	91.0		
10	2.00	18.4	11.2	88.8	80.8	
20	0.850	23.6	14.4	85.6	77.9	
40	0.425	29.3	17.9	82.1	74.7	
60	0.250	34.0	20.8	79.2	72.1	
100	0.150	40.3	24.6	75.4	68.6	
200	0.075	48.2	29.4	70.6	~~64.3~~ 64.2	50-100

%FINER = 100 − Σ % RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

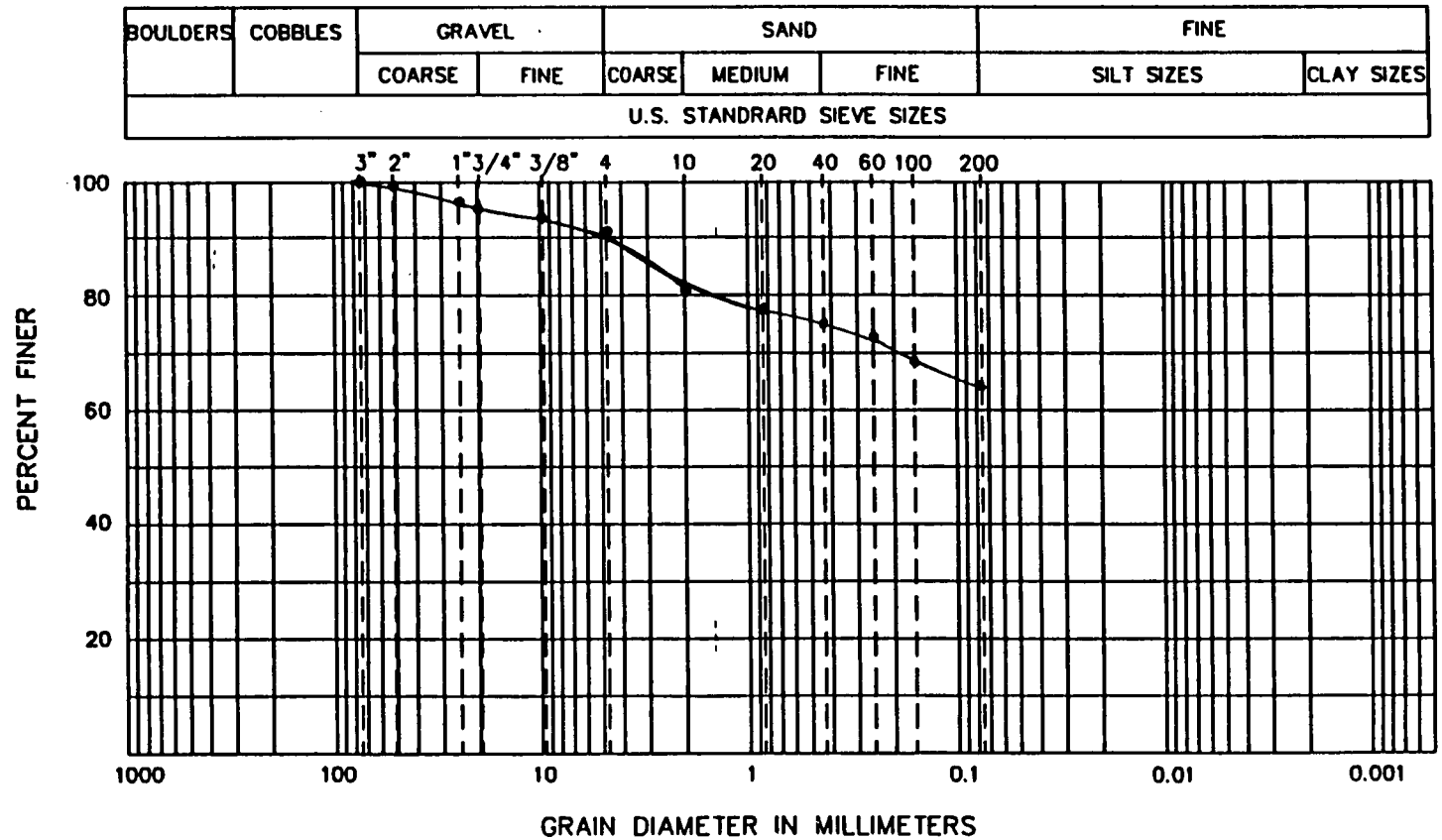
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 28 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-27 QA ID: KW

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	99.4
1 1/2-in.	97.7
1-in.	96.7
3/4-in.	95.8
1/2-in.	94.5
3/8-in.	93.7
NO. 4	91.0
NO. 10	80.8
NO. 20	77.9
NO. 40	74.7
NO. 60	72.1
NO. 100	68.6
NO. 200	64.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) W/ SOME GVL.

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SHEET NO. 2 OF 2

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Atlanta, Georgia

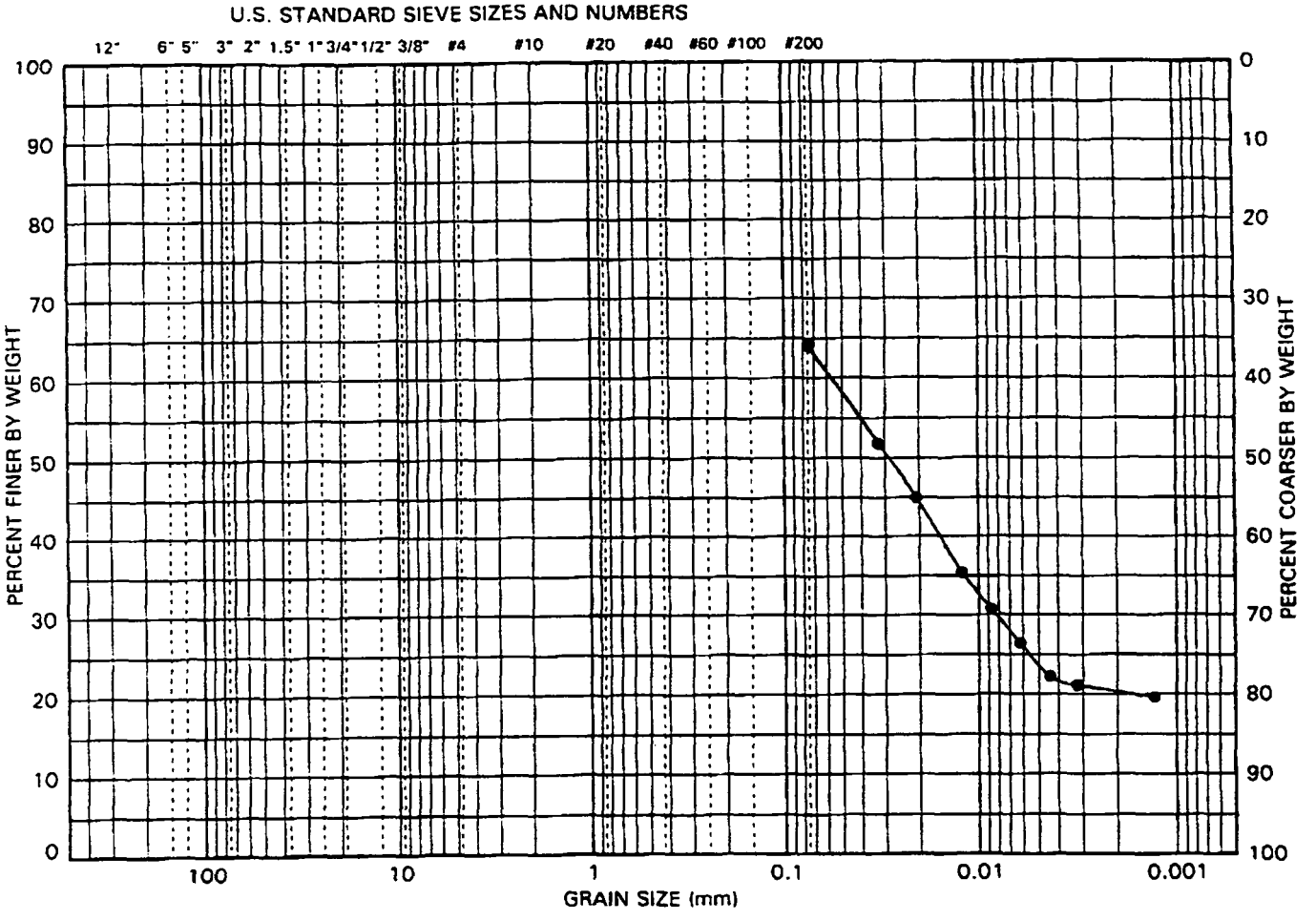
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-27	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G232	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 20.3
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															44	24	20	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 7 day 31 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-27

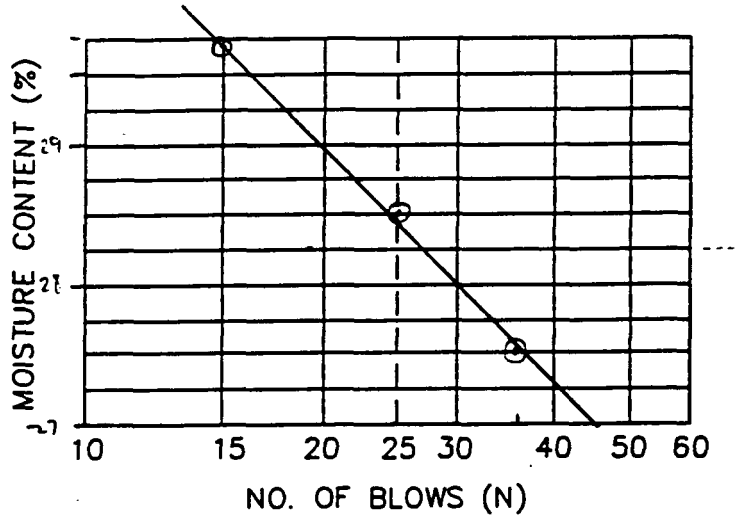
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.9	3.8	3.4	3.6
A	WT. OF TARE	(grams)	28.56	21.08	21.40	21.44
B	WT. OF WET SOIL & TARE	(grams)	40.96	31.99	31.50	32.92
C	WT. OF DRY SOIL & TARE	(grams)	38.25	29.64	29.26	30.29
D	WT. OF WATER = B-C	(grams)	2.71	2.35	2.24	2.63
E	WT. OF DRY SOIL = C-A	(grams)	9.69	8.56	7.86	8.85
F	MOISTURE CONTENT = (D/E)X100	(%)	28.0 ✓	27.5 ✓	28.5 ✓	29.7 ✓
N	NUMBER OF BLOWS		22	36	25	15

VOID 7/31/97

DRYING TARE NO.



CURING TARE NO.

1-F

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.2	3.3		
A	WT. OF TARE	(grams)	21.19	21.44		
B	WT. OF WET SOIL & TARE	(grams)	32.49	28.98		
C	WT. OF DRY SOIL & TARE	(grams)	30.93	27.96		
D	WT. OF WATER = B-C	(grams)	1.56	1.02		
E	WT. OF DRY SOIL = C-A	(grams)	9.74	6.52		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.0 ✓	15.6 ✓		

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 13

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 — DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-27

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

QA ID: JW

	WATER ADDED	(ml)	100	150	200	250	300
A	WT. OF SOIL & MOLD	(grams)		6087.3	6155.4	6218.9	6191.6
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1877.9	1946.0	2009.5	1982.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)		123.9	128.4	132.6	130.8
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		110.2 ✓	112.6 ✓	113.9 ✓	111.0 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			6	15	2	104
F	WT. OF TARE	(grams)		7.62	7.7	7.72	8.31
G	WT. OF WET SOIL & TARE	(grams)		190.01	262.20	265.28	209.05
H	WT. OF DRY SOIL & TARE	(grams)		169.91	230.93	228.96	178.72
I	WT. OF WATER = G - H	(grams)		20.1	31.27	36.32	30.33
J	WT. DRY SOIL = H - F	(grams)		162.29	223.23	221.24	170.41
K	MOISTURE CONTENT = (I/J) X 100	(%)		12.4 ✓	14.0 ✓	16.4 ✓	17.8 ✓

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: JW SHEET NO. 1 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

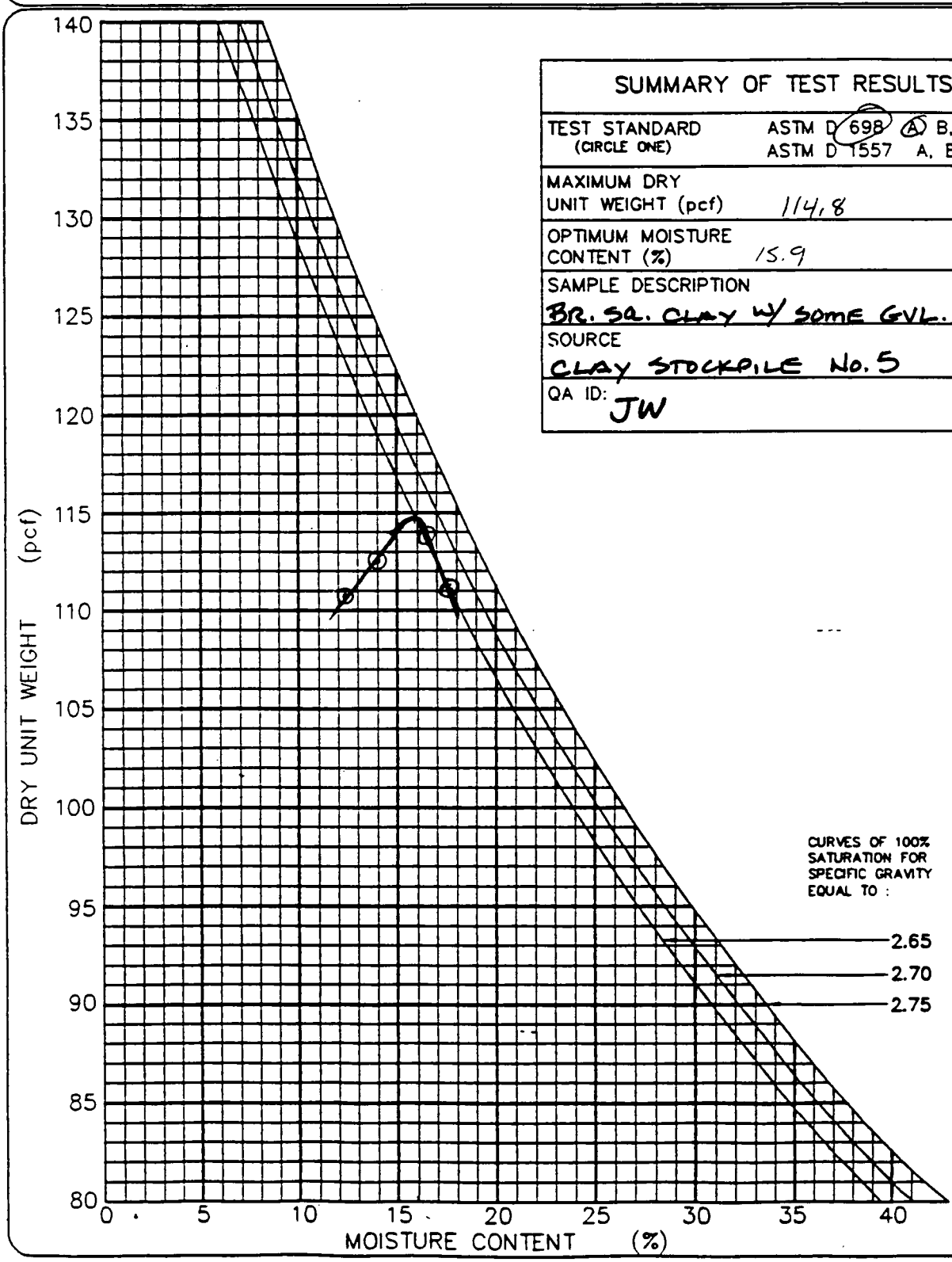
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day JULY month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-27



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	114.8
OPTIMUM MOISTURE CONTENT (%)	15.9
SAMPLE DESCRIPTION	BR. SA. CLAY W/ SOME GVL.
SOURCE	CLAY STOCKPILE No. 5
QA ID:	JW

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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: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-2B

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	14				
A	WT. OF TARE	~~198.2~~ 7.7				
B	WT. OF WET SOIL & TARE	198.2				
C	WT. OF DRY SOIL & TARE	170.0				
D	WT. OF WATER = B-C	28.2				
E	WT. OF DRY SOIL = C-A	162.3				
F	MOISTURE CONTENT = (D/E) X 100	17.4 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	IV				
A	WT. OF TARE	132.3				
B	WT. OF WET SOIL & TARE	306.8				
C	WT. OF DRY SOIL & TARE	281.2				
D	WT. OF WATER = B-C	25.6				
E	WT. OF DRY SOIL = C-A	148.9				
F	MOISTURE CONTENT = (D/E) X 100	17.2 ✓				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-2B

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 31,112.6 grams
>4 SAMPLE WT = 2,082.2 grams

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		14	14
WT. OF DRY SAMPLE PLUS TARE	(grams)	170.0	49.2
WT. OF TARE	(grams)	7.7	7.7
WT. OF DRY SAMPLE	(grams)	162.3	41.5

SIEVE ANALYSIS QA ID: KW/PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	Ø	100		100
1½"	37.5	130.0	0.4	99.6		
1"	25.0	284.3	0.9	99.1		
¾"	19.0	489.5	1.6	98.4		90-100
½"	12.5	858.1	2.8	97.2		
⅜"	9.5	1079.6	3.5	96.5		
4	4.75	1888.7	6.1	93.9		
10	2.00	10.3	7/28/97 ~~6.4~~ 6.3	@ 7/28/97 ~~93.6~~ 93.7	~~87.9~~ 88.0 @ 7/28/97	
20	0.850	15.4	9.5	90.5	85.0	
40	0.425	21.0	12.9	87.1	81.8	
60	0.250	25.8	15.9	84.1	79.0	
100	0.150	32.3	19.9	80.1	75.2	
200	0.075	40.5	25.0	75.0	70.4	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

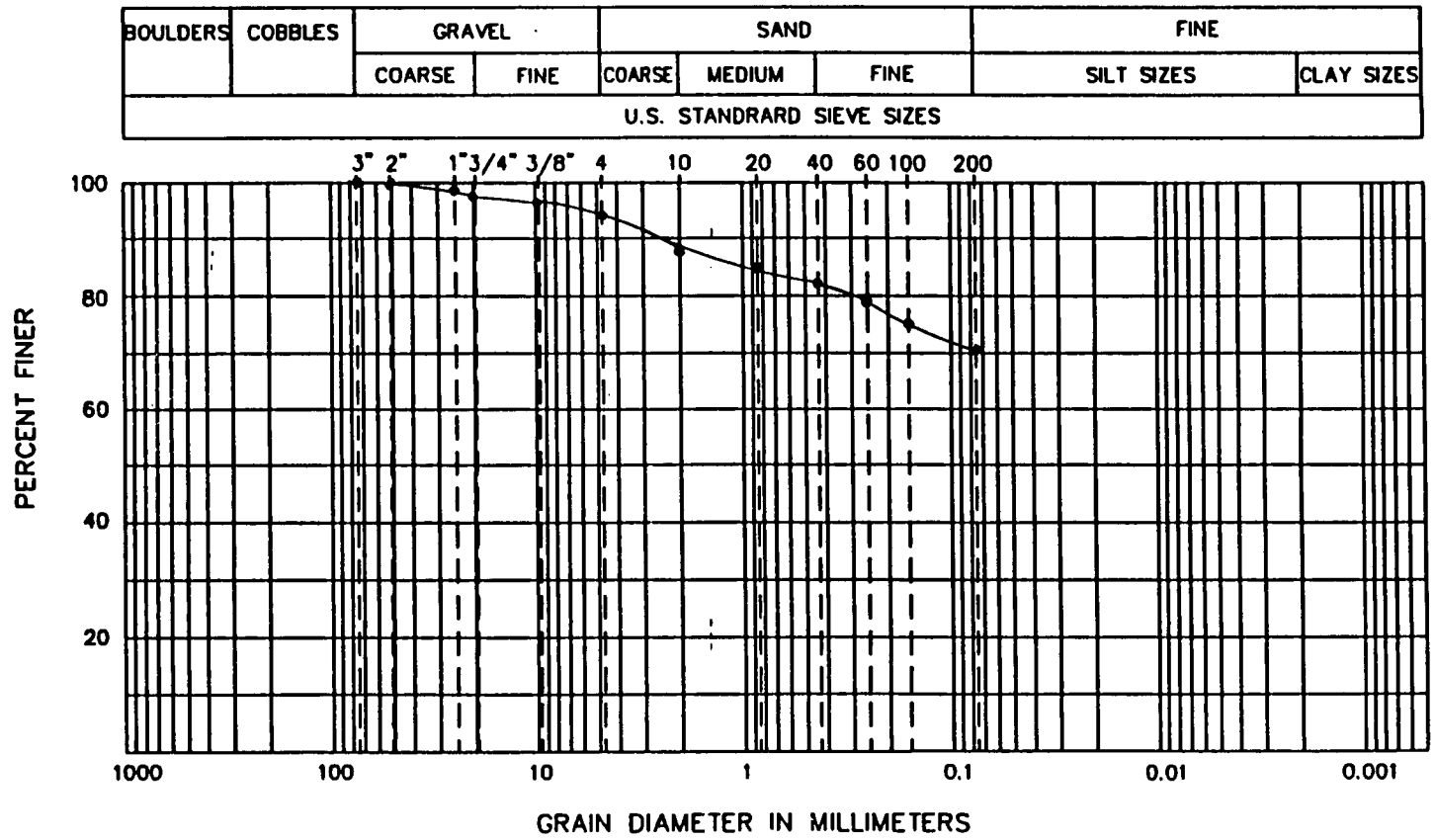
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 28 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-28 QA ID: KW

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 32

(PL) 16

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.6
1-in.	99.1
3/4-in.	98.4
1/2-in.	97.2
3/8-in.	96.5
NO. 4	93.9
NO. 10	88.0
NO. 20	85.0
NO. 40	81.8
NO. 60	79.0
NO. 100	75.2
NO. 200	70.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) W/ SOME GVL.

GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: BN SHEET NO. 2 OF 2

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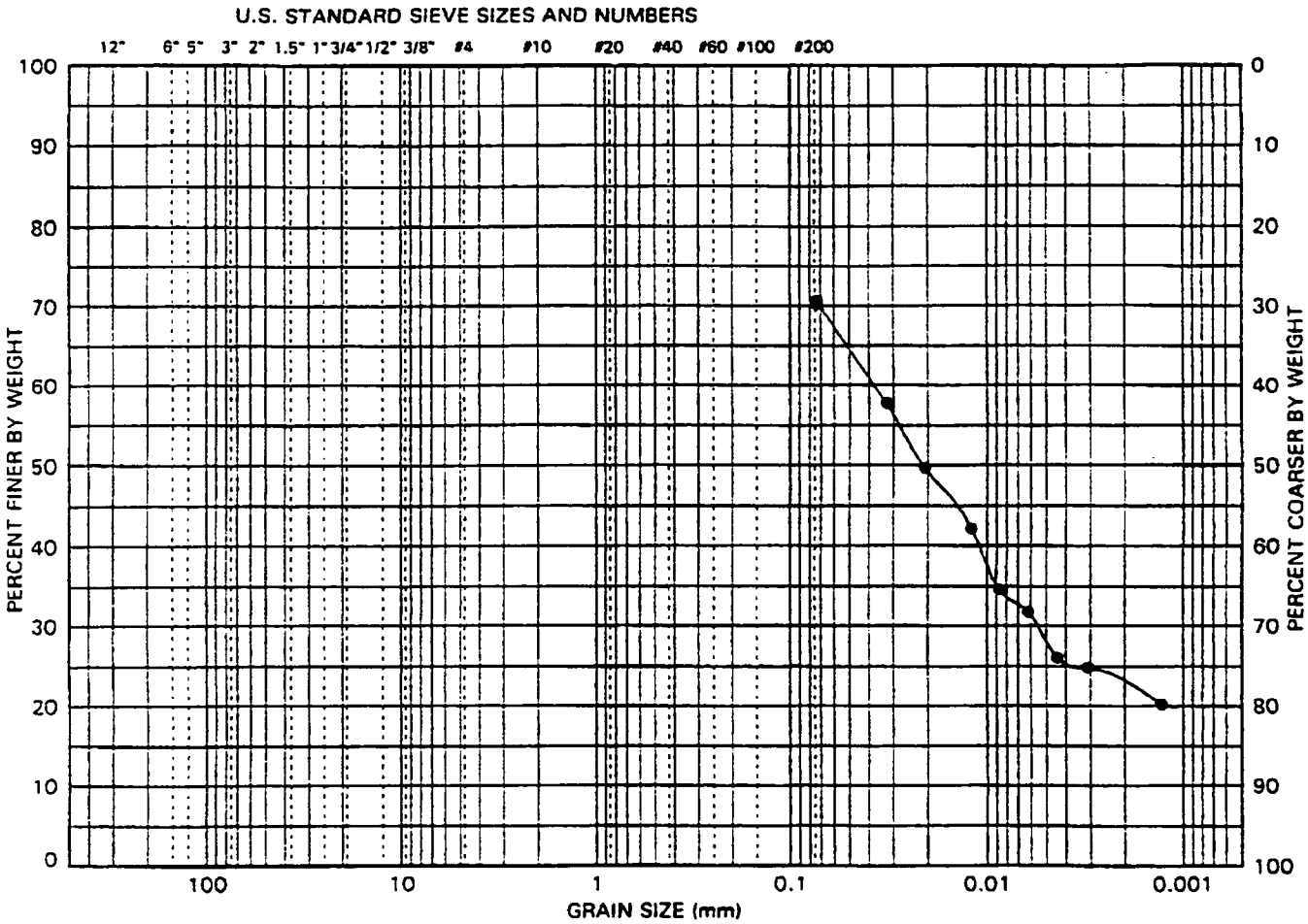
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-28	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G233	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 22.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

RECEIVED AUG 01 1997

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															49	28	22	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

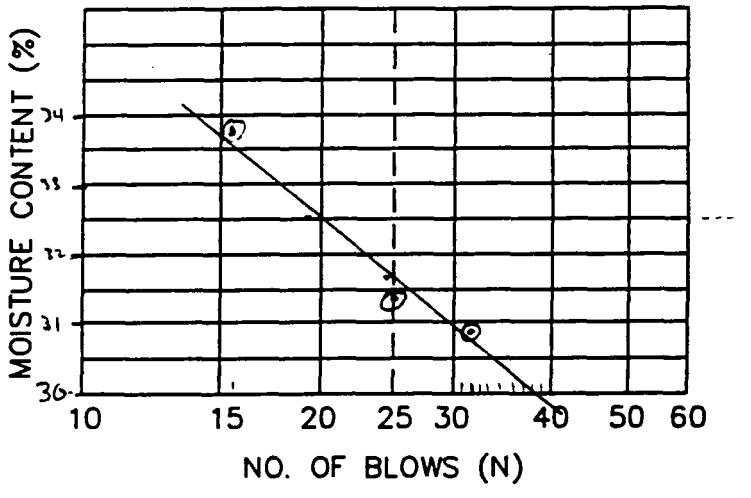
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-28

LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		LP-28.1	LP 28.2	LP 28.3	
A	WT. OF TARE	(grams)	3.50	3.52	3.60	
B	WT. OF WET SOIL & TARE	(grams)	16.37	18.08	21.32	
C	WT. OF DRY SOIL & TARE	(grams)	13.35	14.60	16.85	
D	WT. OF WATER = B-C	(grams)	3.02	3.48	4.47	
E	WT. OF DRY SOIL = C-A	(grams)	9.85	11.08	13.25	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.7 ✓	31.4 ✓	33.7 ✓	
N	NUMBER OF BLOWS		32	25	16	

DRYING TARE NO.



CURING TARE NO.

1-6

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		LP-28.4	LP28.5		
A	WT. OF TARE	(grams)	3.51	3.52		
B	WT. OF WET SOIL & TARE	(grams)	12.55	9.61		
C	WT. OF DRY SOIL & TARE	(grams)	11.29	8.78		
D	WT. OF WATER = B-C	(grams)	1.26	.83		
E	WT. OF DRY SOIL = C-A	(grams)	7.78	5.26		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.2 ✓	15.8 ✓		

LIQUID LIMIT (LL) = 32 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 16

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 — DATE: 26 day JULY month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-28

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

QA ID: JW

	WATER ADDED	(ml)	100	150	200	250	300
A	WT. OF SOIL & MOLD	(grams)		6055.4	6178.0	6173.5	6132.7
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1846.2	1968.6	1964.1	1923.3
D	WET UNIT WT.(1) = C X 0.066	(pcf)		121.8	129.9	129.6	126.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		106.7 ✓	111.8 ✓	109.6 ✓	105.8 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			[illegible]	1	30	11
F	WT. OF TARE	(grams)		[illegible]	7.32	8.33	7.34
G	WT. OF WET SOIL & TARE	(grams)		257.5	272.24	226.75	232.95
H	WT. OF DRY SOIL & TARE	(grams)		226.70	235.40	192.95	195.44
I	WT. OF WATER = G - H	(grams)		30.8	36.84	33.8	37.51
J	WT. DRY SOIL = H - F	(grams)		218.59	228.08	184.62	188.1
K	MOISTURE CONTENT = (I/J) X 100	(%)		14.1 ✓	16.2 ✓	18.3 ✓	19.9 ✓

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

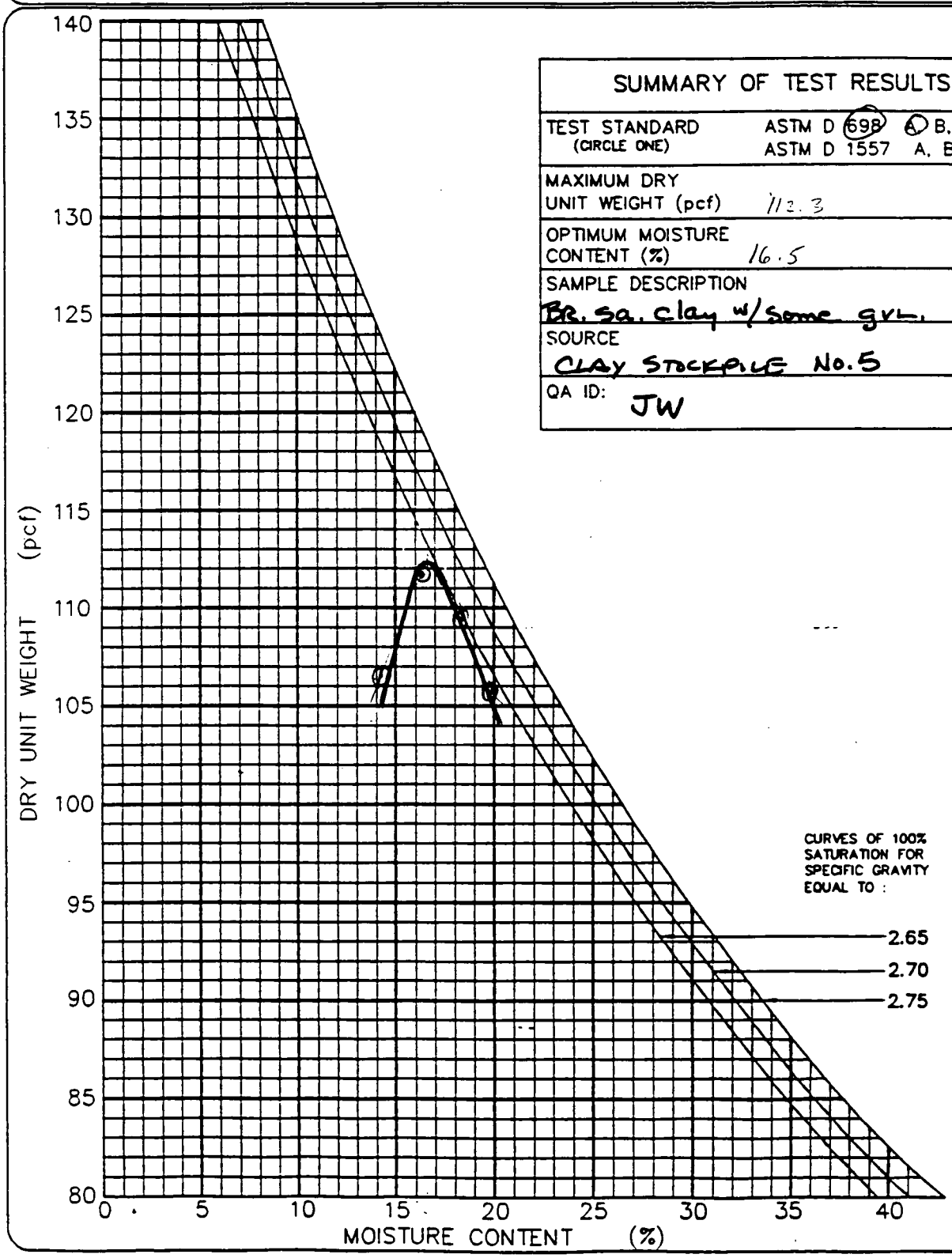
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-28



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	112.3
OPTIMUM MOISTURE CONTENT (%)	16.5
SAMPLE DESCRIPTION	BR. SA. CLAY W/SOME GVL.
SOURCE	CLAY STOCKPILE NO.5
QA ID:	JW

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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: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-29

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW

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. _____	105				
A	WT. OF TARE	8.3				
B	WT. OF WET SOIL & TARE	184.5				
C	WT. OF DRY SOIL & TARE	154.2				
D	WT. OF WATER = B-C	30.3				
E	WT. OF DRY SOIL = C-A	145.9				
F	MOISTURE CONTENT = (D/E) X 100	20.8 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: KW

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	262.7				
C	WT. OF DRY SOIL & TARE	239.6				
D	WT. OF WATER = B-C	23.1				
E	WT. OF DRY SOIL = C-A	107.6				
F	MOISTURE CONTENT = (D/E) X 100	21.5 ✓				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-29

SOIL SAMPLE SIZE TOTAL SAMPLE WT = ~~29,[illegible]~~ 31,865.4 grams
> #4 SAMPLE WT: 2,268 grams

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		105	105
WT. OF DRY SAMPLE PLUS TARE	(grams)	154.2	28.2
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	145.9	19.9

SIEVE ANALYSIS QA ID: KW/PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	113.9	0.4 @ 7/28/97	99.6		
1"	25.0	250.3	~~0.9~~ 0.8	99.2		
¾"	19.0	365.0	1.1	98.9		90-100
½"	12.5	578.2	1.8	98.2		
⅜"	9.5	922.6	2.9	97.1		
4	4.75	2210.0	6.9	93.1		
10	2.00	4.0	2.7	97.3	90.6	
20	0.850	6.7	4.6	95.4	88.8	
40	0.425	9.3	6.4	93.6	87.1	
60	0.250	11.4	7.8	92.2	85.8	
100	0.150	14.6	10.0	90.0	83.8	
200	0.075	19.6	13.4	86.6	80.6	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

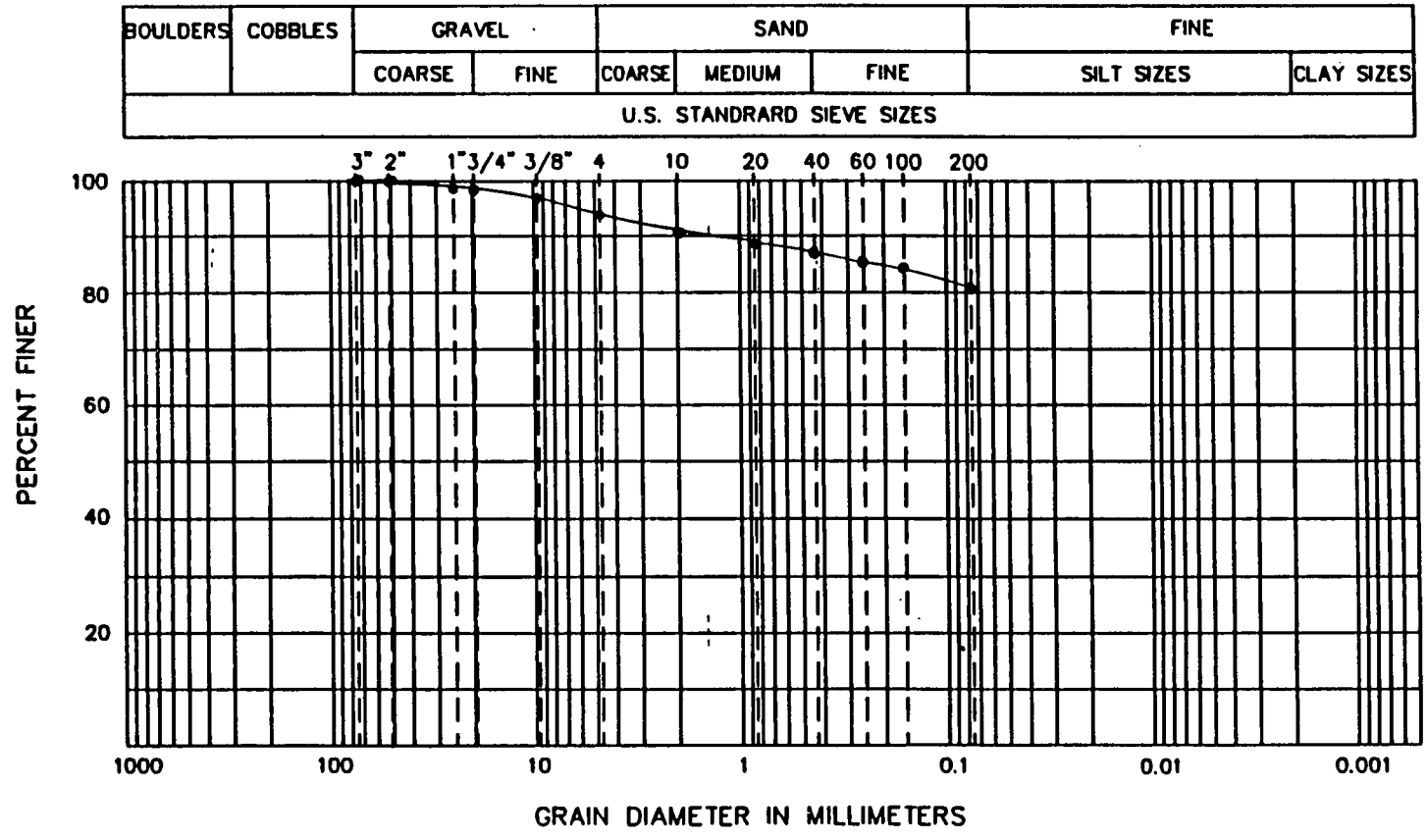
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 28 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-29 QA ID: KW

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 38

(PL) 16

(PI) 22

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.6
1-in.	99.2
3/4-in.	98.9
1/2-in.	98.2
3/8-in.	97.1
NO. 4	93.1
NO. 10	90.6
NO. 20	88.8
NO. 40	87.1
NO. 60	85.8
NO. 100	83.8
NO. 200	80.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN LEAN CLAY (CL) W/ SAND

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SHEET NO. 2 OF 2

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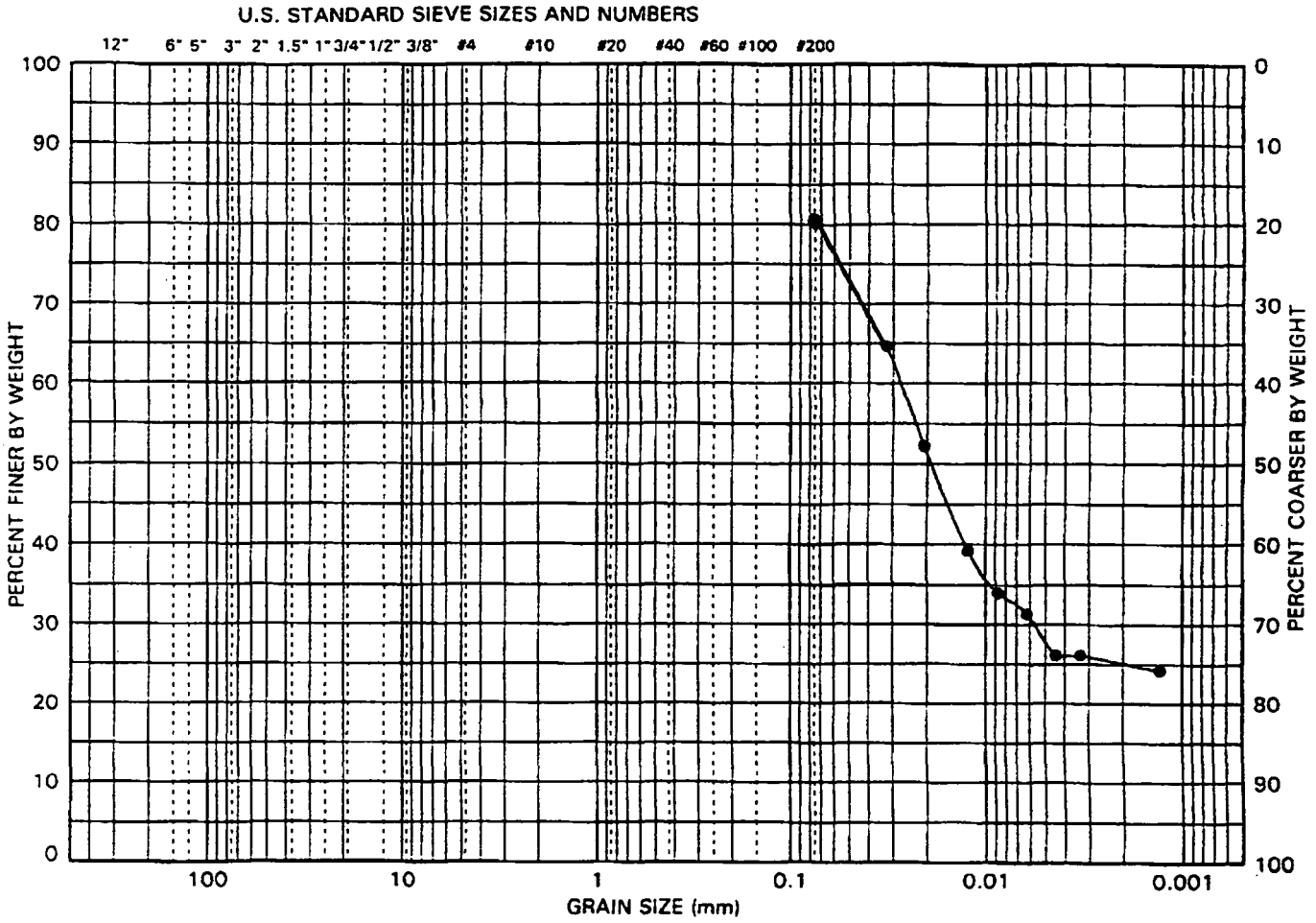
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-29	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G235	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 25.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															51	28	25	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

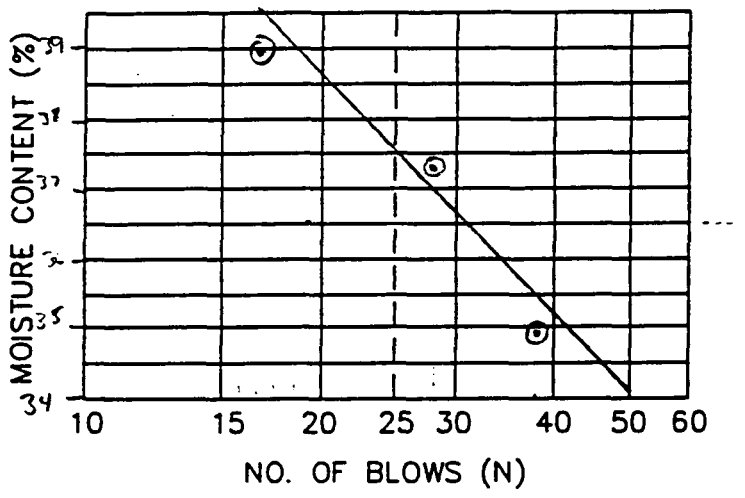
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-29

LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		LP29.1	LP29.2	LP29.3	
A	WT. OF TARE	(grams)	3.50	3.50	3.50	
B	WT. OF WET SOIL & TARE	(grams)	22.27	23.10	19.64	
C	WT. OF DRY SOIL & TARE	(grams)	17.41	17.78	15.12	
D	WT. OF WATER = B-C	(grams)	4.86	5.32	4.52	
E	WT. OF DRY SOIL = C-A	(grams)	13.91	14.28	11.62	
F	MOISTURE CONTENT = (D/E)X100	(%)	34.9	37.3	38.9	
N	NUMBER OF BLOWS		38	28	17	

DRYING TARE NO.



CURING TARE NO.

1-E

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		LP29.4	LP29.5		
A	WT. OF TARE	(grams)	3.50	3.50		
B	WT. OF WET SOIL & TARE	(grams)	11.48	7.64		
C	WT. OF DRY SOIL & TARE	(grams)	10.38	7.08		
D	WT. OF WATER = B-C	(grams)	1.1	.56		
E	WT. OF DRY SOIL = C-A	(grams)	6.88	3.58		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.0	15.6		

LIQUID LIMIT (LL) = 38 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 22

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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 — DATE: 28 day 7 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-29

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

QA ID: JW

	WATER ADDED	(ml)		200	250	300	350
A	WT. OF SOIL & MOLD	(grams)		5996.5	6079.2	6155.4	6141.7
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1787.1	1868.8	1946	1932.3
D	WET UNIT WT.(1) = C X 0.066	(pcf)		117.9	123.3	128.4	127.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		103.4 -	106.0 -	108.4 -	106.3 -

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			6	15	2	31
F	WT. OF TARE	(grams)		7.60	7.75	7.71	8.37
G	WT. OF WET SOIL & TARE	(grams)		241.61	286.11	260.32	208.53
H	WT. OF DRY SOIL & TARE	(grams)		212.95	247.18	220.86	175.15
I	WT. OF WATER = G - H	(grams)		28.66	38.93	39.46	33.38
J	WT. DRY SOIL = H - F	(grams)		205.35	239.43	213.15	166.78
K	MOISTURE CONTENT = (I/J) X 100	(%)		14.0 -	16.3 -	18.5 -	20.0 -

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FLUOR DANIEL FERNALD

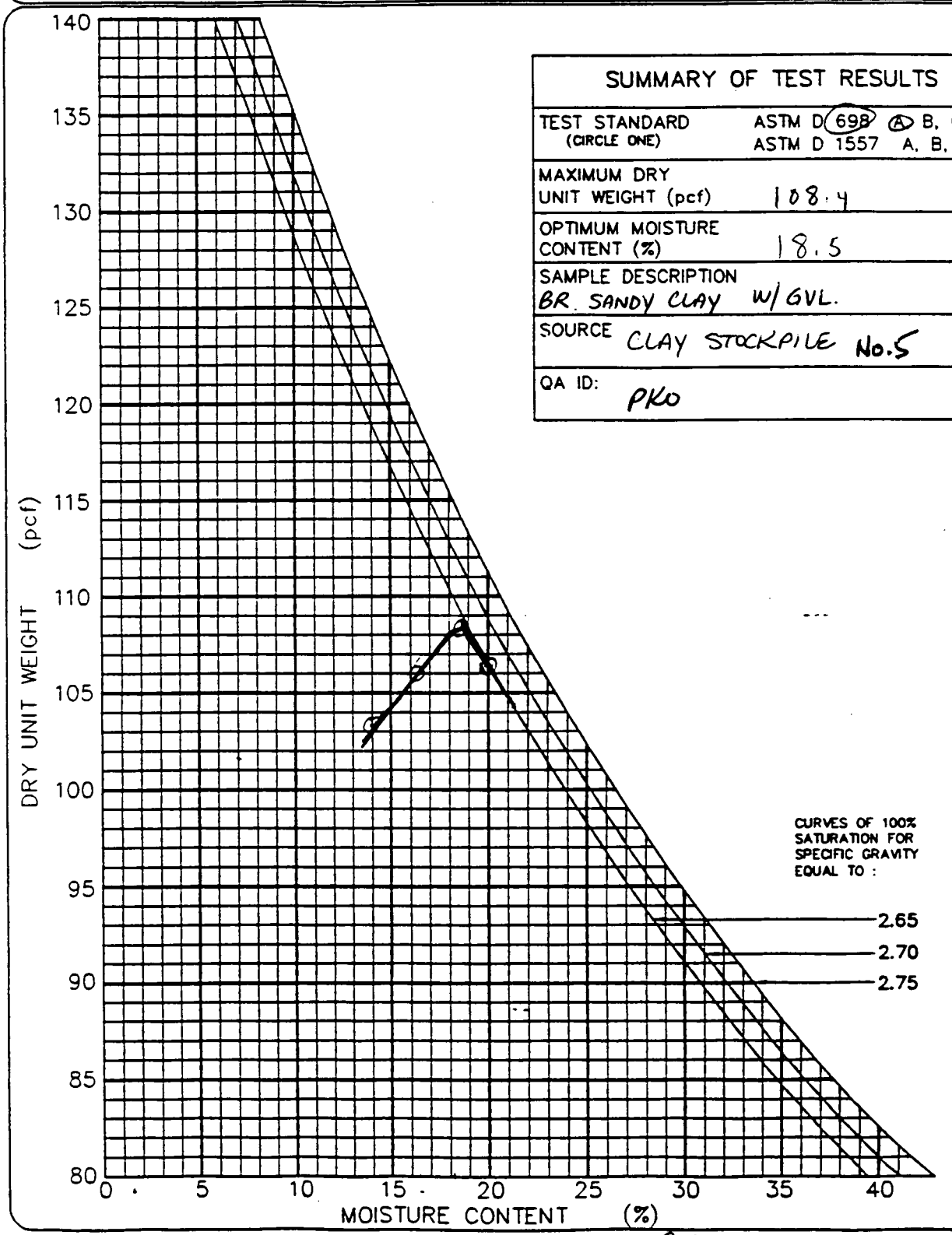
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 28 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-29



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	108.4
OPTIMUM MOISTURE CONTENT (%)	18.5
SAMPLE DESCRIPTION	BR. SANDY CLAY W/ GVL.
SOURCE	CLAY STOCKPILE No. 5
QA ID:	PKO

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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: 24 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-30

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW

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. _____	25				
A	WT. OF TARE	8.2				
B	WT. OF WET SOIL & TARE	145.7				
C	WT. OF DRY SOIL & TARE	122.4				
D	WT. OF WATER = B-C	23.3				
E	WT. OF DRY SOIL = C-A	114.2				
F	MOISTURE CONTENT = (D/E) X 100	20.4 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: KW

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	247.3				
C	WT. OF DRY SOIL & TARE	225.8				
D	WT. OF WATER = B-C	21.5				
E	WT. OF DRY SOIL = C-A	93.8				
F	MOISTURE CONTENT = (D/E) X 100	22.9 ✓				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-30

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 31,905.3 grams
> #4 SAMPLE WT = ~~4,636 grams~~ @ 7/26/96 5,165.6 grams

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		25	25
WT. OF DRY SAMPLE PLUS TARE	(grams)	122.4	50.2
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	114.2	42.0

SIEVE ANALYSIS QA ID: KW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	Ø	100		100
1½"	37.5	256.1	0.8	99.2		
1"	25.0	753.3	2.4	97.6		
¾"	19.0	1082.0	3.4	96.6		90-100
½"	12.5	1,621.5	5.1	94.9		
⅜"	9.5	2,319.8	7.3	92.7		
4	4.75	5,009.6	15.7	84.3		
10	2.00	8.8	7.7	92.3	77.8	
20	0.850	14.3	12.5	87.5	73.8	
40	0.425	21.2	18.6	81.4	68.6	@ 7/26/97
60	0.250	28.0	24.5	75.5	~~63.7~~ 63.6	
100	0.150	35.1	30.7	69.3	58.4	
200	0.075	41.8	36.6	63.4	53.4	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

DATE: 28 day JULY month 1997 year

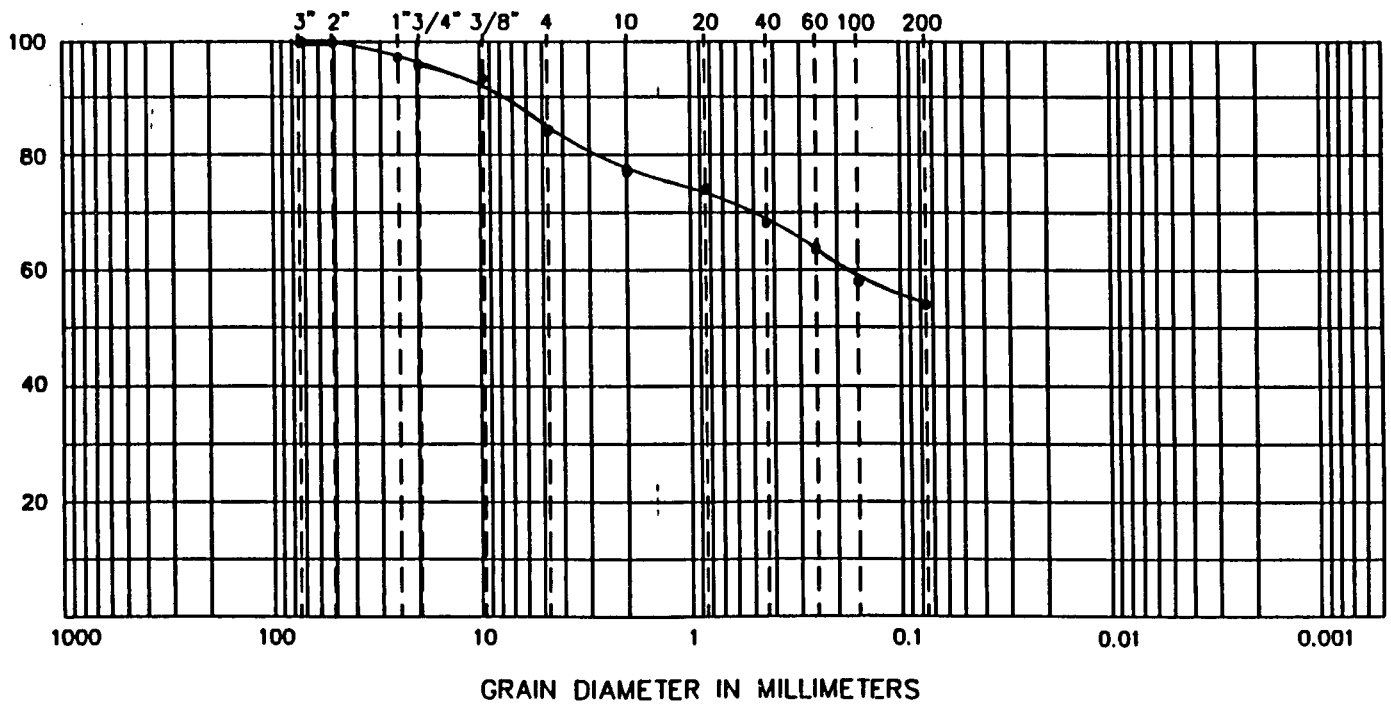
MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-30 QA ID: KW

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

U.S. STANDRARD SIEVE SIZES



ATTERBERG LIMITS

(LL) 33

(PL) 15

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.2
1-in.	97.6
3/4-in.	96.6
1/2-in.	94.9
3/8-in.	92.7
NO. 4	84.3
NO. 10	77.8
NO. 20	73.8
NO. 40	68.6
NO. 60	63.6
NO. 100	58.4
NO. 200	53.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN/GRAY SANDY LEAN CLAY (CL) W/ SOME GVL.

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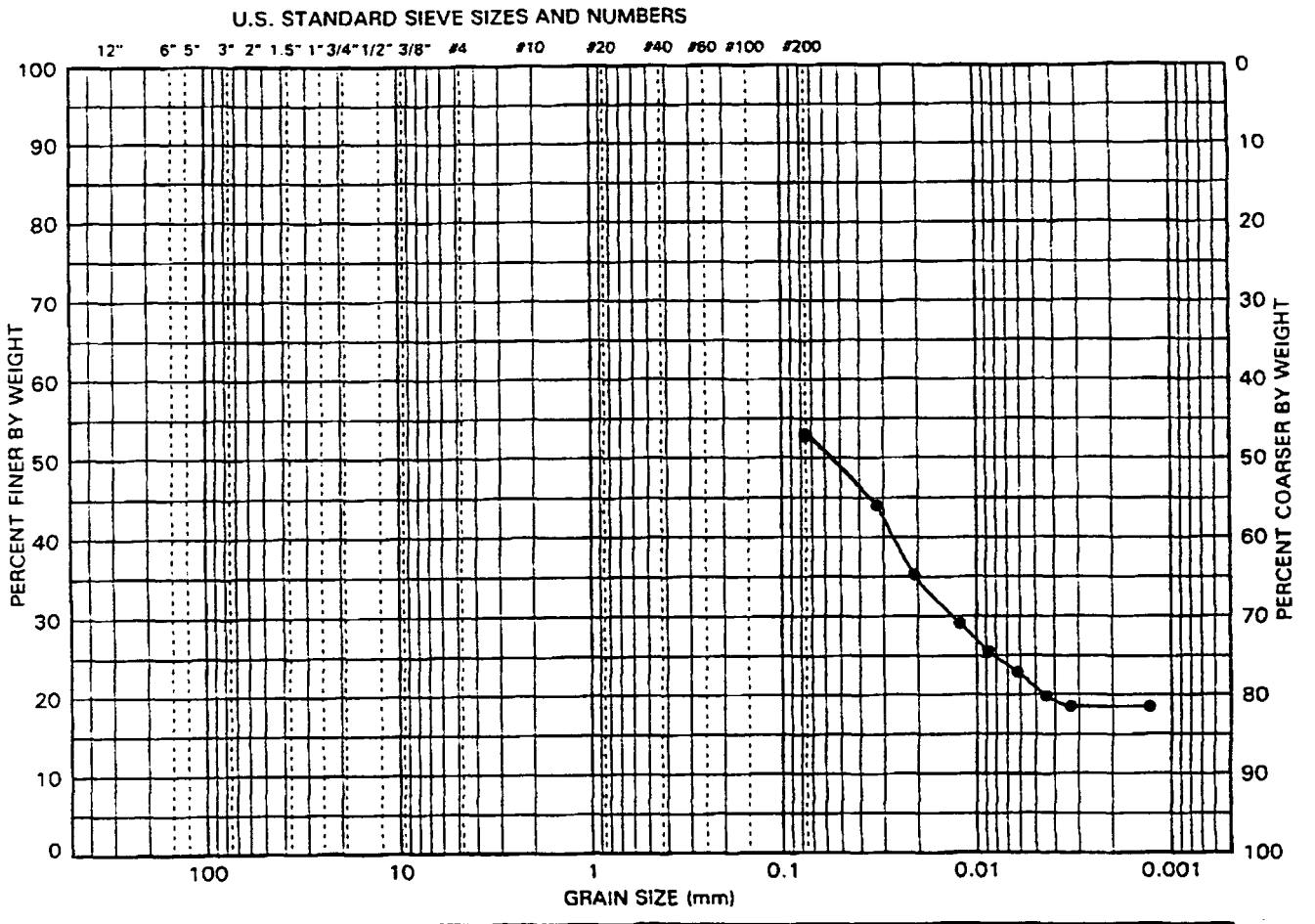
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-30	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G236	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 18.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															35	21	19	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

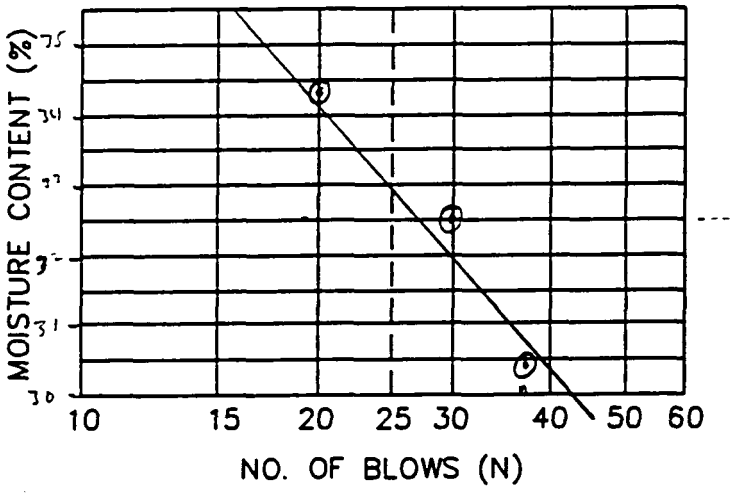
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-30

LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		LP 30.1	LP 30.2	LP 30.3	
A	WT. OF TARE	(grams)	3.5	3.5	3.5	
B	WT. OF WET SOIL & TARE	(grams)	19.41	28.50	20.98	
C	WT. OF DRY SOIL & TARE	(grams)	15.70	22.37	16.52	
D	WT. OF WATER = B-C	(grams)	3.71	6.13	4.46	
E	WT. OF DRY SOIL = C-A	(grams)	12.2	18.87	13.02	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.4 ✓	32.5 ✓	34.3 ✓	
N	NUMBER OF BLOWS		37	30	20	

DRYING TARE NO.



CURING TARE NO.

1 - A

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		LP 30.4	LP 30.5		
A	WT. OF TARE	(grams)	3.50	3.50		
B	WT. OF WET SOIL & TARE	(grams)	9.44	10.88		
C	WT. OF DRY SOIL & TARE	(grams)	8.67	9.92		
D	WT. OF WATER = B-C	(grams)	.77	.96		
E	WT. OF DRY SOIL = C-A	(grams)	5.17	6.42		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.9 ✓	15.0 ✓		

LIQUID LIMIT (LL) = 33 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 18

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 — DATE: 28 day 7 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-30

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

QA ID: JW

	WATER ADDED	(ml)		150	200	250	300
A	WT. OF SOIL & MOLD	(grams)		6032.9	6149.5	6209.8	6169.0
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		~~1814.5~~ 1823.5	1940.1	2000.4	1959.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)		~~119.8~~ 120.4	128.0	132.0	129.3
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		~~105.8~~ 106.4	111.0	112.3	108.5

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			27	13	164	33
F	WT. OF TARE	(grams)		8.18	7.62	8.00	8.45
G	WT. OF WET SOIL & TARE	(grams)		213.43	275.86	201.19	227.54
H	WT. OF DRY SOIL & TARE	(grams)		189.50	248.85	172.45	192.22
I	WT. OF WATER = G - H	(grams)		23.93	37.01	28.74	35.32
J	WT. DRY SOIL = H - F	(grams)		181.32	241.23	164.45	183.77
K	MOISTURE CONTENT = (I/J) X 100	(%)		13.2	15.3	17.5	19.2

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FLUOR DANIEL FERNALD

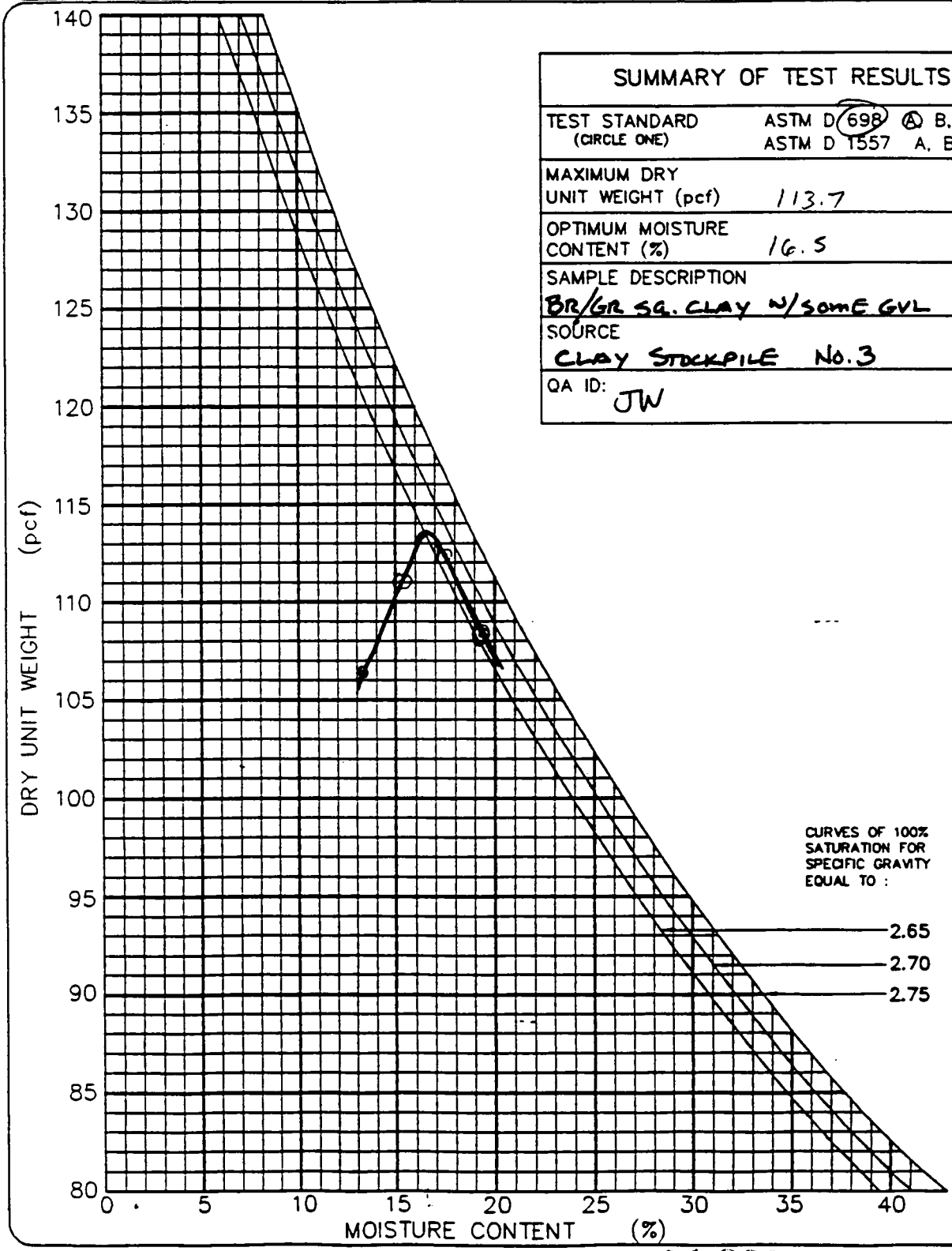
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 28 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-30



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	113.7
OPTIMUM MOISTURE CONTENT (%)	16.5
SAMPLE DESCRIPTION	BR/GR SG. CLAY W/SOME GVL
SOURCE	CLAY STOCKPILE NO.3
QA ID:	JW

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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-31

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW

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. _____	7				
A	WT. OF TARE	~~7.25~~	7/20/97 7.3			
B	WT. OF WET SOIL & TARE	159.5				
C	WT. OF DRY SOIL & TARE	138.7				
D	WT. OF WATER = B-C	20.8				
E	WT. OF DRY SOIL = C-A	131.4				
F	MOISTURE CONTENT = (D/E) X 100	15.8				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: KW

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	255.2				
C	WT. OF DRY SOIL & TARE	238.3				
D	WT. OF WATER = B-C	16.9				
E	WT. OF DRY SOIL = C-A	106.3				
F	MOISTURE CONTENT = (D/E) X 100	15.9				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-31

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 30,101 grams
> #4 SAMPLE WT = 3,660.6 grams

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		7	7
WT. OF DRY SAMPLE PLUS TARE	(grams)	138.7	45.9
WT. OF TARE	(grams)	7.3	7.3
WT. OF DRY SAMPLE	(grams)	131.4	38.6

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	352.3	1.2	98.8		100
1½"	37.5	455.6	1.5	98.5		
1"	25.0	685.6	2.3	97.7		
¾"	19.0	1052.8	3.5	96.5		90-100
½"	12.5	1651.3	5.5	94.5		
⅜"	9.5	2111.4	7.0	93.0		
4	4.75	3591.6	11.9	88.1		
10	2.00	12.7	9.7	90.3	79.6	
20	0.850	17.9	13.6	86.4	76.1	
40	0.425	23.1	17.6	82.4	72.6	
60	0.250	27.3	20.8	79.2	69.8	
100	0.150	32.2	24.5	75.5	66.5	
200	0.075	38.0	28.9	71.1	62.6	50-100

%FINER = 100 − Σ% RETAINED

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CHECKED BY: (K)

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

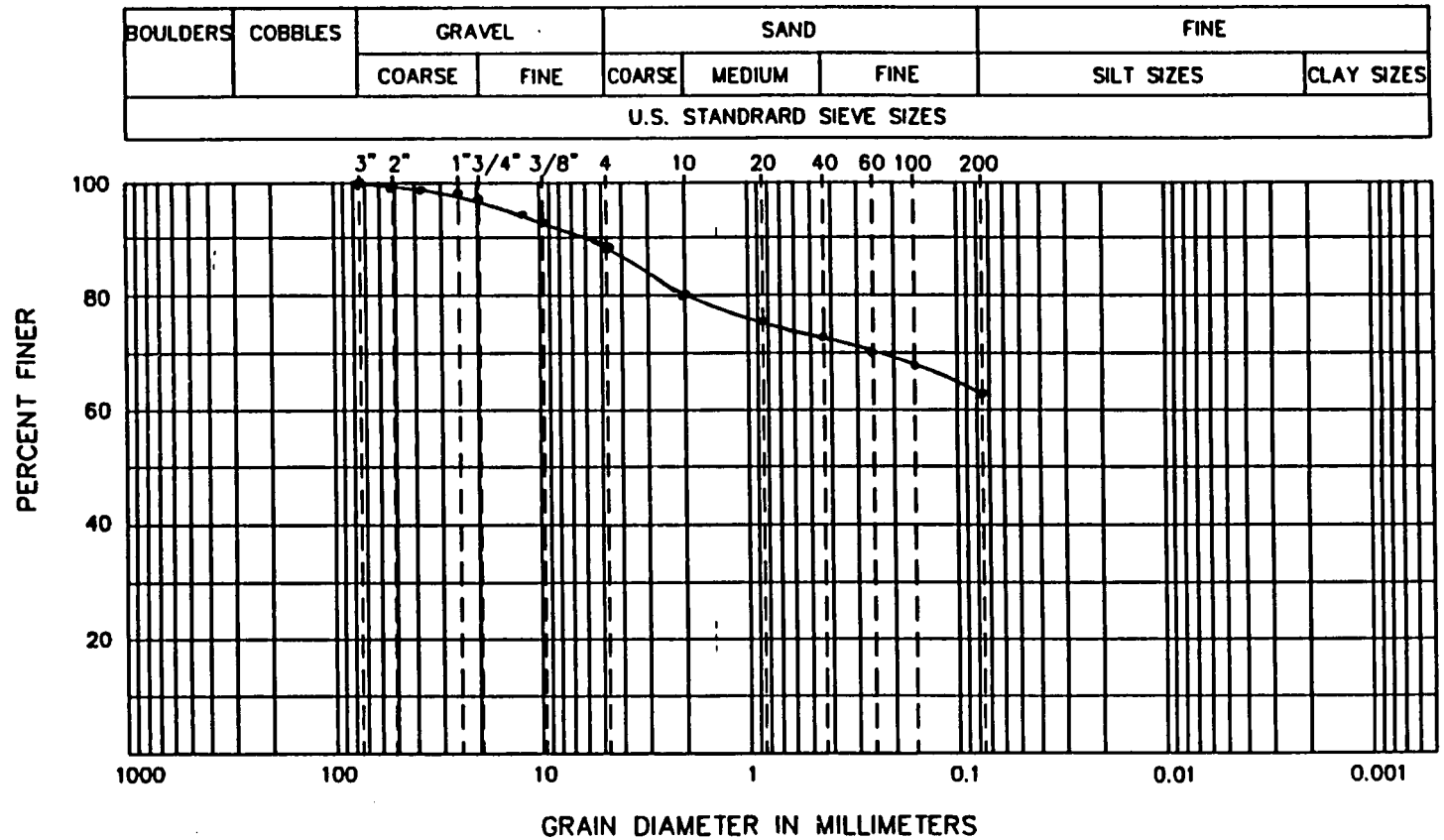
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-31 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 33

(PL) 15

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100.0
2-in.	98.8
1 1/2-in.	98.5
1-in.	97.7
3/4-in.	96.5
1/2-in.	94.5
3/8-in.	93.0
NO. 4	88.1
NO. 10	79.6
NO. 20	76.1
NO. 40	72.6
NO. 60	69.8
NO. 100	66.5
NO. 200	62.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN sandy LEAN CLAY (CL) w/some Gravel

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SHEET NO. 2 OF 2

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

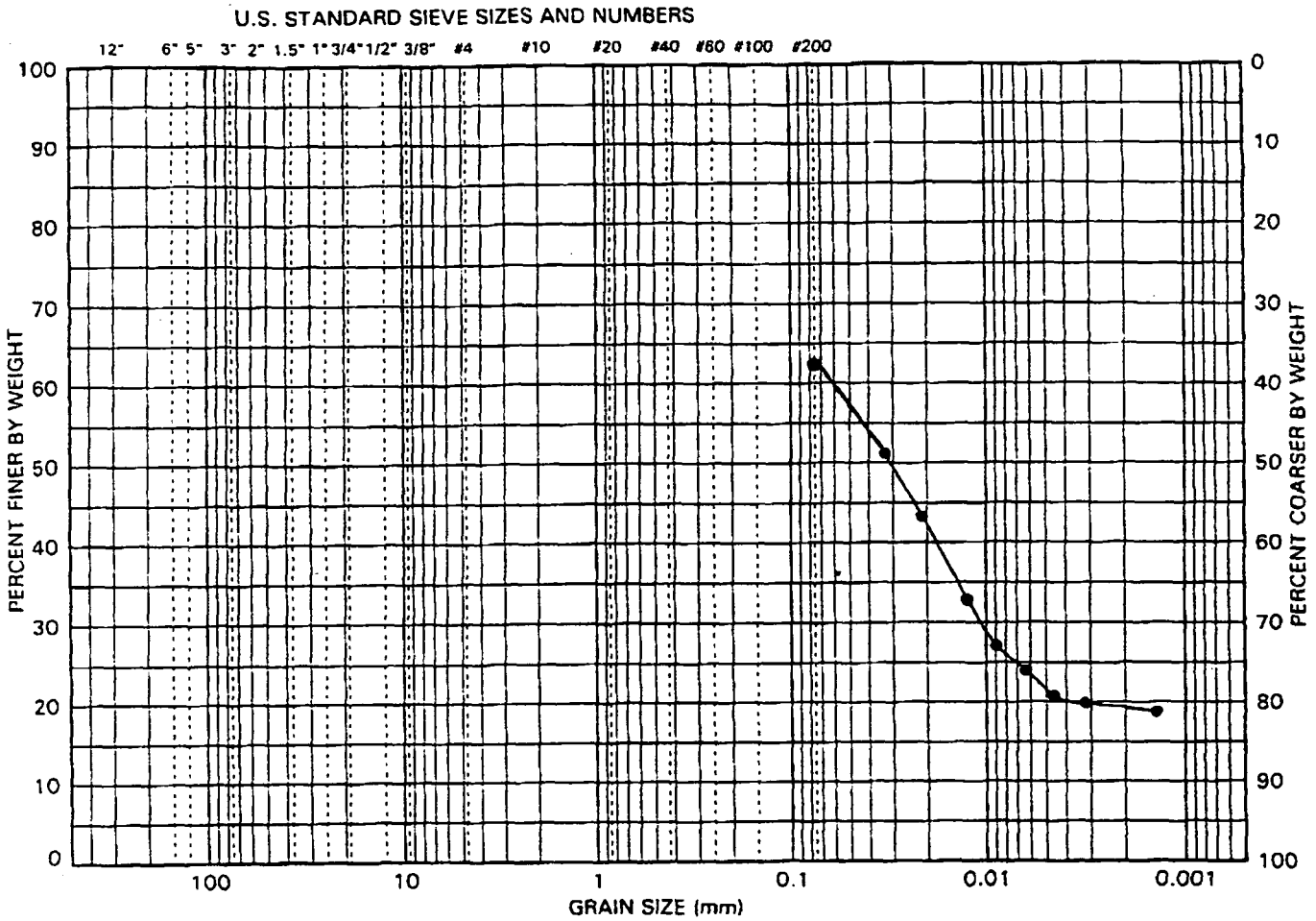
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID LP-31	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO. 97G237	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:			SILT (%)
			CLAY(%) 19.2
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															42	22	19	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

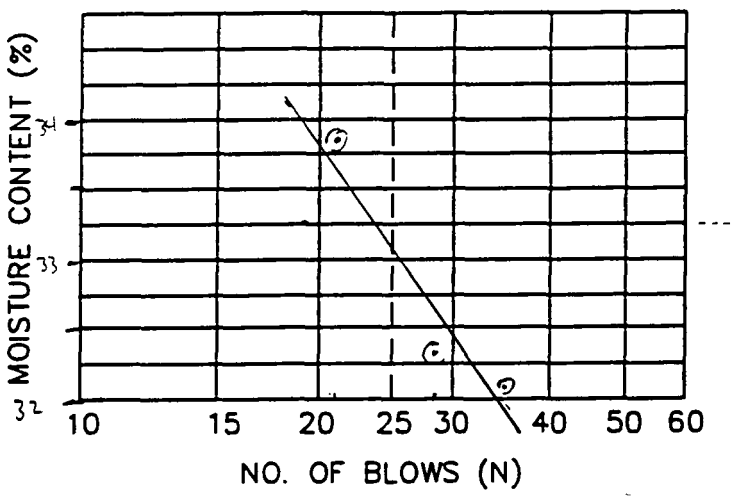
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-31

LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		K	1.2	2.2	2.9
A	WT. OF TARE	(grams)	~~13.9~~	28.50	27.63	31.46
B	WT. OF WET SOIL & TARE	(grams)		42.51	42.91	44.98
C	WT. OF DRY SOIL & TARE	(grams)		39.09	39.20	41.56
D	WT. OF WATER = B-C	(grams)		3.42	3.71	3.42
E	WT. OF DRY SOIL = C-A	(grams)		10.59	11.57	10.1
F	MOISTURE CONTENT = (D/E)X100	(%)		32.3 ✓	32.1 ✓	33.9 ✓
N	NUMBER OF BLOWS			28	35	21

DRYING TARE NO.



CURING TARE NO.

1-D

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.3	3.2		
A	WT. OF TARE	(grams)	31.20	27.82		
B	WT. OF WET SOIL & TARE	(grams)	39.24	33.09		
C	WT. OF DRY SOIL & TARE	(grams)	38.15	32.40		
D	WT. OF WATER = B-C	(grams)	1.09	.69		
E	WT. OF DRY SOIL = C-A	(grams)	6.95	4.58		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.7 ✓	15.1 ✓		

LIQUID LIMIT (LL) = 33 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 18

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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 DATE: 28 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-31

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

QA ID: JW

	WATER ADDED	(ml)	150	200	250	300	
A	WT. OF SOIL & MOLD	(grams)	6023.8	6139.9	6214.3	6182.6	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1814.4	1950.5	2004.9	1973.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	119.8	128.7	132.3	130.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.4 -	111.6 -	113.7 -	110.1 -	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.		14	1	102	7	
F	WT. OF TARE	(grams)	7.82	7.33	8.26	7.28	
G	WT. OF WET SOIL & TARE	(grams)	240.69	243.19	208.15	269.10	
H	WT. OF DRY SOIL & TARE	(grams)	216.72	211.86	180.05	228.57	
I	WT. OF WATER = G - H	(grams)	23.97	31.33	28.10	40.53	
J	WT. DRY SOIL = H - F	(grams)	208.9	204.53	171.79	22[illegible].29	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.5 -	15.3 -	16.4 -	18.3 -	

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

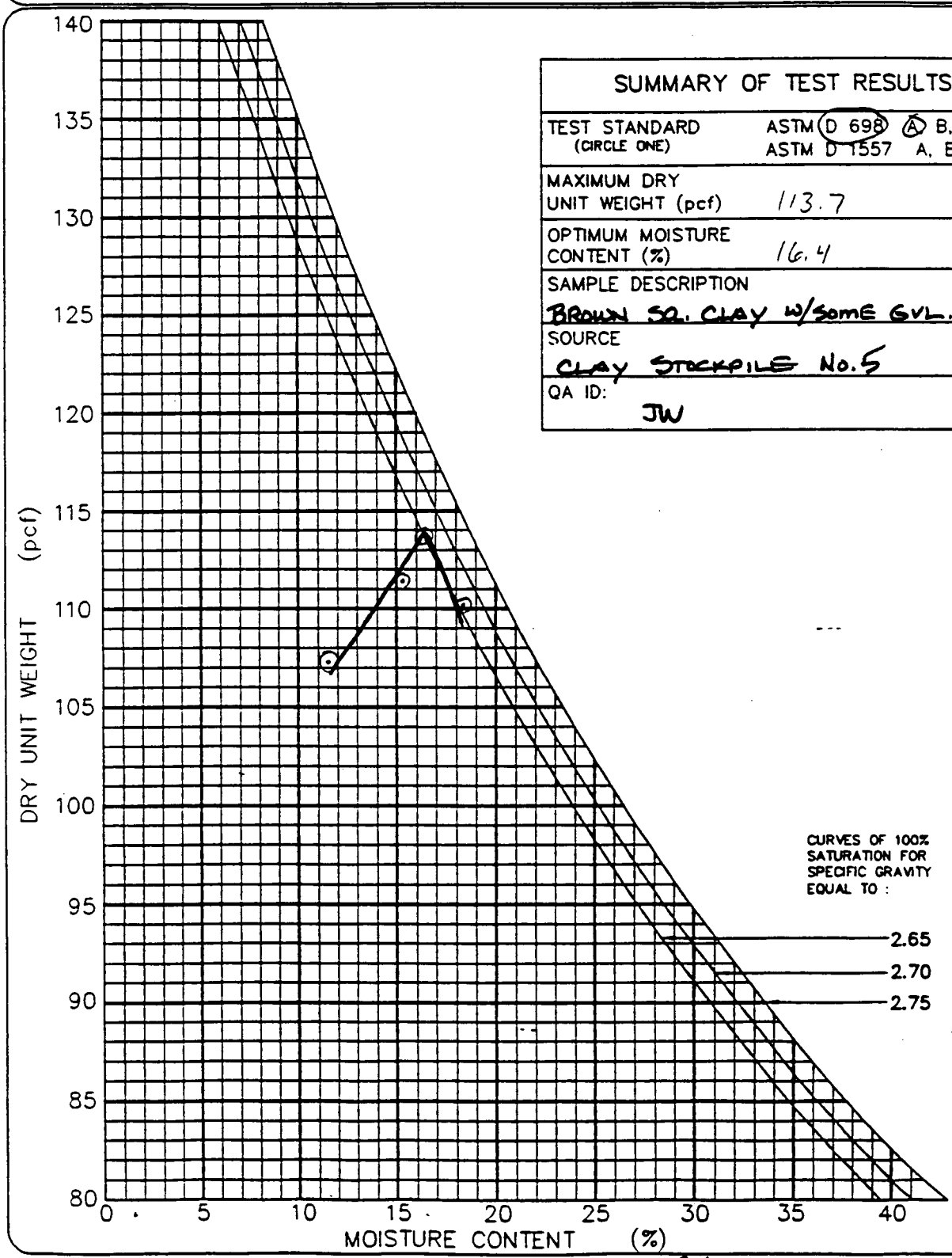
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 28 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-31



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	113.7
OPTIMUM MOISTURE CONTENT (%)	16.4
SAMPLE DESCRIPTION	BROWN SQ. CLAY W/SOME GVL.
SOURCE	CLAY STOCKPILE No. 5
QA ID:	JW

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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: 25 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-32

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW

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. _____	32				
A	WT. OF TARE	8.3				
B	WT. OF WET SOIL & TARE	162.4				
C	WT. OF DRY SOIL & TARE	135.8				
D	WT. OF WATER = B-C	26.6				
E	WT. OF DRY SOIL = C-A	127.5				
F	MOISTURE CONTENT = (D/E) X 100	20.9 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: KW

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.	IV				
A	WT. OF TARE	132.3				
B	WT. OF WET SOIL & TARE	264.5				
C	WT. OF DRY SOIL & TARE	243.8				
D	WT. OF WATER = B-C	20.7				
E	WT. OF DRY SOIL = C-A	111.5				
F	MOISTURE CONTENT = (D/E) X 100	18.6 ✓				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-~~32~~ HEM 32

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 30,427.9 gms
> #4 SAMPLE WT = 1179.7 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		32	32
WT. OF DRY SAMPLE PLUS TARE	(grams)	135.8	~~45.9~~ 27.6
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	127.5	19.3

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100		100
1½"	37.5	116.6	0.4	99.6		
1"	25.0	329.1	1.1	98.9		
¾"	19.0	401.4	1.3	98.7		90-100
½"	12.5	630.5	2.1	97.9		
⅜"	9.5	770.2	2.5	97.5		
4	4.75	1139.4	3.7	96.3		
10	2.00	3.0	2.4	97.6	94.0	
20	0.850	6.0	4.7	95.3	91.8	
40	0.425	8.3	6.5	93.5	90.0	
60	0.250	10.6	8.3	91.7	88.3	
100	0.150	13.9	10.9	89.1	85.8	
200	0.075	18.7	14.7	85.3	82.1	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

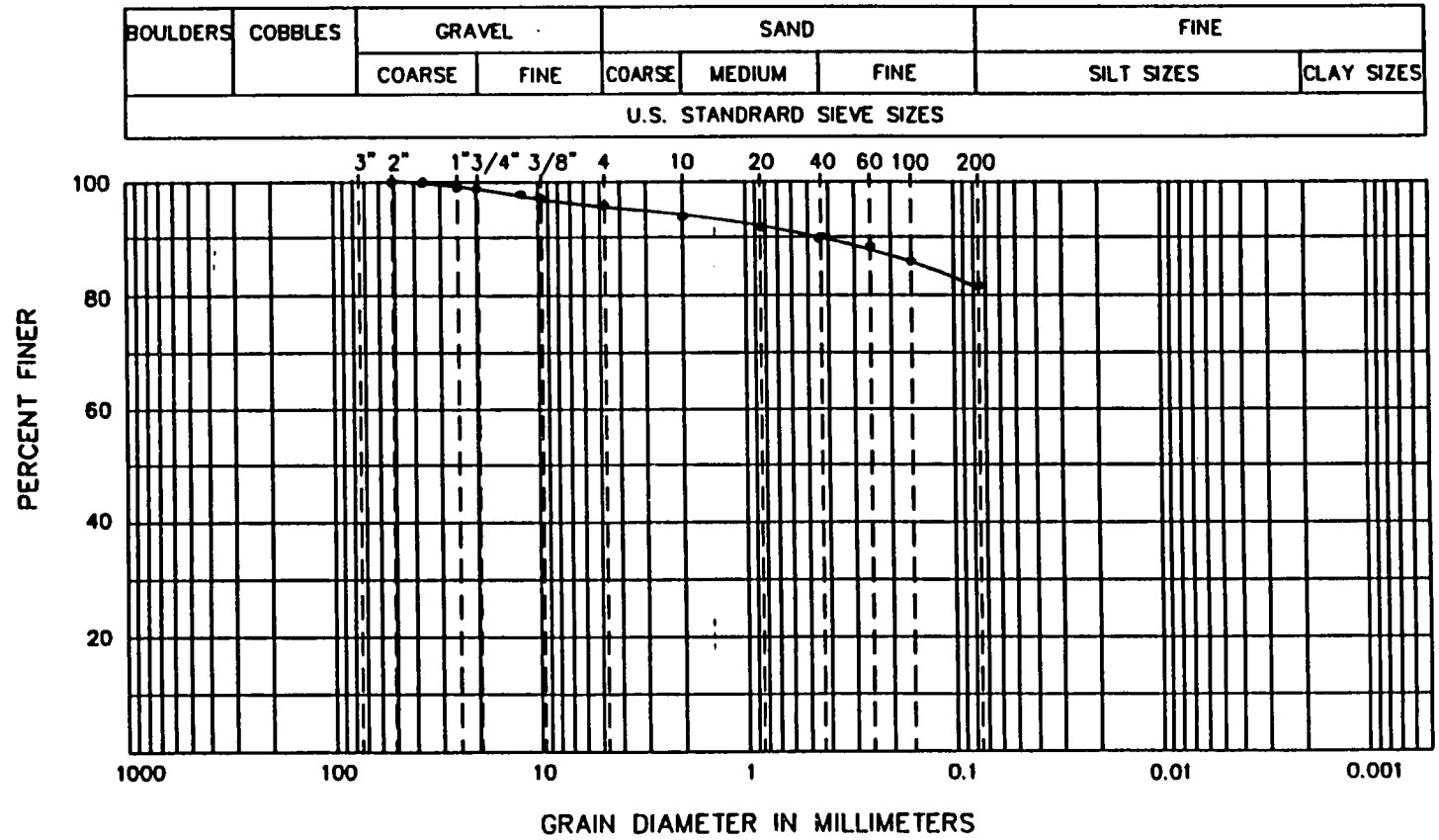
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-32 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 33

(PL) 18

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.6
1-in.	98.9
3/4-in.	98.7
1/2-in.	97.9
3/8-in.	97.5
NO. 4	96.3
NO. 10	94.0
NO. 20	91.8
NO. 40	90.0
NO. 60	88.3
NO. 100	85.8
NO. 200	82.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN LEAN CLAY (CL) w/Some Sand and Tr. of Gravel

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SHEET NO. 2 OF 2

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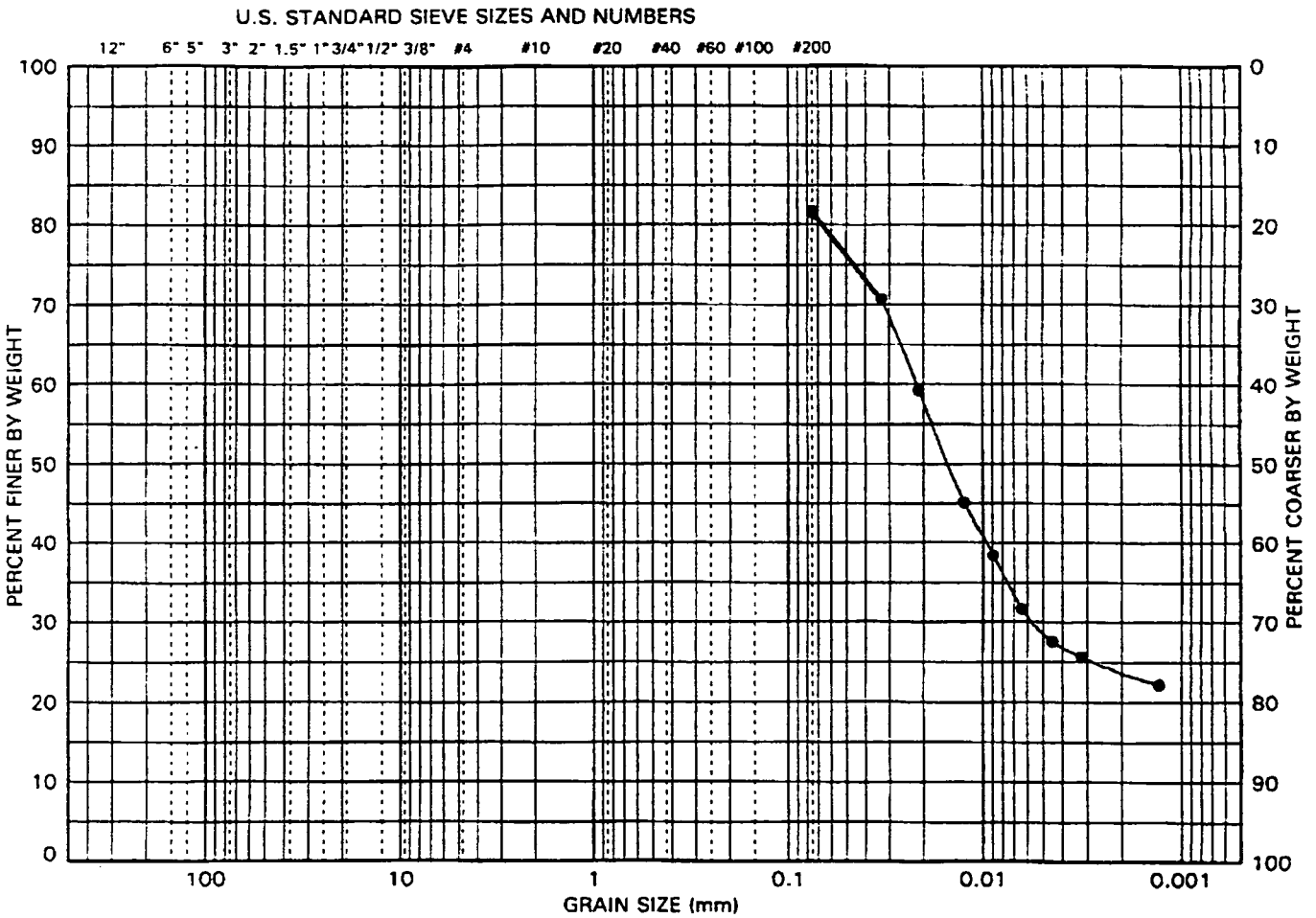
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-32	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G284	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 23.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															58	29	24	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 4 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-32

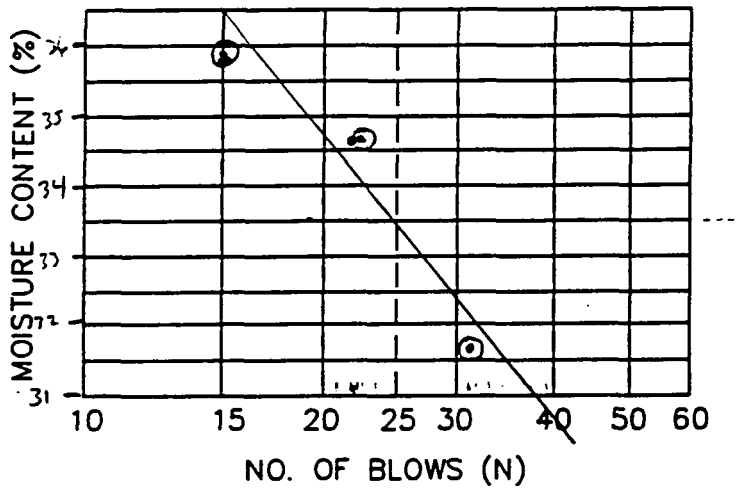
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.6	1.3	2.3	
A	WT. OF TARE	(grams)	28.56	28.44	31.20	
B	WT. OF WET SOIL & TARE	(grams)	48.32	49.60	50.14	
C	WT. OF DRY SOIL & TARE	(grams)	43.58	44.21	45.15	
D	WT. OF WATER = B-C	(grams)	4.74	5.39	4.99	
E	WT. OF DRY SOIL = C-A	(grams)	15.02	15.57	13.95	
F	MOISTURE CONTENT = (D/E)X100	(%)	31.6	34.6	35.8	
N	NUMBER OF BLOWS		31	22	15	

DRYING TARE NO.

1



CURING TARE NO.

1-A

CL

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.4	3.7		
A	WT. OF TARE	(grams)	27.39	21.29		
B	WT. OF WET SOIL & TARE	(grams)	33.18	25.31		
C	WT. OF DRY SOIL & TARE	(grams)	32.30	24.71		
D	WT. OF WATER = B-C	(grams)	0.88	0.6		
E	WT. OF DRY SOIL = C-A	(grams)	4.91	3.42		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.9	17.5		

LIQUID LIMIT (LL) = 33 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 15

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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 — DATE: 30 day 7 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-32

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

QA ID: JW

	WATER ADDED	(ml)	200	150	200	250	300
A	WT. OF SOIL & MOLD	(grams)	6119.1	5946.7	6119.4	6141.7	6114.5
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A − B	(grams)	1909.7	1737.3	1909.7	1932.3	1905.1
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.0	114.7	126.0	127.5	125.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	106.6 ✓	98.0 ✓	105.3 ✓	107.3 ✓	104.1 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

ASTM D 4643

QA ID: JW

	TARE NO.		VI	5	11 VOID	13	20
F	WT. OF TARE	(grams)	132.3	7.62	7.3	7.66	8.36
G	WT. OF WET SOIL & TARE	(grams)	290.4	186.60	279.20	238.50	200.27
H	WT. OF DRY SOIL & TARE	(grams)	266.1	161.54	234.45	201.91	167.30
I	WT. OF WATER = G − H	(grams)	24.3	25.06	44.75	36.59	32.97
J	WT. DRY SOIL = H − F	(grams)	133.8	153.92	227.09	194.25	158.9
K	MOISTURE CONTENT = (I/J) X 100	(%)	18.2 ✓	16.3 ✓	19.7 ✓	18.8 ✓	20.7 ✓

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FLUOR DANIEL FERNALD

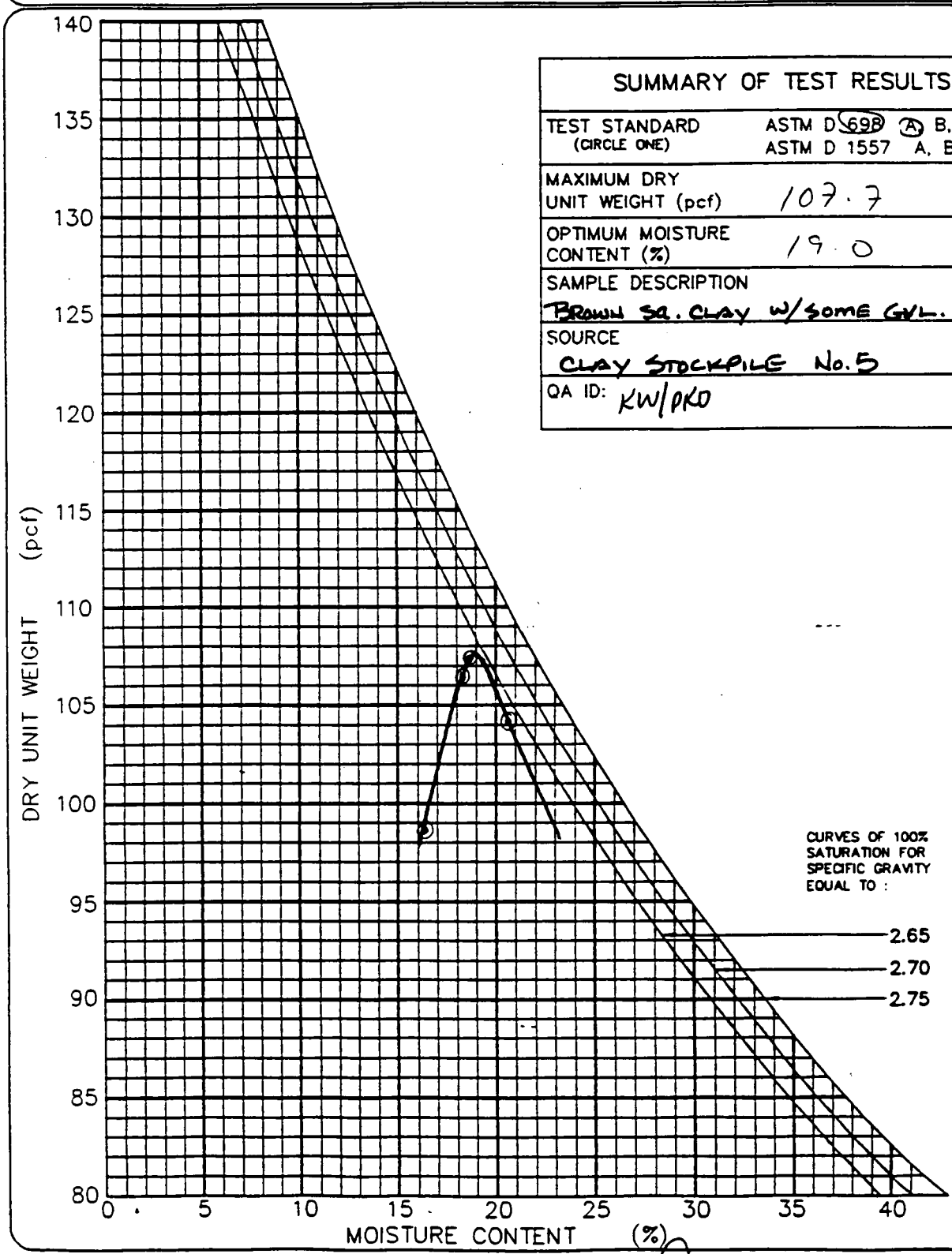
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-32



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	107.7
OPTIMUM MOISTURE CONTENT (%)	19.0
SAMPLE DESCRIPTION	BROWN SA. CLAY W/SOME GVL.
SOURCE	CLAY STOCKPILE No. 5
QA ID: KW/PKO	

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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-33

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW

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. _____	102				
A	WT. OF TARE	8.2				
B	WT. OF WET SOIL & TARE	198.5				
C	WT. OF DRY SOIL & TARE	167.2				
D	WT. OF WATER = B-C	31.3				
E	WT. OF DRY SOIL = C-A	159				
F	MOISTURE CONTENT = (D/E) X 100	19.7 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	IV				
A	WT. OF TARE	132.3				
B	WT. OF WET SOIL & TARE	340.6				
C	WT. OF DRY SOIL & TARE	308.4				
D	WT. OF WATER = B-C	32.2				
E	WT. OF DRY SOIL = C-A	176.1				
F	MOISTURE CONTENT = (D/E) X 100	18.3% ✓				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-33

SOIL SAMPLE SIZE > TOTAL SAMPLE WT = 30,360.2 gms
#4 SAMPLE WT = 2500.1 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		102	102
WT. OF DRY SAMPLE PLUS TARE	(grams)	167.2	40.2
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	159	32.0

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100		100
1½"	37.5	112.4	0.4	99.6		
1"	25.0	288.5	1.0	99.0		
¾"	19.0	476.1	1.6	98.4		90-100
½"	12.5	686.5	2.3	97.7		
⅜"	9.5	1023.4	3.4	96.6		
4	4.75	2304.7	7.6	92.4		
10	2.00	7.1	4.5	95.5	88.2	
20	0.850	13.4	8.4	91.6	84.6	
40	0.425	19.3	12.1	87.9	81.2	
60	0.250	22.6	14.2	85.8	79.3	
100	0.150	26.2	16.5	83.5	77.2	
200	0.075	31.6	19.9	80.1	74.0	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

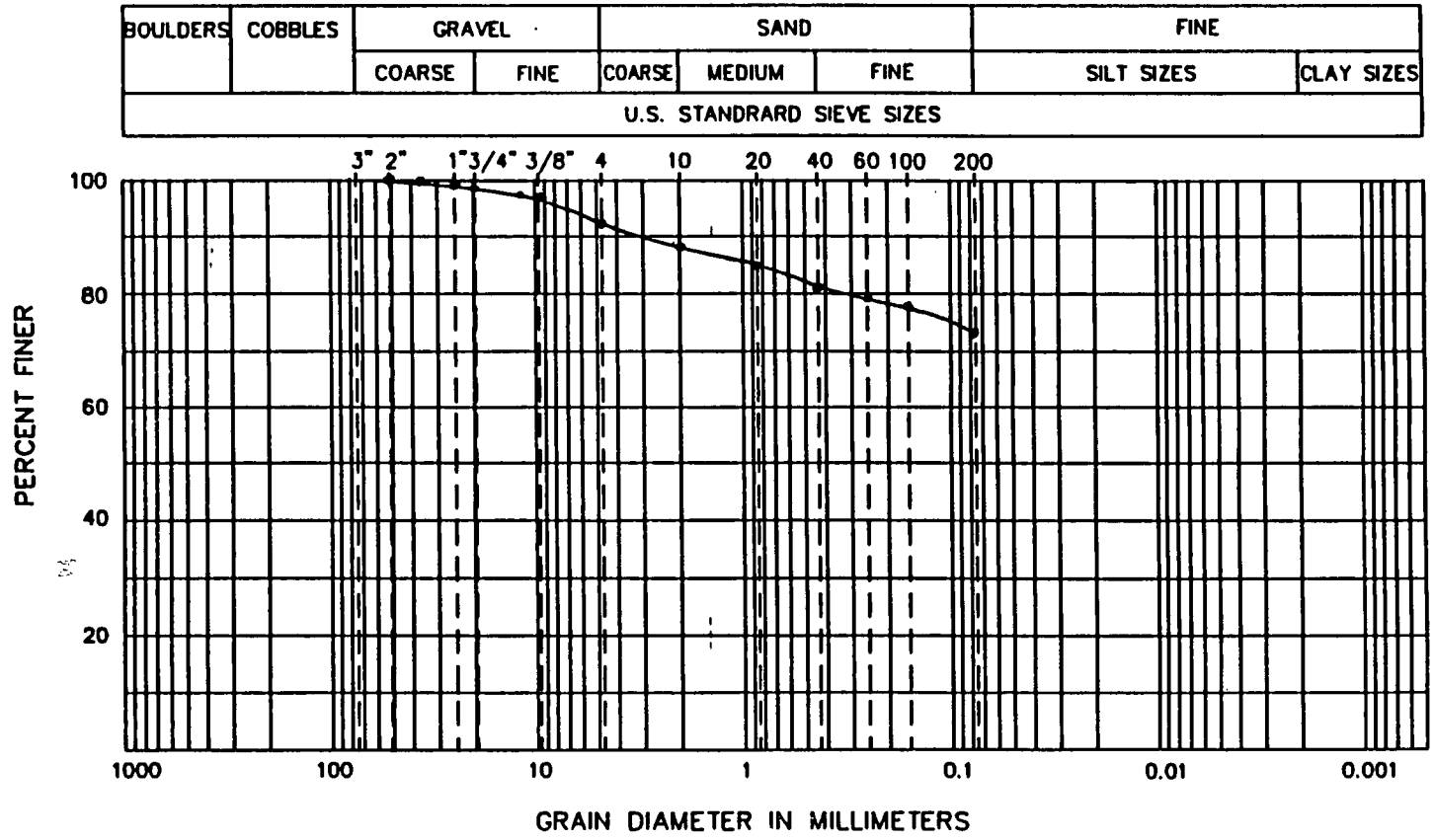
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-33 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 26

(PL) 14

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.6
1-in.	99.0
3/4-in.	98.4
1/2-in.	97.7
3/8-in.	96.6
NO. 4	92.4
NO. 10	88.2
NO. 20	84.6
NO. 40	81.2
NO. 60	79.3
NO. 100	77.2
NO. 200	74.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) W/SOME GRAVEL

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GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

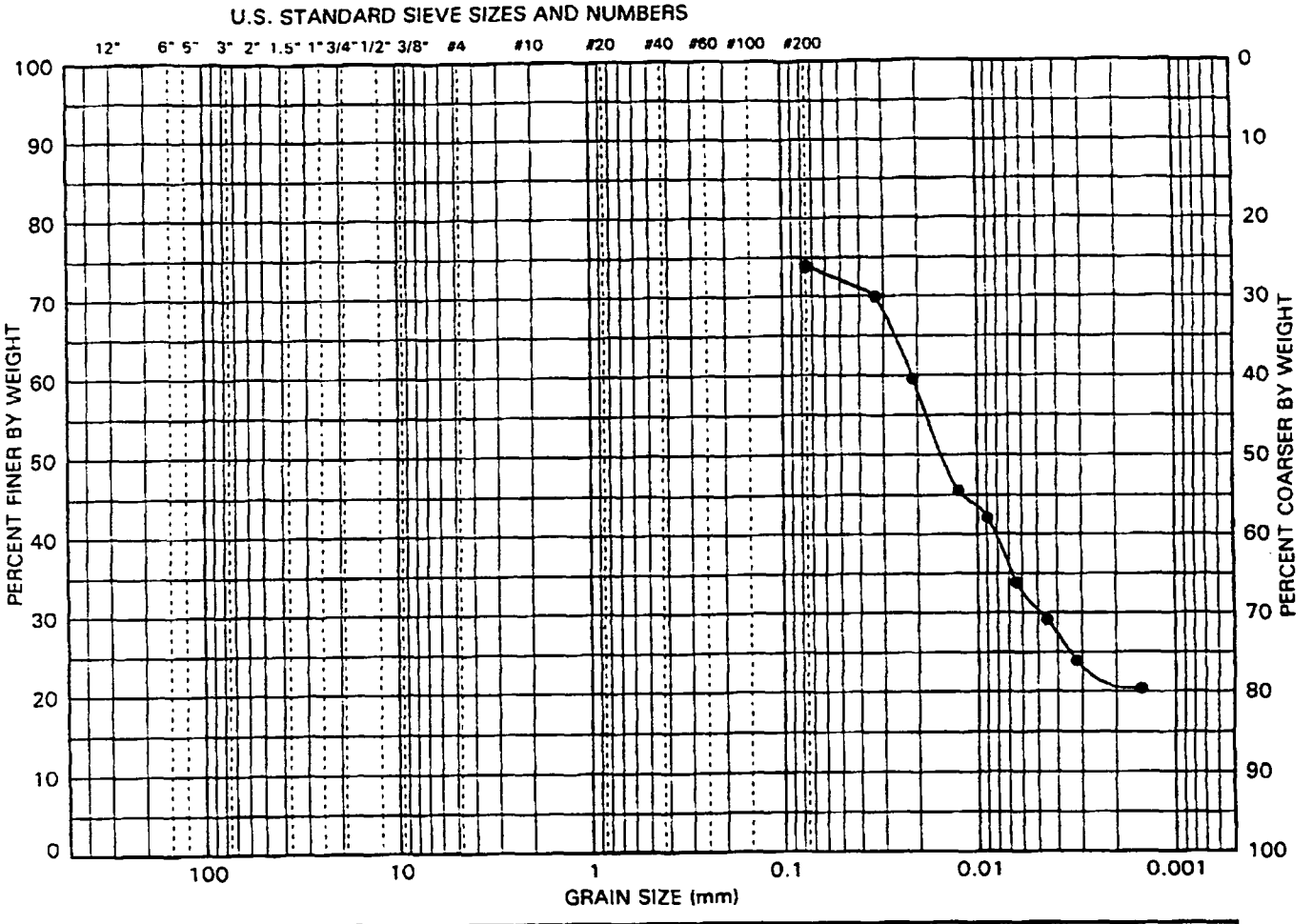
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/04/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-33	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G285	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 21.7
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															58	31	22	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 2 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-33

LIQUID LIMIT DETERMINATION

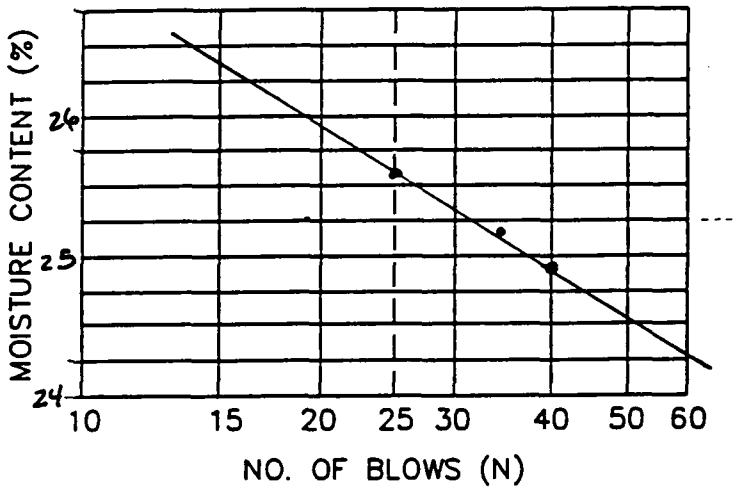
QA ID: JW

	TARE NO.		1.3	2.7	1.1	2.5
A	WT. OF TARE	(grams)	28.64	28.67	28.76	28.42
B	WT. OF WET SOIL & TARE	(grams)	44.00	42.78	42.22	40.41
C	WT. OF DRY SOIL & TARE	(grams)	40.94	39.90	39.49	38.00
D	WT. OF WATER = B-C	(grams)	3.06	2.88	2.73	2.41
E	WT. OF DRY SOIL = C-A	(grams)	12.3	11.23	10.73	9.58
F	MOISTURE CONTENT = (D/E)X100	(%)	24.9	25.6	25.4	25.2
N	NUMBER OF BLOWS		40	25	33	35

VOID

DRYING TARE NO.

I



CURING TARE NO.

1-B

CL

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.4	2.6		
A	WT. OF TARE	(grams)	27.39	28.56		
B	WT. OF WET SOIL & TARE	(grams)	39.42	38.04		
C	WT. OF DRY SOIL & TARE	(grams)	37.92	36.86		
D	WT. OF WATER = B-C	(grams)	1.5	1.18		
E	WT. OF DRY SOIL = C-A	(grams)	10.53	8.3		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.2	14.2		

LIQUID LIMIT (LL) = 26 PLASTIC LIMIT (PL) = 14 PLASTICITY INDEX (PI) = 12

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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 — DATE: 30 day 7 month 92 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-33

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

QA ID: JW

	WATER ADDED	(ml)	100	150	200	250	300
A	WT. OF SOIL & MOLD	(grams)		6119.1	6232.5	6255.1	6223.4
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1909.7	2023.1	2045.7	2014
D	WET UNIT WT.(1) = C X 0.066	(pcf)		126.0	133.5	135.0	132.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		114.1 ✓	118.4 ✓	118.5 ✓	114.7 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			29	9	1	14
F	WT. OF TARE	(grams)		8.24	7.25	7.28	7.72
G	WT. OF WET SOIL & TARE	(grams)		193.42	266.33	263.17	183.58
H	WT. OF DRY SOIL & TARE	(grams)		176.01	236.83	231.88	159.50
I	WT. OF WATER = G - H	(grams)		17.41	29.5	31.29	24.08
J	WT. DRY SOIL = H - F	(grams)		167.77	229.58	224.6	151.78
K	MOISTURE CONTENT = (I/J) X 100	(%)		10.4 ✓	12.8 ✓	13.9 ✓	15.9 ✓

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

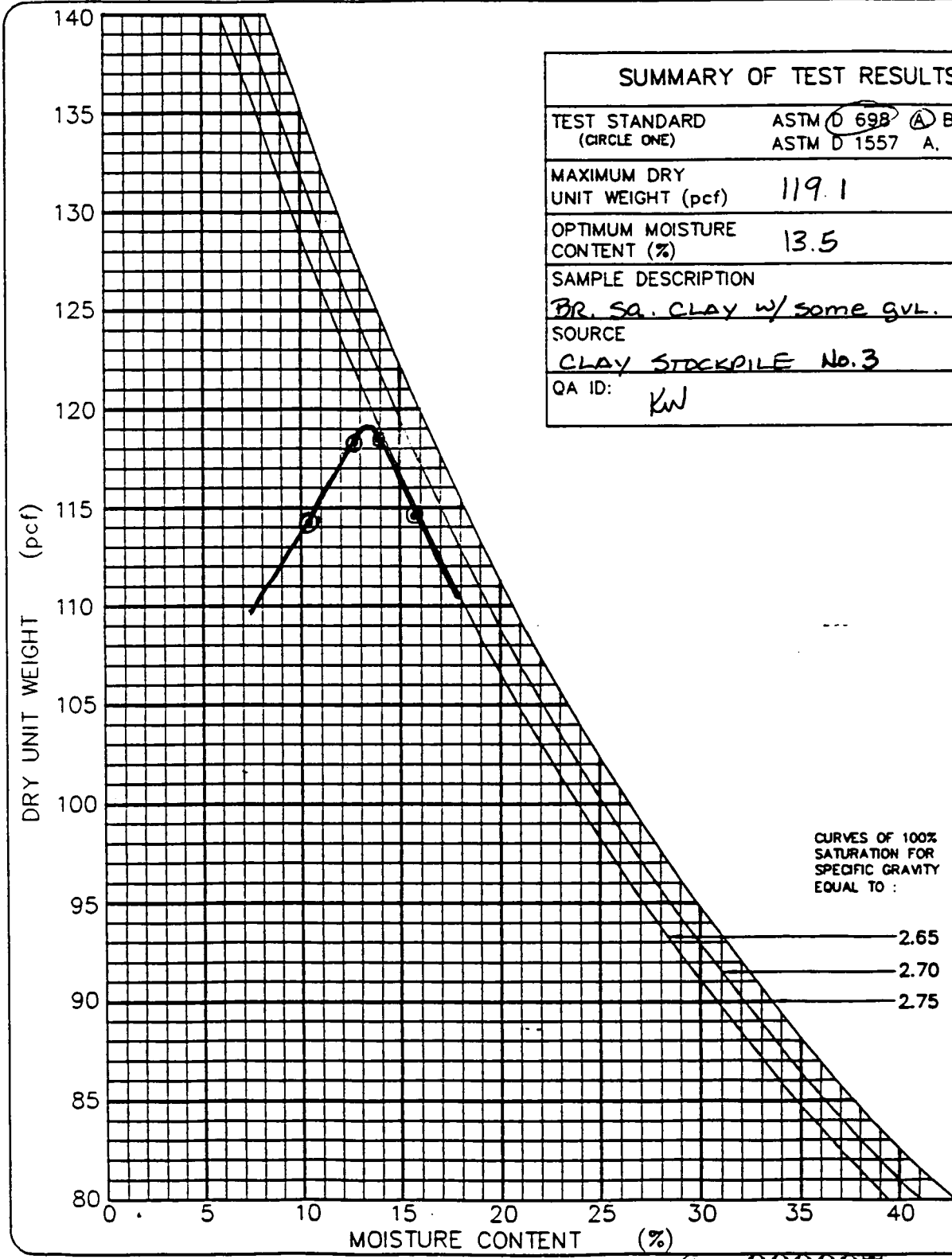
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 30 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-33



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	119.1
OPTIMUM MOISTURE CONTENT (%)	13.5
SAMPLE DESCRIPTION	BR. SA. CLAY w/ some GVL.
SOURCE	CLAY STOCKPILE No. 3
QA ID:	KW

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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-34

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: KW

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. _____	21				
A	WT. OF TARE	8.3				
B	WT. OF WET SOIL & TARE	184.0				
C	WT. OF DRY SOIL & TARE	153.0				
D	WT. OF WATER = B-C	31				
E	WT. OF DRY SOIL = C-A	144.7				
F	MOISTURE CONTENT = (D/E) X 100	21.4 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: KW/PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	262.2				
C	WT. OF DRY SOIL & TARE	239.8				
D	WT. OF WATER = B-C	22.4				
E	WT. OF DRY SOIL = C-A	107.8				
F	MOISTURE CONTENT = (D/E) X 100	20.8 ✓				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-34

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 33,850.9 gms
> #4 SAMPLE WT = 1420.3 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		21 ~~27~~ 7/26/97	21 ~~27~~ 7/26/97
WT. OF DRY SAMPLE PLUS TARE	(grams)	153.0	7/26/97 ~~48.9~~ 47.8
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	144.7	7/26/97 ~~40.6~~ 39.5

SIEVE ANALYSIS QA ID: PKD

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100		100
1½"	37.5	203.2	0.6	99.4		
1'	25.0	312.1	0.9	99.1		
3/4"	19.0	391.0	1.2	98.8		90-100
½"	12.5	560.0	1.7	98.3		
3/8"	9.5	717.6	2.1	97.9		
4	4.75	1327.7	3.9	96.1		
10	2.00	10.4	7.2	92.8	89.2	
20	0.850	15.1	10.4	89.6	86.1	
40	0.425	19.7	13.6	86.4	83.0	
60	0.250	23.9	16.5	83.5	80.2	
100	0.150	30.6	21.1	78.9	75.8	
200	0.025	39.1	27.0	73.0	70.2	50-100

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

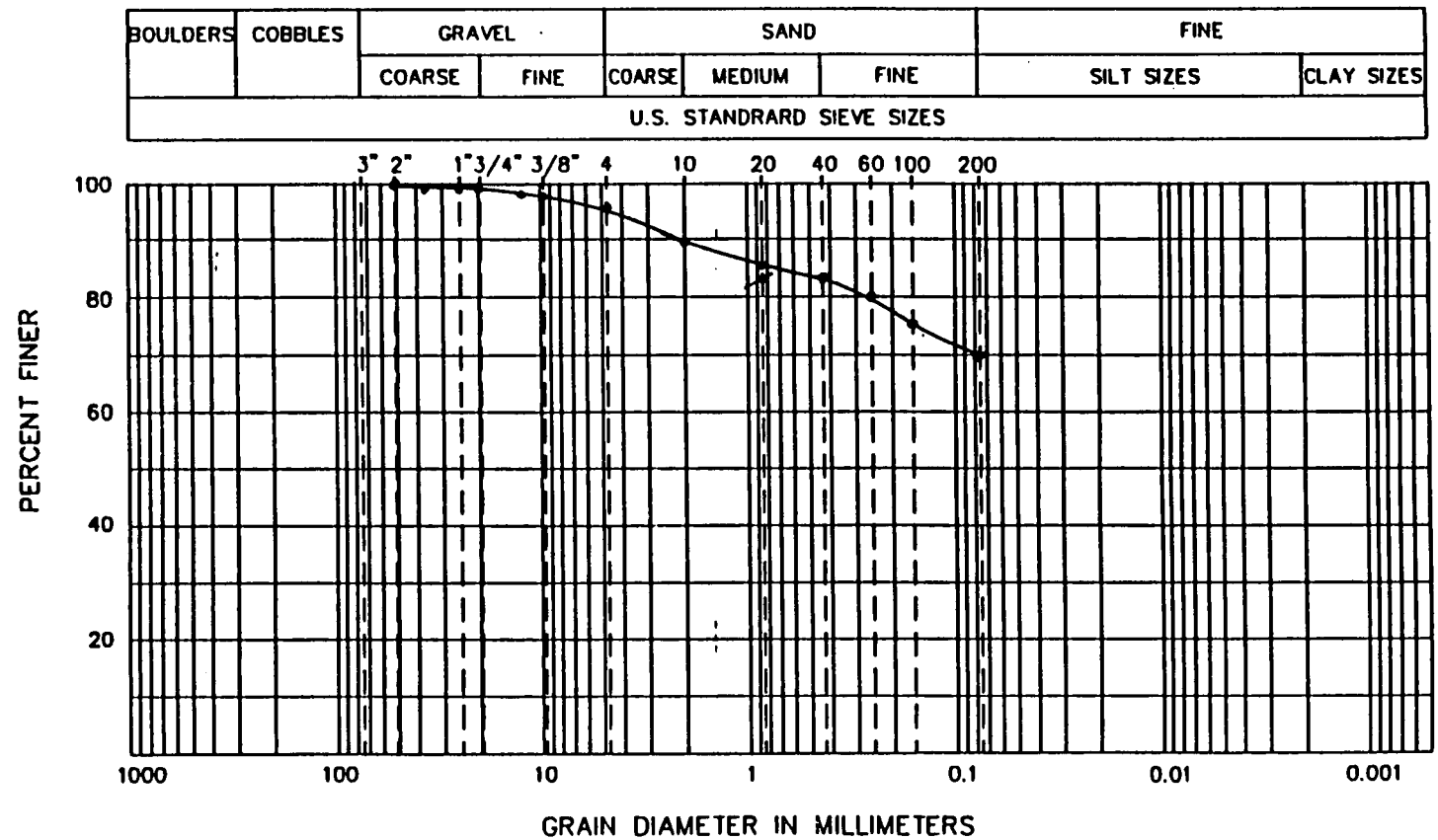
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-34 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/a (C_c) N/a



ATTERBERG LIMITS

(LL) 22

(PL) 16

(PI) 6

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.4
1-in.	99.1
3/4-in.	98.8
1/2-in.	98.3
3/8-in.	97.9
NO. 4	96.1
NO. 10	89.2
NO. 20	86.1
NO. 40	83.0
NO. 60	80.2
NO. 100	75.8
NO. 200	70.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN & GRAY SANDY SILTY LEAN CLAY (CL-ML) W/ TRACE OF GRAVEL

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

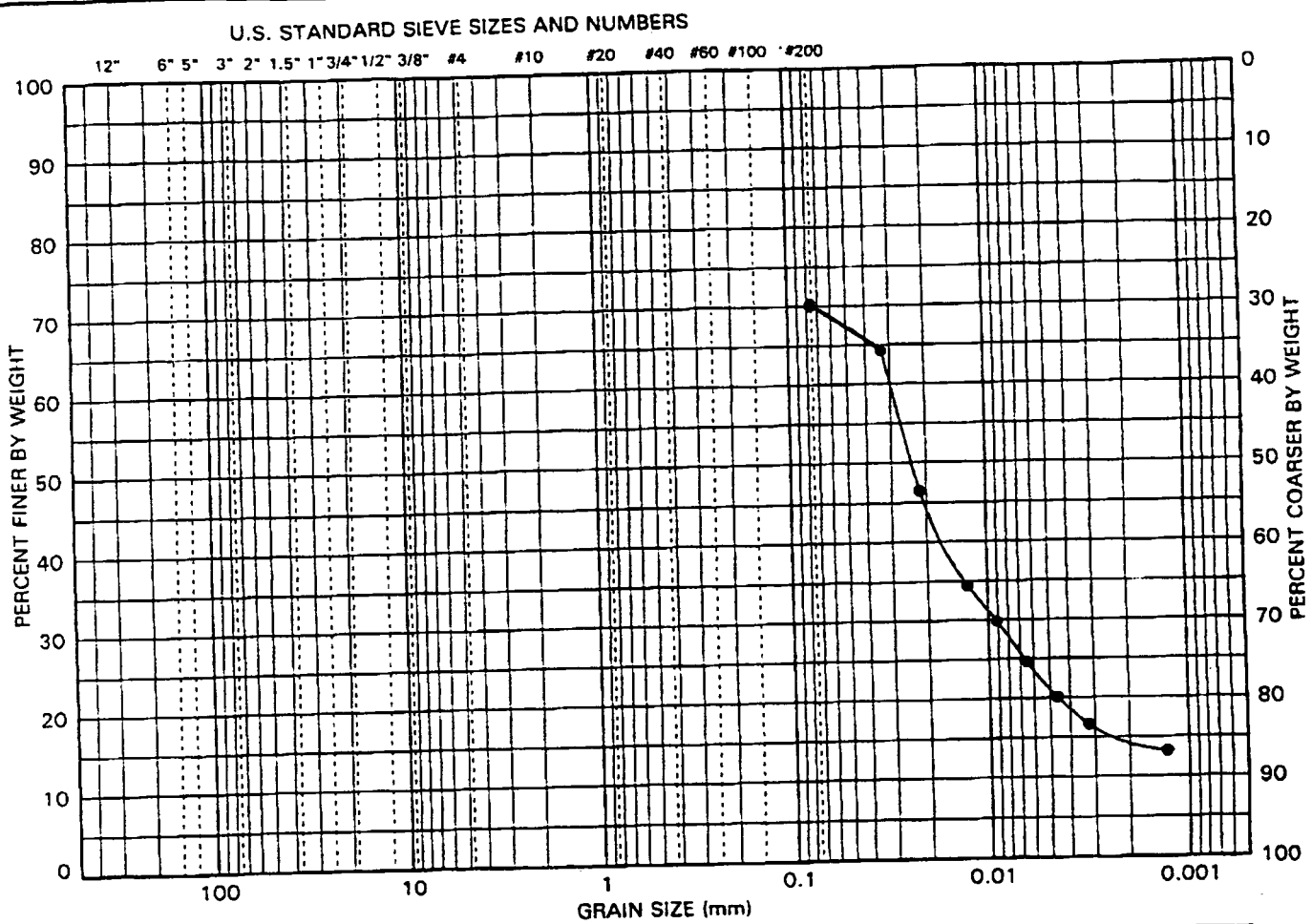
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-34	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97G286	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY(%)	14.8
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															45	21	15	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 2 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-34

LIQUID LIMIT DETERMINATION

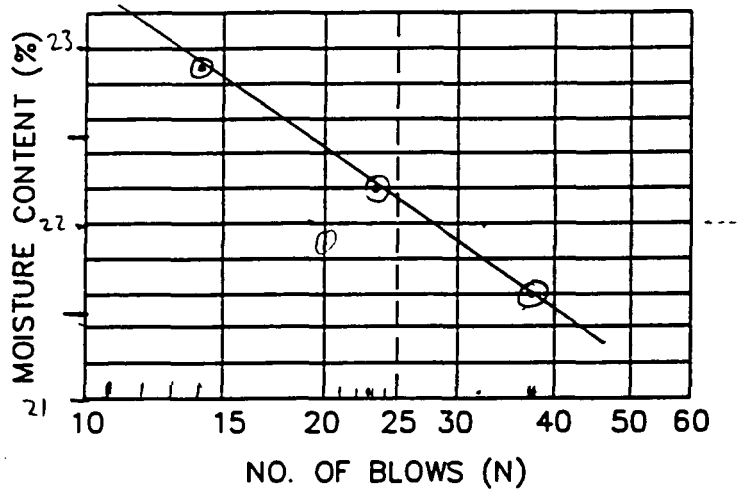
QA ID: JW

	TARE NO.		3.6	4.0	4.2	4.3
A	WT. OF TARE	(grams)	21.44	21.11	21.19	21.36
B	WT. OF WET SOIL & TARE	(grams)	33.15	33.05	32.77	34.30
C	WT. OF DRY SOIL & TARE	(grams)	30.97	30.88	30.69	32.00
D	WT. OF WATER = B-C	(grams)	2.18	2.17	2.08	2.3
E	WT. OF DRY SOIL = C-A	(grams)	9.53	9.77	9.5	10.64
F	MOISTURE CONTENT = (D/E)X100	(%)	22.9	22.2	21.9	21.6
N	NUMBER OF BLOWS		14	23	20	38

VOID

DRYING TARE NO.

C



CURING TARE NO.

1-D

CL-ML

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		3.3	3.7	3.9	
A	WT. OF TARE	(grams)	21.44	21.29	21.01	
B	WT. OF WET SOIL & TARE	(grams)	36.49	32.42	32.73	
C	WT. OF DRY SOIL & TARE	(grams)	33.78	30.86	31.14	
D	WT. OF WATER = B-C	(grams)	2.71	1.56	1.59	
E	WT. OF DRY SOIL = C-A	(grams)	12.34	9.57	10.13	
F	MOISTURE CONTENT = (D/E)X100	(%)	22.0	16.3	15.7	

32 VOID

LIQUID LIMIT (LL) = 22 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 6

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 4 day 8 month 92 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-34

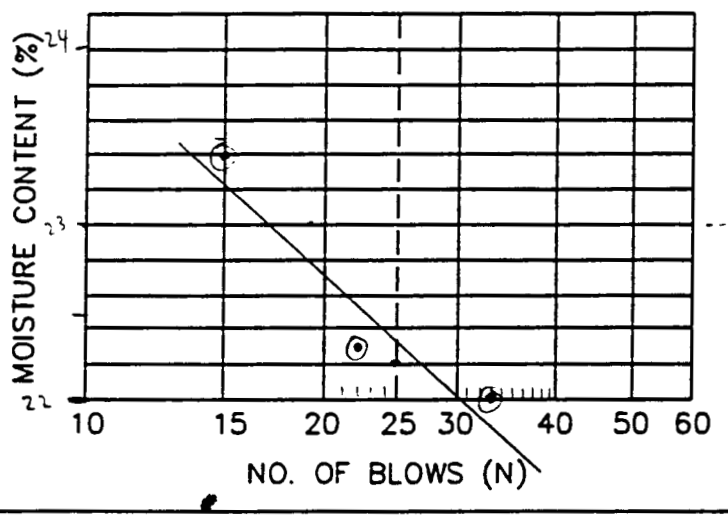
LIQUID LIMIT DETERMINATION

RERUN OF LIQUID LIMIT

QA ID: JW

	TARE NO.		1.7	2.9	1.4	1.2
A	WT. OF TARE	(grams)	28.49	31.46	28.52	28.50
B	WT. OF WET SOIL & TARE	(grams)	42.57	45.61	45.08	42.30
C	WT. OF DRY SOIL & TARE	(grams)	40.03	42.93	42.06	39.79
D	WT. OF WATER = B-C	(grams)	2.54	2.68	3.02	2.51
E	WT. OF DRY SOIL = C-A	(grams)	11.54	11.47	13.54	11.29
F	MOISTURE CONTENT = (D/E)X100	(%)	22.0	23.4	22.3	22.2
N	NUMBER OF BLOWS		33	15	22	25

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.					
A	WT. OF TARE	(grams)				
B	WT. OF WET SOIL & TARE	(grams)				
C	WT. OF DRY SOIL & TARE	(grams)				
D	WT. OF WATER = B-C	(grams)				
E	WT. OF DRY SOIL = C-A	(grams)				
F	MOISTURE CONTENT = (D/E)X100	(%)				

LIQUID LIMIT (LL) = 22 PLASTIC LIMIT (PL) = — PLASTICITY INDEX (PI) = —

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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 — DATE: 30 day 7 month 97 year

MATERIAL TYPE: CLAY UNER — SAMPLE NO.: LP-34

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

QA ID: JW

	WATER ADDED	(ml)	150	200	250	300	350
A	WT. OF SOIL & MOLD	(grams)		6123.6	6209.8	6232.5	6178.0
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1914.2	2000.4	2023.1	1968.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)		126.3	132.0	133.5	129.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		113.7 ✓	117.0 ✓	116.1 ✓	111.1 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			31	33	6	15
F	WT. OF TARE	(grams)		8.24	8.31	7.59	7.62
G	WT. OF WET SOIL & TARE	(grams)		265.25	245.72	232.82	251.13
H	WT. OF DRY SOIL & TARE	(grams)		239.58	218.84	203.48	215.19
I	WT. OF WATER = G - H	(grams)		25.67	26.88	29.34	35.14
J	WT. DRY SOIL = H - F	(grams)		231.34	210.53	195.89	208.37
K	MOISTURE CONTENT = (I/J) X 100	(%)		11.1 ✓	12.8 ✓	15.0 ✓	16.9 ✓

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FLUOR DANIEL FERNALD

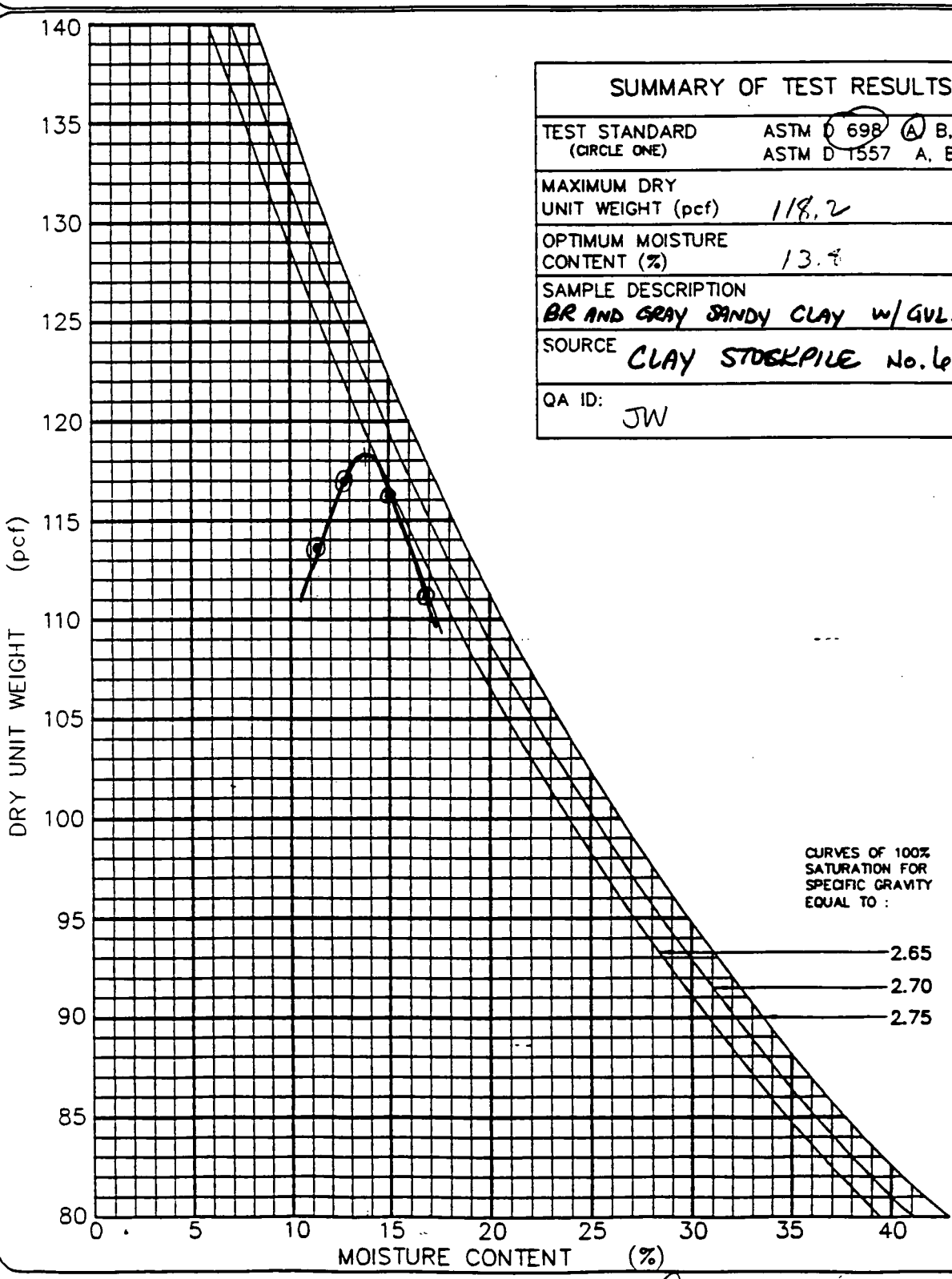
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 30 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-34



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	118.2
OPTIMUM MOISTURE CONTENT (%)	13.4
SAMPLE DESCRIPTION	BR AND GRAY SANDY CLAY w/ GVL.
SOURCE	CLAY STOCKPILE No. 6
QA ID:	JW

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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-35

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW

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. _____	23				
A	WT. OF TARE	8.4				
B	WT. OF WET SOIL & TARE	140.2				
C	WT. OF DRY SOIL & TARE	122.1				
D	WT. OF WATER = B-C	18.1				
E	WT. OF DRY SOIL = C-A	113.7				
F	MOISTURE CONTENT = (D/E) X 100	15.9				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: KW/PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	258.2				
C	WT. OF DRY SOIL & TARE	241.2				
D	WT. OF WATER = B-C	17.0				
E	WT. OF DRY SOIL = C-A	109.2				
F	MOISTURE CONTENT = (D/E) X 100	15.6				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-35

SOIL SAMPLE SIZE TOTAL SAMPLE WT = ~~34,654.6 gms~~ 31,875.8 gms Dcf 07/29/97
>#4 SAMPLE WT = 2224.0 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		23	23
WT. OF DRY SAMPLE PLUS TARE	(grams)	122.1	36.1
WT. OF TARE	(grams)	8.4	8.4
WT. OF DRY SAMPLE	(grams)	113.7	27.7

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100		100
1½"	37.5	216.8	0.7	99.3		
1"	25.0	483.0	1.5	98.5		
3/4"	19.0	592.3	1.9	98.1		90-100
½"	12.5	952.0	3.0	97.0		
3/8"	9.5	1262.2	4.0	96.0		
4	4.75	2158.2	6.8	93.2		
10	2.00	8.2	7.2	92.8	86.5	
20	0.850	12.1	10.6	89.4	83.3	
40	0.425	16.0	14.1	85.9	80.1	
60	0.250	19.5	17.2	82.8	77.2	
100	0.150	24.0	21.1	78.9	73.5	
200	0.025	29.4	25.9	74.1	69.1	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

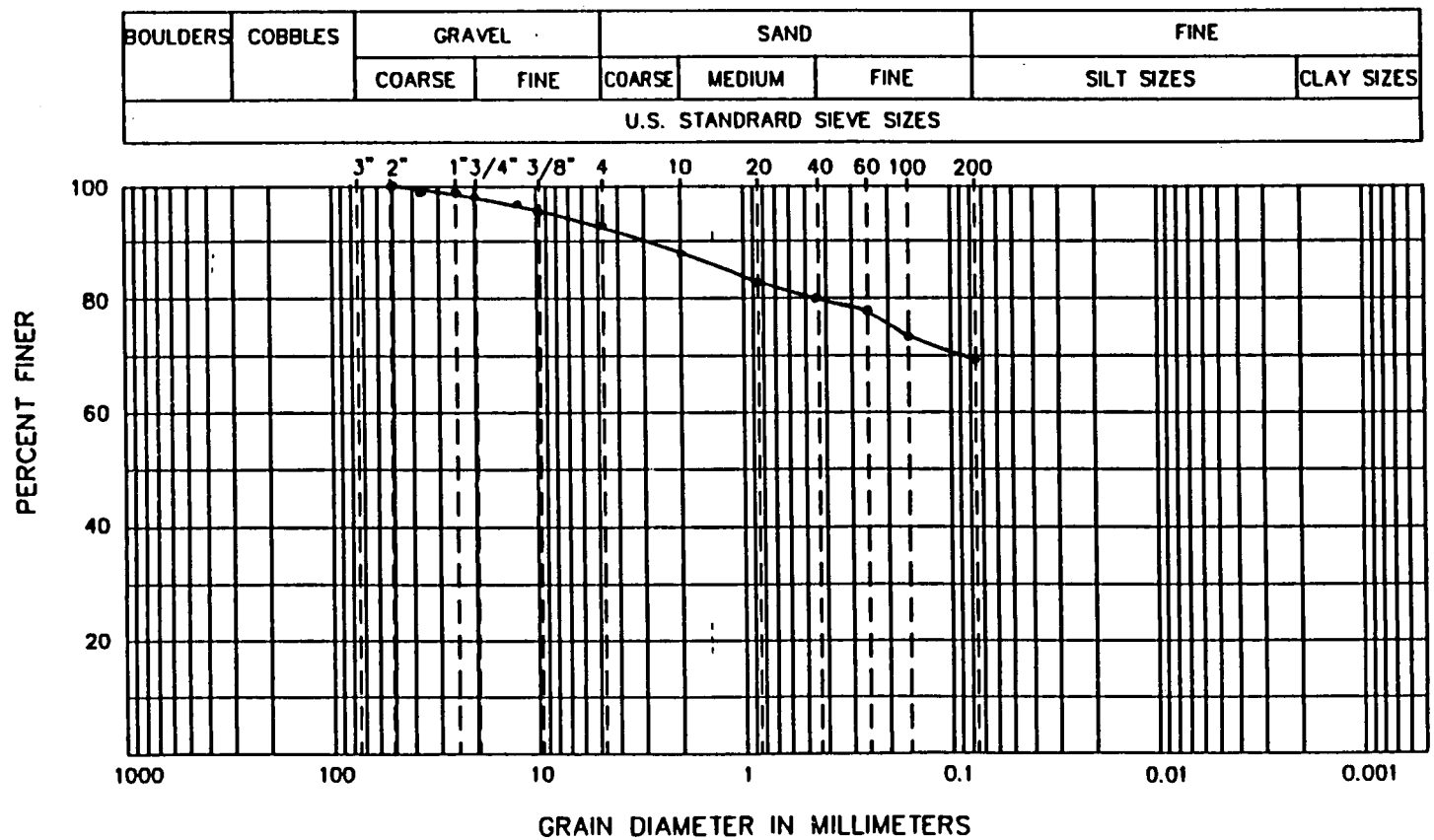
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-35 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 33

(PL) 16

(PI) 17

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.3
1-in.	98.5
3/4-in.	98.1
1/2-in.	97.0
3/8-in.	96.0
NO. 4	93.2
NO. 10	86.5
NO. 20	83.3
NO. 40	80.1
NO. 60	77.2
NO. 100	73.5
NO. 200	69.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN sandy LEAN CLAY (CL) w/SOME GRAVEL

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SHEET NO. 2 OF 2

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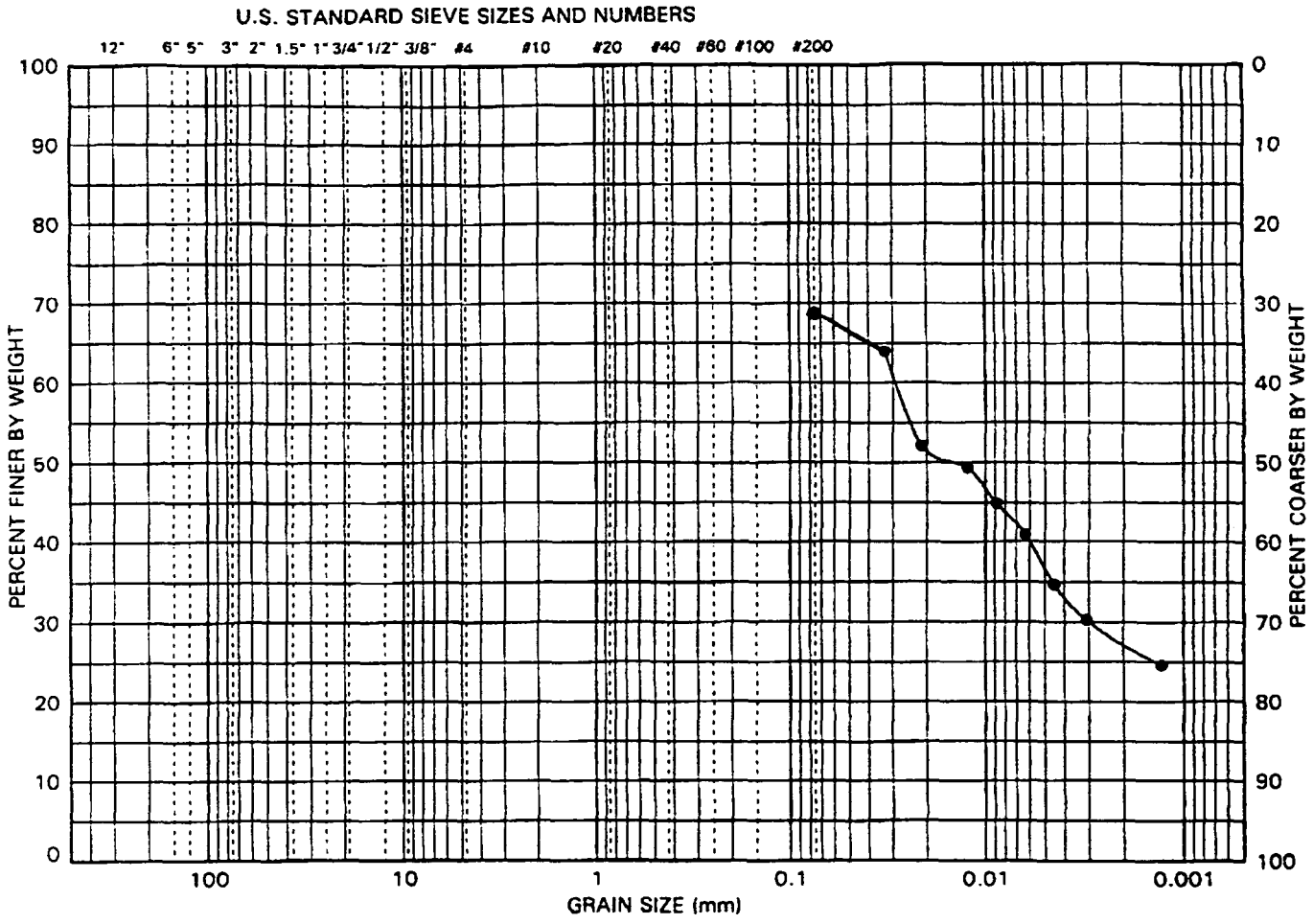
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID LP-35	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO. 97G287	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:			SILT (%)
			CLAY(%) 27.4
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															52	37	27	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 2 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-35

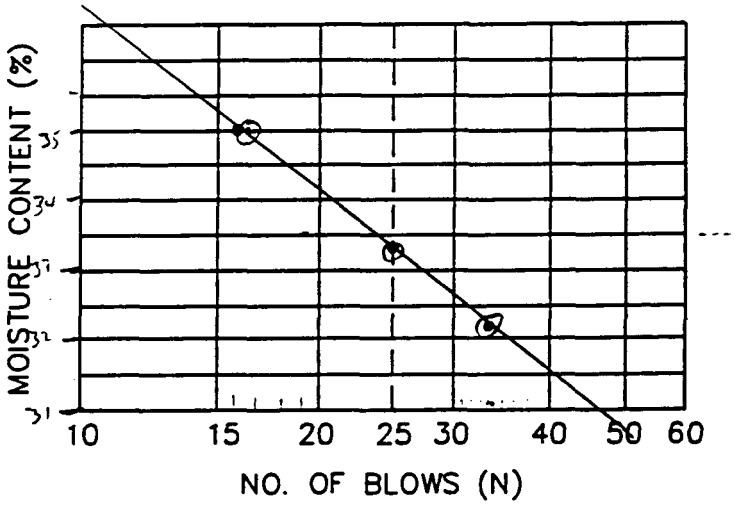
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.2	2.3	4.1	
A	WT. OF TARE	(grams)	27.63	31.20	21.07	
B	WT. OF WET SOIL & TARE	(grams)	39.98	45.96	35.06	
C	WT. OF DRY SOIL & TARE	(grams)	36.97	42.27	31.43	
D	WT. OF WATER = B-C	(grams)	3.01	3.69	3.63	
E	WT. OF DRY SOIL = C-A	(grams)	9.34	11.07	10.36	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.2 ✓	33.3 ✓	35.0 ✓	
N	NUMBER OF BLOWS		34	25	16	

DRYING TARE NO.

H



CURING TARE NO.

1-G

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.4	1.7		
A	WT. OF TARE	(grams)	28.52	28.49		
B	WT. OF WET SOIL & TARE	(grams)	37.41	35.37		
C	WT. OF DRY SOIL & TARE	(grams)	36.17	34.40		
D	WT. OF WATER = B-C	(grams)	1.24	0.97		
E	WT. OF DRY SOIL = C-A	(grams)	7.65	5.91		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.2 ✓	16.4 ✓		

LIQUID LIMIT (LL) = 33 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 17

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 — DATE: 30 day 7 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-35

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

4/23/97 — QA ID: JW

	WATER ADDED	(ml)	250	150	200	250	300
A	WT. OF SOIL & MOLD	(grams)	6185.1	6046.5	6155.4	6196.2	6182.0
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)	1976.7	1837.1	1946	1986.8	1973.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.5	121.2	128.4	131.1	130.2
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.7 ✓	106.6 ✓	111.9 ✓	110.6 ✓	109.9 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.		34	104	105	25	26
F	WT. OF TARE	(grams)	8.3	8.25	8.30	8.40	8.40
G	WT. OF WET SOIL & TARE	(grams)	289.5	209.44	236.94	219.50	273.30
H	WT. OF DRY SOIL & TARE	(grams)	251.07	185.13	207.63	186.58	231.95
I	WT. OF WATER = G - H	(grams)	38.43	24.31	29.31	32.92	41.35
J	WT. DRY SOIL = H - F	(grams)	242.77	176.88	199.33	178.18	223.55
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.8 ✓	13.7 ✓	14.7 ✓	18.5 ✓	18.5 ✓

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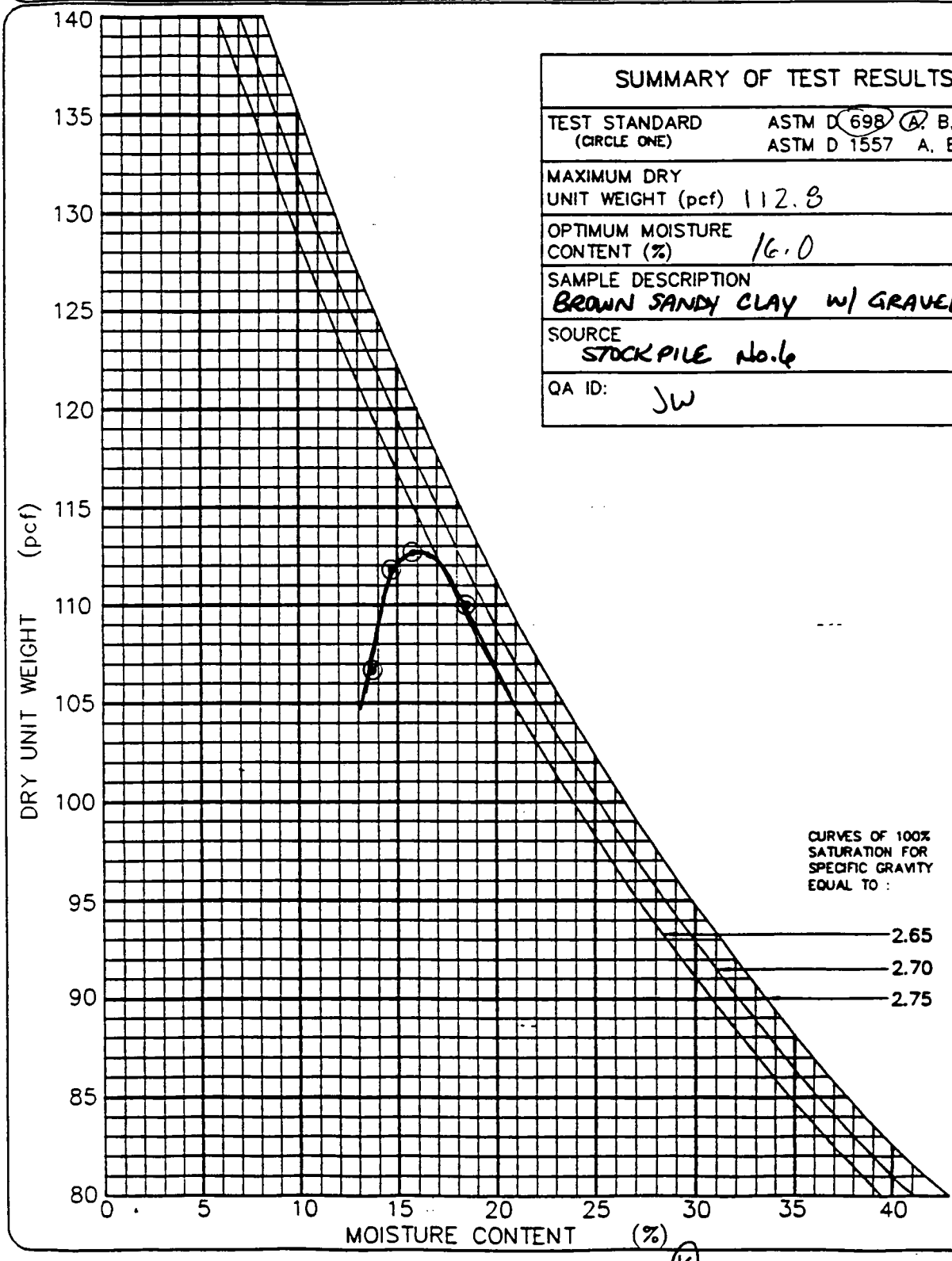
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 30 day 7 month 92 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-35



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	112.8
OPTIMUM MOISTURE CONTENT (%)	16.0
SAMPLE DESCRIPTION	BROWN SANDY CLAY w/ GRAVEL
SOURCE	STOCKPILE No. 6
QA ID:	JW

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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-36

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: KW

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. _____	101				
A	WT. OF TARE	8.2				
B	WT. OF WET SOIL & TARE	156.7				
C	WT. OF DRY SOIL & TARE	129.9				
D	WT. OF WATER = B-C	26.8				
E	WT. OF DRY SOIL = C-A	121.7				
F	MOISTURE CONTENT = (D/E) X 100	22.0				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: KW/PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	246.9				
C	WT. OF DRY SOIL & TARE	225.5				
D	WT. OF WATER = B-C	21.4				
E	WT. OF DRY SOIL = C-A	93.5				
F	MOISTURE CONTENT = (D/E) X 100	22.9				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-36

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 27,302.0 gms
> #4 SAMPLE WT = 199.4 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		101	101
WT. OF DRY SAMPLE PLUS TARE	(grams)	129.9	12.5
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	121.7	4.3

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100		100
1½"	37.5	Ø	Ø	100		
1"	25.0	45.3	0.2	99.8		
3/4"	19.0	64.2	0.2	99.8		90-100
1/2"	12.5	103.5	0.4	99.6		
3/8"	9.5	116.8	0.4	99.6		
4	4.75	182.9	0.7	99.3		
10	2.00	0.1	0.1	99.9	99.2	
20	0.850	0.5	0.4	99.6	98.9	
40	0.425	1.0	0.8	99.2	98.5	
60	0.250	1.6	1.3	98.7	98.0	
100	0.150	2.5	2.1	97.9	97.2	
200	0.025	4.1	3.4	96.6	95.9	50-100

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

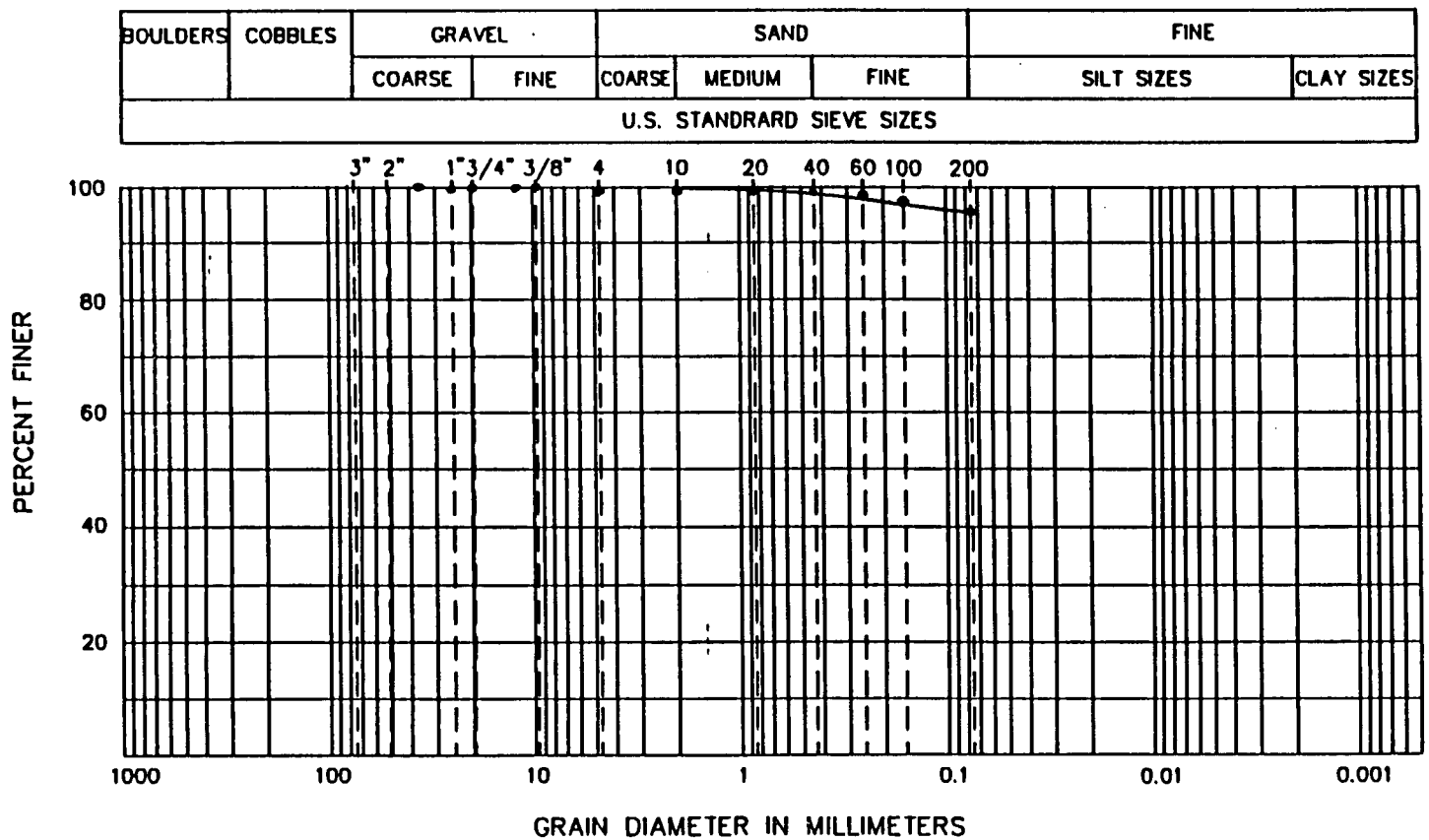
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 04 day AUG. month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-36 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 43

(PL) 18

(PI) 25

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.8
3/4-in.	99.8
1/2-in.	99.6
3/8-in.	99.6
NO. 4	99.3
NO. 10	99.2
NO. 20	98.9
NO. 40	98.5
NO. 60	98.0
NO. 100	97.2
NO. 200	95.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): Brown LEAN CLAY (CL) w/ Trace of Sand

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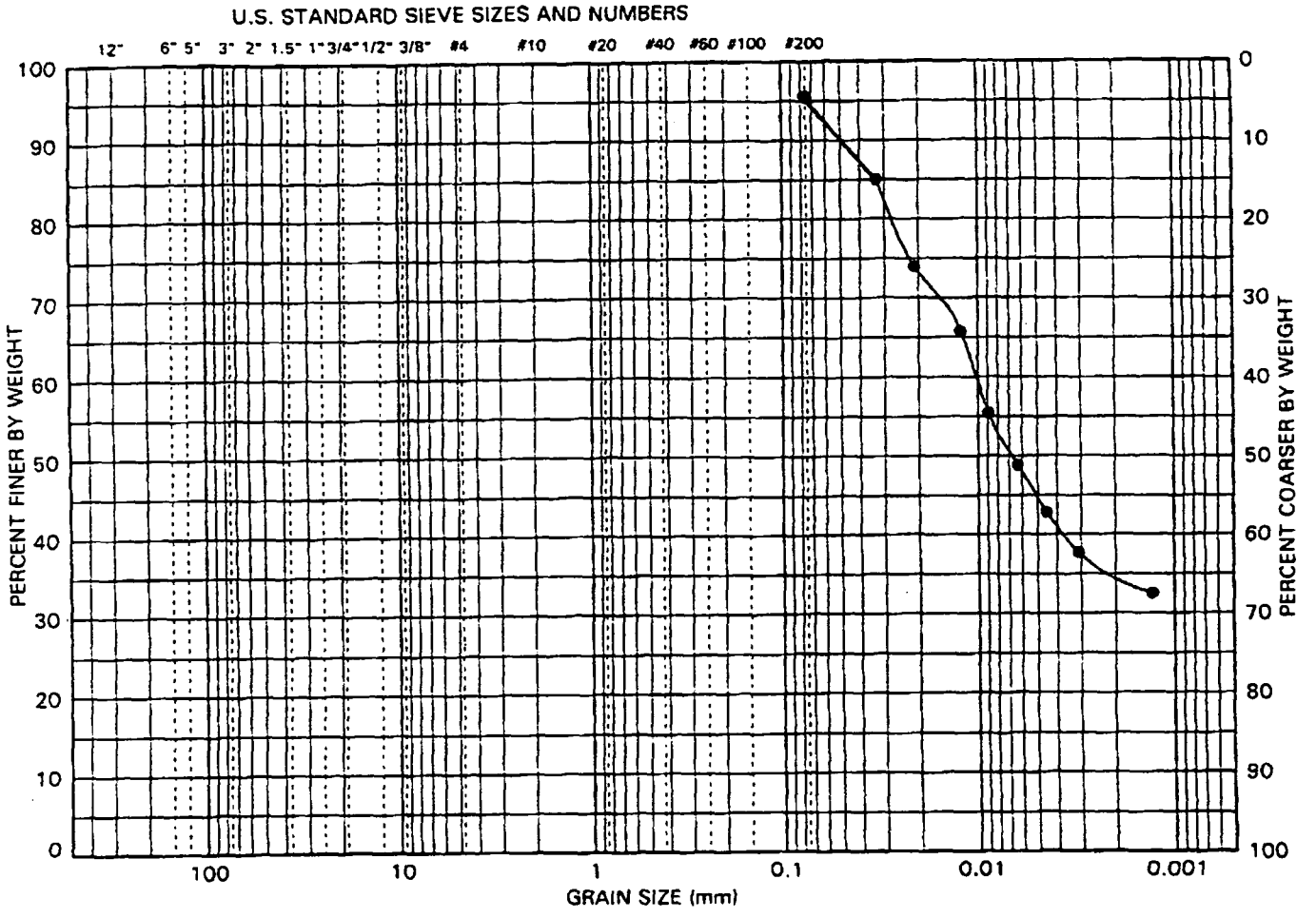
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-36	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G288	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 35.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															73	45	35	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-36

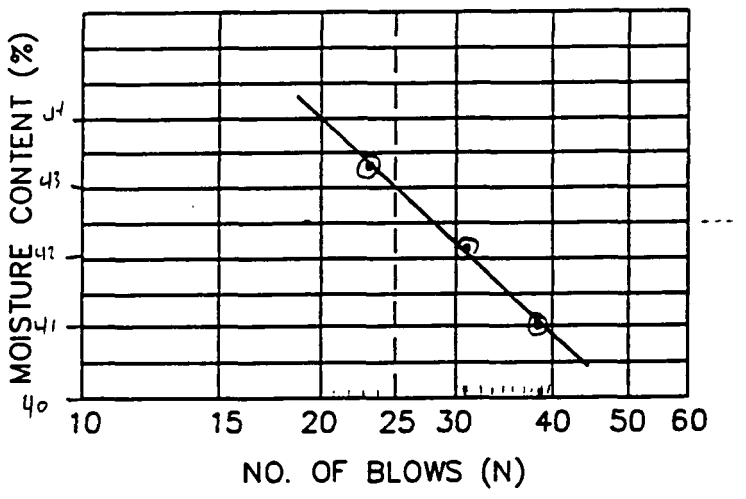
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.3	2.6	2.4	1.7
A	WT. OF TARE	(grams)	28.64	28.56	27.39	28.49
B	WT. OF WET SOIL & TARE	(grams)	35.87	46.51	43.41	44.70
C	WT. OF DRY SOIL & TARE	(grams)	30.6	41.29	38.56	39.90
D	WT. OF WATER = B-C	(grams)	5.27	5.22	4.85	4.8
E	WT. OF DRY SOIL = C-A	(grams)	1.99	12.73	11.17	11.41
F	MOISTURE CONTENT = (D/E)X100	(%)	40.6	41.0	43.4	42.1
N	NUMBER OF BLOWS		26	39	23	31

DRYING TARE NO.

7



CURING TARE NO.

1-C

CL

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		3.7	4.3		
A	WT. OF TARE	(grams)	21.29	21.36		
B	WT. OF WET SOIL & TARE	(grams)	28.69	27.10		
C	WT. OF DRY SOIL & TARE	(grams)	27.59	26.23		
D	WT. OF WATER = B-C	(grams)	1.1	.87		
E	WT. OF DRY SOIL = C-A	(grams)	6.3	4.87		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.5	17.9		

LIQUID LIMIT (LL) = 43 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 25

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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 — DATE: 31 day 7 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-36

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

QA ID: R.L.

	WATER ADDED	(ml)	200	250	300	350	
A	WT. OF SOIL & MOLD	(grams)	3822.2	3958.0	3979.0	3973.5	
B	WT. OF MOLD	(grams)	2046.7	2046.7	2046.7	2046.7	
C	WT. OF SOIL = A - B	(grams)	1775.5	1911.3	1932.3	1926.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.2	126.1	127.5	127.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	101.6 ✓	107.6 ✓	107.1 ✓	104.8 ✓	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: R.L.

	TARE NO.		28	102	9	12	
F	WT. OF TARE	(grams)	8.2	8.2	7.24	7.26	
G	WT. OF WET SOIL & TARE	(grams)	360.0	343.0	344.0	333.56	
H	WT. OF DRY SOIL & TARE	(grams)	313.01	293.90	290.35	276.12	
I	WT. OF WATER = G - H	(grams)	46.99	49.1	53.65	57.44	
J	WT. DRY SOIL = H - F	(grams)	304.81	285.7	283.11	268.86	
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.4 ✓	17.2 ✓	19.0 ✓	21.4 ✓	

000118

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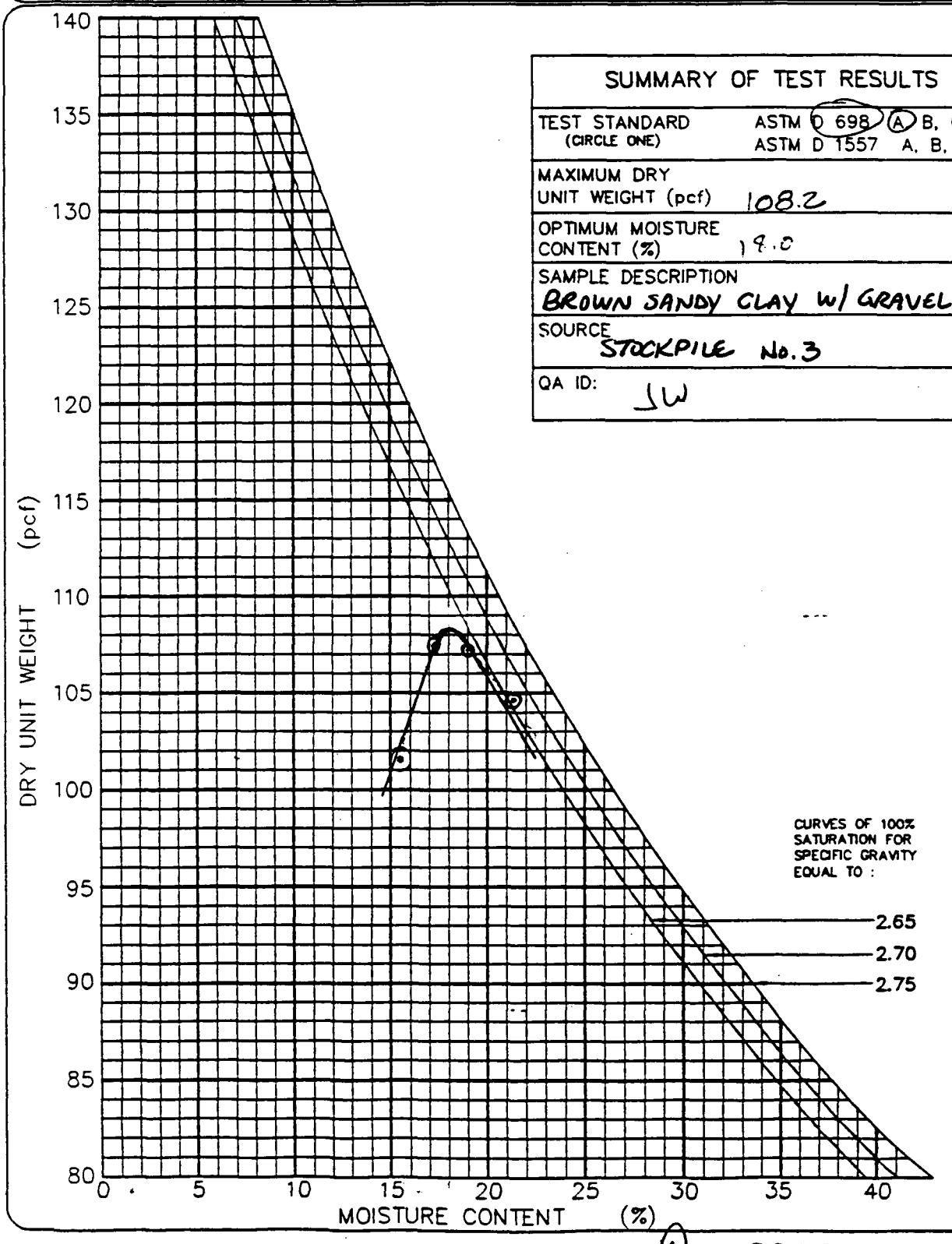
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-36



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	108.2
OPTIMUM MOISTURE CONTENT (%)	19.0
SAMPLE DESCRIPTION	BROWN SANDY CLAY W/ GRAVEL
SOURCE	STOCKPILE No. 3
QA ID:	JW

1266

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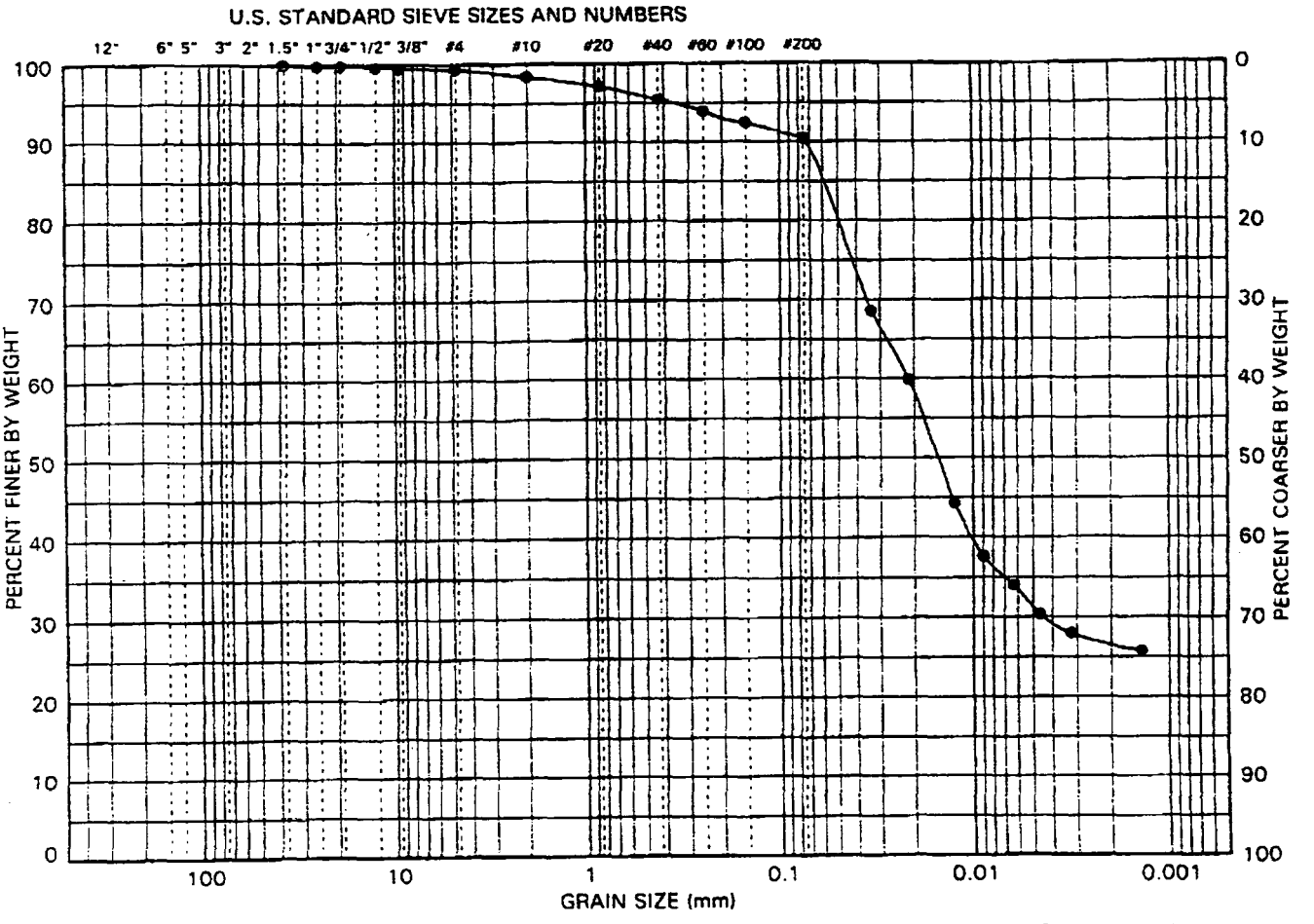
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/06/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-36A	LIQUID LIMIT (%)	52	SOIL FRACTIONS: GRAVEL (%)	0.7
LAB. SAMPLE NO.	97G234	PLASTIC LIMIT (%)	22	SAND (%)	8.9
SAMPLE DEPTH (ft)		PLASTICITY INDEX	30	FINES (%)	90.4
SOIL CLASSIFICATION:				SILT (%)	63.7
CH - Fat Clay				CLAY(%)	26.7
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	99	98	97	95	94	92	90	80	58	31	27	

NOTES:

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FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

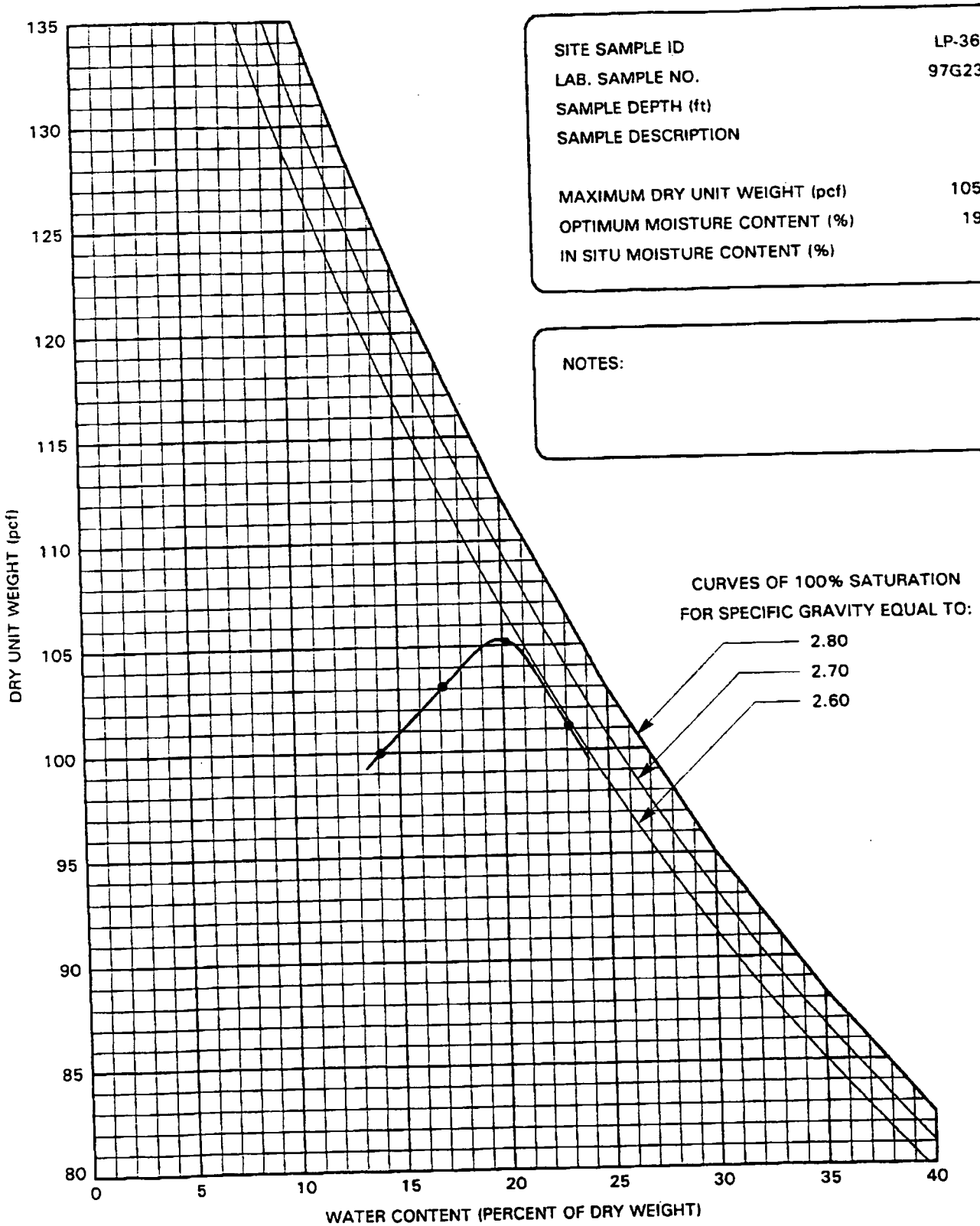
GS FORM: 4MD1 08/04/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-36A
LAB. SAMPLE NO.	97G234
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	105.2
OPTIMUM MOISTURE CONTENT (%)	19.9
IN SITU MOISTURE CONTENT (%)	

NOTES:



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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-37

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW

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. _____	103				
A	WT. OF TARE	8.3				
B	WT. OF WET SOIL & TARE	~~154.6~~ 189.9 7/25/97				
C	WT. OF DRY SOIL & TARE	162.9				
D	WT. OF WATER = B-C	27.0				
E	WT. OF DRY SOIL = C-A	154.6				
F	MOISTURE CONTENT = (D/E) X 100	17.5				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: KW/RKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	298.4				
C	WT. OF DRY SOIL & TARE	274.5				
D	WT. OF WATER = B-C	23.9				
E	WT. OF DRY SOIL = C-A	142.5				
F	MOISTURE CONTENT = (D/E) X 100	16.8				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-37

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 40,172.6 gms
>#4 SAMPLE WT = 3294.9 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	103	103
WT. OF DRY SAMPLE PLUS TARE (grams)	162.9	45.4
WT. OF TARE (grams)	8.3	8.3
WT. OF DRY SAMPLE (grams)	154.6	37.1

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	1186.8	3.0	97.0		100
1½"	37.5	1304.6	3.2	96.8		
1"	25.0	1531.7	3.8	96.2		
3/4"	19.0	1676.2	4.2	95.8		90 - 100
½"	12.5	1973.3	4.9	95.1		
3/8"	9.5	2232.6	5.6	94.4		
4	4.75	3144.9	7.8	92.2		
10	2.00	10.8	7.0	93.0	~~85.8~~	85.7
20	0.850	15.3	9.9	90.1	83.1	
40	0.425	20.0	12.9	87.1	80.3	
60	0.250	24.4	15.8	84.2	77.6	
100	0.150	30.1	19.5	80.5	74.2	
200	0.025	36.6	23.7	76.3	~~70.4~~ 70.3	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

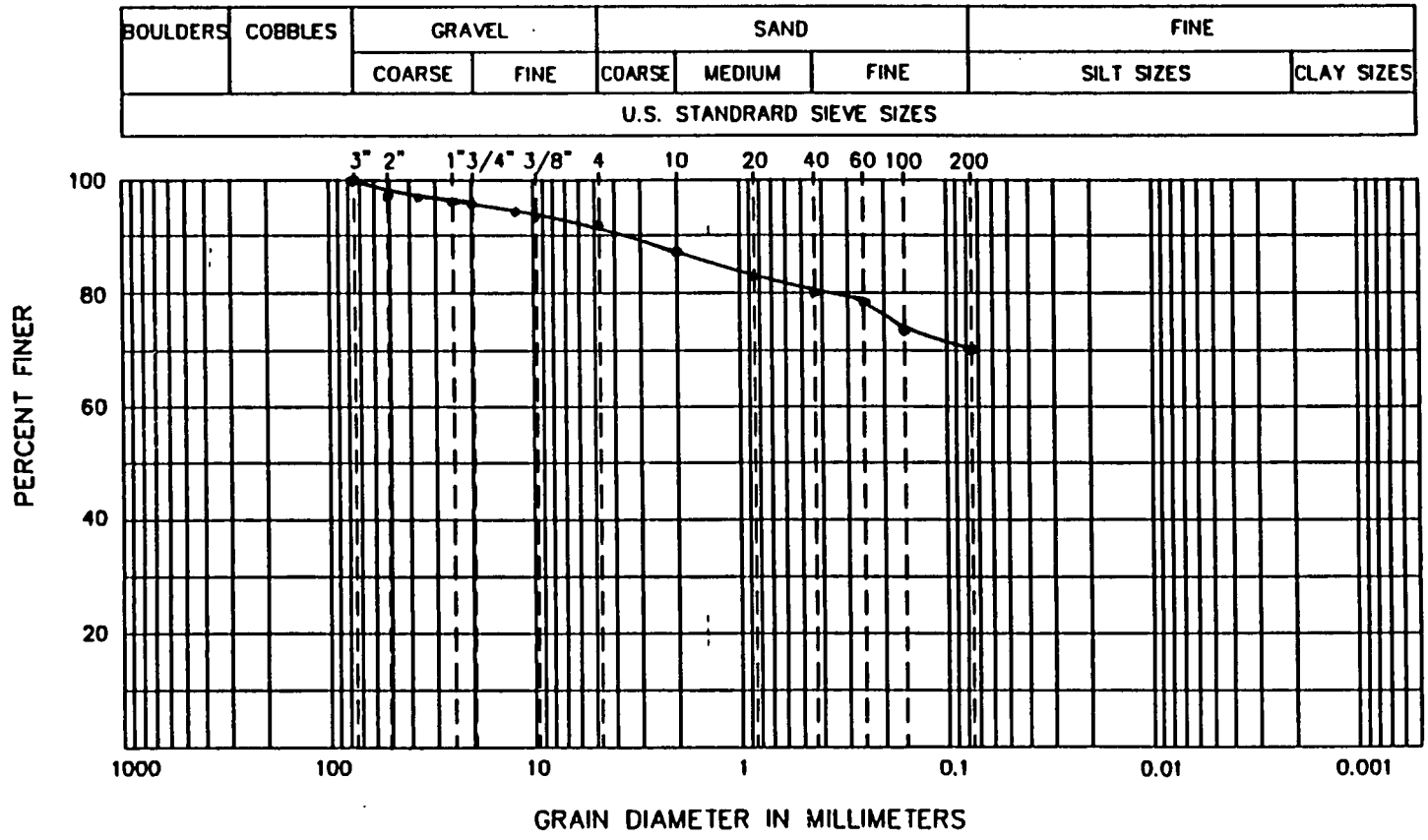
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-37 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 32

(PL) 16

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100.0
2-in.	97.0
1 1/2-in.	96.8
1-in.	96.2
3/4-in.	95.8
1/2-in.	95.1
3/8-in.	94.4
NO. 4	92.2
NO. 10	~~87.6~~ 85.7 BN
NO. 20	83.1
NO. 40	80.3
NO. 60	77.6
NO. 100	74.2
NO. 200	70.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN sandy LEAN CLAY (CL) w/ SOME GRAVEL

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: BN

SHEET NO. 2 OF 2

000124

1266

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE

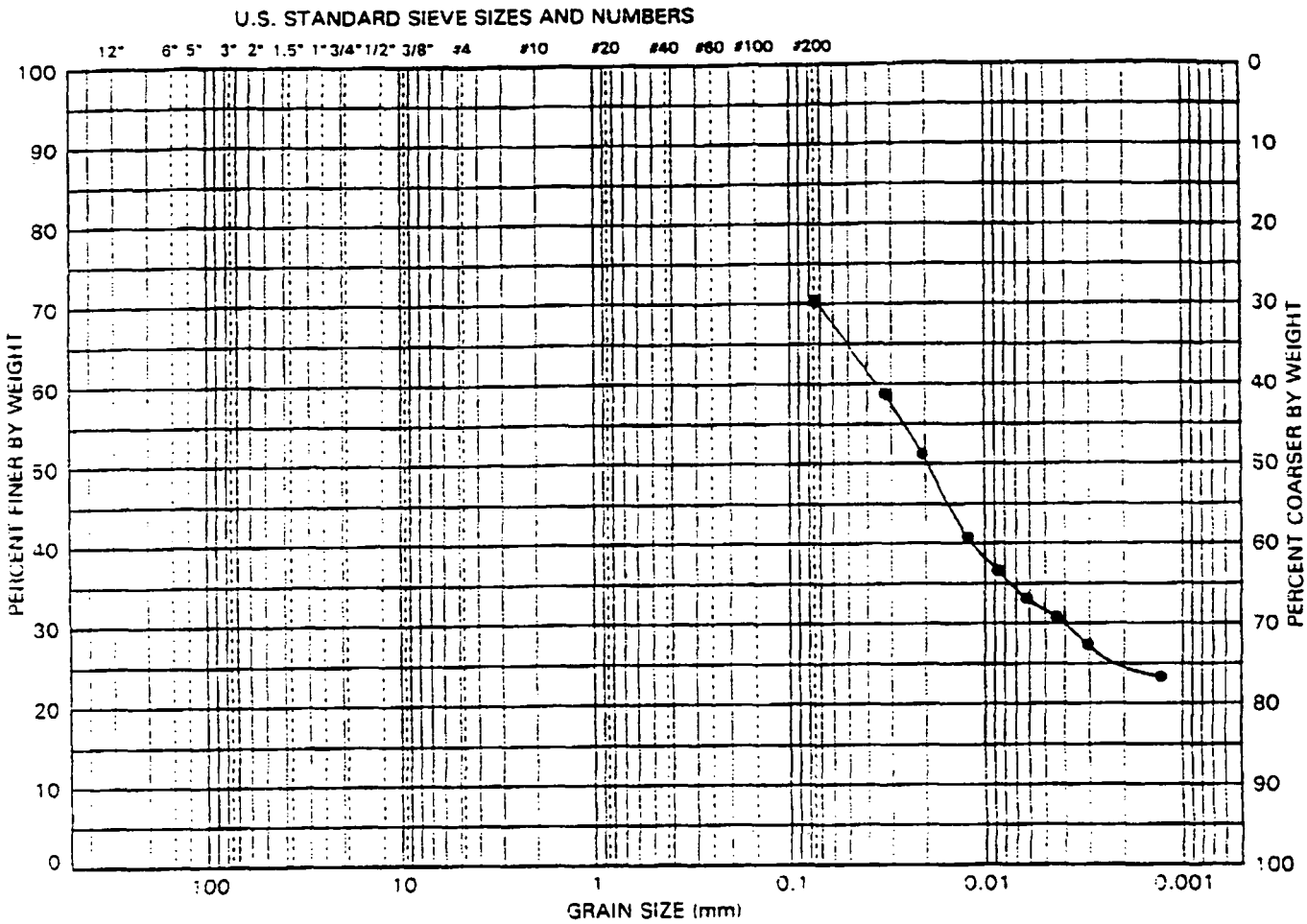
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

RECEIVED AUG 12 1997

GS FORM: 4PS2 08/11/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 ~~D 3042 AND D 4318~~



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID LP-37	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO. 97G289.A	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:			SILT (%)
			CLAY(%) 25.3
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															50	32	25	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day 9 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-37

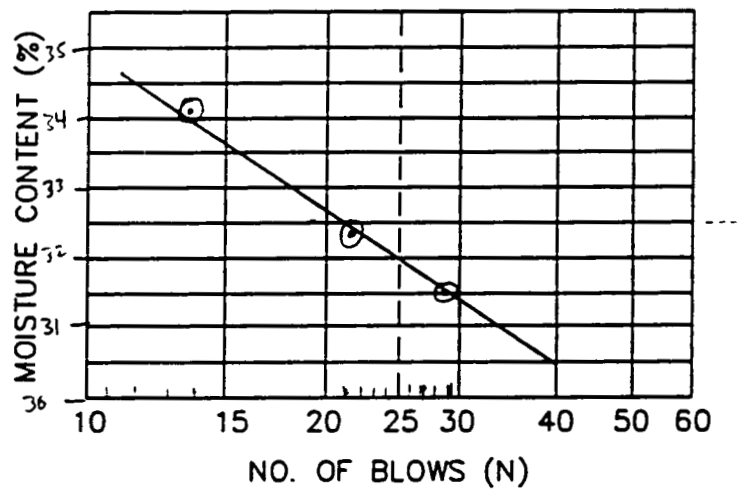
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.4	1.2	2.3	
A	WT. OF TARE	(grams)	28.52	28.50	31.20	
B	WT. OF WET SOIL & TARE	(grams)	44.36	44.18	49.48	
C	WT. OF DRY SOIL & TARE	(grams)	40.57	40.34	44.83	
D	WT. OF WATER = B-C	(grams)	3.79	3.84	4.65	
E	WT. OF DRY SOIL = C-A	(grams)	12.05	11.84	13.63	
F	MOISTURE CONTENT = (D/E)X100	(%)	31.5 ✓	32.4 ✓	34.1 ✓	
N	NUMBER OF BLOWS		29	21	14	

DRYING TARE NO.

25



CURING TARE NO.

1-F

CL

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		3.5	3.4		
A	WT. OF TARE	(grams)	21.20	21.44		
B	WT. OF WET SOIL & TARE	(grams)	27.28	30.12		
C	WT. OF DRY SOIL & TARE	(grams)	26.45	28.94		
D	WT. OF WATER = B-C	(grams)	.83	1.18		
E	WT. OF DRY SOIL = C-A	(grams)	5.25	7.5		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.8 ✓	15.7 ✓		

LIQUID LIMIT (LL) = 32 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 16

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 — DATE: 31 day 7 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-37

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

QA ID: R.C

	WATER ADDED	(ml)	100	150	200	250	~~200~~ 50
A	WT. OF SOIL & MOLD	(grams)	3920.3	4068.8	4010.3		3819.3
B	WT. OF MOLD	(grams)	2046.7	2046.7	2046.7	2046.7	2046.7
C	WT. OF SOIL = A - B	(grams)	1873.6	2022.1	1963.6		1767.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.7	133.5	129.6		116.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.4 ✓	114.0 ✓	109.0 ✓		103.4 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: R.C

	TARE NO.		29	25	32		10
F	WT. OF TARE	(grams)	8.24	8.27	8.34		7.23
G	WT. OF WET SOIL & TARE	(grams)	341.31	365.67	319.24		441.5
H	WT. OF DRY SOIL & TARE	(grams)	301.11	316.37	269.86		392.03
I	WT. OF WATER = G - H	(grams)	40.2	49.3	49.38		49.47
J	WT. DRY SOIL = H - F	(grams)	292.87	308.1	261.52		384.8
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.7 ✓	16.0 ✓	18.9 ✓		12.9 ✓

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: [illegible] SHEET NO. 1 OF 2

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FLUOR DANIEL FERNALD

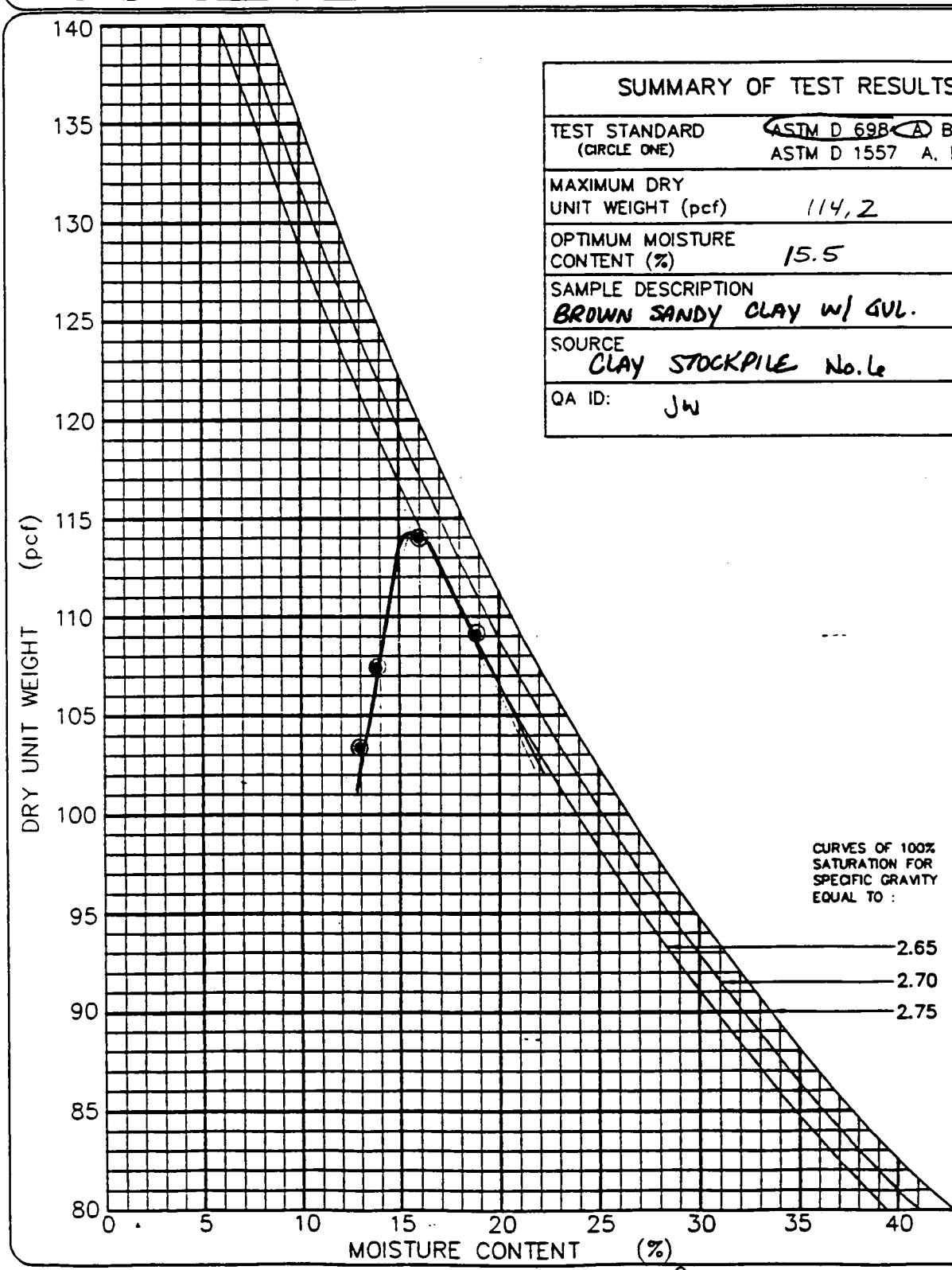
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-37



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	114.2
OPTIMUM MOISTURE CONTENT (%)	15.5
SAMPLE DESCRIPTION	BROWN SANDY CLAY w/ GVL.
SOURCE	CLAY STOCKPILE No. 6
QA ID:	JW

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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-38

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: KW/DKO

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. _____	26				
A	WT. OF TARE	8.3				
B	WT. OF WET SOIL & TARE	183.1				
C	WT. OF DRY SOIL & TARE	159.8				
D	WT. OF WATER = B-C	23.3				
E	WT. OF DRY SOIL = C-A	151.5				
F	MOISTURE CONTENT = (D/E) X 100	15.4 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: KW

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	286.3				
C	WT. OF DRY SOIL & TARE	268.0				
D	WT. OF WATER = B-C	18.3				
E	WT. OF DRY SOIL = C-A	136				
F	MOISTURE CONTENT = (D/E) X 100	13.5 ✓				

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-38

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 33,743.2 gms
> #4 SAMPLE WT = 3247.6 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		26	26
WT. OF DRY SAMPLE PLUS TARE	(grams)	159.8	48.5
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	151.5	40.2

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	868.3	2.6	97.4		100
1½"	37.5	1013.0	3.0	97.0		
1"	25.0	1435.3	4.3	95.7		
¾"	19.0	1597.9	4.7	95.3		90-100
½"	12.5	1983.8	5.9	94.1		
⅜"	9.5	2222.4	6.6	93.4		
4	4.75	3061.9	9.1	90.9		
10	2.00	9.2	6.1	93.9	85.4	
20	0.850	15.4	10.2	89.8	81.6	
40	0.425	21.8	14.4	85.6	77.8	
60	0.250	27.1	17.9	82.1	74.6	
100	0.150	33.0	21.8	78.2	71.1	
200	0.075	39.9	26.3	73.7	67.0	50-100

%FINER = 100 − Σ% RETAINED

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CHECKED BY: (K) 000130 SHEET NO. 1 OF 2

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

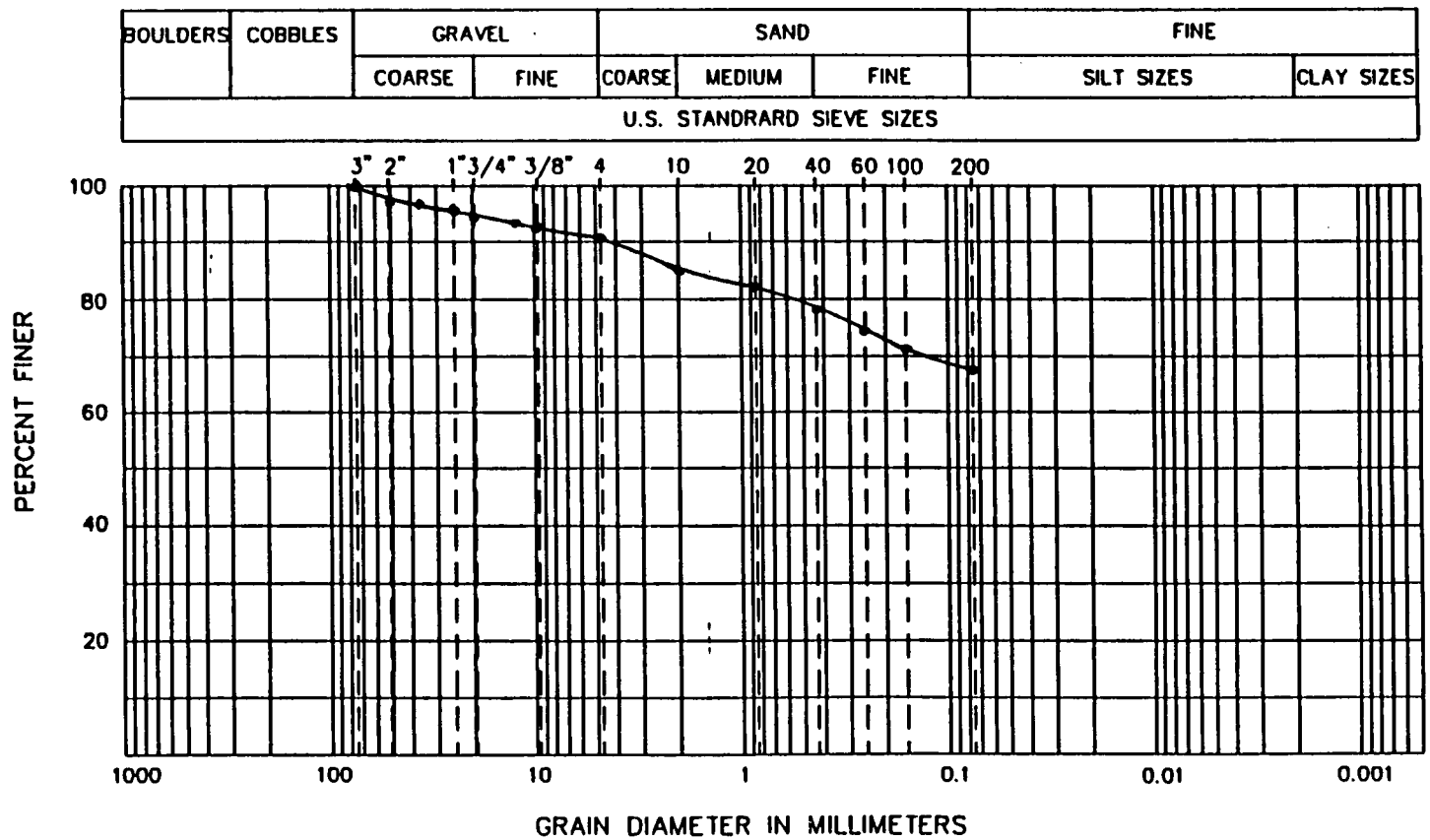
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-38 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100.0
2-in.	97.4
1 1/2-in.	97.0
1-in.	95.7
3/4-in.	95.3
1/2-in.	94.1
3/8-in.	93.4
NO. 4	90.9
NO. 10	85.4
NO. 20	81.6
NO. 40	77.8
NO. 60	74.6
NO. 100	71.1
NO. 200	67.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) W/SOME GRAVEL

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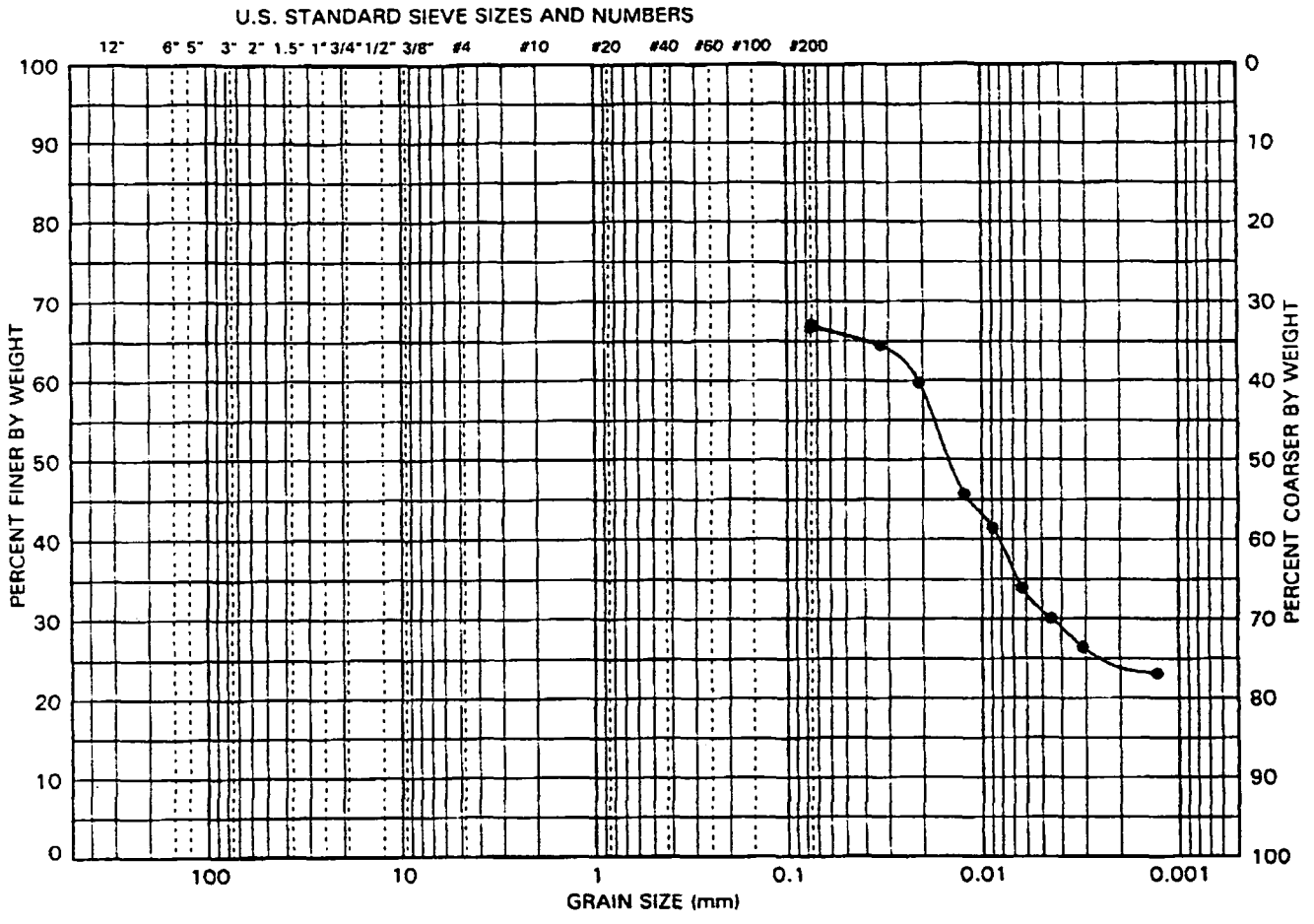
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID LP-38	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO. 97G290	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:			SILT (%)
			CLAY(%) 24.7
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															59	31	25	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-38

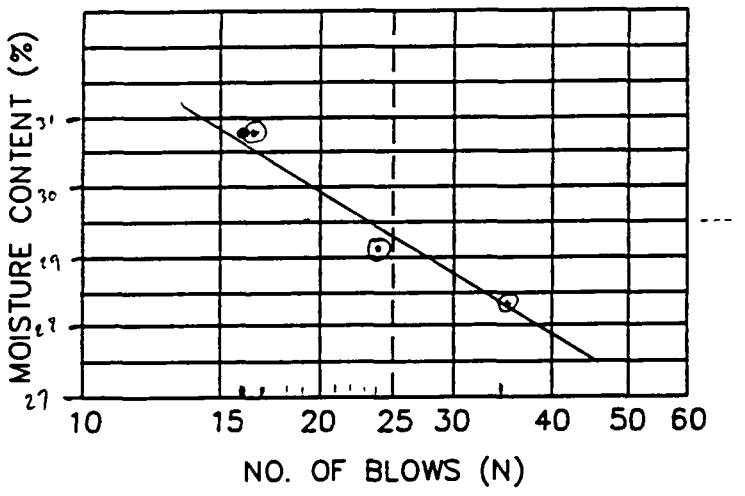
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.9	3.9	21.1	
A	WT. OF TARE	(grams)	31.46	21.01	21.07	
B	WT. OF WET SOIL & TARE	(grams)	52.43	40.57	35.07	
C	WT. OF DRY SOIL & TARE	(grams)	47.70	36.24	31.77	
D	WT. OF WATER = B-C	(grams)	4.73	4.33	3.3	
E	WT. OF DRY SOIL = C-A	(grams)	16.24	15.23	10.7	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.1	28.4	30.8	
N	NUMBER OF BLOWS		24	34	16	

DRYING TARE NO.

27



CURING TARE NO.

1-E

CL

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.2	4.0		
A	WT. OF TARE	(grams)	21.19	21.11		
B	WT. OF WET SOIL & TARE	(grams)	28.68	27.07		
C	WT. OF DRY SOIL & TARE	(grams)	27.66	26.26		
D	WT. OF WATER = B-C	(grams)	1.02	.81		
E	WT. OF DRY SOIL = C-A	(grams)	6.47	5.15		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.8	15.7		

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 13

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 DATE: 31 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-38

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

QA ID: R.L.

	WATER ADDED	(ml)	50	100	150	200	
A	WT. OF SOIL & MOLD	(grams)	3826.2	3998.0	4048.2	4016.5	
B	WT. OF MOLD	(grams)	2046.7	2046.7	2046.7	2046.7	
C	WT. OF SOIL = A - B	(grams)	1779.5	1951.3	2001.5	1969.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.4	128.8	132.1	130.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	104.5 ✓	112.1 ✓	113.0 ✓	109.3 ✓	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: R.L.

	TARE NO.		15	23	21	105	
F	WT. OF TARE	(grams)	7.7	8.4	8.4	8.24	
G	WT. OF WET SOIL & TARE	(grams)	391.0	401.5	323.4	383.9	
H	WT. OF DRY SOIL & TARE	(grams)	348.97	350.42	277.76	324.09	
I	WT. OF WATER = G - H	(grams)	42.03	51.08	45.64	59.81	
J	WT. DRY SOIL = H - F	(grams)	341.27	342.02	269.36	315.85	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.3 ✓	14.9 ✓	16.9 ✓	18.9 ✓	

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FLUOR DANIEL FERNALD

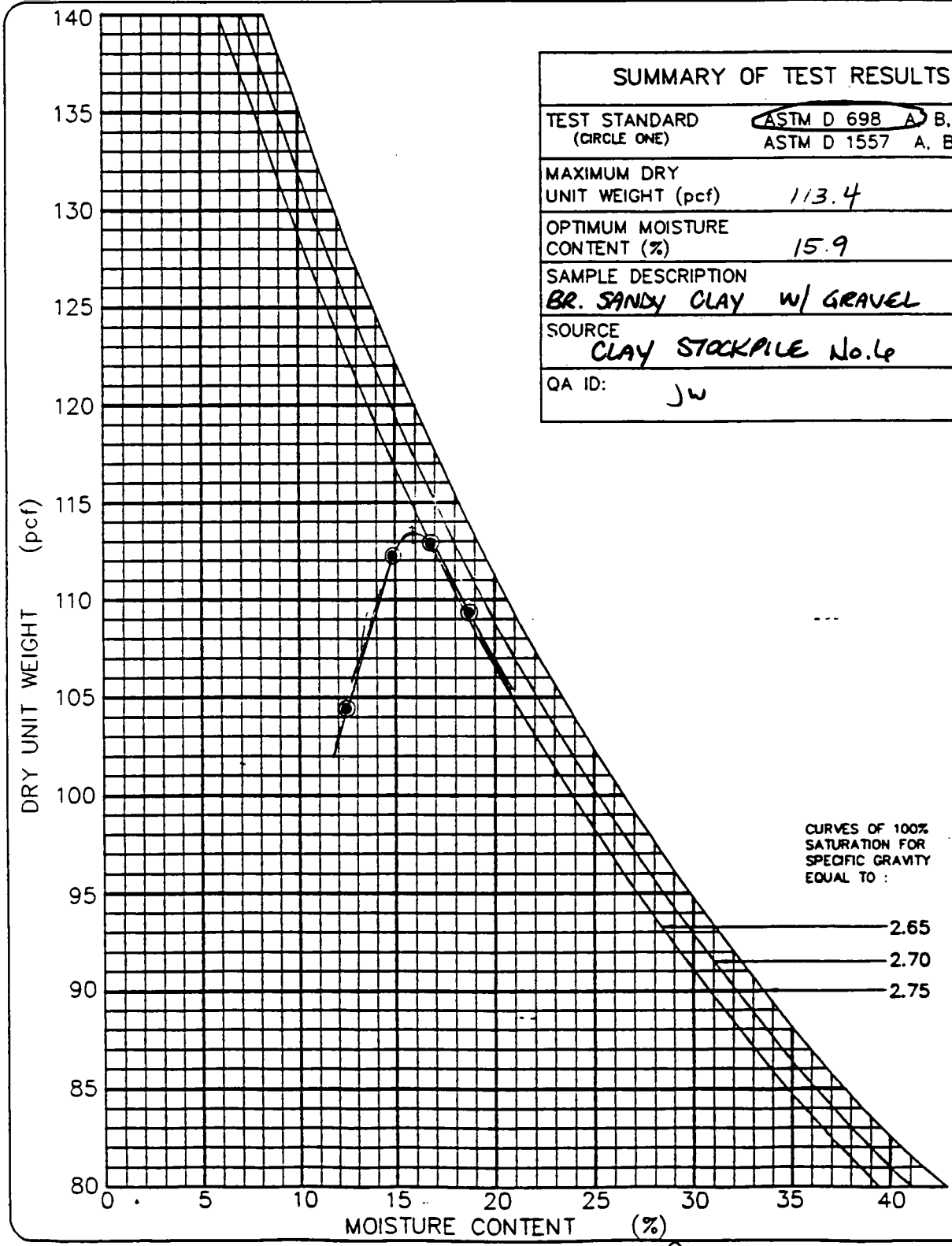
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day 7 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-38



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	113.4
OPTIMUM MOISTURE CONTENT (%)	15.9
SAMPLE DESCRIPTION	BR. SANDY CLAY W/ GRAVEL
SOURCE	CLAY STOCKPILE No. 6
QA ID:	JW

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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-39

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: KW

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. _____	5				
A	WT. OF TARE	7.6				
B	WT. OF WET SOIL & TARE	172.3				
C	WT. OF DRY SOIL & TARE	150.3				
D	WT. OF WATER = B-C	22.0				
E	WT. OF DRY SOIL = C-A	142.7				
F	MOISTURE CONTENT = (D/E) X 100	15.4 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: KW

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	298.0				
C	WT. OF DRY SOIL & TARE	274.3				
D	WT. OF WATER = B-C	23.7				
E	WT. OF DRY SOIL = C-A	142.3				
F	MOISTURE CONTENT = (D/E) X 100	16.7 ✓				

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-39

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 23,607.2 gms
> #4 SAMPLE WT = 1398.9 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		5	5
WT. OF DRY SAMPLE PLUS TARE	(grams)	150.3	57.9
WT. OF TARE	(grams)	7.6	7.6
WT. OF DRY SAMPLE	(grams)	142.7	50.3

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	257.1	1.1	98.9		100
1½"	37.5	373.7	1.6	98.4		
1"	25.0	434.6	1.8	98.2		
¾"	19.0	579.1	2.2	97.8		90-100
½"	12.5	669.7	2.8	97.2		
⅜"	9.5	812.4	3.4	96.6		
4	4.75	1282.7	5.4	94.6		
10	2.00	14.7	10.3	89.7	84.9	
20	0.850	24.1	16.9	83.1	78.6	
40	0.425	31.2	21.9	78.1	73.9	
60	0.250	36.5	25.6	74.4	70.4	
100	0.150	42.6	29.9	70.1	66.3	
200	0.075	49.6	34.8	65.2	61.7	50-100

%FINER = 100 − Σ% RETAINED

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PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

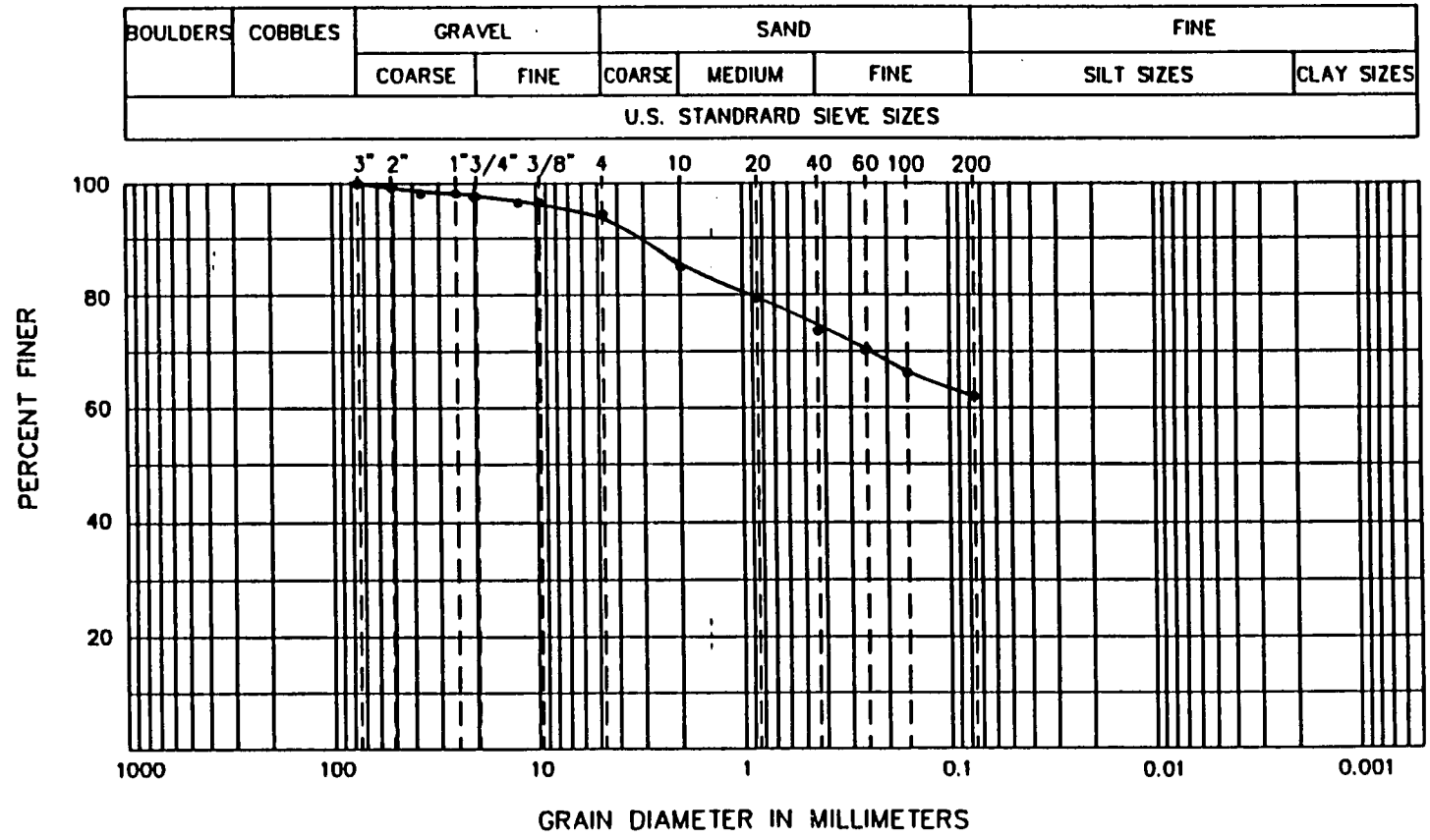
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-39 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 28

(PL) 16

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100.0
2-in.	98.9
1 1/2-in.	98.4
1-in.	98.2
3/4-in.	97.8
1/2-in.	97.2
3/8-in.	96.6
NO. 4	94.6
NO. 10	84.9
NO. 20	78.6
NO. 40	73.9
NO. 60	70.4
NO. 100	66.3
NO. 200	61.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN Sandy LEAN CLAY (CL) w/SOME GRAVEL

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE

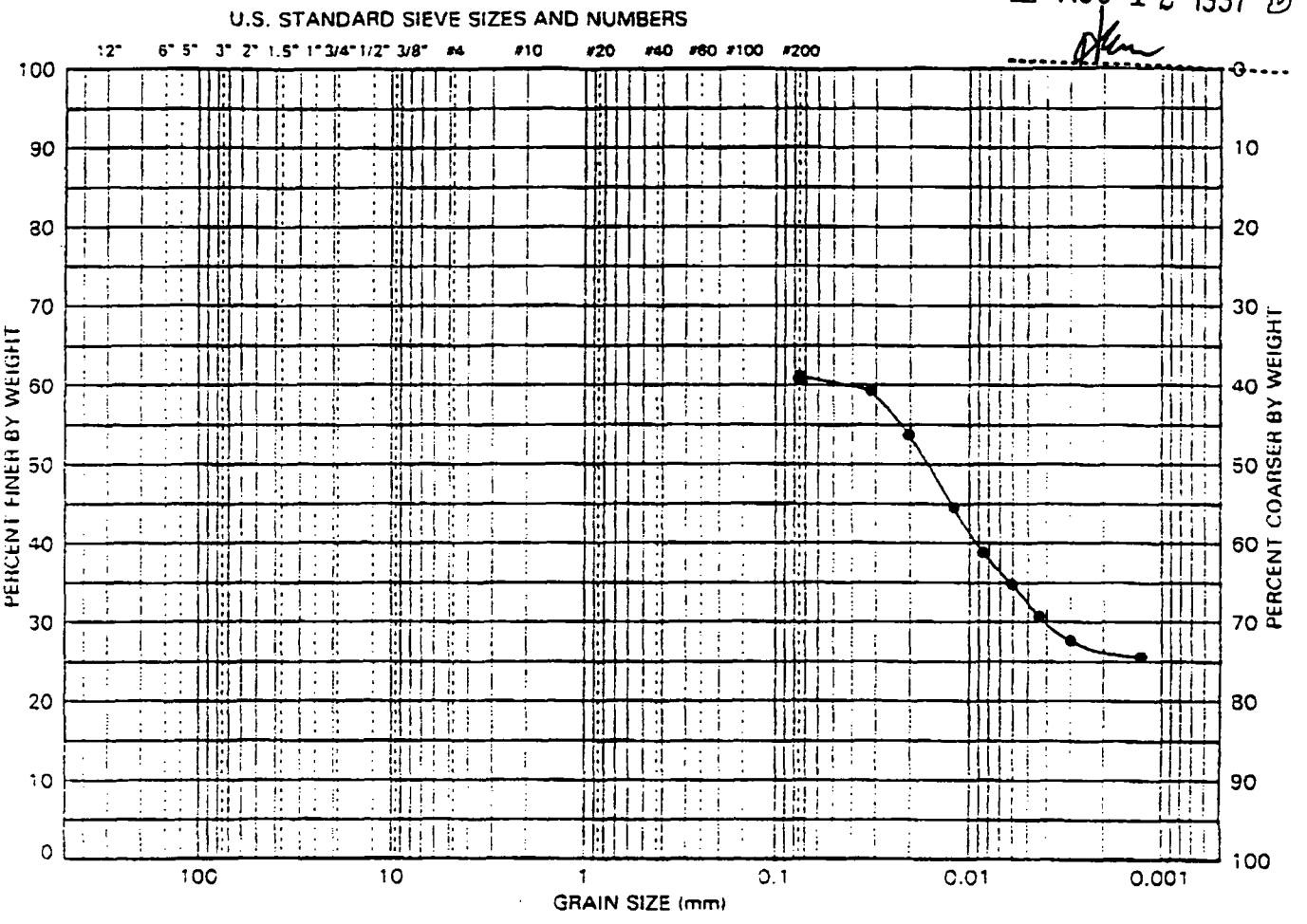
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/11/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM: D 422, D 2487, D 3042 AND D 4318

RECEIVED AUG 12 1997



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-39	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97H16	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY(%)	26.6
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200

PERCENT PASSING SIEVE SIZES (mm)

75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
	53	32	27	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-39

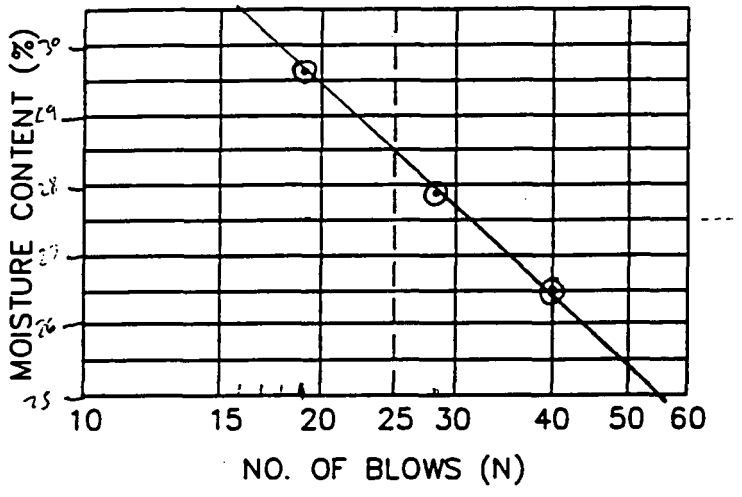
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.8	2.5	3.3	
A	WT. OF TARE	(grams)	28.81	28.42	21.20	
B	WT. OF WET SOIL & TARE	(grams)	46.87	48.45	42.08	
C	WT. OF DRY SOIL & TARE	(grams)	42.74	44.08	37.70	
D	WT. OF WATER = B-C	(grams)	4.13	4.37	4.38	
E	WT. OF DRY SOIL = C-A	(grams)	13.93	15.66	16.5	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.6 ✓	27.9 ✓	26.5 ✓	
N	NUMBER OF BLOWS		19	28	40	

DRYING TARE NO.

102



CURING TARE NO.

1-2

CL

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.6	2.7		
A	WT. OF TARE	(grams)	28.87	28.67		
B	WT. OF WET SOIL & TARE	(grams)	35.37	37.82		
C	WT. OF DRY SOIL & TARE	(grams)	34.45	36.57		
D	WT. OF WATER = B-C	(grams)	0.92	1.25		
E	WT. OF DRY SOIL = C-A	(grams)	5.58	7.9		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.5 ✓	15.8 ✓		

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 12

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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 — DATE: 8 day 1 month 92 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-39

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

QA ID: RIL

	WATER ADDED	(ml)	200	250	300	350	
A	WT. OF SOIL & MOLD	(grams)	3800.4	3942.3	4028.0	4032.50	
B	WT. OF MOLD	(grams)	2046.7	2046.7	2046.7	2046.7	
C	WT. OF SOIL = A - B	(grams)	1753.7	1895.6	1981.3	1985.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	115.7	125.1	130.8	131.1	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	103.9 ✓	110.4 ✓	113.4 ✓	111.3 ✓	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RIL

	TARE NO.		24	105	6	103	
F	WT. OF TARE	(grams)	126.25	8.2	7.63	8.37	
G	WT. OF WET SOIL & TARE	(grams)	328.29	343.1	347.77	344.06	
H	WT. OF DRY SOIL & TARE	(grams)	307.58	303.80	302.62	293.31	
I	WT. OF WATER = G - H	(grams)	20.71	39.3	45.15	50.75	
J	WT. DRY SOIL = H - F	(grams)	181.33	295.6	294.99	284.94	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.4 ✓	13.3 ✓	15.3 ✓	17.8 ✓	

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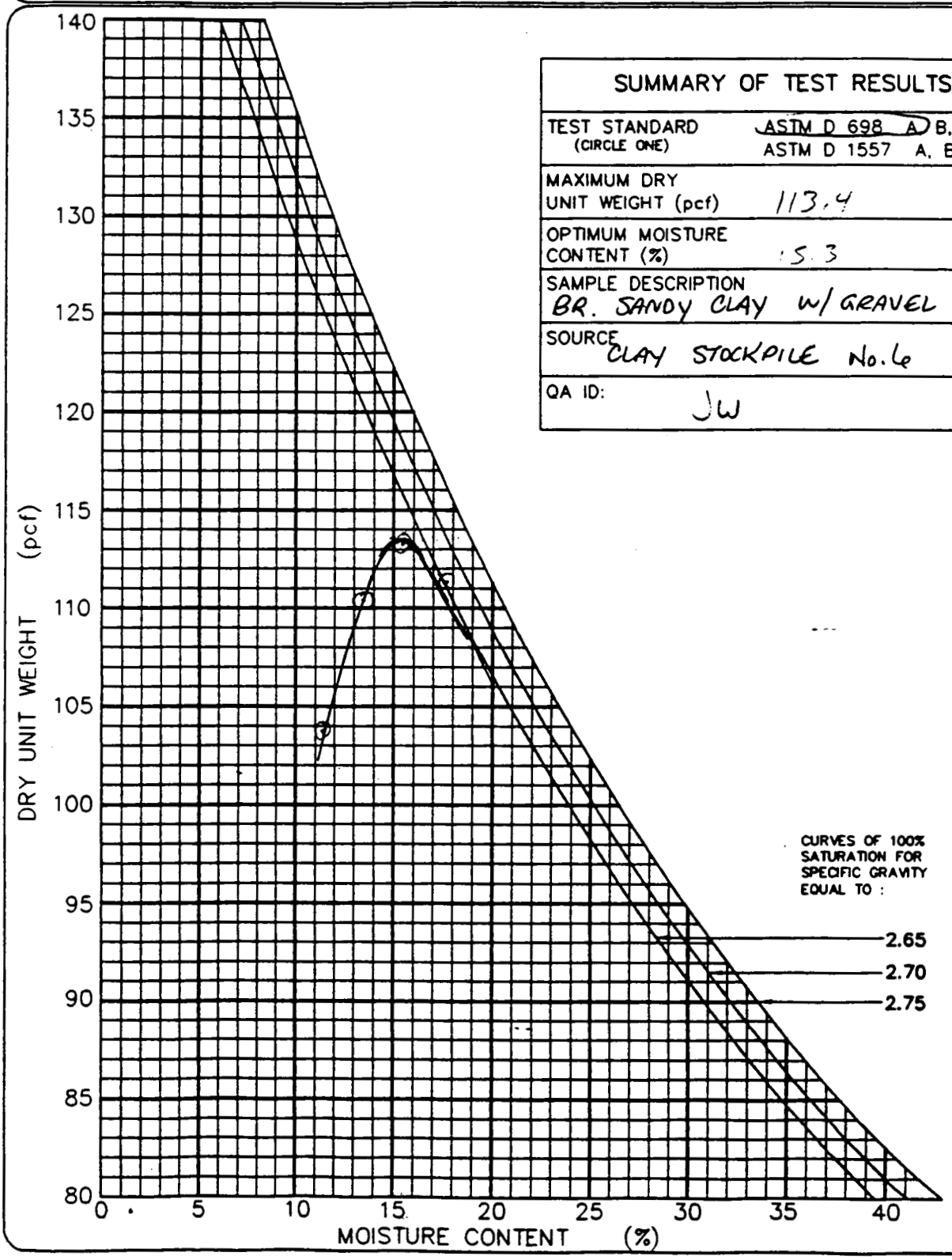
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 8 day 1 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-39



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	113.4
OPTIMUM MOISTURE CONTENT (%)	15.3
SAMPLE DESCRIPTION	BR. SANDY CLAY w/ GRAVEL
SOURCE	CLAY STOCKPILE No. 6
QA ID:	JW

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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: 26 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-40

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: KW

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. _____	28				
A	WT. OF TARE	8.3				
B	WT. OF WET SOIL & TARE	189.5				
C	WT. OF DRY SOIL & TARE	158.4				
D	WT. OF WATER = B-C	31.1				
E	WT. OF DRY SOIL = C-A	150.1				
F	MOISTURE CONTENT = (D/E) X 100	20.7				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: KW

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	274.1				
C	WT. OF DRY SOIL & TARE	251.6				
D	WT. OF WATER = B-C	22.5				
E	WT. OF DRY SOIL = C-A	119.6				
F	MOISTURE CONTENT = (D/E) X 100	18.87				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-40

SOIL SAMPLE SIZE TOTAL SAMPLE WT. = 18,127.0 gm
>#4 SAMPLE WT = 1207.7 gm

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		28	28
WT. OF DRY SAMPLE PLUS TARE	(grams)	158.4	22.1
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	150.1	13.8

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100		100
1½"	37.5	85.7	0.5	99.5		
1"	25.0	158.6	0.9	99.1		
3/4"	19.0	315.9	1.7	98.3		90 - 100
½"	12.5	574.6	2.8	97.2		
3/8"	9.5	633.3	3.5	96.5		
4	4.75	1128.4	6.2	93.8		
10	2.00	3.6	2.4	97.6	~~91.6~~ 91.5	91.5
20	0.850	5.3	3.5	96.5	90.5	
40	0.425	6.9	4.6	95.4	89.5	
60	0.250	8.6	5.7	94.3	88.5	
100	0.150	10.9	7.3	92.7	87.0	
200	0.075	13.7	9.1	90.9	85.3	50-100

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

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PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

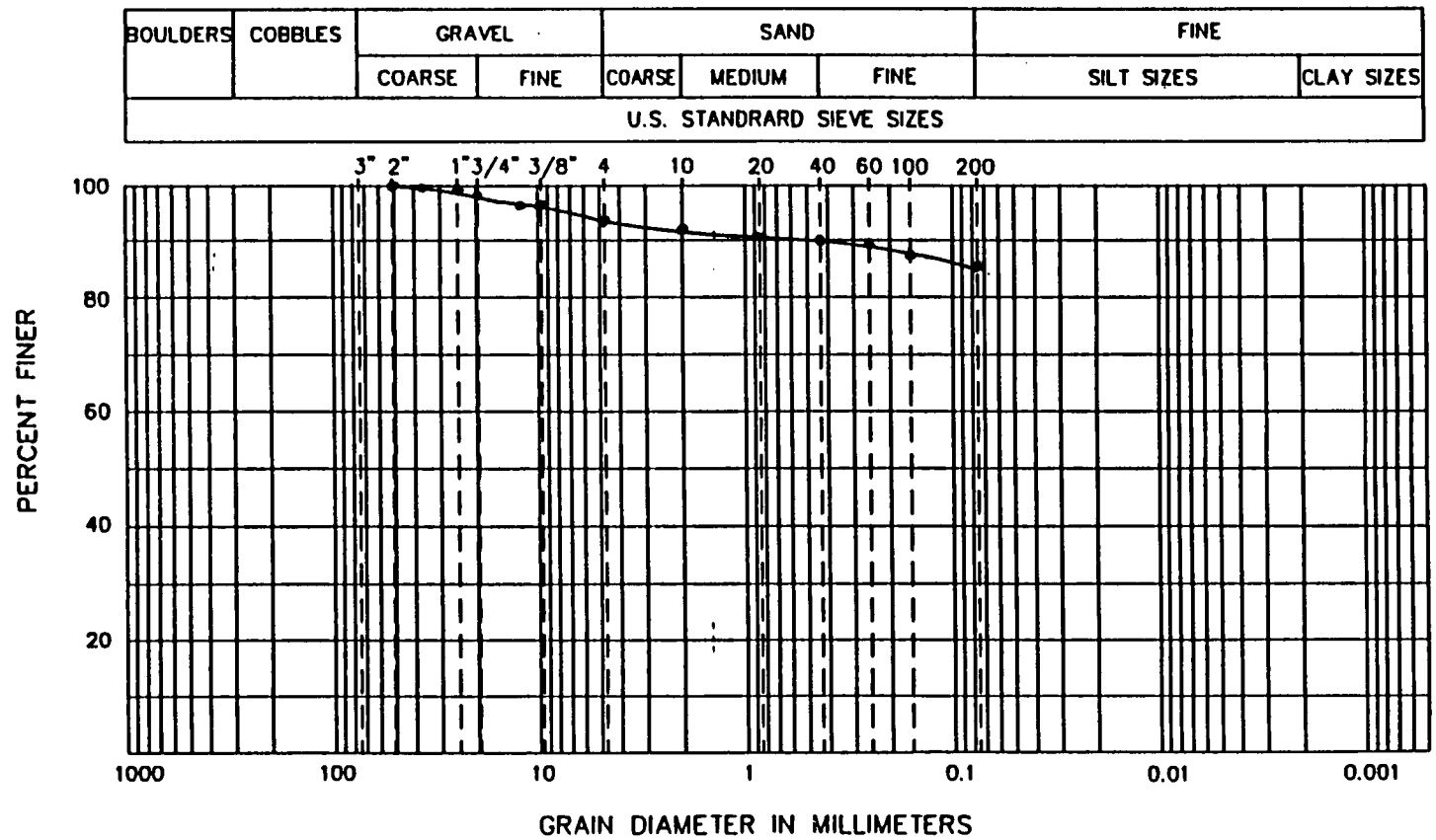
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-40 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 23

(PL) 15

(PI) 8

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.5
1-in.	99.1
3/4-in.	98.3
1/2-in.	97.2
3/8-in.	96.5
NO. 4	93.8
NO. 10	91.5
NO. 20	90.5
NO. 40	89.5
NO. 60	88.5
NO. 100	87.0
NO. 200	85.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN/GRAY LEAN CLAY (CL) W/SOME SAND & GRAVEL

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SHEET NO. 2 OF 2

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Atlanta, Georgia

FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/11/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487

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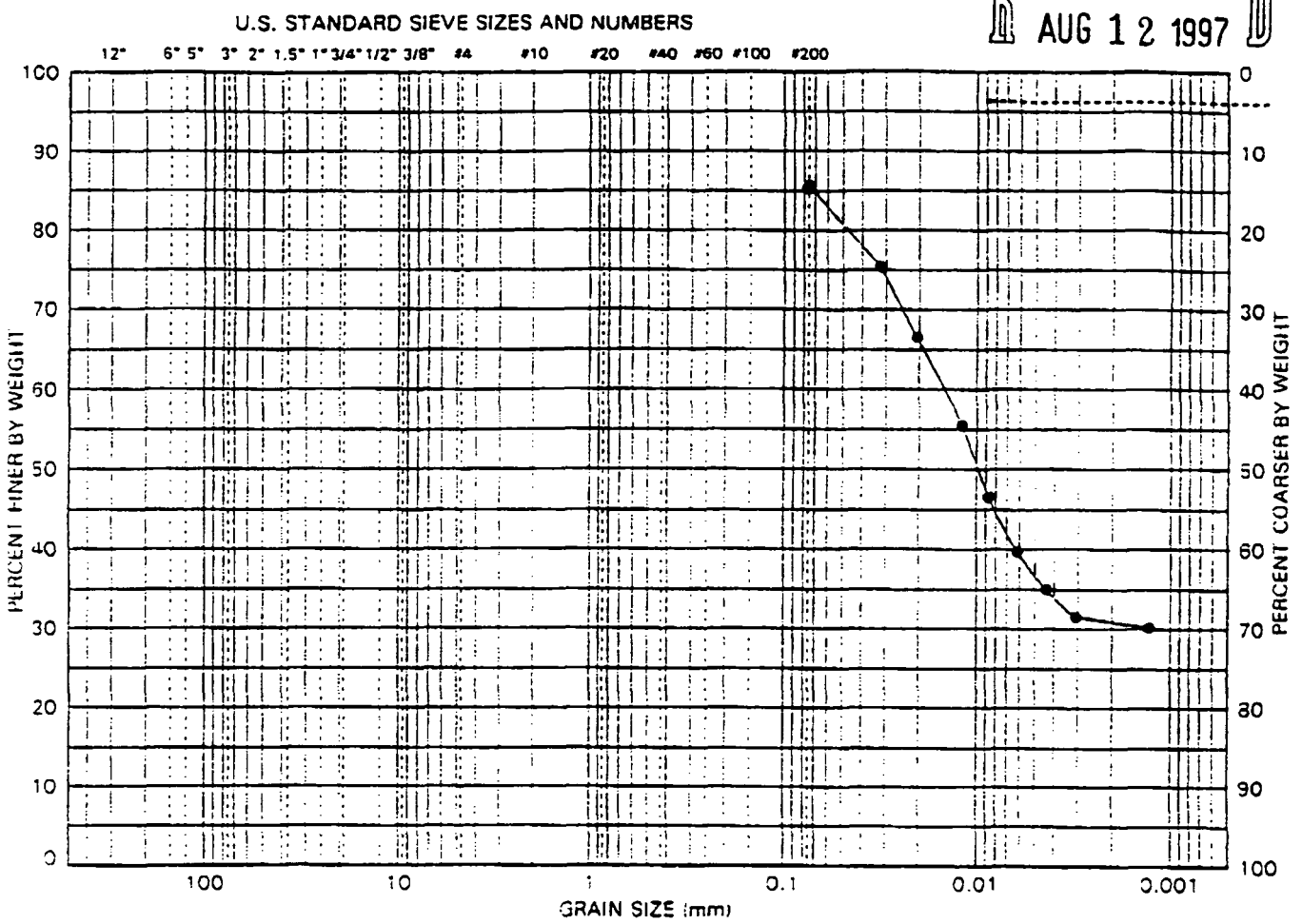

SITE SAMPLE ID	LP-40	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97H17	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY (%)	30.8
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															66	37	31	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-4D

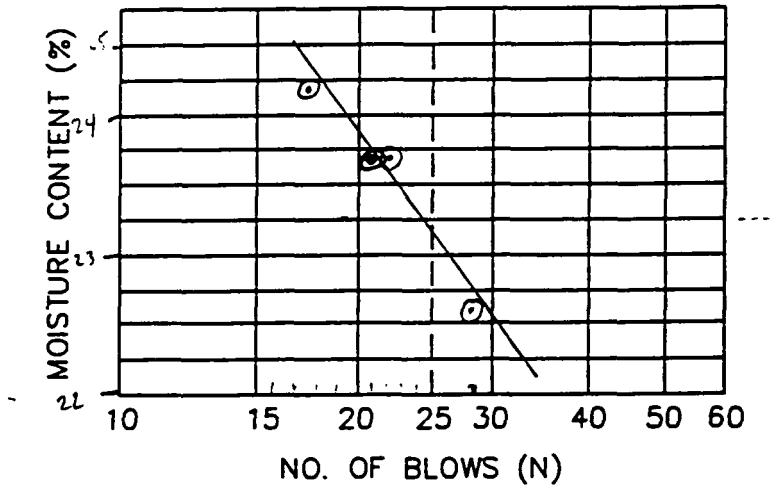
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.			1.7	2.9	1.2
A	WT. OF TARE	(grams)		28.49	31.46	25.50
B	WT. OF WET SOIL & TARE	(grams)		44.62	53.48	48.37
C	WT. OF DRY SOIL & TARE	(grams)		41.65	49.19	44.56
D	WT. OF WATER = B-C	(grams)		2.97	4.29	3.81
E	WT. OF DRY SOIL = C-A	(grams)		13.16	17.73	16.06
F	MOISTURE CONTENT = (D/E)X100	(%)		22.6	24.2	23.7
N	NUMBER OF BLOWS			28	17	21

DRYING TARE NO.

3



CURING TARE NO.

1 - 5

CL

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.6	3.9		
A	WT. OF TARE	(grams)	28.56	21.01		
B	WT. OF WET SOIL & TARE	(grams)	39.42	31.46		
C	WT. OF DRY SOIL & TARE	(grams)	38.04	30.13		
D	WT. OF WATER = B-C	(grams)	1.38	1.33		
E	WT. OF DRY SOIL = C-A	(grams)	9.48	9.12		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.6	14.6		

LIQUID LIMIT (LL) = 23 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 8

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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 — DATE: 8 day 1 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-40

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

QA ID: RW

	WATER ADDED	(ml)	200	250	300	350	
A	WT. OF SOIL & MOLD	(grams)	3912.0	4037.04	4082.4	4032.5	
B	WT. OF MOLD	(grams)	2046.7	2046.7	2046.7	2046.7	
C	WT. OF SOIL = A - B	(grams)	1865.3	1990.3	2038.3	1985.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.1	131.4	134.5	131.1	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.5	115.9	116.3	111.2	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RW

	TARE NO.		8	101	28	34	
F	WT. OF TARE	(grams)	7.2	8.22	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	350.3	347.32	354.25	326.29	
H	WT. OF DRY SOIL & TARE	(grams)	315.30	306.45	307.42	278.10	
I	WT. OF WATER = G - H	(grams)	35.0	40.87	46.83	48.19	
J	WT. DRY SOIL = H - F	(grams)	308.1	298.17	299.22	269.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.4	13.7	15.7	17.9	

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1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

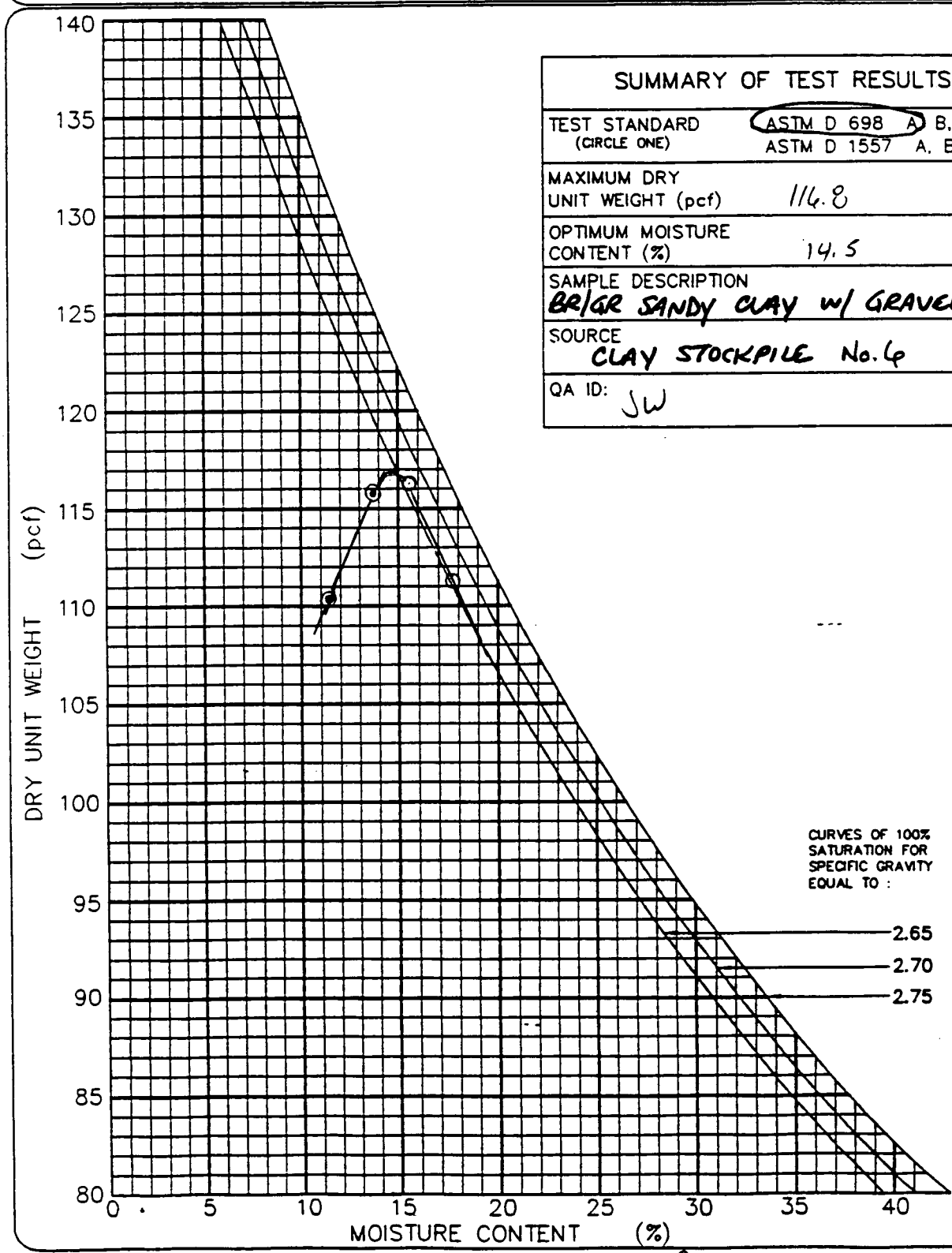
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 8 day 1 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-40



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	114.8
OPTIMUM MOISTURE CONTENT (%)	14.5
SAMPLE DESCRIPTION	BR/GR SANDY CLAY w/ GRAVEL
SOURCE	CLAY STOCKPILE No. 6
QA ID:	JW

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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: 28 day JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-41

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	10				
A	WT. OF TARE	7.4				
B	WT. OF WET SOIL & TARE	193.7				
C	WT. OF DRY SOIL & TARE	166.4				
D	WT. OF WATER = B-C	27.3				
E	WT. OF DRY SOIL = C-A	159.0				
F	MOISTURE CONTENT = (D/E) X 100	17.2				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	360.1				
C	WT. OF DRY SOIL & TARE	330.70				
D	WT. OF WATER = B-C	29.4				
E	WT. OF DRY SOIL = C-A	198.7				
F	MOISTURE CONTENT = (D/E) X 100	14.8				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 01 day AUGUST month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-41

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 22,682.6 grms
> #4 SAMPLE WT = 1286.3 grms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	10	10
WT. OF DRY SAMPLE PLUS TARE (grams)	166.4	33.7
WT. OF TARE (grams)	7.4	7.4
WT. OF DRY SAMPLE (grams)	159.0 ✓	26.3 ✓

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100		100
1½"	37.5	117.4	0.5	99.5		
1"	25.0	117.4	0.5	99.5		
¾"	19.0	167.9	0.7	99.3		90-100
½"	12.5	339.1	1.5	98.5		
⅜"	9.5	500.9	2.2	97.8		
4	4.75	1220.9	5.4	94.6		
10	2.00	8.6	5.4	94.6	89.5	
20	0.850	11.9	7.5	92.5	87.5	
40	0.425	15.4	9.7	90.3	85.4	
60	0.250	18.4	11.6	88.4	83.6	
100	0.150	21.9	13.8	86.2	81.5	
200	0.075	26.1	16.4	83.6	79.1 ✓	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

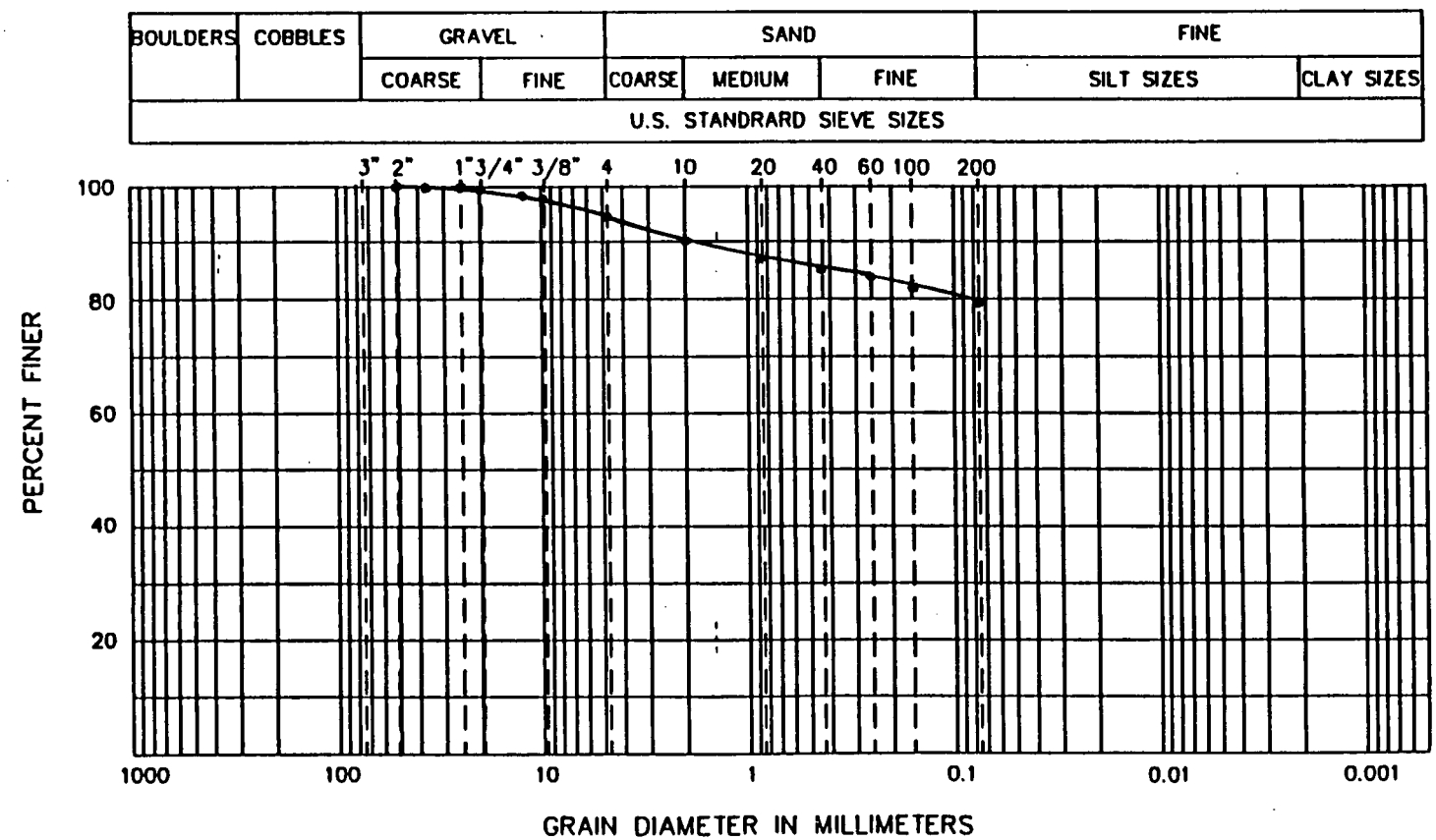
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 04 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-41 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 28

(PL) 16

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.5
1-in.	99.5
3/4-in.	99.3
1/2-in.	98.5
3/8-in.	97.8
NO. 4	94.6
NO. 10	89.5
NO. 20	87.7
NO. 40	85.4
NO. 60	83.6
NO. 100	81.5
NO. 200	79.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN Sandy LEAN CLAY (CL) w/ some Gravel

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SHEET NO. 2 OF 2

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

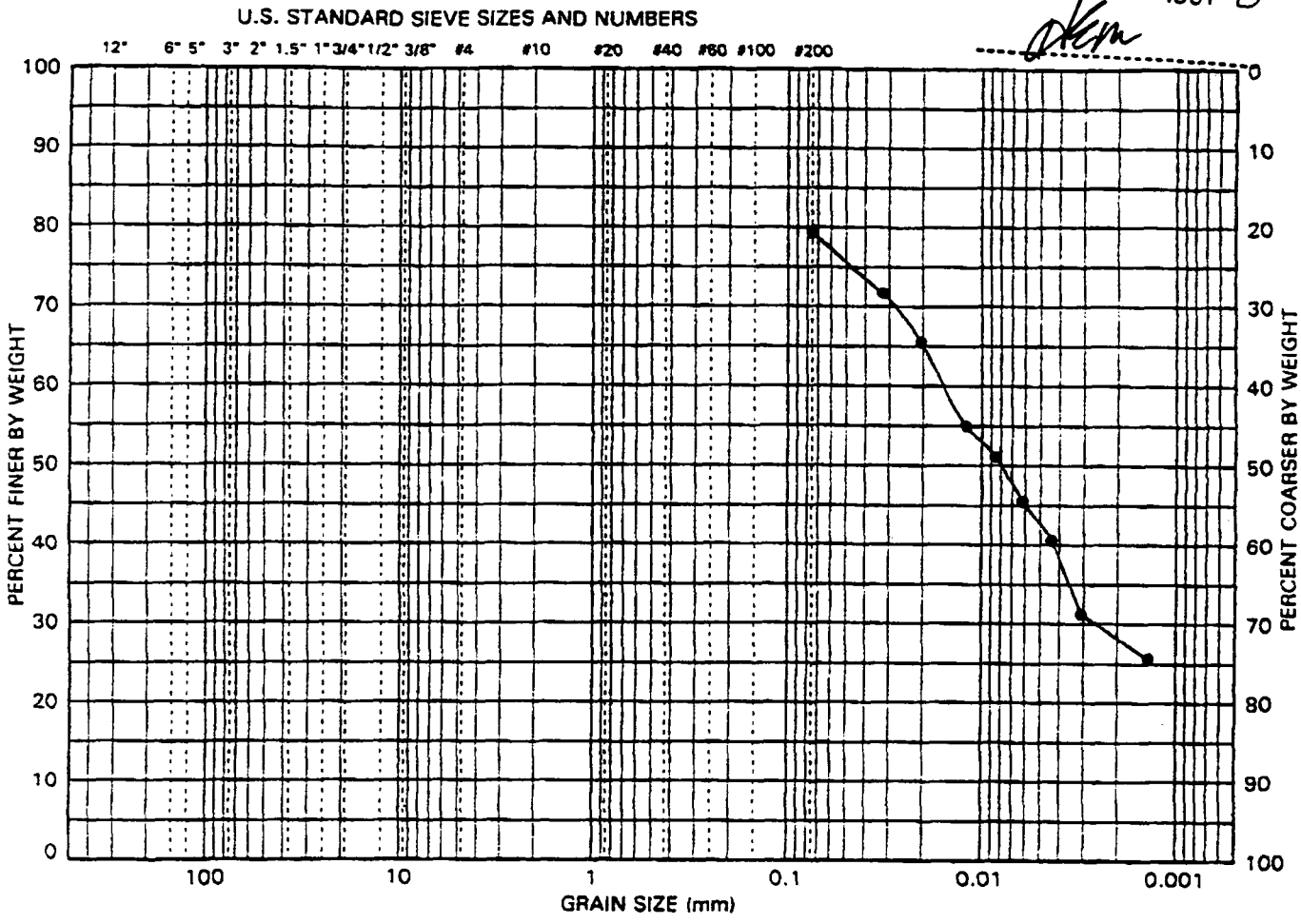
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/13/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487, D 3042 AND D 4318

RECEIVED AUG 14 1997



SITE SAMPLE ID	LP-41	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97H49	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:				SILT (%)	
				CLAY(%)	28.1
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															65	42	28	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-41

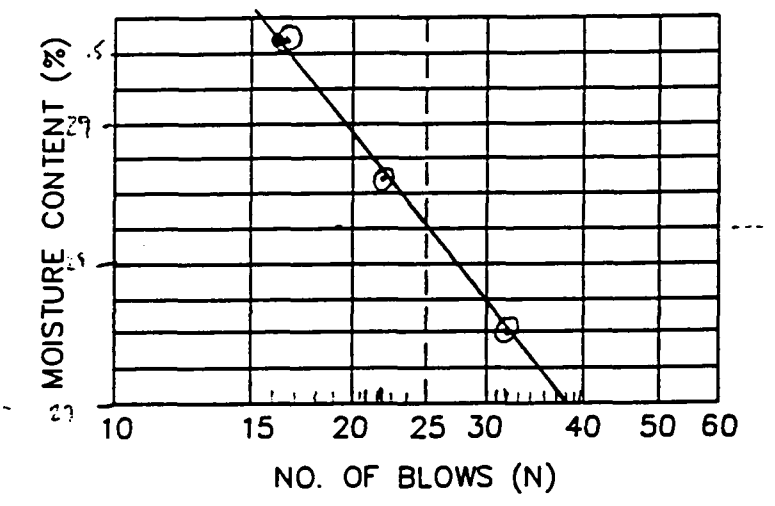
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		1.4	1.3	2.3	
A	WT. OF TARE	(grams)	28.52	28.64	31.20	
B	WT. OF WET SOIL & TARE	(grams)	46.45	44.80	48.65	
C	WT. OF DRY SOIL & TARE	(grams)	42.58	41.21	44.66	
D	WT. OF WATER = B-C	(grams)	3.87	3.59	3.99	
E	WT. OF DRY SOIL = C-A	(grams)	14.06	12.57	13.46	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.5 ✓	28.6 ✓	29.6 ✓	
N	NUMBER OF BLOWS		32	22	16	

DRYING TARE NO.

30



CURING TARE NO.

1-0

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.1	3.7		
A	WT. OF TARE	(grams)	21.07	21.29		
B	WT. OF WET SOIL & TARE	(grams)	31.97	28.10		
C	WT. OF DRY SOIL & TARE	(grams)	30.46	27.17		
D	WT. OF WATER = B-C	(grams)	1.51	0.93		
E	WT. OF DRY SOIL = C-A	(grams)	9.39	5.88		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.1 ✓	15.8 ✓		

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 12

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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 DATE: 8 day 2 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-41

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

QA ID: JW

	WATER ADDED	(ml)		150	200	250	300
A	WT. OF SOIL & MOLD	(grams)		6042.0	6087.3	6196.2	6196.2
B	WT. OF MOLD	(grams)		4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)		1832.6	1877.6	1986.9	1986.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)		121.0	123.9	131.1	131.1
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		106.4	~~107.9~~ 108.0	112.1	110.8

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.			10	25	102	30
F	WT. OF TARE	(grams)		7.43	8.23	8.26	8.36
G	WT. OF WET SOIL & TARE	(grams)		229.52	297.26	238.37	222.68
H	WT. OF DRY SOIL & TARE	(grams)		202.79	259.94	204.92	189.34
I	WT. OF WATER = G - H	(grams)		26.73	37.32	33.45	33.34
J	WT. DRY SOIL = H - F	(grams)		195.36	251.71	196.66	180.98
K	MOISTURE CONTENT = (I/J) X 100	(%)		13.7	14.8	17.0	18.4

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FLUOR DANIEL FERNALD

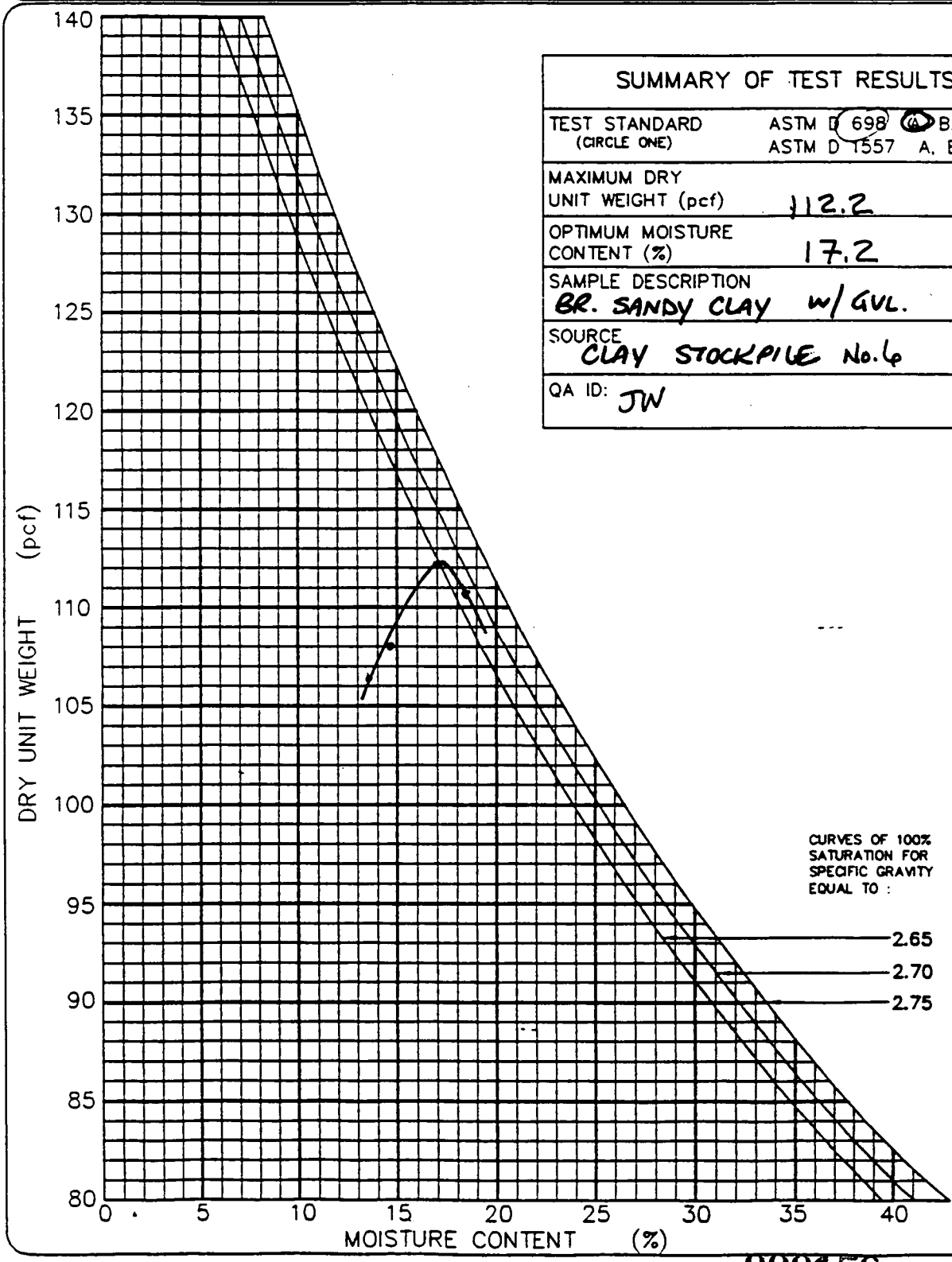
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 03 day AUG. month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-41



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	112.2
OPTIMUM MOISTURE CONTENT (%)	17.2
SAMPLE DESCRIPTION	BR. SANDY CLAY w/ GVL.
SOURCE	CLAY STOCKPILE No. 6
QA ID:	JW

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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 JULY month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-42

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	7				
A	WT. OF TARE	7.3				
B	WT. OF WET SOIL & TARE	199.4				
C	WT. OF DRY SOIL & TARE	166.2				
D	WT. OF WATER = B-C	33.2				
E	WT. OF DRY SOIL = C-A	158.9				
F	MOISTURE CONTENT = (D/E) X 100	20.9 ✓				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	V				
A	WT. OF TARE	126.25				
B	WT. OF WET SOIL & TARE	336.1				
C	WT. OF DRY SOIL & TARE	310.2				
D	WT. OF WATER = B-C	25.9				
E	WT. OF DRY SOIL = C-A	184.0				
F	MOISTURE CONTENT = (D/E) X 100	14.1 ✓				

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 04 day AUG month '97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-42

SOIL SAMPLE SIZE TOTAL SAMPLE WT. = 22,435.7 grms
>#4 SAMPLE WT. = 1524.7 grms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		7	7
WT. OF DRY SAMPLE PLUS TARE	(grams)	166.2	14.65
WT. OF TARE	(grams)	7.3	7.3
WT. OF DRY SAMPLE	(grams)	158.9	7.35

SIEVE ANALYSIS QA ID: JN/NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø				100
1½"	37.5	Ø	0	100		
1"	25.0	76.9	0.3	99.7		
¾"	19.0	216.6	1.0	99.0		90-100
½"	12.5	443.2	2.0	98.0		
⅜"	9.5	624.9	2.8	97.2		
4	4.75	1396.5	6.2	93.8		
10	2.00	0.91	0.6	99.4	~~85.4~~ 93.2	7/5/97 HM
20	0.850	2.02	1.3	98.7	92.6	
40	0.425	3.20	2.0	98.0	91.9	
60	0.250	4.33	2.7	97.3	91.3	
100	0.150	6.08	3.8	96.2	90.2	
200	0.025	7.76	4.9	95.1	89.2	50-100

%FINER = 100 − Σ% RETAINED

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PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

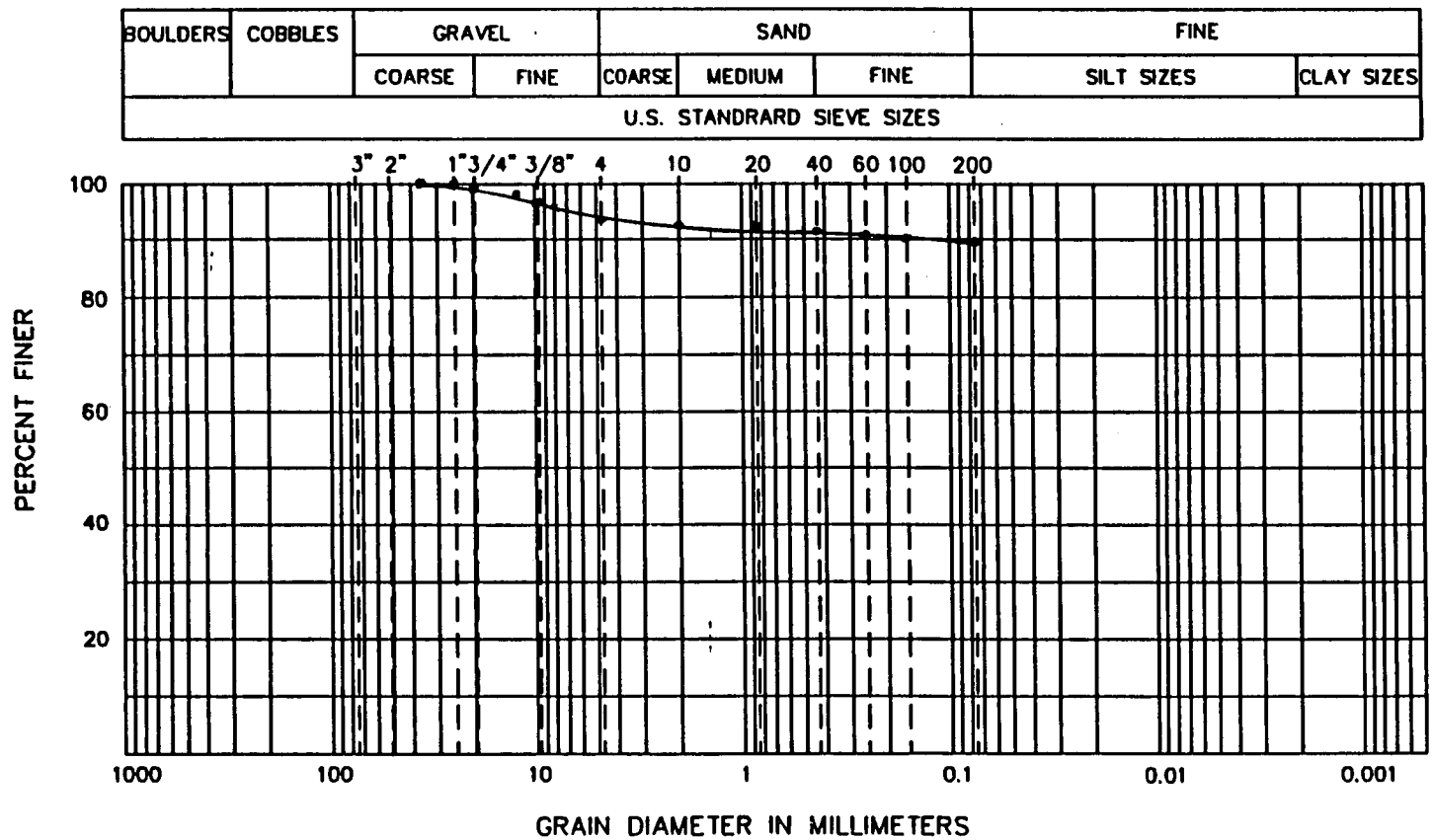
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 05 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-42 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.7
3/4-in.	99.0
1/2-in.	98.0
3/8-in.	97.2
NO. 4	93.8
NO. 10	93.2
NO. 20	92.6
NO. 40	91.9
NO. 60	91.3
NO. 100	90.2
NO. 200	89.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN LEAN CLAY (CL) w/ some sand & Gravel

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Atlanta, Georgia

FIGURE

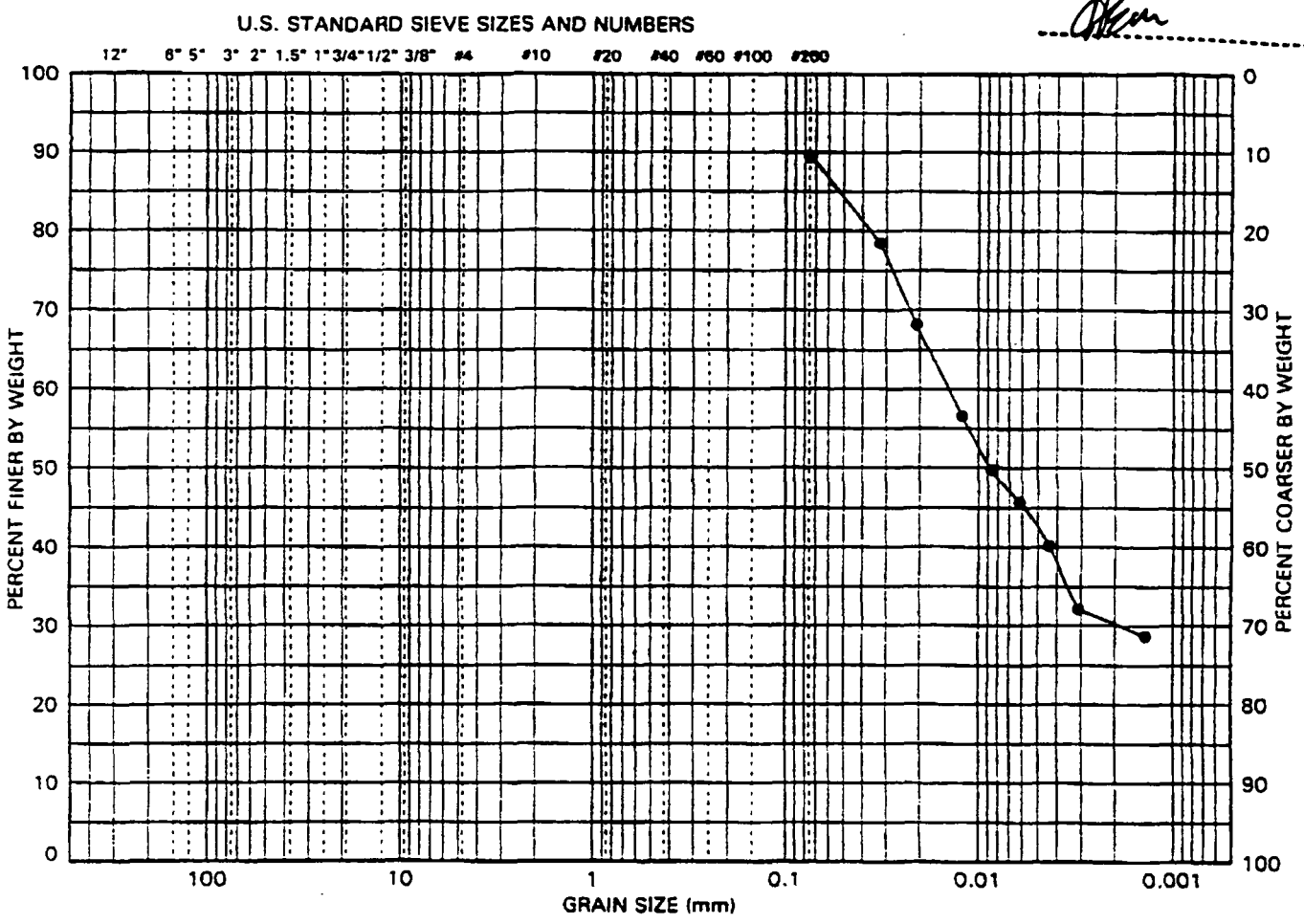
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

RECEIVED AUG 14 1997

GS FORM: 4PS2 08/13/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3282 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-42	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97H50	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 30.2
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															67	42	30	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 5 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-42

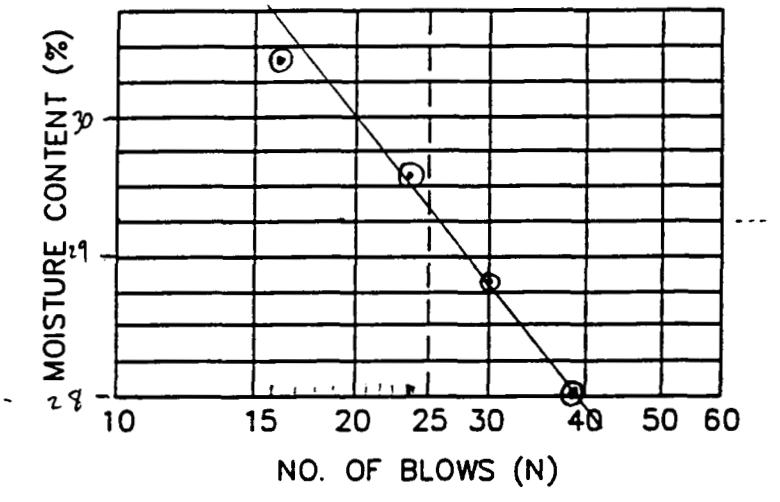
LIQUID LIMIT DETERMINATION

QA ID: JU

	TARE NO.		4.0	2.4	4.3	2.5
A	WT. OF TARE	(grams)	21.11	27.39	21.36	28.42
B	WT. OF WET SOIL & TARE	(grams)	37.37	47.11	39.82	46.45
C	WT. OF DRY SOIL & TARE	(grams)	33.58	42.80	35.60	42.42
D	WT. OF WATER = B-C	(grams)	3.79	4.31	4.22	4.03
E	WT. OF DRY SOIL = C-A	(grams)	12.47	15.41	14.24	14.00
F	MOISTURE CONTENT = (D/E)X100	(%)	30.4	28.0	29.6	28.8
N	NUMBER OF BLOWS		16	39	24	30

DRYING TARE NO.

2



CURING TARE NO.

1-M

CL

PLASTIC LIMIT DETERMINATION

QA ID: JU

	TARE NO.		4.2	3.3		
A	WT. OF TARE	(grams)	21.19	21.44		
B	WT. OF WET SOIL & TARE	(grams)	29.28	30.92		
C	WT. OF DRY SOIL & TARE	(grams)	28.17	29.63		
D	WT. OF WATER = B-C	(grams)	1.11	1.29		
E	WT. OF DRY SOIL = C-A	(grams)	6.98	8.19		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.9	15.8		

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 13

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 — DATE: 8 day 2 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-42

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

QA ID: JW

	WATER ADDED	(ml)	50	100	150	200 - DRY	250
A	WT. OF SOIL & MOLD	(grams)	6155.3	6241.5	6209.8	5973.9	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1945.9	2032.1	2000.4	1764.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	128.4	134.1	132.0	116.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.4	115.0	112.4	106.8	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.		22	11	5	28	
F	WT. OF TARE	(grams)	8.39	7.35	7.60	7.20	
G	WT. OF WET SOIL & TARE	(grams)	233.41	207.36	245.55	272.13	
H	WT. OF DRY SOIL & TARE	(grams)	207.11	178.82	210.06	250.24	
I	WT. OF WATER = G - H	(grams)	26.3	28.54	35.49	21.89	
J	WT. DRY SOIL = H - F	(grams)	198.72	171.47	202.46	242.04	
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.2	16.6	17.5	9.0	

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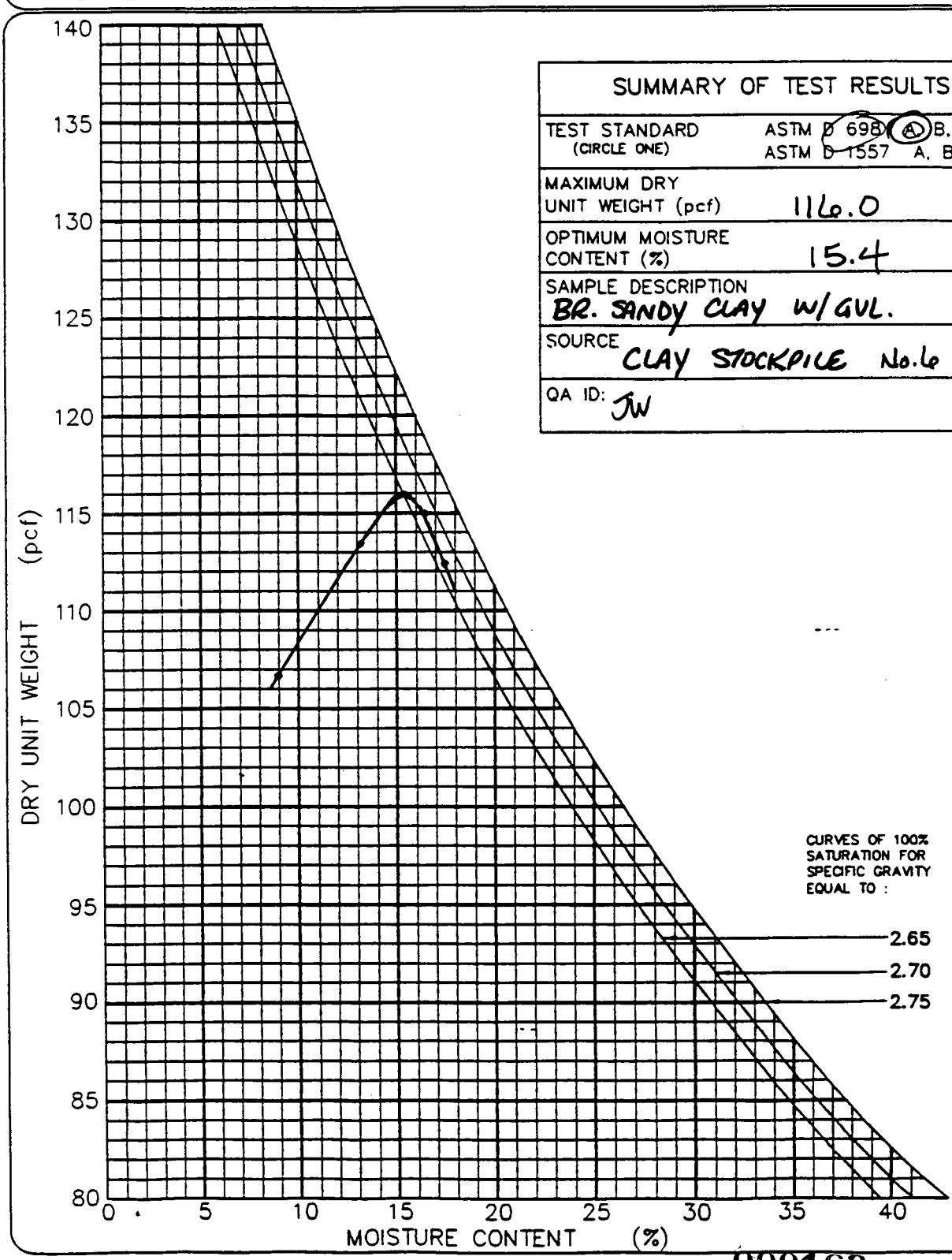
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-42



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	116.0
OPTIMUM MOISTURE CONTENT (%)	15.4
SAMPLE DESCRIPTION	BR. SANDY CLAY W/ GVL.
SOURCE	CLAY STOCKPILE No. 6
QA ID:	JW

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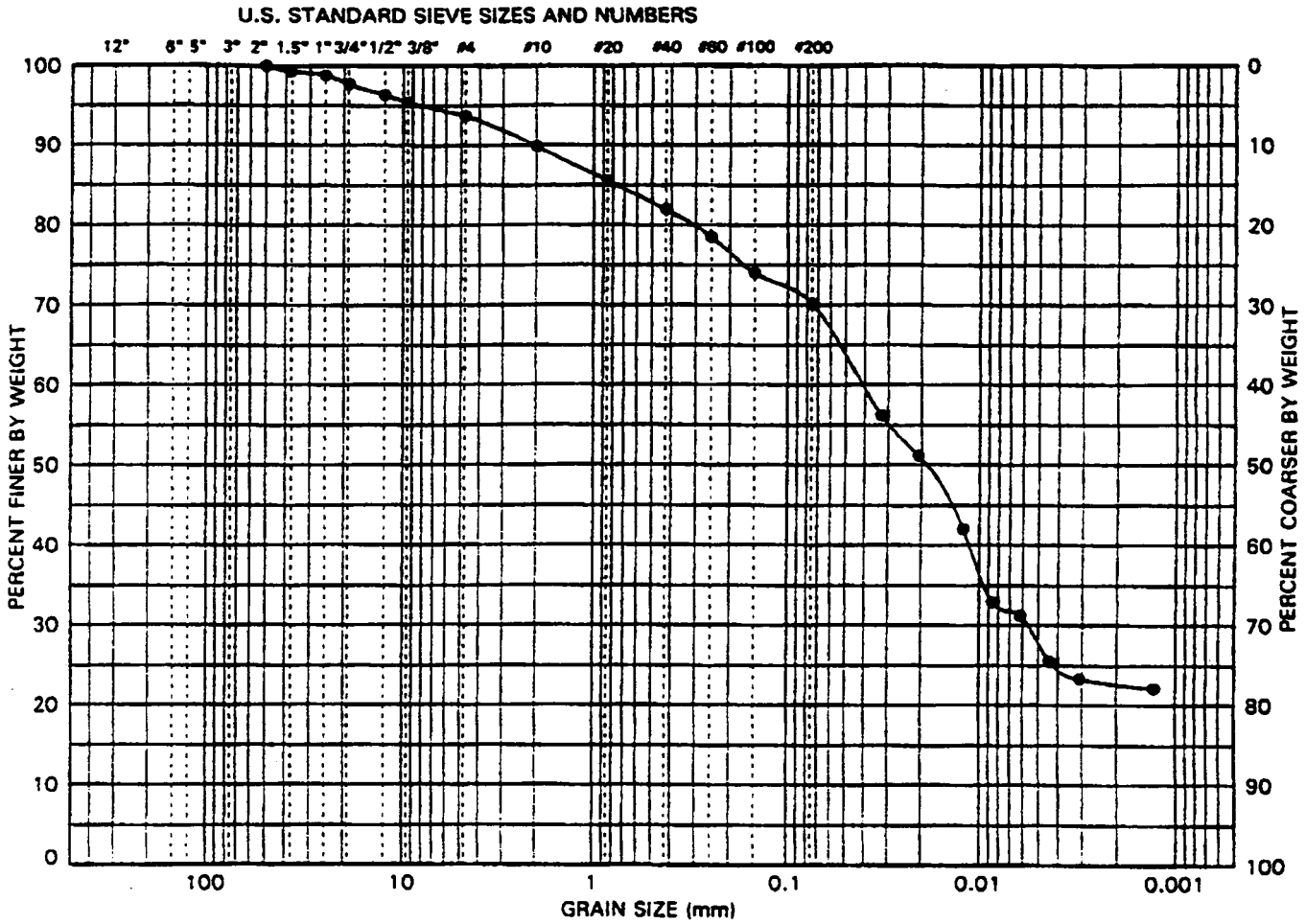
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-17.1	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	6.3
LAB. SAMPLE NO.	97H278	PLASTIC LIMIT (%)		SAND (%)	23.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	70.1
SOIL CLASSIFICATION:				SILT (%)	47.4
				CLAY(%)	22.7
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	99	99	98	96	95	94	90	86	82	79	74	70	63	50	28	23	

NOTES:

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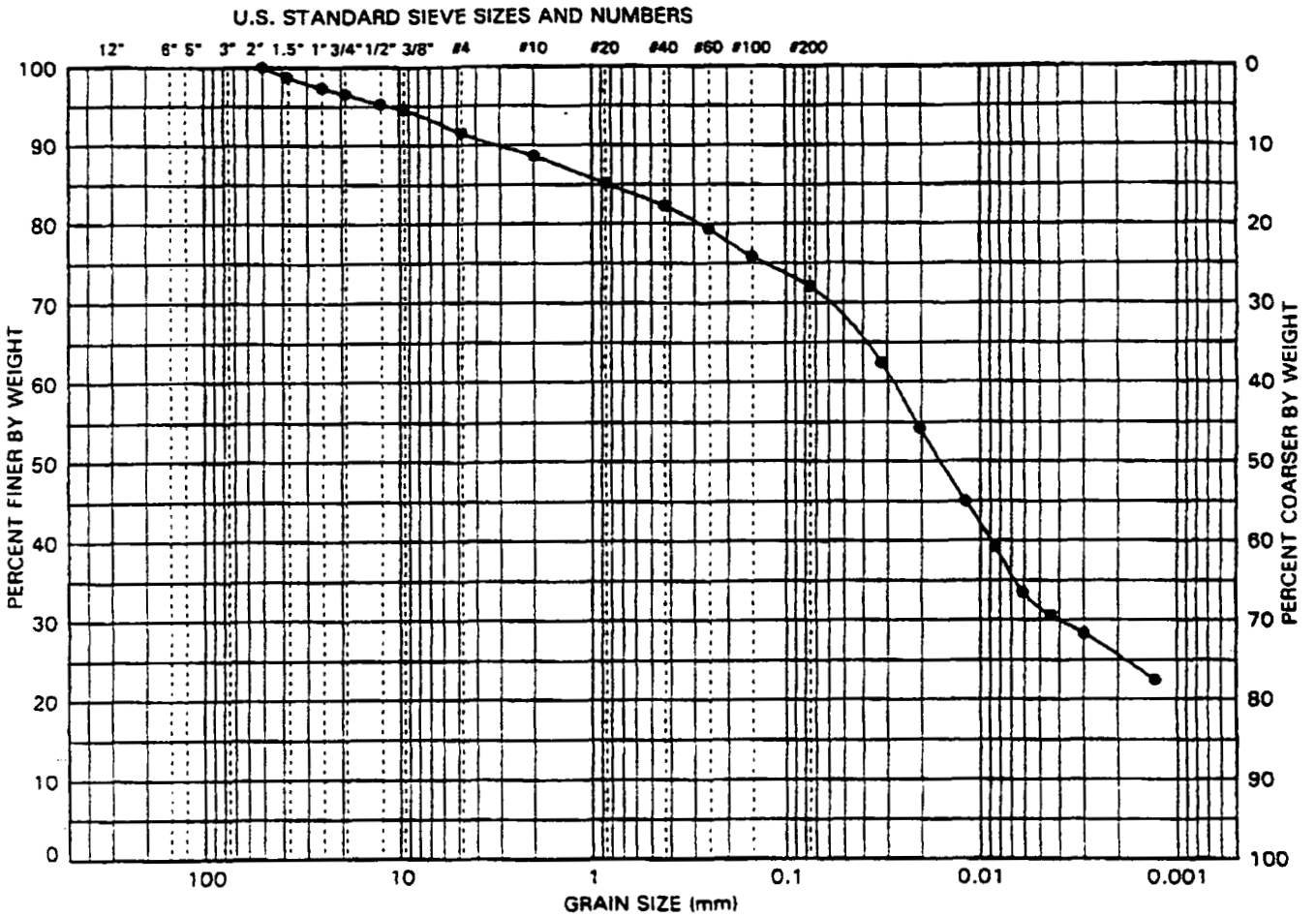
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/28/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-17.2	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97H279	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	8.5
SAND (%)	19.5
FINES (%)	72.0
SILT (%)	46.5
CLAY(%)	25.5
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	99	97	97	95	95	92	89	85	82	79	76	72	67	54	32	25	

NOTES:

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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 — DATE: 20 day AUG. month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP 18.1

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 (ONE POINT CHECK)

QA ID: JW

	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6187.1				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1977.7				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.5				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.9				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.		31				
F	WT. OF TARE	(grams)	8.31				
G	WT. OF WET SOIL & TARE	(grams)	341.09				
H	WT. OF DRY SOIL & TARE	(grams)	298.77				
I	WT. OF WATER = G - H	(grams)	42.32				
J	WT. DRY SOIL = H - F	(grams)	290.46				
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.6				

CLOSELY COMPARES WITH SAMPLE LP-1B 113.1 pcf / 14.5% omc.

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GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC — CHECKED BY: [illegible] — SHEET NO. 1 OF 1

1266

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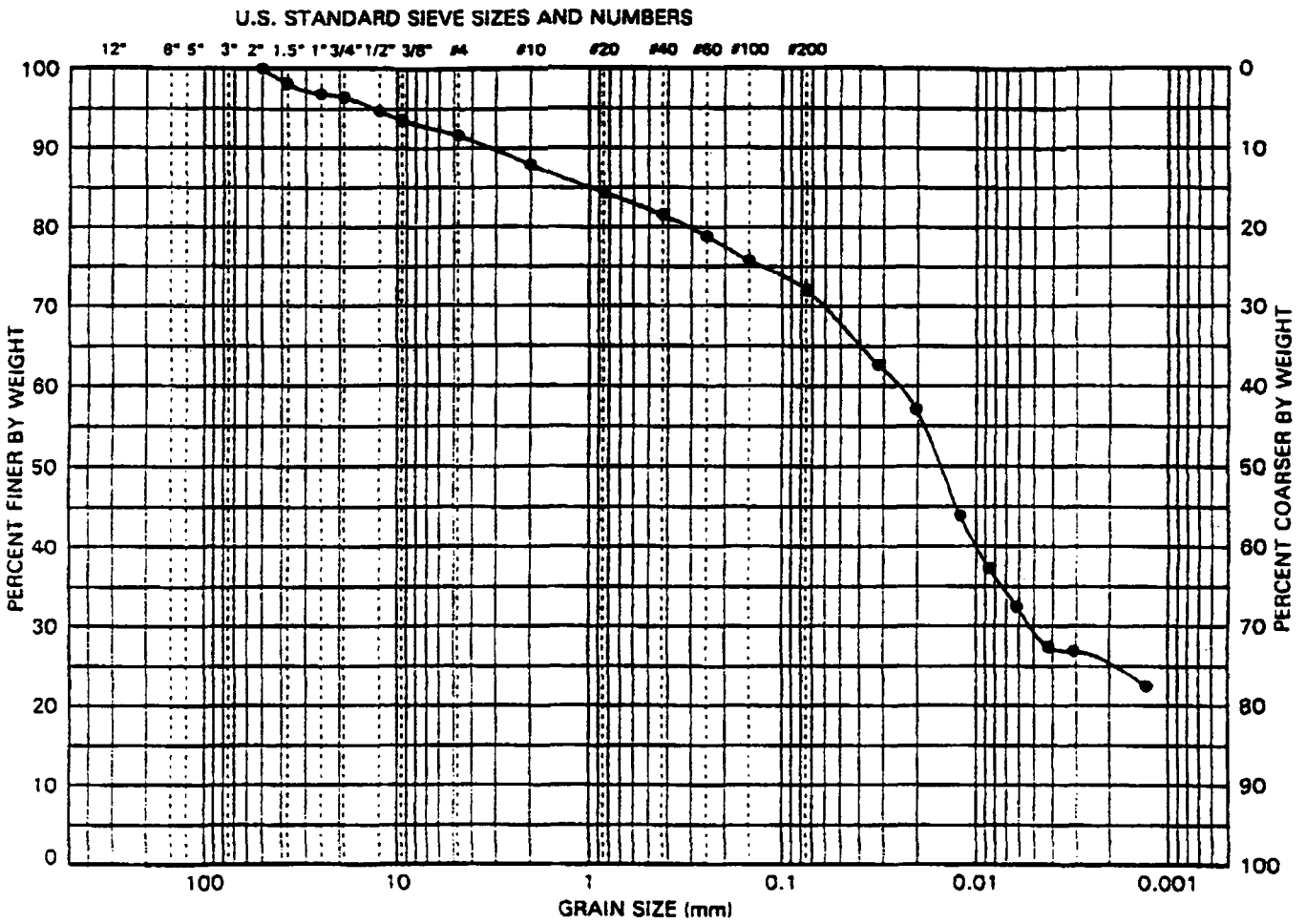
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-18.2	LIQUID LIMIT (%)	35	SOIL FRACTIONS	GRAVEL (%) 8.4
LAB. SAMPLE NO.	97H281	PLASTIC LIMIT (%)	18		SAND (%) 19.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX	17		FINES (%) 72.0
SOIL CLASSIFICATION:					SILT (%) 47.3
CL - Lean Clay with Sand					CLAY(%) 24.7
					COEFF. UNIFORMITY (Cu)
					COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	98	97	96	95	94	92	88	84	82	79	76	72	68	56	30	25	

NOTES:

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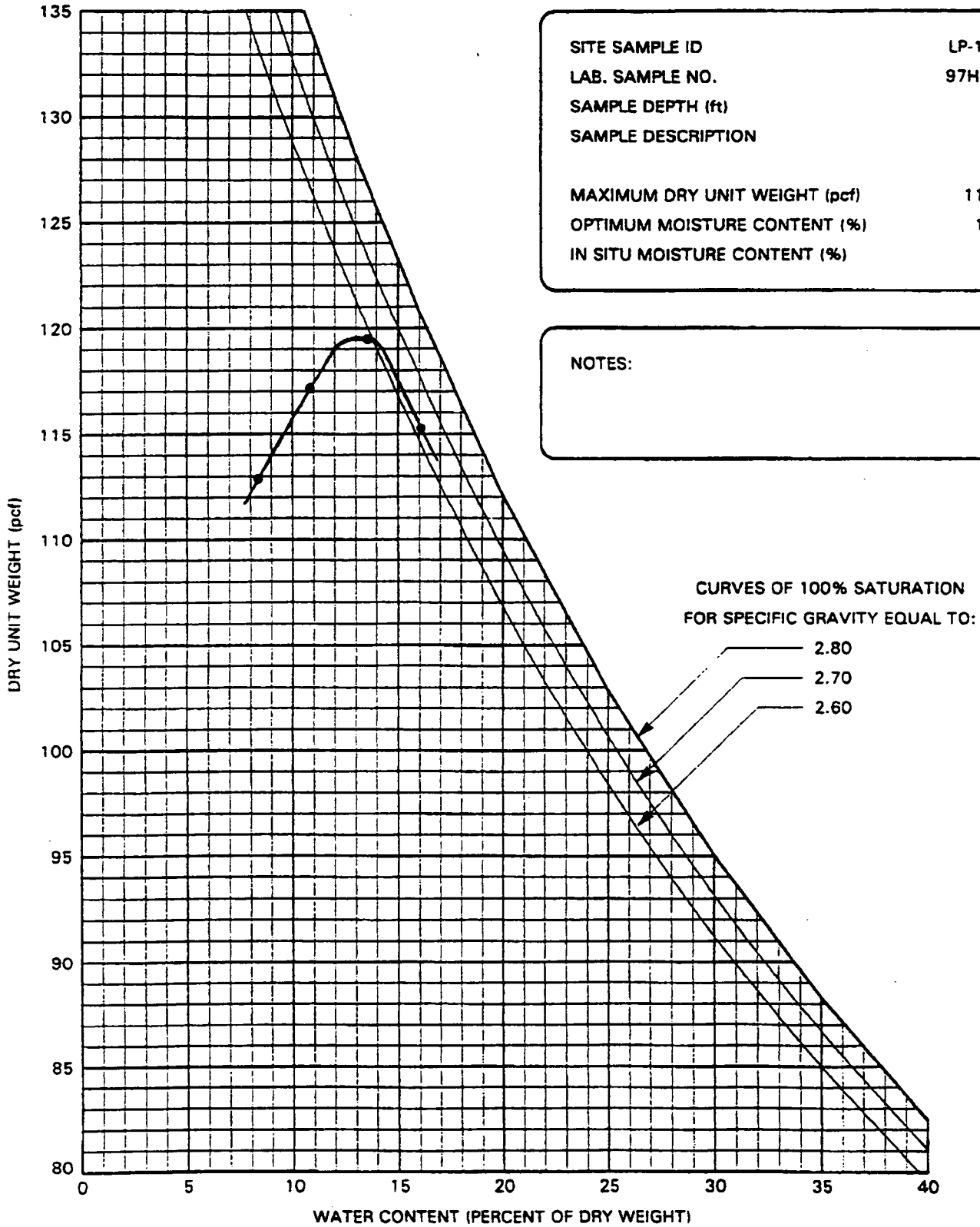
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 08/27/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A / D-4718



SITE SAMPLE ID	LP-18.2
LAB. SAMPLE NO.	97H281
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	119.5
OPTIMUM MOISTURE CONTENT (%)	13.2
IN SITU MOISTURE CONTENT (%)	

NOTES:

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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 — DATE: 8 day 13 month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-43

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

QA ID: JW

	WATER ADDED	(ml)	[illegible]	0 ml	50 ml	100 ml	150 ml
A	WT. OF SOIL & MOLD	(grams)	5996.6	6078.2	6237	6282.4	6209.8
B	WT. OF MOLD	(grams)	4239.4	4239.4	4239.4	4239.4	4239.4
C	WT. OF SOIL = A − B	(grams)	1757.2	1868.8	2027.6	2073.0	[illegible]
D	WET UNIT WT.(1) = C X 0.066	(pcf)	115.0	123.3	133.8	136.8	[illegible]
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.1	111.7	118.4	119.0	112.4

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: JW

	TARE NO.		14	8	3	104	24
F	WT. OF TARE	(grams)	7.84	7.34	7.60	8.24	8.41
G	WT. OF WET SOIL & TARE	(grams)	224.76	285.92	264.86	272.42	287.73
H	WT. OF DRY SOIL & TARE	(grams)	204.74	259.57	235.35	237.99	246.39
I	WT. OF WATER = G − H	(grams)	20.02	26.25	29.51	34.43	41.34
J	WT. DRY SOIL = H − F	(grams)	196.9	252.23	227.75	229.75	237.98
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.2	10.4	13.0	15.0	17.4

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FLUOR DANIEL FERNALD

1266

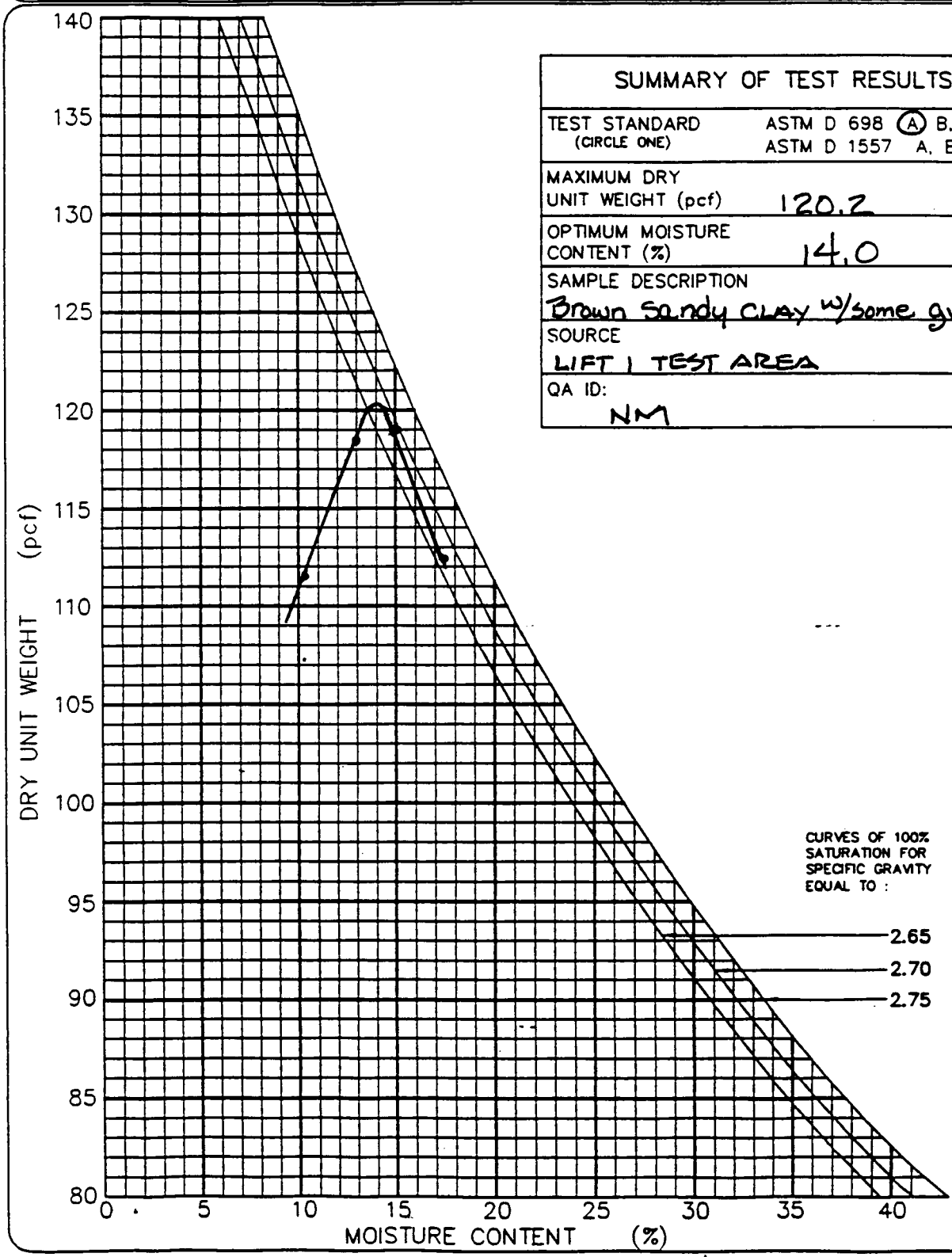
MOISTURE-DENSITY RELATIONSHIP

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-43



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	120.2
OPTIMUM MOISTURE CONTENT (%)	14.0
SAMPLE DESCRIPTION	Brown sandy CLAY w/some gvl.
SOURCE	LIFT 1 TEST AREA
QA ID:	NM

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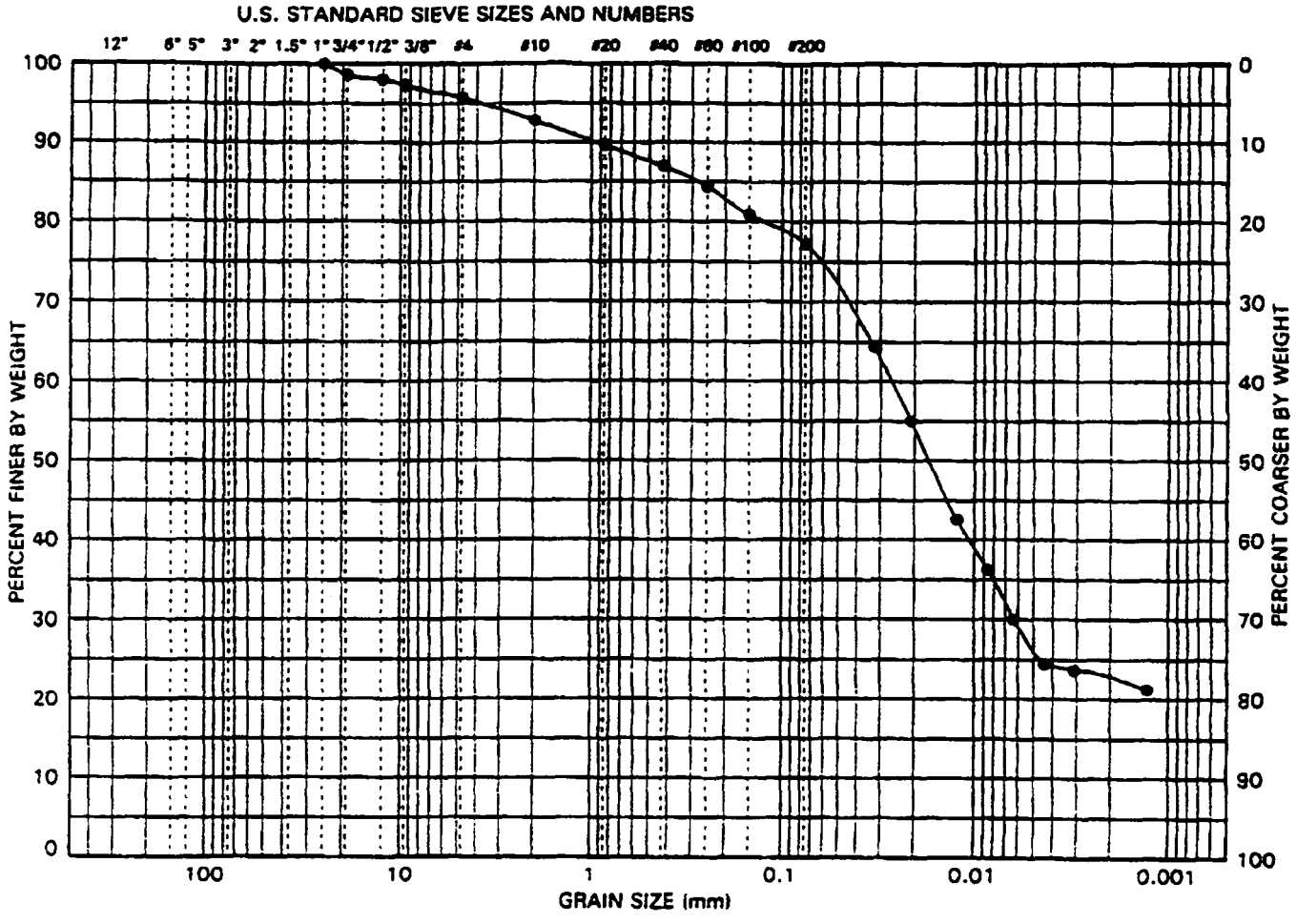
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-19.1	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	4.3
LAB. SAMPLE NO.	97H282	PLASTIC LIMIT (%)		SAND (%)	18.5
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	77.2
SOIL CLASSIFICATION:				SILT (%)	54.8
				CLAY(%)	22.4
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	99	98	97	96	93	90	87	84	81	77	71	54	26	22	

NOTES:

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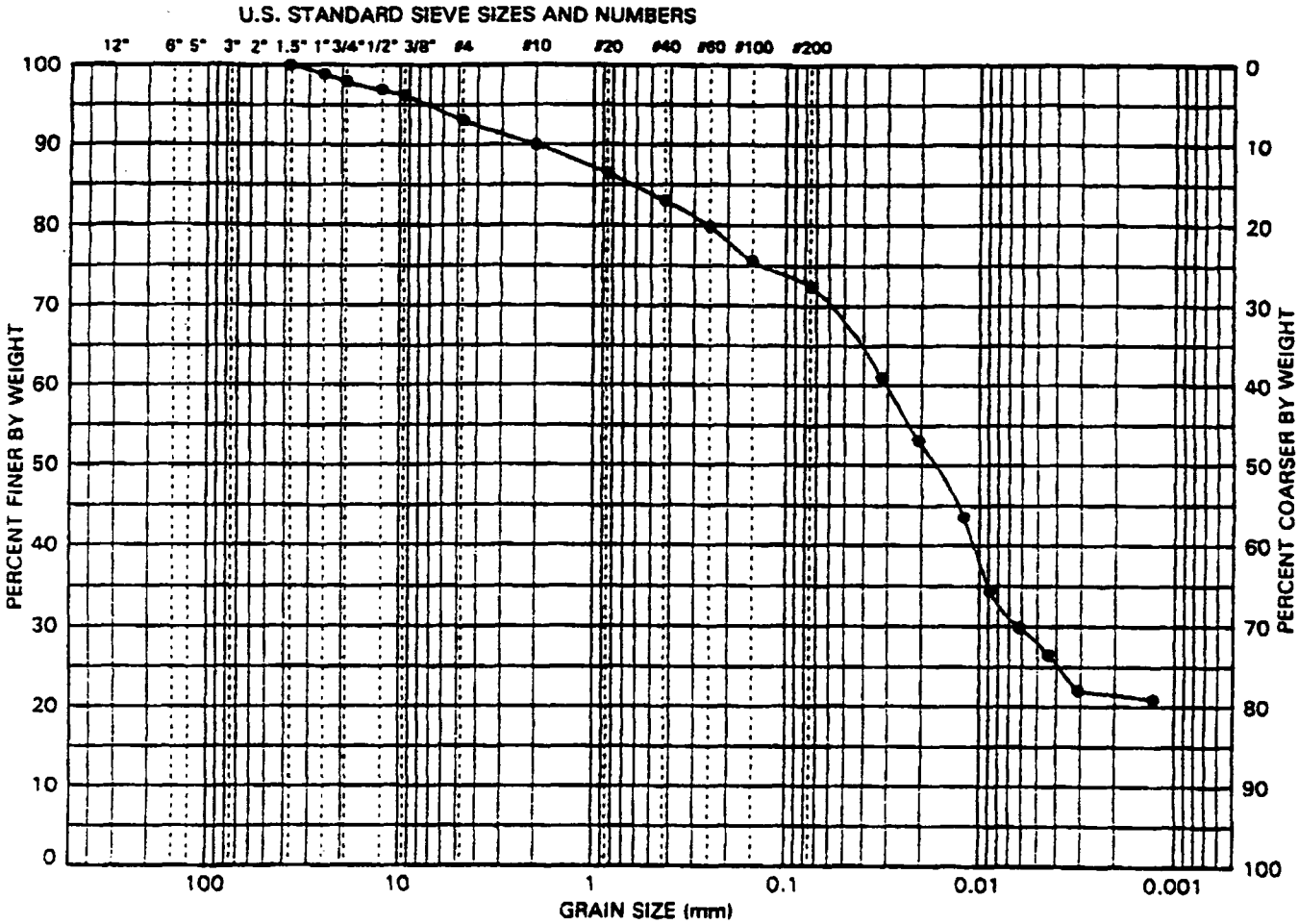
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-19.2	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	7.0
LAB. SAMPLE NO.	97H283	PLASTIC LIMIT (%)		SAND (%)	20.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	72.4
SOIL CLASSIFICATION:				SILT (%)	51.0
				CLAY(%)	21.4
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	99	98	97	96	93	90	86	83	80	76	72	67	52	28	21	

NOTES:

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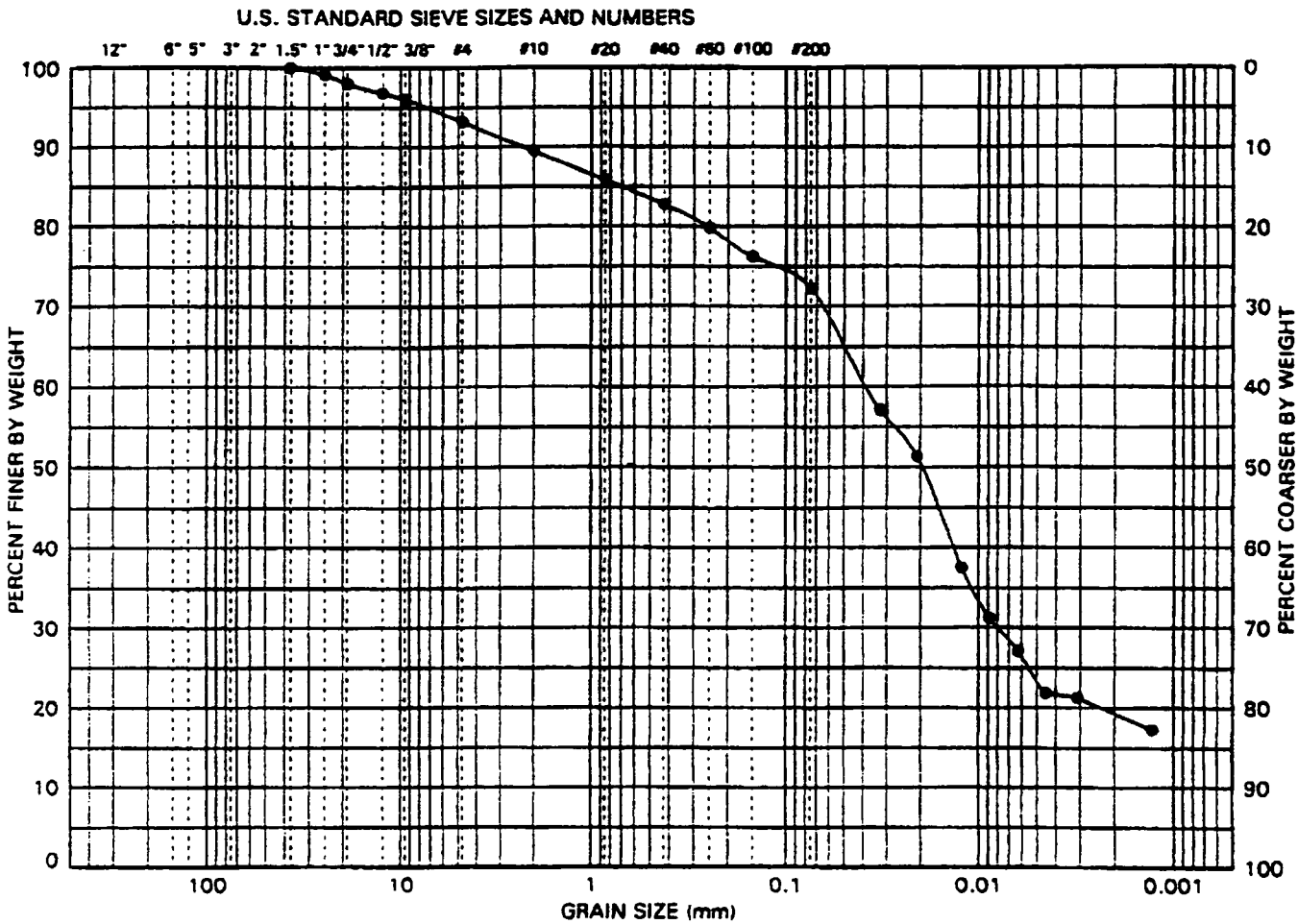
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID LP-21.1	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 6.9
LAB. SAMPLE NO. 97H284	PLASTIC LIMIT (%)		SAND (%) 20.9
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%) 72.2
SOIL CLASSIFICATION:			SILT (%) 52.9
			CLAY(%) 19.3
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	99	98	97	96	93	89	86	83	80	76	72	65	50	24	19	

NOTES:

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 22 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP 21.1

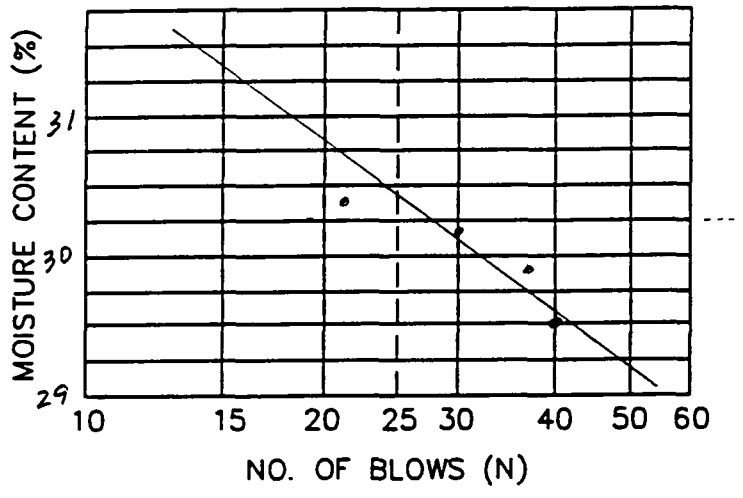
LIQUID LIMIT DETERMINATION

QA ID: JW

	TARE NO.		2.4	2.6	2.3	2.5
A	WT. OF TARE	(grams)	27.39	28.56	31.20	28.42
B	WT. OF WET SOIL & TARE	(grams)	45.85	46.29	50.04	50.22
C	WT. OF DRY SOIL & TARE	(grams)	41.65	42.21	45.65	45.16
D	WT. OF WATER = B-C	(grams)	4.20	4.08	4.39	5.06
E	WT. OF DRY SOIL = C-A	(grams)	14.26	13.65	14.45	16.74
F	MOISTURE CONTENT = (D/E)X100	(%)	29.5	29.9	30.4	30.2
N	NUMBER OF BLOWS		40	38	22	30

DRYING TARE NO.

H



CURING TARE NO.

1-E

PLASTIC LIMIT DETERMINATION

QA ID: JW

	TARE NO.		4.2	3.9		
A	WT. OF TARE	(grams)	21.19	21.01		
B	WT. OF WET SOIL & TARE	(grams)	27.89	26.06		
C	WT. OF DRY SOIL & TARE	(grams)	26.92	25.32		
D	WT. OF WATER = B-C	(grams)	0.97	0.74		
E	WT. OF DRY SOIL = C-A	(grams)	5.73	4.31		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.9	17.2		

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 13

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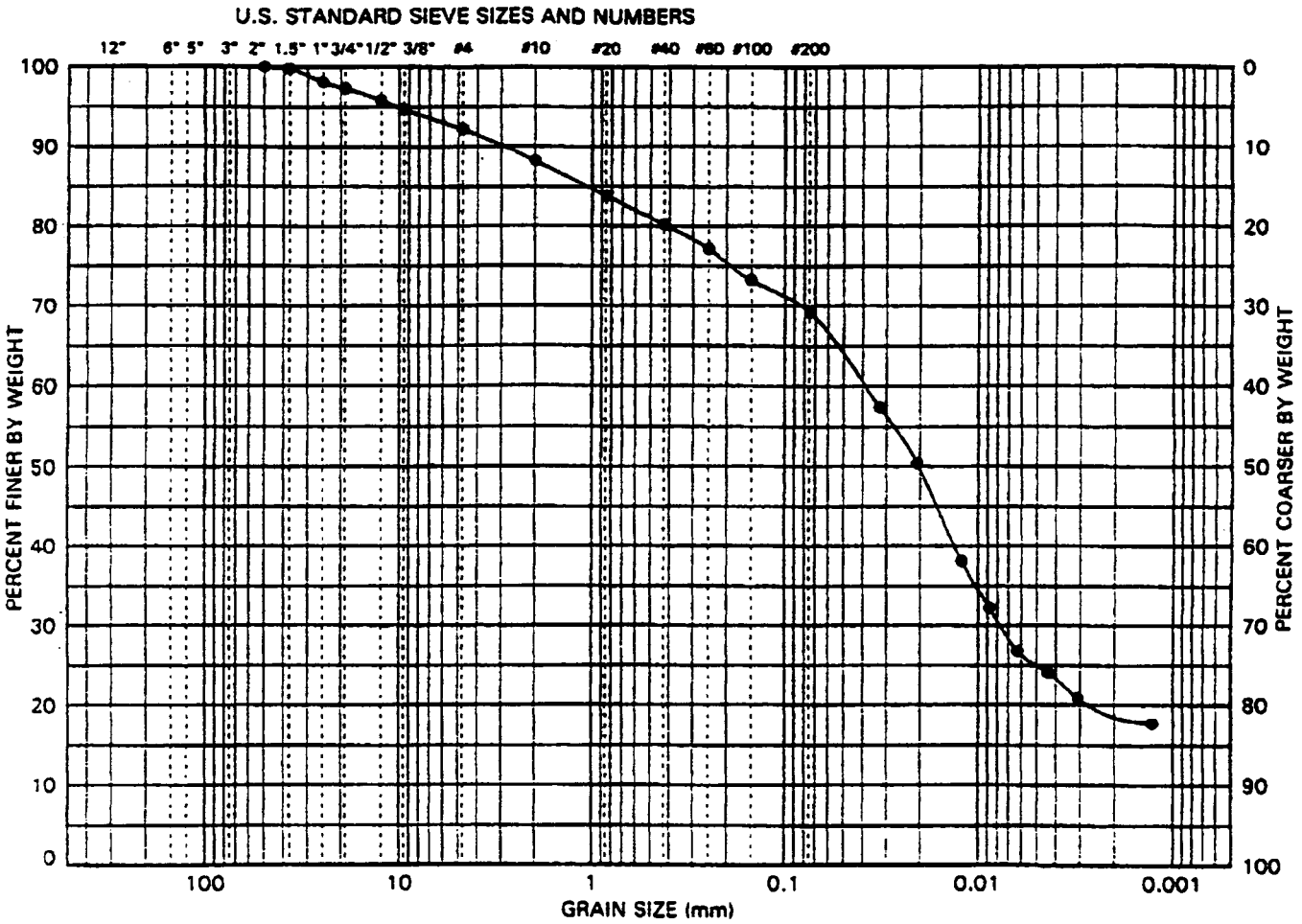
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-21.2	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	7.8
LAB. SAMPLE NO.	97H285	PLASTIC LIMIT (%)		SAND (%)	23.0
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	69.2
SOIL CLASSIFICATION:				SILT (%)	49.9
				CLAY(%)	19.3
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	98	97	96	95	92	88	84	80	77	73	69	63	49	25	19	

NOTES:

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE 7 CONSTRUCTION DATE: 25 day 8 month 97 year

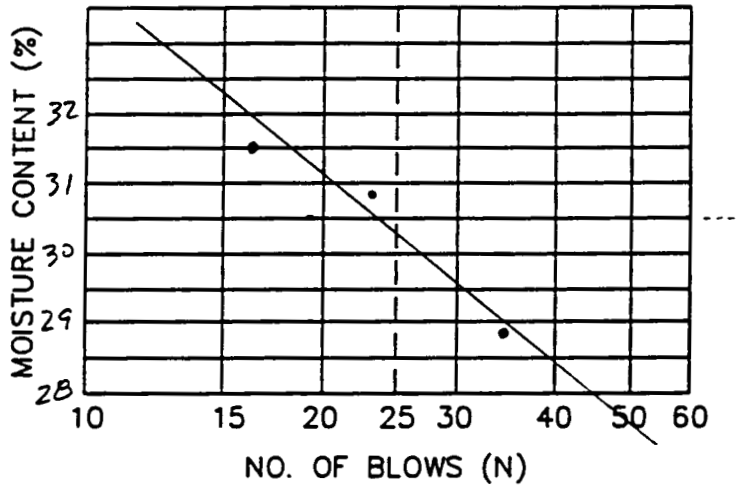
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP 21-2

LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.7	1.1	1.8	
A	WT. OF TARE	(grams)	28.67	28.76	28.81	
B	WT. OF WET SOIL & TARE	(grams)	48.66	45.76	49.16	
C	WT. OF DRY SOIL & TARE	(grams)	44.19	41.76	44.28	
D	WT. OF WATER = B-C	(grams)	4.47	4.00	4.88	
E	WT. OF DRY SOIL = C-A	(grams)	15.52	13.00	15.47	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.8 ✓	30.8 ✓	31.5 ✓	
N	NUMBER OF BLOWS		35	23	17	

DRYING TARE NO.



CURING TARE NO.

1-D

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.9	1.6		
A	WT. OF TARE	(grams)	31.46	28.87		
B	WT. OF WET SOIL & TARE	(grams)	44.58	44.64		
C	WT. OF DRY SOIL & TARE	(grams)	42.64	42.30		
D	WT. OF WATER = B-C	(grams)	1.94	2.34		
E	WT. OF DRY SOIL = C-A	(grams)	11.18	13.43		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.4 ✓	17.4 ✓		

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 21 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP 22.1

SOIL SAMPLE SIZE

	SAND	FINE GRAIN
APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	K	
WT. OF DRY SAMPLE PLUS TARE (grams)	1467.0	526.1
WT. OF TARE (grams)	101.5	101.5
WT. OF DRY SAMPLE (grams)	1365.5	424.6

SIEVE ANALYSIS

QA ID: JW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
1.0	25.0	19.22	1.4	98.6	
3/4	19.0	37.60	2.8	97.2	90-100
1/2	12.5	63.70	4.7	95.3	
3/8	9.5	75.30	5.5	94.5	
#4	4.75	103.55	7.6	92.4	
#10	2.00	160.54	11.8	88.2	
#20	0.850	208.81	15.3	84.7	
#40	0.425	257.30	18.8	81.2	
#60	0.250	304.48	22.3	77.7	
#100	0.150	359.89	26.4	73.6	
#200	0.075	421.80	30.9	69.1	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

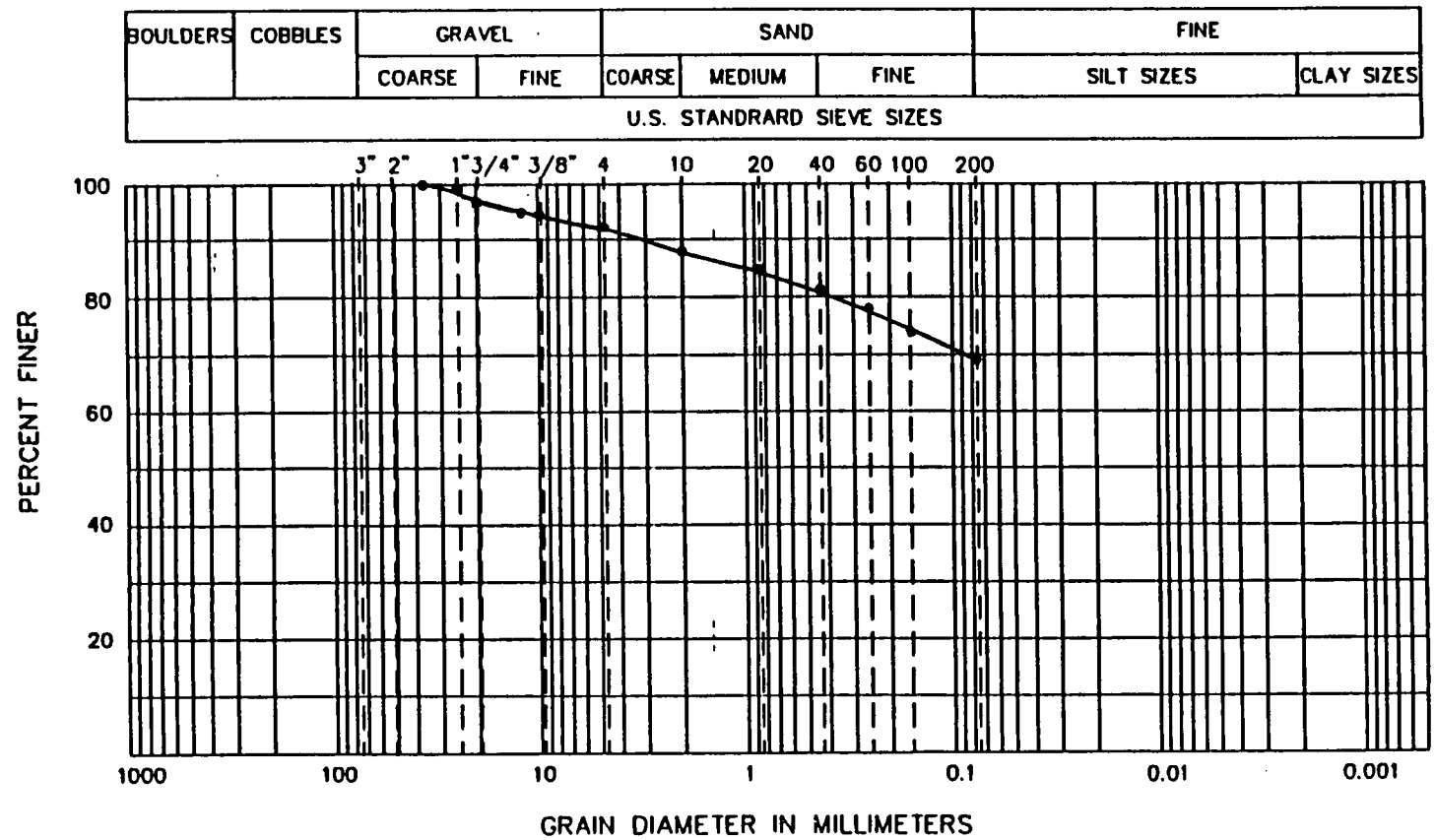
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 22 day AUG. month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-22.1 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL)

(PL) SEE LP-22 TEST NOT RE-RUN

(PI)

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	98.6
3/4-in.	97.2
1/2-in.	95.3
3/8-in.	94.5
NO. 4	92.4
NO. 10	88.2
NO. 20	84.7
NO. 40	81.2
NO. 60	77.7
NO. 100	73.6
NO. 200	69.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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SHEET NO. 2 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 21 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP22.2

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		N	N
WT. OF DRY SAMPLE PLUS TARE	(grams)	1771.1	586.7
WT. OF TARE	(grams)	101.7	101.7
WT. OF DRY SAMPLE	(grams)	1668.7	485.0

SIEVE ANALYSIS

QA ID: JW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
1.0	25.0	0	0	100	
3/4	19.0	25.07	1.5	98.5	90-100
1/2	12.5	53.50	3.2	96.8	
3/8	9.5	73.92	4.4	95.6	
#4	4.75	121.67	7.3	92.7	
#10	2.00	183.85	11.0	89.0	
#20	0.850	242.81	14.6	85.4	
#40	0.425	300.28	18.0	82.0	
#60	0.250	350.07	21.0	79.0	
#100	0.150	411.1	24.6	75.4	
#200	0.075	483.5	29.0	71.0	50-100

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

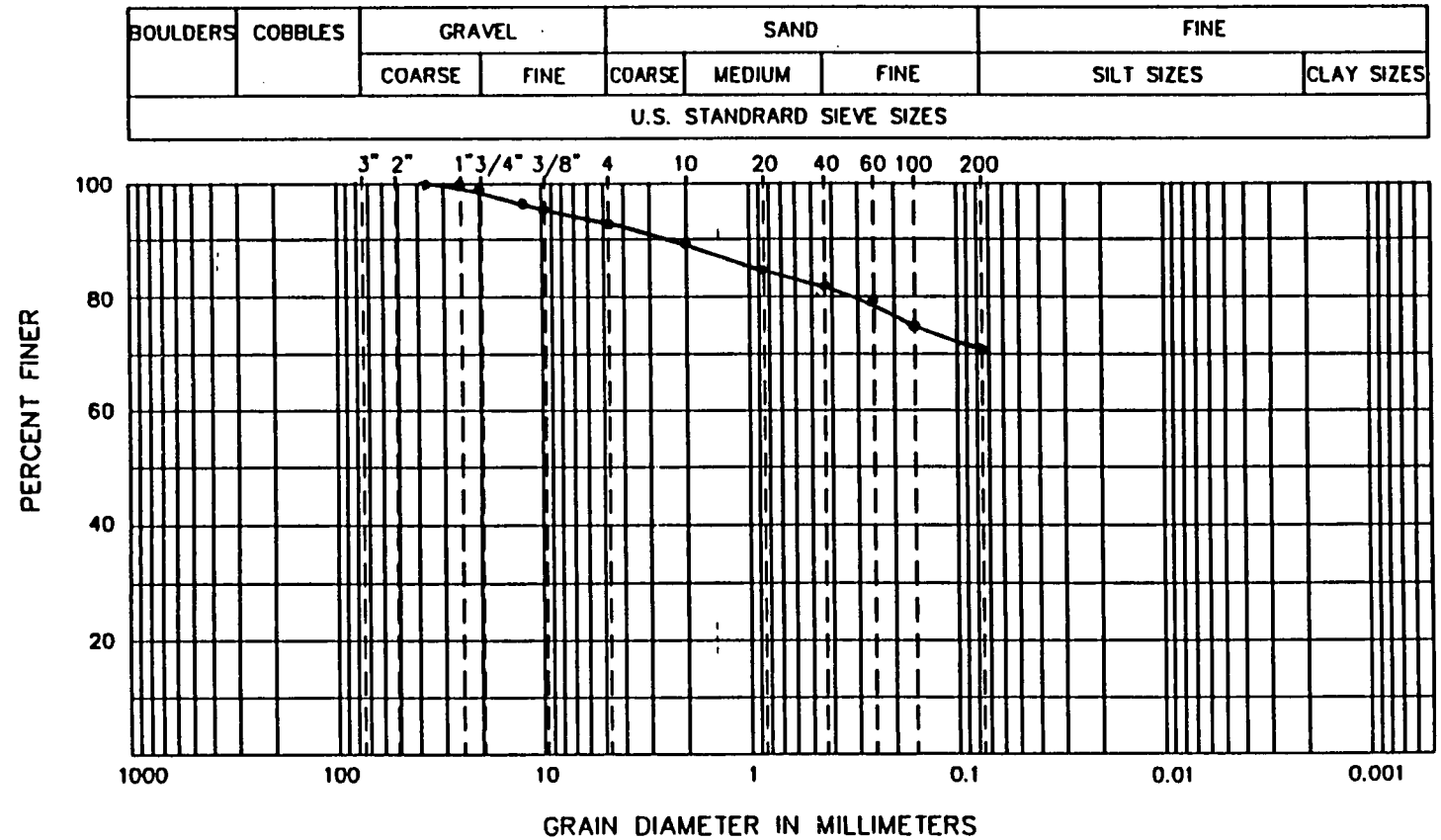
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-22.2 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL)

(PL) SEE LP-22 TEST NOT RE-RUN

(PI)

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	100.0
3/4-in.	98.5
1/2-in.	96.8
3/8-in.	95.6
NO. 4	92.7
NO. 10	89.0
NO. 20	85.4
NO. 40	82.0
NO. 60	79.0
NO. 100	75.4
NO. 200	71.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487):

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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 — DATE: 20 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP 34.1

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 (ON POINT CHECK)

QA ID: JW

	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6259.7				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	2050.3				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	135.3				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.1				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.		23				
F	WT. OF TARE	(grams)	8.43		CLOSELY COMPARES WITH SAMPLE LP-34		
G	WT. OF WET SOIL & TARE	(grams)	301.57		118.2 pcf / 13.8% omc		
H	WT. OF DRY SOIL & TARE	(grams)	264.13				
I	WT. OF WATER = G - H	(grams)	37.44				
J	WT. DRY SOIL = H - F	(grams)	255.7				
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.6				

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC — CHECKED BY: [illegible] — SHEET NO. 1 OF 1

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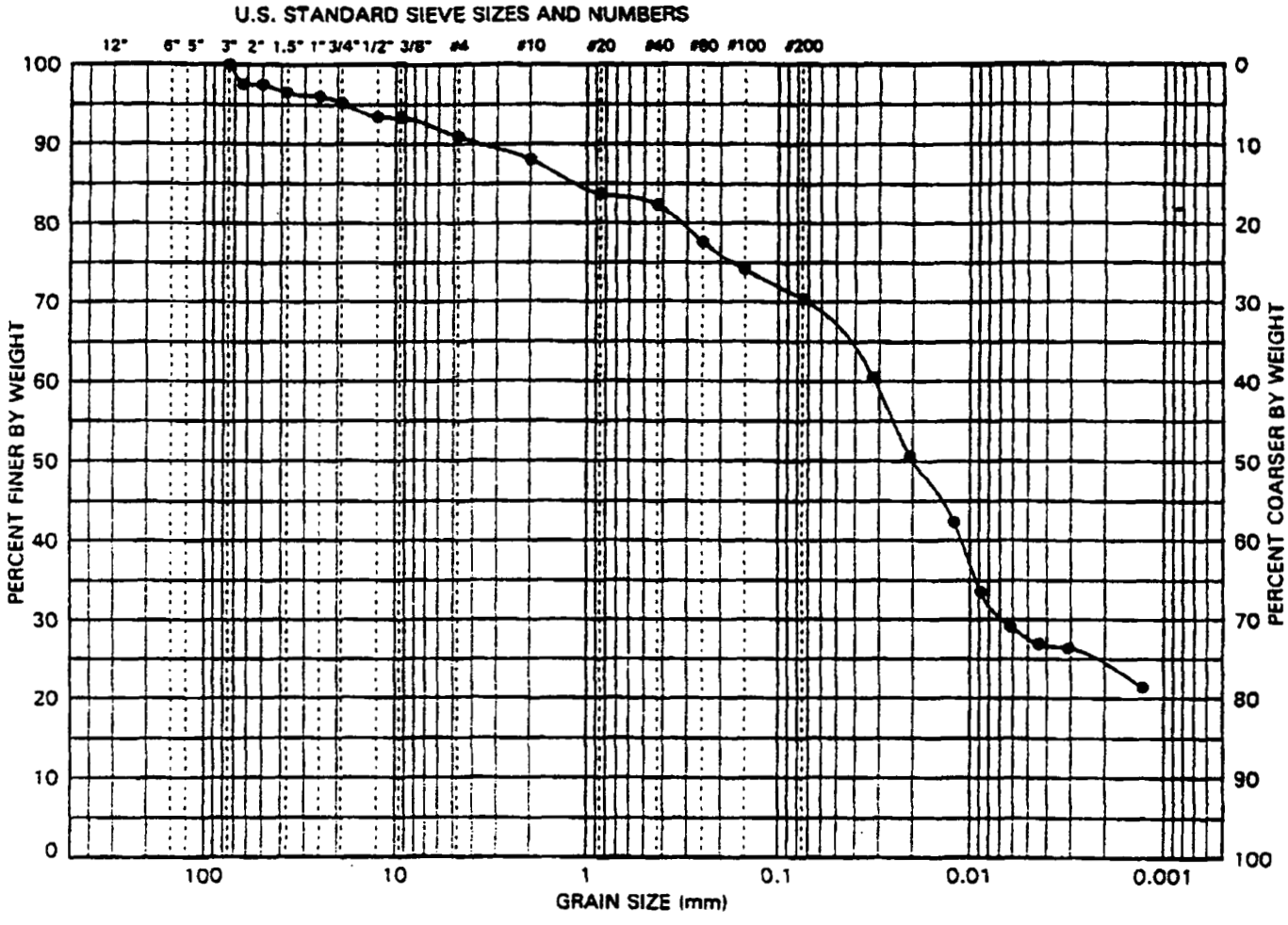
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-34.2	LIQUID LIMIT (%)	37	SOIL FRACTIONS	GRAVEL (%) 9.1
LAB. SAMPLE NO.	97H287	PLASTIC LIMIT (%)	17		SAND (%) 20.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX	20		FINES (%) 70.3
SOIL CLASSIFICATION: CL - Sandy Lean Clay					SILT (%) 46.4
					CLAY(%) 23.9
					COEFF. UNIFORMITY (Cu)
					COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	98	97	96	95	93	93	91	88	84	82	78	74	70	66	50	28	24	

NOTES:

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Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

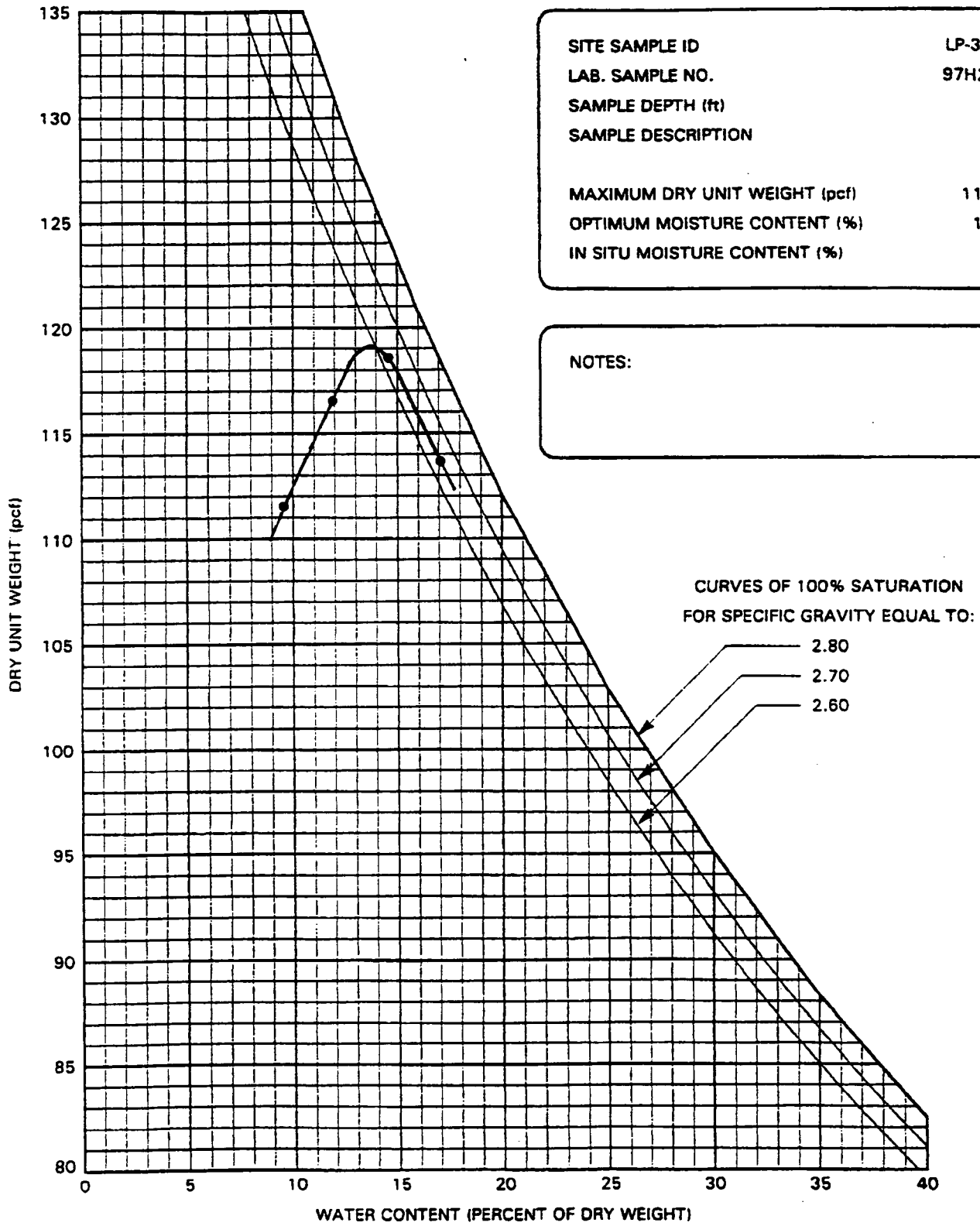
GS FORM: 4MD1 08/27/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A / D-4718

SITE SAMPLE ID	LP-34.2
LAB. SAMPLE NO.	97H287
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	119.1
OPTIMUM MOISTURE CONTENT (%)	13.7
IN SITU MOISTURE CONTENT (%)	

NOTES:



GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE 2 CONSTRUCTION DATE: 25 day 8 month 92 year

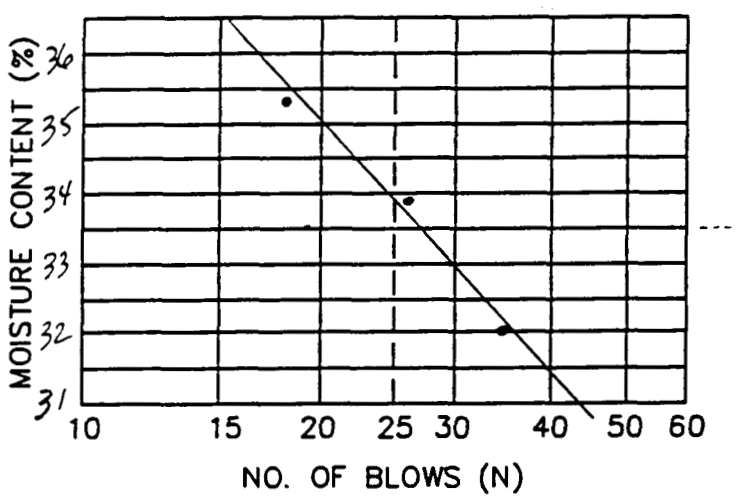
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP 40.1

LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.6	1.2	2.3	
A	WT. OF TARE	(grams)	28.55	28.50	31.20	
B	WT. OF WET SOIL & TARE	(grams)	47.42	45.77	52.39	
C	WT. OF DRY SOIL & TARE	(grams)	42.85	41.40	46.85	
D	WT. OF WATER = B-C	(grams)	4.57	4.37	5.54	
E	WT. OF DRY SOIL = C-A	(grams)	14.30	12.90	15.65	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.0 ✓	33.9 ✓	35.4 ✓	
N	NUMBER OF BLOWS		35	26	18	

DRYING TARE NO.



CURING TARE NO.

1-F

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.4	2.5		
A	WT. OF TARE	(grams)	27.39	28.42		
B	WT. OF WET SOIL & TARE	(grams)	43.37	40.46		
C	WT. OF DRY SOIL & TARE	(grams)	40.94	38.63		
D	WT. OF WATER = B-C	(grams)	2.43	1.83		
E	WT. OF DRY SOIL = C-A	(grams)	13.55	10.21		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.9 ✓	17.9 ✓		

LIQUID LIMIT (LL) = 34 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 16

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 26 day AUG month 97 year

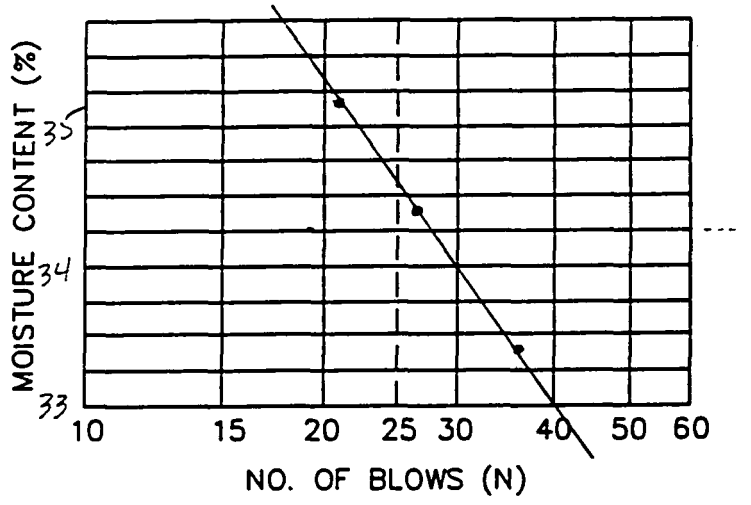
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP 40.2

LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		1.1	1.2	1.6	
A	WT. OF TARE	(grams)	28.76	28.50	28.87	
B	WT. OF WET SOIL & TARE	(grams)	49.31	47.30	50.36	
C	WT. OF DRY SOIL & TARE	(grams)	44.17	42.49	44.77	
D	WT. OF WATER = B-C	(grams)	5.14	4.81	5.59	
E	WT. OF DRY SOIL = C-A	(grams)	15.41	13.99	15.90	
F	MOISTURE CONTENT = (D/E)X100	(%)	33.4 ✓	34.4 ✓	35.2 ✓	
N	NUMBER OF BLOWS		37	27	21	

DRYING TARE NO.



CURING TARE NO.

1-H

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		1.8	2.3		
A	WT. OF TARE	(grams)	28.81	31.20		
B	WT. OF WET SOIL & TARE	(grams)	40.02	42.74		
C	WT. OF DRY SOIL & TARE	(grams)	38.33	40.97		
D	WT. OF WATER = B-C	(grams)	1.69	1.77		
E	WT. OF DRY SOIL = C-A	(grams)	9.52	9.77		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.8 ✓	18.1 ✓		

LIQUID LIMIT (LL) = 35 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 17

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 DATE: 21 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: CHECK LP-44 P4 FOR SGI LAB

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

QA ID: JW

	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6119.1				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1909.7				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.0				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.7				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JW

	TARE NO.		3				
F	WT. OF TARE	(grams)	7.57				
G	WT. OF WET SOIL & TARE	(grams)	278.35		Compares w/ Proctor LP-02		
H	WT. OF DRY SOIL & TARE	(grams)	251.9		D.D.= 119.8 @ 13.0 % omc		
I	WT. OF WATER = G - H	(grams)	26.5				
J	WT. DRY SOIL = H - F	(grams)	244.3				
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.8				

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: KEM SHEET NO. 1 OF 1

000186

1266

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 DATE: 25 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER (SOURCE: Lane 8, LIFT 1, SE Cor. Between CP. 594/1203 SAMPLE NO.: LP-45

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

1 point check plug for Proctor verification

QA ID: NM

	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6141.7				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1932.3				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.5				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.7				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D ~~2216~~ 4643 (MICROWAVE)

QA ID: NM

	TARE NO.		I				
F	WT. OF TARE	(grams)	132.1				
G	WT. OF WET SOIL & TARE	(grams)	259.5				
H	WT. OF DRY SOIL & TARE	(grams)	243.8				
I	WT. OF WATER = G - H	(grams)	15.7				
J	WT. DRY SOIL = H - F	(grams)	111.7				
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.1				

Compares w/ LP-37
MDD = 114.2 pcf
OMC = 15.5 %

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC NOT #9 8/25/97 CHECKED BY: BN SHEET NO. 1 OF 1

000187

1266

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: 27 day AUG month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-46

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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. _____	13				
A	WT. OF TARE	7.7				
B	WT. OF WET SOIL & TARE	155.7				
C	WT. OF DRY SOIL & TARE	130.1				
D	WT. OF WATER = B-C	25.6				
E	WT. OF DRY SOIL = C-A	122.4				
F	MOISTURE CONTENT = (D/E) X 100	20.9				

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-46

SOIL SAMPLE SIZE TOTAL SAMPLE = 19,459.4
>NO.4 TOTAL = 689.4

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		13	13
WT. OF DRY SAMPLE PLUS TARE	(grams)	130.1	18.3
WT. OF TARE	(grams)	7.7	7.7
WT. OF DRY SAMPLE	(grams)	122.4	10.6

SIEVE ANALYSIS QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0					100
1½"	37.50	Ø	Ø	100		
1"	25.0	172.3	0.9	99.1		
¾"	19.0	243.2	1.2	98.8		90-100
½"	12.5	372.4	1.9	98.1		
⅜"	9.5	463.6	2.4	97.6		
4	4.75	685.7	3.5	96.5		
10	2.00	1.3	1.1	98.9	95.4	
20	0.850	2.6	2.1	97.9	94.5	
40	0.425	4.1	3.3	96.7	93.3	
60	0.250	5.6	4.6	95.4	92.1	
100	0.150	7.8	6.4	93.6	90.3	
200	0.075	10.5	8.6	91.4	88.2	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

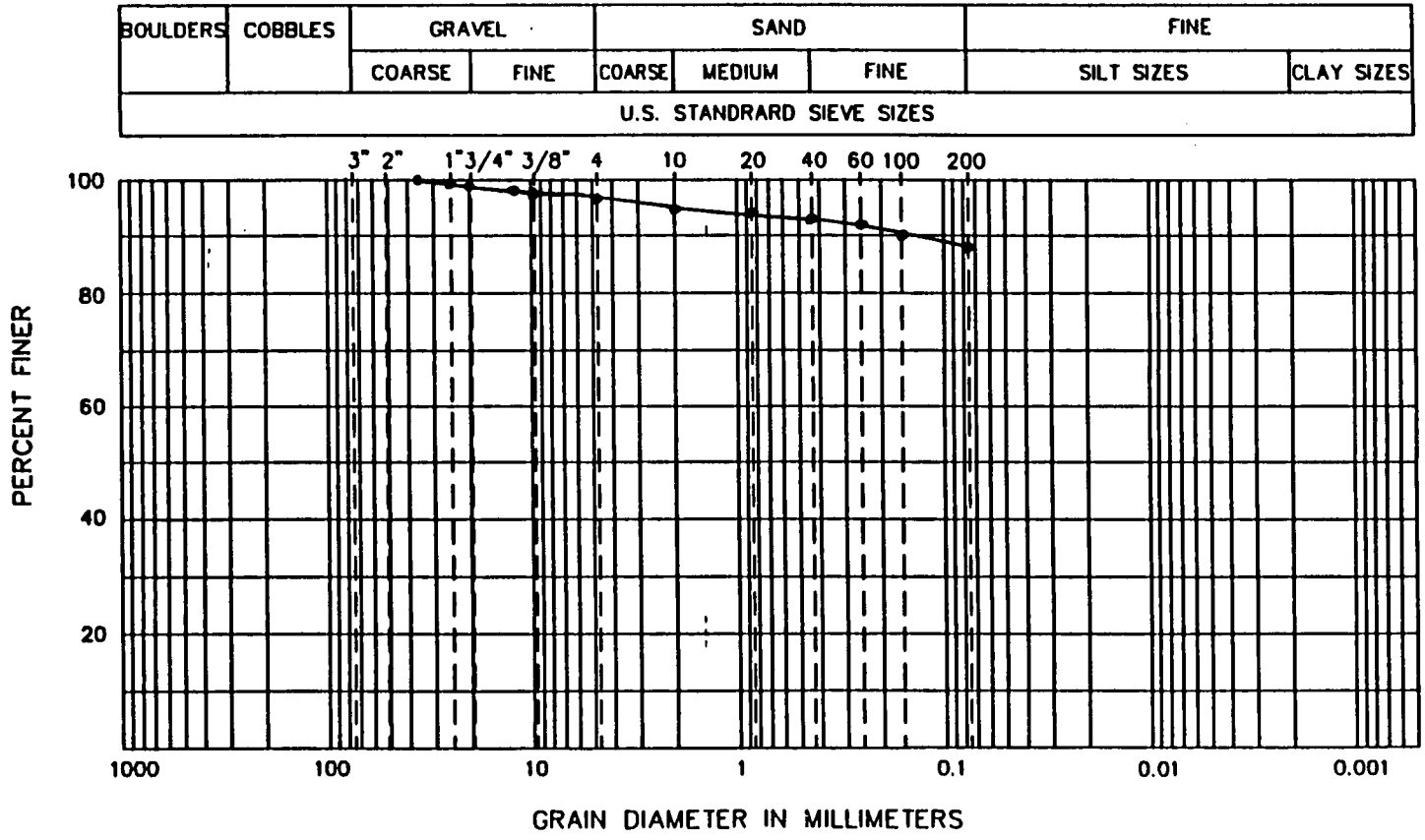
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 30 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-46 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 41

(PL) 20

(PI) 21

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.1
3/4-in.	98.8
1/2-in.	98.1
3/8-in.	97.6
NO. 4	96.5
NO. 10	95.4
NO. 20	94.5
NO. 40	93.3
NO. 60	92.1
NO. 100	90.3
NO. 200	88.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
~~N/A~~	
8/27/97	

SOIL CLASSIFICATION (ASTM D 2487): BROWN LEAN CLAY (CL) W/SOME SAND & TR. of GVL.

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SHEET NO. 2 OF 2

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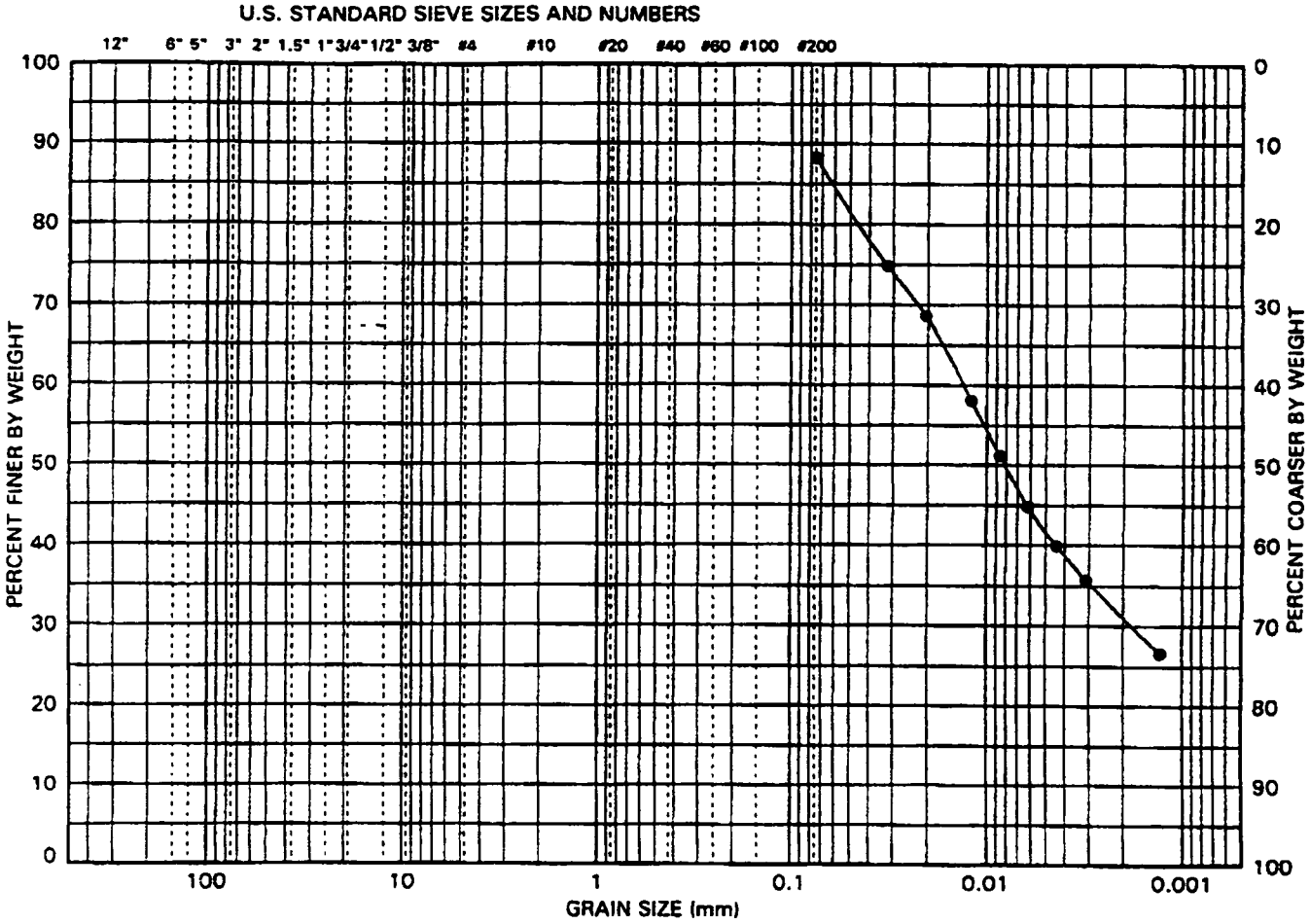
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-46	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97112	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	88.2
SOIL CLASSIFICATION:				SILT (%)	57.1
				CLAY(%)	31.1
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													88	82	68	42	31	

NOTES:

✓ SD 9.10.97

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-46

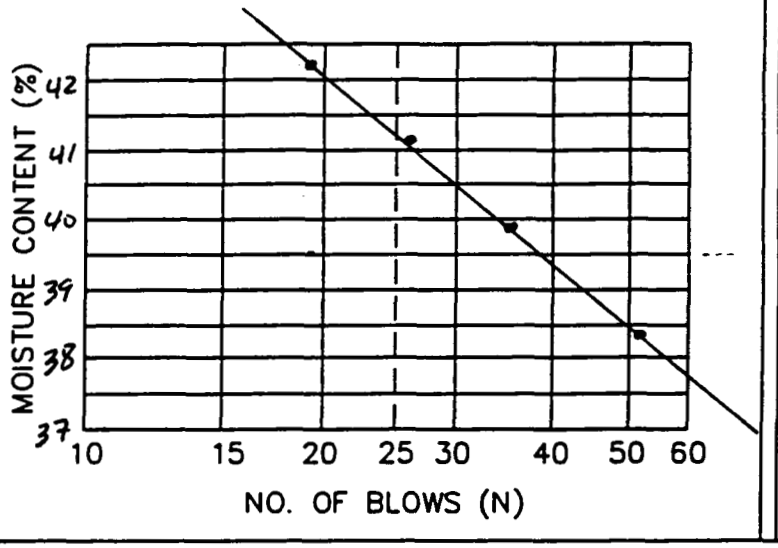
LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		1.3	1.6	2.3	2.4
A	WT. OF TARE	(grams)	28.64	28.87	31.20	27.39
B	WT. OF WET SOIL & TARE	(grams)	42.02	41.63	46.58	45.28
C	WT. OF DRY SOIL & TARE	(grams)	38.31	37.99	42.10	39.97
D	WT. OF WATER = B-C	(grams)	3.71	3.64	4.48	5.31
E	WT. OF DRY SOIL = C-A	(grams)	9.67	9.12	10.90	12.58
F	MOISTURE CONTENT = (D/E)X100	(%)	38.4 ✓	39.9 ✓	41.1 ✓	42.2 ✓
N	NUMBER OF BLOWS		51	36	26	19

DRYING TARE NO.

I



CURING TARE NO.

2-B

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		27	29		
A	WT. OF TARE	(grams)	28.67	31.46		
B	WT. OF WET SOIL & TARE	(grams)	35.20	38.12		
C	WT. OF DRY SOIL & TARE	(grams)	34.13	37.04		
D	WT. OF WATER = B-C	(grams)	1.07	1.08		
E	WT. OF DRY SOIL = C-A	(grams)	5.46	5.58		
F	MOISTURE CONTENT = (D/E)X100	(%)	BN 4/4/97 ~~20.0~~ 19.6	19.4		

LIQUID LIMIT (LL) = 41 PLASTIC LIMIT (PL) = 20 PLASTICITY INDEX (PI) = 21

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 — DATE: 30 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-46

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

QA ID: BE/NM

	WATER ADDED	(ml)	50	100	150	200	250
A	WT. OF SOIL & MOLD	(grams)	5942.2	6032.9	6123.6	6169.0	6110.2
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)	1732.8	1823.5	1914.2	1959.6	1900.8
D	WET UNIT WT.(1) = C X 0.066	(pcf)	114.4	120.3	126.3	129.3	125.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	102.1 ✓	104.4 ✓	108.1 ✓	107.7 ✓	103.0 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: BE/NM

	TARE NO.		21	26	15	30	2
F	WT. OF TARE	(grams)	8.4	8.3	7.7	8.3	7.6
G	WT. OF WET SOIL & TARE	(grams)	366.1	353.7	310.5	238.2	192.3
H	WT. OF DRY SOIL & TARE	(grams)	327.9	308.1	267.0	199.8	159.1
I	WT. OF WATER = G - H	(grams)	38.2	45.6	43.5	38.4	33.2
J	WT. DRY SOIL = H - F	(grams)	319.5	299.8	259.3	191.5	151.5
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.0 ✓	15.2 ✓	16.8 ✓	20.1 ✓	21.9 ✓

*GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: BN SHEET NO. 1 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

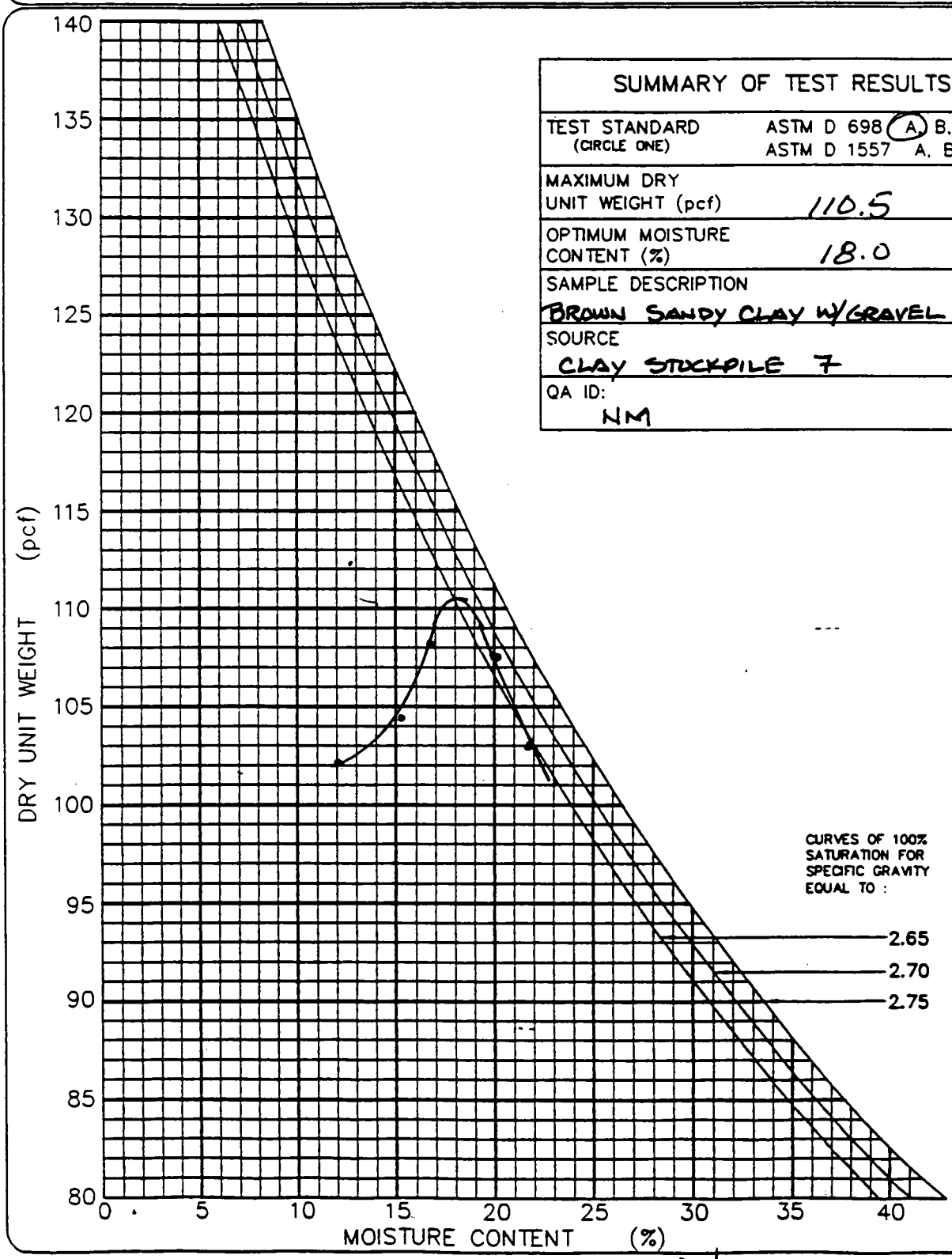
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-46



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	110.5
OPTIMUM MOISTURE CONTENT (%)	18.0
SAMPLE DESCRIPTION	BROWN SANDY CLAY W/GRAVEL
SOURCE	CLAY STOCKPILE 7
QA ID:	NM

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-47

SOIL SAMPLE SIZE TOTAL SAMPLE = 32296.3 grams
> NO.4 TOTAL = 861.8 grams

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		13	13
WT. OF DRY SAMPLE PLUS TARE	(grams)	~~170.9~~ 156.7 8/31/97	36.2
WT. OF TARE	(grams)	7.7	7.7
WT. OF DRY SAMPLE	(grams)	149.0	28.5

SIEVE ANALYSIS QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100.0		100
1½"	37.50	205.8	0.6	99.4		
1"	25.0	205.8	0.6	99.4		
¾"	19.0	357.1	1.1	98.9		90-100
½"	12.5	497.4	1.5	98.5		
⅜"	9.5	570.2	1.8	98.2		
4	4.75	836.3	2.6	97.4		
10	2.00	2.1	1.4	98.6	96.0	
20	0.850	6.1	4.1	95.9	93.4	
40	0.425	11.3	7.6	92.4	90.0	
60	0.250	15.9	10.7	89.3	87.0	
100	0.150	21.5	14.4	85.6	83.4	
200	0.075	28.2	18.9	81.1	79.0	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

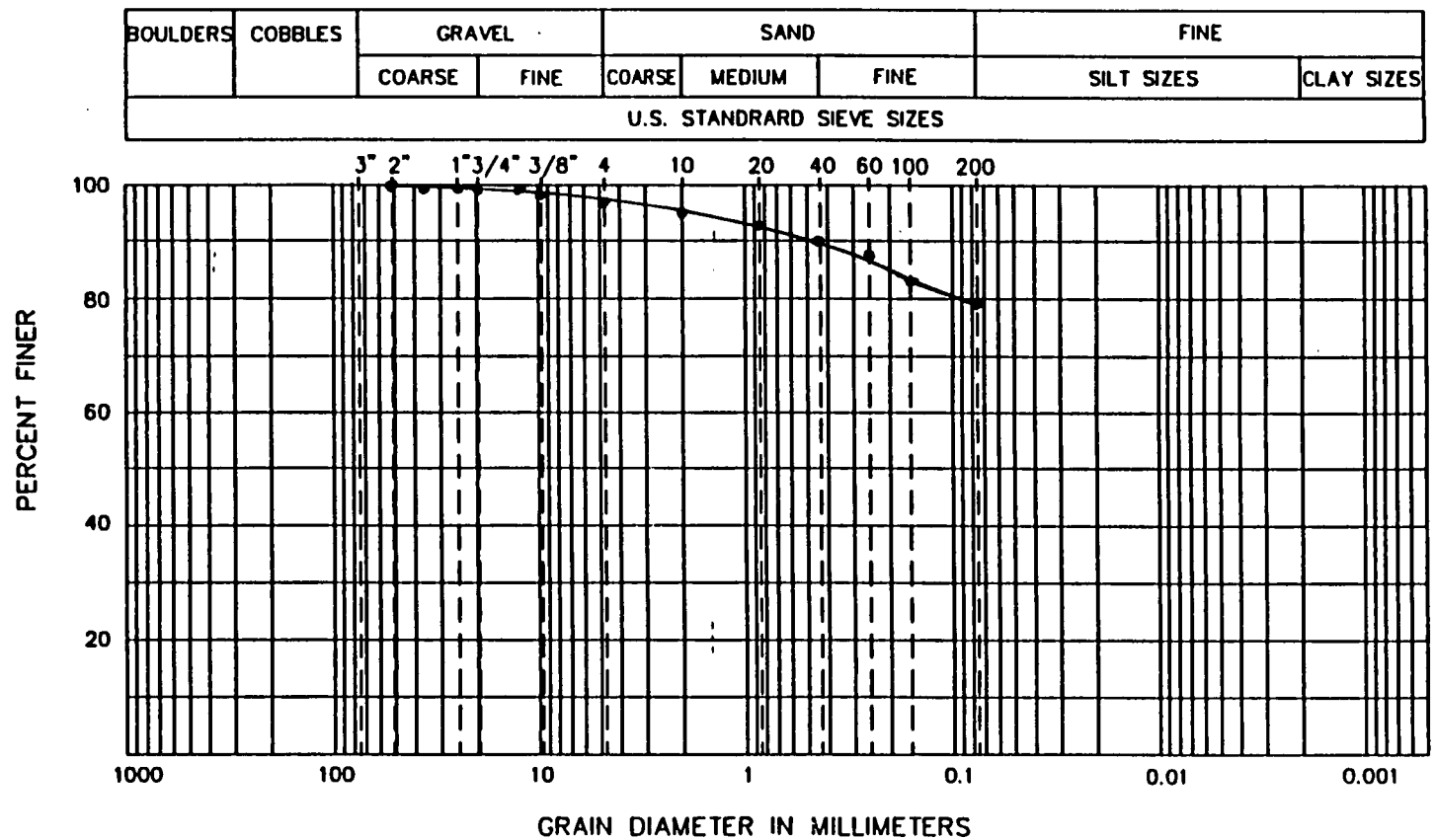
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 03 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-47 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 41

(PL) 19

(PI) 22

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.4
1-in.	99.4
3/4-in.	98.9
1/2-in.	98.5
3/8-in.	98.2
NO. 4	97.4
NO. 10	96.0
NO. 20	93.4
NO. 40	90.0
NO. 60	87.0
NO. 100	83.4
NO. 200	79.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): BROWN ~~SANDY~~ HEM 9/4/97 LEAN CLAY (CL) W/ SOME SAND & TR. of GVL.

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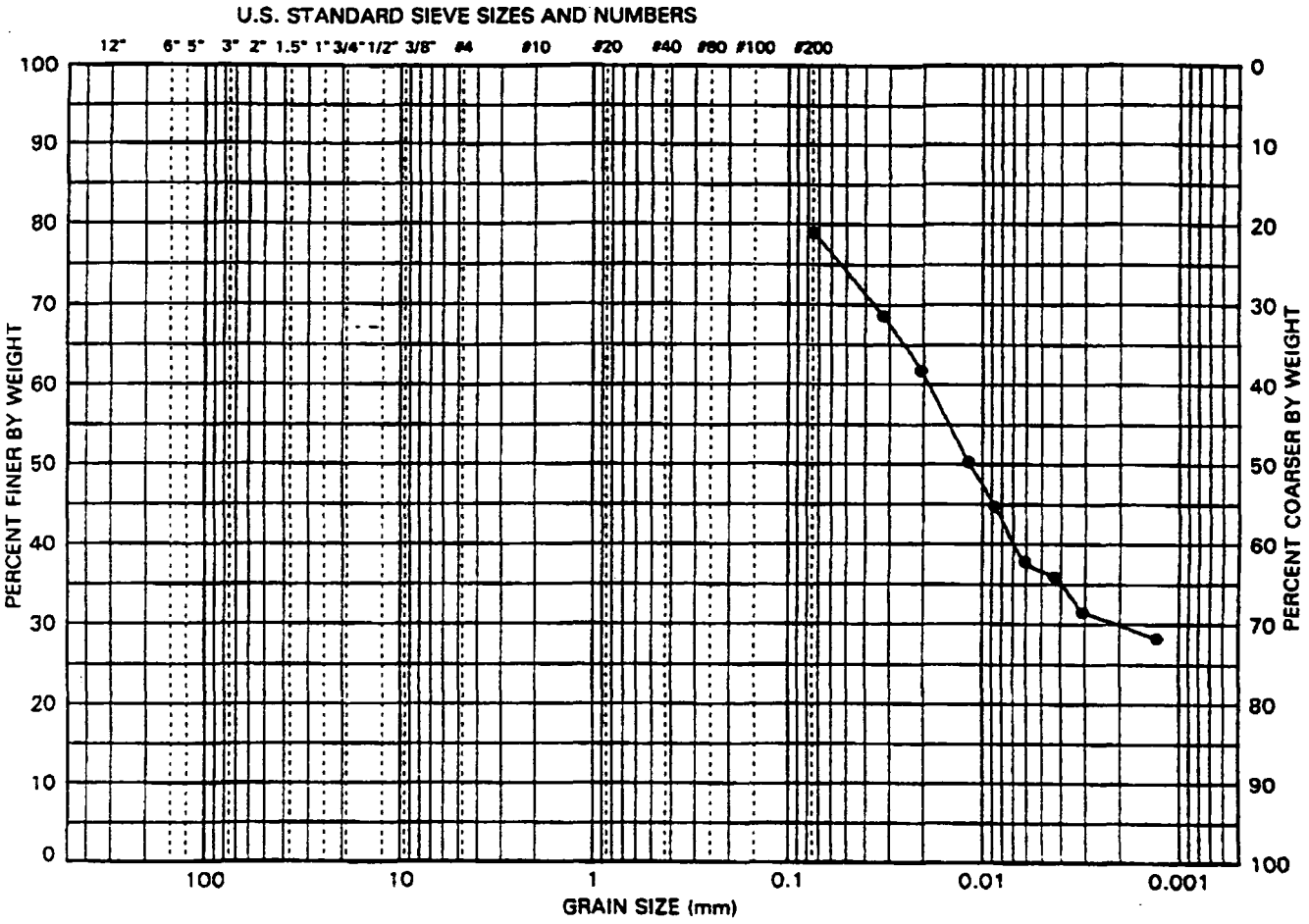
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-47	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97113	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	79.0
SOIL CLASSIFICATION:				SILT (%)	49.1
				CLAY(%)	29.9
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													79	74	61	37	30	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-47

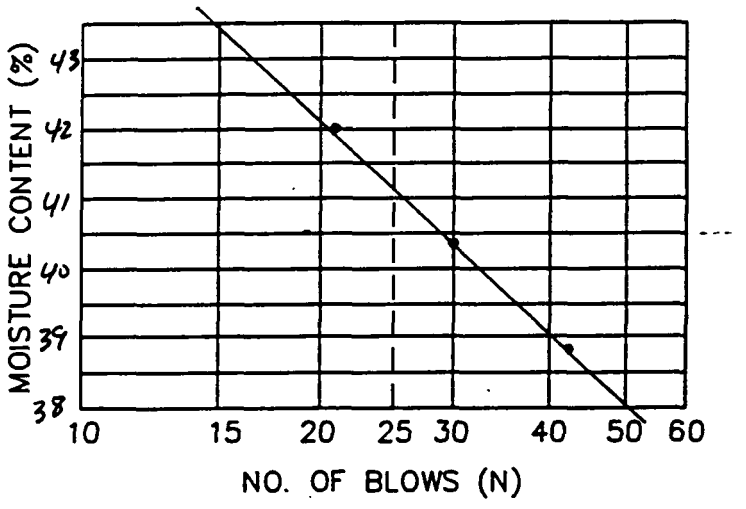
LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		1.3	2.3	2.7	
A	WT. OF TARE	(grams)	28.64	31.20	28.67	
B	WT. OF WET SOIL & TARE	(grams)	45.81	48.13	48.80	
C	WT. OF DRY SOIL & TARE	(grams)	41.01	43.26	42.85	
D	WT. OF WATER = B-C	(grams)	4.80	4.87	5.95	
E	WT. OF DRY SOIL = C-A	(grams)	12.37	12.06	14.18	
F	MOISTURE CONTENT = (D/E)X100	(%)	38.8 ✓	40.4 ✓	42.0 ✓	
N	NUMBER OF BLOWS		42	30	21	

DRYING TARE NO.

I



CURING TARE NO.

1-G

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.4	2.9		
A	WT. OF TARE	(grams)	27.39	31.46		
B	WT. OF WET SOIL & TARE	(grams)	36.48	42.15		
C	WT. OF DRY SOIL & TARE	(grams)	35.03	40.47		
D	WT. OF WATER = B-C	(grams)	1.45	1.68		
E	WT. OF DRY SOIL = C-A	(grams)	7.64	9.01		
F	MOISTURE CONTENT = (D/E)X100	(%)	19.0 ✓	18.6 ✓		

LIQUID LIMIT (LL) = 41 PLASTIC LIMIT (PL) = 19 PLASTICITY INDEX (PI) = 22

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 — DATE: 30 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-47

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

QA ID: BE/NM

	WATER ADDED	(ml)	50	100	150	200	250
A	WT. OF SOIL & MOLD	(grams)	~~5896.8~~ ~~4209.4~~	~~5942.2~~ ~~4209.4~~	~~6032.9~~ ~~4209.4~~	~~6123.6~~ ~~4209.4~~	6091.1
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	4209.4
C	WT. OF SOIL = A - B	(grams)	1687.4	1732.8	1823.5	1914.2	1881.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	111.4	114.4	120.3	126.3	124.2
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	99.3 ✓	100.4 ✓	103.8 ✓	105.3 ✓	101.1 ✓

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: BE/NM

	TARE NO.		5	105	103	25	10
F	WT. OF TARE	(grams)	7.6	8.2	8.4	8.2	7.4
G	WT. OF WET SOIL & TARE	(grams)	359.5	338.5	307.1	254.5	198.4
H	WT. OF DRY SOIL & TARE	(grams)	321.2	298.0	266.1	213.5	163.0
I	WT. OF WATER = G - H	(grams)	38.3	40.5	41.0	41.0	35.4
J	WT. DRY SOIL = H - F	(grams)	313.6	289.8	257.7	205.3	155.6
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.2 ✓	14.0 ✓	15.9 ✓	20.0 ✓	22.8 ✓

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC — CHECKED BY: BN — SHEET NO. 1 OF 2

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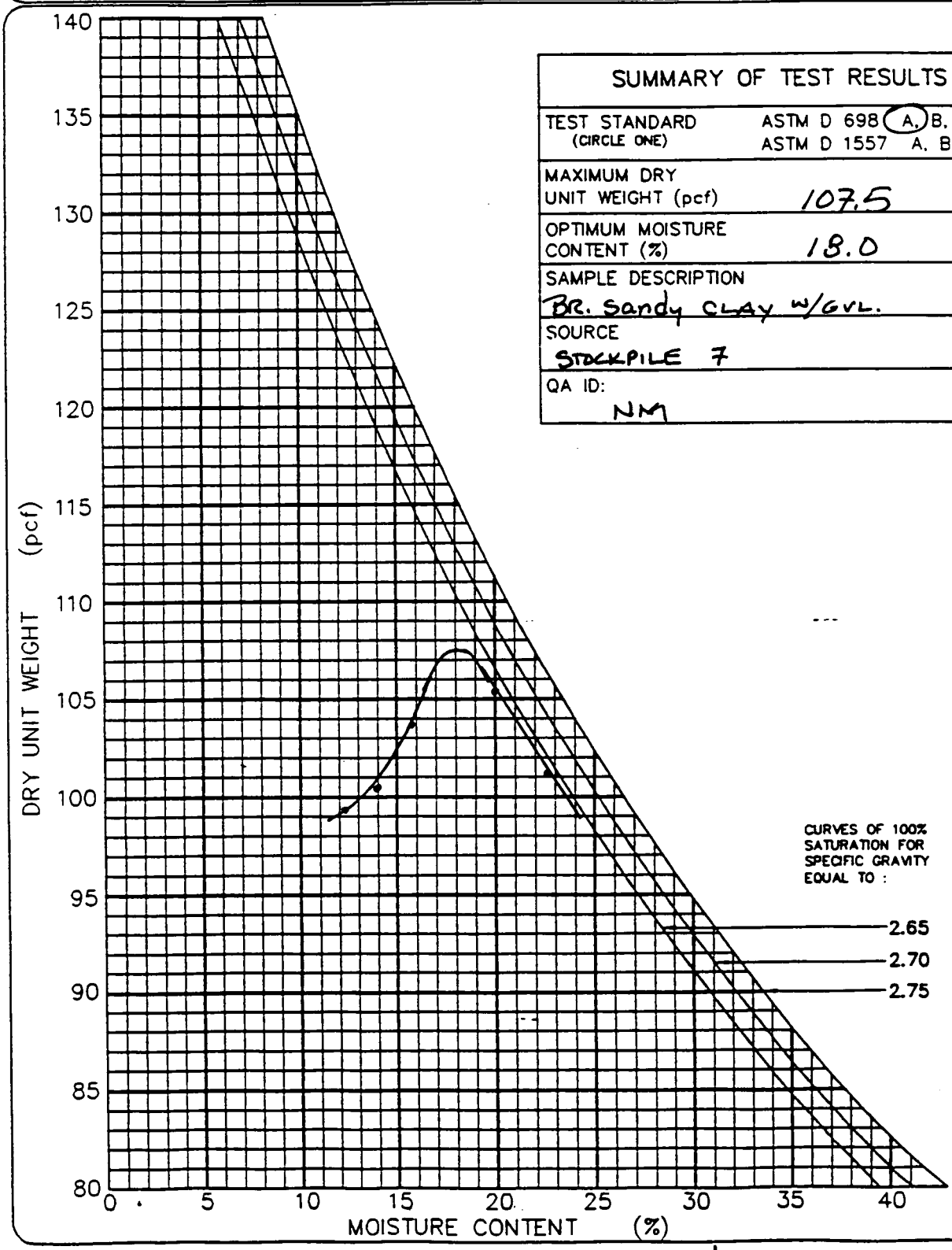
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 31 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-47



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A.) B. C ASTM D 1557 A. B. C
MAXIMUM DRY UNIT WEIGHT (pcf)	107.5
OPTIMUM MOISTURE CONTENT (%)	18.0
SAMPLE DESCRIPTION	BR. Sandy CLAY W/GVL.
SOURCE	STOCKPILE 7
QA ID:	NM

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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: 19 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD MC LP-48,49,50,51 & 52

LANE # 2 OF TEST AREA

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JW/NM

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.	34	28	9	33	101
A	WT. OF TARE	8.31	8.22	7.25	8.31	8.29
B	WT. OF WET SOIL & TARE				297.12	268.01
C	WT. OF DRY SOIL & TARE				258.58	234.40
D	WT. OF WATER = B-C				38.54	33.61
E	WT. OF DRY SOIL = C-A				250.27	226.11
F	MOISTURE CONTENT = (D/E) X 100				15.4 ✓	14.9 ✓
		NA	NA	NA	NDT #1	NDT #2
	Gauge				13.6	12.6

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JW

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.25
B	WT. OF WET SOIL & TARE	217.89	254.45	253.27	258.11	256.00
C	WT. OF DRY SOIL & TARE	206.74	239.10	237.52	241.31	238.89
D	WT. OF WATER = B-C	11.15	15.85	15.75	16.8	17.11
E	WT. OF DRY SOIL = C-A	74.64	107.1	105.52	109.01	112.64
F	MOISTURE CONTENT = (D/E) X 100	14.9 ✓	~~14.8~~ ~~15.7~~ 14.8 BN	14.9 ✓	15.4 ✓	15.2 ✓
	LANE # 2 TEST AREA	SE CORNER	CENTER	NE CORNER	NDT #2	NDT #2

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SHEET NO. 1 OF 2

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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: 8 day 19 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD MOISTURE LP-53,54,55,56+57

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JW/NM

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.	14	20			
A	WT. OF TARE	7.77	8.34			
B	WT. OF WET SOIL & TARE	270.72	243.99			
C	WT. OF DRY SOIL & TARE	235.06	211.95			
D	WT. OF WATER = B-C	35.66	32.04			
E	WT. OF DRY SOIL = C-A	227.29	203.61			
F	MOISTURE CONTENT = (D/E) X 100	15.7	15.7			
		NDT #3	NDT #4			

Gauge = 13.4 14.2

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JN

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.25
B	WT. OF WET SOIL & TARE	231.32	240.73	312.78	330.57	299.01
C	WT. OF DRY SOIL & TARE	218.12	226.09	286.82	299.18	274.45
D	WT. OF WATER = B-C	13.2	14.64	25.96	31.39	24.56
E	WT. OF DRY SOIL = C-A	86.02	94.09	154.82	166.88	148.2
F	MOISTURE CONTENT = (D/E) X 100	15.3	15.6	16.8	18.8	16.6
		NDT #3	NDT #4	SOUTH 1/2	SOUTHERN 1/2	SOUTHERN 1/2

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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: 21 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD [illegible]
LP-58,59,60,61 & 62

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: _____

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. _____	8	3	104	103	22
A	WT. OF TARE	7.30	7.58	8.23	8.38	8.36
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: KW

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.25
B	WT. OF WET SOIL & TARE	312.9	315.4	332.8	309.0	357.15
C	WT. OF DRY SOIL & TARE	287.7	290.5	301.6	286.8	323.86
D	WT. OF WATER = B-C	25.2	24.9	31.2	22.2	33.29
E	WT. OF DRY SOIL = C-A	155.6	158.5	169.6	154.5	197.61
F	MOISTURE CONTENT = (D/E) X 100	16.2	15.7	18.4	14.4	16.8
		SE CORNER	CENTER - S	CENTER - N	NW CORNER	SCREENED MATERIAL

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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: 21 day 8 month 92 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-63,64,65+66

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: JW/KW

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. _____	1	6	22	103	
A	WT. OF TARE	7.29	7.63	8.3	8.4	
B	WT. OF WET SOIL & TARE	407.8	309.94	311.3	309.2	
C	WT. OF DRY SOIL & TARE	357.77	269.86	273.00	270.97	
D	WT. OF WATER = B-C	50.03	40.08	38.3	38.23	
E	WT. OF DRY SOIL = C-A	350.48	262.23	264.7	262.57	
F	MOISTURE CONTENT = (D/E) X 100	14.3 ✓	15.3 ✓	14.5 ✓	14.6 ✓	
		NDT #1	NDT #2	NDT #3	NDT #4	

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: JW/KW

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	II	IV	III	
A	WT. OF TARE	132.1	132.0	132.3	132.0	
B	WT. OF WET SOIL & TARE	316.82	351.31	328.2	310.2	
C	WT. OF DRY SOIL & TARE	292.58	321.89	302.5	287.28	
D	WT. OF WATER = B-C	24.24	29.42	25.7	22.92	
E	WT. OF DRY SOIL = C-A	160.48	189.89	170.2	155.28	
F	MOISTURE CONTENT = (D/E) X 100	15.1 ✓	15.5 ✓	15.1 ✓	14.8 ✓	
		NDT #1	NDT #2	NDT #3	NDT #4	

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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: 22 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD M.C. LP-67, 68, 69, 70 & 71

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: JW/NM

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.	~~13~~ 24	10	~~24~~ 13	29	12
A	WT. OF TARE	~~7.70~~ 8.39	7.39	~~8.39~~ 7.70	8.23	7.28
B	WT. OF WET SOIL & TARE	237.23	297.58	336.15	333.84	276.93
C	WT. OF DRY SOIL & TARE	205.0	258.2	284.2	280.8	240.1
D	WT. OF WATER = B-C	32.2	39.4	52.0	53.0	36.8
E	WT. OF DRY SOIL = C-A	196.6	250.8	276.5	272.6	232.8
F	MOISTURE CONTENT = (D/E) X 100	16.4	15.7	18.8	19.4	15.8

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: JW

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.	~~III~~	II	~~III~~ I	IV	V
A	WT. OF TARE	132.0	132.0	132.01	132.3	126.25
B	WT. OF WET SOIL & TARE	297.68	331.24	361.14	327.72	348.80
C	WT. OF DRY SOIL & TARE	275.81	303.55	323.48	295.39	317.31
D	WT. OF WATER = B-C	21.87	27.69	37.66	32.33	31.49
E	WT. OF DRY SOIL = C-A	143.81	171.55	191.38	163.09	191.06
F	MOISTURE CONTENT = (D/E) X 100	15.2	16.1	19.7	19.8	16.5
		428 -10'	428 -40'	432 20'	432 30'	432 40'

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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: 22 day 8 month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD M.C. LP-72

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JN/NM

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. _____	102				
A	WT. OF TARE	8.25				
B	WT. OF WET SOIL & TARE	313.93				
C	WT. OF DRY SOIL & TARE	275.0				
D	WT. OF WATER = B-C	38.9				
E	WT. OF DRY SOIL = C-A	266.7				
F	MOISTURE CONTENT = (D/E) X 100	14.6				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JW

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	132.1				
B	WT. OF WET SOIL & TARE	336.19				
C	WT. OF DRY SOIL & TARE	309.55				
D	WT. OF WATER = B-C	26.64				
E	WT. OF DRY SOIL = C-A	177.45				
F	MOISTURE CONTENT = (D/E) X 100	15.0				
		507 25				

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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: 22 day 8 month 97 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: FIELD M.C. CELL-01 LP-73, 74 + 75 + 76

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW/NM

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. _____	11	23	31		
A	WT. OF TARE	7.35	8.47	8.27		
B	WT. OF WET SOIL & TARE	393.52	342.40	333.82		
C	WT. OF DRY SOIL & TARE	347.1	301.9	293.2		
D	WT. OF WATER = B-C	46.4	40.5	40.6		
E	WT. OF DRY SOIL = C-A	339.7	293.4	284.9		
F	MOISTURE CONTENT = (D/E) X 100	13.7 ✓	13.8 ✓	14.3 ✓		

Gauge Moist = 11.7 12.1 12.1

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: KW

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	II	III	IV	
A	WT. OF TARE	132.1	132.0	132.6	132.3	
B	WT. OF WET SOIL & TARE	319.28	336.21	345.86	343.74	
C	WT. OF DRY SOIL & TARE	296.04	310.77	319.89	313.35	
D	WT. OF WATER = B-C	23.24	25.44	25.97	30.39	
E	WT. OF DRY SOIL = C-A	163.94	178.77	187.89	191.05	
F	MOISTURE CONTENT = (D/E) X 100	14.2 ✓	14.2 ✓	13.8 ✓	16.8 ✓	
		NDT #1	NDT #2	NDT #3	SCREENED MTL	

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: 23 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD MOISTURES 0915 LP-77,78,79,80+81

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	245.7	267.1	234.7	240.5	252.00
C	WT. OF DRY SOIL & TARE	227.8	245.9	218.7	222.6	231.9
D	WT. OF WATER = B-C	17.9	21.2	16.0	17.9	20.1
E	WT. OF DRY SOIL = C-A	95.7	113.9	86.7	90.3	105.6
F	MOISTURE CONTENT = (D/E) X 100	18.7	18.6	18.5	19.8	19.0
		Lane 8 75' W of E Berm	Lane 8 175' W of E Berm	Lane 8 275' W of E Berm	Lane 8 395' W of E Berm	Lane 7 75' W of E Berm

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: 23 day AUG month 1997 year

MATERIAL TYPE: CLAY Liner SAMPLE NO.: FIELD MOISTURES 0915 LP-82,83,84,85+86

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: _____

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. _____					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	258.4	263.4	255.1	250.1	249.3
C	WT. OF DRY SOIL & TARE	238.6	242.0	238.4	233.6	230.5
D	WT. OF WATER = B-C	19.8	21.4	16.7	16.5	18.8
E	WT. OF DRY SOIL = C-A	106.5	110.0	106.4	101.3	104.2
F	MOISTURE CONTENT = (D/E) X 100	18.6	19.5	15.7	16.3	18.0
		Lane 7 175' W of E Berm	Lane 7 275' W of E Berm	Lane 7 375' W of E Berm	Lane 7 475' W of E Berm	Lane 7 575' W of E Berm

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: 23 day AUG month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD MOISTURES 1030 LP-B7,88,89,90&91

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: _____

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. _____					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	271.2	262.6	250.9	255.6	258.6
C	WT. OF DRY SOIL & TARE	248.1	242.7	233.0	238.0	240.9
D	WT. OF WATER = B-C	23.1	19.9	17.9	17.6	17.7
E	WT. OF DRY SOIL = C-A	116.0	110.7	101.0	105.7	114.6
F	MOISTURE CONTENT = (D/E) X 100	19.9	18.0	17.7	16.7	15.4
		Lane 6/7 75' W of E Berm	Lane 6/7 175' W of E Berm	Lane 6/7 275' W of E Berm	Lane 6/7 375' W of E Berm	Lane 6/7 500' W of E Berm

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I Construction DATE: 23 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD moisture 1130 LP-92,93,94,95+96

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: _____

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. _____					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	261.2	258.4	269.3	252.2	239.9
C	WT. OF DRY SOIL & TARE	239.5	241.3	251.3	234.0	223.6
D	WT. OF WATER = B-C	21.7	17.1	18.0	18.2	16.3
E	WT. OF DRY SOIL = C-A	107.4	109.3	119.3	101.7	97.3
F	MOISTURE CONTENT = (D/E) X 100	20.2	15.6	15.1	17.9	16.8
		Lan 6 75'N of EBan	Lan 6 175'N of EBan	Lan 6 275'N of EBan	Lan 6 375'N of EBan	Lan 6 475'N of EBan

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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: 23 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD MC (TROXLER) 1645 HRS LP-97,98,99 + 100

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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. _____	33	11	20	101	
A	WT. OF TARE	8.3	7.4	8.4	8.3	
B	WT. OF WET SOIL & TARE	276.8	178.3	166.8	234.0	
C	WT. OF DRY SOIL & TARE	237.4	152.1	146.2	200.9	
D	WT. OF WATER = B-C	39.4	26.2	20.6	33.1	
E	WT. OF DRY SOIL = C-A	229.1	144.7	137.8	192.6	
F	MOISTURE CONTENT = (D/E) X 100	17.2 ✓	18.1 ✓	14.9 ✓	17.2 ✓	
		NDT-1	NDT-2	NDT-3	NDT-4	
	TROXLER	15.4	15.0	12.7	15.7	

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	
A	WT. OF TARE	132.1	132.0	132.0	132.3	
B	WT. OF WET SOIL & TARE	219.8	274.3	241.9	269.9	
C	WT. OF DRY SOIL & TARE	207.3	252.5	227.4	249.2	
D	WT. OF WATER = B-C	12.5	21.8	14.5	20.7	
E	WT. OF DRY SOIL = C-A	75.2	120.5	95.4	116.9	
F	MOISTURE CONTENT = (D/E) X 100	16.6 ✓	18.1 ✓	15.2 ✓	17.7 ✓	
		NDT-1	NDT-2	NDT-3	NDT-4	

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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: 23 day Aug month '97 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: FIELD MC 1830 LP-101,102,103,104 + 105

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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.	14	12	23	31	24
A	WT. OF TARE	7.8	7.3	8.4	8.3	8.4
B	WT. OF WET SOIL & TARE	185.2	195.1	214.9	180.2	222.5
C	WT. OF DRY SOIL & TARE	160.5	172.0	187.7	156.0	192.9
D	WT. OF WATER = B-C	24.7	23.1	27.2	24.2	29.6
E	WT. OF DRY SOIL = C-A	152.7	164.7	179.3	147.7	184.5
F	MOISTURE CONTENT = (D/E) X 100	16.2	14.0	BN 15.2	16.4	16.0
		FDT-5	FDT-6	FDT-7	FDT-8	FDT-9
	TROXLER GAUGE	15.4	12.0	12.9	12.4	13.7

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	260.1	276.4	236.1	250.3	246.3
C	WT. OF DRY SOIL & TARE	241.1	257.4	222.5	233.5	229.6
D	WT. OF WATER = B-C	19.0	19.0	13.6	16.8	16.7
E	WT. OF DRY SOIL = C-A	109.0	125.4	90.5	101.2	103.3
F	MOISTURE CONTENT = (D/E) X 100	17.4	15.2	15.0	16.6	16.2
		FDT-5	FDT-6	FDT-7	FDT-8	FDT-9

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: 25 day AUG month 1997 year

MATERIAL TYPE: [illegible] (*Subgrade) SAMPLE NO.: FIELD [illegible] 1023(3) — 1110(2) LP-106, 107, 108, 109 + 110

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: _____

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. _____					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: [illegible]

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	II	III	IV *	V *
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	297.5	274.1	259.1	273.3	266.8
C	WT. OF DRY SOIL & TARE	277.7	255.8	240.8	258.9	253.4
D	WT. OF WATER = B-C	19.8	18.3	18.3	14.4	13.4
E	WT. OF DRY SOIL = C-A	145.6	123.8	108.8	126.6	127.1
F	MOISTURE CONTENT = (D/E) X 100	13.6	14.8	16.8	11.4	10.5
		CP-511	CP-520	CP-532	SUBGR LN 5 SQ606	SUBGR LN5 SQ621
		LN2 LIFT 1	LN2 LIFT 1	LN2 LIFT 1		

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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: 25 day AUG month 97 year

MATERIAL TYPE: CLAY Liner — SAMPLE NO.: FIELD m.c 1110 LP-111, 112, 113, 114 + 115

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight — QA ID: _____

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. _____					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight — QA ID: Nm

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	256.3	260.5	262.1	256.2	263.5
C	WT. OF DRY SOIL & TARE	238.8	241.7	243.3	236.7	241.1
D	WT. OF WATER = B-C	17.5	18.8	18.8	19.5	22.4
E	WT. OF DRY SOIL = C-A	106.7	109.7	111.3	104.4	114.8
F	MOISTURE CONTENT = (D/E) X 100	16.4 ✓	17.1 ✓	16.9 ✓	18.7 ✓	19.5 ✓
		LN 1 L-2 CP-401	LN 1 L-2 CP 403	LN 1 L-2 CP 406	LN 2 L-2 CP 510	LN 2 L-2 CP 519

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: 25 day AUG month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD M.C.

1110(1) 1830(4) LP-116,117,118,119 & 120

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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. _____		29	33	11	14
A	WT. OF TARE		8.2	8.3	7.4	7.8
B	WT. OF WET SOIL & TARE		187.1	221.9	191.6	217.5
C	WT. OF DRY SOIL & TARE		164.4	194.1	166.4	189.6
D	WT. OF WATER = B-C		22.7	27.8	25.2	27.9
E	WT. OF DRY SOIL = C-A		156.2	185.8	159.0	181.8
F	MOISTURE CONTENT = (D/E) X 100		14.5	15.0	15.8	15.3
			LN 2 - LIFT 1 NDT-1	LN-1 LIFT 1 NDT-2	LN 2 - LIFT 2 NDT-3	LN-1 LIFT 1 NDT-4
	GAUGE =		11.5	12.3	13.3	13.6

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	270.2	248.4	266.3	256.7	272.5
C	WT. OF DRY SOIL & TARE	251.1	233.3	248.8	239.0	252.7
D	WT. OF WATER = B-C	19.1	15.1	17.5	17.7	19.8
E	WT. OF DRY SOIL = C-A	119.0	101.3	116.8	106.7	126.4
F	MOISTURE CONTENT = (D/E) X 100	16.1	14.9	15.0	16.6	15.7
		LN 2 L-2 CP 526	LN-2 LIFT 1 NDT-1	LN-1 LIFT 1 NDT-2	LN-2 LIFT 2 NDT-3	LN-1 LIFT 1 NDT-4

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: 25 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD M.C. 1830(5) LP-121,122,123,124 & 125

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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. _____	20	101	12	23	31
A	WT. OF TARE	8.3	8.3	7.3	8.4	8.2
B	WT. OF WET SOIL & TARE	200.5	185.9	200.3	203.8	176.5
C	WT. OF DRY SOIL & TARE	175.2	161.3	175.3	178.4	149.9
D	WT. OF WATER = B-C	25.3	24.6	25.0	25.4	26.6
E	WT. OF DRY SOIL = C-A	166.9	153.0	168.0	170.0	141.7
F	MOISTURE CONTENT = (D/E) X 100	15.2 LN-2 LIFT 2 NDT-5	16.1 LN-1 LIFT 1 NDT-6	14.9 LN-3 LIFT 1 NDT-7	14.9 LN-3 LIFT 1 NDT-8	18.8 LN-8 LIFT 1 NDT-9
	GAUGE	13.3	13.5	12.3	11.8	16.2

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	263.8	275.4	258.7	269.4	236.0
C	WT. OF DRY SOIL & TARE	246.0	256.1	242.7	251.9	218.5
D	WT. OF WATER = B-C	17.8	19.3	16.0	17.5	17.5
E	WT. OF DRY SOIL = C-A	113.9	124.1	110.7	119.6	92.2
F	MOISTURE CONTENT = (D/E) X 100	15.6 LN-2 LIFT 2 NDT-5	15.6 LN-1 LIFT 1 NDT-6	14.5 LN-3 LIFT 1 NDT-7	14.6 LN-3 LIFT 1 NDT-8	19.0 LN-8 LIFT 1 NDT-9

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: 26 day AUG month [illegible] year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD MC 1045 LP-126, 127, 128, 129 + 130

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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.	11	29	33	14	20
A	WT. OF TARE	7.3	8.3	8.3	7.7	8.3
B	WT. OF WET SOIL & TARE	189.5	242.2	216.5	216.9	194.6
C	WT. OF DRY SOIL & TARE	165.7	216.3	190.3	188.1	168.1
D	WT. OF WATER = B-C	23.8	25.9	26.2	28.8	26.5
E	WT. OF DRY SOIL = C-A	158.4	208.0	182.0	180.4	159.8
F	MOISTURE CONTENT = (D/E) X 100	15.0	12.5	14.4	16.0	16.6
		NDT-50	NDT-51	NDT-52	NDT-53	NDT-54
	GAUGE =	14.5	11.2	12.3	13.6	13.2

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	269.4	253.3	267.8	269.6	284.0
C	WT. OF DRY SOIL & TARE	251.2	239.7	249.5	250.0	261.9
D	WT. OF WATER = B-C	18.2	13.6	18.3	19.6	22.1
E	WT. OF DRY SOIL = C-A	119.1	107.7	117.5	117.7	135.6
F	MOISTURE CONTENT = (D/E) X 100	BN 4/4/97 ~~15.2~~ 15.3	12.6	15.6	16.7	16.3
		NDT-50	NDT-51	NDT-52	NDT-53	NDT-54

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: 26 day AUG month 1997 year

MATERIAL TYPE: CLAY Liner SAMPLE NO.: FIELD M.C. 1215(2) 1600(3) LP-131, 132, 133, 134 + 135

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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.	101	12	23	31	24
A	WT. OF TARE	8.3	7.3	8.4	8.3	8.4
B	WT. OF WET SOIL & TARE	232.5	204.6	191.2	235.4	210.8
C	WT. OF DRY SOIL & TARE	202.8	179.2	167.0	204.5	182.9
D	WT. OF WATER = B-C	29.7	25.4	24.2	30.9	27.9
E	WT. OF DRY SOIL = C-A	194.5	171.9	158.6	196.2	174.5
F	MOISTURE CONTENT = (D/E) X 100	15.3	14.8	15.3	15.7	16.0
		NDT-55	NDT-56	NDT-57	NDT-58	NDT-59

GAUGE = 11.5 13.4 ---

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	273.6	273.2	276.6	250.0	257.9
C	WT. OF DRY SOIL & TARE	254.3	254.3	256.9	233.8	239.2
D	WT. OF WATER = B-C	19.3	18.9	19.7	16.2	18.7
E	WT. OF DRY SOIL = C-A	122.2	122.3	124.9	101.5	112.9
F	MOISTURE CONTENT = (D/E) X 100	15.8	15.5	15.8	16.0	16.6
		NDT-55	NDT-56	NDT-57	NDT-58	NDT-59

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: 26 day AUG month 1997 year

MATERIAL TYPE: CLAY Liner SAMPLE NO.: FIELD m.c.
1600 LP-136, 137, 138, 139 & 140

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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. _____	30	102	25	7	27
A	WT. OF TARE	8.3	8.2	8.2	7.3	8.2
B	WT. OF WET SOIL & TARE	188.5	202.8	178.9	187.7	192.8
C	WT. OF DRY SOIL & TARE	162.3	175.1	154.3	161.9	166.7
D	WT. OF WATER = B-C	26.2	27.7	24.6	25.8	26.1
E	WT. OF DRY SOIL = C-A	154.0	166.9	146.1	154.6	158.5
F	MOISTURE CONTENT = (D/E) X 100	17.0 ✓	16.6 ✓	16.8 ✓	16.7 ✓	16.5 ✓
		NDT-60	NDT-61	NDT-62	NDT-63	NDT-64

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	261.3	238.9	278.0	254.7	257.2
C	WT. OF DRY SOIL & TARE	242.6	223.4	257.7	237.2	238.6
D	WT. OF WATER = B-C	18.7	15.5	20.3	17.5	18.6
E	WT. OF DRY SOIL = C-A	110.5	91.4	125.7	104.9	112.3
F	MOISTURE CONTENT = (D/E) X 100	16.9 ✓	17.0 ✓	16.1 ✓	16.7 ✓	16.6 ✓
		NDT-60	NDT-61	NDT-62	NDT-63	NDT-64

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: 26 day AUG month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD m.c. LP-141 1750

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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. _____	3				
A	WT. OF TARE	7.6				
B	WT. OF WET SOIL & TARE	179.6				
C	WT. OF DRY SOIL & TARE	156.3				
D	WT. OF WATER = B-C	23.3				
E	WT. OF DRY SOIL = C-A	148.7				
F	MOISTURE CONTENT = (D/E) X 100	15.7 ✓				
		NDT-65				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: NM

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	132.1				
B	WT. OF WET SOIL & TARE	262.9				
C	WT. OF DRY SOIL & TARE	245.1				
D	WT. OF WATER = B-C	17.8				
E	WT. OF DRY SOIL = C-A	113.0				
F	MOISTURE CONTENT = (D/E) X 100	15.8 ✓				
		NDT-65				

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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: 27 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD M.C. LP-142,143,144,145 & 146

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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.	8	30	24	102	25
A	WT. OF TARE	7.3	8.3	8.4	8.2	8.2
B	WT. OF WET SOIL & TARE	208.6	211.2	218.2	216.9	192.7
C	WT. OF DRY SOIL & TARE	180.8	182.8	189.4	187.1	164.8
D	WT. OF WATER = B-C	27.8	28.4	28.8	29.8	27.9
E	WT. OF DRY SOIL = C-A	173.5	174.5	181.0	178.9	156.6
F	MOISTURE CONTENT = (D/E) X 100	16.0	16.3	15.9	16.7	17.8
		NDT-67	NDT-68	NDT-70	NDT-72	NDT-75
	GAUGE	15.2	15.0	13.3	14.3	14.5

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Clay Stockpiles DATE: 22 day 08 month 97 year

MATERIAL TYPE: compacted clay liner SAMPLE NO.: LP-147 + 148

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: BE

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. _____	103	22			
A	WT. OF TARE	8.3	8.3			
B	WT. OF WET SOIL & TARE	436.4	443.6			
C	WT. OF DRY SOIL & TARE	373.6	383.5			
D	WT. OF WATER = B-C	62.8	60.1			
E	WT. OF DRY SOIL = C-A	365.3	375.2			
F	MOISTURE CONTENT = (D/E) X 100	17.2 ✓ STOCKPILE #3	16.0 ✓ STOCKPILE #5			

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: BE

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	II			
A	WT. OF TARE	132.1	132.0			
B	WT. OF WET SOIL & TARE	376.6	318.6			
C	WT. OF DRY SOIL & TARE	292.6	297.3			
D	WT. OF WATER = B-C	24.0	21.3			
E	WT. OF DRY SOIL = C-A	160.5 ~~144.5~~	165.3 ~~186.6~~			
F	MOISTURE CONTENT = (D/E) X 100	15.0 ✓ ~~13.0~~ STOCKPILE #3	12.9 ~~11.4~~ STOCKPILE #5			

HEW 9/22/97

BN 9/4/97

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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: 28 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: FIELD M.C. LP-149, 150, 151 & 152

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: UM

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. _____	30	8	25	24	
A	WT. OF TARE	8.3	7.3	8.2	8.4	
B	WT. OF WET SOIL & TARE	208.8	218.5	211.4	232.2	
C	WT. OF DRY SOIL & TARE	181.3	190.7	180.1	202.0	
D	WT. OF WATER = B-C	27.5	27.8	31.3	30.2	
E	WT. OF DRY SOIL = C-A	173.0	183.4	171.9	193.6	
F	MOISTURE CONTENT = (D/E) X 100	15.9	15.2	18.2	15.6	
		NDT-80	NDT-82	NDT-87	NDT-89	
	GAUGE =	15.3	14.0	17.2	13.4	

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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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: 29 day AUG month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-153 + 154 FIELD M.C.

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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.	22	24			
A	WT. OF TARE	8.3	8.4			
B	WT. OF WET SOIL & TARE	243.5	221.1			
C	WT. OF DRY SOIL & TARE	211.2	191.9			
D	WT. OF WATER = B-C	32.3	29.2			
E	WT. OF DRY SOIL = C-A	202.9	183.5			
F	MOISTURE CONTENT = (D/E) X 100	15.9	15.9			
		NDT-91	NDT-102			
	GAUGE =	14.5	14.0	---		

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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FLUOR DANIEL FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-155, 156, 157 FIELD M.C.

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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

		LP-155	LP-156	LP-157		
	TARE NO. _____	25	30	8		
A	WT. OF TARE	8.3	8.3	7.3		
B	WT. OF WET SOIL & TARE	287.0	319.5	288.2		
C	WT. OF DRY SOIL & TARE	252.7	280.0	250.6		
D	WT. OF WATER = B-C	34.3	39.5	37.6		
E	WT. OF DRY SOIL = C-A	244.4	271.7	243.3		
F	MOISTURE CONTENT = (D/E) X 100	14.0 ✓	14.5 ✓	15.5 ✓		
		NDT-113	NDT-116	NDT-125		

GAUGE = 15.3 15.2 14.3

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-158

SOIL SAMPLE SIZE TOTAL SAMPLE = 31,715.7 gms
> NO.4 TOTAL = 1,787.3

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	31	31
WT. OF DRY SAMPLE PLUS TARE (grams)	241.9	67.1
WT. OF TARE (grams)	8.3	8.3
WT. OF DRY SAMPLE (grams)	233.6	58.8

SIEVE ANALYSIS QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100.0		100.0
1½"	37.5	84.6	0.3	99.7		
1"	25.0	349.5	1.1	98.9		
¾"	19.0	491.4	1.5	98.5		90-100
½"	12.5	851.6	2.7	97.3		
⅜"	9.5	1161.7	3.7	96.3		
4	4.75	1768.1	5.6	94.4		
10	2.00	9.5	4.1	95.9	90.5	
20	0.850	18.9	8.1	91.9	86.8	
40	0.425	28.2	12.1	87.9	83.0	
60	0.250	36.1	15.5	84.5	79.8	
100	0.150	46.1	19.7	80.3	75.8	
200	0.075	58.3	25.0	75.0	70.8	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

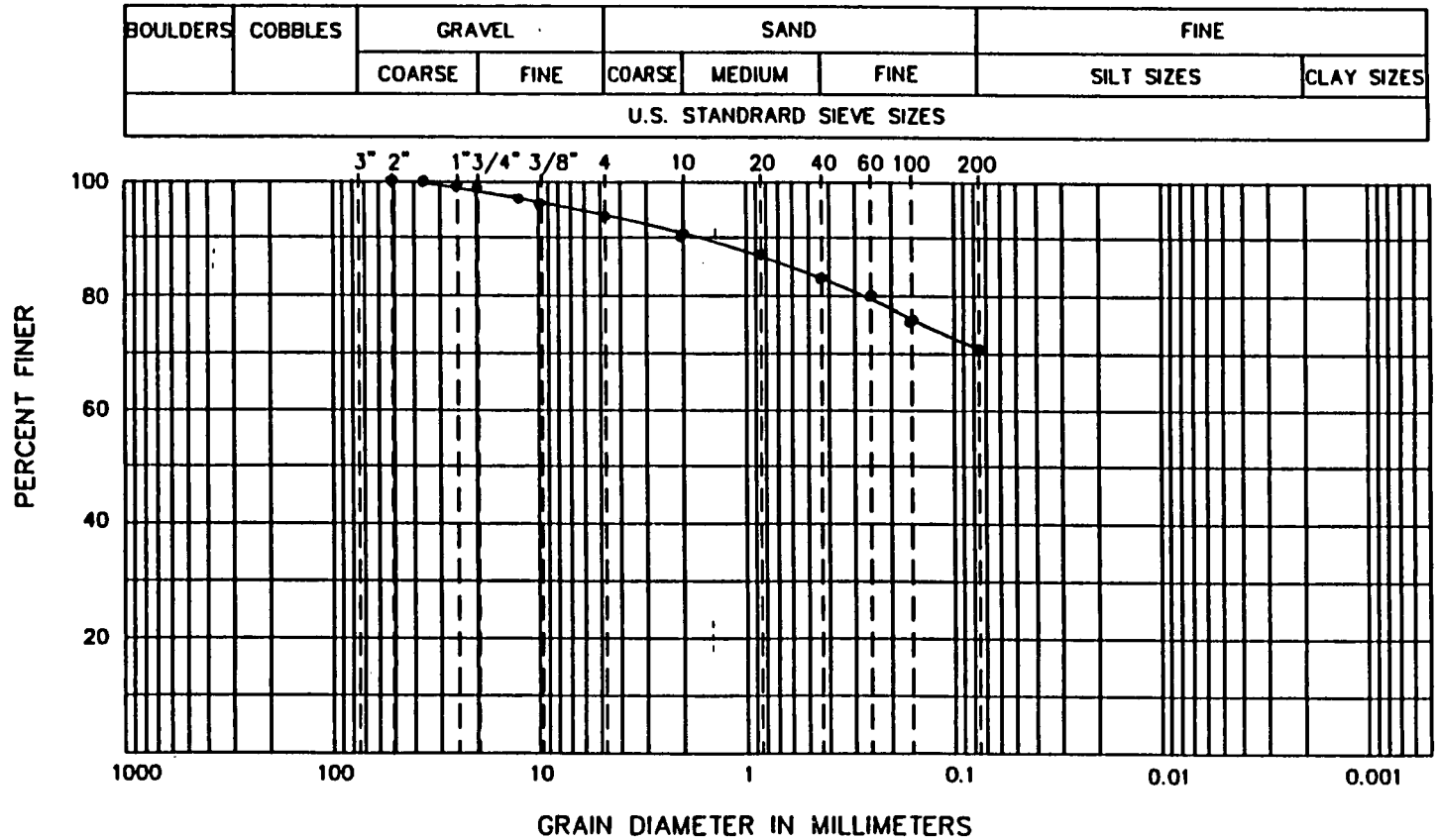
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 06 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-158 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 33

(PL) 17

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.7
1-in.	98.9
3/4-in.	98.5
1/2-in.	97.3
3/8-in.	96.3
NO. 4	94.4
NO. 10	90.5
NO. 20	86.8
NO. 40	83.0
NO. 60	79.8
NO. 100	75.8
NO. 200	70.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	69
0.020	55
0.005	31
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): BROWN sandy lean clay w/TR of GVL (CL)

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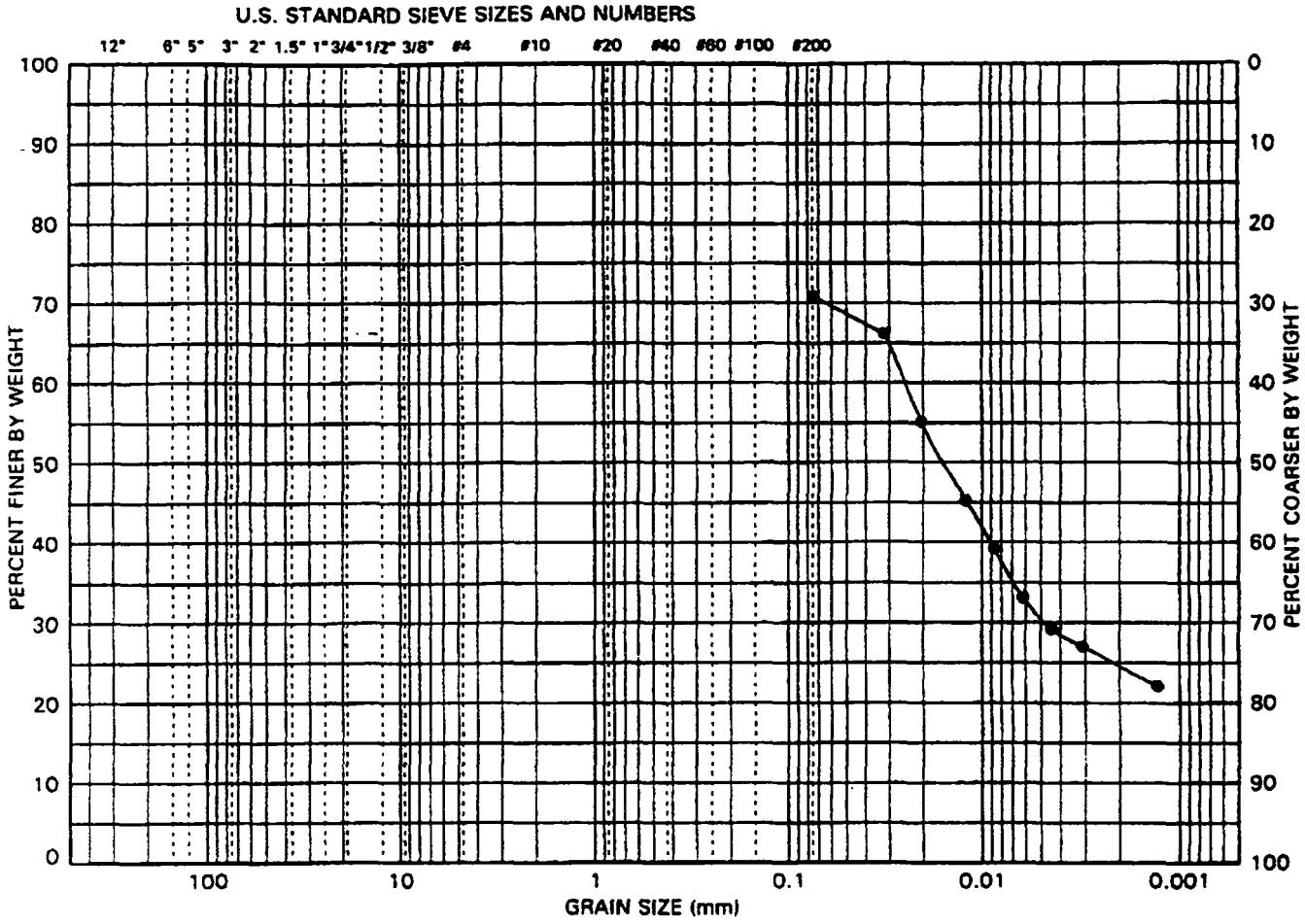
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/11/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-158	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97149	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	70.8
SOIL CLASSIFICATION:				SILT (%)	46.3
				CLAY(%)	24.5
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													71	69	55	31	25	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-158

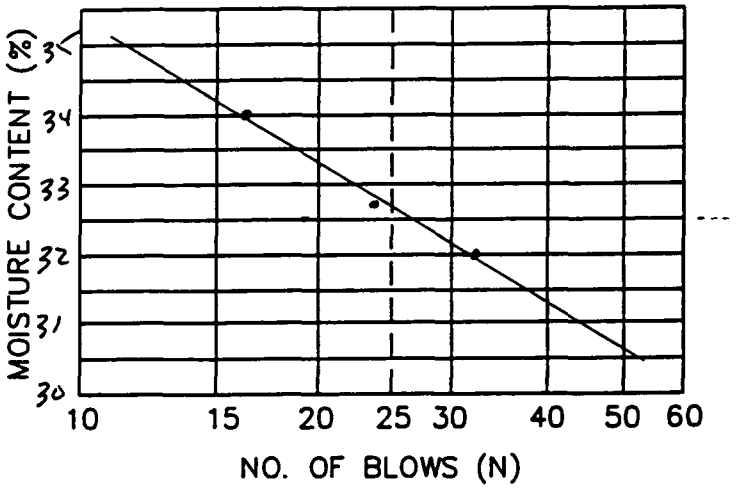
LIQUID LIMIT DETERMINATION

QA ID: BN

	TARE NO.		1.1	1.4	2.5	
A	WT. OF TARE	(grams)	28.76	28.52	28.42	
B	WT. OF WET SOIL & TARE	(grams)	44.79	45.70	52.57	
C	WT. OF DRY SOIL & TARE	(grams)	40.90	41.47	46.44	
D	WT. OF WATER = B-C	(grams)	3.89	4.23	6.13	
E	WT. OF DRY SOIL = C-A	(grams)	12.14	12.95	18.02	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.0	32.7	34.0	
N	NUMBER OF BLOWS		32	24	17	

DRYING TARE NO.

I



CURING TARE NO.

Z

PLASTIC LIMIT DETERMINATION

QA ID: BN

	TARE NO.		31	2.6		
A	WT. OF TARE	(grams)	28.38	28.56		
B	WT. OF WET SOIL & TARE	(grams)	36.23	35.87		
C	WT. OF DRY SOIL & TARE	(grams)	35.13	34.81		
D	WT. OF WATER = B-C	(grams)	1.10	1.06		
E	WT. OF DRY SOIL = C-A	(grams)	6.75	6.25		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.3	17.0		

LIQUID LIMIT (LL) = 33 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 16

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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 DATE: 04 day SEPT month 97 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-158

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

QA ID: BN

	WATER ADDED	(ml)	~~6078~~ 100ml	150ml	200ml	50ml	
A	WT. OF SOIL & MOLD	(grams)	6078.2 ~~4209.4~~	6214.3 ~~4209.4~~	6214.3 ~~4209.4~~	6032.9 ~~4209.4~~	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1868.8	2004.9	2004.9	1823.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.3	132.3	132.3	120.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.6	114.8	113.0	109.2	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: BN

	TARE NO.		7	25	30	8	
F	WT. OF TARE	(grams)	7.3	8.2	8.3	7.3	
G	WT. OF WET SOIL & TARE	(grams)	244.0	275.6	~~311.8~~ 314.9	267.7	
H	WT. OF DRY SOIL & TARE	(grams)	217.7	240.4	270.2	243.6	
I	WT. OF WATER = G - H	(grams)	26.3	35.2	44.7	24.1	
J	WT. DRY SOIL = H - F	(grams)	210.4	232.2	261.9	236.3	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.5	15.2	17.1	10.2	

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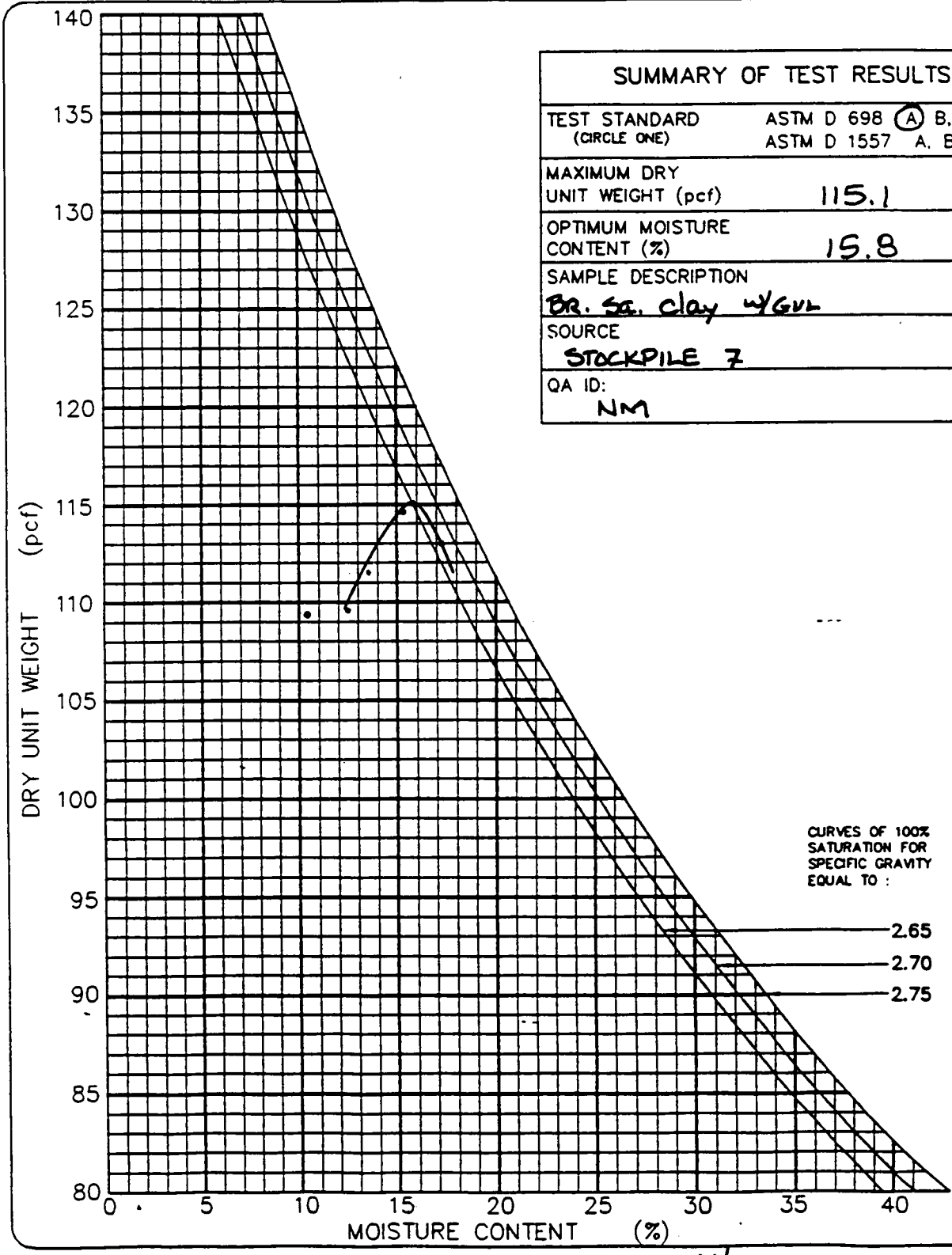
MOISTURE-DENSITY RELATIONSHIP

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-158



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	115.1
OPTIMUM MOISTURE CONTENT (%)	15.8
SAMPLE DESCRIPTION	BR. SA. CLAY W/GVL
SOURCE	STOCKPILE 7
QA ID:	NM

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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: 03 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-159,110,161 FIELD MC

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: NM

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

		LP-159	LP-160	LP-161	LP-	
	TARE NO.	25	7	30		
A	WT. OF TARE	8.3	7.3	8.3		
B	WT. OF WET SOIL & TARE	240.1	225.9	254.7		
C	WT. OF DRY SOIL & TARE	208.5	196.1	222.0		
D	WT. OF WATER = B-C	31.6	29.8	32.7		
E	WT. OF DRY SOIL = C-A	200.2	188.8	213.7		
F	MOISTURE CONTENT = (D/E) X 100	15.8	15.8	15.3		
		NDT-135	NDT-138	NDT-148		

GAUGE = 13.8 13.0 13.5

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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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: 04 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-162, 163

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

		LP-162	LP-163			
	TARE NO.	26	15			
A	WT. OF TARE	8.33	7.71			
B	WT. OF WET SOIL & TARE	310.69	315.09			
C	WT. OF DRY SOIL & TARE	270.9	275.2			
D	WT. OF WATER = B-C	39.8	39.9			
E	WT. OF DRY SOIL = C-A	262.6	267.5			
F	MOISTURE CONTENT = (D/E) X 100	15.2	14.9			
		NDT-160	NDT 171			
	Gauge	13.7	14.2	---		

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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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: 05 day SEPT month 1997 year

MATERIAL TYPE: clay liner SAMPLE NO.: LP-164, 165, 166

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

		LP-164	LP-165	LP-166		
	TARE NO. _____	7	8	25		
A	WT. OF TARE	7.25	7.30	8.3		
B	WT. OF WET SOIL & TARE	243.66	234.85	242.4		
C	WT. OF DRY SOIL & TARE	210.1	204.2	209.2		
D	WT. OF WATER = B-C	33.6	30.7	33.2		
E	WT. OF DRY SOIL = C-A	202.8	196.9	200.9		
F	MOISTURE CONTENT = (D/E) X 100	16.6	15.6	16.5		
		NDT-182	NDT-187	NDT-197		

GAUGE = -14.6 13.6 15.2

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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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: 06 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-167, ~~168~~ 169 BAN/6/97

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: RBN

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

		LP-167	LP-~~168~~ 169			
	TARE NO. _____	9	7			
A	WT. OF TARE	7.3	7.3			
B	WT. OF WET SOIL & TARE	243.9	242.9			
C	WT. OF DRY SOIL & TARE	212.6	210.9			
D	WT. OF WATER = B-C	31.3	32.0			
E	WT. OF DRY SOIL = C-A	205.3	203.6			
F	MOISTURE CONTENT = (D/E) X 100	15.2	15.7			
		NDT-209	NDT-224			
	Gauge	-13.6	14.0%		---	

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

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

MATERIAL TYPE: clay liner SAMPLE NO.: LP-10.1

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) Total Sample = 9181.5 >No.4 total = 898.8 (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		31	28
WT. OF DRY SAMPLE PLUS TARE	(grams)	180.4	45.7
WT. OF TARE	(grams)	8.2	8.3
WT. OF DRY SAMPLE	(grams)	172.2	37.4

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
1½"	37.5	0	0	100		
1"	25.0	302.5	3.3	96.7		
3/4"	19.0	416.9	4.5	95.5		90-100
½"	12.5	521.9	5.7	94.3		
3/8"	9.5	637.1	6.9	93.1		
4	4.75	873.8	9.5	90.5		
10	2.00	6.6	3.8	96.2	87.1	
20	0.850	12.9	7.5	92.5	83.7	
40	0.425	18.9	11.0	89.0	80.5	
60	0.250	24.1	14.0	86.0	77.8	
100	0.150	30.1	17.5	82.5	74.7	
200	0.075	37.4	21.7	78.3	70.9	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

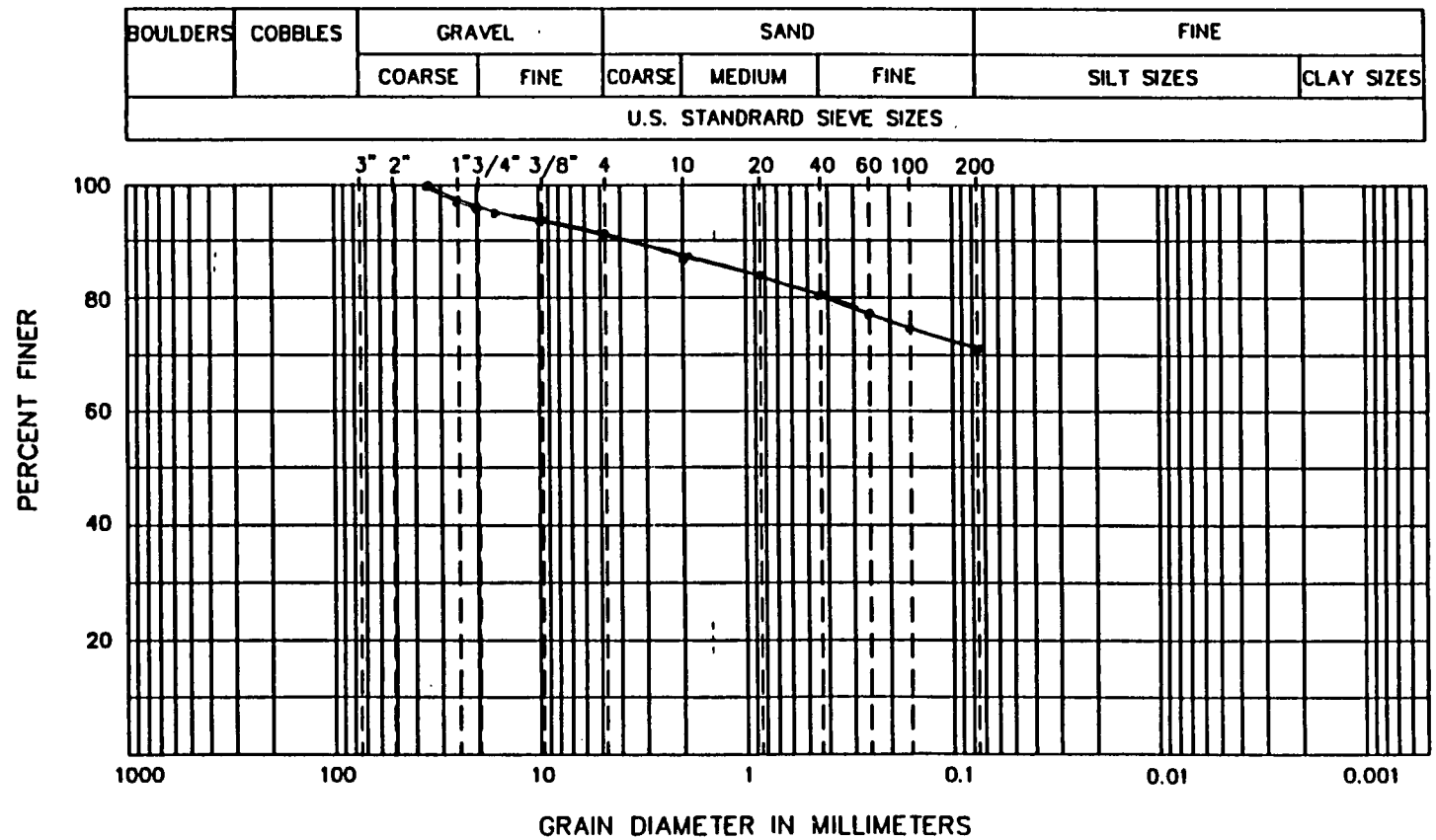
DESCRIPTION: Phase I Construction

DATE: 10 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner

SAMPLE NO.: LP10.1 QA ID: RBN

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100
1-in.	96.7
3/4-in.	95.5
1/2-in.	94.3
3/8-in.	93.1
NO. 4	90.5
NO. 10	87.1
NO. 20	83.7
NO. 40	80.5
NO. 60	77.8
NO. 100	74.7
NO. 200	70.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): N/A

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SHEET NO. 2 OF 2

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 08 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-10.2

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) Total Sample: 8053.8 7 No.4 total: 750.89 (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		8	30
WT. OF DRY SAMPLE PLUS TARE	(grams)	171.0	42.5
WT. OF TARE	(grams)	7.3	7.3
WT. OF DRY SAMPLE	(grams)	163.7	35.2

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
1½"	37.5	0	RBN ~~100~~ 0	100		
1"	25.0	113.4	1.4	98.6		
3/4"	19.0	183.3	2.3	97.7		90-100
1/2"	12.5	388.2	4.8	95.2		
3/8"	9.5	515.9	6.4	93.6		
4	4.75	745.5	9.3	90.7		
10	2.00	6.5	4.0	96.0	87.1	
20	0.850	12.9	7.9	92.1	83.5	
40	0.425	18.4	11.2	88.8	80.5	
60	0.250	23.1	14.1	85.9	77.9	
100	0.150	28.7	17.5	82.5	74.8	
200	0.075	35.2	21.5	RBN 78.5 ~~79.6~~	71.2	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

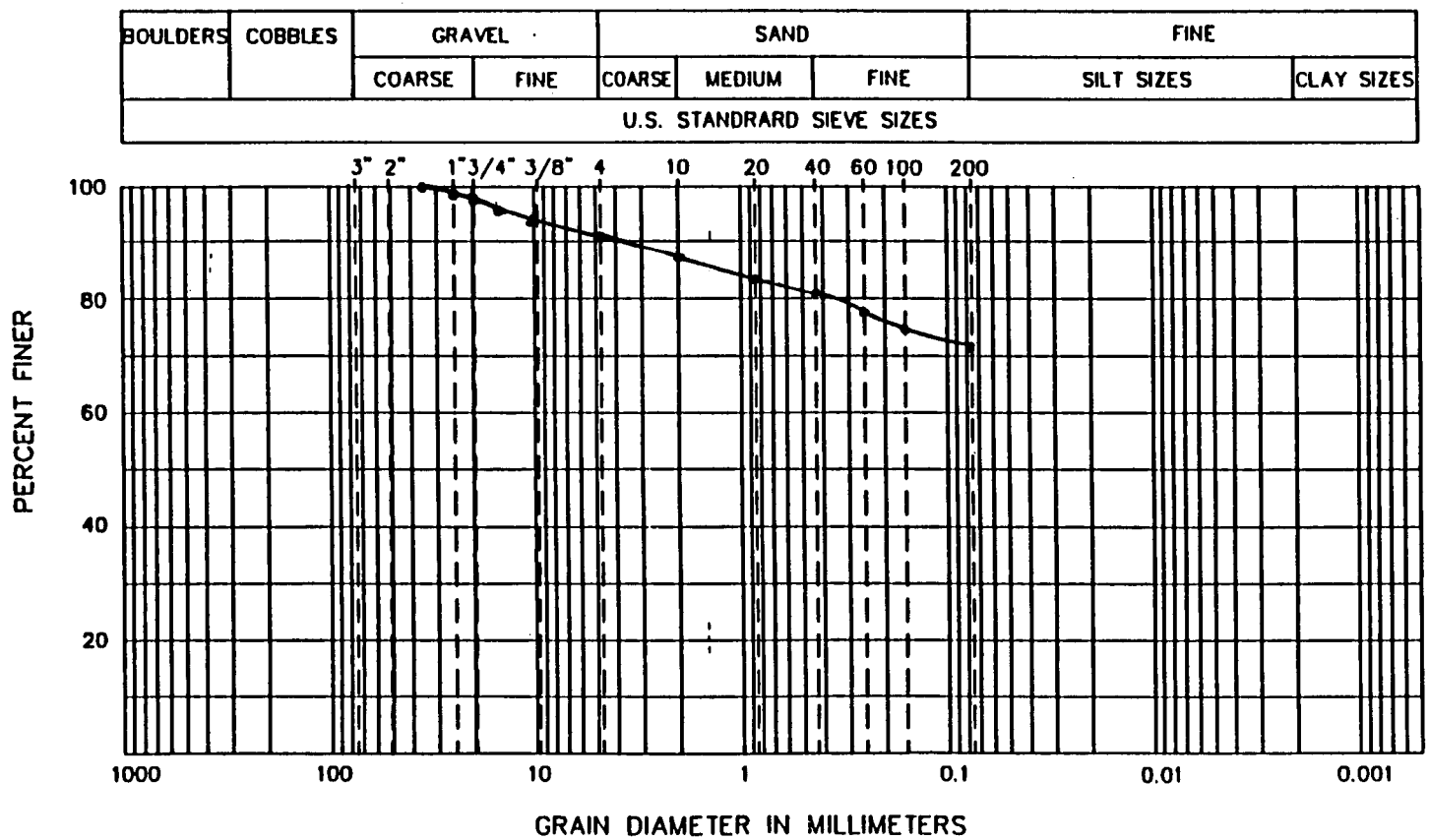
DESCRIPTION: Phase I Construction

DATE: 10 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner

SAMPLE NO.: LP-10.2 QA ID: PBN

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100
1-in.	98.6
3/4-in.	97.7
1/2-in.	95.2
3/8-in.	93.6
NO. 4	90.7
NO. 10	87.1
NO. 20	83.5
NO. 40	80.5
NO. 60	77.9
NO. 100	74.8
NO. 200	71.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): N/A

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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 — DATE: 06 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-16B

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

LANE 7 — CHECKPOINT — QA ID: RBN

	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6169.0				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A − B	(grams)	1959.6				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.3				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.3	113.7			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: SN

			Microwave	Oven			
	TARE NO.		I	28			
F	WT. OF TARE	(grams)	132.1	8.2			
G	WT. OF WET SOIL & TARE	(grams)	203.0	277.5	COMPARES WITH LP-27		
H	WT. OF DRY SOIL & TARE	(grams)	194.2	244.9	MDD = 114.8 pcf		
I	WT. OF WATER = G − H	(grams)	8.8	32.6	OMC = 15.9 %		
J	WT. DRY SOIL = H − F	(grams)	62.1	236.7			
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.2	13.7			

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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 — DATE: 06 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-170

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

QA ID: RBN

			1pt.	CHECK POINT			
	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6078.2				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A − B	(grams)	1868.8				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.3				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.4	107.2			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: RBN

			microwave	oven			
	TARE NO.		I	25			
F	WT. OF TARE	(grams)	132.1	8.3			
G	WT. OF WET SOIL & TARE	(grams)	205.8	265.7	COMPARES WITH LP-16		
H	WT. OF DRY SOIL & TARE	(grams)	196.3	232.1	MDD = 109.5 pcf		
I	WT. OF WATER = G − H	(grams)	9.5	33.6	OMC = 17.8 %		
J	WT. DRY SOIL = H − F	(grams)	64.2	223.8			
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.8	15.0			

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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: 08 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP 171, 172

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

		LP-171	LP-172			
	TARE NO.	i	22			
A	WT. OF TARE	7.3	8.3			
B	WT. OF WET SOIL & TARE	195.8	223.8			
C	WT. OF DRY SOIL & TARE	172.2	195.9			
D	WT. OF WATER = B-C	23.6	27.9			
E	WT. OF DRY SOIL = C-A	164.9	187.6			
F	MOISTURE CONTENT = (D/E) X 100	14.3	14.9			
		NDT-231	NDT-239			
	Gauge	12.7	14.0	---		

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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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 — DATE: 11 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-173

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

QA ID: RBN

			Void	checkpoint	~~Start~~	checkpoint		
	WATER ADDED	(ml)		0		0		
A	WT. OF SOIL & MOLD	(grams)		6264.1		6119.1		
B	WT. OF MOLD	(grams)		4209.4		4209.4		
C	WT. OF SOIL = A − B	(grams)		2054.7		1909.7		
D	WET UNIT WT.(1) = C X 0.066	(pcf)		135.6		126.0		
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		116.5		111.0	112.1	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: RBN

			ID#10 microwave	oven	Microwave	oven RBN 9/11/97 microwave	
	TARE NO.		I	24	I	28	
F	WT. OF TARE	(grams)	132.2	8.4	132.2	8.3	Compares w/ LP-13
G	WT. OF WET SOIL & TARE	(grams)	209.4D	166.9	202.1	279.9	MDD = 113.1 pcf
H	WT. OF DRY SOIL & TARE	(grams)	194.5	13/a/m	193.8	249.9	OMC = 14.52
I	WT. OF WATER = G − H	(grams)	10.9		8.3	30.0	
J	WT. DRY SOIL = H − F	(grams)	66.3		61.6	241.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	16.4		13.5	12.4	

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-174

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) Total Sample: 28914.1 Total >No.4: 1226.3 (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		21	21
WT. OF DRY SAMPLE PLUS TARE	(grams)	202.7	36.2
WT. OF TARE	(grams)	8.4	8.4
WT. OF DRY SAMPLE	(grams)	194.3	27.8

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	147.5	0.5	99.5		100
1½"	37.5	250.2	0.9	99.1		
1"	25.0	318.3	1.1	98.9		
¾"	19.0	452.1	1.6	98.4		90-100
½"	12.5	664.8	2.3	97.7		
⅜"	9.5	801.9	2.8	97.2		
4	4.75	1182.0	4.1	95.9		
10	2.00	4.3	2.2	97.8	93.8	
20	0.850	8.4	4.3	95.7	91.8	
40	0.425	12.4	6.4	93.6	89.8	
60	0.250	16.3	8.4	91.6	87.8	
100	0.150	21.5	11.1	88.9	85.3	
200	0.075	27.8	14.3	85.7	82.2	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

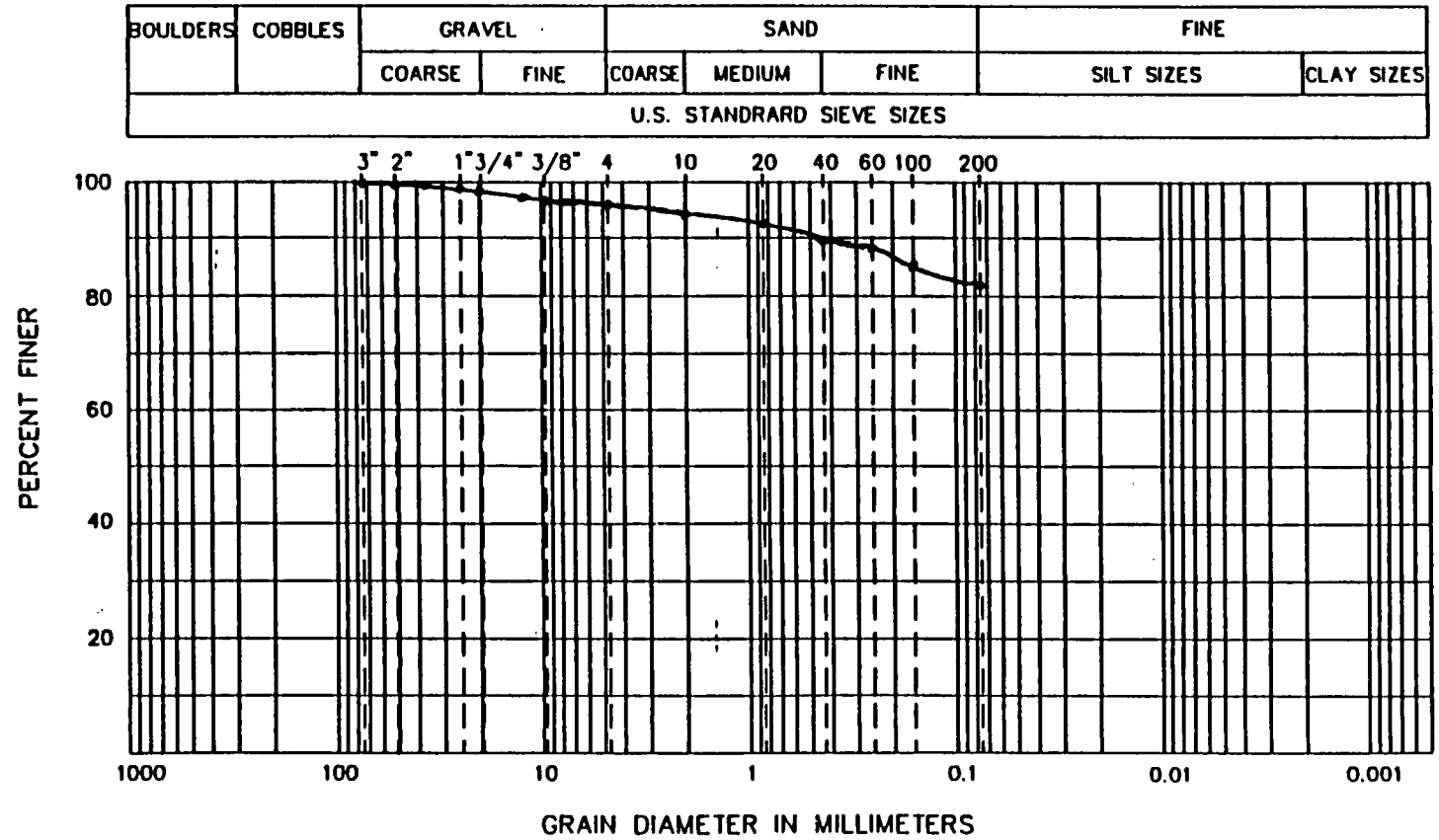
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 16 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-174 QA ID: RRN

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 37

(PL) 18

(PI) 19

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	99.5
1 1/2-in.	99.1
1-in.	98.9
3/4-in.	98.4
1/2-in.	97.7
3/8-in.	97.2
NO. 4	95.9
NO. 10	93.8
NO. 20	91.8
NO. 40	89.8
NO. 60	87.8
NO. 100	85.3
NO. 200	82.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	77
0.020	67
0.005	39
0.002	32

SOIL CLASSIFICATION (ASTM D 2487): BROWN Lean Clay with sand - CL

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

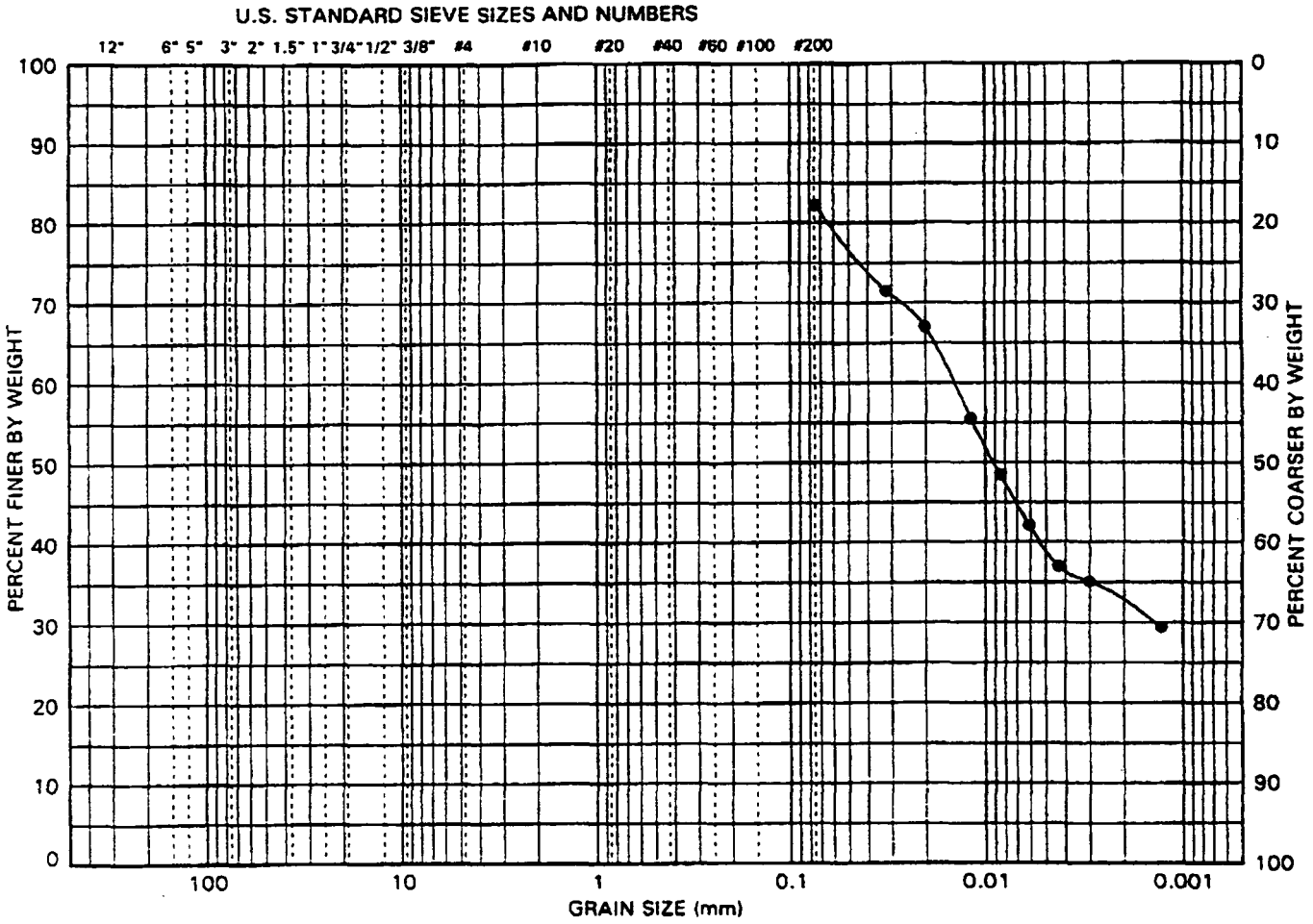
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/18/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-174	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	971174	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	82.2
SOIL CLASSIFICATION:				SILT (%)	49.9
				CLAY(%)	32.3
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													82	77	67	39	32	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-174

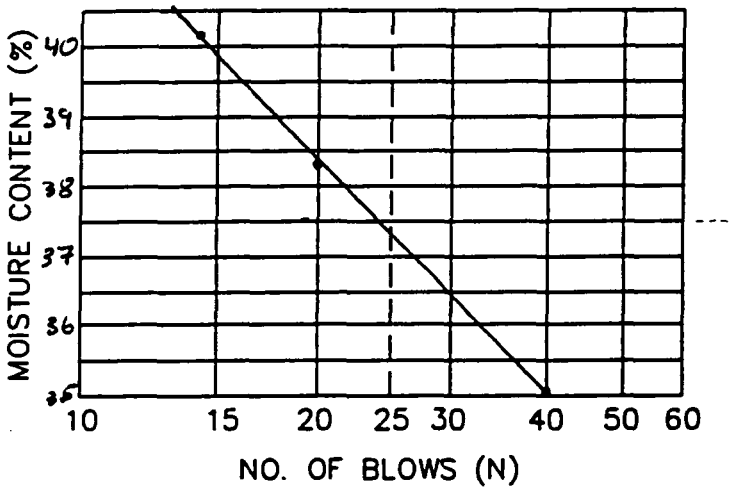
LIQUID LIMIT DETERMINATION

QA ID: RBN

	TARE NO.		2.8	1.9	1.1	
A	WT. OF TARE	(grams)	28.45	28.54	28.76	
B	WT. OF WET SOIL & TARE	(grams)	47.47	45.99	46.46	RBN 9/16/97
C	WT. OF DRY SOIL & TARE	(grams)	42.52	40.98	41.60 56	
D	WT. OF WATER = B-C	(grams)	4.95	5.01	4.90	
E	WT. OF DRY SOIL = C-A	(grams)	14.07	12.44	12.80	
F	MOISTURE CONTENT = (D/E)X100	(%)	35.18	40.27	38.28	
N	NUMBER OF BLOWS		40	14	20	

DRYING TARE NO.

B



CURING TARE NO.

1-G

PLASTIC LIMIT DETERMINATION

QA ID: RBN

	TARE NO.		3.2	27		
A	WT. OF TARE	(grams)	27.82	28.67		
B	WT. OF WET SOIL & TARE	(grams)	35.90	35.65		
C	WT. OF DRY SOIL & TARE	(grams)	34.69	34.60		
D	WT. OF WATER = B-C	(grams)	1.21	1.05		
E	WT. OF DRY SOIL = C-A	(grams)	6.87	5.93		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.61	17.71		

LIQUID LIMIT (LL) = 37 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 19

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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 — DATE: 13 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-174

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

QA ID: RBN

	WATER ADDED	(ml)	50	100	150	200	
A	WT. OF SOIL & MOLD	(grams)	5960.3	6064.6	6168.9	6164.4	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1750.9	1855.2	1959.5	1955.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	115.6	122.4	129.3	129.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	103.3	106.7	110.8	107.9	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RBN

	TARE NO.		6	31	8	7	
F	WT. OF TARE	(grams)	7.6	8.3	7.3	7.3	
G	WT. OF WET SOIL & TARE	(grams)	248.2	296.1	253.2	250.5	
H	WT. OF DRY SOIL & TARE	(grams)	222.7	259.3	218.0	210.7	
I	WT. OF WATER = G - H	(grams)	25.5	36.8	35.2	39.8	
J	WT. DRY SOIL = H - F	(grams)	215.1	251.0	210.7	203.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.9	14.7	16.7	19.6	

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GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: [illegible] SHEET NO. 1 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

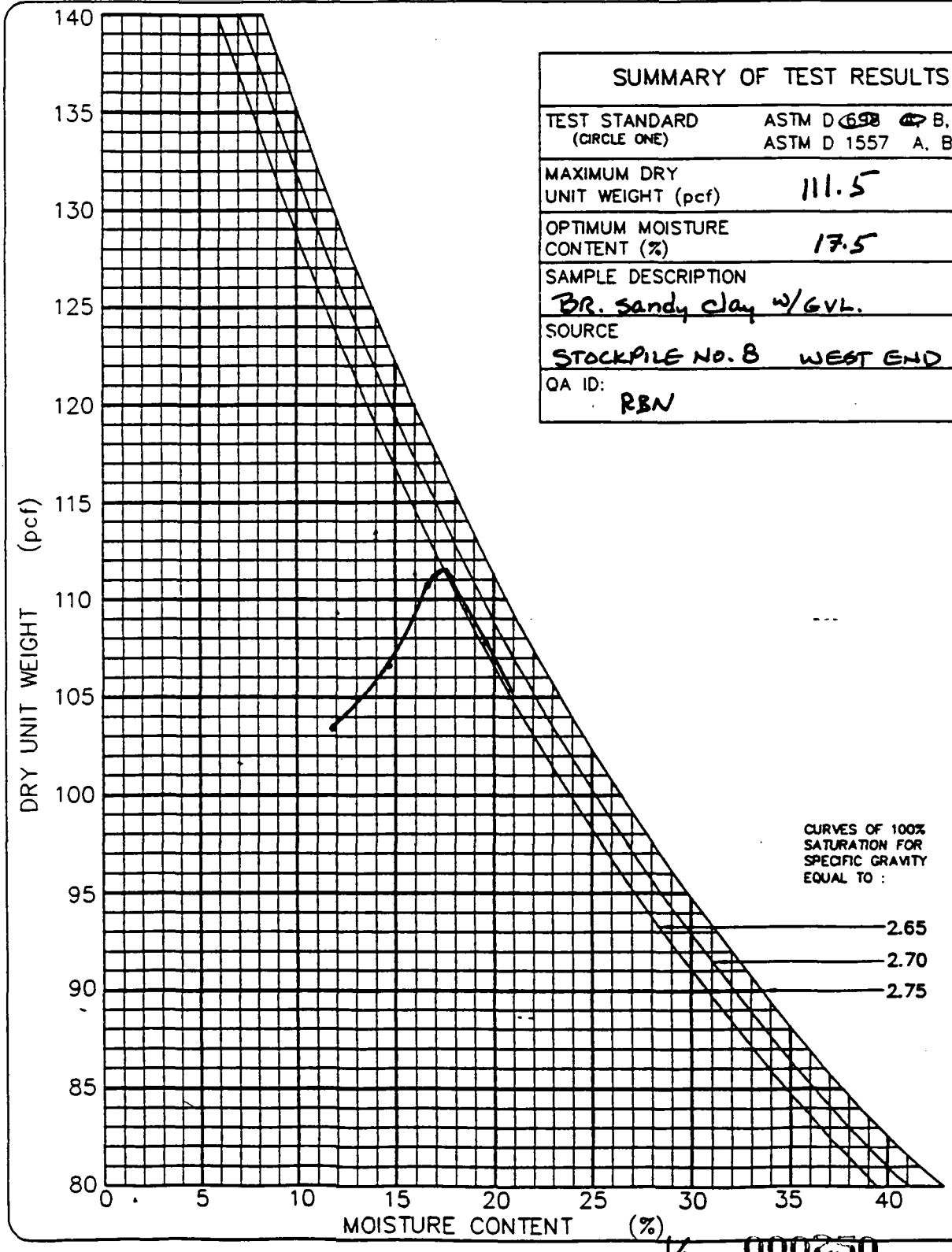
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-174



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	111.5
OPTIMUM MOISTURE CONTENT (%)	17.5
SAMPLE DESCRIPTION	BR. sandy clay w/GVL.
SOURCE	STOCKPILE NO. 8 WEST END
QA ID:	RBN

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-175

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) Total sample 39641.6 Total > NO.4: 3199.4 (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		34	34
WT. OF DRY SAMPLE PLUS TARE	(grams)	178.0	36.3
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	169.7	28.0

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100.0
1½"	37.5	925.4	2.3	97.7		
1"	25.0	1243.8	3.1	96.9		
¾"	19.0	1580.5	4.0	96.0		90-100
½"	12.5	2087.3	5.3	94.7		
⅜"	9.5	2372.4	6.0	94.0		
4	4.75	3092.3	7.8	92.2		
10	2.00	5.6	3.3	96.7	89.2	
20	0.850	10.6	6.2	93.8	86.5	
40	0.425	15.0	8.8	91.2	84.1	
60	0.250	18.7	11.0	89.0	82.1	
100	0.150	23.0	13.6	86.4	79.7	
200	0.075	28.0	16.5	83.5	77.0	50-100

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

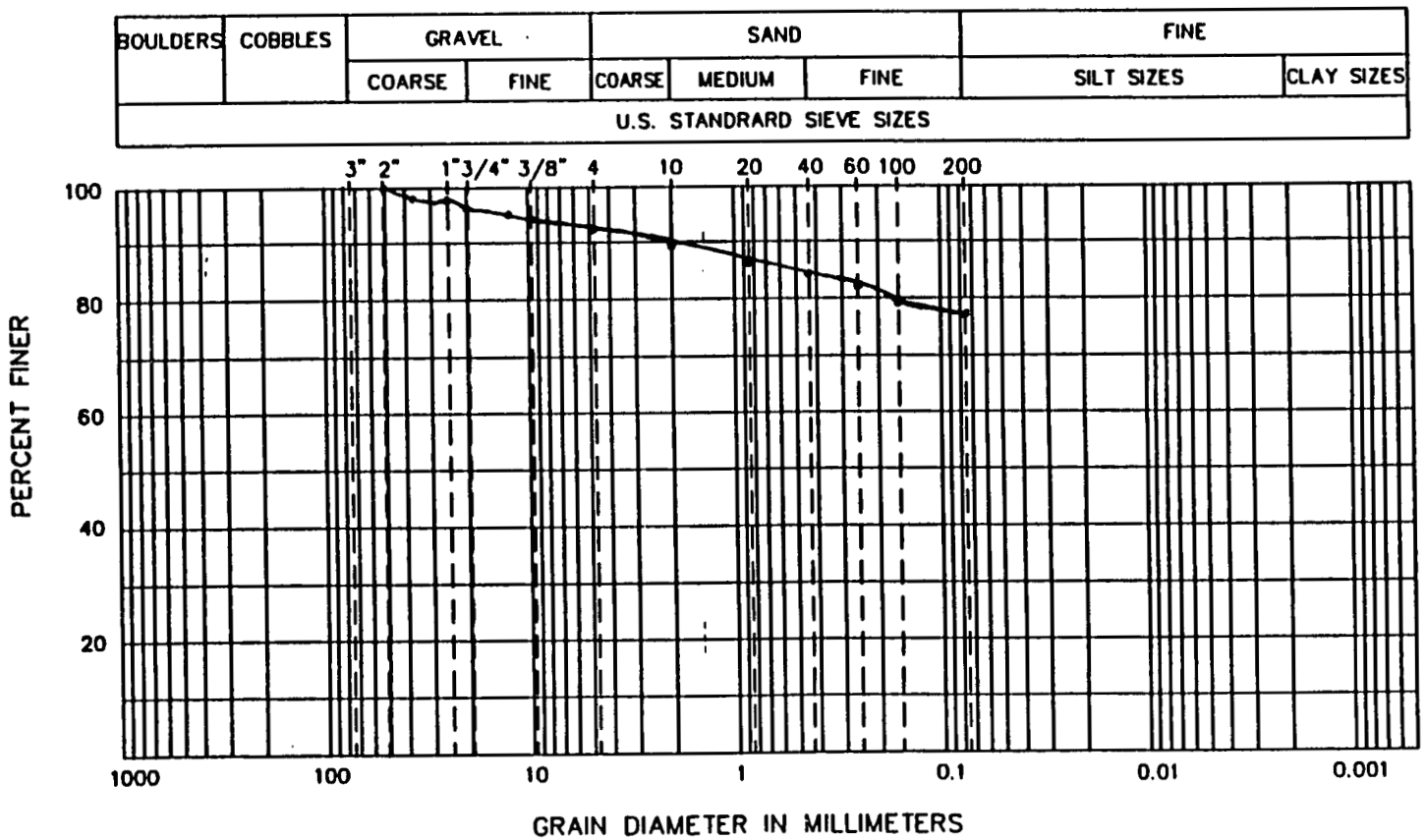
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 16 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-175 QA ID: RBN

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 34

(PL) 18

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100
1 1/2-in.	97.7
1-in.	96.9
3/4-in.	96.0
1/2-in.	94.7
3/8-in.	94.0
NO. 4	92.2
NO. 10	89.2
NO. 20	86.6
NO. 40	84.1
NO. 60	82.1
NO. 100	79.7
NO. 200	77.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	72
0.020	59
0.005	35
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): Brown Lean Clay w/sand - CL

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SHEET NO. 2 OF 2

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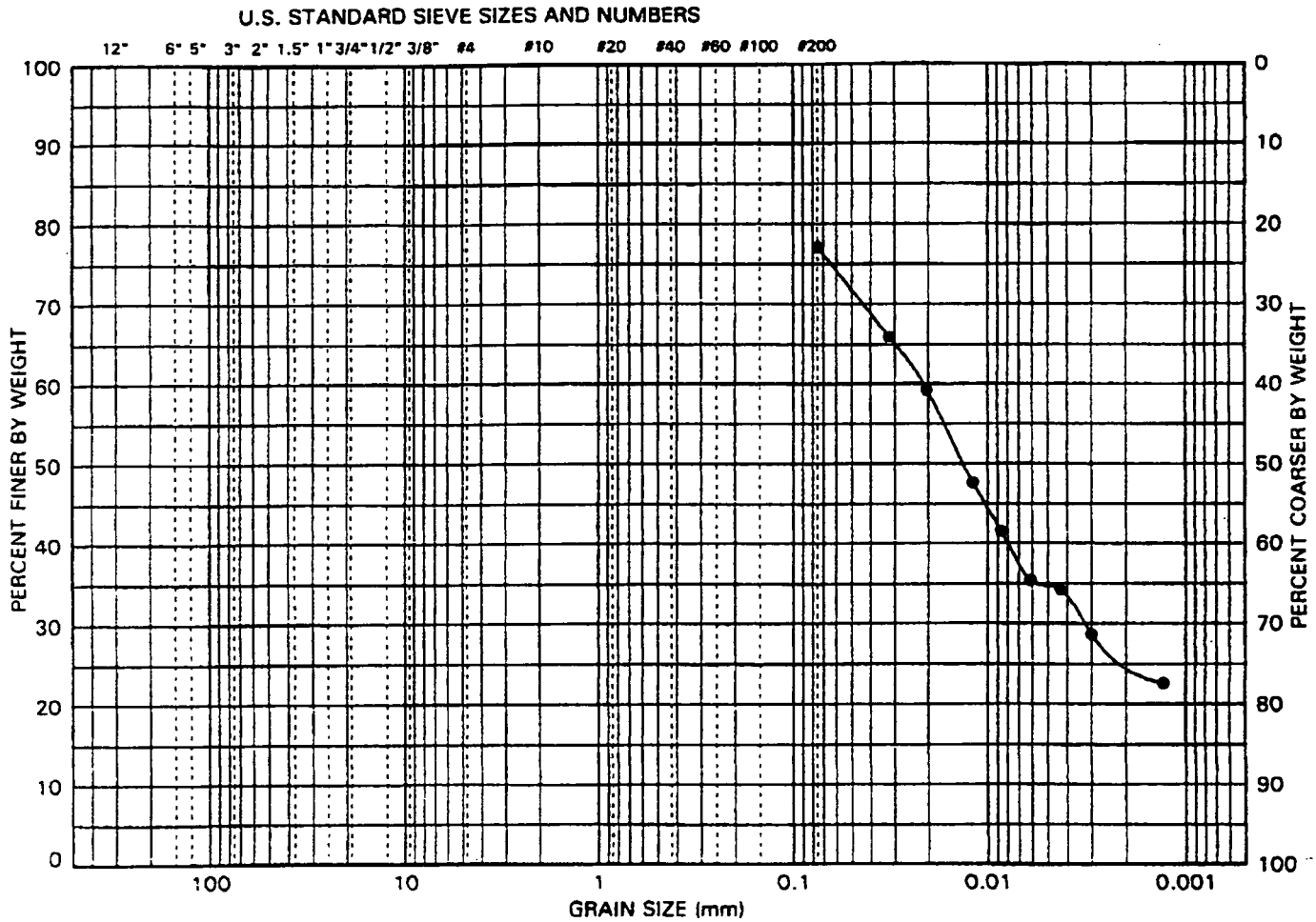
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/18/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-175	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97I175	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	77.0
SOIL CLASSIFICATION:				SILT (%)	51.3
				CLAY(%)	25.7
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													77	72	59	35	26	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

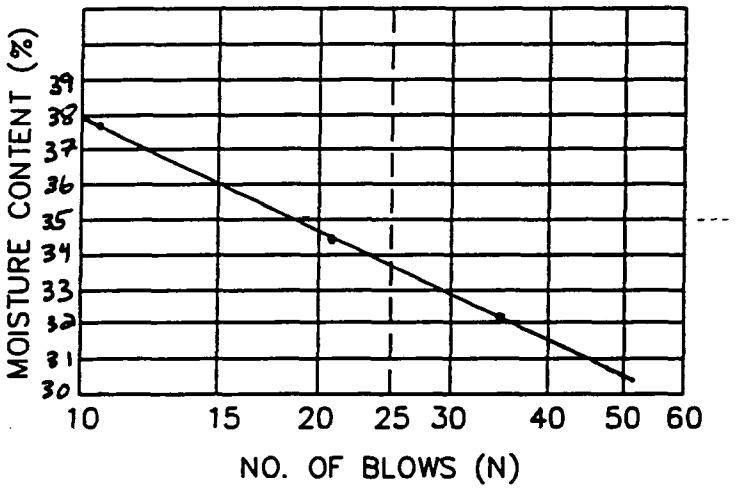
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-175

LIQUID LIMIT DETERMINATION

QA ID: RBN

	TARE NO.		1.2	2.3	1.4	
A	WT. OF TARE	(grams)	28.50	31.20	28.52	
B	WT. OF WET SOIL & TARE	(grams)	46.30	47.10	46.00	
C	WT. OF DRY SOIL & TARE	(grams)	41.97	43.02	41.20	
D	WT. OF WATER = B-C	(grams)	4.33	4.08	4.8	
E	WT. OF DRY SOIL = C-A	(grams)	13.47	11.82	12.68	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.15	34.52	37.85	
N	NUMBER OF BLOWS		36	21	11	

DRYING TARE NO.: A



CURING TARE NO.: 1-F

PLASTIC LIMIT DETERMINATION

QA ID: RBN

	TARE NO.		2.5	2.6		
A	WT. OF TARE	(grams)	28.42	28.55		
B	WT. OF WET SOIL & TARE	(grams)	36.29	35.92		
C	WT. OF DRY SOIL & TARE	(grams)	35.07	34.78		
D	WT. OF WATER = B-C	(grams)	1.22	1.14		
E	WT. OF DRY SOIL = C-A	(grams)	6.65	6.23		
F	MOISTURE CONTENT = (D/E)X100	(%)	18.35	18.30		

LIQUID LIMIT (LL) = 34 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 16

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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 — DATE: 13 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-175

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

QA ID: RBN

	WATER ADDED	(ml)	50	100	150	0	
A	WT. OF SOIL & MOLD	(grams)	6132.7	6168.9	6169.0	6029.3	
B	WT. OF MOLD	(grams)	4209.4	4209.4 RBN 9/12/97	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1923.3	1959.~~6~~5	1959.6	1819.9	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.9	129.33	129.3	120.1	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.6	110.0	108.3	107.4	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RBN

	TARE NO.		28	22	5	10	
F	WT. OF TARE	(grams)	8.3	8.4	7.6	7.4	
G	WT. OF WET SOIL & TARE	(grams)	284.1	232.9	284.2	268.8	
H	WT. OF DRY SOIL & TARE	(grams)	248.7	199.4	239.2	241.2	
I	WT. OF WATER = G - H	(grams)	35.4	33.5	45.0 ~~191.0~~ RBN 9/16/97	27.6	
J	WT. DRY SOIL = H - F	(grams)	240.4	191.0	231.6	233.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.7	17.5	19.4	11.8	

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FLUOR DANIEL FERNALD

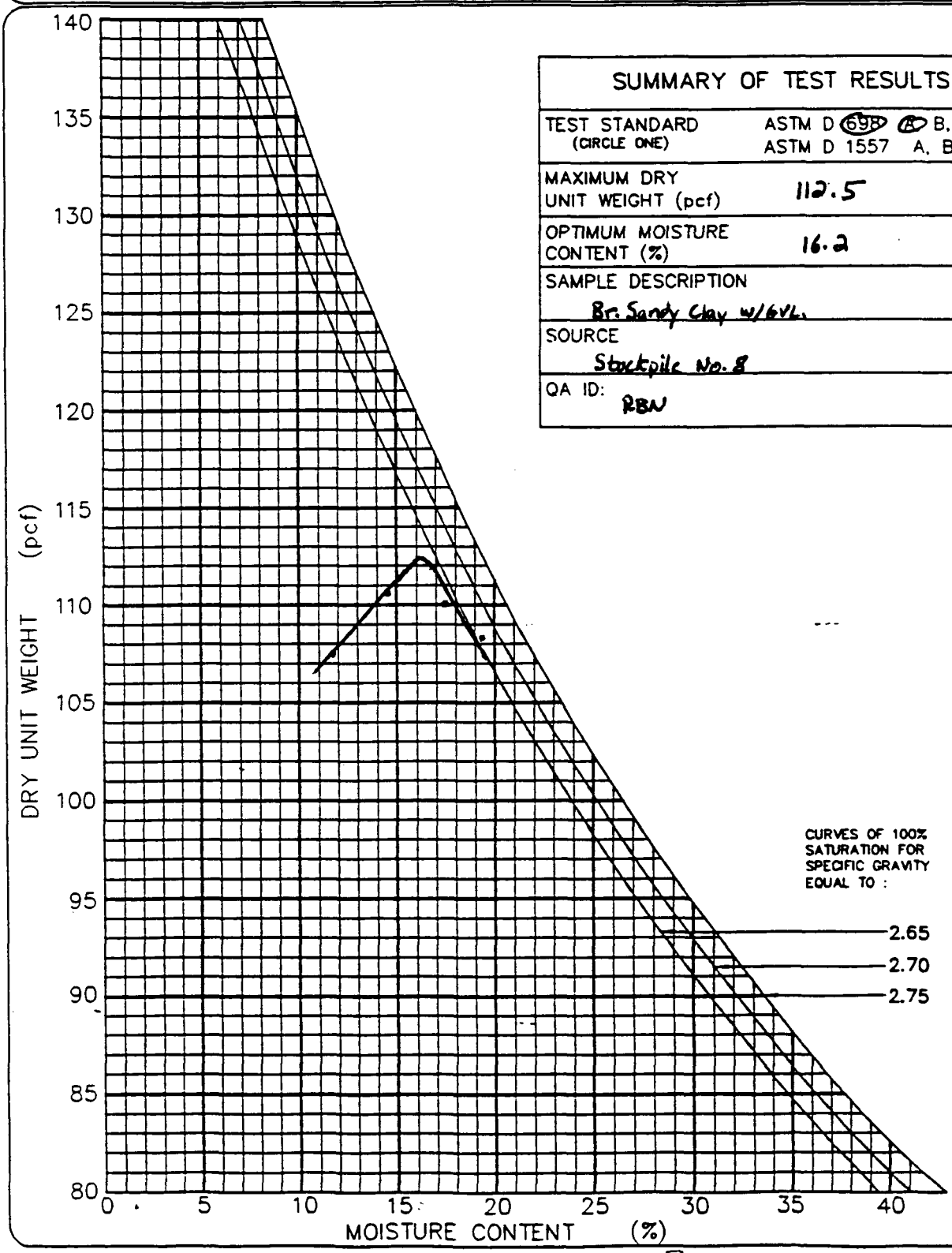
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I construction DATE: RBN 15 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-175



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 A B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	112.5
OPTIMUM MOISTURE CONTENT (%)	16.2
SAMPLE DESCRIPTION	Br. Sandy Clay w/GVL.
SOURCE	Stockpile No. 8
QA ID:	RBN

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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: 11 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-176, 177, 179, 180, 181, 182

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: RBN

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

		LP176	LP-177	LP-179	LP-180	LP-181	LP-18
	TARE NO. _____	24	30	34	22	1	10
A	WT. OF TARE	8.5	8.4	8.3	8.3	7.3	8.
B	WT. OF WET SOIL & TARE	~~189.8~~	146.8	192.8	218.3	245.8	181.
C	WT. OF DRY SOIL & TARE	163.8	124.4	RBN 9/11/97 ~~172~~ 164.8	188.1	212.9	156.
D	WT. OF WATER = B-C	26.0	22.4	28.0	30.2	32.9	25.
E	WT. OF DRY SOIL = C-A	155.3	116.0	156.5 ~~184.~~ RBN 9/10/97	179.8	205.6	148.
F	MOISTURE CONTENT = (D/E) X 100	16.7	19.3	17.9	16.8	16.0	17.
				NDT-242	NDT-243	NDT-245	NDT 246
	Gauge	14.5	—	15.9	14.2	13.6	14.2

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: RBN

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%

		LP-176	LP-177			
	TARE NO.	I ~~24~~ RBN 9/11/97	I			
A	WT. OF TARE	132.1 ~~8.5~~	132.1			
B	WT. OF WET SOIL & TARE	167.80 RBN ~~167.80~~ 9/11/97	157.4			
C	WT. OF DRY SOIL & TARE	162.4	153.2			
D	WT. OF WATER = B-C	5.4	4.2			
E	WT. OF DRY SOIL = C-A	30.3	21.1			
F	MOISTURE CONTENT = (D/E) X 100	17.8	19.9			

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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 — DATE: 12 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-178

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

QA ID: RBN

			checkpoint				
	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6119.1				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1909.7				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.0				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	~~111.9~~ 110.4	110.4			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RBN

			Microwave	OVEN			
	TARE NO.		I	1			
F	WT. OF TARE	(grams)	132.1	7.3			
G	WT. OF WET SOIL & TARE	(grams)	204.8	268.2	compares w/ LP-37		
H	WT. OF DRY SOIL & TARE	(grams)	195.8	235.9	MDD = 114.2 pcf		
I	WT. OF WATER = G - H	(grams)	~~8.0~~ 9	32.3	OMC = 15.5%		
J	WT. DRY SOIL = H - F	(grams)	63.7	228.6			
K	MOISTURE CONTENT = (I/J) X 100	(%)	~~12.6~~ 14.1	14.1			

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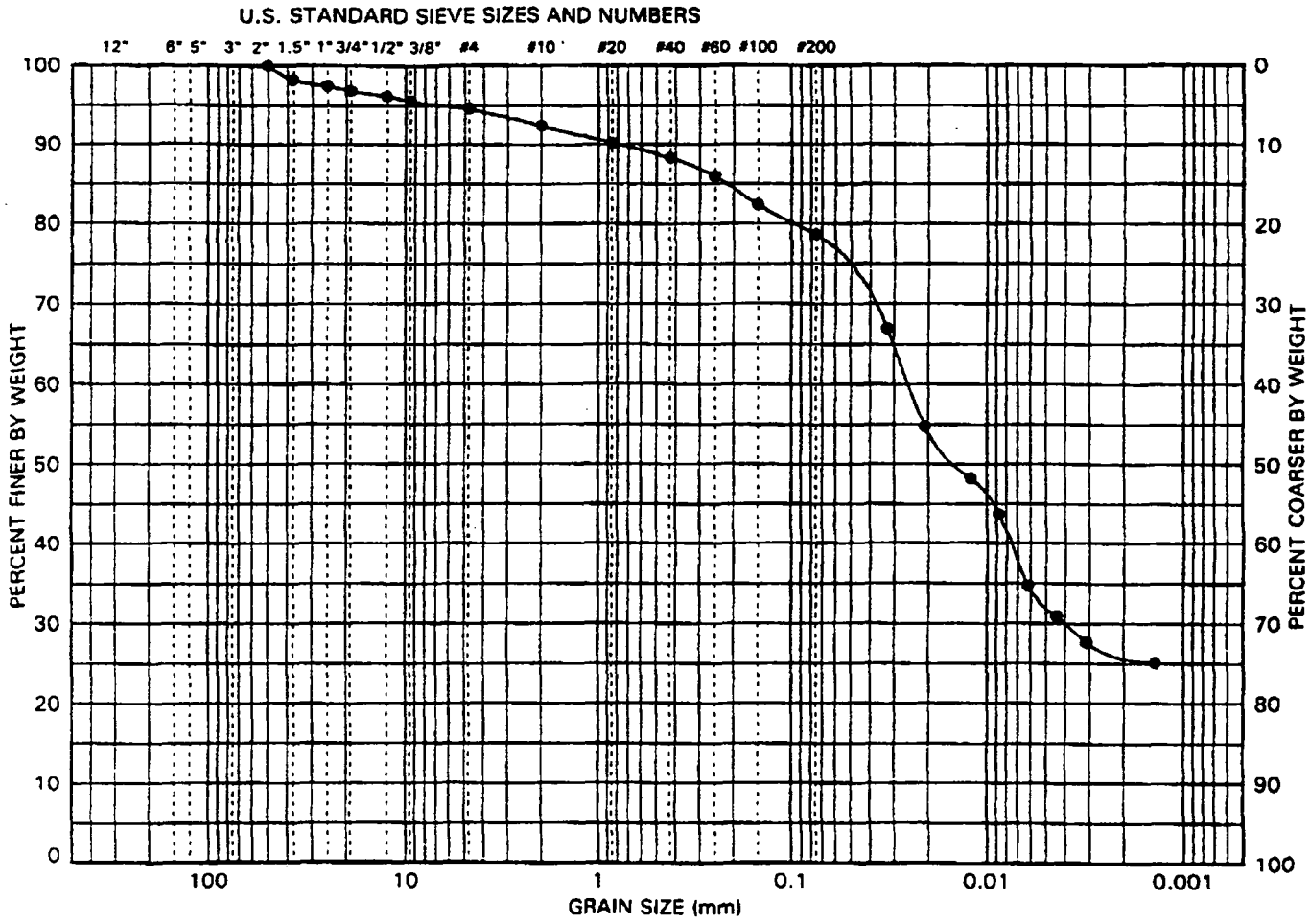
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/18/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-183	LIQUID LIMIT (%)	45	SOIL FRACTIONS: GRAVEL (%)	5.5
LAB. SAMPLE NO.	97I170	PLASTIC LIMIT (%)	20	SAND (%)	15.9
SAMPLE DEPTH (ft)		PLASTICITY INDEX	25	FINES (%)	78.6
SOIL CLASSIFICATION: CL - Lean Clay with Sand				SILT (%)	52.3
				CLAY(%)	26.3
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	98	97	97	96	96	95	92	90	88	86	82	79	73	54	32	26	

NOTES:

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FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

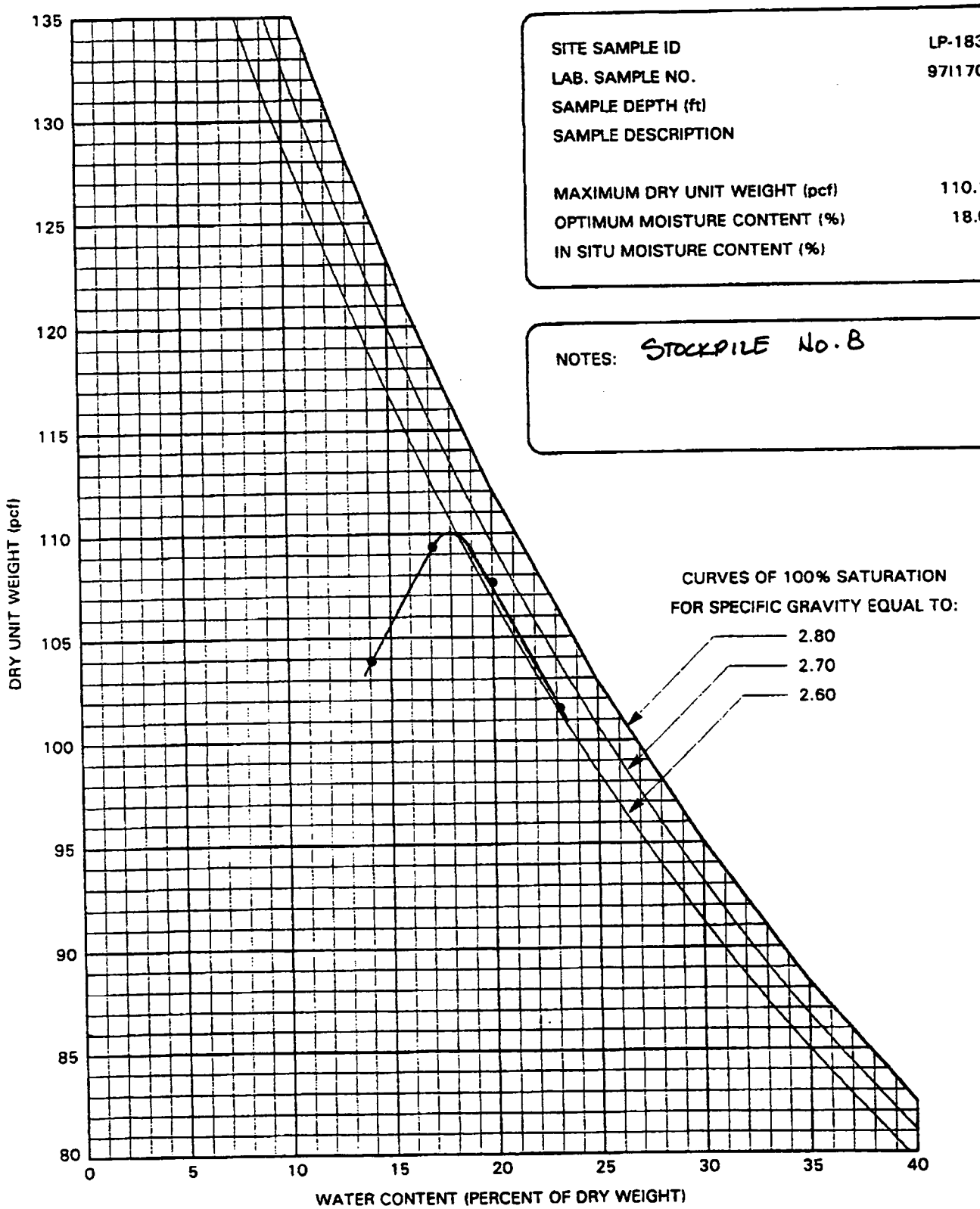
GS FORM: 4MD1 09/18/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-183
LAB. SAMPLE NO.	971170
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	110.1
OPTIMUM MOISTURE CONTENT (%)	18.0
IN SITU MOISTURE CONTENT (%)	

NOTES: STOCKPILE No. 8



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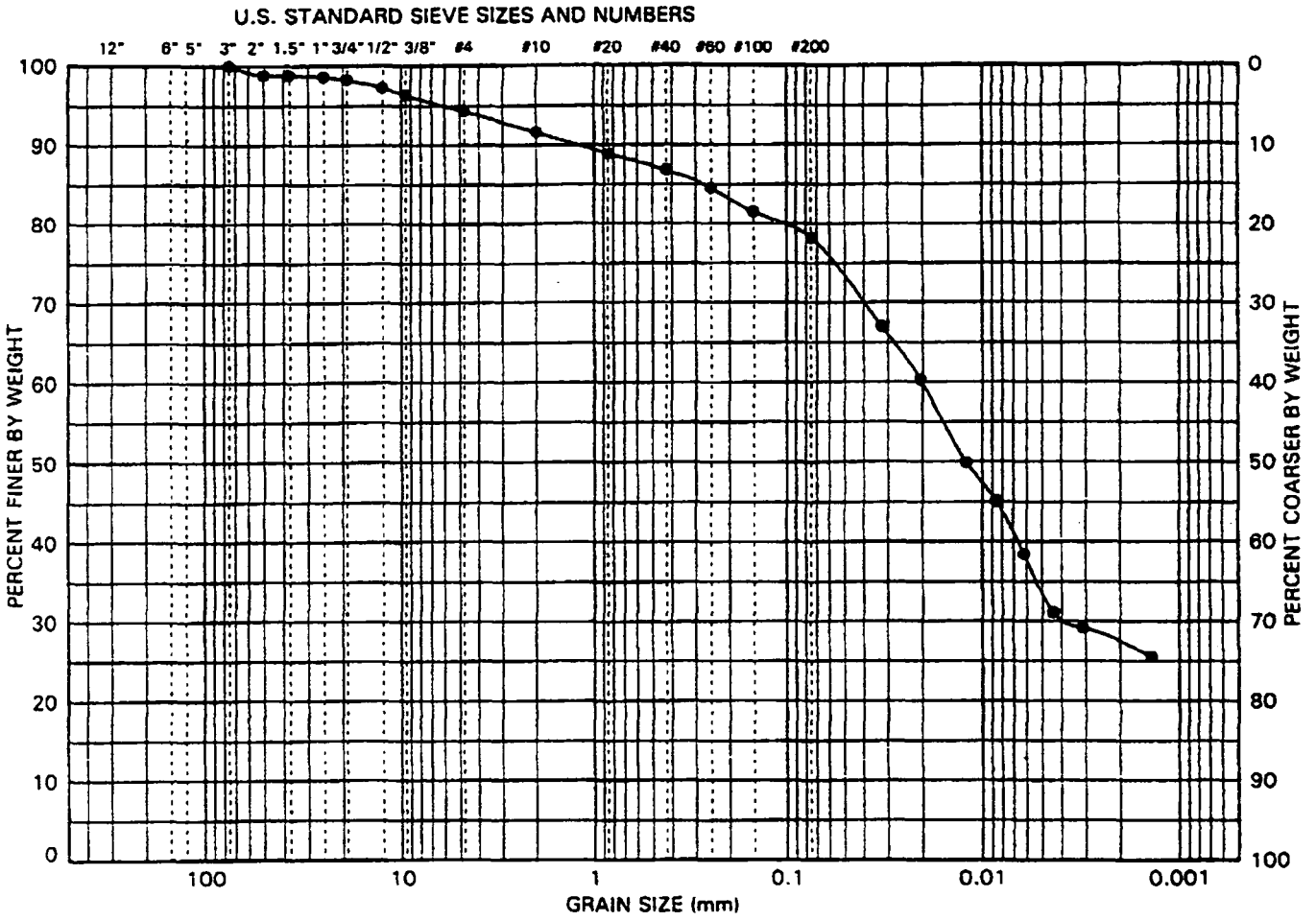
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/18/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-184	LIQUID LIMIT (%)	44	SOIL FRACTIONS: GRAVEL (%)	5.7
LAB. SAMPLE NO.	971171	PLASTIC LIMIT (%)	19	SAND (%)	16.1
SAMPLE DEPTH (ft)		PLASTICITY INDEX	25	FINES (%)	78.2
SOIL CLASSIFICATION:				SILT (%)	51.0
CL - Lean Clay with Sand				CLAY(%)	27.2
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	99	99	99	98	97	96	94	92	89	87	85	82	78	73	60	34	27	

NOTES:

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FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

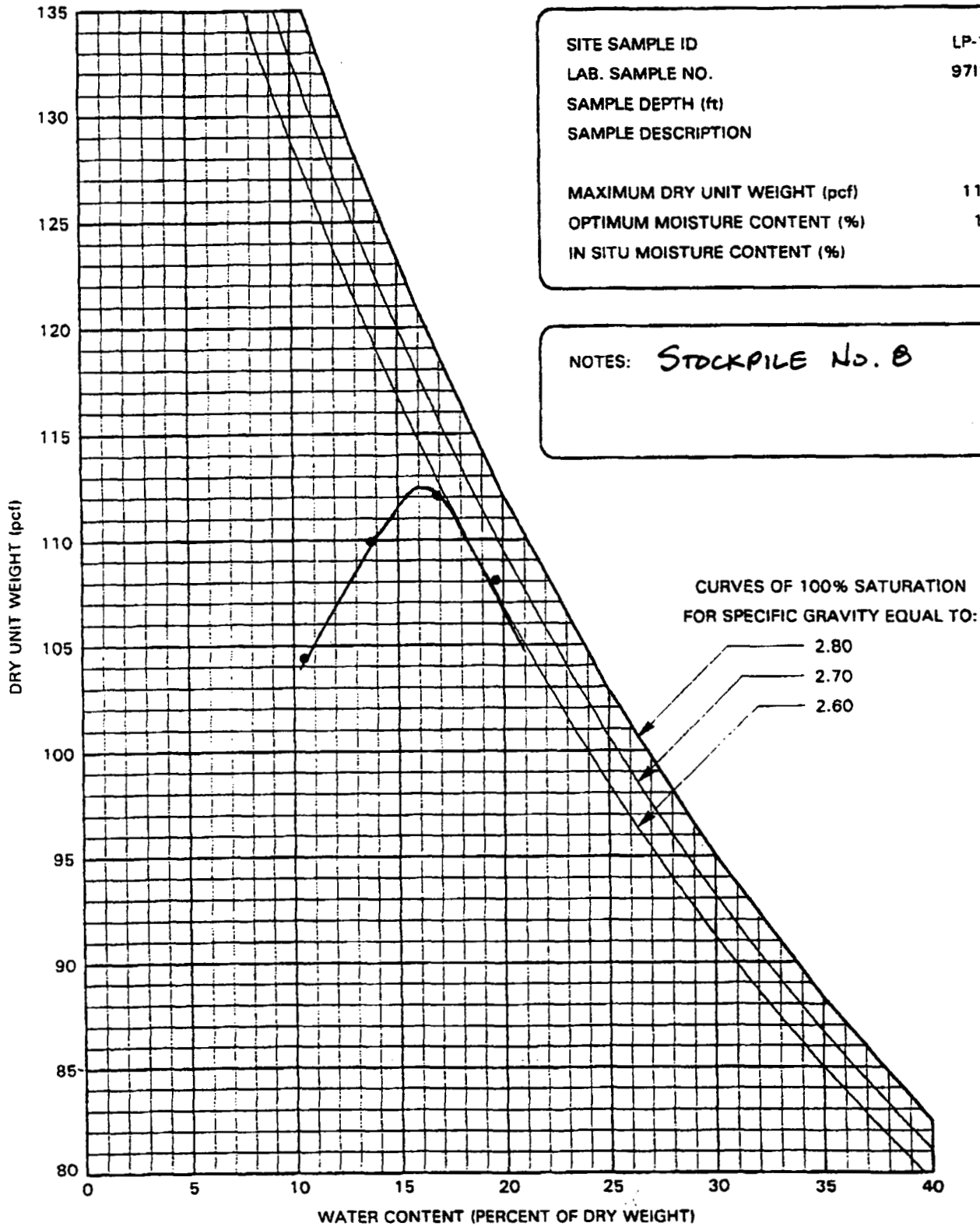
GS FORM: 4MD1 09/18/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-184
LAB. SAMPLE NO.	971171
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	112.4
OPTIMUM MOISTURE CONTENT (%)	16.1
IN SITU MOISTURE CONTENT (%)	

NOTES: STOCKPILE No. 8



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: 12 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-185, 186, 187, 188, 189, 190

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: BBN/BN/RU

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

		LP-185	LP-186	LP-187	LP-188	LP-189
	TARE NO.	28	5	7	8	10
A	WT. OF TARE	8.2	7.6	7.3	7.3	7.3
B	WT. OF WET SOIL & TARE	194.2	312.4	277.6	260.8	247.8
C	WT. OF DRY SOIL & TARE	170.7	269.3	232.9	225.8	215.3
D	WT. OF WATER = B-C	23.5	43.1	39.7	35.0	32.5
E	WT. OF DRY SOIL = C-A	162.5	261.7	225.6	218.5	208.0
F	MOISTURE CONTENT = (D/E) X 100	14.5	16.5	17.6	16.0	15.6
		NDT-246	NDT-249	NDT-248	NDT-264	NDT-255
	Gauge	13.0	13.5	14.5	13.7	14.7

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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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: 12 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-190

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: RBN/BN/[illegible]

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

		LP-190				
	TARE NO. _____	22				
A	WT. OF TARE	8.4				
B	WT. OF WET SOIL & TARE	290.7				
C	WT. OF DRY SOIL & TARE	259.0				
D	WT. OF WATER = B-C	31.7				
E	WT. OF DRY SOIL = C-A	250.6				
F	MOISTURE CONTENT = (D/E) X 100	12.6				
		NDT-257				

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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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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: 13 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-191, 192, 193, 195, 196, LP-197, 198

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: RBN

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

		LP-191	LP-192	LP-193	LP-197	LP-198
	TARE NO. _____	30	103	24	25	105
A	WT. OF TARE	8.5	8.8	8.6	8.3	8.3
B	WT. OF WET SOIL & TARE	227.1	223.2	238.4	224.6	210.3
C	WT. OF DRY SOIL & TARE	202.0	196.5	212.4	198.4	183.1
D	WT. OF WATER = B-C	25.1	26.7	26.0	26.2	27.2
E	WT. OF DRY SOIL = C-A	193.5	187.7	203.8	190.1	174.8
F	MOISTURE CONTENT = (D/E) X 100	13.0	14.2	12.8	13.8	15.6
		NDT-260	NDT-262	NDT-266	NDT-270	NDT-272
	Gauge	-12.3	13.4	11.4	125	13.7

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: RBN

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%

		LP-195	LP-196			
	TARE NO.	RBN 9/13/97 I	I			
A	WT. OF TARE	132.1 ~~132.1~~	132.1			
B	WT. OF WET SOIL & TARE	~~193.2~~ 190.2	193.2			
C	WT. OF DRY SOIL & TARE	181.2	184.2			
D	WT. OF WATER = B-C	9.0	9.0			
E	WT. OF DRY SOIL = C-A	49.1	52.1			
F	MOISTURE CONTENT = (D/E) X 100	18.3	17.3			

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 — DATE: 13 day Sept month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-19H

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

QA ID: RBN

			checkpoint				
	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6150.8				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1941.4				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	128.1				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.8				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RBN

			microwave	OVEN			
	TARE NO.		I	26			
F	WT. OF TARE	(grams)	132.1	8.3			
G	WT. OF WET SOIL & TARE	(grams)	195.4	214.1	Compares w/ LP-18		
H	WT. OF DRY SOIL & TARE	(grams)	187.8	190.2	MDD = 113.1 pcf		
I	WT. OF WATER = G - H	(grams)	7.6	23.9	omc = 14.5%		
J	WT. DRY SOIL = H - F	(grams)	55.7	181.9			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.6	13.1			

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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: 13 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-199,200

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: RBN

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

		LP-199	LP-200			
	TARE NO. _____	9	102			
A	WT. OF TARE	7.3	8.3			
B	WT. OF WET SOIL & TARE	227.0	213.0			
C	WT. OF DRY SOIL & TARE	199.4	185.3			
D	WT. OF WATER = B-C	27.6	27.7			
E	WT. OF DRY SOIL = C-A	192.1	177.0			
F	MOISTURE CONTENT = (D/E) X 100	14.4	15.6			
		NDT-276	NDT-275			
	Gauge	-11.6	14.2	---		

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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Atlanta, Georgia

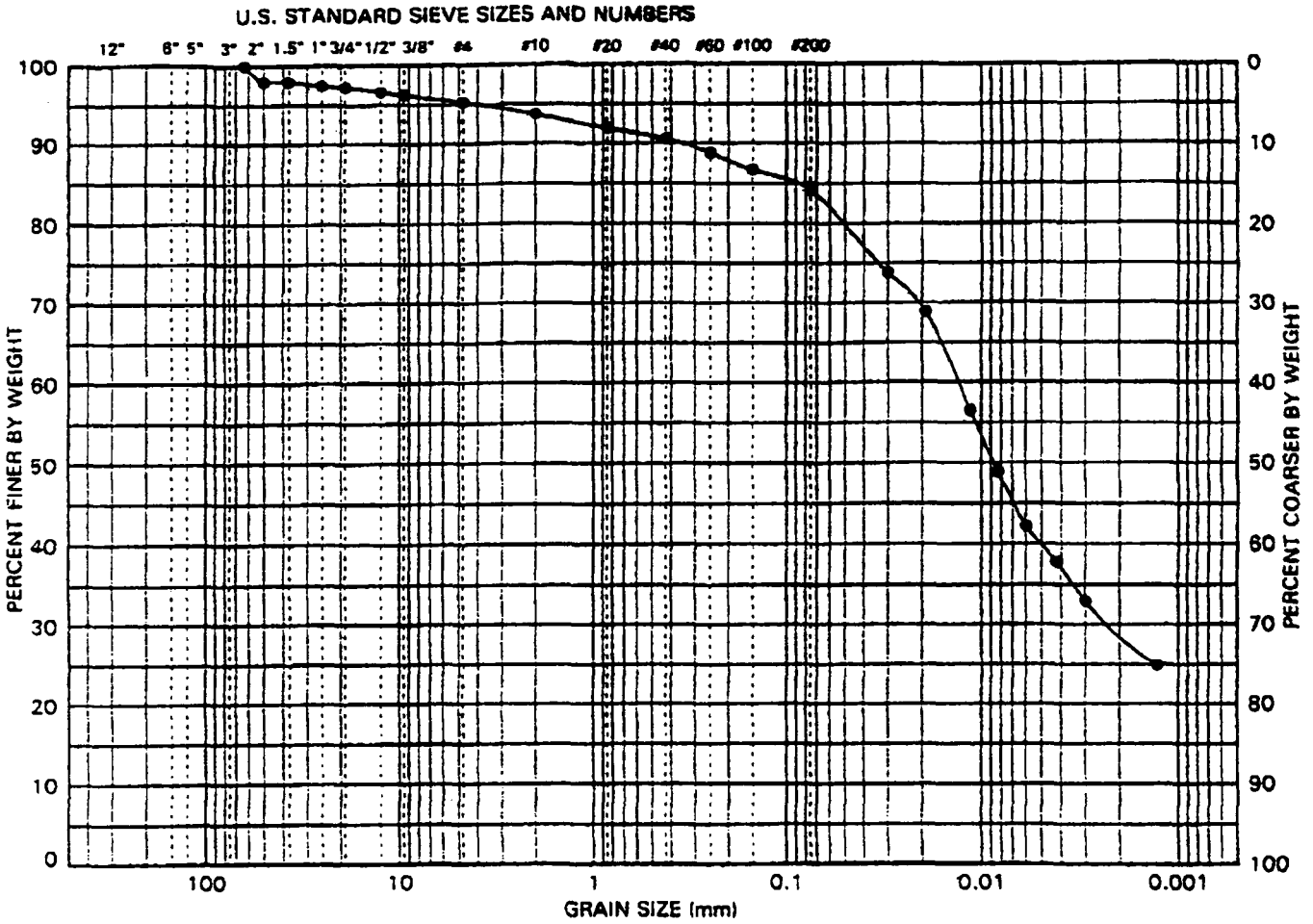
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/23/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SOIL DESC.	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-201	LIQUID LIMIT (%)	41	SOIL FRACTIONS: GRAVEL (%)	4.7
LAB. SAMPLE NO.	971196	PLASTIC LIMIT (%)	20	SAND (%)	11.2
SAMPLE DEPTH (ft)		PLASTICITY INDEX	21	FINES (%)	84.1
SOIL CLASSIFICATION:				SILT (%)	55.1
CL - Lean Clay with Sand				CLAY(%)	29.0
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	98	98	97	97	97	96	95	94	92	91	89	87	84	80	69	40	29	

NOTES:

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FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

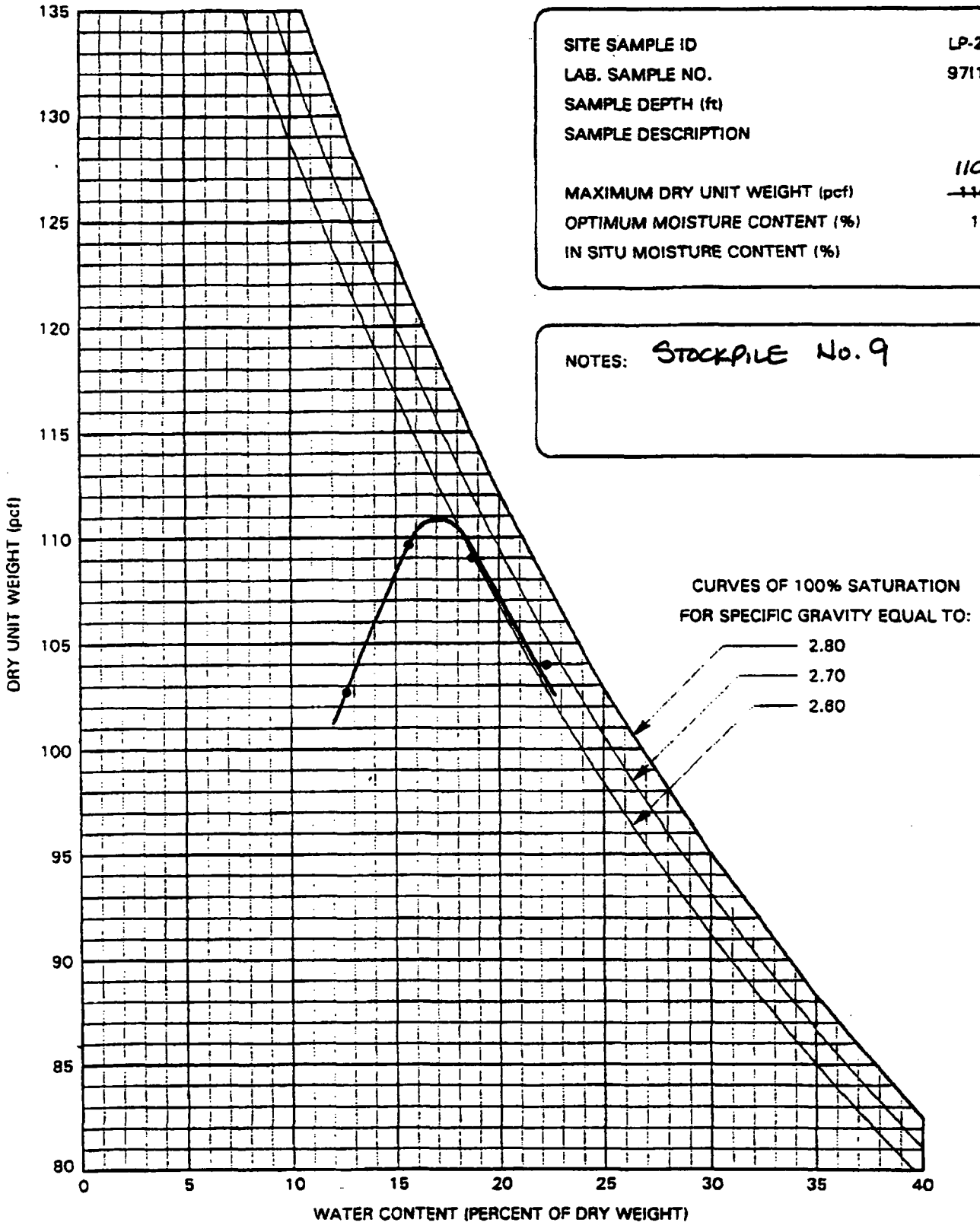
GS FORM: 4MD1 09/23/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-201
LAB. SAMPLE NO.	971196
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	~~110.4~~ 110.8
OPTIMUM MOISTURE CONTENT (%)	17.0
IN SITU MOISTURE CONTENT (%)	

NOTES: STOCKPILE No. 9



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: 15 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-202, 203, 204, 205, 206

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: RBN

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

		LP-202	LP-203	LP-204	LP-205	LP-206
	TARE NO.	102	25	8	31	5
A	WT. OF TARE	8.2	8.2	7.3	8.3	7.6
B	WT. OF WET SOIL & TARE	201.7	206.6	233.5	268.3	248.9
C	WT. OF DRY SOIL & TARE	177.3	180.4	203.3	231.7	218.7
D	WT. OF WATER = B-C	24.4	26.2	30.2	36.6	30.2
E	WT. OF DRY SOIL = C-A	169.1	172.2	196.0	223.4	211.1
F	MOISTURE CONTENT = (D/E) X 100	14.4	15.2	15.4	16.4	14.3
		NDT-316	NDT-315	NDT-298	NDT-307	NDT-299
	Gauge	13.8	13.5	14.3	14.8	13.3

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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: 15 day SEPT month 1997 year

MATERIAL TYPE: CLAYLINER SAMPLE NO.: LP-207,208

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: RBN

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

		LP-207	LP-208			
	TARE NO. _____	7	103			
A	WT. OF TARE	7.4	8.4			
B	WT. OF WET SOIL & TARE	210.6	198.0			
C	WT. OF DRY SOIL & TARE	187.5	173.8			
D	WT. OF WATER = B-C	23.1	24.2			
E	WT. OF DRY SOIL = C-A	180.1	165.4			
F	MOISTURE CONTENT = (D/E) X 100	12.8	14.6			
		NDT-297	NDT-313			
	Gauge	-12.2	13.2	---		

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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 — DATE: 16 day SEPT month 1997 year

MATERIAL TYPE: CLAYLINER — SAMPLE NO.: LP-209

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

QA ID: RBN/JL

	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6205.2				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1995.8				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.7				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	116.6	116.6			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RBN/JL

			Microwave	OVEN			
	TARE NO.		I	2			
F	WT. OF TARE	(grams)	132.1	7.6			
G	WT. OF WET SOIL & TARE	(grams)	194.8	279.9	COMPARES WITH LP-34		
H	WT. OF DRY SOIL & TARE	(grams)	187.6	248.6	MDD = 118.2 pcf		
I	WT. OF WATER = G - H	(grams)	7.2	31.3	OMC = 13.8 %		
J	WT. DRY SOIL = H - F	(grams)	55.5	241.0			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.0	13.0			

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GEO SYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: [illegible] SHEET NO. 1 OF 1

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: CHECKPOINT RESEARCH - Phase I Construction — DATE: 16 day 09 month 97 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-210

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

QA ID: JL

			*	CHECKPOINT			
	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6096.4				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1886.98				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.5				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.5	111.2			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

			Microwave	OVEN			
	TARE NO.		I	9			
F	WT. OF TARE	(grams)	132.1	7.3			
G	WT. OF WET SOIL & TARE	(grams)	210.9	259.4			
H	WT. OF DRY SOIL & TARE	(grams)	202.0	232.4			
I	WT. OF WATER = G - H	(grams)	8.9	27.0			
J	WT. DRY SOIL = H - F	(grams)	69.9	225.1			
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.7%	12.0			

compares w/ LP-158
MDD = 115.1 pcf
OMC = 15.8 %

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: RBN SHEET NO. 1 OF 1

* BRIAN Nichols observed while Jennifer L. performed test

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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 — DATE: 16 day SEPT month 1997 year

MATERIAL TYPE: CLAYLINER — SAMPLE NO.: LP-210

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

QA ID: RBN/JL

			CHECK POINT				
	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6128.0				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1919.6				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.7				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.4				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RBN/JL

			Microwave	OVEN			
	TARE NO.		I	13			
F	WT. OF TARE	(grams)	13.21	8.2			
G	WT. OF WET SOIL & TARE	(grams)	188.6	247.5	COMPARES WITH LP-158		
H	WT. OF DRY SOIL & TARE	(grams)	181.8	219.2	mdd =	115.1 pcf	
I	WT. OF WATER = G - H	(grams)	6.8	28.3	omc =	15.8 %	
J	WT. DRY SOIL = H - F	(grams)	49.7	211.0			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.7	13.4			

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GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC — CHECKED BY: [illegible] — SHEET NO. 1 OF 1

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: 16 day SEPT month 1997 year

MATERIAL TYPE: Clay liner SAMPLE NO.: LP-211, 212, 213, 214, 215

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: RBN/JC

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

		LP-211	LP-212	LP-213	LP-214	LP-215
	TARE NO.	22	10	28	26	30
A	WT. OF TARE	8.3	7.3	8.2	8.4	8.4
B	WT. OF WET SOIL & TARE	163.7	222.9	263.3	205.3	187.8
C	WT. OF DRY SOIL & TARE	144.0	194.5	231.8	180.0	161.3
D	WT. OF WATER = B-C	19.7	28.4	31.5	25.3	26.5
E	WT. OF DRY SOIL = C-A	135.7	187.2	223.6	171.6	152.9
F	MOISTURE CONTENT = (D/E) X 100	14.5	15.1	14.1	14.7	17.3
		NDT-327	NDT-331	NDT-331	NDT-342	NDT-341
		15.4	13.4	13.4	13.3	14.7

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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: 16 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-216, 217, 218

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: RBN/JC

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

		LP-216	LP-217	LP-218		
	TARE NO. _____	24	1	6		
A	WT. OF TARE	8.4	7.3	7.6		
B	WT. OF WET SOIL & TARE	230.7	240.9	232.9		
C	WT. OF DRY SOIL & TARE	204.4	209.9	203.4		
D	WT. OF WATER = B-C	26.3	31.0	29.5		
E	WT. OF DRY SOIL = C-A	196.0	202.6	195.8		
F	MOISTURE CONTENT = (D/E) X 100	13.4	15.3	15.1		
		NDT-343	NDT-347	NDT-357		
	Gauge	-10.9	12.0	15.1		

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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: 17 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-219, 220

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: RBN/JL

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

		LP-219	LP-220	LP-221	LP-222	RBN 9/17/97 ~~LP-22~~
	TARE NO.	~~I~~ II 105	104	103	102	
A	WT. OF TARE	8.2	8.2	8.4	8.2	
B	WT. OF WET SOIL & TARE	192.4	183.9	196.5	213.2	
C	WT. OF DRY SOIL & TARE	164.4	157.2	172.7	186.0	
D	WT. OF WATER = B-C	28.0	26.7	23.8	27.2	
E	WT. OF DRY SOIL = C-A	156.2	149.0	164.3	177.8	
F	MOISTURE CONTENT = (D/E) X 100	17.9	17.9	14.5	15.3	
				NDT 359	NDT 367	
	gage	-		13.5	14.0	

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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%

		LP-219	LP-220			
	TARE NO.	I	II			
A	WT. OF TARE	132.1	132.0			
B	WT. OF WET SOIL & TARE	143.3	188.6			
C	WT. OF DRY SOIL & TARE	183.3	179.9			
D	WT. OF WATER = B-C	10.0	8.7			
E	WT. OF DRY SOIL = C-A	51.2	47.9			
F	MOISTURE CONTENT = (D/E) X 100	19.5	18.2			

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: 17 day Sept month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP 223-227

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-223	LP-224	LP 225	LP 226	LP-227
	TARE NO. _____	30	24	10	9	~~27~~ 26
A	WT. OF TARE	8.3	8.4	7.3	7.2	8.3
B	WT. OF WET SOIL & TARE	257.2	213.9	207.6	232.6	251.2
C	WT. OF DRY SOIL & TARE	224.7	184.8	178.5	200.3	218.3
D	WT. OF WATER = B-C	32.5	29.1	29.1	32.3	32.9
E	WT. OF DRY SOIL = C-A	216.4	176.4	171.2	193.1	210.0
F	MOISTURE CONTENT = (D/E) X 100	15.0	16.5	17.0	16.7	15.7
		NDT 367			NDT-385	NDT-384
	gag	-11.8	16.1	14.4	14.4	14.0

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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%

		LP 223	LP 224	LP 225	LP 226	LP-227
	TARE NO.	I	II	III	IV	V
A	WT. OF TARE	132.1	132.0	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	190.9	276.6	292.8	278.5	272.2
C	WT. OF DRY SOIL & TARE	183.9	255.8	270.0	258.4	253.1
D	WT. OF WATER = B-C	7.0	20.8	22.8	20.1	19.1
E	WT. OF DRY SOIL = C-A	51.8	123.8	138.0	126.1	126.8
F	MOISTURE CONTENT = (D/E) X 100	13.5	16.8	16.5	15.9	15.1

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: 18 day Sept month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP 228, LP 229

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: KW

100% PASING THE NO. 10 (2-mm) SIEVE	microwave	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	LP-228 LP-229	2.5 kilograms

	TARE NO.	IV	I			
A	WT. OF TARE	132.3	132.1			
B	WT. OF WET SOIL & TARE	314.80	338.1			
C	WT. OF DRY SOIL & TARE	291.5	310.5			
D	WT. OF WATER = B-C	23.3	27.6			
E	WT. OF DRY SOIL = C-A	159.2	178.4			
F	MOISTURE CONTENT = (D/E) X 100	14.6	15.5			
		STOCKPILE #4	STOCKPILE #4			

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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 — DATE: 18 day Sept. month 1997 year

MATERIAL TYPE: Clay Liner, cont. pt 414 Bench N. Berm Lift #6 — SAMPLE NO.: LP 230 (JC)

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

QA ID: JC

			LP 230	CHECK POINT			
	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6236.9				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A − B	(grams)	2027.5				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.8				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.0	117.8			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: JC

				microwave			
	TARE NO.		20	III			
F	WT. OF TARE	(grams)	8.3	132.0			
G	WT. OF WET SOIL & TARE	(grams)	233.7	307.0	COMPARES WITH LP-33		
H	WT. OF DRY SOIL & TARE	(grams)	207.0	286.1	MDD = 119.1 pcf		
I	WT. OF WATER = G − H	(grams)	26.7	20.9	omc = 13.5%		
J	WT. DRY SOIL = H − F	(grams)	198.7	154.1			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.4	13.6			

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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 — DATE: 18 day Sept month 1997 year

MATERIAL TYPE: clay Liner, E. Berm cont. pt. 579 NEW. Lift 4 stockpile 4 — SAMPLE NO.: LP 231

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

QA ID: JL

			LP-231	CHECK POINT			
	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6200.6				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1991.2				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.4				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.5	115.5			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

			oven	microwave			
	TARE NO.		12	II			
F	WT. OF TARE	(grams)	7.3	132.0			
G	WT. OF WET SOIL & TARE	(grams)	216.4	294.1	COMPARES WITH LP-24		
H	WT. OF DRY SOIL & TARE	(grams)	191.0	274.5	MDD = 117.5 pcf		
I	WT. OF WATER = G - H	(grams)	25.4	19.6	OMC = 15.5%		
J	WT. DRY SOIL = H - F	(grams)	183.7	142.5			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.8	13.8			

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC — CHECKED BY: [signature] — SHEET NO. 1 OF 1

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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 — DATE: 18 day Sept month 1997 year

MATERIAL TYPE: Clay Liner, Stockpile #4 E. Berm Bench Lift #3 — SAMPLE NO.: LP-232

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

LP-232 — CHECK POINT — QA ID: JC

	WATER ADDED	(ml)	/				
A	WT. OF SOIL & MOLD	(grams)	6100.8				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1891.4				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.8				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.4	110.1			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JC

			Oven	microwave			
	TARE NO.		33	V 9/18/97 JC			
F	WT. OF TARE	(grams)	8.3	126.38			
G	WT. OF WET SOIL & TARE	(grams)	208.6	312.2	COMPARES WITH LP-01		
H	WT. OF DRY SOIL & TARE	(grams)	185.4	290.3	MDD = 115.0 pcf		
I	WT. OF WATER = G - H	(grams)	23.2	~~30.9~~ 21.9	OMC = 14.5%		
J	WT. DRY SOIL = H - F	(grams)	177.1	164.0			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.1	~~18.8~~ 13.4			

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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: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 18 day Sept month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-233 → LP 236

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-233	LP 234	LP 235	236	
	TARE NO.	6	23	101	14	
A	WT. OF TARE	7.6	8.4	8.3	7.8	
B	WT. OF WET SOIL & TARE	208.7	228.4	238.9	242.8	
C	WT. OF DRY SOIL & TARE	183.7	199.4	209.2	212.3	
D	WT. OF WATER = B-C	25.0	29.0	29.7	30.5	
E	WT. OF DRY SOIL = C-A	176.1	191.0	200.9	204.5	
F	MOISTURE CONTENT = (D/E) X 100	14.2	15.2	14.8	14.9	
		NDT-417	NDT-418	NDT-407	NDT-398	
	Avge	12.6	13.5	13.4	12.7	

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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%

		LP-233	LP-234	LP-235	LP-236	
	TARE NO.	II	IV	V	III	
A	WT. OF TARE	132.0	132.3	126.3	132.0	
B	WT. OF WET SOIL & TARE	321.1	321.0	299.0	297.9	
C	WT. OF DRY SOIL & TARE	298.3	295.6	277.3	276.2	
D	WT. OF WATER = B-C	22.8	25.4	21.7	21.5	
E	WT. OF DRY SOIL = C-A	166.3	163.3	151.0	144.2	
F	MOISTURE CONTENT = (D/E) X 100	13.7	15.6	14.4	14.9	
		NDT-417	NDT-418	NDT 407	NDT 398	

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PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

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

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-237

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
Total Sample: ~~39611.6~~ 43959.1 g PBN 9/22/97 Total >No 4 : ~~3199.4~~ 1606.5 g (grams)	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		104	104
WT. OF DRY SAMPLE PLUS TARE	(grams)	206.5	36.7
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	198.3	28.5

SIEVE ANALYSIS

QA ID: PBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0					100
1½"	37.5	0	0	100		
1"	25.0	31.4	0.1	99.9		
¾"	19.0	292.6	0.7	99.3		90-100
½"	12.5	705.9	1.6	98.4		
⅜"	9.5	973.6	2.2	97.8		
4	4.75	1565.8	3.6	96.4		
10	2.00	4.3	2.2	97.8	94.3	
20	0.850	8.7	4.4	95.6	92.2	
40	0.425	12.9	6.5	93.5	90.1	
60	0.250	16.9	8.5	91.5	88.2	
100	0.150	22.2	11.2	88.8	85.6	
200	0.075	28.5	14.4	85.6	82.5	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

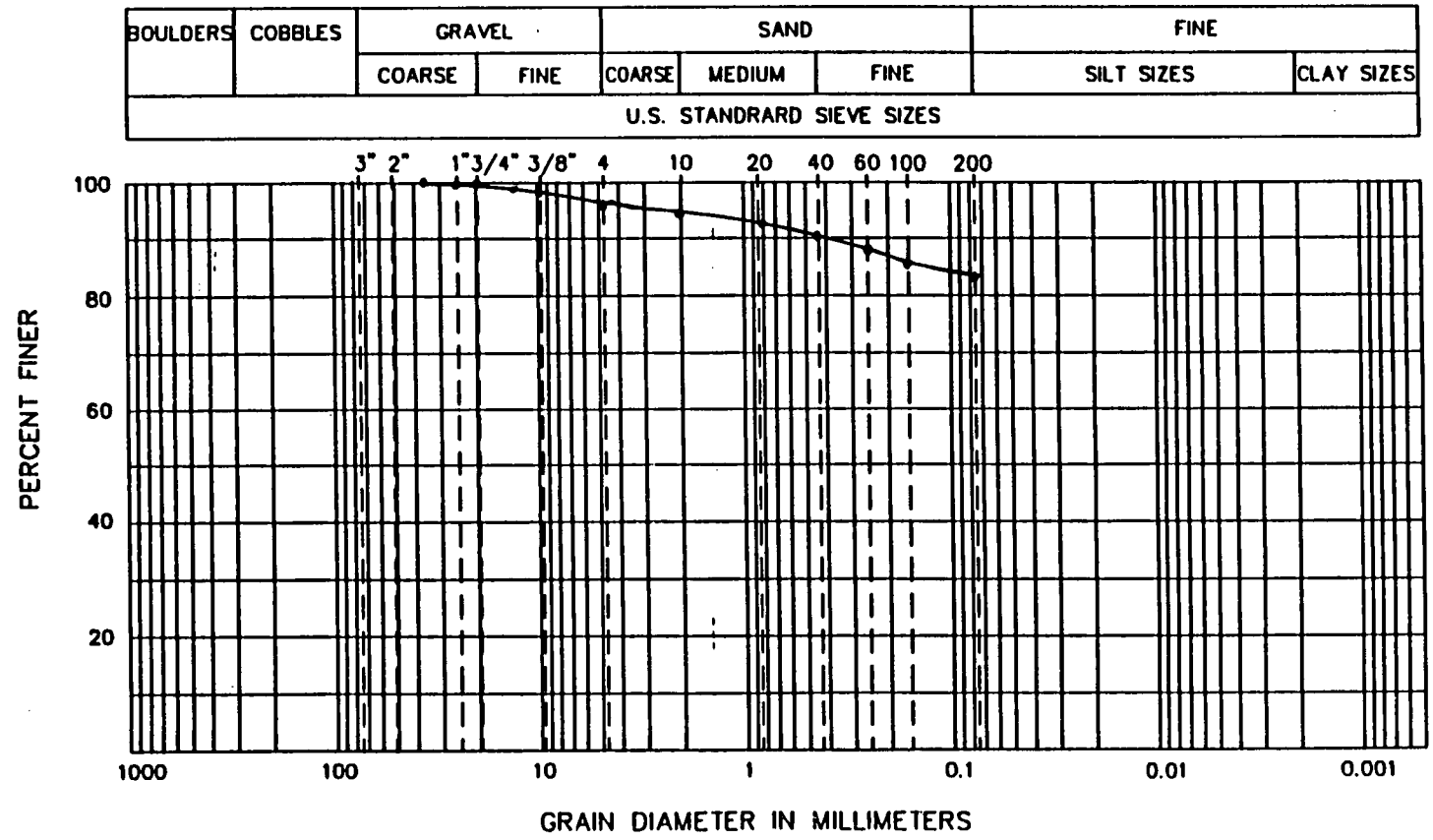
DESCRIPTION: Phase I Construction

DATE: 22 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner

SAMPLE NO.: LP-237 QA ID: RBN

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 39

(PL) 17

(PI) 22

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100
1-in.	99.9
3/4-in.	99.3
1/2-in.	98.4
3/8-in.	97.8
NO. 4	96.4
NO. 10	94.3
NO. 20	92.2
NO. 40	90.1
NO. 60	88.2
NO. 100	85.6
NO. 200	82.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	78
0.020	64
0.005	38
0.002	30

SOIL CLASSIFICATION (ASTM D 2487): Brown lean clay with sand-CL

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

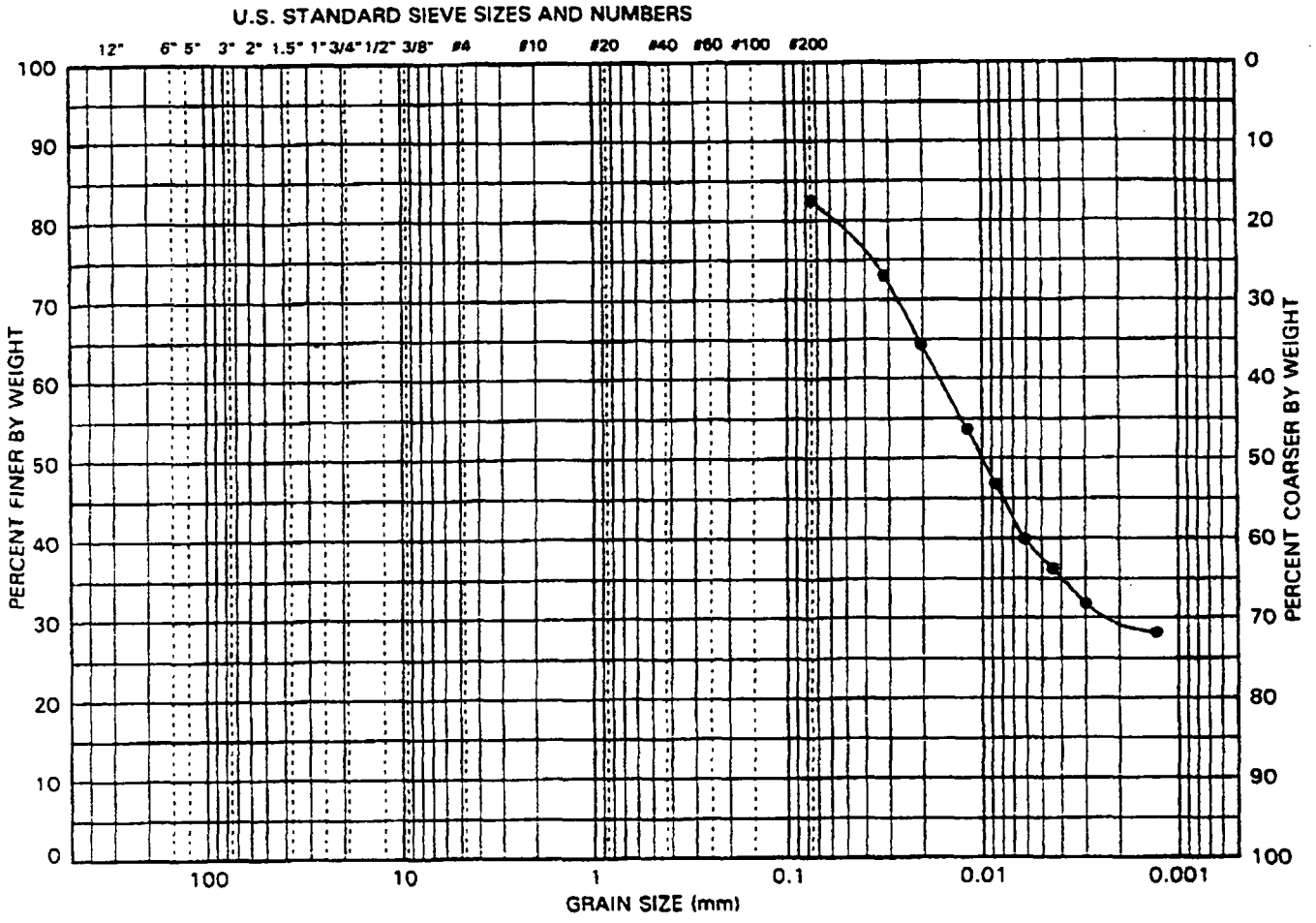
FIGURE

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0186
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-237	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	971272	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	82.5
SOIL CLASSIFICATION:				SILT (%)	52.5
				CLAY(%)	30.0
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													83	78	64	38	30	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

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

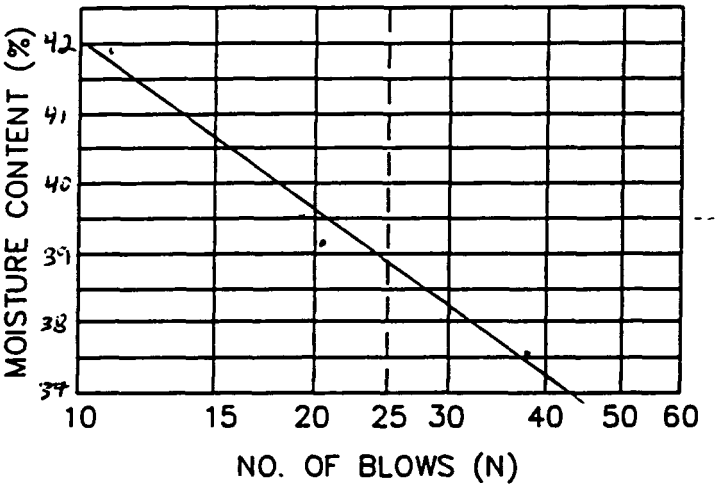
MATERIAL TYPE: CLAYLINER SAMPLE NO.: LP-237

LIQUID LIMIT DETERMINATION

QA ID: RBN

	TARE NO.		2.7	1.4	1.9	
A	WT. OF TARE	(grams)	28.67	28.52	28.56	
B	WT. OF WET SOIL & TARE	(grams)	~~38.43~~ 46.00 RBN 9/22/97	46.03	50.47	
C	WT. OF DRY SOIL & TARE	(grams)	41.70	41.10	44.0	
D	WT. OF WATER = B-C	(grams)	4.90	4.43	6.47	
E	WT. OF DRY SOIL = C-A	(grams)	13.03	12.58	15.44	
F	MOISTURE CONTENT = (D/E)X100	(%)	37.6	39.2	41.9	
N	NUMBER OF BLOWS		38	RBN 9/22/97 ~~20~~ 21	12	

DRYING TARE NO.: G



CURING TARE NO.: Z

PLASTIC LIMIT DETERMINATION

QA ID: RBN

	TARE NO.		3.1	3.2		
A	WT. OF TARE	(grams)	28.38	27.82		
B	WT. OF WET SOIL & TARE	(grams)	34.80	35.0		
C	WT. OF DRY SOIL & TARE	(grams)	33.80	34.0		
D	WT. OF WATER = B-C	(grams)	1.00	1.0		
E	WT. OF DRY SOIL = C-A	(grams)	5.42	6.18		
F	MOISTURE CONTENT = (D/E)X100	(%)	18.5	16.2		

LIQUID LIMIT (LL) = 39 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 22

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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 — DATE: 21 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-237

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

QA ID: RBN

	WATER ADDED	(ml)	100ml	150ml	200ml	50ml	
A	WT. OF SOIL & MOLD	(grams)	6064.6	6150.8	6171.2	5964.8	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1855.2	1941.4	1961.8	1755.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	122.4	128.1 RBN 9/22/97	129.5	115.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	106.6	~~106.5~~ 109.3	108.7	102.8	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: RBN

	TARE NO.		28 ~~8-2~~ RBN 9/22/97	12	20	11	
F	WT. OF TARE	(grams)	8.2	7.3	8.3	7.3	
G	WT. OF WET SOIL & TARE	(grams)	254.6	275.8	271.4	270.2	
H	WT. OF DRY SOIL & TARE	(grams)	222.9	236.3	229.2	240.5	
I	WT. OF WATER = G - H	(grams)	31.7	~~46.6~~ 39.5	42.2	29.7	
J	WT. DRY SOIL = H - F	(grams)	214.7	229.0 RBN 9/22/97	220.9	233.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.8	~~20.3~~ 17.2	19.1	12.7	

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FLUOR DANIEL FERNALD

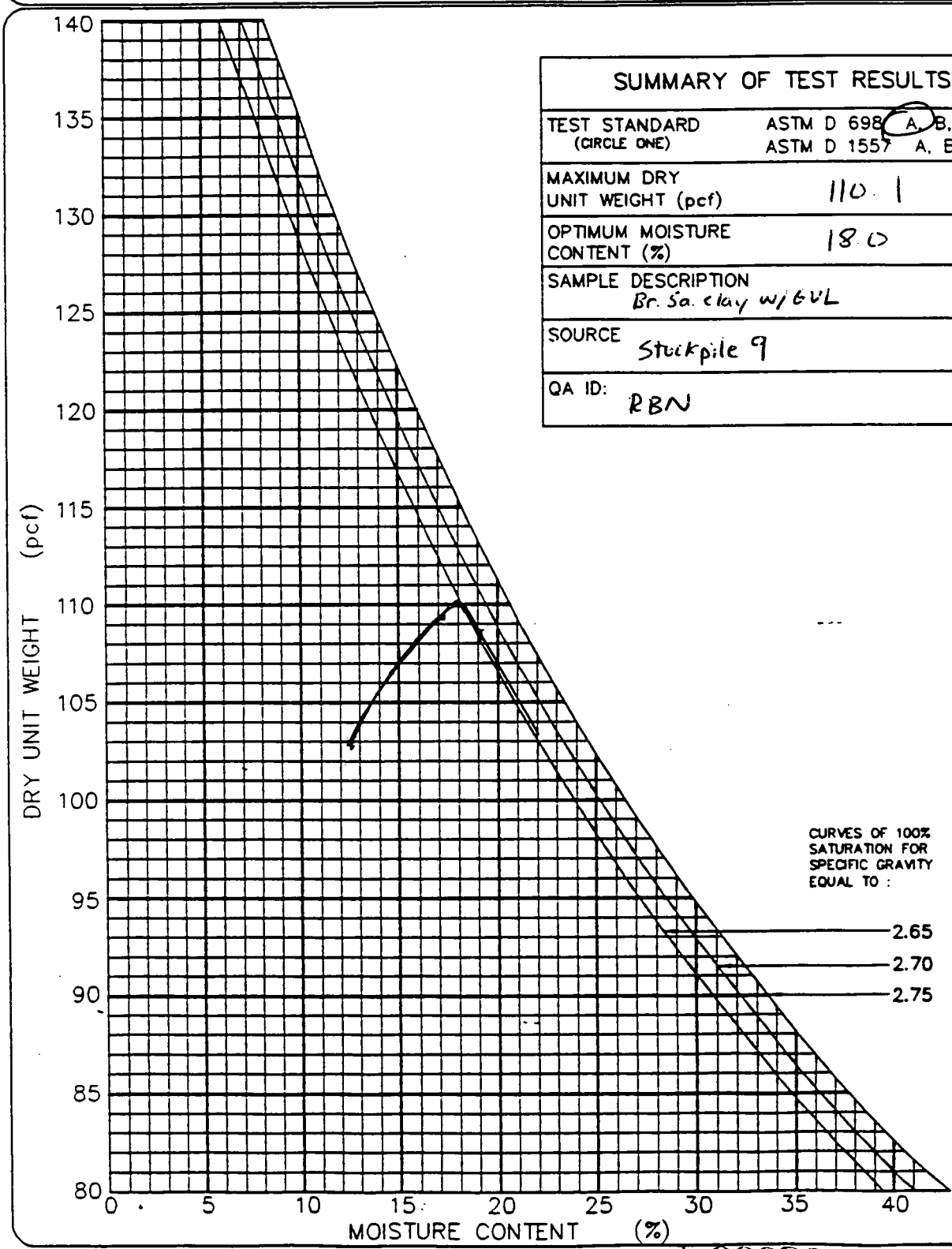
MOISTURE-DENSITY RELATIONSHIP

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-237



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	110.1
OPTIMUM MOISTURE CONTENT (%)	18.0
SAMPLE DESCRIPTION	Br. Sa. clay w/ GVL
SOURCE	Stockpile 9
QA ID:	RBN

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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 DATE: 19 day Sept month 1997 year

MATERIAL TYPE: Clay Liner, Stock pile 4 NE corner cell 1 berm -end dump SAMPLE NO.: LP 238

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

CHECK POINT QA ID: JL

	WATER ADDED	(ml)	/				
A	WT. OF SOIL & MOLD	(grams)	6191.5				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1982.1				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.8				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.9				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

			OVEN	Microwave			
	TARE NO.		12	IV			
F	WT. OF TARE	(grams)	7.3	132.3			
G	WT. OF WET SOIL & TARE	(grams)	217.9	306.7	COMPARES WITH LP-25		
H	WT. OF DRY SOIL & TARE	(grams)	193.8	286.8	MDD = 118.3 pcf		
I	WT. OF WATER = G - H	(grams)	24.1	19.9	OMC = 14.0%		
J	WT. DRY SOIL = H - F	(grams)	186.5	154.5			
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.9	12.9			

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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 — DATE: 19 day Sept month 1997 year

MATERIAL TYPE: Clay liner, stockpile 7 — SAMPLE NO.: LP 239

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

CHECK POINT — QA ID: JC

	WATER ADDED	(ml)	✓				
A	WT. OF SOIL & MOLD	(grams)	6123.5				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1914.1				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.3				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.1				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JC

			oven	microwave			
	TARE NO.		11	▽			
F	WT. OF TARE	(grams)	7.3	126.3			
G	WT. OF WET SOIL & TARE	(grams)	210.0	293.7	COMPARES WITH LP-01		
H	WT. OF DRY SOIL & TARE	(grams)	186.5	274.8	MDD = 115.0 pcf		
I	WT. OF WATER = G - H	(grams)	23.5	18.9	OMC = 14.5%		
J	WT. DRY SOIL = H - F	(grams)	179.2	148.5			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.1	12.7			

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GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC — CHECKED BY: HEM — SHEET NO. 1 OF 1

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 - stockpile 7 — DATE: 20 day SEPT month 1997 year

MATERIAL TYPE: clay liner — SAMPLE NO.: LP-240

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

* (compares w/LP 158 (115.1 pcf/15.8% MC)) CHECK POINT — QA ID: RBN

	WATER ADDED	(ml)	—				
A	WT. OF SOIL & MOLD	(grams)	6223.4				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	2014.0				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	132.9				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	* 115.1				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

			Microwave	oven			
	TARE NO.		5	14			
F	WT. OF TARE	(grams)	92.2	7.8			
G	WT. OF WET SOIL & TARE	(grams)	188.1	218.3	COMPARES WITH LP-24		
H	WT. OF DRY SOIL & TARE	(grams)	175.2	184.2	MDD = 117.5 pcf		
I	WT. OF WATER = G - H	(grams)	12.9	29.1	OMC = 15.5%		
J	WT. DRY SOIL = H - F	(grams)	83.0	210.5			
K	MOISTURE CONTENT = (I/J) X 100	(%)	* 15.5	13.8			

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC — CHECKED BY: [illegible] — SHEET NO. 1 OF 1

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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 - stockpile 4

DATE: 20 day Sept month 1997 year

MATERIAL TYPE: Clay Liner

SAMPLE NO.: LP-241

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

Checkpoint - compares with LP-14

QA ID: JL

	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6246.0				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	2036.6				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	134.4				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.2				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

			MICROWAVE	OVEN			
	TARE NO.		III	101			
F	WT. OF TARE	(grams)	13.20	8.3			
G	WT. OF WET SOIL & TARE	(grams)	252.8	276.5	COMPARES WITH LP-25		
H	WT. OF DRY SOIL & TARE	(grams)	238.2	244.1	MDD = 118.3 pcf		
I	WT. OF WATER = G - H	(grams)	14.6	32.4	omc = 14.0%		
J	WT. DRY SOIL = H - F	(grams)	106.2	235.8			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.7	13.7			

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SHEET NO. 1 OF 1

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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 DATE: 22 day Sept month 97 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP 242

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

CHECK POINT QA ID: RBW/JL

	WATER ADDED	(ml)	— 9/22/97 JL				
A	WT. OF SOIL & MOLD	(grams)	6173.45				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A − B	(grams)	1964.1				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.6				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.9				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: RBW/JL

			Microwave	Oven			
	TARE NO.		IV	103			
F	WT. OF TARE	(grams)	13.24	8.4	* compares w/LP 175 (112.5 pcf/16.2% MC)		
G	WT. OF WET SOIL & TARE	(grams)	239.6	287.1			
H	WT. OF DRY SOIL & TARE	(grams)	225.0	249.5			
I	WT. OF WATER = G − H	(grams)	14.6	37.6			
J	WT. DRY SOIL = H − F	(grams)	92.6	241.1			
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.8	15.6			

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 25 day SEPT month 1997 year

MATERIAL TYPE: Clay liner SAMPLE NO.: LP-243

SOIL SAMPLE SIZE TOTAL SAMPLE = 43,024.0 gms
> NO. 4 = 802.9 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		2	13
WT. OF DRY SAMPLE PLUS TARE	(grams)	158.2	32.6
WT. OF TARE	(grams)	7.7	8.2
WT. OF DRY SAMPLE	(grams)	150.5	24.4

SIEVE ANALYSIS QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	67.5	.2	99.5		
1"	25.0	120.5	.3	99.7		
¾"	19.0	227.8	.5	99.5		90-100
½"	12.5	404.9	.9	99.1		
⅜"	9.5	524.9	1.2	98.8		
4	4.75	777.3	1.5	98.2		
10	2.00	3.9	2.6	97.4	95.6	
20	0.850	7.8	6.5	93.5	91.8	
40	0.425	14.6	9.7	90.3	88.7	
60	0.250	17.6	11.7	88.3	86.7	
100	0.150	20.8	13.5	86.2	84.6	
200	0.075	24.4	16.2	83.8	82.3	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

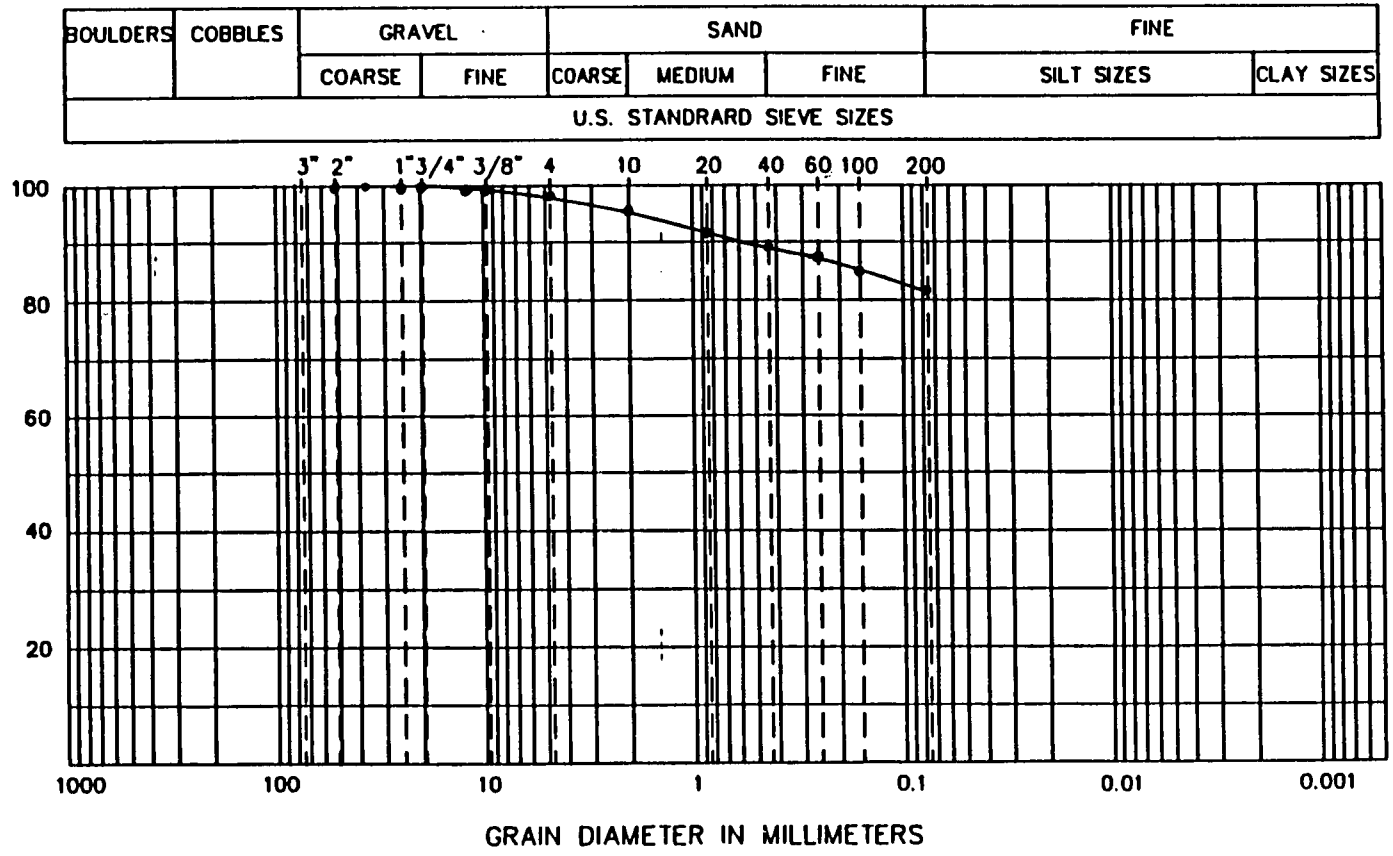
DESCRIPTION: Phase I Construction

DATE: 26 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner

SAMPLE NO.: LP-243 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 42

(PL) 20

(PI) 22

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.8
1-in.	99.7
3/4-in.	99.5
1/2-in.	99.1
3/8-in.	98.8
NO. 4	98.2
NO. 10	95.6
NO. 20	91.8
NO. 40	88.7
NO. 60	86.7
NO. 100	84.4
NO. 200	82.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	77
0.020	61
0.005	33
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): BROWN LEAN CLAY (CL) w/some sand and tr. of GVL.

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SHEET NO. 2 OF 2

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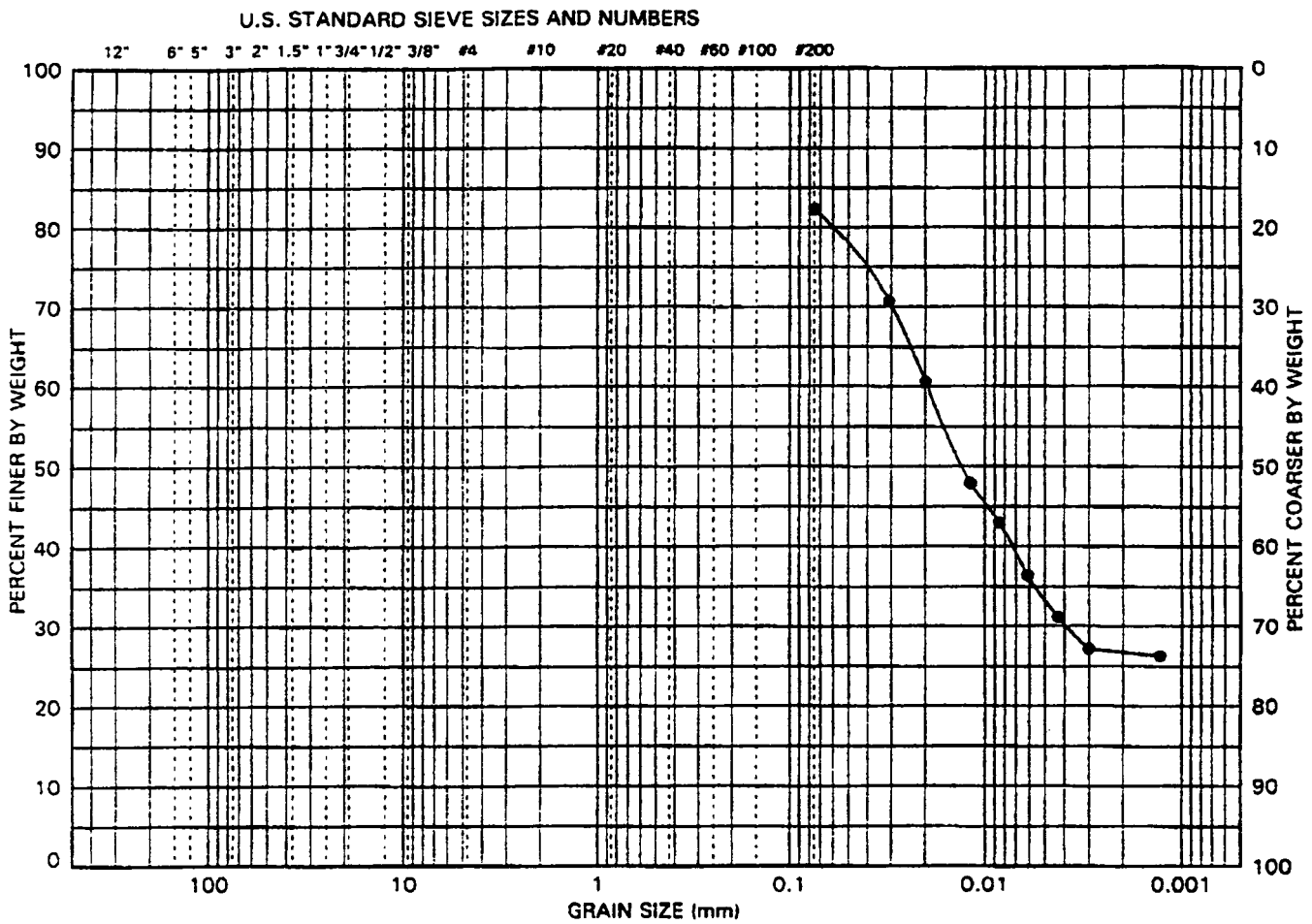
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/29/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-243	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	971327	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	82.3
SOIL CLASSIFICATION:				SILT (%)	55.5
-				CLAY(%)	26.8
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													82	77	61	33	27	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

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

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP 243

LIQUID LIMIT DETERMINATION

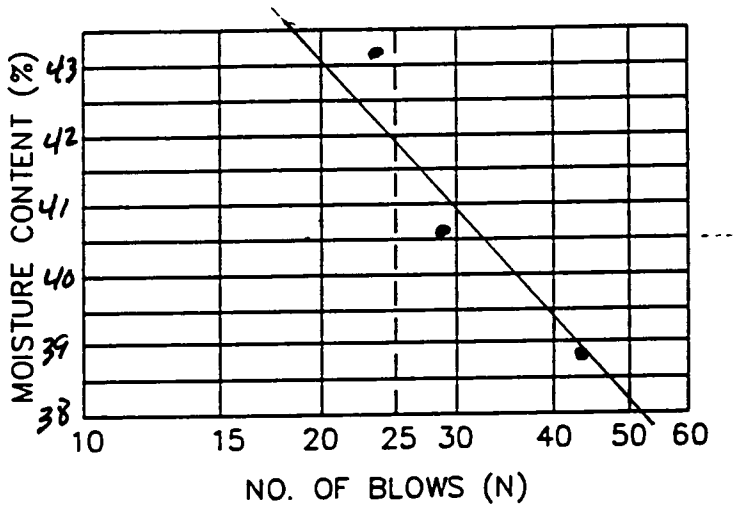
QA ID: NM

	TARE NO.		1.4	1.9	2.7	
A	WT. OF TARE	(grams)	28.52	28.56	28.67	
B	WT. OF WET SOIL & TARE	(grams)	45.52	46.57	47.02	
C	WT. OF DRY SOIL & TARE	(grams)	40.77	41.37	41.50	
D	WT. OF WATER = B-C	(grams)	4.75	5.20	5.52	
E	WT. OF DRY SOIL = C-A	(grams)	12.25	12.81	12.83	
F	MOISTURE CONTENT = (D/E)X100	(%)	38.78	40.59	43.02	
N	NUMBER OF BLOWS		44	29	24	

DRYING TARE NO.

G

Test observed by Jennifer Lepkowski 9/30/97



CURING TARE NO.

II

CL

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		3.1	3.2		
A	WT. OF TARE	(grams)	28.38	27.82		
B	WT. OF WET SOIL & TARE	(grams)	40.33	38.76		
C	WT. OF DRY SOIL & TARE	(grams)	38.37	~~37.0~~ 36.96		
D	WT. OF WATER = B-C	(grams)	1.96	1.80		
E	WT. OF DRY SOIL = C-A	(grams)	9.99	9.14		
F	MOISTURE CONTENT = (D/E)X100	(%)	19.62	19.69		

LIQUID LIMIT (LL) = 42 PLASTIC LIMIT (PL) = 20 PLASTICITY INDEX (PI) = 22

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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 — DATE: 24 day SEPT month 97 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-243

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

QA ID: NM/JL

	WATER ADDED	(ml)	50mL	100mL	150mL	200mL	
A	WT. OF SOIL & MOLD	(grams)	6023.8	6091.8	6105.5	6069.2	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1814.4	1882.4	1896.1	1859.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	119.8	124.2	125.1	122.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	102.4	104.0	103.4	98.5	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: NM/JL

	TARE NO.		11	6	20	12	
F	WT. OF TARE	(grams)	7.84	7.6	8.3	7.3	
G	WT. OF WET SOIL & TARE	(grams)	203.8	259.8	220.6	197.2	
H	WT. OF DRY SOIL & TARE	(grams)	175.2	218.8	183.8	159.7	
I	WT. OF WATER = G - H	(grams)	28.6	41.0	36.8	37.5	
J	WT. DRY SOIL = H - F	(grams)	167.8	211.2	175.5	152.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	17.0	19.4	21.0	24.6	

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FLUOR DANIEL FERNALD

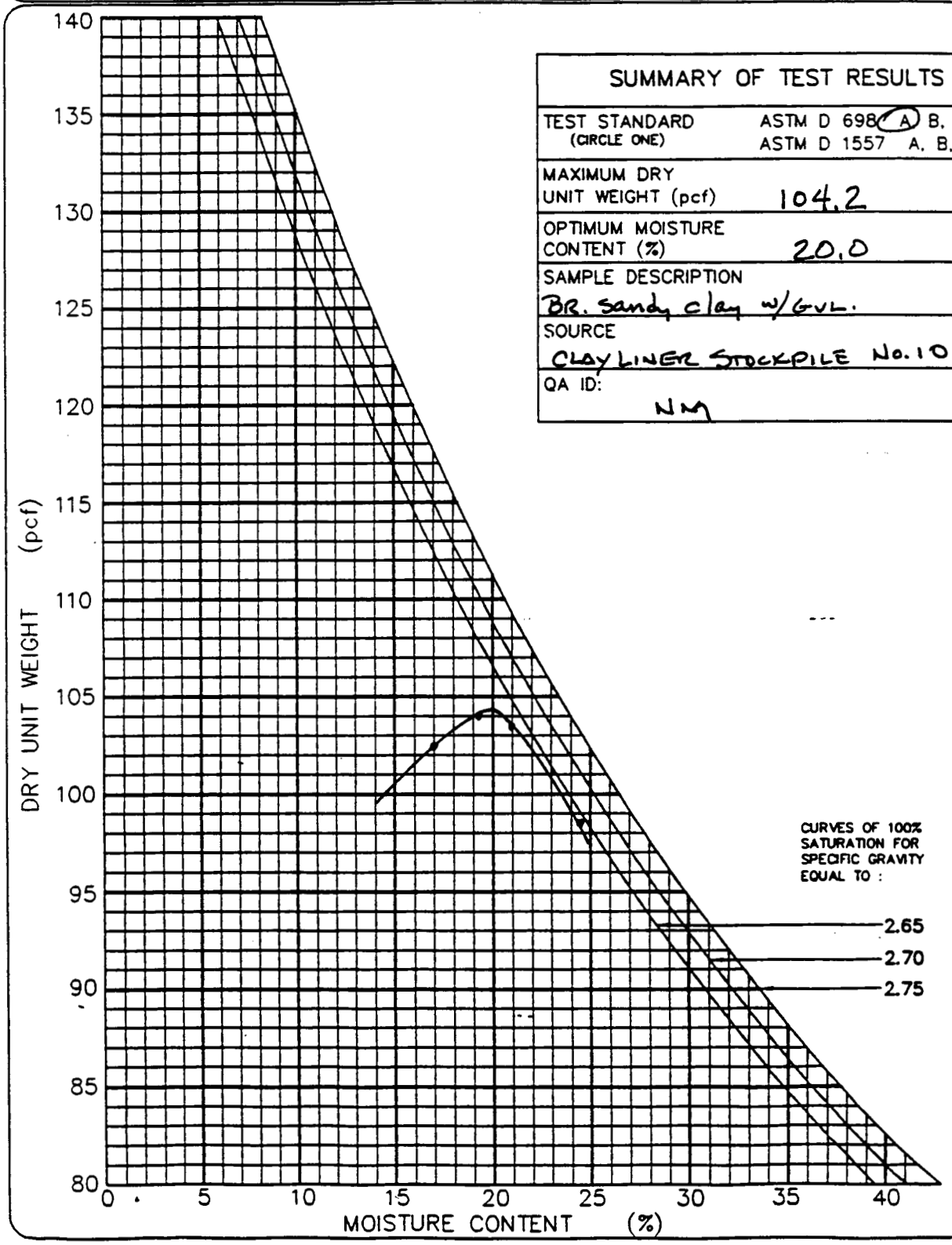
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 25 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-243



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	104.2
OPTIMUM MOISTURE CONTENT (%)	20.0
SAMPLE DESCRIPTION	BR. sandy clay w/GVL.
SOURCE	CLAY LINER STOCKPILE No. 10
QA ID:	NM

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FLUOR DANIEL FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction. DATE: 22 day Sept. month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP 244 - 248

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-244	LP-245	LP-246	LP 247	LP-248
	TARE NO.	12	6	28	14	20
A	WT. OF TARE	7.3	7.6	8.2	7.7	8.3
B	WT. OF WET SOIL & TARE	244.9	228.0	219.2	219.1	211.2
C	WT. OF DRY SOIL & TARE	217.3	194.0	190.6	190.8	182.4
D	WT. OF WATER = B-C	27.6	34.0	28.6	28.3	28.8
E	WT. OF DRY SOIL = C-A	210.0	186.4	182.4	183.1	174.1
F	MOISTURE CONTENT = (D/E) X 100	13.1	18.2	15.7	15.5	16.5
		NDT-470	NDT-490	NDT-492	NDT 493	NDT 494
	gage	-11.6	15.8	14.1	14.2	15.4

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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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 — DATE: 23 day SEPT month 1997 year

MATERIAL TYPE: Clay Liner stockpile 5 — SAMPLE NO.: LP-249

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

QA ID: RBN

			checkpoint				
	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	6205.2				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A − B	(grams)	1995.8				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.7				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.1				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: RBN

			microwave	oven			
	TARE NO.		IV	11			
F	WT. OF TARE	(grams)	132.3	7.3			
G	WT. OF WET SOIL & TARE	(grams)	284.3	274.8	COMPARES WITH LP-27		
H	WT. OF DRY SOIL & TARE	(grams)	264.0	239.6	MDD = 114.8 pcf		
I	WT. OF WATER = G − H	(grams)	20.3	35.2	OMC = 15.9%		
J	WT. DRY SOIL = H − F	(grams)	131.7	232.3			
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.4	15.2			

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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

DATE: 24 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-251

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

CK. POINT

QA ID: NM

	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6014.7				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1805.3				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	119.2				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	108.8				

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: NM

			OVEN	MICROWAVE			
	TARE NO.		13	III			
F	WT. OF TARE	(grams)	8.2	132.0			
G	WT. OF WET SOIL & TARE	(grams)	260.8	296.0	COMPARES WITH LP-34		
H	WT. OF DRY SOIL & TARE	(grams)	238.8	281.7	MDD = 118.2 pcf		
I	WT. OF WATER = G - H	(grams)	22.0	14.3	OMC = 13.8%		
J	WT. DRY SOIL = H - F	(grams)	230.6	149.7			
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.5	9.6			

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC

CHECKED BY: [illegible]

SHEET NO. 1 OF 1

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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: 24 day Sept month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-250 -255

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: JL/NM

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

STR. FILL

		LP-250	LP-252	LP-253	LP-254	LP-255
	TARE NO.	3	29	27	101	23
A	WT. OF TARE	7.6	8.2	8.2	8.3	8.4
B	WT. OF WET SOIL & TARE	207.8	217.6	219.8	192.9	230.9
C	WT. OF DRY SOIL & TARE	178.8	188.2	187.4	167.6	196.4
D	WT. OF WATER = B-C	29.0	29.4	32.4	25.3	34.5
E	WT. OF DRY SOIL = C-A	171.2	180.0	179.2	159.3	188.0
F	MOISTURE CONTENT = (D/E) X 100	16.9	16.3	18.1	15.9	18.4
		NDT-534	NDT-551	NDT-547	NDT-585	NDT-557
	Jage	14.3	13.7	15.8	13.7	16.4

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: JL/NM

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.	III	IV			
A	WT. OF TARE	132.0	132.0			
B	WT. OF WET SOIL & TARE	235.5	240.4			
C	WT. OF DRY SOIL & TARE	221.0	225.6			
D	WT. OF WATER = B-C	14.5	14.8			
E	WT. OF DRY SOIL = C-A	89.0	93.6			
F	MOISTURE CONTENT = (D/E) X 100	16.3	15.8			

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FLUOR DANIEL FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-256, 257

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: WM/JL

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

		LP-256	LP-257			
	TARE NO.	14	28			
A	WT. OF TARE	7.8	8.3			
B	WT. OF WET SOIL & TARE	209.1	201.6			
C	WT. OF DRY SOIL & TARE	181.5	172.4			
D	WT. OF WATER = B-C	27.6	29.2			
E	WT. OF DRY SOIL = C-A	173.7	164.1			
F	MOISTURE CONTENT = (D/E) X 100	15.9	17.8			
		NDT-558	NDT-562			
	Gauge	-13.7	15.8	---		

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE	--				
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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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: 25 day Sept month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-258, 259, 260

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-258	LP-259	LP-260		
	TARE NO.	2	28	20		
A	WT. OF TARE	8.1	8.2	8.3		
B	WT. OF WET SOIL & TARE	207.9	203.5	209.5		
C	WT. OF DRY SOIL & TARE	182.4	174.7	180.4		
D	WT. OF WATER = B-C	25.5	28.8	29.1		
E	WT. OF DRY SOIL = C-A	174.3	166.5	172.1		
F	MOISTURE CONTENT = (D/E) X 100	14.6	17.3	16.9		
		NDT 564	NDT 567	NDT 569		
	gage	-12.7	14.6	15.5...		

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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%

		LP-258	LP-259	LP-260		
	TARE NO.	III	IV	I		
A	WT. OF TARE	132.0	132.3	132.1		
B	WT. OF WET SOIL & TARE	254.4	238.2	244.7		
C	WT. OF DRY SOIL & TARE	239.1	223.1	228.2		
D	WT. OF WATER = B-C	15.3	15.1	16.5		
E	WT. OF DRY SOIL = C-A	107.1	90.8	96.1		
F	MOISTURE CONTENT = (D/E) X 100	14.3	16.6	17.2		

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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 — DATE: 25 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-261

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

QA ID: NM

			CHECK POINT				
	WATER ADDED	(ml)	—				
A	WT. OF SOIL & MOLD	(grams)	6187.1				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1977.7				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.5				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.4	113.4			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: NM/JL

			OVEN	MICROWAVE			
	TARE NO.		3	V			
F	WT. OF TARE	(grams)	7.6	126.3			
G	WT. OF WET SOIL & TARE	(grams)	177.8	258.9			
H	WT. OF DRY SOIL & TARE	(grams)	155.5	241.5			
I	WT. OF WATER = G - H	(grams)	22.3	17.4			
J	WT. DRY SOIL = H - F	(grams)	147.9	115.2			
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.1	15.1			

COMPARES WITH LP-158
MDD = 115.1 pcf
OMC = 15.8 %

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 03 day OCT month 1997 year

MATERIAL TYPE: SAMPLE NO.: LP-262

SOIL SAMPLE SIZE TOTAL SAMPLE = 20,430.1 g
>No.4 SAMPLE = 684.9 g

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		33	33
WT. OF DRY SAMPLE PLUS TARE	(grams)	126.9	31.8
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	118.6	23.5

SIEVE ANALYSIS QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	0	0	100		
1"	25.0	131.9	.6	99.4		
3/4	19.0	205.7	1.0	99.0		90-100
1/2	12.5	360.5	1.8	98.2		
3/8	9.5	446.1	2.2	97.8		
4	4.75	650.4	3.2	96.8		
10	2.00	2.2	1.9	98.1	95.0	
20	0.850	6.1	5.1	94.9	91.9	
40	0.425	10.7	9.0	91.0	88.1	
60	0.250	14.4	12.1	87.9	85.1	
100	0.150	18.5	15.6	84.4	81.7	
200	0.075	23.4	19.7	80.3	77.7	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

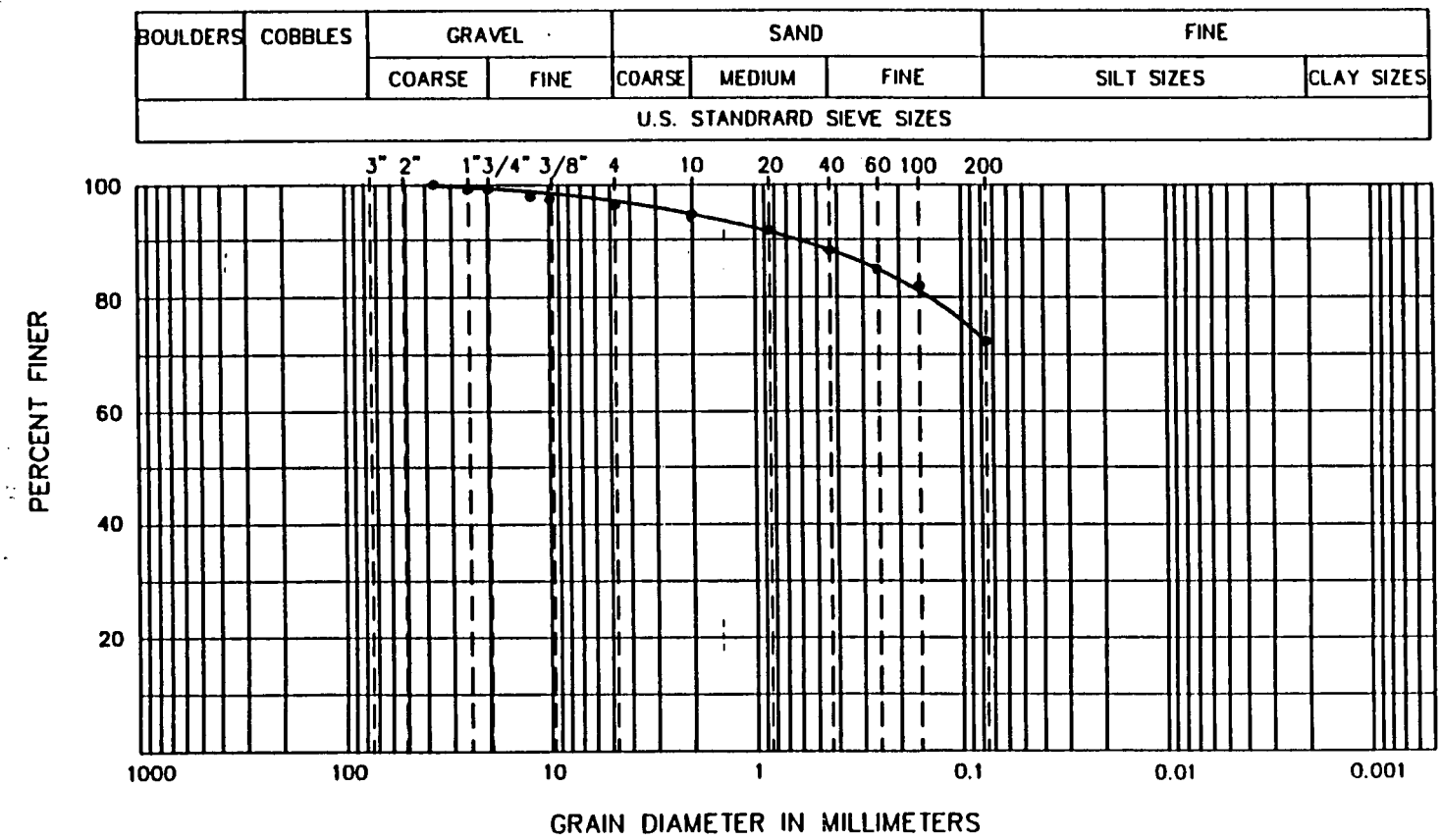
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 03 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-262 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 37

(PL) 19

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.4
3/4-in.	99.0
1/2-in.	98.2
3/8-in.	97.8
NO. 4	96.8
NO. 10	95.0
NO. 20	91.9
NO. 40	88.1
NO. 60	85.1
NO. 100	81.7
NO. 200	72.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.080	~~78~~ 74
0.020	~~74~~ 58
0.005	~~58~~ 33
0.002	25

10/21/97

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) W/TR. of GVL.

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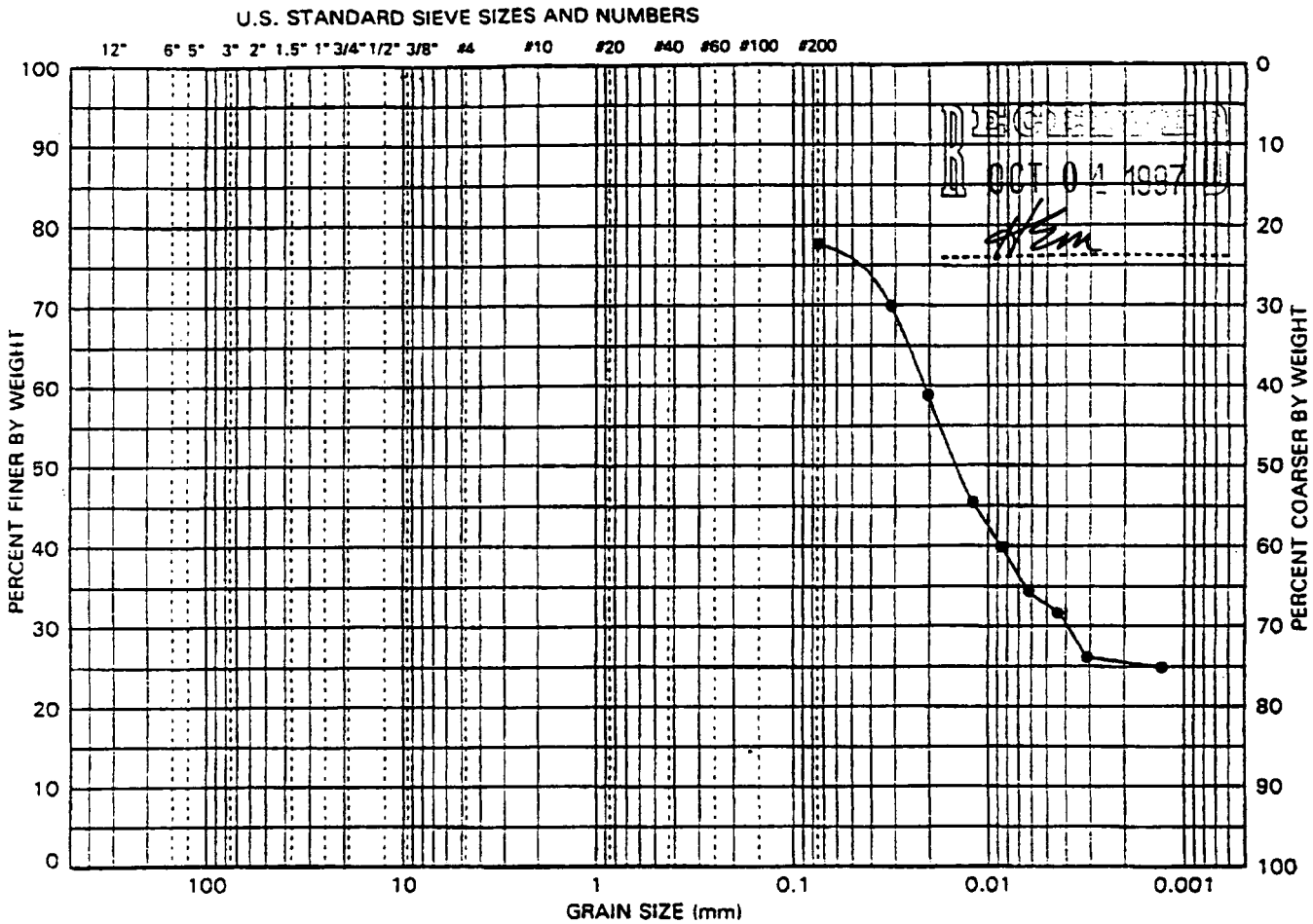
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-262	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	971357	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	77.7
SOIL CLASSIFICATION:				SILT (%)	52.2
				CLAY(%)	25.5
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													78	74	58	33	25	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-262

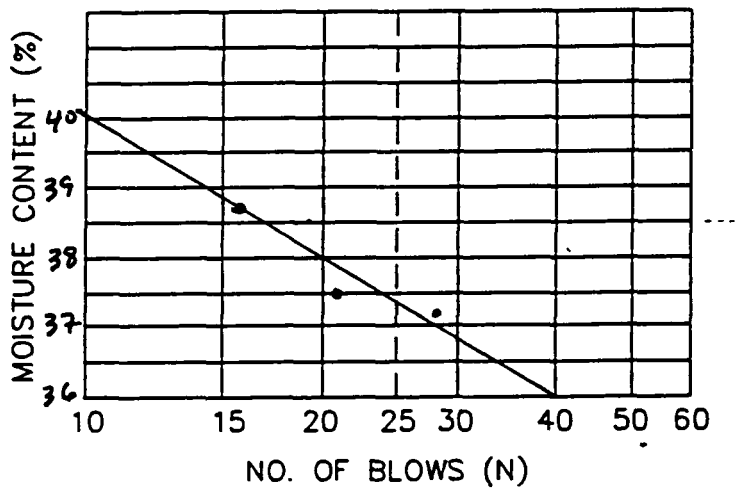
LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.7	3.1	3.2	
A	WT. OF TARE	(grams)	28.67	28.38	27.82	
B	WT. OF WET SOIL & TARE	(grams)	46.35	44.74	43.67	
C	WT. OF DRY SOIL & TARE	(grams)	41.56	40.28	39.25	
D	WT. OF WATER = B-C	(grams)	4.79	4.46	4.42	
E	WT. OF DRY SOIL = C-A	(grams)	12.89	11.90	11.43	
F	MOISTURE CONTENT = (D/E)X100	(%)	37.2	37.5	38.7	
N	NUMBER OF BLOWS		28	21	16	

DRYING TARE NO.

G



CURING TARE NO.

J-B

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		1.4	2.3		
A	WT. OF TARE	(grams)	28.52	31.20		
B	WT. OF WET SOIL & TARE	(grams)	42.95	41.39		
C	WT. OF DRY SOIL & TARE	(grams)	40.66	39.78		
D	WT. OF WATER = B-C	(grams)	2.29	1.61		
E	WT. OF DRY SOIL = C-A	(grams)	12.14	8.58		
F	MOISTURE CONTENT = (D/E)X100	(%)	18.9	18.8		

LIQUID LIMIT (LL) = 37 PLASTIC LIMIT (PL) = 19 PLASTICITY INDEX (PI) = 18

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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 — DATE: 27 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-262

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

QA ID: RBN

	WATER ADDED	(ml)	50	100ml	150ml	200	
A	WT. OF SOIL & MOLD	(grams)	6001.1	6116.8	6141.7	6132.7	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A − B	(grams)	1791.7	1907.4	1932.3	1923.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	118.3	125.9	127.5	126.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	102.6	106.9	106.9	104.2	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT − ASTM D 2216

QA ID: RBN

	TARE NO.		104	103	5	1	
F	WT. OF TARE	(grams)	8.2	8.4	7.6	7.3	
G	WT. OF WET SOIL & TARE	(grams)	283.5	271.8	250.5	276.4	
H	WT. OF DRY SOIL & TARE	(grams)	247.0	232.0	211.2	228.3	
I	WT. OF WATER = G − H	(grams)	36.5	39.8	39.3	48.1	
J	WT. DRY SOIL = H − F	(grams)	238.8	223.6	203.6	221.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.3	17.8	19.3	21.8	

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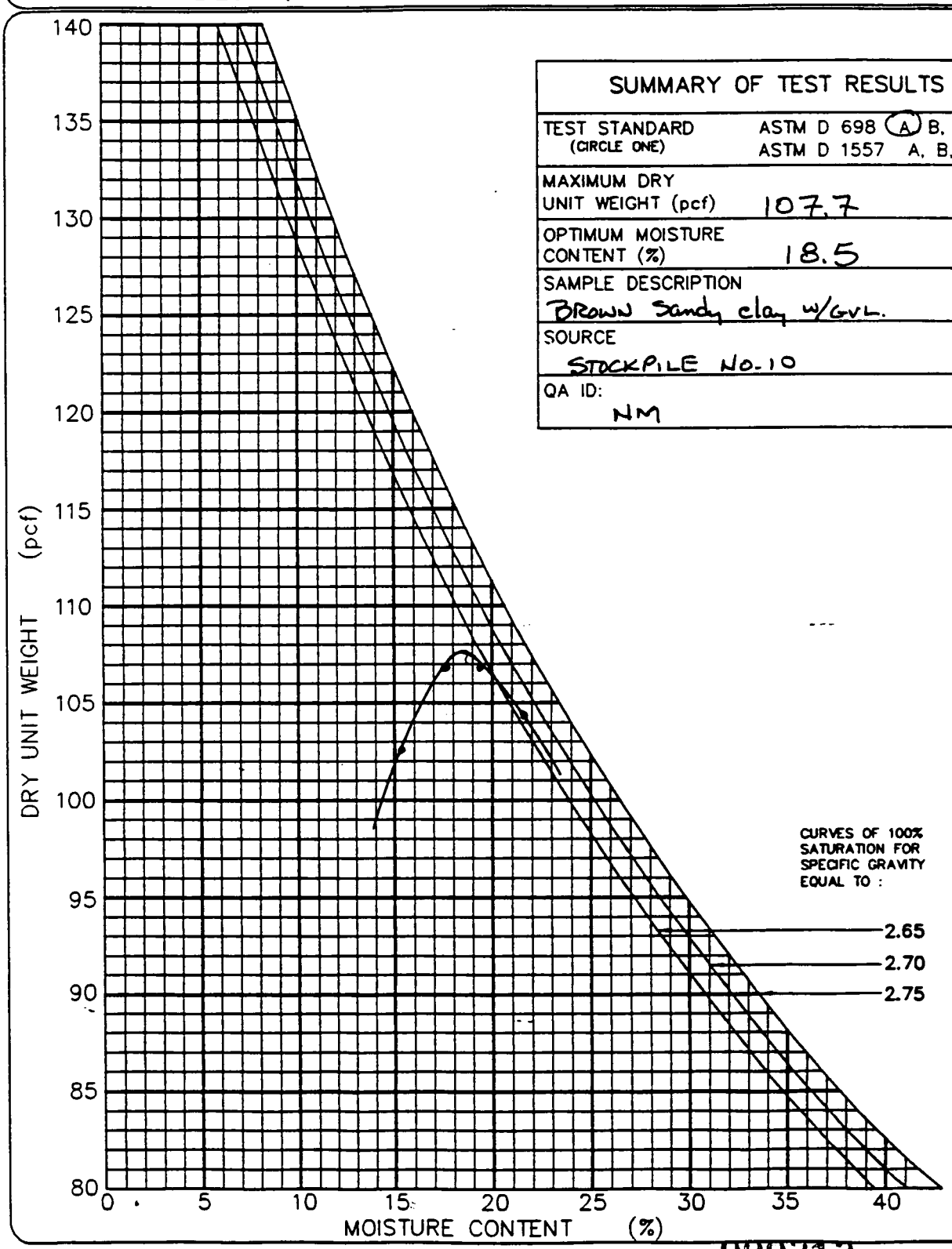
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-262



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	107.7
OPTIMUM MOISTURE CONTENT (%)	18.5
SAMPLE DESCRIPTION	BROWN Sandy clay w/GVL.
SOURCE	STOCKPILE NO. 10
QA ID:	NM

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-263

SOIL SAMPLE SIZE TOTAL SAMPLE = 33357.2 g
> NO.4 SAMPLE = 815.9 g

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		2	2
WT. OF DRY SAMPLE PLUS TARE	(grams)	175.8	45.6
WT. OF TARE	(grams)	8.1	8.1
WT. OF DRY SAMPLE	(grams)	167.7	37.5

SIEVE ANALYSIS QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	0	0	100		
1"	25.0	0	0	100		
¾"	19.0	150.3	.5	99.5		90-100
½"	12.5	319.5	1.0	99.0		
⅜"	9.5	462.4	1.4	98.6		
4	4.75	783.3	2.3	97.7		
10	2.00	4.8	2.9	97.1	94.9	
20	0.850	11.0	6.6	93.4	91.3	
40	0.425	18.0	10.7	89.3	87.2	
60	0.250	23.6	14.1	85.9	83.9	
100	0.150	30.0	17.9	82.1	80.2	
200	0.075	37.3	22.2	77.8	76.0	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

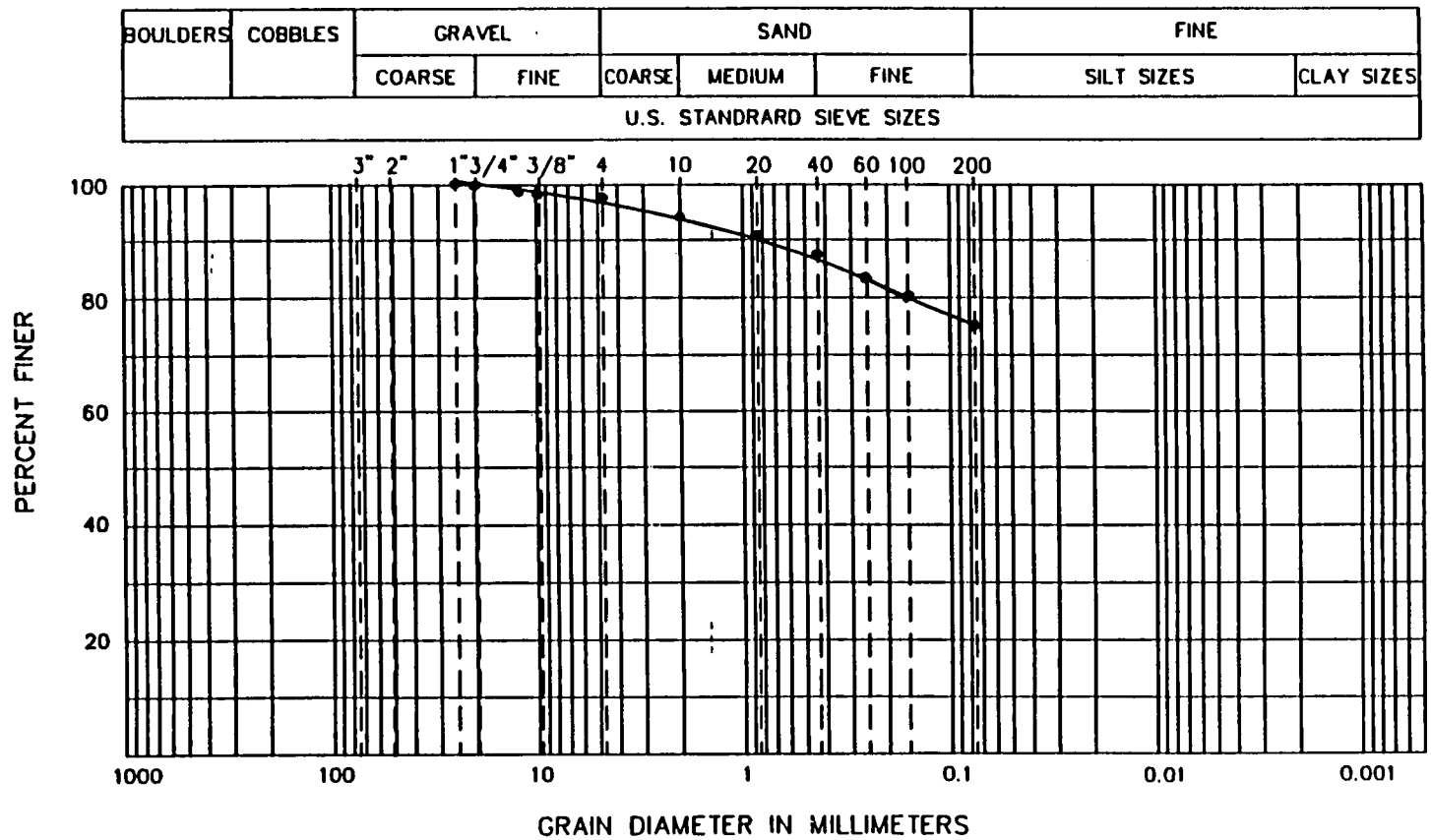
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 03 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-263 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 40

(PL) 19

(PI) 21

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	100.0
3/4-in.	99.5
1/2-in.	99.0
3/8-in.	98.6
NO. 4	97.7
NO. 10	94.9
NO. 20	91.3
NO. 40	87.2
NO. 60	83.9
NO. 100	80.2
NO. 200	76.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	71
0.020	58
0.005	33
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): BROWN sandy LEAN CLAY (CL) w/TR of GVL

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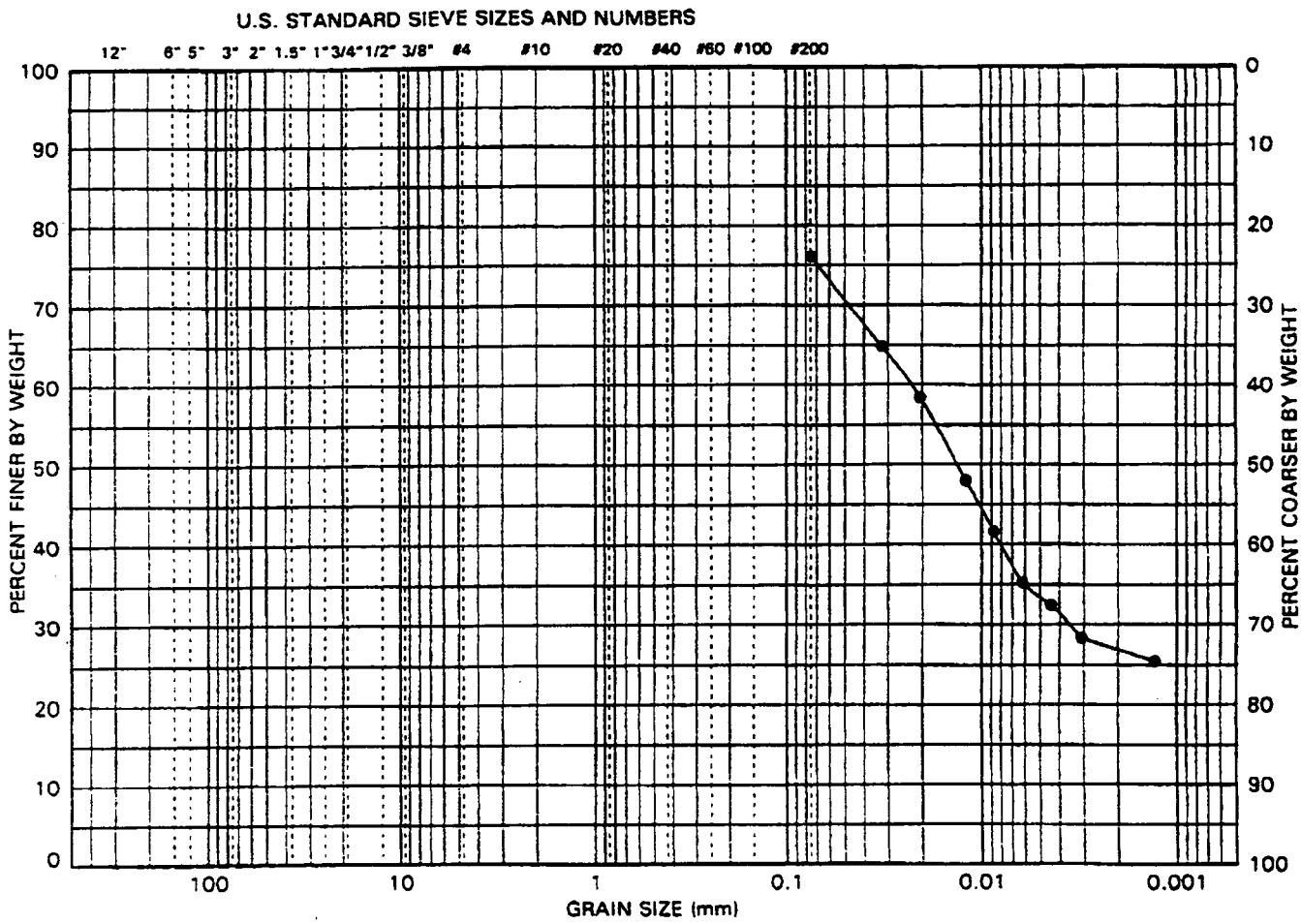
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-263	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	971372	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	76.0
SOIL CLASSIFICATION:				SILT (%)	49.2
				CLAY(%)	26.8
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													76	71	58	33	27	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-263

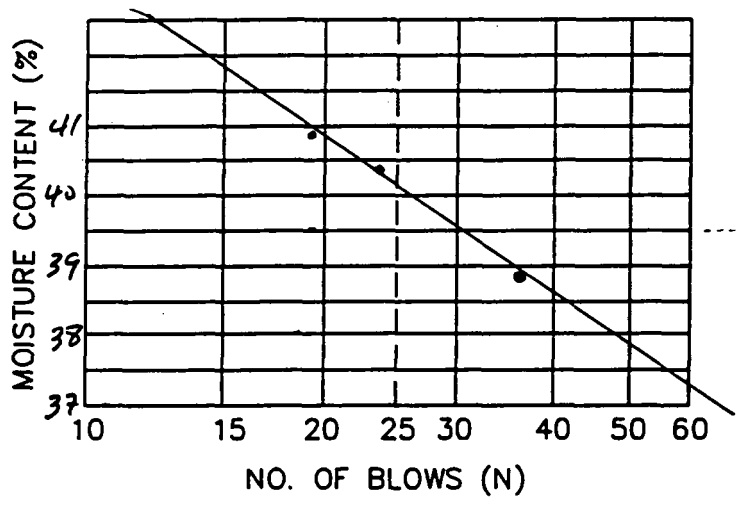
LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.6	1.2	1.9	
A	WT. OF TARE	(grams)	28.55	28.50	28.56	
B	WT. OF WET SOIL & TARE	(grams)	45.76	47.27	47.43	
C	WT. OF DRY SOIL & TARE	(grams)	40.94	41.87	41.95	
D	WT. OF WATER = B-C	(grams)	4.82	5.40	5.48	
E	WT. OF DRY SOIL = C-A	(grams)	12.39	13.37	13.39	
F	MOISTURE CONTENT = (D/E)X100	(%)	38.9	40.4	40.9	
N	NUMBER OF BLOWS		37	24	19	

DRYING TARE NO.

R



CURING TARE NO.

Z

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.5	2.9		
A	WT. OF TARE	(grams)	28.42	31.46		
B	WT. OF WET SOIL & TARE	(grams)	40.29	41.41		
C	WT. OF DRY SOIL & TARE	(grams)	38.42	39.86		
D	WT. OF WATER = B-C	(grams)	1.87	1.55		
E	WT. OF DRY SOIL = C-A	(grams)	10.00	8.40		
F	MOISTURE CONTENT = (D/E)X100	(%)	18.7	18.5		

LIQUID LIMIT (LL) = 40 PLASTIC LIMIT (PL) = 19 PLASTICITY INDEX (PI) = 21

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 — DATE: 29 day SEPT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-263

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

QA ID: JL

	WATER ADDED	(ml)	50 JL 9/29	100	~~150~~ 200 JL 9/30	~~200~~ 150 9/30 JL	
A	WT. OF SOIL & MOLD	(grams)	5946.~~6~~.7	6042.0	6144.0	6132.7	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1737.3	1832.6	1934.6	1923.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	114.7	121.0	127.7	126.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	100.7	104.9	106.4	107.1	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

	TARE NO.		3	5	2	104	
F	WT. OF TARE	(grams)	7.6	7.6	8.1	8.2	
G	WT. OF WET SOIL & TARE	(grams)	226.3	205.8	222.8	217.0	
H	WT. OF DRY SOIL & TARE	(grams)	199.6	179.3	187.1	184.4	
I	WT. OF WATER = G - H	(grams)	26.7	26.5	35.7	32.6	
J	WT. DRY SOIL = H - F	(grams)	192.0	171.7	179.0	176.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.9	15.4	20.0	18.5	

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FLUOR DANIEL FERNALD

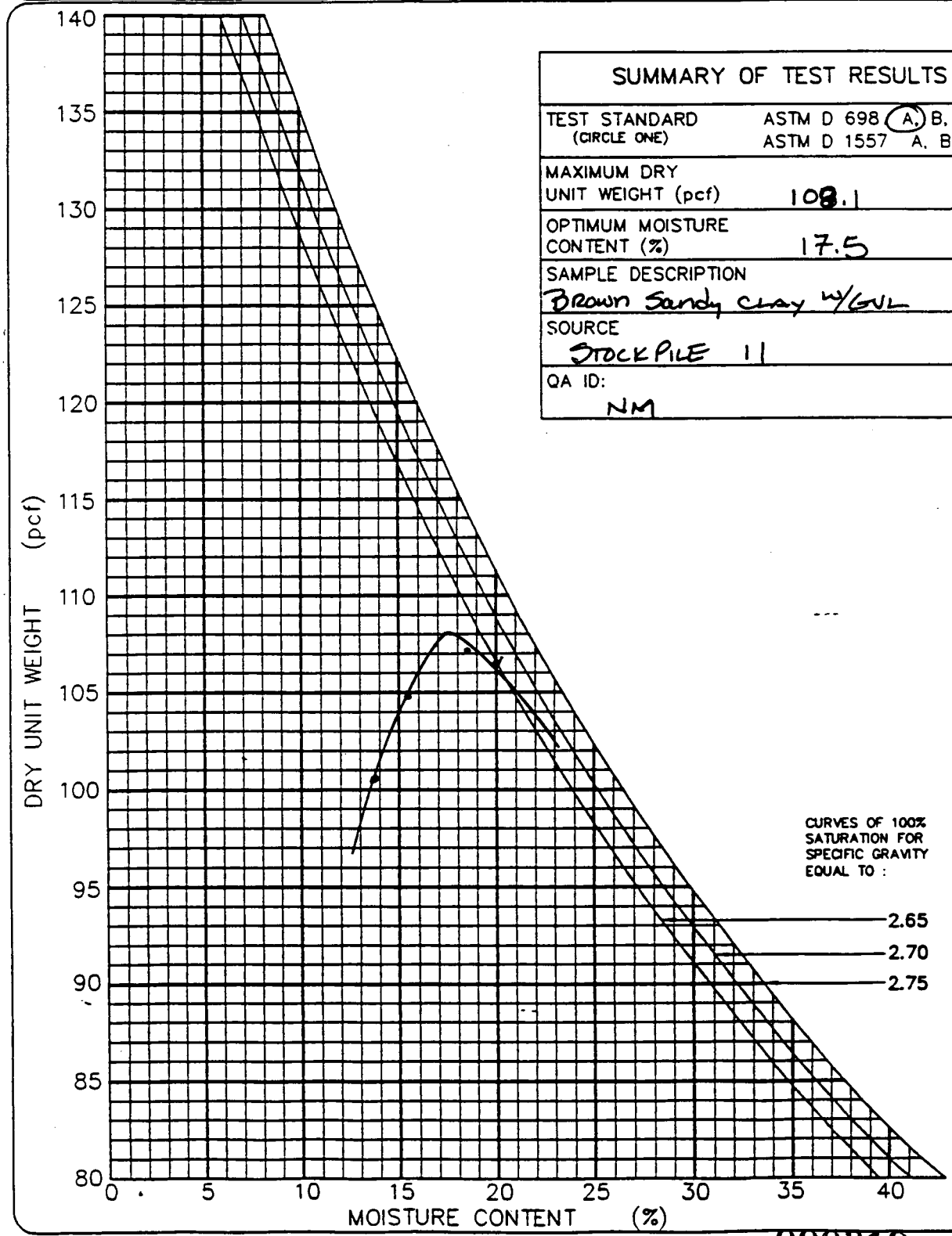
MOISTURE-DENSITY RELATIONSHIP

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-263



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A.) B. C ASTM D 1557 A. B. C
MAXIMUM DRY UNIT WEIGHT (pcf)	108.1
OPTIMUM MOISTURE CONTENT (%)	17.5
SAMPLE DESCRIPTION	Brown Sandy clay w/GVL
SOURCE	STOCKPILE 11
QA ID:	NM

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: 27 day Sept month 1997 year

MATERIAL TYPE: Clay liner SAMPLE NO.: LP-264 – LP-266

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: JL

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

		LP-264	LP-265	LP-266		
	TARE NO.	3	2	6		
A	WT. OF TARE	7.6	8.1	7.6		
B	WT. OF WET SOIL & TARE	209.9	209.0	207.6		
C	WT. OF DRY SOIL & TARE	179.9	179.4	178.0		
D	WT. OF WATER = B-C	30.0	29.6	29.6		
E	WT. OF DRY SOIL = C-A	172.3	171.3	170.4		
F	MOISTURE CONTENT = (D/E) X 100	17.4	17.3	17.4		
		NDT 574	NDT 578	NDT 584		
	Jrgs	15.7	16.3	13.8		

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

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

DATE: 29 day Sept month 1997 year

MATERIAL TYPE: Clay Liner.

SAMPLE NO.: LP-~~268~~ 267

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

LP-2687 ~~5/2~~ 9/29/97 CHECK POINT

QA ID: JC

	WATER ADDED	(ml)	/				
A	WT. OF SOIL & MOLD	(grams)	6155.4				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1946.0				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	128.4				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.7	113.1			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JC

			oven	microwave			
	TARE NO.		103	V			
F	WT. OF TARE	(grams)	8.4	126.3			
G	WT. OF WET SOIL & TARE	(grams)	209.8	236.6	COMPARES WITH LP-01		
H	WT. OF DRY SOIL & TARE	(grams)	185.2	223.5	MDD =	115.0 pcf	
I	WT. OF WATER = G - H	(grams)	24.6	13.1	OMC =	14.52	
J	WT. DRY SOIL = H - F	(grams)	176.8	97.2			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.9	13.5			

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

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 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-269

SOIL SAMPLE SIZE total sample = 20425.6 g. >No. 4 Sample = 694.0 g.

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		13	13
WT. OF DRY SAMPLE PLUS TARE	(grams)	134.6	30.7
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	126.4	22.5

SIEVE ANALYSIS QA ID: SL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	0	0	100		
1"	25.0	110.6	.5	99.5		
¾"	19.0	201.1	1.0	99.0		90-100
½"	12.5	323.6	1.6	98.4		
⅜"	9.5	438.0	2.1	97.9		
4	4.75	664.4	3.3	96.7		
10	2.00	3.0	2.4	97.6	94.4	
20	0.850	7.0	5.5	94.5	91.4	
40	0.425	10.9	8.6	91.4	88.4	
60	0.250	14.1	11.4	88.6	85.7	
100	0.150	17.9	14.2	85.8	83.0	
200	0.075	22.5	17.8	82.2	79.5	50-100

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

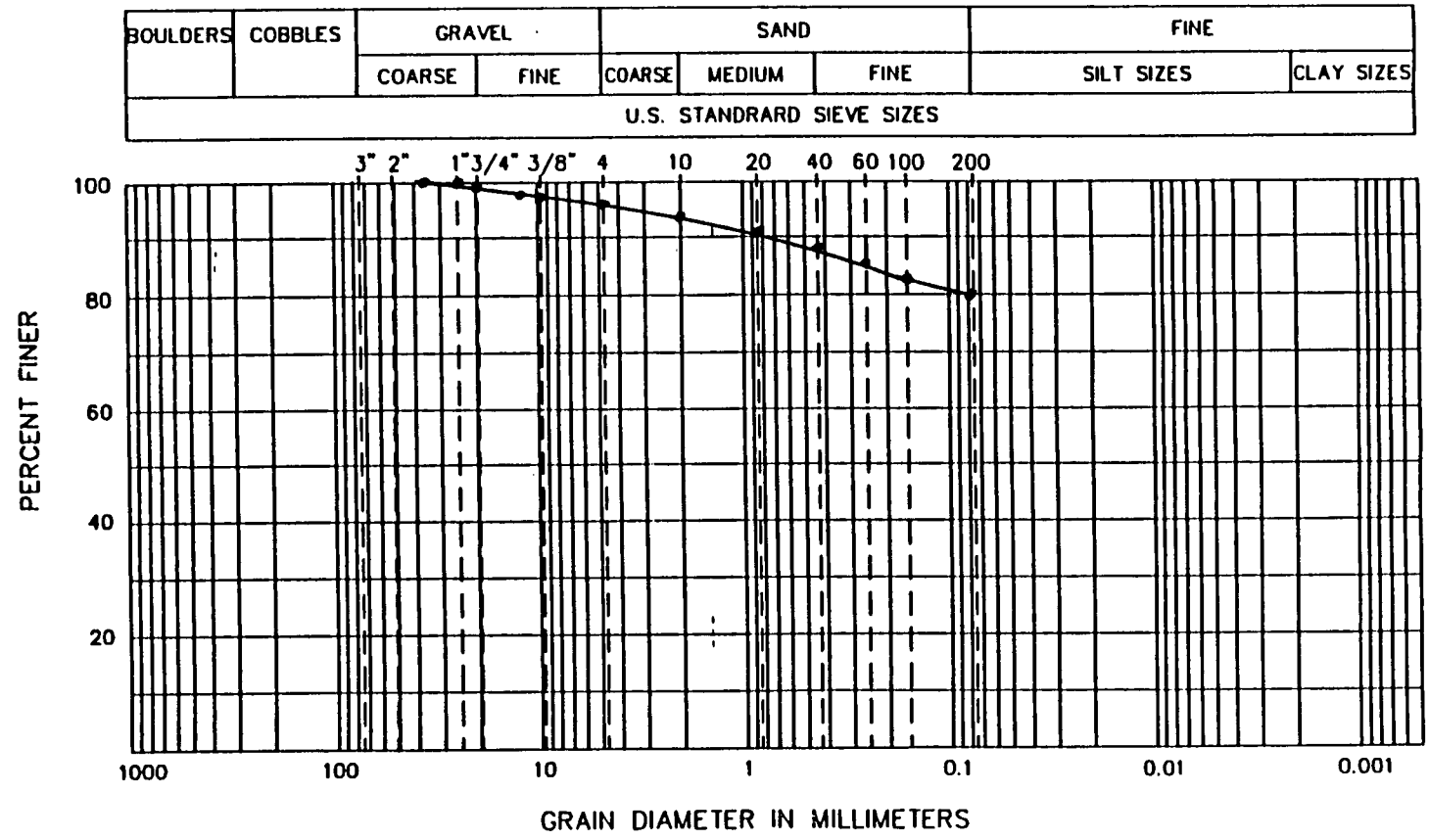
DATE: 03 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: ~~LP-263~~ LP-269 HBm 9/29/97

QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 39

(PL) 20

(PI) 19

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.5
3/4-in.	99.0
1/2-in.	98.4
3/8-in.	97.9
NO. 4	96.7
NO. 10	94.4
NO. 20	91.4
NO. 40	88.4
NO. 60	85.7
NO. 100	83.0
NO. 200	79.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	77
0.020	61
0.005	35
0.002	28

SOIL CLASSIFICATION (ASTM D 2487): BROWN LEAN CLAY (CL) w/ SOME SAND & TR. of GVL

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SHEET NO. 2 OF 2

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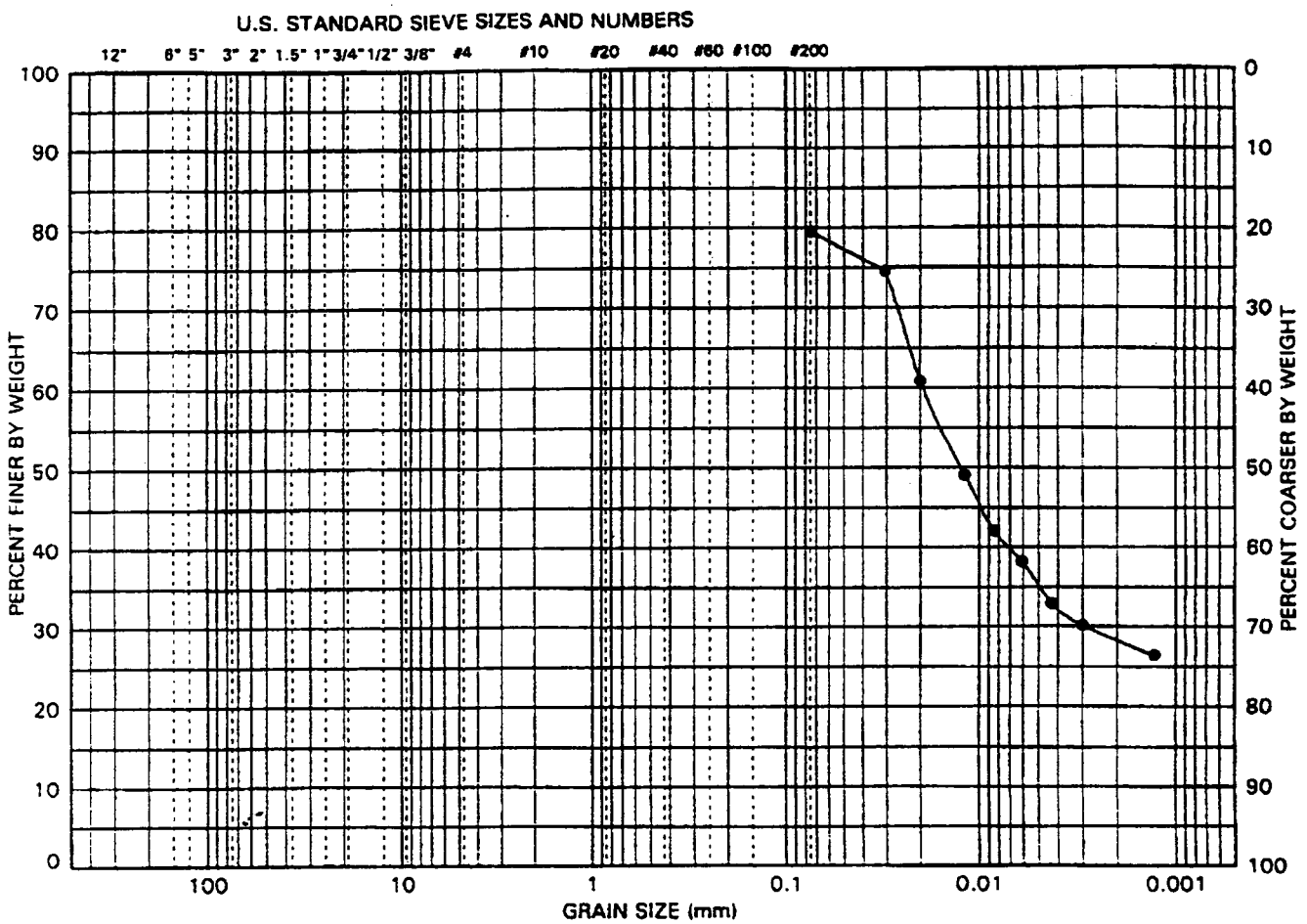
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-269	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97J13	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	79.5
SOIL CLASSIFICATION:				SILT (%)	51.1
				CLAY(%)	28.4
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													80	77	61	35	28	

NOTES:

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: ~~LP-263~~ LP-269 HEm 9/30/97

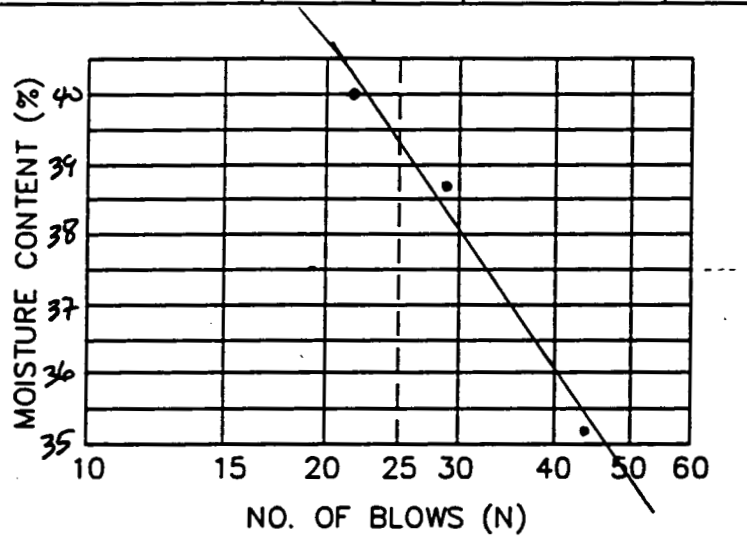
LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		1.2	1.4	1.9	
A	WT. OF TARE	(grams)	28.50	28.52	28.56	
B	WT. OF WET SOIL & TARE	(grams)	45.87	51.76	46.21	
C	WT. OF DRY SOIL & TARE	(grams)	41.35	45.28	41.17	
D	WT. OF WATER = B-C	(grams)	4.52	6.48	5.04	
E	WT. OF DRY SOIL = C-A	(grams)	12.85	16.76	12.61	
F	MOISTURE CONTENT = (D/E)X100	(%)	35.2	38.7	40.0	
N	NUMBER OF BLOWS		44	29	22	

DRYING TARE NO.

M



CURING TARE NO.

1-C

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.3	2.5		
A	WT. OF TARE	(grams)	31.20	28.42		
B	WT. OF WET SOIL & TARE	(grams)	41.72	39.17		
C	WT. OF DRY SOIL & TARE	(grams)	39.98	37.40		
D	WT. OF WATER = B-C	(grams)	1.74	1.77		
E	WT. OF DRY SOIL = C-A	(grams)	8.78	8.98		
F	MOISTURE CONTENT = (D/E)X100	(%)	19.8	19.7		

LIQUID LIMIT (LL) = 39 PLASTIC LIMIT (PL) = 20 PLASTICITY INDEX (PI) = 19

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 — DATE: 1 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: ~~LP-263~~ LP-269 ~~HEM 9/30/97~~

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

QA ID: JC

	WATER ADDED	(ml)	50	100	150	200	0
A	WT. OF SOIL & MOLD	(grams)	5987.5	6023.8	6150.8	6128.1	5892.3
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	~~4440~~ 4209.4
C	WT. OF SOIL = A − B	(grams)	1778.1	1814.4	1941.4	1918.7	1682.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.4	119.8	128.1	126.6	111.1
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	102.5	103.1	106.9	103.2	99.1

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: JC

	TARE NO.		9	8	20	103	104
F	WT. OF TARE	(grams)	7.2	7.3	8.3	8.4	8.2
G	WT. OF WET SOIL & TARE	(grams)	211.3	215.8	222.3	219.4	229.1
H	WT. OF DRY SOIL & TARE	(grams)	185.4	186.7	187.0	180.4	205.5
I	WT. OF WATER = G − H	(grams)	25.9	29.1	35.3	39.0	23.6
J	WT. DRY SOIL = H − F	(grams)	178.2	179.4	178.7	172.0	197.3
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.5	16.2	19.8	22.7	12.0

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

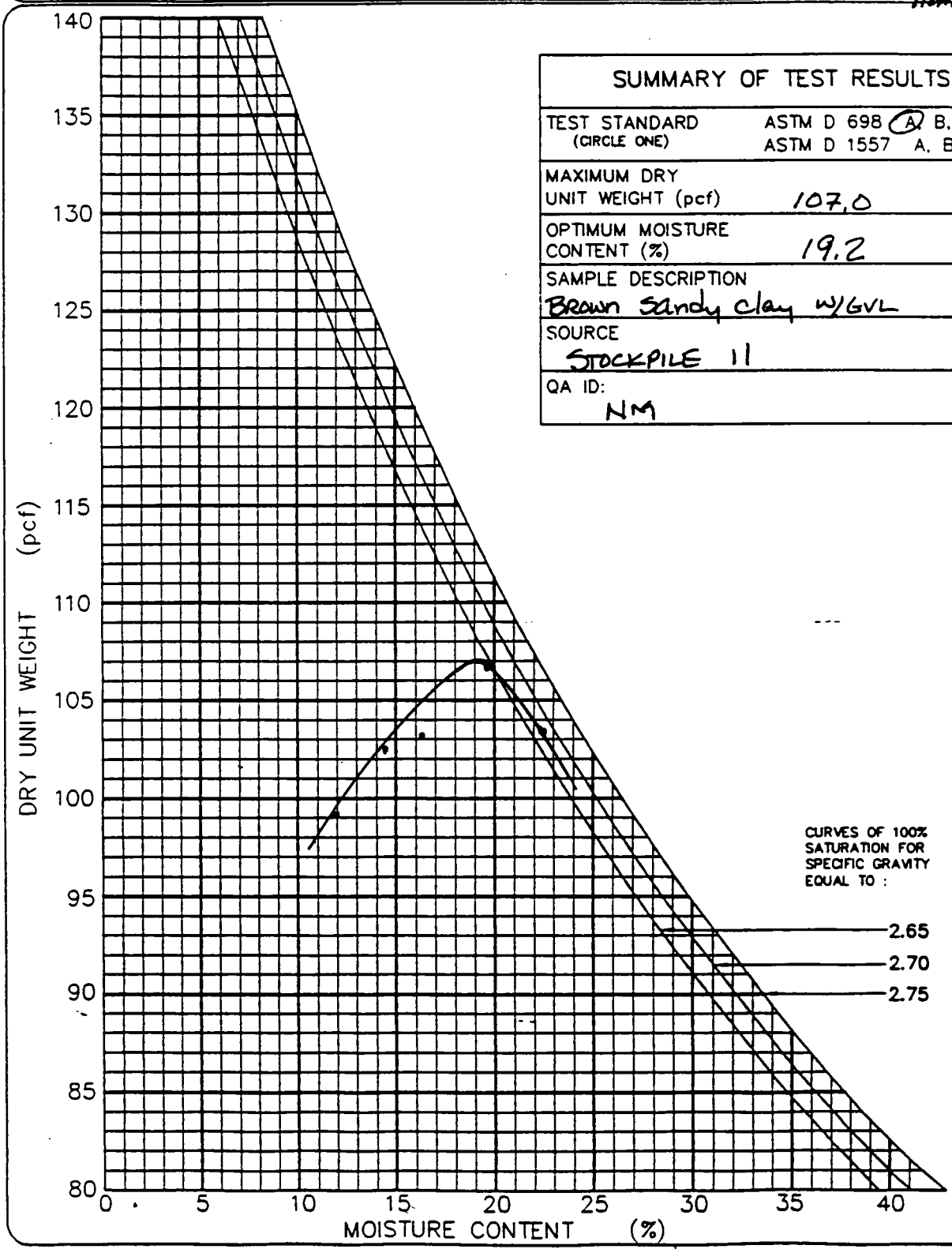
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: ~~LP-263~~ LP-269 ~~HM 9/30/97~~



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	107.0
OPTIMUM MOISTURE CONTENT (%)	19.2
SAMPLE DESCRIPTION	Brown sandy clay w/GVL
SOURCE	STOCKPILE 11
QA ID:	NM

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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: 29 day Sept month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-268, 270-273

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-268	LP-270	LP-271	LP-272	LP-273
	TARE NO.	20	22	9	28	8
A	WT. OF TARE	8.3	8.3	7.2	8.2	7.3
B	WT. OF WET SOIL & TARE	214.6	222.8	203.9	212.0	226.3
C	WT. OF DRY SOIL & TARE	186.7	192.1	177.1	182.3	186.7
D	WT. OF WATER = B-C	27.9	30.7	26.8	29.7	39.6
E	WT. OF DRY SOIL = C-A	178.4	183.8	169.9	174.1	179.4
F	MOISTURE CONTENT = (D/E) X 100	15.6	16.7	15.8	17.1	22.1
		NDT 591	NDT 598	NDT 600	NDT-602	NDT-604
	gage	14.0	16.2	13.0	14.4	15.4

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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%

		LP-268	LP-270	LP-271	LP-272	LP-273
	TARE NO.	III	I	IV	IV	V
A	WT. OF TARE	132.0	132.1	132.3	132.3	126.3
B	WT. OF WET SOIL & TARE	236.7	250.0	235.4	268.1	241.8
C	WT. OF DRY SOIL & TARE	222.1	232.5	221.2	248.7	225.3
D	WT. OF WATER = B-C	14.6	17.5	14.2	19.4	16.5
E	WT. OF DRY SOIL = C-A	90.1	100.4	88.9	116.4	99.0
F	MOISTURE CONTENT = (D/E) X 100	16.2	17.4	16.0	16.7	16.7

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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: 29 day Sept month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-274

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-274				
	TARE NO.	31				
A	WT. OF TARE	8.3				
B	WT. OF WET SOIL & TARE	215.5				
C	WT. OF DRY SOIL & TARE	187.0				
D	WT. OF WATER = B-C	28.5				
E	WT. OF DRY SOIL = C-A	178.7				
F	MOISTURE CONTENT = (D/E) X 100	15.9				
		NDT 608				
	gage	15.0			---	

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	238.5				
C	WT. OF DRY SOIL & TARE	223.1				
D	WT. OF WATER = B-C	15.4				
E	WT. OF DRY SOIL = C-A	91.1				
F	MOISTURE CONTENT = (D/E) X 100	16.9				

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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 Sept month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-275, LP-276

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JC

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

		LP-275	LP-276			
	TARE NO.	20	103			
A	WT. OF TARE	8.3	8.4			
B	WT. OF WET SOIL & TARE	212.6	204.3			
C	WT. OF DRY SOIL & TARE	184.2	175.7			
D	WT. OF WATER = B-C	28.4	28.6			
E	WT. OF DRY SOIL = C-A	175.9	167.3			
F	MOISTURE CONTENT = (D/E) X 100	16.1	17.1			
		NDT 619	NDT 623			
	gage	14.8	15.6			

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JC

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%

		LP-275	LP-276			
	TARE NO.	III	V			
A	WT. OF TARE	132.0	126.3			
B	WT. OF WET SOIL & TARE	247.8	248.6			
C	WT. OF DRY SOIL & TARE	231.4	230.4			
D	WT. OF WATER = B-C	16.4	18.2			
E	WT. OF DRY SOIL = C-A	99.4	104.1			
F	MOISTURE CONTENT = (D/E) X 100	16.5	17.5			

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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 — DATE: 30 day Sept month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-277

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

QA ID: II

			CHECK POINT				
	WATER ADDED	(ml)	/				
A	WT. OF SOIL & MOLD	(grams)	6205.2				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1995.8				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.7				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.0	115.0			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: II

			oven	microwave			
	TARE NO.		8	IV			
F	WT. OF TARE	(grams)	7.3	132.3			
G	WT. OF WET SOIL & TARE	(grams)	174.3	257.9	COMPARES WITH LP-42		
H	WT. OF DRY SOIL & TARE	(grams)	153.1	242.0	MDD =	116.0 pcf	
I	WT. OF WATER = G - H	(grams)	21.2	15.9	OMC =	15.4%	
J	WT. DRY SOIL = H - F	(grams)	145.8	109.7			
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.5	14.5			

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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 — DATE: 1 day Oct month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-278

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

QA ID: NM

			CHECK POINT				
	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6132.9				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1923.5				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.0				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.2	111.4			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: NM

			oven	microwave			
	TARE NO.		1	IV			
F	WT. OF TARE	(grams)	7.3	132.3			
G	WT. OF WET SOIL & TARE	(grams)	219.7	283.2	COMPARES WITH LP-37		
H	WT. OF DRY SOIL & TARE	(grams)	193.3	264.8	MDD = 114.2 pcf		
I	WT. OF WATER = G - H	(grams)	26.4	18.4	OMC = 15.5%		
J	WT. DRY SOIL = H - F	(grams)	186.0	132.5			
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.2	14.0 13.9			

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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 — DATE: 1 day Oct month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-274

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

QA ID: NM

			CHECK POINT				
	WATER ADDED	(ml)	/				
A	WT. OF SOIL & MOLD	(grams)	6141.7				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1932.3				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.5				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.8	112.6			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

			OVEN	MICROWAVE			
	TARE NO.		6	V			
F	WT. OF TARE	(grams)	7.6	126.3			
G	WT. OF WET SOIL & TARE	(grams)	207.3	272.2	COMPARES WITH LP-24		
H	WT. OF DRY SOIL & TARE	(grams)	184.4	255.2	MDD = 117.5 pcf		
I	WT. OF WATER = G - H	(grams)	22.9	17.0	OMC = 15.5%		
J	WT. DRY SOIL = H - F	(grams)	176.8	128.9			
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.0	13.2			

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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 — DATE: 1 day Oct. month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-280

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

QA ID: JL

			CHECK POINT				
	WATER ADDED	(ml)	/				
A	WT. OF SOIL & MOLD	(grams)	6028.3				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1818.9				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.0				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	104.7	104.3			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JM/JL

			OVEN	MICROWAVE			
	TARE NO.		3	X			
F	WT. OF TARE	(grams)	7.5	126.3			
G	WT. OF WET SOIL & TARE	(grams)	251.1	250.5	HEM 10/1/97	COMPARES WITH LP-263 ~~CONFORMS~~	
H	WT. OF DRY SOIL & TARE	(grams)	220.1	234.2		MDD =	108.1 pcf
I	WT. OF WATER = G - H	(grams)	31.0	16.3		OMC =	17.5%
J	WT. DRY SOIL = H - F	(grams)	212.6	107.9			
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.6	15.1			

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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: 2 day Oct month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-281 - LP 285

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: 2

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

		LP-281	LP-282	LP-283	LP-284	LP-285
	TARE NO.	28	20	103	104	1
A	WT. OF TARE	8.2	8.3	8.4	8.2	7.3
B	WT. OF WET SOIL & TARE	218.9	203.6	192.3	194.5	228.0
C	WT. OF DRY SOIL & TARE	190.9	178.6	166.1	167.6	196.1
D	WT. OF WATER = B-C	28.0	25.0	26.2	26.9	31.9
E	WT. OF DRY SOIL = C-A	182.7	170.3	157.7	159.4	188.8
F	MOISTURE CONTENT = (D/E) X 100	15.3	14.7	16.6	16.9	16.9
		NOT 641	NOT 643	NOT 645	NOT 647	NOT 249
	avg	15.4	14.2	14.8	15.1	15.8

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: 2L

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.	V	I	III	IV	V
A	WT. OF TARE	126.3	132.1	132.0	132.3	126.3
B	WT. OF WET SOIL & TARE	246.4	236.0	229.3	242.5	239.4
C	WT. OF DRY SOIL & TARE	230.1	222.3	214.6	226.7	222.7
D	WT. OF WATER = B-C	16.3	13.7	14.6	15.8	16.7
E	WT. OF DRY SOIL = C-A	103.8	90.2	82.6	94.4	96.4
F	MOISTURE CONTENT = (D/E) X 100	15.7	15.2	17.7	16.7	17.3

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 2 day Oct month 1997 year

MATERIAL TYPE: Clay Liner. SAMPLE NO.: LP-286 - LP 290

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-286	LP-287	LP-288	LP-289	LP-290
	TARE NO.	8	9	23	26	12
A	WT. OF TARE	7.3	7.2	8.4	8.3	7.2
B	WT. OF WET SOIL & TARE	214.4	228.0	226.5	206.2	216.8
C	WT. OF DRY SOIL & TARE	184.2	195.4	196.2	176.5	183.5
D	WT. OF WATER = B-C	30.2	32.6	30.3	29.7	33.3
E	WT. OF DRY SOIL = C-A	176.9	188.2	187.8	168.2	176.3
F	MOISTURE CONTENT = (D/E) X 100	17.1	17.3	16.1	17.7	18.9
		NOT 651	NOT 653	NOT 655	NOT 661	NOT-662
	gauge	16.6	15.8	14.8	17.3	17.4

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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	III	IV	V	I
A	WT. OF TARE	132.1	132.0	132.3	126.3	132.1
B	WT. OF WET SOIL & TARE	261.7	240.8	242.0	226.3	236.2
C	WT. OF DRY SOIL & TARE	242.3	224.3	226.5	210.8	219.2
D	WT. OF WATER = B-C	19.4	16.5	15.5	15.5	17.0
E	WT. OF DRY SOIL = C-A	110.2	92.3	94.2	84.5	87.1
F	MOISTURE CONTENT = (D/E) X 100	17.6	17.9	16.5	18.3	19.5

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: 2 day Oct month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-291 - LP294

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-291	LP-292	~~LP-293~~	~~LP-294~~	~~LP-295~~ LP-294
	TARE NO.	11	105	29	27	6
A	WT. OF TARE	7.3	8.2	8.3	8.2	7.6
B	WT. OF WET SOIL & TARE	230.2	207.4	215.0	233.2	208.7
C	WT. OF DRY SOIL & TARE	198.2	177.2	184.4		178.0
D	WT. OF WATER = B-C	32.0	30.2	30.6		30.7
E	WT. OF DRY SOIL = C-A	190.9	169.0	176.1		170.4
F	MOISTURE CONTENT = (D/E) X 100	16.8	17.9	17.4		18.0
		NDT-665	NDT-667	NDT-668		NDT 669
	gage	15.8	16.3	15.1		16.5

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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%

		I	IV	III	V	I
A	WT. OF TARE	130.1	132.3	132.0	126.3	132.1
B	WT. OF WET SOIL & TARE	243.5	237.2	230.6	243.4	239.8
C	WT. OF DRY SOIL & TARE	226.9	222.2	216.0		223.3
D	WT. OF WATER = B-C	16.6	~~25.0~~ 15.0	14.6		16.5
E	WT. OF DRY SOIL = C-A	94.8	79.9	84.0		91.2
F	MOISTURE CONTENT = (D/E) X 100	~~8.5~~ 17.5	18.8	17.4		18.1

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FLUOR DANIEL FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 2 day Oct. month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP 295, LP 296

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-296	LP-295	LP-296		
	TARE NO.	27	JL 714	27		
A	WT. OF TARE	8.2	7.8	8.2		
B	WT. OF WET SOIL & TARE	233.3	218.5	233.2		
C	WT. OF DRY SOIL & TARE		184.7	196.8		
D	WT. OF WATER = B-C		33.8	36.4		
E	WT. OF DRY SOIL = C-A		176.9	188.6		
F	MOISTURE CONTENT = (D/E) X 100		19.1	19.3		
			NDT 670	NDT 671		
			17.7	18.0		

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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.		IV	JL 250 ~~126~~ V		
A	WT. OF TARE		132.3	126.3		
B	WT. OF WET SOIL & TARE		251.3	243.4		
C	WT. OF DRY SOIL & TARE		231.6	224.1		
D	WT. OF WATER = B-C		19.7	19.3		
E	WT. OF DRY SOIL = C-A		99.3	97.8		
F	MOISTURE CONTENT = (D/E) X 100		19.8	19.7		

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-~~267~~ 297 HBM 10/2/97

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
22906.8 g 7 No 4 362.9 g	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		13	13
WT. OF DRY SAMPLE PLUS TARE	(grams)	133.1	39.3
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	124.9	31.1

SIEVE ANALYSIS

QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0					100
1½"	37.5	0	0	100.0		
1"	25.0	36.6	0.2 ~~1.6~~ HBM 10/4/97	99.8 ~~98.4~~		
¾"	19.0	98.7	0.4	99.6		90-100
½"	12.5	180.4	0.8	99.2		
⅜"	9.5	224.7	1.0	99.0		
4	4.75	380.1	1.7	98.3		
10	2.00	2.3	1.8	98.2	96.5	
20	0.850	8.1	6.5	93.5	91.9	
40	0.425	15.2	12.2	87.8	86.3	
60	0.250	20.7	16.6	83.4	82.0	
100	0.150	26.1	20.9	79.1	77.8	
200	0.075	31.1	24.9	75.1	73.8	50-100

%FINER = 100 − Σ % RETAINED

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CHECKED BY: JL 000339 SHEET NO. 1 OF 2

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

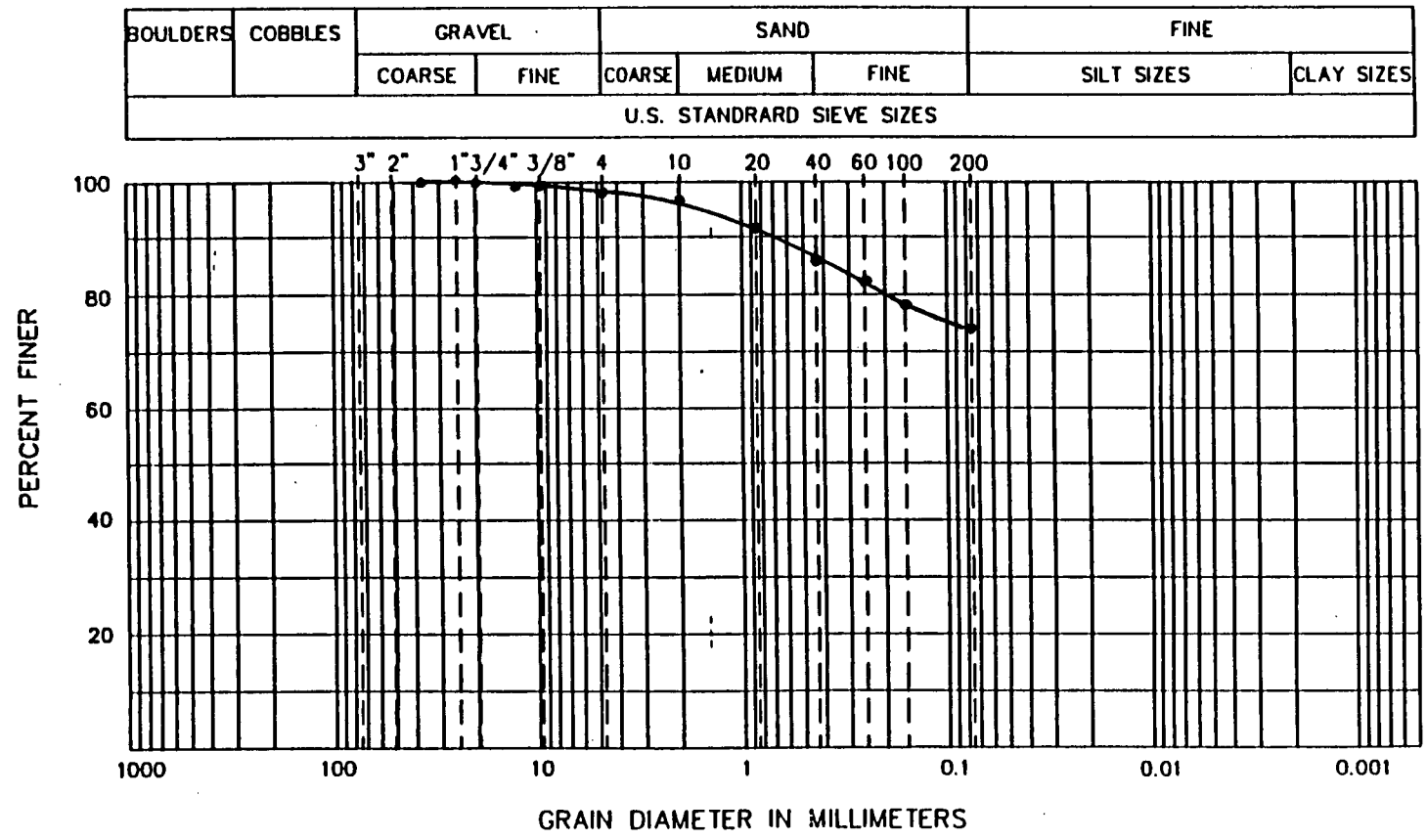
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 08 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP ~~069~~297 HEM 10/2/97 QA ID: N/A

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 39

(PL) 20

(PI) 19

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.8
3/4-in.	99.6
1/2-in.	99.2
3/8-in.	99.0
NO. 4	98.3
NO. 10	96.5
NO. 20	91.9
NO. 40	86.3
NO. 60	82.0
NO. 100	77.8
NO. 200	73.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	70
0.020	55
0.005	31
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): BROWN sandy LEAN CLAY (CL) w/ TR. of GRL.

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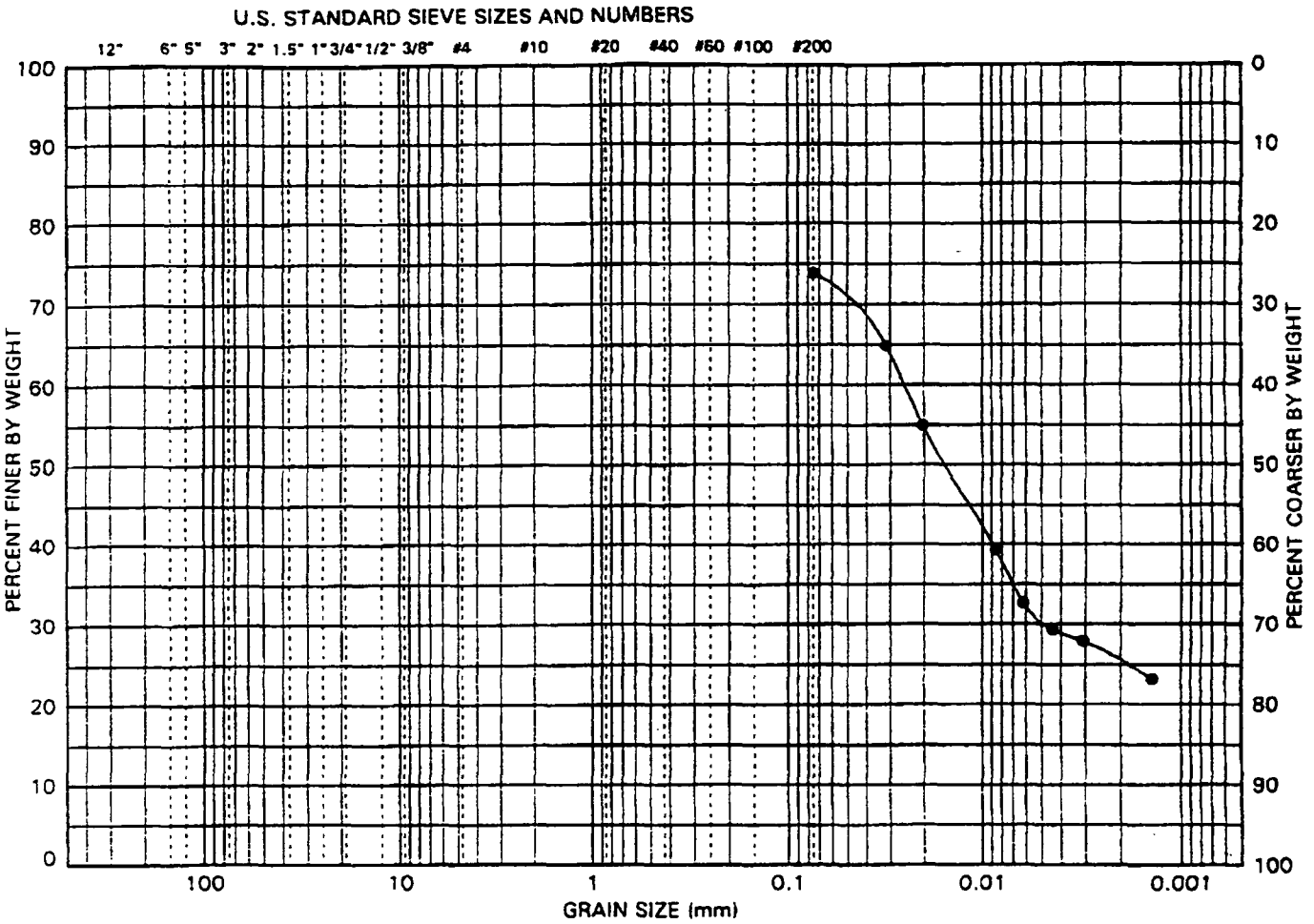
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-297	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97J55	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	73.8
SOIL CLASSIFICATION:				SILT (%)	48.5
				CLAY(%)	25.3
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													74	70	55	31	25	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-~~269~~ 297 HEM 10/2/97

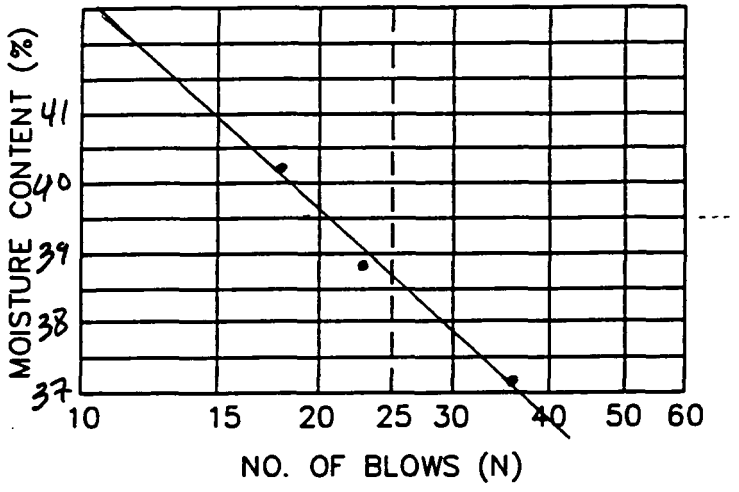
LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		3.1	2.5	2.3	
A	WT. OF TARE	(grams)	28.38	28.42	31.20	
B	WT. OF WET SOIL & TARE	(grams)	43.89	44.44	46.23	
C	WT. OF DRY SOIL & TARE	(grams)	39.69	39.95	41.92	
D	WT. OF WATER = B-C	(grams)	4.20	4.49	4.31	
E	WT. OF DRY SOIL = C-A	(grams)	11.31	11.53	10.72	
F	MOISTURE CONTENT = (D/E)X100	(%)	37.14	38.94	40.21	
N	NUMBER OF BLOWS		36	23	18	

DRYING TARE NO.

R



CURING TARE NO.

Z

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		1.9	2.9		
A	WT. OF TARE	(grams)	28.56	31.46		
B	WT. OF WET SOIL & TARE	(grams)	36.57	41.34		
C	WT. OF DRY SOIL & TARE	(grams)	35.23	39.68		
D	WT. OF WATER = B-C	(grams)	1.34	1.66		
E	WT. OF DRY SOIL = C-A	(grams)	6.67	8.22		
F	MOISTURE CONTENT = (D/E)X100	(%)	20.09	20.19		

LIQUID LIMIT (LL) = 39 PLASTIC LIMIT (PL) = 20 PLASTICITY INDEX (PI) = 19

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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 — DATE: 04 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-~~268~~ 297 ~~Hem~~ 10/2/97

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

QA ID: NM

	WATER ADDED	(ml)	50mL	100mL	150.0mL	200 mL	
A	WT. OF SOIL & MOLD	(grams)	5978.7	6060.4	6101.2	6136.9 ~~6176.6~~	~~Hem~~ 10/4/97
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1769.3	1851.0	1891.8	~~1937.5~~	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	116.8	122.2	124.9	124.5 ~~127.9~~	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	102.8	106.0	107.0	105.7	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: NM

	TARE NO.		26	27	8	3	
F	WT. OF TARE	(grams)	8.4	8.2	7.3	7.6	
G	WT. OF WET SOIL & TARE	(grams)	214.2	199.9	202.0	221.0	
H	WT. OF DRY SOIL & TARE	(grams)	189.6	174.4	174.1	185.9	
I	WT. OF WATER = G - H	(grams)	24.6	25.5	27.9	35.1	
J	WT. DRY SOIL = H - F	(grams)	181.2	166.2	166.8	178.3	
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.6	15.3	16.7	19.7	

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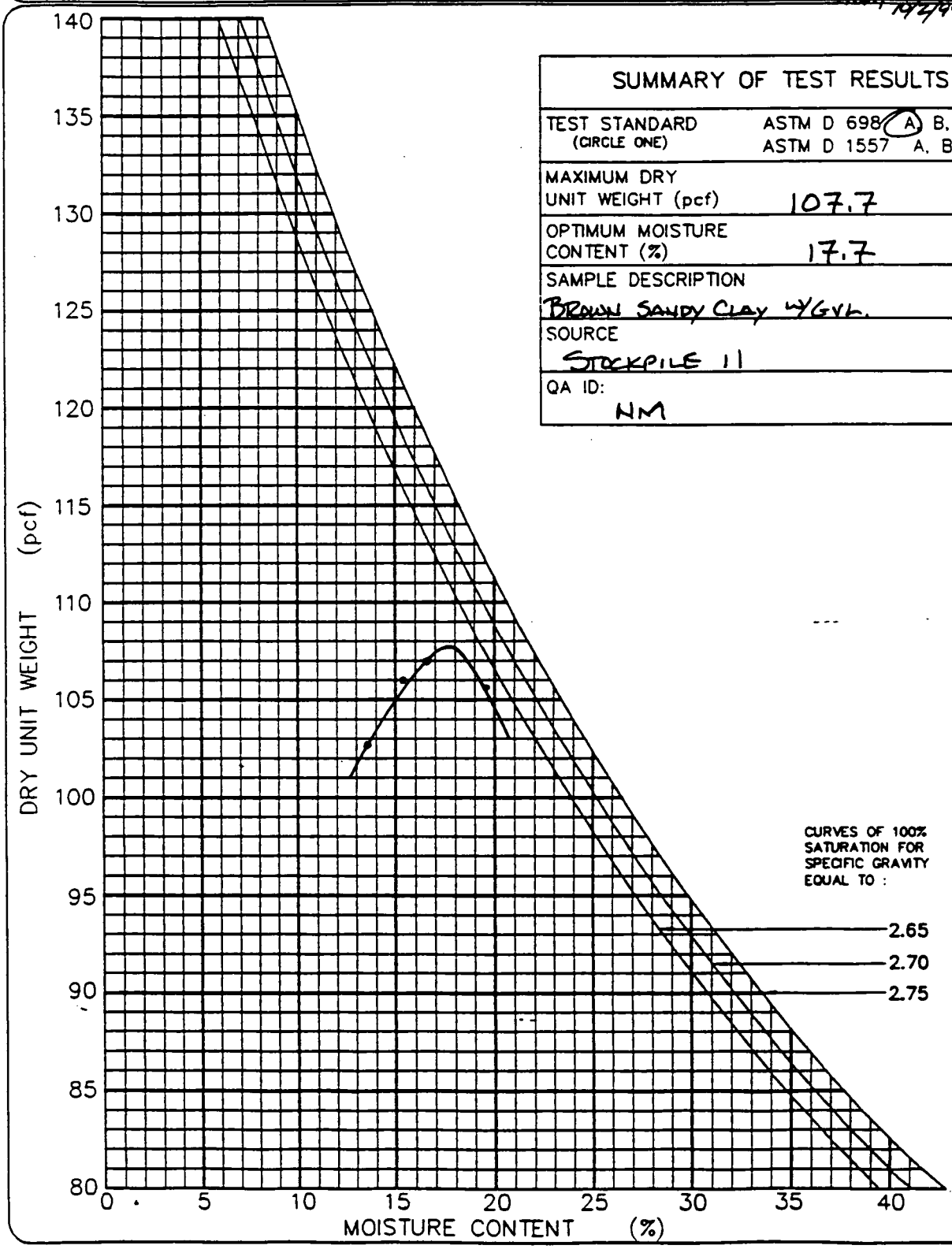
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-~~269~~ 297 10/2/97



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	107.7
OPTIMUM MOISTURE CONTENT (%)	17.7
SAMPLE DESCRIPTION	BROWN SANDY CLAY W/GVL.
SOURCE	STOCKPILE 11
QA ID:	NM

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 04 day OCT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-299

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
20,230.6 g (grams) 7No4 680.4 g	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	2	2
WT. OF DRY SAMPLE PLUS TARE (grams)	166.5	45.4
WT. OF TARE (grams)	8.2	8.2
WT. OF DRY SAMPLE (grams)	158.3	37.2

SIEVE ANALYSIS

QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	82.0	0.4	99.6		
1"	25.0	107.4	0.5	99.5		
¾"	19.0	215.5	1.1	98.9		90-100
½"	12.5	314.6	1.6	98.4		
⅜	9.5	409.4	2.0	98.0		
4	4.75	667.2	3.3	96.7		
10	2.00	4.4	2.3	97.2	94.0	
20	0.850	10.1	6.4	93.6	90.5	
40	0.425	17.2	10.9	89.1	86.2	
60	0.250	23.1	14.6	85.4	82.6	
100	0.150	29.9	18.9	81.1	78.4	
200	0.075	37.2	23.5	76.5	74.0	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

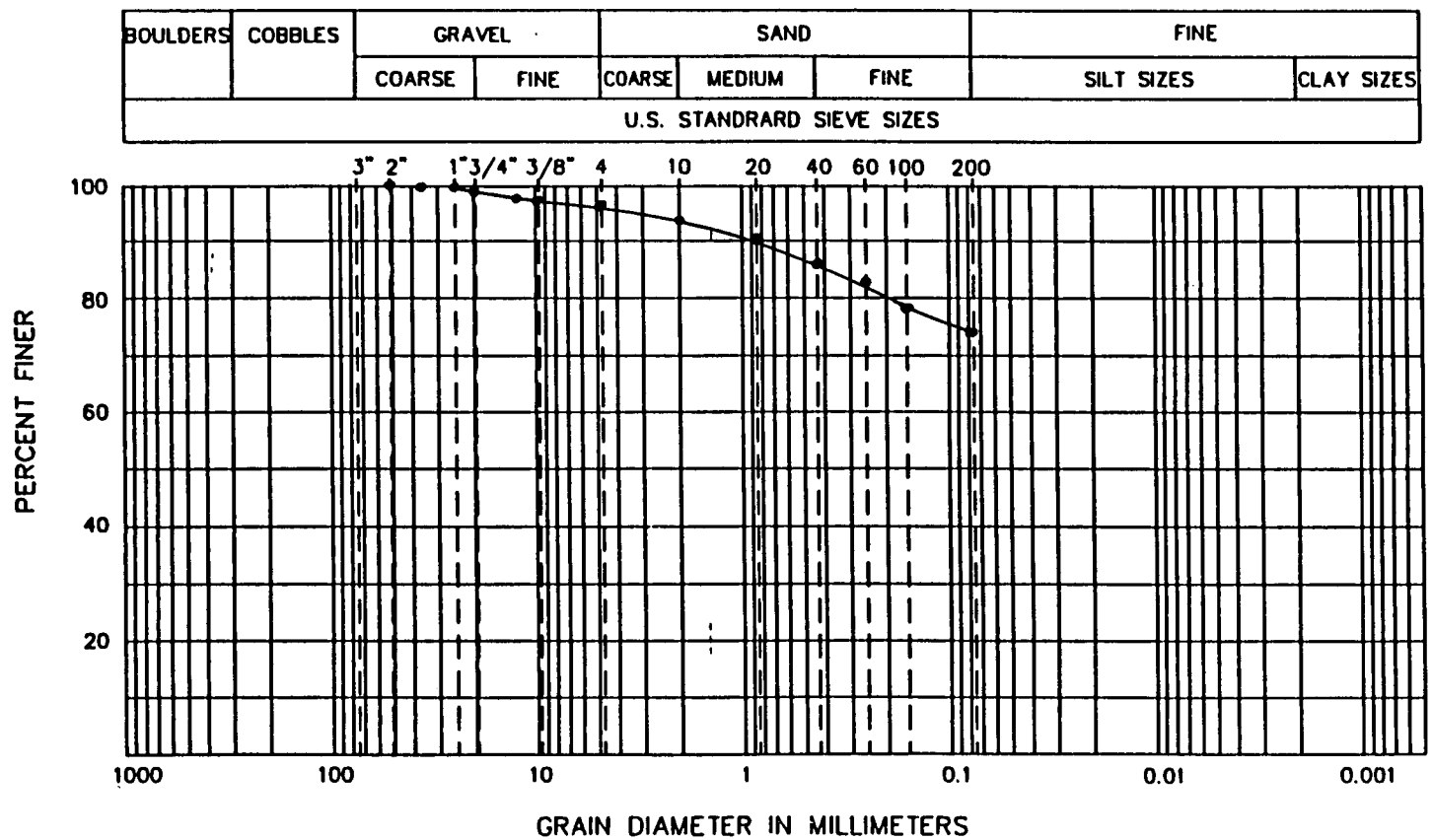
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction — DATE: 08 day OCT month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-299 QA ID: NM

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 40

(PL) 19

(PI) 21

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.6
1-in.	99.5
3/4-in.	98.9
1/2-in.	98.4
3/8-in.	98.0
NO. 4	96.7
NO. 10	94.0
NO. 20	90.5
NO. 40	86.2
NO. 60	82.6
NO. 100	78.4
NO. 200	74.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	70
0.020	56
0.005	33
0.002	28

SOIL CLASSIFICATION (ASTM D 2487): BROWN Sandy LEAN CLAY (CL) w/TR. of GVL.

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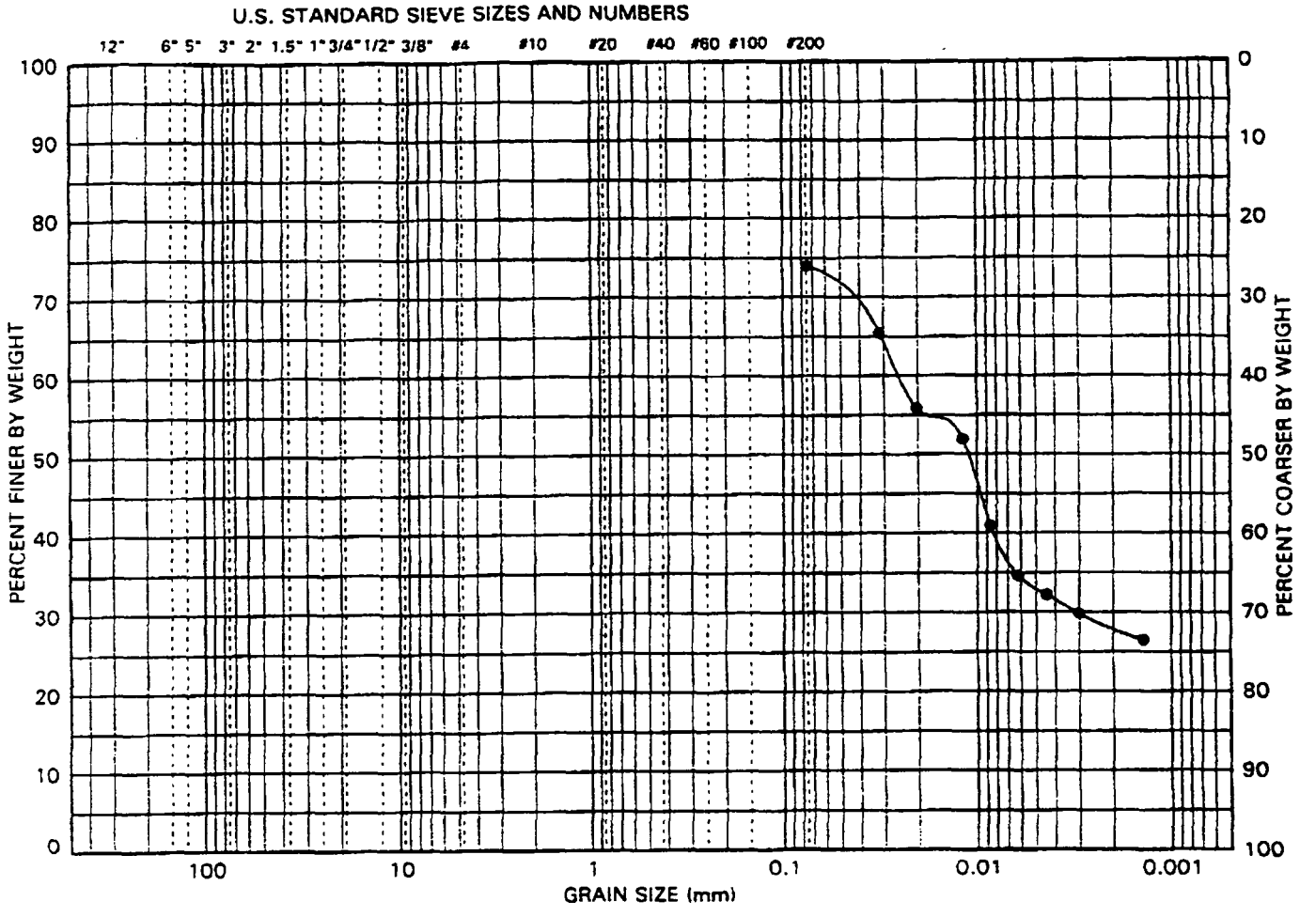
FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-299	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97J56	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%) 74.0
SOIL CLASSIFICATION:				SILT (%) 46.0
				CLAY(%) 28.0
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													74	70	56	33	28	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 07 day Oct month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-299

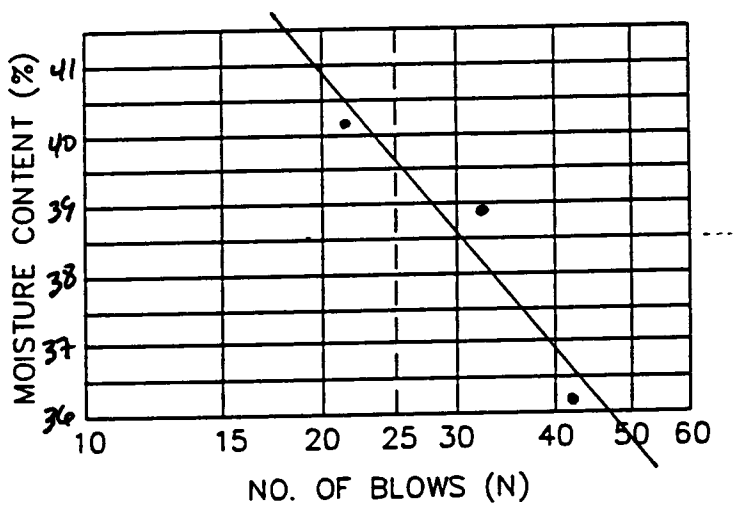
LIQUID LIMIT DETERMINATION

QA ID: NM/JL

	TARE NO.		1.2	1.4	1.9	
A	WT. OF TARE	(grams)	28.50	28.52	28.56	
B	WT. OF WET SOIL & TARE	(grams)	44.42	41.94	44.88	
C	WT. OF DRY SOIL & TARE	(grams)	40.19	38.18	40.20	
D	WT. OF WATER = B-C	(grams)	4.23	3.76	4.68	
E	WT. OF DRY SOIL = C-A	(grams)	11.69	9.66	11.64	
F	MOISTURE CONTENT = (D/E)X100	(%)	36.18	38.92	40.21	
N	NUMBER OF BLOWS		42	33	22	

DRYING TARE NO.

M



CURING TARE NO.

1-C

PLASTIC LIMIT DETERMINATION

QA ID: NM/JL

	TARE NO.		2.3	2.5		
A	WT. OF TARE	(grams)	31.20	28.42		
B	WT. OE WET SOIL & TARE	(grams)	39.93	39.93		
C	WT. OF DRY SOIL & TARE	(grams)	38.52	38.08		
D	WT. OF WATER = B-C	(grams)	1.41	1.85		
E	WT. OF DRY SOIL = C-A	(grams)	7.32	9.66		
F	MOISTURE CONTENT = (D/E)X100	(%)	19.26	19.15		

LIQUID LIMIT (LL) = 40 PLASTIC LIMIT (PL) = 19 PLASTICITY INDEX (PI) = 21

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 — DATE: 6 day Oct month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-299

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

QA ID: JL

	WATER ADDED	(ml)	50	100	150	200	
A	WT. OF SOIL & MOLD	(grams)	6055.6	6123.6	6169.0	6123.6	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1846.2	1914.2	1959.6	1914.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	121.8	126.3	129.3	126.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	105.8	108.3	108.3	104.1	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

	TARE NO.		3	8	28	27	
F	WT. OF TARE	(grams)	7.5	7.3	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	207.0	191.3	216.8	207.3	
H	WT. OF DRY SOIL & TARE	(grams)	180.8	165.1	182.9	172.3	
I	WT. OF WATER = G - H	(grams)	26.2	26.2	33.9	35.0	
J	WT. DRY SOIL = H - F	(grams)	173.3	157.8	174.7	164.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.1	16.6	19.4	21.3	

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

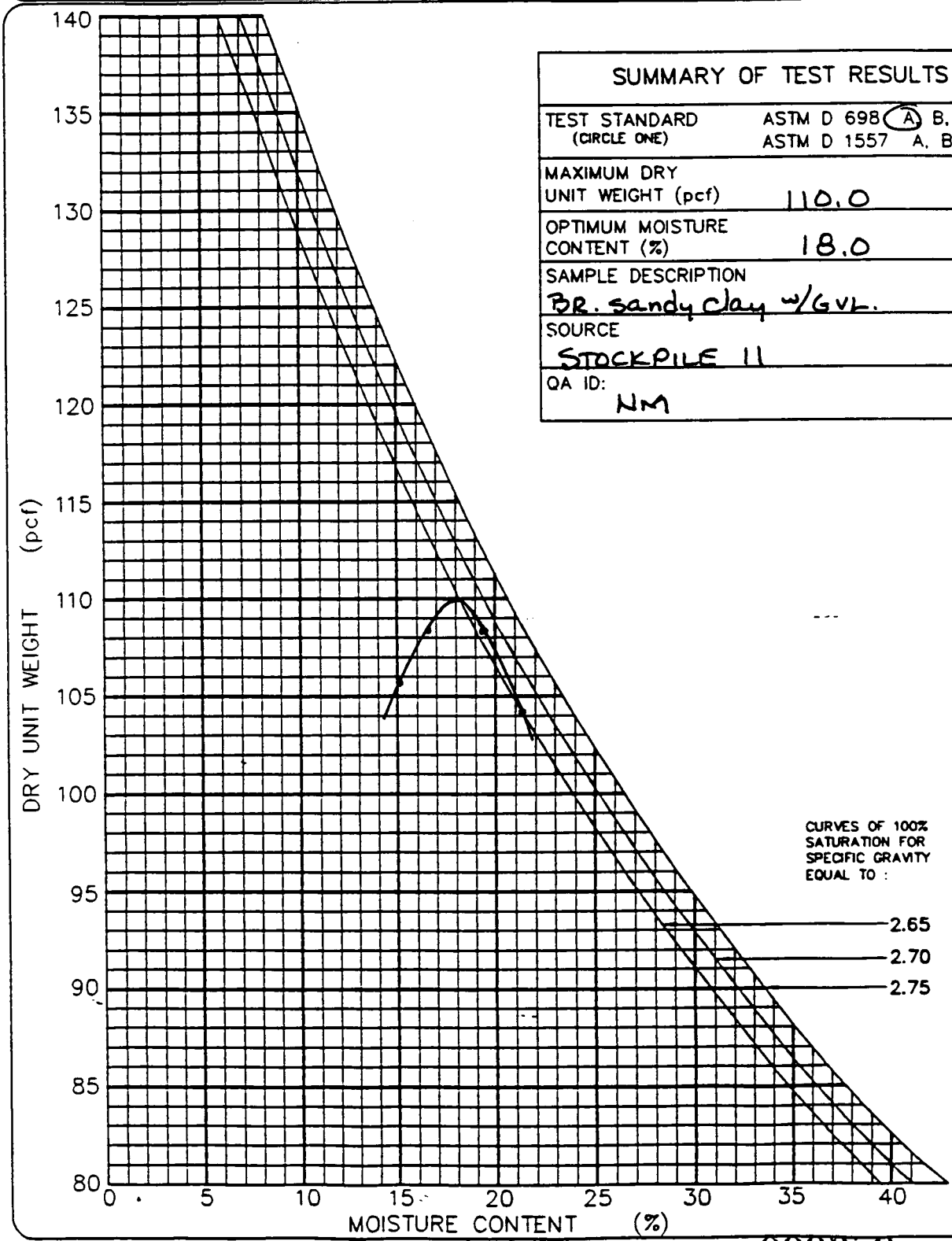
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 07 day OCT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-299



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	110.0
OPTIMUM MOISTURE CONTENT (%)	18.0
SAMPLE DESCRIPTION	BR. sandy clay w/GVL.
SOURCE	STOCKPILE 11
QA ID:	NM

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 04 day OCT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-300

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	19,232.6 g (grams)	SAND	FINE GRAIN
>No. 4 771.1 g.		115	65

		BEFORE WASH	AFTER WASH
TARE NO.		33	33
WT. OF DRY SAMPLE PLUS TARE	(grams)	145.5	45.9
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	137.2	37.6

SIEVE ANALYSIS

QA ID: NM/JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0					100
1½"	37.5	0	0	100.0		
1"	25.0	106.0	0.6	99.4		
¾"	19.0	144.9	0.8	99.2		90-100
½"	12.5	347.9	1.8	98.2		
⅜"	9.5	454.1	2.4	97.6		
4	4.75	758.4	3.9	96.1		
10	2.00	5.3	3.9	96.1	92.4	
20	0.850	10.7	7.8	92.2	88.6	
40	0.425	16.9	12.3	87.7	84.3	
60	0.250	22.5	16.4	83.6	80.3	
100	0.150	29.4	21.4	78.6	75.5	
200	0.075	37.4	27.3	72.7	69.9	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

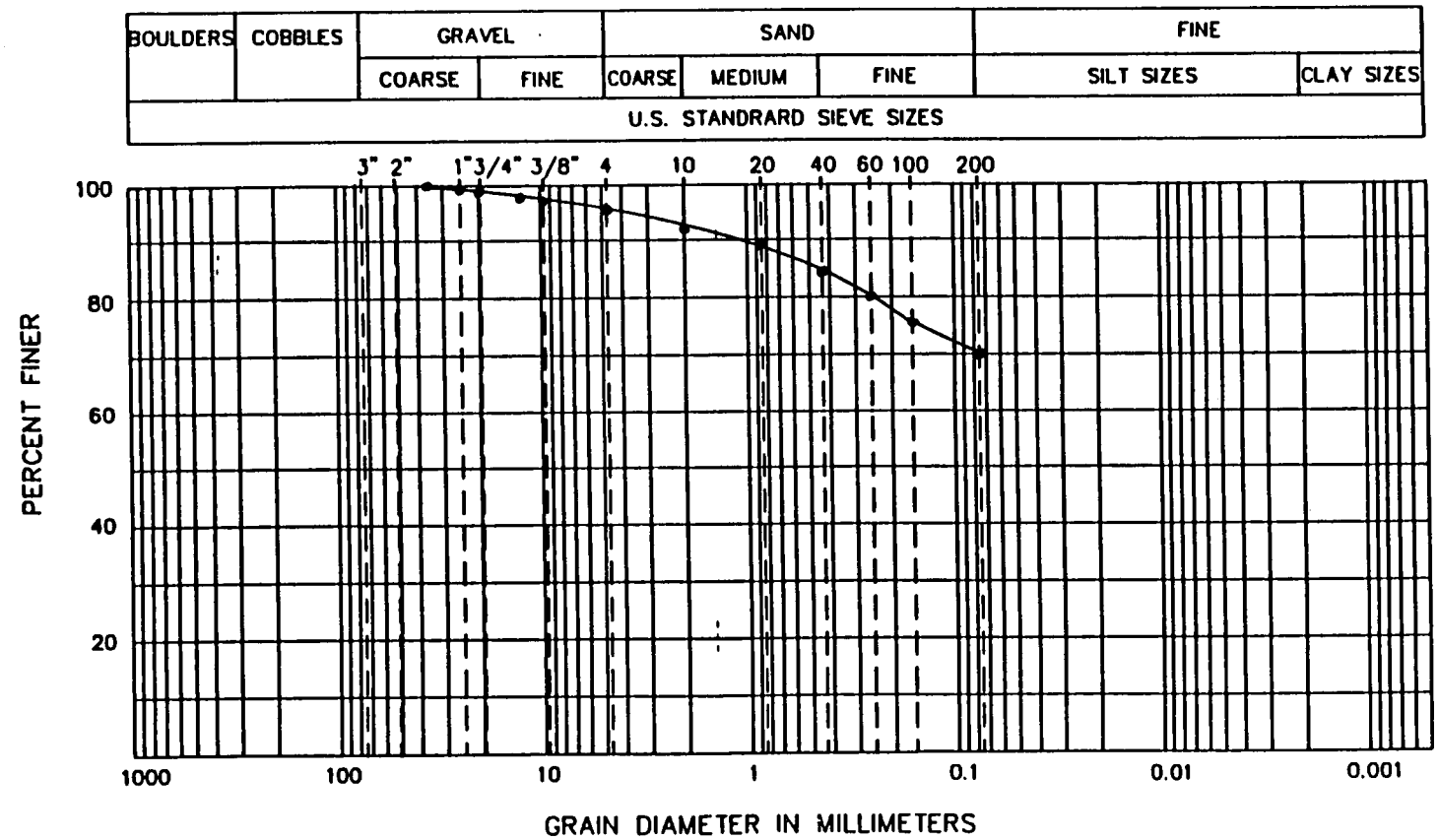
DESCRIPTION: Phase I Construction

DATE: 08 day Oct month 1997 year

MATERIAL TYPE: Clay Liner

SAMPLE NO.: LP-300 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 32

(PL) 17

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.4
3/4-in.	99.2
1/2-in.	98.2
3/8-in.	97.6
NO. 4	96.1
NO. 10	92.4
NO. 20	88.6
NO. 40	84.3
NO. 60	80.3
NO. 100	75.5
NO. 200	69.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	66
0.020	53
0.005	30
0.002	23

SOIL CLASSIFICATION (ASTM D 2487): BROWN sandy LEAN CLAY (CL) w/TR of GVL.

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SHEET NO. 2 OF 2

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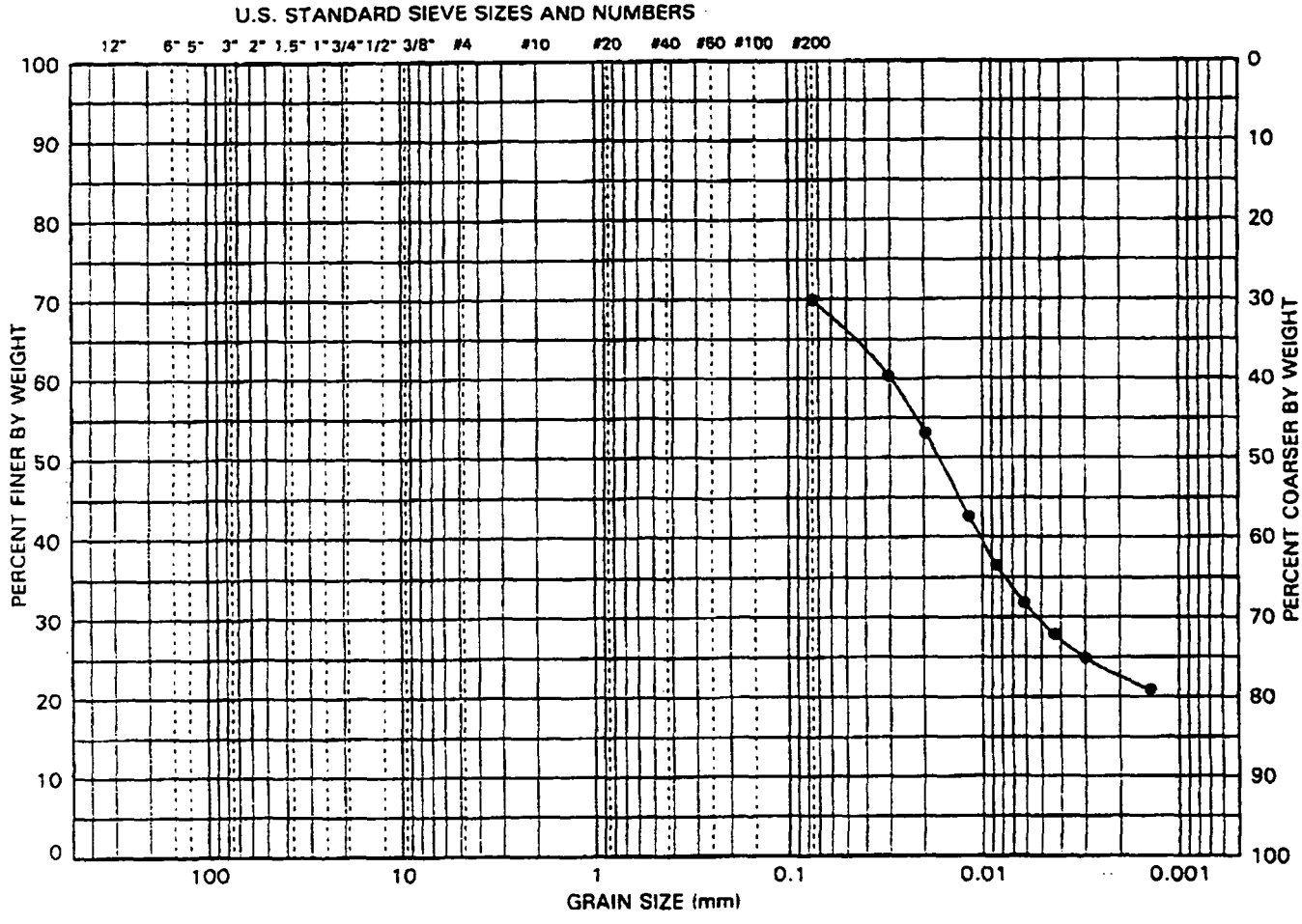
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-300	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97J57	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	69.9
SOIL CLASSIFICATION:				SILT (%)	47.1
				CLAY(%)	22.8
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													70	66	53	30	23	

NOTES:

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction — DATE: 07 day 05 month 1997 year

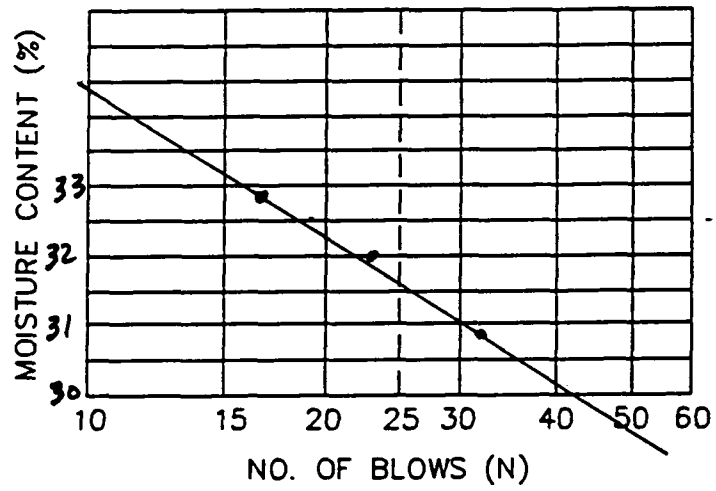
MATERIAL TYPE: Clay Liner — SAMPLE NO.: LP-300

LIQUID LIMIT DETERMINATION

QA ID: JM/JL

	TARE NO.		1.3	2.2	2.9	
A	WT. OF TARE	(grams)	28.64	27.63	31.46	
B	WT. OF WET SOIL & TARE	(grams)	44.35	44.91	48.73	
C	WT. OF DRY SOIL & TARE	(grams)	40.64	40.72	44.46	
D	WT. OF WATER = B-C	(grams)	3.71	4.19	4.27	
E	WT. OF DRY SOIL = C-A	(grams)	12.00	13.09	13.00	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.92	32.01	32.85	
N	NUMBER OF BLOWS		32	23	17	

DRYING TARE NO.: G



CURING TARE NO.: 2-B

PLASTIC LIMIT DETERMINATION

QA ID: JM/JL

	TARE NO.		3.1	3.2		
A	WT. OF TARE	(grams)	28.38	27.82		
B	WT. OF WET SOIL & TARE	(grams)	36.56	38.39		
C	WT. OF DRY SOIL & TARE	(grams)	35.36	36.84		
D	WT. OF WATER = B-C	(grams)	1.20	1.55		
E	WT. OF DRY SOIL = C-A	(grams)	6.98	9.02		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.19	17.18		

LIQUID LIMIT (LL) = 32 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 15

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 DATE: 6 day Oct month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: Lp-300

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

QA ID: JL

	WATER ADDED	(ml)	50	100	150	200	
A	WT. OF SOIL & MOLD	(grams)	6123.6	6214.3	6214.3	6169.0	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1914.2	2004.9	2004.9	1959.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.3	132.3	132.3	129.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.1	114.7	112.8	107.8	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

	TARE NO.		26	12	104	23	
F	WT. OF TARE	(grams)	8.3	7.2	8.2	8.4	
G	WT. OF WET SOIL & TARE	(grams)	210.3	217.1	210.7	213.9	
H	WT. OF DRY SOIL & TARE	(grams)	187.5	189.2	180.8	179.6	
I	WT. OF WATER = G - H	(grams)	22.8	27.9	29.9	34.3	
J	WT. DRY SOIL = H - F	(grams)	179.2	182.0	172.6	171.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.7	15.3	17.3	20.0	

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FLUOR DANIEL FERNALD

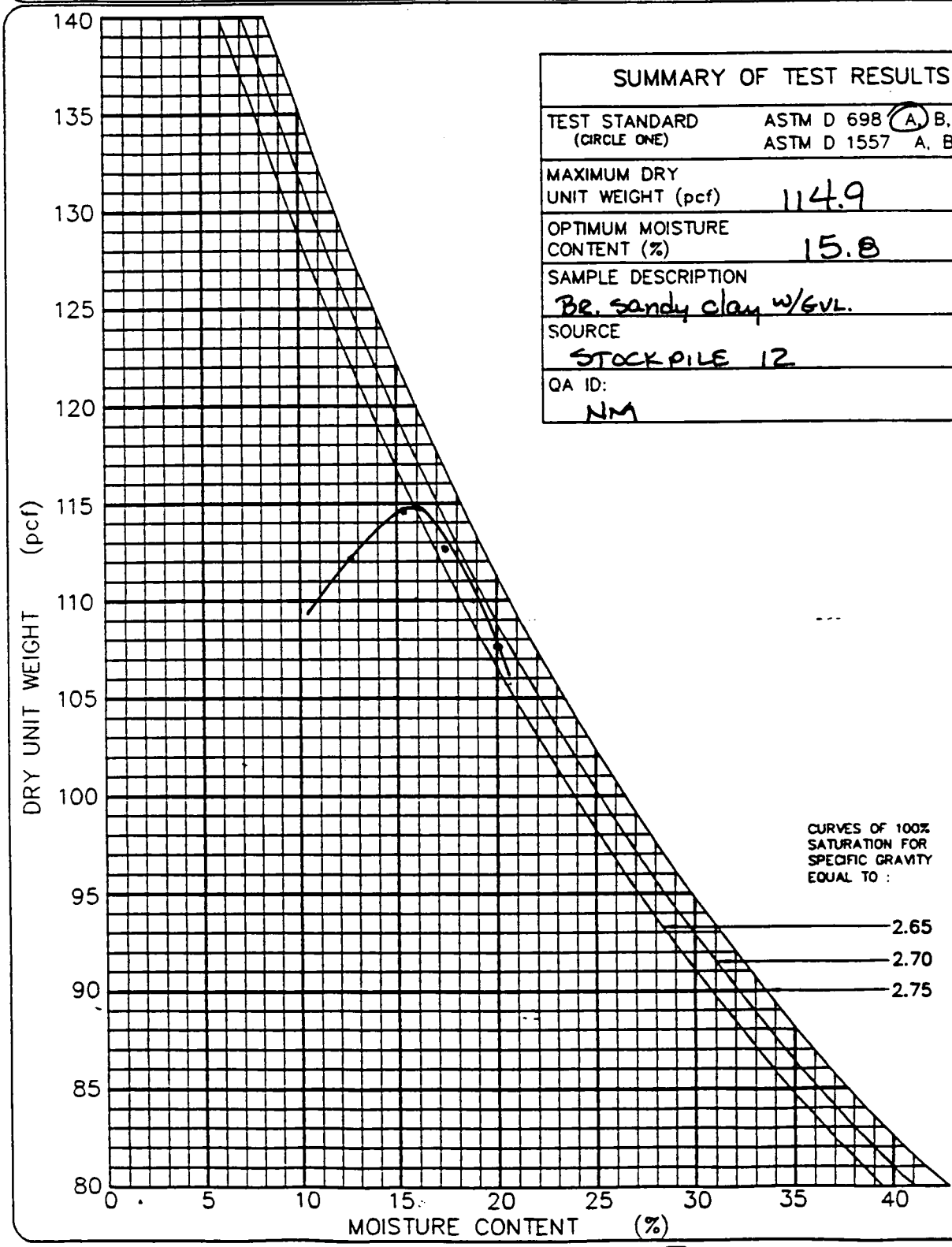
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction DATE: 07 day OCT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-300



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	114.9
OPTIMUM MOISTURE CONTENT (%)	15.8
SAMPLE DESCRIPTION	Br. sandy clay w/GVL.
SOURCE	STOCKPILE 12
QA ID:	NM

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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: 03 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-298, 301, 302, 303

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight — QA ID: JL/NM

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

		LP-298	LP-301	LP-302	LP-303	
	TARE NO. _____	26	13	2	33	
A	WT. OF TARE	8.3	8.2	8.2	8.3	
B	WT. OF WET SOIL & TARE	217.2	257.1	225.3	230.2	
C	WT. OF DRY SOIL & TARE	187.6	218.9	193.3	196.4	
D	WT. OF WATER = B-C	29.6	38.2	32.0	33.8	
E	WT. OF DRY SOIL = C-A	179.3	210.7	185.1	188.1	
F	MOISTURE CONTENT = (D/E) X 100	16.5	18.1	17.3	18.0	
		NDT-683	NDT-688	NDT-689	NDT 693	
	GAUGE	14.2	17.3	16.6	18.0	

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight — QA ID: JL

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.	IV				
A	WT. OF TARE	132.3				
B	WT. OF WET SOIL & TARE	244.2				
C	WT. OF DRY SOIL & TARE	228.1				
D	WT. OF WATER = B-C	16.1				
E	WT. OF DRY SOIL = C-A	95.8				
F	MOISTURE CONTENT = (D/E) X 100	16.8				

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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: 8 day Oct month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: Lp 304, Lp 305, Lp 306

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		Lp-304	Lp-305	Lp-306		
	TARE NO.	3	8	23		
A	WT. OF TARE	7.5	7.3	8.4		
B	WT. OF WET SOIL & TARE	201.7	205.5	196.9		
C	WT. OF DRY SOIL & TARE	172.8	174.5	166.8		
D	WT. OF WATER = B-C	28.9	31.0	30.1		
E	WT. OF DRY SOIL = C-A	165.3	167.2	158.4		
F	MOISTURE CONTENT = (D/E) X 100	17.5	18.5	19.0		
		WDT 695	WDT 697	WDT 702		
	gage	16.8	16.1	16.4		

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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.	IV	I	V		
A	WT. OF TARE	132.3	132.1	126.3		
B	WT. OF WET SOIL & TARE	224.6	232.2	225.8		
C	WT. OF DRY SOIL & TARE	210.3	216.3	209.7		
D	WT. OF WATER = B-C	14.3	15.9	16.1		
E	WT. OF DRY SOIL = C-A	78.0	84.2	83.4		
F	MOISTURE CONTENT = (D/E) X 100	18.3	18.9	19.3		

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-307

SOIL SAMPLE SIZE TOTAL SAMPLE = 22,839.8
>NO.4 = 1950.6

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		13	13
WT. OF DRY SAMPLE PLUS TARE	(grams)	148.8	48.0
WT. OF TARE	(grams)	8.2	8.2
WT. OF DRY SAMPLE	(grams)	140.6	39.8

SIEVE ANALYSIS QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	0	0	100		
1"	25.0	148.0	.1	99.9		
¾"	19.0	533.4	2.3	97.7		90-100
½"	12.5	1045.0	4.6	95.4		
⅜"	9.5	1326.5	5.8	94.2		
4	4.75	1872.2	8.2	91.8		
10	2.00	5.0	3.6	96.4	88.5	
20	0.850	11.1	7.9	92.1	84.5	
40	0.425	17.1	12.2	87.8	80.6	
60	0.250	22.5	16.0	84.0	77.1	
100	0.150	29.9	~~16.3~~ 21.3	78.7	72.2	
200	0.075	39.1	27.8	72.2	66.3	50-100

%FINER = 100 − Σ % RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

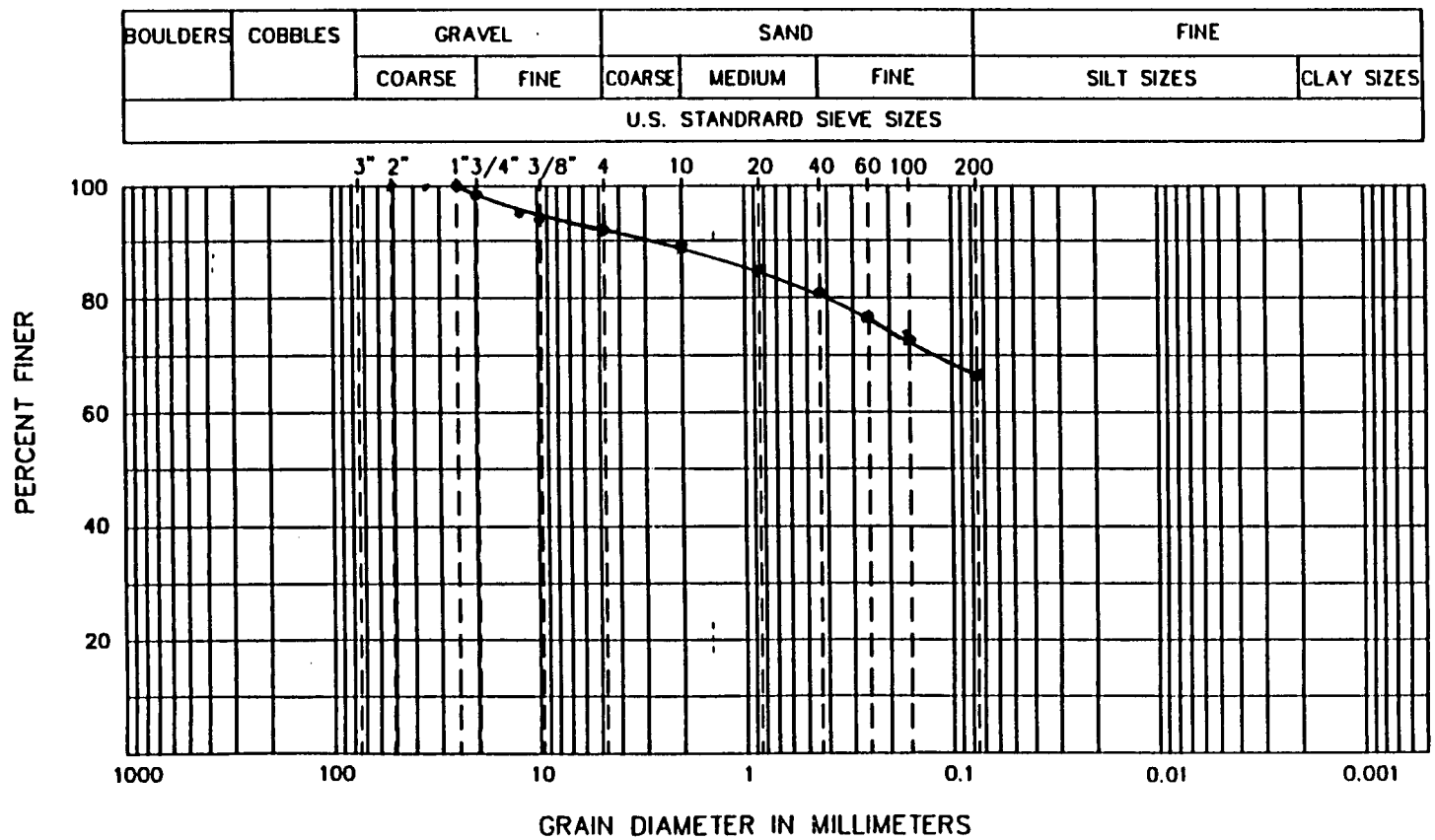
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 11 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-307 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 29

(PL) 18

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100
1 1/2-in.	100
1-in.	99.9
3/4-in.	~~94.3~~ 97.7
1/2-in.	95.4
3/8-in.	94.2
NO. 4	91.8
NO. 10	88.5
NO. 20	84.5
NO. 40	80.6
NO. 60	77.1
NO. 100	73.2
NO. 200	66.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	61
0.020	48
0.005	27
0.002	20

SOIL CLASSIFICATION (ASTM D 2487): BROWN Sandy LEAN CLAY (CL) w/ SOME GVL.

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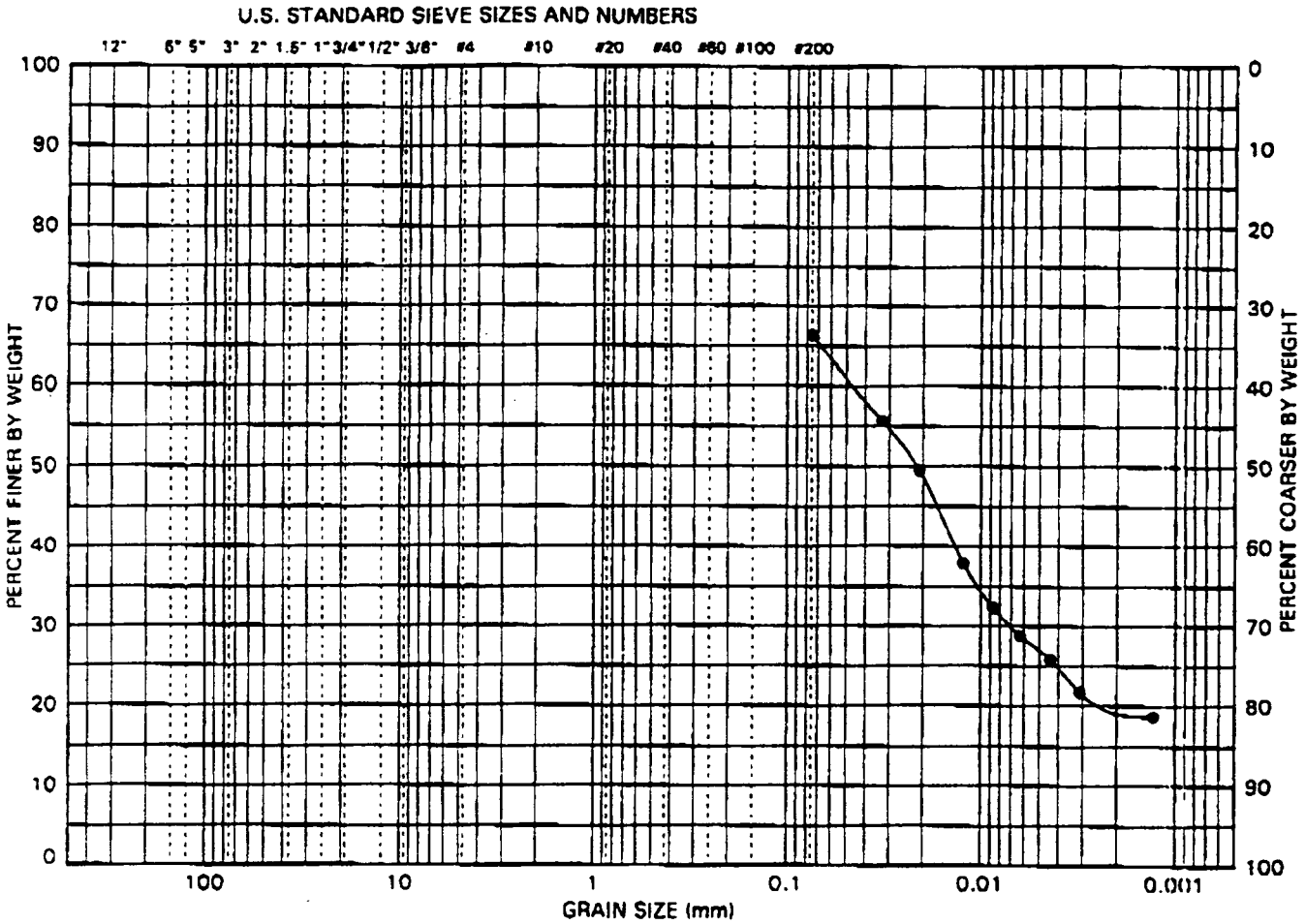
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/16/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-307	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97J95	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	66.3
SOIL CLASSIFICATION:				SILT (%)	46.1
				CLAY(%)	20.2
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													66	61	48	27	20	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-307

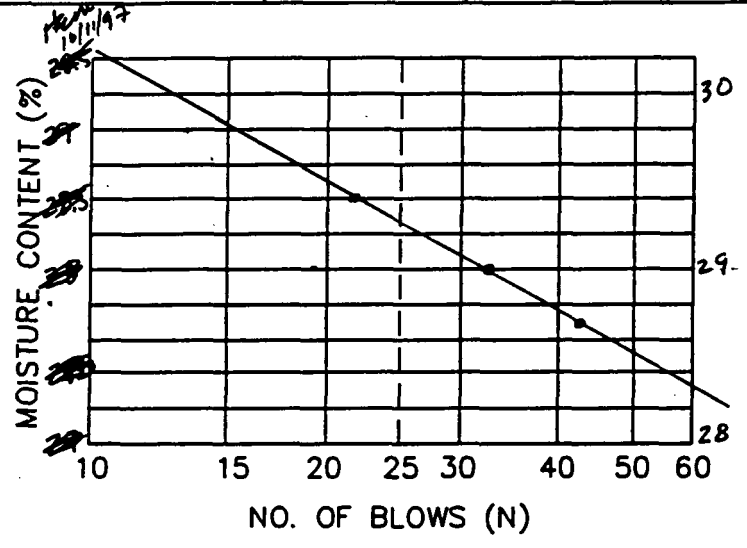
LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.6	2.5	2.3	
A	WT. OF TARE	(grams)	28.55	28.42	31.20	
B	WT. OF WET SOIL & TARE	(grams)	46.69	45.97	49.31	
C	WT. OF DRY SOIL & TARE	(grams)	42.57	42.03	45.27	
D	WT. OF WATER = B-C	(grams)	4.12	3.94	4.04	
E	WT. OF DRY SOIL = C-A	(grams)	14.02	13.61	14.07	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.39	28.95	28.71	
N	NUMBER OF BLOWS		22	33	42	

DRYING TARE NO.

G



CURING TARE NO.

II

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.9	3.1		
A	WT. OF TARE	(grams)	31.46	28.38		
B	WT. OF WET SOIL & TARE	(grams)	39.95	36.99		
C	WT. OF DRY SOIL & TARE	(grams)	38.67	35.71		
D	WT. OF WATER = B-C	(grams)	1.28	1.28		
E	WT. OF DRY SOIL = C-A	(grams)	7.21	7.33		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.75	17.46		

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 11

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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 — DATE: 10 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-307

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

QA ID: JL

	WATER ADDED	(ml)	50	100	150	0	
A	WT. OF SOIL & MOLD	(grams)	6214.3	6214.3	01/10/97 JL ~~6168~~ 6169.0	6123.6	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	2004.9	2004.9	1959.6	1914.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	132.3	132.3	129.3	126.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.3	113.3	108.7	112.2	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

	TARE NO.		12	33	29	26	
F	WT. OF TARE	(grams)	7.3	8.3	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	201.6	212.9	235.3	212.9	
H	WT. OF DRY SOIL & TARE	(grams)	175.2	183.4	199.1	190.0	
I	WT. OF WATER = G - H	(grams)	26.4	29.5	36.2	22.9	
J	WT. DRY SOIL = H - F	(grams)	167.9	175.1	190.9	181.7	
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.7	16.8	19.0	12.6	

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FLUOR DANIEL FERNALD

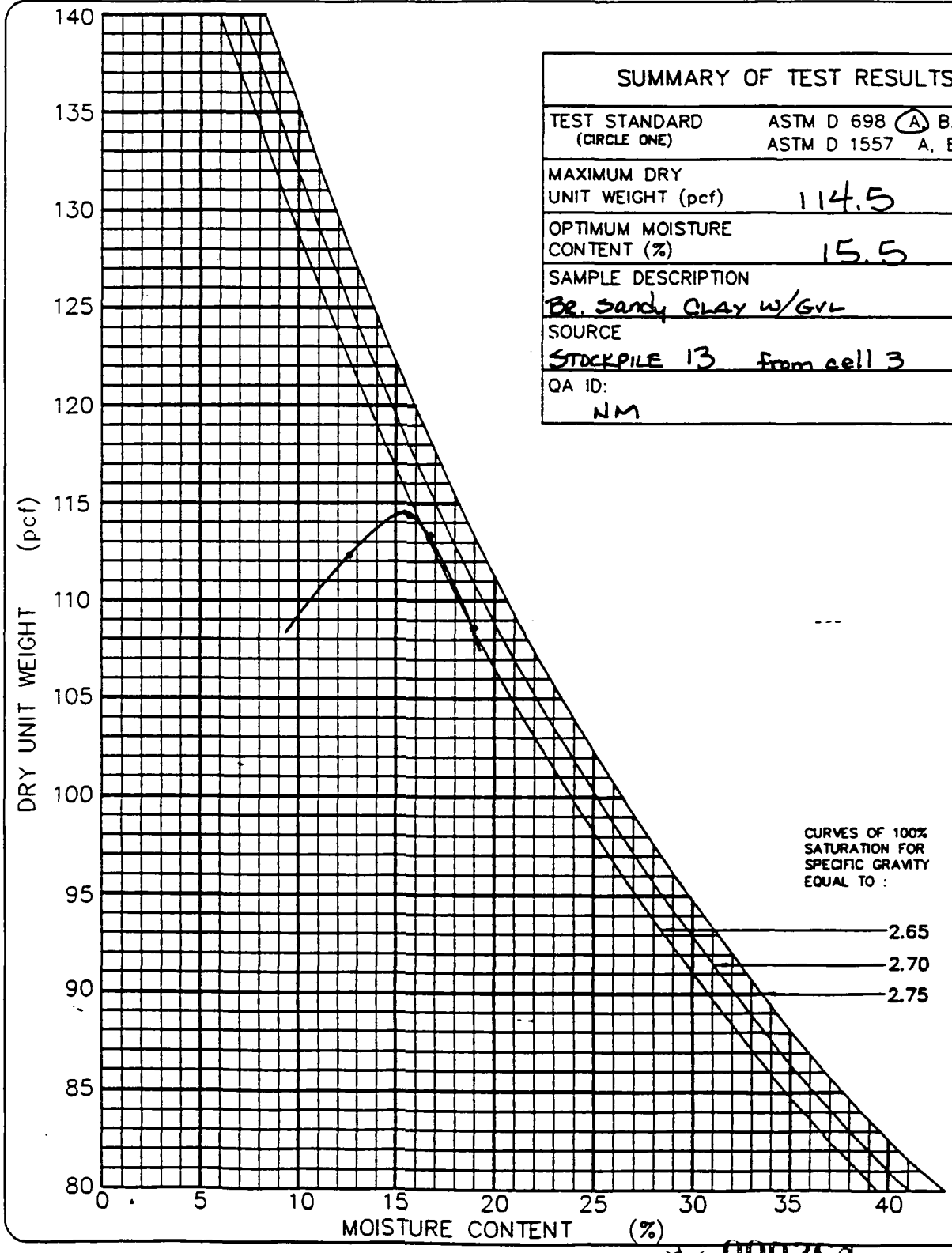
MOISTURE-DENSITY RELATIONSHIP

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

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-307



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	114.5
OPTIMUM MOISTURE CONTENT (%)	15.5
SAMPLE DESCRIPTION	Br. Sandy CLAY w/GVL
SOURCE	STOCKPILE 13 from cell 3
QA ID:	NM

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: 05 day OCT month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-~~299~~ 308,309,310,311,312

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP 308	LP 309	LP 310	LP 311	LP 312
	TARE NO.	3	8	23	2	12
A	WT. OF TARE	7.5	7.3	8.4	8.2	7.3
B	WT. OF WET SOIL & TARE	215.9	201.1	219.9	218.7	206.4
C	WT. OF DRY SOIL & TARE	187.0	169.1	187.5	187.5	174.2
D	WT. OF WATER = B-C	28.9	32.0	32.4	31.2	32.2
E	WT. OF DRY SOIL = C-A	179.5	161.8	179.1	179.3	166.9
F	MOISTURE CONTENT = (D/E) X 100	16.1	19.8	18.1	17.4	19.3
		NDT 712	NDT-720	NDT 721	NDT-725	NDT 735
		16.7	18.4	16.6	16.6	17.4

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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	V	IV	III	I
A	WT. OF TARE	132.1	126.3	132.3	132.0	132.1
B	WT. OF WET SOIL & TARE	249.4	229.9	238.3	224.9	238.3
C	WT. OF DRY SOIL & TARE	232.4	212.7	221.6	211.2	220.6
D	WT. OF WATER = B-C	17.0	17.2	16.7	13.7	17.1
E	WT. OF DRY SOIL = C-A	100.3	86.4	89.3	79.2	88.5
F	MOISTURE CONTENT = (D/E) X 100	16.9	19.9	18.7	17.3	19.3

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: 09 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-313, 314

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: JL

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

		LP-313	LP 314			
	TARE NO. _____	101	14			
A	WT. OF TARE	8.3	7.8			
B	WT. OF WET SOIL & TARE	190.8	205.4			
C	WT. OF DRY SOIL & TARE	161.7	166.3			
D	WT. OF WATER = B-C	29.1	39.1			
E	WT. OF DRY SOIL = C-A	153.4	158.5			
F	MOISTURE CONTENT = (D/E) X 100	19.0	24.7			
		NDT 737	NDT 738			
	gage	18.6	23.3			

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: JL

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%

		III	IV			
	TARE NO.					
A	WT. OF TARE	132.0	132.3			
B	WT. OF WET SOIL & TARE	232.2	226.0			
C	WT. OF DRY SOIL & TARE	216.0	207.7			
D	WT. OF WATER = B-C	16.2	18.3			
E	WT. OF DRY SOIL = C-A	84.0	75.4			
F	MOISTURE CONTENT = (D/E) X 100	19.3	24.3			

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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 — DATE: 09 day OCT month 1997 year

MATERIAL TYPE: STR. FILL — SAMPLE NO.: LP-315

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

QA ID: JL

			CHECK POINT				
	WATER ADDED	(ml)	0				
A	WT. OF SOIL & MOLD	(grams)	5942.2				
B	WT. OF MOLD	(grams)	4209.4				
C	WT. OF SOIL = A - B	(grams)	1732.8				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	114.4				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	101.2	100.4			

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

			oven	microwave			
	TARE NO.		29	I			
F	WT. OF TARE	(grams)	8.3	132.1			
G	WT. OF WET SOIL & TARE	(grams)	217.0	238.2	COMPARES w/LP-~~243~~ 269		
H	WT. OF DRY SOIL & TARE	(grams)	193.0	225.2	MDD = ~~104.2 pcf~~ 107.0 pcf		
I	WT. OF WATER = G - H	(grams)	24.0	13.0	OMC = ~~20.2%~~ 19.2%		
J	WT. DRY SOIL = H - F	(grams)	184.7	93.1	HEM 10/14/97		
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.0	14.0			

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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: 10 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-316, 317, 318, 319, 320

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: JL

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

		LP-316	LP 317	LP-318	LP 319	LP 320
	TARE NO. _____	101	14	28	3	23
A	WT. OF TARE	8.3	7.7	8.2	7.5	8.4
B	WT. OF WET SOIL & TARE	204.7	200.4	207.2	218.0	204.6 JL
C	WT. OF DRY SOIL & TARE	172.3	170.6	174.0	187.3	172.~~8~~2
D	WT. OF WATER = B-C	32.4	29.8	33.2	30.7	32.4
E	WT. OF DRY SOIL = C-A	164.0	162.9	165.8	179.8	163.8
F	MOISTURE CONTENT = (D/E) X 100	19.8	18.3	20.0	17.1	19.8
		NDT 752	NDT-763	NDT-769	WDT	WDT 774
	GAUGE	18.5	16.3	18.7	16.0	17.1

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: JL

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%

		I	III	IV	V	V
	TARE NO.					
A	WT. OF TARE	132.1	132.0	132.3	132.1	126.3
B	WT. OF WET SOIL & TARE	218.2	219.6	~~207~~ JL 230.0	239.3	233.8
C	WT. OF DRY SOIL & TARE	203.7	205.6	213.2	223.3	216.1
D	WT. OF WATER = B-C	14.5	14.0	16.8	16.0	17.7
E	WT. OF DRY SOIL = C-A	71.6	73.6	80.9	~~210.2~~ JL 91.2	89.8
F	MOISTURE CONTENT = (D/E) X 100	203	19.0	20.8	17.5	19.7

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 15,16 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-321

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
~~21,409.9g~~ 20275.9g (grams) >No.4 - 544.3g.	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		13	13
WT. OF DRY SAMPLE PLUS TARE	(grams)	261.4	66.8
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	252.8	58.5

SIEVE ANALYSIS

QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	~~100~~	100		100
1½"	37.5	0	0	100		
1"	25.0	47.5	.2	99.8		
¾"	19.0	120.9	.6	99.4		90-100
½"	12.5	212.1	1.0	99.0		
⅜"	9.5	278.8	1.4	98.6		
4	4.75	476.6	2.4	97.6		
10	2.00	8.8	3.5	96.5	94.2	
20	0.850	19.8	7.8	92.2	90.0	
40	0.425	31.0	12.3	87.7	85.6	
60	0.250	39.1	15.5	84.5	82.5	
100	0.150	48.2	19.1	80.9	79.0	
200	0.075	58.2	23.0	77.0	75.2	50-100

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

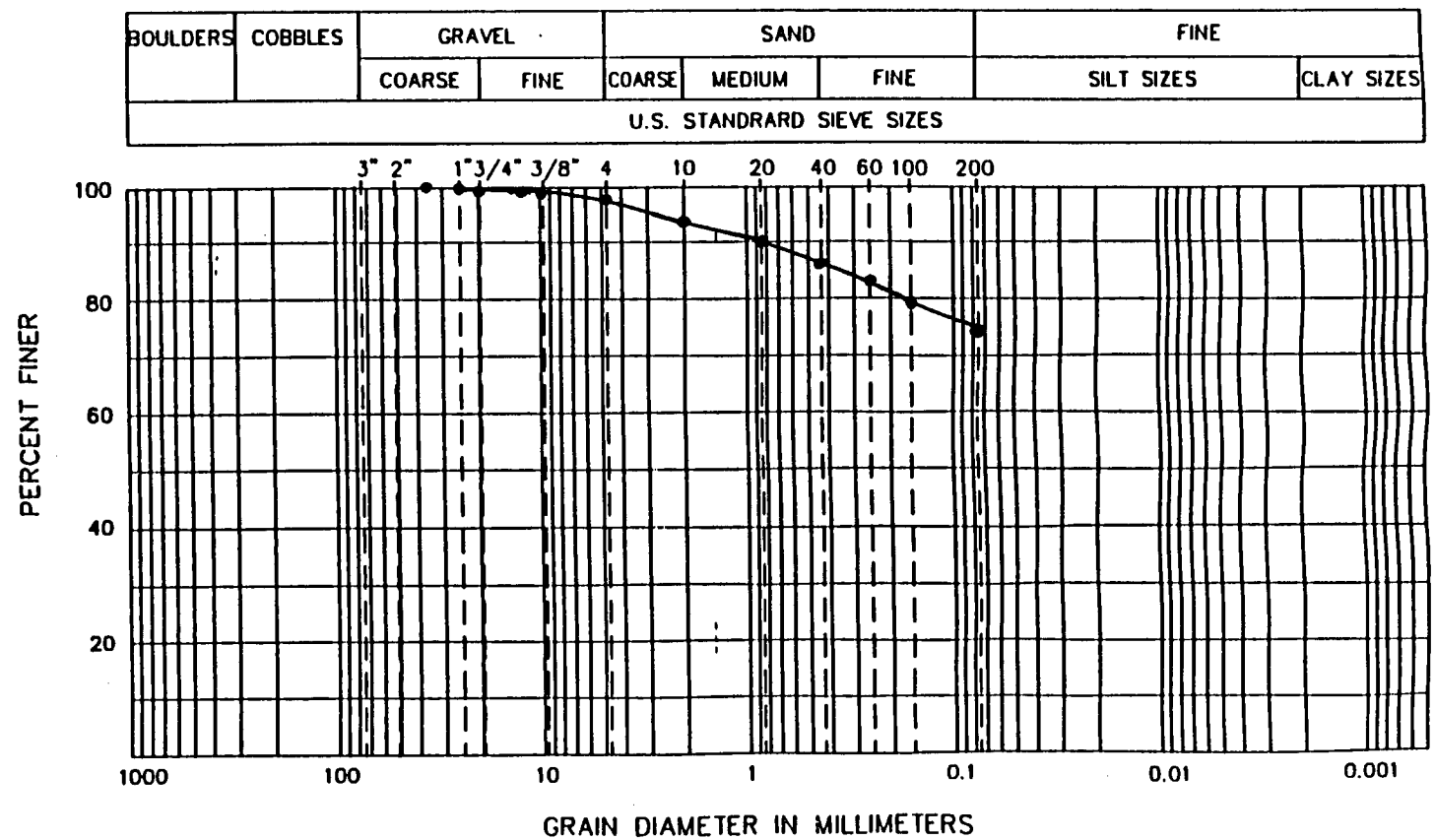
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 16 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-321 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 39

(PL) 17

(PI) 22

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100
1 1/2-in.	100
1-in.	100 ~~99.8~~ 99.8
3/4-in.	99.7
1/2-in.	99.0
3/8-in.	98.6
NO. 4	97.6
NO. 10	94.2
NO. 20	90.0
NO. 40	85.6
NO. 60	82.5
NO. 100	79.0
NO. 200	75.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	69
0.020	55
0.005	30
0.002	21

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY W/ TR. of GVL.

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SHEET NO. 2 OF 2

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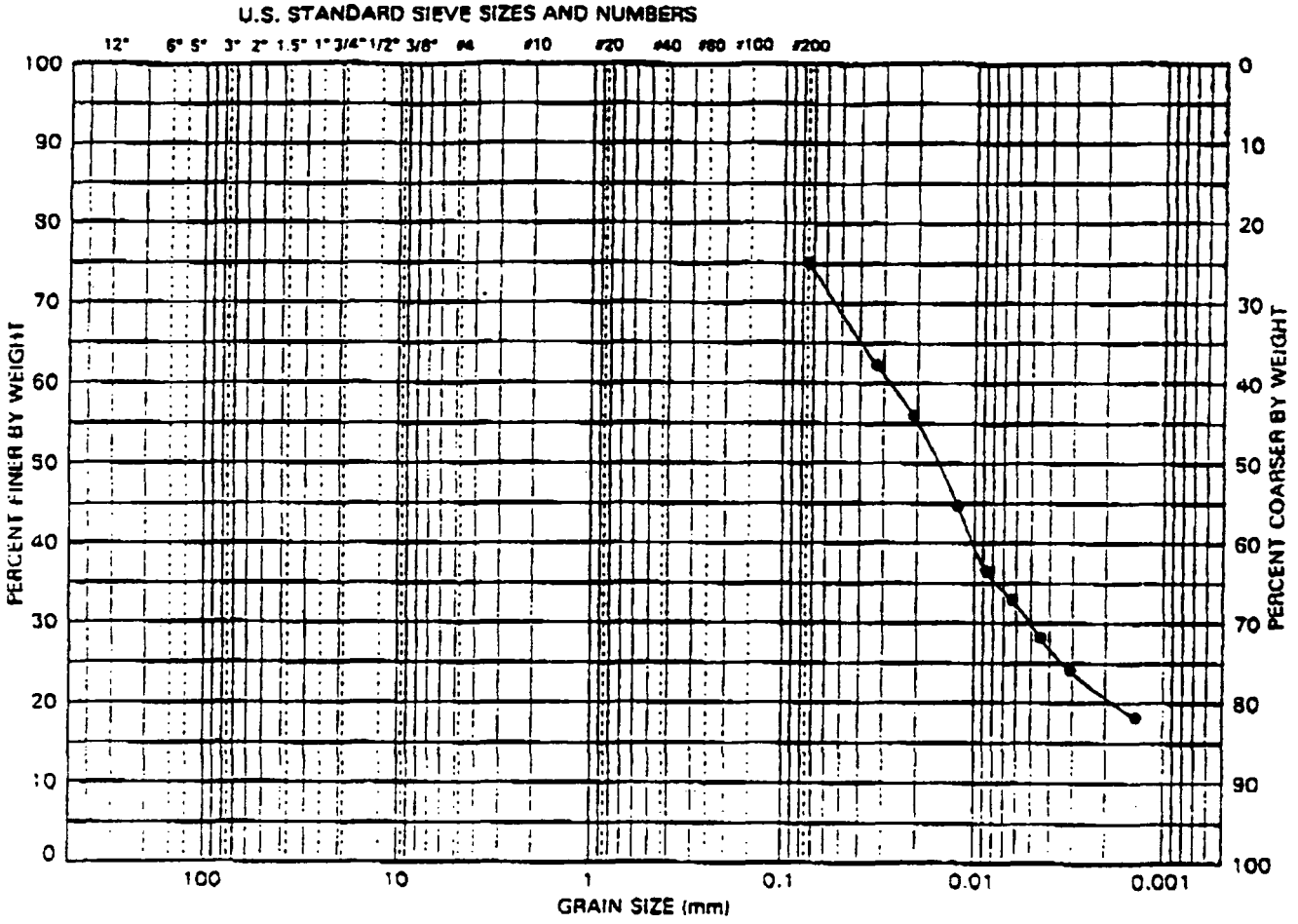
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: P974G006

GS FORM: 4PS2 10/24/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-321	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97J121	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%) 75.2
SOIL CLASSIFICATION:				SILT (%) 54.4
				CLAY(%) 20.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.160	0.075	0.060	0.020	0.005	0.002	0.001
													75	69	55	30	21	

NOTES:

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 15 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-321

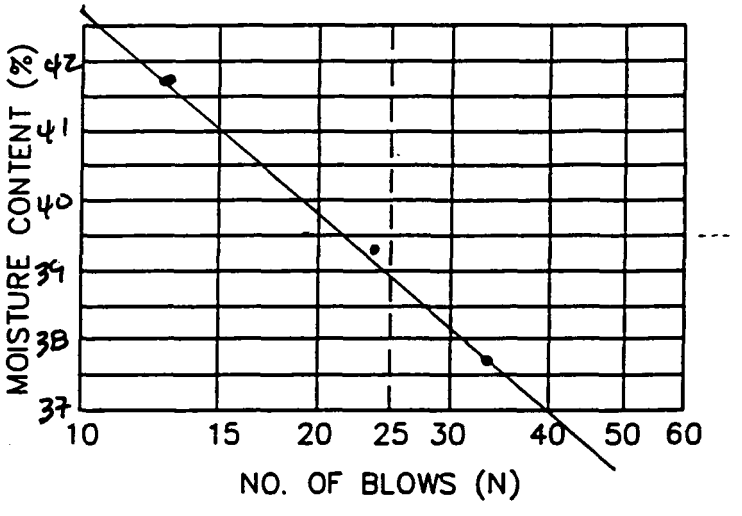
LIQUID LIMIT DETERMINATION

QA ID: JL

	TARE NO.		2.9	3.2	1.2	
A	WT. OF TARE	(grams)	31.46	27.82	28.50	
B	WT. OF WET SOIL & TARE	(grams)	50.57	45.00	48.18	
C	WT. OF DRY SOIL & TARE	(grams)	45.34	40.15	42.39	
D	WT. OF WATER = B-C	(grams)	5.23	4.85	5.79	
E	WT. OF DRY SOIL = C-A	(grams)	13.88	12.33	13.89	
F	MOISTURE CONTENT = (D/E)X100	(%)	37.68	39.33	41.68	
N	NUMBER OF BLOWS		34	24	13	

DRYING TARE NO.

R



CURING TARE NO.

2-B

PLASTIC LIMIT DETERMINATION

QA ID: JL

	TARE NO.		2.3	3.1		
A	WT. OF TARE	(grams)	~~37.79~~ 32.70	~~34.11~~ 28.38		
B	WT. OF WET SOIL & TARE	(grams)	~~36.83~~ 37.71	~~33.31~~ 34.11		
C	WT. OF DRY SOIL & TARE	(grams)	~~0.96~~ 36.83	33.31		
D	WT. OF WATER = B-C	(grams)	0.96	0.80		
E	WT. OF DRY SOIL = C-A	(grams)	5.63	~~5.73~~ 4.93		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.05	16.23		

LIQUID LIMIT (LL) = 39 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 22

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 — DATE: 14 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-321

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

QA ID: JL

	WATER ADDED	(ml)	50 mL	100 mL	150 mL	200 mL	
A	WT. OF SOIL & MOLD	(grams)	6010.2	6078.2	6146.3	6123.6	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1800.8	1868.8	1936.9	1914.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	118.9	123.3	127.8	126.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	104.0	105.1	107.9	104.1	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

	TARE NO.		101	28	14	29	
F	WT. OF TARE	(grams)	8.3	8.2	7.8	8.2	
G	WT. OF WET SOIL & TARE	(grams)	242.6	231.8	222.9	241.9	
H	WT. OF DRY SOIL & TARE	(grams)	~~14~~ 213.2	198.9	189.2	200.9	
I	WT. OF WATER = G - H	(grams)	29.4	32.9	33.7	41.0	
J	WT. DRY SOIL = H - F	(grams)	204.9	190.7	181.4	192.7	
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.3	17.3	18.6	21.3	

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*GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: [illegible]

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

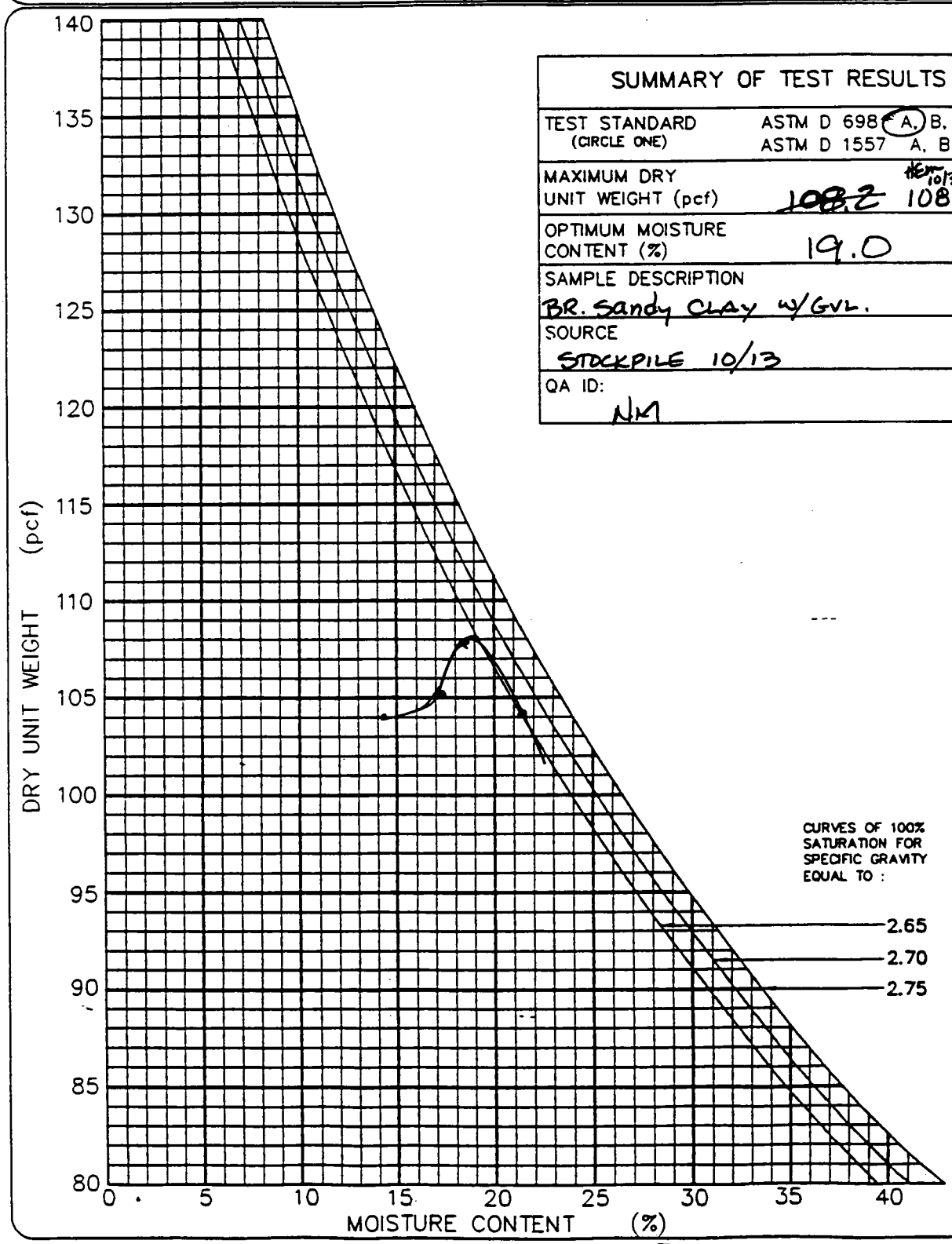
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 15 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-321



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A.) B. C ASTM D 1557 A. B. C
MAXIMUM DRY UNIT WEIGHT (pcf)	~~108.2~~ HEM 10/30/97 108.2
OPTIMUM MOISTURE CONTENT (%)	19.0
SAMPLE DESCRIPTION	BR. Sandy CLAY w/GVL.
SOURCE	STOCKPILE 10/13
QA ID:	NM

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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: 13 day Oct month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP-322, 323

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: JL

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

		LP322	LP323			
	TARE NO.	104	14			
A	WT. OF TARE	8.2	7.8			
B	WT. OF WET SOIL & TARE	208.9	202.7			
C	WT. OF DRY SOIL & TARE	179.8	171.7			
D	WT. OF WATER = B-C	29.1	31.0			
E	WT. OF DRY SOIL = C-A	171.6	163.9			
F	MOISTURE CONTENT = (D/E) X 100	17.0	18.9			
		NDT	NDT 829			
		15.9	16.5			

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: JL

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.	IV	III			
A	WT. OF TARE	132.3	132.0			
B	WT. OF WET SOIL & TARE	276.1	221.1			
C	WT. OF DRY SOIL & TARE	203.6	206.7			
D	WT. OF WATER = B-C	12.5	14.4			
E	WT. OF DRY SOIL = C-A	71.3	74.7			
F	MOISTURE CONTENT = (D/E) X 100	17.5	19.3			

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: 15 day Oct month 1997 year

MATERIAL TYPE: Clay Liner SAMPLE NO.: LP 324

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: JL

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

		LP 324	~~LP 325~~			
	TARE NO.	29	2			
A	WT. OF TARE	8.2	8.2			
B	WT. OF WET SOIL & TARE	202.0	207.3			
C	WT. OF DRY SOIL & TARE	169.4				
D	WT. OF WATER = B-C	32.6				
E	WT. OF DRY SOIL = C-A	161.2				
F	MOISTURE CONTENT = (D/E) X 100	20.2				
		NDT 886	NDT			
	gage	- 17.8	21.1		---	

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: JL

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%

		V	I			
	TARE NO.					
A	WT. OF TARE	126.3	132.1			
B	WT. OF WET SOIL & TARE	213.2	224.9			
C	WT. OF DRY SOIL & TARE	198.6	208.9			
D	WT. OF WATER = B-C	14.6	16.0			
E	WT. OF DRY SOIL = C-A	72.3	76.8			
F	MOISTURE CONTENT = (D/E) X 100	20.2	20.8			

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 20 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-325

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
~~19604.6g~~ JL 20,715.9 (grams) 7 No 4 1111.3g.	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		104 ~~105~~ JL	104
WT. OF DRY SAMPLE PLUS TARE	(grams)	226.8 ~~317.4~~	64.8
WT. OF TARE	(grams)	8.2 ~~8.5~~	8.2
WT. OF DRY SAMPLE	(grams)	JL ~~64.8~~ 218.6	JL ~~64.8~~ 56.6

SIEVE ANALYSIS

QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		100
1½"	37.5	0	0	100		
1"	25.0	145.1	.7	99.3		
¾"	19.0	245.4	1.1	98.9		90-100
½"	12.5	437.6	2.1	97.9		
⅜"	9.5	601.4	2.9	97.1		
4	4.75	1079.6	5.2	94.8		
10	2.00	11.2	5.1	94.9	90.0	
HEM 10/14/97 ~~15~~ 20	0.850	20.4	9.3	90.7	86.0	
~~16~~ 40	0.425	29.1	13.3	86.7	82.2	
60	0.250	36.6	16.7	83.3	79.0	
100	0.150	45.7	20.9	79.1	75.0	
200	0.075	56.4	25.8	74.2	70.3	50-100

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

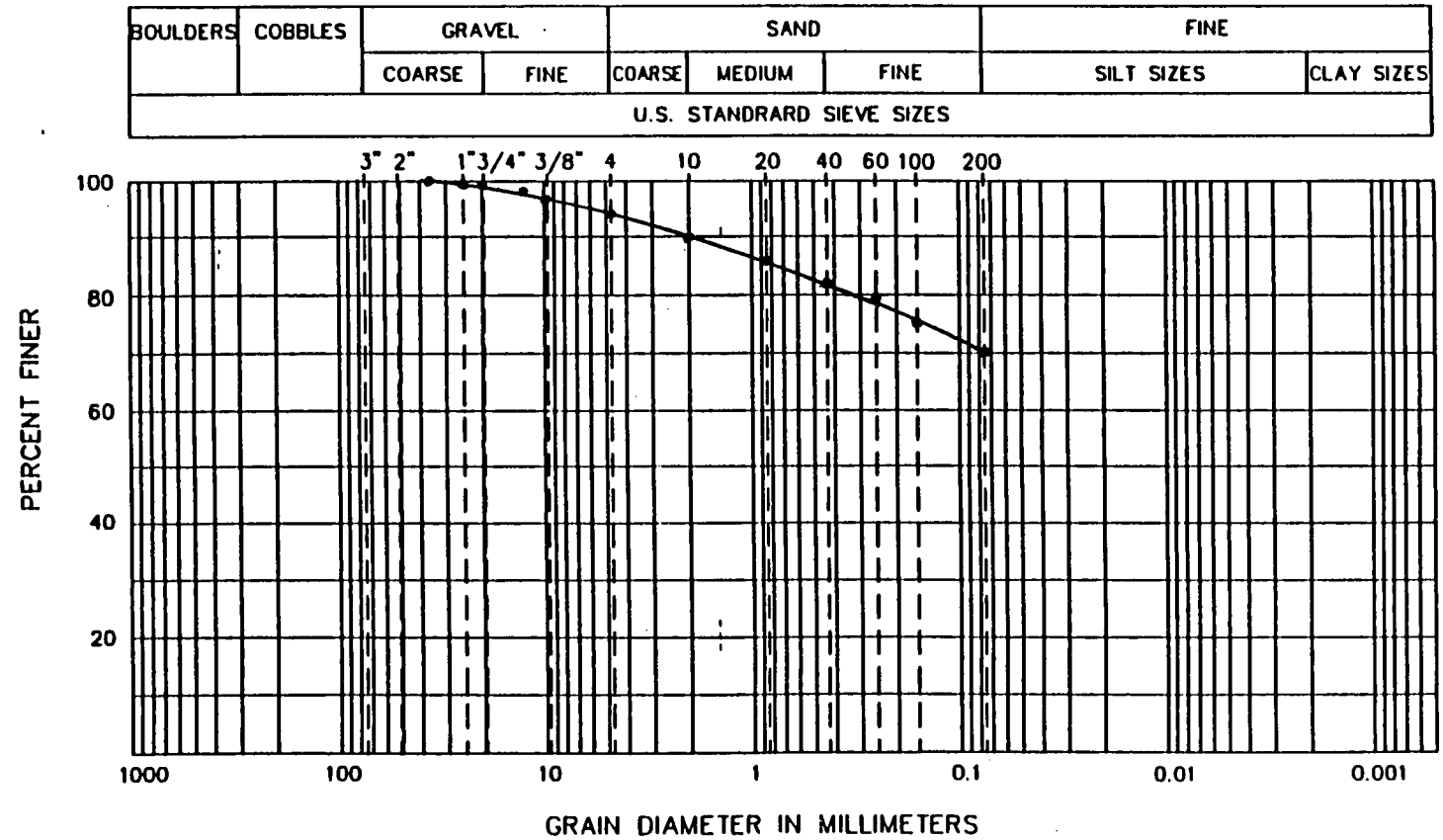
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 21 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-325 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 32

(PL) 17

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100
1 1/2-in.	100
1-in.	99.3
3/4-in.	98.9
1/2-in.	97.9
3/8-in.	97.1
NO. 4	94.8
NO. 10	90.0
NO. 20	86.0
NO. 40	82.2
NO. 60	79.0
NO. 100	75.0
NO. 200	70.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	66
0.020	56
0.005	30
0.002	22

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) W/ SOME GVL.

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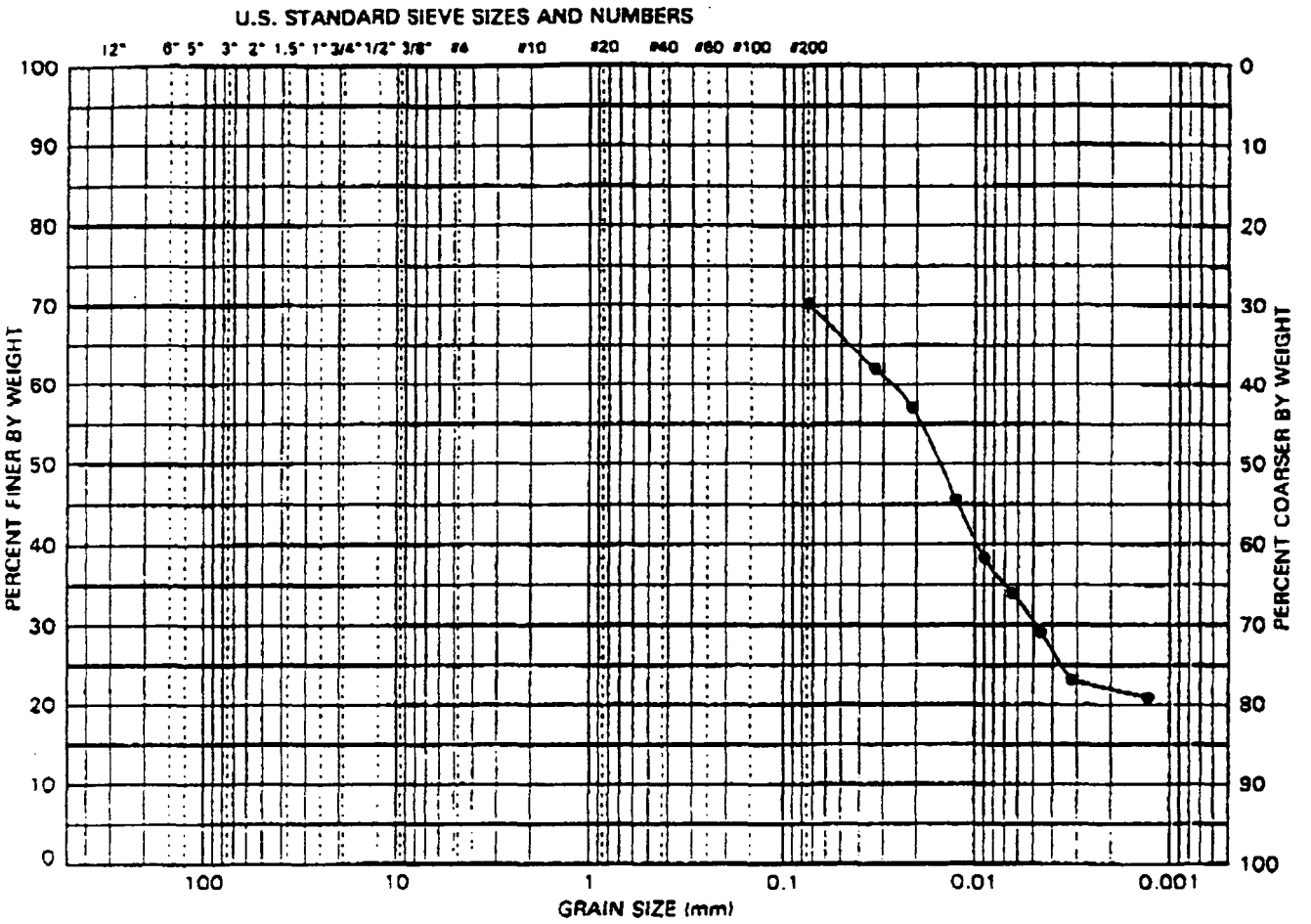
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G008

GS FORM: 4PS2 10/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-325	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97J175	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	70.3
SOIL CLASSIFICATION:				SILT (%)	48.3
				CLAY(%)	22.0
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													70	66	56	30	22	

NOTES:

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

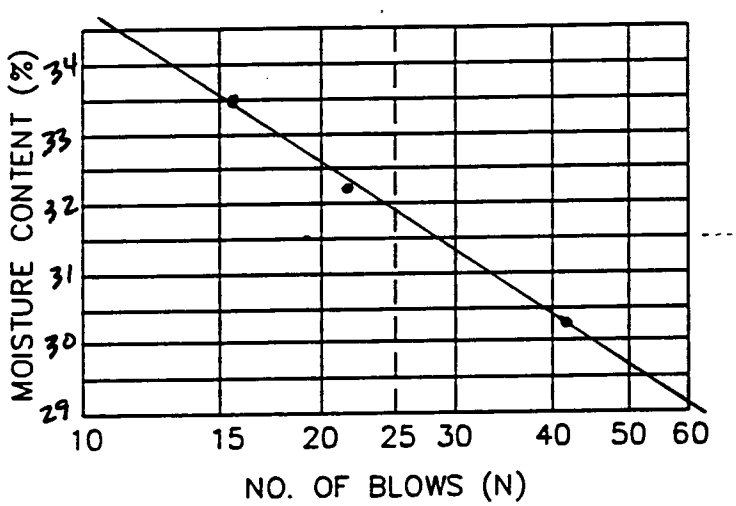
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-325

LIQUID LIMIT DETERMINATION

QA ID: JL

	TARE NO.		2.2	1.2	1.1	
A	WT. OF TARE	(grams)	27.63	28.50	28.76	
B	WT. OF WET SOIL & TARE	(grams)	47.24	46.89	47.35	
C	WT. OF DRY SOIL & TARE	(grams)	42.68	42.41	42.69	
D	WT. OF WATER = B-C	(grams)	4.56	4.48	4.66	
E	WT. OF DRY SOIL = C-A	(grams)	15.05	13.91	13.93	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.30	32.21	33.45	
N	NUMBER OF BLOWS		42	22	16	

DRYING TARE NO.: G



CURING TARE NO.: 1-H

PLASTIC LIMIT DETERMINATION

QA ID: JL

	TARE NO.		2.8	1.9		
A	WT. OF TARE	(grams)	28.45	28.56		
B	WT. OF WET SOIL & TARE	(grams)	44.19	43.21		
C	WT. OF DRY SOIL & TARE	(grams)	42.01	41.06		
D	WT. OF WATER = B-C	(grams)	2.18	2.15		
E	WT. OF DRY SOIL = C-A	(grams)	13.56	12.50		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.08	17.20		

LIQUID LIMIT (LL) = 32 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 15

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 — DATE: 21 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-325

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

QA ID: JL

	WATER ADDED	(ml)	50	100	150	200	
A	WT. OF SOIL & MOLD	(grams)	~~6109~~ 6110.0	6214.3	6223.4	6169.0	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1900.6	2004.9	2014.0	1959.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	125.4	132.3	132.9	129.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.6	114.0	112.4	108.6	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

	TARE NO.		6	20	9	33	
F	WT. OF TARE	(grams)	7.6	8.3	7.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	261.1	233.1	238.7	246.6	
H	WT. OF DRY SOIL & TARE	(grams)	231.1	201.9	203.1	208.4	
I	WT. OF WATER = G - H	(grams)	30.0	31.2	35.6	38.2	
J	WT. DRY SOIL = H - F	(grams)	223.5	193.6	195.9	200.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.4	16.1	18.2	19.1	

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

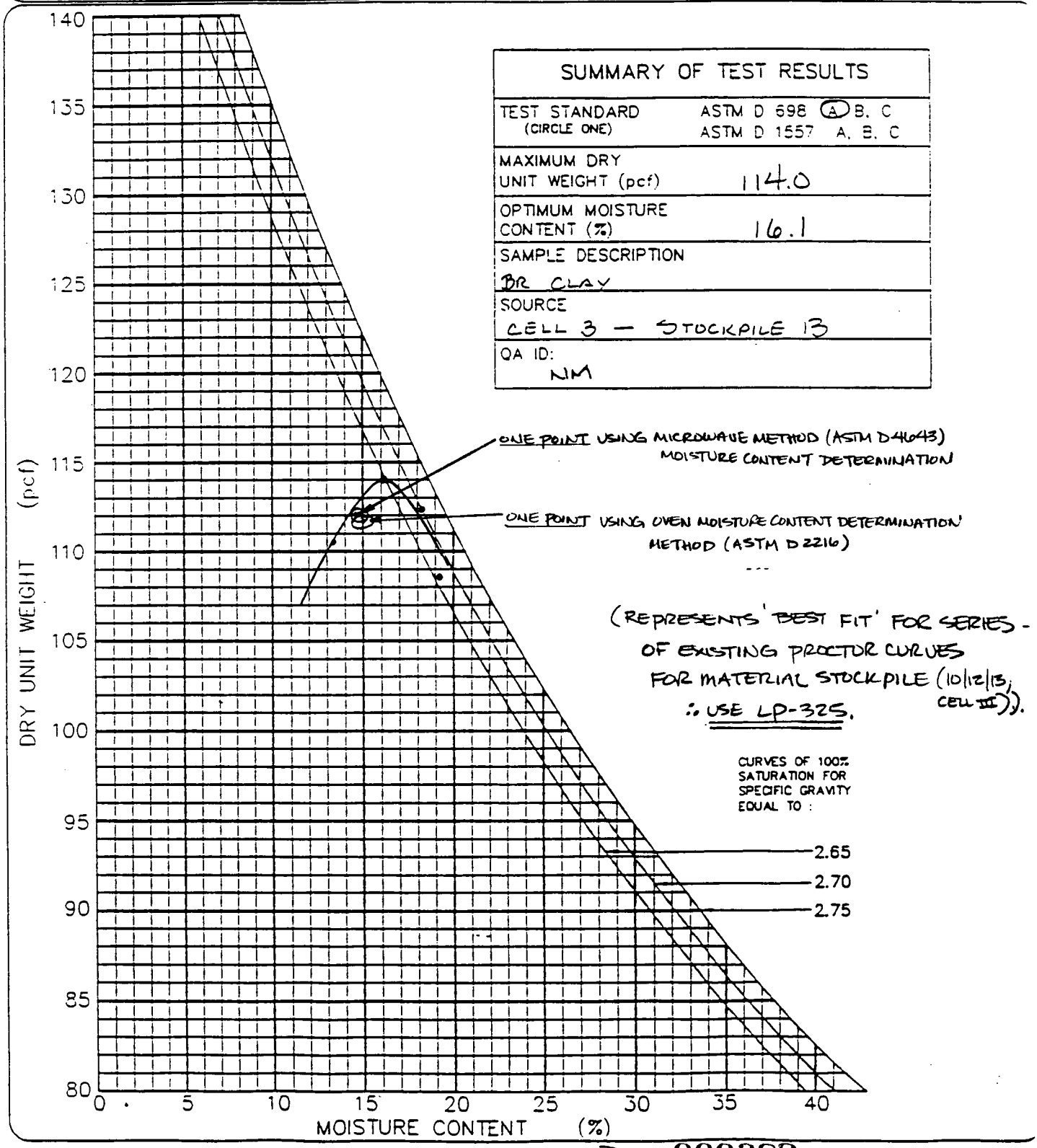
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 22 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-325



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	114.0
OPTIMUM MOISTURE CONTENT (%)	16.1
SAMPLE DESCRIPTION	BR CLAY
SOURCE	CELL 3 — STOCKPILE 13
QA ID:	NM

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 23 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-326

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
21,818.2g; > No 4 = 952.6 g	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		13	13
WT. OF DRY SAMPLE PLUS TARE	(grams)	23.4 JL ~~8.2~~ 234.3	68.4
WT. OF TARE	(grams)	23.4 JL 8.2	8.2
WT. OF DRY SAMPLE	(grams)	JL ~~234.3~~ 226.1	60.2

SIEVE ANALYSIS

QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	JL ~~0.2~~ 0	100		100
1½"	37.5	50.1	0.2	99.8		
1"	25.0	116.1	0.5	99.5		
¾"	19.0	157.4	0.7	99.3		90-100
½"	12.5	352.8	1.6	98.4		
⅜"	9.5	502.9	2.3	97.7		
4	4.75	917.6	4.2	95.8		
10	2.00 ~~0.8~~ HEM 10/17/97	8.1	3.6	96.4	92.4	
20	0.850	19.4	8.6	91.4	87.6	
40	0.425	30.8	13.6	86.4	82.8	
60	0.250	39.1	17.3	82.7	79.2	
100	0.150	49.1	21.7	78.3	75.0	
200	0.075	59.9	26.5	73.5	70.4	50-100

%FINER = 100 − Σ% RETAINED

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CHECKED BY: [illegible] 000383 SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

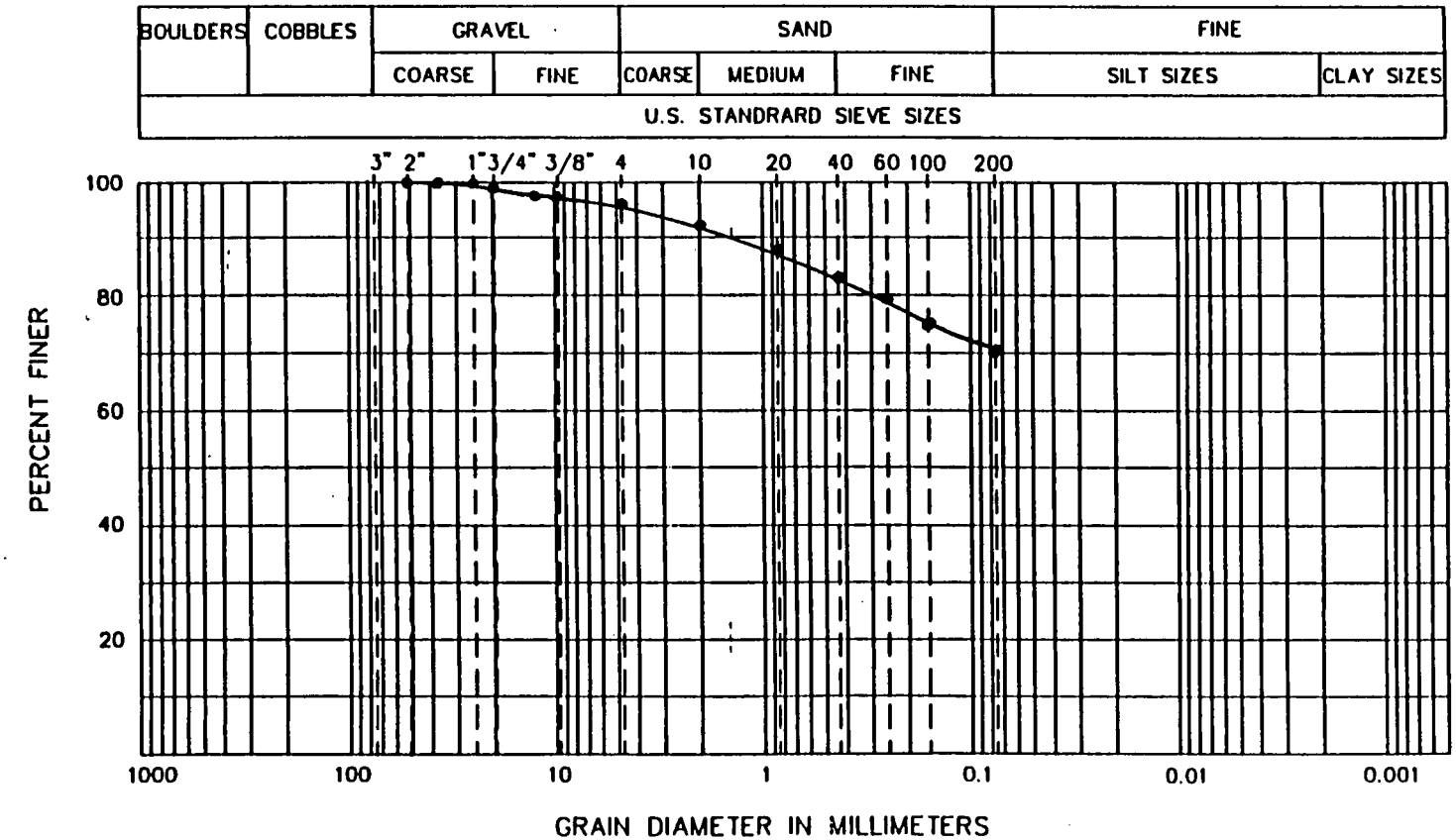
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 23 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-326 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 35

(PL) 17

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	99.8
1-in.	99.5
3/4-in.	99.3
1/2-in.	98.4
3/8-in.	97.7
NO. 4	95.8
NO. 10	92.4
NO. 20	87.6
NO. 40	82.8
NO. 60	79.2
NO. 100	75.0
NO. 200	70.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	66
0.020	52
0.005	31
0.002	24

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) W/ TRACE OF GVL.

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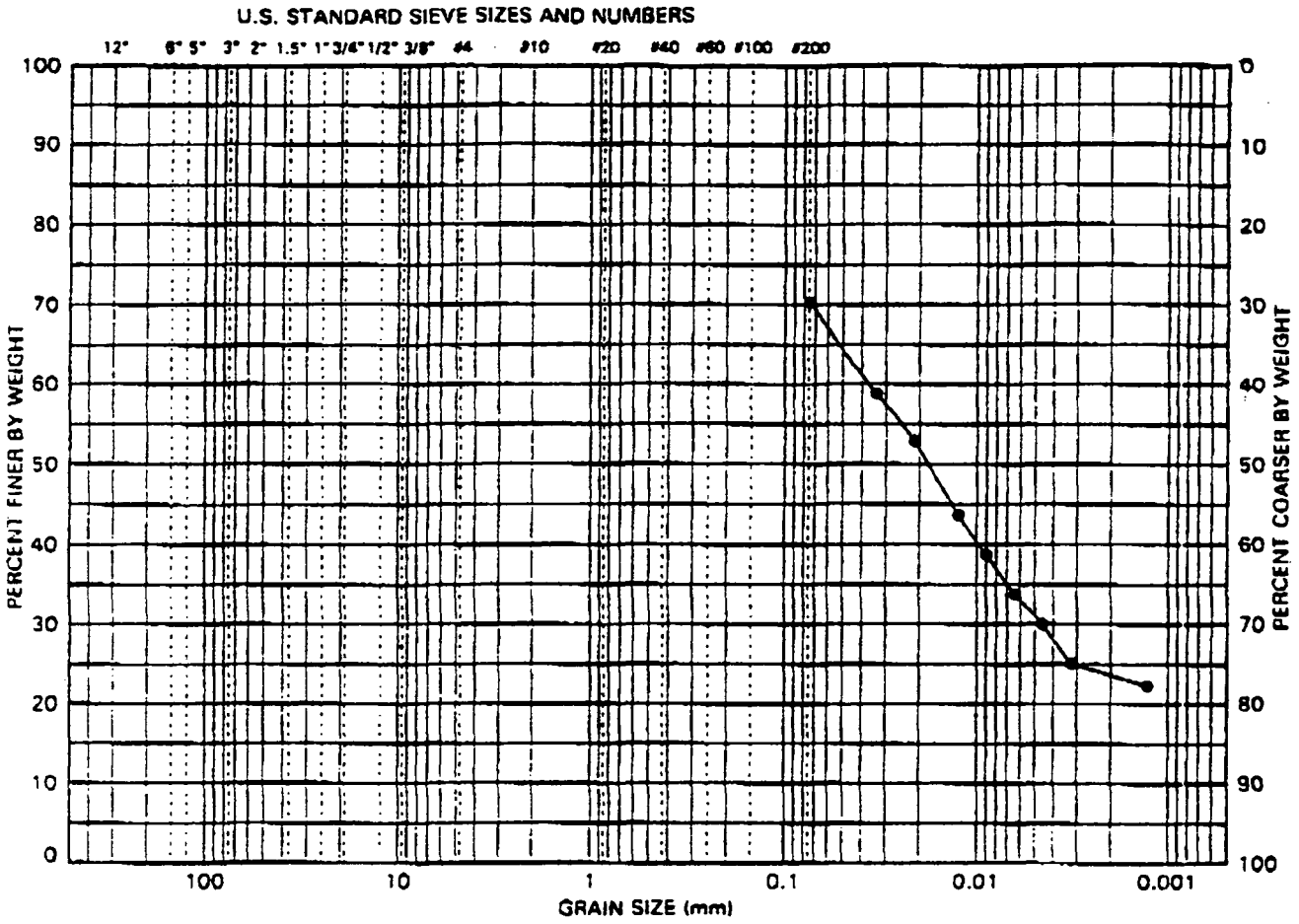
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-326	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97J176	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	70.4
SOIL CLASSIFICATION:				SILT (%)	46.8
				CLAY(%)	23.6
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													70	65	52	31	24	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 22 day Oct month 1997 year

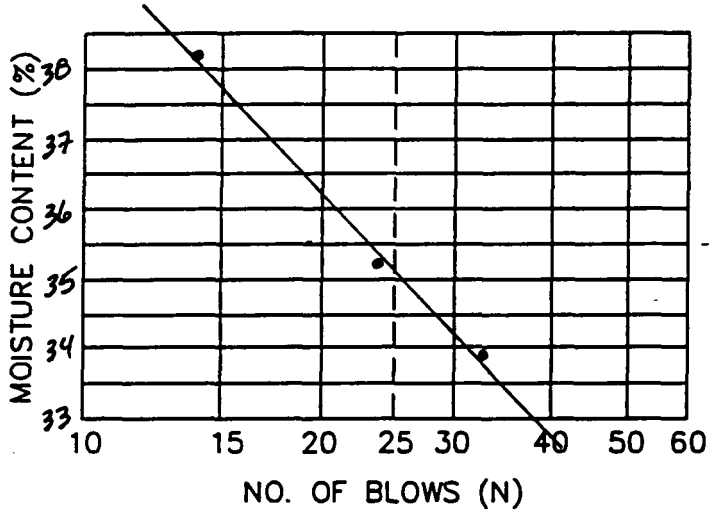
MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-326

LIQUID LIMIT DETERMINATION

QA ID: JL

	TARE NO.		1.2	3.2	1.1	
A	WT. OF TARE	(grams)	28.50	27.82	28.76	
B	WT. OF WET SOIL & TARE	(grams)	47.73	45.74	45.85	
C	WT. OF DRY SOIL & TARE	(grams)	42.86	41.07	41.13	
D	WT. OF WATER = B-C	(grams)	4.87	4.67	4.72	
E	WT. OF DRY SOIL = C-A	(grams)	14.36	13.25	12.37	
F	MOISTURE CONTENT = (D/E)X100	(%)	33.9	35.2	38.2	
N	NUMBER OF BLOWS		33	24	14	

DRYING TARE NO.: L



CURING TARE NO.: I

PLASTIC LIMIT DETERMINATION

QA ID: JL

	TARE NO.		2.2	2.5		
A	WT. OF TARE	(grams)	27.63	28.42		
B	WT. OF WET SOIL & TARE	(grams)	40.01	44.96		
C	WT. OF DRY SOIL & TARE	(grams)	38.26	42.59		
D	WT. OF WATER = B-C	(grams)	1.75	2.37		
E	WT. OF DRY SOIL = C-A	(grams)	10.63	14.17		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.5	16.7		

LIQUID LIMIT (LL) = 35 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 18

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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 DATE: 21 day Oct month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-326

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

QA ID: JL

	WATER ADDED	(ml)	50	100	150	200	
A	WT. OF SOIL & MOLD	(grams)	6028.3	6055.6	6169.0	6169.0	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1819.9	1846.2	1959.6	1959.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.1	121.8	129.3	129.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	106.1	105.8	109.3	107.6	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

	TARE NO.		29	27	22	105	
F	WT. OF TARE	(grams)	8.2	8.2	8.3	8.3	
G	WT. OF WET SOIL & TARE	(grams)	255.3	241.2	238.3	237.2	
H	WT. OF DRY SOIL & TARE	(grams)	226.4	210.6	202.7	198.7	
I	WT. OF WATER = G - H	(grams)	28.9	30.6	35.6	38.5	
J	WT. DRY SOIL = H - F	(grams)	218.2	202.4	194.4	190.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.2	15.1	18.3	20.2	

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FLUOR DANIEL FERNALD

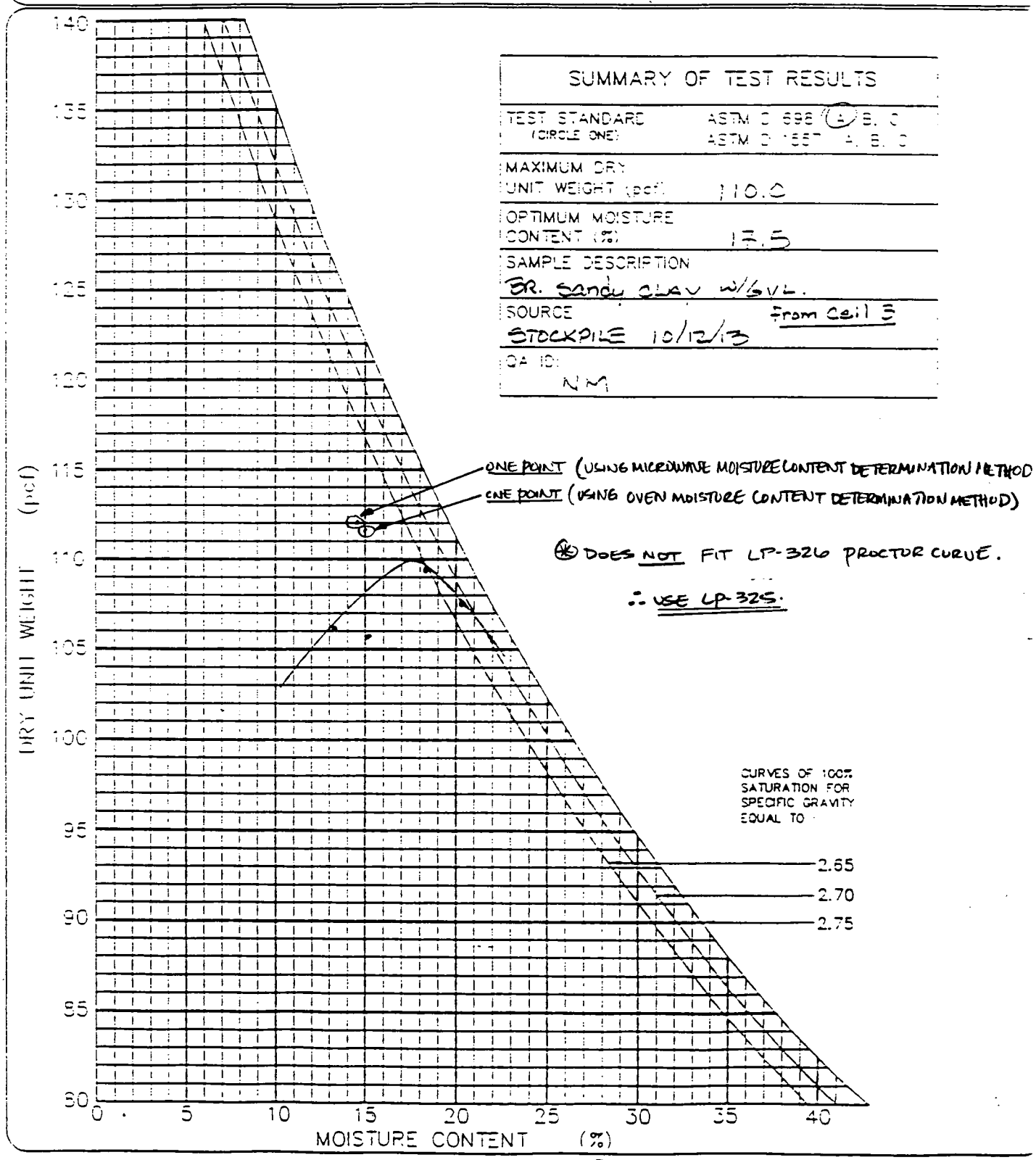
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO: 300166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 22 day Oct month 1992 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-326



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A) B, C ASTM D 1557 A, B, C
MAXIMUM DRY UNIT WEIGHT (pcf)	110.0
OPTIMUM MOISTURE CONTENT (%)	17.5
SAMPLE DESCRIPTION	BR. sandy CLAY w/GVL.
SOURCE	STOCKPILE 10/12/93 from Cell 3
QA ID:	NM

GEOSYNTEC CONSULTANTS FILE NO. 2-12-MDR — CHECKED BY: JL — 000388 — SHEET NO. 2 OF 2

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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 — DATE: 17 day Oct month 1997 year

MATERIAL TYPE: Clay Liner — SAMPLE NO.: Lp 327

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

CHECK POINT — QA ID: A2

	WATER ADDED	(ml)	Ø				
A	WT. OF SOIL & MOLD	(grams)	5987.5				
B	WT. OF MOLD	(grams)	4209.4			COMPARES WITH LP-269	
C	WT. OF SOIL = A − B	(grams)	1778.1			MDD = 107.0 pcf	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.4			OMC = 19.2 %	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	102.9		102.9		

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: A2

	TARE NO.		~~23~~	~~23~~	~~27~~	V	
F	WT. OF TARE	(grams)	8.4	~~8.2~~		126.25	
G	WT. OF WET SOIL & TARE	(grams)	255.2	~~245.4~~		362.10	
H	WT. OF DRY SOIL & TARE	(grams)	224.7			333.0	
I	WT. OF WATER = G − H	(grams)	30.5			29.1	
J	WT. DRY SOIL = H − F	(grams)	216.3			206.75	
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.1			14.1	

GEOSYNTEC CONSULTANTS FILE NO. 2-04-FLC CHECKED BY: [illegible] SHEET NO. 1 OF 1

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 23 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-328

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
19264.4 g	115	65

7 No 4 440.0g

		BEFORE WASH	AFTER WASH
TARE NO.		104	104
WT. OF DRY SAMPLE PLUS TARE	(grams)	195.4	63.1
WT. OF TARE	(grams)	8.3	8.3
WT. OF DRY SAMPLE	(grams)	187.1	54.8

SIEVE ANALYSIS

QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	Ø	Ø	100.0		100
1½"	37.5	Ø	Ø	100.0		
1"	25.0	52.3	0.3	99.7		
¾"	19.0	97.4	0.5	99.5		90-100
½"	12.5	174.0	0.9	99.1		
⅜"	9.5	252.9	1.3	98.7		
4	4.75	426.1	2.2	97.8		
10	2.00	7.8	4.2	95.8	93.7	
20	0.850	20.8	11.1	88.9	86.9	
40	0.425	32.6	17.4	82.6	80.8	
60	0.250	39.9	21.3	78.7	~~74.0~~ 77.0 NGM 10/28/97	
100	0.150	47.3	25.3	74.7	73.1	
200	0.075	54.5	29.1	70.9	69.3	50-100

%FINER = 100 − Σ% RETAINED

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CHECKED BY: [illegible] 000390 SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

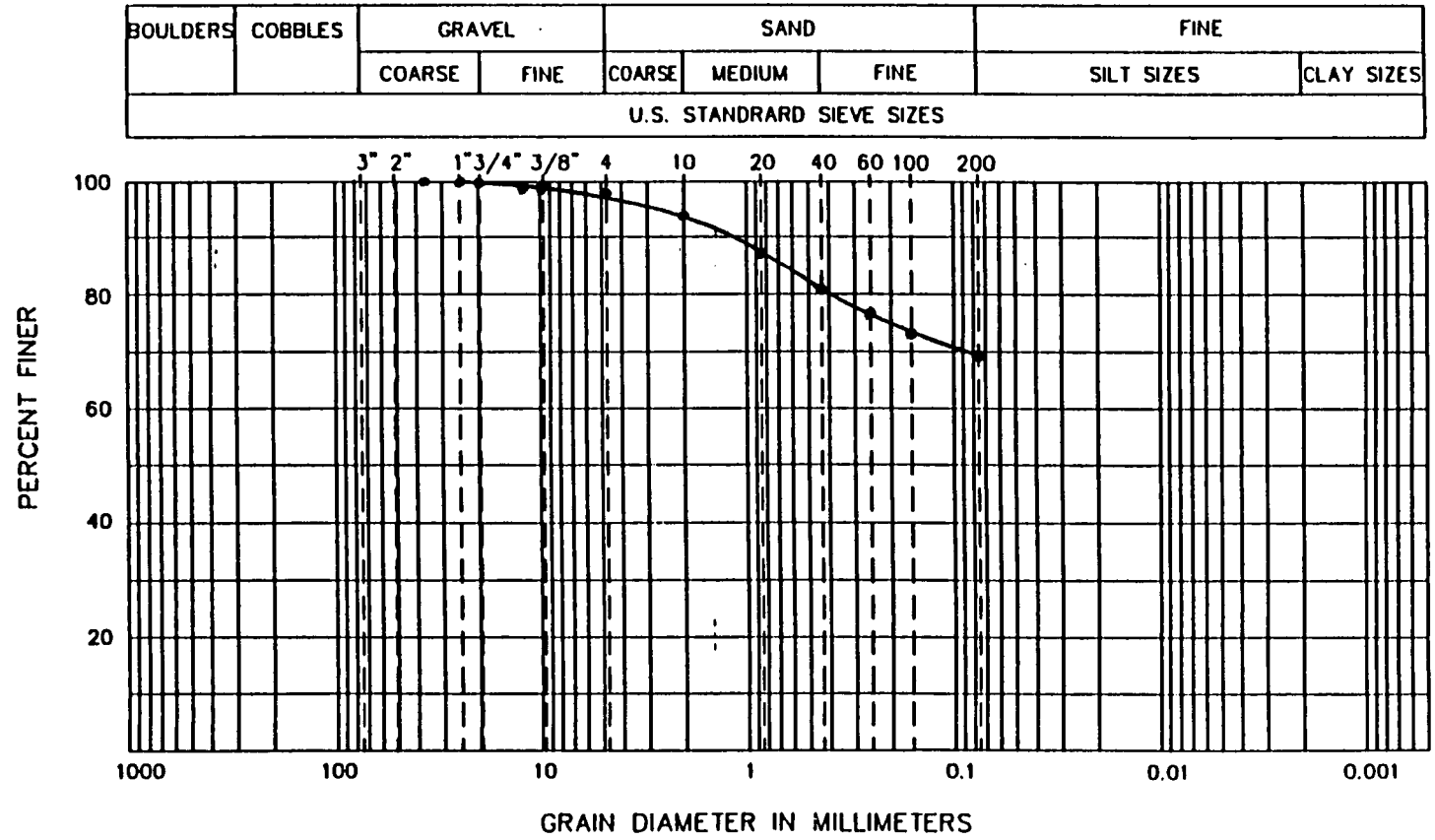
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 28 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER

SAMPLE NO.: LP-328 QA ID: NM

CURVE COEFFICIENTS: (C_u) N/A (C_c) N/A



ATTERBERG LIMITS

(LL) 37

(PL) 19

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.7
3/4-in.	99.5
1/2-in.	99.1
3/8-in.	98.7
NO. 4	97.8
NO. 10	93.7
NO. 20	86.9
NO. 40	80.9
NO. 60	77.0
NO. 100	73.1
NO. 200	69.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.050	64
0.020	53
0.005	28
0.002	22

SOIL CLASSIFICATION (ASTM D 2487): BROWN SANDY LEAN CLAY (CL) W/ TRACE OF GVL.

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SHEET NO. 2 OF 2

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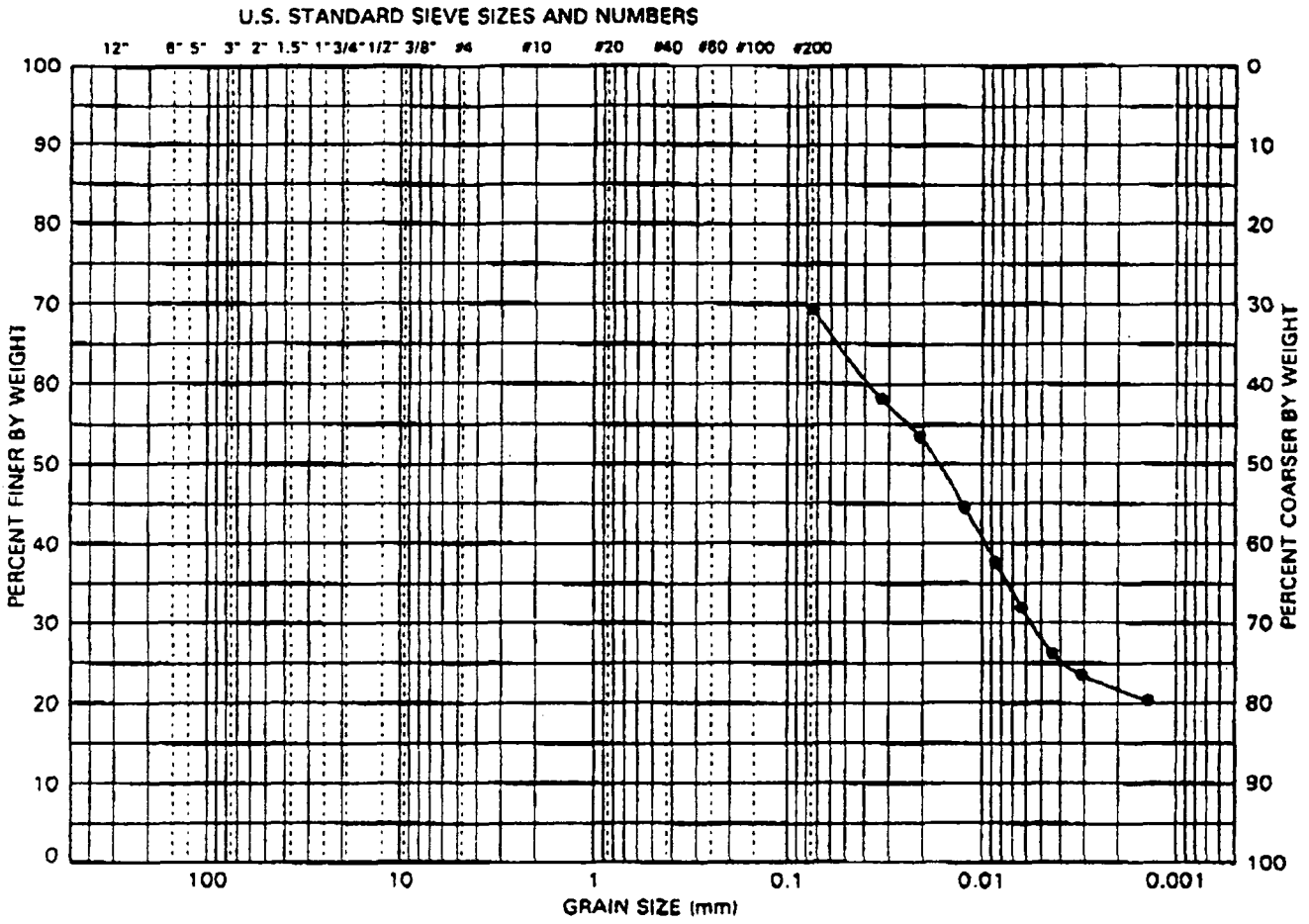
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0186
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	LP-328	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97J257	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	69.3
SOIL CLASSIFICATION:				SILT (%)	47.5
				CLAY(%)	21.8
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													69	64	53	28	22	

NOTES:

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FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 27 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-32B

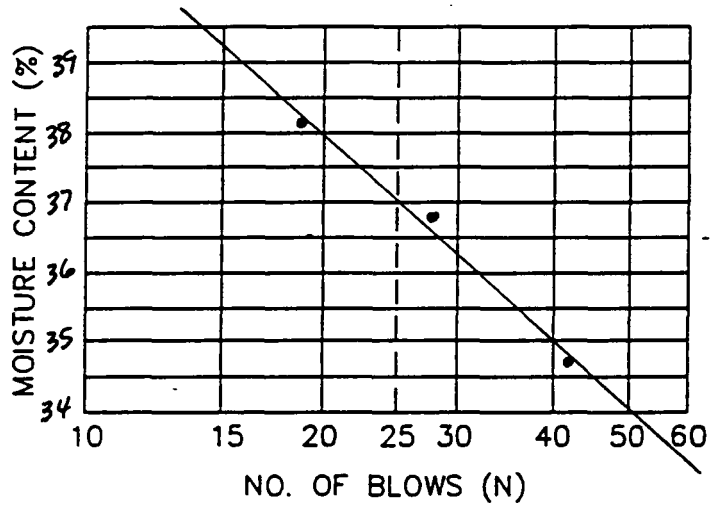
LIQUID LIMIT DETERMINATION

QA ID: NM

	TARE NO.		3.1	1.9	2.5	
A	WT. OF TARE	(grams)	28.38	28.56	28.42	
B	WT. OF WET SOIL & TARE	(grams)	45.93	50.38	47.72	
C	WT. OF DRY SOIL & TARE	(grams)	41.41	44.51	42.40	
D	WT. OF WATER = B-C	(grams)	4.52	5.87	5.32	
E	WT. OF DRY SOIL = C-A	(grams)	13.03	15.95	13.98	
F	MOISTURE CONTENT = (D/E)X100	(%)	34.7	36.8	38.1	
N	NUMBER OF BLOWS		42	28	19	

DRYING TARE NO.

G



CURING TARE NO.

II

PLASTIC LIMIT DETERMINATION

QA ID: NM

	TARE NO.		2.2	2.9		
A	WT. OF TARE	(grams)	27.63	31.46		
B	WT. OF WET SOIL & TARE	(grams)	35.67	41.26		
C	WT. OF DRY SOIL & TARE	(grams)	34.38	39.68		
D	WT. OF WATER = B-C	(grams)	1.29	1.58		
E	WT. OF DRY SOIL = C-A	(grams)	6.75	8.22		
F	MOISTURE CONTENT = (D/E)X100	(%)	19.1	19.2		

LIQUID LIMIT (LL) = 37 PLASTIC LIMIT (PL) = 19 PLASTICITY INDEX (PI) = 18

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 — DATE: 24 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER — SAMPLE NO.: LP-328

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

QA ID: NM

	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	5919.7	6010.5	6101.2	6123.9	
B	WT. OF MOLD	(grams)	4209.4	4209.4	4209.4	4209.4	
C	WT. OF SOIL = A - B	(grams)	1710.3	1801.1	1891.8	1914.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	112.9	118.9	124.9	126.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	99.6	103.8	107.0	105.2	

NOTE: IF CALIBRATED MOLD OF 1/30 FT^3 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 FT^3 ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: JL

	TARE NO.		2	1	13	33	
F	WT. OF TARE	(grams)	8.2	7.3	8.3	8.3	
G	WT. OF WET SOIL & TARE	(grams)	236.1	257.7	247.2	219.8	
H	WT. OF DRY SOIL & TARE	(grams)	209.4	225.9	213.1	184.2	
I	WT. OF WATER = G - H	(grams)	26.7	31.8	34.1	35.6	
J	WT. DRY SOIL = H - F	(grams)	201.2	218.6	204.8	175.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.3	14.5	16.7	20.2	

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

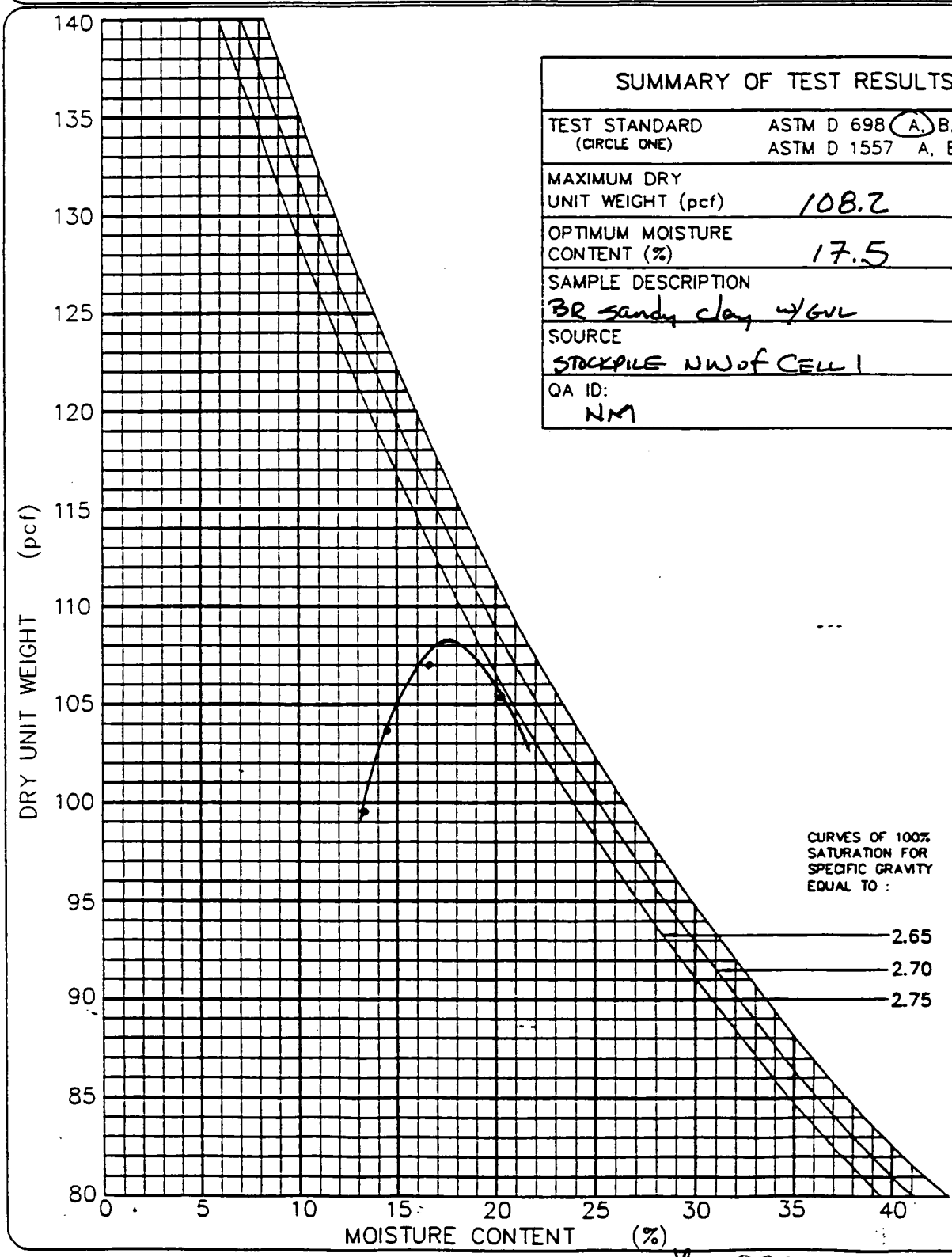
MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 27 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP-328



SUMMARY OF TEST RESULTS	
TEST STANDARD (CIRCLE ONE)	ASTM D 698 (A.) B. C ASTM D 1557 A. B. C
MAXIMUM DRY UNIT WEIGHT (pcf)	108.2
OPTIMUM MOISTURE CONTENT (%)	17.5
SAMPLE DESCRIPTION	BR sandy clay w/GVL
SOURCE	STOCKPILE NW of CELL 1
QA ID:	NM

©GEOSYNTEC CONSULTANTS FILE NO. 2-12-MDR CHECKED BY: [illegible] 000395 SHEET NO. 2 OF 2

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: 31 day OCT month 1997 year

MATERIAL TYPE: CLAY LINER SAMPLE NO.: LP 329

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight

QA ID: JFM

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.					
A	WT. OF TARE					
B	WT. OF WET SOIL & TARE					
C	WT. OF DRY SOIL & TARE					
D	WT. OF WATER = B-C					
E	WT. OF DRY SOIL = C-A					
F	MOISTURE CONTENT = (D/E) X 100					

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight

QA ID: JFM

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	259.1				
C	WT. OF DRY SOIL & TARE	239.6				
D	WT. OF WATER = B-C	19.5				
E	WT. OF DRY SOIL = C-A	107.6				
F	MOISTURE CONTENT = (D/E) X 100	18.1				

Granular Drainage Material
LCS & LDS Drainage Layer, No. 78 Stone
LCS & LDS Drainage Corridor, No. 57 Stone

• Soil Sample Log
LCS & LDS Drainage Layer, No. 78 Stone
LCS & LDS Drainage Corridor, No. 57 Stone

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

SOIL SAMPLE LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 02 July YEAR: 1997

SITE SAMPLE NO.	OFF-SITE LAB SAMPLE NO.	VISUAL DESCRIPTION	SOURCE (LOCATION/DEPTH)	MATERIAL TYPE	DATE SAMPLED (day/mo)	TEST METHODS	QA ID
GDM-01	—	#78 STONE	SUBMITTAL 43-R0 PETRO	GRANULAR MATERIAL DRAINAGE ~~MEDIUM~~ Hem 7/7/97	02 JULY	ASTM C 136, D2487, D3042, D2434	NM
GDM-02	—	#57 STONE	SUBMITTAL 44-R-0 PETRO	GRANULAR DRAINAGE MATERIAL	08 JULY	ASTM C136, D2487, D3042, D2434	NM
GDM-02d	—	#57 STONE	SUBMITTAL 44-R-0 PETRO (RETEST)	GRANULAR DRAINAGE MATERIAL	08 JULY	ASTM C 136, D2487	NM
VOID ~~GDM-03~~		~~#57 STONE~~	SUBMITTAL ~~PETRO~~	"	~~06 AUG~~	~~ASTM C136, D2487, D3042, D2434~~	~~NM~~
GDM-04	—	#57 STONE	SUPPLIERS STOCKPILE	GRANULAR DRAINAGE MATERIAL	06 AUG, ~~08 AUG~~ Hem	ASTM C136, D2487, D3042, D2434	NM
GDM-05	97H217	#57 STONE	SUPPLIERS STOCKPILE	GRANULAR DRAINAGE MATERIAL	13 AUG.	ASTM C136, D2487, D3042, D2434	NM
GDM-06	971176	#78 STONE	SUPPLIERS STOCKPILE	GRANULAR DRAINAGE MATERIAL	09 SEPT	ASTM C136, D2487, D3042, D2434	NM
GDM-07	971177	#78 STONE	↓	↓	↓	↓	NM
GDM-08	971178	#78 STONE				ASTM C136, D2487, ~~D3042~~ D2434	NM
GDM-09	971179	#78 STONE				ASTM C136, D2487, D3042, D2434	NM
GDM-10	971180	#78 STONE				↓	NM
GDM-11	—	#57 STONE	on-site stockpile	Granular Drainage Material	12 SEPT	ASTM C136, D2487, ~~D3042, D2434~~ RBN 9/29/97	RBN
GDM-12	97I373	#57 STONE	SUPPLIERS STOCKPILE	"	26 SEPT	ASTM C136, D2487,	NM
GDM-13	—	#78 STONE	ON SITE STOCKPILE	"	16 OCT	ASTM C136, D2487	NM
GDM-14	97J183	#78 STONE	"	"	20 OCT	ASTM C136, D2487, D2434	NM

NOTES: GDM-03 WAS VOIDED (NOT OBTAINED)

0003399

1269

GEO SYNTEC CONSULTANTS FILE NO. 2-01-SSL CHECKED BY: JFM SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

SOIL SAMPLE LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 20 OCTOBER YEAR: 1997

SITE SAMPLE NO.	OFF-SITE LAB SAMPLE NO.	VISUAL DESCRIPTION	SOURCE (LOCATION/DEPTH)	MATERIAL TYPE	DATE SAMPLED (day/mo)	TEST METHODS	QA ID
GDM-15	—	#78 STONE	ON SITE STOCKPILE	GRANULAR DRAINAGE MAT'L	20 OCT	ASTM C136, D2487	NM
GDM-16	—	"	EAST "	"	23 OCT	ASTM C136, D2487	NM
GDM-17	—	"	WEST "	"	23 OCT	"	NM
GDM-18	—	"	WEST ON-SITE STOCKPILE	"	28 OCT	"	NM

NOTES:

©GEOSYNTEC CONSULTANTS FILE NO. 2-01-SSL CHECKED BY: JJM SHEET NO. 2 OF 2

000400

1266

- Laboratory Test Summary

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

LABORATORY TEST SUMMARY REQUEST FORM NO. _____

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 02 day JULY month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL — QA ID: NM

NOTE: Separate forms are required for each material type and source. Strike out nonapplicable tests.

SITE SAMPLE NO.	LAB SAMPLE NO.	MOISTURE CONTENT ASTM D 2216/ D 4643 (%)	GRAIN SIZE: PASSING NO. 200 SIEVE ASTM D 1140 (%)	GRAIN SIZE: ASTM ~~D 422~~ C 136 SIEVE	GRAIN SIZE: ASTM ~~D 422~~ C 136 HYDR.	ATTERBERG LIMITS ASTM D 4318: LL (%)	ATTERBERG LIMITS: PL (%)	ATTERBERG LIMITS: PI	SP. GR. ASTM D 854	SOIL CLASS. ASTM D 2487	LOI ASTM C311 (%)	CARBO CONT. ASTM D3042 (%)	COMPACTION ASTM D 698 (or) ASTM D 1557: MAX. DRY UNIT WT. (pcf)	COMPACTION: OPT. MOIST. CONT. (%)	PERMEABILITY ASTM D 2434(1) (or) ASTM D 5084(2): DRY UNIT WT. (pcf)	PERMEABILITY: MOIST. CONT. ASTM D 2216 (%)	PERMEABILITY: HYDRAULIC COND'VITY (cm/sec)	PASS/ FAIL	ACUMUL. QUANT. PLACED (APPROX) (yd³)
* GDM-01	97G26	—	0.1	✓	—	—	—	—	—	(GP)	—	0.1	—	—	103.4	DRY	9.2	~~**~~ P ~~F~~	SUBM. 43 REV 0
** GDM-02	97G27	—	0.0	✓	—	—	—	—	—	(GP)	—	0.1	—	—	104.8	DRY	15.1	F	SUBM. 44 REV 0
** GDM-02.1	—	—	0.1	✓	—	—	—	—	—	(GP)	—	0.1	—	—	—	—	—	F	SUBM. 44 REV. 0 PRETEST
VOID ~~GDM-03~~		—		✓	—	—	—	—	—		—		—	—					SUBM. -
** GDM-04	—		0.0	✓	—	—	—	—	—	(GP)	—	—	—	—	—	—	—	F	SUPPLIER STOCKPILE
** GDM-05	97H217		0.2	✓	—	—	—	—	—	(GP)	—	0.1	—	—	102.5	DRY	14.8	P	SUPPLIER STOCKPILE
* GDM-06	971176	—	0.2	✓	—	—	—	—	—	(GP)	—	0.2	—		103.4	1.6	6.3	P ~~X~~	3000
* GDM-07	971197	—	0.1	✓	—	—	—	—	—	(GP)	—	0.1	—	—	101.0	1.6	6.0	P	6000
* GDM-08	971198	—	0.1	✓	—	—	—	—	—	(GP)	—	—	—	—	98.8	1.2	7.8	P	9000
* GDM-09	971199	—	0.1	✓	—	—	—	—	—	(GP)	—	0.2	—	—	98.7	1.4	6.9	P	12000

COMMENTS: * NO. 78 ** NO. 57 NOTE: *** SPECIFICATION REVISED REFER DCN 1702-015 2/97 JTM

NOTES: (1) HYDRAULIC CONDUCTIVITY DETERMINED AT A HYDRAULIC GRADIENT OF 0.1.

(2) HYDRAULIC CONDUCTIVITY DETERMINED AT AN EFFECTIVE CONFINING STRESS OF ____.

CHECKED BY: JTM

SHEET NO. 1 OF 2

000402

1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

LABORATORY TEST SUMMARY REQUEST FORM NO. _____

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 10 day SEPT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL — QA ID: NM

NOTE: Separate forms are required for each material type and source. Strike out nonapplicable tests.

	SITE SAMPLE NO.	LAB SAMPLE NO.	MOISTURE CONTENT ASTM D 2216/ D 4643 (%)	GRAIN SIZE: PASSING NO. 200 SIEVE ASTM D 1140 (%)	GRAIN SIZE: ASTM ~~D 422~~ C136 SIEVE	GRAIN SIZE: ASTM ~~D 422~~ C136 HYDR.	ATTERBERG LIMITS ASTM D 4318: LL (%)	ATTERBERG LIMITS: PL (%)	ATTERBERG LIMITS: PI	SP. GR. ASTM D 854	SOIL CLASS. ASTM D 2487	LOI ASTM C311 (%)	CARBO CONT. ASTM D3042 (%)	COMPACTION ASTM D 698 (or) ASTM D 1557: MAX. DRY UNIT WT. (pcf)	COMPACTION: OPT. MOIST. CONT. (%)	PERMEABILITY ASTM D 2434(1) (or) ASTM D 5084(2): DRY UNIT WT. (pcf)	PERMEABILITY: MOIST. CONT. ASTM D 2216 (%)	PERMEABILITY: HYDRAULIC COND'VITY (cm/sec)	PASS/ FAIL ***	ACUMUL. QUANT. PLACED (APPROX) (yd³)
*	GDM-10	971180	—	0.1	✓	—	—	—	—	—	(GP)	—	0.2	—	—	96.4	1.7	5.8	P	15000
**	GDM-11	—	—	0.1	✓	—	—	—	—	—	(GP)	—	—	—	—	—	—	—	P	100
**	GDM-12	971373	—	0.2	✓	—	—	—	—	—	(GP)	—	0.1	—	—	101.7	1.5	14	P	
*	GDM-13	—	—	0.5	✓	—	—	—	—	—	(GP)	—	—	—	—	—	—	—	F	
*	GDM-14	971183	—	0.2	✓	—	—	—	—	—	(GP)	—	—	—	—	101.5	0.1	9.3	F	
*	GDM-15	—	—	0.1	✓	—	—	—	—	—	(GP)	—	—	—	—	—	—	—	P	
*	GDM-16	—	—	0.2	✓	—	—	—	—	—	(GP)	—	—	—	—	—	—	—	F	
*	GDM-17	—	—	0.2	✓	—	—	—	—	—	(GP)	—	—	—	—	—	—	—	F	
*	GDM-18	—	—	0.5	✓	—	—	—	—	—	(GP)	—	—	—	—	—	—	—	F	

COMMENTS: * NO. 7B ** NO. 57 *** SPECIFICATION REVISED, REFER DCN 1702-015 (AND NON-CONFORMANCE 1702-008)

NOTES: (1) HYDRAULIC CONDUCTIVITY DETERMINED AT A HYDRAULIC GRADIENT OF 0.1.

(2) HYDRAULIC CONDUCTIVITY DETERMINED AT AN EFFECTIVE CONFINING STRESS OF ____.

CHECKED BY: JM

SHEET NO. 2 OF 2

- **Laboratory Testing**

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C 136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04·1

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

MATERIAL TYPE: #78 STONE SUBMITTAL 43 REV 0 SAMPLE NO.: GDM-01

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	Δ	N/A
WT. OF DRY SAMPLE PLUS TARE (grams)	1100.0	↓
WT. OF TARE (grams)	13.9	↓
WT. OF DRY SAMPLE (grams)	1086.1	↓

SIEVE ANALYSIS

QA ID: PKO RL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
3/4"	19.0	Ø	0	100.0	100
1/2"	12.5	116.8	10.8	89.2**	~~90~~ 85 *** - 100 97 2/17/97
3/8"	9.5	354.2	32.6	67.4	40 - 75
4	4.75	945.0	87.0	13.0	5 - 25
8	2.36	1075.1	99.0	1.0	0 - 10
16	1.18	1078.3	99.3	0.7	0 - 5
30	0.60	1079.0	99.3	0.7	
50	0.30	1079.6	99.4	0.6	
100	0.15	1083.1	99.7	0.3	
200	0.075	1084.9	99.9	0.1	0 - 2
PAN	—	1085.4	—	—	—

** DOES NOT COMPLY WITH PHASE I SPEC. REV.0 SECTION 02710 PART 2.01 B

*** SPECIFICATION REVISED VIA DCN NO 1702-015 JZM 2/14/97

* TECH. SPEC. SEC. 02710 PT 2.01 B

%FINER = 100 − Σ% RETAINED

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CHECKED BY: KLM

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM ~~D 422~~ C136 & ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

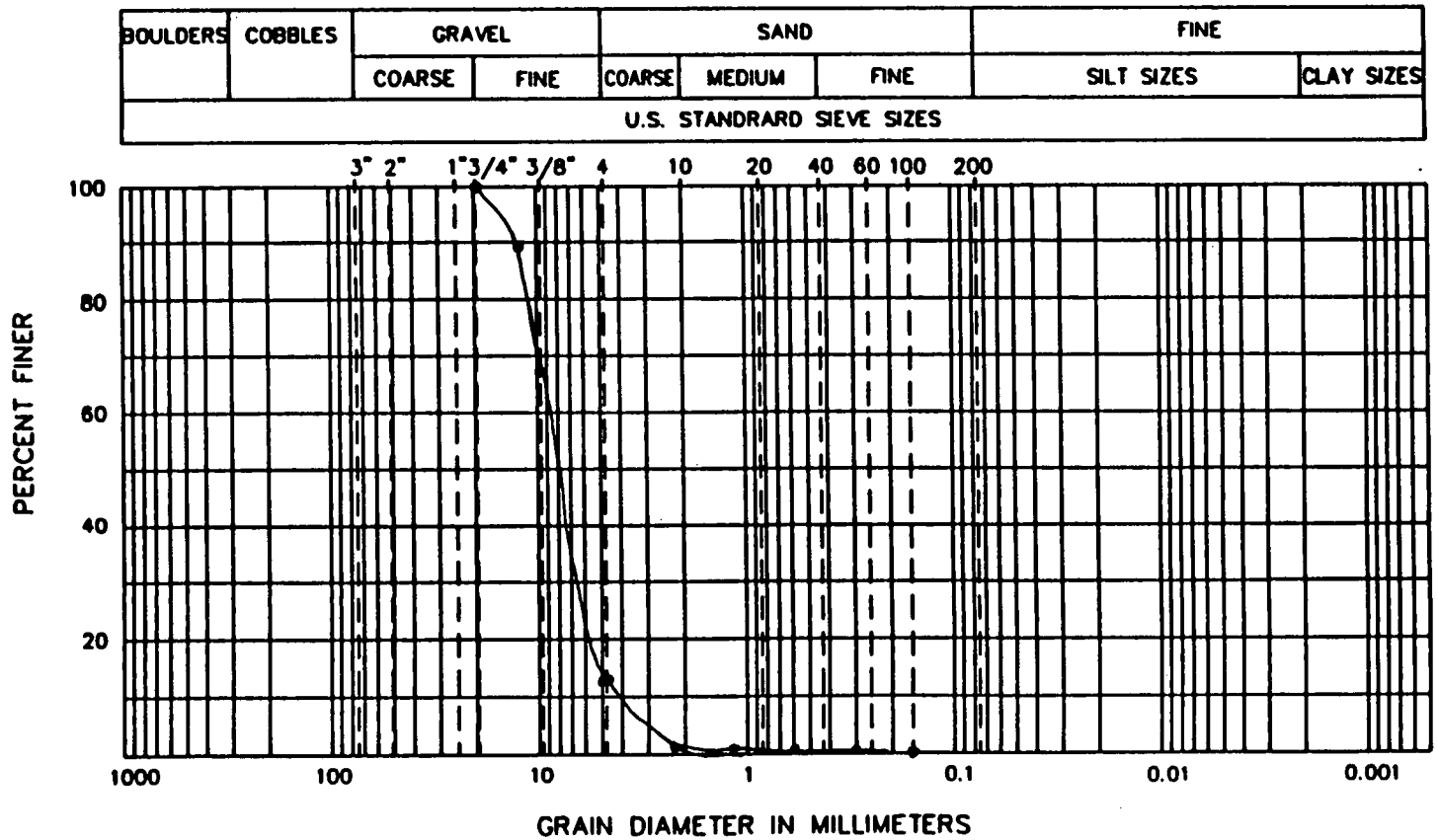
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 03 day JULY month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL #78 STONE

SAMPLE NO.: GDM-01 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{8.8}{4.1} = 2.15$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{43.6}{36.1} = 1.21$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100.0
1/2-in.	89.2
3/8-in.	67.4
NO. 4	13.0
NO. ~~10~~ 8	1.0
NO. ~~20~~ 16	0.7
NO. ~~40~~ 30	0.7
NO. ~~60~~ 50	0.6
NO. 100	0.3
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: [illegible]

SHEET NO. 2 OF 2

000406

1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 08 day JULY month '97 year

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L #57 SUBMITTAL 44 REV 0 SAMPLE NO.: GDM-02

SOIL SAMPLE SIZE TOTAL SAMPLE WT = 9842.6 gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		8	N/A
WT. OF DRY SAMPLE PLUS TARE	(grams)	52.6	
WT. OF TARE	(grams)	7.2	
WT. OF DRY SAMPLE	(grams)	45.4	

SIEVE ANALYSIS QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		* PROJECT SPECIFICATIONS
2"		Ø	Ø	100		
1½"		Ø	Ø	100		100
1"		25.6	0.3	99.7		95-100
¾"		2435.3	24.7	75.3		
½"		7532.1	76.5	23.5 **		25-60
⅜"		9420.0	95.7	4.3		
4		9794.7	99.5	0.5		0-10
8		7.5	16.5	83.5	0.4	0-5
16		11.6	25.6	74.4	0.4	
30		16.7	36.8	63.2	0.3	
50		24.4	53.8	46.2	0.2	
100		35.8	78.9	21.1	0.1	
200		43.3	95.4	4.6	0.0	0-2

** DOES NOT COMPLY WITH PHASE I SPEC. REV. 0 SECTION 02710 PART 2.01.D
RETEST AS SAMP GDM-02.1

NOTE: SIEVE ANALYSIS PERFORMED ON INDIVIDUAL SAMPLES AND MATHEMATICALLY COMBINED

* PHASE I SPEC. REV 0 SECTION 02710 PART 2.01.D

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

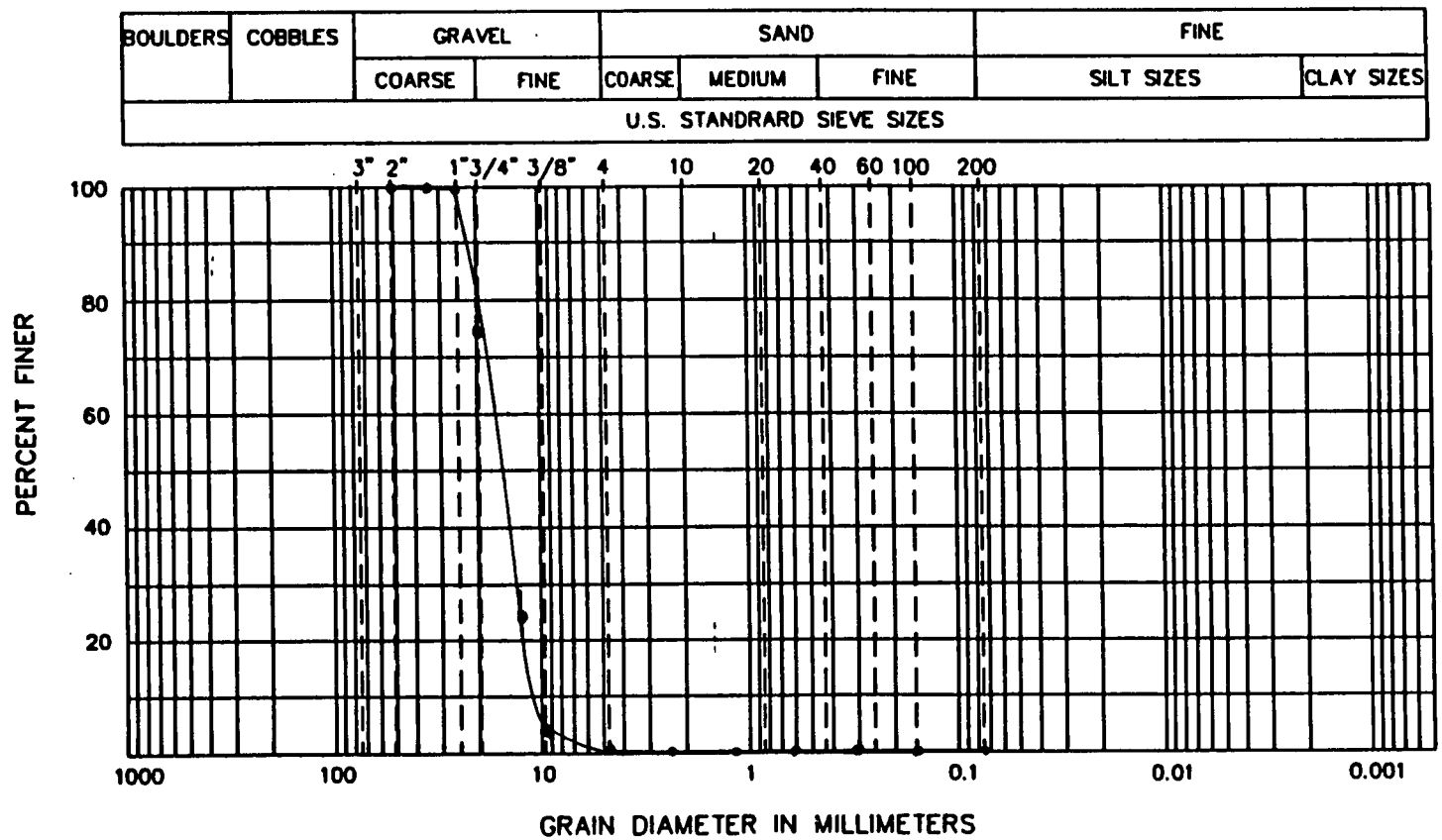
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 08 day JULY month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL #57 STONE — SAMPLE NO.: GDM-02 QA ID: PFO

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = 17/11.5 = 1.5$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{196}{17 \times 11.5} = 1.0$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100
1 1/2-in.	100
1-in.	99.7
3/4-in.	75.3
1/2-in.	23.5
3/8-in.	4.3
NO. 4	0.5
NO. ~~10~~ 8	0.4
NO. ~~20~~ 16	0.4
NO. ~~40~~ 30	0.3
NO. ~~60~~ 50	0.2
NO. 100	0.1
NO. 200	0.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): GP - POORLY GRADED GRAVEL

GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY:

SHEET NO. 2 OF 2

000408

1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD

(ASTM ~~D-422~~) C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 9 day 7 month 97 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL #57 SAMPLE NO.: GDM-02.1
SUBMITTAL 44 REV 0

TOTAL SAMPLE WEIGHT = 10,069.5g

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		6	NA
WT. OF DRY SAMPLE PLUS TARE	(grams)	120.1	NA
WT. OF TARE	(grams)	7.6	NA
WT. OF DRY SAMPLE	(grams)	112.5	NA

SIEVE ANALYSIS

QA ID: SQ.

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		* PROJECT SPECIFICATIONS
2"	50.0 m	0	0	100		
1½"	37.5	0	0	100		100
1"	25.0	0	0	100		95-100
¾"	19.0	2834.0	28.1	71.9		
½"	12.5	7796.2	77.4	22.6**		25-60
⅜"	9.5	9551.3	94.9	5.1		
4	4.75	9956.5	98.9	1.1		0-10
8	2.36	30.3	26.9	73.1	0.8	0-5
16	1.18	48.3	42.9	57.1	0.6	
30	0.600	61.9	55.0	45.0	0.5	
50	0.300	78.3	69.6	30.4	0.3	
100	0.150	94.3	83.8	16.2	0.2	
200	0.075	107.9	95.9	4.1	0.1	0-2

** DOES NOT COMPLY WITH PHASE I SPEC. REV. 0 SECTION 02710 PART 2.01.D

* PHASE I SPEC. REV 0 SECT. 02710 PART 2.01.D

NOTE: SIEVE ANALYSIS PERFORMED ON INDIVIDUAL SAMPLES AND MATHEMATICALLY COMBINED

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM ~~D 422~~ C 136 & ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

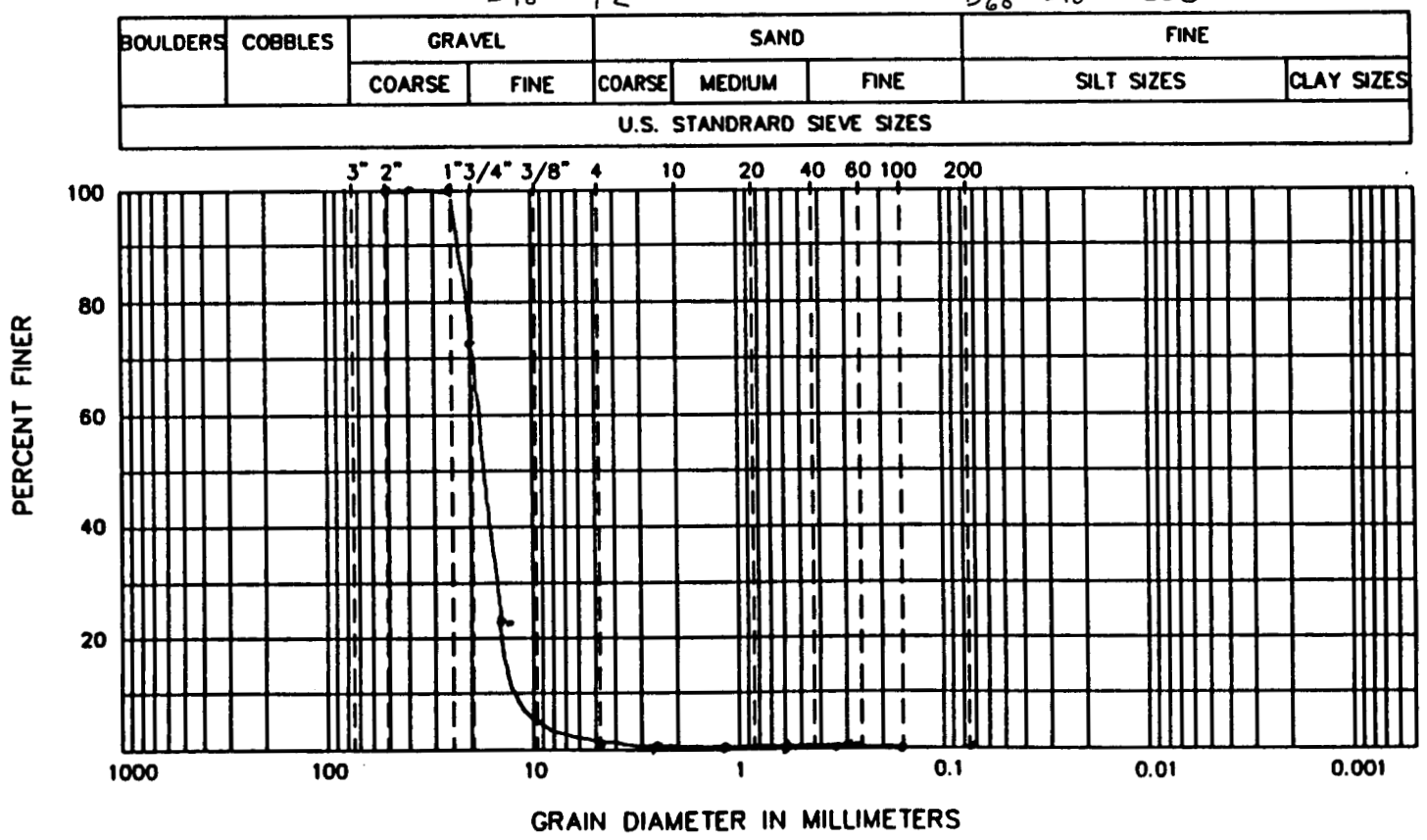
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 9 day 7 month 97 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL #57

SAMPLE NO.: GDM-02.1 QA ID: SQ1

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{19}{12} = 1.6$ $(C_c)\ \frac{D_{30}^2}{D_{60} \times D_{10}} = \frac{256}{228} = 1.1$



ATTERBERG LIMITS

(LL) NA

(PL) NA

(PI) NA

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	71.9
1/2-in.	22.6
3/8-in.	5.1
NO. 4	1.1
SQ1 NO. ~~10~~ 8	0.8
SQ1 NO. ~~20~~ 16	0.6
SQ1 NO. ~~40~~ 30	0.5
SQ1 NO. ~~60~~ 50	0.3
NO. 100	0.2
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
NA	NA

SOIL CLASSIFICATION (ASTM D 2487): GP - POORLY GRADED GRAVEL

GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

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SHEET NO. 2 OF 2

000410

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TABLE 2

SUMMARY OF INDEX PROPERTIES
GRANULAR DRAINAGE MATERIAL

RECEIVED
JUL 16 1997
KEM

FDF-OSDF PHASE I

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Carbonate Content ASTM D 3042			Hydraulic Conductivity ASTM D 2434			Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422						Soluble Carbonate (%)	Before Acid Bath Figure No.	After Acid Bath Figure No.	Test Specimen Initial Conditions		Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)					Dry Unit Weight (pcf)	Moisture Content (%)		
GDM-01	97G26									0.1			103.4	Dry	9.2	
GDM-02	97G27									0.1			104.8	Dry	15.1	

Note.

1. The reported hydraulic conductivity was measured at a gradient of 0.1.

GQ0166/F974G006

GeoSyntec Consultants
Geomechanics and Environmental Laboratory

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 8 day 8 month 97 year

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (#57) SAMPLE NO.: GDM-04

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.		
WT. OF DRY SAMPLE PLUS TARE (grams)		
WT. OF TARE (grams)		
WT. OF DRY SAMPLE (grams)	9826.78	

SIEVE ANALYSIS

QA ID: JW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
2"	50.0	0.0	0	100	
1½"	37.5	0.0	0	100	100
1"	25.0	109.1	1.1	98.9	95-100
¾"	19.5	5242.9	53.4	46.6	
½"	12.5	9395.0	95.6	4.4 **	25-60
⅜"	9.5	9739.9	99.1	0.9	
4	4.75	9765.4	99.4	0.6	0-10
8	2.36	9767.33	99.4	0.6	0-5
16	1.18	9771.59	99.4	0.6	
30	0.60	9778.65	99.5	0.5	
50	0.30	9789.22	99.6	0.4	
100	0.15	9803.96	99.8	0.2	
200	0.075	9826.78	100.0	0.0	0-2

** FAILS TO MEET SPEC. REQUIREMENT SECTION 02710 Part 2.01.D

* PHASE I SPEC REV-0 SEC. 02710 Part 2.01.D

%FINER = 100 − Σ% RETAINED

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CHECKED BY: [illegible] 000412 SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/~~D 422~~) (ASTM D 2487)

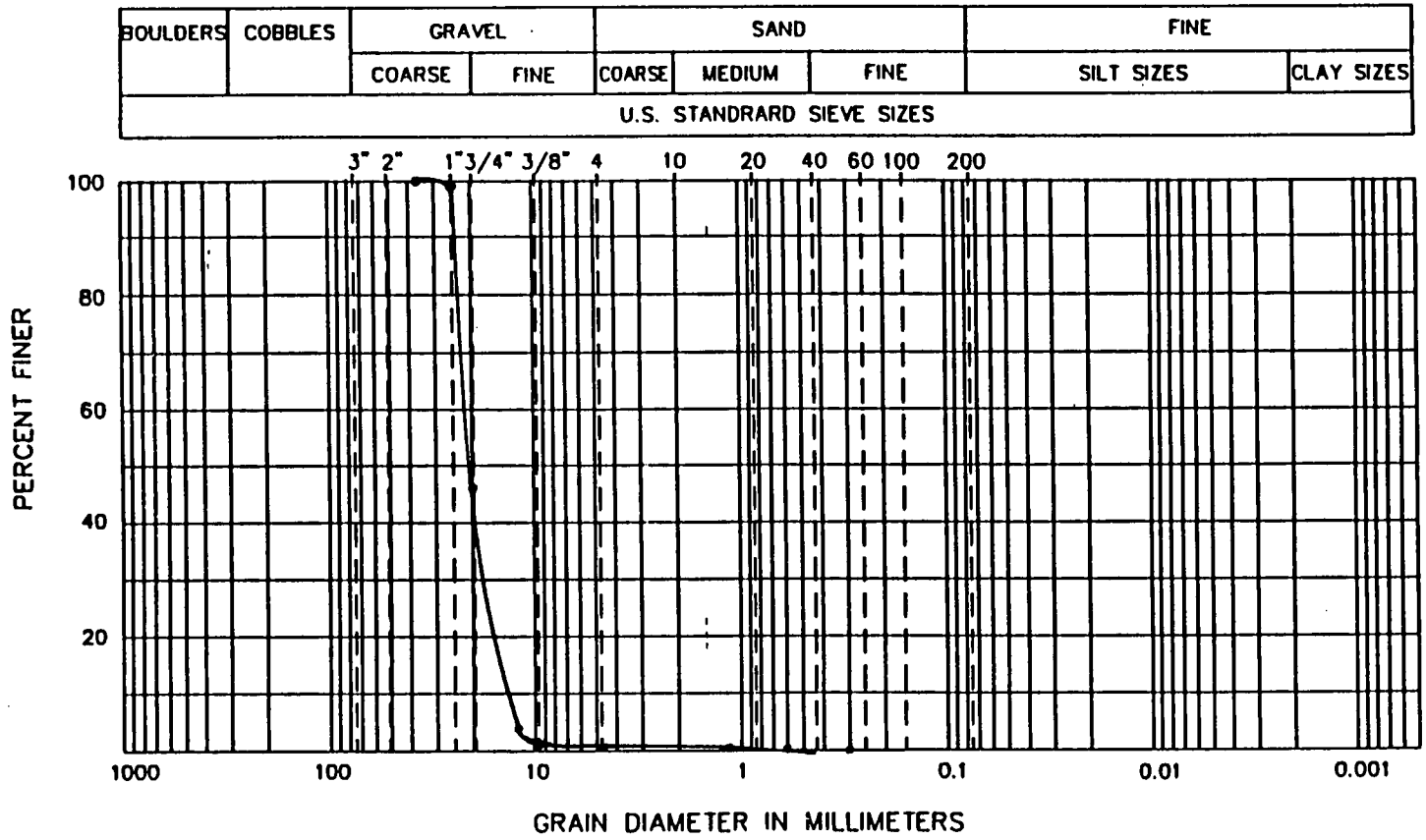
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 8 day 8 month 97 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (#57 STONE) — SAMPLE NO.: GDM-04 QA ID: NM

CURVE COEFFICIENTS: $(C_U)\ \frac{D_{60}}{D_{10}} = \frac{24}{14} = 1.71$ $(C_C)\ \frac{D_{10}^2}{D_{10} \times D_{60}} = \frac{324}{336} = .96$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.9
3/4-in.	46.6
1/2-in.	4.4
3/8-in.	0.9
NO. 4	0.6
NO. 10	0.6
NO. 20	0.6
NO. 40	0.5
NO. 60	0.4
NO. 100	0.2
NO. 200	0.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 15 day 8 month 97 year

MATERIAL TYPE: #57 STONE SAMPLE NO.: GDM-05

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.		N/A
WT. OF DRY SAMPLE PLUS TARE (grams)		
WT. OF TARE (grams)		
WT. OF DRY SAMPLE (grams)	12 628.2	

SIEVE ANALYSIS

QA ID: JW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
2"	50.0	0.0	0	100	
1½"	37.5	0.0	0	100	100
1	25.0	0.0	0	100	95-100
¾		2434.2	19.3	80.7	
½	12.5	8561.8	67.8	32.2	25-60
⅜	9.5	11 696.7	92.6	7.4	
4	4.75	12 570.7	99.5	.5	0-10
8	2.36	12 578.7	99.6	.4	0-5
16	1.18	12 581.9	99.6	.4	
30	0.60	12 584.0	99.6	.4	
50	0.30	12 586.1	99.7	.3	
100	0.15	12 590.3	99.7	.3	
200	0.075	12 605.4	99.8	.2	0-2

* PHASE I SPEC REV-0 SECTION 02710 PART 2.01.D

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

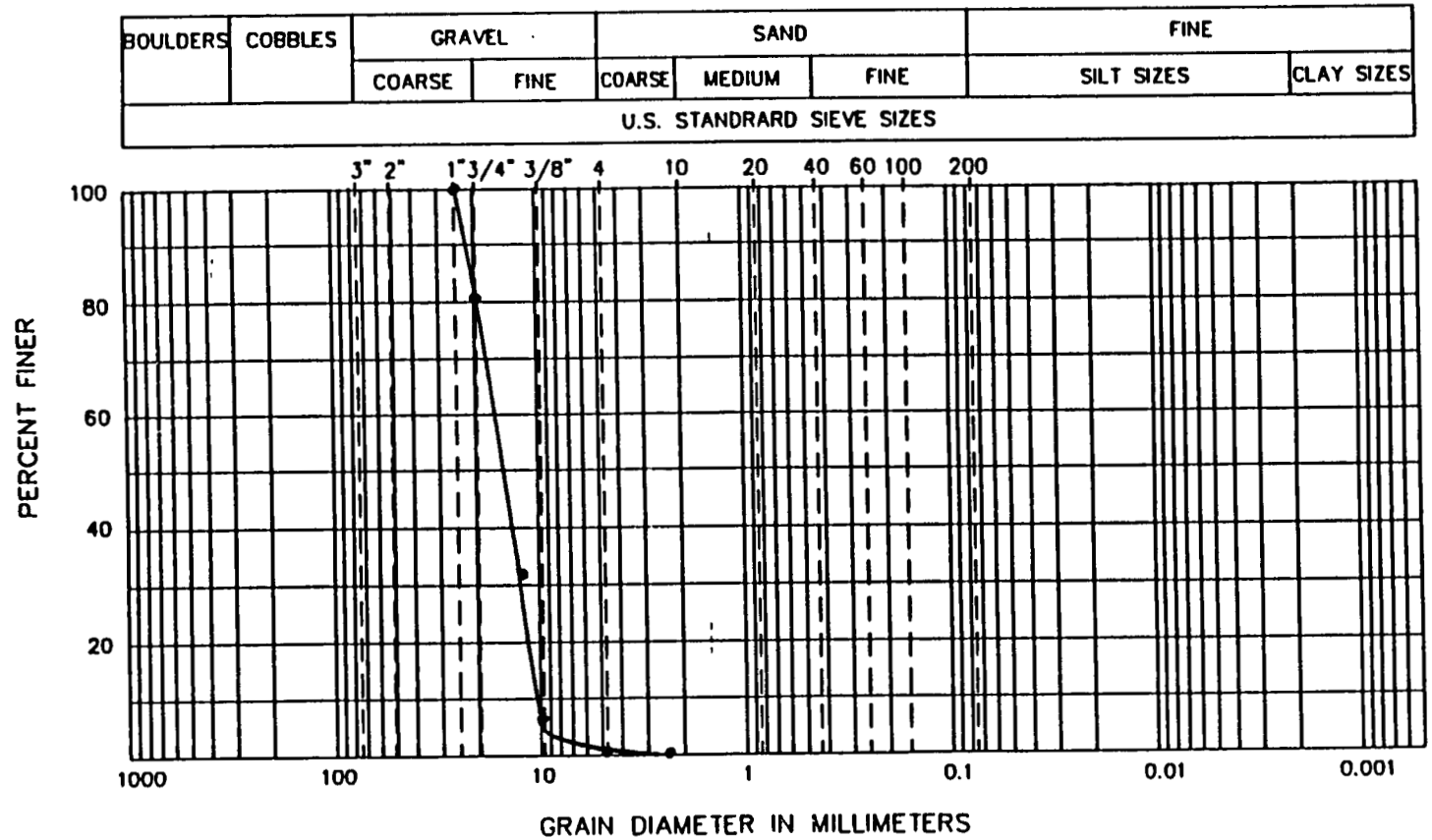
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 15 day 8 month 97 year

MATERIAL TYPE: #57 STONE GRANULAR DRAINAGE MATERIAL

SAMPLE NO.: GDM-05 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{17}{11} = 1.5$ ✓ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{196}{187} = 1.05$ ✓



ATTERBERG LIMITS

(LL) N/A

(PL)

(PI)

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	100
3/4-in.	80.7
1/2-in.	32.2
3/8-in.	7.4
NO. 4	0.5
NO. 10	0.4
NO. 20	0.4
NO. 40	0.4
NO. 60	0.3
NO. 100	0.3
NO. 200	0.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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SHEET NO. 2 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (#78) SAMPLE NO.: GDM-06

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		0	
WT. OF DRY SAMPLE PLUS TARE	(grams)	792.0	
WT. OF TARE	(grams)	15.5	
WT. OF DRY SAMPLE	(grams)	776.5	

SIEVE ANALYSIS

QA ID: KBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
1"	25.0				
3/4"	19.0	0	0	100	100
1/2"	12.5	82.3	10.6	89.4	85 * ~~90~~-100 HGM 9/10/97
3/8"	9.5	198.5	25.6	74.4	40-75
4	4.75	602.9	77.6	22.4	5-25
8	2.36	757.2	97.5	2.5	0-10
16	1.18	765.2	98.5	1.5	0-5
30	0.60	767.7	98.9	1.1	
50	0.30	768.9	99.0	1.0	
100	0.19	771.3	99.3	0.7	
200	0.075	774.8	99.8	0.2	0-2

* Per DCN-15

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

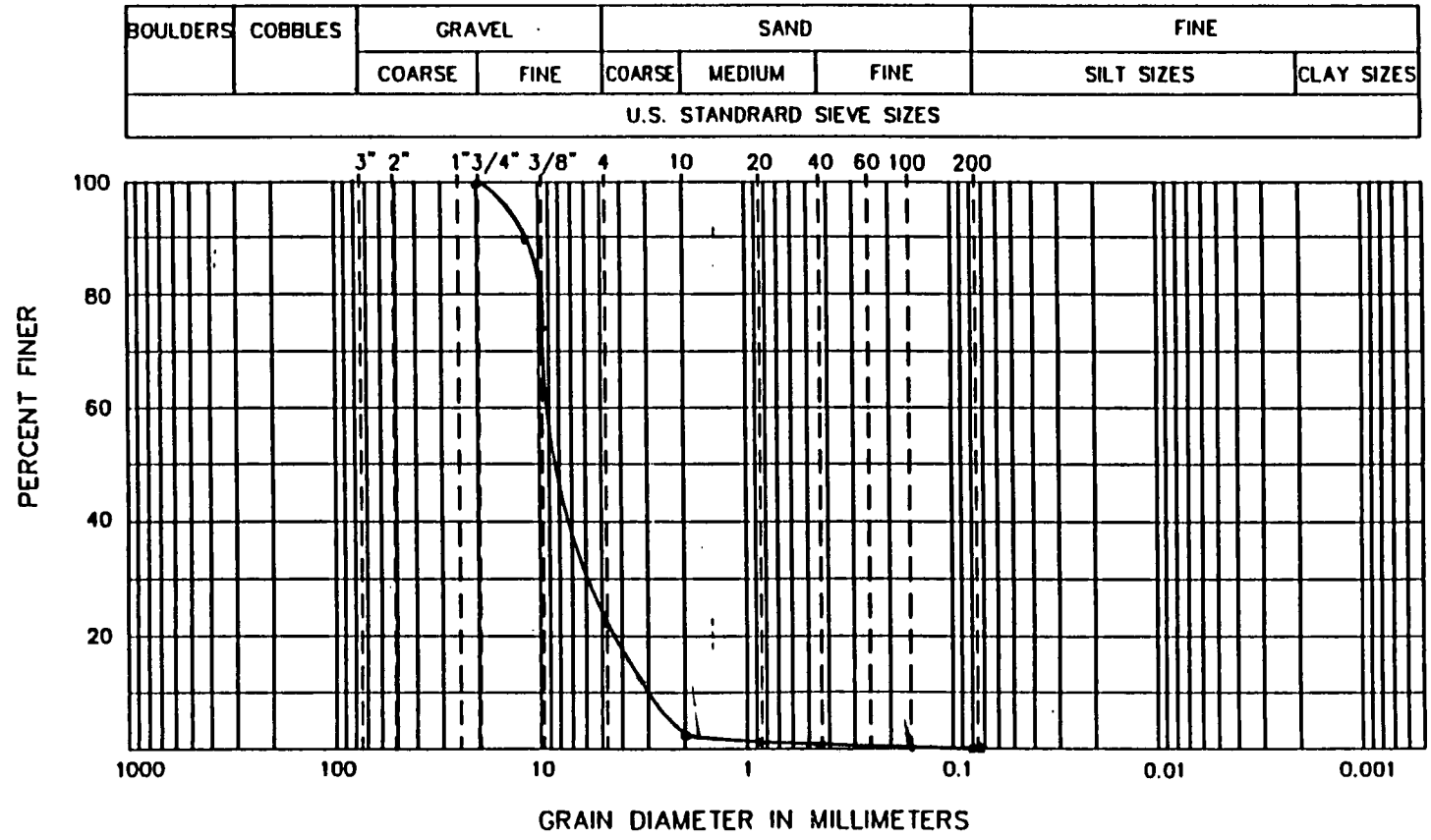
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO. 78 STONE) — SAMPLE NO.: GDM-06 QA ID: RBN

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{9.1}{3.0} = 3.0$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{34.81}{30 \times 9.1} = 1.3$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100
1/2-in.	89.4
3/8-in.	74.4
NO. 4	22.4
~~NO. 10~~ 8	2.5
~~NO. 20~~ 16	1.5
~~NO. 40~~ 30	1.1
~~NO. 60~~ 50	1.0
NO. 100	0.7
NO. 200	0.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): GP - Poorly Graded Gravel

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SHEET NO. 2 OF 2

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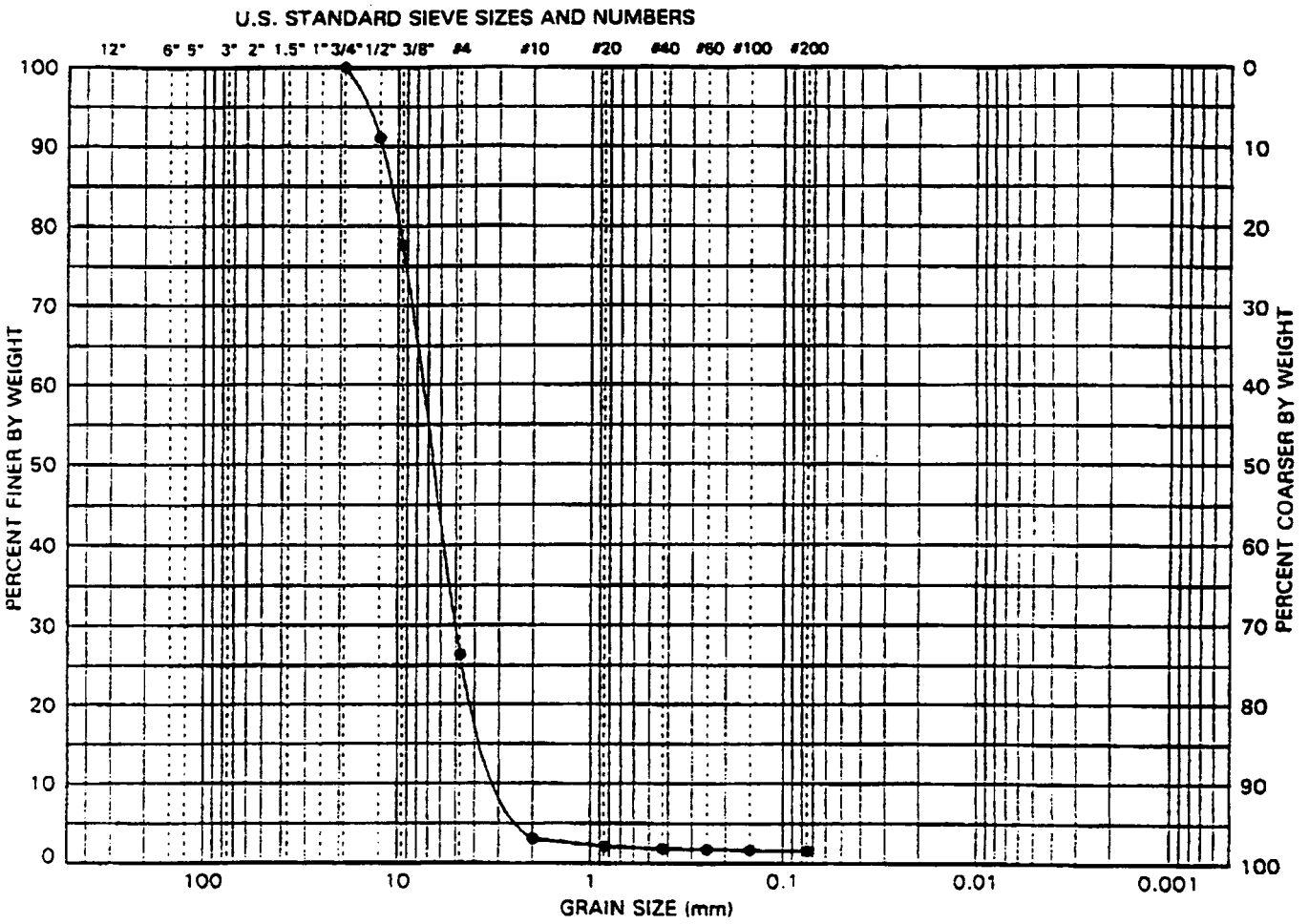
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID GDM-06	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 73.7
LAB. SAMPLE NO. 971176..	PLASTIC LIMIT (%)		SAND (%) 24.7
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%) 1.6
SOIL CLASSIFICATION:			SILT (%)
GP - Poorly Graded Gravel with Sand			CLAY(%)
			COEFF. UNIFORMITY (Cu) 2.9
			COEFF. CURVATURE (Cc) 1.29

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	91	78	26	3	2	2	2	2	2					

NOTES: After Acid Bath

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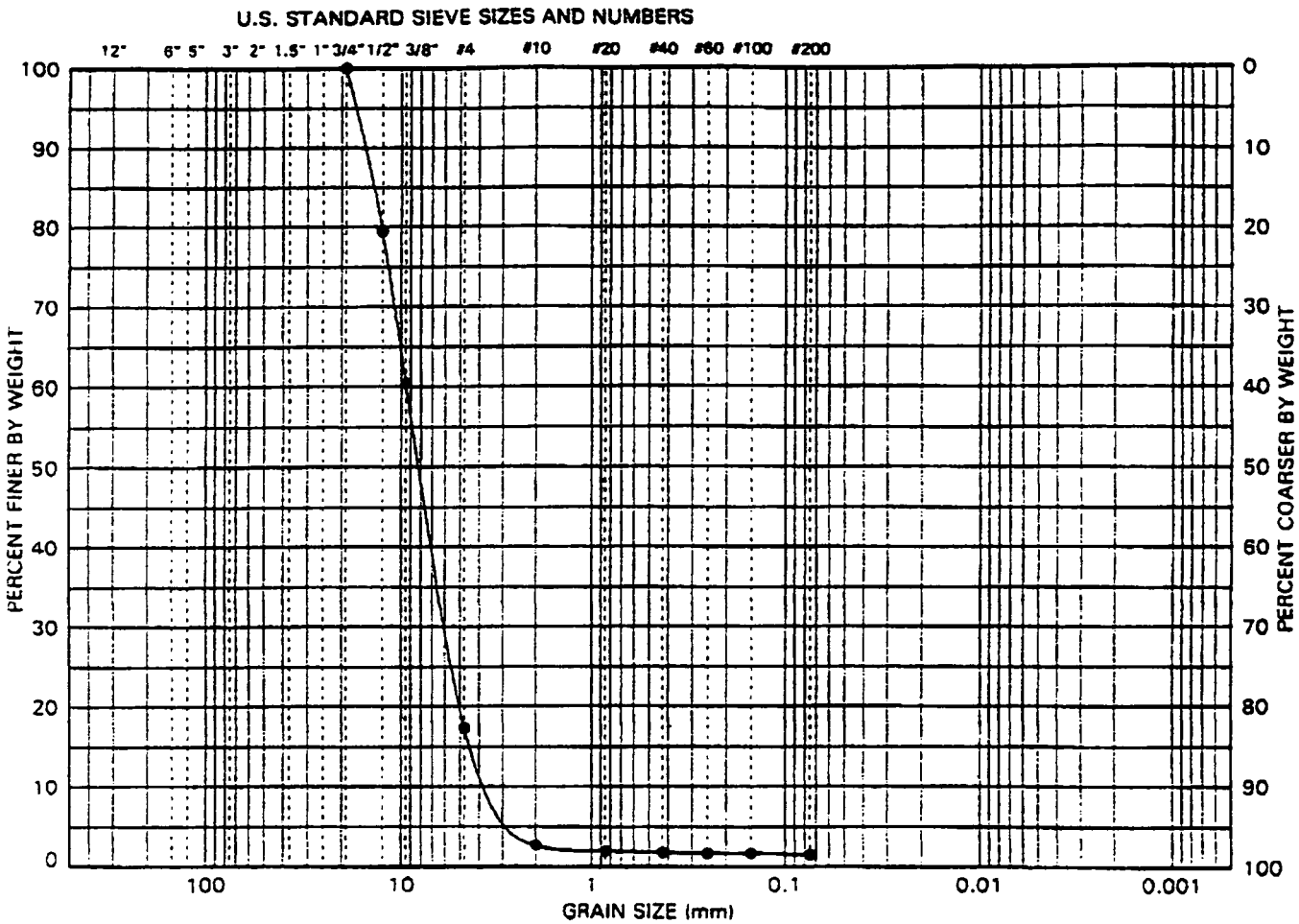
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-07	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	82.7
LAB. SAMPLE NO.	971177.	PLASTIC LIMIT (%)		SAND (%)	15.8
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.5
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	3.1
				COEFF. CURVATURE (Cc)	1.17

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	79	60	17	3	2	2	2	2	2					

NOTES: Before Acid Bath

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 12 day SEPT month 1997 year

MATERIAL TYPE: Granular Drainage Material (#78) SAMPLE NO.: GDM-07

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	C	
WT. OF DRY SAMPLE PLUS TARE (grams)	1586.5	
WT. OF TARE (grams)	13.9	
WT. OF DRY SAMPLE (grams)	1572.6	

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
1"	25.0				
3/4"	19.0	0	0	100	100
1/2"	12.5	220.6	14.0	86.0	85-100
3/8"	9.5	542.6	34.5	65.5	40-75
4	4.75	1339.2	85.2	14.8	5-25
8	2.36	1539.9	97.9	2.1	0-10
16	1.18	1551.2	98.6	RBN 9/12/97 ~~44~~ 1.4	0-5
30	0.60	1555.0	98.9	1.1	
50	0.30	1558.1	99.1	0.9	
100	0.150	1566.8	99.6	0.4	
200	0.075	RBN 9/12/97 ~~1568~~ 1571.3	99.9	0.1	0-2

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction

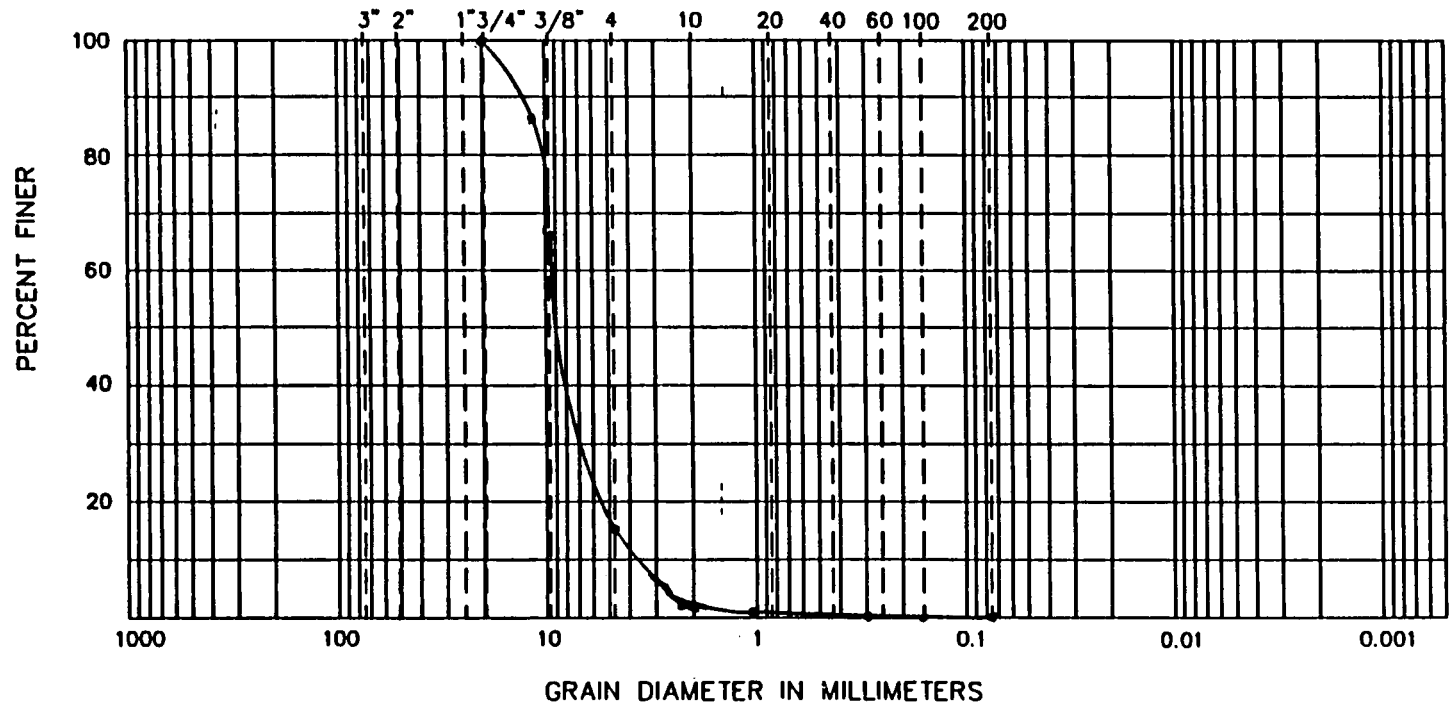
DATE: 12 day SEPT month 1997 year

MATERIAL TYPE: Granular Drainage Material (#78)

SAMPLE NO.: 60M-07 QA ID: RBN

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{43}{27} = 2.5$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{49}{43 \times 27} = 1.4$

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES
U.S. STANDRARD SIEVE SIZES								



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100
1/2-in.	86.0
3/8-in.	65.5
NO. 4	14.8
NO. ~~10~~ 8	2.1
NO. ~~20~~ 16	1.4
NO. ~~40~~ 30	1.1
NO. ~~60~~ 50	0.9
NO. 100	0.4
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): GP - Poorly Graded Gravel

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GEO SYNTEC CONSULTANTS
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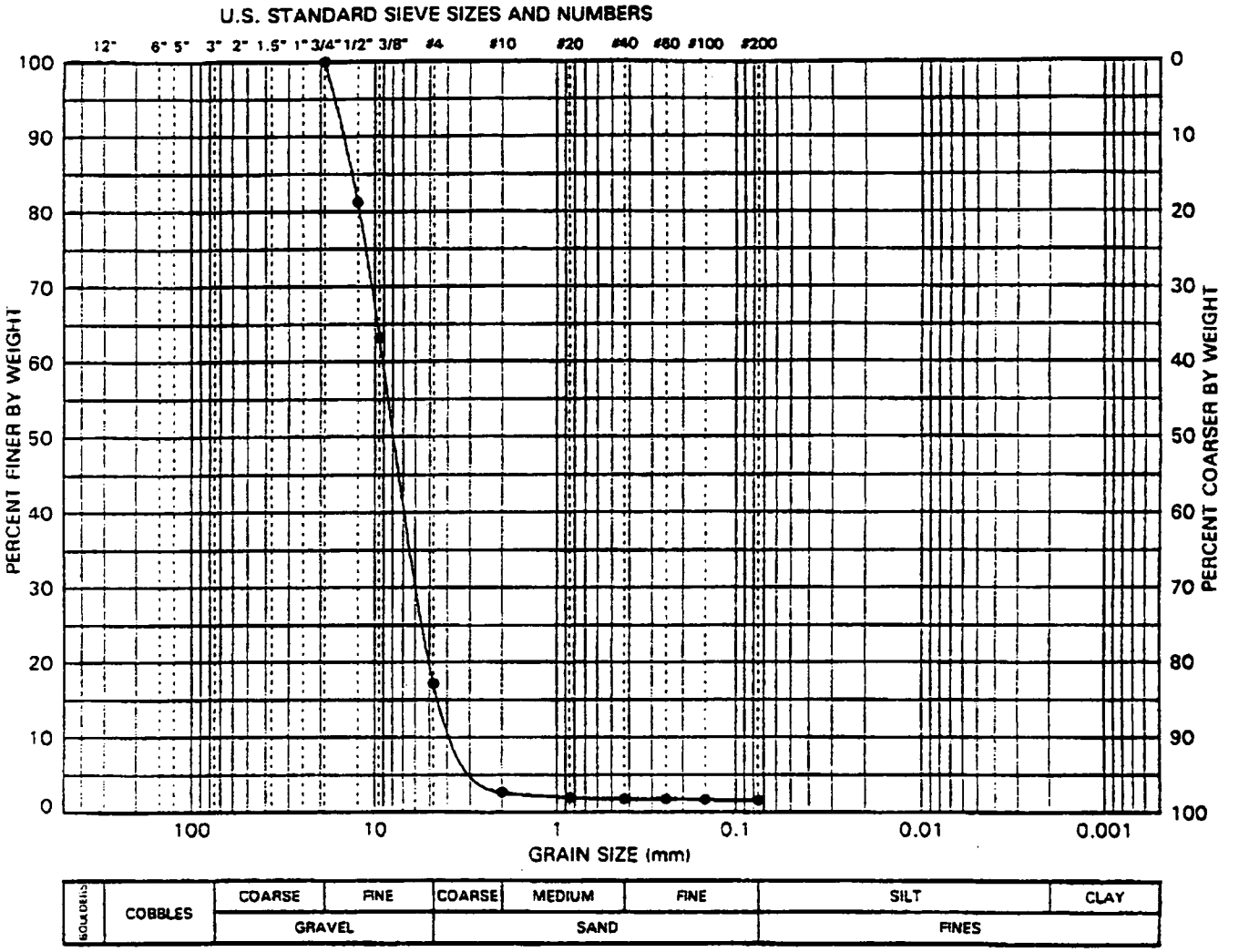
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	GDM-07	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	82.9
LAB. SAMPLE NO.	971177..	PLASTIC LIMIT (%)		SAND (%)	15.5
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.6
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.18

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	81	63	17	3	2	2	2	2	2					

NOTES: After Acid Bath

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (#78) SAMPLE NO.: GDM-08

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		K	
WT. OF DRY SAMPLE PLUS TARE	(grams)	1151.8	
WT. OF TARE	(grams)	14.0	
WT. OF DRY SAMPLE	(grams)	1137.8	

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
1"	25.0				
3/4"	19.0	0	0	100	100
1/2"	12.5	141.0	12.4	87.6	85 ~~90~~ *-100 *Per 6/1/97
3/8"	9.5	363.2	31.9	68.1	40-75
4	4.75	977.2	85.9	14.1	5-25
8	2.36	1113.3	97.8	2.2	0-10
16	1.18	1121.6	98.6	1.4	0-5
30	0.60	1124.8	98.9	1.1	
50	0.30	1127.1	99.1	0.9	
100	0.150	1131.6	99.5	0.5	
200	0.075	1136.7	99.9	0.1	0-2

* Per DCN-15

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

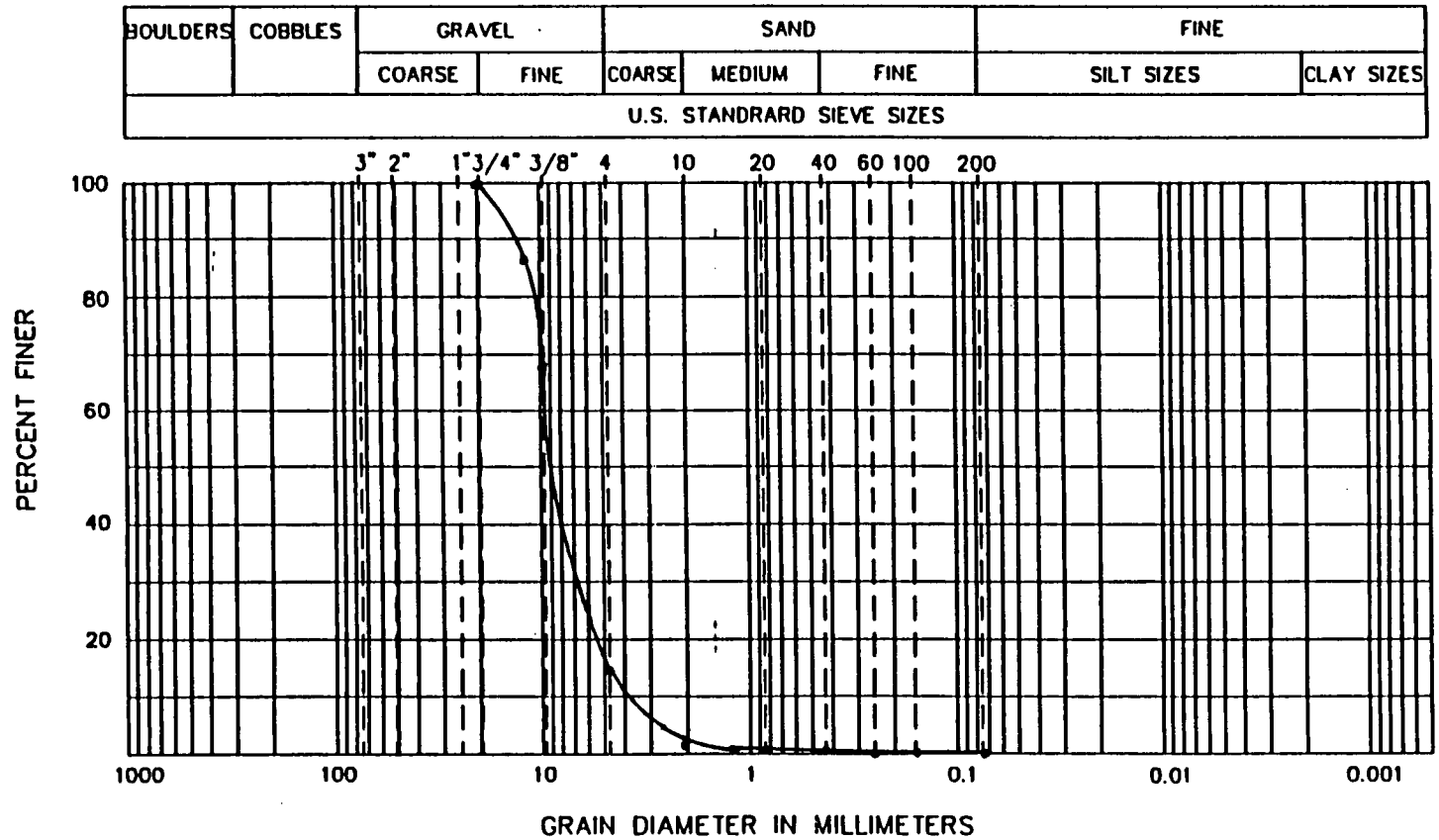
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 11 day SEPT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO. 78 STONE)

SAMPLE NO.: GDM-08 QA ID: PBN

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{9.5}{3.8} = 2.5$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{4.624}{3.8 \times 9.5} = 1.3$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100
1/2-in.	87.6
3/8-in.	68.1
NO. 4	14.1
~~NO. 10~~ 8	2.2
~~NO. 20~~ 16	1.4
~~NO. 40~~ 30	1.1
~~NO. 60~~ 50	0.9
NO. 100	0.5
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): GP- Poorly Graded Gravel

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SHEET NO. 2 OF 2

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (#78) SAMPLE NO.: GDM-09

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		I	
WT. OF DRY SAMPLE PLUS TARE	(grams)	1213.8	
WT. OF TARE	(grams)	14.1 RBN 9/11/97	
WT. OF DRY SAMPLE	(grams)	~~1198.7~~ 1199.7	

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
1"	25.0				
3/4"	19.0	0	0	100.0	100
1/2"	12.5	176.5	14.7	85.3	85 ~~90~~-100* HGM 9/10/97
3/8"	9.5	455.7	38.0	62.0	40-75
4	4.75	1068.2	89.0	11.0	5-25
8	2.36	1178.2	98.2	1.8	0-10
16	1.18	1184.6	98.7	1.3	0-5
30	0.60	1188.6	99.1	0.9	
50	0.30	1190.9	99.3	0.7	
100	0.150	1195.4	99.6	0.4	
200	0.075	1199.0	99.9	0.1	0-2

* PER DCN-15

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION

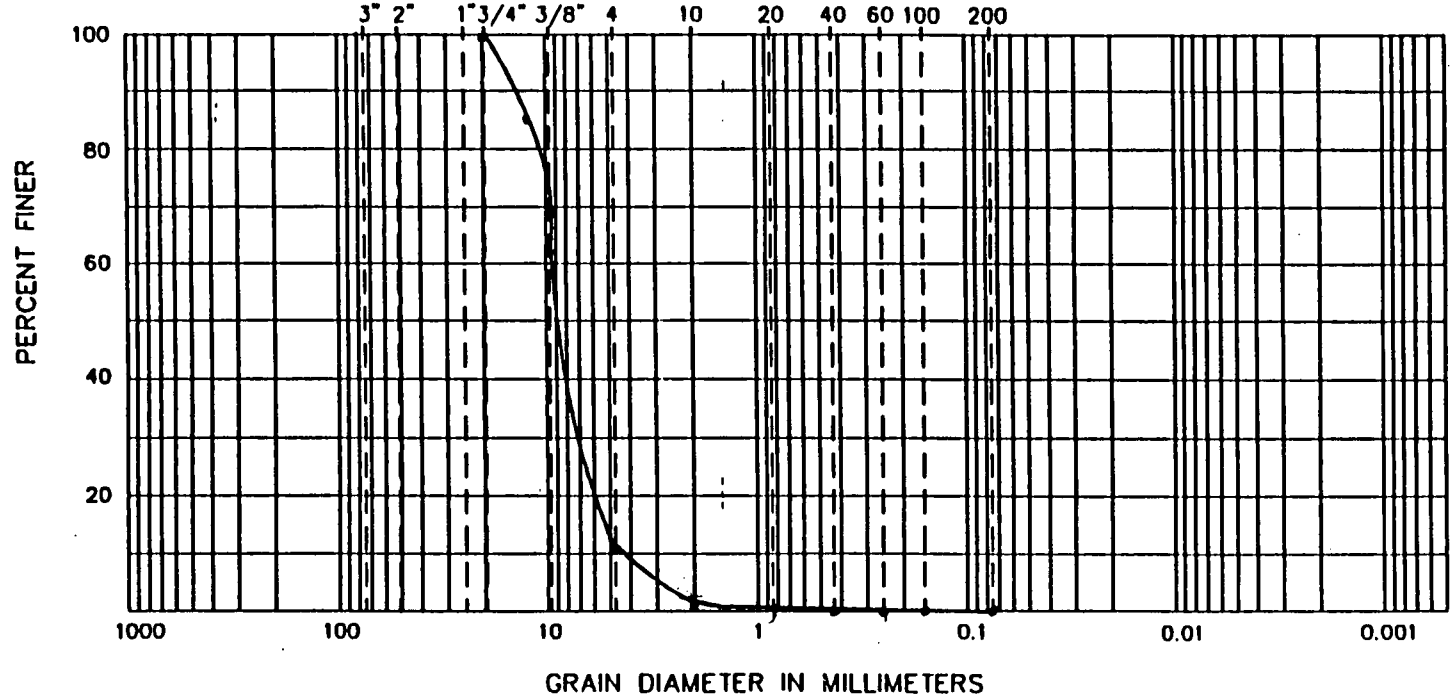
DATE: 11 day SEPT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO. 78 STONE)

SAMPLE NO.: GDM-09 QA ID: RBN

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{9.4}{4.3} = 2.2$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{(7.1)^2}{9.4 \times 4.3} = 1.2$

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES
U.S. STANDRARD SIEVE SIZES								



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100
1/2-in.	85.3
3/8-in.	62.0
NO. 4	11.0
~~NO. 10~~ 8	1.8
~~NO. 20~~ 16	1.3
~~NO. 40~~ 30	0.9
~~NO. 60~~ 50	0.7
NO. 100	0.4
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): GP - Poorly Graded Gravel

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SHEET NO. 2 OF 2

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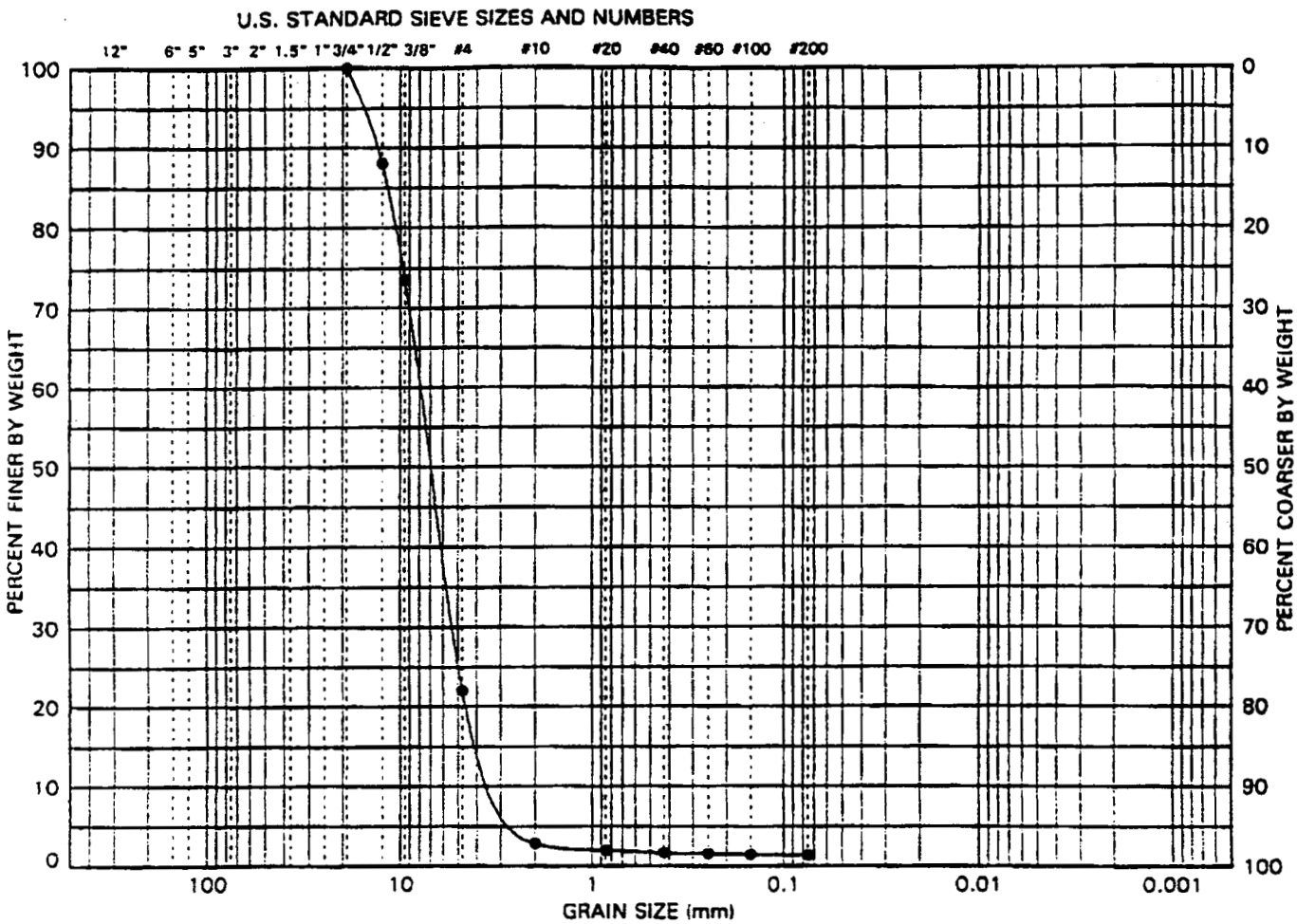
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-09	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	78.0
LAB. SAMPLE NO.	971179.	PLASTIC LIMIT (%)		SAND (%)	20.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.4
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.28

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	88	74	22	3	2	2	2	2	1					

NOTES: Before Acid Bath

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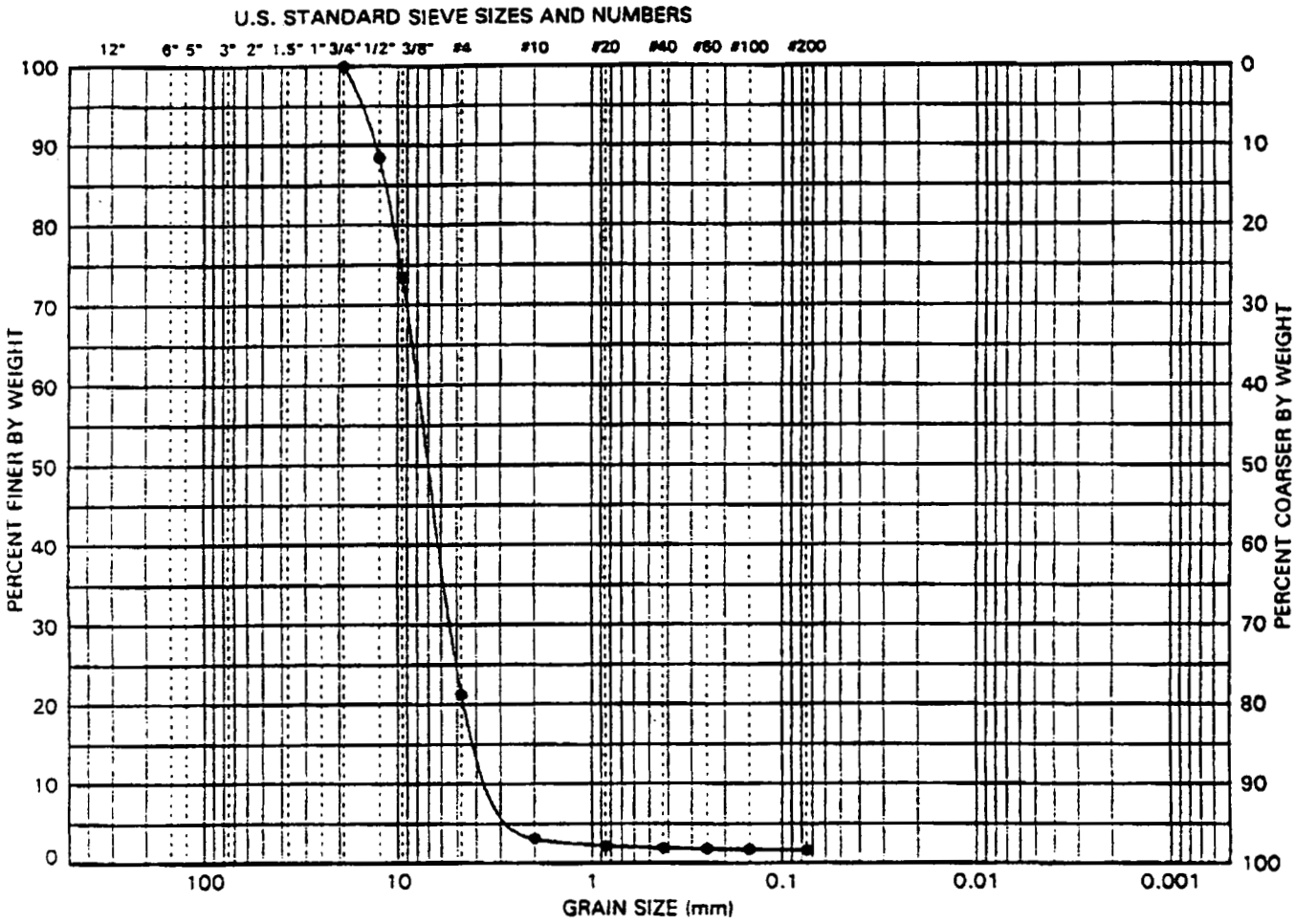
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-09	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	78.8
LAB. SAMPLE NO.	971179..	PLASTIC LIMIT (%)		SAND (%)	19.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.6
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.29

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	88	73	21	3	2	2	2	2	2					

NOTES: After Acid Bath

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (#78) SAMPLE NO.: GDM-10

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		F	
WT. OF DRY SAMPLE PLUS TARE	(grams)	1183.5	
WT. OF TARE	(grams)	14.0	
WT. OF DRY SAMPLE	(grams)	1169.5	

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
1"	25.0				
3/4"	19.0	0	0	100	100
1/2"	12.5	169.5	14.5	85.5	~~85~~ 90-100 * 0 9/10/97
3/8"	9.5	405.4	34.7	65.3	40-75
4	4.75	987.7	84.5	15.5	5-25
8	2.36	1143.0	97.7	2.3	0-10
16	1.18	1151.9	98.5	1.5	0-5
30	0.60	1155.3	98.8	1.2	
50	0.30	1157.2	98.9	1.1	
100	0.150	1163.8	99.5	0.5	
200	0.075	1167.8	99.9	0.1	0-2

*Per DCN-15

%FINER = 100 − Σ% RETAINED

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FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

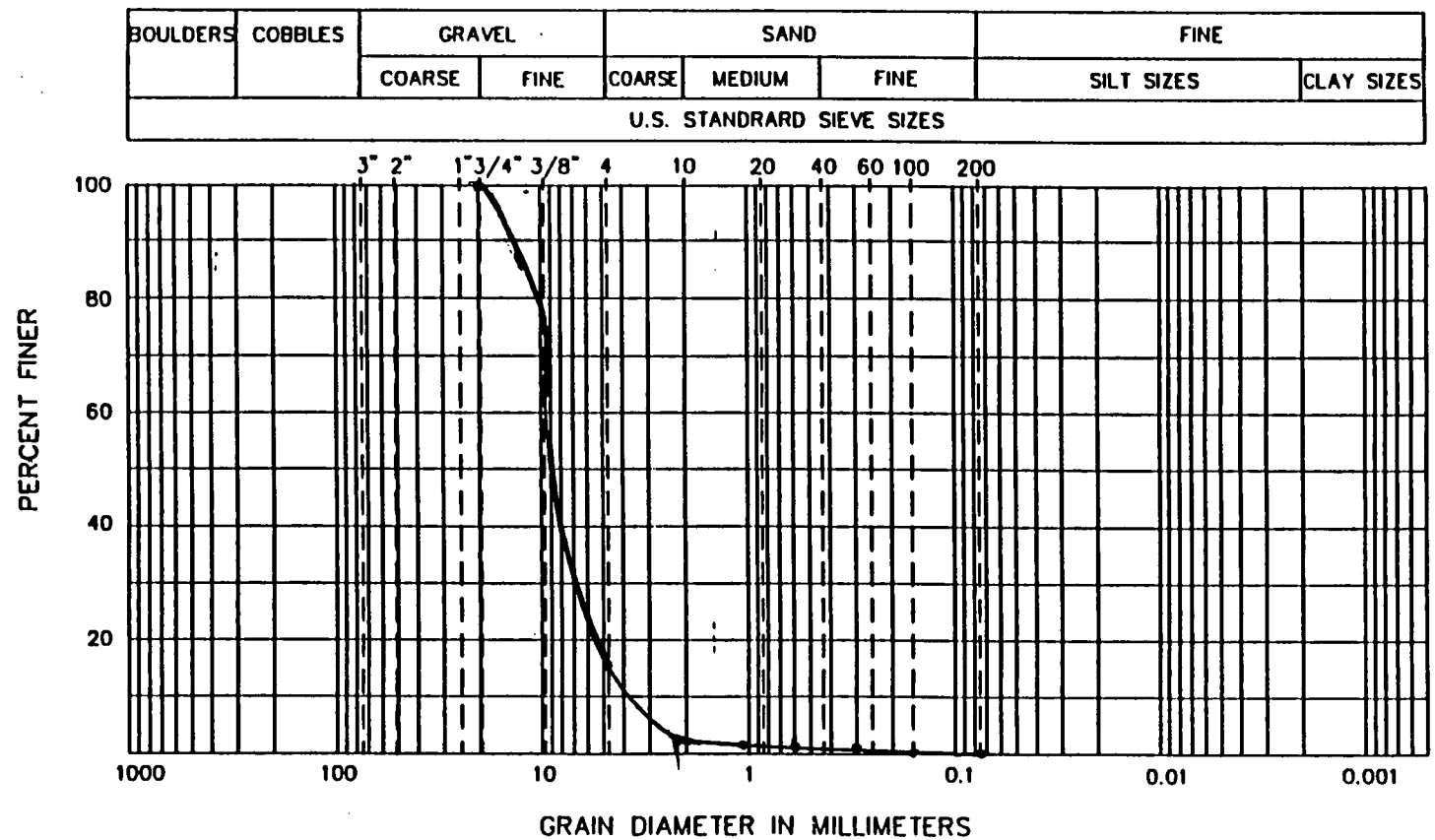
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 11 day SEPT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO. 78 STONE)

SAMPLE NO.: GDM-10 QA ID: PBN

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{9.5}{3.8} = 2.5$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{6.9^2}{9.5 \times 3.8} = 1.3$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100
1/2-in.	85.5
3/8-in.	65.3
NO. 4	15.5
NO. ~~10~~ 8	2.3
NO. ~~20~~ 16	1.6
NO. ~~40~~ 30	1.2
NO. ~~60~~ 50	1.1
NO. 100	0.5
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): GP Poorly Graded Gravel

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SHEET NO. 2 OF 2

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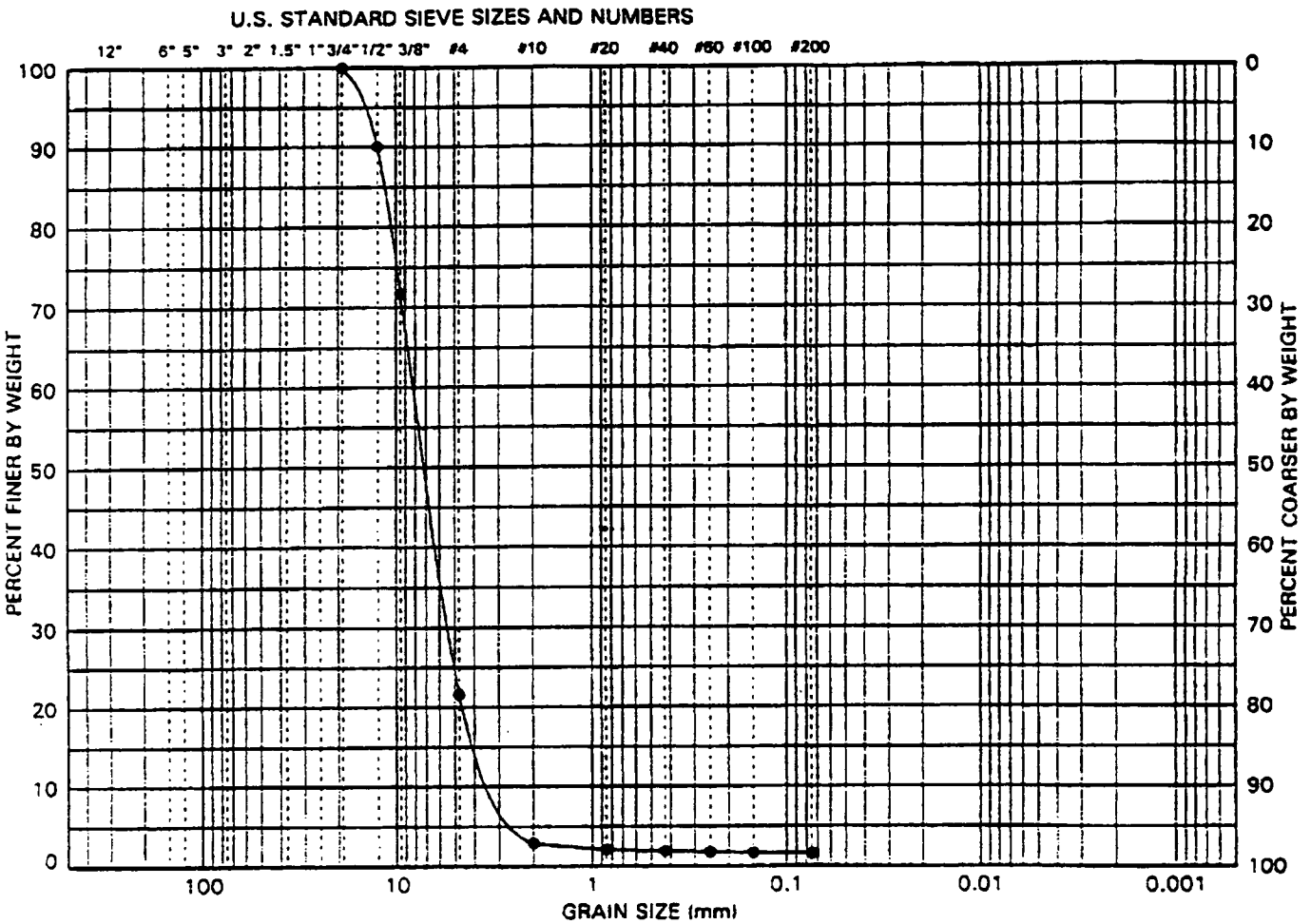
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	GDM-10	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	971180.	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	

SOIL CLASSIFICATION:
GP - Poorly Graded Gravel with Sand

SOIL FRACTIONS	
GRAVEL (%)	78.4
SAND (%)	20.0
FINES (%)	1.6
SILT (%)	
CLAY(%)	
COEFF. UNIFORMITY (Cu)	2.9
COEFF. CURVATURE (Cc)	1.27

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200
100	100	100	100	100	90	72	22	3	2	2	2	2	2

PERCENT PASSING SIEVE SIZES (mm)

75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001

NOTES: Before Acid Bath

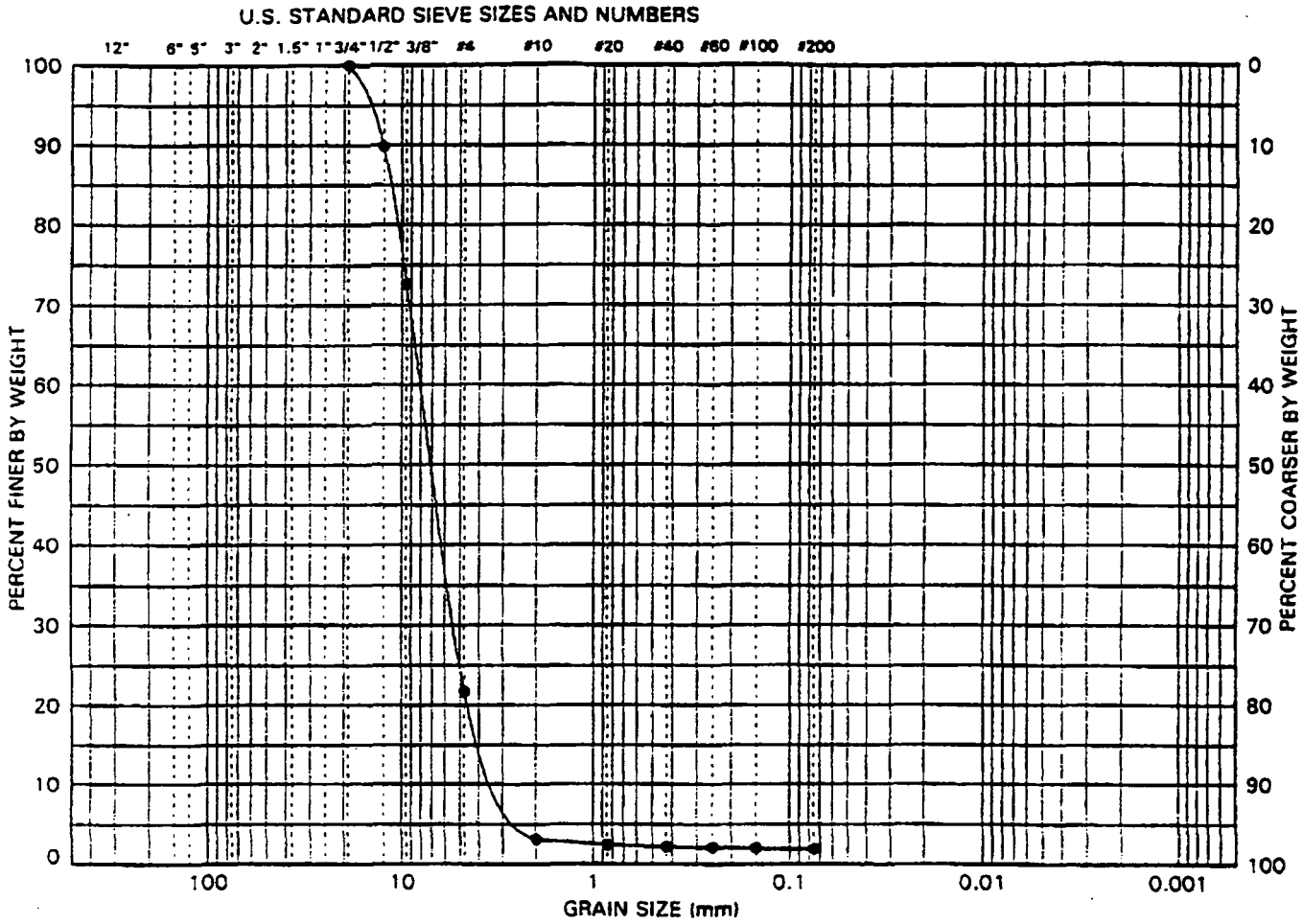
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID	GDM-10	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	78.3
LAB. SAMPLE NO.	971180..	PLASTIC LIMIT (%)		SAND (%)	19.8
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.9
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.28

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	90	73	22	3	2	2	2	2	2					

NOTES: After Acid Bath

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I construction DATE: 13 day SEPT month 1997 year

MATERIAL TYPE: #57 Stone SAMPLE NO.: 6DM-11

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) Total Sample: 9,086.8 (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	15	
WT. OF DRY SAMPLE PLUS TARE (grams)	~~767~~ 57.0	
WT. OF TARE (grams)	7.67	
WT. OF DRY SAMPLE (grams)	49.3	

SIEVE ANALYSIS

QA ID: PBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
2"	50.0	0	0	100		
1 1/2"	37.5	0	0	100		100
1"	25.0	20.2	0.2	99.8		95-100
3/4"	19.0	2041.0	22.5	77.5		
1/2"	12.5	6477.5	71.3	28.7		25-60
3/8"	9.5	8461.8	93.1	6.9		
4	4.75	8976.5	98.8	1.2		0-10
8	2.36	12.4	25.2	74.8	0.9	0-5
16	1.18	20.7	42.0	58.0	0.7	
30	0.600	26.4	53.5	46.5	0.6	
50	0.300	32.6	66.1	33.9	0.4	
100	0.150	37.3	75.7	24.3	0.3	
200	0.075	44.5	90	10.0	0.1	0-2

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

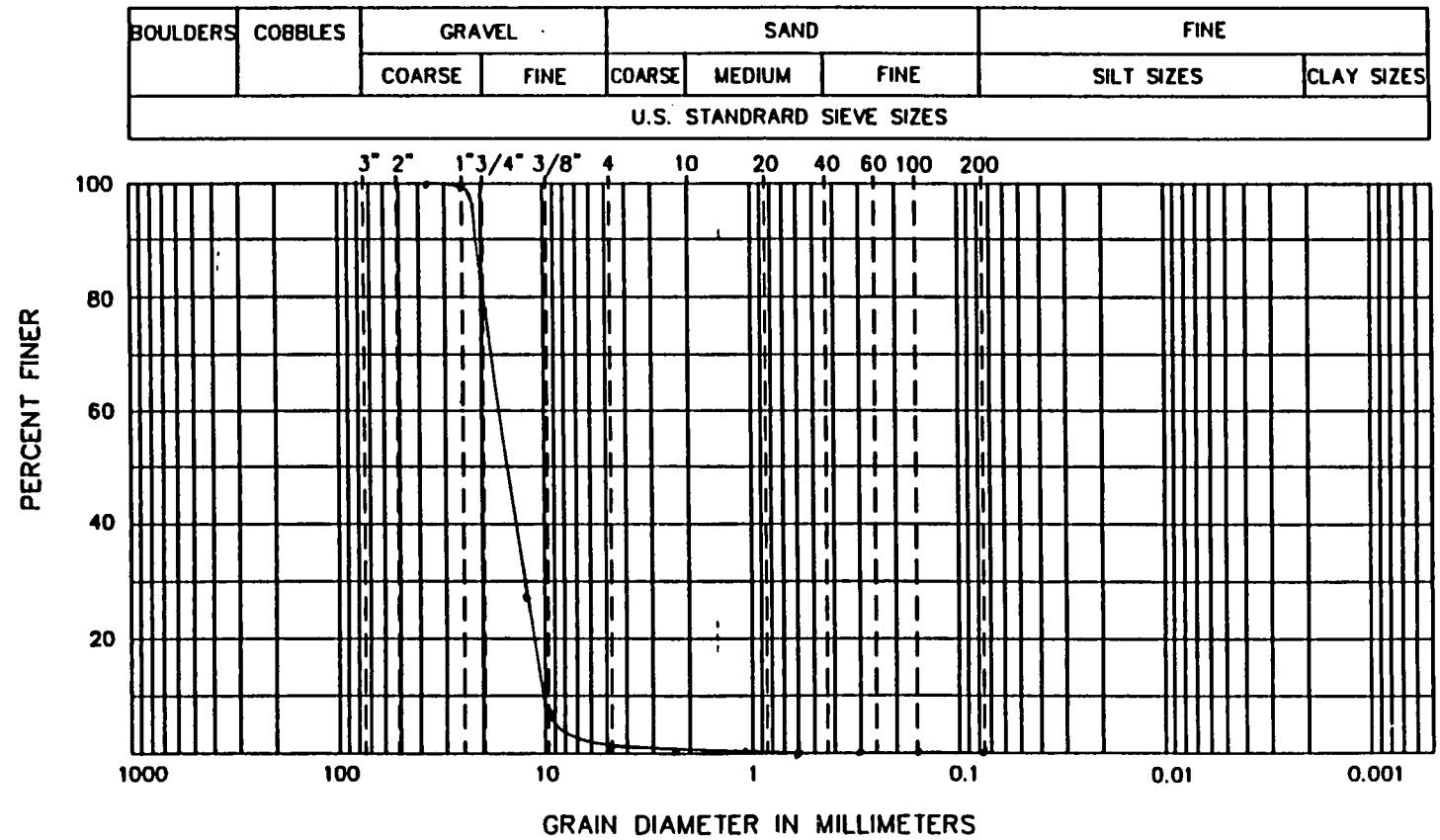
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I construction — DATE: 13 day SEPT month 1997 year

MATERIAL TYPE: #57 Stone — SAMPLE NO.: 6DU-11 QA ID: RBN

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{17}{10} = 1.7$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{169}{17 \times 10} = 1.0$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100
1-in.	99.8
3/4-in.	77.5
1/2-in.	28.7
3/8-in.	6.9
~~NO. 4~~ 4	1.2
~~NO. 10~~ 8	0.9
~~NO. 20~~ 16	0.7
~~NO. 40~~ 30	0.6
NO. 60 50	0.4
NO. 100	0.3
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): GP- Poorly Graded Gravel

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FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C 136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 27 day SEPT month 1997 year

MATERIAL TYPE: #57 STONE GRANULAR DRAINAGE MAT'L SAMPLE NO.: GDM-12

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.			
WT. OF DRY SAMPLE PLUS TARE	(grams)	11,630.8	
WT. OF TARE	(grams)	1,324.6	
WT. OF DRY SAMPLE	(grams)	10,306.2	

SIEVE ANALYSIS

QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
2"	50.0				
1½"	37.5	0	0	100	100
1"	25.0	72.6	0.7	99.3	95-100
¾"	19.0	1,383.5	13.4	86.6	
½"	12.5	5,339.1	51.8	48.2	25-60
⅜"	9.5	8,550.7	83.0	17.0	
4	4.75	10,208.7	99.1	0.9	0-10
8	2.36	10,238.0	99.3	0.7	0-5
16	1.18	10,247.0	99.4	0.6	
30	0.60	10,253.4	99.5	0.5	
50	0.30	10,260.0	99.6	0.4	
100	0.150	10,267.0	99.6	0.4	
200	0.075	10,286.3	99.8	0.2	0-2

* PHASE I SPEC REV 0 SECT. 02710 PART 2.01 D

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

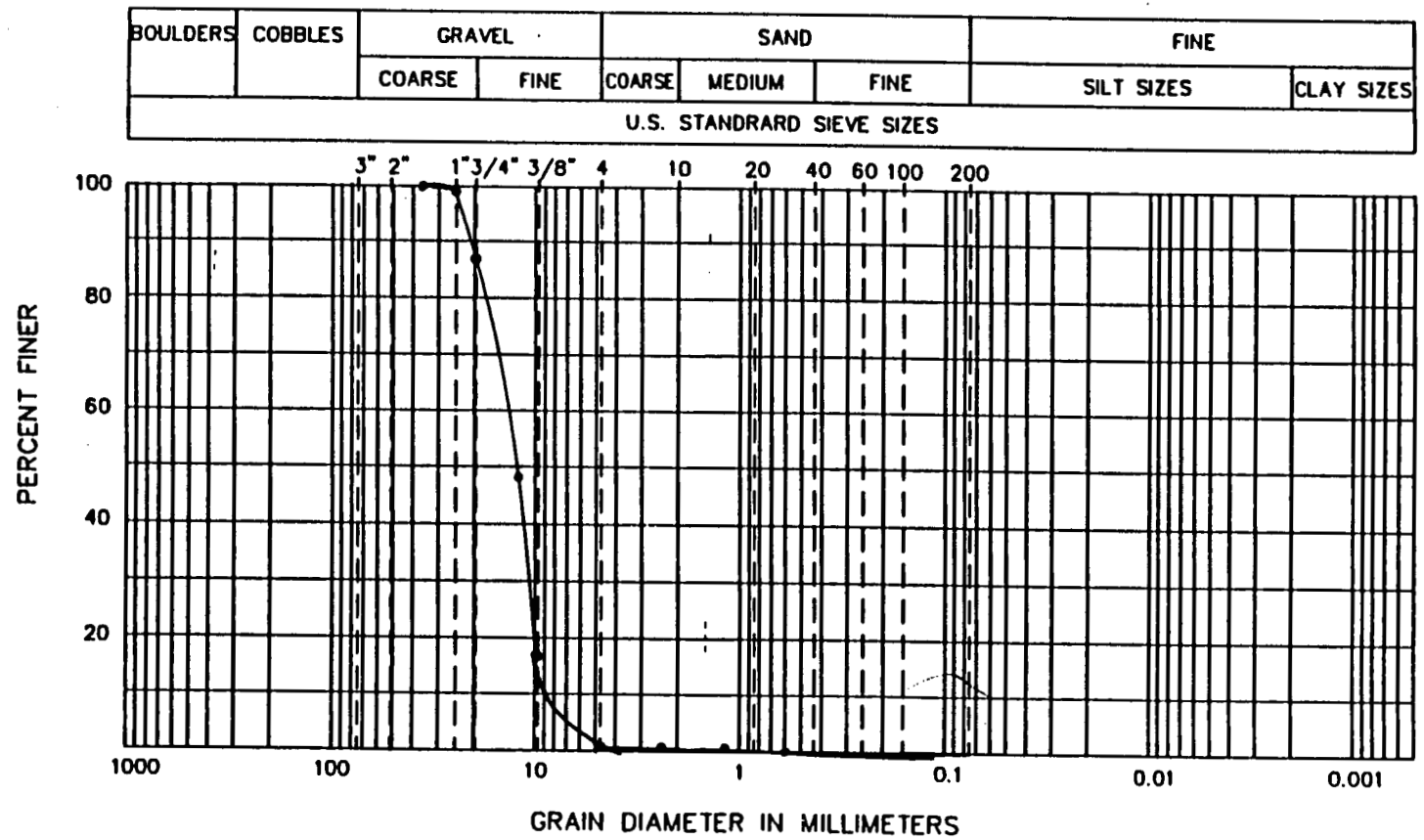
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 27 day SEPT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO. 57 STONE)

SAMPLE NO.: GDM-12 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{14.}{9} = 1.6$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{12}{126} = 0.96$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	99.3
3/4-in.	86.6
1/2-in.	48.2
3/8-in.	17.0
NO. 4	0.9
NO. ~~10~~ 8	0.7
NO. ~~20~~ 16	0.6
NO. ~~40~~ 30	0.5
NO. ~~60~~ 50	0.4
NO. 100	0.4
NO. 200	0.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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SHEET NO. 2 OF 2

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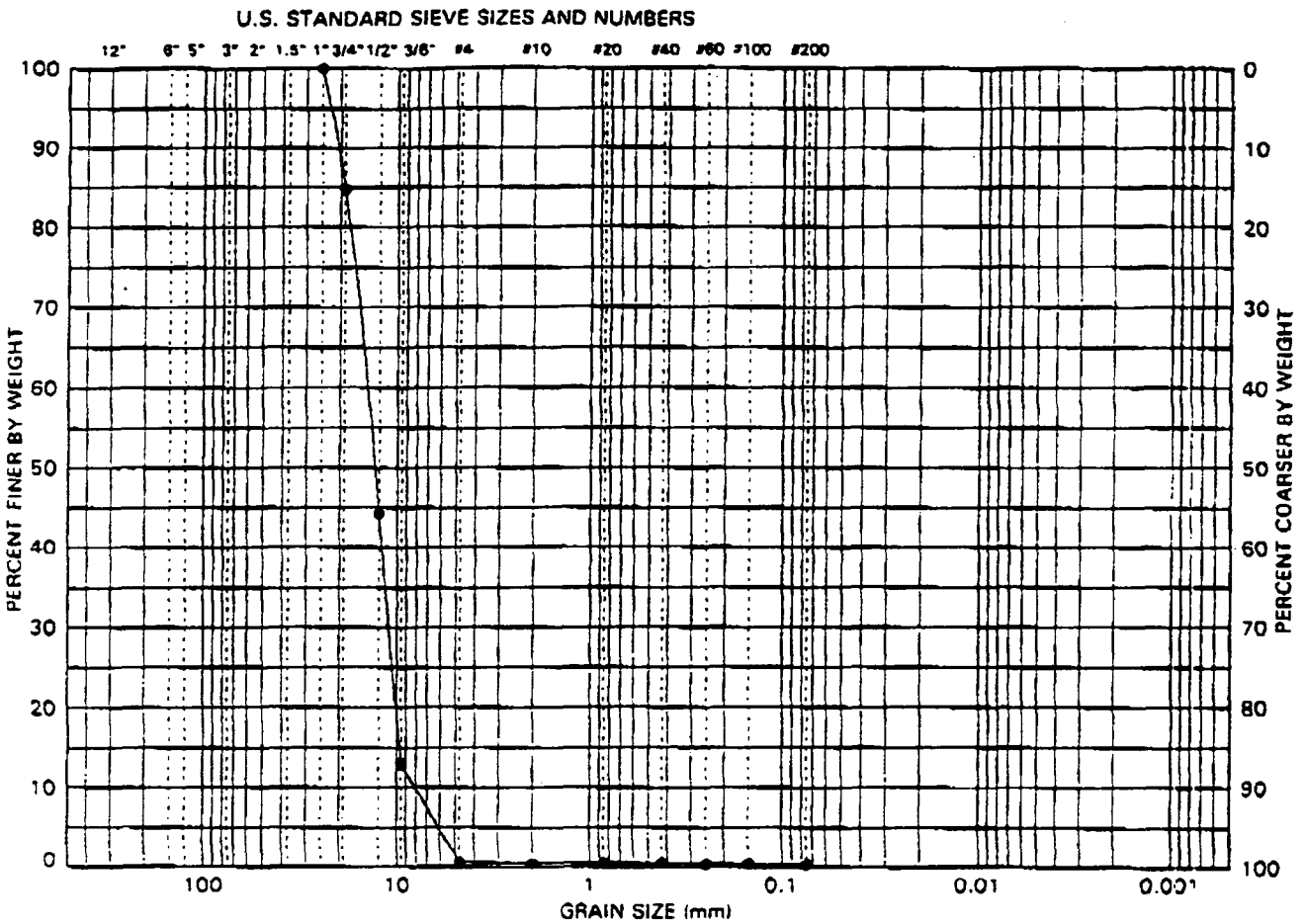
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID GDM-12 *	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 99.4
LAB. SAMPLE NO. 971373.	PLASTIC LIMIT (%)		SAND (%) 0.3
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%) 0.3
SOIL CLASSIFICATION: GP - Poorly Graded Gravel			SILT (%)
			CLAY(%)
			COEFF. UNIFORMITY (Cu) 1.8
			COEFF. CURVATURE (Cc) 1.03

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	85	44	13	1	1	1	1	0	0	0					

NOTES: * BEFORE ACID BATH

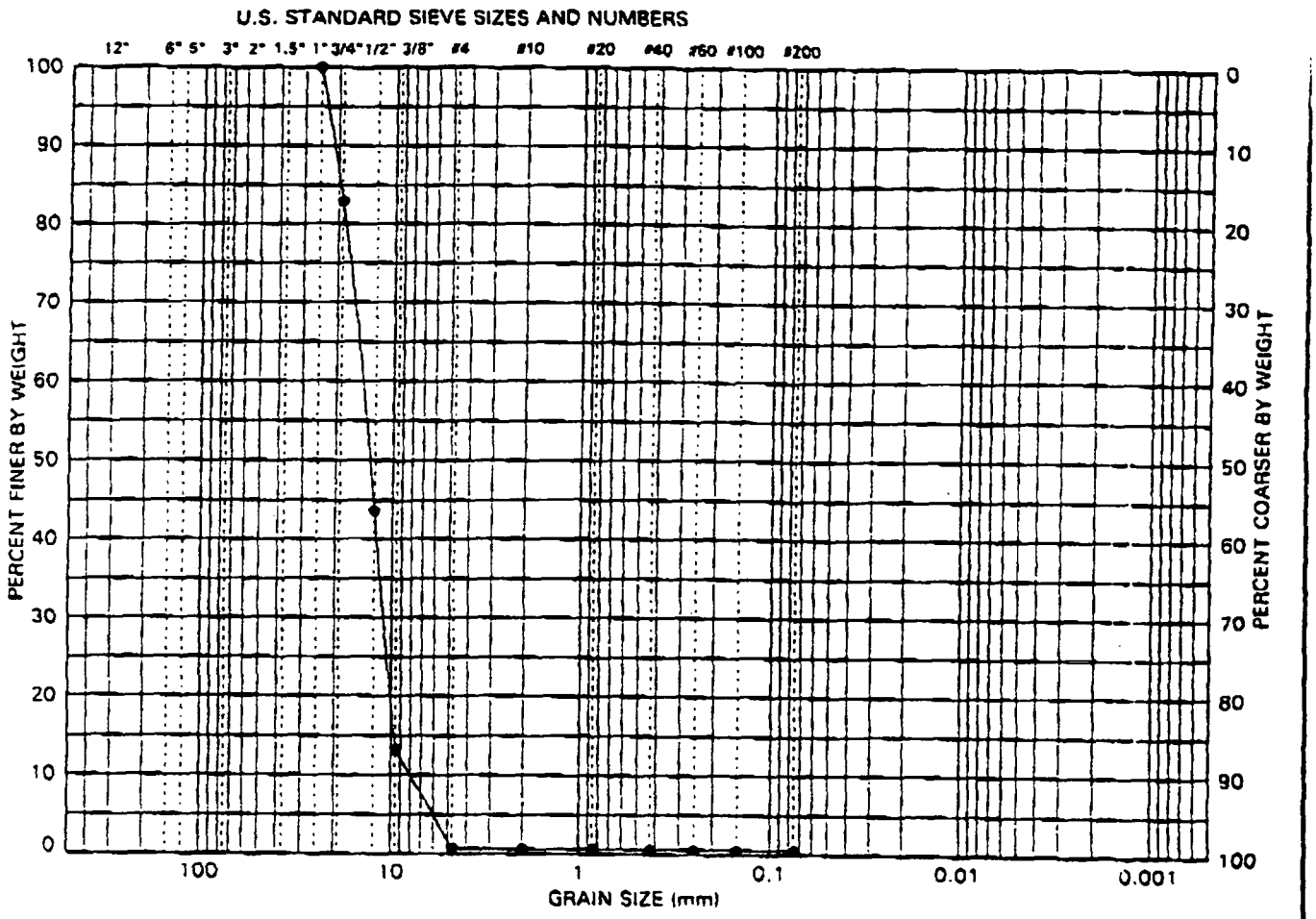
GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID GMD-12 *	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 99.2
LAB. SAMPLE NO. 971373..	PLASTIC LIMIT (%)		SAND (%) 0.3
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%) 0.5
SOIL CLASSIFICATION: GP - Poorly Graded Gravel			SILT (%)
			CLAY(%)
			COEFF. UNIFORMITY (Cu) 1.9
			COEFF. CURVATURE (Cc) 1.03

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	83	44	13	1	1	1	1	1	1	1					

NOTES: * AFTER ACID BATH

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 17 day OCT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (NO. 78) SAMPLE NO.: GDM-13

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.			
WT. OF DRY SAMPLE PLUS TARE	(grams)	4676.8	
WT. OF TARE	(grams)	1324.6	
WT. OF DRY SAMPLE	(grams)	3352.2	

SIEVE ANALYSIS

QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	▲ PROJECT SPECIFICATIONS
1"	25.0	Ø	Ø	100.0	
3/4"	19.0	Ø	Ø	100.0	100
1/2"	12.5	913.0	27.2	** 72.8	*85-100
3/8"	9.5	1798.6	53.7	46.3	40-75
4	4.75	3148.6	93.9	6.1	5-25
8	2.36	3305.6	98.6	1.4	0-10
16	1.18	3313.0	98.8	1.2	0-5
30	0.60	3316.4	98.9	1.1	
50	0.30	3318.9	99.0	1.0	
100	0.150	3328.8	99.3	0.7	
200	0.075	3336.7	99.5	0.5	0-2

* PER DCN 1702-015

▲ TECH. SPEC SEC. 02710 PT. 2.01 B

** DOES NOT CONFORM TO SPECIFICATION OR DCN

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

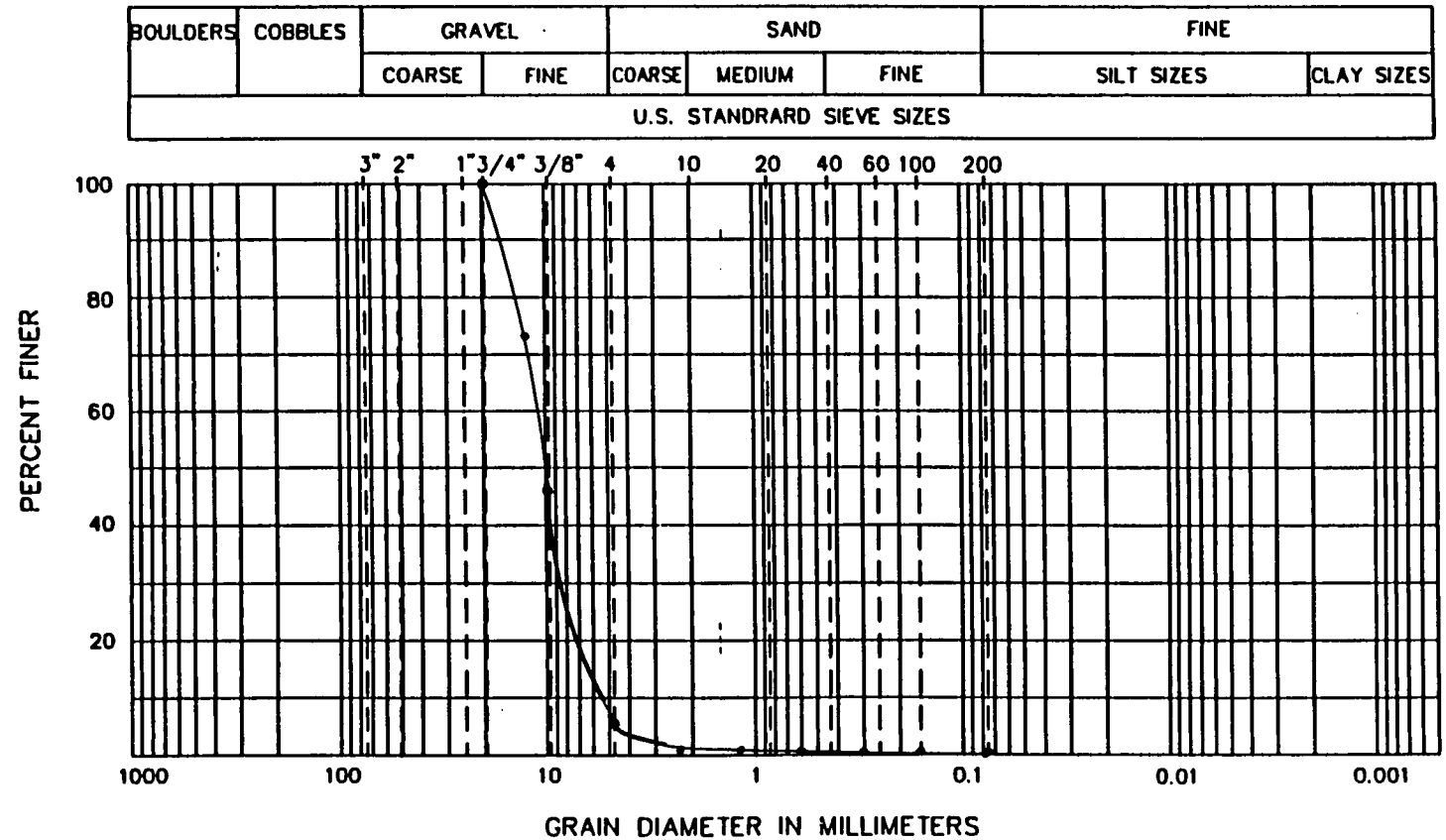
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 17 day OCT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO. 78 STONE)

SAMPLE NO.: GDM-13 QA ID: _____

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{11}{5.5} = 2.0$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{77.44}{60.5} = 1.28$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100.0
1/2-in.	72.8
3/8-in.	46.3
NO. 4	6.1
NO. 8	1.4
NO. 16	1.2
NO. 30	1.1
NO. 50	1.0
NO. 100	0.7
NO. 200	0.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (No.78) SAMPLE NO.: GDM-14

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		K	
WT. OF DRY SAMPLE PLUS TARE	(grams)	3184.7	
WT. OF TARE	(grams)	101.5	
WT. OF DRY SAMPLE	(grams)	3083.2	

SIEVE ANALYSIS

QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
1"	25.0	0	0	100	
3/4"	19.0	0	0	100	100
1/2"	12.5	886.8	28.8	71.2 ***	** 85-100
3/8"	9.5	1782.0	57.8	42.2	40-75
4	4.75	2910.1	94.4	5.6	5-25
8	2.36	3043.8	98.7	1.3	0-10
16	1.18	3051.6	99.0	1.0	0-5
30	0.60	3055.6	99.1	0.9	
50	0.30	3058.3	99.2	0.8	
100	0.150	3067.1	99.5	0.5	
200	0.075	3078.4	99.8	0.2	0-2

*** DOES NOT COMPLY WITH SPECIFICATION REQUIREMENT

* TECH. SPEC. SEC. 02710 PART 2.01 B

** PER DCN 1702-15

%FINER = 100 − Σ % RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

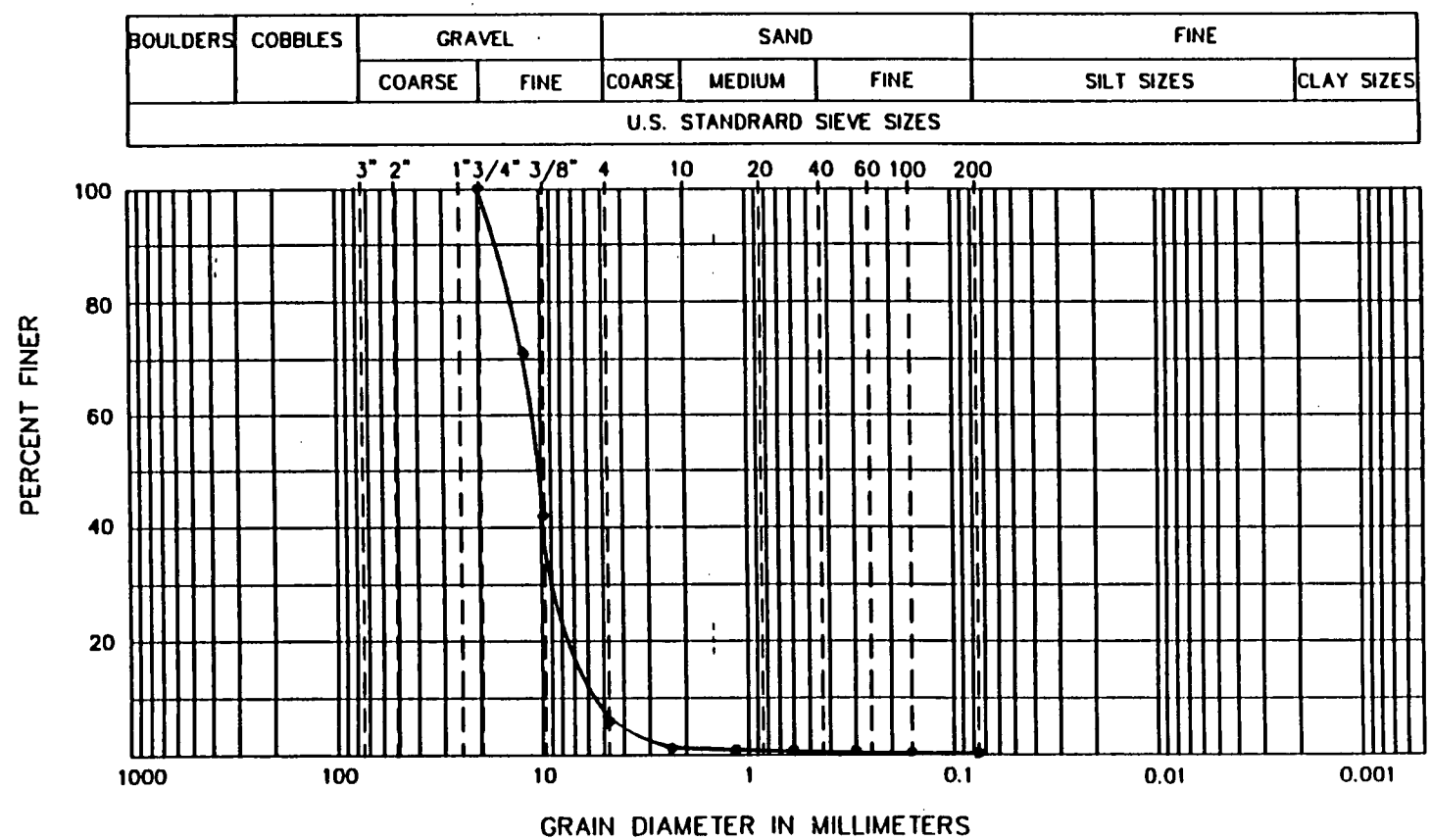
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 21 day OCT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO.78 STONE

SAMPLE NO.: GDM-14 QA ID: NM

CURVE COEFFICIENTS: $(C_U)\ \frac{D_{60}}{D_{80}} = \frac{12}{5.6} = 2.14$ $(C_C)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{81}{67.2} = 1.21$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100.0
1/2-in.	71.2
3/8-in.	42.2
NO. 4	5.6
NO. 8	1.3
NO. 16	1.0
NO. 30	0.9
NO. 50	0.8
NO. 100	0.5
NO. 200	0.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

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

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (No.78) SAMPLE NO.: GDM-15

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		N	
WT. OF DRY SAMPLE PLUS TARE	(grams)	1334.6	
WT. OF TARE	(grams)	101.9	
WT. OF DRY SAMPLE	(grams)	1232.7	

SIEVE ANALYSIS

QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
1"	25.0	0	0	100	
3/4"	19.0	0	0	100	100
1/2"	12.5	~~43.3~~ 122.5	9.9	90.1	**35-100
3/8"	9.5	~~1310~~ 389.8	31.6	68.4	40-75
4	4.75	~~430.6~~ 1058.9	85.9	14.1	5-25
8	2.36	1,198.3	97.2	2.8	0-10
16	1.18	1,212.7	98.4	1.6	0-5
30	0.60	1,216.7	98.7	1.3	
50	0.30	1,217.8	98.8	1.2	
100	0.150	1,227.0	99.5	0.5	
200	0.075	1,231.9	99.9	0.1	0-2

*TECH. SPEC. SEC. 02710 PART 2.01 B

** PER DCN 1702-15

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

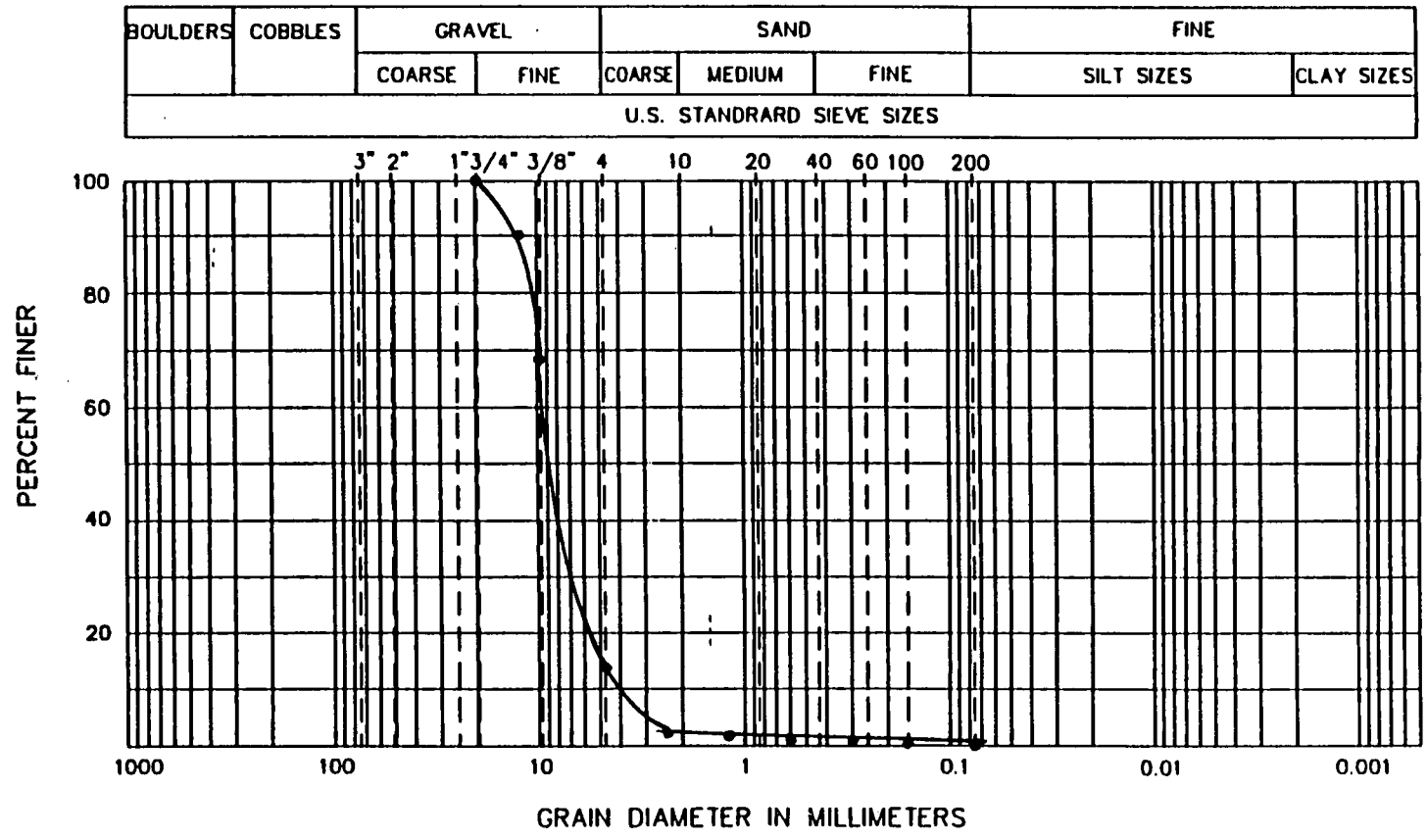
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 21 day OCT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO. 78 STONE)

SAMPLE NO.: GDM-15 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{9.6}{4} = 2.4$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{49}{38.4} = 1.28$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100.0
1/2-in.	90.1
3/8-in.	68.4
NO. 4	14.1
NO. 8	2.8
NO. 16	1.6
NO. 30	1.3
NO. 50	1.2
NO. 100	0.5
NO. 200	0.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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SHEET NO. 2 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 24 day Oct month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (No.78) SAMPLE NO.: GDM-16

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		N	
WT. OF DRY SAMPLE PLUS TARE	(grams)	1910.6	
WT. OF TARE	(grams)	101.8	
WT. OF DRY SAMPLE	(grams)	1808.8	

SIEVE ANALYSIS

QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
1"	25.0 ~~50~~ HEM 11/23/97	0	0	100	
3/4"	19.0	0	0	100	100
1/2"	12.5	~~378.9~~ 854.1	47.3	52.7 ***	** 85-100
3/8"	9.5	21 065 ~~676.8~~ 1451.6	80.3	19.7 ***	40-75
4	4.75	1783.0	98.6	1.4 ***	5-25
8	2.36	1792.5	99.1	0.9	0-10
16	1.18	1796.4	99.3	0.7	0-5
30	0.60	1798.4	99.4	0.6	
50	0.30	1799.2	99.5	0.5	
100	0.150	1800.2	99.5	0.5	
200	0.075	1805.4	99.8	0.2	0-2

*TECH. SPEC. SEC. 02710 PT. 2.01 B

*** DOES NOT COMPLY WITH TECH. SPEC. OR DCN.

**PER DCN 1702-015

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

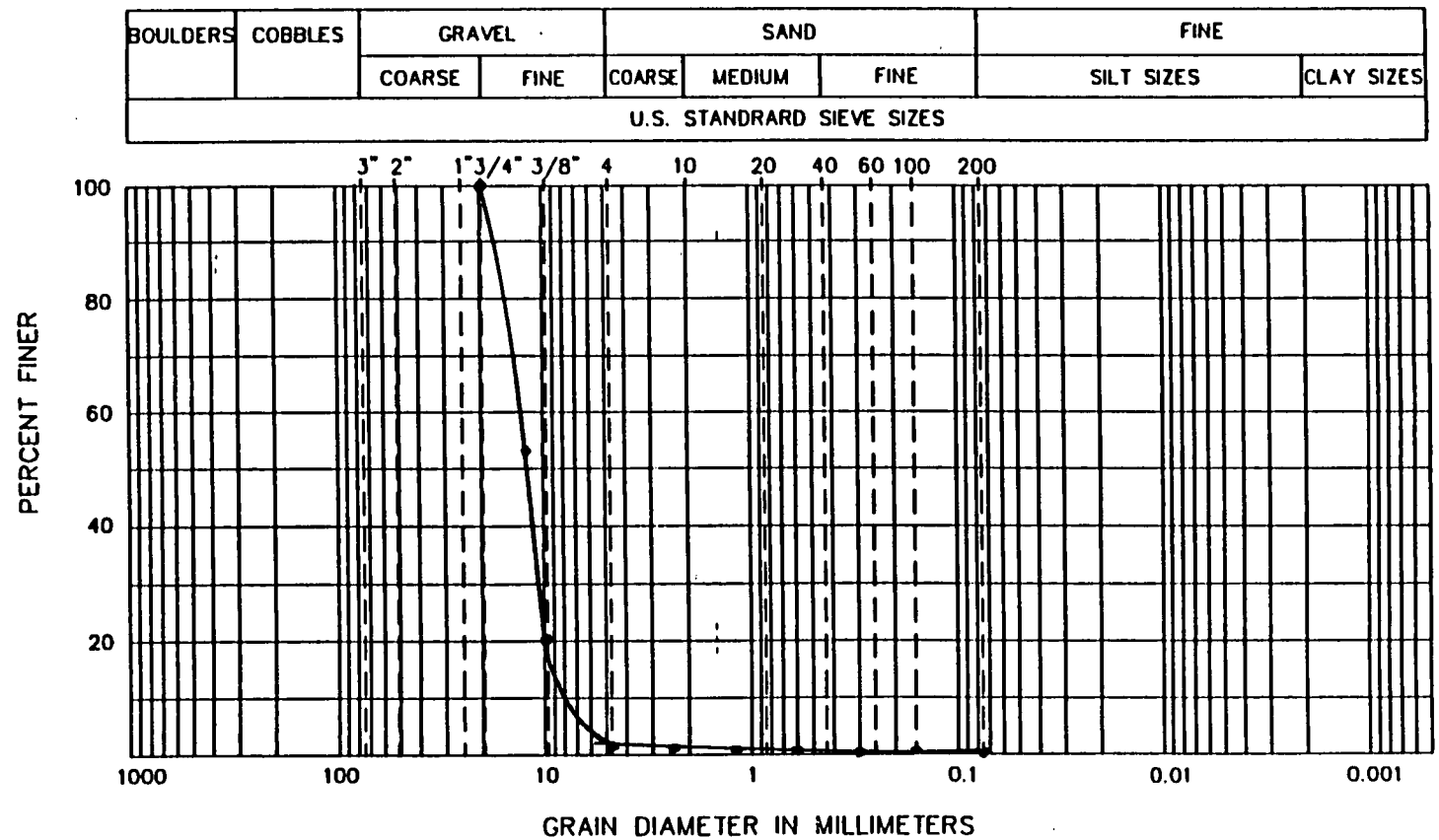
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 24 day Oct month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (No. 78 STONE)

SAMPLE NO.: GDM-16 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\frac{D_{60}}{D_{10}} = \frac{14}{8} = 1.75$ $(C_c)\frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{121}{112} = 1.08$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	100
3/4-in.	100
1/2-in.	52.7
3/8-in.	19.7
NO. 4	1.4
NO. ~~10~~ 8	0.9
NO. ~~20~~ 16	0.7
NO. ~~40~~ 30	0.6
NO. ~~60~~ 50	0.5
NO. 100	0.5
NO. 200	0.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: _____

SHEET NO. 2 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C 136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 24 day Oct month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (No. 78) SAMPLE NO.: GDM-17

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	K	
WT. OF DRY SAMPLE PLUS TARE (grams)	2060.9	
WT. OF TARE (grams)	101.5	
WT. OF DRY SAMPLE (grams)	1959.4	

SIEVE ANALYSIS

QA ID: JL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
1"	25.0	0	0	100	
3/4"	19.0	0	0	100	100
1/2"	12.5	625.5	31.9	68.1 ***	** 85-100
3/8"	9.4	1249.4	63.8	36.2 ***	40-75
4	4.75	1907.7	97.4	2.6 ***	5-25
8	2.36	1939.3	~~98~~ 99.0	1.0	0-10
16	1.18	1941.9	99.1	0.9	0-5
30	0.60	1944.0	99.2	0.8	
50	0.30	1945.4	99.3	0.7	
100	0.150	1948.6	99.4	0.6	
200	0.075	1956.3	99.8	0.2	0-2

*** DOES NOT COMPLY WITH TECH. SPEC OR DCN

* TECH. SPEC. SEC. 02710 PART 2.01 B

** REVISED PER DCN 1702-015

%FINER = 100 − Σ % RETAINED

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CHECKED BY: [illegible] 000447 SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

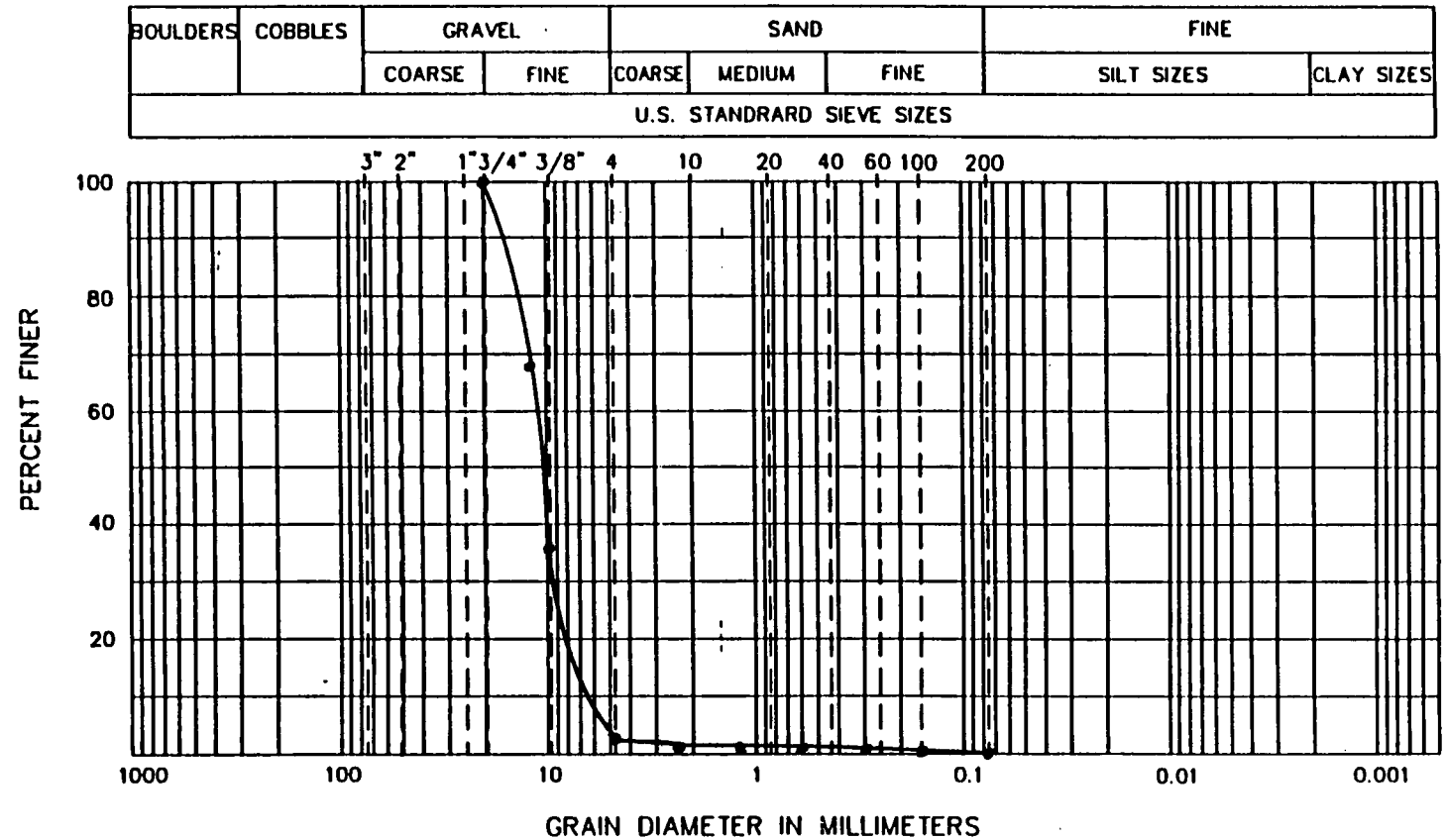
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 24 day OCT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MEDIUM (No. 78 STONE)

SAMPLE NO.: GDM-17 QA ID: NM

CURVE COEFFICIENTS: $(C_U)\ \frac{D_{60}}{D_{10}} = \frac{11}{6.5} = 1.69$ $(C_C)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{90.3}{71.5}\ 1.26$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	100
3/4-in.	100
1/2-in.	68.1
3/8-in.	36.2
NO. 4	2.6
NO. 10	1.0
NO. 20	0.9
NO. 40	0.8
NO. 60	0.7
NO. 100	0.6
NO. 200	0.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

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

MATERIAL TYPE: GRANULAR DRAINAGE MAT'L (No.78) SAMPLE NO.: GDM-18

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO. HZM 10/29/97		HZM 10/29/97
WT. OF DRY SAMPLE PLUS TARE LBS. ~~(grams)~~	47.42 #	
WT. OF TARE LBS. ~~(grams)~~	1.89	
WT. OF DRY SAMPLE (grams)	45.53	

SIEVE ANALYSIS

< No 4 = 2.05 lbs. = 929 g

QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED ~~(grams)~~ LBS	% RETAINED	% FINER		* PROJECT SPECIFICATIONS
1"	25.0					
3/4"	19.0	Ø				100
1/2"	12.5	12.75	28.0	72.0***		**85-100
3/8	9.5	26.12	57.4	42.6		40-75
4	4.75	43.47	95.5	4.5***		5-25
8	2.36	160.1 g	72.7	27.3	1.2	0-10
16	1.18	173.0 g	78.6	21.4	1.0	0-5
30	0.60	179.4 g	81.5	18.5	0.8	
50	0.30	183.5 g	83.4	16.6	0.7	
100	0.150	187.6 g	85.2	14.8	0.7	
200	0.075	193.9	88.1	11.9	0.5	0-2

352.1 g
132.0
220.1

*** DOES NOT COMPLY WITH CURRENT SPEC.

* TECH. SPEC. SEC. 02710 Part 2.01 B

** DCN 1702-015

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

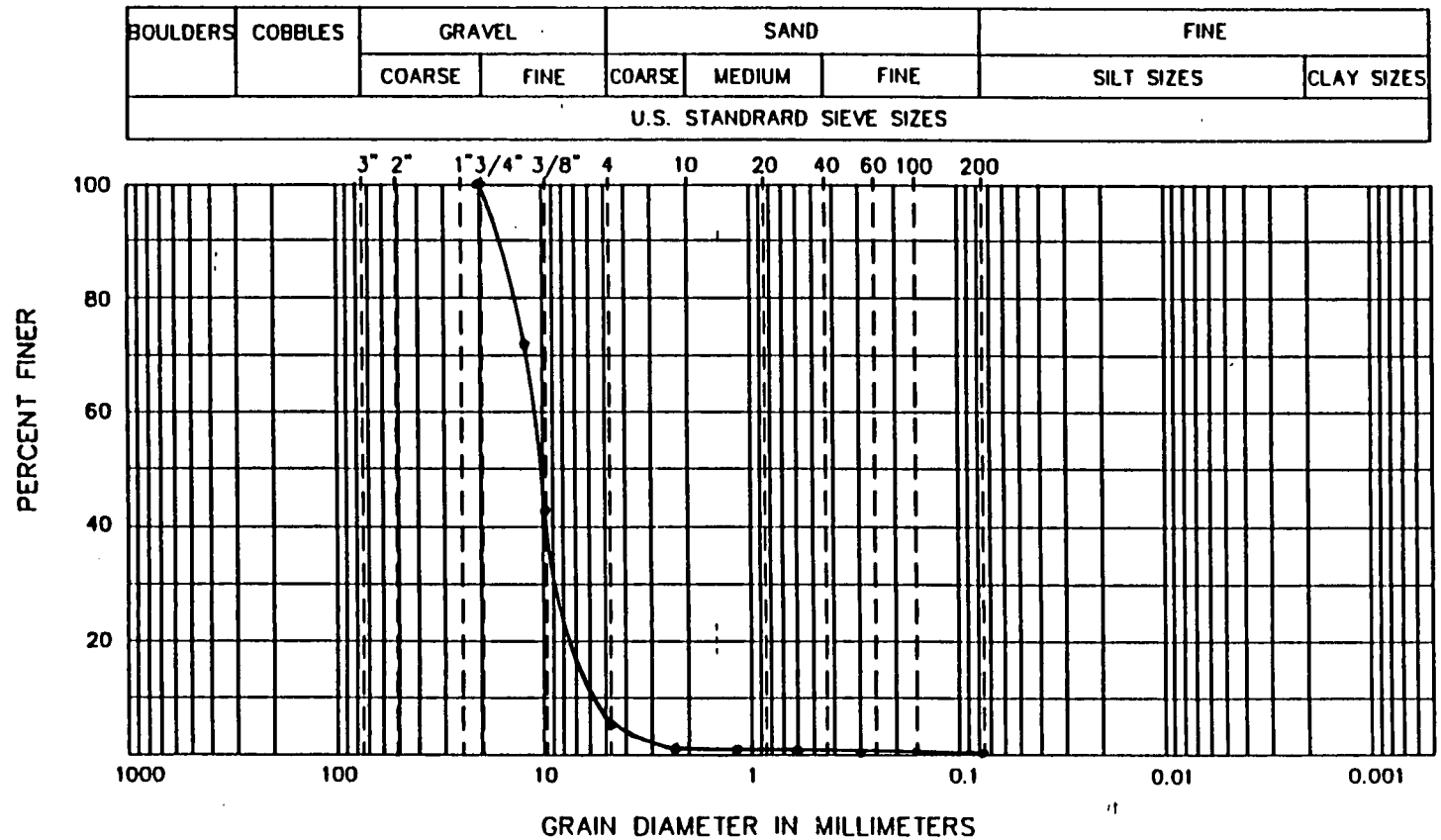
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 29 day OCT month 1997 year

MATERIAL TYPE: GRANULAR DRAINAGE MATERIAL (NO. 78 STONE) — SAMPLE NO.: GDM-18 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{11}{5.9} = 1.86$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{8.1}{64.9} = 1.25$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	100.0
1/2-in.	72.0
3/8-in.	42.6
NO. 4	4.5
NO. 8	1.2
NO. 16	1.0
NO. 30	0.8
NO. 50	0.7
NO. 100	0.7
NO. 200	0.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED GRAVEL (GP)

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Pipe Embedment Fill

Soil Sample Log

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

SOIL SAMPLE LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 09 JUNE YEAR: 1997

SITE SAMPLE NO.	OFF-SITE LAB SAMPLE NO.	VISUAL DESCRIPTION	SOURCE (LOCATION/DEPTH)	MATERIAL TYPE	DATE SAMPLED (day/mo)	TEST METHODS	QA ID
PET/PEF-01	—	TAN SAND	JAMES BUNNELL, INC.	PIPE EMBEDMENT FILL	09 JUNE	ASTM C136, D2487	PKO
PET/PEF-02	—	TAN SAND	POWELL GVL & TOPSOIL	PIPE EMBEDMENT FILL	02 JULY	ASTM C136, D2487	NM
PET/PEF-02.1	—	" "	"	" " "	07 JULY	ASTM C136, D2487	NM
PET/PEF-03	—	" "	ON SITE STOCKPILE "	" " "	11 JULY 97	ASTM C136, D2487	NM
PET/PEF-03.1	—	" "	"	" " "	12 JULY 97	ASTM C136, D2487	NM
PET/PEF-04	—	" "	ON SITE STOCKPILE "	" " "	11 SEPT 97	ASTM C136, D2487	NM

NOTES:

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000453

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Laboratory Test Summary

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

LABORATORY TEST SUMMARY REQUEST FORM NO. _____

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 09 day JUNE month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL — QA ID: PKO

NOTE: Separate forms are required for each material type and source. Strike out nonapplicable tests.

SITE SAMPLE NO.	LAB SAMPLE NO.	MOISTURE CONTENT ASTM D 2216/ D 4643 (%)	GRAIN SIZE: PASSING NO. 200 SIEVE ASTM D 1140 (%)	GRAIN SIZE: ASTM D 422 SIEVE	GRAIN SIZE: ASTM D 422 HYDR.	ATTERBERG LIMITS ASTM D 4318: LL (%)	ATTERBERG LIMITS: PL (%)	ATTERBERG LIMITS: PI	SP. GR. ASTM D 854	SOIL CLASS. ASTM D 2487	LOI ASTM C311 (%)	CARBO CONT. ASTM D3042 (%)	COMPACTION ASTM D 698 (or) ASTM D 1557: MAX. DRY UNIT WT. (pcf)	COMPACTION: OPT. MOIST. CONT. (%)	PERMEABILITY ASTM D 2434(1) (or) ASTM D 5084(2): DRY UNIT WT. (pcf)	PERMEABILITY: MOIST. CONT. ASTM D 2216 (%)	PERMEABILITY: HYDRAULIC COND'VITY (cm/sec)	PASS/ FAIL	ACUMUL. QUANT. PLACED (APPROX) (yd³)
PET/ PEF-01	—	0.6 / 0.7	0.03	✓	—	—	—	—	—	(SP)	—	—	—	—	—	—	—	F	Subm. 36-R-0
PET/ PEF-02	—	— / —	0.4	✓	—	—	—	—	—	(SP)	—	—	—	—	—	—	—	F	Subm. 36-R-1
PET/ PEF-02.1	—	— / —	0.4	✓	—	—	—	—	—	(SP)	—	—	—	—	—	—	—	P	Subm. 36-R-1
PET/ PEF-03	—	— / —	0.2	✓	—	—	—	—	—	(SP)	—	—	—	—	—	—	—	F	100
PET/ PEF03.1	—	— / —	0.5	✓	—	—	—	—	—	(SP)	—	—	—	—	—	—	—	P	100
PET/ PEF-04	—	— / —	0.4	✓	—	—	—	—	—	(SP)	—	—	—	—	—	—	—	P	150

COMMENTS: _____

NOTES: (1) HYDRAULIC CONDUCTIVITY DETERMINED AT A HYDRAULIC GRADIENT OF NA.

(2) HYDRAULIC CONDUCTIVITY DETERMINED AT AN EFFECTIVE CONFINING STRESS OF NA.

•GEO SYNTEC CONSULTANTS FILE NO. 2-22-LTS

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SHEET NO. 1 OF 1

000455

- Laboratory Testing

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 ONE CONSTRUCTION DATE: 09 day JUNE month 1997 year

MATERIAL TYPE: FILL EMBEDMENT FILL SAMPLE NO.: DET [illegible]

OVEN METHOD (ASTM D 2216): Recommended Mass Of Moist Sample Weight QA ID: PKO

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. _____	4				
A	WT. OF TARE	7.51				
B	WT. OF WET SOIL & TARE	227.0				
C	WT. OF DRY SOIL & TARE	225.6				
D	WT. OF WATER = B-C	1.4				
E	WT. OF DRY SOIL = C-A	218.1				
F	MOISTURE CONTENT = (D/E) X 100	0.6				

MICROWAVE METHOD (ASTM D 4643): Recommended Mass Of Moist Sample Weight QA ID: PKO

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.	III				
A	WT. OF TARE	132.0				
B	WT. OF WET SOIL & TARE	308.17				
C	WT. OF DRY SOIL & TARE	306.91				
D	WT. OF WATER = B-C	1.26				
E	WT. OF DRY SOIL = C-A	174.91				
F	MOISTURE CONTENT = (D/E) X 100	0.7				

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD ~~(ASTM D 422)~~ C 136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04·1

DESCRIPTION: PHASE ONE DATE: 10 day JUN month [illegible] year

MATERIAL TYPE: DIA [illegible] SAMPLE NO.: PET/D[illegible]

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	8	N/A
WT. OF DRY SAMPLE PLUS TARE (grams)	249.17	
WT. OF TARE (grams)	7.20	
WT. OF DRY SAMPLE (grams)	241.97	

SIEVE ANALYSIS

QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
4	4.75	0.2	0.08	99.9	~~95-100~~ 90-100 Hem
8	2.36	20.7	8.6	91.4	~~70-100~~ Hem
16	1.18	96.0	39.7	60.3	~~38-80~~ Hem
30	0.60	175.9	72.7	27.3	~~18-60~~ Hem
50	0.30	229.7	94.9	5.1 **	~~5-30~~ 7-40 Hem
100	0.150	241.4	99.8	0.2	~~1-10~~ Hem
200	0.075	241.9	99.97	0.03	~~0-5~~ 0-12 Hem
PAN	–	241.96	—	—	—

** DOES NOT COMPLY WITH ODOT 703.06

%FINER = 100 − Σ% RETAINED

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CHECKED BY: [illegible] 11/6/97

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM ~~D 422~~ & ASTM D 2487)

C136 Qdy 6/13/97

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

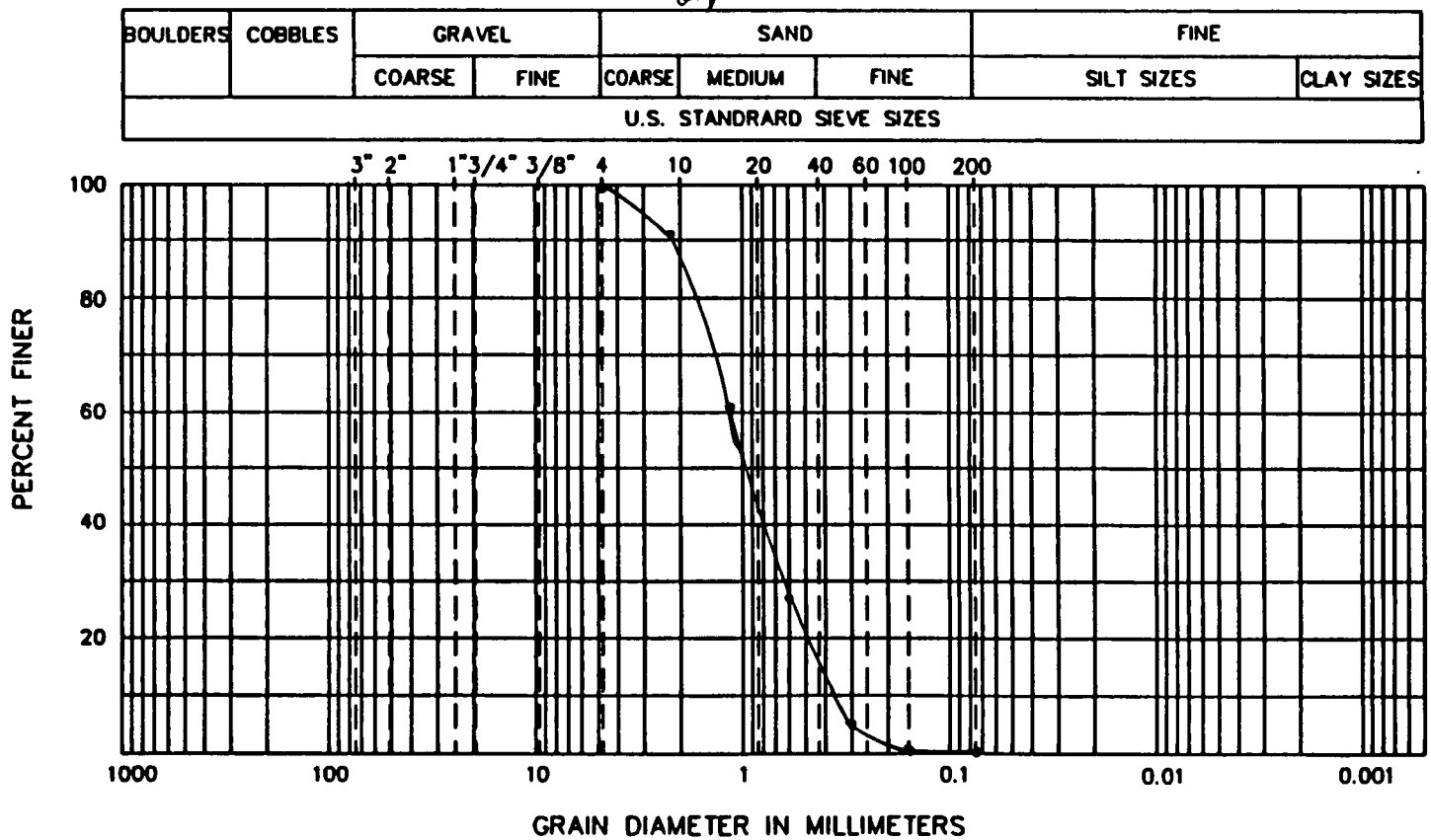
DESCRIPTION: PHASE ONE

DATE: 10 day JUNE month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL

SAMPLE NO.: UET/MEF-01 QA ID: PKO

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{1.2}{0.38} = 3.16$ Qdy 6/17/97 $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{0.42}{0.38 \times 1.2} = 0.93$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	
NO. 4	99.9
NO. 10 8	91.4
NO. 20 16	60.3
NO. 40 30	27.3
NO. 60 50	5.1
NO. 100	0.2
NO. 200	0.03

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): SP - POORLY GRADED SAND

GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: JTM 11/6/97

SHEET NO. 2 OF 2

000459

1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~ C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04·1

DESCRIPTION: Phase I Investigation DATE: 03 day JULY month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL SAMPLE NO.: PET/PEF-02

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		11	N/A
WT. OF DRY SAMPLE PLUS TARE	(grams)	214.7	↓
WT. OF TARE	(grams)	7.3	↓
WT. OF DRY SAMPLE	(grams)	207.4	↓

SIEVE ANALYSIS

QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
3/8	9.5	Ø	0	100.0	
4	4.75	Ø	0	100.0	90-100
8	2.36	16.6	8.0	92.0	
16	1.18	69.4	33.5	66.5	
30	0.60	134.0	64.6	35.4	
50	0.30	193.0	93.1	6.9**	7-40
100	0.15	205.4	99.0	1.0	
200	0.075	206.6	99.6	0.4	0-10
PAN	—	207.1	—	—	—

*ODOT 703.06

** DOES NOT COMPLY WITH ODOT 703.06
RERUN AS SAMPLE PET/PEF-02.1

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM ~~D 422~~ C136 & ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

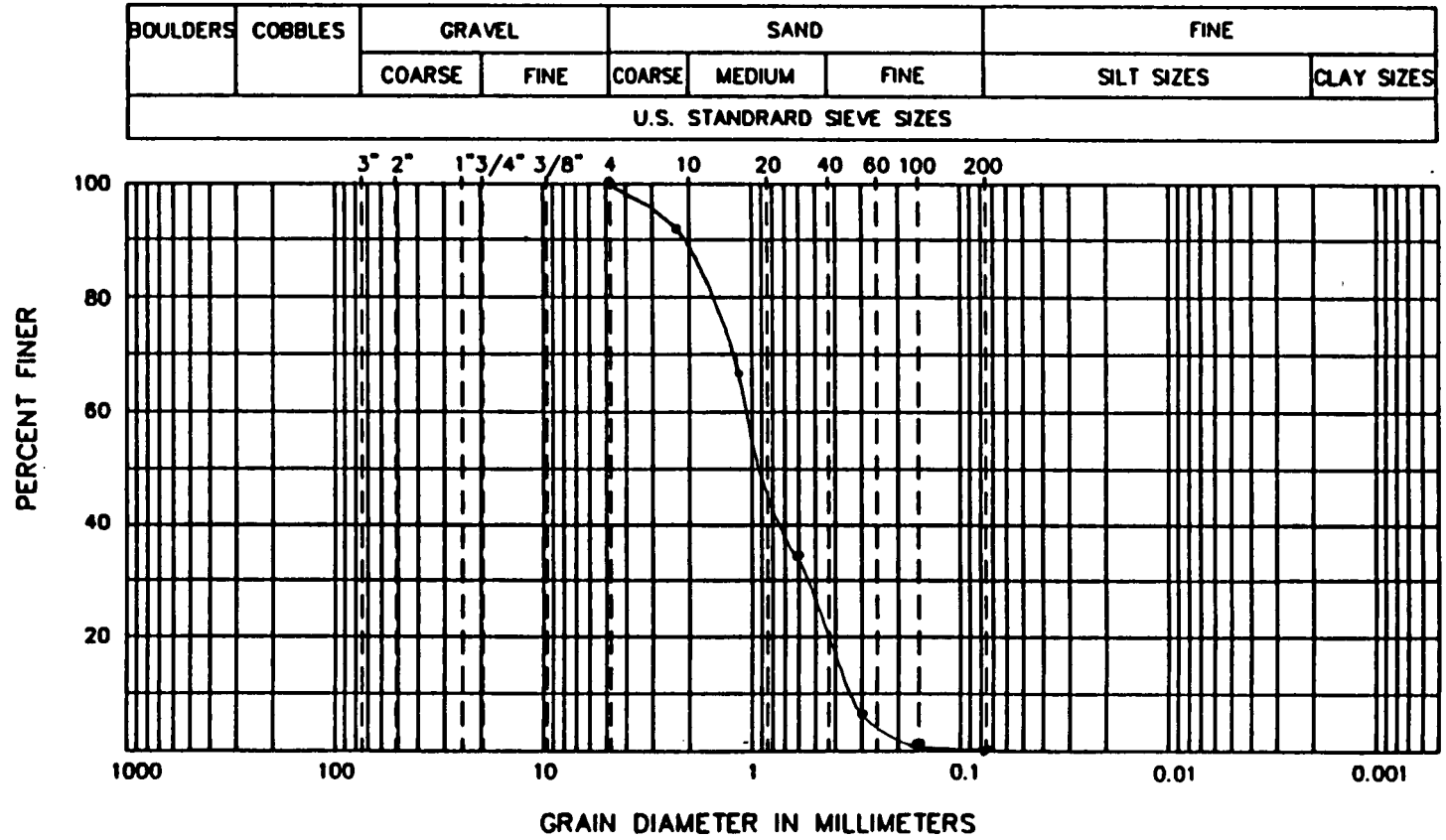
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 03 day JULY month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL

SAMPLE NO.: PET/PEF-02 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{1.1}{0.34} = 3.24$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{0.28}{0.34 \times 1.1} = 0.75$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	
NO. 4	100.0
NO. ~~10~~ 8	92.0
NO. ~~20~~ 16	66.5
NO. ~~40~~ 30	35.4
NO. ~~60~~ 50	6.9
NO. 100	1.0
NO. 200	0.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED SAND (SP)

GEOSYNTEC CONSULTANTS FILE NO. 2-18-PSD CHECKED BY: RBW SHEET NO. 2 OF 2

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1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 07 day JULY month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL SAMPLE NO.: PET/PEF-02.1

SOURCE: PETRO SUBMITTAL

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		8	N/A
WT. OF DRY SAMPLE PLUS TARE	(grams)	271.9	↓
WT. OF TARE	(grams)	7.2	↓
WT. OF DRY SAMPLE	(grams)	264.7	↓

SIEVE ANALYSIS

QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
4	4.75	0.2	0.1	99.9	90-100
8	2.36	20.1	7.6	92.4	
16	1.18	81.2	30.7	69.3	
30	0.600	161.5	61.0	39.0	
50	0.300	243.6	92.0	8.0	7-40
100	0.150	261.4	98.8	1.2	
200	0.075	263.6	99.6	0.4	0-10
PAN	—	264.4	—	—	—

*ODOT 703.06

RE-TEST SAMPLE.

Cdf 07/07/97

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM ~~D 422~~ C136 & ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

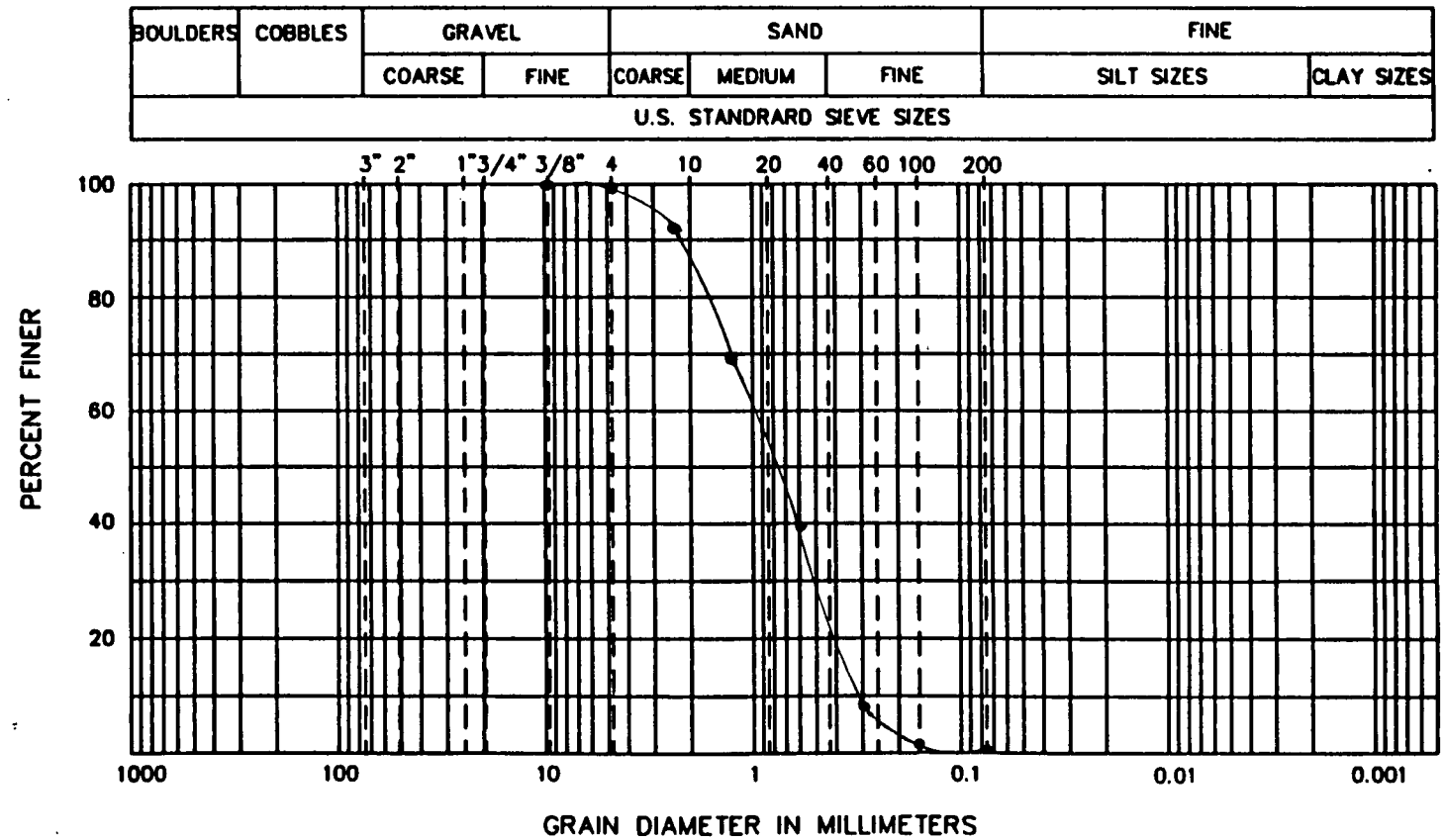
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 07 day JULY month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL

SAMPLE NO.: PET/PEF-021 QA ID: PKO

CURVE COEFFICIENTS: $(C_u) = D_{60}/D_{10} = 0.97/0.31 = 3.1$ $(C_c) = D_{30}^2/(D_{60} \times D_{10}) = 0.26/(0.97 \times 0.31) = 0.9$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	100
NO. 4	99.9
NO. ~~10~~ 8	92.4
NO. ~~20~~ 16	69.3
NO. ~~40~~ 30	39.0
NO. ~~60~~ 50	8.0
NO. 100	1.2
NO. 200	0.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): SP - POORLY GRADED SAND

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: ABN

SHEET NO. 2 OF 2

000463

1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE 1 CONSTRUCTION DATE: 12 day JULY month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL SAMPLE NO.: PET/PEF-03

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		30	N/A
WT. OF DRY SAMPLE PLUS TARE	(grams)	281.41	
WT. OF TARE	(grams)	8.27	
WT. OF DRY SAMPLE	(grams)	273.14	

SIEVE ANALYSIS

QA ID: PKO/RL

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
3/8"	9.5	Ø	Ø	100	
4	4.75	0.6	0.2	99.8	90 - 100
8	2.36	19.1	7.0	93.0	
16	1.18	93.5	34.2	65.8	
30	0.600	190.9	69.9	30.1	
50	0.300	261.7	95.8	4.2 **	7 - 40
100	0.150	272.0	99.6	0.4	
200	0.075	272.7	99.8	0.2	0 - 10
PAN	—	273.1	—	—	

* ODOT 703.06

** DOES NOT COMPLY WITH ODOT 703.06
RERUN AS SAMPLE PET/PEF-03.1

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM ~~D 422~~ C136 & ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

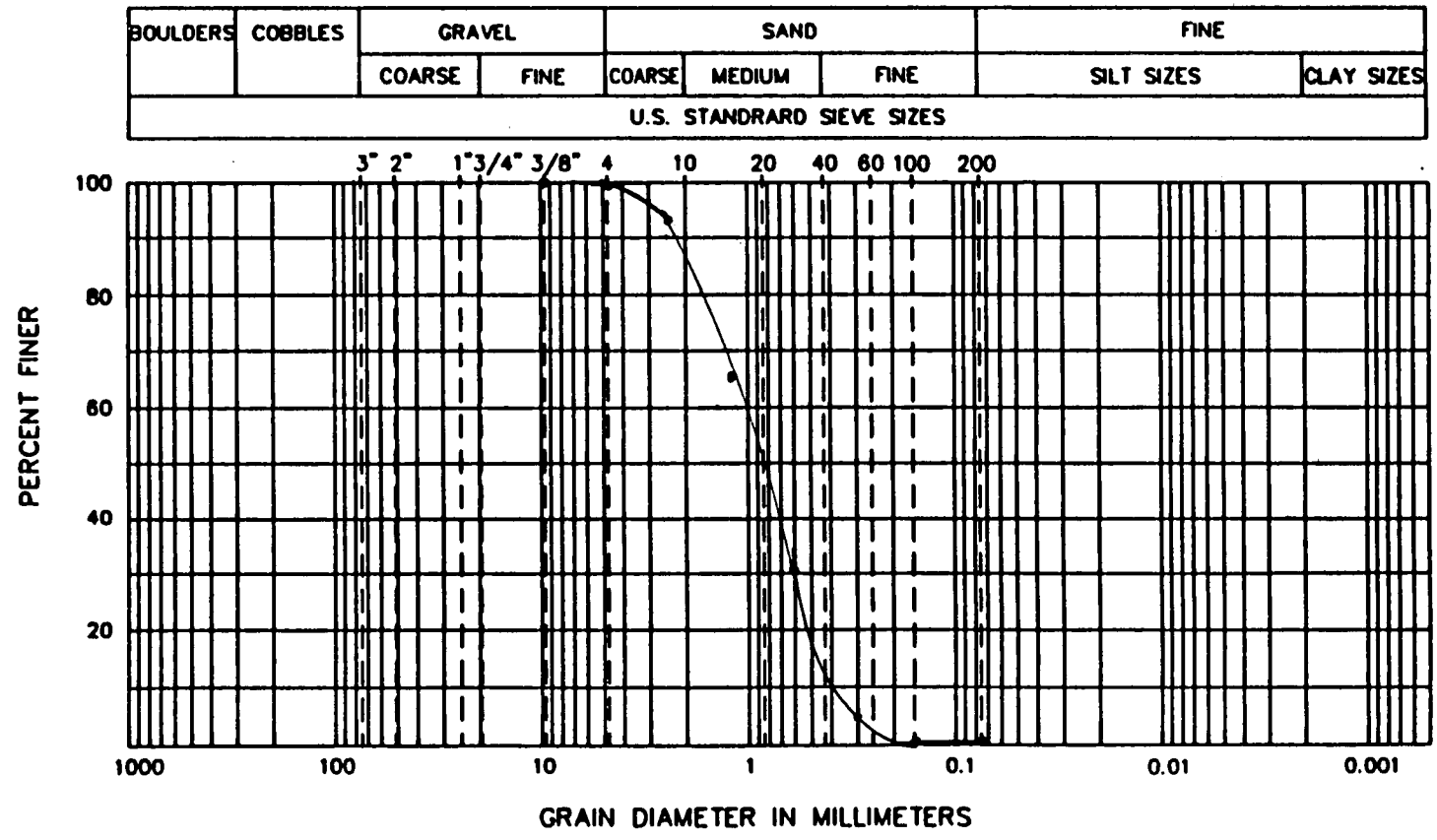
DESCRIPTION: PHASE 1 CONSTRUCTION

DATE: 12 day JULY month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL

SAMPLE NO.: PET/PEF-03 QA ID: PKO/RL

CURVE COEFFICIENTS: $(C_u) = D_{60}/D_{10} = \frac{1.0}{0.4} = 2.5$ $(C_c) = \frac{D_{30}^2}{D_{60} \times D_{10}} = \frac{0.36}{1.0 \times 0.4} = 0.9$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	100
NO. 4	99.8
NO. ~~10~~ 8	93.0
NO. ~~20~~ 16	65.8
NO. ~~40~~ 30	30.1
NO. ~~60~~ 50	4.2
NO. 100	0.4
NO. 200	0.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): SP - POORLY GRADED SAND

GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: [illegible]

SHEET NO. 2 OF 2

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1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD

(ASTM ~~D-422~~) C 136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE 1 CONSTRUCTION DATE: 13 day JULY month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL SAMPLE NO.: PET/PEF-03.1

SOIL SAMPLE SIZE

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

		BEFORE WASH	AFTER WASH
TARE NO.		31	N/A
WT. OF DRY SAMPLE PLUS TARE	(grams)	257.8	↓
WT. OF TARE	(grams)	8.2	
WT. OF DRY SAMPLE	(grams)	249.6	

SIEVE ANALYSIS

QA ID: PKO

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	* PROJECT SPECIFICATIONS
4	4.75	Ø	0	100	90-100
8	2.36	12.5	5.0	95.0	
16	1.18	63.1	25.2	74.8	
30	0.600	144.4	57.9	42.1	
50	0.300	224.8	90.1	9.9	7-40
100	0.150	246.5	98.8	1.2	
200	0.075	248.4	99.5	0.5	0-10
PAN	—	249.3	—	—	—

*ODOT 703.06

* REFEST SAMPLE.

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

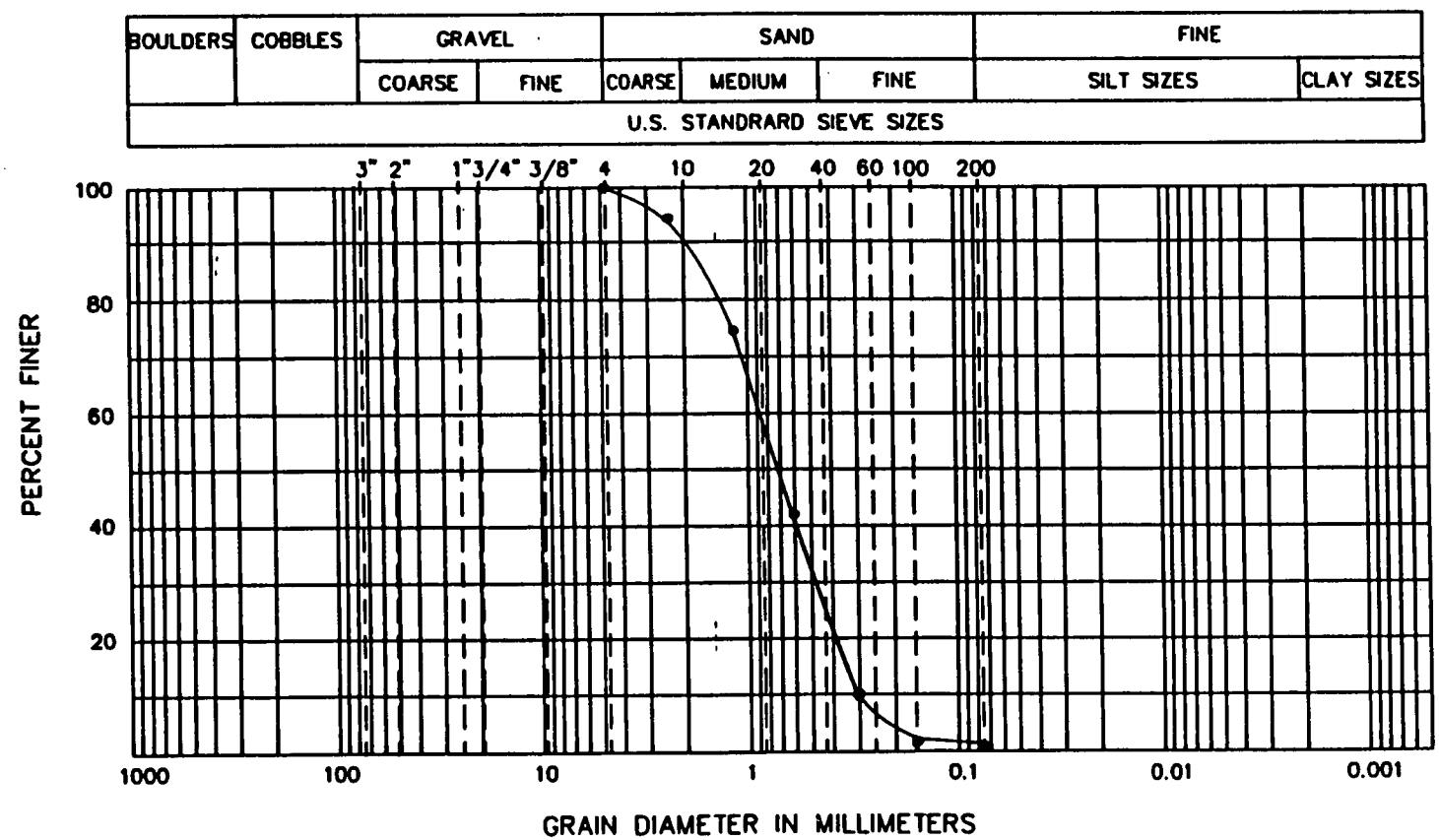
LOCATION: FERNALD, OHIO — PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 13 day JULY month 1997 year

MATERIAL TYPE: PIPE EMBEDMENT FILL — SAMPLE NO.: PET/PEF-03.1 QA ID: NM

SOURCE: ON SITE STOCKPILE

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{0.89}{0.30} = 3.0$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{0.23}{0.30 \times 0.89} = 0.86$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	
NO. 4	100
NO. 10 8	98.0
NO. 20 16	74.8
NO. 40 30	42.1
NO. 60 50	9.9
NO. 100	1.2
NO. 200	0.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): POORLY GRADED SAND (SP)

GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: Ody

SHEET NO. 2 OF 2

000467

1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~) C 136

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: Phase I Construction DATE: 12 day SEPT month 1997 year

MATERIAL TYPE: Pre Embankment Fill SAMPLE NO.: ~~AET-DEF-04~~

SOIL SAMPLE SIZE

	SAND	FINE GRAIN
APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	115	65

	BEFORE WASH	AFTER WASH
TARE NO.	31	
WT. OF DRY SAMPLE PLUS TARE (grams)	277.4	
WT. OF TARE (grams)	8.2	
WT. OF DRY SAMPLE (grams)	269.2	

SIEVE ANALYSIS

QA ID: RBN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
3/8"	9.5				
4	4.75	0	0	100	40-100
8	2.36	21.4	7.9	92.1	
16	1.18	76.0	28.2	71.8	
30	0.60	157.1	58.4	41.6	
50	0.30	242.6	90.1	9.9	7-40
100	0.15	265.2	98.5	1.5	
200	0.075	268.0	99.6	0.4	0-10

%FINER = 100 − Σ% RETAINED

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CHECKED BY: JL

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS (ASTM C 136/D 422) (ASTM D 2487)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

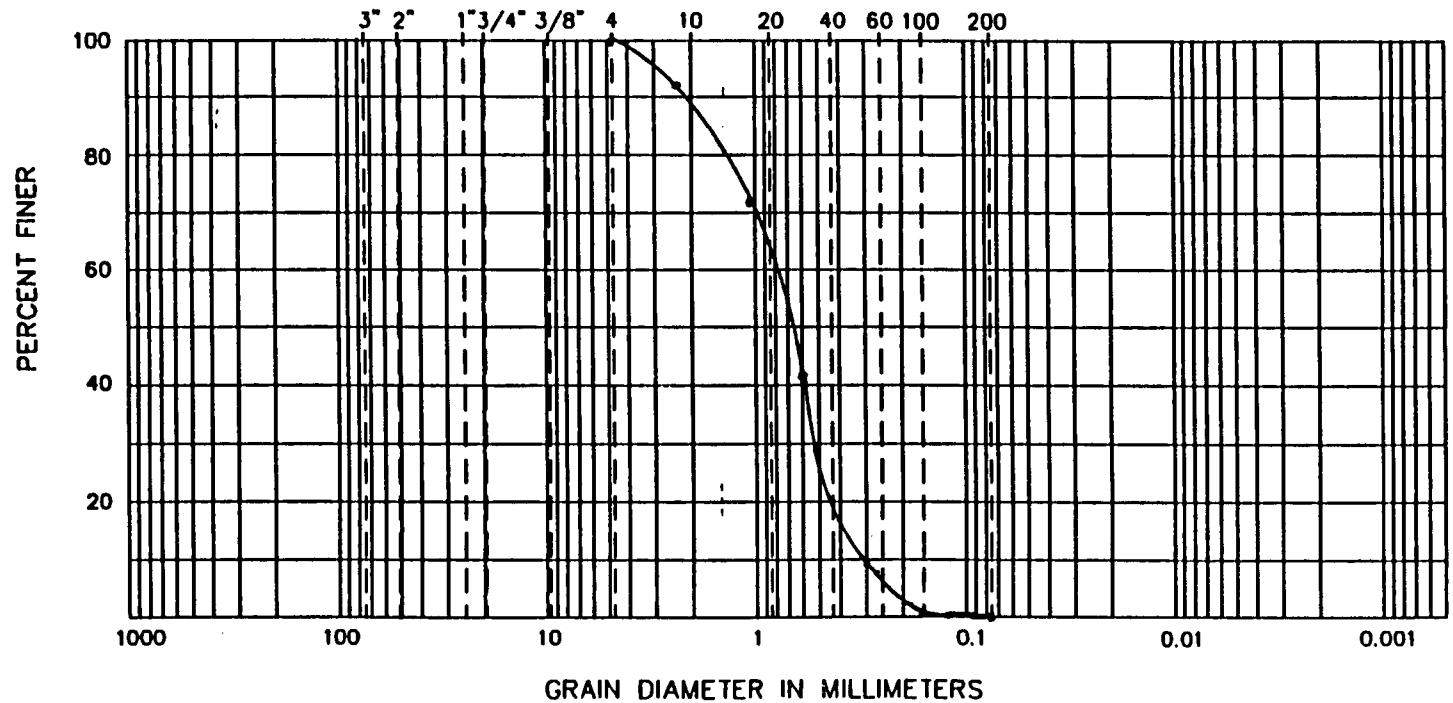
LOCATION: FERNALD, OHIO — PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: Phase I Construction — DATE: 12 day SEPT month 1997 year

MATERIAL TYPE: Pipe Embedment Fill — SAMPLE NO.: PET/PEF 04 QA ID: EBN

CURVE COEFFICIENTS: (C_u) $\frac{D_{60}}{D_{10}} = \frac{.78}{.32} = 2.4$ (C_c) $\frac{D_{30}^2}{D_{60} \times D_{10}} = \frac{.27}{.78 \times .32} = 1.1$

BOULDERS	COBBLES	GRAVEL		SAND			FINE	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES
U.S. STANDRARD SIEVE SIZES								



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	
1-in.	
3/4-in.	
1/2-in.	
3/8-in.	
NO. 4	100
NO. ~~10~~ 8	92.1
NO. ~~20~~ 16	71.8
NO. ~~40~~ 30	41.6
NO. ~~60~~ 50	9.9
NO. 100	1.5
NO. 200	0.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): SP - Poorly Graded Sand

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SHEET NO. 2 OF 2

000469

1266

Aggregate Base

- **Soil Sample Log**

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

SOIL SAMPLE LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 MAY YEAR: 1997

SITE SAMPLE NO.	OFF-SITE LAB SAMPLE NO.	VISUAL DESCRIPTION	SOURCE (LOCATION/DEPTH)	MATERIAL TYPE	DATE SAMPLED (day/mo)	TEST METHODS	QA ID
RB-01	—	CRUSHED GRAVEL	PETRO * SUBMITTAL 028	#304 AGG. BASE	REC'd 5/31/97	ASTM C136	NM
RB-02	—	"	ON-SITE *	"	8/1/97	"	KW

NOTES: *CRS AMERICAN AGGREGATES

GEO SYNTEC CONSULTANTS FILE NO. 2-01-SSL CHECKED BY: JFM SHEET NO. 1 OF 1

000472

12266

Laboratory Test Summary

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

LABORATORY TEST SUMMARY REQUEST FORM NO. _____

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day MAY month 1997 year

MATERIAL TYPE: #304 AGGREGATE BASE QA ID: NM

NOTE: Separate forms are required for each material type and source. Strike out nonapplicable tests.

SITE SAMPLE NO.	LAB SAMPLE NO.	MOISTURE CONTENT ASTM D 2216/ D 4643 (%)	GRAIN SIZE			ATTERBERG LIMITS ASTM D 4318			SP. GR. ASTM D 854	SOIL CLASS. ASTM D 2487	LOI	CARBO CONT.	COMPACTION ASTM D 698 (or) ASTM D 1557		PERMEABILITY ASTM D 2434(1) (or) ASTM D 5084(2)			PASS/ FAIL	ACUMUL. QUANT. PLACED (APPROX)
			PASSING NO. 200 SIEVE ASTM D 1140 (%)	ASTM ~~D 422~~ C136 @ 6/2/97 SIEVE	HYDR.	LL (%)	PL (%)	PI			ASTM C311 (%)	ASTM D3042 (%)	MAX. DRY UNIT WT. (pcf)	OPT. MOIST. CONT. (%)	DRY UNIT WT. (pcf)	MOIST. CONT. ASTM D 2216 (%)	HYDRAULIC COND'VITY (cm/sec)		(yd^3)
RB-01	—		4.3	C136 ✓	—	—	—	—	—	(GW)	—	—	—	—	—	—	—	P	40
RB-02	—		6.1	✓	—	—	—	—	—	(GW)	—	—	—	—	—	—	—	P	

COMMENTS: _____

NOTES: (1) HYDRAULIC CONDUCTIVITY DETERMINED AT A HYDRAULIC GRADIENT OF NA.

(2) HYDRAULIC CONDUCTIVITY DETERMINED AT AN EFFECTIVE CONFINING STRESS OF NA.

GEOSYNTEC CONSULTANTS FILE NO. 2-22-LTS CHECKED BY: JTM SHEET NO. 1 OF 1

000474

1266

- Laboratory Testing

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD

(ASTM ~~D 422~~) C 136 HEM 5/31/97

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: G00166 TASK NO.: 04.1

DESCRIPTION: PHASE I CONSTRUCTION DATE: 31 day MAY month 1997 year

MATERIAL TYPE: #304 AGGREGATE BASE SAMPLE NO.: RB-01

SOURCE: PETRO SUBMITTAL 028

SOIL SAMPLE SIZE TOTAL SAMPLE WT. 6544.5gms
< #4 SAMPLE WT. 3264.8gms

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH -4 PORTION	AFTER WASH
TARE NO.	N	N/A
WT. OF DRY SAMPLE PLUS TARE (grams)	600.7	
WT. OF TARE (grams)	101.5	
WT. OF DRY SAMPLE (grams)	499.2	

SIEVE ANALYSIS QA ID: NM

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT * SPECIFICATIONS
2"	50.0	Ø	Ø	100.0		100
1½"	37.5	Ø	Ø	100.0		
1"	25.0	644.7	9.9	90.1		70-100
¾"	19.0	1937.2	29.6	70.4		50-90 ~~60-100~~ HEM 6/3/97
½"	12.5	2845.9	43.5	56.5		
⅜"	9.5	2914.4	44.5	55.5		
4	4.75	3277.4	50.1	49.9		30-60
8	2.36	137.3	27.5	72.5	36.2	
16	1.18	246.4	49.4	50.6	25.2	
30	0.60	315.8	63.3	36.7	18.3	9-33
50	0.30	364.1	72.9	27.1	13.5	
100	0.15	410.2	82.2	17.8	8.9	
200	0.075	456.0	91.3	8.7	4.3	

* ODOT No. 304 AGG. BA. PHASE I TECH. SPEC. SEC. 02230 Part 2.01 B

NOTE: SIEVE ANALYSIS PERFORMED ON INDIVIDUAL SAMPLES AND MATHMATICALLY COMBINED. HEM

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM ~~D 422~~ C 136 & ASTM D 2487) HEM 5/31/97

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ0166 TASK NO.: 04.1

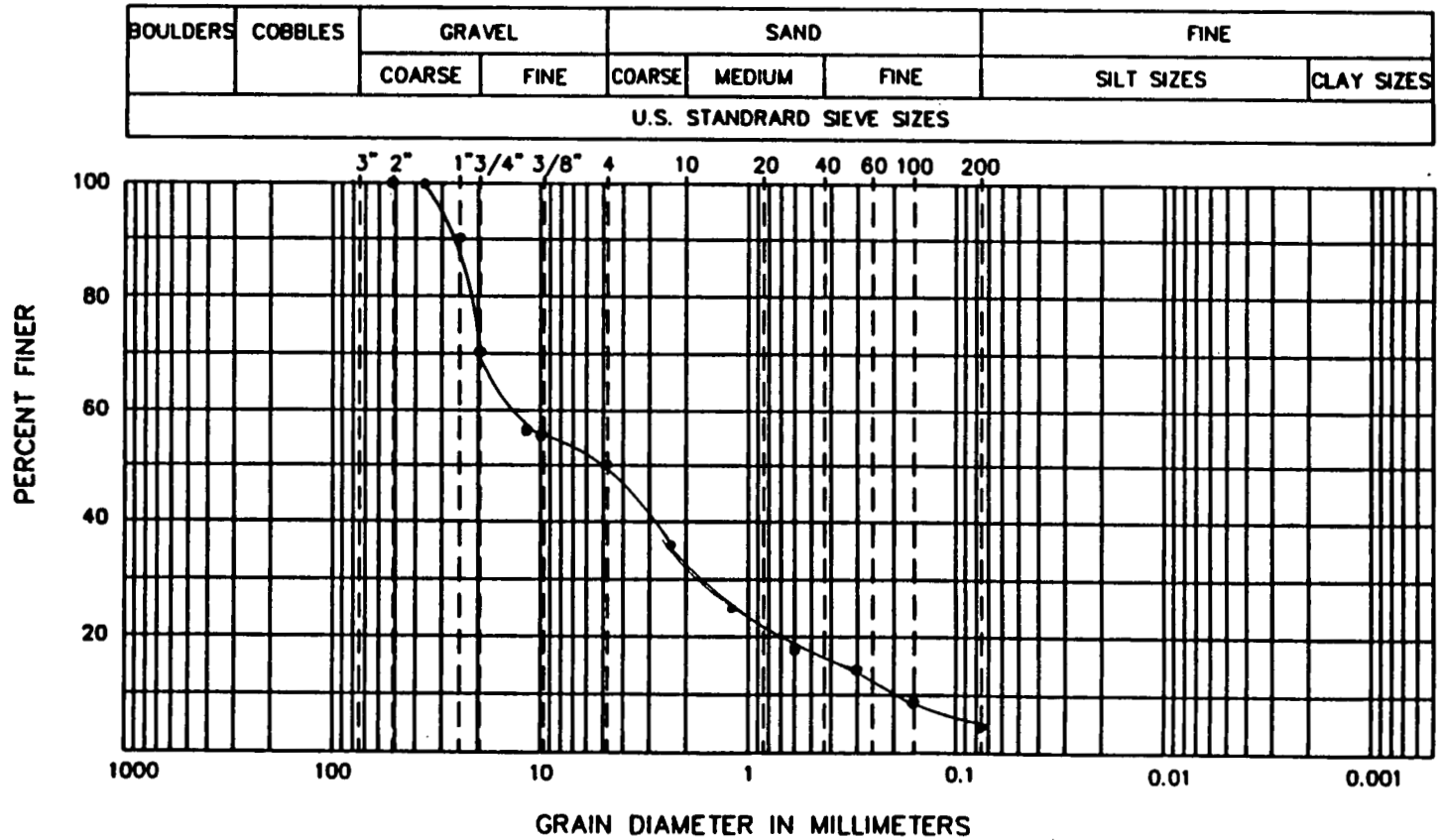
DESCRIPTION: PHASE I CONSTRUCTION

DATE: 31 day MAY month 1997 year

MATERIAL TYPE: #304 AGGREGATE BASE

SAMPLE NO.: RB-01 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{1.5}{.2} = 75$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{3.24}{.2 \times 1.5} = 1.08$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	100.0
1 1/2-in.	100.0
1-in.	90.1
3/4-in.	70.4
1/2-in.	56.5
3/8-in.	55.5
NO. 4	49.9
NO. ~~10~~ 8	36.2
NO. ~~20~~ 16	25.2
NO. ~~40~~ 30	18.3
NO. ~~60~~ 50	13.5
NO. 100	8.9
NO. 200	4.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): WELL GRADED GRAVEL (GW)

GEOSYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: DJP

SHEET NO. 2 OF 2

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1266

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE ANALYSIS MECHANICAL SIEVE METHOD (ASTM ~~D 422~~ C 136) 6/2/97

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION DATE: 8 day 8 month 97 year

MATERIAL TYPE: #304 AGGREGATE BASE SAMPLE NO.: RB-02

SOIL SAMPLE SIZE TOTAL SAMPLE WT. = 10,177.0 g
<#4 SAMPLE WT. = 4277.45 g

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH	AFTER WASH
TARE NO.		N/A
WT. OF DRY SAMPLE PLUS TARE (grams)		
WT. OF TARE (grams)		
WT. OF DRY SAMPLE (grams)	455.5	

SIEVE ANALYSIS QA ID: JW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		* PROJECT SPECIFICATIONS
2"	50.0	0.0	0	100		100
1½"	37.5	0.0	0	100		
1"	25.0	614.2	6.0	94.0		70-100
¾"	19.0	3075.4	30.2	69.8		50-90
½"	12.5	5234.4	51.4	48.6		
⅜"	9.5	5546.4	54.5	45.5		
4	4.75	5899.5	58.0	42.0		30-60
8	2.36	94.57	20.8	79.2	33.3	
16	1.18	199.03	43.7	56.3	23.6	
30	0.60	267.81	58.8	41.2	17.3	9-33
50	0.30	313.99	68.9	31.1	13.1	
100	0.15	347.08	76.2	23.8	10.0	
200	0.075	389.6	85.4	14.6	6.1	0-13

*ODOT No. 304 AGG. BASE PHASE I TECH. SPEC. SEC. 02230 Part 2.01.B

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

PARTICLE SIZE DISTRIBUTION AND SOIL CLASSIFICATION TEST RESULTS

(ASTM C 136/D 422) (ASTM D 2487)

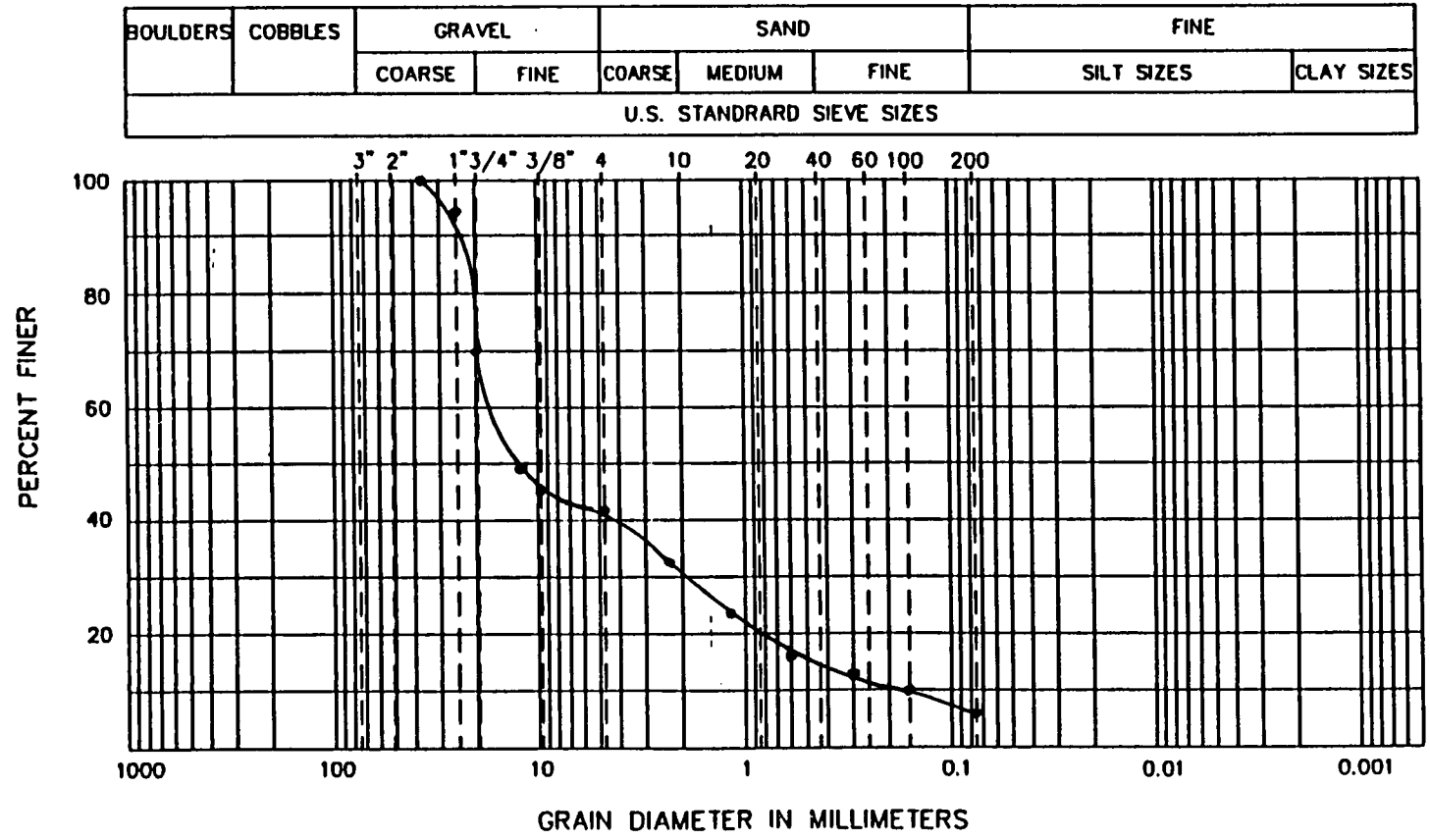
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

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

DESCRIPTION: PHASE I CONSTRUCTION — DATE: 09 day AUG month 1997 year

MATERIAL TYPE: #304 AGGREGATE BASE — SAMPLE NO.: RB-02 QA ID: NM

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} = \frac{18}{12} = 90.0$ $(C_c)\ \frac{D_{30}^2}{D_{10} \times D_{60}} = \frac{3.61}{3.6} = 1.00$



ATTERBERG LIMITS

(LL) N/A

(PL) N/A

(PI) N/A

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	
2-in.	
1 1/2-in.	100.0
1-in.	94.0
3/4-in.	69.8
1/2-in.	48.6
3/8-in.	45.5
NO. 4	42.0
NO. ~~10~~ 8	33.3
NO. ~~20~~ 16	23.6
NO. ~~40~~ 30	17.3
NO. ~~60~~ 50	13.1
NO. 100	10.0
NO. 200	6.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	N/A

SOIL CLASSIFICATION (ASTM D 2487): WELL GRADED SANDY GRAVEL (GW)

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: RBN

SHEET NO. 2 OF 2

000479

1266

Off-Site Laboratory Test Results

10 December 1997

Mr. Kenneth W. Cargill, P.E.
GeoSyntec Consultants
1100 Lake Hearn Drive, N.E., Suite 200
Atlanta, Georgia 30342

Subject: **DRAFT** Final Report - Laboratory Test Results
FDF-OSDF-Phase I Construction

Dear Mr. Cargill,

GeoSyntec Consultants (GeoSyntec) Geomechanics and Environmental Laboratory in Alpharetta, Georgia, is pleased to present the attached final test results (Tables 1 through 4 and Figures 1 through 105) for the above referenced project. A blank shown on any of the tables or the figures indicates that the test was not performed, the parameter is not applicable, or that the test resulted in insufficient data to report the designated parameter. Attachment A presents the general information pertinent to the testing program, and the policy of GeoSyntec regarding the limitations and the use of the test results.

The Geomechanics and Environmental Laboratory appreciates the opportunity to provide testing services for this project. Should you have any questions regarding the attached test results or if you require additional information, please do not hesitate to contact either of the undersigned.

Sincerely,

Barry E. Sigmon, P.G.
Assistant Program Manager
Geotechnical Testing

Nader S. Rad, Ph.D., P.E.
Laboratory Director

Copy To: David Phillips
Attachments

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Pipe Embedment Fill

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS
LEACHATE CONVEYANCE SYSTEM - PIPE EMBEDMENT FILL

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Carbonate Content ASTM D 3042			Hydraulic Conductivity ASTM D 5084				Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422						Soluble Carbonate (%)	Before Acid Bath Figure No.	After Acid Bath Figure No.	Test Specimen Initial Conditions		Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)					Dry Unit Weight (pcf)	Moisture Content (%)			
PEF-01	97D65.1[1]		1.4	1					SP - Poorly Graded Sand								
	97D65.2[2]		1.5	2					SP - Poorly Graded Sand								
PEF-02	97D67[2]		1.0	3					SP - Poorly Graded Sand								

Notes:

1. The following U.S. Standard Sieves were used: No. 4; No. 10; No. 20; No. 40; No. 60; No. 100; and No. 200.
2. The following U.S. Standard Sieves were used: No. 4; No. 8; No. 18; No. 30; No. 50; No. 100; and No. 200.

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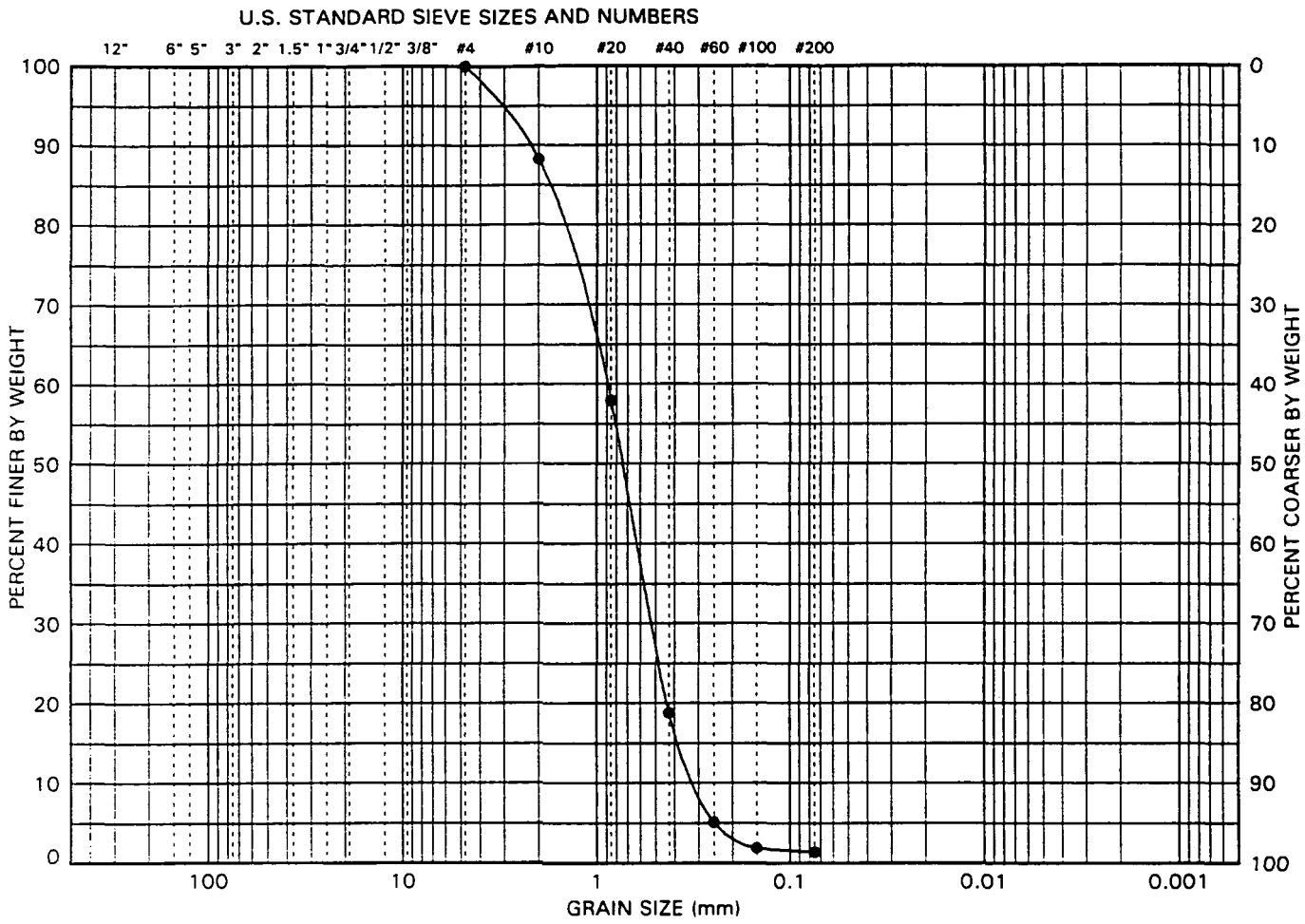
FIGURE 1

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 12/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	PEF-01	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97D65.1	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	

SOIL CLASSIFICATION:
SP - Poorly Graded Sand

SOIL FRACTIONS	
GRAVEL (%)	0.0
SAND (%)	98.6
FINES (%)	1.4
SILT (%)	
CLAY(%)	
COEFF. UNIFORMITY (Cu)	3.0
COEFF. CURVATURE (Cc)	0.99

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	100	88	58	19	5	2	1					

NOTES:

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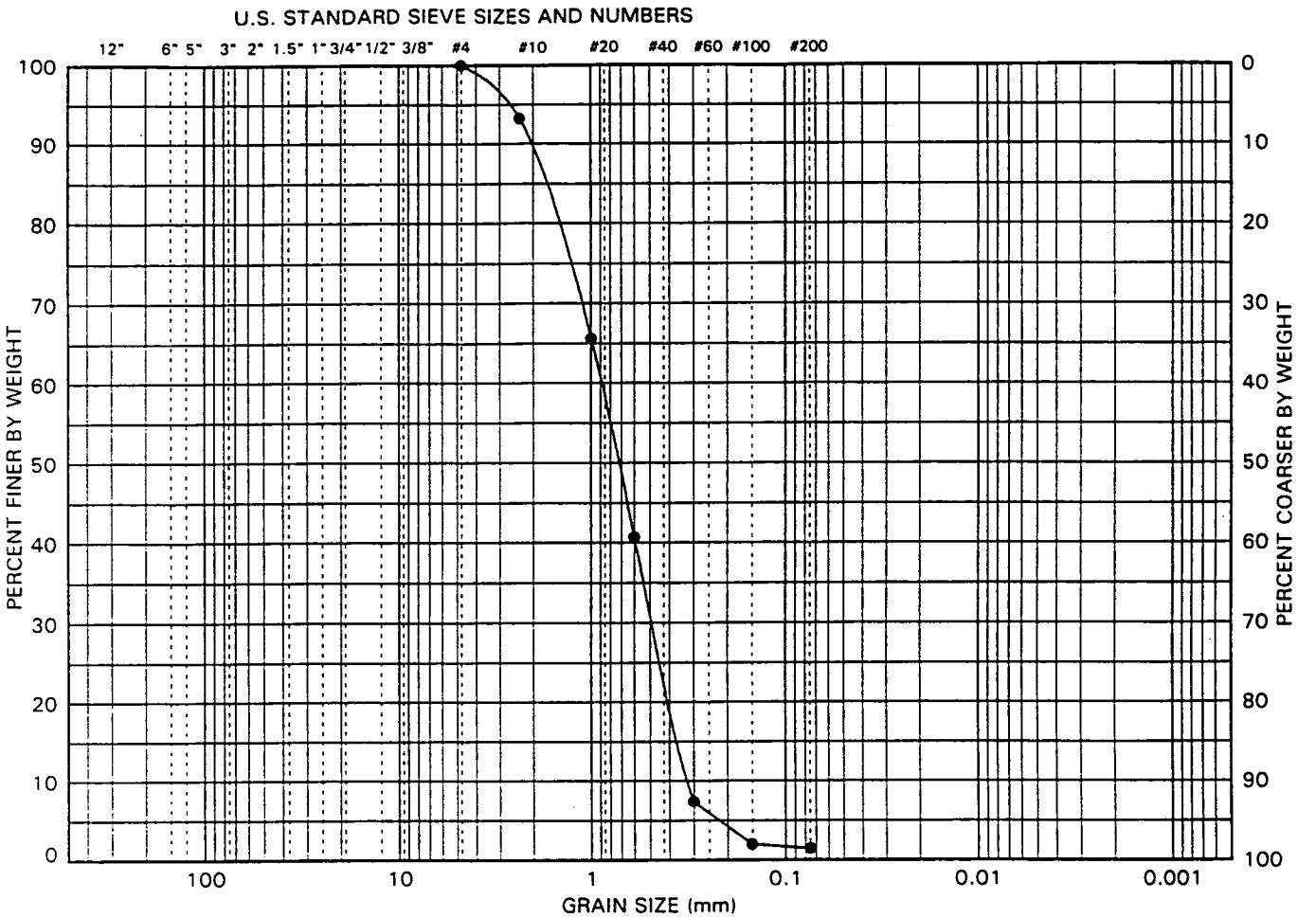
FIGURE 2

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 12/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	PEF-01	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 0.0
LAB. SAMPLE NO.	97D65.2	PLASTIC LIMIT (%)		SAND (%) 98.5
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%) 1.5
SOIL CLASSIFICATION: SP - Poorly Graded Sand				SILT (%)
				CLAY(%)
				COEFF. UNIFORMITY (Cu) 2.8
				COEFF. CURVATURE (Cc) 0.82

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	100					2	2					

NOTES:

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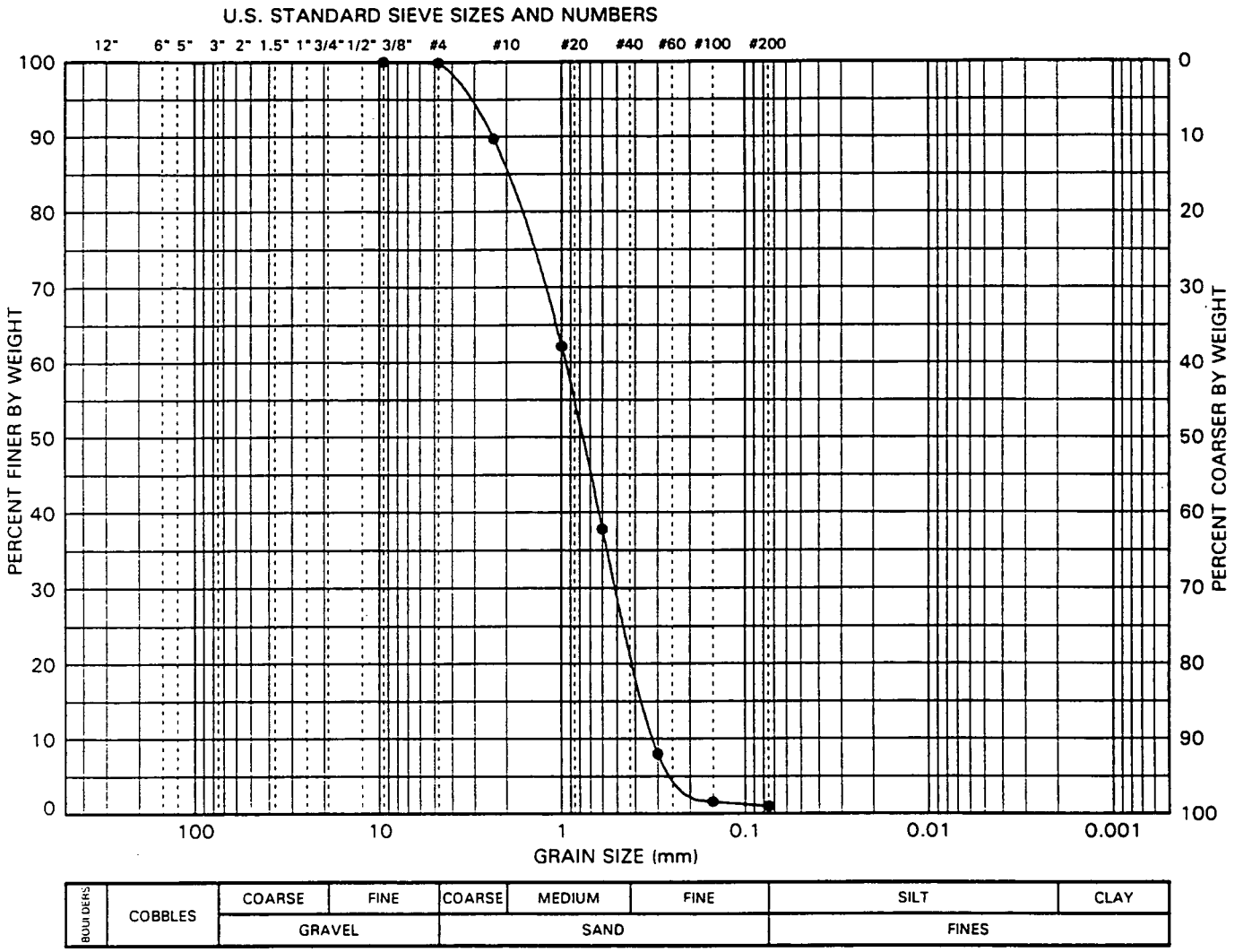
FIGURE 3

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 12/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	PEF-02	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	0.1
LAB. SAMPLE NO.	97D67	PLASTIC LIMIT (%)		SAND (%)	98.9
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.0
SOIL CLASSIFICATION: SP - Poorly Graded Sand				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	3.0
				COEFF. CURVATURE (Cc)	0.83

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	100					2	1					

NOTES:

Manhole Embedment Fill

TABLE 2

SUMMARY OF LABORATORY TEST RESULTS
LEACHATE CONVEYANCE SYSTEM - MANHOLE ~~EMBANKMENT~~ EMBANKMENT FILL

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Carbonate Content ASTM D 3042			Hydraulic Conductivity ASTM D 5084				Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422						Soluble Carbonate (%)	Before Acid Bath Figure No.	After Acid Bath Figure No.	Test Specimen Initial Conditions		Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)					Dry Unit Weight (pcf)	Moisture Content (%)			
MEF-01	97D68[1]		0.1	4					SP - Poorly Graded Sand with Gravel								
MEF-02	97D69[1]		0.5	5					SP - Poorly Graded Sand with Gravel								

Note:

1. The following U.S. Standard Sieves were used: No. 4; No. 8; No. 18; No. 30; No. 50; No. 100; and No. 200.

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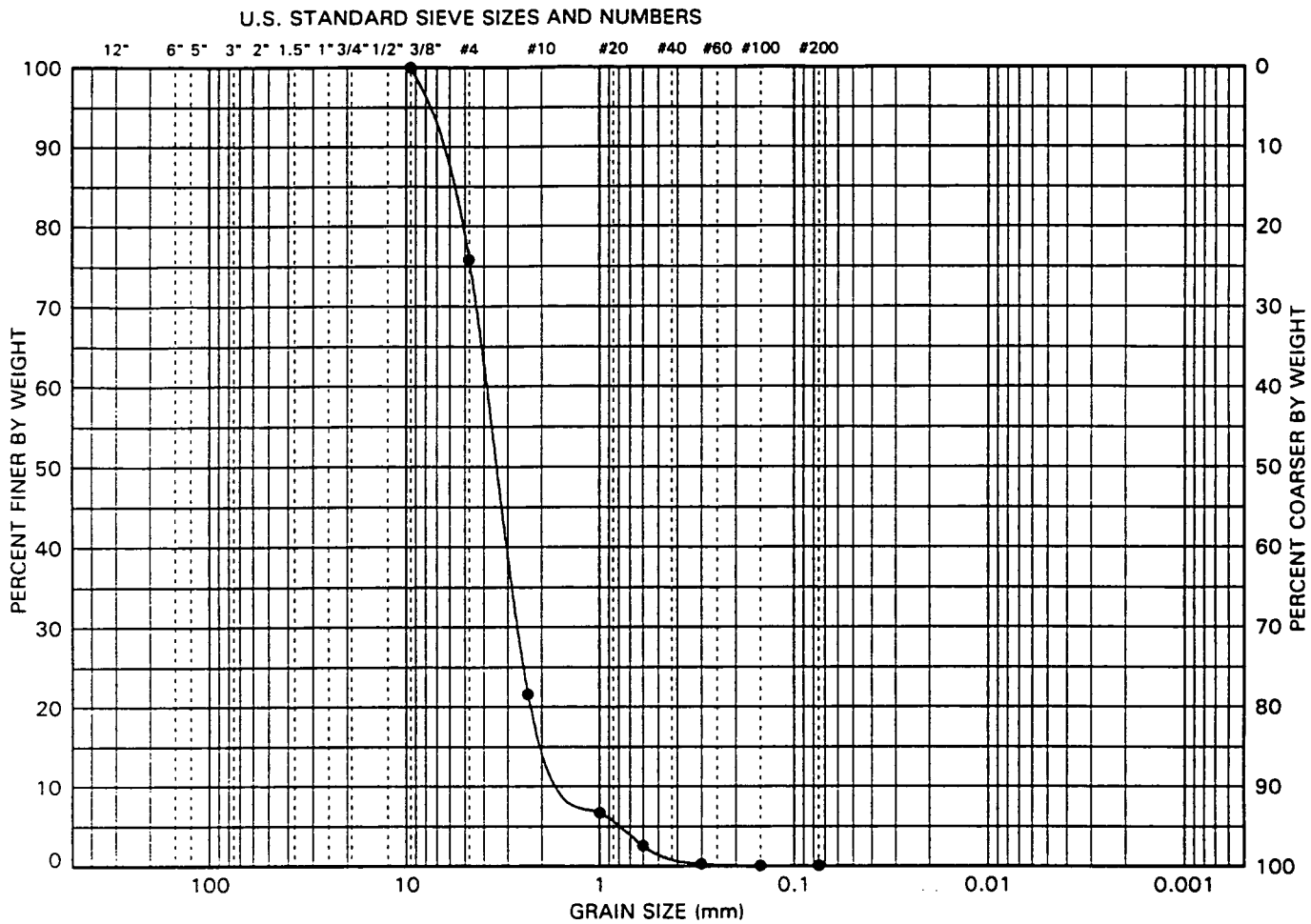
FIGURE 4
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 12/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	MEF-01	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	24.2
LAB. SAMPLE NO.	97D68	PLASTIC LIMIT (%)		SAND (%)	75.7
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	0.1
SOIL CLASSIFICATION:				SILT (%)	
SP - Poorly Graded Sand with Gravel				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	3.2
				COEFF. CURVATURE (Cc)	1.48

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	76					0	0					

NOTES:

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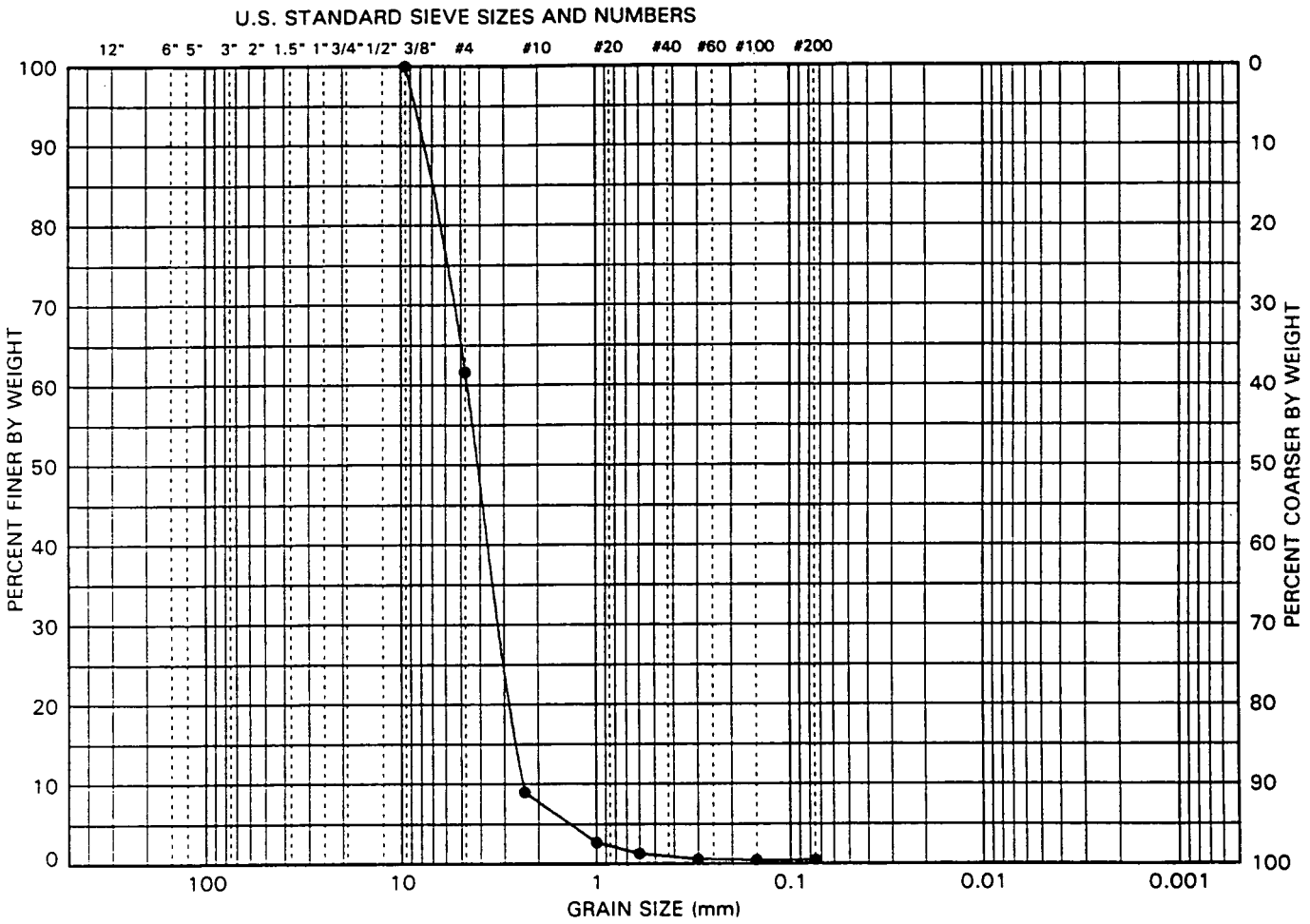
FIGURE 5
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 12/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	MEF-02	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	38.4
LAB. SAMPLE NO.	97D69	PLASTIC LIMIT (%)		SAND (%)	61.1
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	0.5
SOIL CLASSIFICATION: SP - Poorly Graded Sand with Gravel				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	1.9
				COEFF. CURVATURE (Cc)	0.88

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	62					1	1					

NOTES:

Granular Drainage Material

TABLE 3

SUMMARY OF LABORATORY TEST RESULTS
GRANULAR DRAINAGE MATERIAL

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Carbonate Content[1] ASTM D 3042			Hydraulic Conductivity[2] ASTM D 2434			Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422						Soluble Carbonate (%)	Before Acid Bath Figure No.	After Acid Bath Figure No.	Test Specimen Initial Conditions		Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)					Dry Unit Weight (pcf)	Moisture Content (%)		
GDM-01	97G26									0.1	6	7	103.4	Dry	9.2	
GDM-02	97G27									0.1	8	9	104.8	Dry	15	
GDM-05	97H217									0.1	10	11	102.5	Dry	15	
GDM-06	97I176									0.2	12	13	103.4	1.6	6.3	
GDM-07	97I177									0.1	14	15	101.0	1.6	6.0	
GDM-08	97I178												98.8	1.2	7.8	
GDM-09	97I179									0.2	16	17	98.7	1.4	6.9	
GDM-10	97I180									0.2	18	19	96.4	1.7	5.8	
GDM-12	97I373									0.1	20	21	101.7	1.5	14	
GDM-14	97J183												101.5	0.1	9.3	

Notes:

1. At the request of the client, a hydrochloric acid solution (HCl) with a pH of 4 was used.
2. The reported hydraulic conductivity was measured at a gradient of 0.1.

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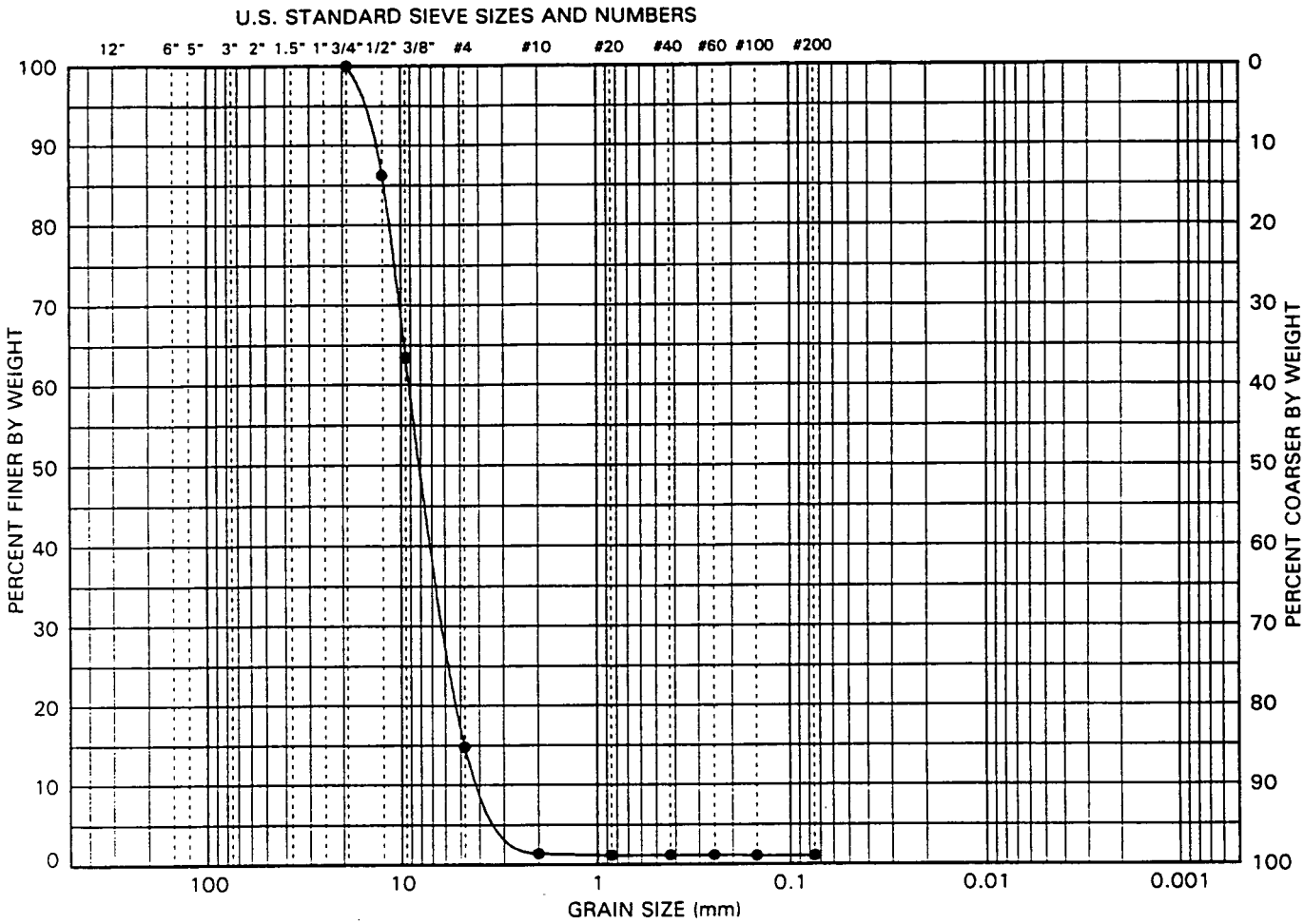
FIGURE 6

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-01	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	85.2
LAB. SAMPLE NO.	97G26.	PLASTIC LIMIT (%)		SAND (%)	13.7
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.1
SOIL CLASSIFICATION: GP - Poorly Graded Gravel				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.6
				COEFF. CURVATURE (Cc)	1.10

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	86	63	15	1	1	1	1	1	1					

NOTES: Before Acid Bath

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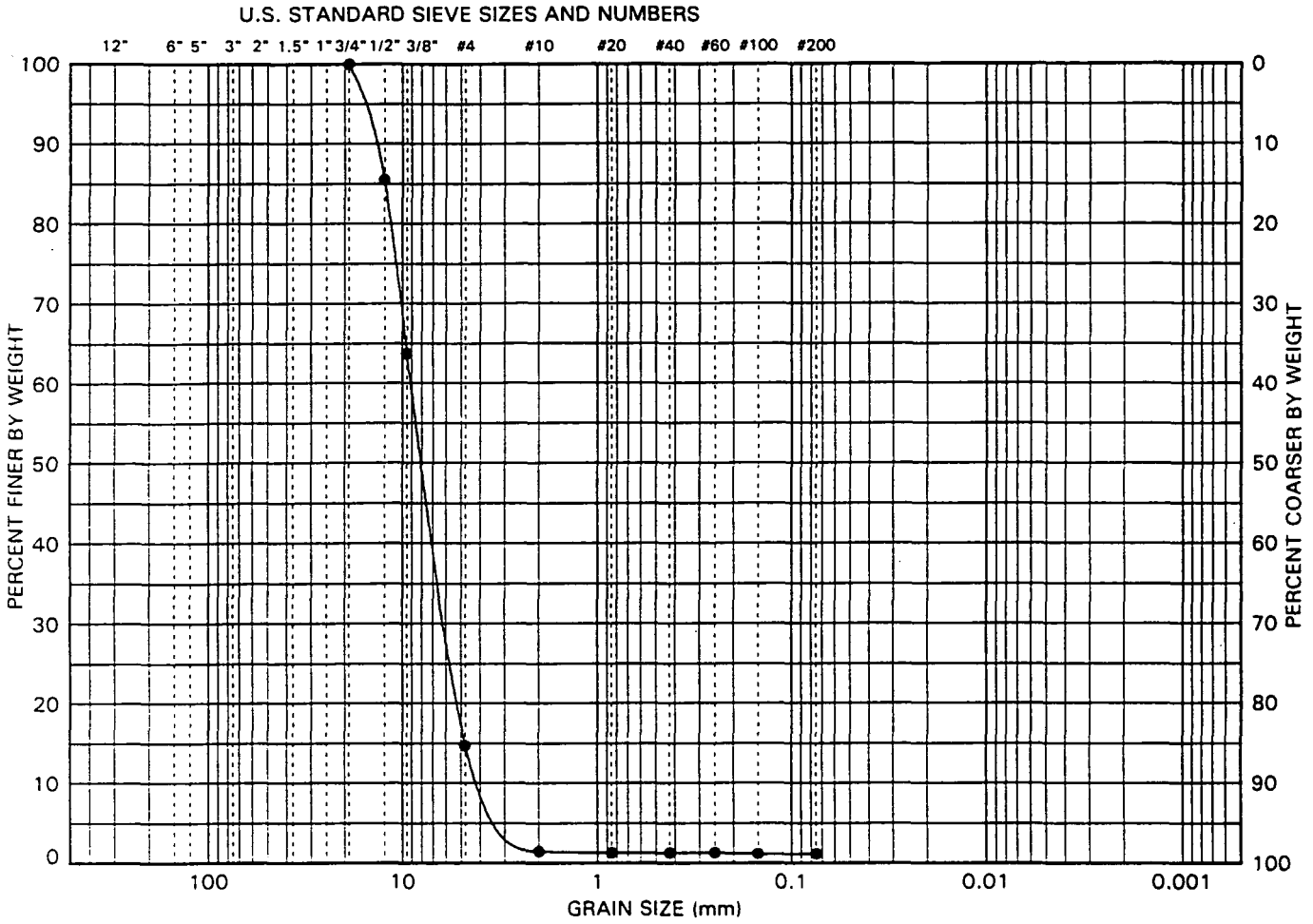
FIGURE 7

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-01	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	85.3
LAB. SAMPLE NO.	97G26..	PLASTIC LIMIT (%)		SAND (%)	13.5
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.2
SOIL CLASSIFICATION: GP - Poorly Graded Gravel				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.6
				COEFF. CURVATURE (Cc)	1.11

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	86	64	15	2	1	1	1	1	1					

NOTES: After Acid Bath

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Atlanta, Georgia

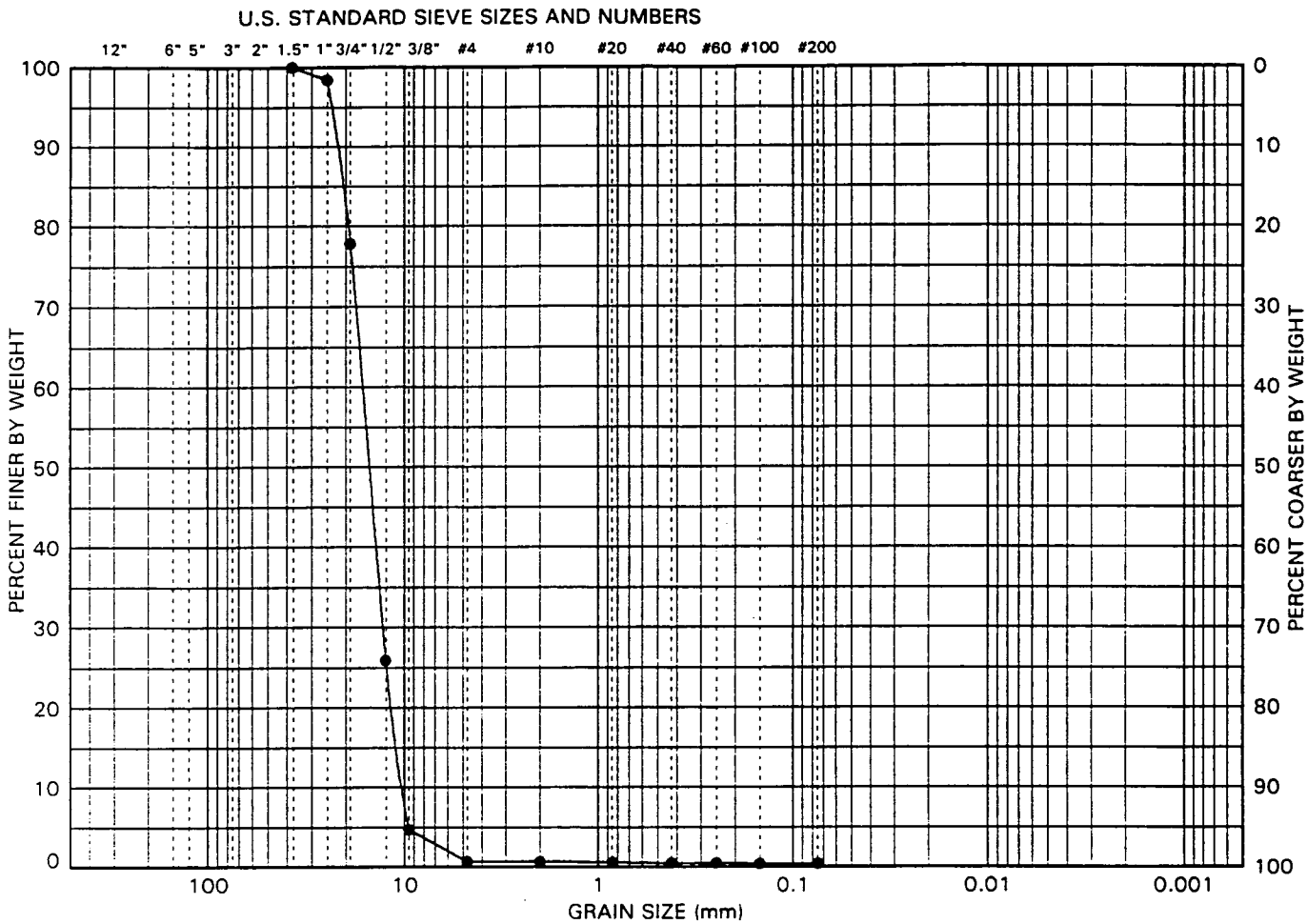
FIGURE 8

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-02	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	99.3
LAB. SAMPLE NO.	97G27.	PLASTIC LIMIT (%)		SAND (%)	0.3
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	0.4
SOIL CLASSIFICATION: GP - Poorly Graded Gravel				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	1.6
				COEFF. CURVATURE (Cc)	1.00

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200

PERCENT PASSING SIEVE SIZES (mm)

75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075
100	100	100	98	78	26	5	1	1	1	1	1	0	0

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001

NOTES: Before Acid Bath

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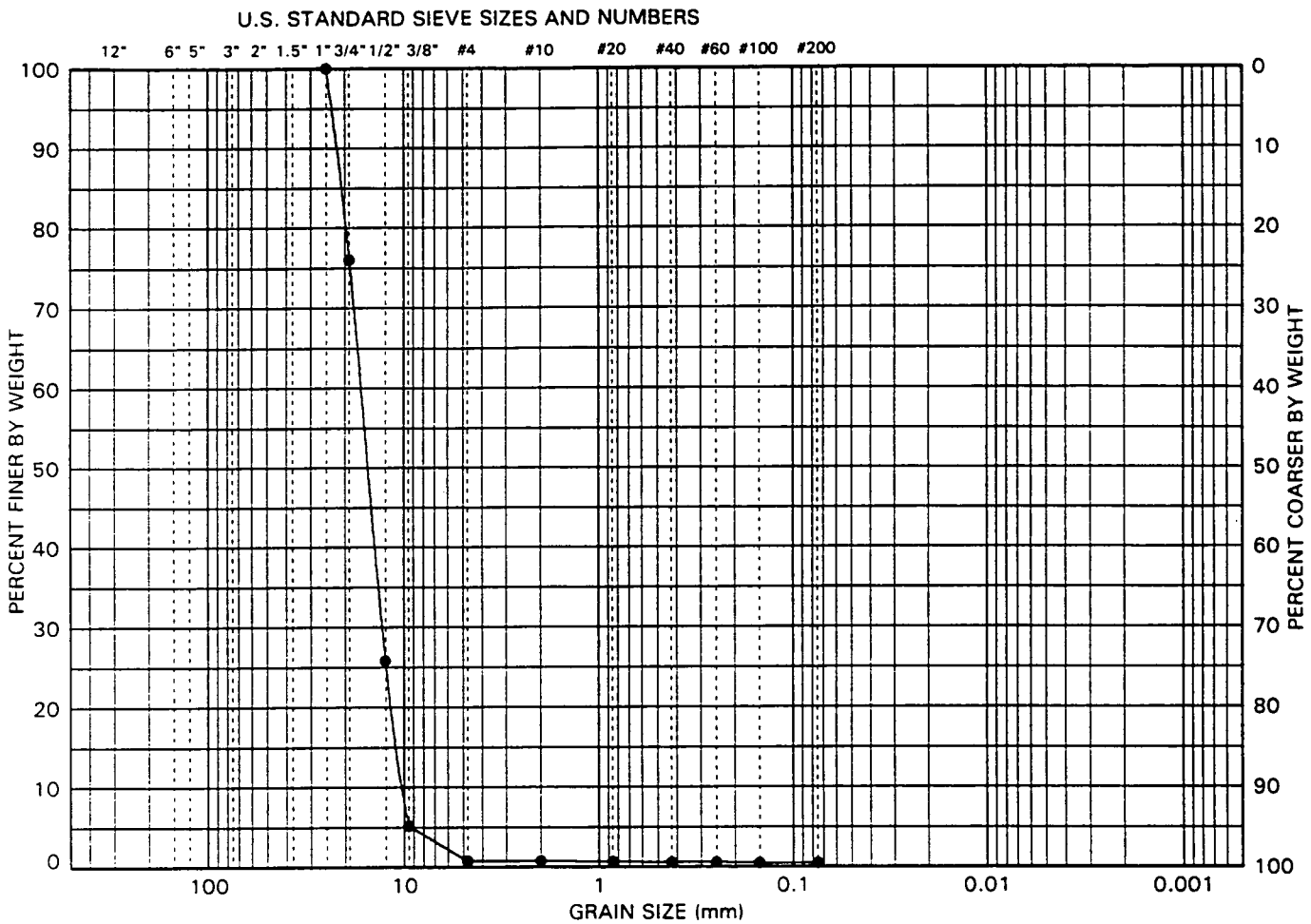
FIGURE 9

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-02	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	99.2
LAB. SAMPLE NO.	97G27..	PLASTIC LIMIT (%)		SAND (%)	0.3
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	0.5
SOIL CLASSIFICATION: GP - Poorly Graded Gravel				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	1.6
				COEFF. CURVATURE (Cc)	1.00

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	76	26	5	1	1	1	1	1	1	1					

NOTES: After Acid Bath

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Atlanta, Georgia

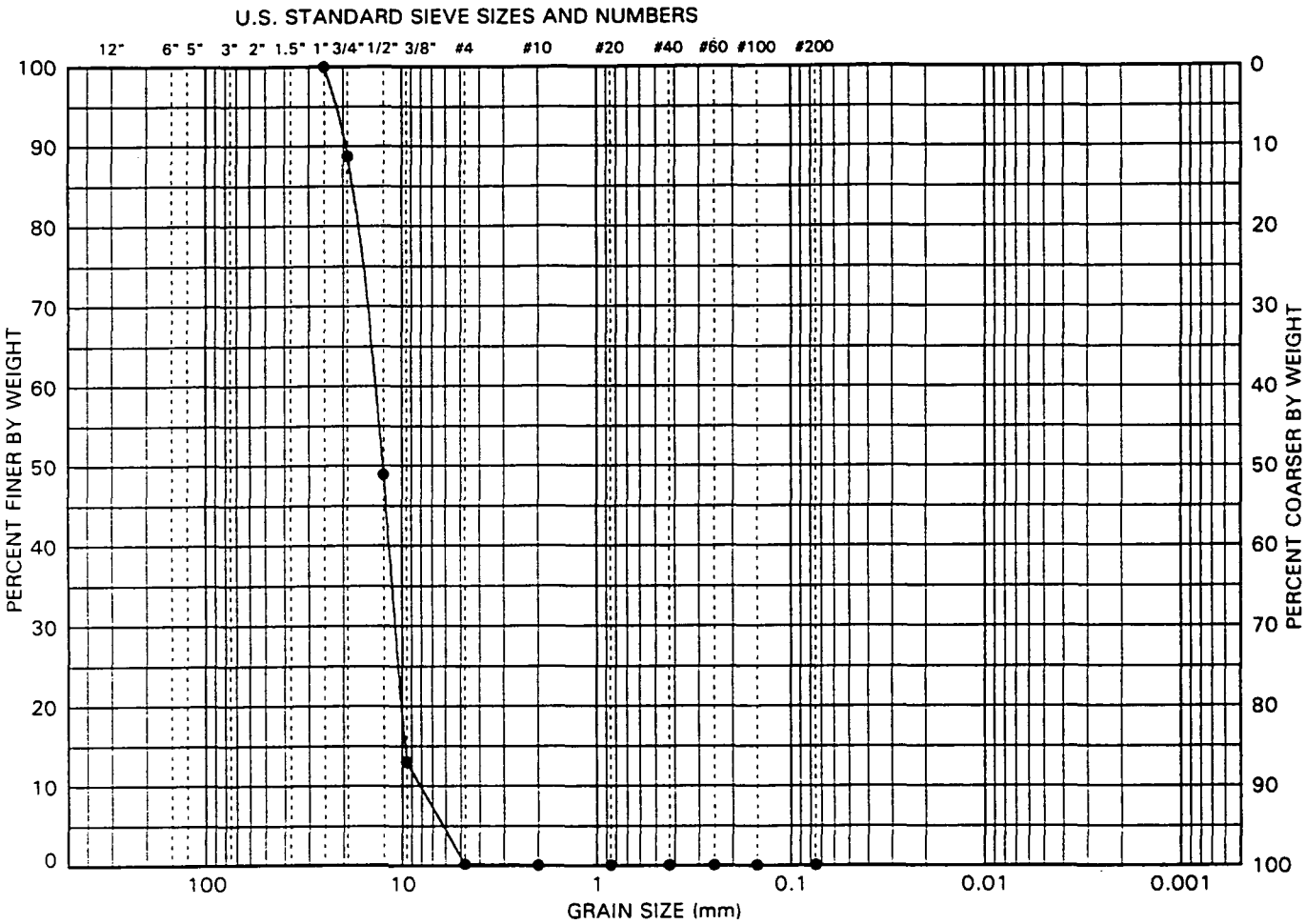
FIGURE 10

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-05	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 99.8
LAB. SAMPLE NO.	97H217.	PLASTIC LIMIT (%)		SAND (%) 0.1
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%) 0.1
SOIL CLASSIFICATION:				SILT (%)
GP - Poorly Graded Gravel				CLAY(%)
				COEFF. UNIFORMITY (Cu) 1.7
				COEFF. CURVATURE (Cc) 1.03

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	89	49	13	0	0	0	0	0	0	0					

NOTES: Before Acid Bath

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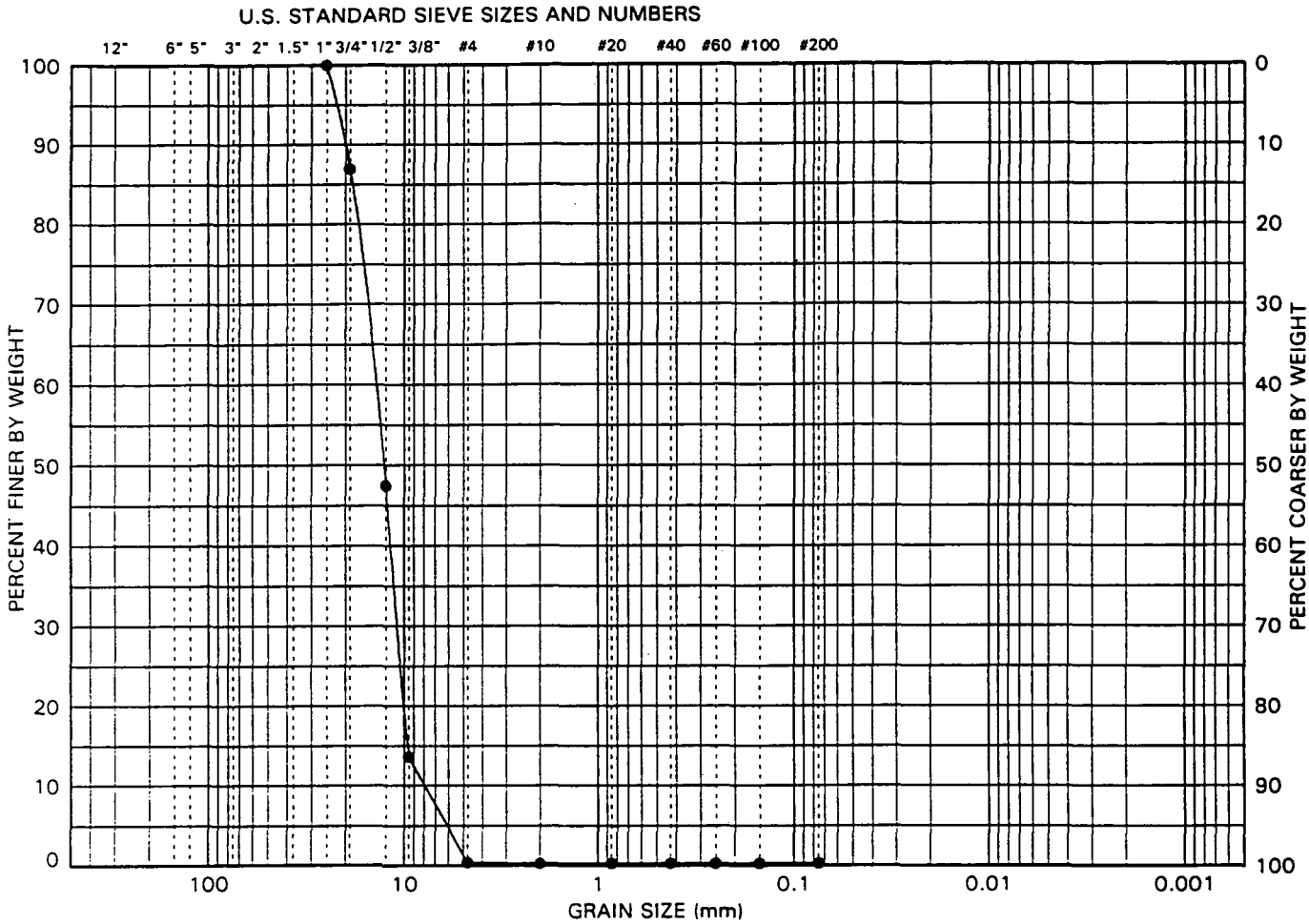
FIGURE 11

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-05	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	99.6
LAB. SAMPLE NO.	97H217..	PLASTIC LIMIT (%)		SAND (%)	0.1
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	0.3
SOIL CLASSIFICATION: GP - Poorly Graded Gravel				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	1.8
				COEFF. CURVATURE (Cc)	1.05

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	87	47	14	0	0	0	0	0	0	0					

NOTES: After Acid Bath

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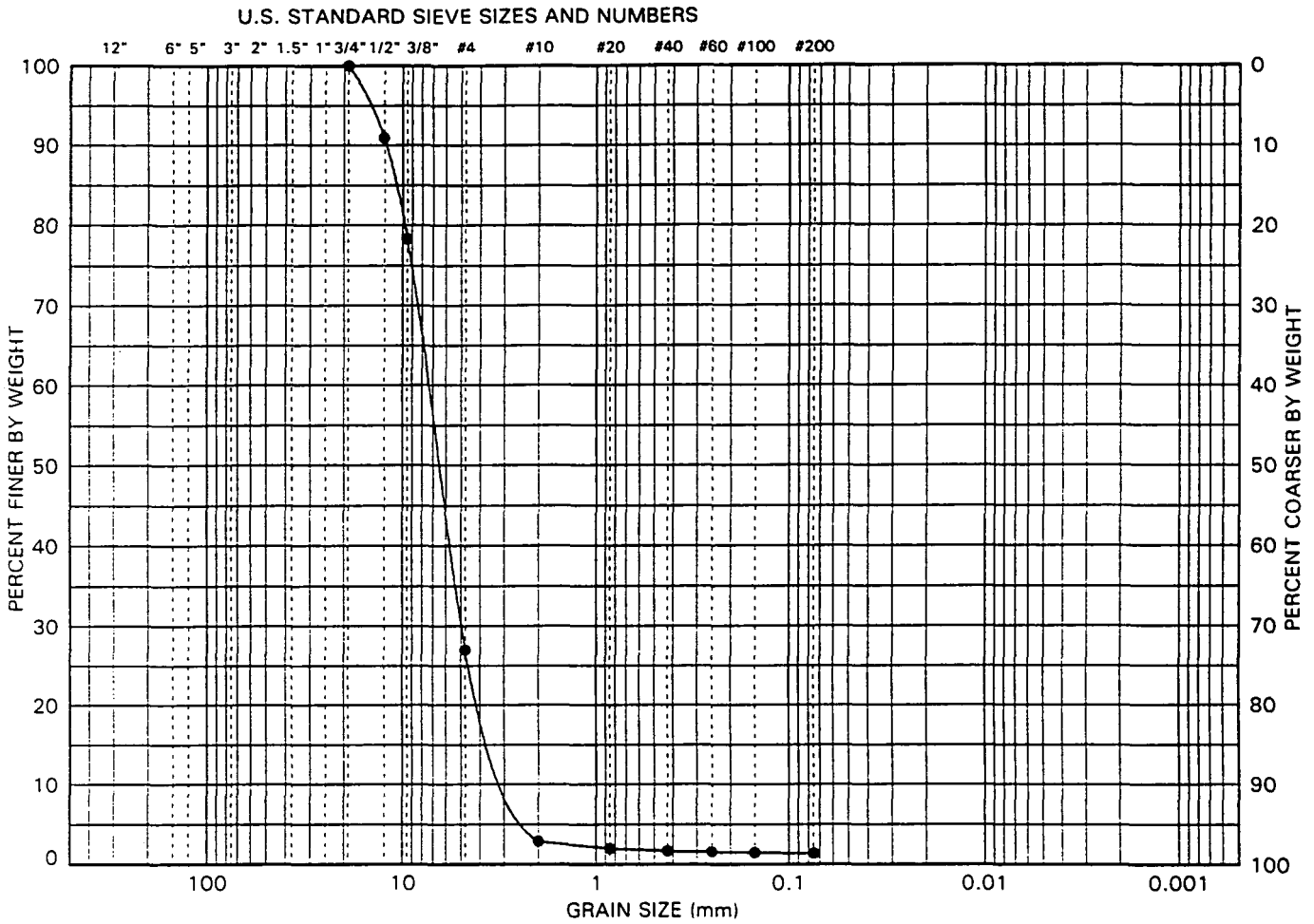
FIGURE 12

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-06	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	73.0
LAB. SAMPLE NO.	97I176.	PLASTIC LIMIT (%)		SAND (%)	25.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.4
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.28

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	91	78	27	3	2	2	2	2	1					

NOTES: Before Acid Bath

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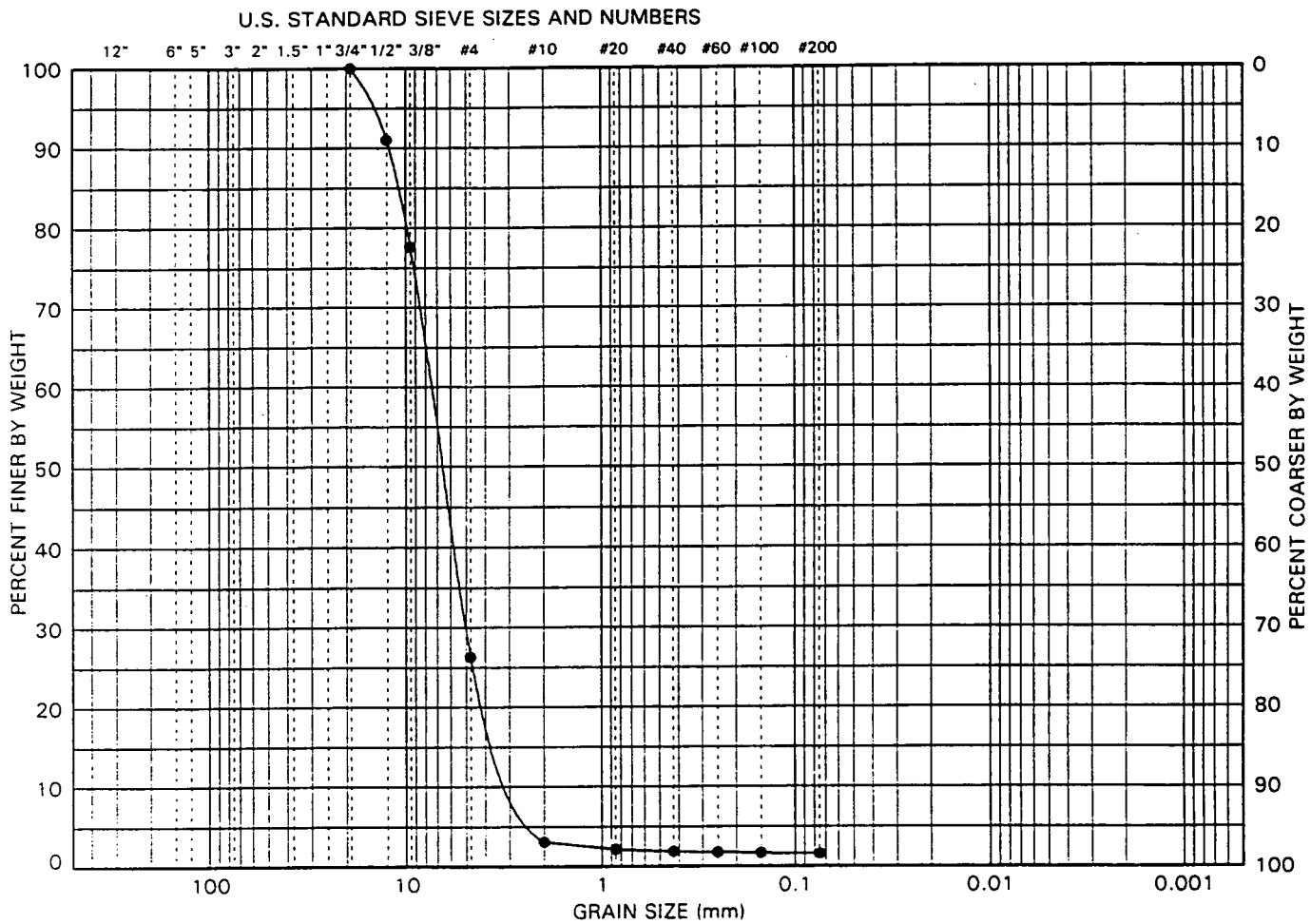
FIGURE 13

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-06	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	73.7
LAB. SAMPLE NO.	971176..	PLASTIC LIMIT (%)		SAND (%)	24.7
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.6
SOIL CLASSIFICATION: GP - Poorly Graded Gravel with Sand				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.29

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	91	78	26	3	2	2	2	2	2					

NOTES: After Acid Bath

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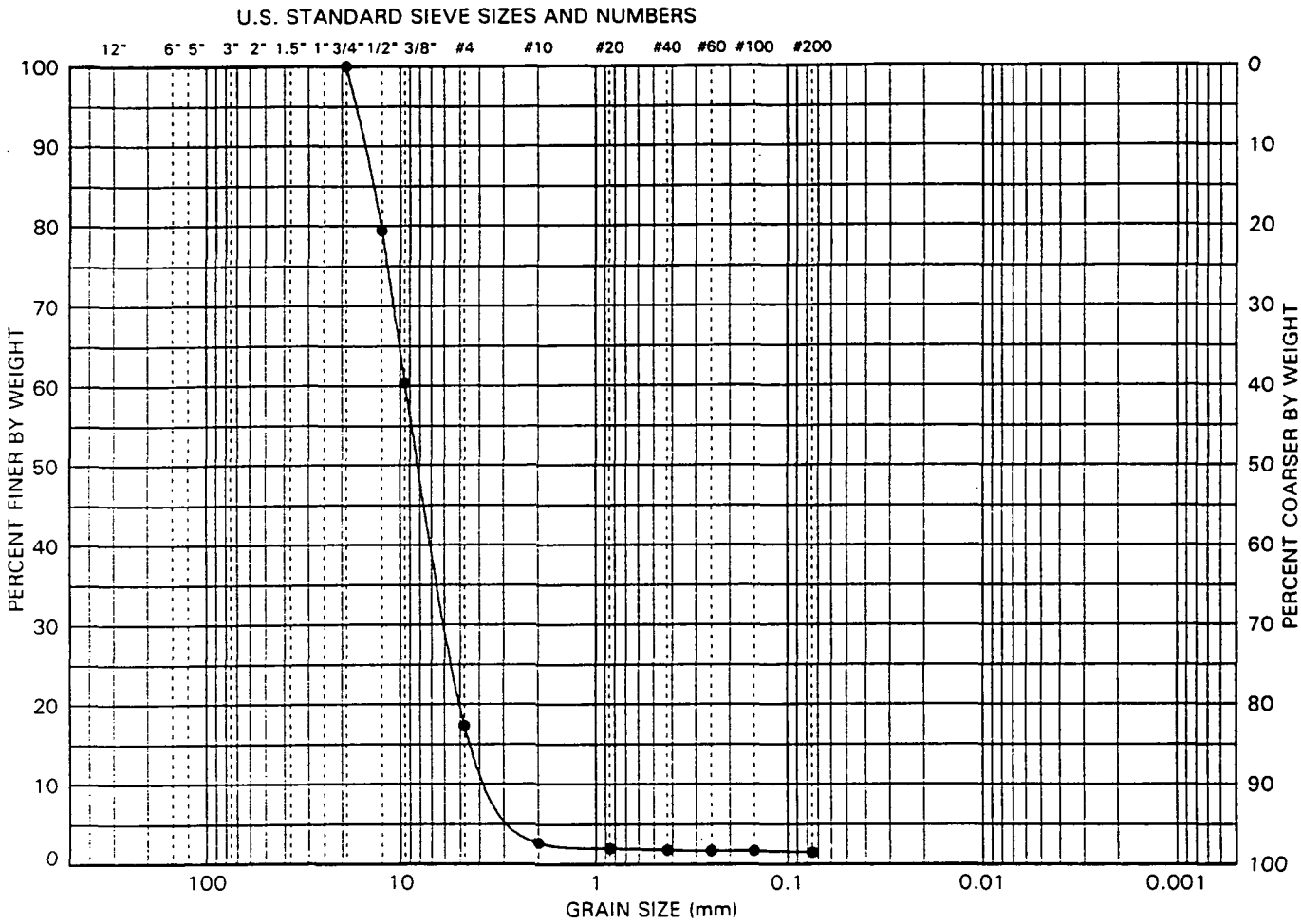
FIGURE 14

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-07	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	82.7
LAB. SAMPLE NO.	97I177.	PLASTIC LIMIT (%)		SAND (%)	15.8
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.5
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	3.1
				COEFF. CURVATURE (Cc)	1.17

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	79	60	17	3	2	2	2	2	2					

NOTES: Before Acid Bath

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Atlanta, Georgia

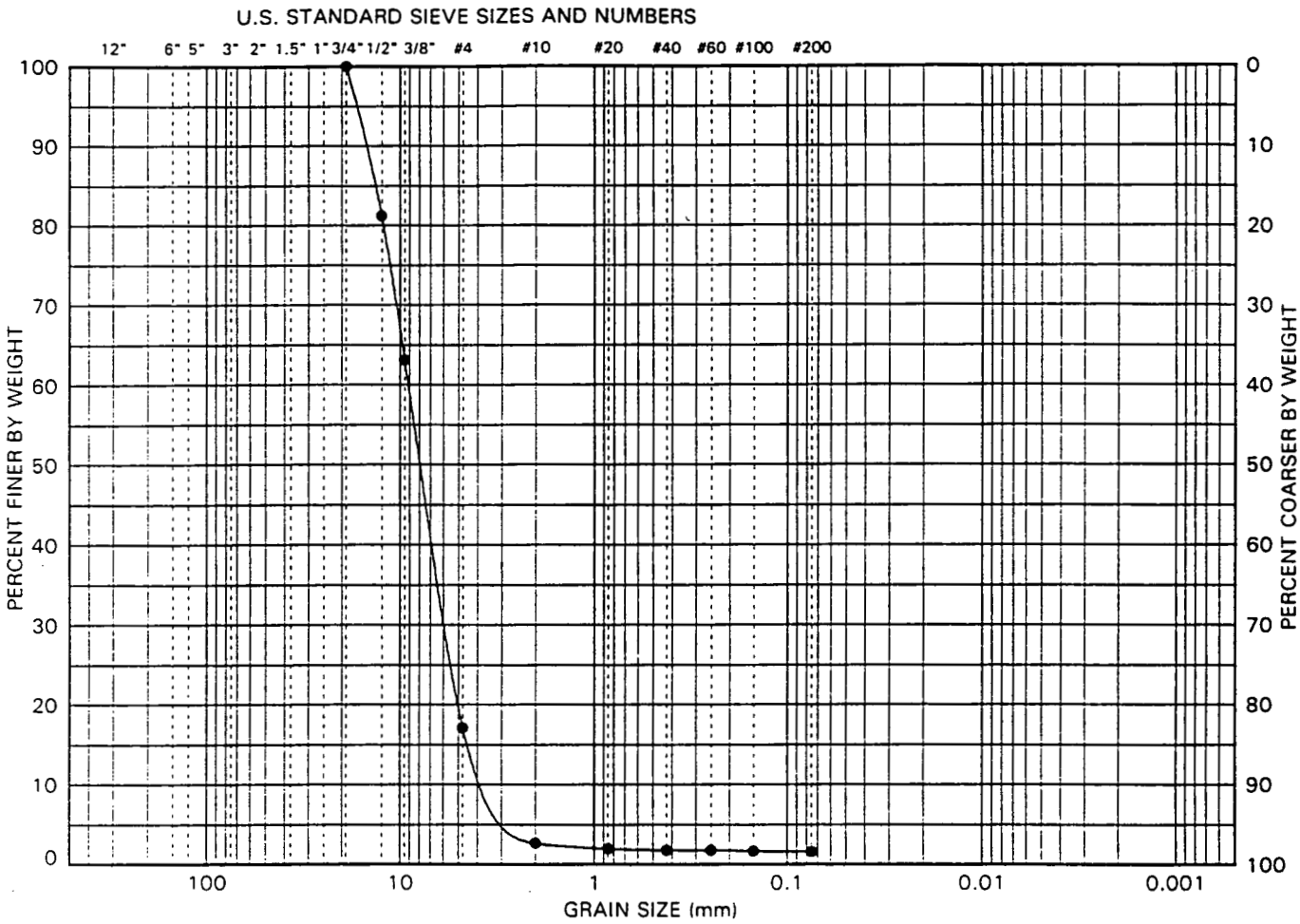
FIGURE 15

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-07	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 82.9
LAB. SAMPLE NO.	97I177..	PLASTIC LIMIT (%)		SAND (%) 15.5
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%) 1.6
SOIL CLASSIFICATION: GP - Poorly Graded Gravel with Sand				SILT (%)
				CLAY(%)
				COEFF. UNIFORMITY (Cu) 2.9
				COEFF. CURVATURE (Cc) 1.18

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	81	63	17	3	2	2	2	2	2					

NOTES: After Acid Bath

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Atlanta, Georgia

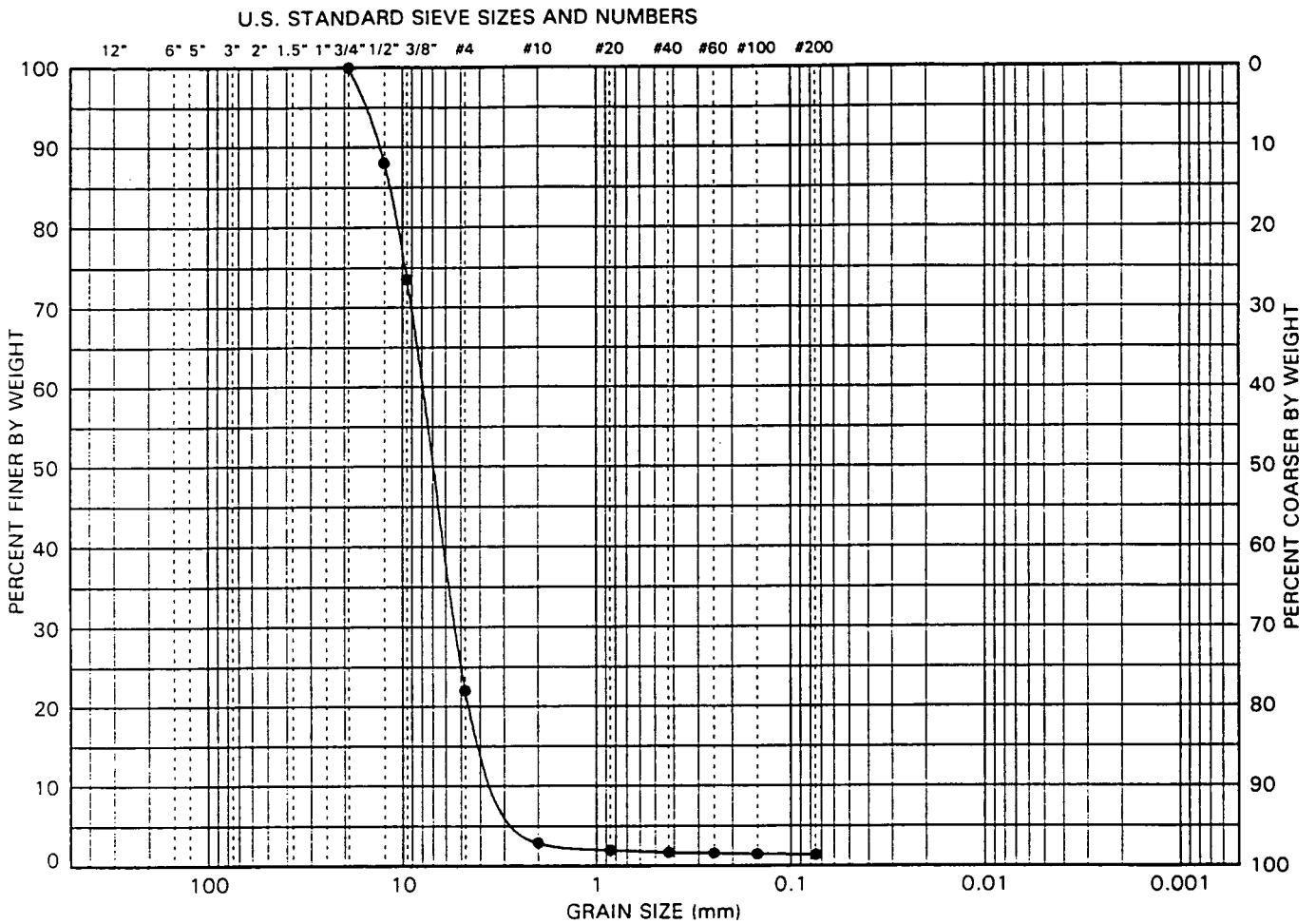
FIGURE 16

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-09	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	78.0
LAB. SAMPLE NO.	971179.	PLASTIC LIMIT (%)		SAND (%)	20.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.4
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.28

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	88	74	22	3	2	2	2	2	1					

NOTES: Before Acid Bath

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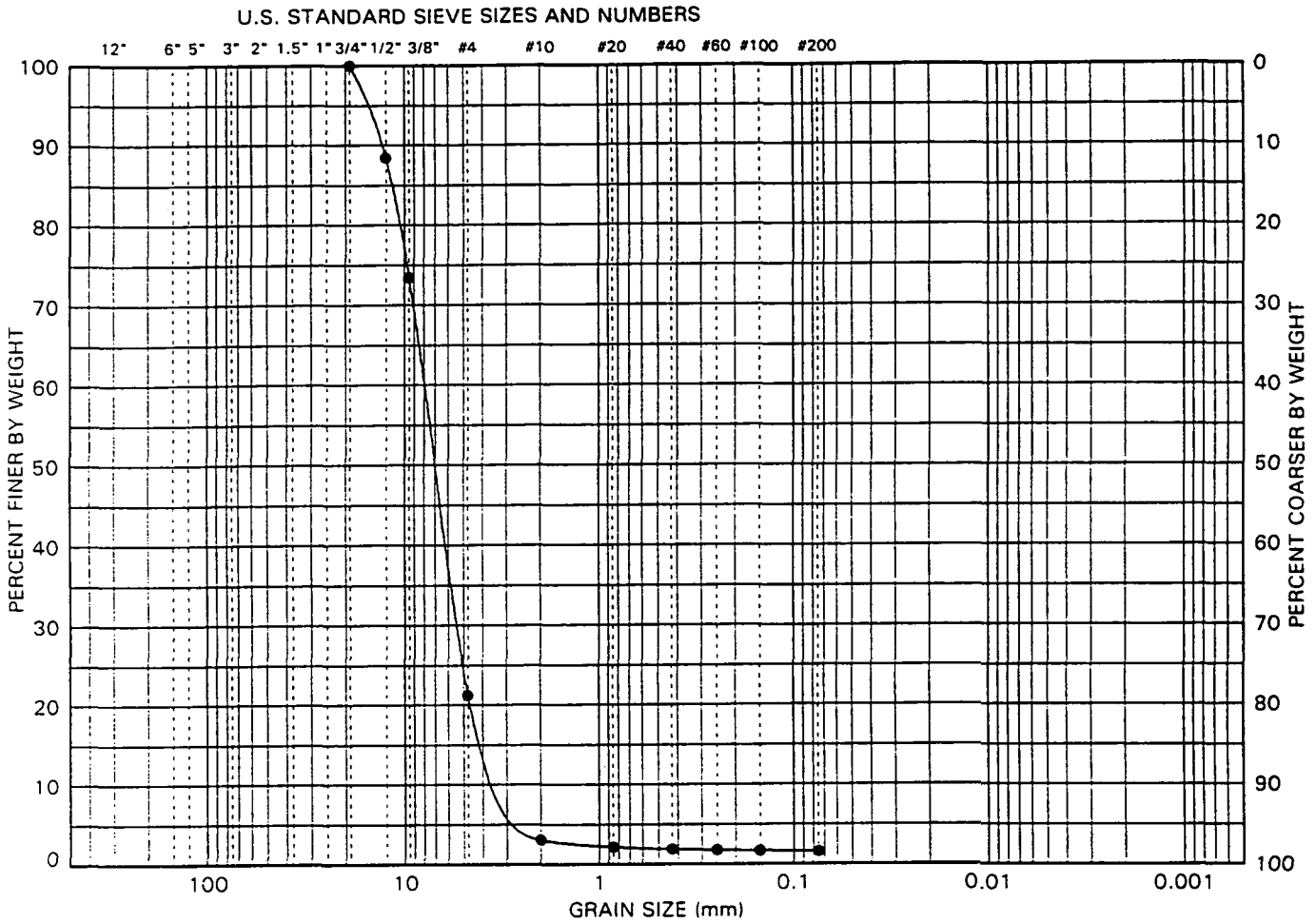
Atlanta, Georgia

FIGURE 17
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOUNDARIES	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-09	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	78.8
LAB. SAMPLE NO.	97I179..	PLASTIC LIMIT (%)		SAND (%)	19.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.6
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.29

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	88	73	21	3	2	2	2	2	2					

NOTES: After Acid Bath

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Atlanta, Georgia

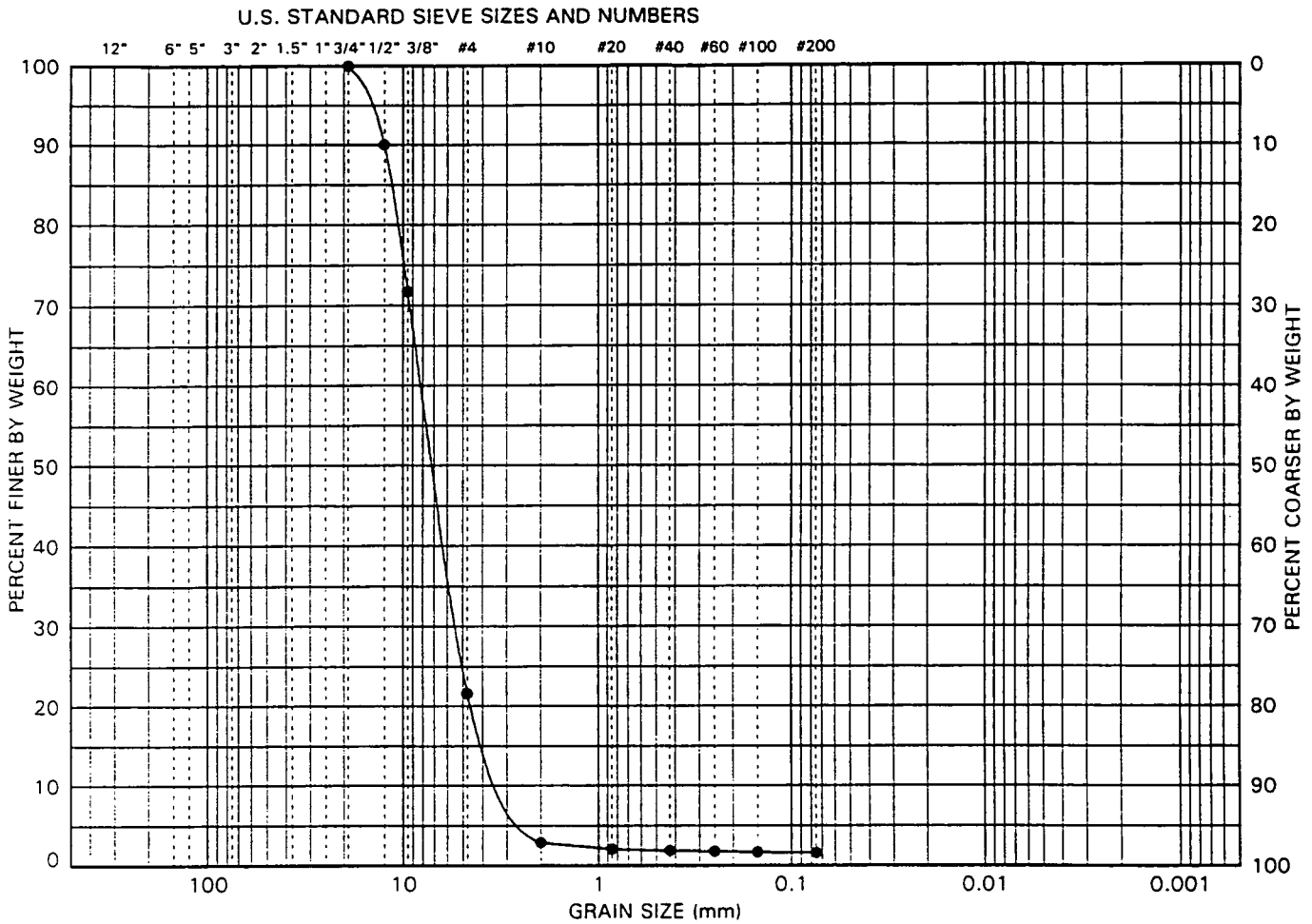
FIGURE 18

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-10	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	78.4
LAB. SAMPLE NO.	971180.	PLASTIC LIMIT (%)		SAND (%)	20.0
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.6
SOIL CLASSIFICATION:				SILT (%)	
GP - Poorly Graded Gravel with Sand				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.27

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	90	72	22	3	2	2	2	2	2					

NOTES: Before Acid Bath

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Atlanta, Georgia

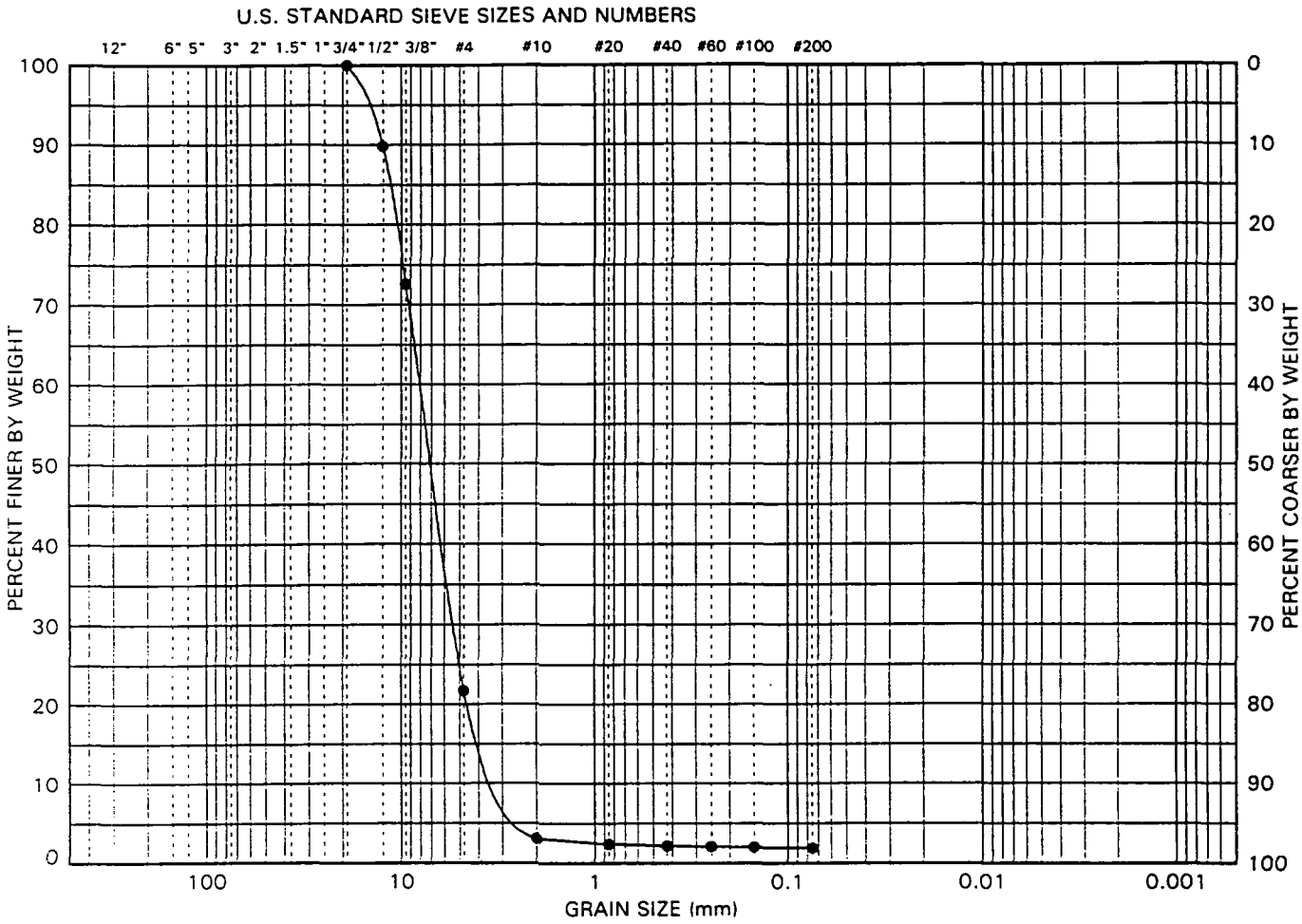
FIGURE 19

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GDM-10	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	78.3
LAB. SAMPLE NO.	97I180..	PLASTIC LIMIT (%)		SAND (%)	19.8
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	1.9
SOIL CLASSIFICATION: GP - Poorly Graded Gravel with Sand				SILT (%)	
				CLAY(%)	
				COEFF. UNIFORMITY (Cu)	2.9
				COEFF. CURVATURE (Cc)	1.28

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	90	73	22	3	2	2	2	2	2					

NOTES: After Acid Bath

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Atlanta, Georgia

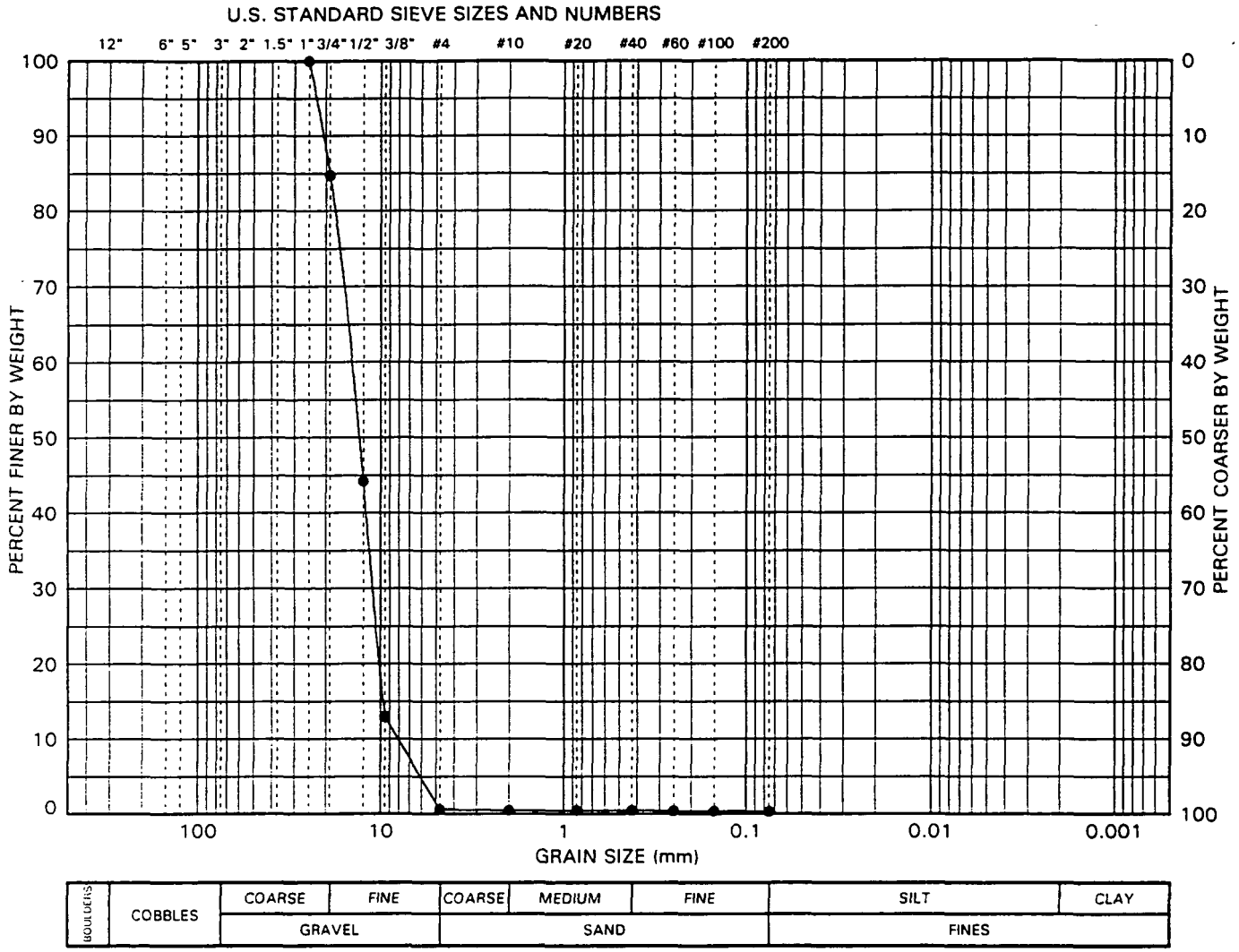
FIGURE 20

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



SITE SAMPLE ID GDM-12	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 99.4
LAB. SAMPLE NO. 971373.	PLASTIC LIMIT (%)		SAND (%) 0.3
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%) 0.3
SOIL CLASSIFICATION: GP - Poorly Graded Gravel			SILT (%)
			CLAY(%)
			COEFF. UNIFORMITY (Cu) 1.8
			COEFF. CURVATURE (Cc) 1.03

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	85	44	13	1	1	1	1	0	0	0					

NOTES: Before Acid Bath

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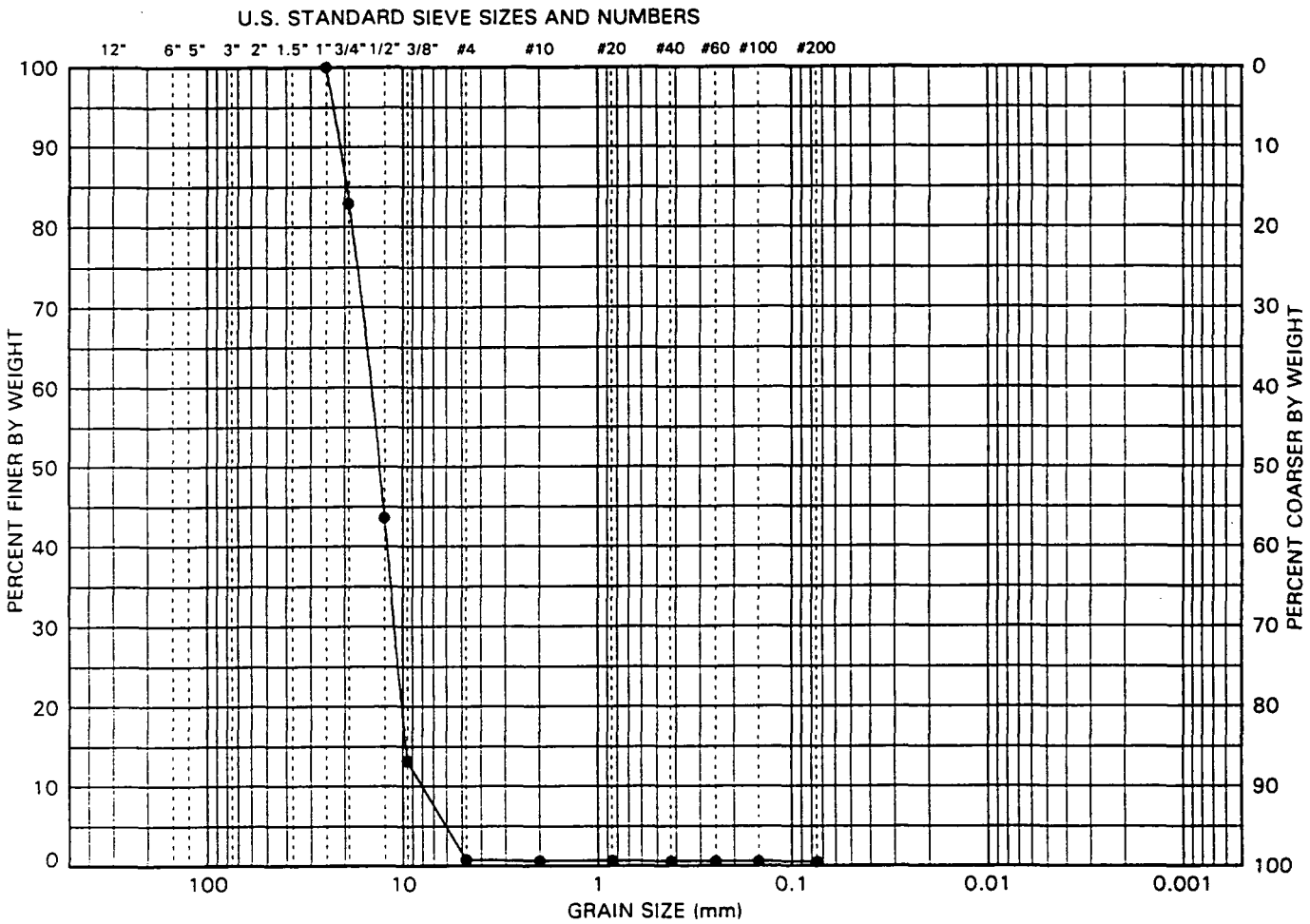
FIGURE 21

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	GMD-12	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 99.2
LAB. SAMPLE NO.	971373..	PLASTIC LIMIT (%)		SAND (%) 0.3
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%) 0.5
SOIL CLASSIFICATION:				SILT (%)
GP - Poorly Graded Gravel				CLAY(%)
				COEFF. UNIFORMITY (Cu) 1.9
				COEFF. CURVATURE (Cc) 1.03

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	83	44	13	1	1	1	1	1	1	1					

NOTES: After Acid Bath

Compacted Clay Liner

TABLE 4

SUMMARY OF LABORATORY TEST RESULTS
LOW PERMEABILITY CLAY LINER

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Specific Gravity ASTM D 854 (-)	Compaction			Hydraulic Conductivity ASTM D 5084				Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422							Standard Proctor ASTM D 698			Test Specimen Initial Conditions		Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)			Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Fig. No.	Dry Unit Weight (pcf)	Moisture Content (%)			
LP-01	97G61.1				22									108.9	16.8	5	1.2E-5	
	97G61.2													112.3	16.9	5	2.9E-8	
LP-02	97G62.1				23									113.7	15.4	5	9.6E-6	
	97G62.2													115.6	15.6	5	2.2E-8	
LP-03	97G66				24									121.2	14.4	5	3.2E-8	
LP-04	97G67.A				25									119.0	14.7	5	2.6E-8	
LP-05	97G81				26					2.75				118.1	15.9	5	3.0E-8	
LP-06	97G107				27									116.6	15.8	5	2.1E-8	
LP-07	97G128				28									118.0	14.7	5	1.8E-7	
LP-07.1	97G223	16.1	70.5	29	29	38	18	20	CL - Sandy Lean Clay		119.0	14.5	30	115.5	17.5	5	1.6E-8	
LP-07.2	97G224	12.6	67.3	31	31	35	19	16	CL - Sandy Lean Clay		117.4	14.0	32	114.7	17.2	5	1.1E-8	
LP-08	97G129				33									106.4	21.0	5	1.1E-8	
LP-09	97G130				34									115.0	17.4	5	1.8E-8	
LP-10	97G146				35									119.7	14.6	5	4.7E-8	

000510

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TABLE 4 (continued)

SUMMARY OF LABORATORY TEST RESULTS
LOW PERMEABILITY CLAY LINER

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Specific Gravity ASTM D 854 (-)	Compaction			Hydraulic Conductivity ASTM D 5084				Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422							Standard Proctor ASTM D 698			Test Specimen Initial Conditions		Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)			Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Fig. No.	Dry Unit Weight (pcf)	Moisture Content (%)			
LP-11	97G147				36									118.1	15.6	5	2.0E-8	
LP-12	97G164				37									119.5	14.7	5	2.9E-8	
LP-13	97G165				38									122.6	13.6	5	5.8E-8	
LP-14	97G166				39									121.9	13.7	5	4.3E-8	
LP-15	97G167.1				40					2.74				122.6	13.0	5	7.9E-8	
	97G167.2													118.6	15.2	5	5.1E-8	
LP-16	97G168.2				41									110.8	18.7	5	3.7E-8	
LP-17	97G187				42									121.3	14.0	5	1.8E-8	
LP-17.1	97H278		70.1	43	43													
LP-17.2	97H279		72.0	44	44													
LP-18	97G188.A				45									116.5	16.3	5	1.1E-8	
LP-18.1	97H280													116.1	16.3	5	1.4E-8	
LP-18.2	97H281		72.0	46	46	35	18	17	CL - Lean Clay with Sand		119.5	13.2	47					
	97H281.A													119.3	14.9	5	7.7E-8	

000511

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TABLE 4 (continued)

SUMMARY OF LABORATORY TEST RESULTS
LOW PERMEABILITY CLAY LINER

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Specific Gravity ASTM D 854 (-)	Compaction			Hydraulic Conductivity ASTM D 5084				Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422							Standard Proctor ASTM D 698			Test Specimen Initial Conditions		Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)			Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Fig. No.	Dry Unit Weight (pcf)	Moisture Content (%)			
LP-19	97G189				48									116.8	16.0	5	1.4E-8	
LP-19.1	97H282		77.2	49	49													
LP-19.2	97H283		72.4	50	50													
LP-20	97G220				51									120.2	14.6	5	5.0E-8	
LP-21	97G221				52									122.7	13.5	5	3.2E-8	
LP-21.1	97H284		72.2	53	53													
LP-21.2	97H285		69.2	54	54													
LP-22	97G222.A				55									121.0	13.9	5	2.2E-8	
LP-23	97G227				56									109.9	19.1	5	5.9E-8	
LP-24	97G228.A				57									114.3	16.7	5	1.9E-8	
LP-25	97G229				58									116.3	16.1	5	6.8E-8	
LP-25A	97G225	14.2	65.5	59	59	32	18	14	CL - Sandy Lean Clay	2.77	123.0	12.7	60	115.0	16.4	5	4.2E-8	

000512

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TABLE 4 (continued)

SUMMARY OF LABORATORY TEST RESULTS
LOW PERMEABILITY CLAY LINER

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Specific Gravity ASTM D 854 (-)	Compaction			Hydraulic Conductivity ASTM D 5084				Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422							Standard Proctor ASTM D 698			Test Specimen Initial Conditions		Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)			Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Fig. No.	Dry Unit Weight (pcf)	Moisture Content (%)			
LP-26	97G231				61									112.9	17.8	5	2.6E-8	
LP-27	97G232				62									116.7	15.3	5	8.9E-8	
LP-28	97G233				63									112.4	17.7	5	7.2E-8	
LP-29	97G235				64									106.4	20.7	5	8.5E-9	
LP-30	97G236				65									115.5	17.0	5	8.9E-9	
LP-31	97G237				66									111.6	18.2	5	1.2E-8	
LP-32	97G284				67									109.2	18.8	5	1.4E-8	
LP-33	97G285				68									119.8	14.7	5	2.0E-8	
LP-34	97G286.1				69									119.1	14.7	5	1.9E-7	
	97G286.2													118.7	14.9	5	1.8E-7	
LP-34.1	97H286					31	17	14						116.8	16.0	5	7.8E-8	
LP-34.2	97H287		70.3	70	70	37	17	20	CL - Sandy Lean Clay		119.1	13.7	71	118.6	15.2	5	5.1E-8	

000513

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TABLE 4 (continued)

SUMMARY OF LABORATORY TEST RESULTS
LOW PERMEABILITY CLAY LINER

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Specific Gravity ASTM D 854 (-)	Compaction			Hydraulic Conductivity ASTM D 5084				Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422							Standard Proctor ASTM D 698			Test Specimen Initial Conditions		Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)			Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Fig. No.	Dry Unit Weight (pcf)	Moisture Content (%)			
LP-35	97G287				72									114.5	16.7	5	3.7E-8	
LP-36	97G288				73									108.3	19.7	5	1.2E-8	
LP-36A	97G234	22.6	90.4	74	74	52	22	30	CH - Fat Clay	2.76	105.2	19.9	75	111.9	17.9	5	4.7E-8	
LP-37	97G289				76									110.1	18.9	5	2.3E-8	
LP-38	97G290				77									115.6	16.4	5	3.9E-8	
LP-39	97H16				78									116.6	16.1	5	4.8E-8	
LP-40	97H17				79									116.4	16.1	5	2.0E-8	
LP-41	97H49.A				80									111.6	18.2	5	1.6E-8	
LP-42	97H50				81									113.0	17.6	5	1.0E-8	

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TABLE 4 (continued)

SUMMARY OF LABORATORY TEST RESULTS
LOW PERMEABILITY CLAY LINER

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Specific Gravity ASTM D 854 (-)	Compaction			Hydraulic Conductivity ASTM D 5084				Remarks
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422							Standard Proctor ASTM D 698			Test Specimen Initial Conditions		Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)			Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Fig. No.	Dry Unit Weight (pcf)	Moisture Content (%)			
LP-46	97112				82									110.8	18.6	5	1.2E-8	
LP-47	97113				83									111.6	18.1	5	1.7E-8	
LP-158	97149				84									116.1	16.4	5	1.1E-8	
LP-174	971174.A				85									108.6	20.5	5	6.4E-9	
LP-175	971175				86									116.3	16.3	5	3.6E-8	
LP-183	971170	19.1	78.6	87	87	45	20	25	CL - Lean Clay with Sand		110.1	18.0	88	108.9	19.6	5	2.6E-8	
LP-184	971171	20.0	78.2	89	89	44	19	25	CL - Lean Clay with Sand		112.4	16.1	90	107.5	20.2	5	5.6E-8	
LP-201	971196	16.5	84.1	91	91	41	20	21	CL - Lean Clay with Sand		110.8	17.0	92	115.5	16.2	5	5.1E-8	
LP-237	971272				93									108.9	19.8	5	1.3E-8	
LP-243	971327				94									102.4	23.3	5	1.1E-8	
LP-262	971357				95									113.0	18.0	5	9.1E-9	

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TABLE 4 (continued)

SUMMARY OF LABORATORY TEST RESULTS
LOW PERMEABILITY CLAY LINER

FLUOR DANIEL FERNALD
FDF-OSDF - PHASE I CONSTRUCTION

Site Sample ID	Lab Sample No.	Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Specific Gravity ASTM D 854 (-)	Compaction			Hydraulic Conductivity ASTM D 5084				Remarks
											Standard Proctor ASTM D 698			Test Specimen Initial Conditions				
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422							Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Fig. No.	Dry Unit Weight (pcf)	Moisture Content (%)	Consol. Pressure (psi)	Hydraulic Conductivity (cm/s)	
				Sieve Figure No.	Hydrom. Figure No.	LL (%)	PL (%)	PI (-)										
LP-263	97J372				96									114.1	17.3	5	1.1E-8	
LP-269	97J13				97									110.1	18.2	5	1.0E-8	
LP-297	97J55				98									109.9	19.0	5	1.1E-8	
LP-299	97J56				99									109.6	19.1	5	9.6E-9	
LP-300	97J57				100									114.5	17.2	5	2.6E-8	
LP-307	97J95				101									111.2	18.4	5	2.1E-8	
LP-321	97J121				102									108.4	19.5	5	6.6E-9	
LP-325	97J175				103									112.9	17.6	5	1.8E-8	
LP-326	97J176				104									108.7	19.6	5	2.9E-8	
LP-328	97J257				105									112.4	17.7	5	4.2E-9	

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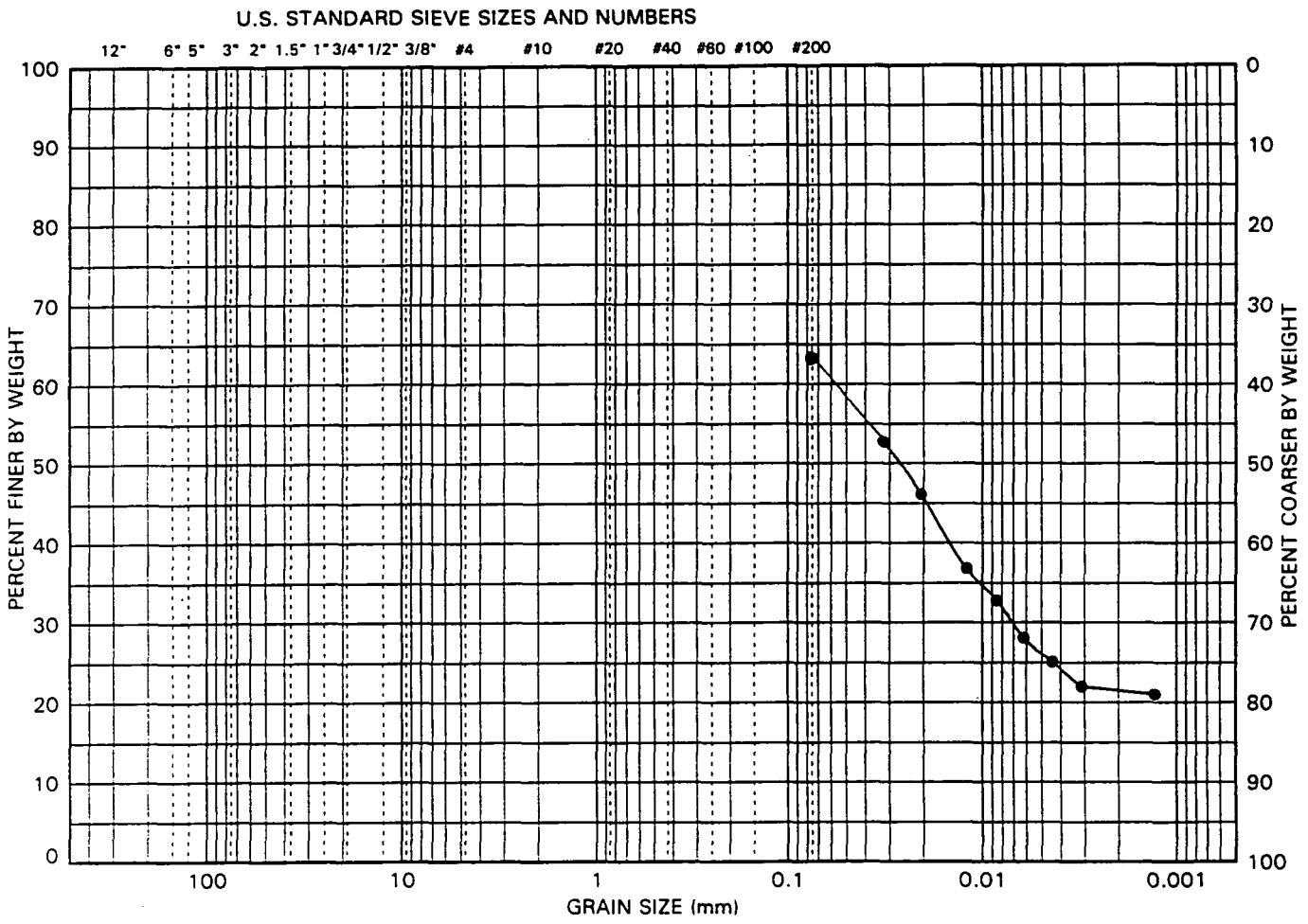
FIGURE 22
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-01	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G61	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 21.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															46	26	21	

NOTES:

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Atlanta, Georgia

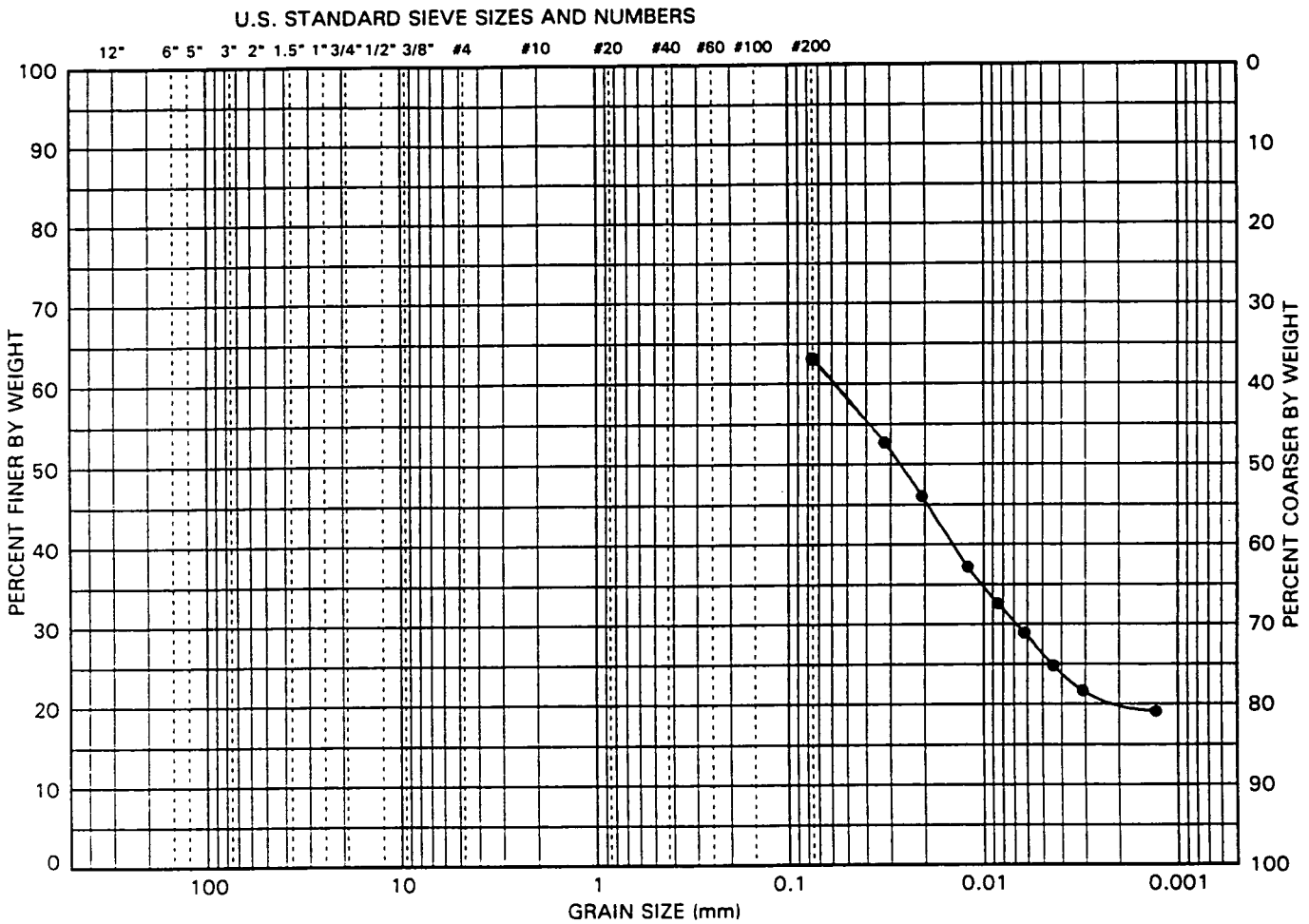
FIGURE 23

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-02	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97G62	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY(%)	20.4
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200

PERCENT PASSING SIEVE SIZES (mm)

75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
	45	26	20	

NOTES:

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Atlanta, Georgia

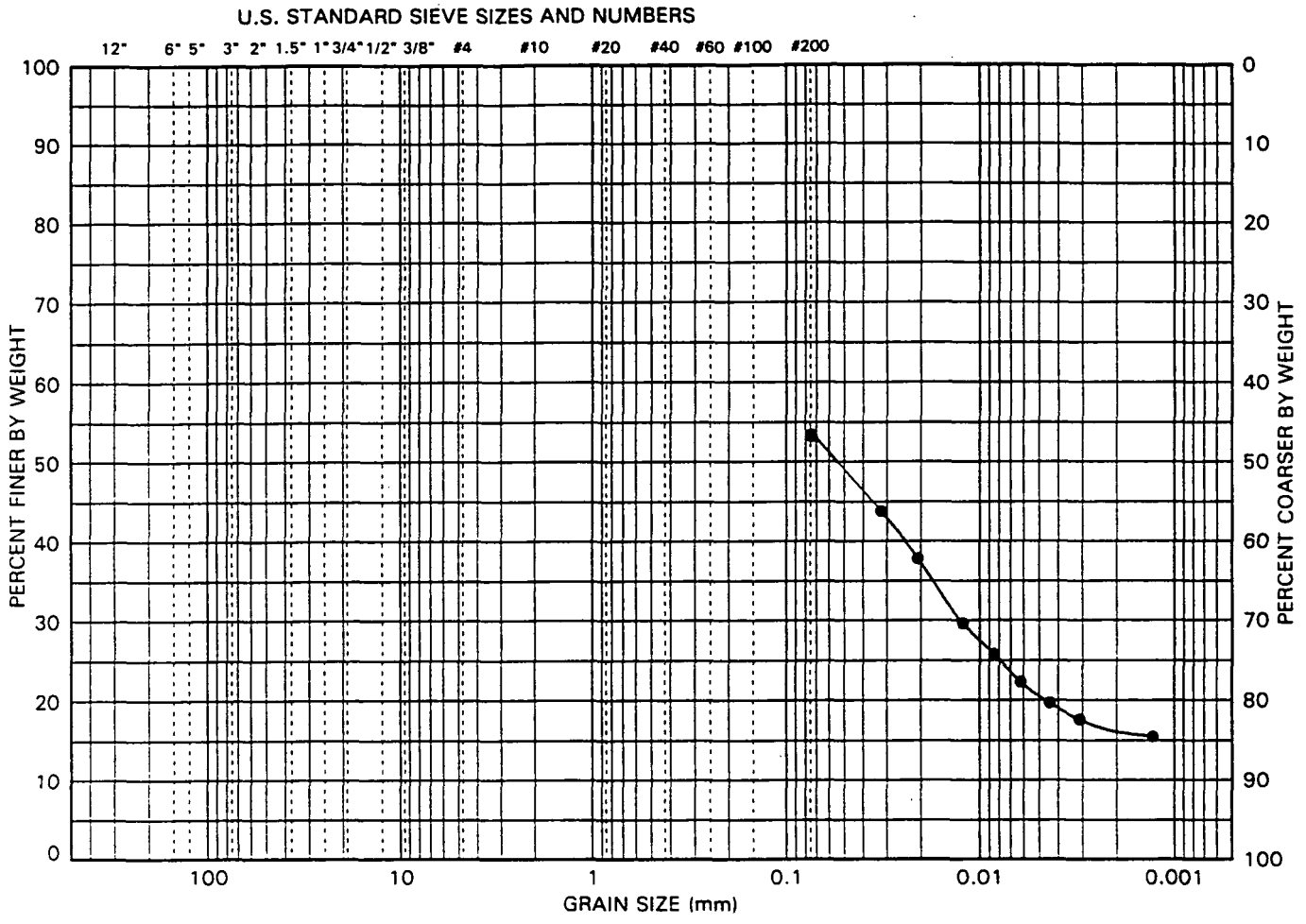
FIGURE 24

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-03	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G66	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 16.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															37	21	17	

NOTES:

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Atlanta, Georgia

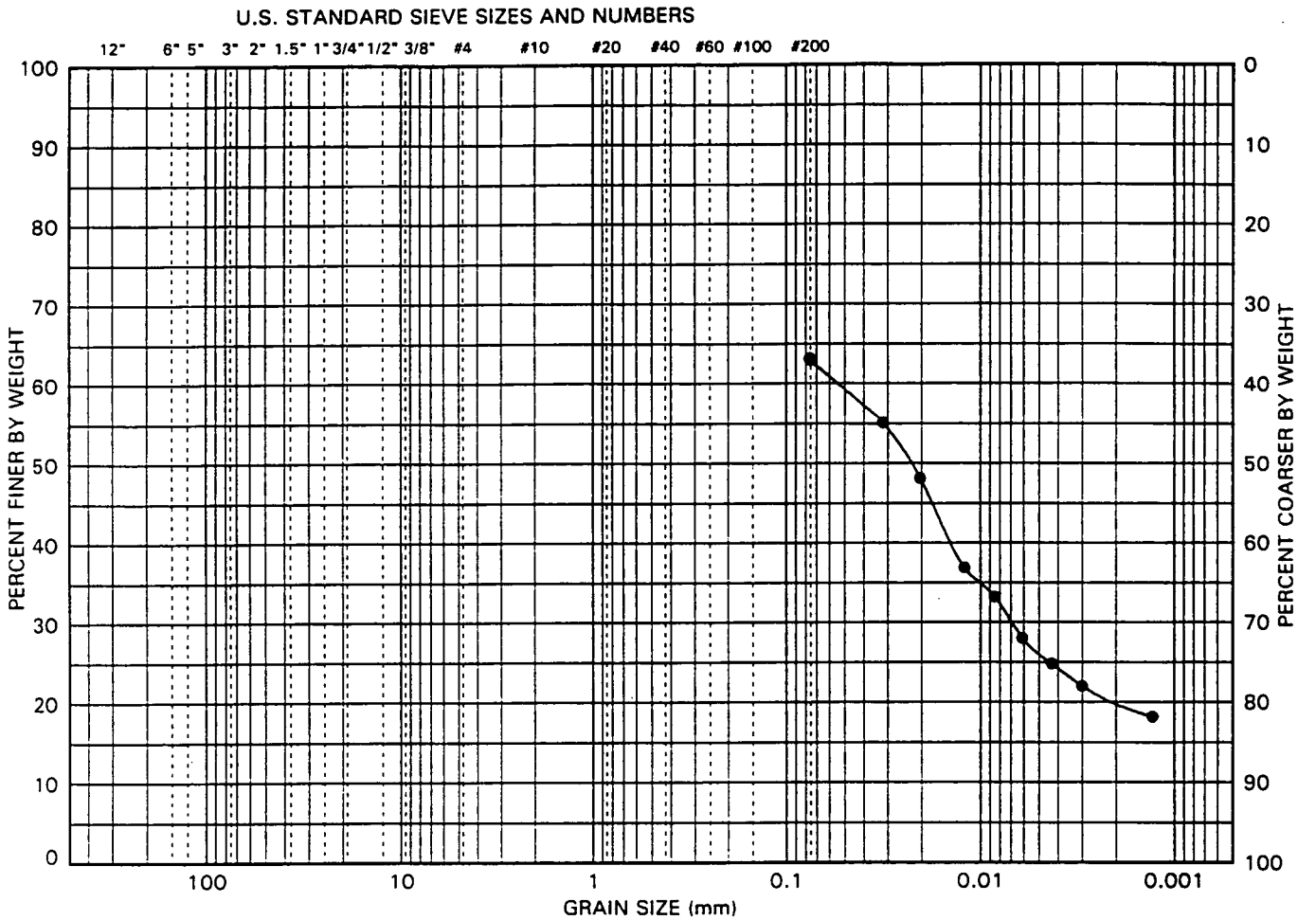
FIGURE 25

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-04	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97G67	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY(%)	20.2
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															48	26	20	

NOTES:

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Atlanta, Georgia

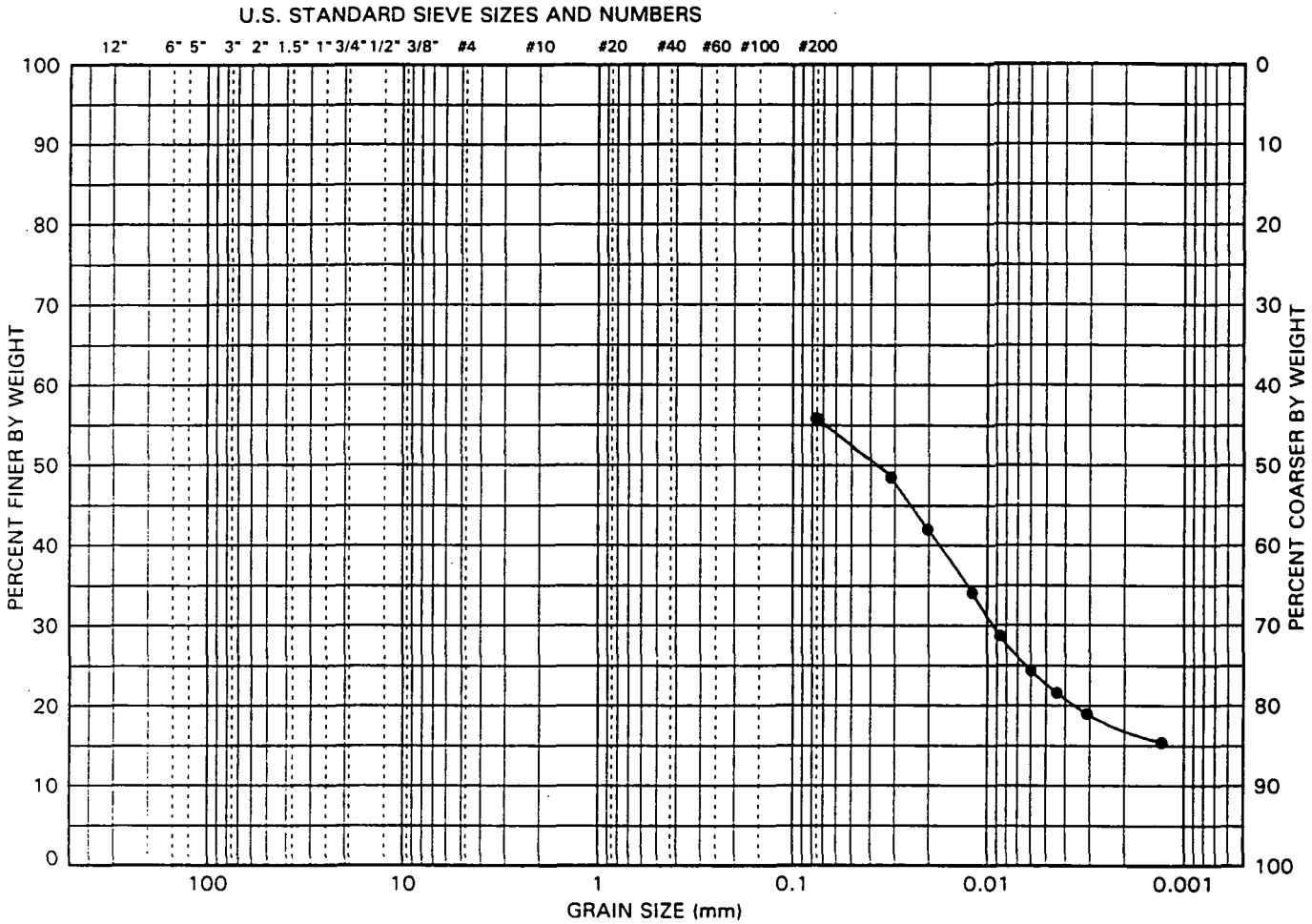
FIGURE 26

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-05	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97G81	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY(%)	17.2
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200

PERCENT PASSING SIEVE SIZES (mm)

75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
	42	23	17	

NOTES:

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Atlanta, Georgia

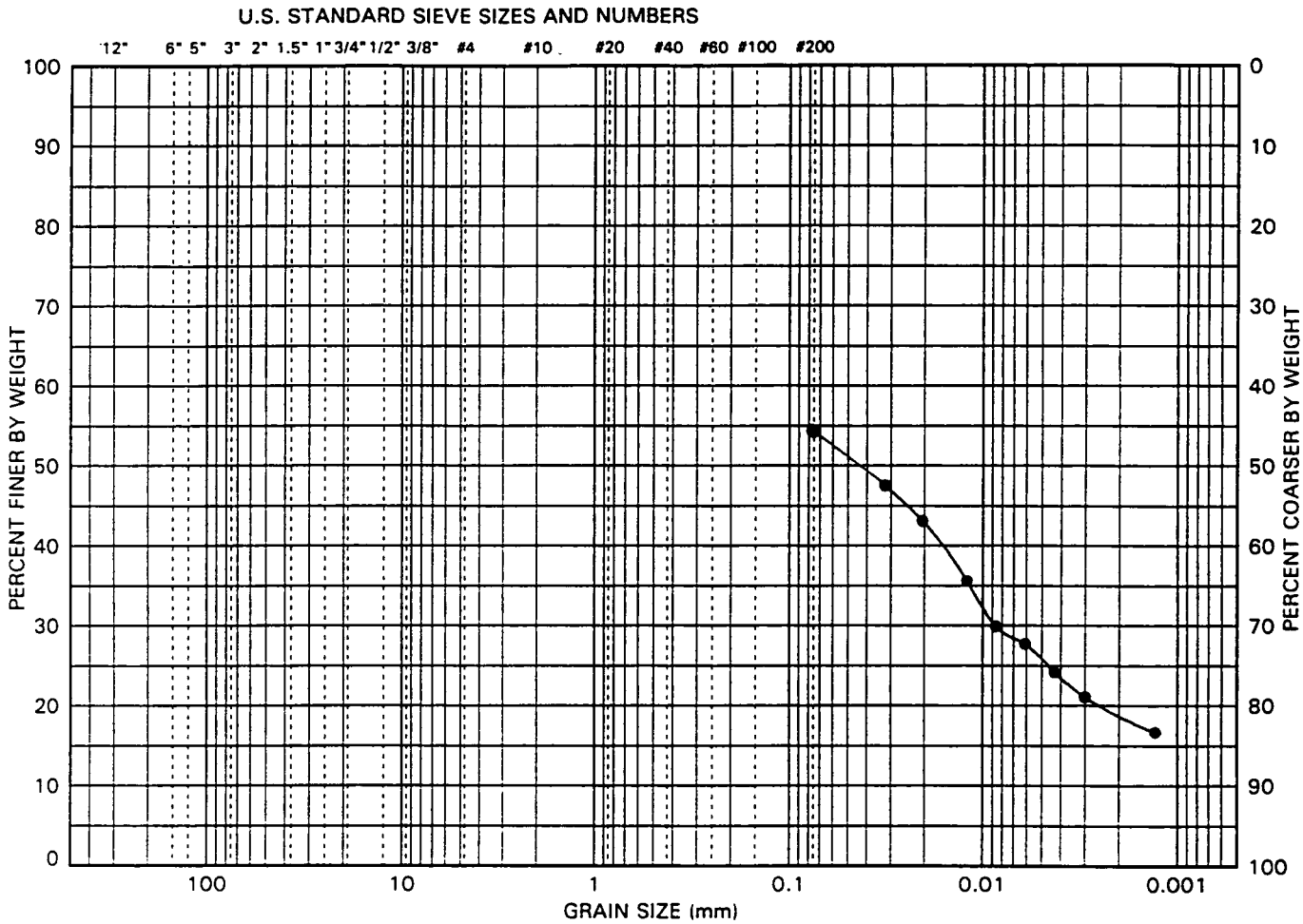
FIGURE 27

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-06	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G107	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 19.0
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															43	26	19	

NOTES:

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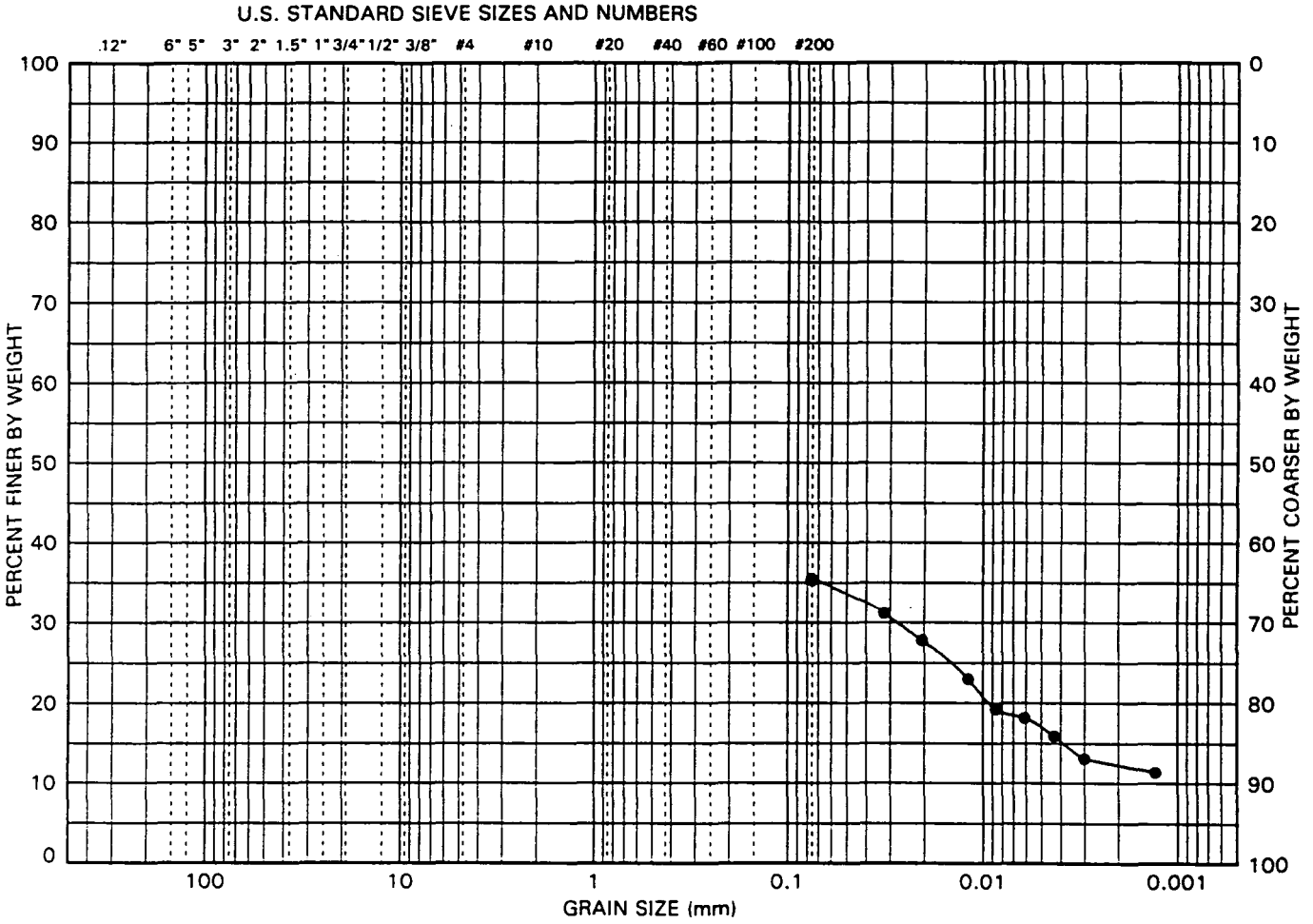
FIGURE 28

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-07	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G128	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 12.3
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															28	17	12	

NOTES:

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Atlanta, Georgia

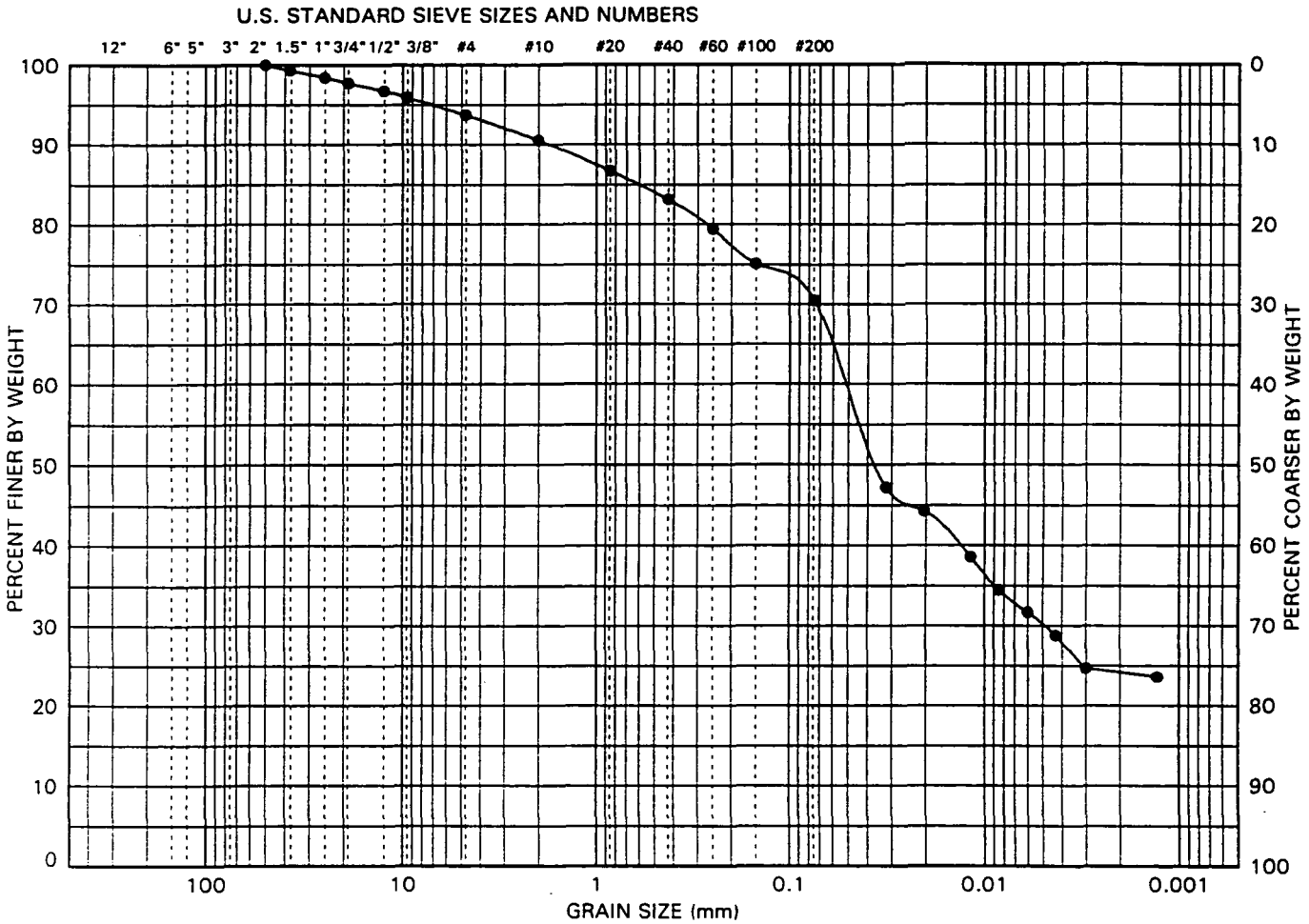
FIGURE 29

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/04/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-07.1	LIQUID LIMIT (%)	38	SOIL FRACTIONS: GRAVEL (%)	6.3
LAB. SAMPLE NO.	97G223	PLASTIC LIMIT (%)	18	SAND (%)	23.2
SAMPLE DEPTH (ft)		PLASTICITY INDEX	20	FINES (%)	70.5
SOIL CLASSIFICATION: CL - Sandy Lean Clay				SILT (%)	46.3
				CLAY(%)	24.2
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	99	98	98	97	96	94	91	87	83	79	75	71	59	44	30	24	

NOTES:

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FIGURE 30

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 08/05/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A / D 4718

SITE SAMPLE ID	LP-07.1
LAB. SAMPLE NO.	97G223
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	119.0
OPTIMUM MOISTURE CONTENT (%)	14.5
IN SITU MOISTURE CONTENT (%)	

NOTES:

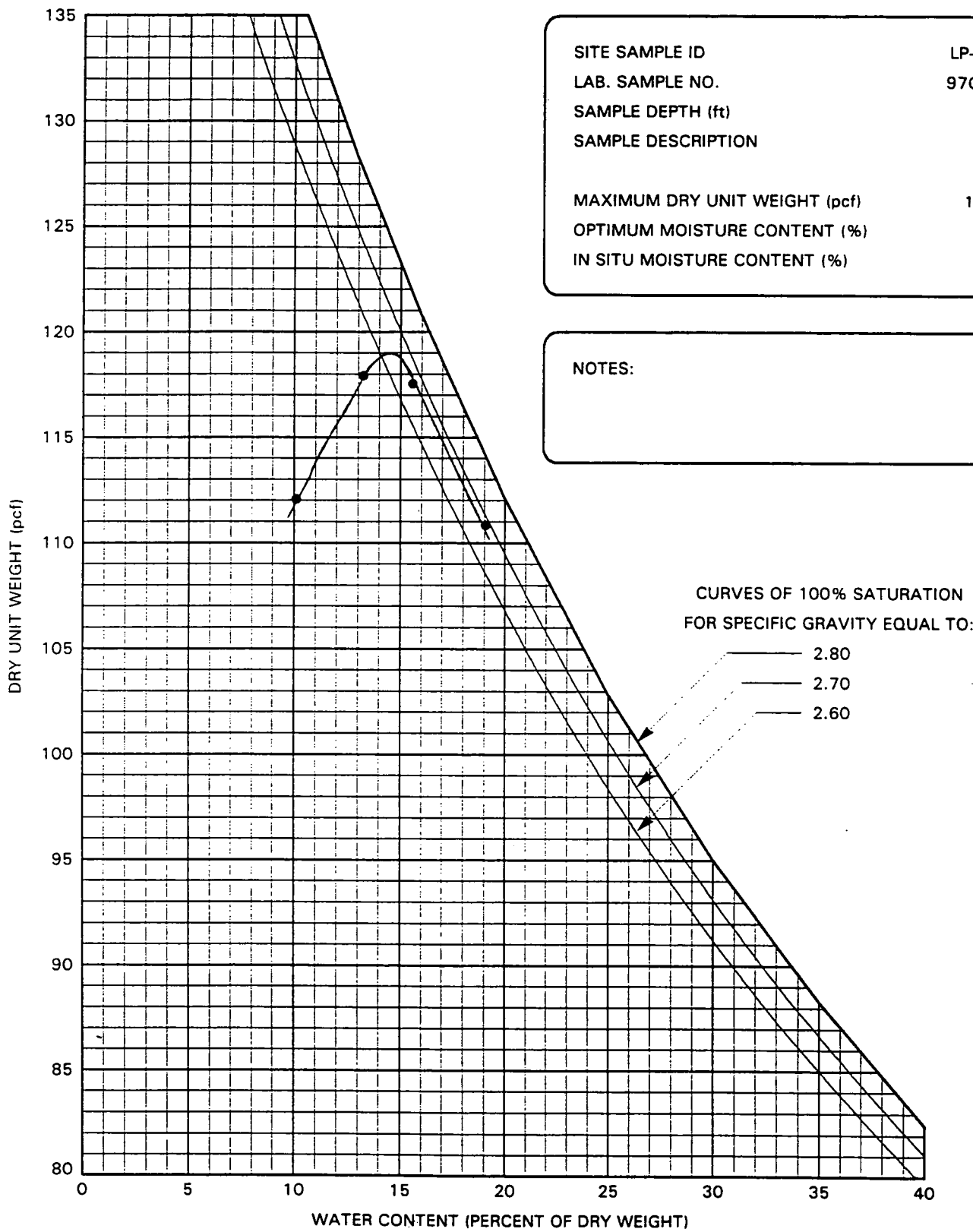

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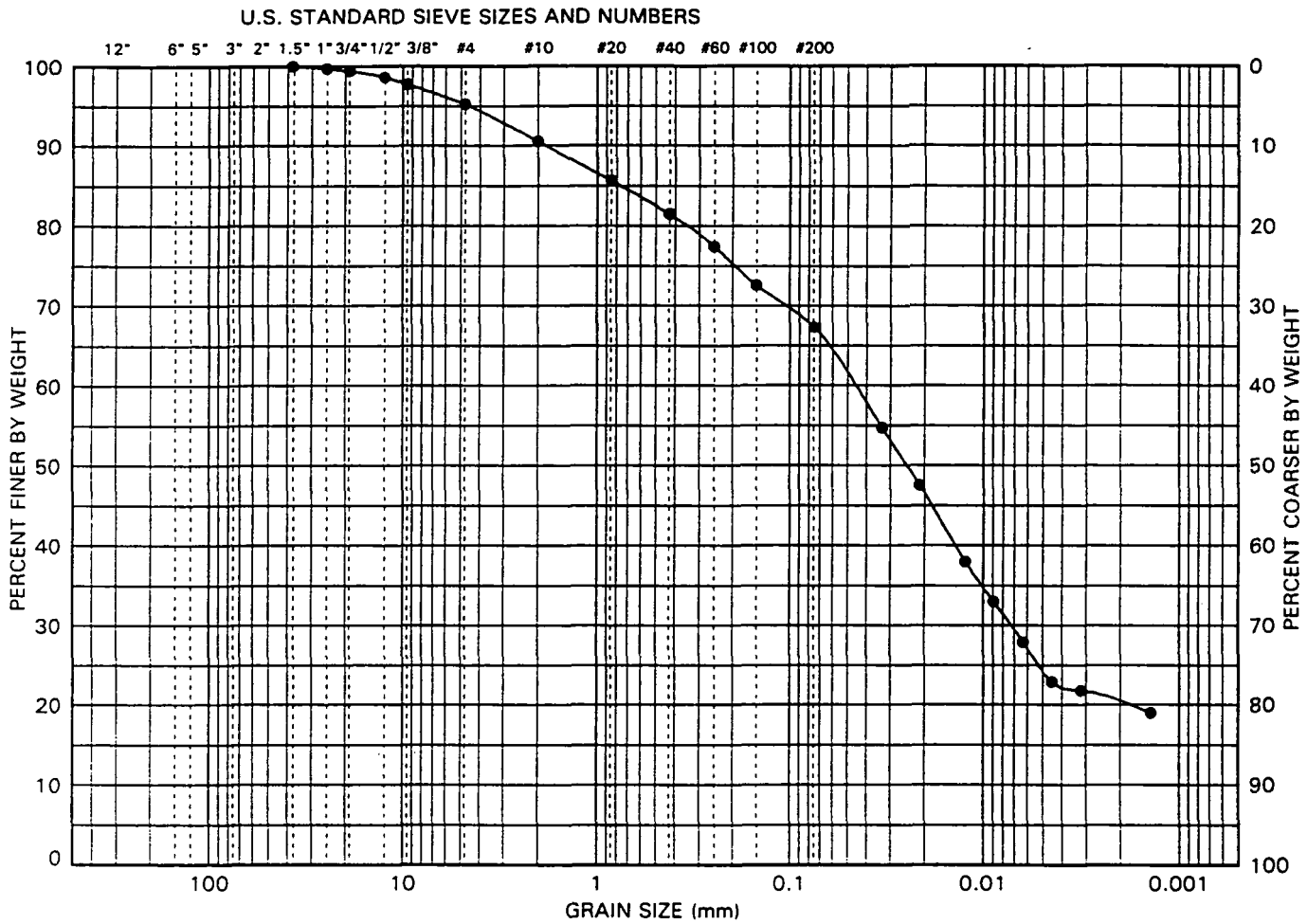
FIGURE 31
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/04/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-07.2	LIQUID LIMIT (%)	35	SOIL FRACTIONS	GRAVEL (%) 4.8
LAB. SAMPLE NO.	97G224	PLASTIC LIMIT (%)	19		SAND (%) 27.9
SAMPLE DEPTH (ft)		PLASTICITY INDEX	16		FINES (%) 67.3
SOIL CLASSIFICATION: CL - Sandy Lean Clay					SILT (%) 47.1
					CLAY(%) 20.2
					COEFF. UNIFORMITY (Cu)
					COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	99	99	98	95	91	86	82	77	73	67	61	46	24	20	

NOTES:

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FIGURE 32

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 08/04/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-07.2
LAB. SAMPLE NO.	97G224
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	117.4
OPTIMUM MOISTURE CONTENT (%)	14.0
IN SITU MOISTURE CONTENT (%)	

NOTES:

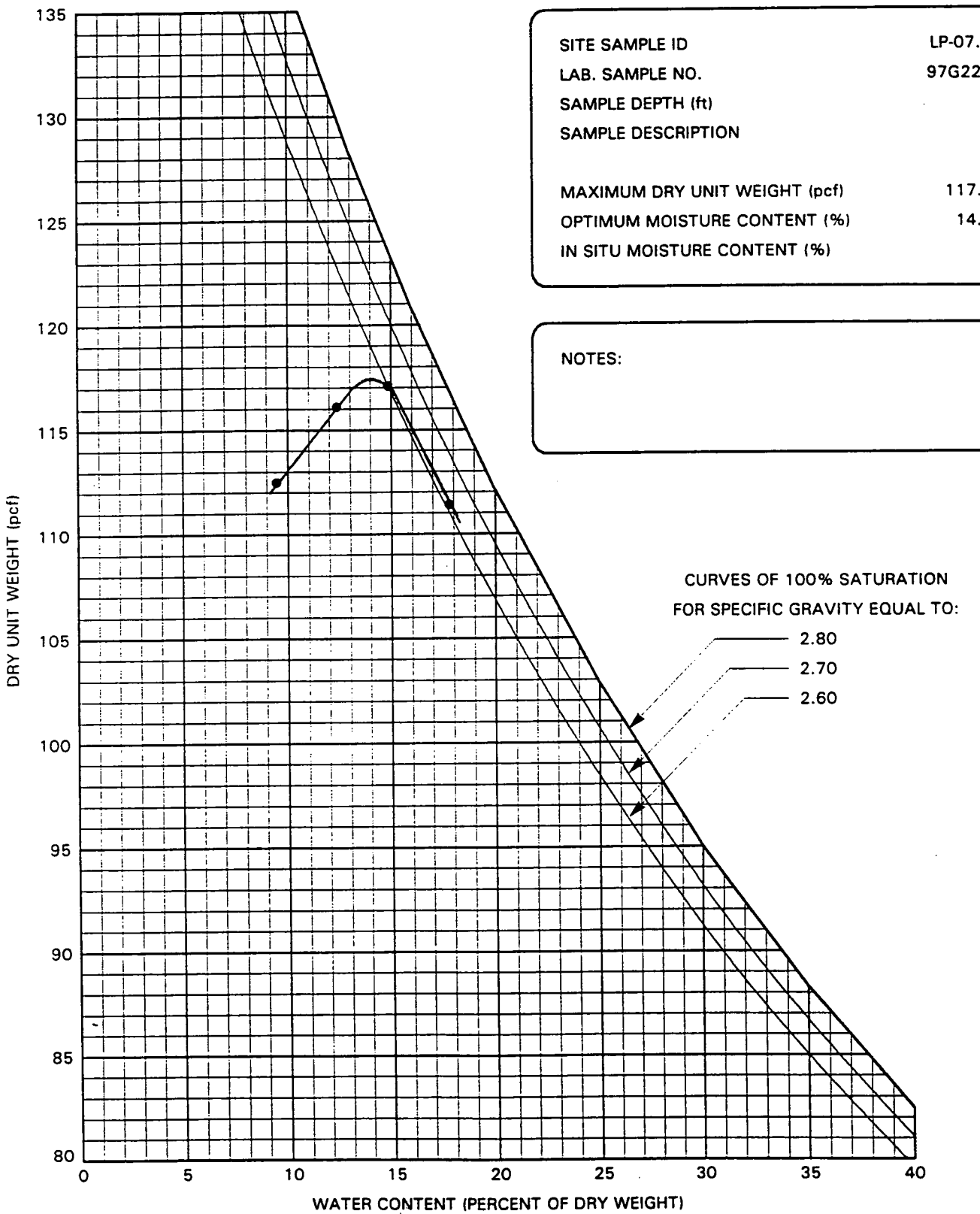

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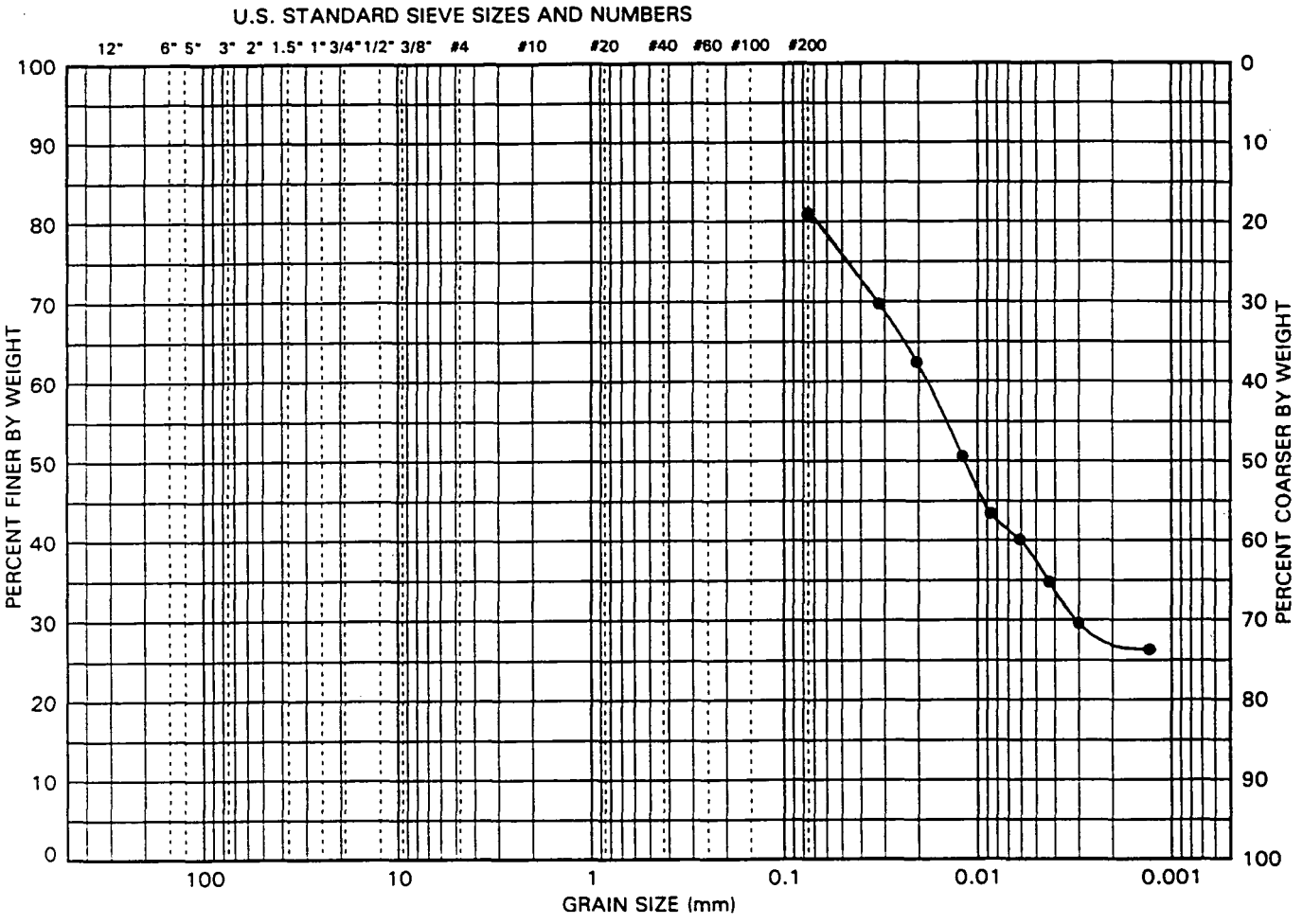
FIGURE 33
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-08	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G129	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 28.0
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															62	37	28	

NOTES:

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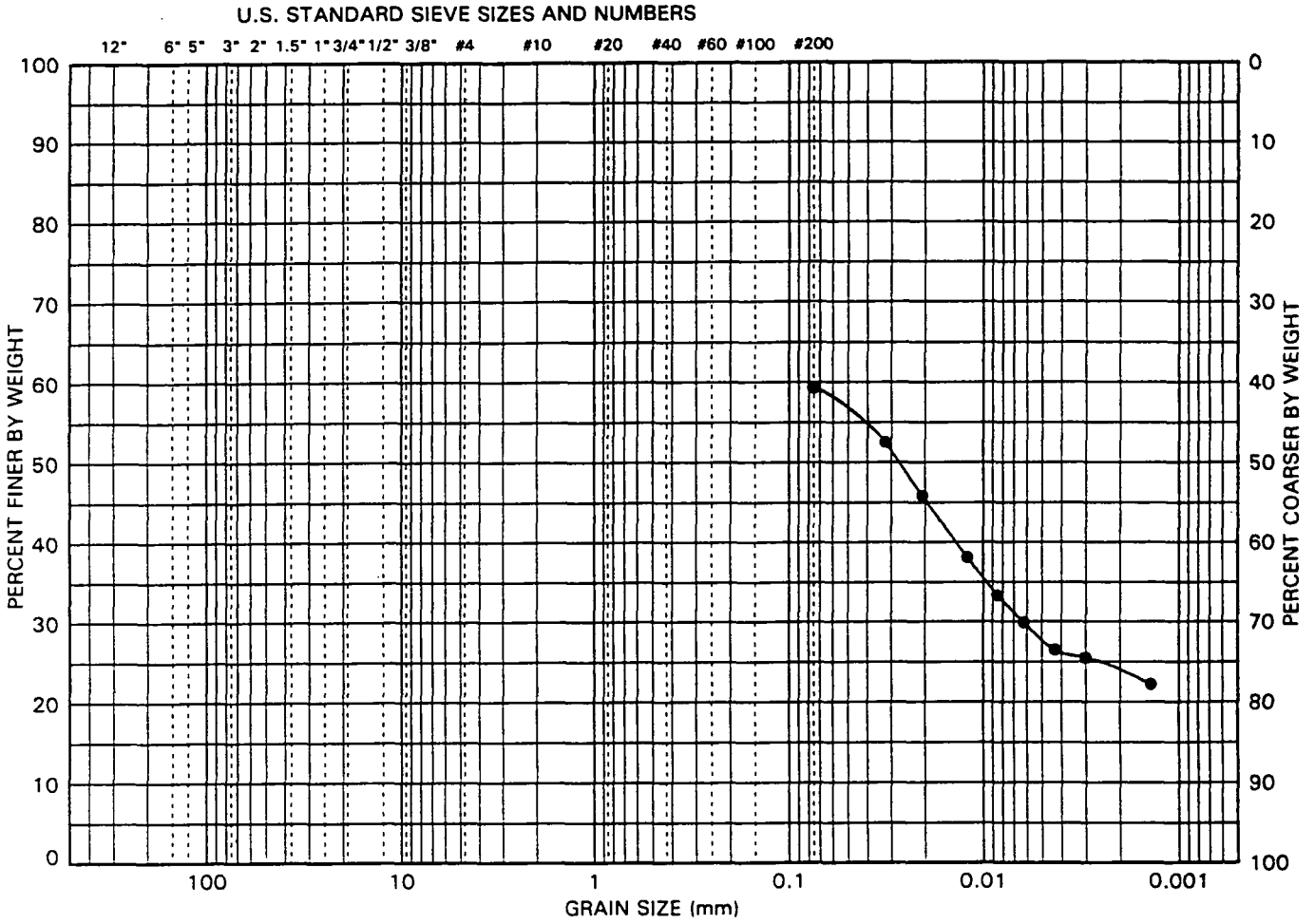
FIGURE 34
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-09	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G130	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 23.7
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															45	28	24	

NOTES:

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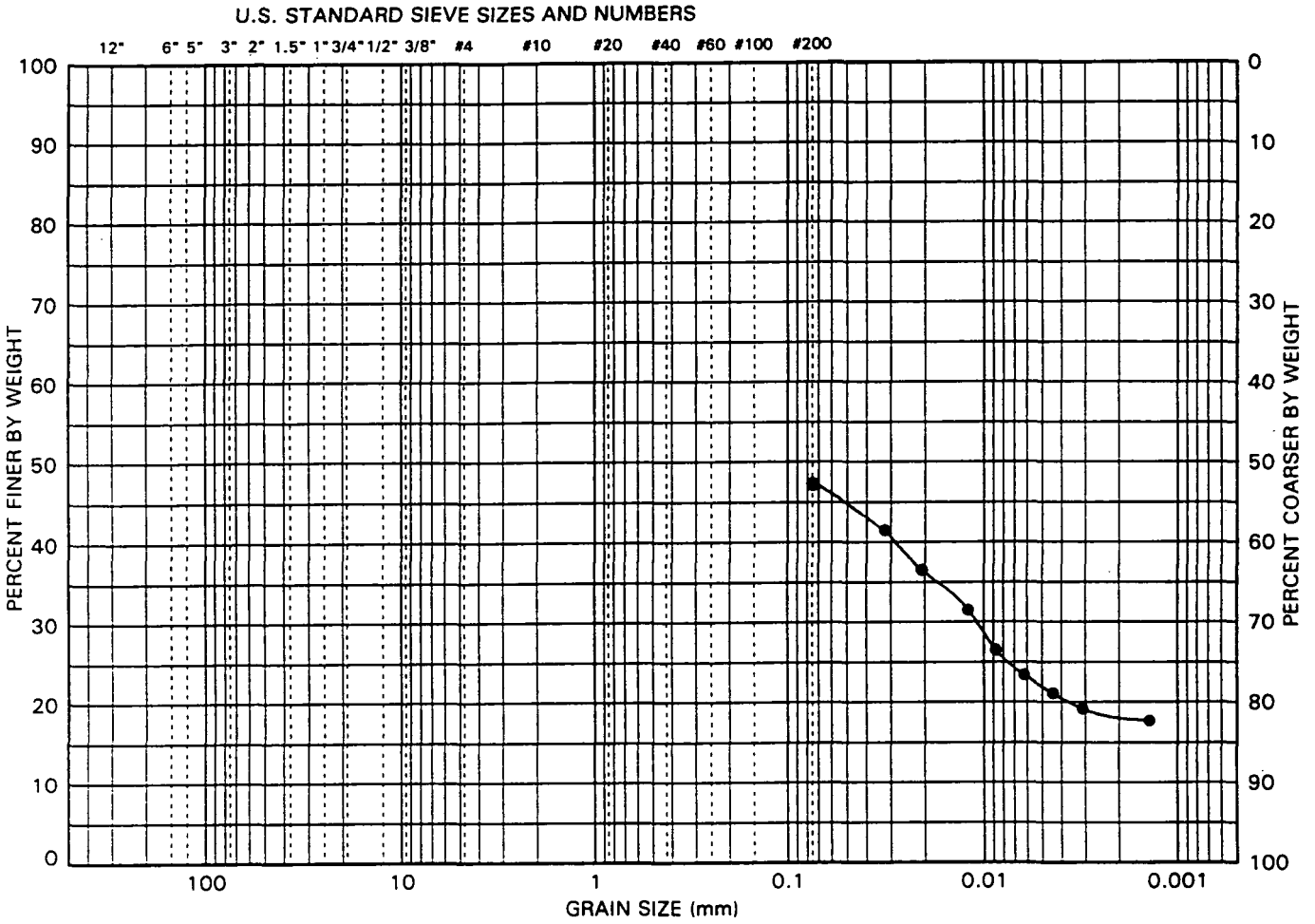
FIGURE 35

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-10	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G146	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 18.4
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															36	22	18	

NOTES:

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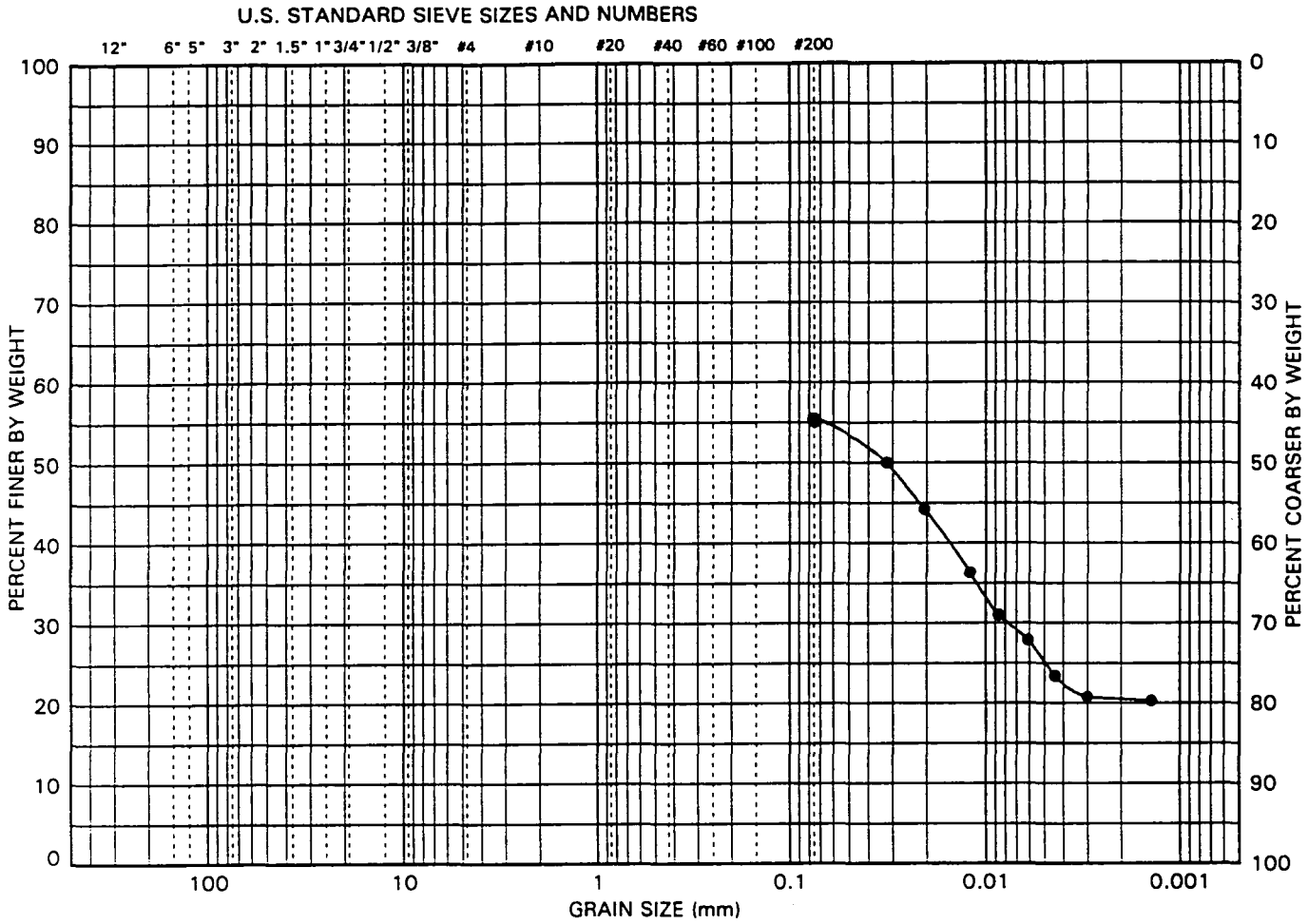
FIGURE 36

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-11	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G147	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 20.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															44	25	21	

NOTES:

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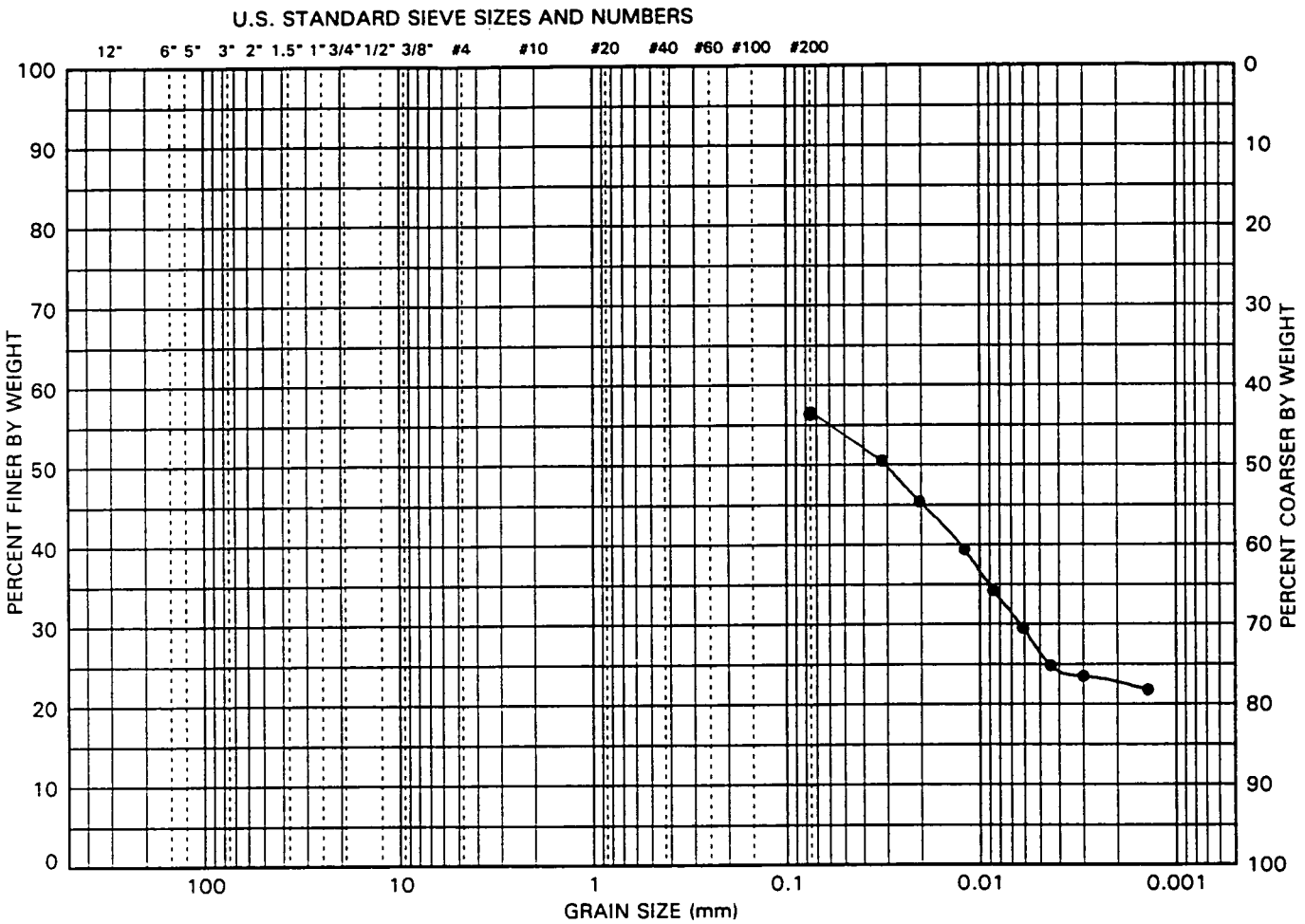
FIGURE 37

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-12	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G164	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 22.6
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															45	27	23	

NOTES:

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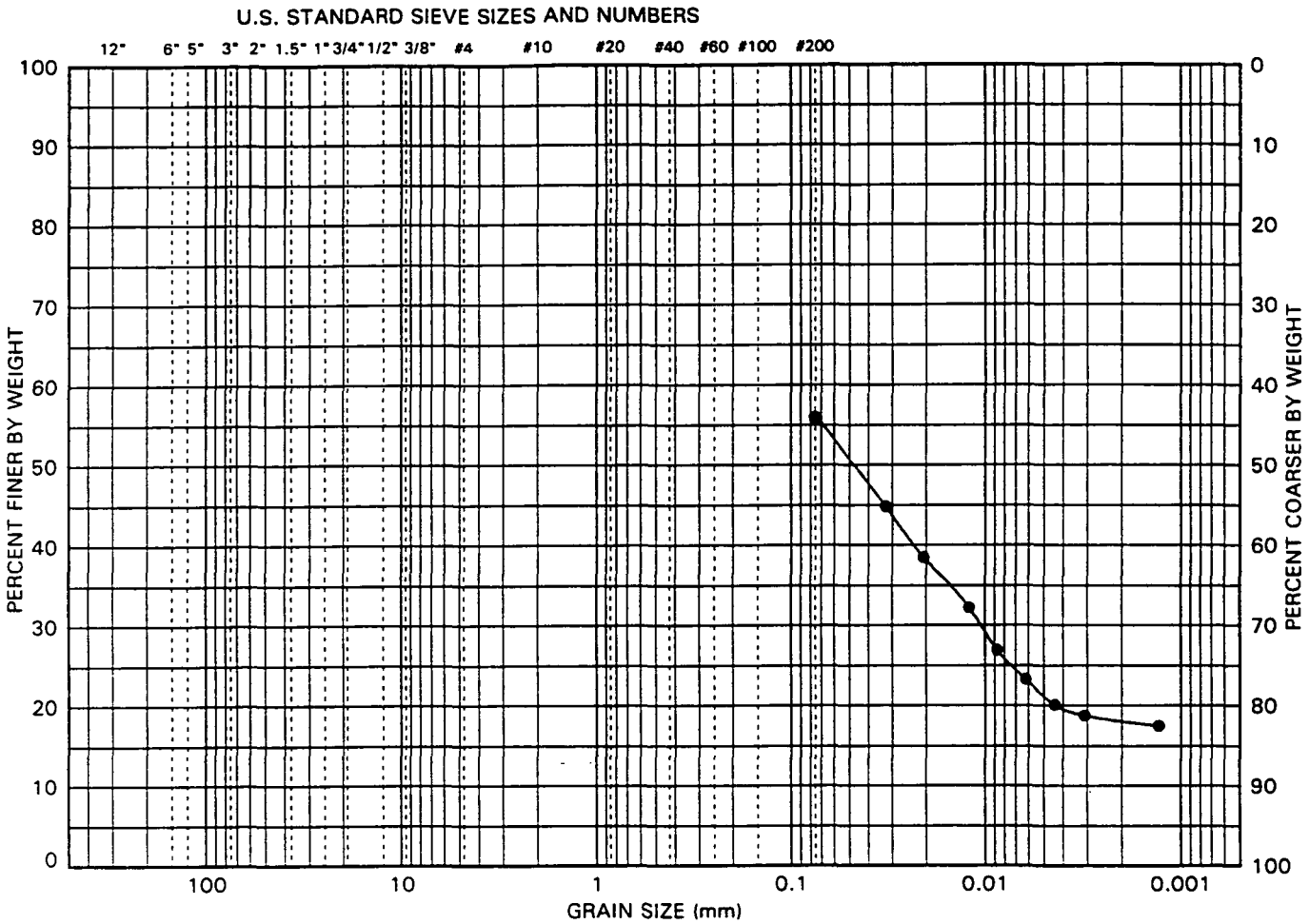
FIGURE 38

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-13	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G165	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 18.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															38	21	18	

NOTES:

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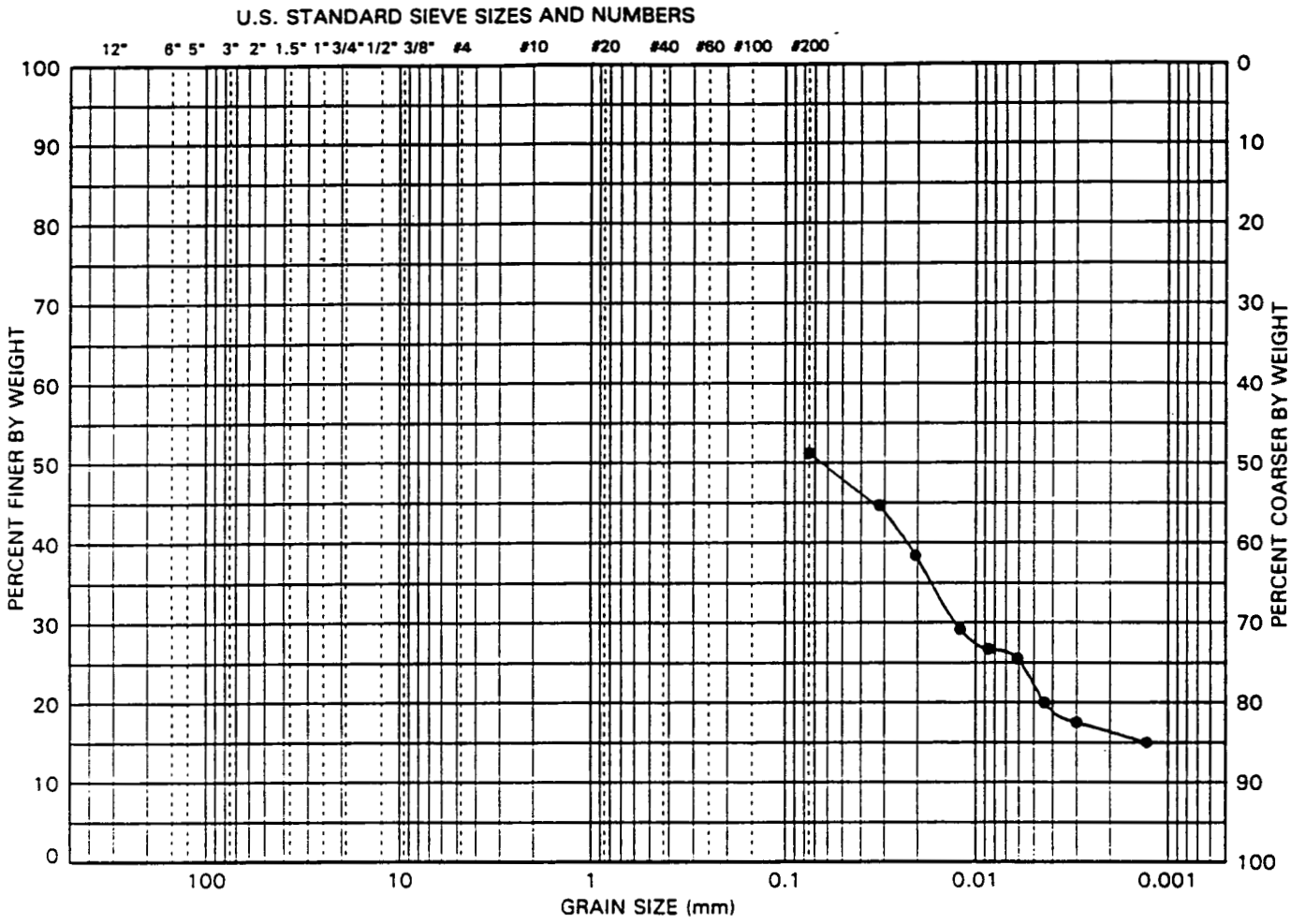
FIGURE 39
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/01/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-14	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G166	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 16.3
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															38	22	16	

NOTES:

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Atlanta, Georgia

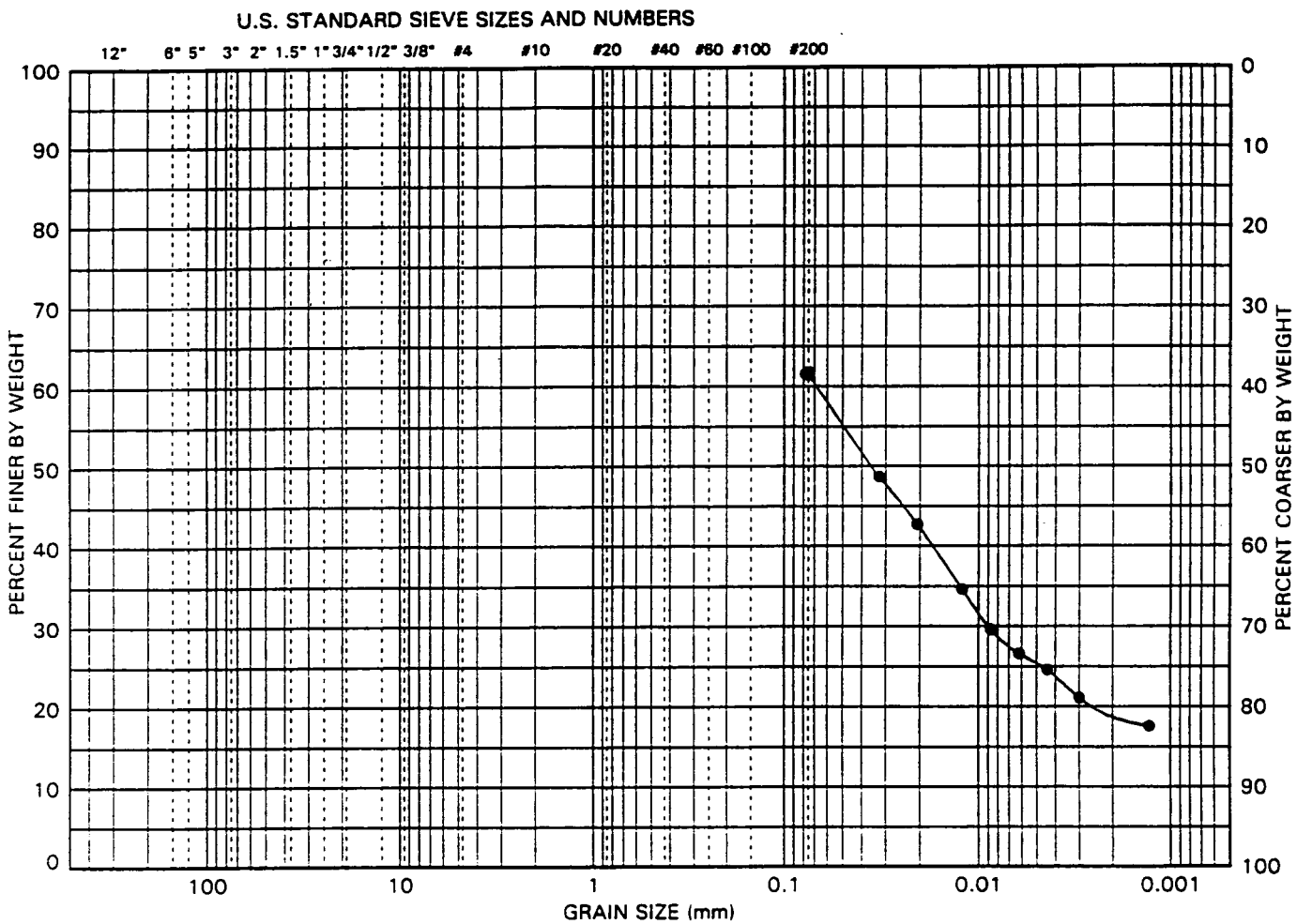
FIGURE 40

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/01/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-15	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G167	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 19.4
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															42	25	19	

NOTES:

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Atlanta, Georgia

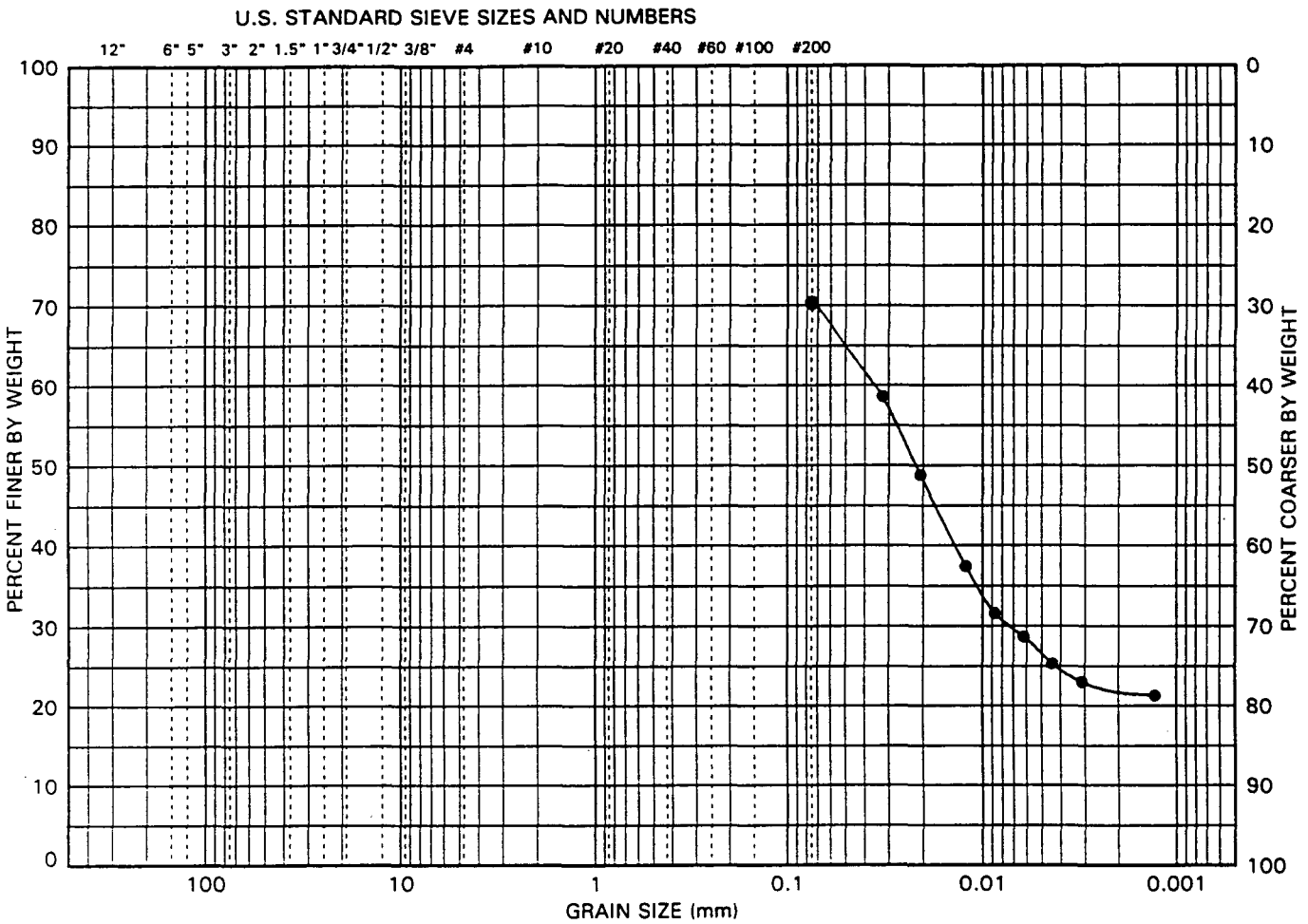
FIGURE 41

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-16	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G168	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
-				CLAY(%) 22.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															48	27	22	

NOTES:

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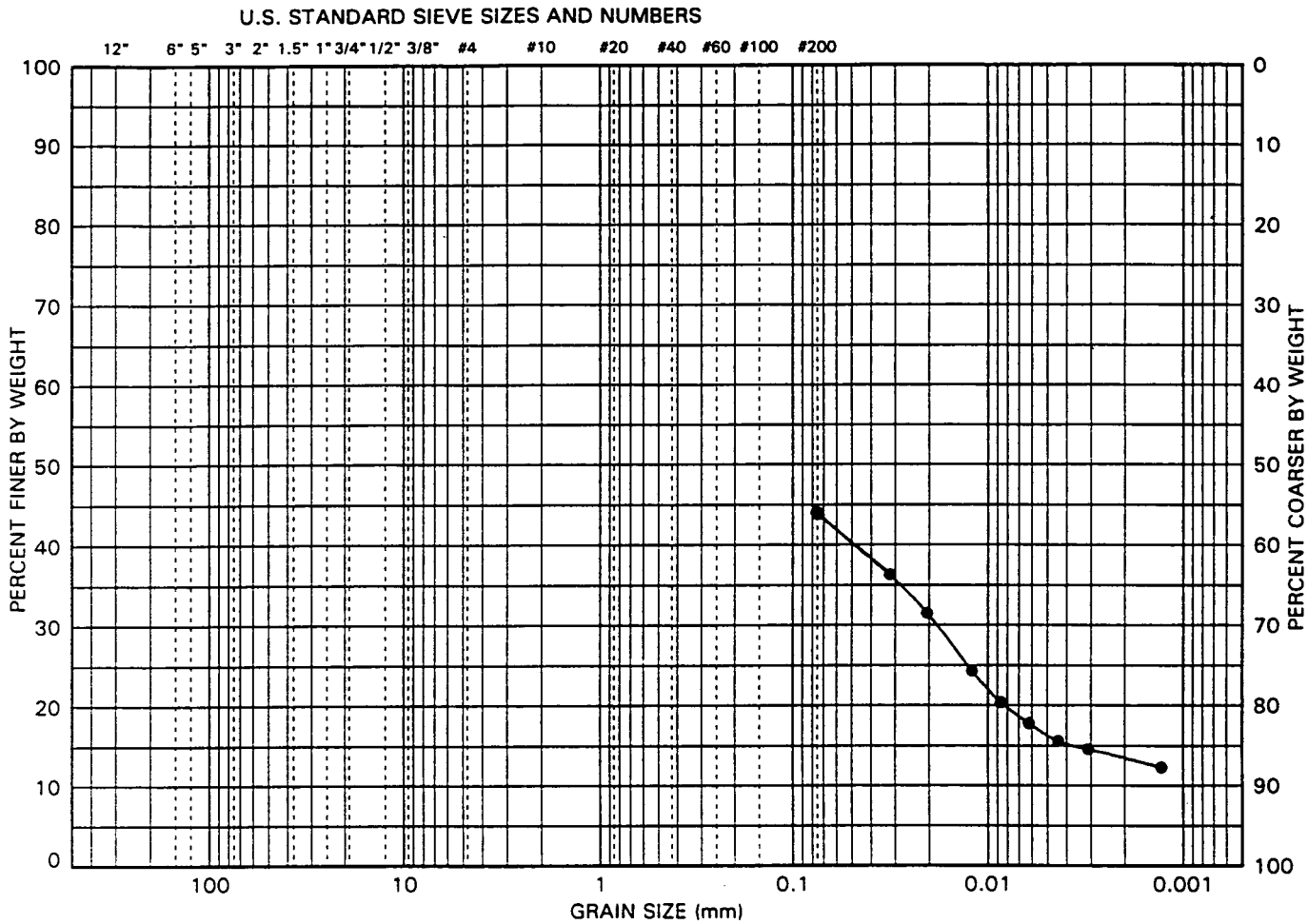
FIGURE 42

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-17	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G187	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 13.4
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															31	16	13	

NOTES:

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Atlanta, Georgia

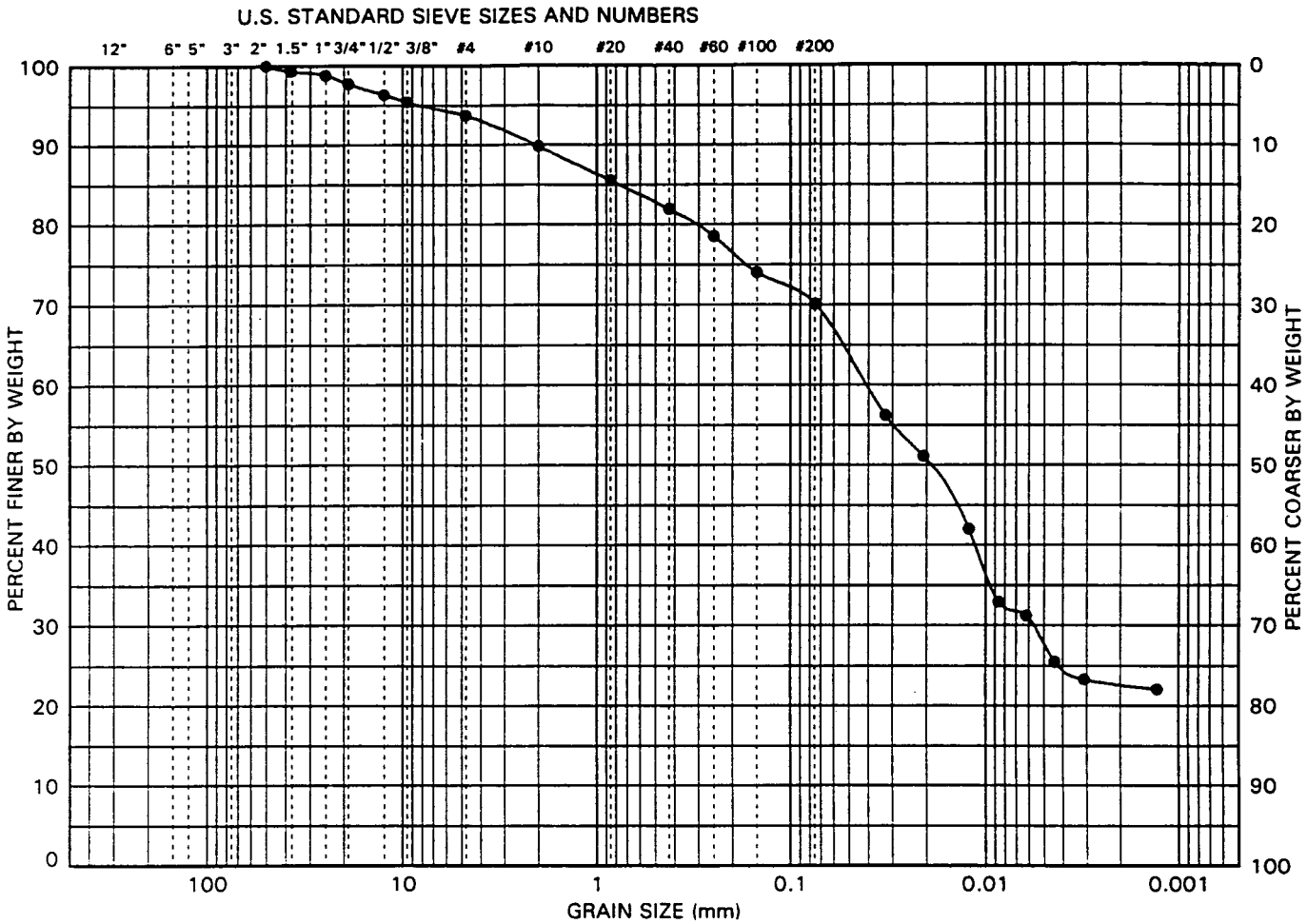
FIGURE 43

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-17.1	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%) 6.3
LAB. SAMPLE NO.	97H278	PLASTIC LIMIT (%)		SAND (%) 23.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%) 70.1
SOIL CLASSIFICATION:				SILT (%) 47.4
				CLAY(%) 22.7
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	99	99	98	96	95	94	90	86	82	79	74	70	63	50	28	23	

NOTES:

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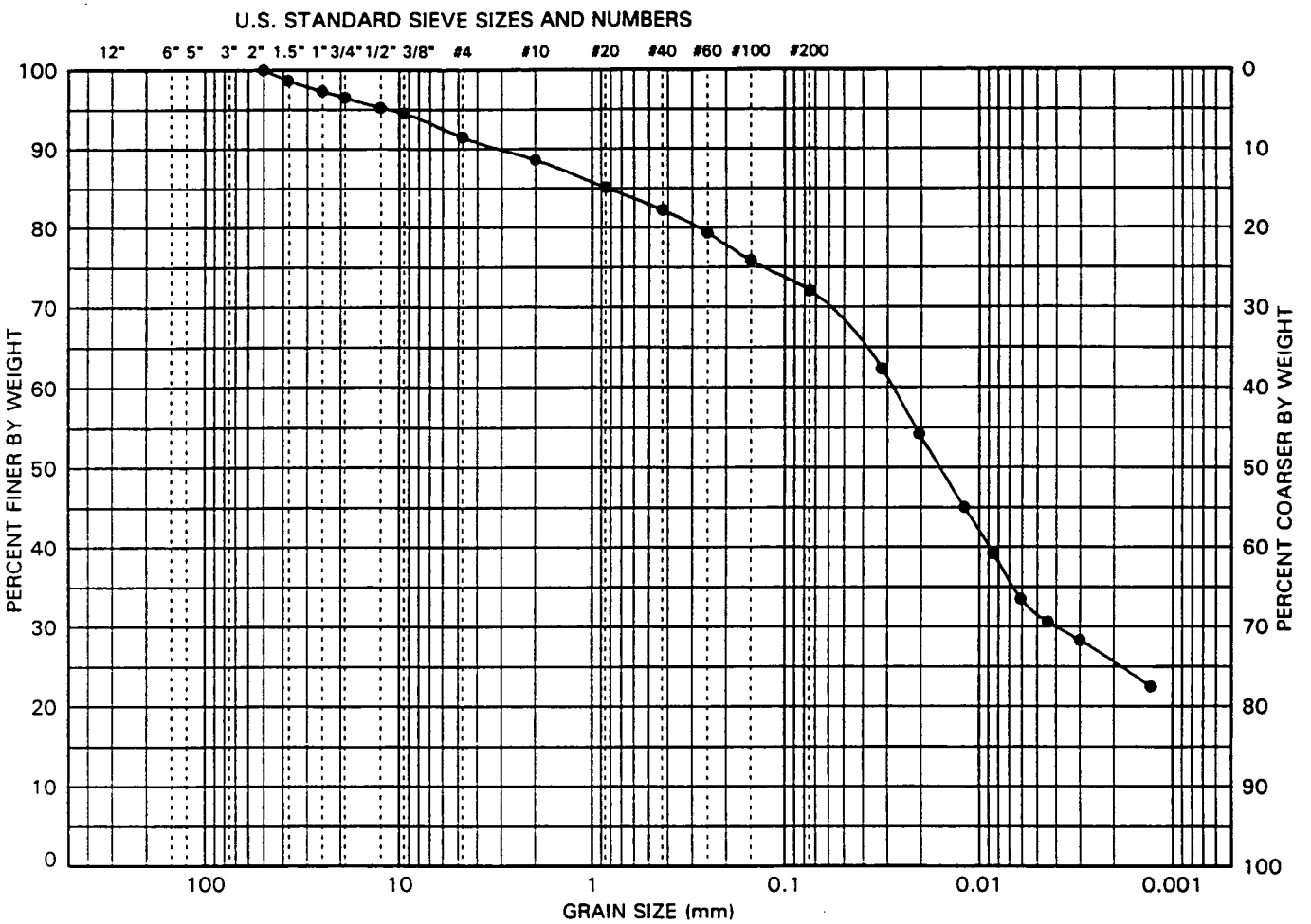
FIGURE 44

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/28/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-17.2	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	8.5
LAB. SAMPLE NO.	97H279	PLASTIC LIMIT (%)		SAND (%)	19.5
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	72.0
SOIL CLASSIFICATION:				SILT (%)	46.5
				CLAY(%)	25.5
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	99	97	97	95	95	92	89	85	82	79	76	72	67	54	32	25	

NOTES:

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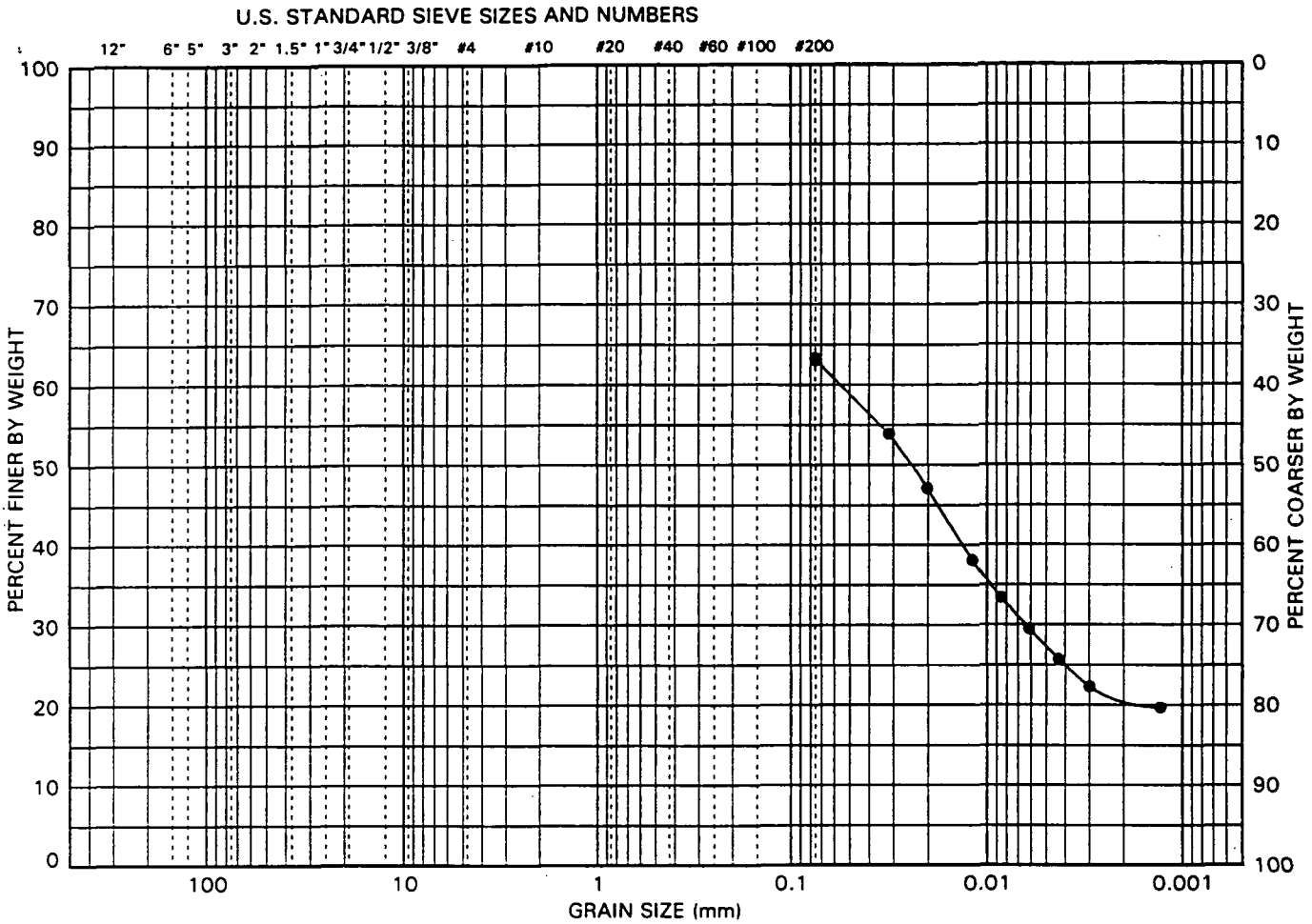
FIGURE 45

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-18	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97G188	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY(%)	21.0
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200

PERCENT PASSING SIEVE SIZES (mm)

75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
	47	27	21	

NOTES:

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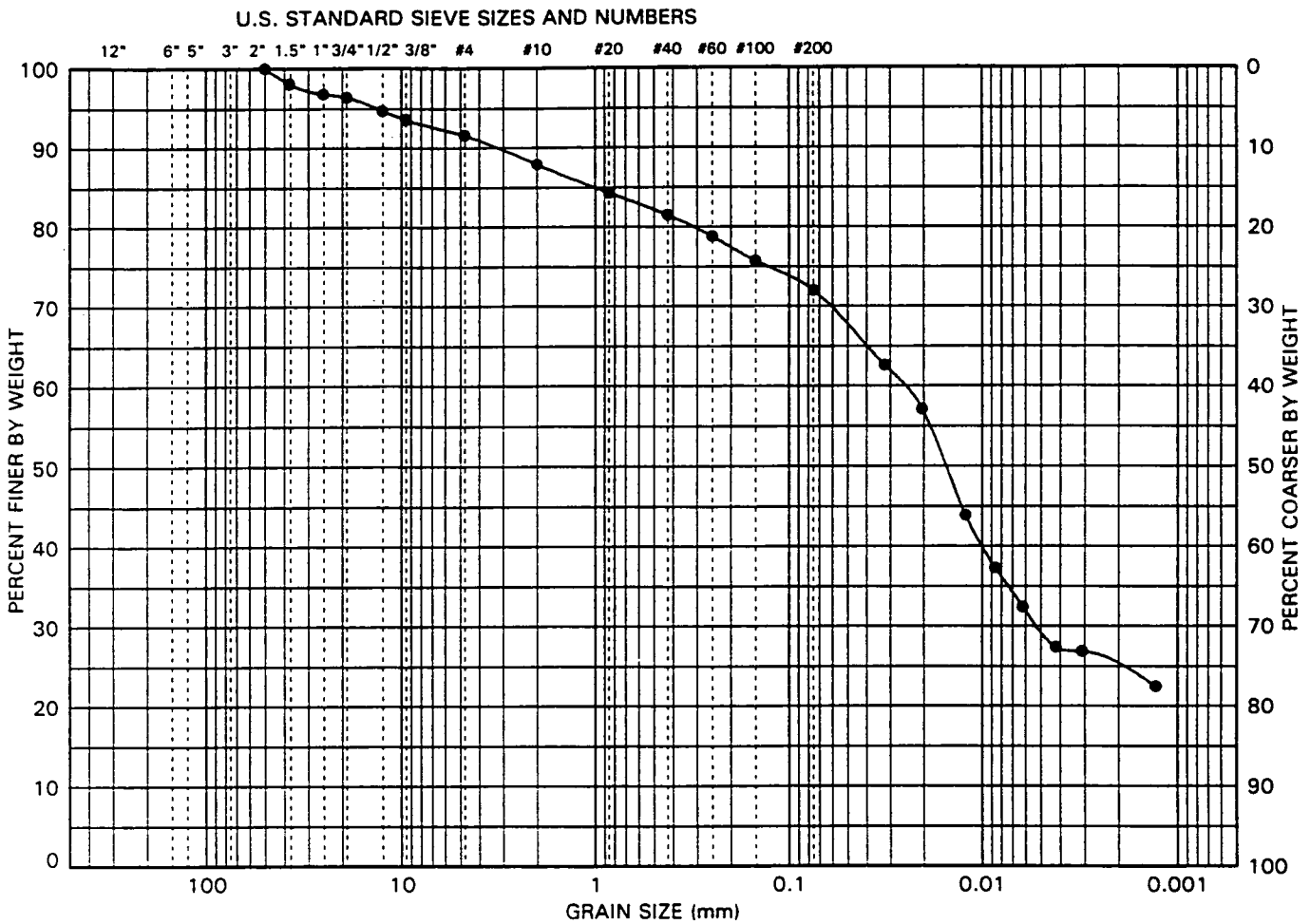
FIGURE 46
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-18.2	LIQUID LIMIT (%)	35	SOIL FRACTIONS: GRAVEL (%)	8.4
LAB. SAMPLE NO.	97H281	PLASTIC LIMIT (%)	18	SAND (%)	19.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX	17	FINES (%)	72.0
SOIL CLASSIFICATION:				SILT (%)	47.3
CL - Lean Clay with Sand				CLAY(%)	24.7
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	98	97	96	95	94	92	88	84	82	79	76	72	68	56	30	25	

NOTES:

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FIGURE 47

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 08/27/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A / D-4718

SITE SAMPLE ID	LP-18.2
LAB. SAMPLE NO.	97H281
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	119.5
OPTIMUM MOISTURE CONTENT (%)	13.2
IN SITU MOISTURE CONTENT (%)	

NOTES:

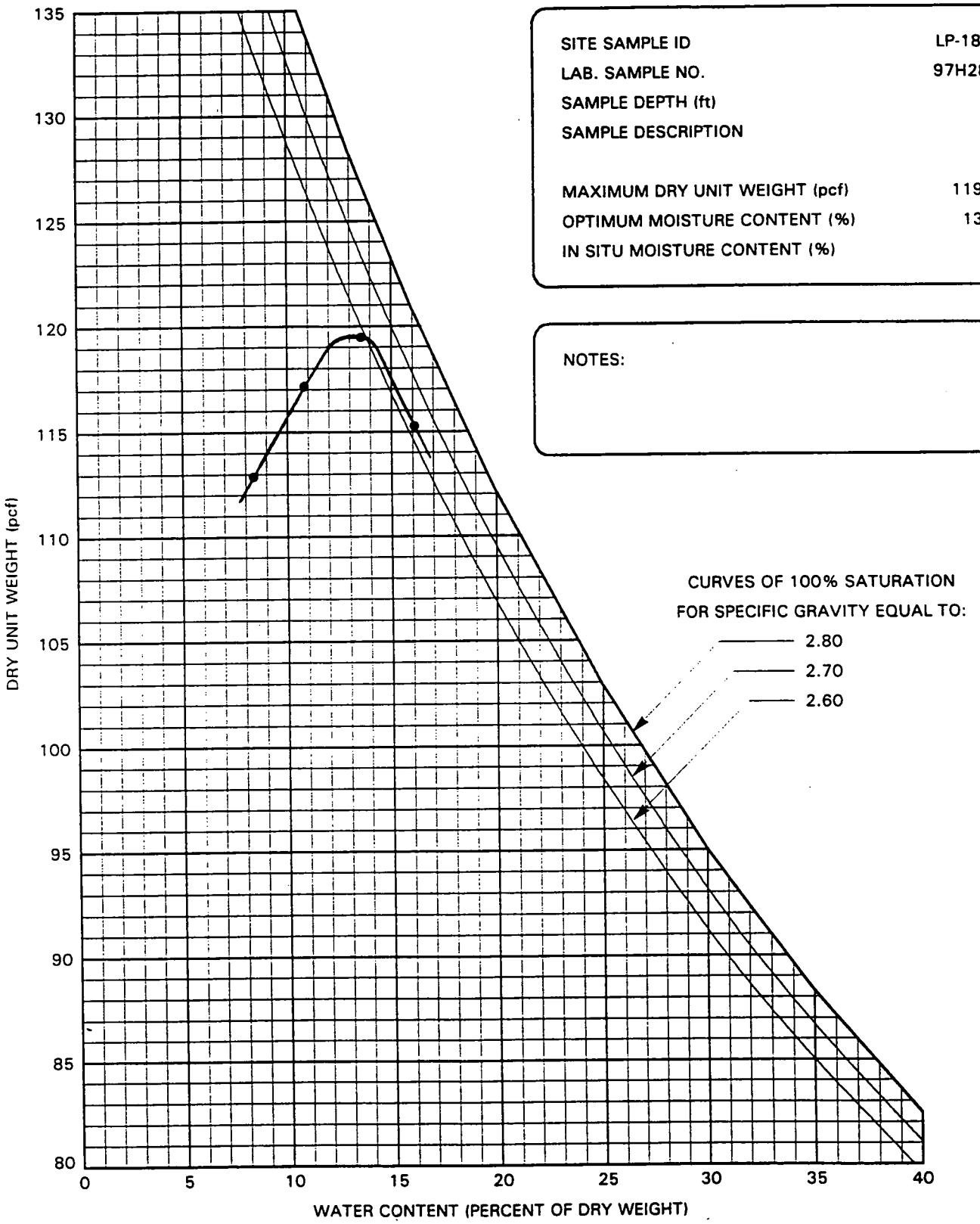

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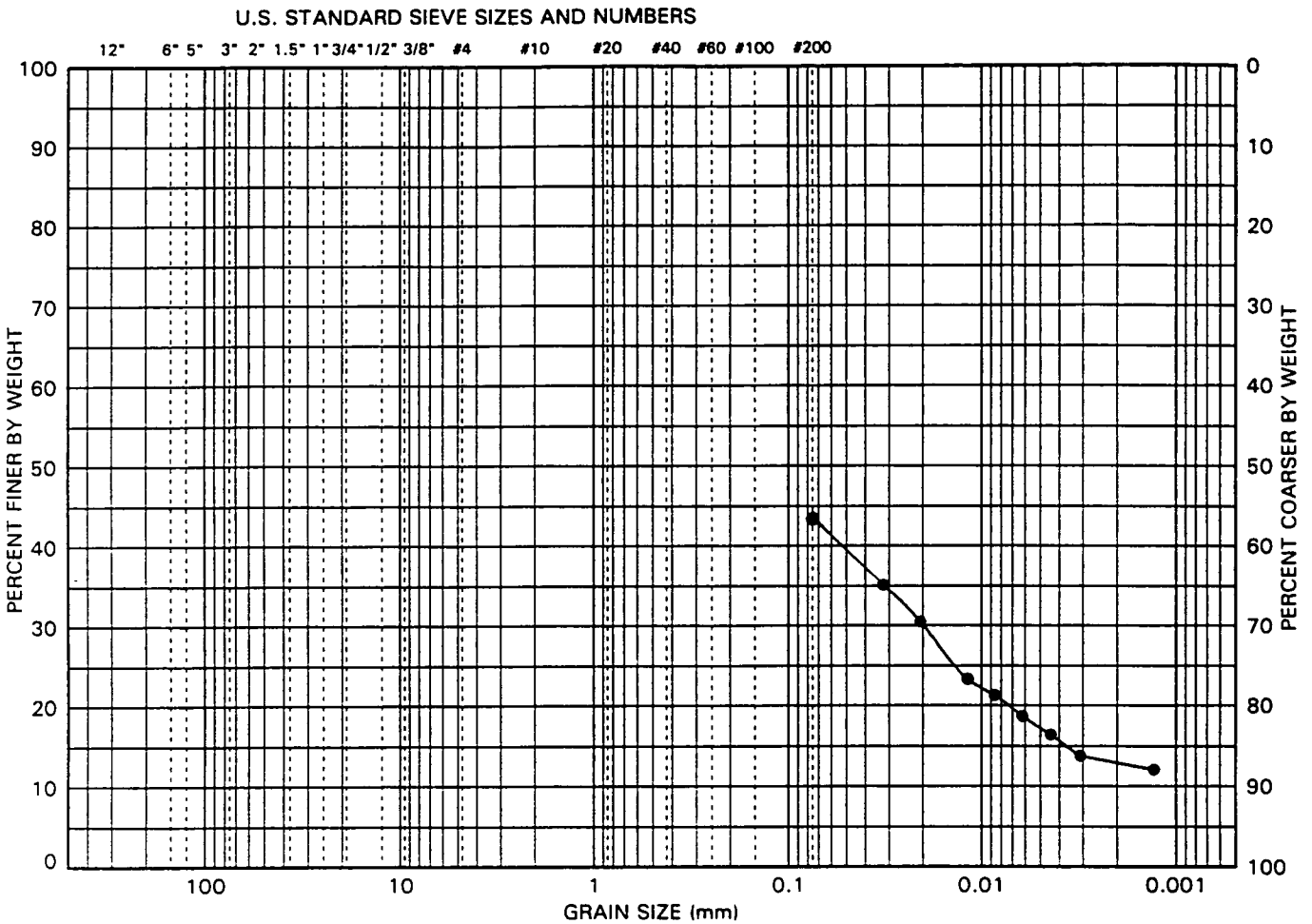
FIGURE 48

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-19	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G189	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 12.9
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															30	17	13	

NOTES:

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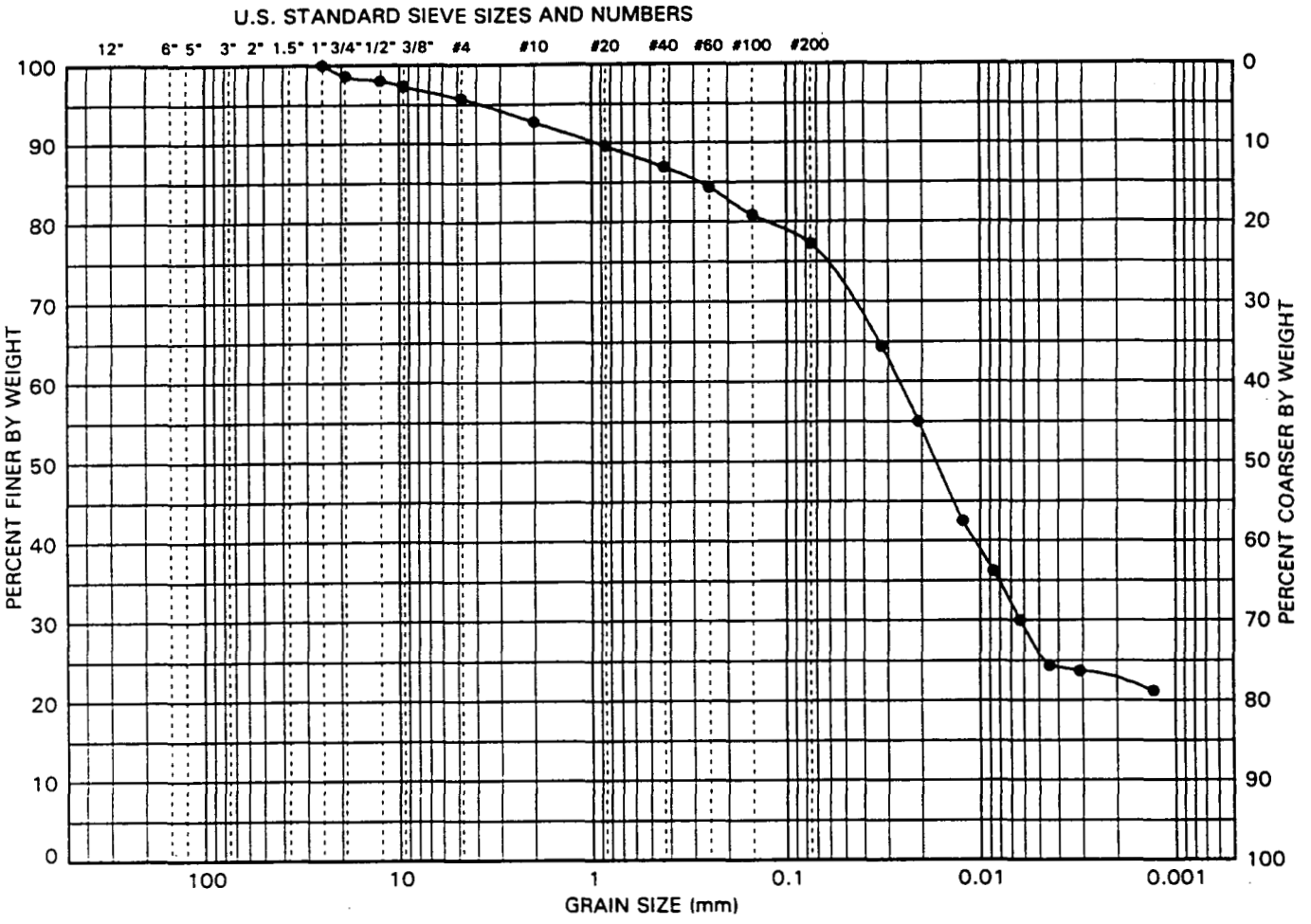
FIGURE 49

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-19.1	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	4.3
LAB. SAMPLE NO.	97H282	PLASTIC LIMIT (%)		SAND (%)	18.5
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	77.2
SOIL CLASSIFICATION:				SILT (%)	54.8
				CLAY(%)	22.4
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	99	98	97	96	93	90	87	84	81	77	71	54	26	22	

NOTES:

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Atlanta, Georgia

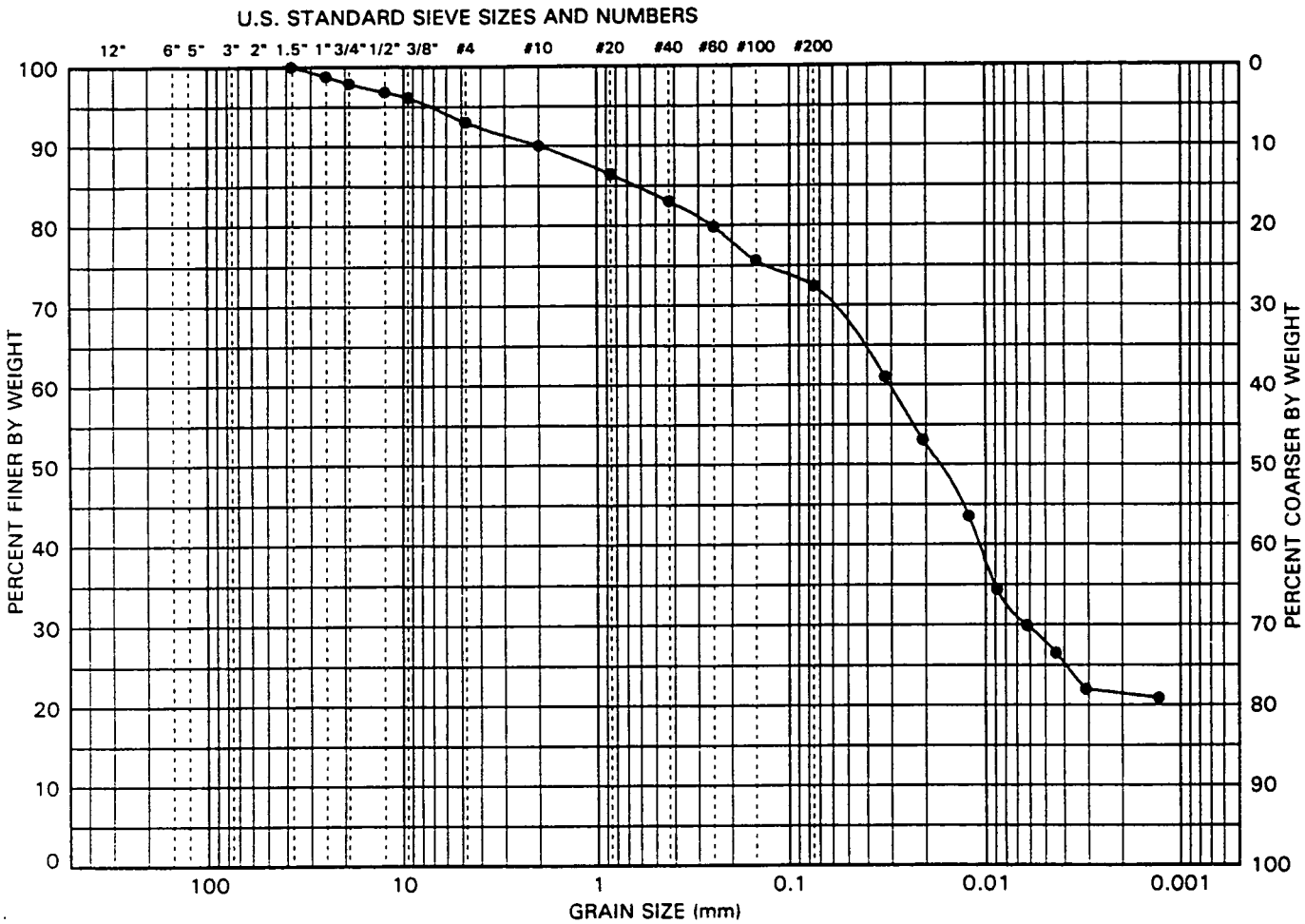
FIGURE 50

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-19.2	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	7.0
LAB. SAMPLE NO.	97H283	PLASTIC LIMIT (%)		SAND (%)	20.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	72.4
SOIL CLASSIFICATION:				SILT (%)	51.0
				CLAY(%)	21.4
			COEFF. UNIFORMITY (Cu)		
			COEFF. CURVATURE (Cc)		

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	99	98	97	96	93	90	86	83	80	76	72	67	52	28	21	

NOTES:

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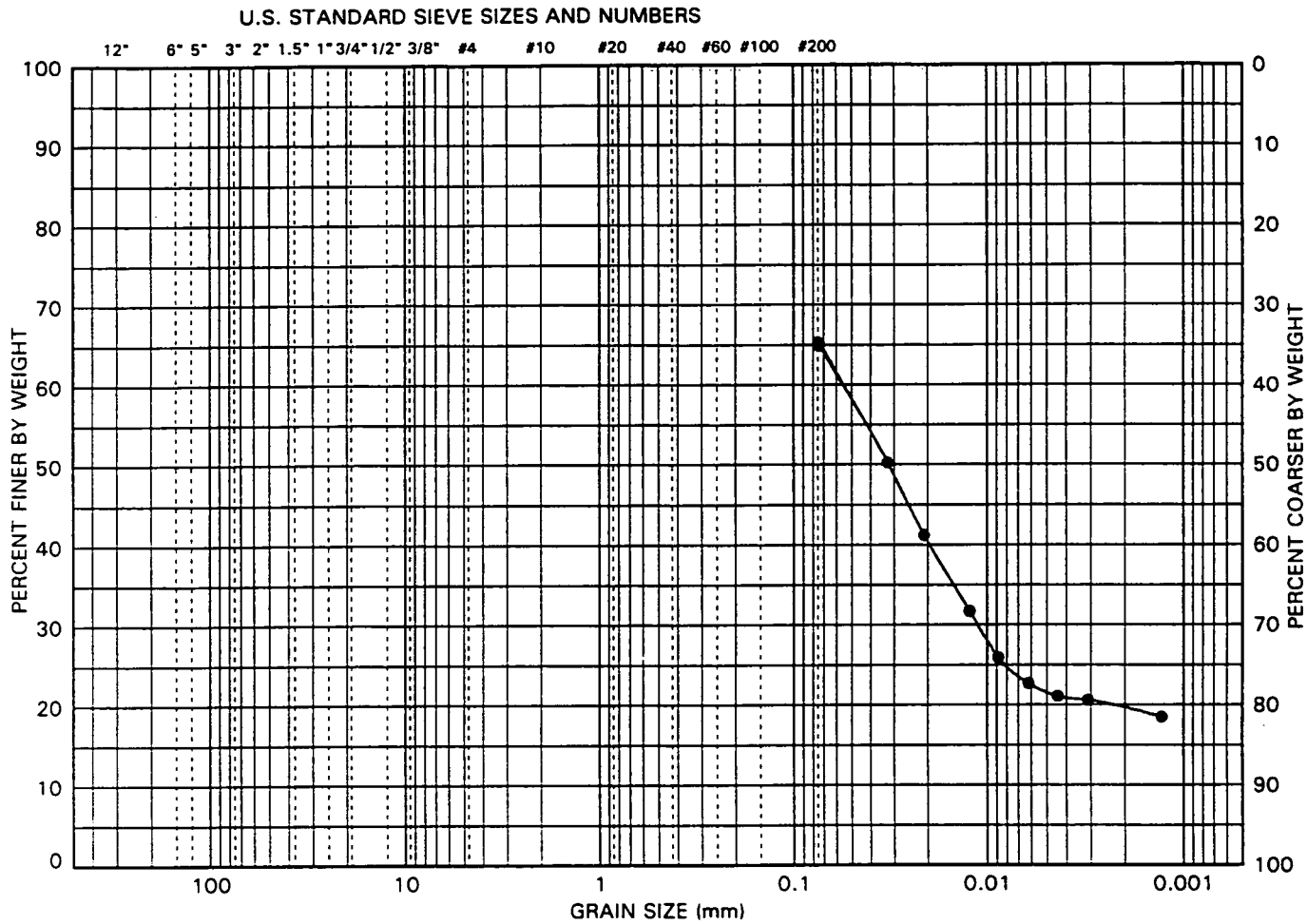
FIGURE 51

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-20	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G220	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 19.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															40	22	20	

NOTES:

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Atlanta, Georgia

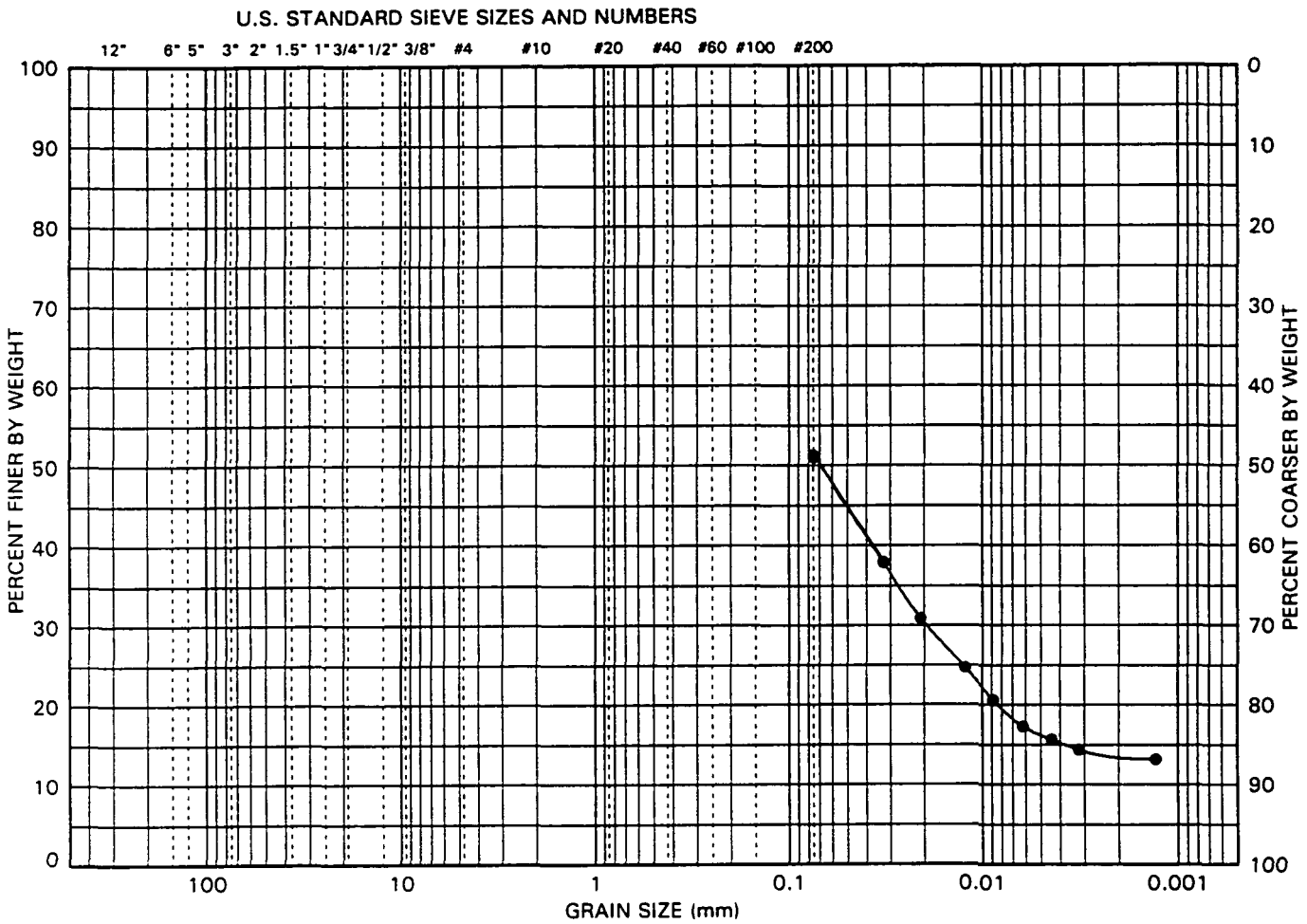
FIGURE 52

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-21	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G221	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 13.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															30	16	14	

NOTES:

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Atlanta, Georgia

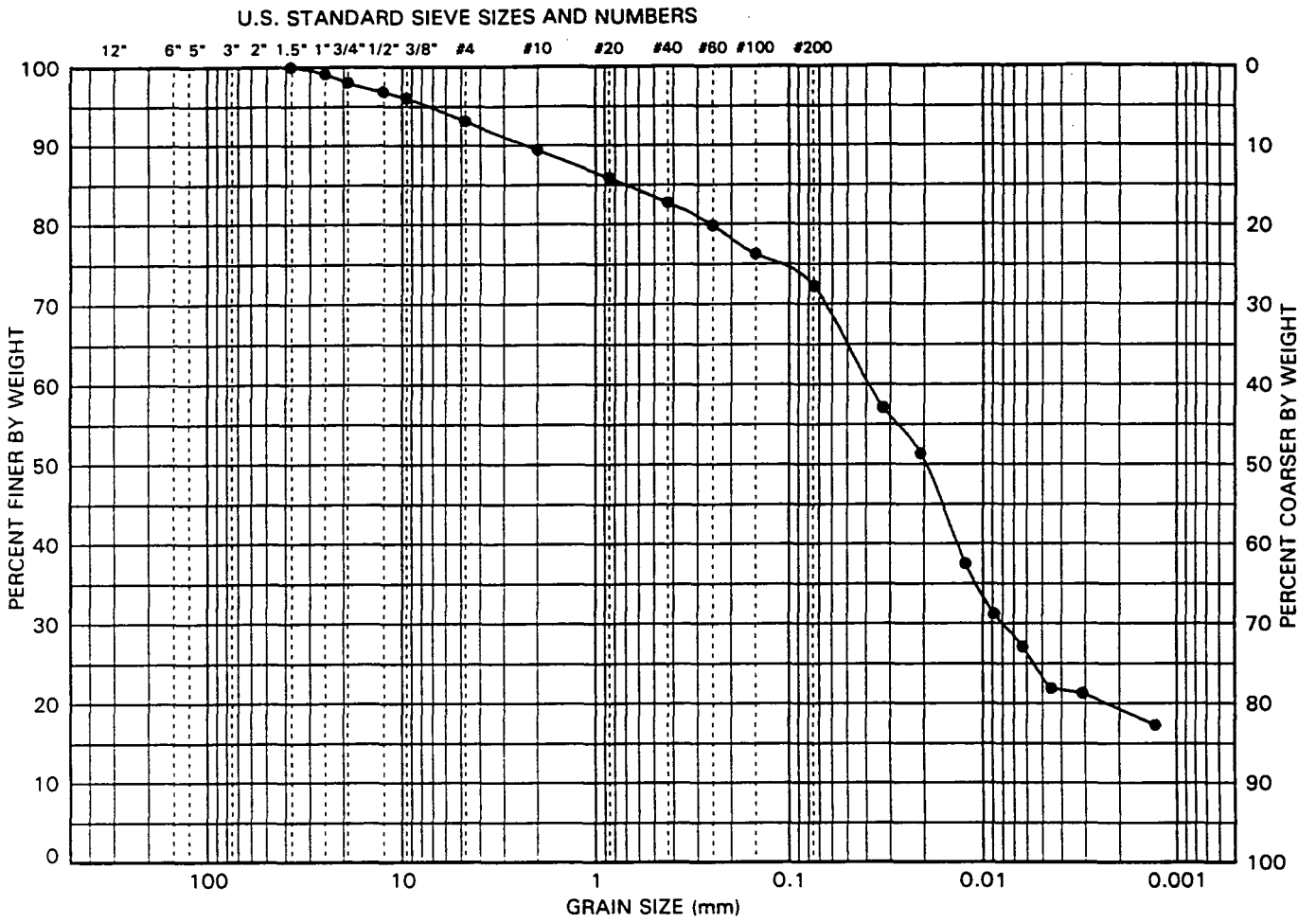
FIGURE 53

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-21.1	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	6.9
LAB. SAMPLE NO.	97H284	PLASTIC LIMIT (%)		SAND (%)	20.9
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	72.2
SOIL CLASSIFICATION:				SILT (%)	52.9
				CLAY(%)	19.3
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	99	98	97	96	93	89	86	83	80	76	72	65	50	24	19	

NOTES:

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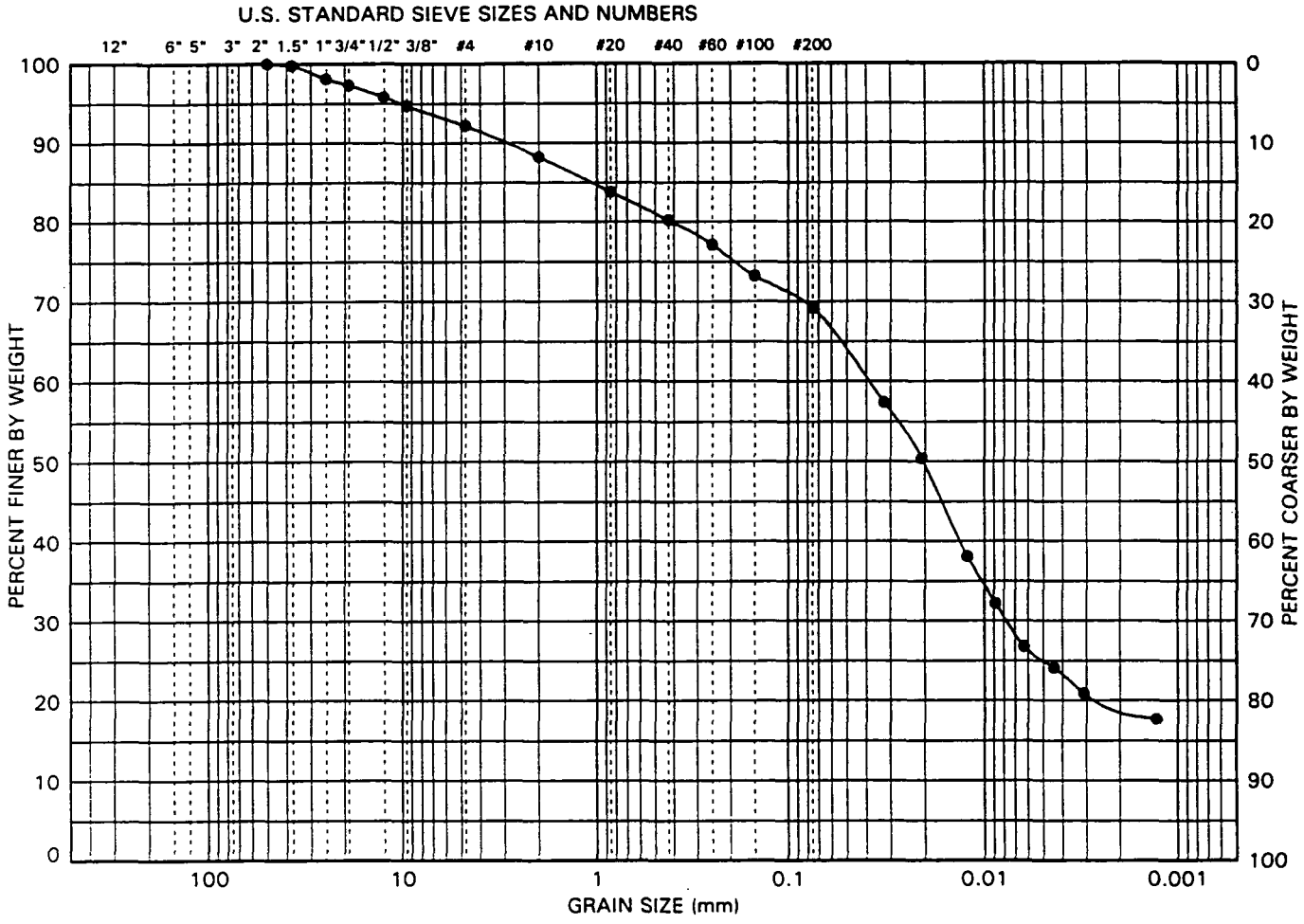
Atlanta, Georgia

FIGURE 54
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-21.2	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	7.8
LAB. SAMPLE NO.	97H285	PLASTIC LIMIT (%)		SAND (%)	23.0
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	69.2
SOIL CLASSIFICATION:				SILT (%)	49.9
				CLAY(%)	19.3
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	98	97	96	95	92	88	84	80	77	73	69	63	49	25	19	

NOTES:

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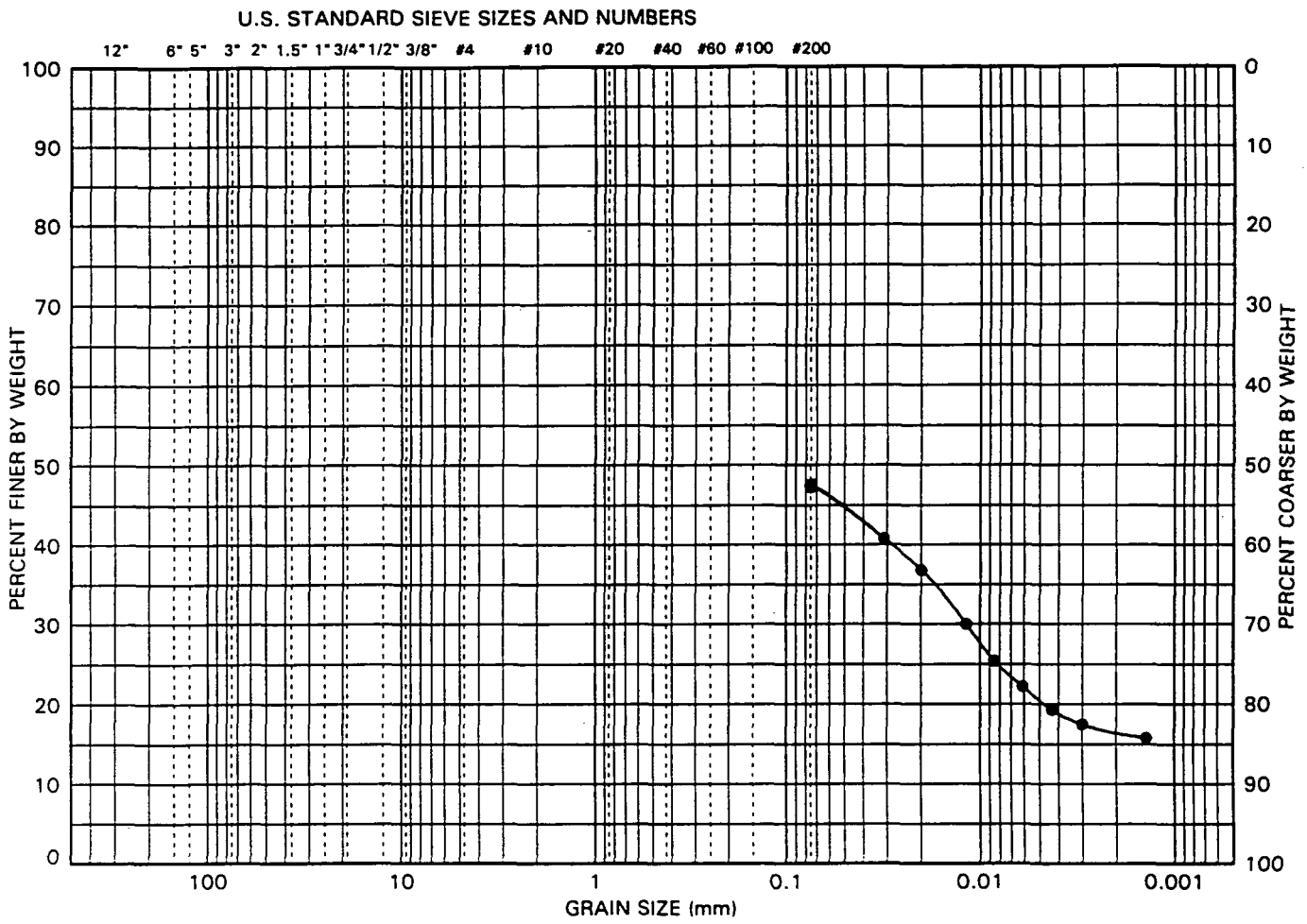
Atlanta, Georgia

FIGURE 55
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-22	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G222	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 16.6
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															37	21	17	

NOTES:

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Atlanta, Georgia

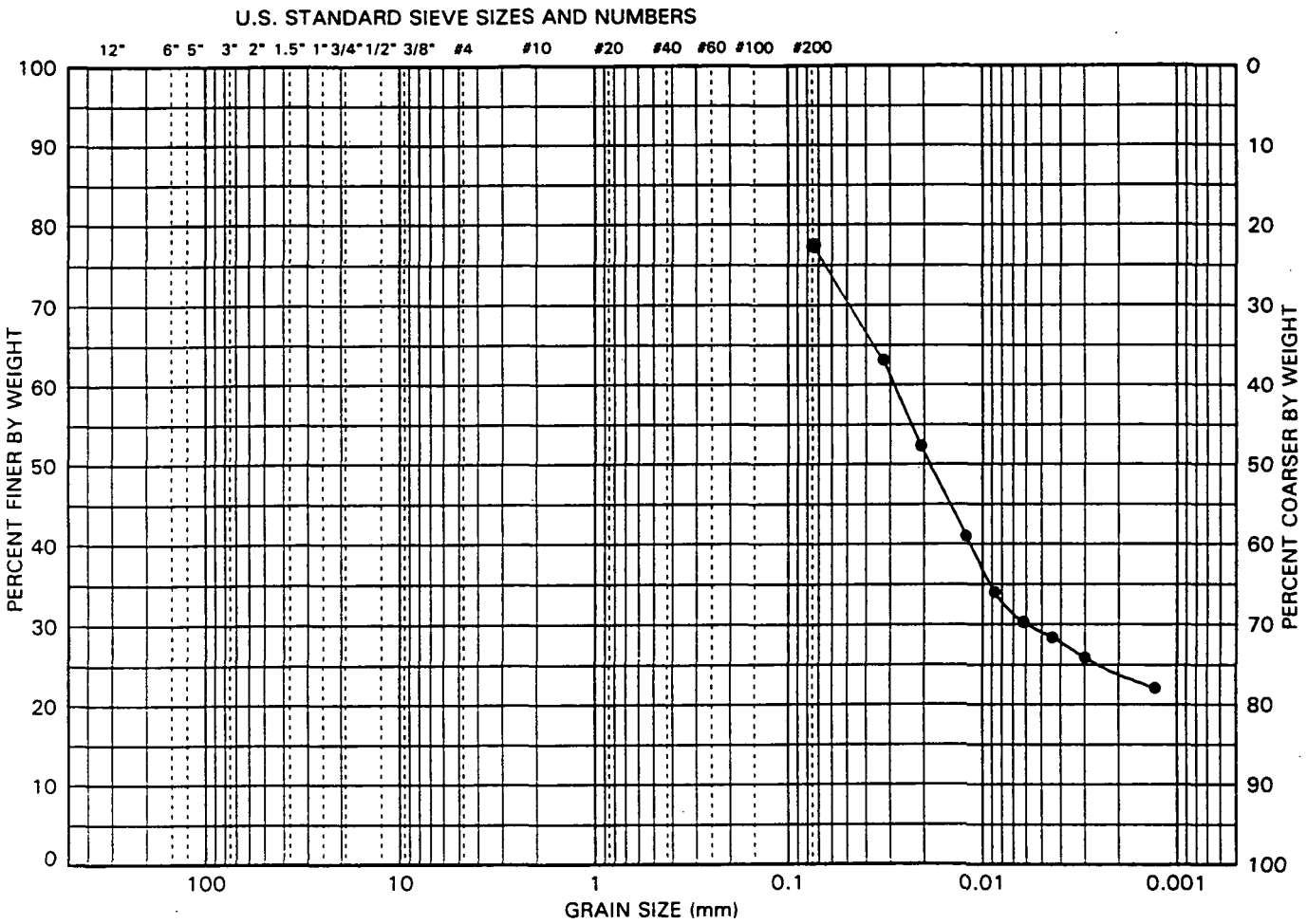
FIGURE 56

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-23	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G227	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 24.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															51	29	24	

NOTES:

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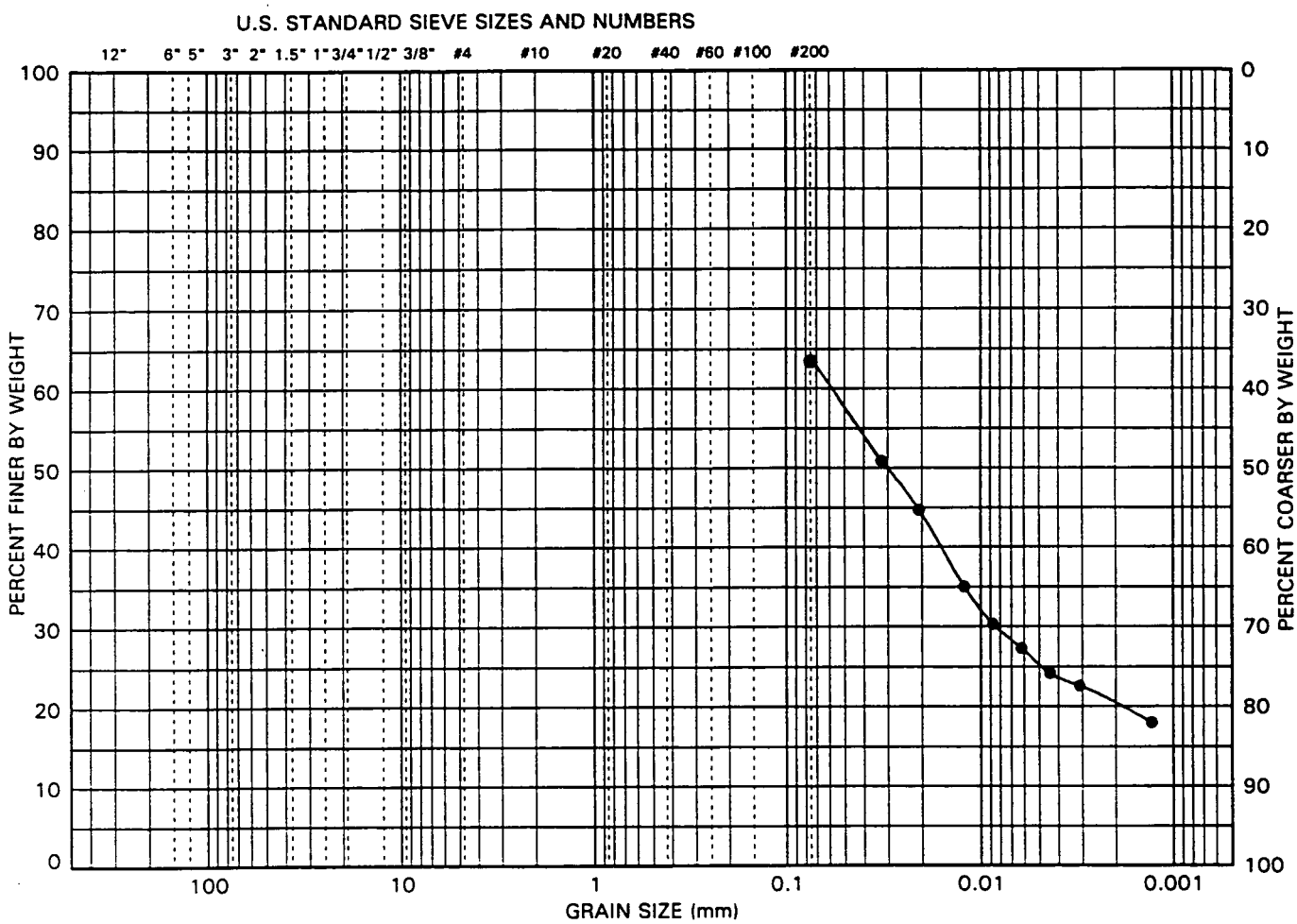
FIGURE 57
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-24	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G228	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 20.3
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															44	25	20	

NOTES:

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Atlanta, Georgia

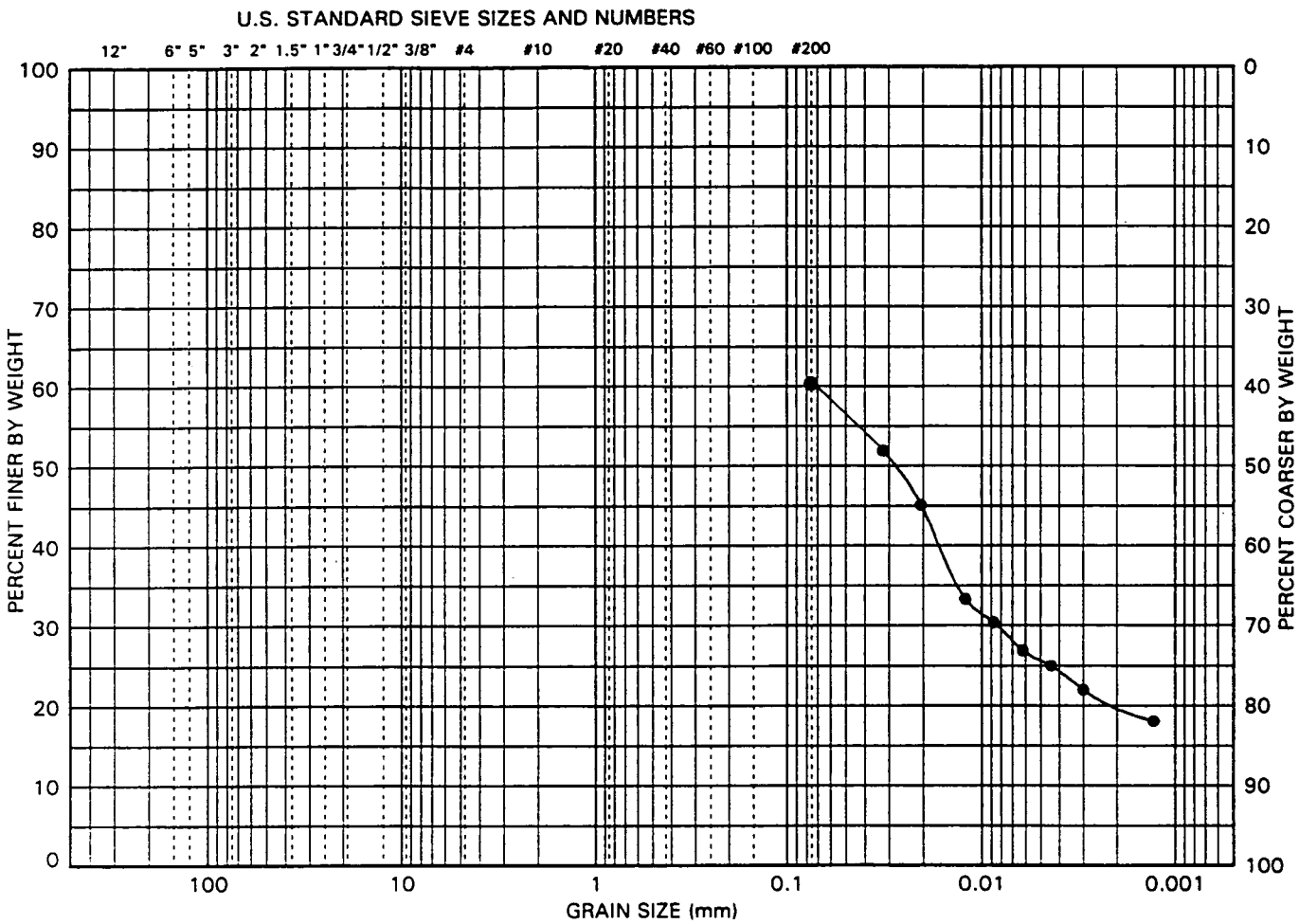
FIGURE 58

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-25	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G229	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 20.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															44	26	20	

NOTES:

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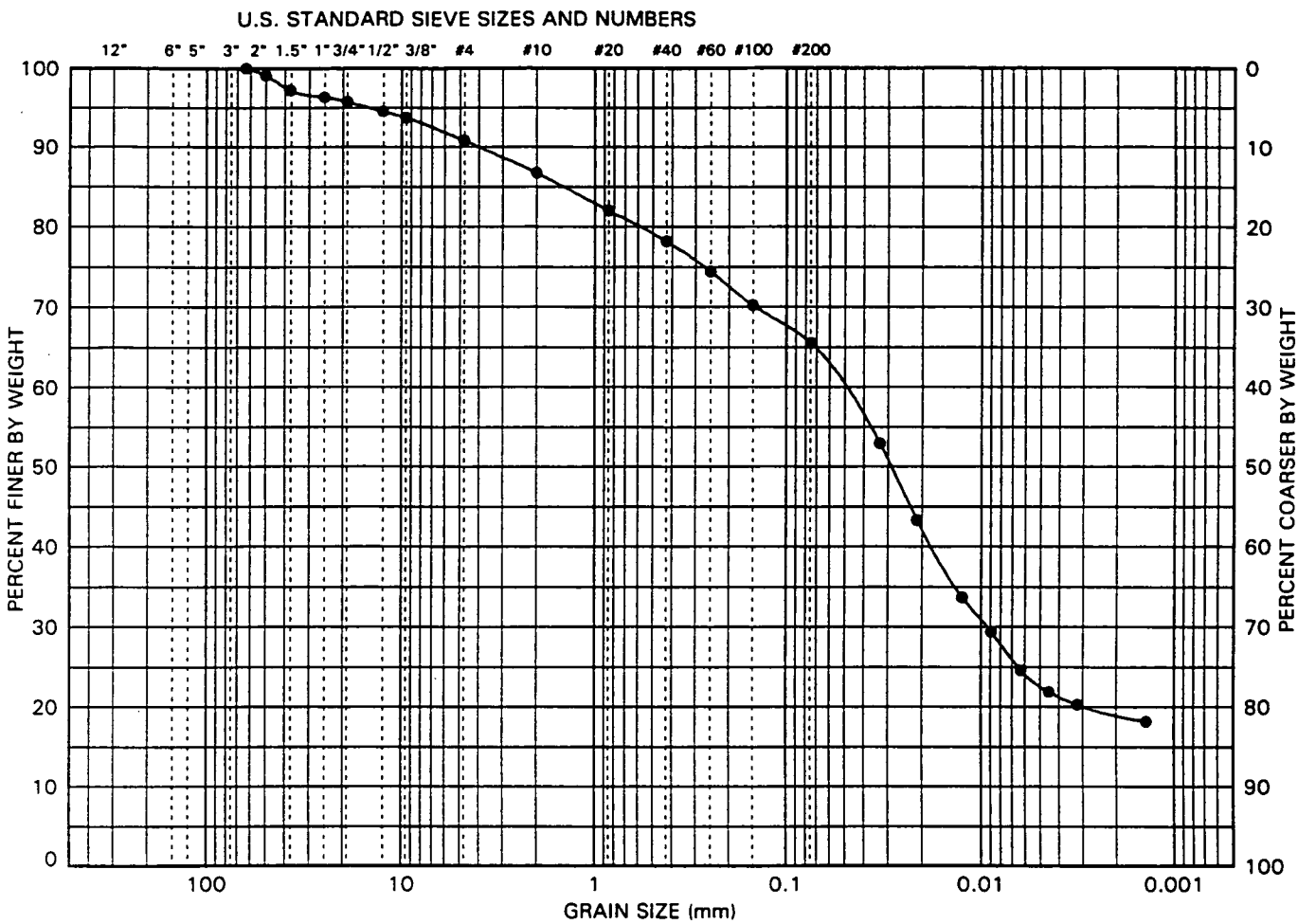
FIGURE 59

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/04/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-25A	LIQUID LIMIT (%)	32	SOIL FRACTIONS: GRAVEL (%)	9.2
LAB. SAMPLE NO.	97G225	PLASTIC LIMIT (%)	18	SAND (%)	25.3
SAMPLE DEPTH (ft)		PLASTICITY INDEX	14	FINES (%)	65.5
SOIL CLASSIFICATION: CL - Sandy Lean Clay				SILT (%)	46.4
				CLAY(%)	19.1
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	99	97	96	96	95	94	91	87	82	78	74	70	66	59	42	23	19	

NOTES:

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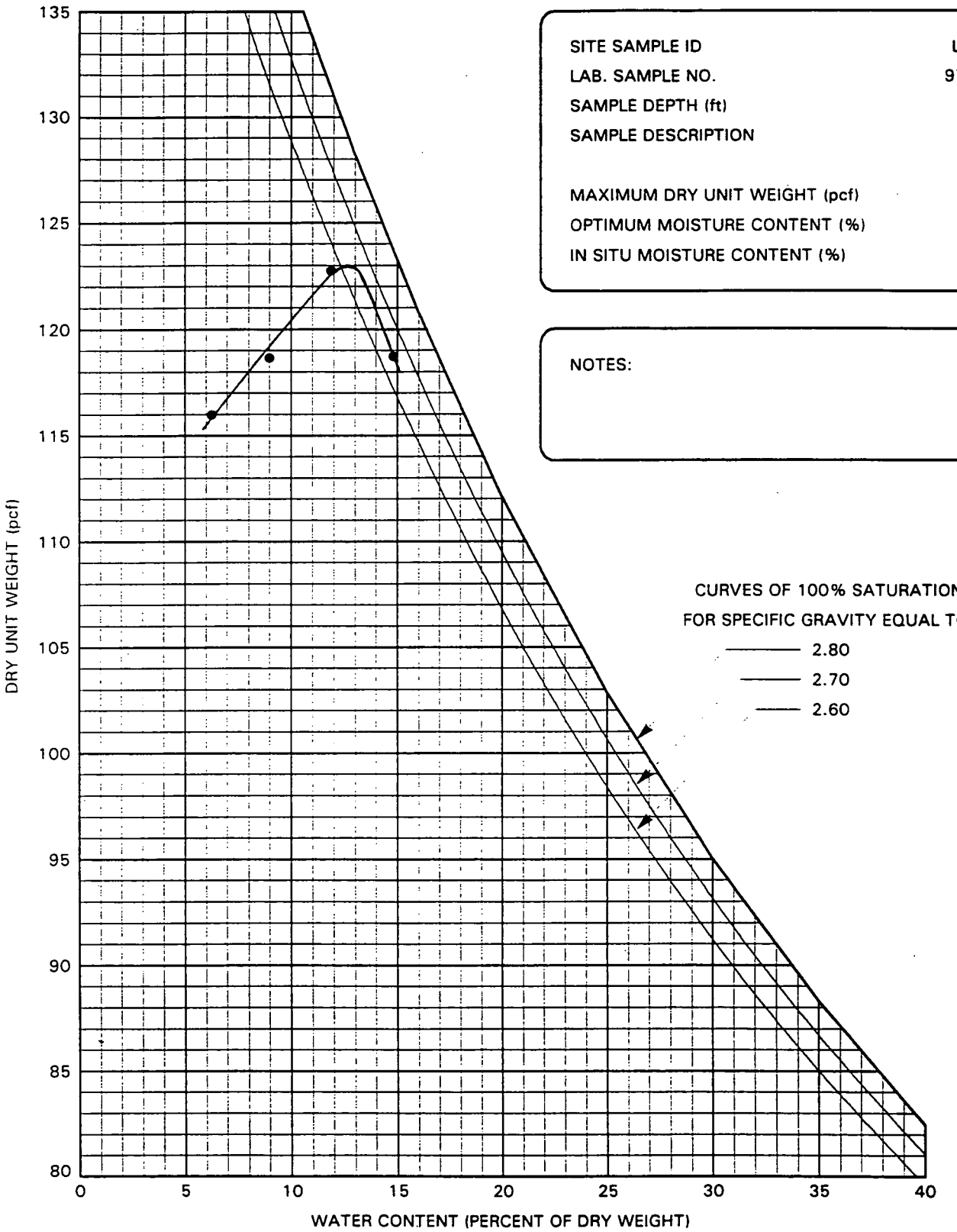
FIGURE 60

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 11/25/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A / D-4718



SITE SAMPLE ID	LP-25A
LAB. SAMPLE NO.	97G225
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	123.0
OPTIMUM MOISTURE CONTENT (%)	12.7
IN SITU MOISTURE CONTENT (%)	

NOTES:

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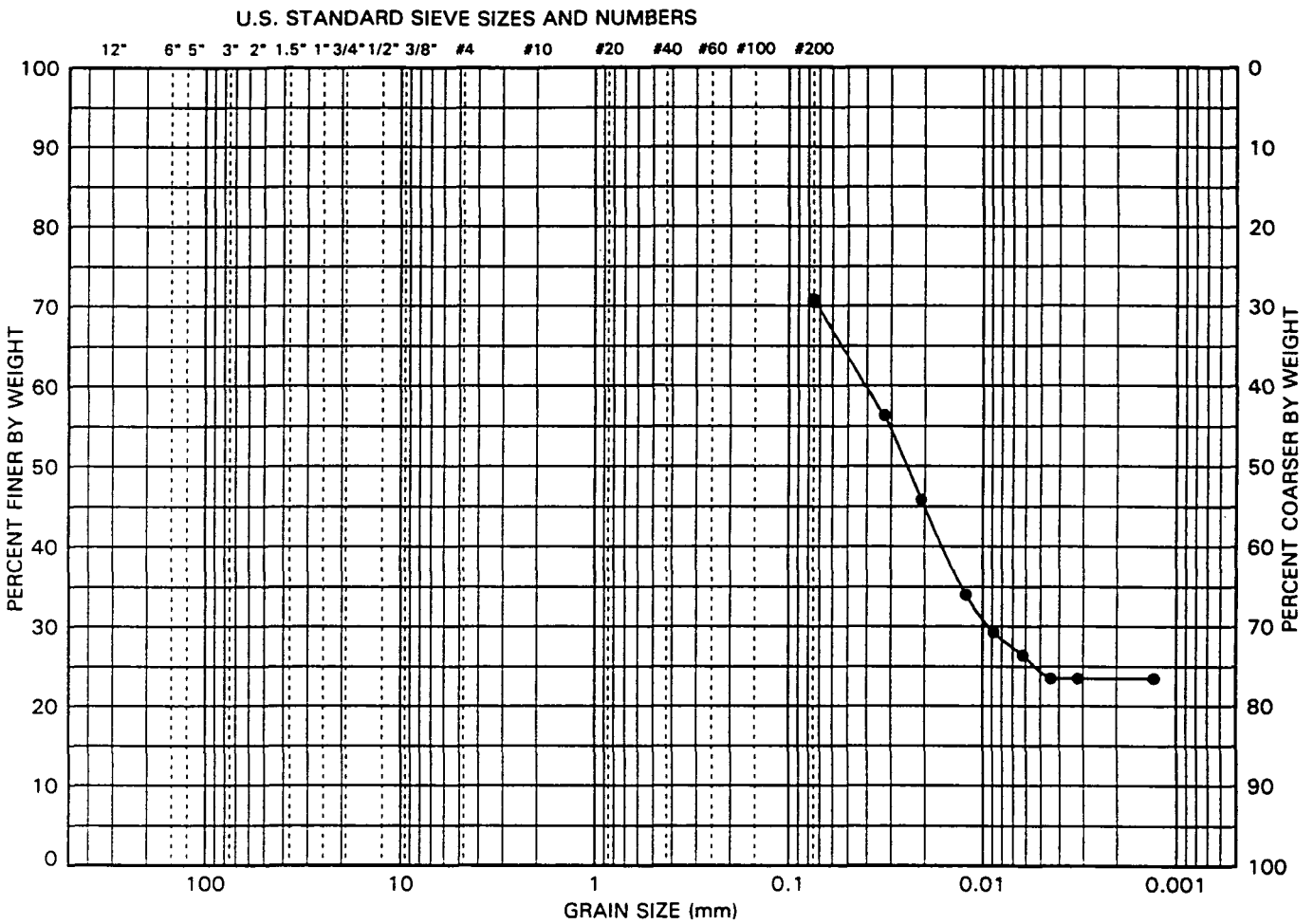
Atlanta, Georgia

FIGURE 61
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-26	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G231	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 23.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															45	25	24	

NOTES:

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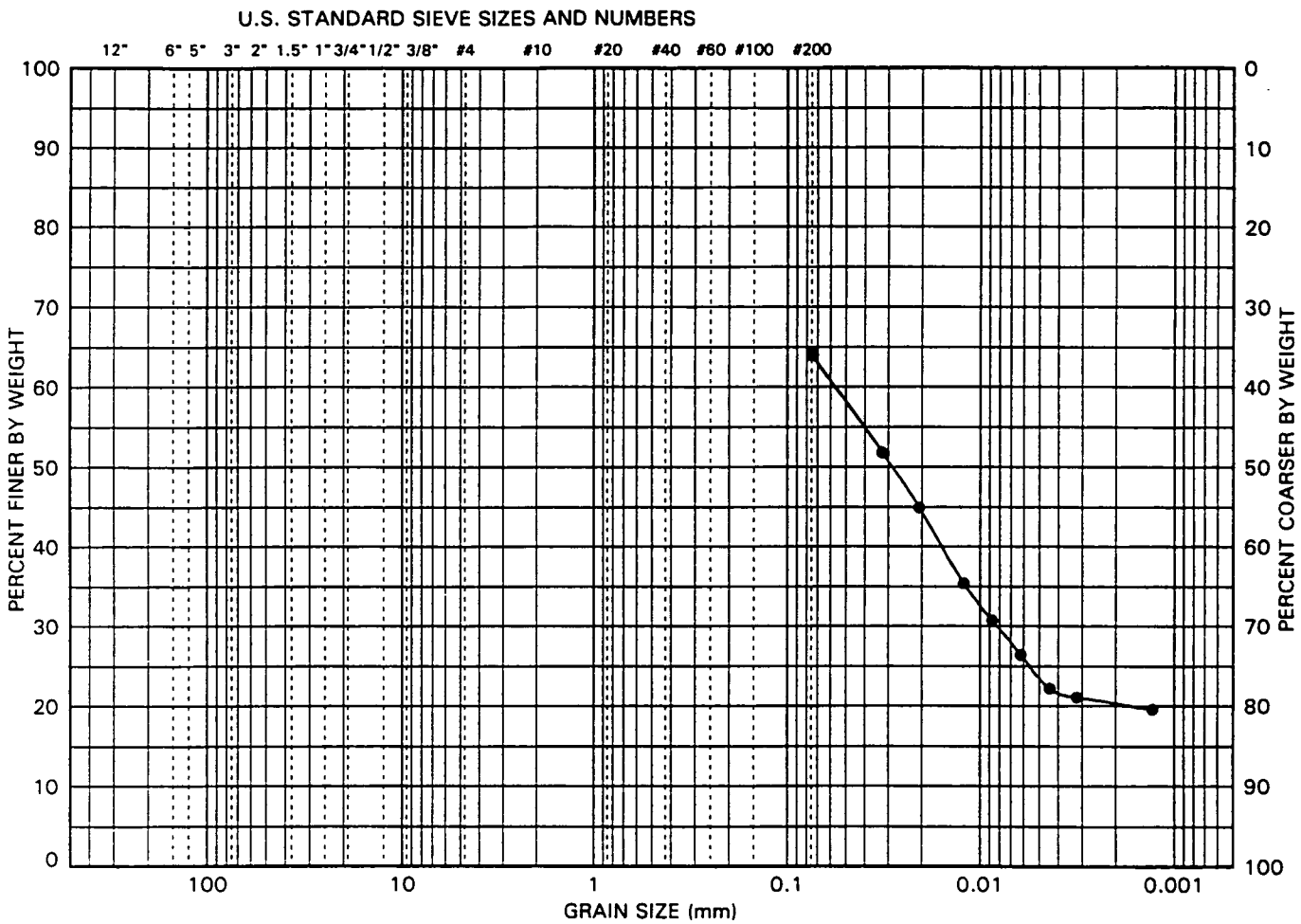
Atlanta, Georgia

FIGURE 62
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-27	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G232	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 20.3
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															44	24	20	

NOTES:

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Atlanta, Georgia

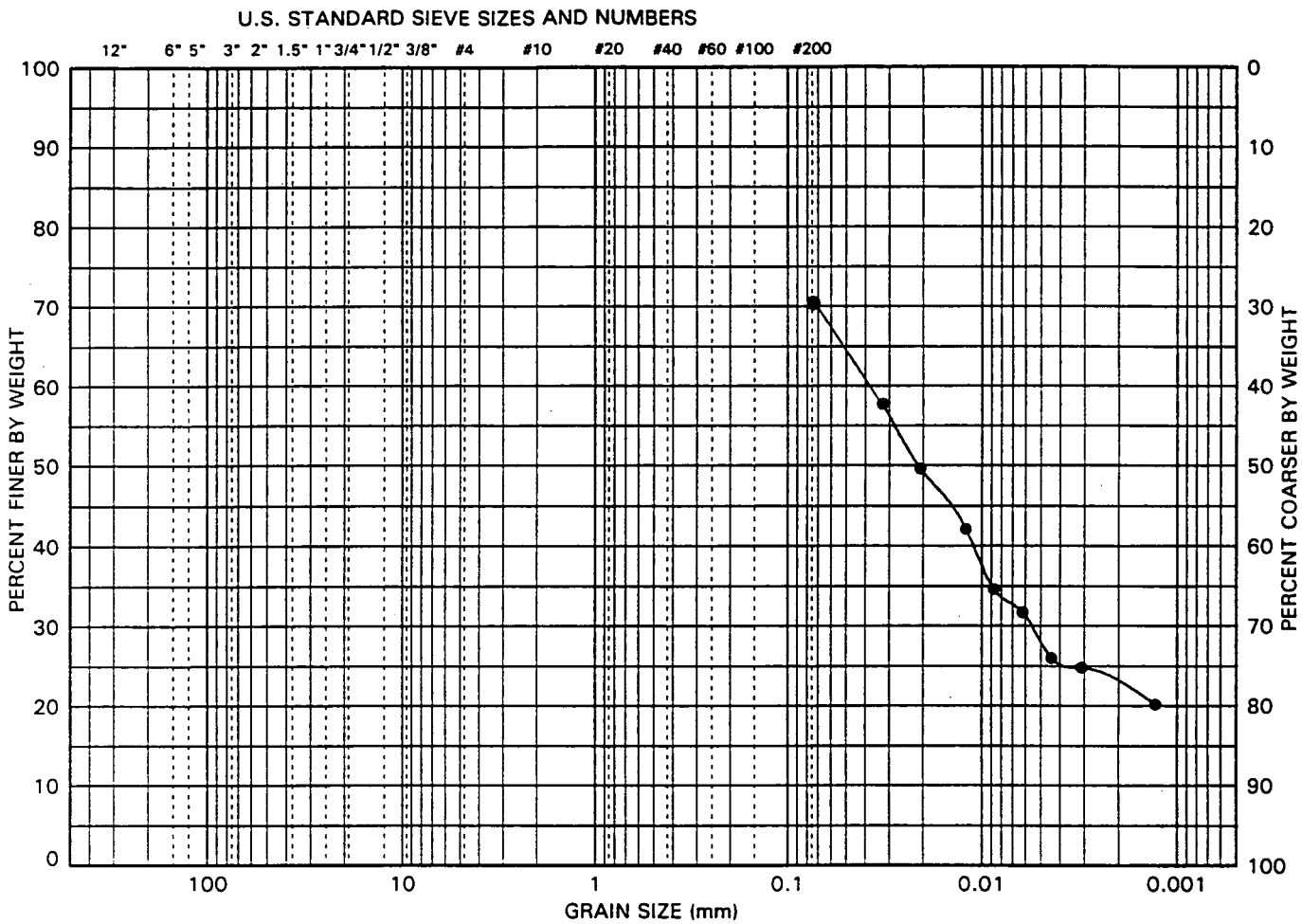
FIGURE 63

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 07/31/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-28	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G233	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 22.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															49	28	22	

NOTES:

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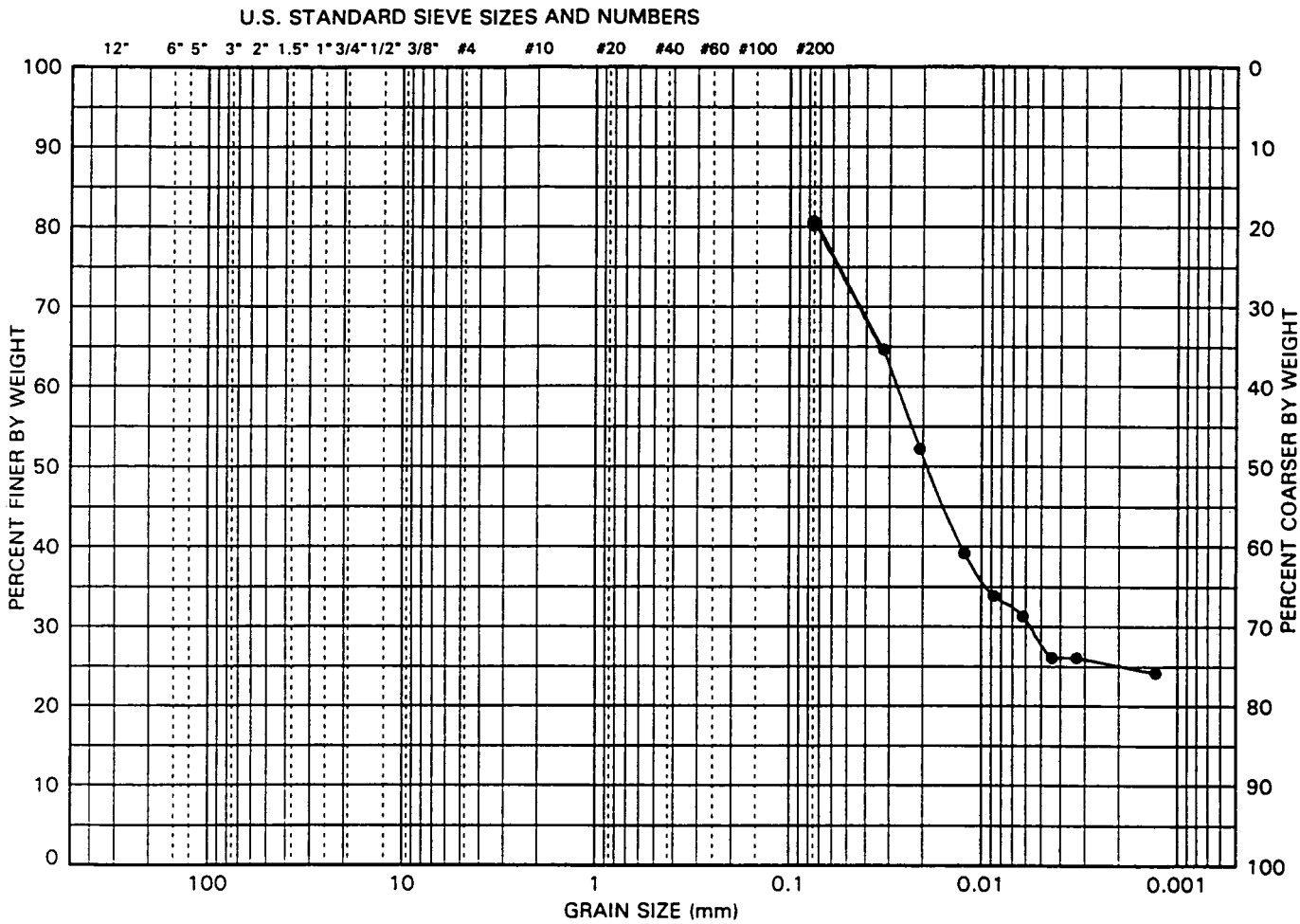
FIGURE 64
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-29	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G235	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
-				CLAY(%) 25.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															51	28	25	

NOTES:

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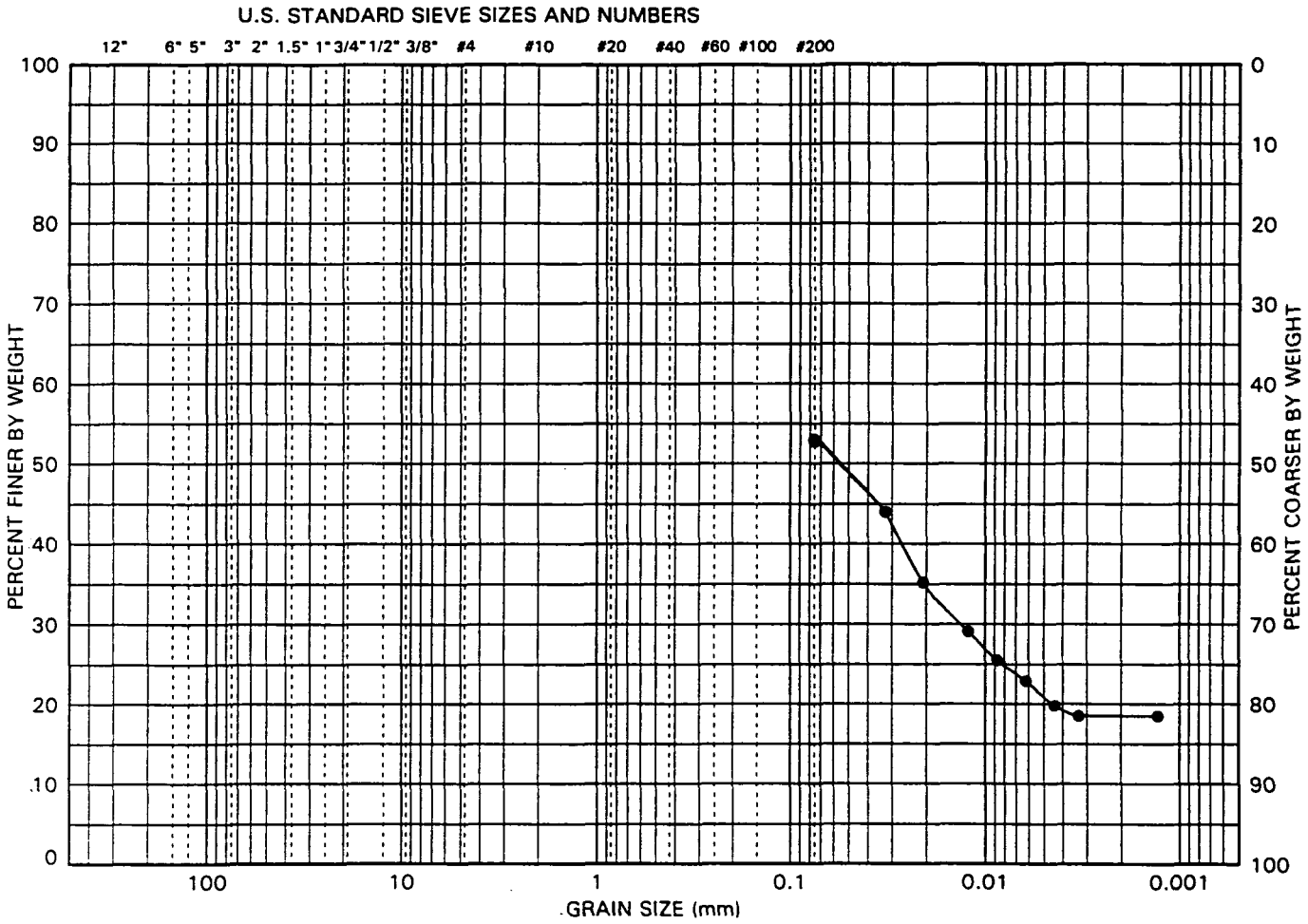
FIGURE 65
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-30	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G236	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 18.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															35	21	19	

NOTES:

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Atlanta, Georgia

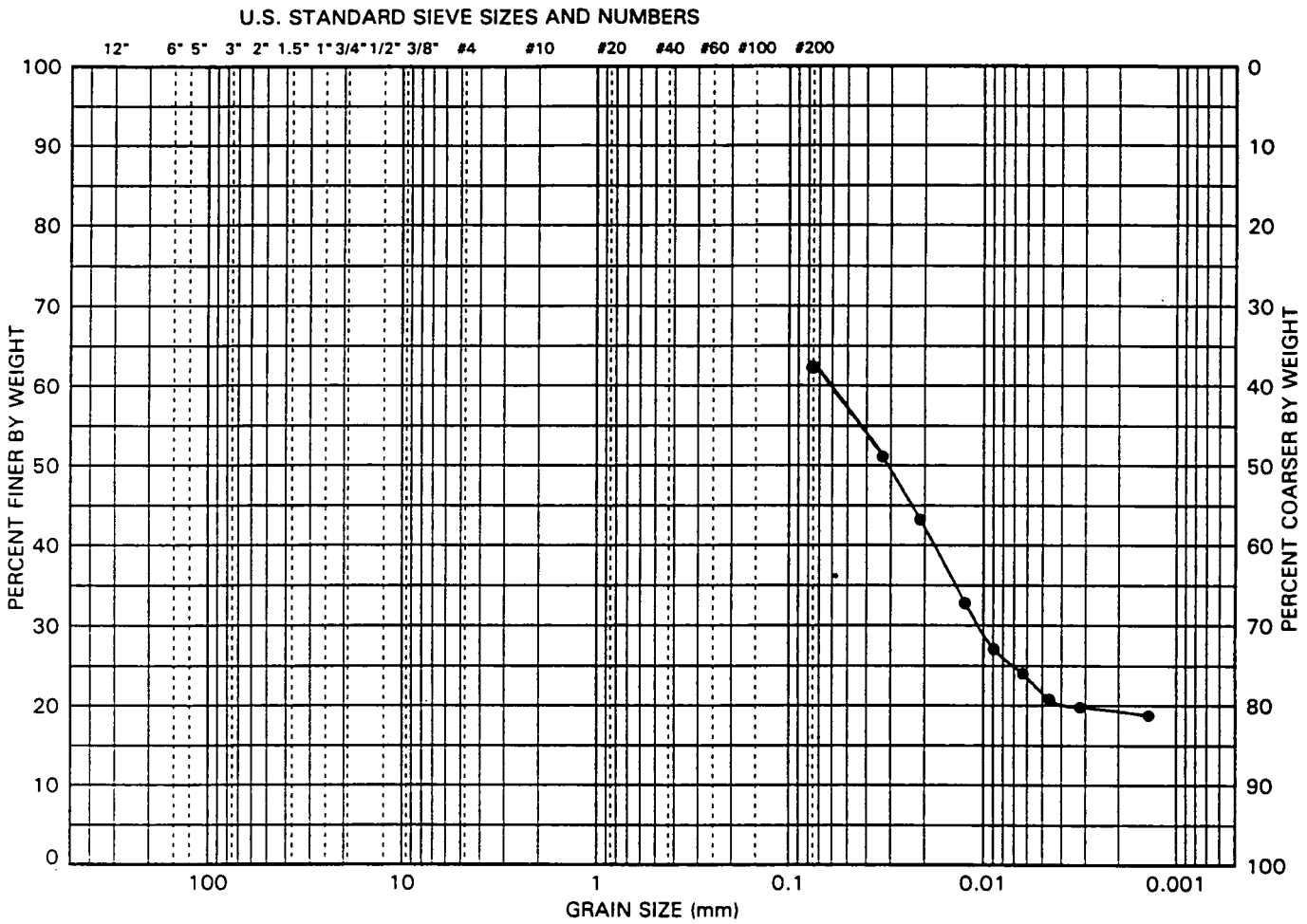
FIGURE 66

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-31	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G237	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 19.2
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															42	22	19	

NOTES:

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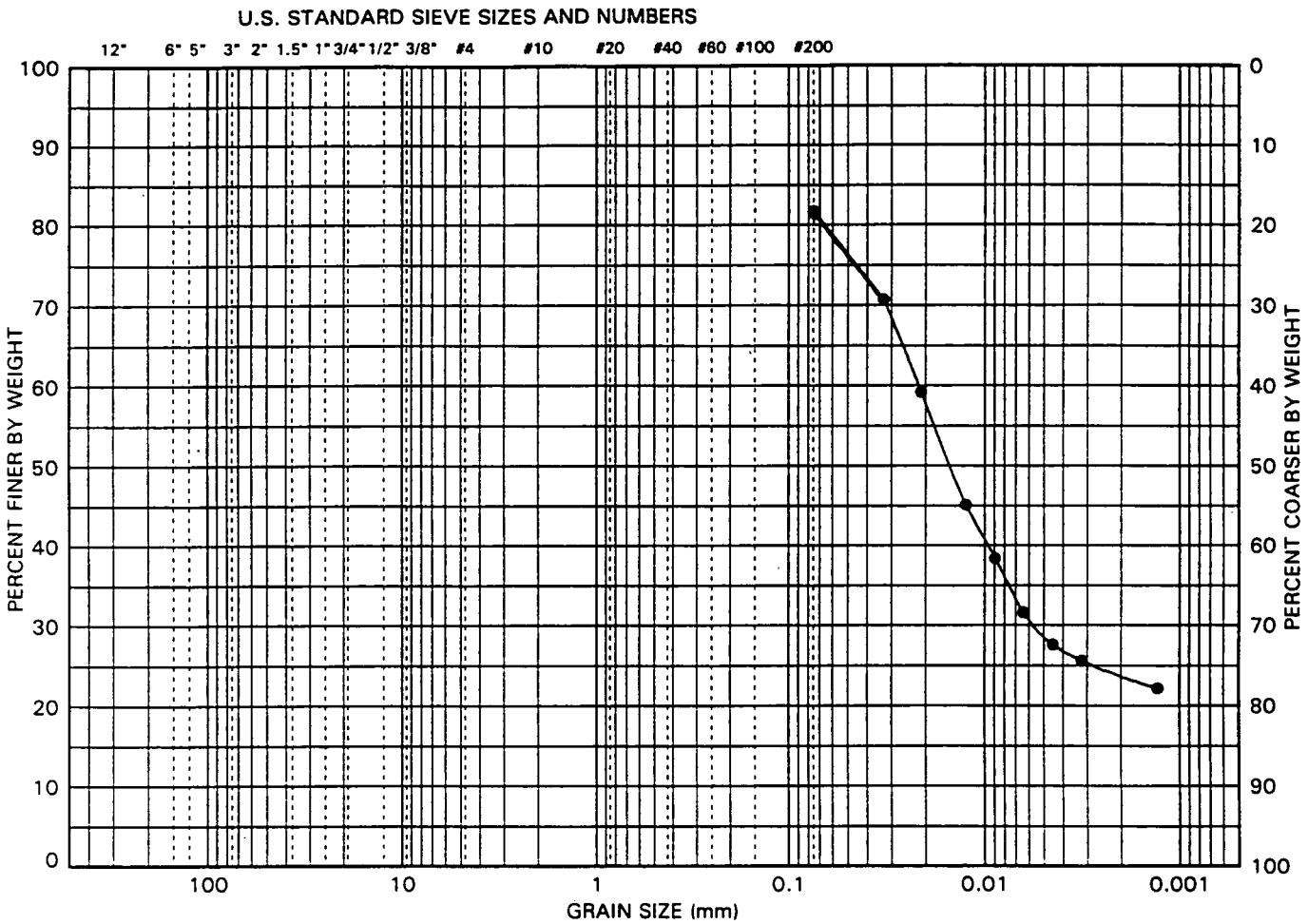
Atlanta, Georgia

FIGURE 67
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-32	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G284	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 23.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															58	29	24	

NOTES:

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Atlanta, Georgia

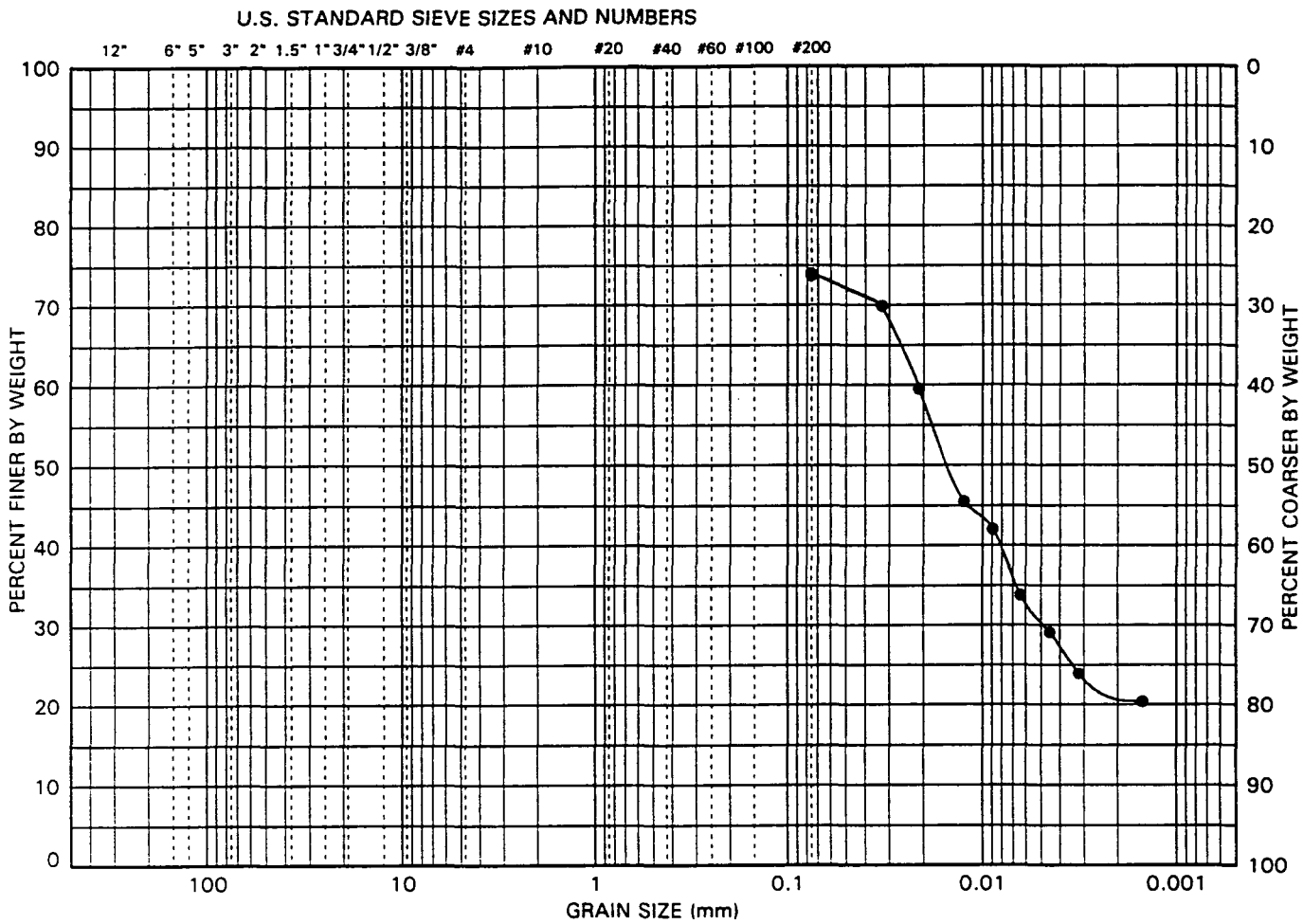
FIGURE 68

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/04/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-33	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G285	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 21.7
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															58	31	22	

NOTES:

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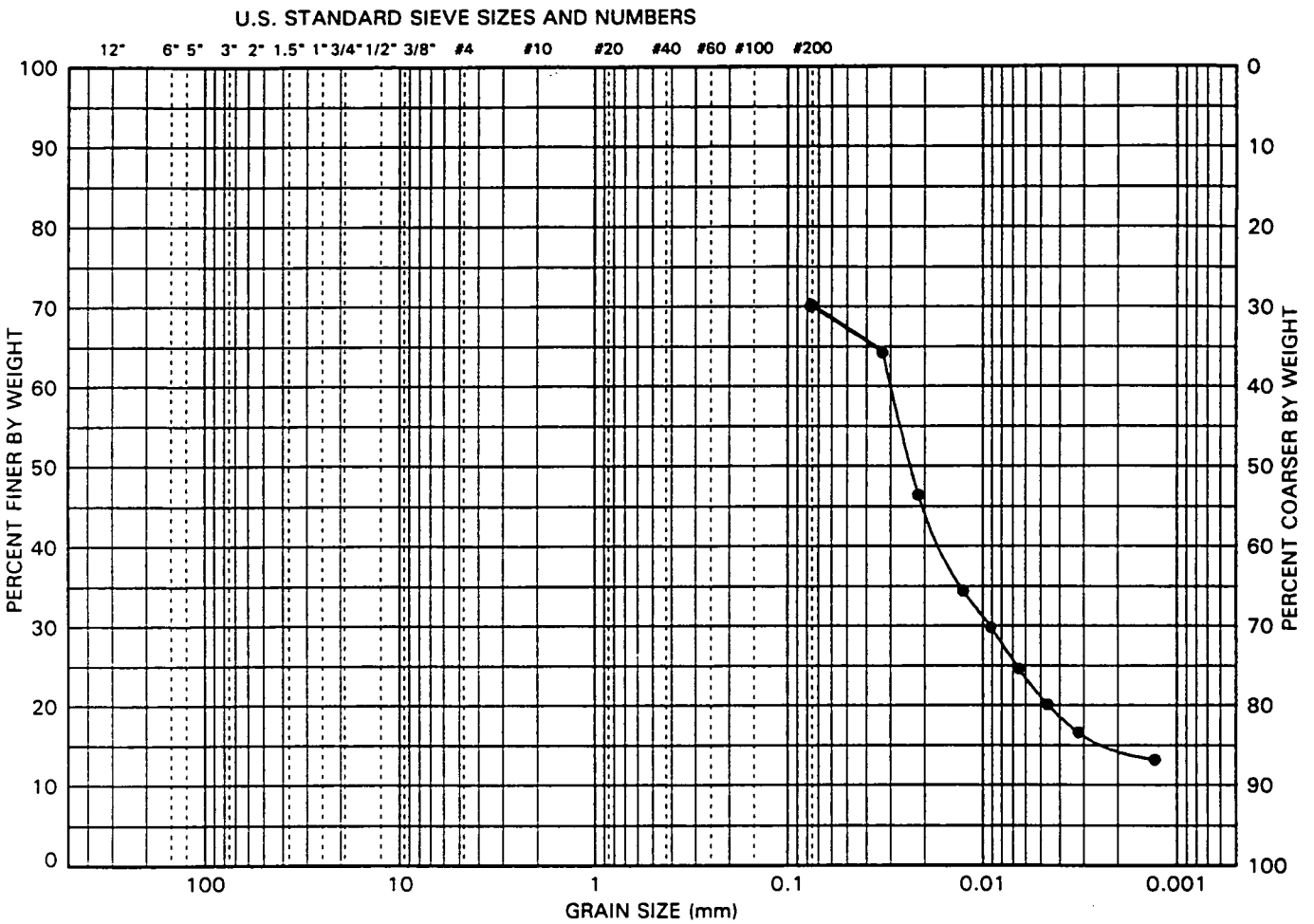
FIGURE 69

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-34	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G286	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
-				CLAY(%) 14.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															45	21	15	

NOTES:

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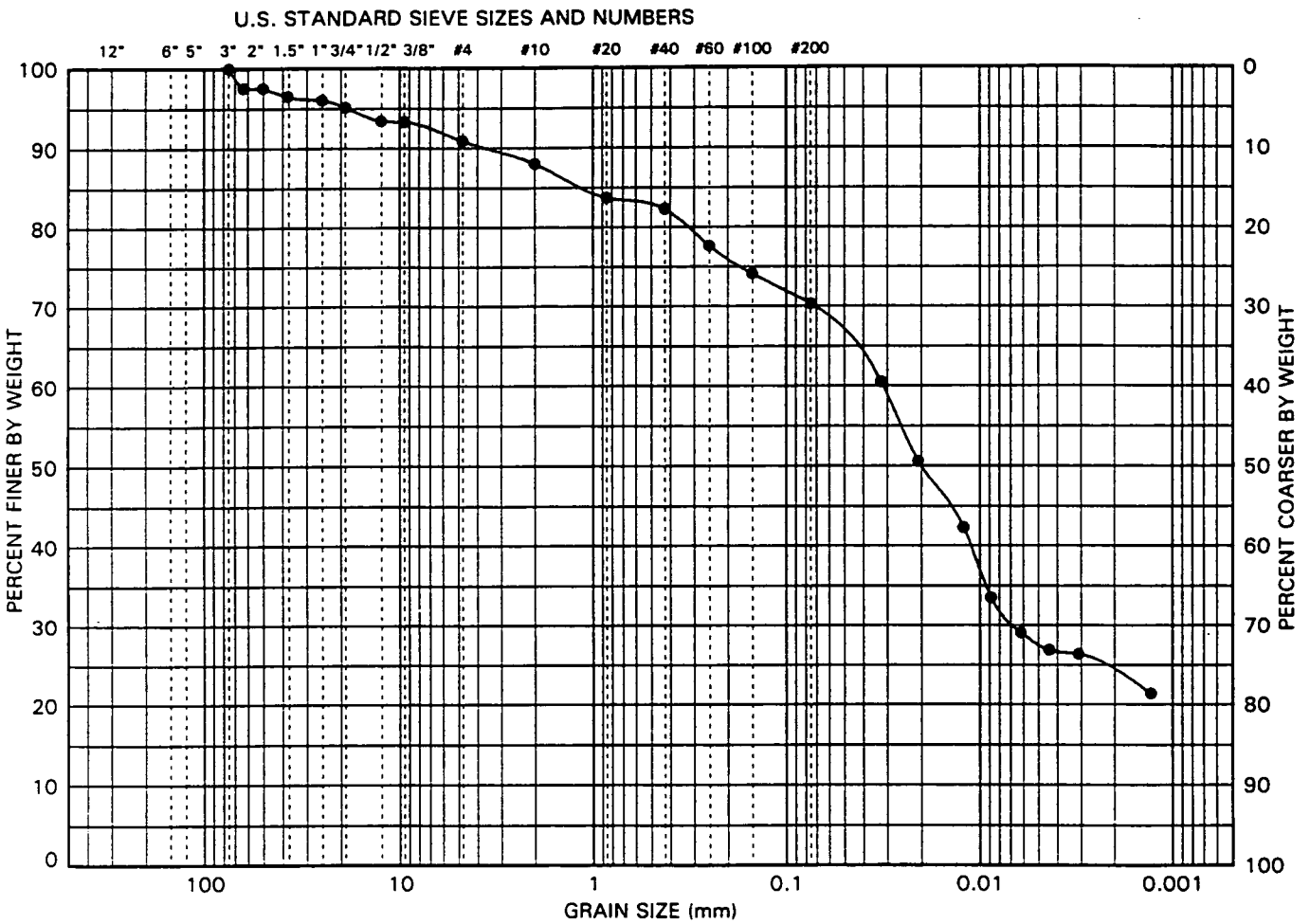
FIGURE 70

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/27/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-34.2	LIQUID LIMIT (%)	37	SOIL FRACTIONS	GRAVEL (%) 9.1
LAB. SAMPLE NO.	97H287	PLASTIC LIMIT (%)	17		SAND (%) 20.6
SAMPLE DEPTH (ft)		PLASTICITY INDEX	20		FINES (%) 70.3
SOIL CLASSIFICATION: CL - Sandy Lean Clay					SILT (%) 46.4
					CLAY(%) 23.9
					COEFF. UNIFORMITY (Cu)
					COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	98	97	96	95	93	93	91	88	84	82	78	74	70	66	50	28	24	

NOTES:

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FIGURE 71

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 08/27/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A / D-4718

SITE SAMPLE ID	LP-34.2
LAB. SAMPLE NO.	97H287
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	119.1
OPTIMUM MOISTURE CONTENT (%)	13.7
IN SITU MOISTURE CONTENT (%)	

NOTES:

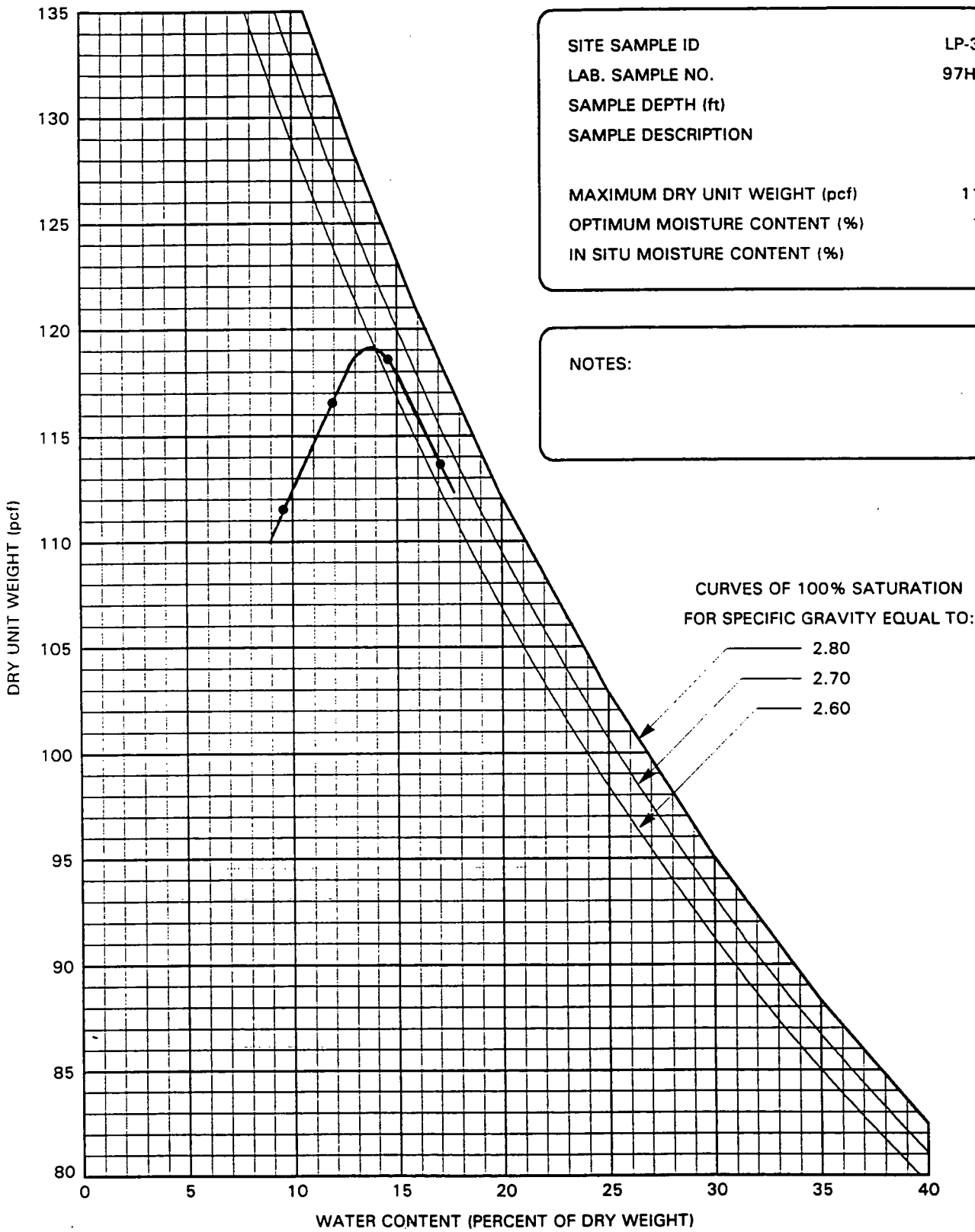

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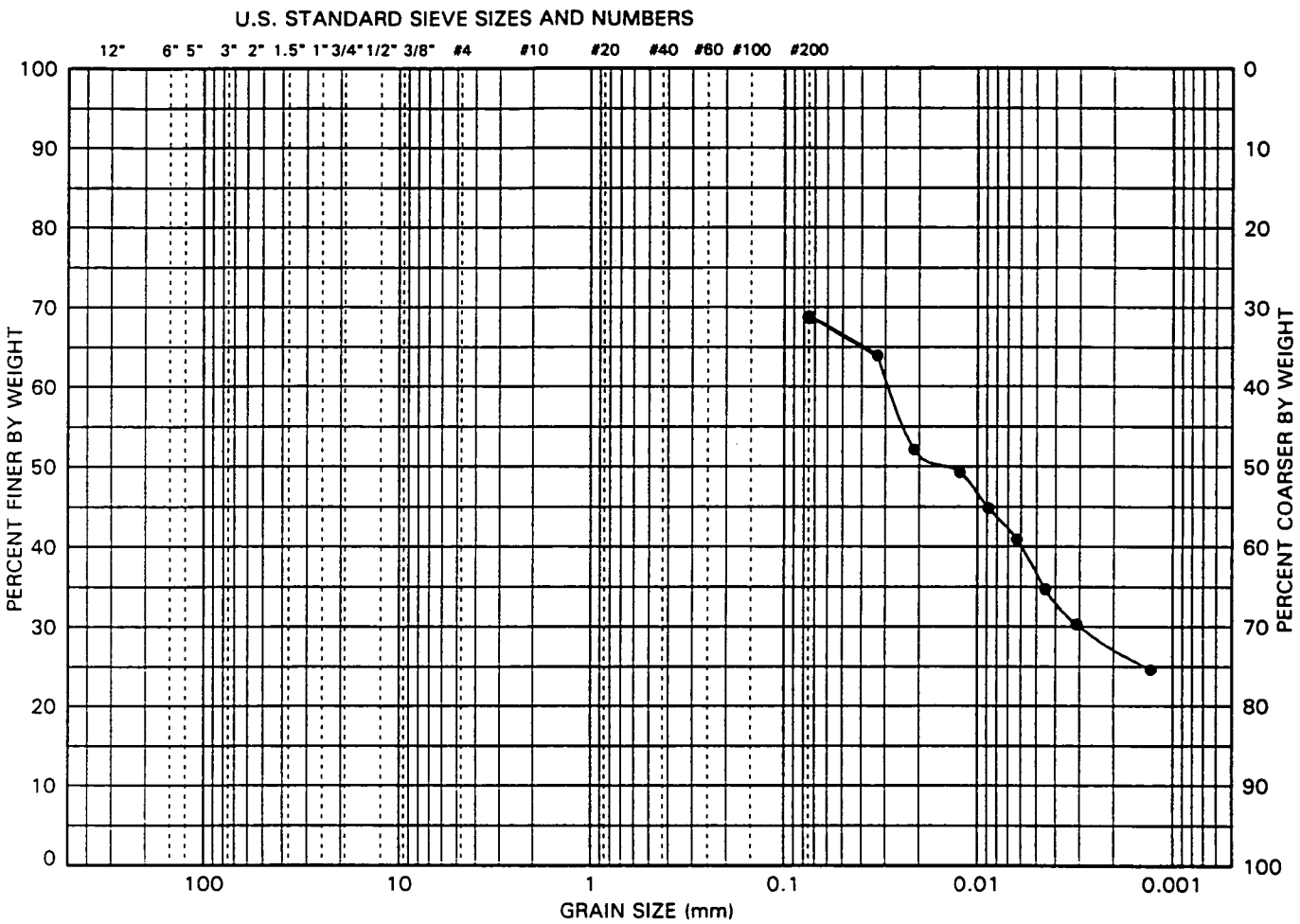
FIGURE 72

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID LP-35	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO. 97G287	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:			SILT (%)	
			CLAY(%)	27.4
			COEFF. UNIFORMITY (Cu)	
			COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															52	37	27	

NOTES:

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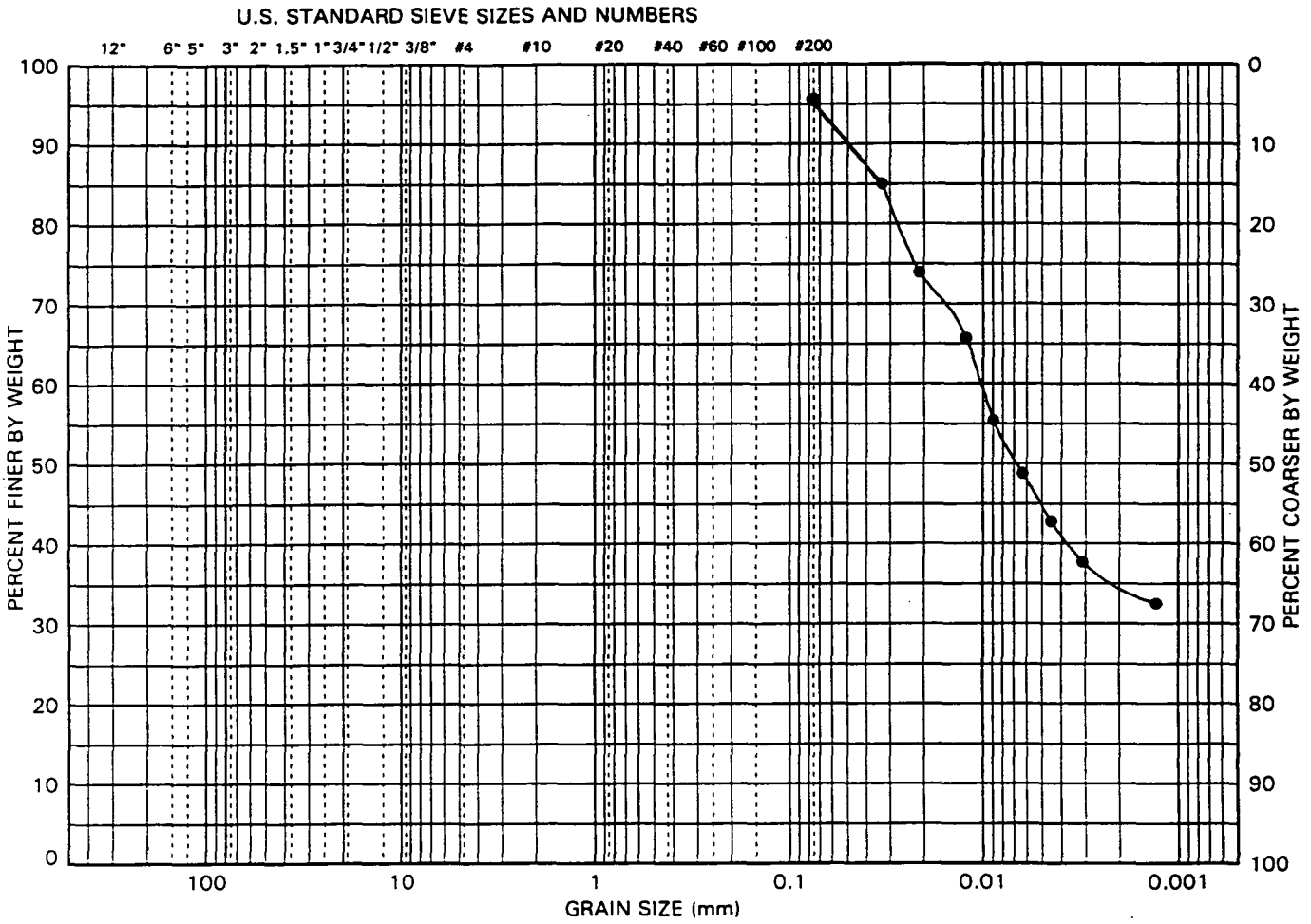
FIGURE 73

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-36	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G288	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 35.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															73	45	35	

NOTES:

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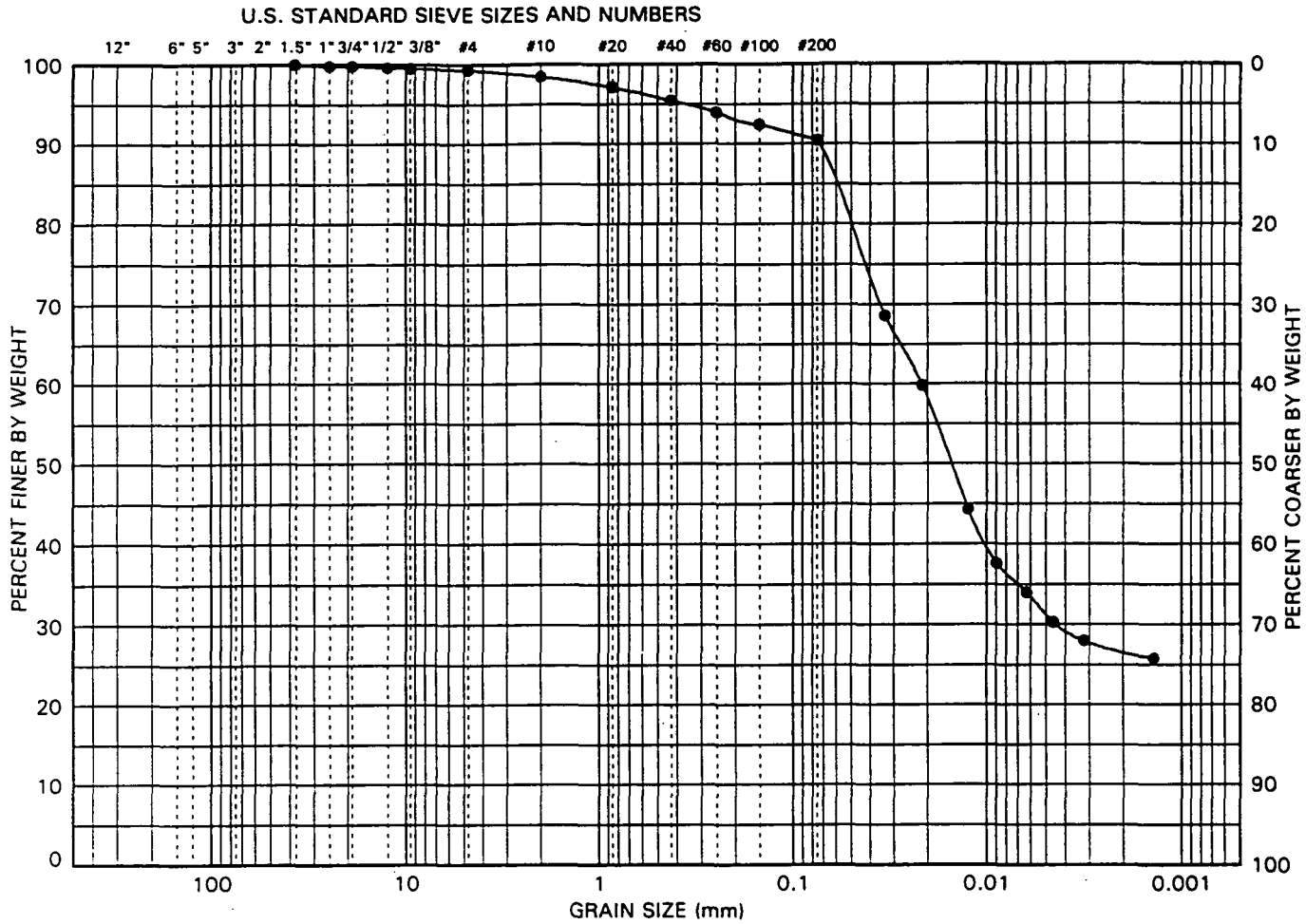
FIGURE 74

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/06/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-36A	LIQUID LIMIT (%)	52	SOIL FRACTIONS	GRAVEL (%) 0.7
LAB. SAMPLE NO.	97G234	PLASTIC LIMIT (%)	22		SAND (%) 8.9
SAMPLE DEPTH (ft)		PLASTICITY INDEX	30		FINES (%) 90.4
SOIL CLASSIFICATION: CH - Fat Clay					SILT (%) 63.7
					CLAY(%) 26.7
					COEFF. UNIFORMITY (Cu)
					COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	99	98	97	95	94	92	90	80	58	31	27	

NOTES:

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FIGURE 75

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 08/04/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-36A
LAB. SAMPLE NO.	97G234
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	105.2
OPTIMUM MOISTURE CONTENT (%)	19.9
IN SITU MOISTURE CONTENT (%)	

NOTES:

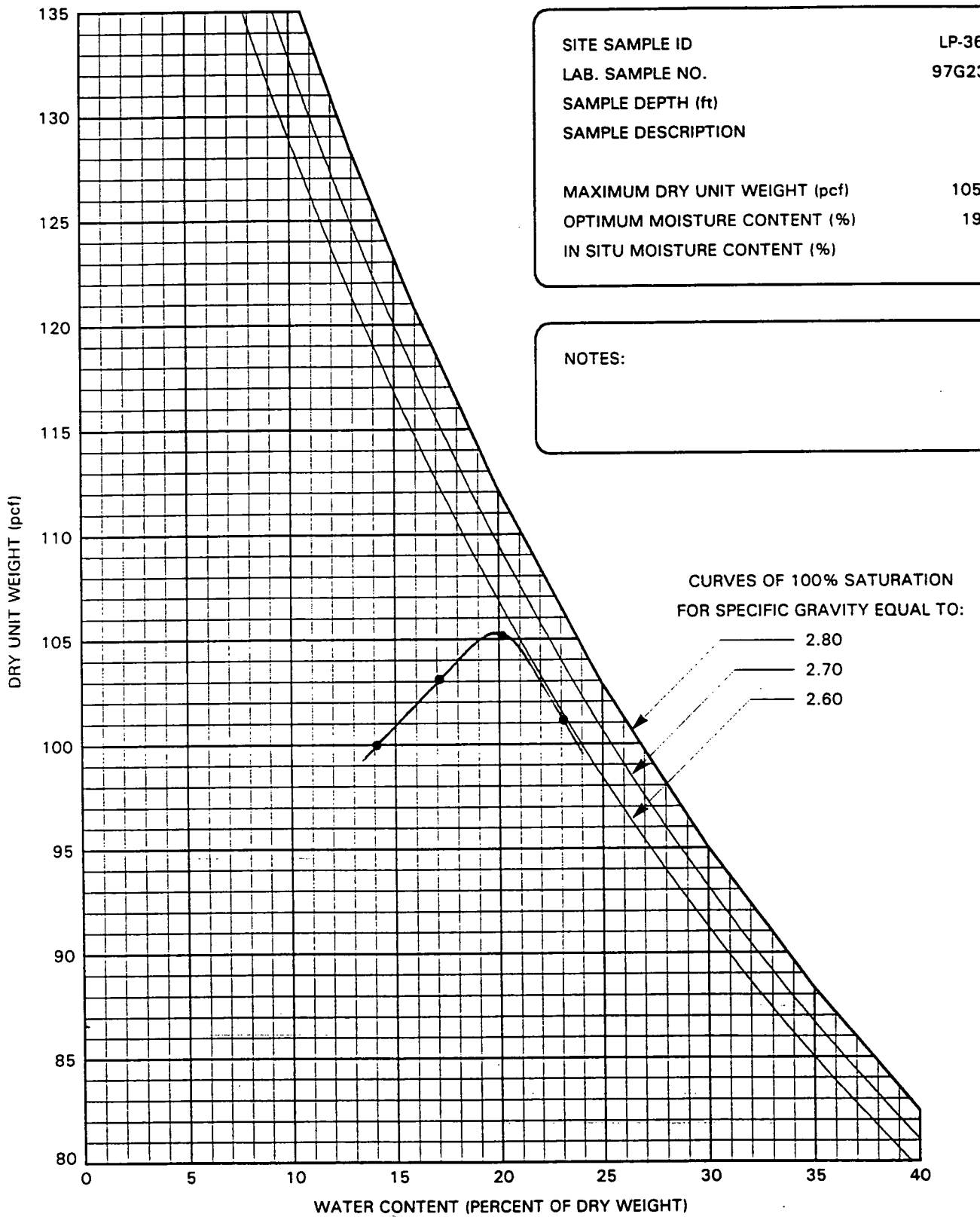

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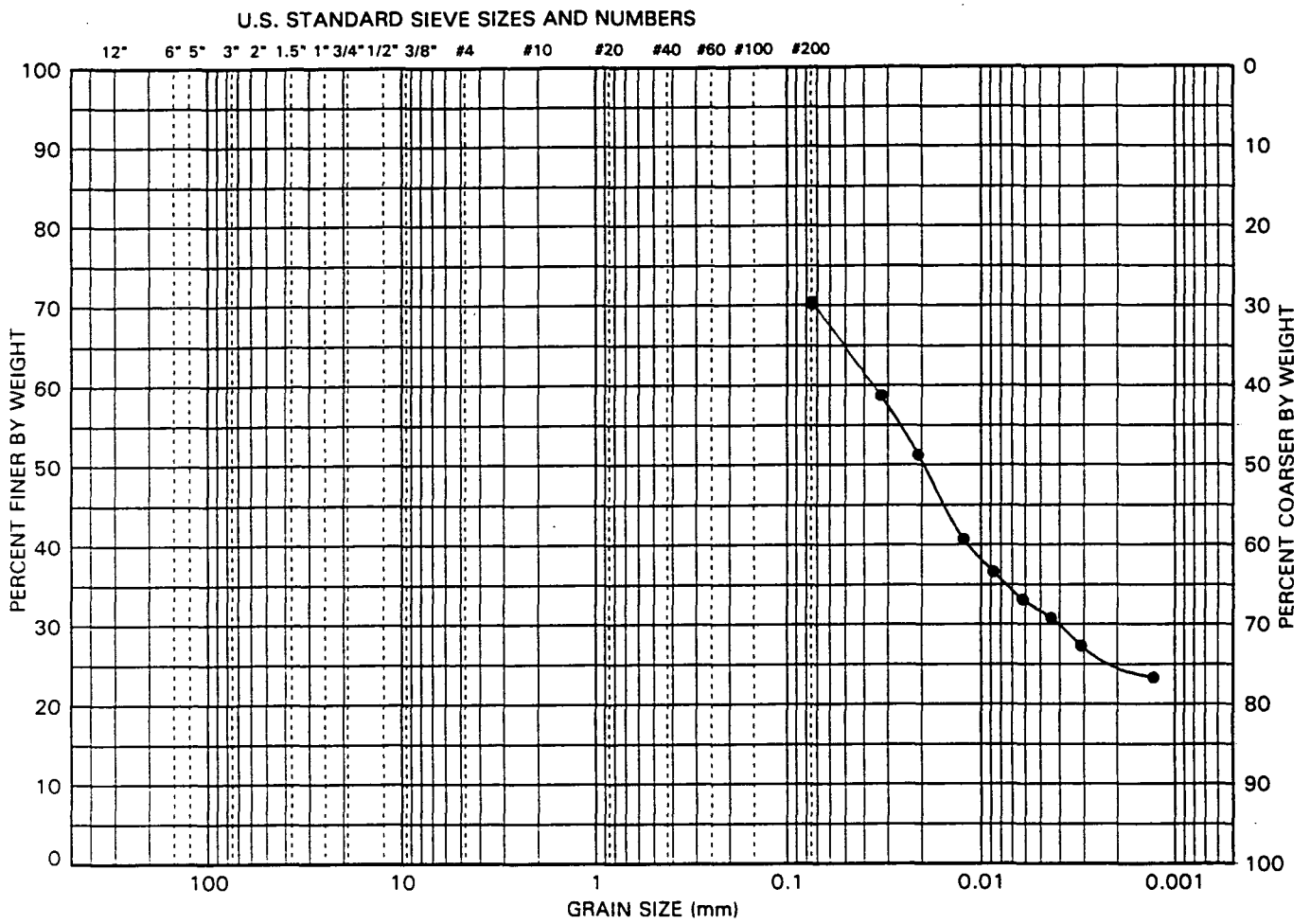
FIGURE 76
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/11/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID LP-37	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO. 97G289.A	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:			SILT (%)	
			CLAY(%)	25.3
			COEFF. UNIFORMITY (Cu)	
			COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															50	32	25	

NOTES:

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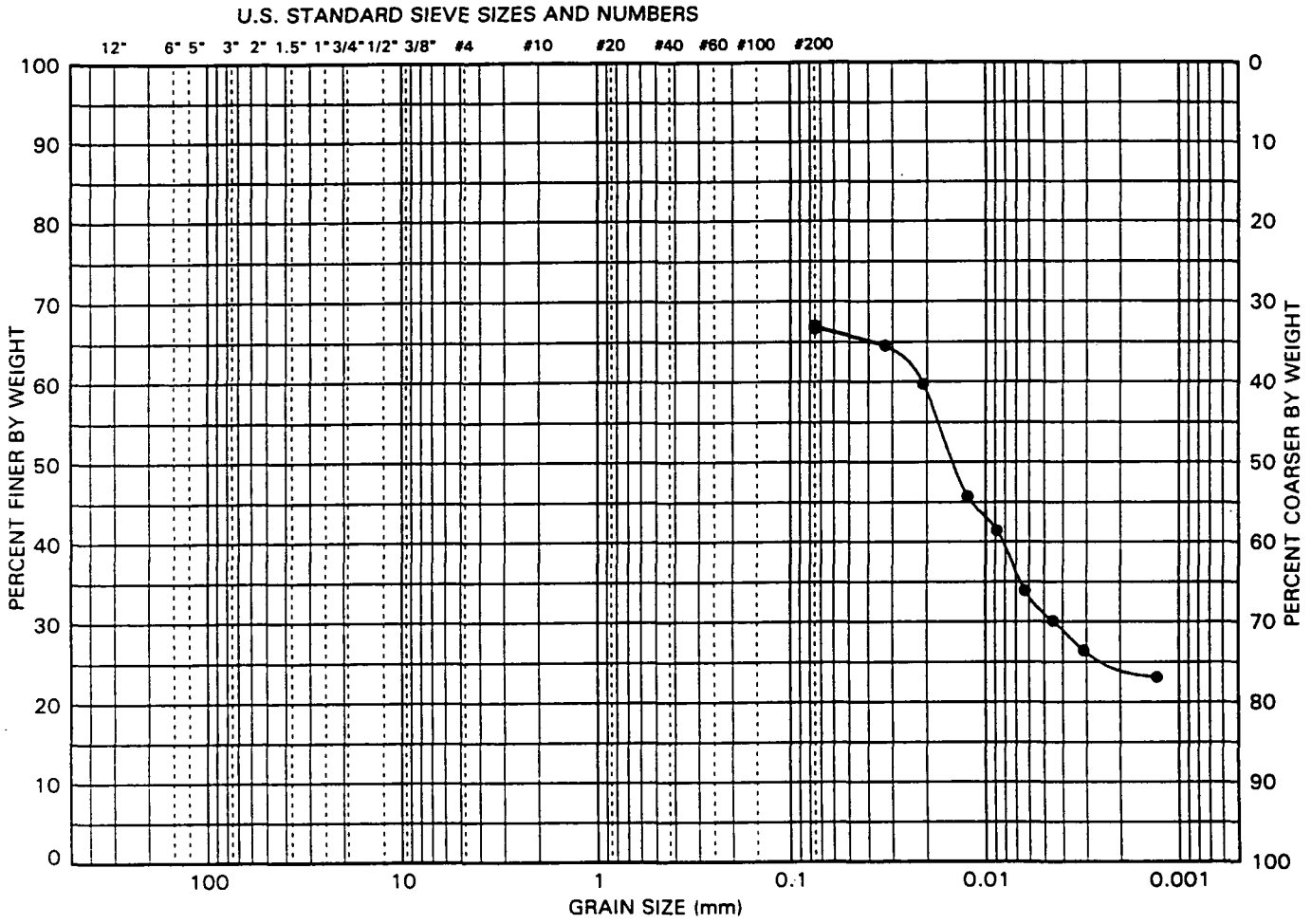
FIGURE 77

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/05/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-38	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97G290	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 24.7
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															59	31	25	

NOTES:

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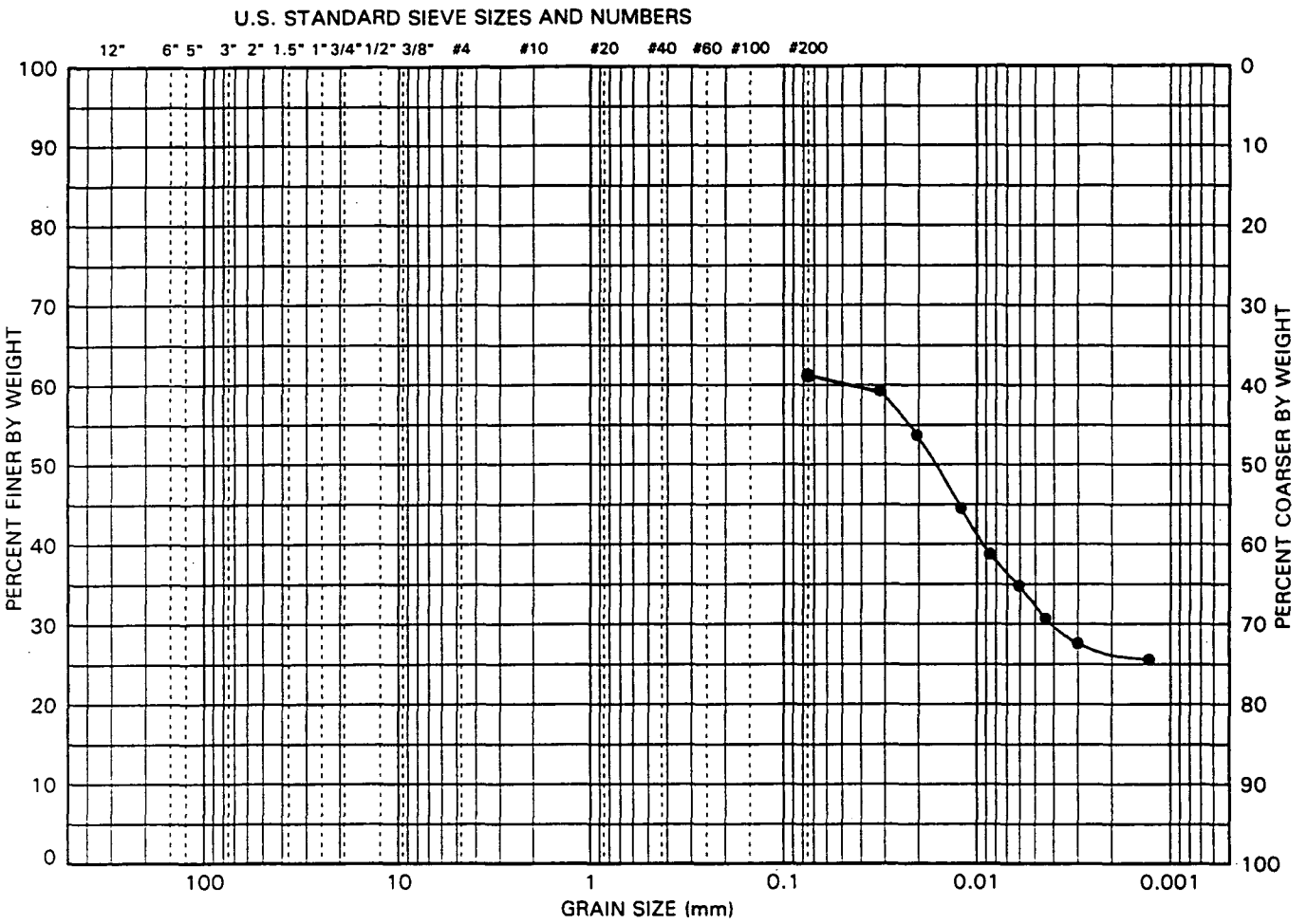
FIGURE 78
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/11/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-39	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97H16	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 26.6
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															53	32	27	

NOTES:

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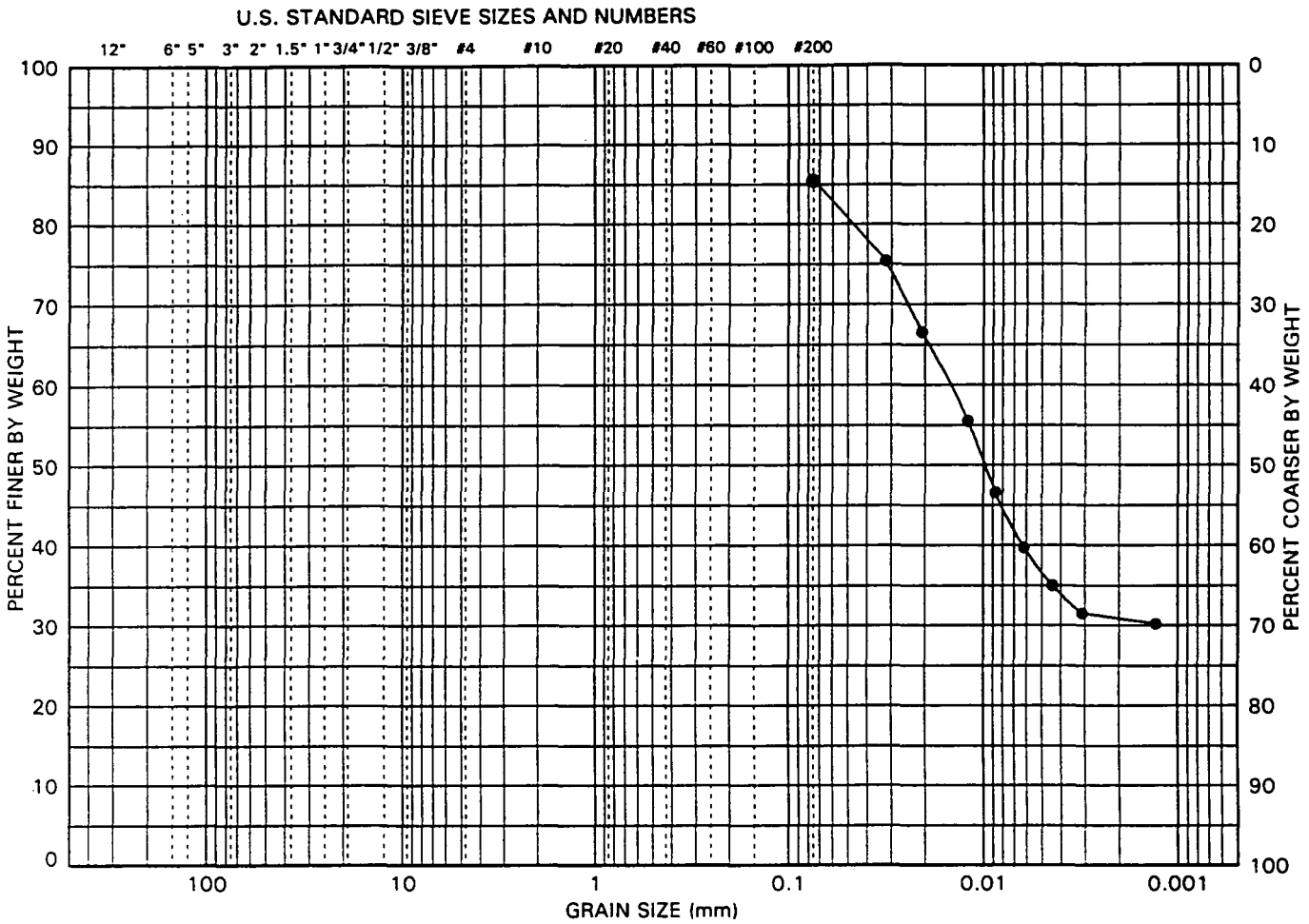
Atlanta, Georgia

FIGURE 79
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/11/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-40	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97H17	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 30.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															66	37	31	

NOTES:

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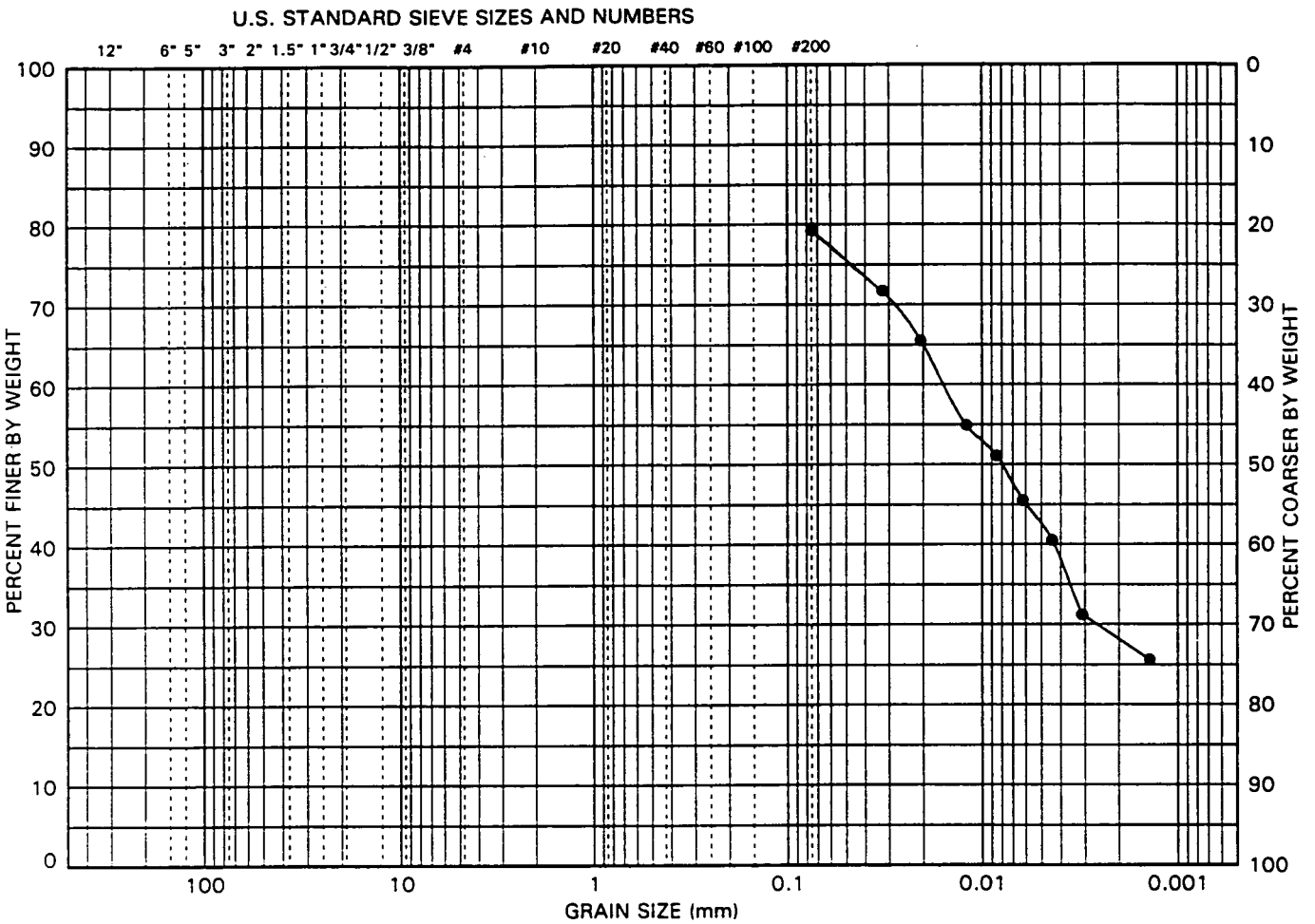
FIGURE 80

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/13/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-41	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97H49	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 28.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															65	42	28	

NOTES:

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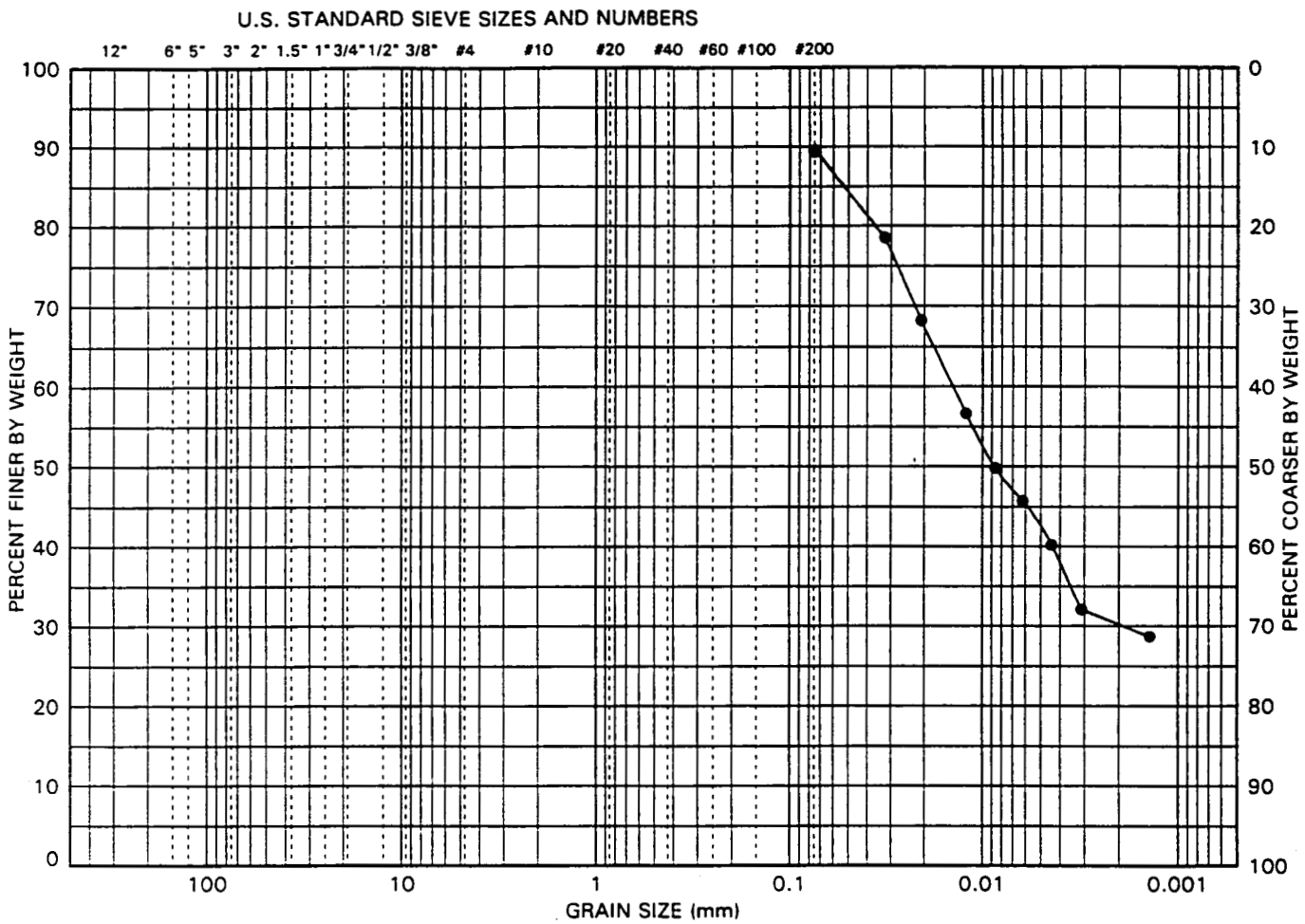
Atlanta, Georgia

FIGURE 81
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 08/13/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-42	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97H50	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:				SILT (%)	
				CLAY(%)	30.2
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
															67	42	30	

NOTES:

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Atlanta, Georgia

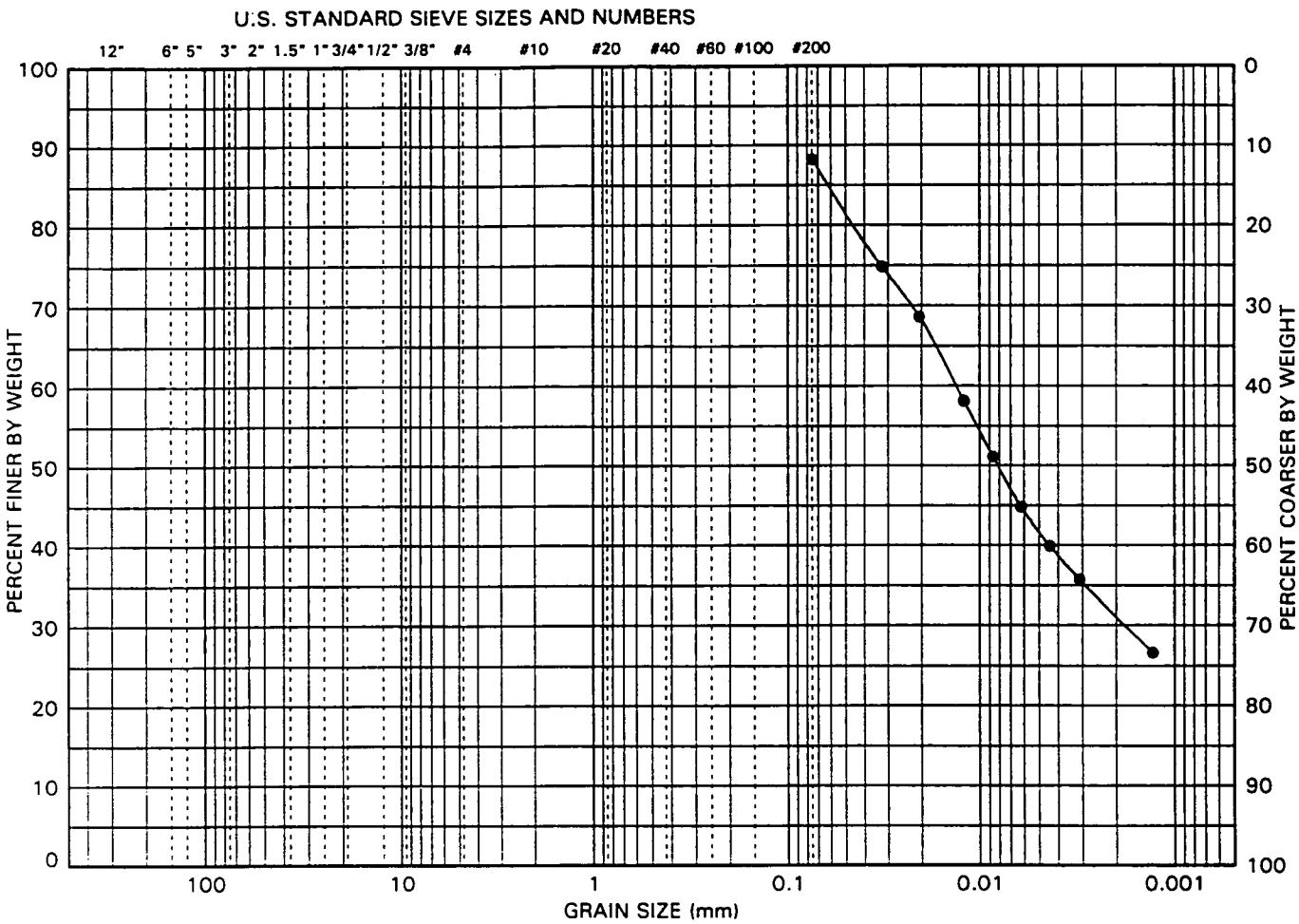
FIGURE 82

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-46	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97I12	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 31.1
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													88	82	68	42	31	

NOTES:

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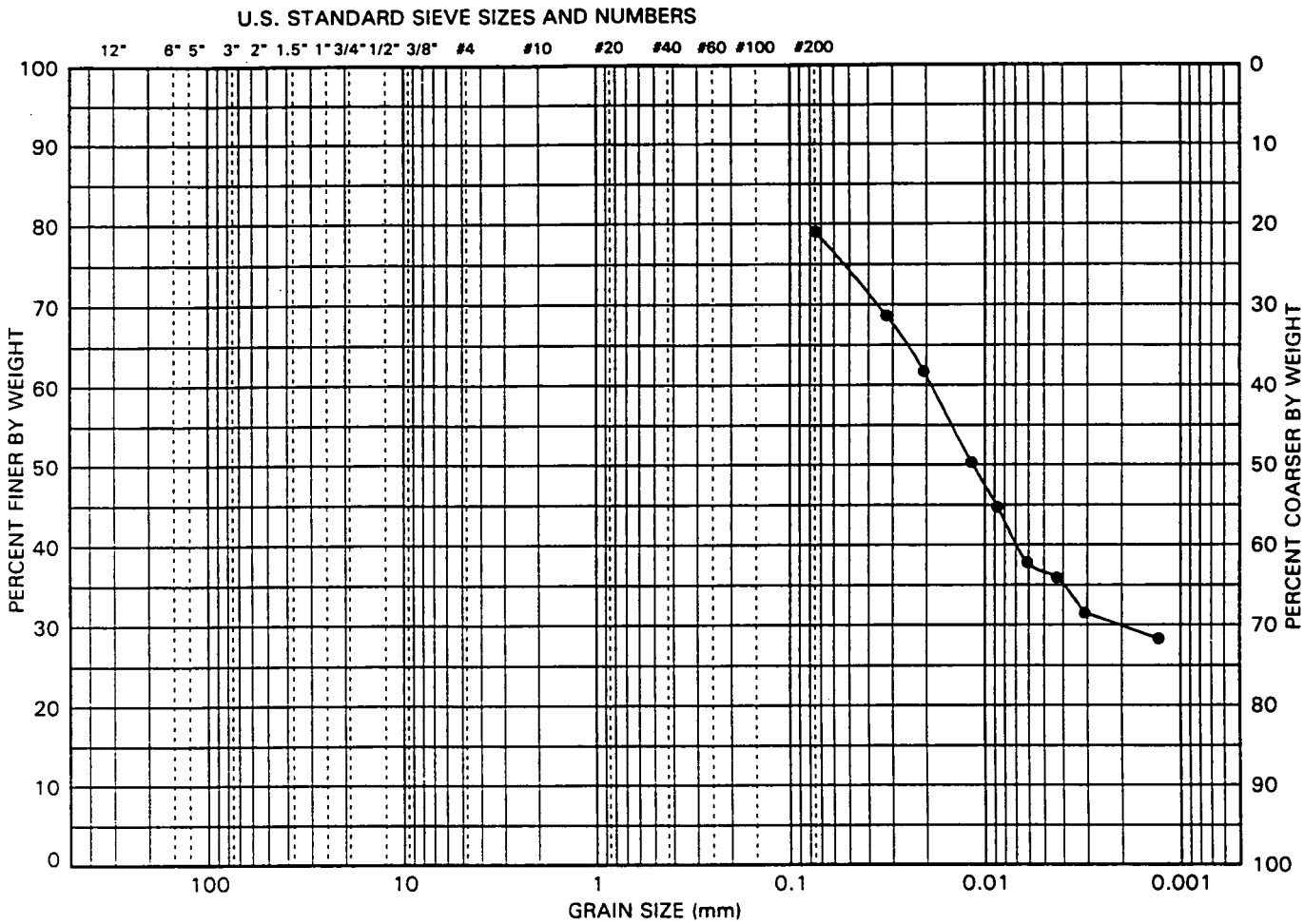
Atlanta, Georgia

FIGURE 83
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-47	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97I13	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:				SILT (%)	
				CLAY(%)	29.9
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													79	74	61	37	30	

NOTES:

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Atlanta, Georgia

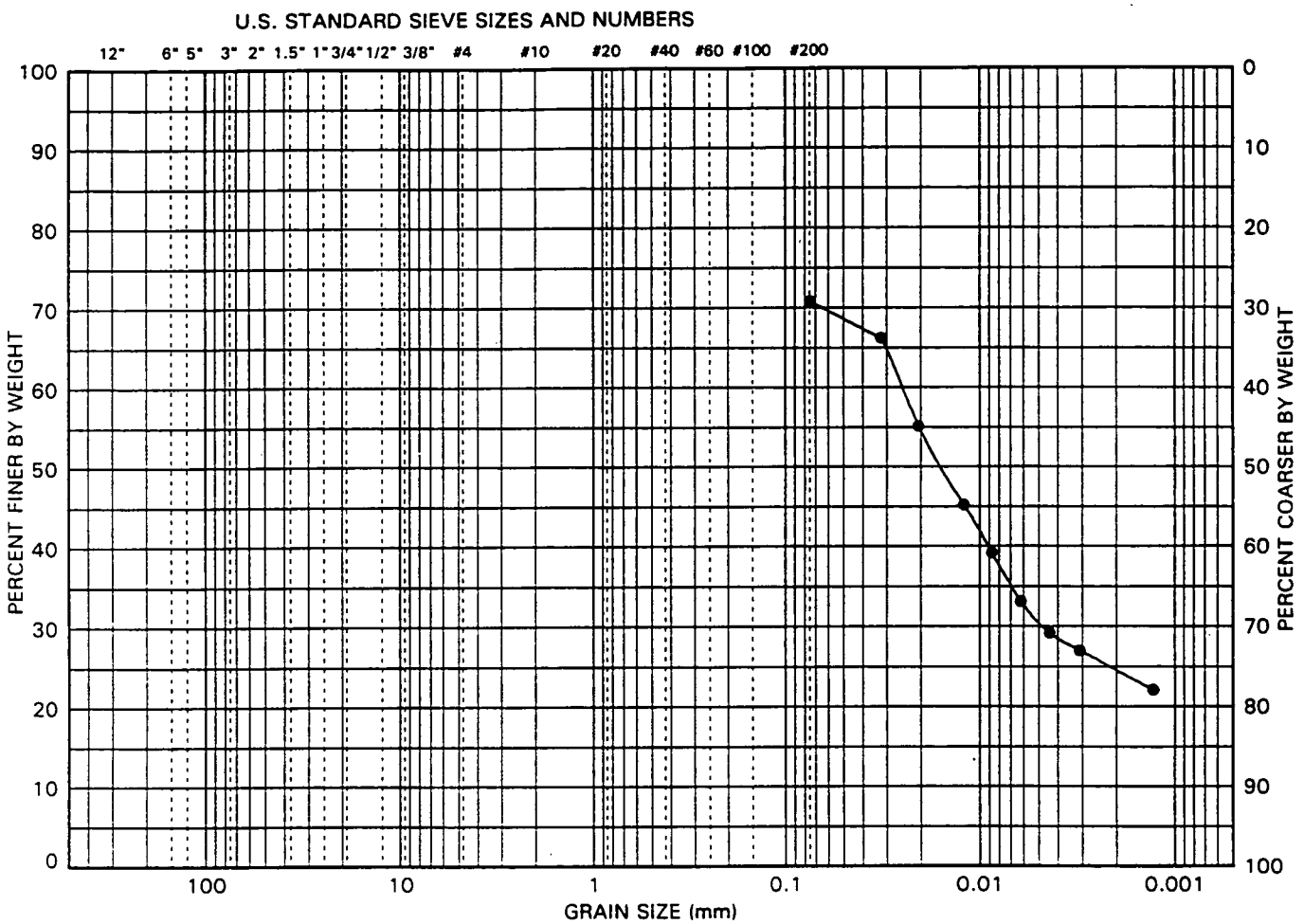
FIGURE 84

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/11/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-158	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97149	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 24.5
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													71	69	55	31	25	

NOTES:

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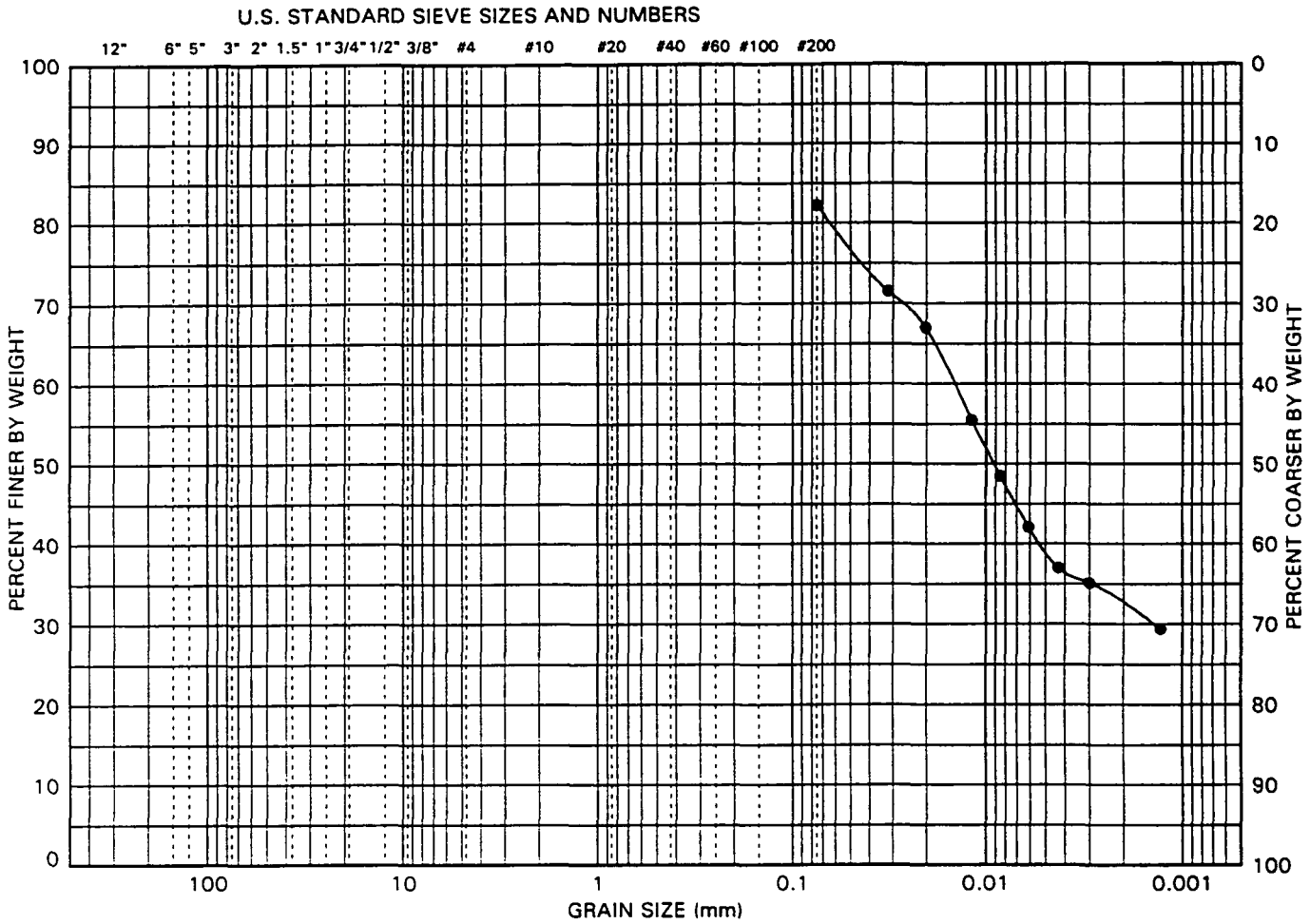
FIGURE 85

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/18/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-174	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	971174	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 32.3
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													82	77	67	39	32	

NOTES:

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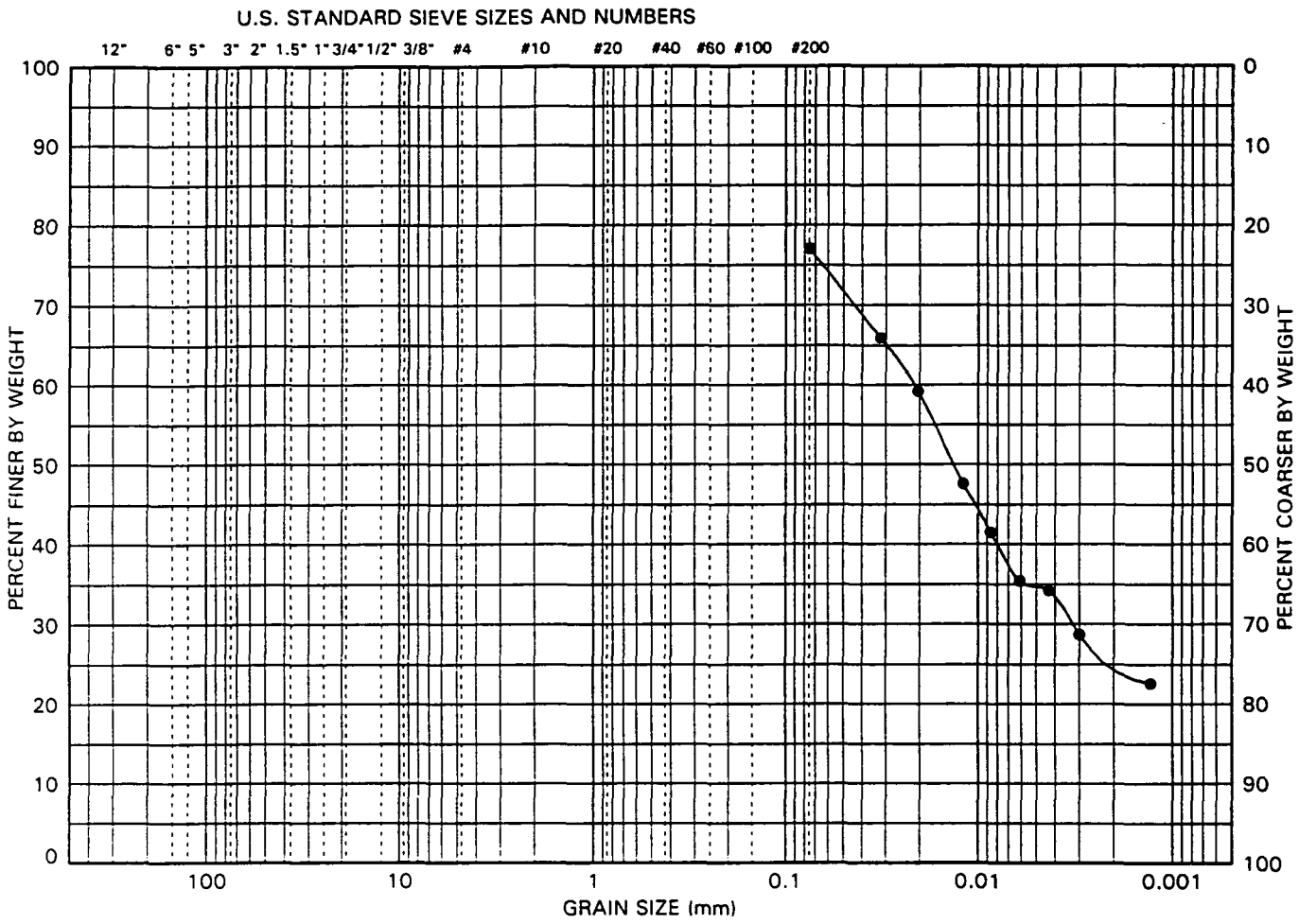
Atlanta, Georgia

FIGURE 86
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/18/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-175	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	971175	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY(%)	25.7
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													77	72	59	35	26	

NOTES:

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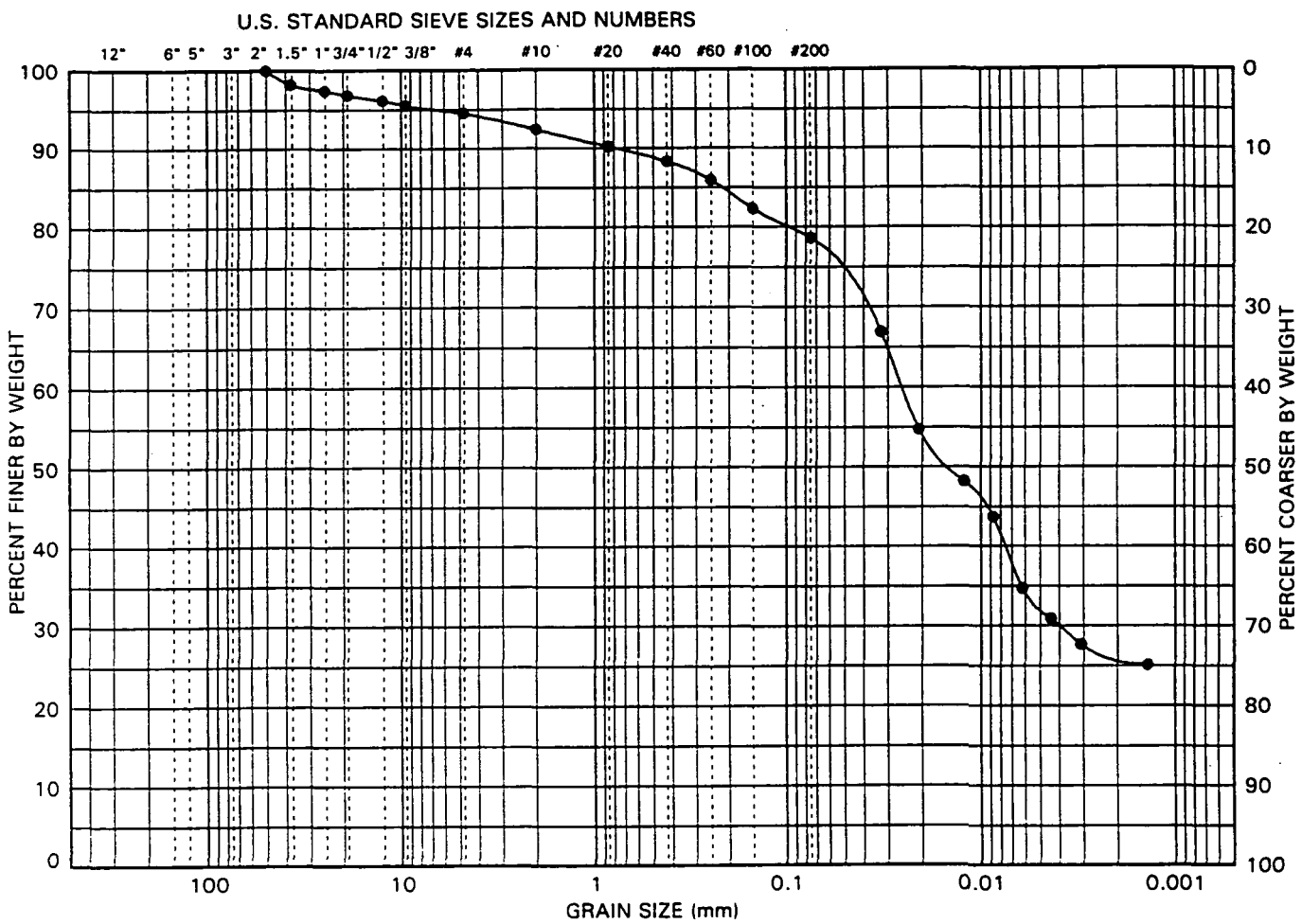
FIGURE 87

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/18/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-183	LIQUID LIMIT (%)	45	SOIL FRACTIONS: GRAVEL (%)	5.5
LAB. SAMPLE NO.	971170	PLASTIC LIMIT (%)	20	SAND (%)	15.9
SAMPLE DEPTH (ft)		PLASTICITY INDEX	25	FINES (%)	78.6
SOIL CLASSIFICATION:				SILT (%)	52.3
CL - Lean Clay with Sand				CLAY(%)	26.3
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	98	97	97	96	96	95	92	90	88	86	82	79	73	54	32	26	

NOTES:

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FIGURE 88

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

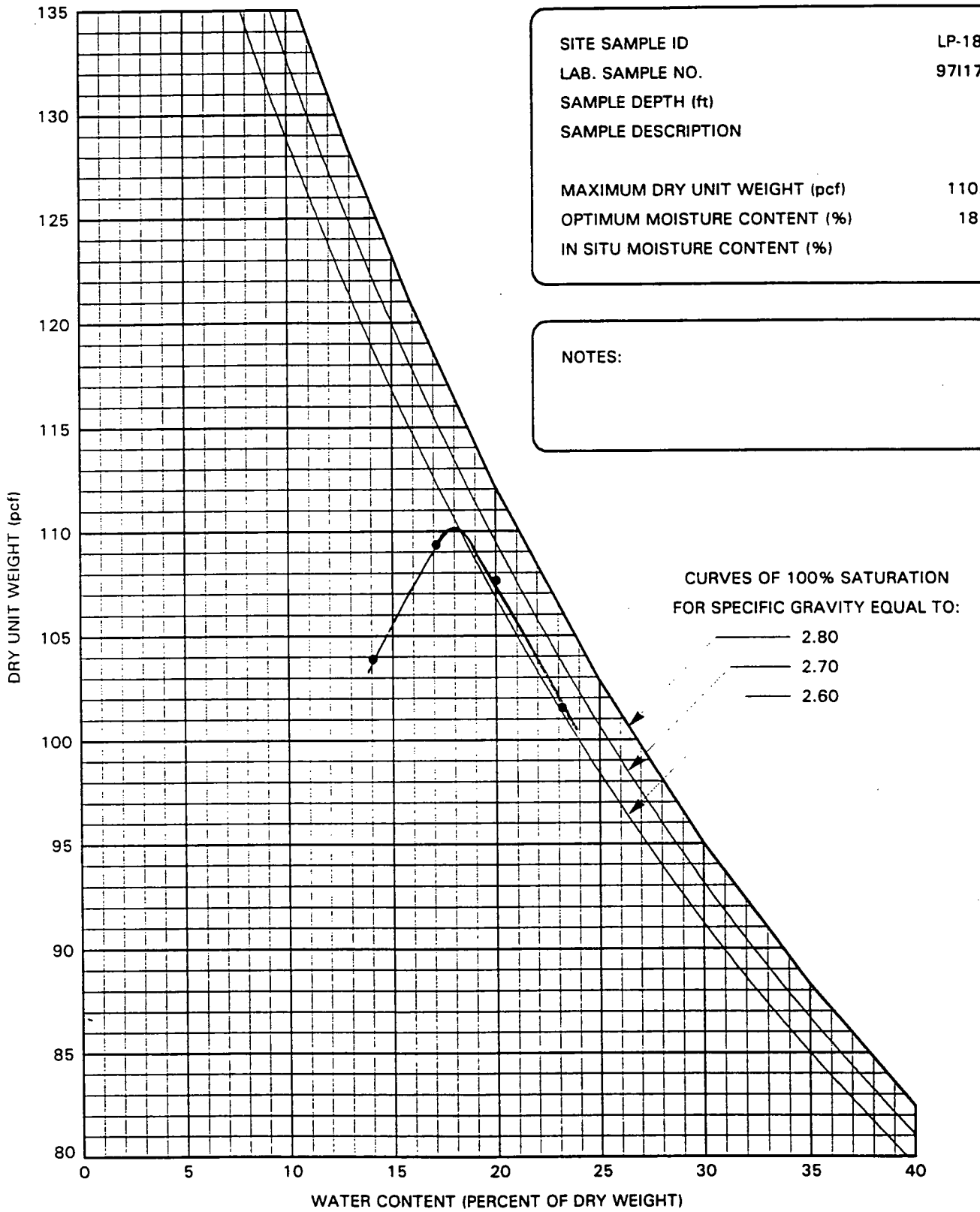
GS FORM: 4MD1 09/18/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-183
LAB. SAMPLE NO.	971170
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	110.1
OPTIMUM MOISTURE CONTENT (%)	18.0
IN SITU MOISTURE CONTENT (%)	

NOTES:



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Atlanta, Georgia

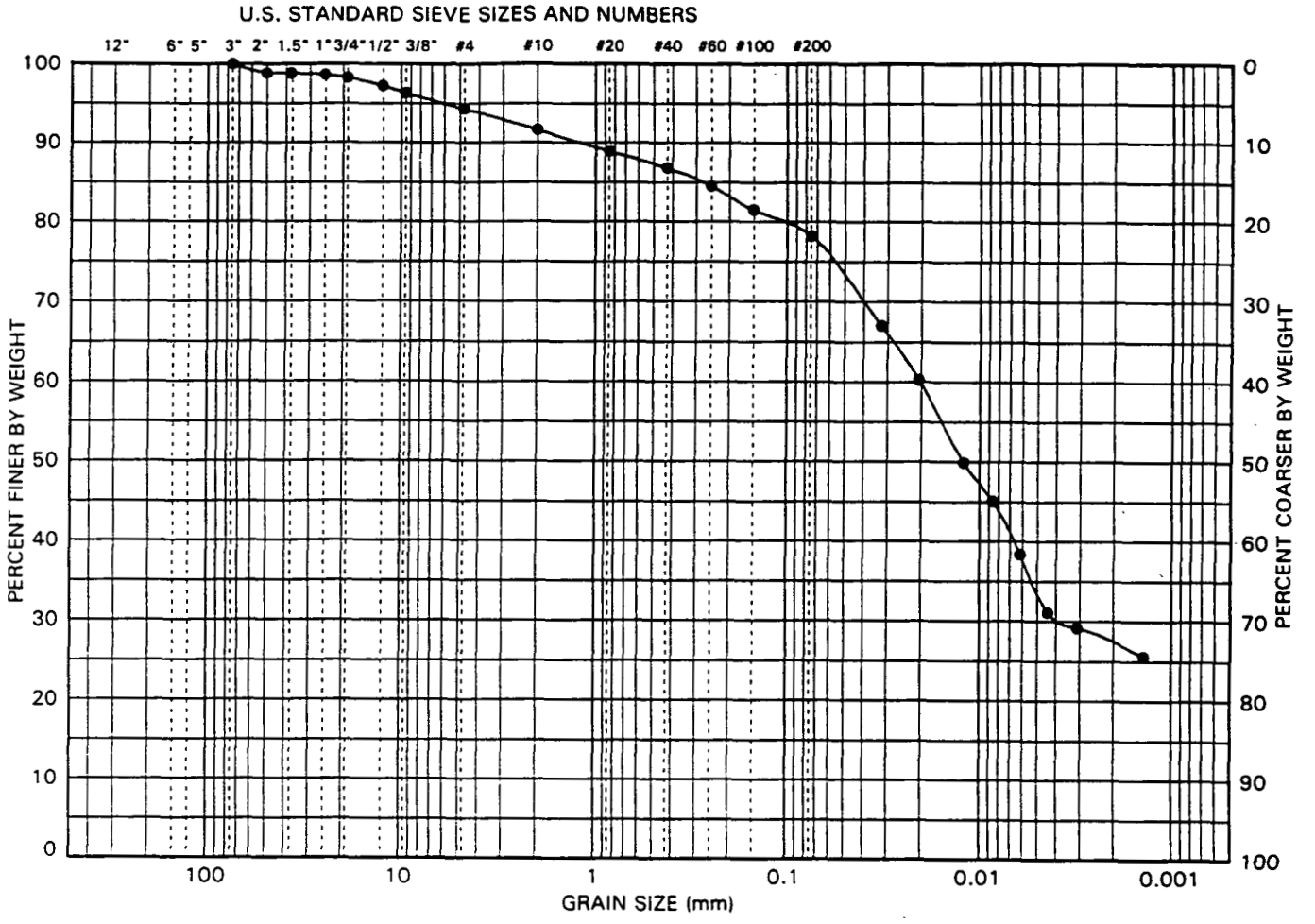
FIGURE 89

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/18/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-184	LIQUID LIMIT (%)	44	SOIL FRACTIONS: GRAVEL (%)	5.7
LAB. SAMPLE NO.	97I171	PLASTIC LIMIT (%)	19	SAND (%)	16.1
SAMPLE DEPTH (ft)		PLASTICITY INDEX	25	FINES (%)	78.2
SOIL CLASSIFICATION: CL - Lean Clay with Sand				SILT (%)	51.0
				CLAY(%)	27.2
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	99	99	99	98	97	96	94	92	89	87	85	82	78	73	60	34	27	

NOTES:

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Atlanta, Georgia

FIGURE 90

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4MD1 09/18/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-184
LAB. SAMPLE NO.	97I171
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	112.4
OPTIMUM MOISTURE CONTENT (%)	16.1
IN SITU MOISTURE CONTENT (%)	

NOTES:

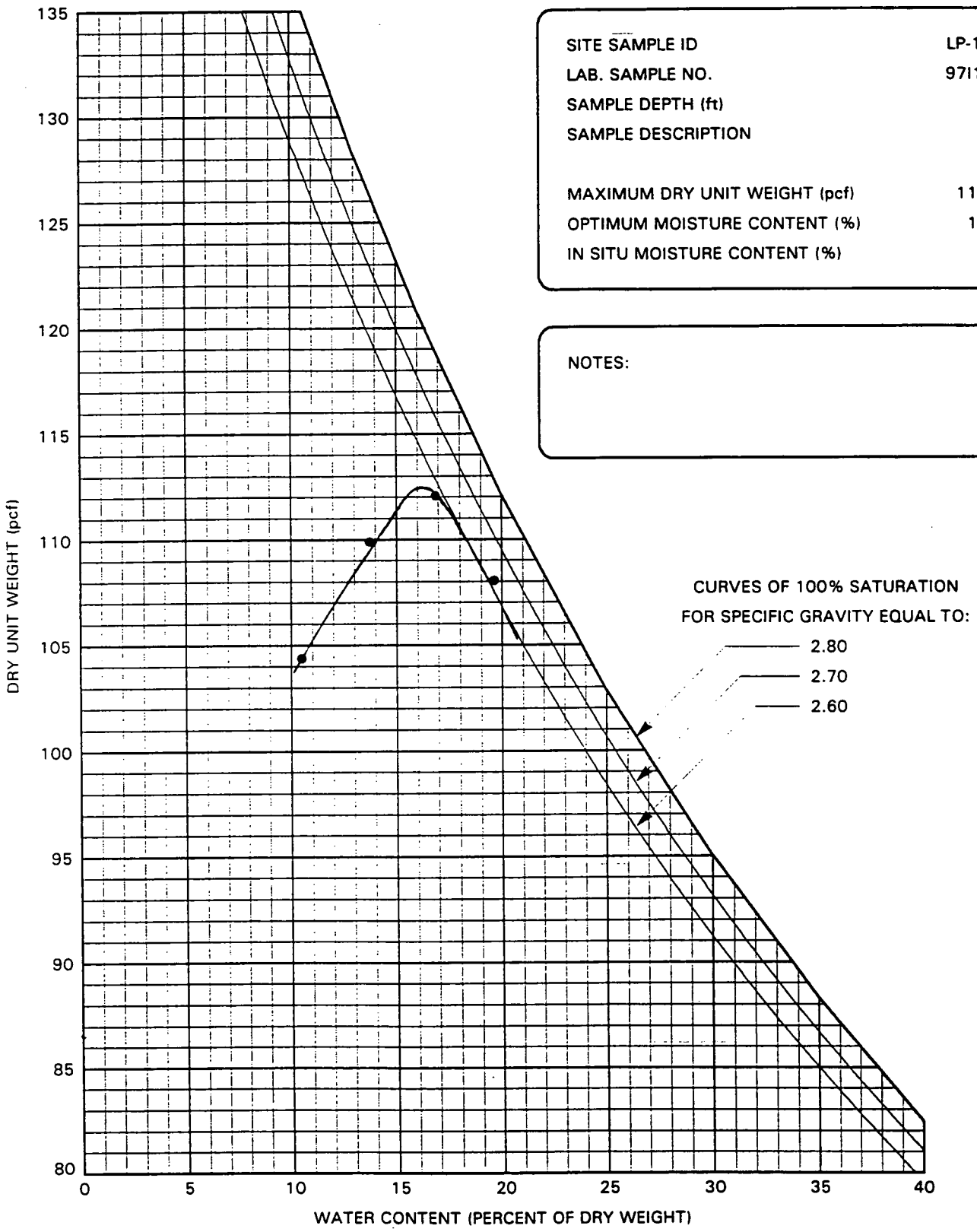

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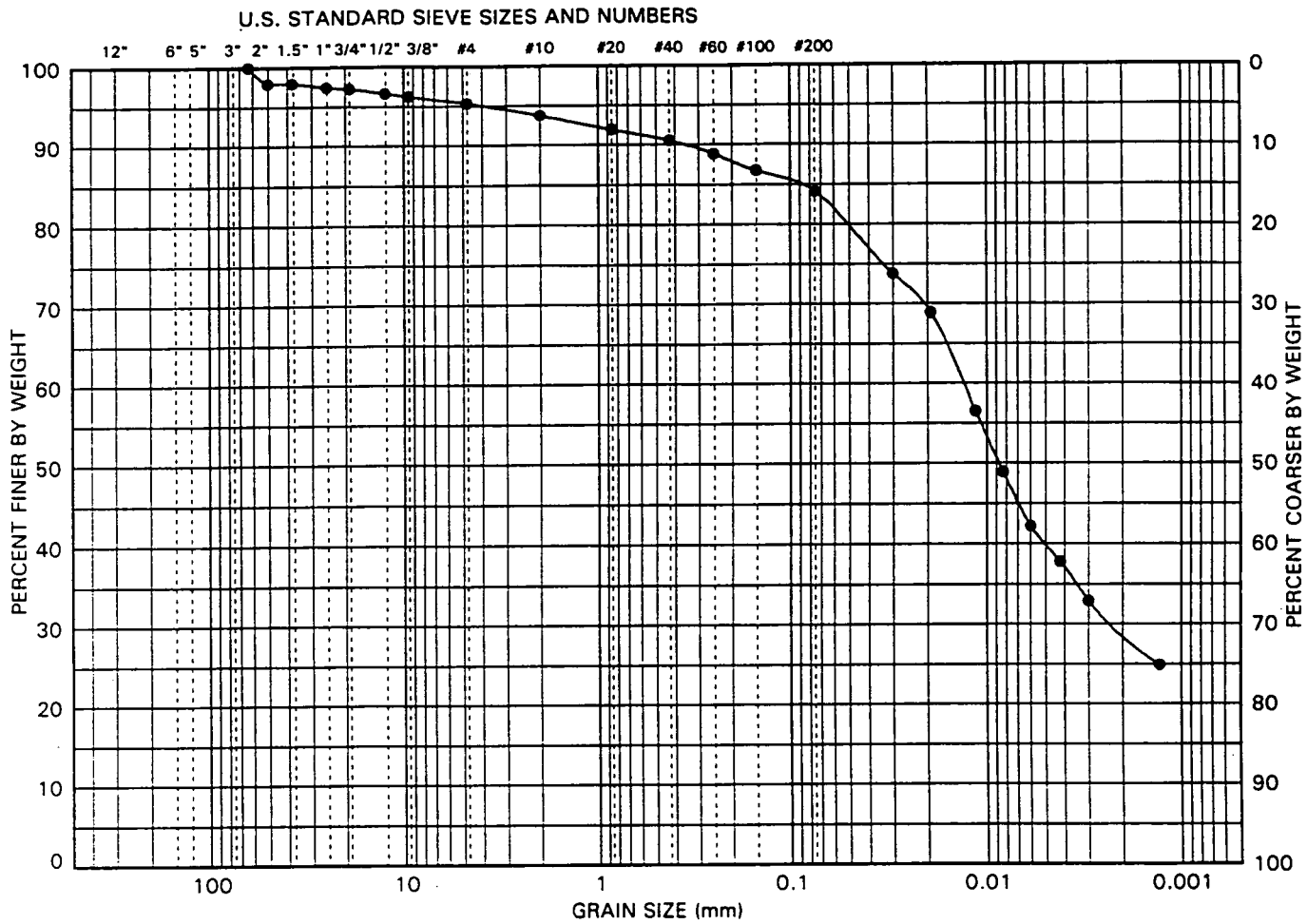
FIGURE 91

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/23/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-201	LIQUID LIMIT (%)	41	SOIL FRACTIONS: GRAVEL (%)	4.7
LAB. SAMPLE NO.	971196	PLASTIC LIMIT (%)	20	SAND (%)	11.2
SAMPLE DEPTH (ft)		PLASTICITY INDEX	21	FINES (%)	84.1
SOIL CLASSIFICATION: CL - Lean Clay with Sand				SILT (%)	55.1
				CLAY(%)	29.0
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	98	98	97	97	97	96	95	94	92	91	89	87	84	80	69	40	29	

NOTES:

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Atlanta, Georgia

FIGURE 92

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

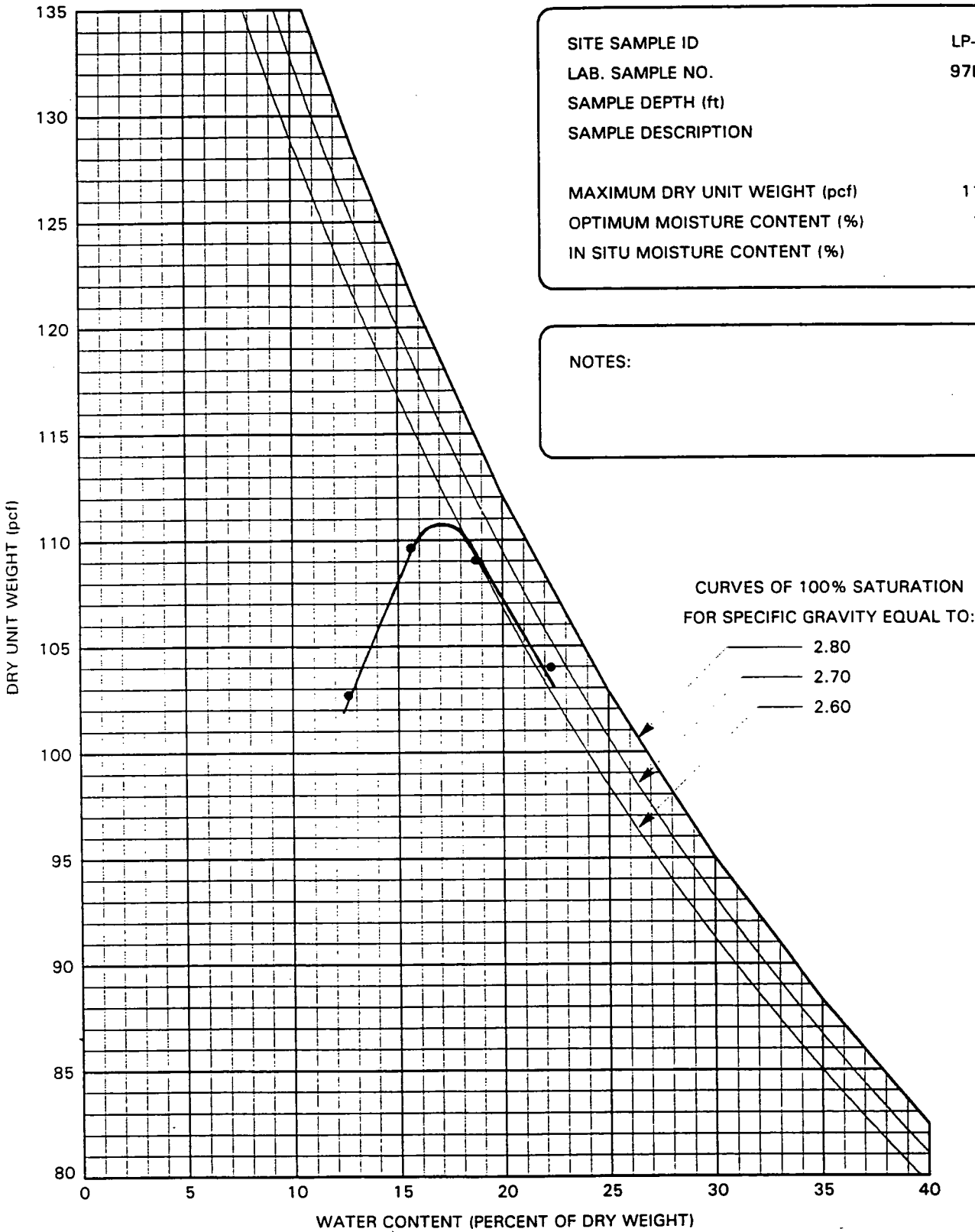
GS FORM: 4MD1 09/24/97

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TESTING

ASTM D-698-A

SITE SAMPLE ID	LP-201
LAB. SAMPLE NO.	97I196
SAMPLE DEPTH (ft)	
SAMPLE DESCRIPTION	
MAXIMUM DRY UNIT WEIGHT (pcf)	110.8
OPTIMUM MOISTURE CONTENT (%)	17.0
IN SITU MOISTURE CONTENT (%)	

NOTES:



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Atlanta, Georgia

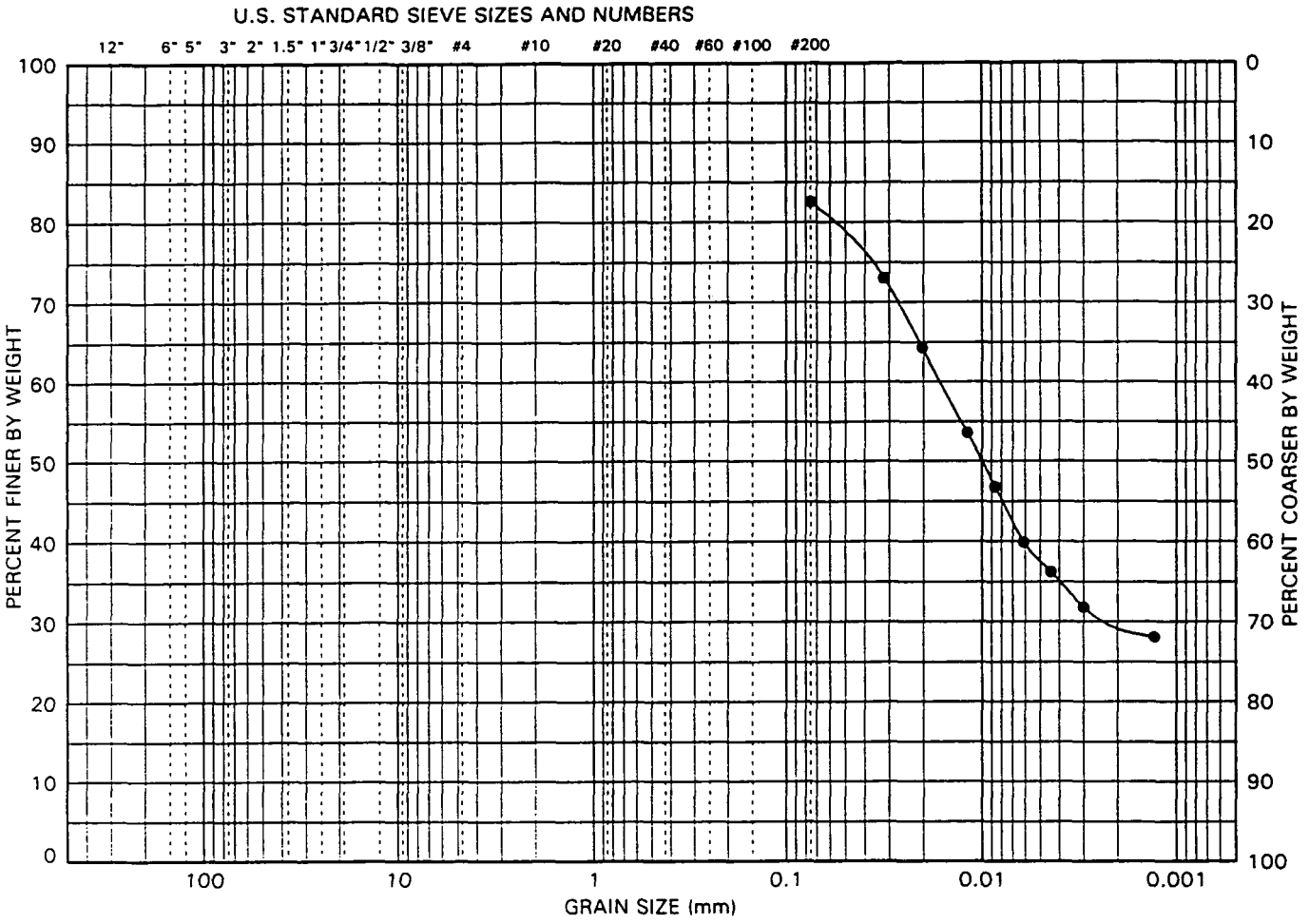
FIGURE 93

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/25/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-237	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	971272	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 30.0
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													83	78	64	38	30	

NOTES:

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Atlanta, Georgia

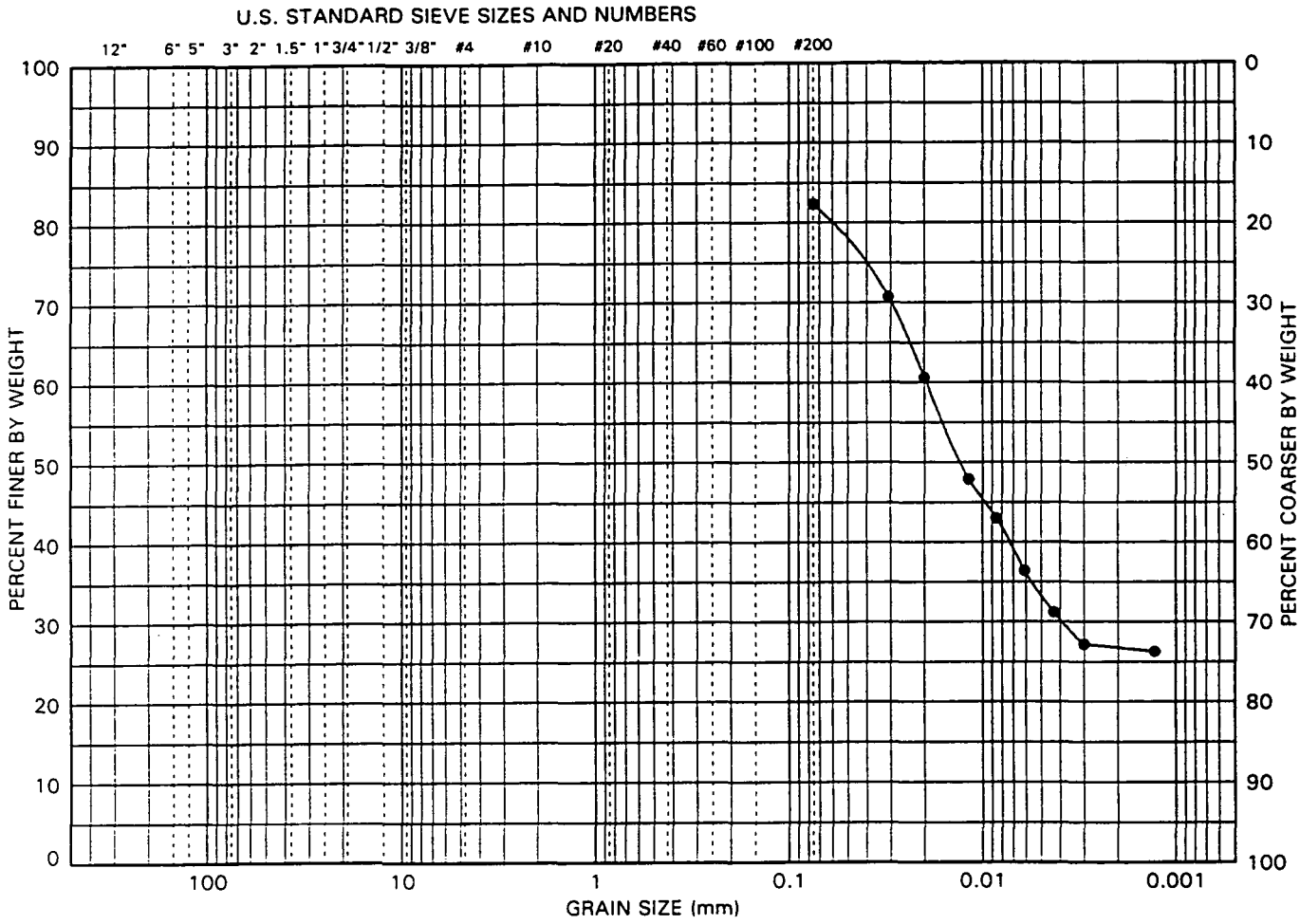
FIGURE 94

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 09/29/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-243	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	971327	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:				SILT (%)	
				CLAY(%)	26.8
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													82	77	61	33	27	

NOTES:

GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

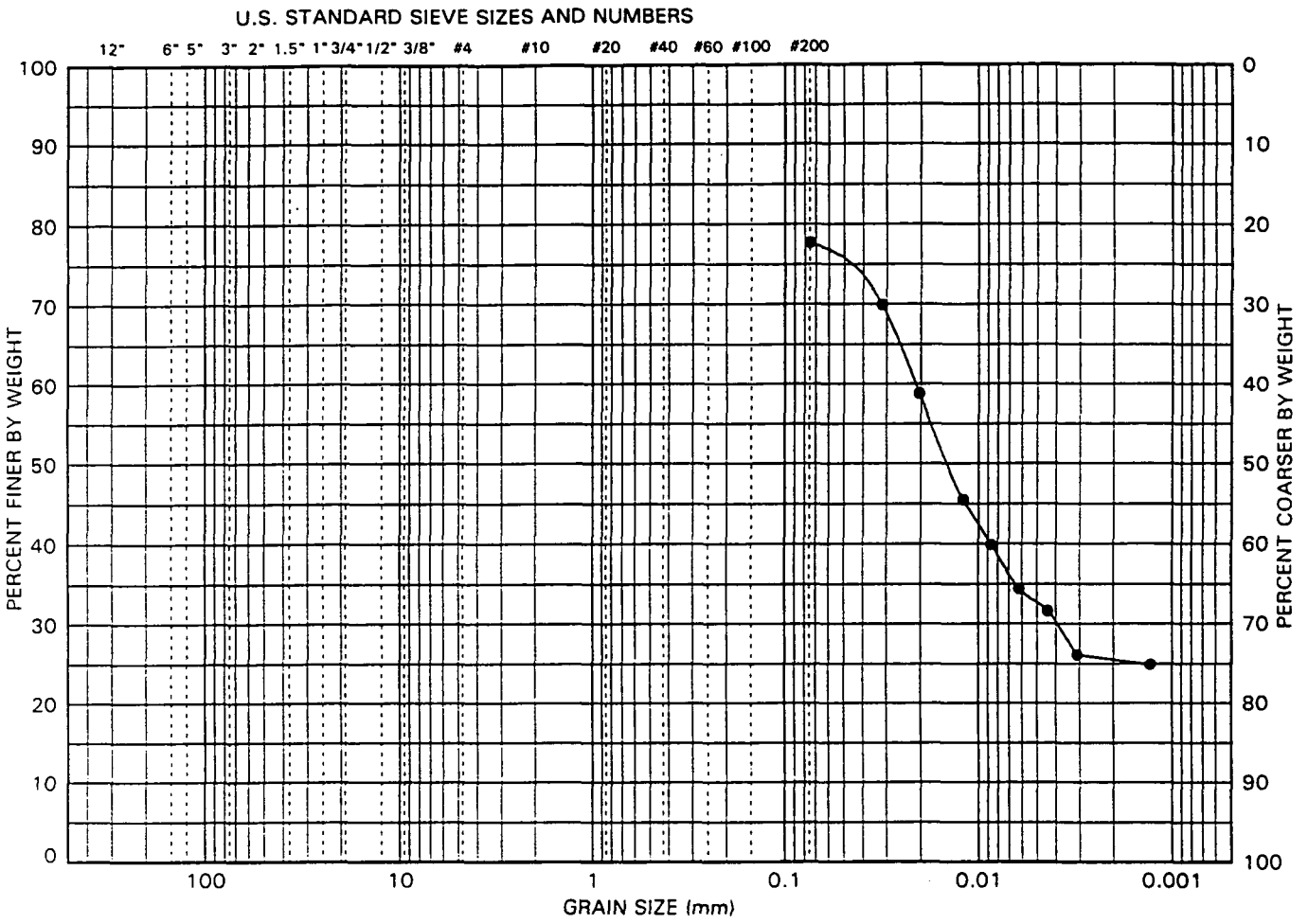
FIGURE 95

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-262	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	971357	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:				SILT (%)	
				CLAY(%)	25.5
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													78	74	58	33	25	

NOTES:

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Atlanta, Georgia

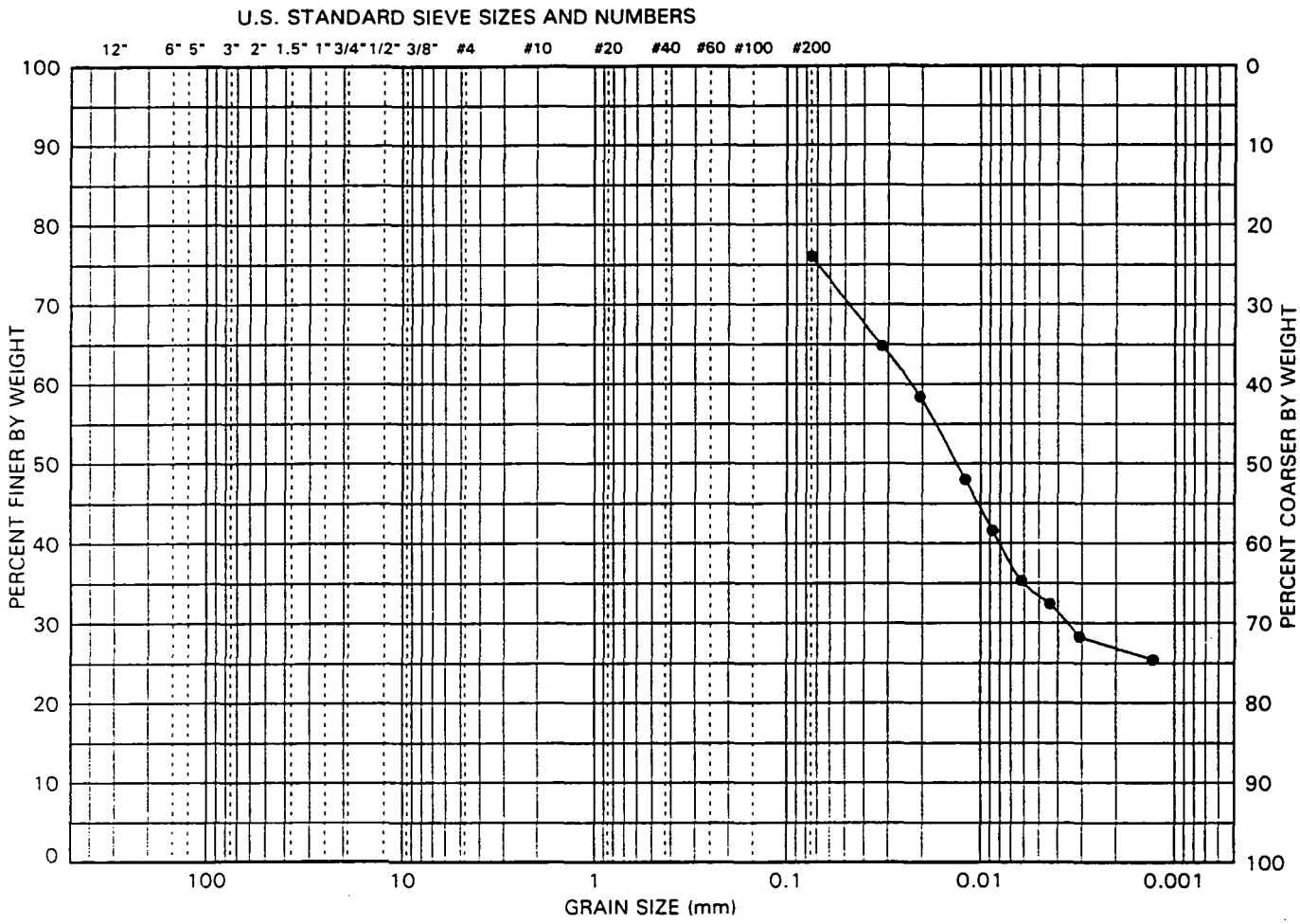
FIGURE 96

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-263	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	971372	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 26.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													76	71	58	33	27	

NOTES:

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Atlanta, Georgia

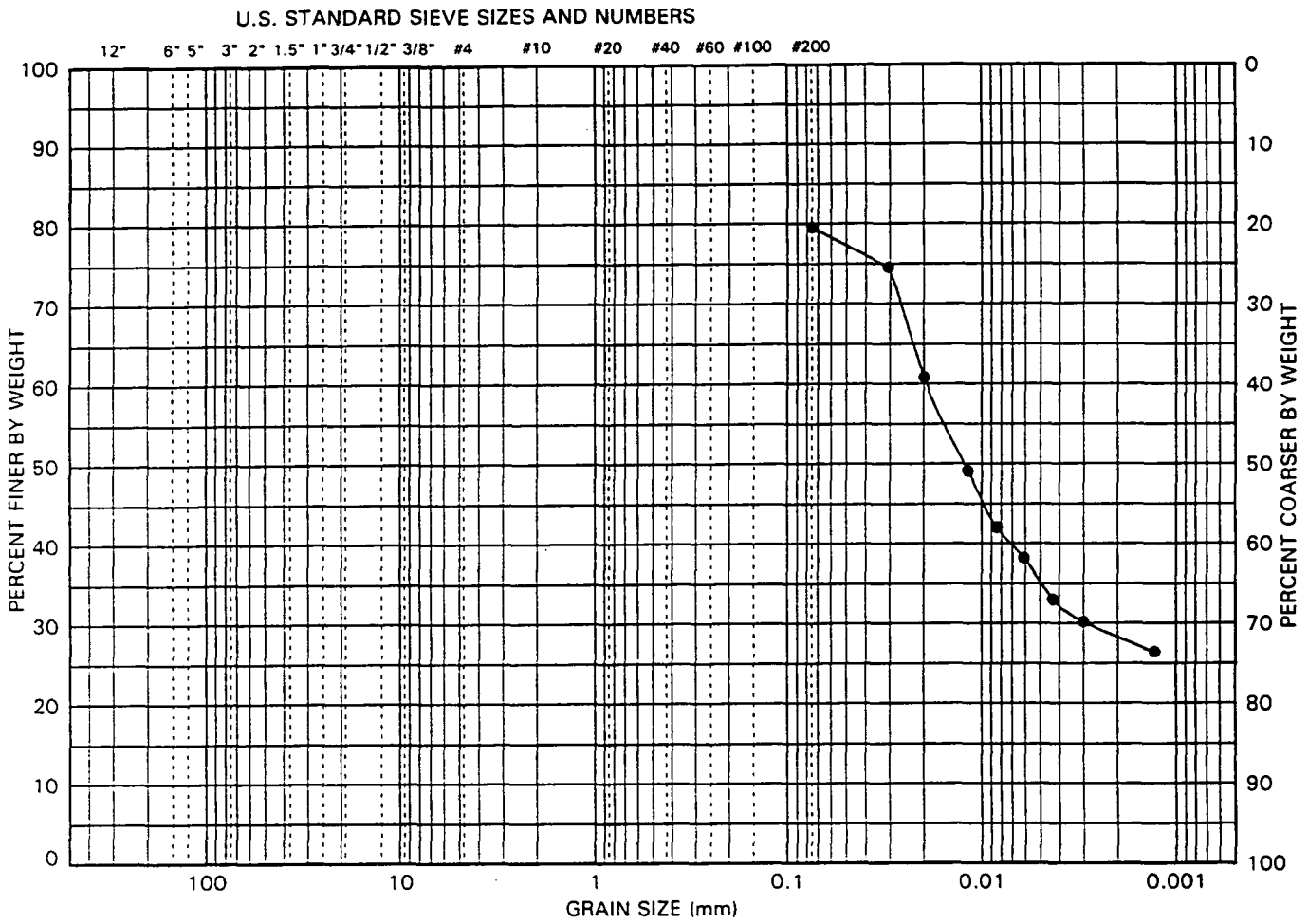
FIGURE 97

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/08/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-269	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)	
LAB. SAMPLE NO.	97J13	PLASTIC LIMIT (%)		SAND (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)	
SOIL CLASSIFICATION:				SILT (%)	
				CLAY(%)	28.4
				COEFF. UNIFORMITY (Cu)	
				COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													80	77	61	35	28	

NOTES:

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Atlanta, Georgia

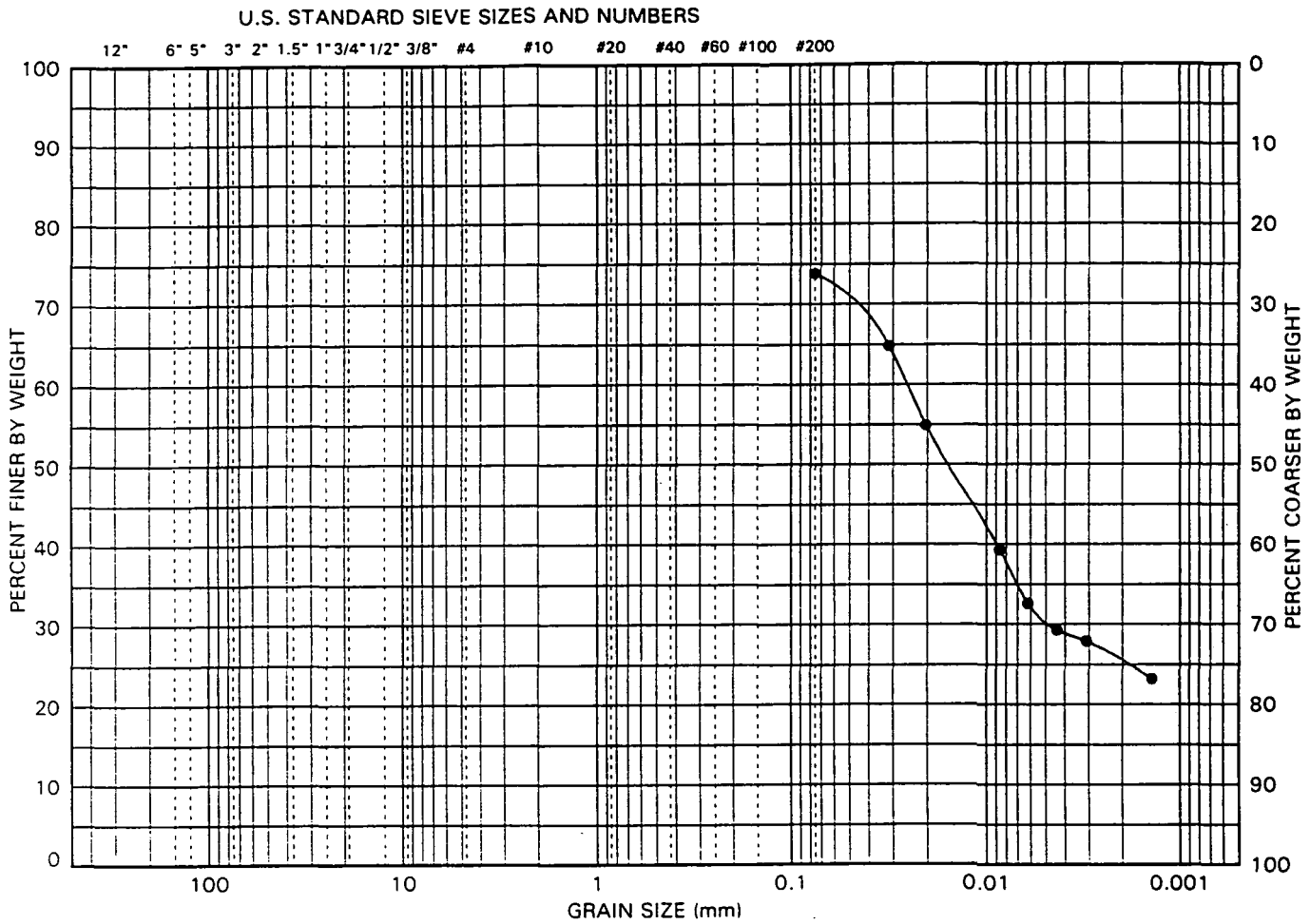
FIGURE 98

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-297	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97J55	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 25.3
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													74	70	55	31	25	

NOTES:

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Atlanta, Georgia

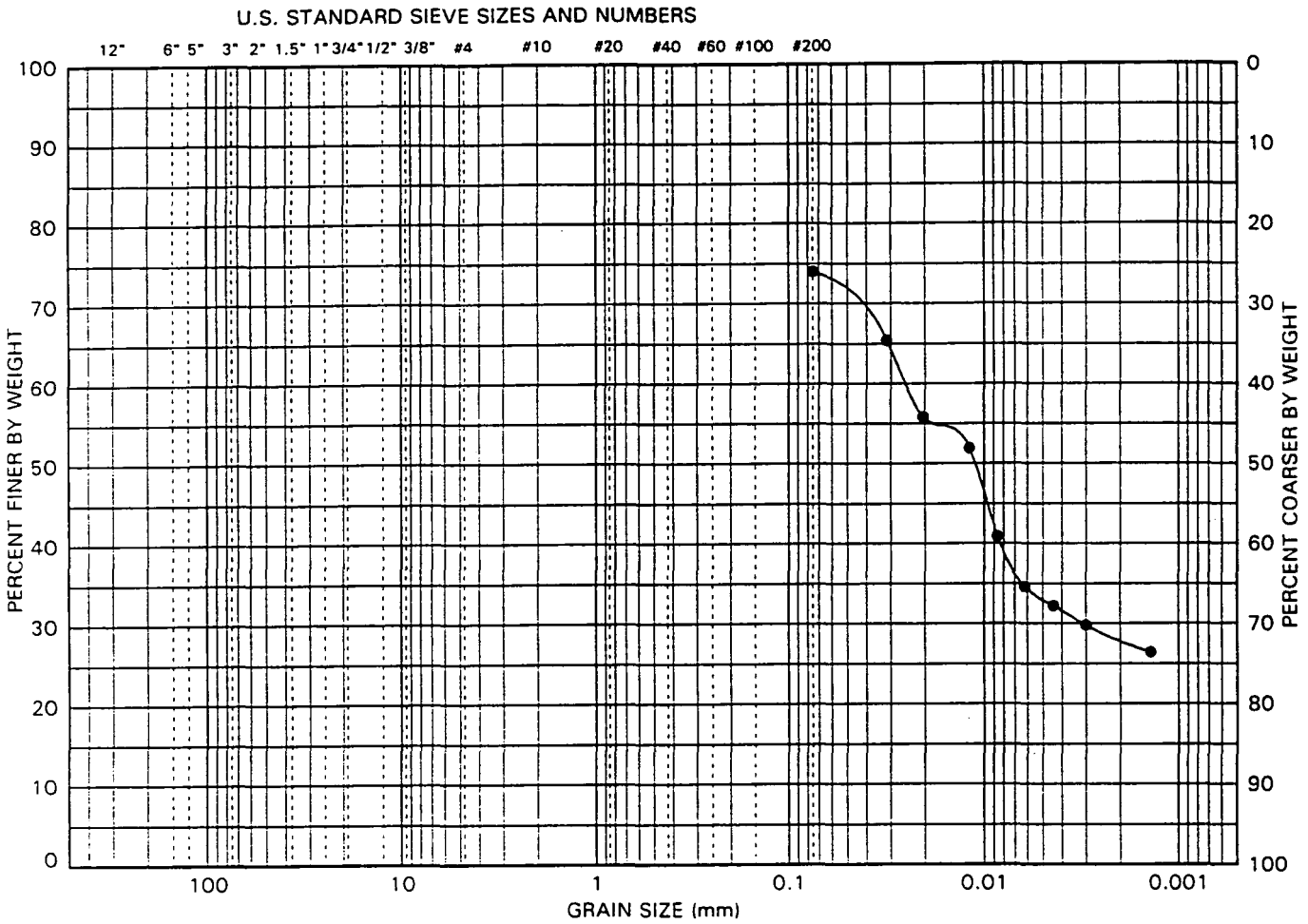
FIGURE 99

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



SITE SAMPLE ID LP-299	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO. 97J56	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%) 74.0
SOIL CLASSIFICATION:			SILT (%)
			CLAY(%)
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													74	70	56	33	28	

NOTES:

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Atlanta, Georgia

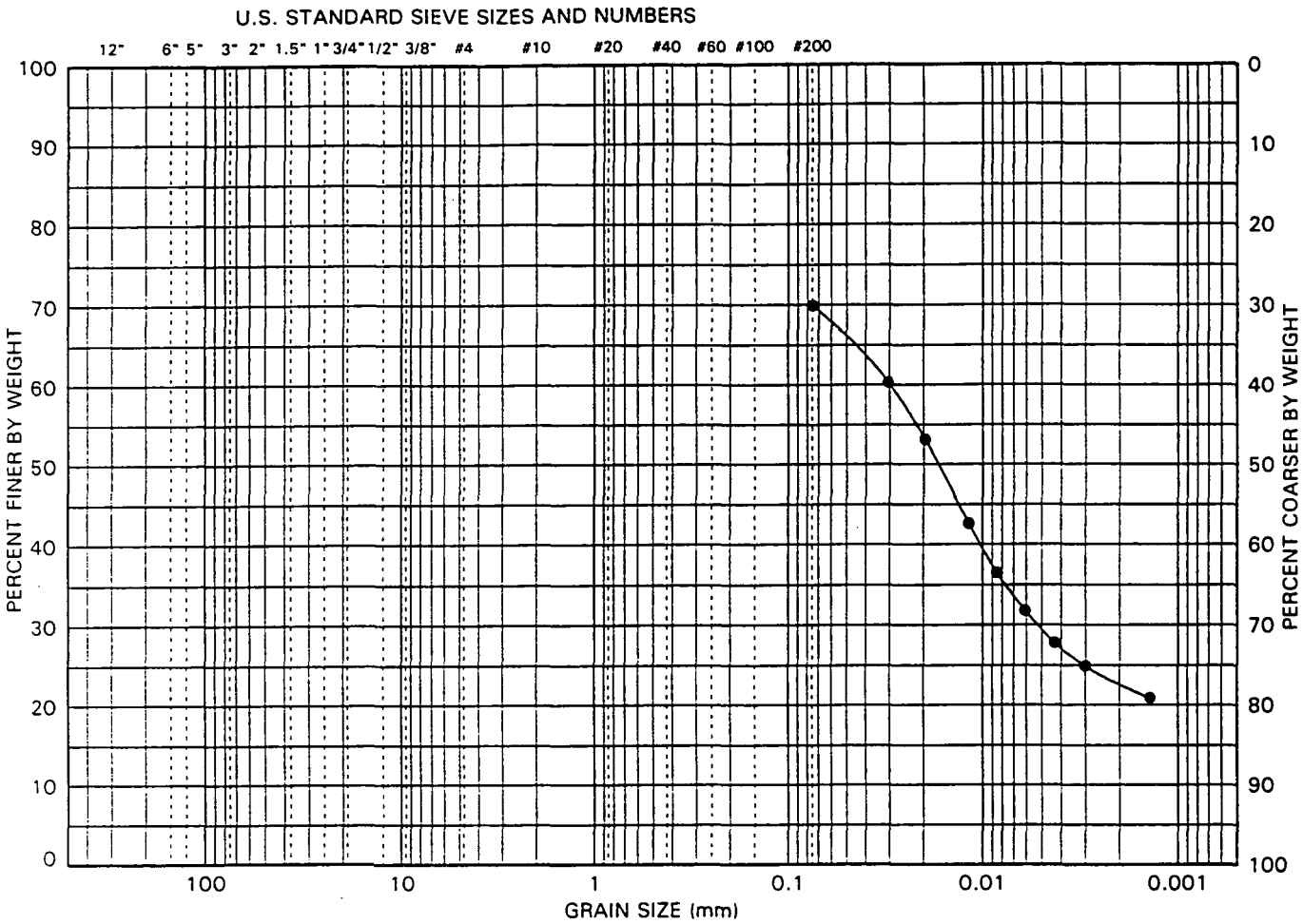
FIGURE 100

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/10/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-300	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97J57	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 22.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													70	66	53	30	23	

NOTES:

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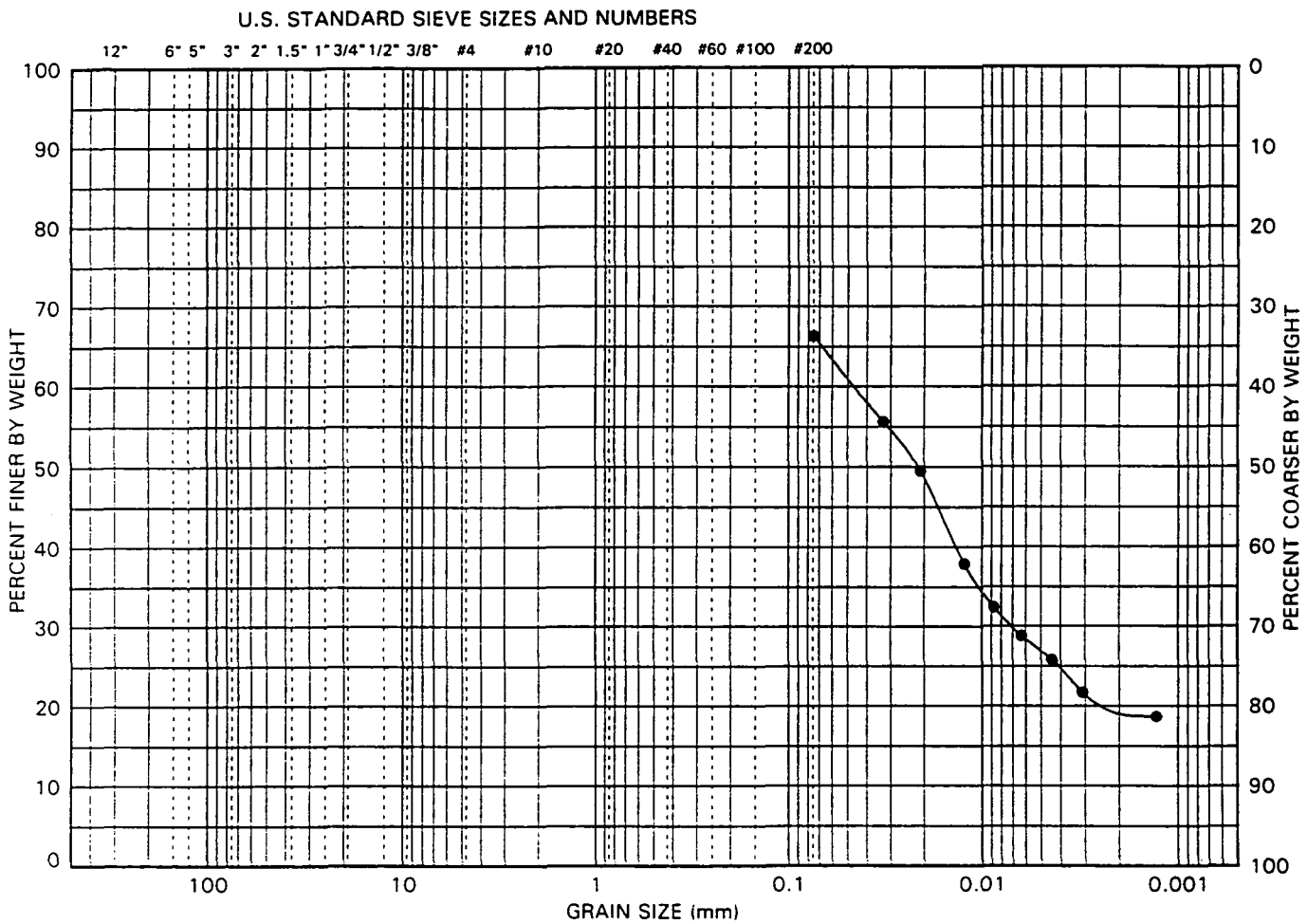
Atlanta, Georgia

FIGURE 101
PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/16/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



Boulders	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-307	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97J95	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 20.2
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													66	61	48	27	20	

NOTES:

GEO SYNTEC CONSULTANTS
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Atlanta, Georgia

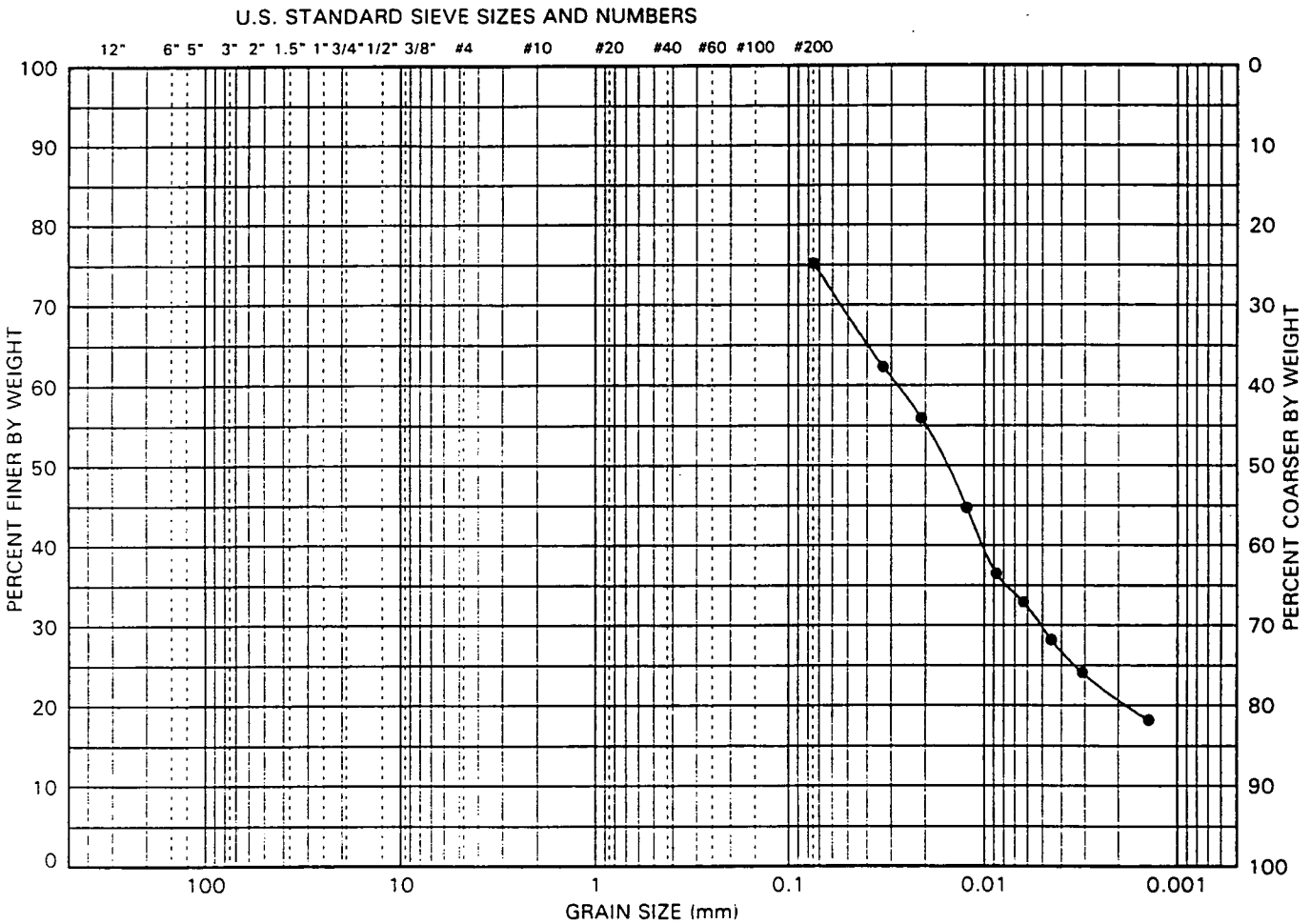
FIGURE 102

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/24/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-321	LIQUID LIMIT (%)	
LAB. SAMPLE NO.	97J121	PLASTIC LIMIT (%)	
SAMPLE DEPTH (ft)		PLASTICITY INDEX	
SOIL CLASSIFICATION:			

SOIL FRACTIONS	
GRAVEL (%)	
SAND (%)	
FINES (%)	
SILT (%)	
CLAY(%)	20.8
COEFF. UNIFORMITY (Cu)	
COEFF. CURVATURE (Cc)	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													75	69	55	30	21	

NOTES:

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Atlanta, Georgia

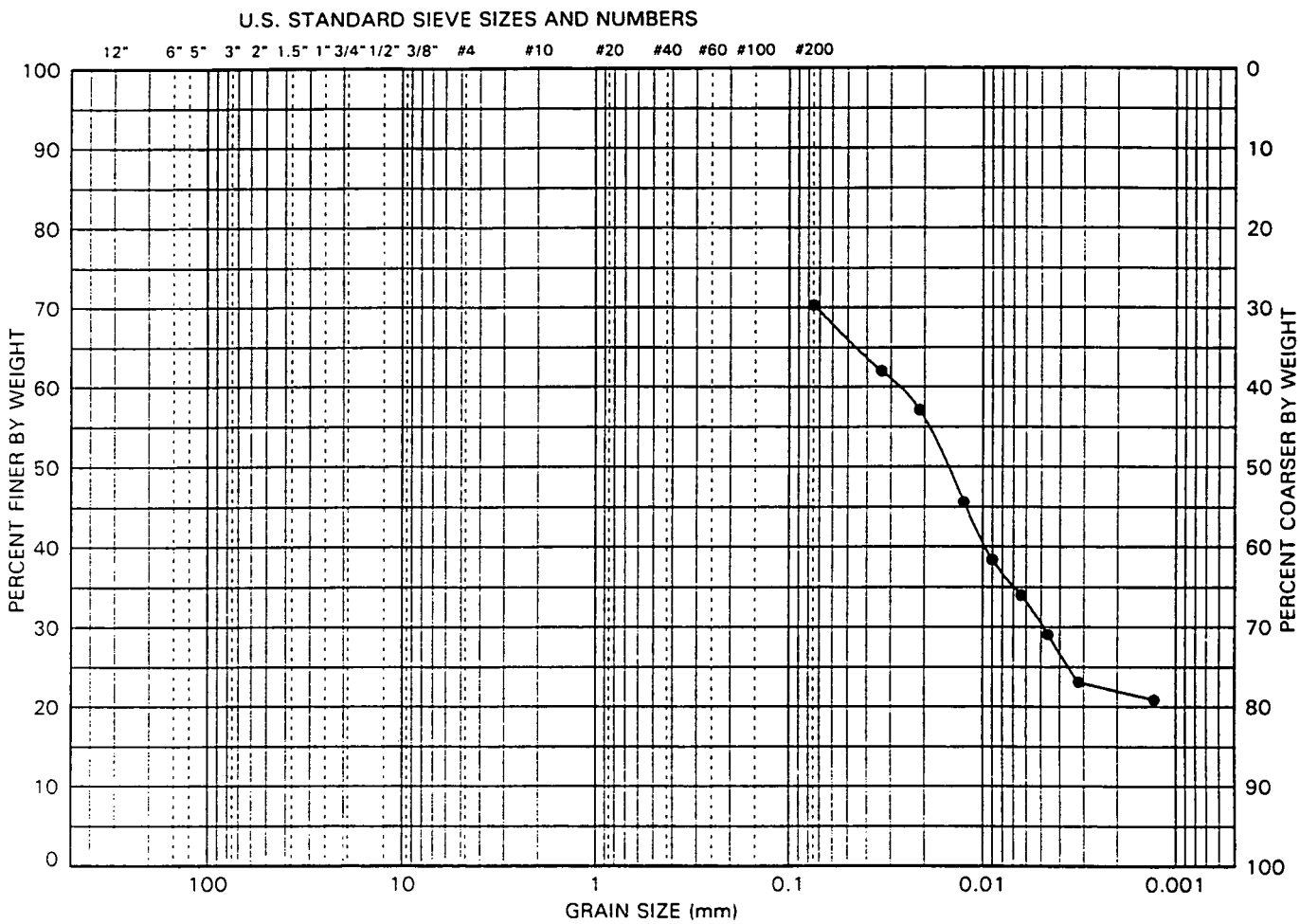
FIGURE 103

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



BOULDERS	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-325	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97J175	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 22.0
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													70	66	56	30	22	

NOTES:

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Geomechanics and Environmental Laboratory
Atlanta, Georgia

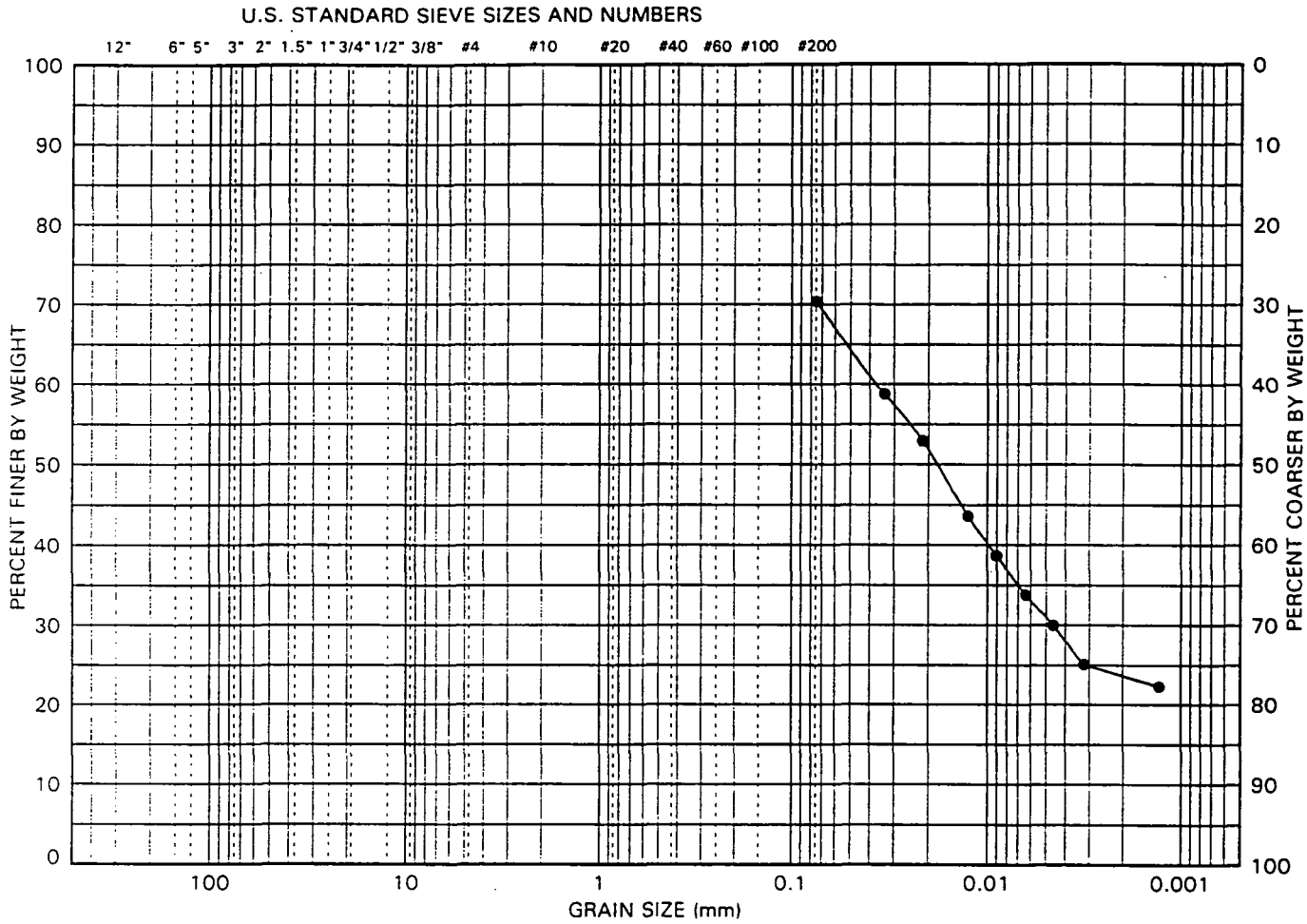
FIGURE 104

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 10/30/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487 D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID LP-326	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO. 97J176	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)	PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:			SILT (%)
			CLAY(%) 23.6
			COEFF. UNIFORMITY (Cu)
			COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													70	65	52	31	24	

NOTES:

GEO SYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

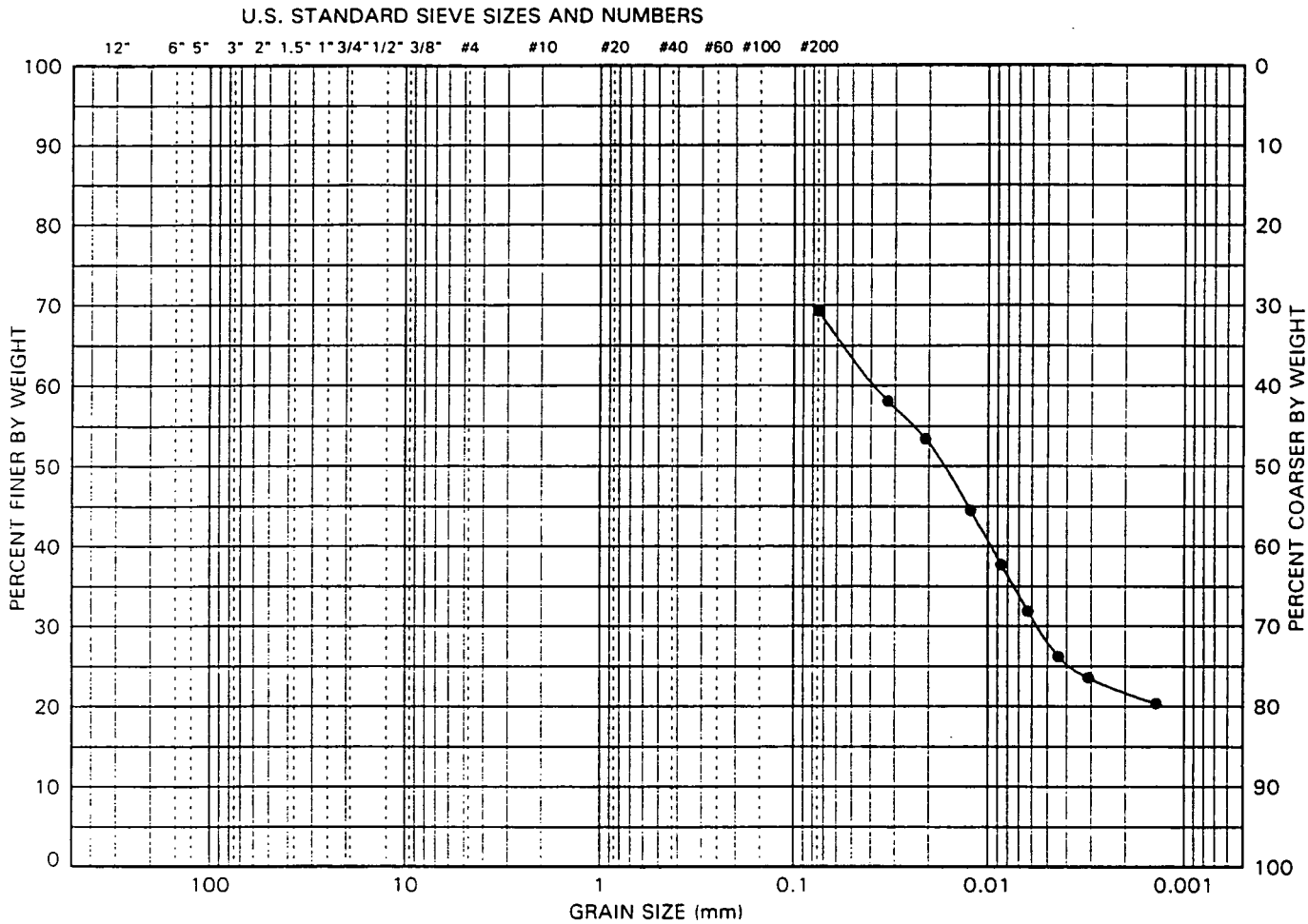
FIGURE 105

PROJECT: FDF-OSDF-PHASE I CONSTRUCTION
PROJECT NO.: GQ0166
DOCUMENT NO.: F974G006

GS FORM: 4PS2 11/03/97

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM C 136, D 422, D 2487
D 3042 AND D 4318



	COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		GRAVEL		SAND			FINES	

SITE SAMPLE ID	LP-328	LIQUID LIMIT (%)	SOIL FRACTIONS	GRAVEL (%)
LAB. SAMPLE NO.	97J257	PLASTIC LIMIT (%)		SAND (%)
SAMPLE DEPTH (ft)		PLASTICITY INDEX		FINES (%)
SOIL CLASSIFICATION:				SILT (%)
				CLAY(%) 21.8
				COEFF. UNIFORMITY (Cu)
				COEFF. CURVATURE (Cc)

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
													69	64	53	28	22	

NOTES:

ATTACHMENT A

Sample Identification, Handling, Storage and Disposal

Laboratory Test Standards

Application of Test Results

SAMPLE IDENTIFICATION, HANDLING, STORAGE AND DISPOSAL

Test materials were sent to GeoSyntec Consultants (GeoSyntec) Geomechanics and Environmental Laboratory in Atlanta, Georgia by the client or its representative(s). Samples delivered to the laboratory were identified by client sample identification (ID) numbers which had been assigned by representative(s) of the client. Upon being received at the laboratory, each sample was assigned a laboratory sample number to facilitate tracking and documentation.

Based on the information provided to GeoSyntec by the client or its representative(s) and, when applicable, procedural guidelines recommended by an industrial hygiene consultant, the following Occupational Safety and Health Administration (OSHA) level of personal protection was adopted for handling and testing of the test materials:

[X] test materials were not contaminated, no special protection measures were taken;
[ ] level D
[ ] level C
[ ] level B

In accordance with the health and safety guidelines of GeoSyntec, contaminated materials are stored in a designated containment area in the laboratory. Non-contaminated materials are stored in a general storage area in the laboratory.

GeoSyntec Geomechanics and Environmental Laboratory will return contaminated materials to the client or designated representative(s), at the clients' cost, 30 days following the completion of the testing program, unless special arrangements for proper disposal have been made with the laboratory. Materials which are not contaminated will be discarded 90 days after they were received at the laboratory, unless long-term storage arrangements are specifically made with GeoSyntec Geomechanics and Environmental Laboratory.

LABORATORY TEST STANDARDS

At the request of the client, the laboratory testing program was performed utilizing the guidelines provided in the following test standards:

[X] **moisture content** - American Society for Testing and Materials (ASTM) D 2216 "*Standard Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures*";

[ ] **moisture content** - ASTM D 4643 "*Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Method*";

[ ] **particle-size analysis** - ASTM C 136, "*Standard Method for Sieve Analysis of Fine and Coarse Aggregates*";

[X] **particle-size analysis** - ASTM D 422, "*Standard Method for Particle-Size Analysis of Soils*";

[X] **percent passing No. 200 sieve** - ASTM D 1140, "*Standard Test Method for Amount of Material in Soil Finer Than No. 200 (75 microns) sieve*";

[X] **Atterberg limits** - ASTM D 4318, "*Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*";

[X] **soil classification** - ASTM D 2487, "*Standard Test Method for Classification of Soils for Engineering Purposes*";

[ ] **soil pH** - ASTM D 4972, "*Standard Test Method for pH of Soils*";

[ ] **soil pH** - United States Environmental Protection Agency (USEPA) SW-846 Method 9045, Revision 1, 1987, Standard Test Method for Measurement of "*Soil pH*";

[X] **specific gravity** - ASTM D 854, "*Standard Test Method for Specific Gravity of Soils*";

[X] **carbonate content** - ASTM D 3042, "*Standard Test Method for Insoluble Residue in Carbonate Aggregates*";

[ ] **carbonate content** - ASTM D 4373, *"Standard Test Method for Calcium Carbonate Content of Soils"*;

[ ] **acid reactivity** - ASTM D 2488, *"Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)"*;

[ ] **soundness** - ASTM C 88, *"Standard Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate"*;

[ ] **loss-on-ignition (LOI)** - ASTM D 2974, *"Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils"*;

[X] **standard Proctor compaction** - ASTM D 698, *"Standard Test Method for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop"*;

[ ] **modified Proctor compaction** - ASTM D 1557, *"Standard Test Method for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop"*;

[ ] **maximum relative density** - ASTM D 4253, *"Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table"*;

[ ] **minimum relative density** - ASTM D 4254, *"Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density"*;

[ ] **unit weight** - ASTM D 2937, *"Standard Test Method for Density of Soil In Place by the Drive-Cylinder Method"*;

[ ] **unit weight, void ratio, porosity, and degree of saturation** - U. S. Army Corp of Engineers (USCOE); EM-1110-2-1906, *"Unit Weight, Void Ratio, Porosity, and Degree of Saturation, Appendix II"*;

[ ] **mass per unit area** - ASTM D 3776, *"Standard Test Method for Mass Per Unit Area (weight) of Woven Fabric"*;

[ ] **thickness measurement** - ASTM D 1777, *"Standard Test Method for Measuring Thickness of Textile Materials"*;

[ ] **free swell** - United States Pharmacopeia National Formulary (USP-NF) XVII, *"Swell Index of Clay"*;

[ ] **swell of clay in GCL's** - Geosynthetic Research Institute (GRI) GCL-1, *"Standard Test Method for Swell Measurement of the Clay Component of GCL's"*;

[ ] **fluid loss** - American Petroleum Institute (API) RP 13B, *"Section 4, Bentonite"*;

[ ] **marsh funnel** - API RP 13B, *"Section 4, Field Testing of Oil Mud Viscosity and Gel Strength"*;

[ ] **double hydrometer** - ASTM D 4221, *"Standard Test Method for Dispersive Characteristics of Clay Soil by Double Hydrometer"*;

[ ] **pinhole dispersion** - ASTM D 4647, *"Standard Test Method for Identification and Classification of Dispersive Clay Soils by the Pinhole Test"*;

[ ] **gradient ratio** - ASTM D 5101, *"Standard Test Method for Measuring the Soil-Geotextile System Clogging Potential by the Gradient Ratio"*;

[ ] **hydraulic conductivity ratio (HCR)** - ASTM D 5567, *"Standard Test Method for Hydraulic Conductivity Ratio (HCR) Testing of Soil/Geotextile Systems"*;

[ ] **hydraulic transmissivity** - ASTM D 4716, *"Standard Test Method for Constant Head Hydraulic Transmissivity (In-plane flow) of Geotextiles and Geotextile Related Products"*;

[ ] **one-dimensional consolidation** - ASTM D 2435, *"Standard Test Method for One-Dimensional Consolidation Properties of Soil"*;

[ ] **one-dimensional swell/collapse** - ASTM D 4546, "*Standard Test Method for One-Dimensional Swell or Settlement Potential of Cohesive Soils*";

[ ] **unconfined compressive strength (UCS)** - ASTM D 2166, " *Standard Test Method for Unconfined Compressive Strength of Cohesive Soil*";

[ ] **triaxial compressive strength ($\overline{ICU}$)** - ASTM D 4767, "*Standard Test Method for Triaxial Compression Test on Cohesive Soils*";

[ ] **triaxial compressive strength (UU)** - ASTM D 2850, "*Standard Test Method for Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression*";

[X] **rigid wall constant head hydraulic conductivity** - ASTM D 2434, "*Standard Test Method for Permeability of Granular Soils (Constant Head)*";

[ ] **rigid wall constant head hydraulic conductivity** - USCOE; EM-1110-2-1906, "*Standard Test Method for Permeability Tests, Appendix VII*";

[X] **flexible wall falling head hydraulic conductivity** - ASTM D 5084, "*Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter*";

[ ] **flexible wall falling head hydraulic conductivity** - USCOE; EM-1110-2-1906, "*Standard Test Method for Permeability Tests, Appendix VII*";

[ ] **index flux of GCL** - proposed ASTM method rough draft # 1, 6/18/94, "*Standard Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter*";

[ ] **flexible wall falling head hydraulic conductivity** - GRI GCL-2, "*Standard Test Method for Permeability of Geosynthetic Clay Liners (GCLs)*";

[ ] **permeability/compatibility** - USEPA Method 9100 SW-846, Revision 1, 1987, Standard Test Method for Measurement of "*Saturated Hydraulic Conductivity, Saturated Leachate Conductivity and Intrinsic Permeability*";

[ ] **permeability** - API RP 27, "*Recommended Practice for Determining Permeability of Porous Media*";

[ ] **capillary-moisture** - ASTM D 2325, "*Standard Test Method for Capillary-Moisture Relationships for Coarse- and Medium-Textured Soils by Porous-Plate Apparatus*";

[ ] **capillary-moisture** - ASTM D 3152, "*Standard Test Method for Capillary-Moisture Relationships for Fine-Textured Soils by Pressure-Membrane Apparatus*";

[ ] **paint filter liquids** - USEPA Method 9095, SW-846, Revision 1, 1987, "*Paint Filter Liquids Test*"; and

[ ] **bulk unit weight** - ASTM C 138, "*Standard Test Method for Weight per Cubic Foot, Yield, and Air Content (Gravimetric) of Concrete*".

APPLICATION OF TEST RESULTS

The reported test results apply to the field materials inasmuch as the samples sent to the laboratory for testing are representative of these materials. This report applies only to the materials tested and does not necessarily indicate the quality or condition of apparently identical or similar materials. The testing was performed in accordance with the general engineering standards and conditions reported. The test results are related to the testing conditions used during the testing program. As a mutual protection to the client, the public, and GeoSyntec, this report is submitted and accepted for the exclusive use of the client and upon the condition that this report is not used, in whole or in part, in any advertising, promotional or publicity matter without prior written authorization from GeoSyntec.

APPENDIX G:

PHASE I - FIELD MOISTURE/DENSITY TEST RESULTS

Compacted Fill
Compacted Clay Liner

Compacted Fill

- 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: O.S.D.F. PHASE ONE DATE: 20 day 06 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site Borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 12"/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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
1	SEE Attached Diag.	First lift	O.S.D.F.-01	19.4	106.9	19.2	123.9	103.9	97.2	P		—	—	—
2	↓	↓	↓	↓	↓	18.4	125.8	106.3	99.4	P		—	—	—
3	↓	Second lift	↓	↓	↓	17.9	128.2	108.7	101.7	P		—	—	—
4	↓	↓	↓	↓	↓	22.9	125.1	101.8	95.2		F	(20 June '97) 5	P	—
5	↓	↓	↓	↓	↓	17.2	126.0	107.5	100.6	P		—	—	—
6	↓	third lift	O.S.D.F.-02	15.0	113.0	13.9	128.5	112.8	99.8	P		—	—	—
7	↓	↓	↓	↓	↓	14.2	129.7	113.6	100.5	P		—	—	—
8	↓	↓	↓	↓	↓	15.4	129.1	111.9	99.0	P		—	—	—

COMMENTS:

GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 2

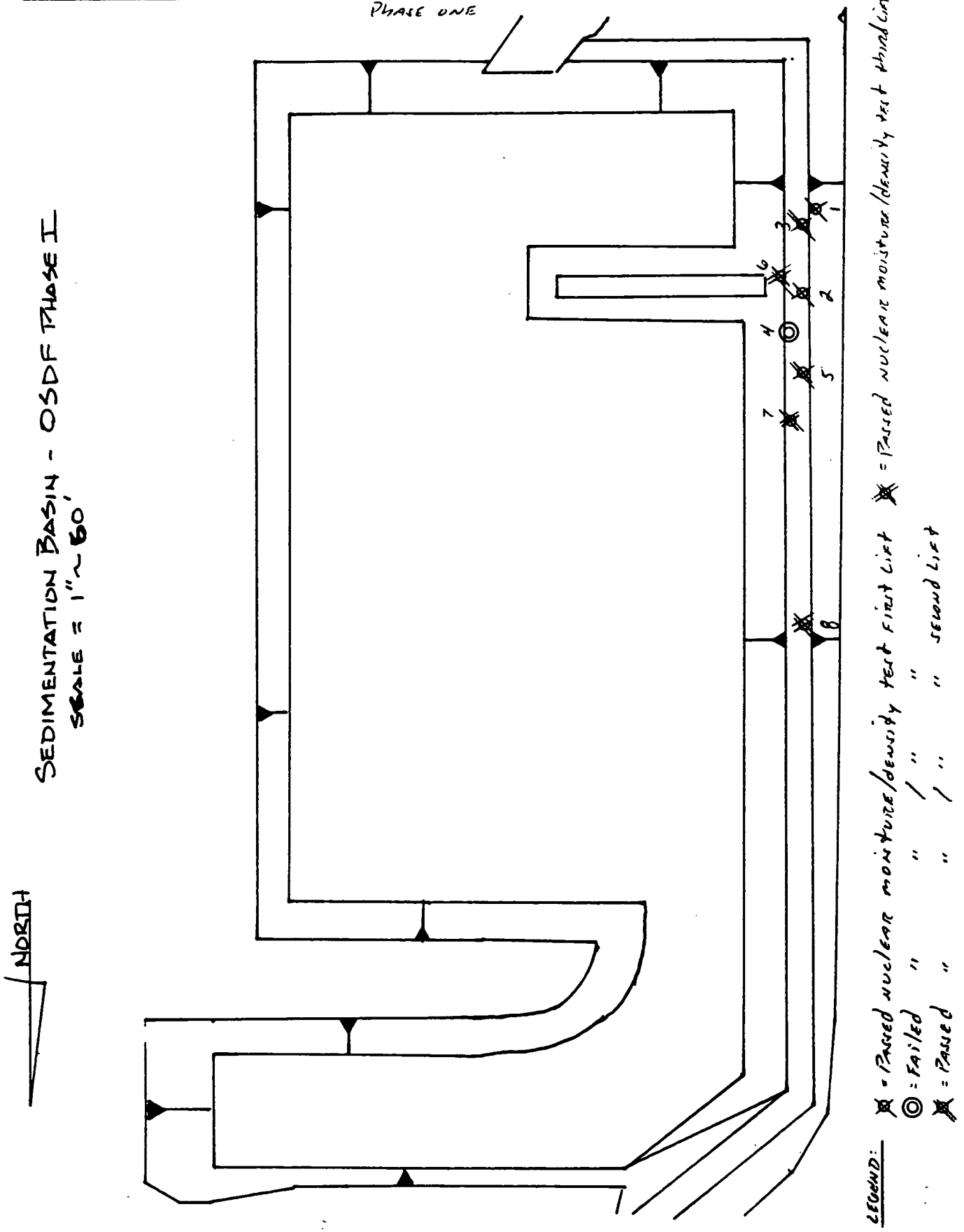
000608

1266

GeoSyntec Consultants

Written by: B. Erickman Date: 97/06/20 (YY MM DD) Reviewed by: [illegible] Date: 97/06/1 (YY MM DD)

Client: FDF Project: OSDF - ~~PE~~ PE 6-21-97 PHASE ONE Project/~~Proposal~~ No.: GQ01606 Task No.: 04.1



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: O.S.D.F. - PHASE ONE

DATE: 21 day 06 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE BORROW MATERIAL TYPE: (CIRCLE ONE) (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 12/8"

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
9	SEE ATTACHED DWG.	FIRST LIFT	O.S.D.F.-01	19.4	106.9	19.3	121.6	101.9	95.3	P		—	—	—
10						18.8	127.9	107.7	100.7	P		—	—	—
11						19.6	126.2	105.5	98.7	P		—	—	—
12						20.9	124.4	102.9	96.3	P		—	—	—
13		SECOND LIFT				17.3	126.4	107.8	100.8	P		—	—	—
14			O.S.D.F.-02	15.0	113.0	16.3	127.4	109.5	96.9	P		—	—	—
15						16.5	129.7	111.3	98.5	P		—	—	—
16						16.5	130.8	112.3	99.4	P		—	—	—
17			O.S.D.F.-01	19.4	106.9	22.1	132.0	108.1	101 Hem ~~95~~	P		—	—	—
18		THIRD LIFT	~~O.S.D.F.-02~~	~~15.0~~	~~113.0~~									

BE 6-21-97

COMMENTS:

CHECKED BY: [signature]

SHEET NO. 1 OF 2

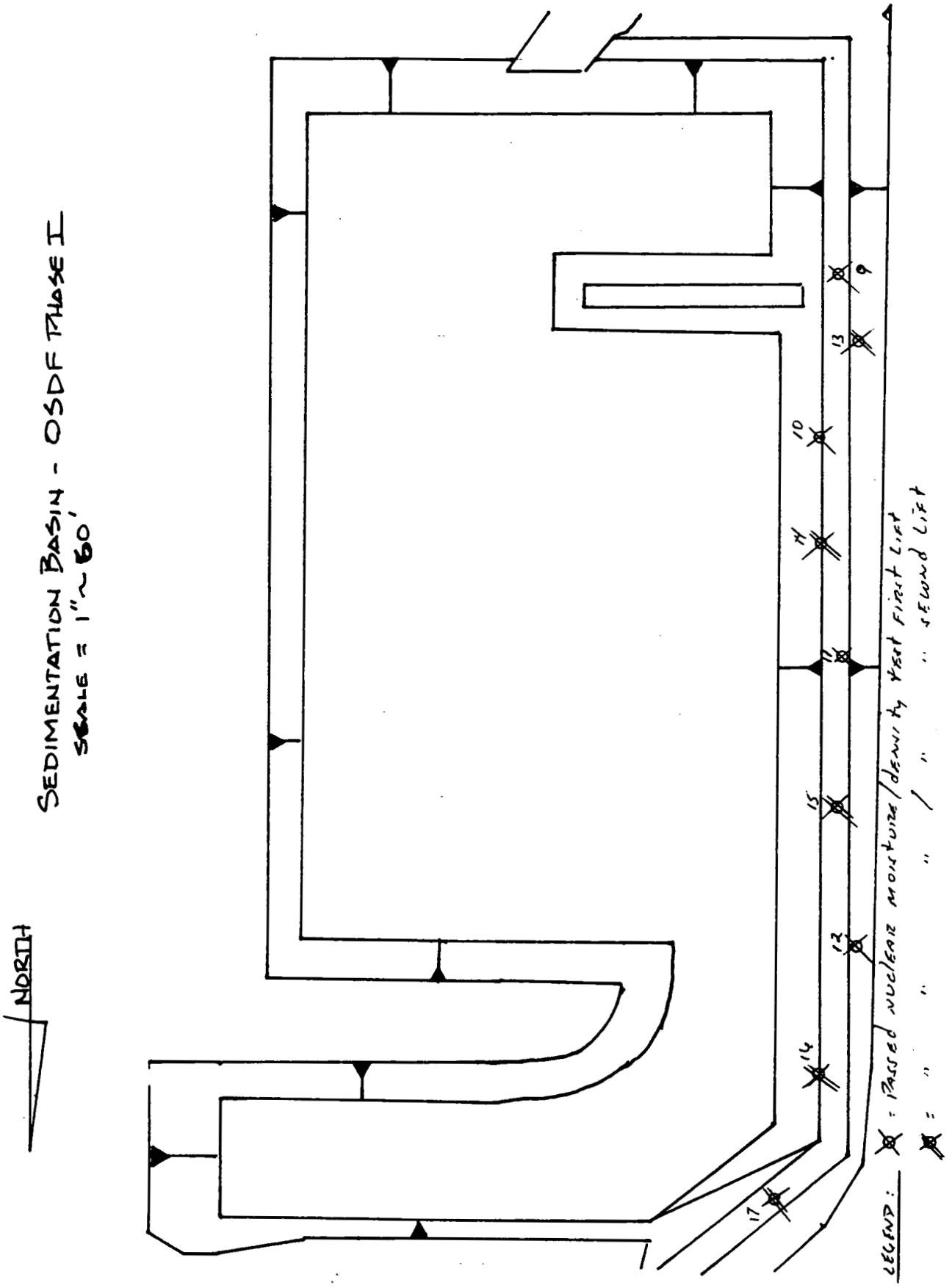
©GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM

000610

1266

Written by: B. ERISMAN Date: 97/06/21 (YY MM DD) Reviewed by: [illegible] Date: 97/06/22 (YY MM DD)

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



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: O.S.D.F. - PHASE ONE DATE: 23 day 06 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
18 ~~19~~ Item	SEE ATTACHED PLAN	THIRD LIFT	O.S.D.F. 02	15.0	113.0	13.4	133.3	117.5	104.0	P		—	—	—
19 ~~20~~ Item	↓	↓	↓	↓	↓	12.8	126.8	112.4	99.5	P		—	—	—
20 ~~21~~ Item						14.6	125.3	109.3	96.7	P		—	—	—

COMMENTS:

©GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF ~~2~~ 6

BE 6.24.97

000612

1266

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: O.S.D.F. PHASE ONE DATE: 23 day 06 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: DC

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
21	SEE ATTACHED DWG.	10" - LIFT 1	OSDF-01	19.4	106.9	20.4	129.3	107.4	100.5	P		—	—	—
22	↓	10" - "	↓	↓	↓	18.4	125.9	106.3	99.4	P		—	—	—
23		10" - LIFT 2	OSDF-02	15.0	113.0	16.7	130.6	112.0	99.1	P		—	—	—
24		10" - "				14.5	131.1	114.5	101.3	P		—	—	—
25		10" - LIFT 3				17.3	130.3	111.1	98.3	P		—	—	—
26		10" - "				17.2	127.3	108.6	96.1	P		—	—	—
27		10" - "				16.8	127.3	109.0	96.5	P		—	—	—
28		10" - LIFT 4				16.2	127.5	109.4	96.8	P		—	—	—
29		10" - "				16.5	127.8	109.7	97.1	P		—	—	—
30	↓	10" - "	↓	↓	↓	15.9	125.6	108.4	95.9	P		—	—	—

COMMENTS:

GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 2 OF 6

000613

1266

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: O.S.D.F. PHASE ONE DATE: 23 day 06 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

TEST NO. HEM	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
31 ~~30~~	SEE ATTACHED DWG	10" Lift 5	OSDF-02	15.0	113.0	16.4	126.8	108.9	96.4	P		—	—	—
32 ~~31~~	↓	↓	↓	↓	↓	16.9	126.9	108.6	96.1	P		—	—	—
33 ~~34~~						15.5	124.4	107.7	95.3	P		—	—	—

COMMENTS:

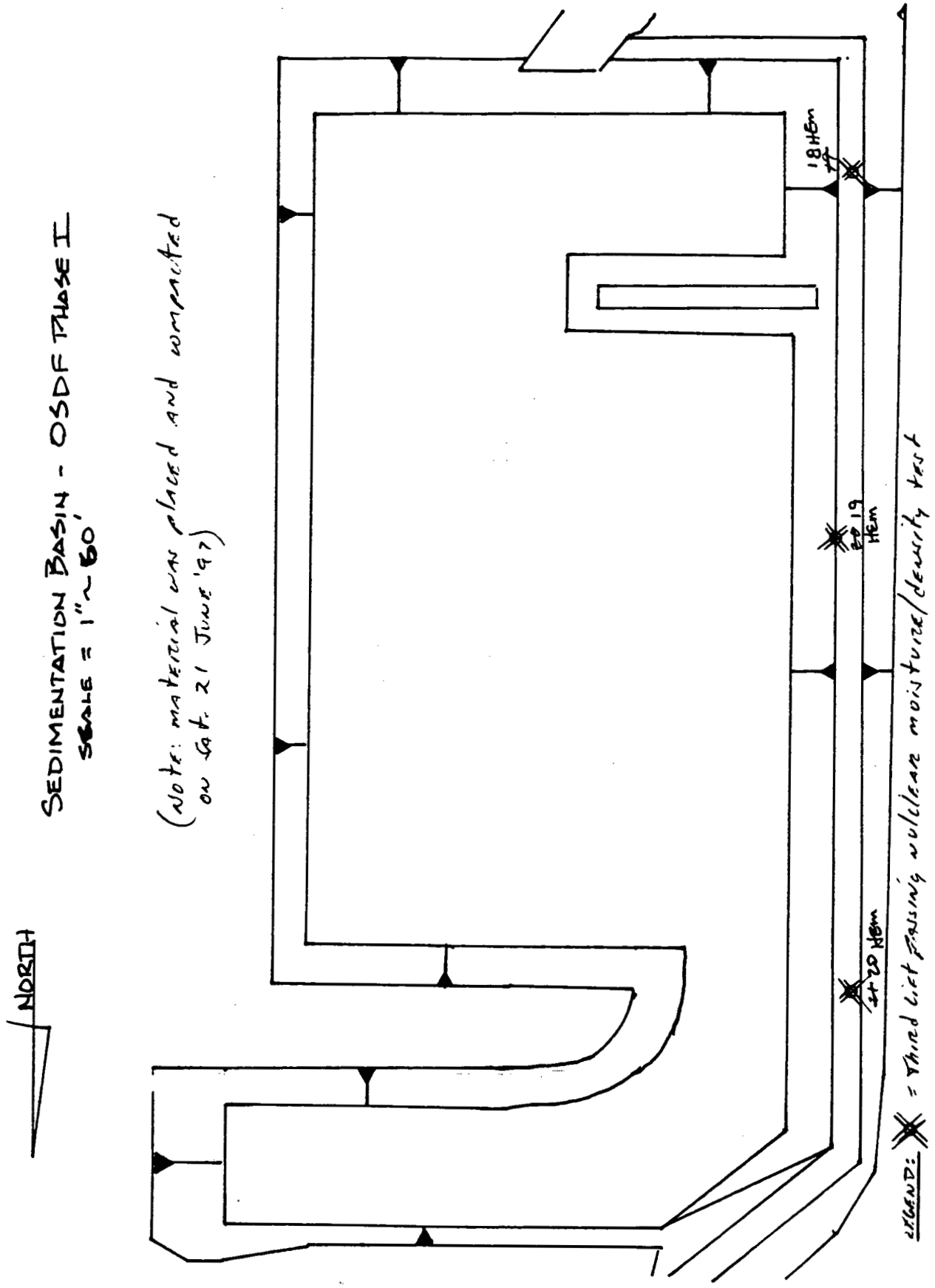
GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 3 OF 6

000614

1266

Written by: B. ERISMAN Date: 97/06/23 (YY MM DD) Reviewed by: [illegible] Date: 97/06/24 (YY MM DD)

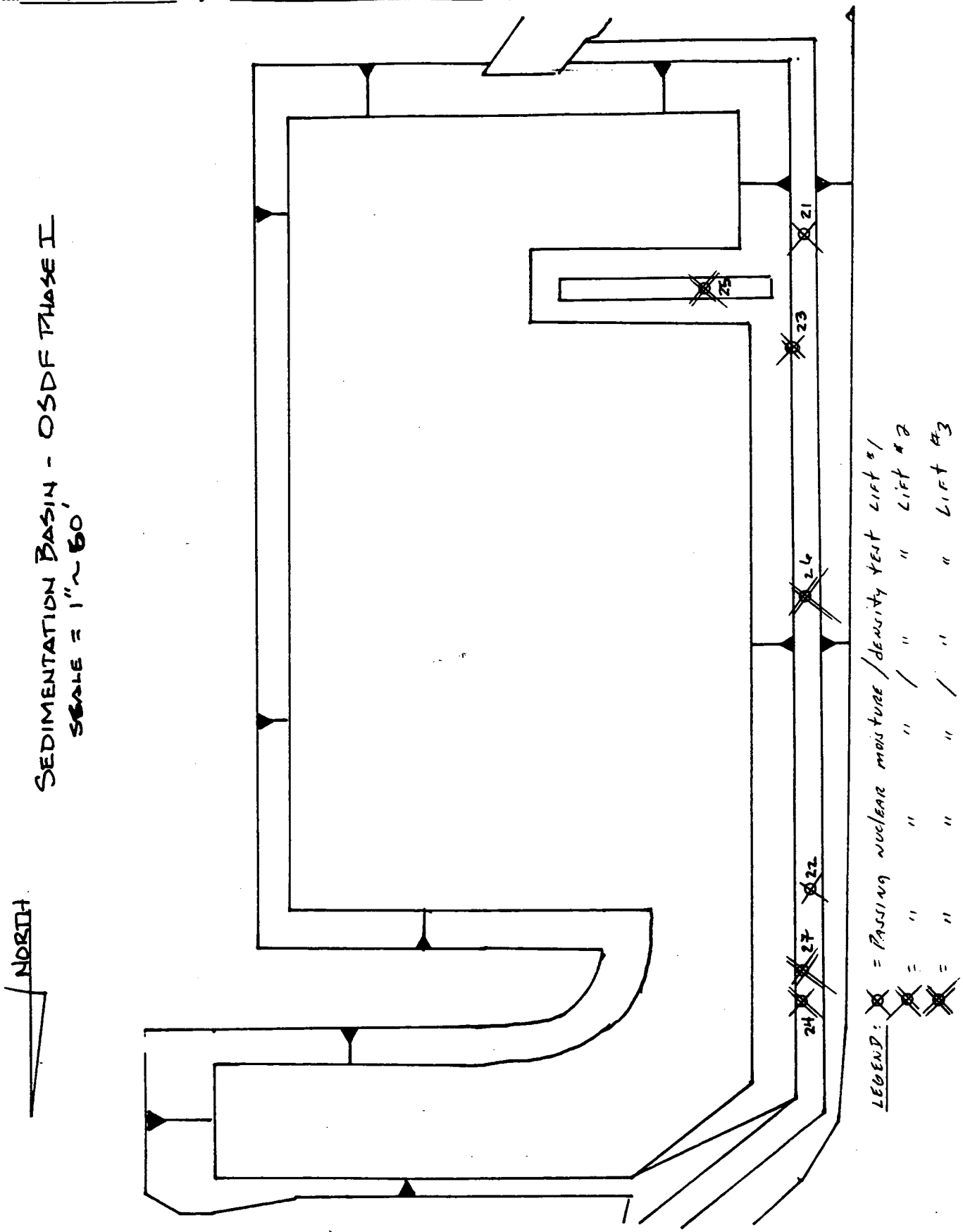
Client: FDF Project: OSDF - PHASE ONE Project/~~Proposal~~ No.: GQ01666 Task No.: 04.1



GEOSYNTEC CONSULTANTS

Written by: B. ERISMAN Date: 97 / 06 / 23 (YY MM DD) Reviewed by: [illegible] Date: 97 / 06 / 24 (YY MM DD)

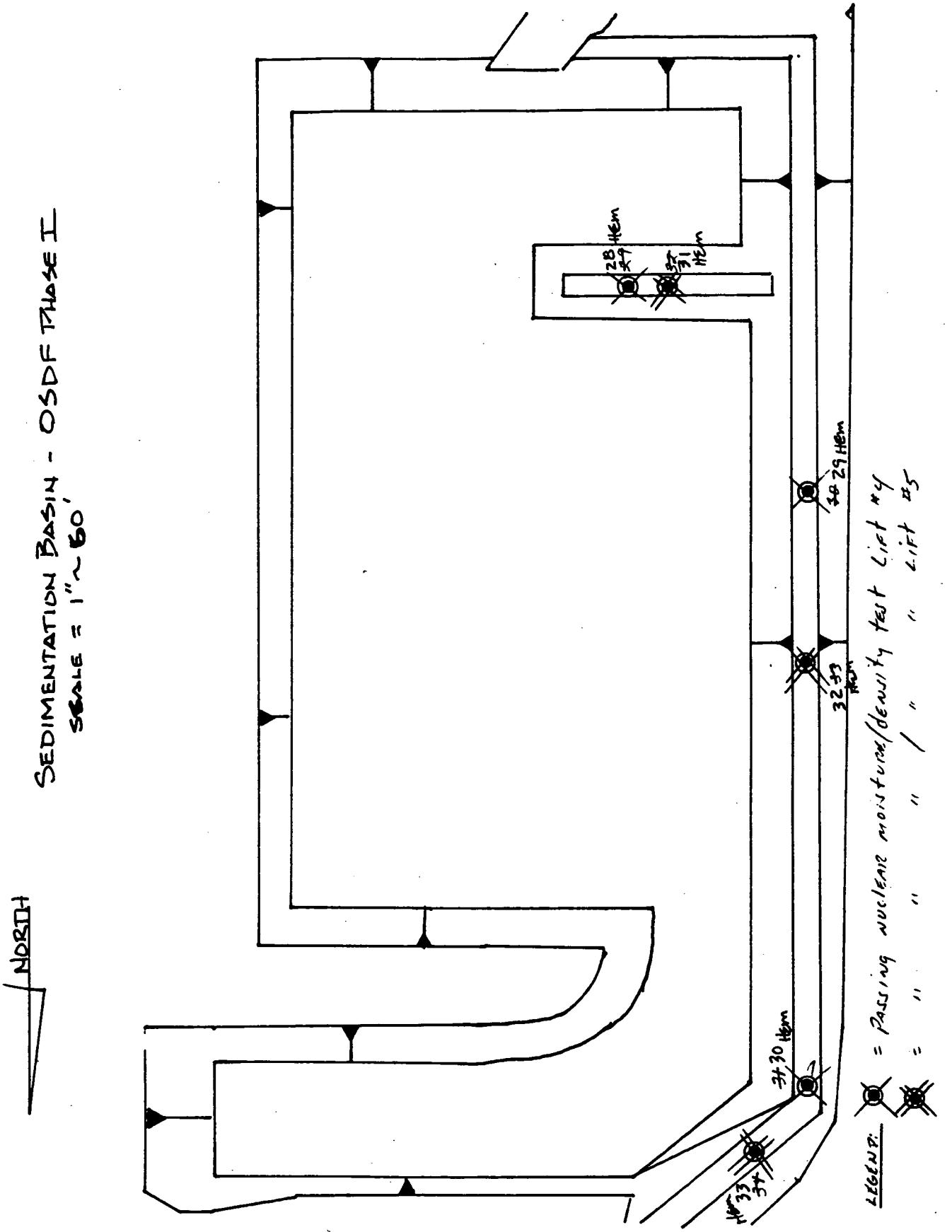
Client: FDF Project: OSDF - PHASE ONE Project/~~Proposal~~ No.: GQ01606 Task No.: 04.1



GEOSYNTEC CONSULTANTS

Written by: B. EFRUSMAN Date: 97 / 06 / 23 (YY MM DD) Reviewed by: [illegible] Date: 97 / 06 / 24 (YY MM DD)

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



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: O.S.D.F. - PHASE ONE DATE: 24 day 06 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
34	see attached Dwg.	10" Lift #1	OSDF 02	15.0	113.0	15.2	126.8	110.1	97.4	P		—	—	—
35	↓	↓	↓	↓	↓	15.5	128.1	110.9	98.1	P		—	—	—
36	↓	10" Lift #2	↓	↓	↓	16.1	127.1	109.5	96.9	P		—	—	—
37	↓	↓	↓	↓	↓	15.8	129.6	111.9	99.0	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [signature] SHEET NO. 1 OF 2

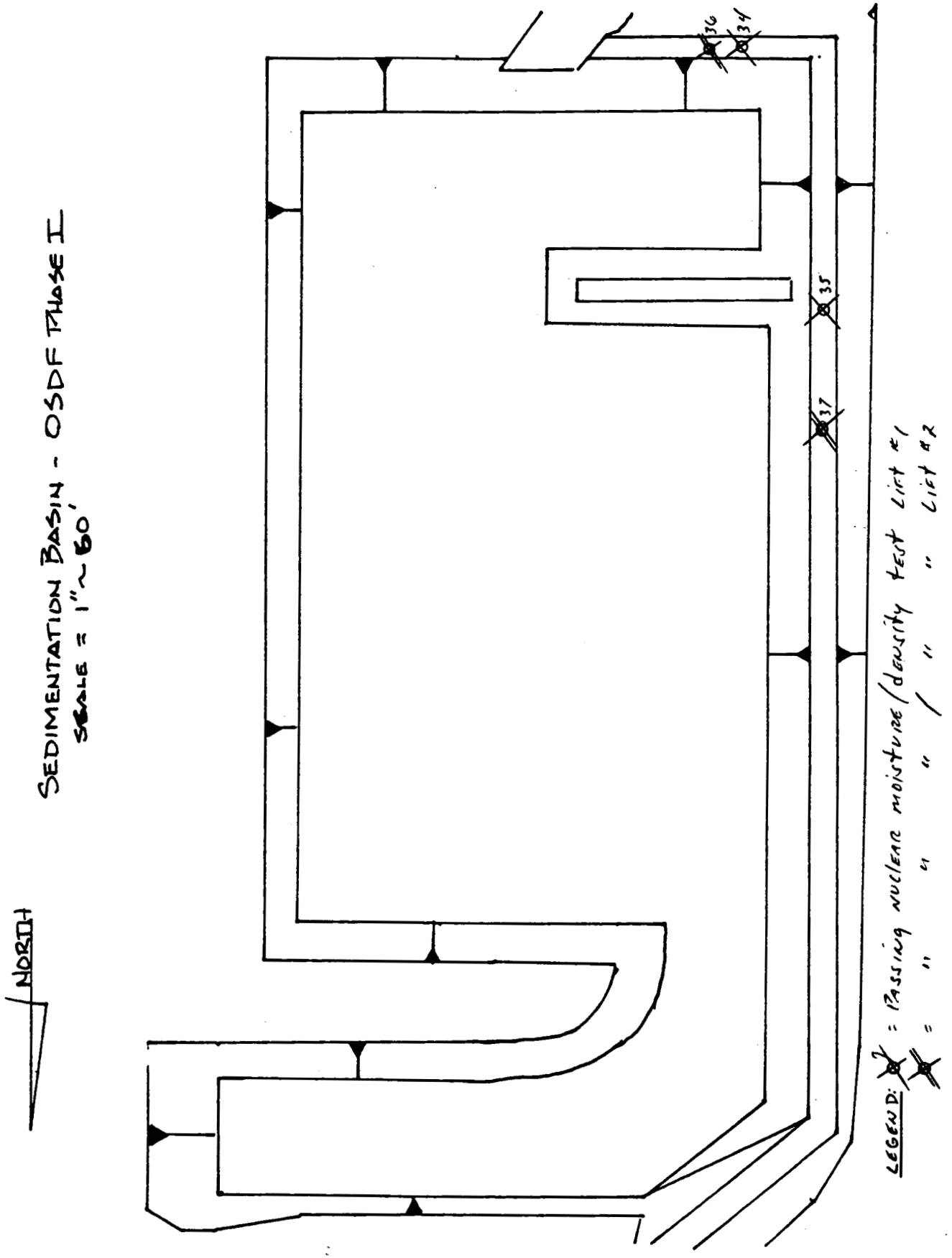
0000618

1266

GeoSyntec Consultants

Written by: B. Bergman Date: 97 / 06 / 24 Reviewed by: [illegible] Date: 97 / 06 / 25

Client: FDF Project: OSDF Project/~~Proposal~~ No.: GQ01666 Task No.: 04.1



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: O.S.D.F - PHASE ONE DATE: 25th day 06 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BF

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
38	SEE attached Dwg	10" LIFT #3	OSDF-02	15.0	113.0	13.2	126.3	111.6	98.7	P		—	—	—
39	↓	↓	↓	↓	↓	13.1	131.4	116.1	102.8	P		—	—	—
40						12.0	131.1	117.1	103.6	P		—	—	—
41						13.9	129.7	113.9	100.8	P		—	—	—
42						12.0	130.7	116.8	103.3	P		—	—	—
43						12.3	131.4	117.0	103.5	P		—	—	—
44						12.1	129.7	115.7	102.4	P		—	—	—
45						12.6	128.3	113.9	100.8	P		—	—	—
46						13.4	125.3	110.5	97.8	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 2

000620

1266

GeoSyntec Consultants

Written by: B. Grossman Date: 97 / 06 / 25 (YY MM DD) Reviewed by: [illegible] Date: 97 / 06 / 26 (YY MM DD)

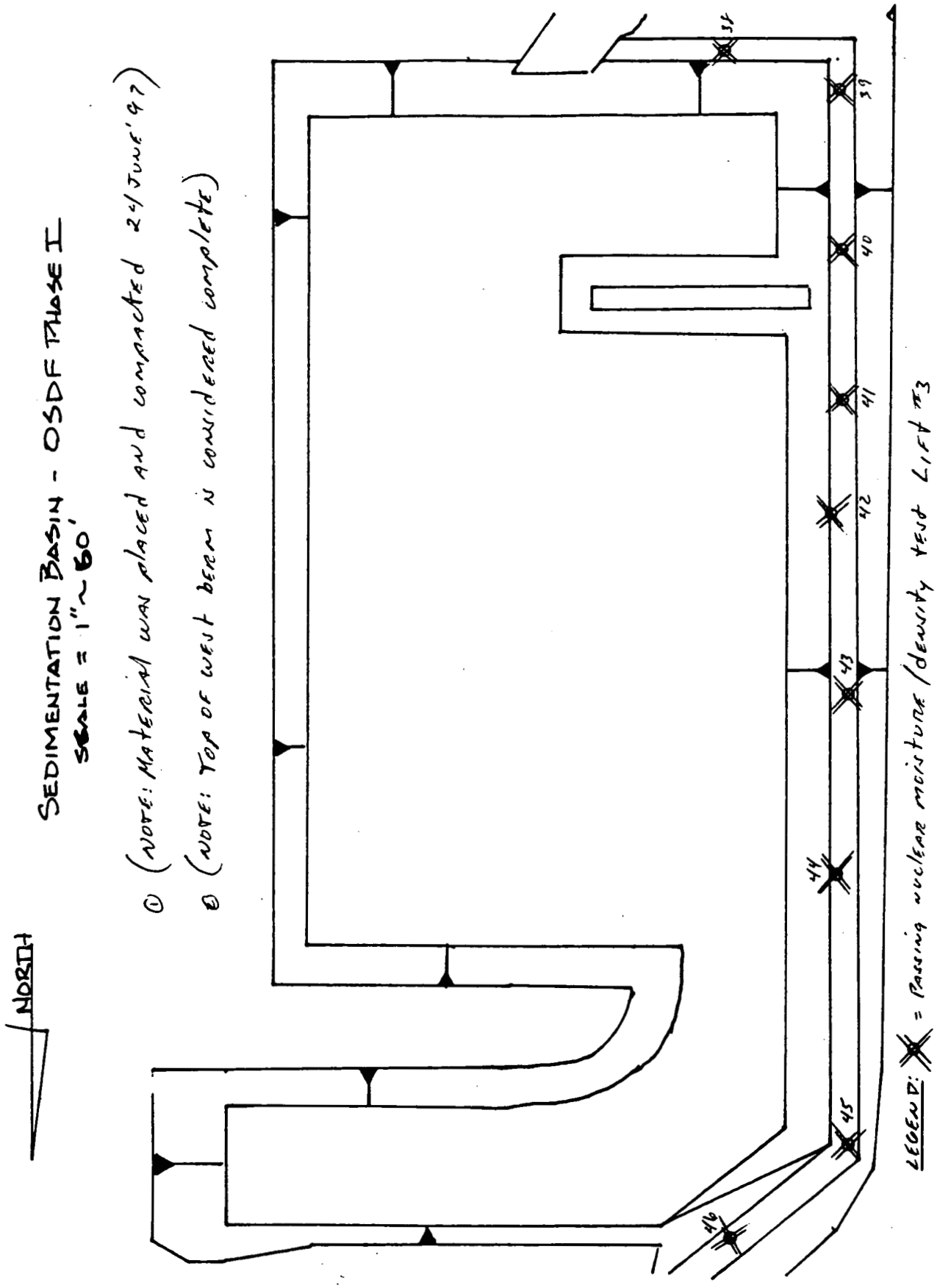
Client: FDF Project: OSDF Project/~~Proposal~~ No.: GQ01606 Task No.: 04.1

SEDIMENTATION BASIN - OSDF PHASE I

SCALE = 1" ~ 60'

① (NOTE: MATERIAL WAS PLACED AND COMPACTED 24/JUNE'97)

② (NOTE: TOP OF WEST BERM IS CONSIDERED COMPLETE)



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: O.S.D.F. PHASE ONE DATE: 28 day 06 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: ON SITE BORROW MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
47	SEE ATTACHED	8" LIFT #1	O.S.D.F.-02	15.0	113.0	17.4	127.4	108.5	96.0	P		—	—	—
48	DWG.	↓	↓	↓	↓	17.6	126.5	107.6	95.2	P		—	—	—
49	↓	8" LIFT #2	↓	↓	↓	16.1	127.8	110.1	97.4	P		—	—	—
50		↓	↓	↓	↓	16.0	127.0	109.5	96.9	P		—	—	—

COMMENTS:

CHECKED BY: [signature]

SHEET NO. 1 OF 2

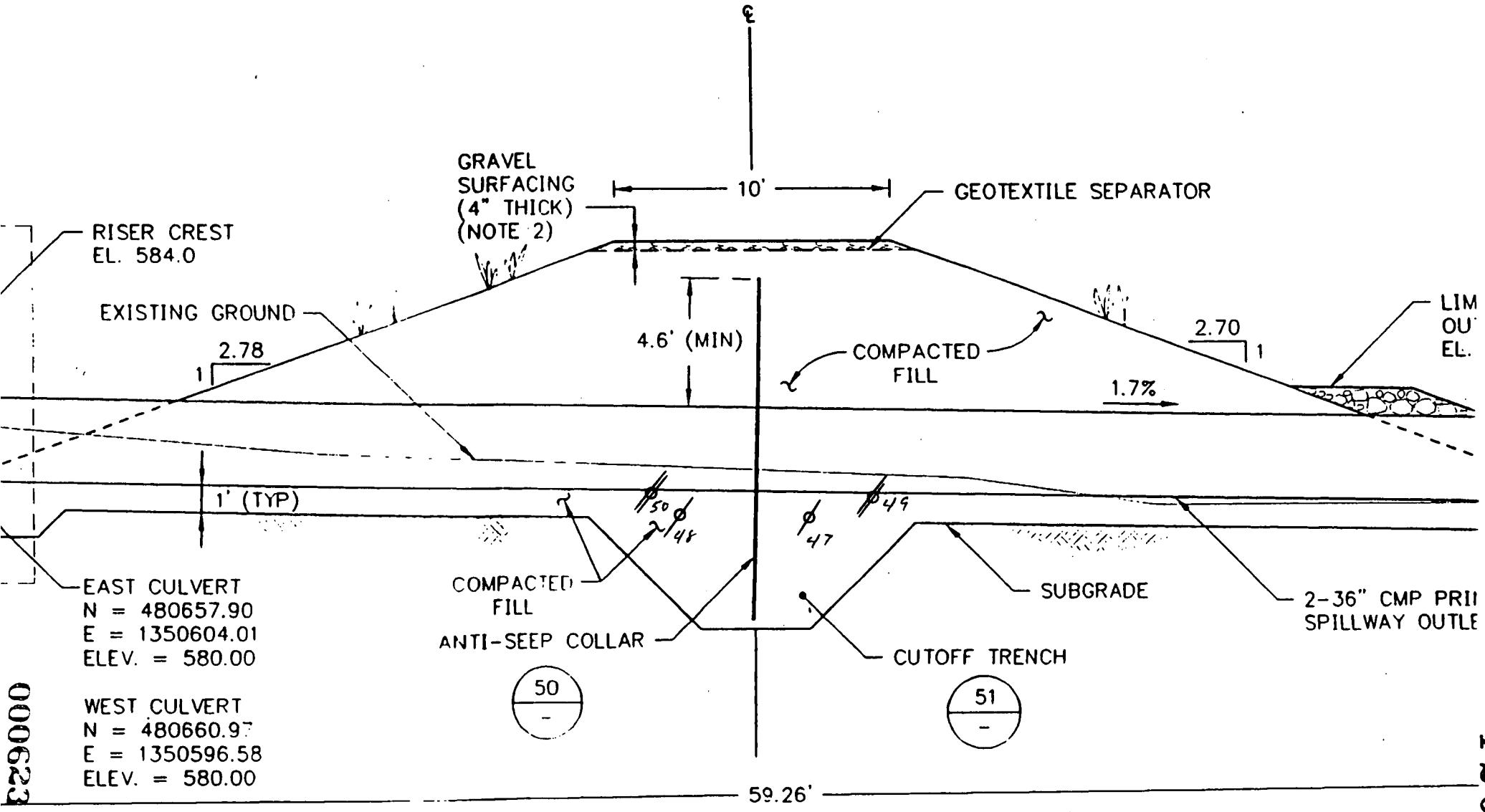
GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM

000622

1266

N

DATE: 6-28-97



LEGEND: ø = Passing nuclear moisture/density test lift #1

ø = Passing test lift #2

A / G-5C

SECTION
SEDIMENTATION BASIN PRINCIPAL SPILLWAY

SCALE: 1" = 5'

PREF FE-K3583

pg 2 of 2

000623

1266

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: O.S.D.F. - PHASE ONE DATE: 30 day 06 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
51	SEE ATTACHED	8" LIFT #1	O.S.D.F.02	15.0	113.0	13.5	128.5	113.2	100.2	P		—	—	—
52	DWG	↓				13.9	124.6	109.5	96.9	P		—	—	—
53		8" LIFT #2				14.5	130.3	113.8	100.7	P		—	—	—
54		↓				15.1	131.0	113.8	100.7	P		—	—	—
55		8" LIFT #3				14.3	133.9	117.1	103.6	P		—	—	—
56		8 LIFT #4				13.7	131.9	116.0	102.7	P		—	—	—
57		8 ↓				13.2	130.6	115.4	102.7	P		—	—	—
58		8 LIFT #5				12.7	124.3	110.3	97.6	P		—	—	—

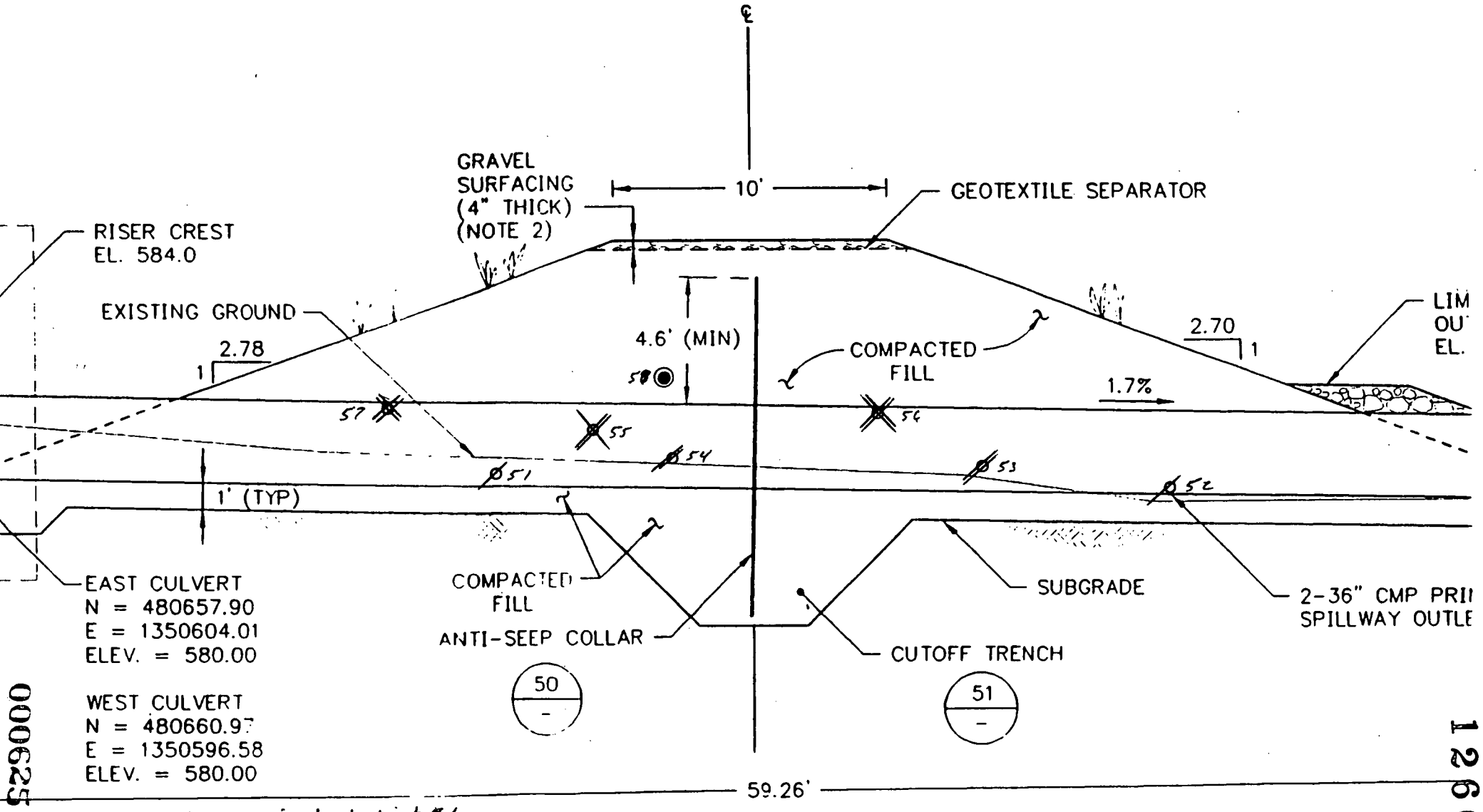
COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: Kem SHEET NO. 1 OF 2

000624

N

DATE: 30 JUNE '97



LEGEND: ⊘ = Passing test Lift #1
⊘ = " " " #2
⊘ = " " " #3
⊘ = " " " #4
◉ = " " " #5

A
G-5C

SECTION
SEDIMENTATION BASIN PRINCIPAL SPILLWAY

SCALE: 1" = 5'

VPEF FS:K3583

pg 2 of 2

000625

12666

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: O.S.D.F. - PHASE ONE DATE: 01 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
59	SEE ATTACHED	8" LIFT #1	O.S.D.F.-02	15.0	113.0	13.2	124.9	110.3	97.6	P		—	—	—
60	DWG	↓	↓	↓	↓	13.7	124.5	109.5	96.9	P		—	—	—
61	↓	8" LIFT #2	↓	↓	↓	14.4	130.2	113.8	100.7	P		—	—	—
62	↓	8" LIFT #3	↓	↓	↓	14.0	130.6	114.6	101.4	P		—	—	—

COMMENTS:

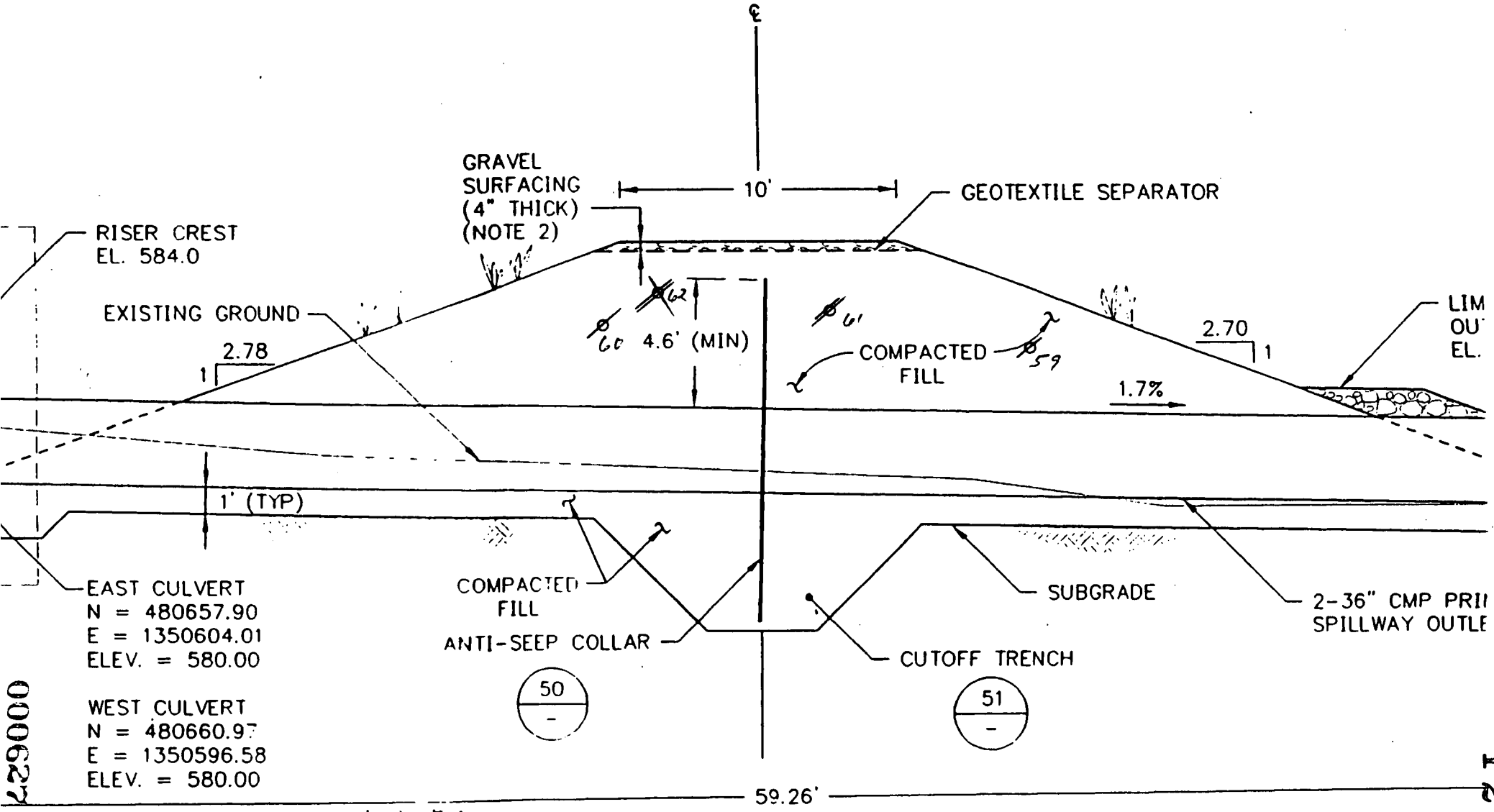
GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 2

000626

12666

N

DATE: 01 July '97



LEGEND: ⊘ = PASSING TEST LIFT #1
⊘ = " " " #2
⊘ = " " " #3

A
G-5C

SECTION
SEDIMENTATION BASIN
PRINCIPAL SPILLWAY

SCALE: 1" = 5'

VPEF FS-43595

000627

12666

pg 2 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: O.S.D.F. PHASE ONE DATE: 02 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
63	See Attached Dwg.	8" Lift #1	OSDF-03	14.2	116.5	13.8	129.2	113.5	97.4	P		—	—	—
64	↓	↓	↓	↓	↓	13.1	127.7	112.9	96.9	P		—	—	—
65	↓	8" Lift #2	↓	↓	↓	13.6	130.0	114.4	98.2	P		—	—	—
66	↓	8" Lift #3	↓	↓	↓	14.0	129.7	113.8	97.7	P		—	—	—

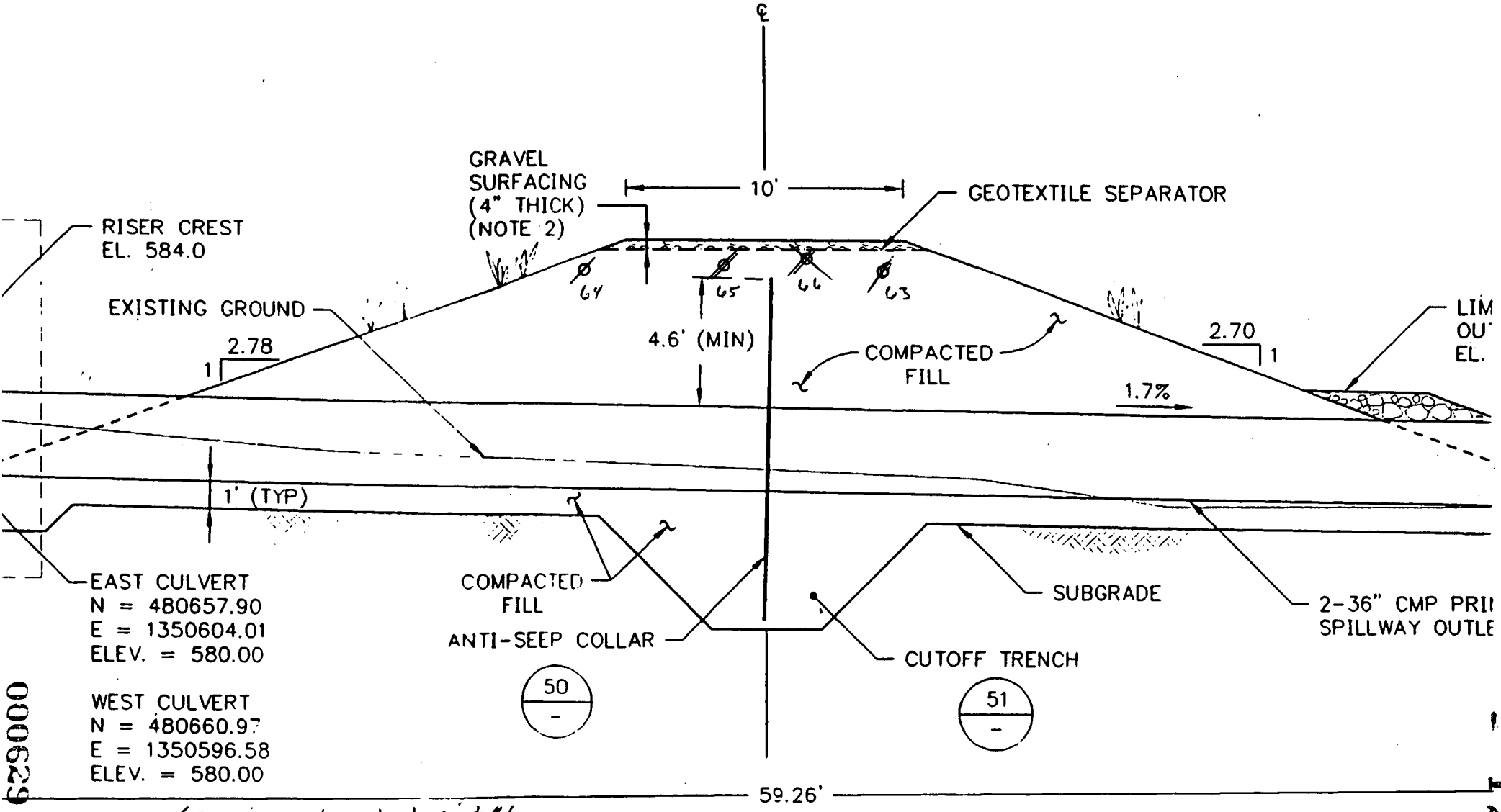
COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: HCM SHEET NO. 1 OF 2

000628

1266

DATE: 02 July '97



LEGEND: = ⌀ = Passing nuclear test lift #1
⌀ " " " lift #2
⌀ " " " lift #3

A
G-5C

SECTION
SEDIMENTATION BASIN
PRINCIPAL SPILLWAY

SCALE: 1" = 5'

XREF FS1K3583

HEM

pg 2 of 2.

000629

1266

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: O.S.D.F. PHASE ONE DATE: 14 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
67	See Attached dwg	8" / 1	O.S.D.F-04	14.0	117.8	14.8	131.4	114.5	97.2	P		—	—	—
68	↓	↓	↓	↓	↓	14.2	132.5	116.0	98.5	P		—	—	—
69	↓	8" / 2	↓	↓	↓	14.5	131.0	114.4	97.1	P		—	—	—
70	↓	↓	↓	↓	↓	13.9	129.2	113.4	96.3	P		—	—	—

COMMENTS:

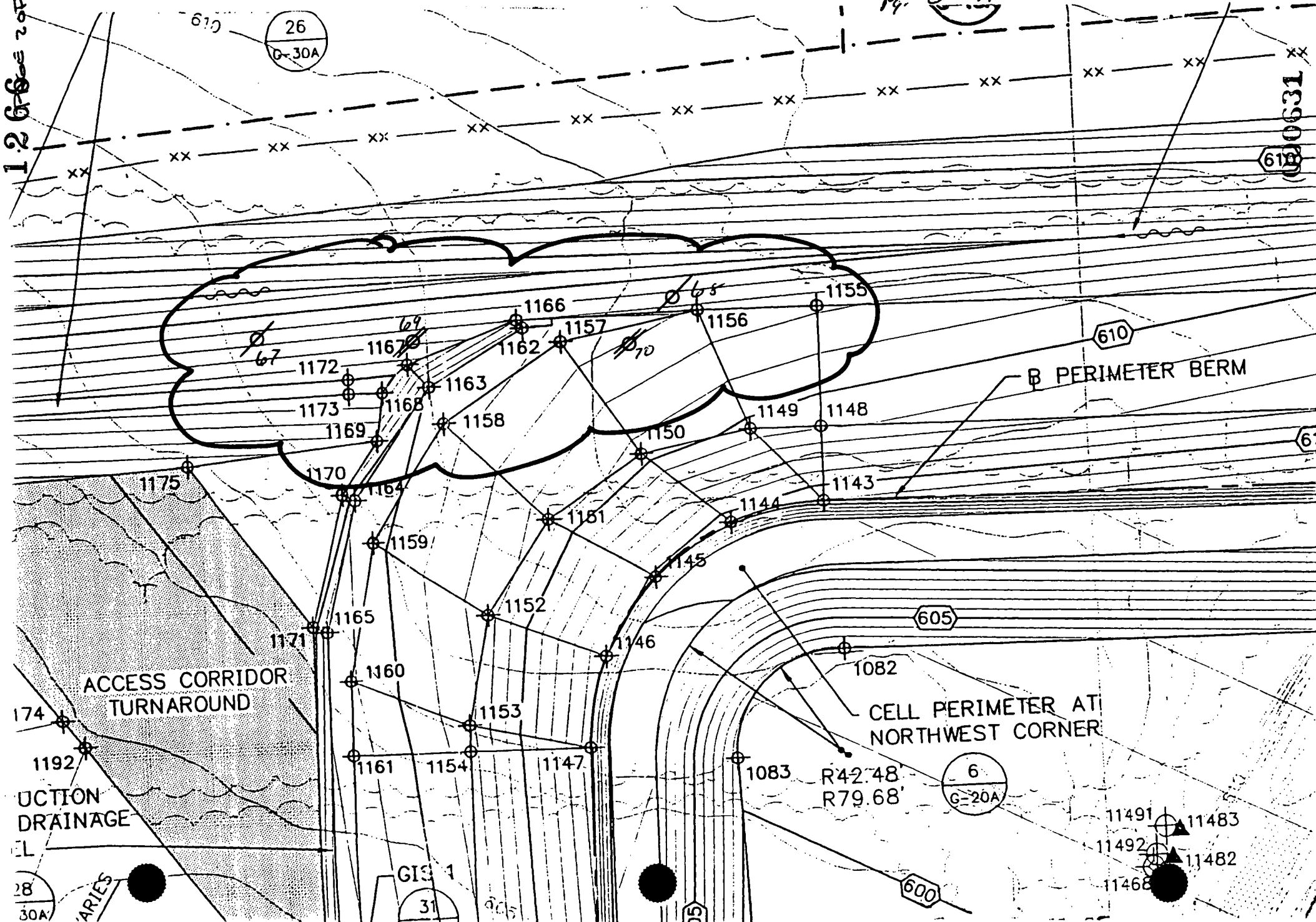
GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 2

0006630

1266

Ø = " " " 1 " " 2nd Lift

Pg. G-5A 2 of 2



000631

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: O.S.D.F. PHASE ONE DATE: 15 day 07 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
71	SEE Attached dwg.	8"/1	O.S.D.F.-04	14.0	117.8	12.8	128.7	114.1	96.9	P		—	—	—
72	↓	↓ ↓	↓	↓	↓	14.2	132.0	115.6	98.1	P		—	—	—
73	↓	8"/2'	LP.5'	13.4	120.0	13.9	138.6	121.7	101.4	P		—	—	—
74	↓	↓ ↓	↓	↓	↓	13.1	134.5	118.9	99.1	P		—	—	—
75	↓	8"/3	↓	↓	↓	14.0	132.7	116.4	97.0	P		—	—	—
76	↓	↓ ↓	↓	↓	↓	12.2	124.8	111.2	92.7		F	77	P	
77	↓	↓ ↓	↓	↓	↓	12.9	129.9	115.1	95.9	P		—	—	—
78	↓	8"/4	O.S.D.F.-04	14.0	117.8	14.4	132.4	115.7	98.2	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 2

000632

1266

= Failing " " 1" " 3rd Lift

DATE: 15 July 97 2 OF 2

26
G-30A

CHANNEL

B

C

1186
1185
187
1188
1183
1189
1184
1180
1181
1190
1182
1179
1178
605
1176
1177
1175
1172
1173
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1168
1167
1164
1159
1165
1171
1160
1161
1174
1192
1191

VARIES

ACCESS CORRIDOR
TURNAROUND

CONSTRUCTION
PHASE DRAINAGE
CHANNEL

28
G-30A

VARIES

GIS

31
G-31

000633

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: O.S.D.F - PHASE ONE DATE: 16 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BL

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
79	See Attached dwg.	8" / 1	O.S.D.F.-07	18.0	107.0	15.1	119.8	104.1	97.3	P		—	—	—
80	↓	↓	↓	↓	↓	14.8	117.8	102.6	95.9	P*	13/14/97	—	—	—
81	↓	/ 2	LP-05	13.4	120.0	12.9	133.0	117.8	98.2	P		—	—	—
82	↓	↓	↓	↓	↓	13.7	136.6	120.1	100.1	P		—	—	—
83	↓	/ 3	↓	↓	↓	12.8	134.5	119.2	99.3	P		—	—	—
84	↓	↓	O.S.D.F.-07	18.0	107.0	15.4	121.5	105.3	98.4	P		—	—	—
85	↓	/ 4	LP-05	13.4	120.0	13.6	133.6	117.6	98.0	P		—	—	—
86	↓	↓	↓	↓	↓	13.0	132.7	117.4	97.8	P		—	—	—
87	↓	↓	O.S.D.F.-07	18.0	107.0	14.9	120.3	104.7	97.9	P*	13/14/97	—	—	—

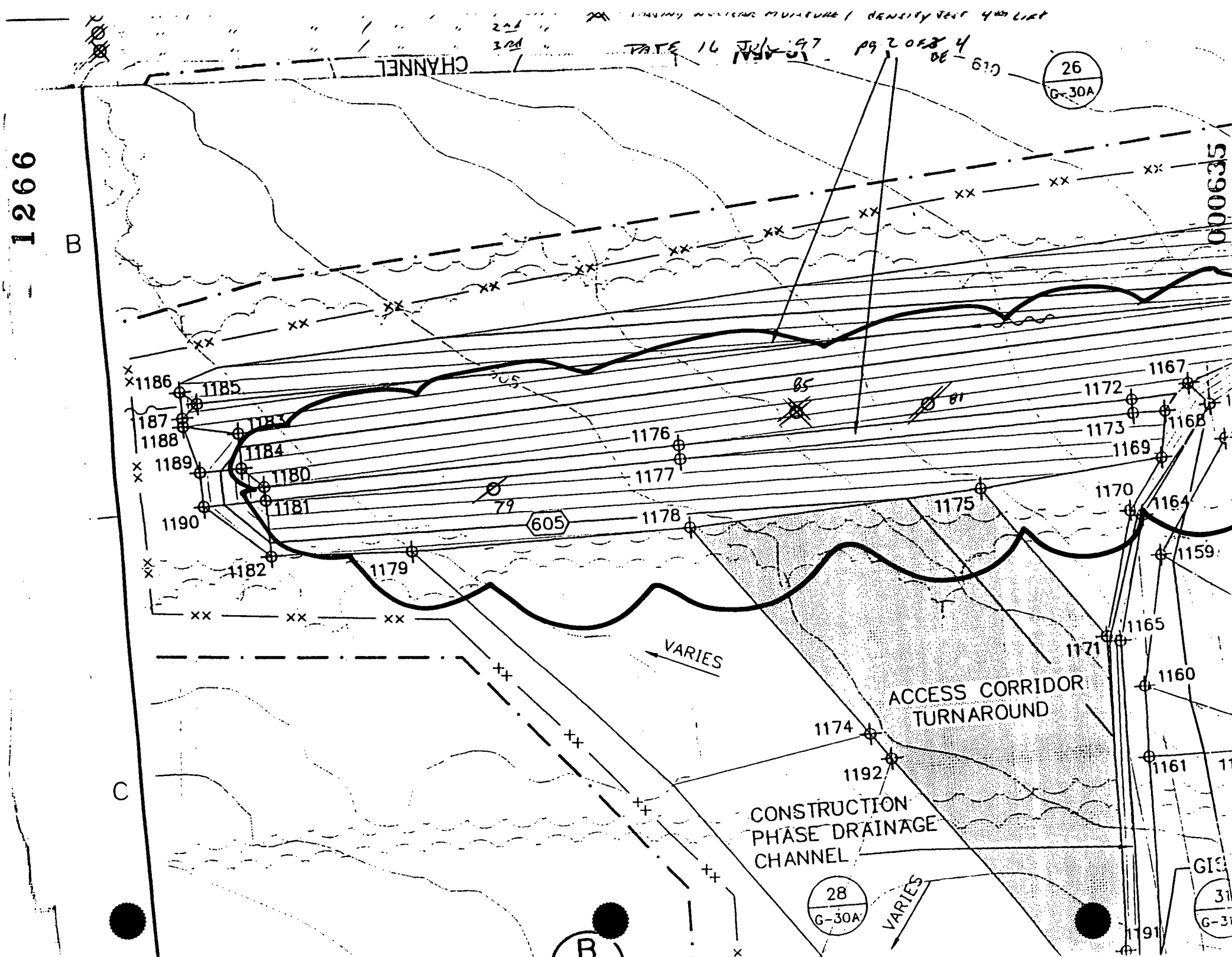
COMMENTS: *Due to a change in fill material, a check point proctor, and full proctor tests were performed. Check point results were 100.7 Lbs. @ 16.5 %m. O.S.D.F.-07 will be completed with results used to calculate the above test data. The contractor was notified of pending test acceptance

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

* See Attached supplemental information sheet 4 of 4

0006634

1266


1266
B
C
CHANNEL
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G-30A
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VARIES
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TURNAROUND
CONSTRUCTION
PHASE DRAINAGE
CHANNEL
28
G-30A
VARIES
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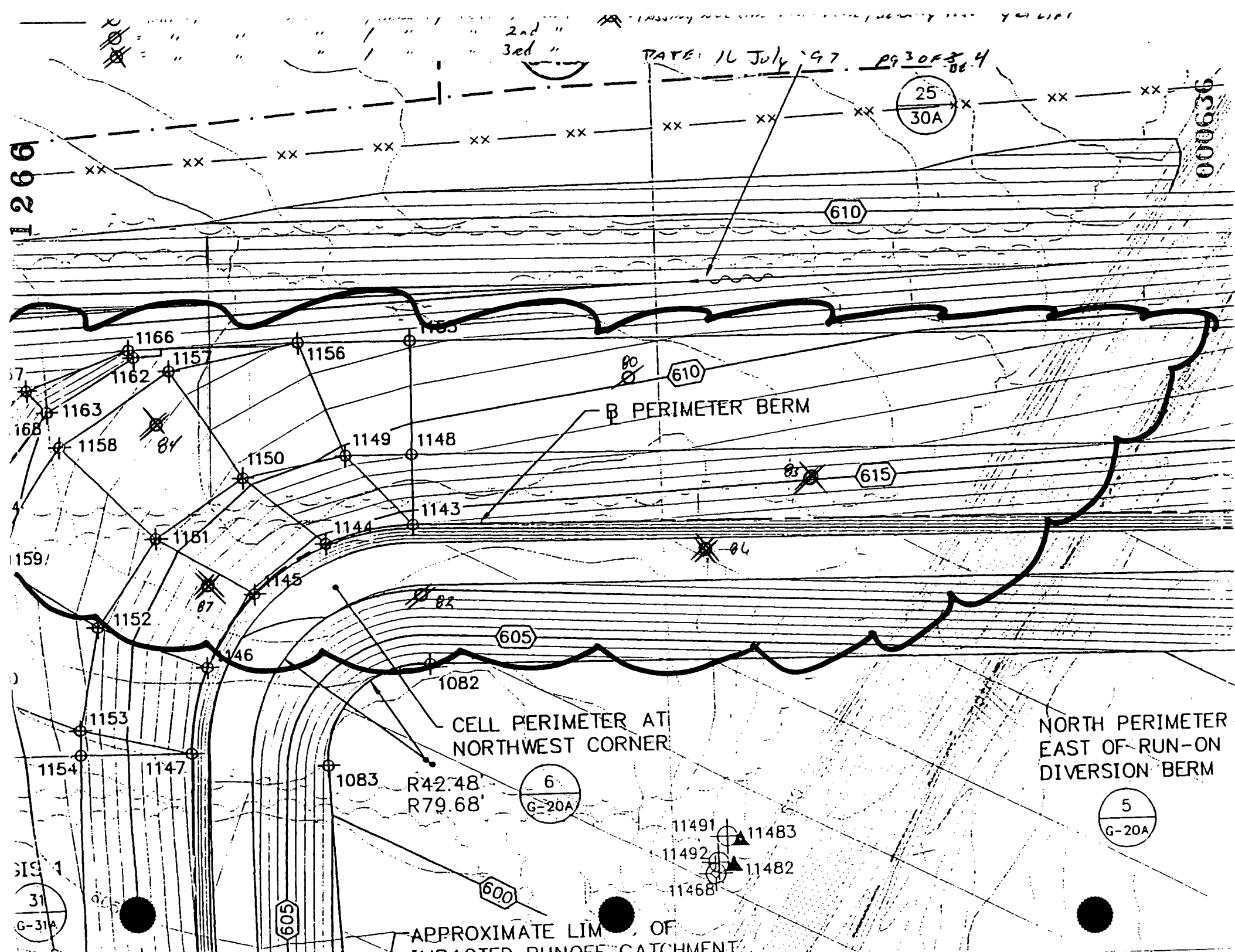
000635


DATE: 16 July '97 pg 3 of 5
25
30A
610
1166
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1152
1146
1082
1153
1154
1147
1083
615
605
600
B PERIMETER BERM
CELL PERIMETER AT
NORTHWEST CORNER
R42.48'
R79.68'
6
G-20A
NORTH PERIMETER
EAST OF RUN-ON
DIVERSION BERM
5
G-20A
11491
11483
11492
11482
11468
APPROXIMATE LIM OF
31
G-31A
000636

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

July '97

Supplemental Information

On 18 July '97 Proctor # O.S.D.F.-07 was completed, and results were inserted and calculated test data from tests # 80, and 87. The Sr. Soils Eng. technician was advised of test results.

Due to successive lifts placed over the test locations, retesting of this lift is not possible

NOTE: Tests results indicated > 95% compaction with 0.2 and 0.1 percent ~~above~~ moisture > ±3% and were accepted based on percent compaction.

JFM

COPY TO: File PER: B. Freeman

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: O.S.D.F. PHASE ONE DATE: 17 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: Ø QA ID: BE

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
88	SEE ATTACHED dwg	8" / 1	LP-5	13.4	120.0	12.2	131.2	116.9	97.4	P		—	—	—
89	↓	8" / 2	↓	↓	↓	11.5	132.6	118.9	99.1	P		—	—	—
90	↓	8" / 1	↓	↓	↓	13.1	131.0	115.8	96.5	P		—	—	—
91	↓	8" / 2	O.S.D.F.-05	13.8	118.0	14.0	132.4	116.1	98.4	P		—	—	—
92	↓	8" / 3	LP-5	13.4	120.0	12.9	131.3	116.3	96.9	P		—	—	—
93	↓	↓ ↓	↓	↓	↓	13.1	132.8	117.1	97.6	P		—	—	—
94	↓	8" / 1	↓	↓	↓	12.7	129.9	115.3	96.1	P		—	—	—
BE ~~95~~														

COMMENTS:

©GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 2

000638

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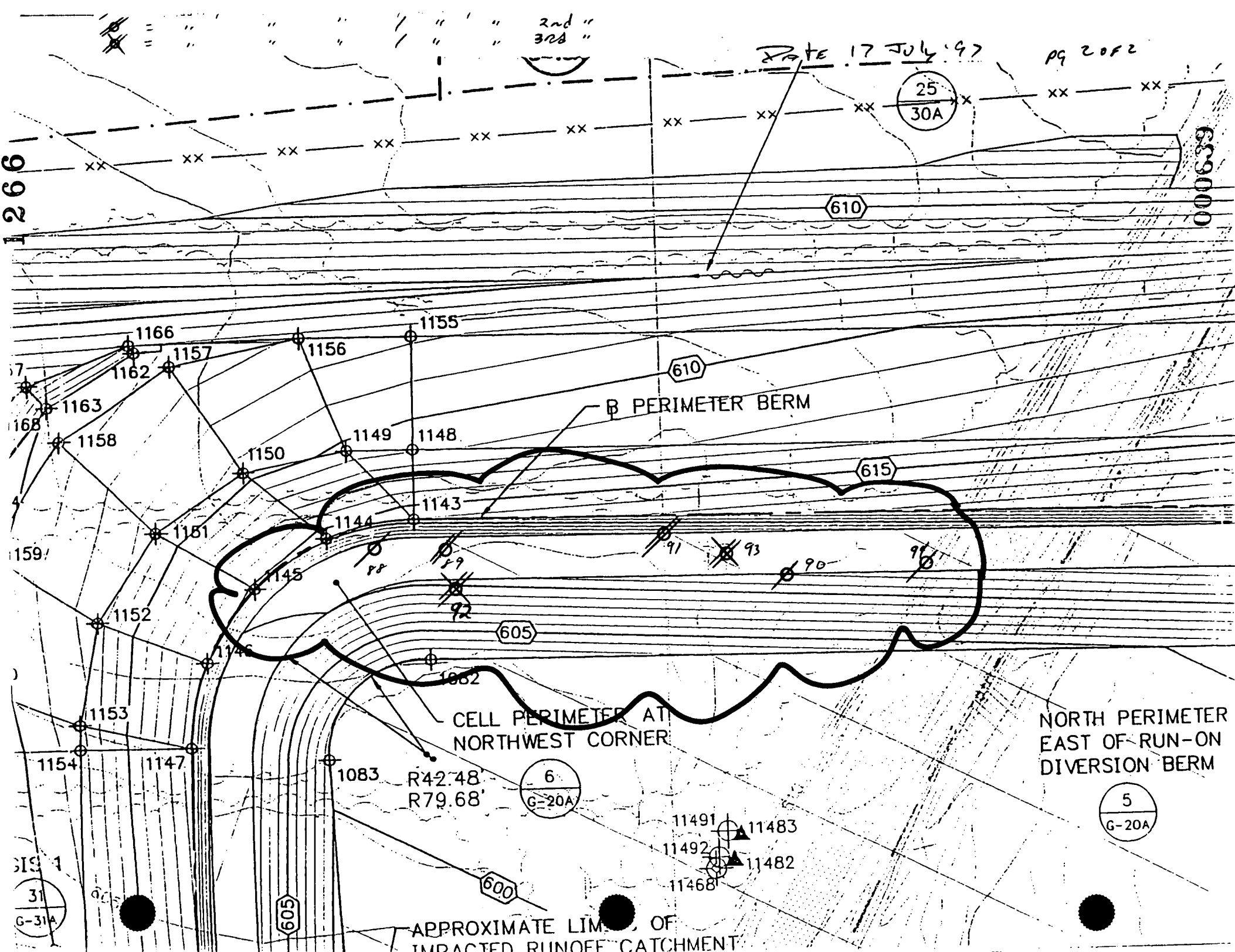
Date 17 July '97
pg 2 of 2
2nd "
3rd "
25
30A
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88
89
91
93
90
92
B PERIMETER BERM
CELL PERIMETER AT
NORTHWEST CORNER
R42.48'
R79.68'
6
G-20A
NORTH PERIMETER
EAST OF RUN-ON
DIVERSION BERM
5
G-20A
11491
11483
11492
11482
11468
APPROXIMATE LIM OF
IMPACTED RUNOFF CATCHMENT
31
G-31A

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: O.S.D.F. PHASE ONE DATE: 18 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

% COMPACTION: 795 % MOISTURE RANGE: ± 3 % ASTM D 698: (CIRCLE ONE) A B C / ASTM D 1557: A B C

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: 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
95	SEE ATTACHED dwg	10" / 1	O.S.D.F.-05	13.8	120.0	12.9	132.2	117.1	97.6	P		—	—	—
96	↓	↓	↓	↓	↓	12.2	131.9	117.6	98.0	P		—	—	—
97						11.4	128.6	115.4	96.2	P		—	—	—
98		8" / 1	LP-3	11.8	124.0	12.2	140.9	125.6	101.3	P		—	—	—
99		↓ ↓				11.6	137.9	123.6	99.7	P		—	—	—
100		8" / 2				12.1	139.6	124.5	100.4	P		—	—	—
101		↓ ↓				13.0	138.5	122.6	98.9	P		—	—	—
102		8" / 3				12.5	140.7	125.1	100.9	P		—	—	—
103		↓ ↓				12.0	135.0	120.5	97.2	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 2

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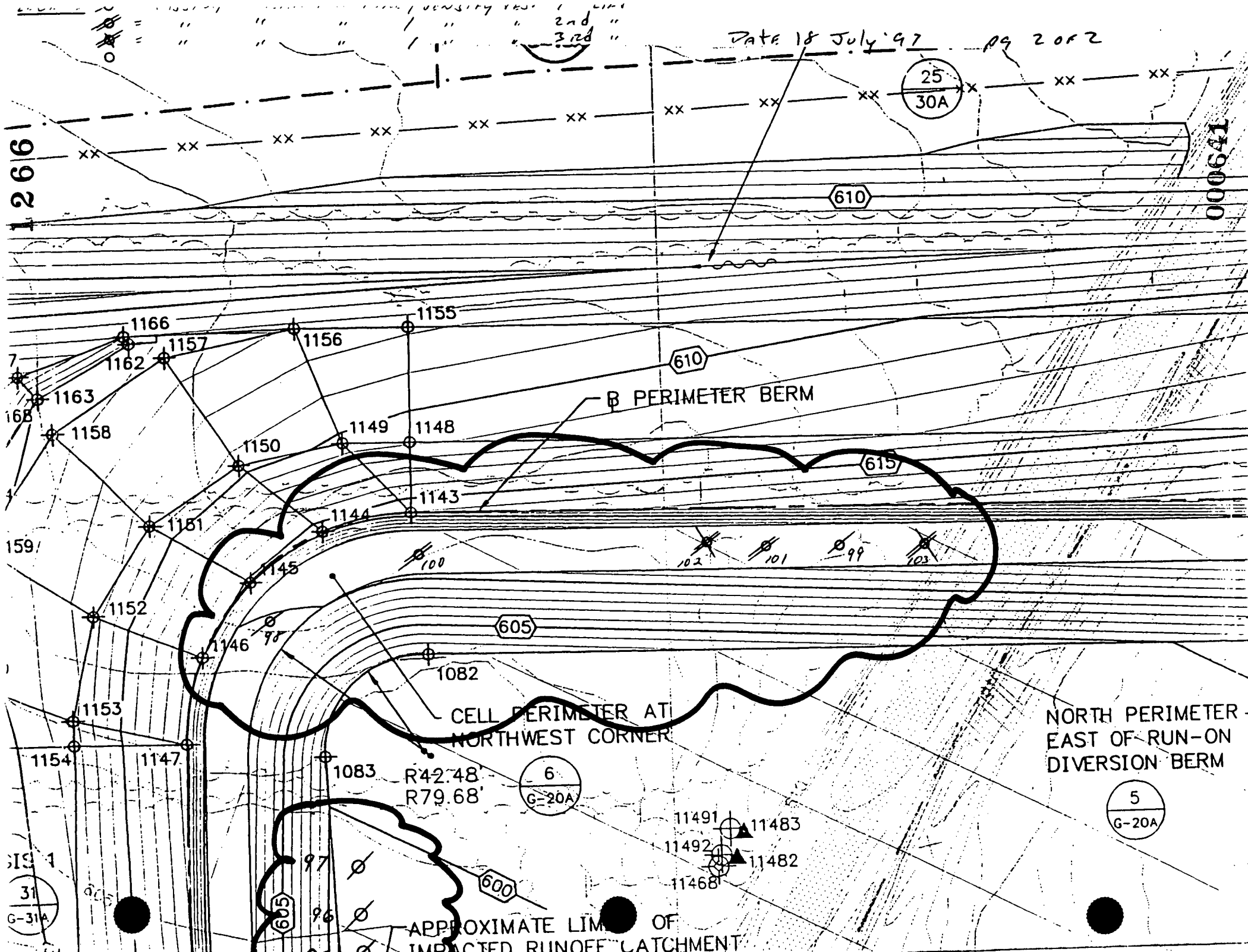
Date 18 July '97 pg 2 of 2
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B PERIMETER BERM
CELL PERIMETER AT NORTHWEST CORNER
R42.48'
R79.68'
6
G-20A
NORTH PERIMETER EAST OF RUN-ON DIVERSION BERM
5
G-20A
11491
11483
11492
11482
11468
APPROXIMATE LIMITS OF IMPACTED RUNOFF CATCHMENT
31
G-31A
100
102
101
99
103
98
97
96
1266
000641

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: O.S.D.F. PHASE ONE DATE: 21 day 07 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
104	SEE ATTACHED dwg	8" / 1	O.S.D.F.-04	14.0	117.8	13.9	129.2	113.4	96.3	P		—	—	—
105	↓	/ ↓	LP-1	14.5	115.0	15.8	129.3	111.7	97.1	P		—	—	—
106	↓	/ ↓	O.S.D.F.-04	14.0	117.8	12.6	129.7	115.2	97.8	P		—	—	—
107	↓	/ 2	↓	↓	↓	13.4	129.4	114.1	96.9	P		—	—	—
108	↓	/ ↓	↓	↓	↓	13.0	130.6	115.6	98.1	P		—	—	—
109	↓	/ 1	LP-1	14.5	115.0	16.0	132.5	114.2	99.3	P		—	—	—
110	↓	/ ↓	↓	↓	↓	14.9	129.7	112.9	95.2	P		—	—	—
111	↓	/ 3	O.S.D.F.-04	14.0	117.8	14.2	130.6	114.4	97.1	P		—	—	—
112	↓	/ 2	LP-1	14.5	115.0	17.9	133.9	113.6	98.8		F	128	P	—
113	↓	/ 4	↓	↓	↓	15.7	133.4	115.3	100.3	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: dkm 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: O.S.D.F. PHASE ONE DATE: 21 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

% COMPACTION: 795% MOISTURE RANGE: ± 3% ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
114	SEE ATTACHED dwg	8" / 4	LP-1	14.5	115.0	15.1	130.3	113.2	98.4	P		—	—	—
115	↓	↓ / 2	↓	↓	↓	16.3	128.4	110.4	96.0	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 2 OF 4

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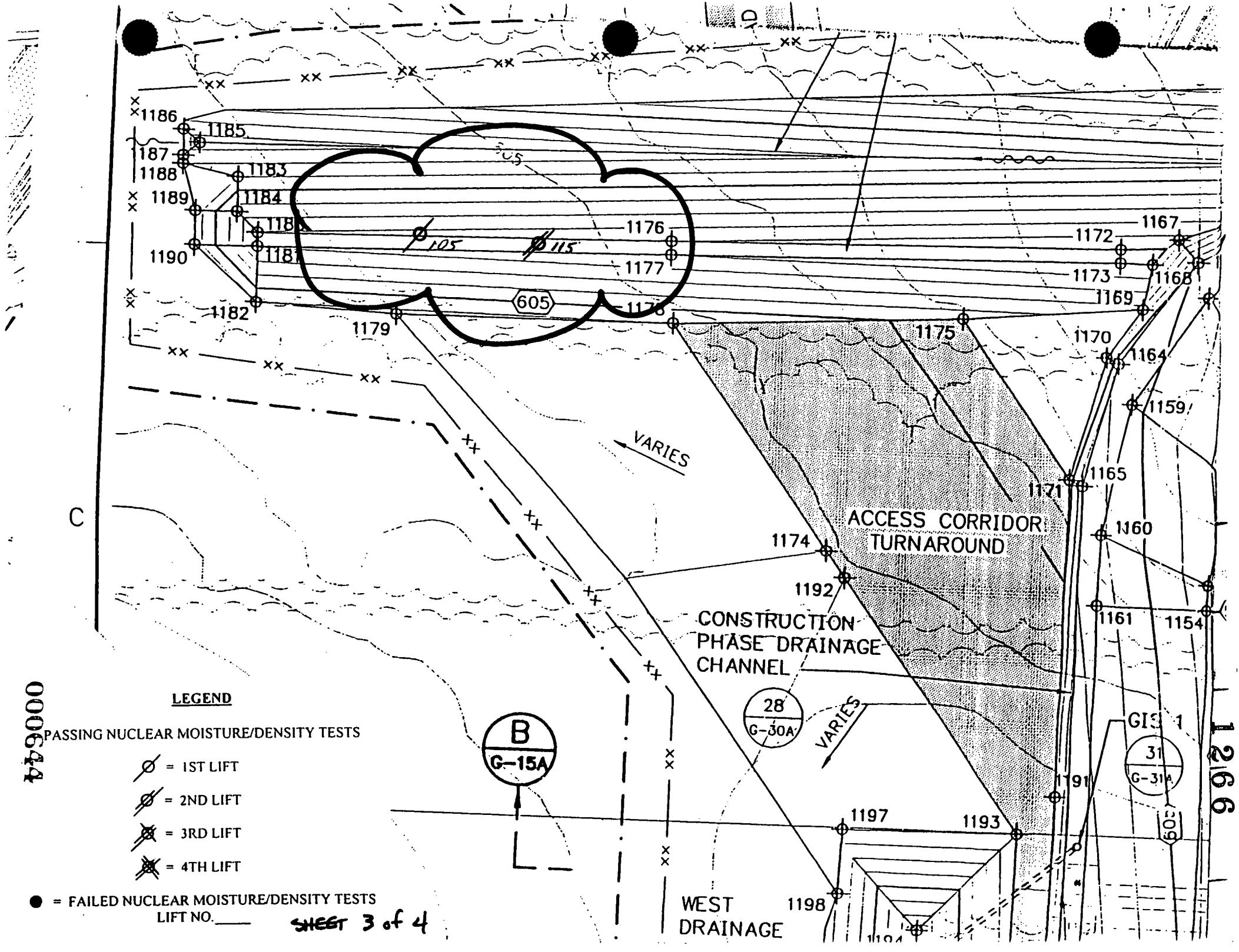
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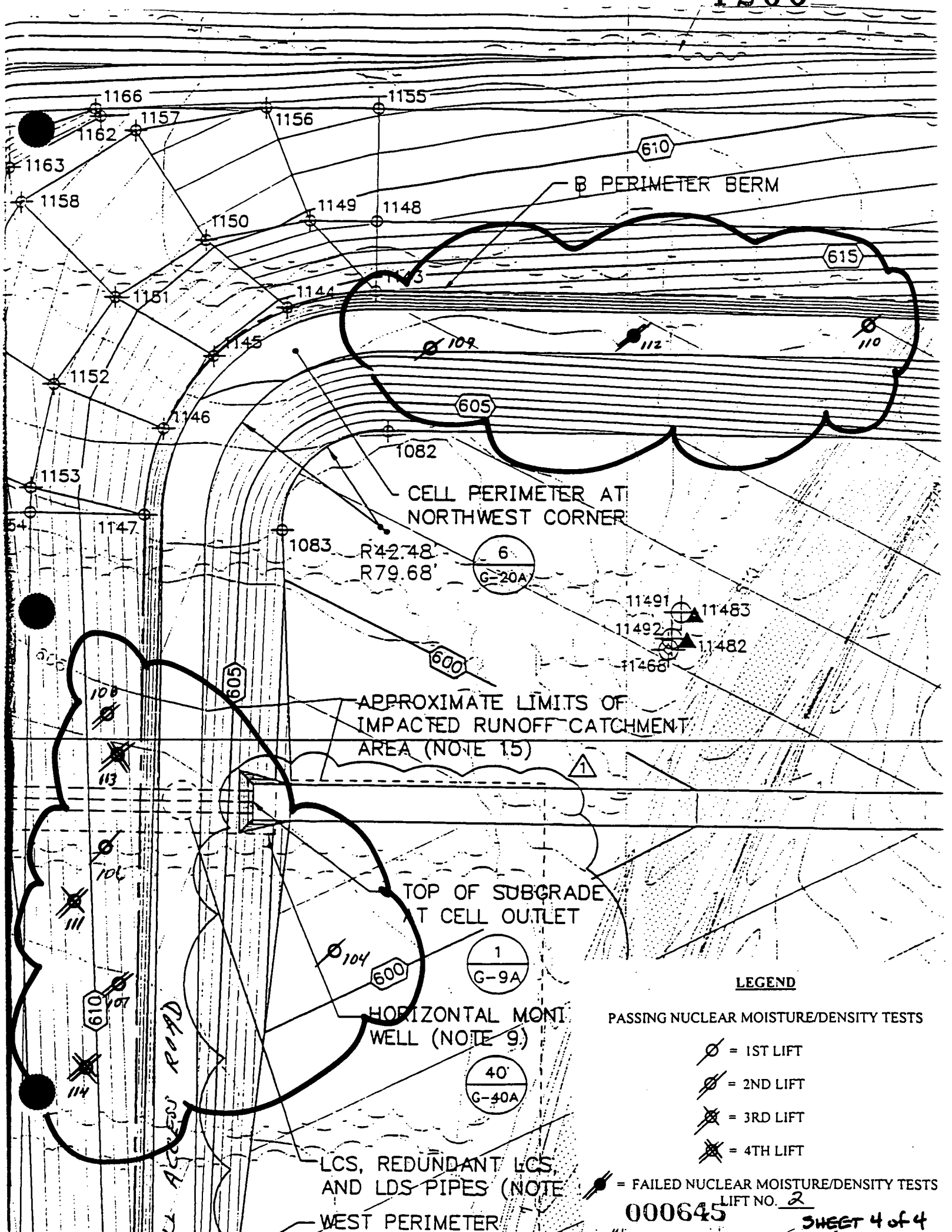
1197
1193
1198
1194
605
105
115
VARIES
ACCESS CORRIDOR
TURNAROUND
CONSTRUCTION
PHASE DRAINAGE
CHANNEL
28
G-30A
B
G-15A
31
G-31A
WEST
DRAINAGE
C
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____
SHEET 3 of 4

000644

1266


1166
1155
1157
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B PERIMETER BERM
1158
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1144
1145
109
112
110
1152
605
1146
1082
1153
CELL PERIMETER AT
NORTHWEST CORNER
1147
1083
R42.48'
R79.68'
6
G-20A
11491
11483
11492
11482
11468
600
605
108
APPROXIMATE LIMITS OF
IMPACTED RUNOFF CATCHMENT
AREA (NOTE 15)
1
113
106
TOP OF SUBGRADE
AT CELL OUTLET
111
104
600
1
G-9A
610
107
HORIZONTAL MONI
WELL (NOTE 9)
40'
G-40A
114
ACCESS ROAD
LCS, REDUNDANT LCS,
AND LDS PIPES (NOTE
WEST PERIMETER
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO. 2

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: O.S.D.F. PHASE ONE DATE: 22 day 07 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: Onsite borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: PG

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
116	SEE ATTACHED dwg	8" / 1	O.S.D.F.-05	13.8	118.0	11.9	128.1	114.5	97.0	P		—	—	—
117	↓	/ 2	↓	↓	↓	12.6	131.7	116.9	99.1	P		—	—	—
118	↓	/ 1	LP-16	17.8	109.0	16.4	124.6	107.0	98.2	P		—	—	—
119	↓	/ 3	↓	↓	↓	15.9	121.4	104.7	96.1	P		—	—	—
120	↓	/ 2	↓	↓	↓	17.0	129.2	110.4	101.3	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: (R) SHEET NO. 1 OF 2

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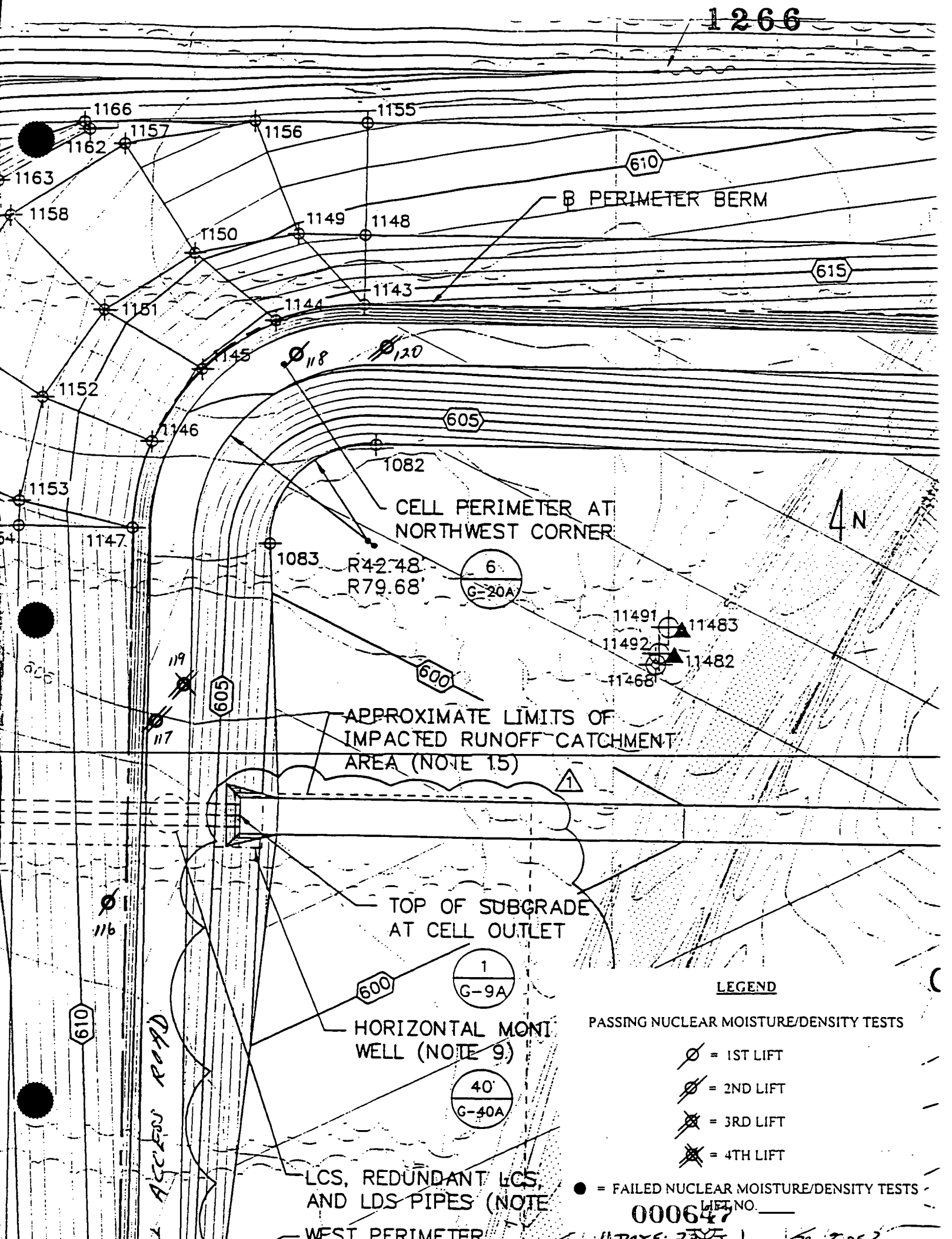
1166
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1146
1153
1147
1083
1082
610
615
605
600
B PERIMETER BERM
CELL PERIMETER AT NORTHWEST CORNER
R42.48'
R79.68'
6
G-20A
11491
11483
11492
11482
11468
APPROXIMATE LIMITS OF IMPACTED RUNOFF CATCHMENT AREA (NOTE 15)
TOP OF SUBGRADE AT CELL OUTLET
1
G-9A
HORIZONTAL MONI WELL (NOTE 9)
40'
G-40A
LCS, REDUNDANT LCS, AND LDS PIPES (NOTE
WEST PERIMETER
ACCESS ROAD
118
120
119
117
116
N
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.

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: O.S.D.F. - PHASE ONE

DATE: 23 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BL

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
121	See Attached dwg	8" / 1	O.S.D.F.04	14.0	117.8	15.2	130.5	113.3	96.2	P		—	—	—
122	↓	↓ "	↓	↓	↓	13.6	132.9	117.0	99.3	P		—	—	—
123		/ 2				14.4	136.5	119.3	101.3	P		—	—	—
124		/ 3				14.8	133.5	116.3	98.7	P		—	—	—

COMMENTS:

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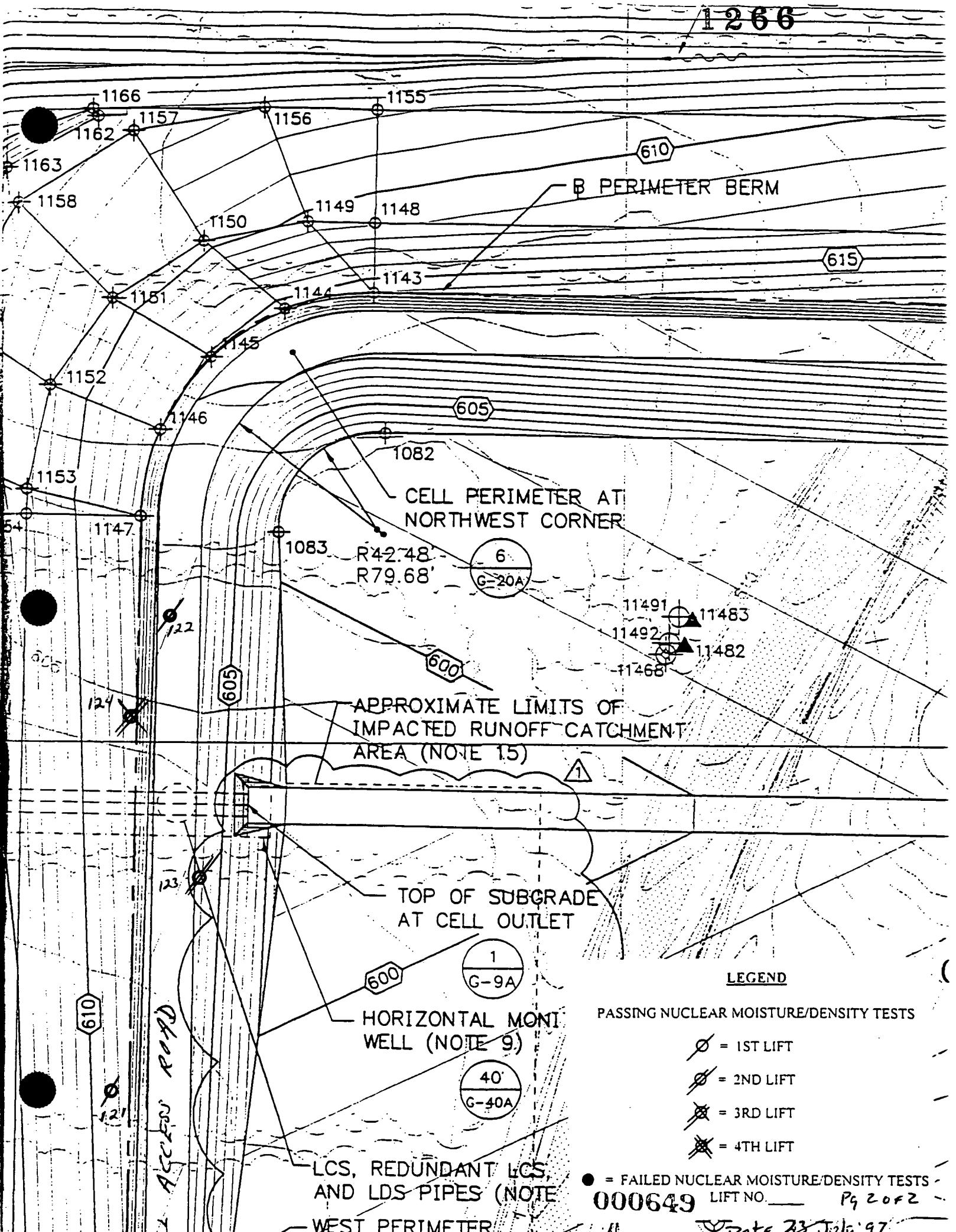
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B PERIMETER BERM
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1153
CELL PERIMETER AT
NORTHWEST CORNER
1147
1083
R42.48'
R79.68'
6
G-20A
11491
11483
11492
11482
11468
122
600
605
124
APPROXIMATE LIMITS OF
IMPACTED RUNOFF CATCHMENT
AREA (NOTE 15)
1
123
TOP OF SUBGRADE
AT CELL OUTLET
1
G-9A
600
610
HORIZONTAL MONI
WELL (NOTE 9)
40'
G-40A
121
ACCESS ROAD
LCS, REDUNDANT LCS,
AND LDS PIPES (NOTE
WEST PERIMETER
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.
Pg 2 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: O.S.D.F. - PHASE ONE DATE: 26 day 07 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20977 COR. FACTOR: n/a QA ID: BE

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
125	SEE ATTACHED dwg	8" / 1	LP-1	14.5	115.0	13.8	127.7	112.2	97.6	P		—	—	—
126	↓	↓	↓	↓	↓	14.2	129.3	113.2	98.4	P		—	—	—
127	↓	↓	↓	↓	↓	13.0	125.1	110.7	96.3	P		—	—	—
128	RETEST OF NDT-112	8" / 2	↓	↓	↓	14.6	130.6	114.0	99.1	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 4

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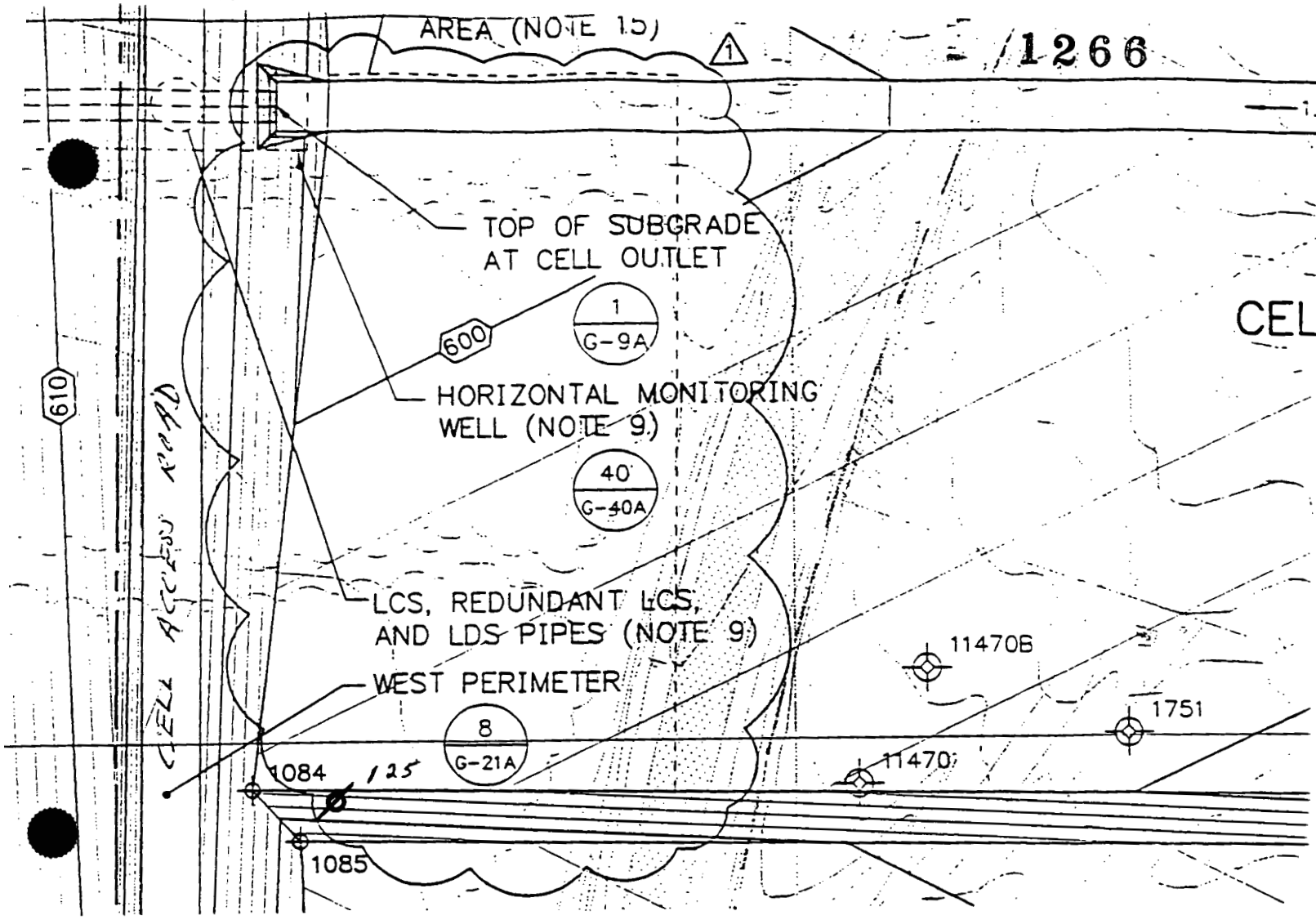


13. ROAD PAVEMENT COURSES FOR EXISTING NORTH ENTRANCE ROAD SHALL BE REMOVE: SEPARATELY IN THE SUBCONTRACTOR WORK AREA IN ACCORDANCE WITH SPECIFICAT

14. LIMIT OF RAIL YARD TOPSOIL EXCAVATION TAKEN FROM SEPARATE CONSTRUCTION F SYSTEM IMPROVEMENTS – GRADING AND DRAINAGE PACKAGE." REFER TO REFERENC

15. IMPACTED RUNOFF CATCHMENT AREA SHALL BE CONSTRUCTED IN CELLS 1 AND 2 AT DRAWING. IMPACTED RUNOFF CATCHMENT AREA IN CELL 1 SHALL REMAIN OPEN FO

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

Ø = 1ST LIFT

Ø = 2ND LIFT

⊗ = 3RD LIFT

⊗ = 4TH LIFT

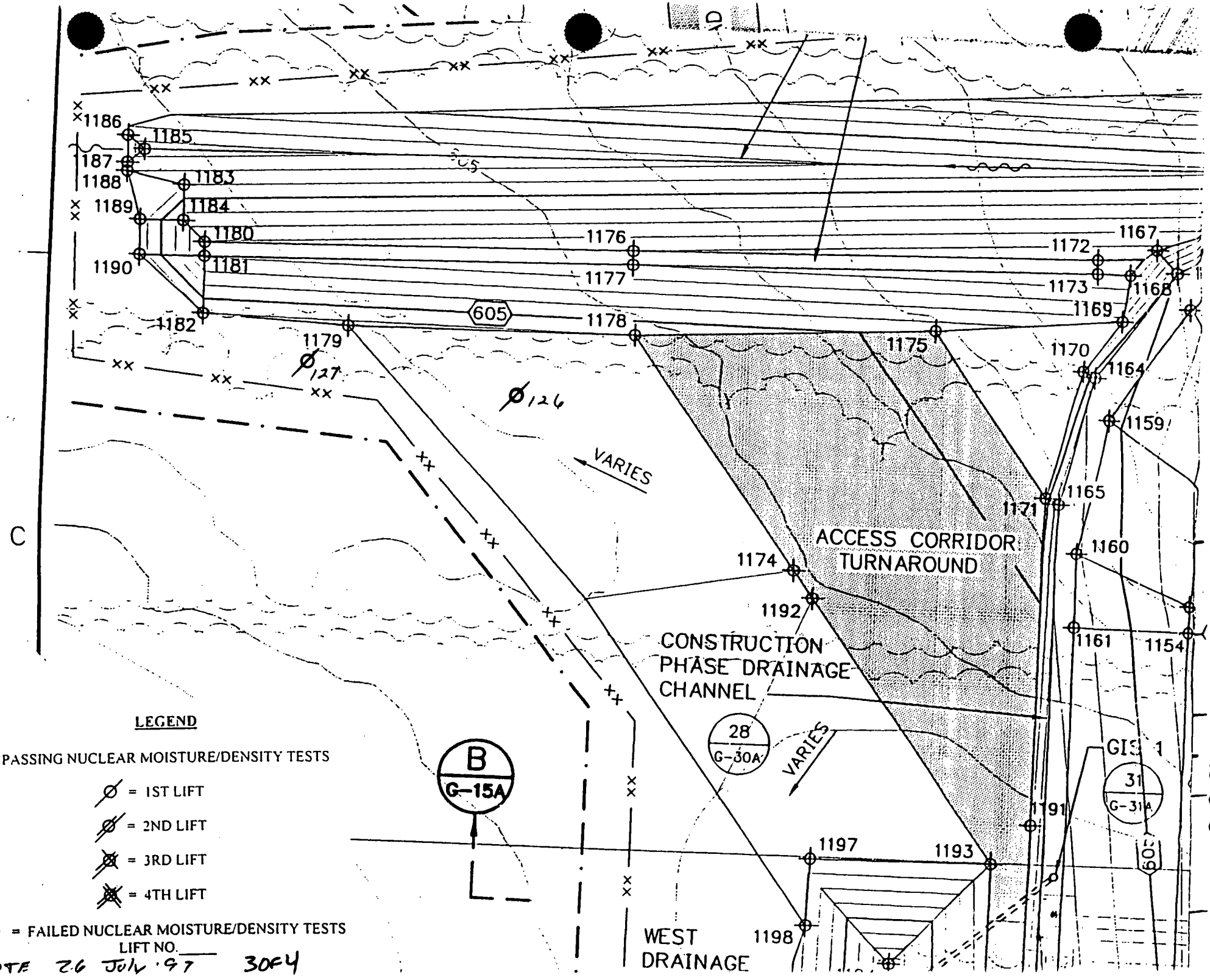
● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____

DATE. 26 July

pg 2 of 4

SUBGRADE CONS

POINT NO.	NORTHING	EASTING	ELEVATION	POINT NO.	NC
1082	483136.95	1350896.76	601.77	1166	483
1083	483093.07	1350851.02	600.43	1167	483
1084	482753.39	1350829.50	602.22	1168	483
1085	482736.84	1350844.56	598.28	1169	483
1137	482729.06	1351480.75	604.64	1170	483
1138	482745.23	1351497.48	608.90	1171	483
1139	482956.61	1351475.88	604.43	1172	483
1140	482972.61	1351475.57	604.43	1173	48
1141	483085.35	1351482.83	606.74	1174	48
1142	483130.29	1351441.00	607.21	1175	48
1143	483198.78	1350891.32	616.09	1176	48
1144	483191.62	1350852.87	615.73	1177	48
[illegible]	483170.34	1350820.27	619.67	1178	48
					48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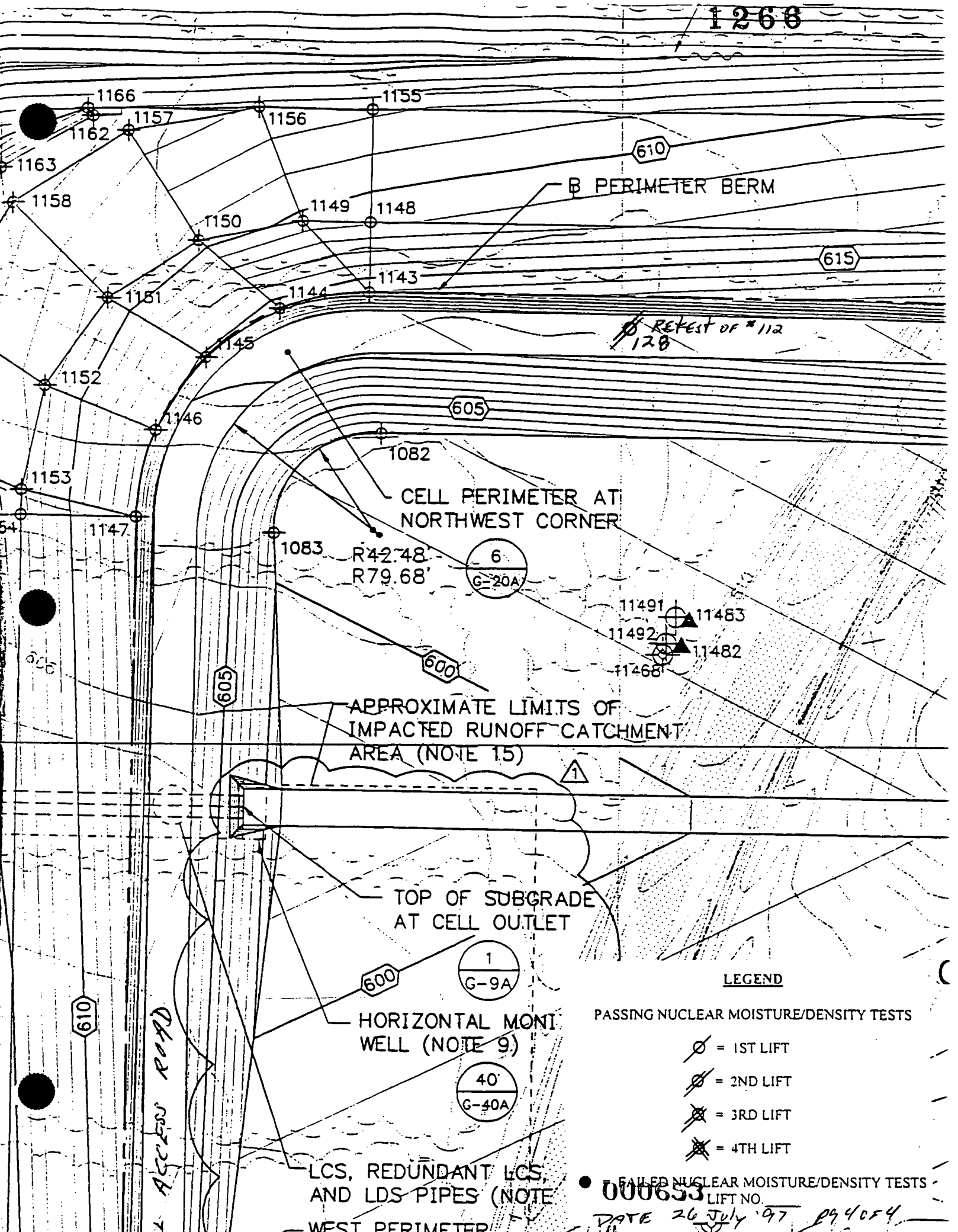
1174
1192
1161
1154
605
VARIES
ACCESS CORRIDOR
TURNAROUND
CONSTRUCTION
PHASE DRAINAGE
CHANNEL
28
G-30A
VARIES
B
G-15A
31
G-31A
1191
1197
1193
1198
WEST
DRAINAGE
C
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.
DATE 26 JULY 97
3 OF 4

000652

0021


1166
1157
1162
1156
1155
1163
1158
610
B PERIMETER BERM
1149
1148
1150
615
1143
1161
1144
REFEST OF #112
128
1145
1152
605
1146
1082
1153
CELL PERIMETER AT
NORTHWEST CORNER
1147
1083
R42.48'
R79.68'
6
G-20A
11491
11483
11492
11482
11468
600
605
APPROXIMATE LIMITS OF
IMPACTED RUNOFF CATCHMENT
AREA (NOTE 15)
1
TOP OF SUBGRADE
AT CELL OUTLET
1
G-9A
600
610
HORIZONTAL MONI
WELL (NOTE 9)
40'
G-40A
ACCESS ROAD
LCS, REDUNDANT LCS,
AND LDS PIPES (NOTE
WEST PERIMETER
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.
000653
DATE 26 JULY '97
PG 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: O.S.D.F. - PHASE ONE DATE: 28 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BC

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
129	SEE ATTACHED dwg	8" / 1	O.S.D.F. 05	13.8	118.0	12.3	129.4	115.2	97.6	P		—	—	—
130		/ 1	O.S.D.F. 04	14.0	117.8	13.4	131.8	116.2	98.6	P		—	—	—
131		/ 2	↓	↓	↓	13.0	130.5	115.5	98.0	P		—	—	—
132		/ 3	LP-12	15.2	116.5	16.6	133.6	114.6	96.4	P		—	—	—
133		/ 4	↓	↓	↓	16.2	132.8	114.3	98.1	P		—	—	—
134		/ 2	O.S.D.F. 05	13.8	118.0	11.9	127.3	113.8	98.3	P		—	—	—
135		/ 5	LP-12	15.2	116.5	15.2	135.1	117.3	100.7	P		—	—	—
136		/ 6	↓	↓	↓	14.0	129.6	113.7	97.6	P		—	—	—
137		/ 3	O.S.D.F. 05	13.8	118.0	13.3	131.3	~~98.2~~ 115.9 BC	98.2	P		—	—	—
138		/ 7	LP-12	15.2	116.5	14.9	131.9	114.8	98.5	P		—	—	—

COMMENTS:

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000654

1266

610

1155

1156

610

B PERIMETER BERM

1149 1148

615

1143

1144

131

133

138

139

136

132

130

605

1082

CELL PERIMETER AT NORTHWEST CORNER

NORTH PERIMETER - EAST OF RUN-ON DIVERSION BERM

1083

R42.48'
R79.68'

6
G-20A

5
G-20A

11491

11483

11492

11482

11468

600

APPROXIMATE LIMITS OF IMPACTED RUNOFF CATCHMENT AREA (NOTE 15)

1

1.0% (TYP.)

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

= 1ST LIFT = 5th Lift

= 2ND LIFT = 6th Lift

= 3RD LIFT = 7th Lift

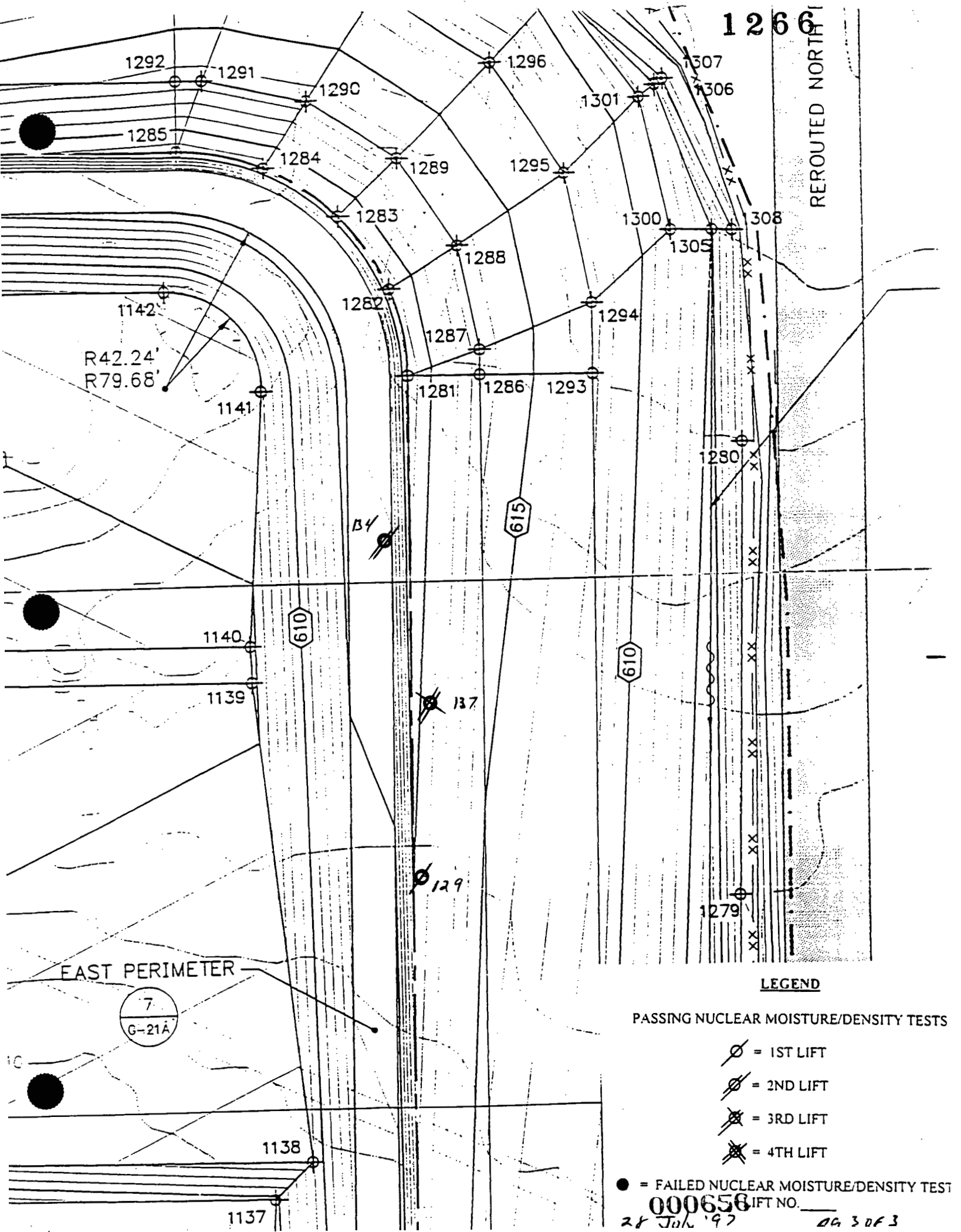
= 4TH LIFT

● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____

CELL 1

28 July '97

pg 2 of 3



28 July '92 PG 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: O.S.D.F. - PHASE ONE DATE: 29 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
139	See Attached Dwg.	8"/ 1	O.S.D.F.-05	13.8	118.0	11.8	130.3	116.6	98.8	P		—	—	—
140	↓	/ 2	↓	↓	↓	13.9	133.8	117.4	99.5	P		—	—	—
141	↓	/ 3	↓	↓	↓	13.3	135.1	119.2	101.0	P		—	—	—
142	↓	↓	↓	↓	↓	12.8	132.8	117.8	99.8	P		—	—	—
143	↓	/ 4	↓	↓	↓	12.7	136.2	120.8	102.4	P		—	—	—
144	↓	↓	↓	↓	↓	15.5	130.9	113.3	96.0	P		—	—	—
145	↓	/ 5	↓	↓	↓	14.5	132.5	115.7	98.0	P		—	—	—
146	↓	/ 6	↓	↓	↓	12.6	134.9	119.9	101.6	P		—	—	—
147	↓	↓	↓	↓	↓	15.1	131.8	114.5	97.1	P		—	—	—
148	↓	/ 7	↓	↓	↓	13.6	131.4	115.7	98.1	P		—	—	—

COMMENTS:

000657

1266

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: O.S.D.F. - PHASE ONE DATE: 29 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
149	SEE ATTACHED dwg.	8" / 8	O.S.D.F.-05	13.8	118.0	13.3	132.9	117.3	99.4	P		—	—	—
150	↓	↓	↓	↓	↓	14.4	131.4	114.7	97.2	P		—	—	—
151						12.9	128.7	114.0	96.6	P		—	—	—
152						13.7	132.0	116.1	98.4	P		—	—	—

COMMENTS:

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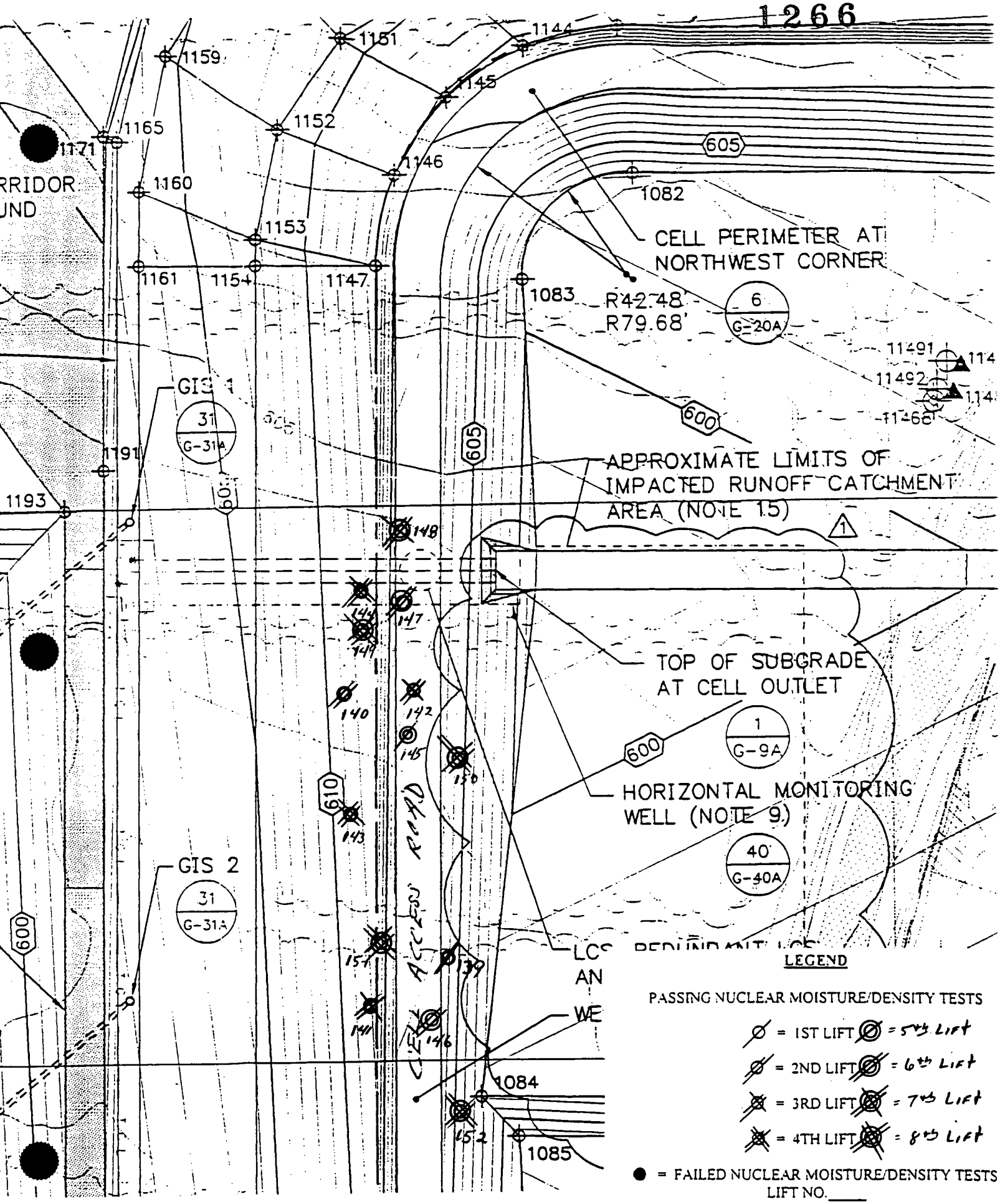
1266



13. ROAD PAVEME
SEPARATELY 1

14. LIMIT OF RAII

EFERS TO THE

Date: 29 July '97 Pg 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: O.S.D.F.-PHASE ONE DATE: 30 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
153	SEE ATTACHED DWG.	8" / 1	O.S.D.F.-05	13.8	118.0	14.6	131.9	115.1	97.6	P		—	—	—
154		/ 2				13.2	136.4	120.5	102.1	P		—	—	—
155		/ 3				15.2	132.9	115.3	97.7	P		—	—	—
156			O.S.D.F.-07	18.0	107.0	15.3	122.9	106.6	99.6	P		—	—	—
157		/ 1				16.5	128.1	109.9	102.7	P		—	—	—
158		/ 4	O.S.D.F.-05	13.8	118.0	12.6	131.4	116.7	98.9	P		—	—	—
159			O.S.D.F.-07	18.0	107.0	16.2	121.1	104.2	97.4	P		—	—	—
160		/ 5				15.8	120.3	103.9	97.1	P		—	—	—
161						16.9	104.8	97.7	91.3		F	16.2	P	—
162	RETEST FOR NOT-161	/ 1 (B)				15.7	119.3	103.1	96.4	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] 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: O.S.D.F. - PHASE ONE DATE: 30 day 07 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
163	SEE ATTACHED DWG.	8" / 1	O.S.D.F.-07	18.0	107.0	16.4	119.9	103.0	96.3	P		—	—	—
164	↓	↓ / 2	↓	↓	↓	15.8	121.6	105.0	98.1	P		—	—	—
165		↓				16.8	120.6	103.3	96.5	P		—	—	—
166		↓ / 3				17.2	122.1	104.2	97.4	P		—	—	—
167		8" ↓	O.S.D.F.-05	13.8	118.0	17.9	131.9	116.8	99.0	P		—	—	—

COMMENTS:

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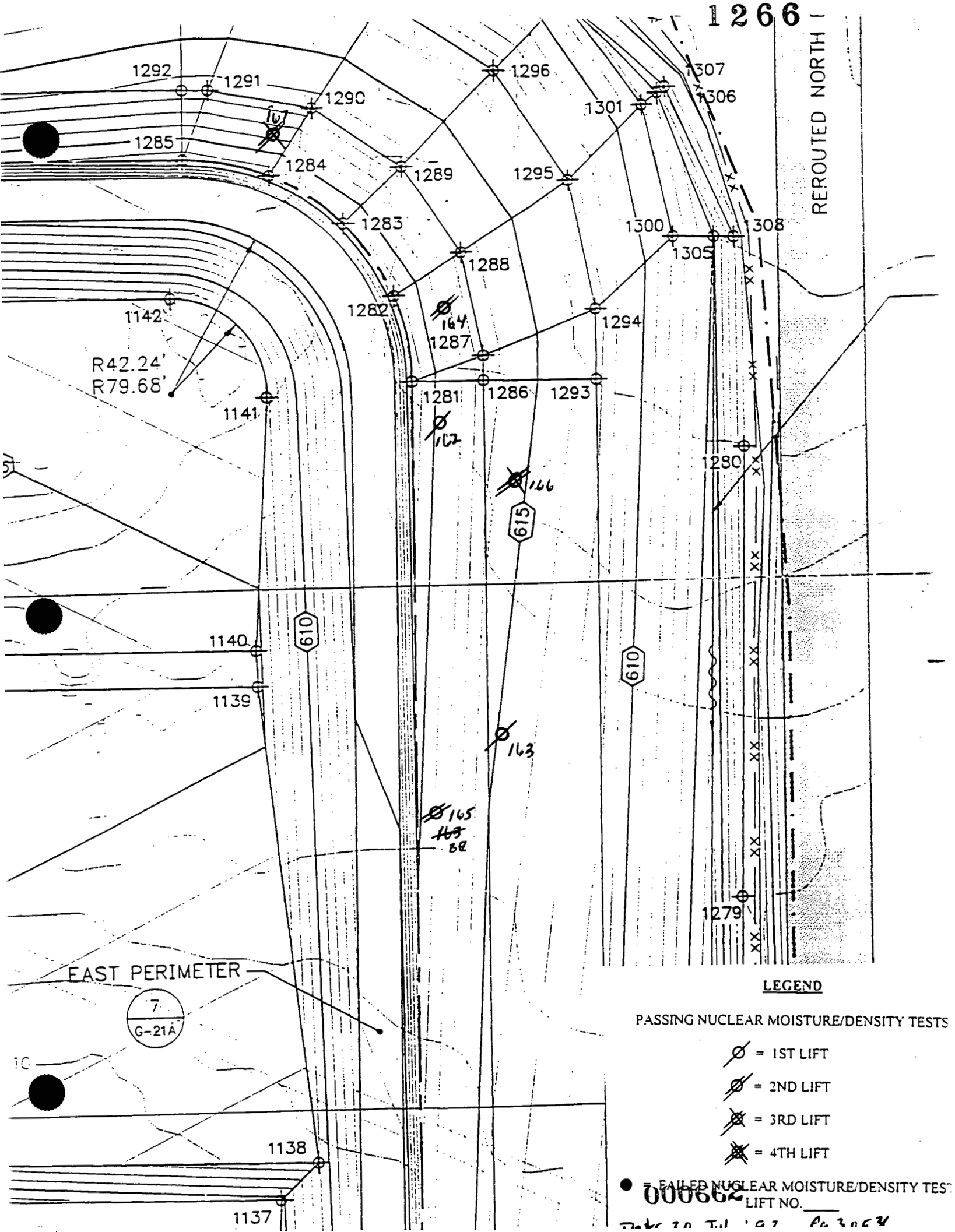
1266


REROUTED NORTH
1292
1291
1290
1285
1284
1289
1296
1295
1301
1307
1306
1283
1288
1300
1305
1308
1282
1287
1294
1142
R42.24'
R79.68'
1141
1281
1286
1293
1280
615
610
1140
1139
1279
EAST PERIMETER
7
G-21A
1138
1137
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TEST
LIFT NO.

1266

1159
1151
1144
1145
1165
1152
1171
1146
605
1160
1082
RRIDOR
UND
1153
CELL PERIMETER AT
NORTHWEST CORNER
1161
1154
1147
1083
R42.48'
R79.68'
6
G-20A
11491
11492
11468
GIS 1
31
G-31A
157
600
605
1191
APPROXIMATE LIMITS OF
IMPACTED RUNOFF CATCHMENT
AREA (NOTE 15)
1193
1
TOP OF SUBGRADE
AT CELL OUTLET
1
G-9A
156
161
600
610
154
HORIZONTAL MONITORING
WELL (NOTE 9)
40'
G-40A
GIS 2
31
G-31A
153
158
600
CLEAN ACCESS ROAD
LC
AN
WE
155
160
159
1084
1085

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

- ⊘ = 1ST LIFT ⊘ = 5th Lift
- ⊘ = 2ND LIFT ⊘ = 6th Lift
- ⊗ = 3RD LIFT ⊗ = 7th Lift
- ⊗ = 4TH LIFT

● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____

13. ROAD PAVEME
SEPARATELY 1

14. LIMIT OF RAII

FERS TO THE

000663

Date 30 July 09 Page 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: 31 day JULY month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE / COMPACTED): 6"

% COMPACTION: >95% 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: N/A 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
168	WEST SIDE OF CELL #1 AREA A	6" / 2ND	OSDF-10	13.8	119.7	10.9	130.1	117.3	98	P		—	—	—
169	EAST SIDE OF CELL #1 AREA B	6" / TOP	"	"	"	12.5	130.2	115.7	96.7	P		—	—	—
170	WEST SIDE OF CELL #1 AREA A	6" / TOP	"	"	"	12.5	129.3	114.9	96.0	P		—	—	—

COMMENTS: SUBGRADE REPAIR SEE ATTACHED MAP FOR LOCATIONS

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000664

1266

GEOSYNTEC CONSULTANTS

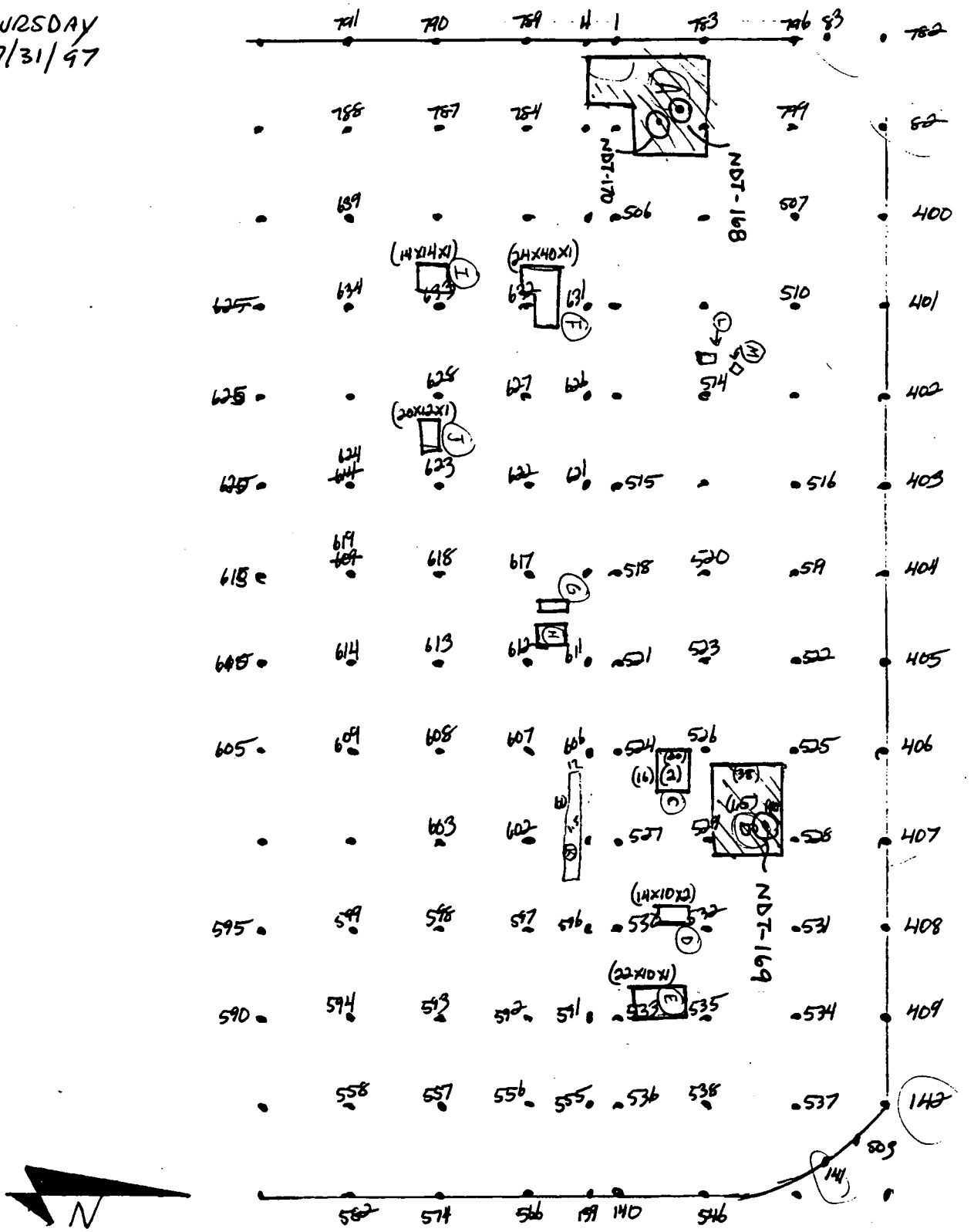
1266 Page ____ of ____

Written by: ~~Rob Pedricord~~ R. Wills @ 7/31/97 Date: ~~97 07 30~~ @ 7/31/97 (YY MM DD) Reviewed by: ____ Date: __/__/__ (YY MM DD)

Client: FDF Project: OSD F Phase I Project/Proposal No.: 660166 Task No.: 04.1

2 OF 2

THURSDAY 7/31/97



Drawing Not to Scale

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: O.S.D.F. - PHASE ONE DATE: 31 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

% COMPACTION: 795% MOISTURE RANGE: ± 3% ASTM D 698: (A) B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
171	SEE Attached dwg.	8" / 1	O.S.D.F.-05	13.8	118.0	12.3	133.5	118.8	100.7	P		—	—	—
172	↓	↓	↓	↓	↓	15.0	129.9	113.0	95.8	P		—	—	—
173	↓	/ 2	↓	↓	↓	11.2	124.8	112.3	95.2	P		—	—	—
174	↓	↓	↓	↓	↓	10.8	126.5	114.1	96.7	P		—	—	—
175	↓	/ 3	↓	↓	↓	10.9	129.3	116.6	98.8	P		—	—	—
176	↓	↓	↓	↓	↓	14.3	128.9	112.7	95.5	P		—	—	—
177	↓	/ 4	↓	↓	↓	12.0	134.0	119.6	101.3	P		—	—	—
178	↓	↓	↓	↓	↓	11.7	126.6	113.3	96.0	P		—	—	—
179	↓	↓	↓	↓	↓	12.5	130.4	115.9	98.2	P		—	—	—
180	↓	/ 5	↓	↓	↓	12.1	129.5	115.5	97.9	P		—	—	—

COMMENTS:

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0006666

1266

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: O.S.D.F. - PHASE ONE DATE: 31 day 07 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
181	SEE Attached Dwg.	8"/5	O.S.D.F. -05	13.8	118.0	12.4	127.5	113.4	96.1	P		—	—	—
182	↓	↓/↓	↓	↓	↓	14.3	134.2	117.4	99.5	P		—	—	—

COMMENTS:

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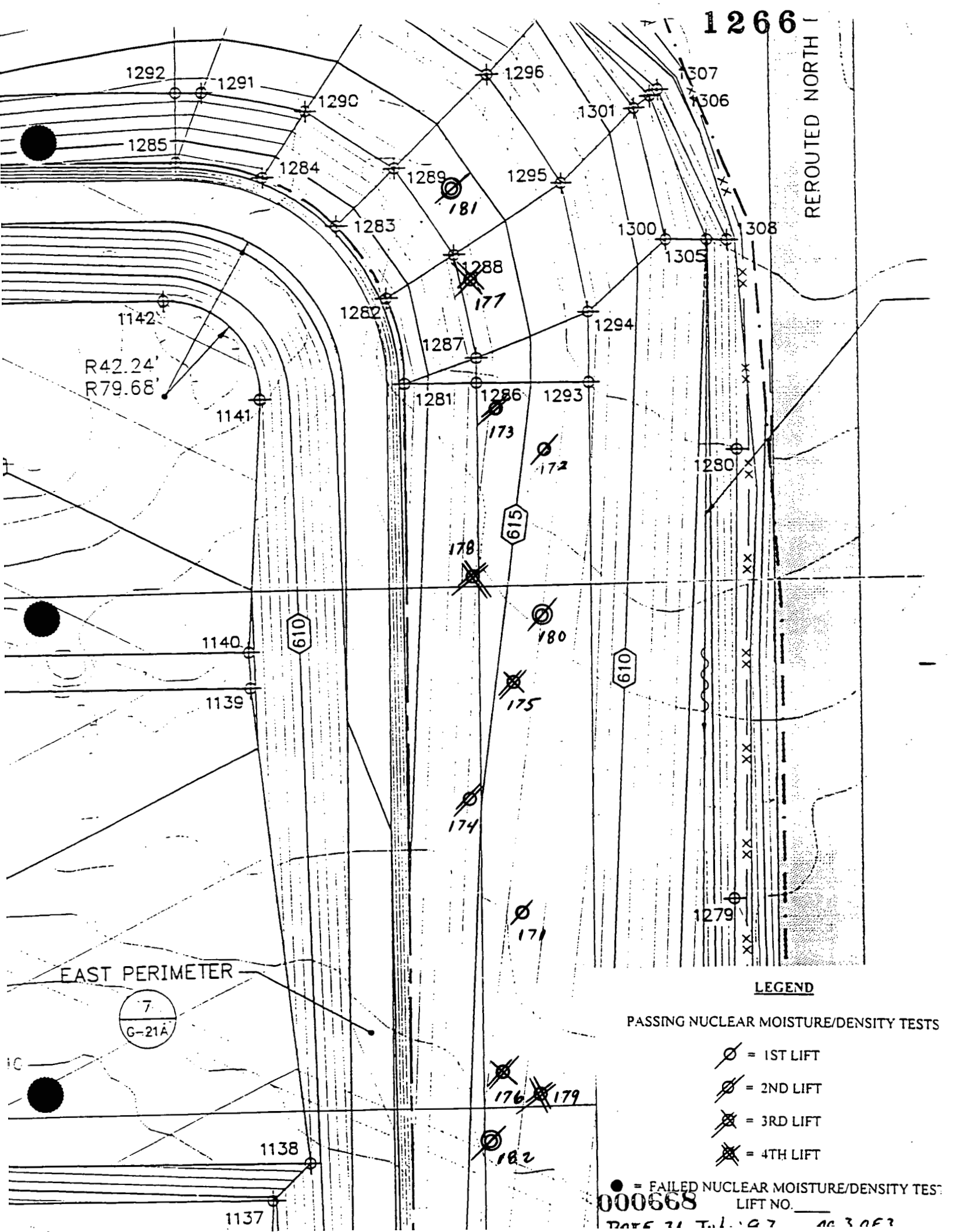
REROUTED NORTH
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1300
1308
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1288
177
1282
1294
1142
1287
R42.24'
R79.68'
1281
1286
1293
1141
173
172
1280
615
178
180
610
1140
610
1139
175
174
1279
171
EAST PERIMETER
7
G-21A
176
179
1138
182
1137
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TEST
LIFT NO.

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: 01 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): 6"

% COMPACTION: > 95% MOISTURE RANGE: _____ 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: N/A 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
183	AREA C CELL FL.	6" / TOP	OSDF-05	13.8	118.0	12.7	121.9	108.2	90.4		F	184	P	—
184	AREA C CELL FL.	6" / RETEST TOP	OSDF-05	13.8	118.0	13.2	127.5	112.6	95.5	P		—	—	—

COMMENTS: SUBGRADE REPAIR (I.E. OVER CUT AREAS)
SEE ATTACHED MAP FOR LOCATIONS.

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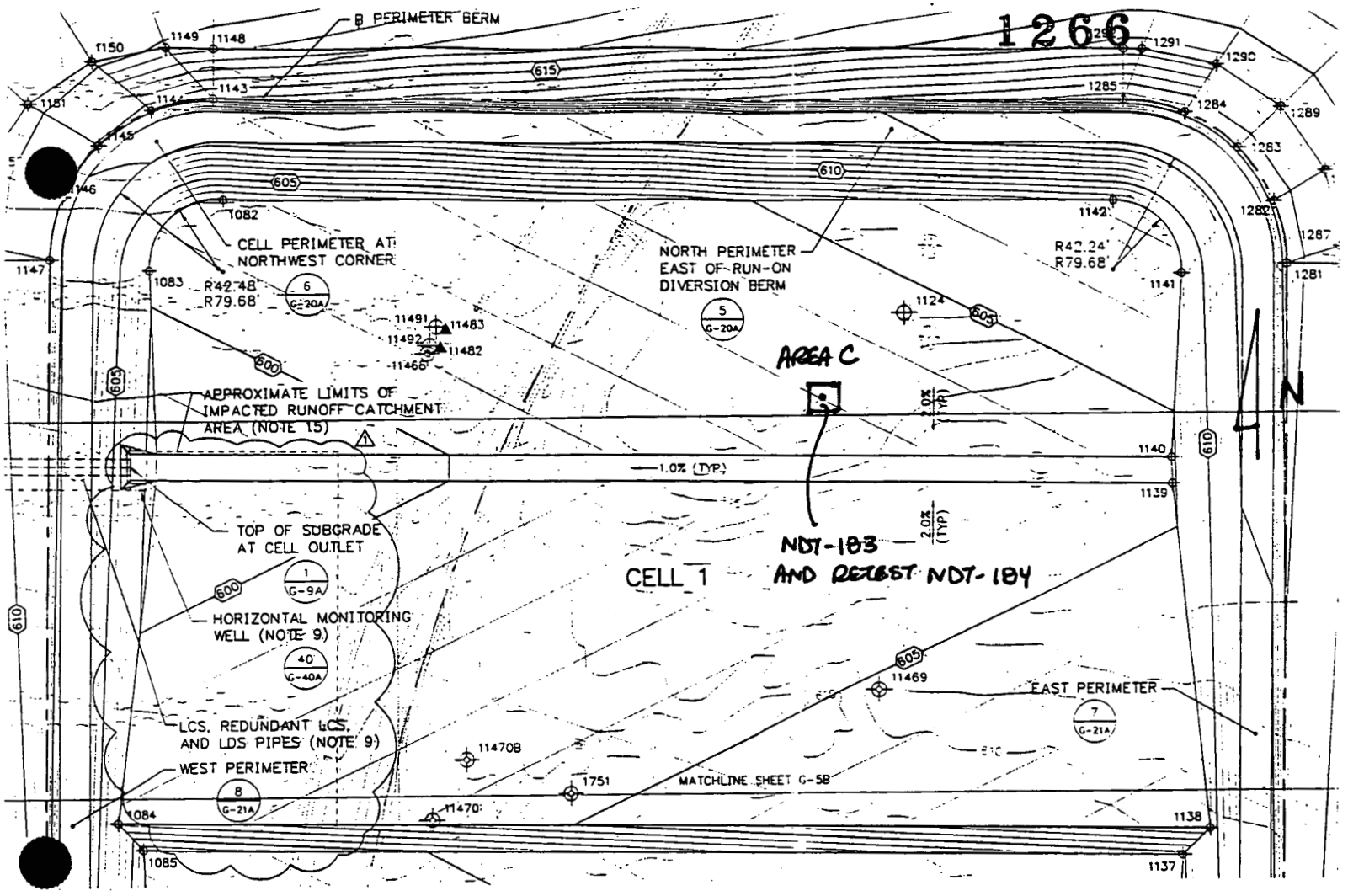

13. ROAD PAVEMENT COURSES FOR EXISTING NORTH ENTRANCE ROAD SHALL BE REMOVED AND STOCKPILED SEPARATELY IN THE SUBCONTRACTOR WORK AREA IN ACCORDANCE WITH SPECIFICATION SECTION 02110.

FRIDAY 01 AUG 97

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: O.S.D.F. - PHASE ONE DATE: 01 day 8 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: 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
185	See Attached Dwg.	8" / 1	OSDF-02	15.0	113.0	12.4	123.2	109.6	97.0	P		—	—	—
186	↓	↓	↓	↓	↓	15.3	127.0	110.1	97.5	P		—	—	—
187		↓				12.6	128.1	114.7	101.5	P		—	—	—
188		/ 2				13.3	128.7	113.6	100.5	P		—	—	—
189		↓				14.4	130.9	114.5	101.3	P		—	—	—
190		/ ↓	↓	↓	↓	15.6	124.7	107.9	95.5	P		—	—	—
191		/ 3	OSDF-05	13.8	118.0	13.9	132.8	116.6	98.9	P		—	—	—
192		↓	↓	↓	↓	14.8	131.7	114.8	97.3	P		—	—	—
193		↓				15.4	130.0	112.6	95.5	P		—	—	—
194	↓	↓ / 4	↓	↓	↓	12.0	133.0	118.8	100.7	P		—	—	—

COMMENTS:

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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: O.S.D.F. - PHASE ONE DATE: 01 day 8 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
195	SEE ATTACHED DWG	8" / 4	O.S.D.E-05	13.8	118.0	14.6	131.3	114.6	97.1	P		—	—	—
196	↓	↓ / 5	↓	↓	↓	15.1	131.8	114.5	97.0	P		—	—	—

COMMENTS:

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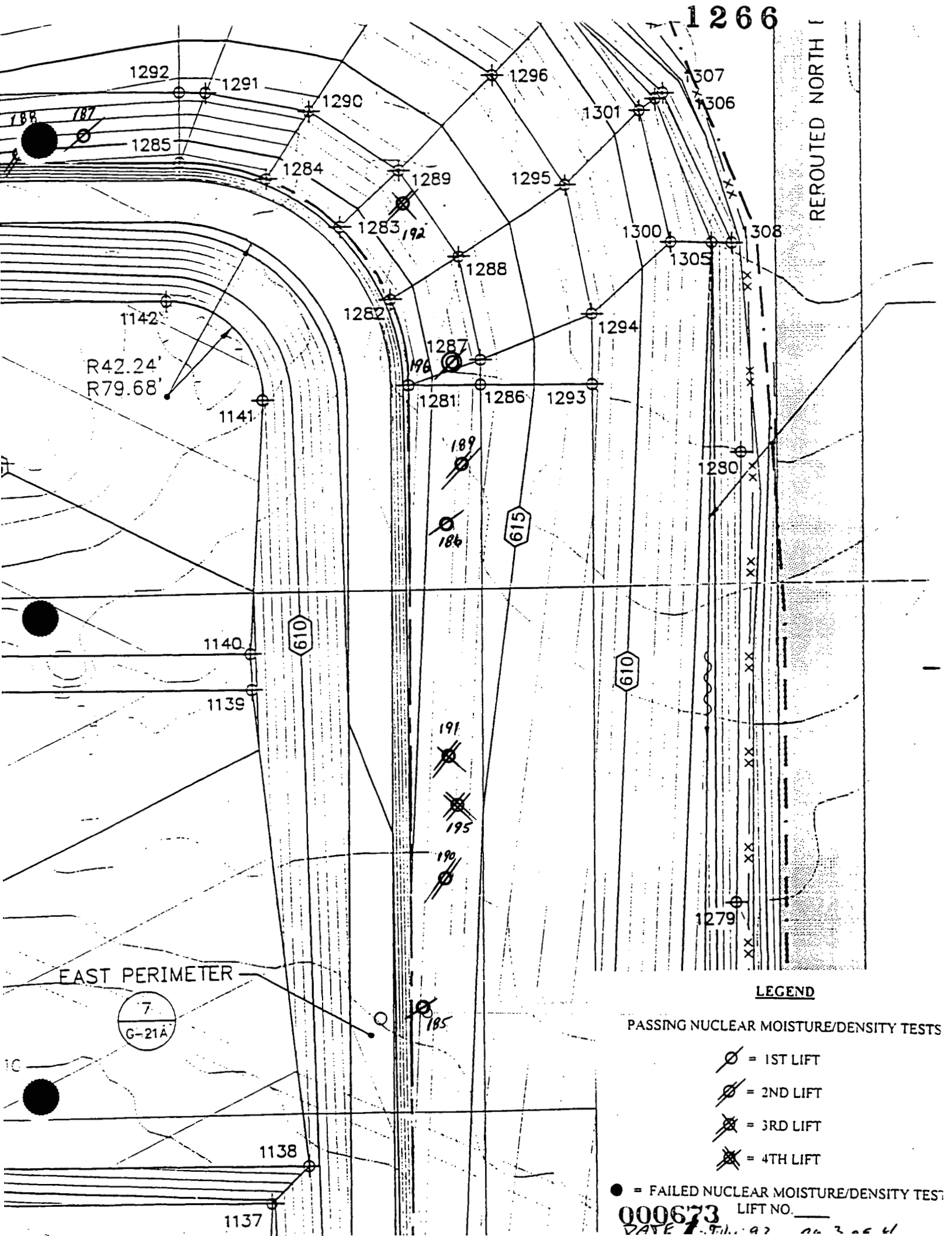
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615
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EAST PERIMETER
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LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TEST
LIFT NO.

610

610

℄ PERIMETER BERM

615

1299

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193

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PERIMETER AT

H

NORTH PERIMETER
EAST OF RUN-ON
DIVERSION BERM

5
G-20A

R42.24'
R79.68'

1124

605

2.0%
(TYP)

1.0% (TYP)

114

113

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

= 1ST LIFT

= 2ND LIFT

= 3RD LIFT

= 4TH LIFT

= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO._____

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Date 4 Jul 97 pg 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: O.S.D.F. - PHASE ONE

DATE: 02 day 8 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE / COMPACTED): 12"

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
197	Cell #1 floor, soft area. See attached drawing.	8" / Bridge Lift	O.S.D.F. 08	11.5	123.0	9.1	116.9	127.5	95.0	P		—	—	—

COMMENTS:

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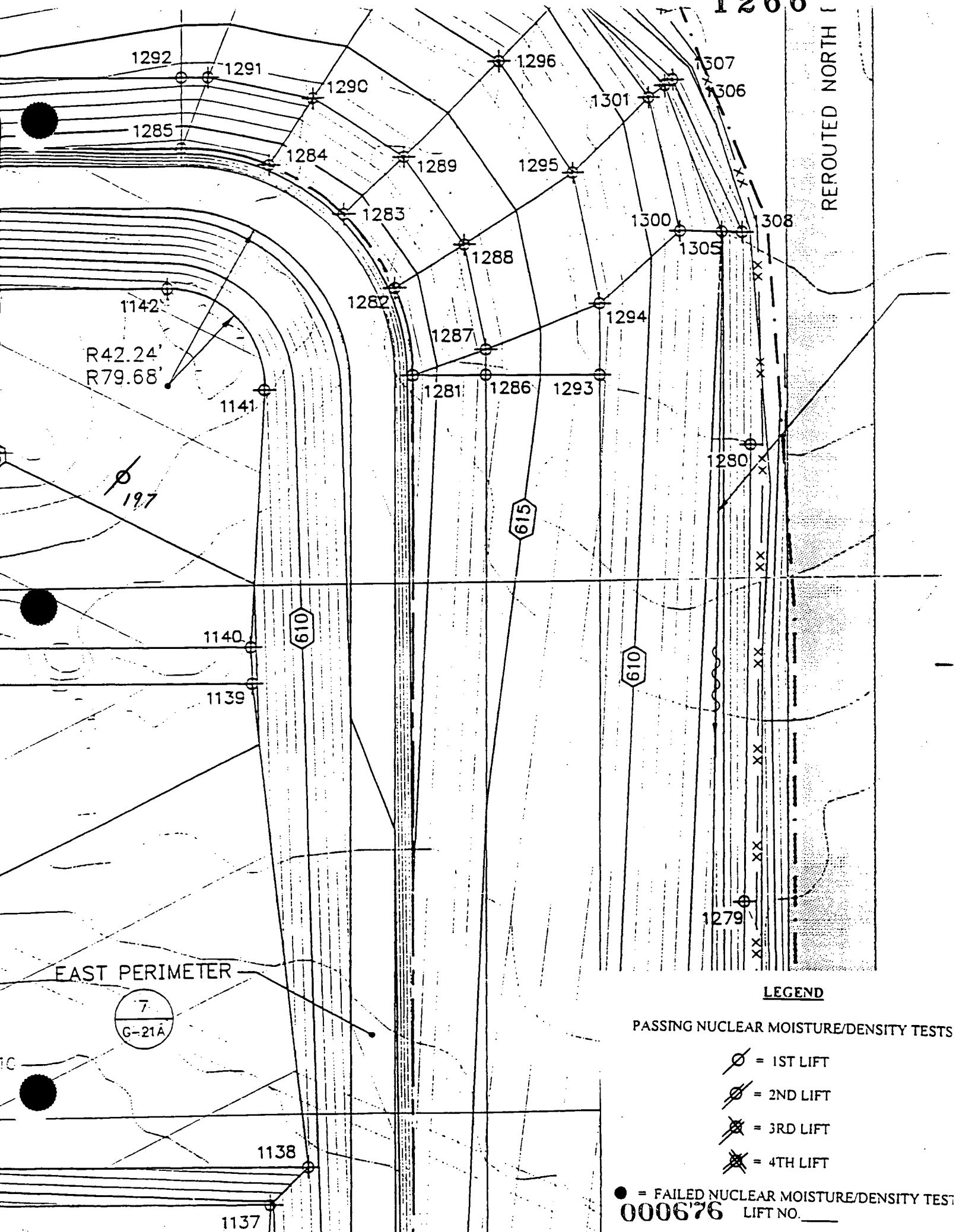
REROUTED NORTH
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1279
1142
R42.24'
R79.68'
1141
19.7
615
610
610
1140
1139
EAST PERIMETER
7
G-21A
1138
1137
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TEST
LIFT NO.

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 AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED) 6"

% COMPACTION: > 95% MOISTURE RANGE: ± 3% 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.	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
198	SEE ATTACHED MAP	6" / 1	OSDF-10	13.8	119.7	13.1	132.9	117.5	98.2	P		—	—	—
199	↓	6" / 2	↓	13.8	119.7	12.8	135.3	119.9	100	P		—	—	—
200	↓	6" / 3	↓	13.8	119.7	13.2	134.5	118.8	99.3	P		—	—	—
201	↓	6" / 4	LP-03	11.8	124.0	10.8	140.1	126.4	102	P		—	—	—
202	↓	6" / 5	LP-23	~~17.6~~ 17.5	~~110.8~~ 110.0 @ 8/4/97	19.3	128.6	107.8	97.8	P		—	—	—
203	↓	6" / 6	LP-03	~~13.8~~ 14.8 @ 8/4/97	~~119.7~~ 124.9	11.9	137.2	122.7	98.9	P		—	—	—
204	↓	6" / TOP	OSDF-02	15.0	113.0	17.4	128.6	109.5	97.0	P		—	—	—
205	↓	6" / 1 *	LP-36	18.0	108.2	20.6	124.4	103.1	95.0	P		—	—	—
206	↓	6" / TOP	OSDF-10	13.8	119.7	13.2	131.7	116.4	97.3	P		—	—	—
207	↓	6" / TOP	↓	13.8	119.7	16.6	128.5	110.2	92.1		F	222	P	—

COMMENTS:

* LIFT CUT DOWN 1' FOR 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 I CONSTRUCTION

DATE: 04 day AUG month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: ON-SITE BORROW MATERIAL TYPE: (CIRCLE ONE) FILL / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 6"

% COMPACTION: > 95% MOISTURE RANGE: ± 3% 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			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
208	SEE ATTACHED MAP	6"/TOP	OSDF-10	13.8	119.7	14.3	129.6	113.4	95	P		—	—	—

COMMENTS:

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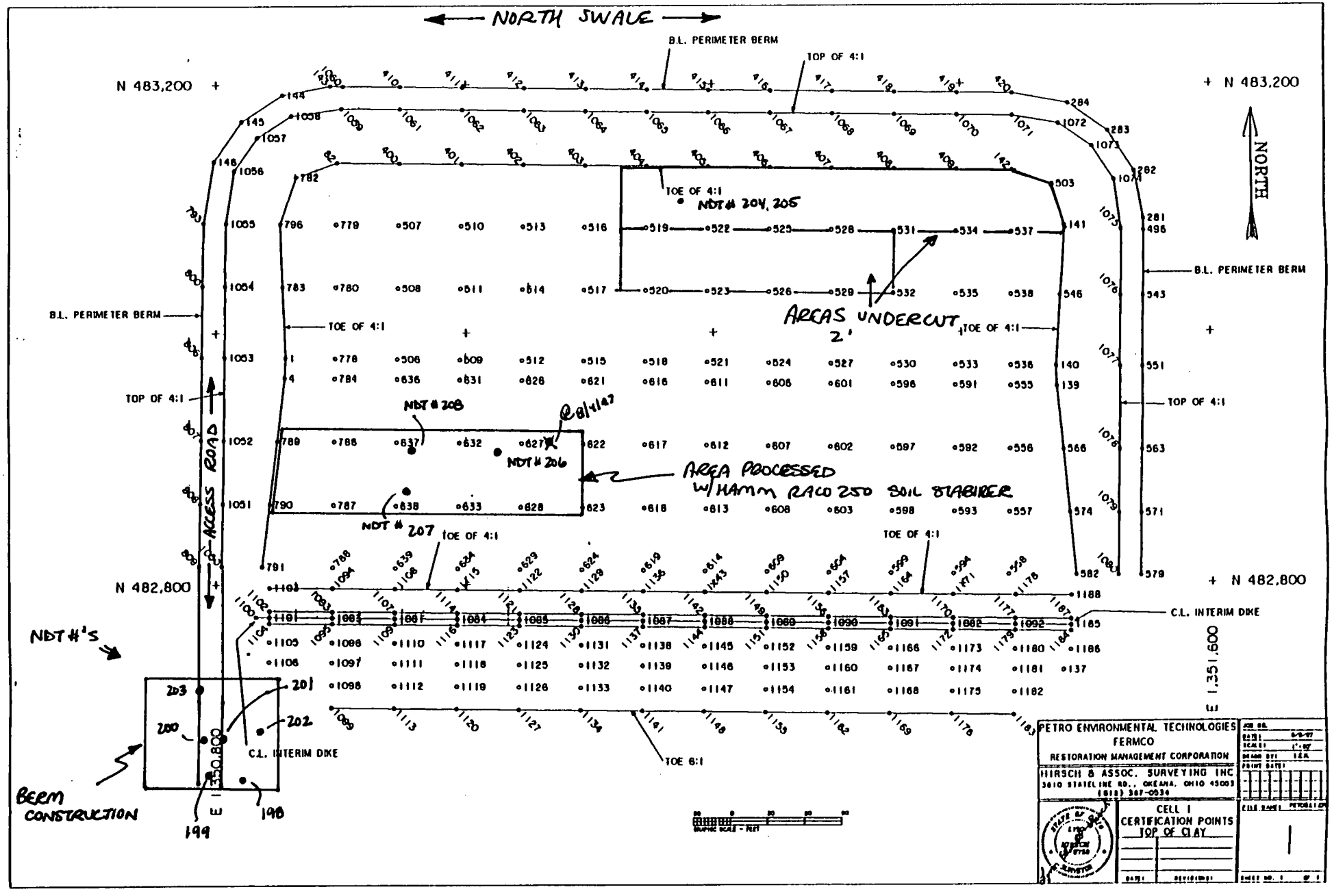

MONDAY 07 AUG 1997 9:26
000679 SHEET 7 OF 7
3 OF 3

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: O.S.D.F. PHASE ONE DATE: 05 day 08 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
209	SEE Attached dwg	8"/ 1	O.S.D.F. 05	13.8	118.0	14.1	132.7	116.4	98.6	P		—	—	—
210	↓	↓ / 2	↓	↓	↓	12.1	130.8	116.7	98.9	P		—	—	—
211	↓	↓ / 3	↓	↓	↓	11.6	128.4	~~114.8~~ 115.1 BE	97.5	P		—	—	—
212	↓	↓ / 4	↓	↓	↓	10.8	127.2	114.8	97.3	P		—	—	—

COMMENTS:

GEOSYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: HJM SHEET NO. 1 OF 2

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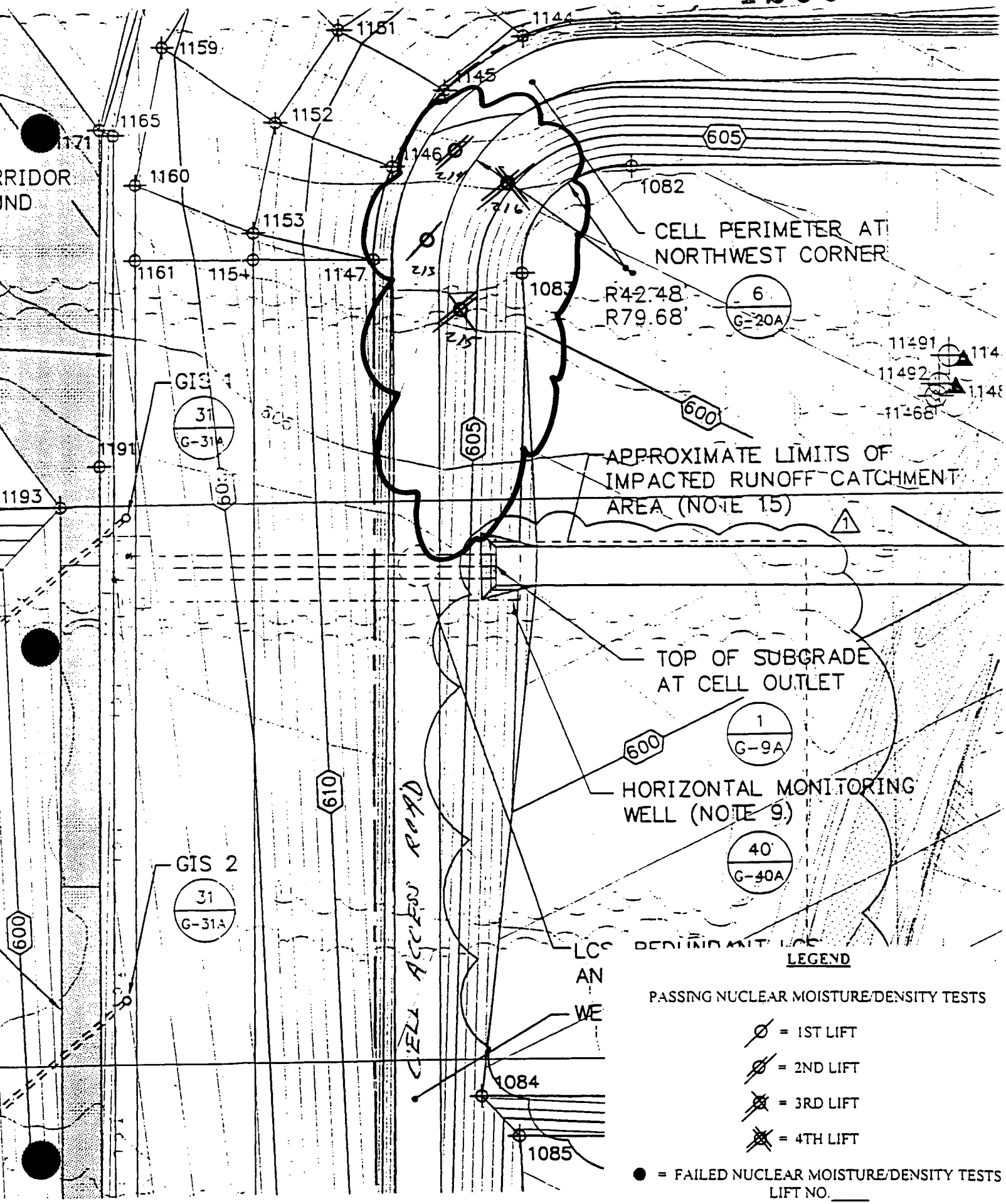

13. ROAD PAVEME
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14. LIMIT OF RAII

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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: O.S.D.F. - PHASE ONE DATE: 06 day 08 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
213	See Attached dwg	8" / 1	O.S.D.F.-05	13.8	118.0	11.5	125.8	112.8	95.6	P		—	—	—
214	↓	↓	↓	↓	↓	12.3	130.6	116.3	98.9	P		—	—	—
215	↓	/ 2	↓	↓	↓	13.9	129.3	113.5	96.2	P		—	—	—
216	↓	↓	↓	↓	↓	11.6	125.5	112.5	95.3	P		—	—	—

COMMENTS:

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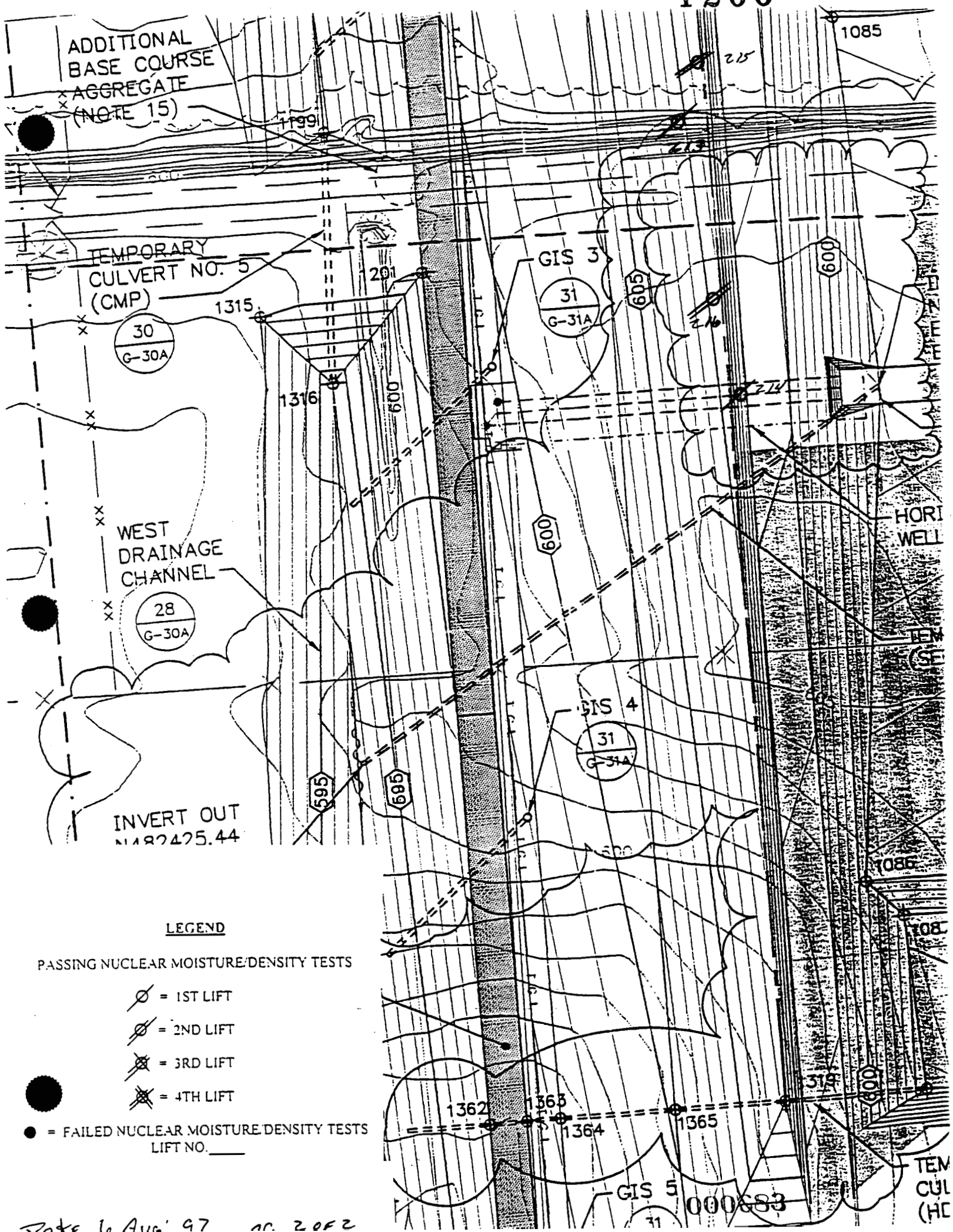

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

= 1ST LIFT

= 2ND LIFT

= 3RD LIFT

= 4TH LIFT

● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO._____

Date 16 Aug 97 AC 3862

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: O.S.D.F. PHASE ONE DATE: 07 day 08 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: DE

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
217	See Attached dwg	8"/ 1	O.S.D.F.-05	13.8	118.0	15.3	130.9	113.5	96.2	P		—	—	—
218	↓	↓ ↓	↓	↓	↓	15.6	132.0	114.2	96.8	P		—	—	—
219	↓	↓ / 2	↓	↓	↓	14.8	138.6	117.6	99.7	P		—	—	—

COMMENTS:

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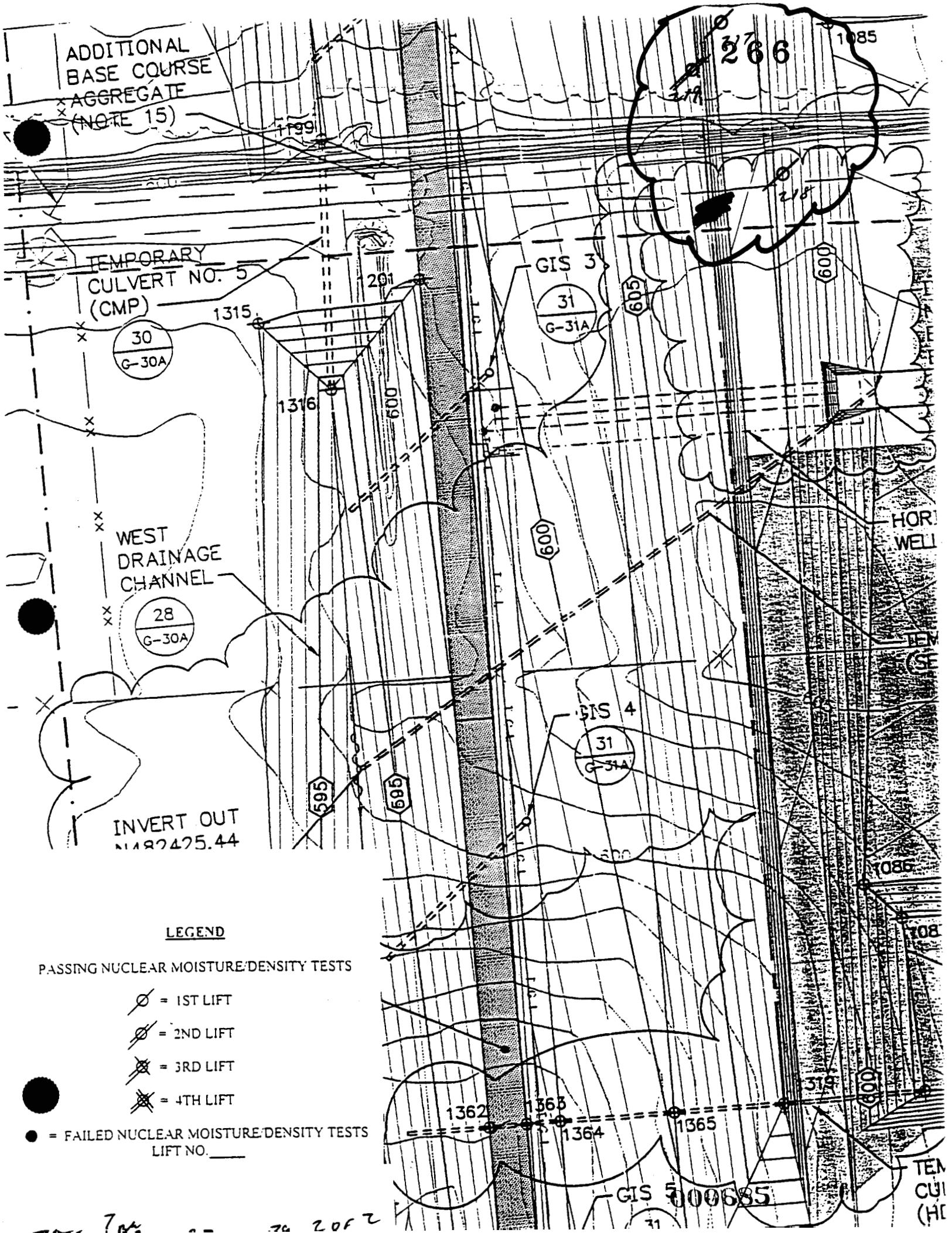

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

Ø = 1ST LIFT

Ø = 2ND LIFT

Ø = 3RD LIFT

Ø = 4TH LIFT

● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO._____

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: O.S.D.F. PHASE ONE DATE: 08 day 08 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: DL

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
220	SEE ATTACHED DWG	8" / 1	O.S.D.F. 05	13.8	118.0	13.8	130.5	114.6	97.1	P		—	—	—
221	↓	↓ ↓	↓	↓	↓	14.2	133.4	116.8	99.0	P		—	—	—

COMMENTS:

GEO SYNTEC CONSULTANTS FILE NO.: 2-20-FNM CHECKED BY: [illegible] SHEET NO. 1 OF 2

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ADDITIONAL BASE COURSE AGGREGATE (NOTE 15)

TEMPORARY CULVERT NO. 5 (CMP)

30 / G-30A

28 / G-30A

WEST DRAINAGE CHANNEL

INVERT OUT

GIS 3

31 / G-31A

GIS 4

31 / G-31A

GIS 5

31

1085

1199

201

1315

1316

600

605

595

220

2210

1086

1319

1362

1363

1364

1365

HORI WELL

TEM (SE

TEM CUL (HD

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

= 1ST LIFT

= 2ND LIFT

= 3RD LIFT

= 4TH LIFT

= FAILED NUCLEAR MOISTURE/DENSITY TESTS LIFT NO._____

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: FILL / (SUBGRADE) / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/(COMPACTED)): 6"

% COMPACTION: > 95% 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: — 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
222	RETEST FOR # 207 SEE ATTACHED MAP	6" / TOP	OSDF-8	11.5	123.0	9.7	133.4	121.6	98.8	P		—	—	—
223		6" / TOP	OSDF-8	11.5	123.0	12.0	133.6	119.3	97.0	P		—	—	—
224		6" / TOP	OSDF-10	13.8	119.7	14.1	131.0	114.8	95.9	P		—	—	—
225		6" / TOP	OSDF-10	13.8	119.7	15.9	127.0	109.6	91.0		F	226	—	F
226	RETEST	6" / TOP	OSDF-10	13.8	119.7	14.5	128.6	112.3	93.8		F	227	P	—
227	RETEST	6" / TOP	OSDF-10	13.8	119.7	13.1	133.2	117.7	98.3	P		—		
~~228~~ 8/14/97														

COMMENTS: SUBGRADE REPAIR AREAS — LANE NO. 6

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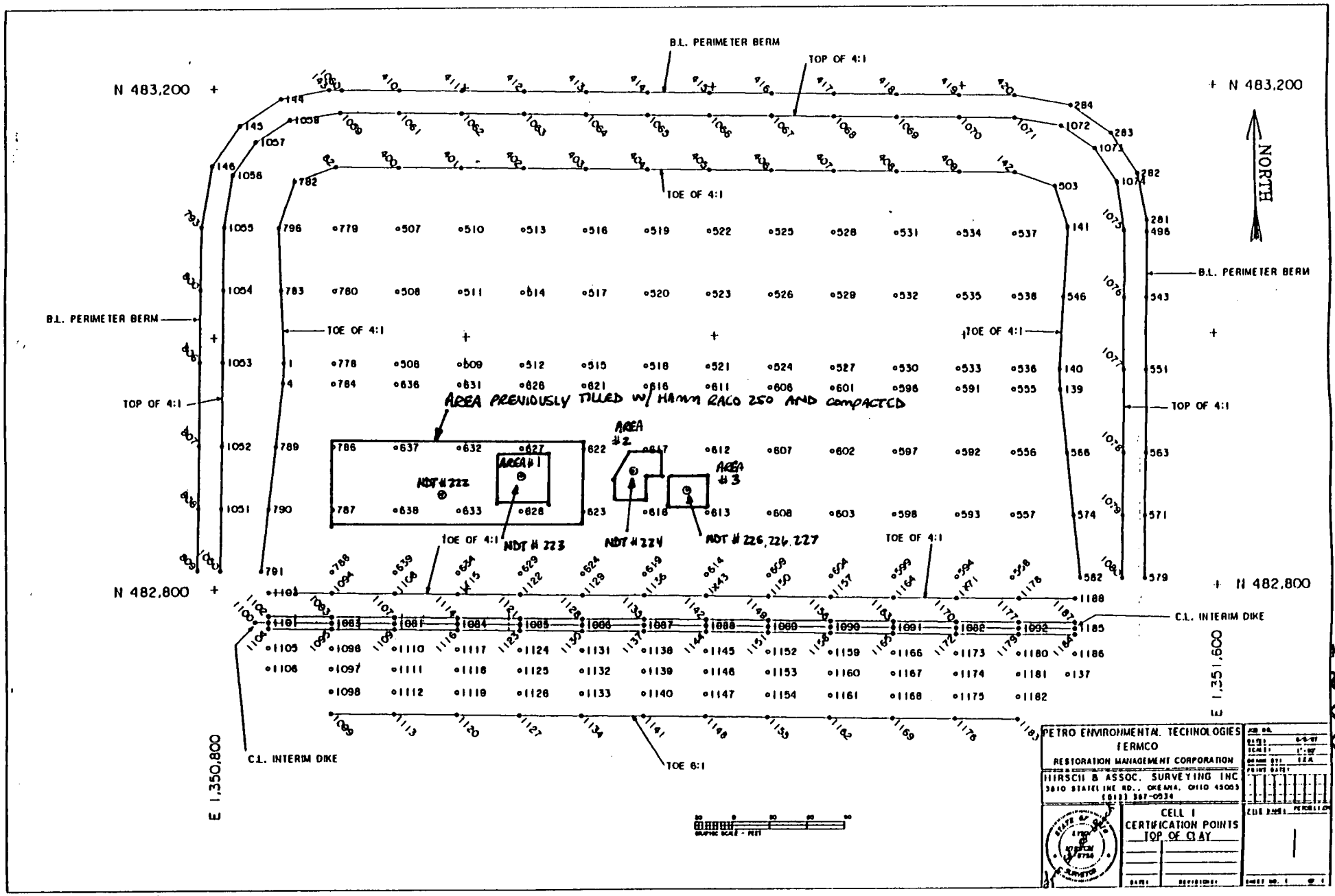

MONDAY AUG 11 1997

12 of 66

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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: O.S.D.F. - PHASE ONE DATE: 21 day 08 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
228	See Attached dwg.	8" / 1	OSDF-15	19.5	107.0	17.6	121.1	103.0	96.3	P		—	—	—
229	↓	/ 2	↓	↓	↓	18.4	125.6	106.1	99.2	P		—	—	—
230	↓	/ 3	↓	↓	↓	21.3	123.8	102.1	95.4	P		—	—	—
231	↓	↓	↓	↓	↓	20.5	125.3	104.0	97.2	P		—	—	—
232	↓	/ 4	↓	↓	↓	19.3	125.3	105.0	98.1	P		—	—	—
233	↓	↓	↓	↓	↓	20.0	125.7	104.8	97.9	P		—	—	—

COMMENTS:

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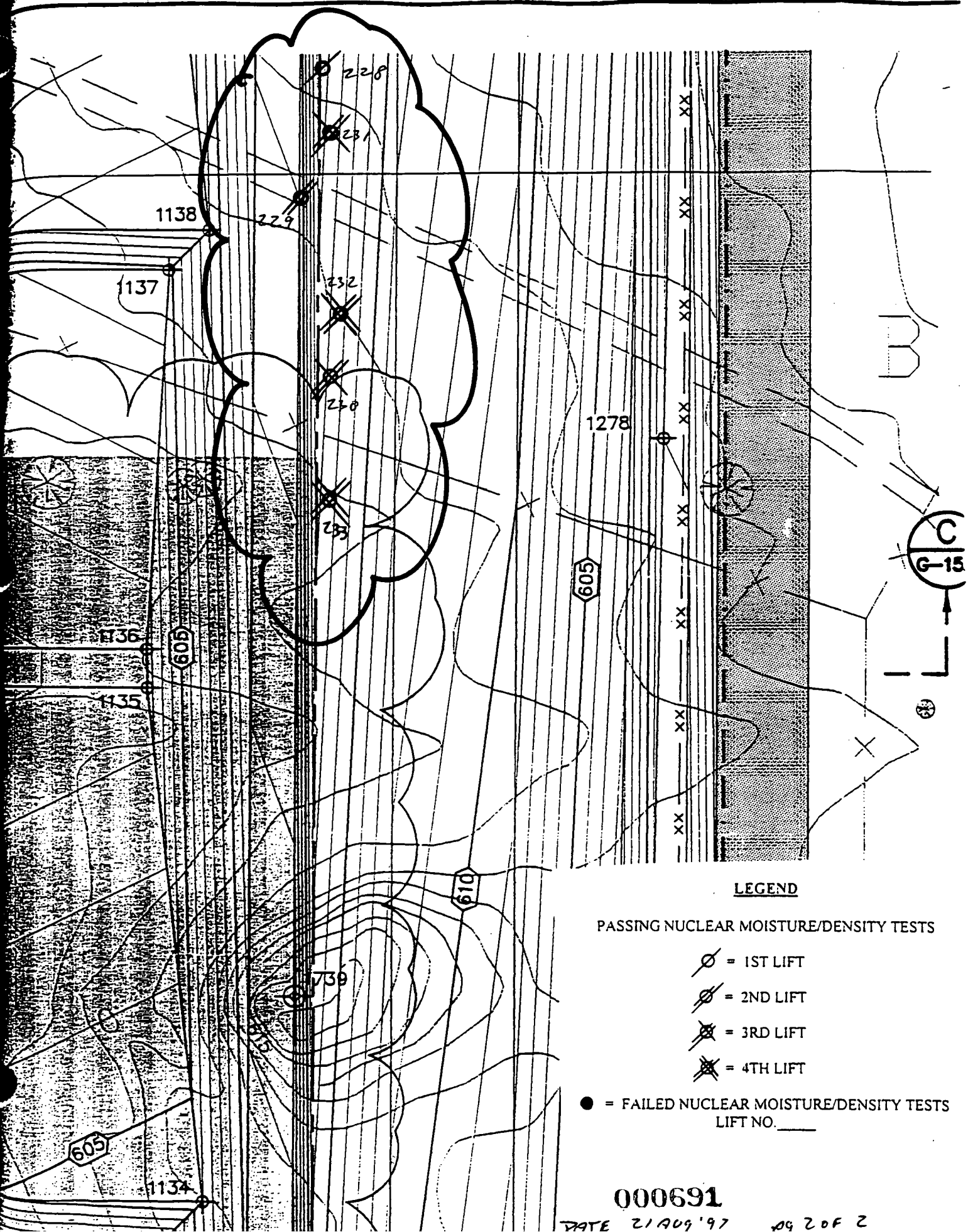

DATE 21 AUG '97 PG 2 OF 2

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: O.S.D.F. - PHASE ONE DATE: 22 day 08 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: n/a QA ID: BE

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
234	SEE Attached dwg	8" / 1	OSDF-15	19.5	107.0	20.6	124.1	102.9	96.2	P		—	—	—
235	↓	↓	↓	↓	↓	18.3	125.1	105.7	98.8	P		—	—	—
236	↓	/ 2	↓	↓	↓	21.0	123.8	102.3	95.6	P		—	—	—
237	↓	↓	↓	↓	↓	21.7	124.8	106.6	95.9	P		—	—	—
238	↓	/ 3	↓	↓	↓	20.6	124.1	102.9	96.2	P		—	—	—
239	↓	↓	↓	↓	↓	21.4	123.5	101.8	95.1	P		—	—	—
240	↓	/ 4	↓	↓	↓	22.1	124.5	102.0	95.3	P		—	—	—
241	↓	↓	↓	↓	↓	23.7	123.0	99.4	92.9		F	242	P	
242	↓	↓	↓	↓	↓	21.2	123.8	102.2	95.5	P		—	—	—
243	↓	/ 5	↓	↓	↓	20.9	124.2	102.7	96.0	P		—	—	—

COMMENTS:

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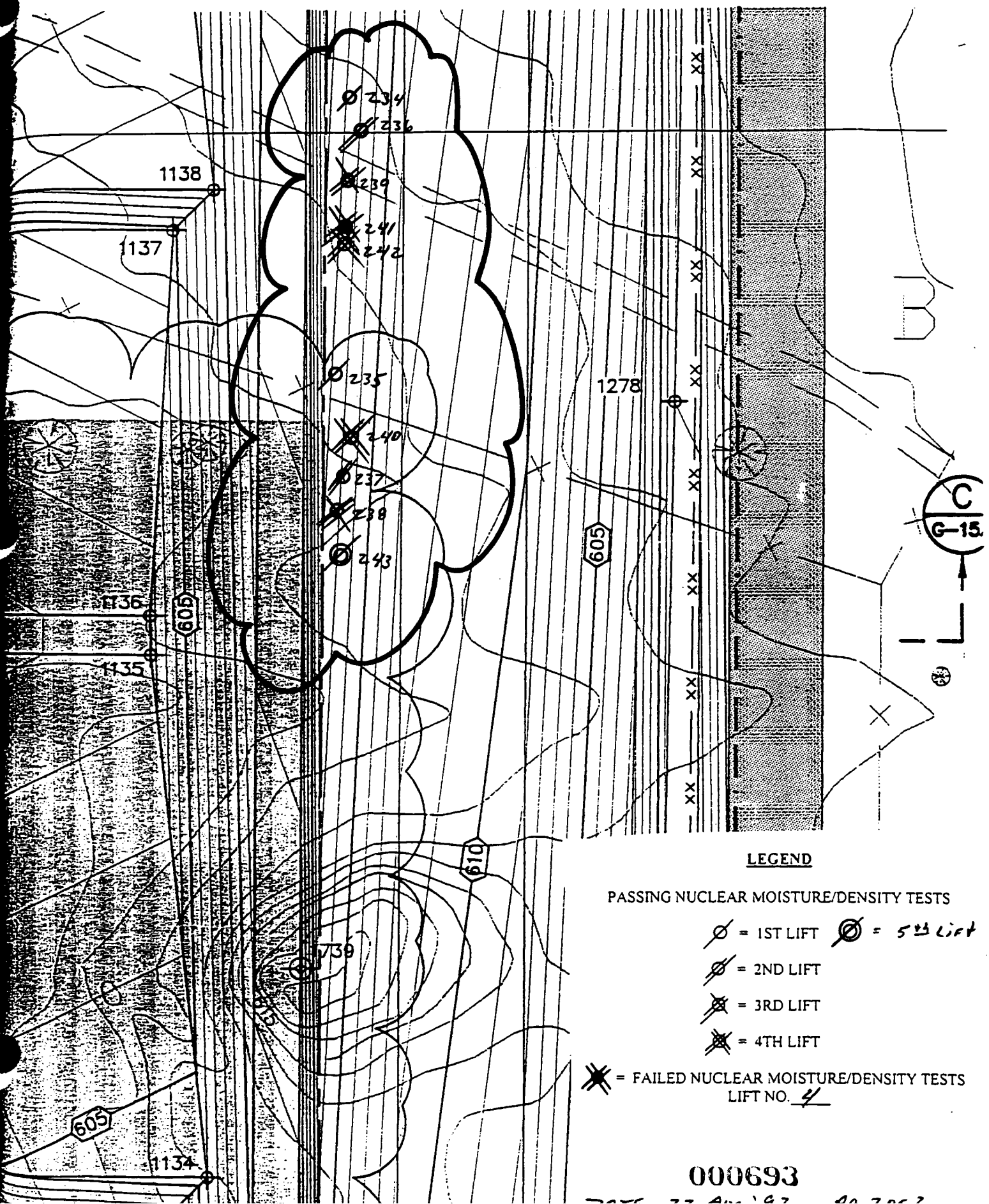
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240
237
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739
C
G-15
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 5th Lift
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO. 4

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: O.S.D.F.- PHASE ONE DATE: 23 day 08 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
244	See Attached dwg.	8"/ 1	OSDF-15	19.5	107.0	19.2	123.5	103.6	96.8	P		—	—	—
245						20.0	124.9	104.1	97.3	P		—	—	—
246		/ 2				23.3	122.3	99.2	92.7		F	247	P	—
247						20.0	123.1	102.6	95.9	P		—	—	—
248		/ 3				17.7	128.8	109.4	102.2	P		—	—	—
249	*	12"/ 1	LP-7	13.4	120.0	11.8	136.1	121.7	101.4	P		—	—	—
250	*					12.2	131.2	116.9	97.4	P		—	—	—
251	*					13.3	135.7	119.8	99.8	P		—	—	—
252	*					11.6	134.3	120.3	100.3	P		—	—	—
253	*					12.8	128.9	114.3	95.3	P		—	—	—

COMMENTS: * Bridge lift placed in cell floor subgrade to backfill undercut soft areas.

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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 ONE DATE: 23 day 08 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: 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
254	* See Attached dwg.	12" / 1	CP-7	13.4	120.0	11.8	134.0	119.9	99.9	P		—	—	—
255	*	↓	↓	↓	↓	11.5	129.2	115.9	96.6	P		—	—	—
256	*	↓	↓	↓	↓	11.9	137.6	123.0	102.5	P		—	—	—
257		8" / 1	OSDF-15	19.5	107.0	17.2	119.5	102.0	95.3	P		—	—	—
258		↓	↓	↓	↓	20.2	130.7	108.7	101.6	P		—	—	—
259		/ 2	↓	↓	↓	19.8	126.7	105.8	98.9	P		—	—	—
260		↓	↓	↓	↓	21.1	125.1	103.3	96.5	P		—	—	—
261		/ 3	↓	↓	↓	19.3	126.9	106.4	99.4	P		—	—	—
262		↓	↓	↓	↓	18.7	121.9	102.7	96.0	P		—	—	—
263	↓	↓ / 4	↓	↓	↓	20.6	126.6	105.0	98.1	P		—	—	—

COMMENTS: * = Bridge lift placed in cell floor subgrade to backfill undercut soft AREA's

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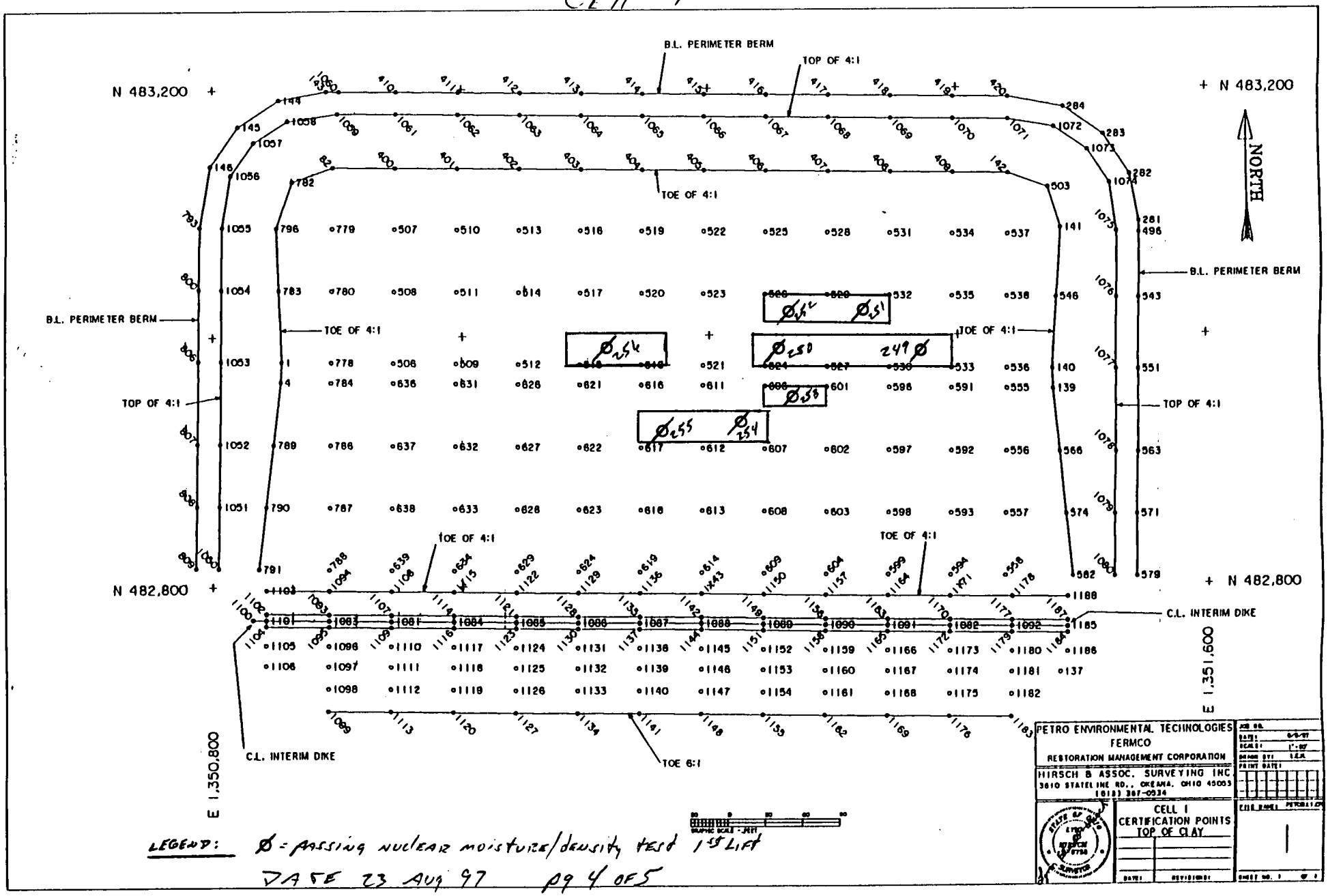

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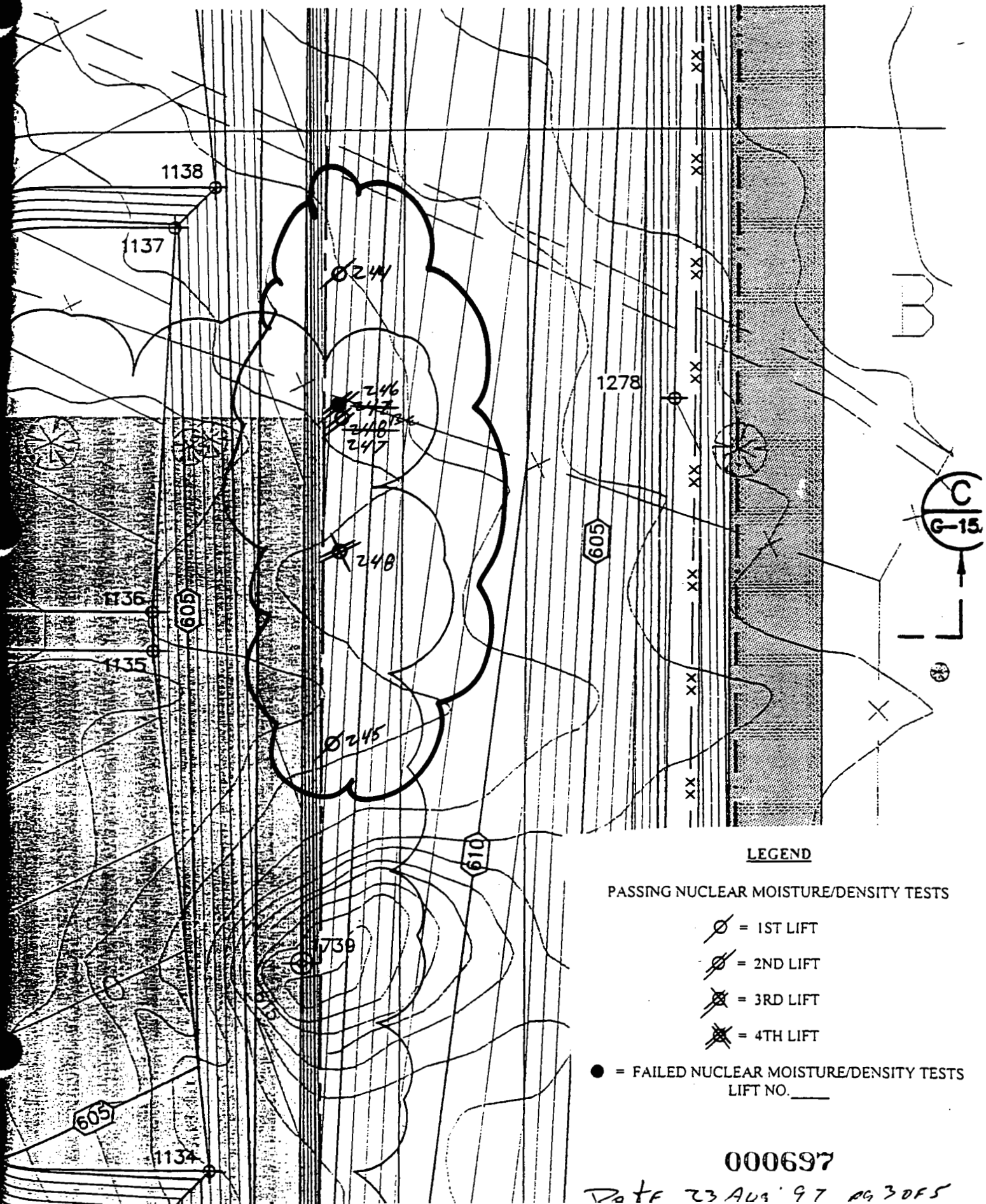
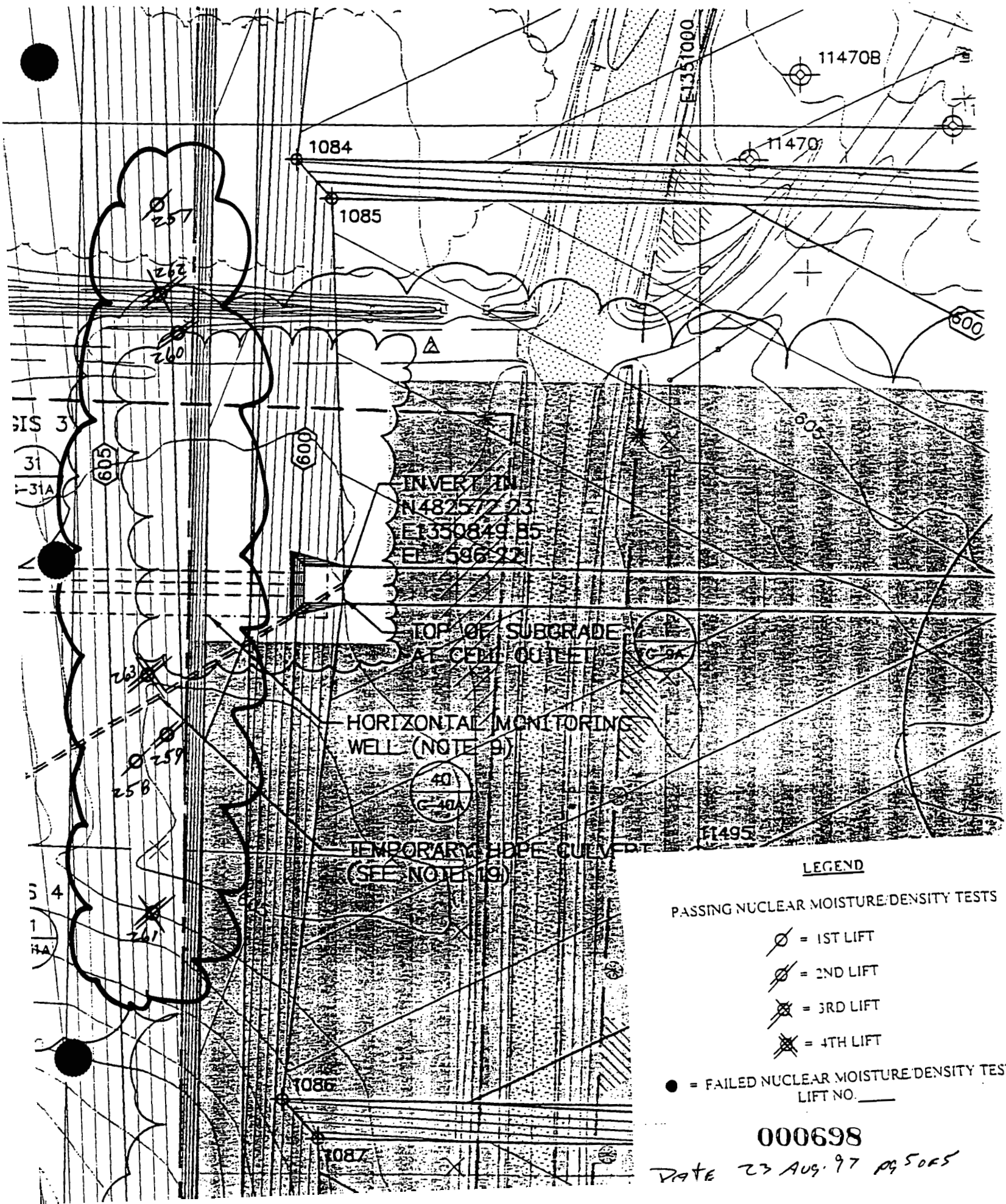


Date 23 Aug 97 pg 3 of 5



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Date 23 Aug. 97 pg 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: OSDF - Phase One DATE: 25 day 08 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: N/A QA ID: BE

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
264	See Attached dwg.	8" / 1	OSDF - 15	19.5	107.0	19.7	124.2	103.8	97.0	P		—	—	—
265	↓	↓	↓	↓	↓	18.2	126.3	106.8	99.9	P		—	—	—
266	↓	/ 2	↓	↓	↓	18.6	129.5	109.2	102.1	P		—	—	—
267	↓	↓	↓	↓	↓	17.5	126.5	107.7	100.6	P		—	—	—
268	↓	/ 3	OSDF - 6	15.1	116.0	16.5	130.2	111.8	96.3	P		—	—	—
269	↓	/ 4	↓	↓	↓	17.5	129.9	110.6	95.3	P		—	—	—
270	↓	↓	↓	↓	↓	13.9	125.9	110.5	95.3	P		—	—	—
271	↓	/ 5	↓	↓	↓	12.9	137.6	121.8	105.1	P		—	—	—
272	↓	↓	↓	↓	↓	16.6	132.4	113.6 ~~113.7~~	97.9 ~~97.1~~	P		—	—	—

COMMENTS:

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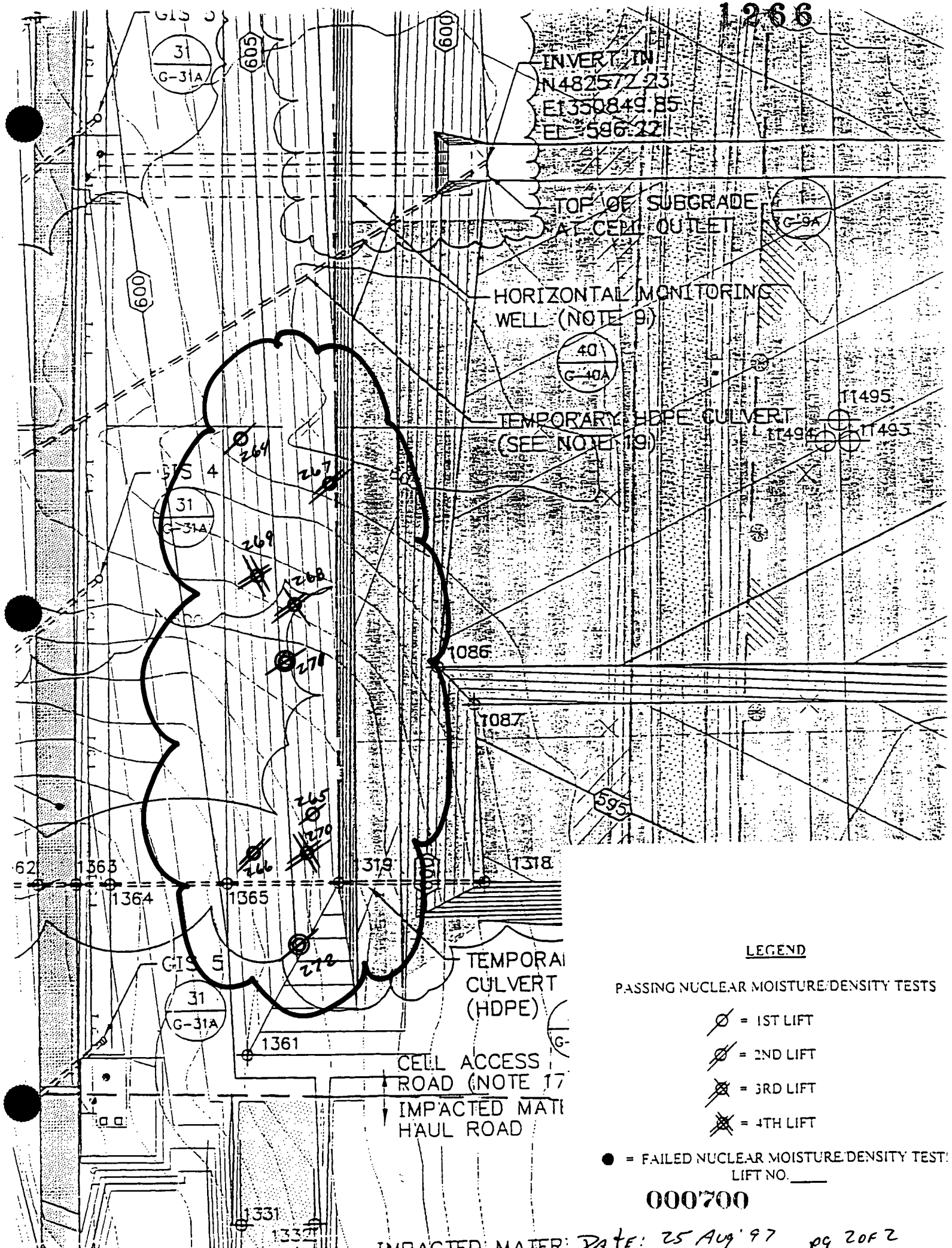

IMPACTED MATER Date: 25 Aug '97 pg 2 of 2

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: OSDF-PHASE ONE DATE: 26 day 08 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: ~~[illegible]~~ 0 14/11/97 QA ID: BE

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
273	See Attached dwg.	8" / 1	OSDF-6	15.1	116.0	16.6	130.3	111.7	96.3	P		—	—	—
274	↓	↓	↓	↓	↓	17.2	130.0	110.9	95.6	P		—	—	—
275	↓	/ 2	↓	↓	↓	16.1	131.2	113.0	97.4	P		—	—	—
276	↓	/ 3	↓	↓	↓	15.9	136.3	117.6	101.4	P		—	—	—
277	↓	↓	↓	↓	↓	16.8	129.8	111.1	95.8	P		—	—	—
278	↓	/ 4	↓	↓	↓	17.0	130.4	111.5	96.1	P		—	—	—
279	↓	/ 5	↓	↓	↓	15.5	133.0	115.2	99.3	P		—	—	—

COMMENTS: ~~0~~ MOISTURE CORRELATION

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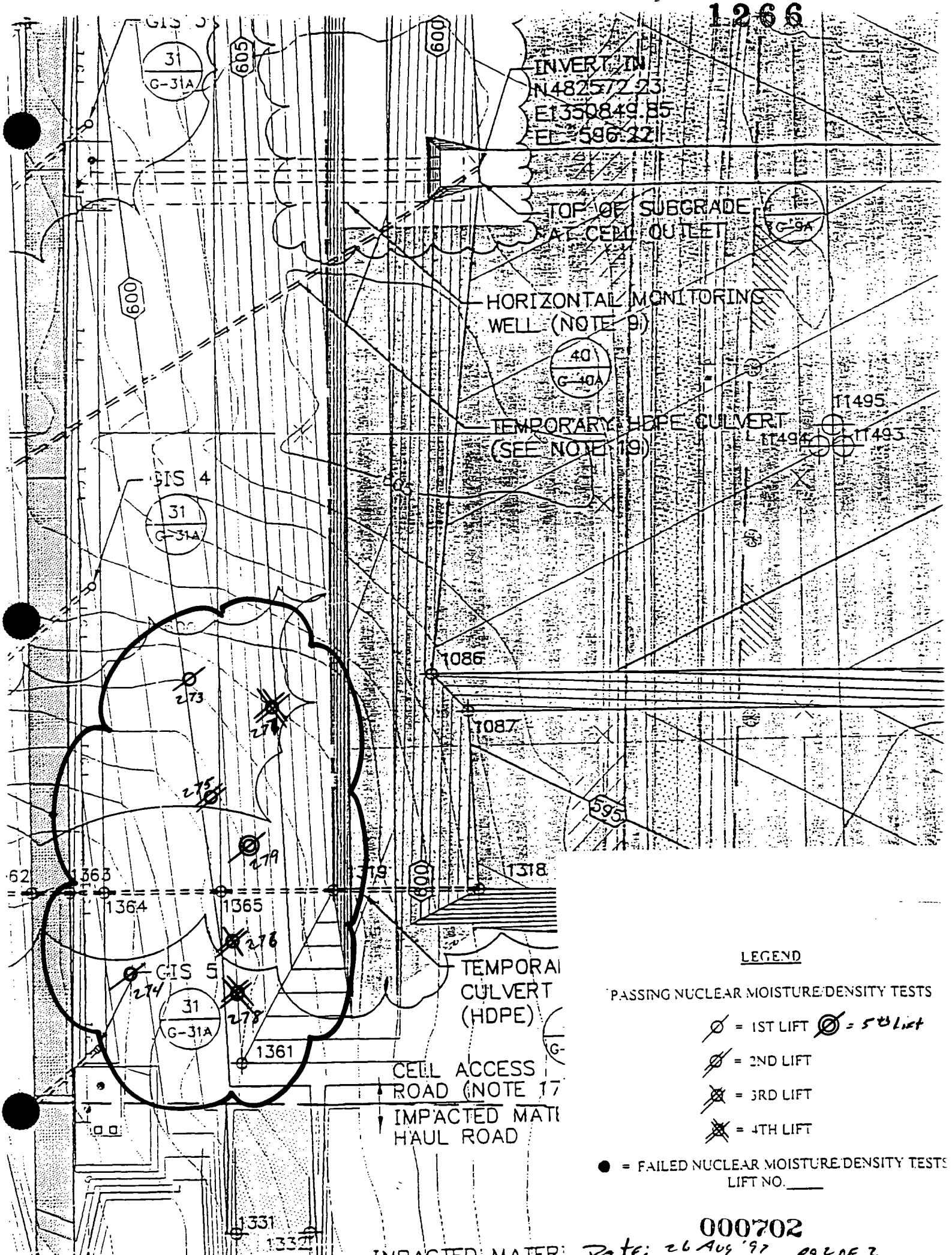

IMPACTED MATER Date: 26 Aug '97 PAGE 3

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: OSDF PHASE ONE DATE: 04 day 09 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: Clay stockpile #4 MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): 12"/6"
(CIRCLE ONE)

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORRECTION GRAPH QA ID: BG

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
280	See Attached dwg.	12" / 1	LP-19	14.0	119.5	15.1	132.5	115.1	96.3	P		—	—	—
281	↓	↓ ↓	↓	↓	↓	15.1	134.9	117.2	98.1	P		—	—	—
282						16.7	136.8	117.2	98.1	P		—	—	—

COMMENTS:

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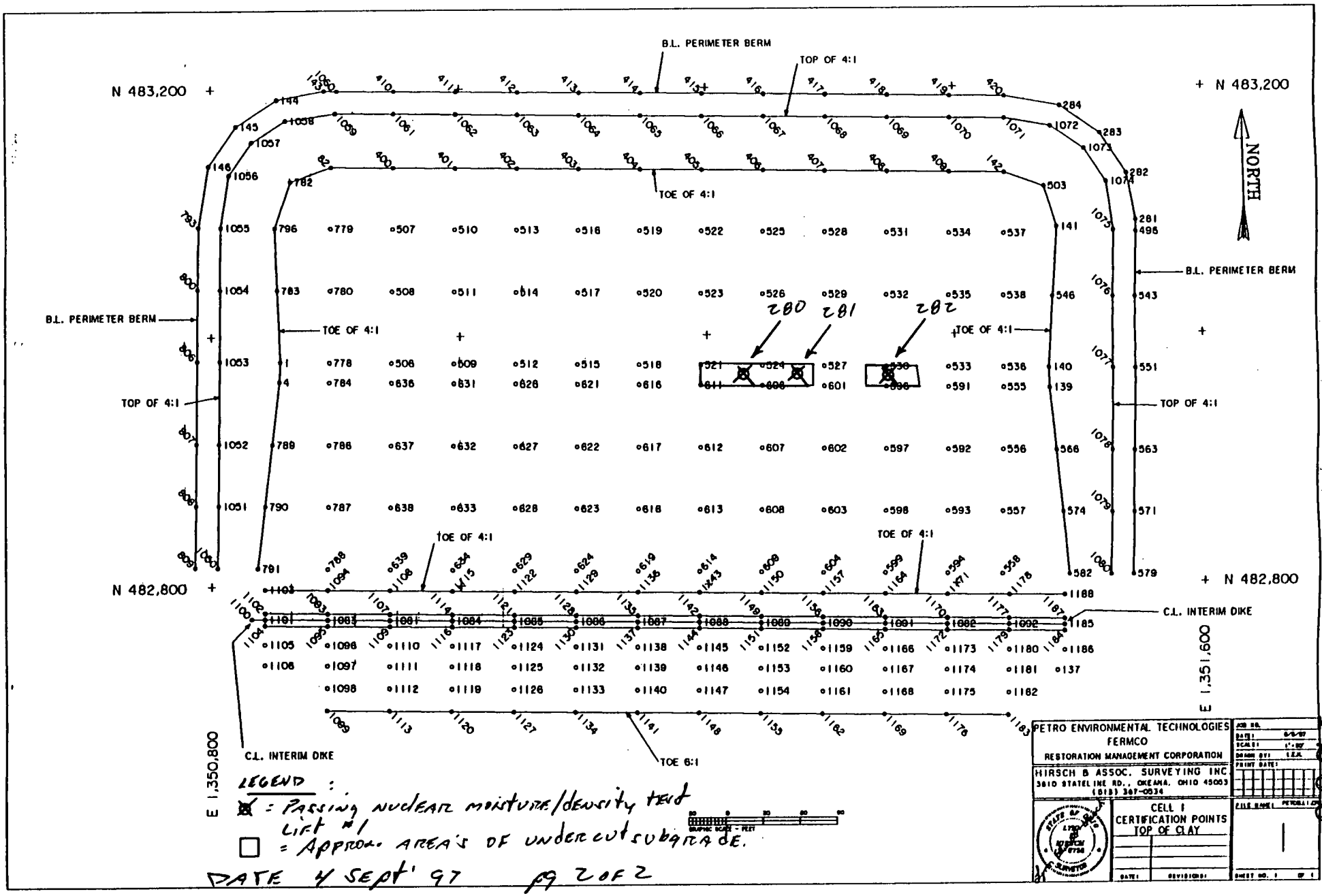

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GEOSYNTEC CONSULTANTS

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 ONE DATE: 18 day 09 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: MOISTURE CORR GRAPH QA ID: BE/S.A

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
283	WEST PERIMETER BERM (SEE ATTACHED dwg)	6" / 4	LP-12	15.2	116.5	16.5	132.8	114.0	97.8	P		—	—	—

COMMENTS:

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000205

1266

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

= 1ST LIFT

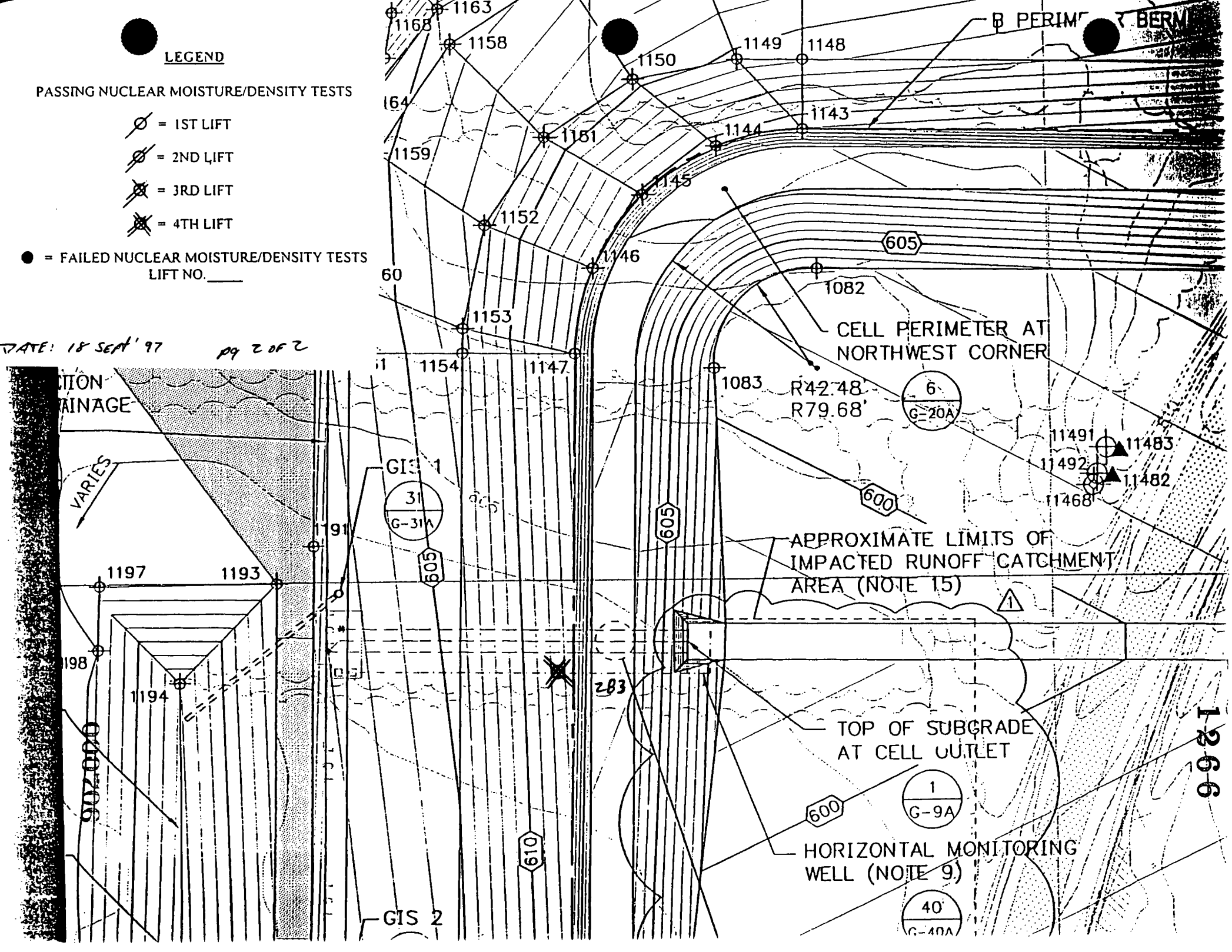
= 2ND LIFT

= 3RD LIFT

= 4TH LIFT

● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____

DATE: 18 SEPT '97 pg 2 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: OSDF- PHASE ONE DATE: 19 day 09 month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: On site borrow MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ 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: 3440/3430 NUCLEAR GAUGE SERIAL NO. 20979/27418 COR. FACTOR: moisture correlation QA ID: SQ/BE

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
284	WEST PERIMITER BERM	6" / 1	OSDF-04	14.0	117.8	16.1	134.8	116.1	98.6	P		—	—	—
285	(SEE Attached dwg)	6" / 2	↓	↓	↓	15.8	133.7	115.5	98.0	P		—	—	—

COMMENTS:

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000707

1266

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

= 1ST LIFT

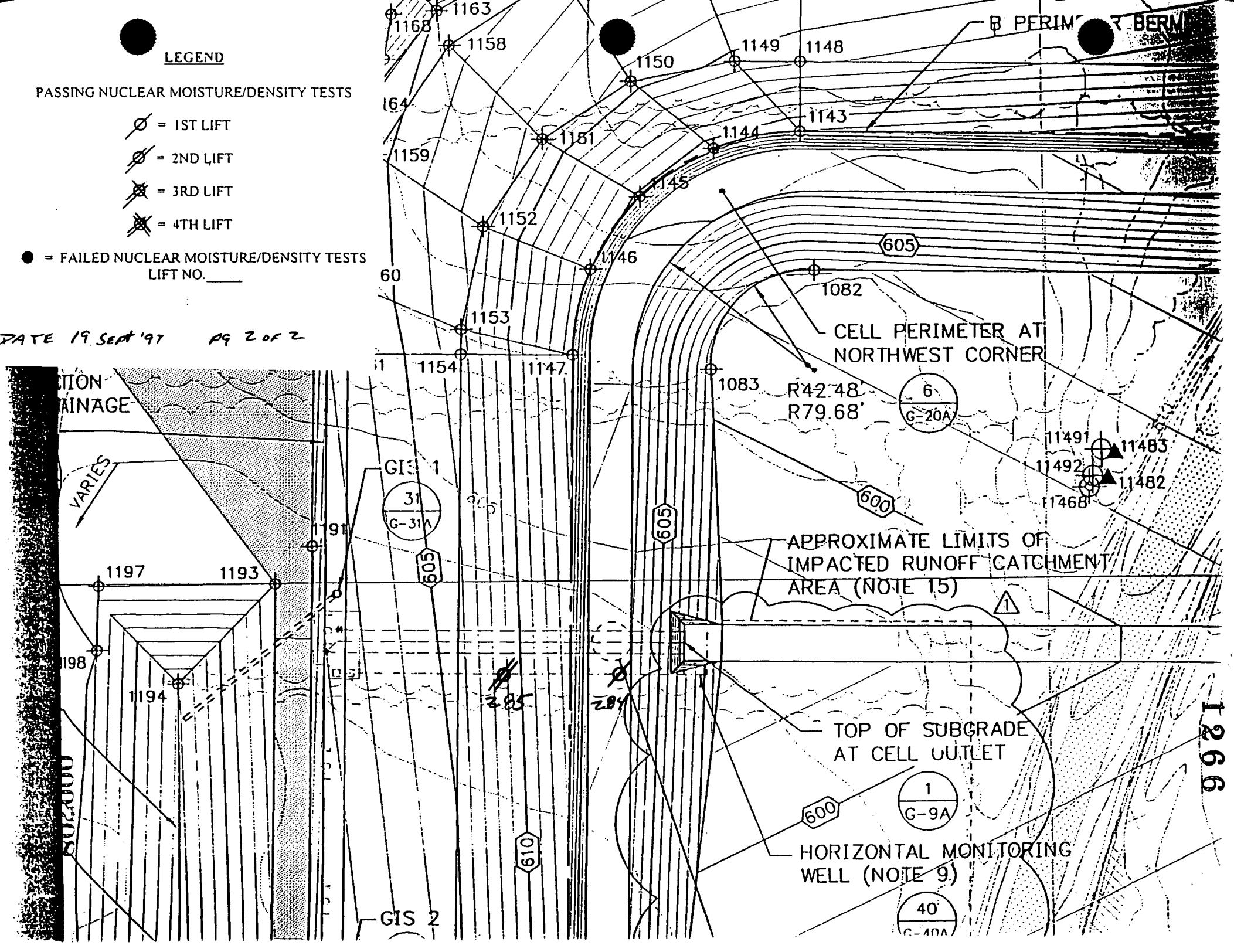
= 2ND LIFT

= 3RD LIFT

= 4TH LIFT

● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____

DATE 19 Sept '97 pg 2 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: OSDF - PHASE ONE DATE: 24 day 09 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: moisture correlation QA ID: PP/BL

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
286	West perimeter berm (see attached dwg)	6" / 1	LP-	16.2	112.5	17.8	131.2	111.4	99.0	P		—	—	—
287		6" / 2	↓	↓	↓	16.4	130.4	112.0	99.6	P		—	—	—

COMMENTS:

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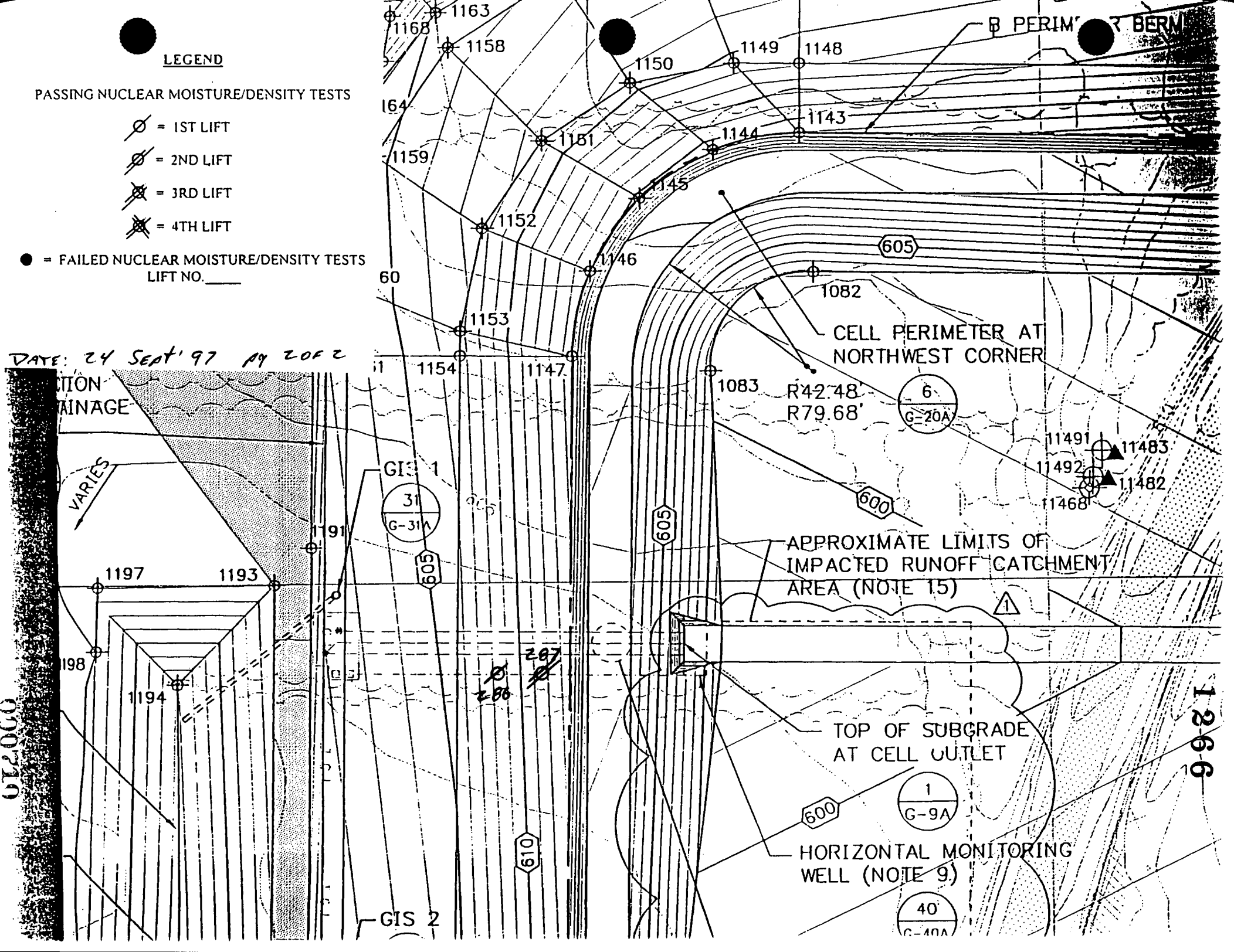
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____
DATE: 24 SEPT '97 PG 2 OF 2
CELL PERIMETER AT NORTHWEST CORNER
R42.48'
R79.68'
APPROXIMATE LIMITS OF IMPACTED RUNOFF CATCHMENT AREA (NOTE 15)
TOP OF SUBGRADE AT CELL OUTLET
HORIZONTAL MONITORING WELL (NOTE 9)
GIS 1
GIS 2
VARIES
605
600
610
1163
1168
1158
1150
1149
1148
1143
1144
1151
1159
1145
1152
1146
1082
1153
1154
1147
1083
1191
1197
1193
1198
1194
11491
11483
11492
11482
11468
6
G-20A
31
G-31A
1
G-9A
40
G-40A
287
286

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: 01 day 10 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: Correlation Curve QA ID: R.L/BE

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
288	WEST PERIMETER BERM	6" / 1	* #11	19.3	106.0	16.8	118.1	101.1	95.4	P		—	—	—
289	(SEE ATTACHED DWG)	6" / 2	* #11	19.3	106.0	16.5	117.4	100.8	95.1	P		—	—	—

COMMENTS: * = The stockpile average of proctor values

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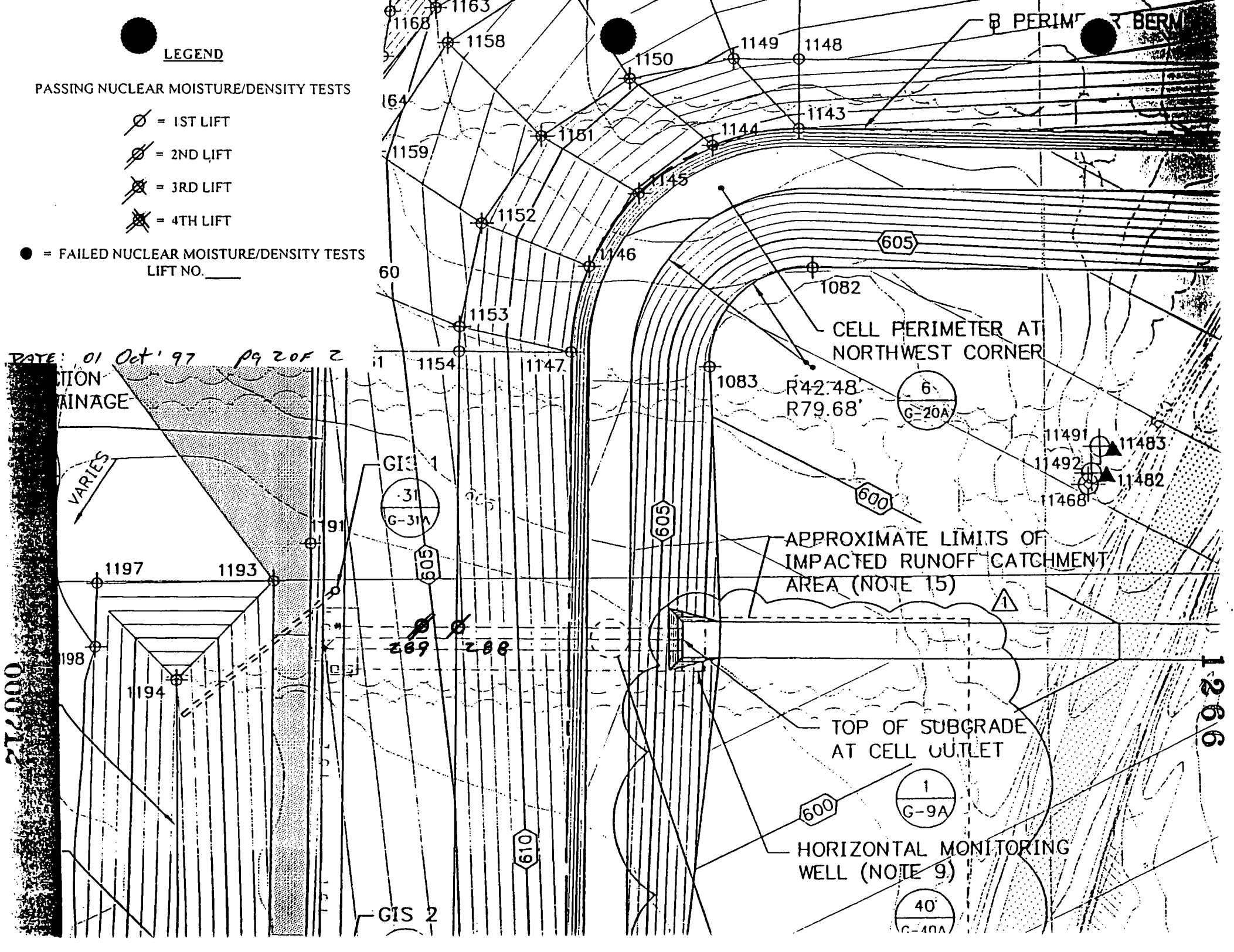
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____
DATE: 01 Oct '97 pg 2 of 2
CELL PERIMETER AT NORTHWEST CORNER
R42.48'
R79.68'
APPROXIMATE LIMITS OF IMPACTED RUNOFF CATCHMENT AREA (NOTE 15)
TOP OF SUBGRADE AT CELL OUTLET
HORIZONTAL MONITORING WELL (NOTE 9)
GIS 1
GIS 2
VARIES
605
600
610
1163
1168
1158
1150
1149
1148
1143
1144
1151
1159
1145
1152
1146
1082
1153
1154
1147
1083
1191
1197
1193
1198
1194
11491
11483
11492
11482
11468
6
G-20A
31
G-31A
1
G-9A
40'
G-40A
269
288
1269

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: 4 day Oct month 97 year

SPECIFICATION REQUIREMENTS

SOURCE: Sed. Basin Stockpile MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): 8"

% COMPACTION: 95% of Std. Proctor MOISTURE RANGE: -3% < OMC < +3% ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3440 NUCLEAR GAUGE SERIAL NO. 20774 COR. FACTOR: Moisture Correction QA ID: [illegible]

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
290	Above LCS/LDS Piping See attached figure	6" / 1	#11	17.5	108.1	13.1 15.1	117.3	10.1 103.6	95.8 (-2.4)	P		—	—	—
291	"	6" / 1	#11	17.5	108.1	14.0 16.0	117.4	10.3.0 101.2	93.6 (-1.5)		F	292	P	—
292	"	6" / 1	#11	17.5	108.1	14.9 17.0	125.3	10.1 104.1	96.1 (-0.5)	P		—	—	—
293	"	6" / 2	#11	17.5	108.1	13.7 15.7	127.7	11.2.3 110.4	10.2.1 94.7 (-1.8)	P		—	—	—
294	South Wall of LCS/LDS Trench (See attached figure)	6" / 1	OSDF-4	13.8	117.8	10.2 12.0	125.4	113.8 112.0	95.1 (-1.2)	P		—	—	—
295	LCS/LDS Cross Lines See Figure	6" / 2	OSDF-2	15.0	113.0	15.3 17.4	133.0	115.3 113.3	100.3 (+2.3)	P		—	—	—
296	"	6" / 3	OSDF-2	15.0	113.0	15.3 17.4	131.7	114.4 112.4	99.5 (+2.0)	P		—	—	—

COMMENTS:

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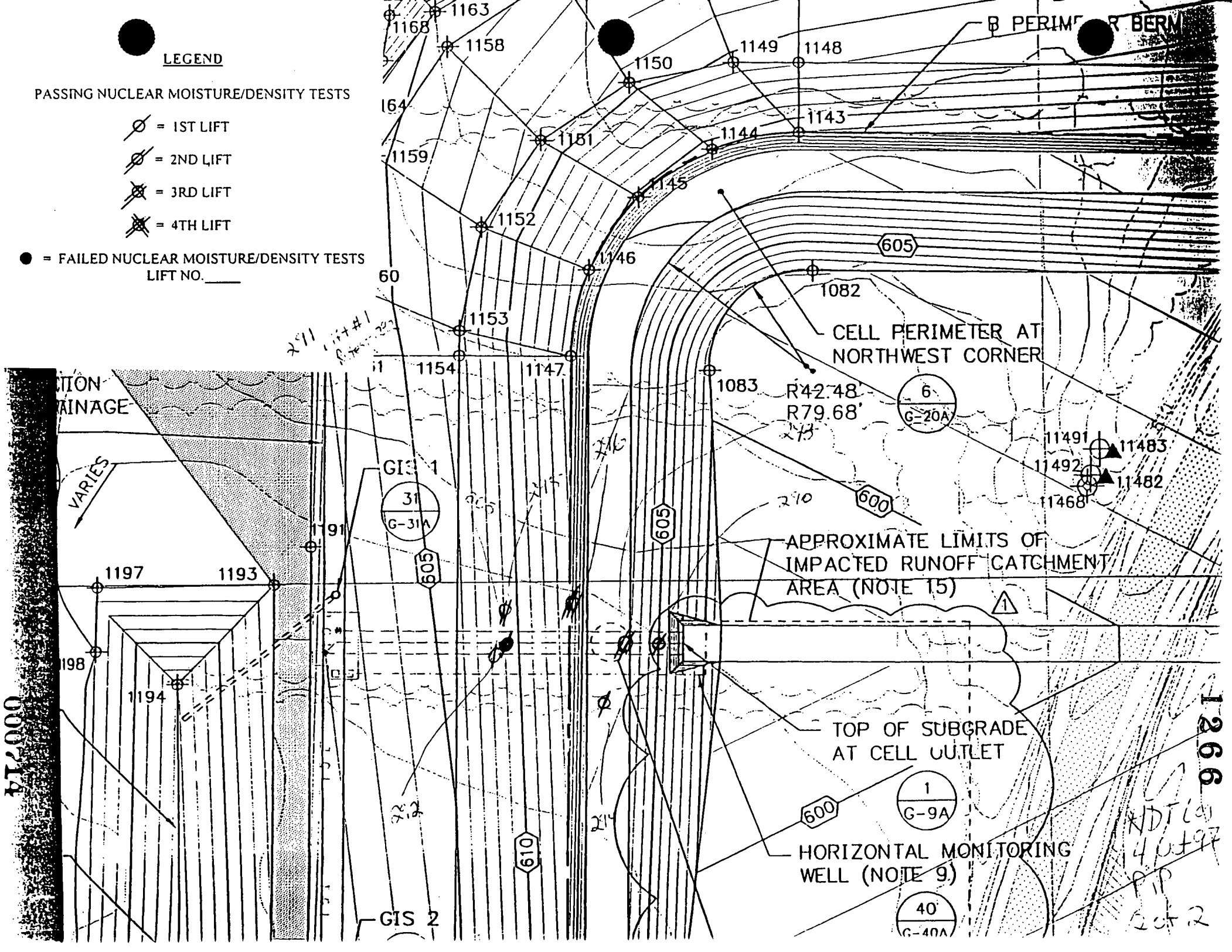
LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____
CELL PERIMETER AT NORTHWEST CORNER
R42.48'
R79.68'
APPROXIMATE LIMITS OF IMPACTED RUNOFF CATCHMENT AREA (NOTE 15)
TOP OF SUBGRADE AT CELL OUTLET
HORIZONTAL MONITORING WELL (NOTE 9)
GIS 1
GIS 2
VARIES
605
600
610
1163
1168
1158
1150
1149
1148
1143
1144
1151
1159
1145
1152
1146
1082
1153
1154
1147
1083
1191
1197
1193
1198
1194
11491
11483
11492
11482
11468
6
G-20A
31
G-31A
1
G-9A
40'
G-40A

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 Monday, DATE: 6 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: Sed. Basin Stockpile MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): 8"

% COMPACTION: 95% Standard Proctor MOISTURE RANGE: -3% < OMC < +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 Correction QA ID: PJP/RWL

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
	LCS/LDS Corridor of West Berm											—	—	—
297	See attached figure	8" / 1	OSDF-4	14.0	117.8	13.8 15.0	130.2	114.4 113.2	96.1 / +1.0	P		—	—	
298		6" / 2				13.9 15.1	130.8	114.9 113.6	96.4 / +1.1	P		—	—	—
299		3				16.4 16.8	132.6	114.9 113.5	96.3 / +2.8	P		—	—	—
300		4				16.4 17.9	117.7	101.1 99.8	88.3 / +3.9		F	301	P	—
301		4				15.6 17.0	134.9	116.0 115.3	97.9 / +3.0	P		—	—	—
302		5				14.5 15.8	133.5	116.6 115.3	97.9 / +1.8	P		—	—	—
303		6				15.6 17.0	130.4	112.8 111.5	94.7 / +3.0		F	304	P	—
304		6				14.9 16.2	132.0	114.9 113.6	96.4 / +2.2	P		—	—	—
305		7	OSDF-2	15.0	113.0	15.9 17.4	128.5	108.8 109.5	96.9 / +2.4	P		—	—	—

COMMENTS:

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000715

1266

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 06 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

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

% COMPACTION: 95% STANDARD PROCTOR 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: PP/RL

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
306		6" / 8	OSDF-1	19.4	106.9	18.0 19.8	128.2	108.6 107.0	100.1/+0.4	P		—	—	—
307		9	OSDF-2	15.0	113.0	16.1 17.6	130.8	112.7 111.2	98.4/+2.6	P		—	—	—
308		10	↓	↓	↓	16.0 17.4	130.7	112.7 111.3	98.5/+2.4	P		—	—	—
309		11	OSDF-1	19.4	106.9	17.9 19.6	128.0	108.6 107.0	100.1/+0.2	P		—	—	—
310		12				21.4 23.9	126.9	104.6 102.4	95.8/+4.5		F	311/312	P	—
311		12				16.6 18.1	127.4	109.3 107.8	100.8/-1.3	P		—	P	—
312		12				19.2 21.2	127.5	107.0 105.2	98.4/+1.8	P		—	—	—
313		13				17.9 19.1	129.3	110.1 108.5	101.5/-0.3	P		—	—	—
314		14				17.0 18.6	129.7	110.8 109.4	102.3/-0.8	P		—	—	—

COMMENTS:

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000716

1266

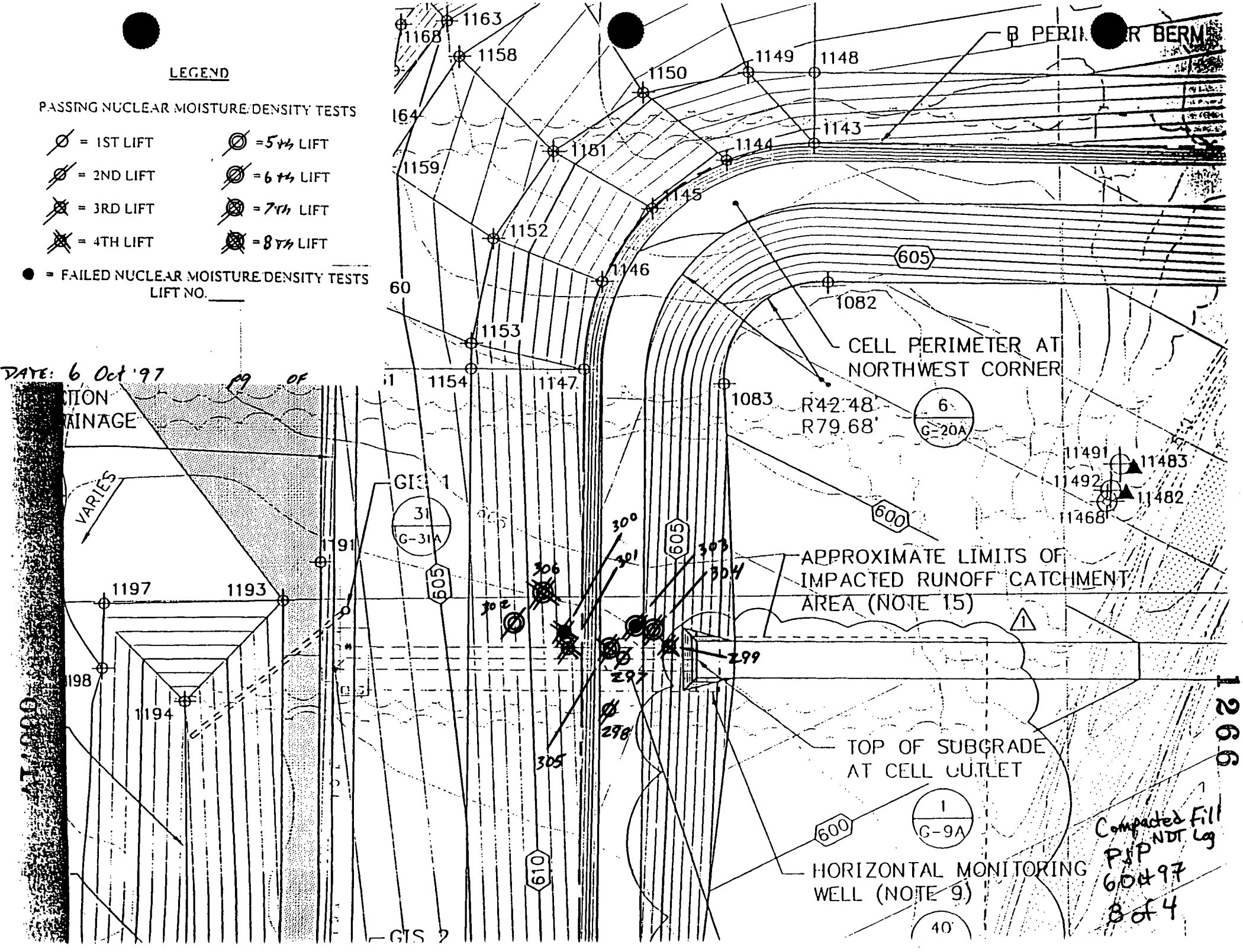
LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

- = 1ST LIFT
- = 2ND LIFT
- = 3RD LIFT
- = 4TH LIFT
- = 5th LIFT
- = 6th LIFT
- = 7th LIFT
- = 8th LIFT

● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____

DATE: 6 Oct '97 Pg OF



Compacted Fill
NDT Log
PJP
6 Oct 97
8 of 4

1266

LEGEND

ASSING NUCLEAR MOISTURE/DENSITY TESTS

□ = 9th LIFT

= 10th LIFT

= 11th LIFT

= 12th LIFT

= 13th LIFT

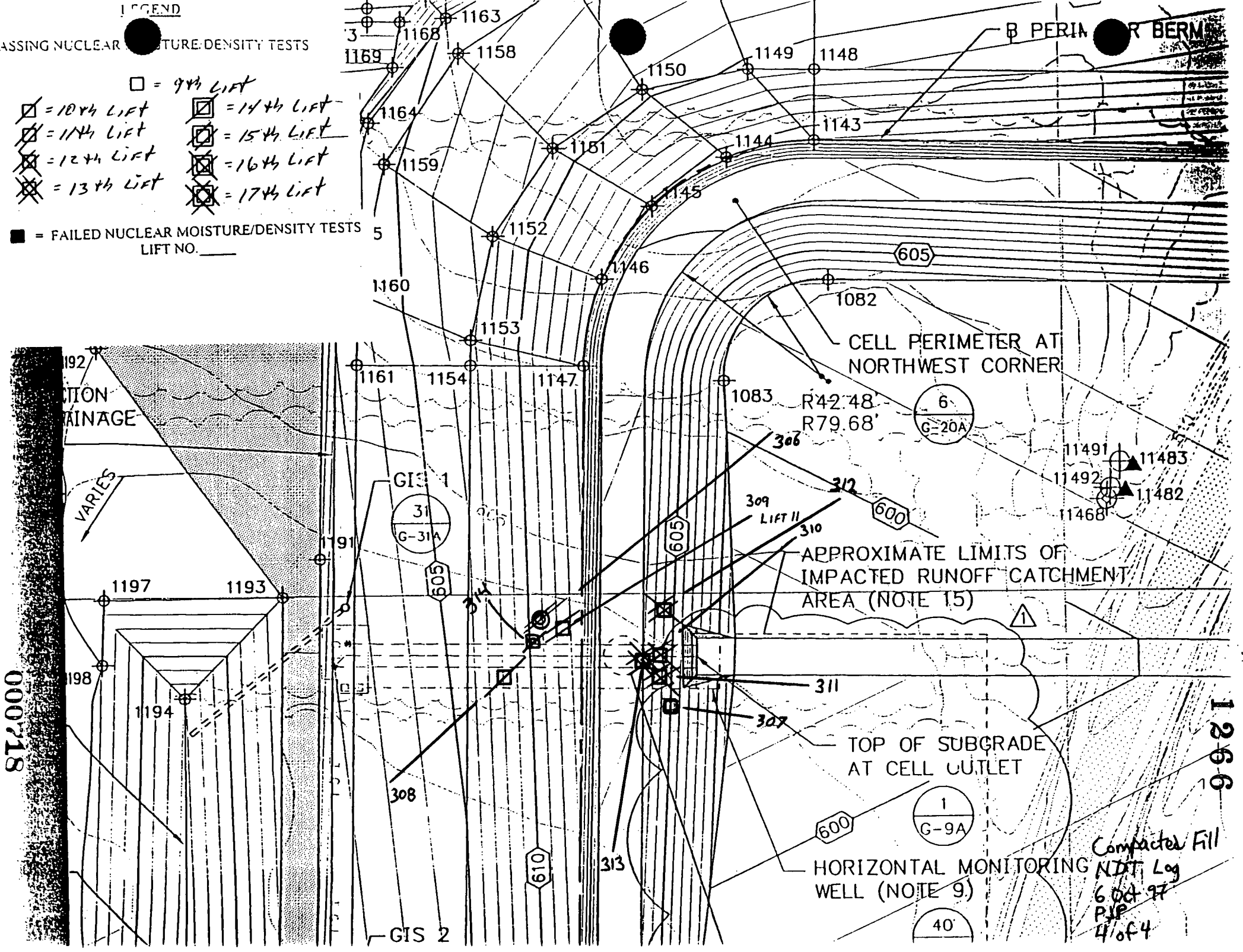
= 14th LIFT

= 15th LIFT

= 16th LIFT

= 17th LIFT

■ = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO._____



000218

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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 Tuesday DATE: 7 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

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

% COMPACTION: 95% Standard Proctor MOISTURE RANGE: -3% < OMC < +3% 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/RWL/WN

TEST NO.	TEST LOCATION West Berm	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
315	See attached figure	6" / 1	OSDF-4	14.0	117.8	too low to correct 7.5	125.9	117.0	99.3 / -6.5		F	320	P	F
316	↓	1	OSDF-2	15.0	113.0	16.3 17.8	130.6	112.0 111.1	98.3 / +2.8	P		—	—	—
317		1	OSDF-4	14.0	117.8	11.5 est. 12.3	127.1	114.0 113.2	96.1 / -1.7	P		—	—	—
318	15' south, 15' west of pt. 1364	1	↓	↓	↓	14.5 15.8	132.5	115.7 114.4	97.1 / +1.8	P		—	—	—
319	1' south, 20' west of pt. 917	1				15.0 16.4	130.4	113.4 112.0	95.1 / +2.4	P		—	—	—
320	15' south, 45' west of pt. 805	1				too low for correction 7.9	135.2	125.2	106.3 / -6.1		F	321	P	—
321	10' south, 45' west of pt. 795	1	OSDF-2	15.0	113.0	14.7 16.0	125.2	109.1 107.9	95.5 / +1	P		—	—	—
322	15' west, 12' south of pt. 809	2	OSDF-4	14.0	117.8	19.6 16.0	133.0	116.0 114.7	97.3 / +2	P		—	—	—
323	21' west, 18' south of pt. 915	2	OSDF-2	15.0	113.0	17.7 19.4	129.3	109.8 108.3	95.8 / +4.4		F	324	P	—
324	21' west, 21' south of pt 915	2	↓	↓	↓	16.0 17.5	127.9	110.3 108.9	96.4 / +2.5	P		—	—	—

COMMENTS:

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000219

1266

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 Tuesday DATE: 7 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: Sed. Basin Stockpile MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≈8"

% COMPACTION: 95% Standard Proctor MOISTURE RANGE: -3% < OMC < +3% 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: BJP/WN

TEST NO.	TEST LOCATION West Berm	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
325	16' west, 3' north of pt. 808	6" / 2	OSDF-2	15.0	113.0	17.6 19.3	130.4	110.9 109.3	96.7/+4.3		F	326	P	—
326	8' west of pt. 808	2	↓	↓	↓	15.7 17.2	131.7	113.8 112.4	99.5/+2.2	P		—	—	—
327	45' west, 15' north of pt. 805	2	OSDF-4	14.0	117.8	10.3 est. 11.6	134.5	122.0 120.5	102.3/-2.4	P		—	—	—
328	50' west, 50' south of pt. 805	2	OSDF-2	15.0	113.0	15.0 16.4	128.7	111.9 110.6	97.9/+1.4	P		—	—	—
329	12' west, 22' south of pt. 809	3				16.4 17.9	127.9	109.9 108.5	96.0/+2.9	P		—	—	—
330	30' west, 30' south of pt. 912	1				16.2 17.7	128.8	110.3 109.4	96.8/+2.7	P		—	—	—
331	36' west, 9' south of pt. 916	1				14.5 15.8	127.7	111.5 110.3	97.6/+0.8	P		—	—	—
332	20' south, 35' west of pt. 912	2				15.7 17.1	129.9	112.3 110.9	98.1/+2.1	P		—	—	—
333	12' west of pt. 913	3	OSDF-4	14.0	117.8	14.1 15.4	133.0	116.6 115.3	97.8/+1.4	P		—	—	—
334	42' west, 24' south of pt. 913	2	OSDF-2	15.0	113.0	16.5 18.0	131.8	113.1 111.7	98.8/+3	P		—	—	—

COMMENTS:

BJP

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0007220

12266

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 Tuesday DATE: 7 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

SOURCE: Sed. Basin Stockpile MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ (CIRCLE ONE) LIFT THICKNESS (LOOSE/COMPACTED): ≈8"

% COMPACTION: 95% Standard Proctor MOISTURE RANGE: -3% < OMC < +3% 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/WN

TEST NO.	TEST LOCATION West Berm	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
335	25' west, 15' north of pt. 916	6" / 3	OSDF-2	15.0	113.0	16.3 17.8	129.6	111.4 110.0	97.4/+2.8	P		—	—	—
336	50' west, 15' north of pt. 916	2	OSDF-4	14.0	117.8	15.6 17.0	133.3	115.3 113.9	96.7/+3	P		—	—	—
337	50' west, 12' south of pt. 911	1	OSDF-2	15.0	113.0	17.2 18.8	129.4	110.4 108.9	96.4/+3.8		F	*	—	—
338	55' west, 15' north of pt. 810	1	↓	↓	↓	17.5 19.2	125.9	107.2 105.6	93.5/+4.2		F	*	—	—
339	12' south, 15' west of pt. 809	4				16.3 17.8	130.3	112.1 110.6	97.9/+2.8	P		—	—	—
340	27' north, 12' west of pt. 913	4	OSDF-1	19.4	106.9	18.5 20.4	127.7	107.8 106.1	99.3/+1	P		—	—	—
341	18' west, 10' south of pt. 916	4	OSDF-2	15.0	113.0	17.6 19.4	130.6	111.0 109.4	96.8/+4.4		F	342	P	—

COMMENTS: * Lift was placed far western edge of west berm of Cell 1/2 ; Area was subsequently cut and regraded ∴ retests were not completed (lift removed)

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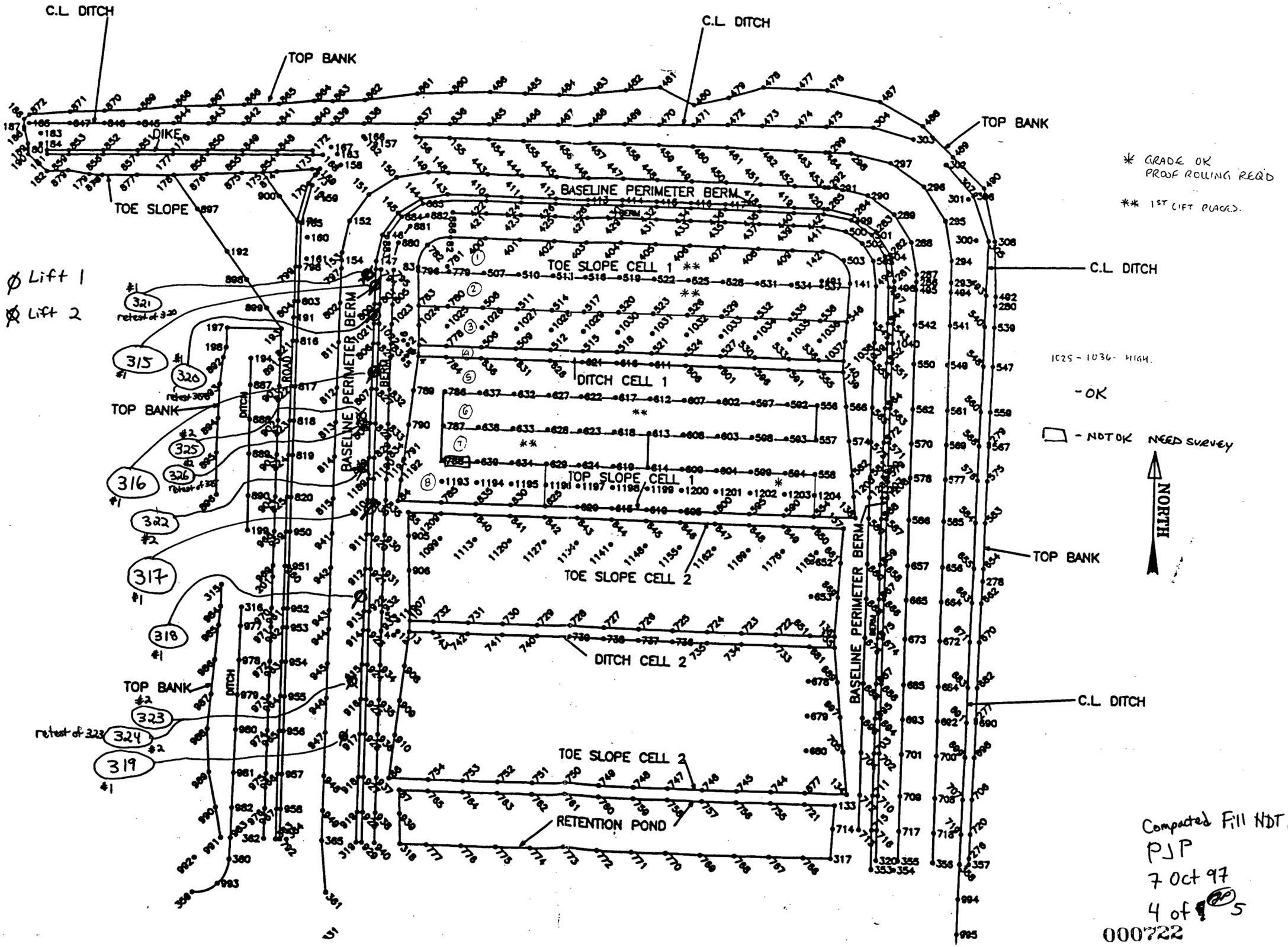
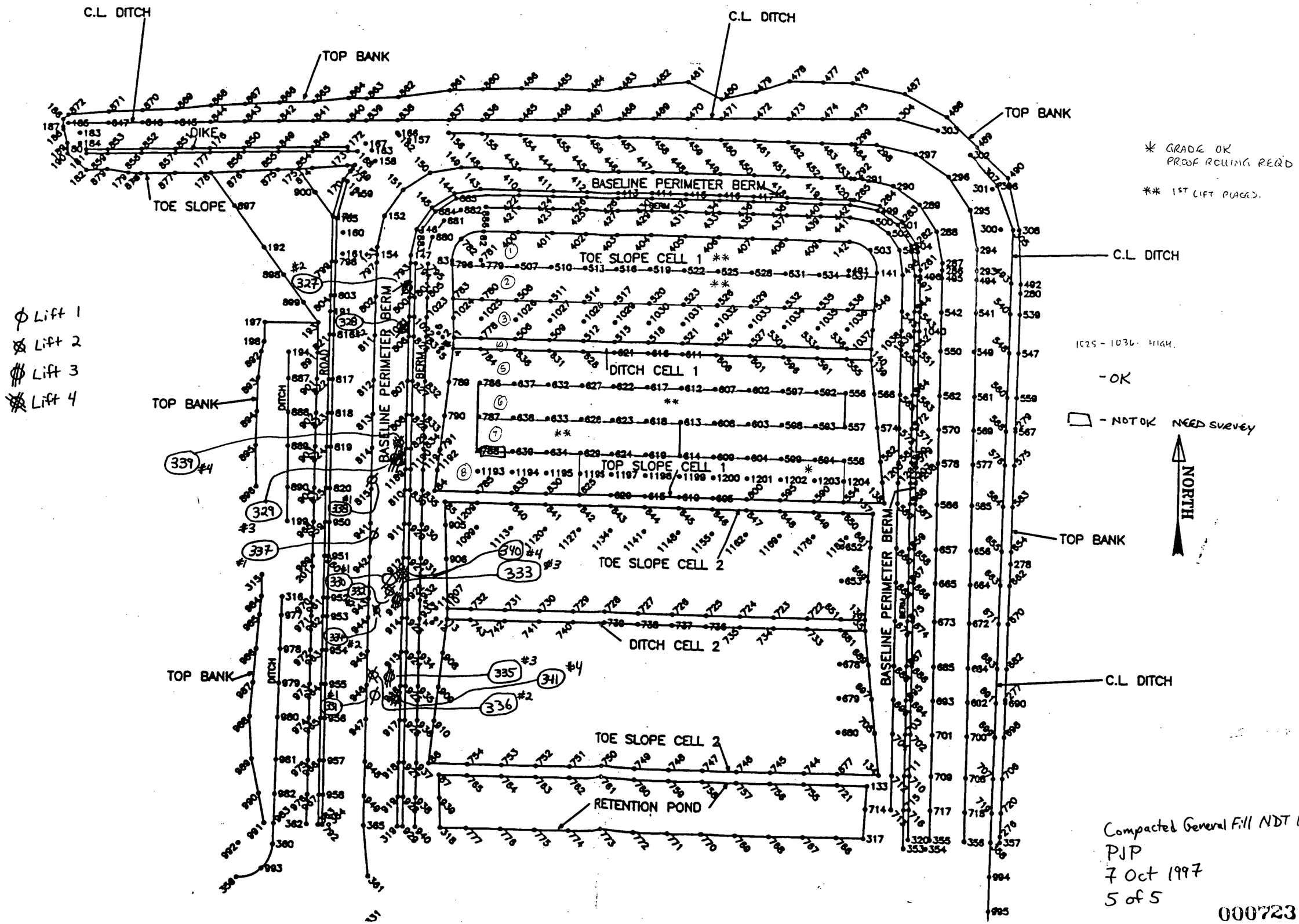
1266



Compacted Fill NDT Log
PJP
7 Oct 97
4 of 5



Compacted General Fill NDT log
PJP
7 Oct 1997
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 1 Construction

DATE: 9 day Oct month 1997 year (Thursday)

SPECIFICATION REQUIREMENTS

SOURCE: Sed. Basin Stockpile MATERIAL TYPE: (FILL) / SUBGRADE / SUBBASE / CLAY / OTHER: _____ LIFT THICKNESS (LOOSE/COMPACTED): ≈8"
(CIRCLE ONE)

% COMPACTION: 95% Standard Proctor MOISTURE RANGE: -3% < OMC < +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 OA ID: RIP/WN

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
342	20' west, 10' north pt. 916	6" / 4	OSDF-2	15.0	113.0	16.4 / 17.9	128.8	110.7 / 109.2	96.7 / +2.9	P		—	—	—

COMMENTS:

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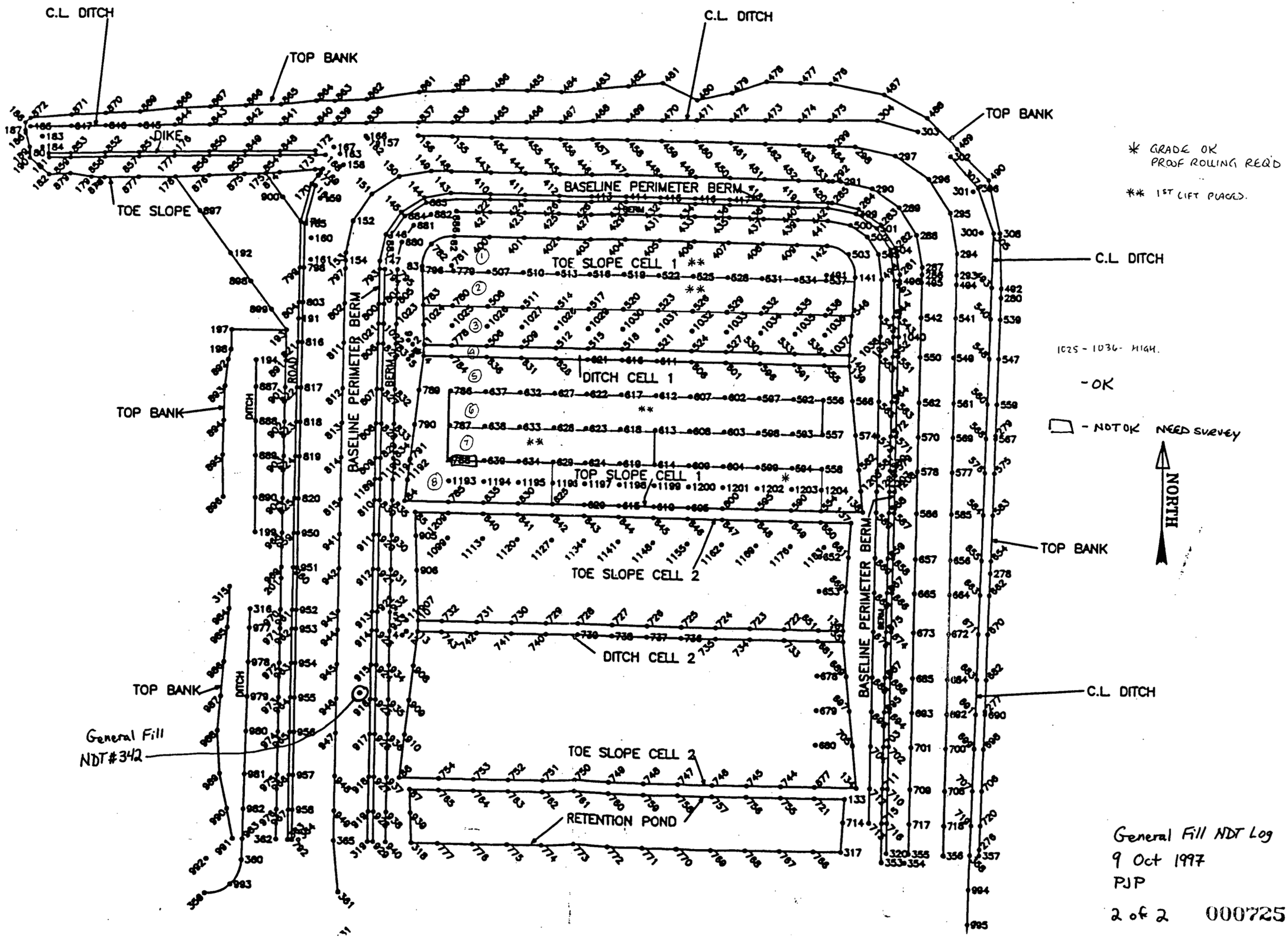
000224

12266



General Fill NDT Log
9 Oct 1997
PJP

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: 14 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 MOISTURE RANGE: -3% < OMC < +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: PJP/WN/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.	RETEST PASS	RETEST FAIL
343	↓	6" / 1	OSDF-4	14.0	117.8	13.1 14.4	131.5	116.3 114.9	97.6/+0.4	P		—	—	—
344	↓	1	OSDF-2	15.0	113.0	16.0 17.6	133.7	115.3 113.7	100.6/+2.6	P		—	—	—
345	↓	1	OSDF-1	19.4	106.9	19.8 21.7	131.0	109.4 107.6	100.7/+1.9	P		—	—	—
346	↓	1	OSDF-2	15.0	113.0	14.9 16.5	131.1	114.1 112.5	99.6/+1.5	P		—	—	—
347	↓	1	↓	↓	↓	14.9 16.5	132.7	115.5 113.9	100.8/+1.5	P		—	—	—
348	↓	2	OSDF-19	20.0	102.2	28.9 31.7	118.3	91.7 89.8	87.9/+11.7		F	352	P	—
349	↓	2	↓	↓	↓	22.6 24.7	124.2	101.3 99.6	97.5/+4.7		F	351	P	—
350	↓	2	↓	↓	↓	20.6 22.6	126.2	104.6 102.9	100.7/+2.6	P		—	—	—
351	↓	2	↓	↓	↓	18.9 20.1	127.4	107.7 106.1	103.8/+0.1	P		—	—	—
352	↓	2	↓	↓	↓	18.7 20.5	128.6	108.4 106.7	104.4/+0.5	P		—	—	—

COMMENTS:

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000726

1266

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: 14 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 MOISTURE RANGE: -3% < OMC < +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: PJP/WN/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.	RETEST PASS	RETEST FAIL
353		6" / 3	OSDF-19	20.0	102.2	22.6 24.7	126.6	103.3 101.5	99.3/+4.7		F	(PJP) 354 ~~353~~	P	—
354		3				19.2 21.0	129.1	108.4 106.9	104.4/+1	P		—	—	—
355		2				19.2 21.0	127.1	106.7 105.0	102.8/+1	P		—	—	—
356		3				25.2 27.6	123.7	98.8 96.9	94.8/+7.6		F	358	—	F
357		1				20.3 22.2	125.0	104.0 102.3	100.1/+2.2	P		—	—	—

COMMENTS:

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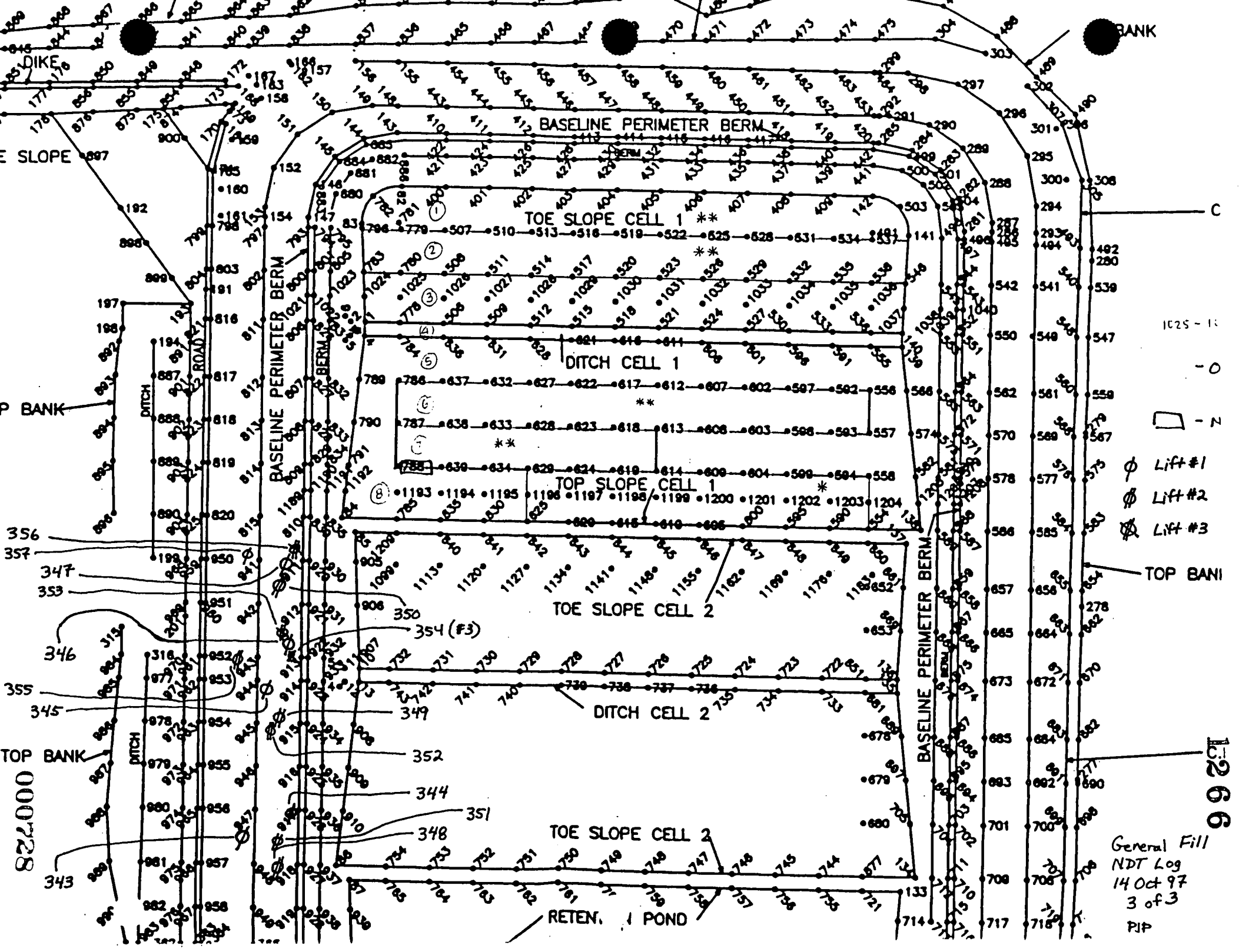
000227

1266


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
BASELINE PERIMETER BERM
BASELINE PERIMETER BERM
ROAD
DITCH
TOP BANK
TOP BANK
TOP BANK
RETENTION POND
Lift #1
Lift #2
Lift #3
356
357
347
353
350
354 (#3)
346
355
345
349
352
344
351
348
343
General Fill
NDT Log
14 Oct 97
3 of 3
PIP
000728
1266

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: 15 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 MOISTURE RANGE: -3% < OMC < +3% ASTM D 698: A B C / ASTM D 1557: A B C (CIRCLE ONE)

NUCLEAR GAUGE TYPE: Troxler 3430 NUCLEAR GAUGE SERIAL NO. 24487 COR. FACTOR: Moisture Correlation QA ID: RP/BN/SG/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
358 *	West Berm	6" / 3	OSDF-19	20.0	102.2	15.3 16.8	120.0	104.0 102.7	100.5/-3.2		F	359	P	—
359 *		3				17.1 18.7	124.5	106.3 104.9	102.6/-1.3	P		—	—	—
360 ×		1				15.3 16.8	123.6	107.2 105.8	103.5/-3.2		F	361	P	
361		1				17.5 19.2	123.6	105.2 103.7	101.5/-0.8	P		—	—	—
362		1				19.2 21.0	124.9	104.8 103.2	101.0/+1.0	P		—	—	—
363		1				16.5 18.1	119.9	103.0 101.5	99.3/-1.9	P		—	—	—
364		1				20.1 22.1	125.9	104.8 103.1	100.9/+2.1	P		—	—	—
365		1				18.0 19.8	124.9	105.8 104.3	102.1/-0.2	P		—	—	—
366		2				22.6 24.7	123.8	101.0 99.3	97.2/+4.7		F	368	P	—
367		2				21.0 23.0	125.1	103.3 101.6	99.4/+3	P		—	—	—

COMMENTS: * retests of failing test no. 356 from yesterday
× first test

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000229

1266

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: 15 day Oct month 1997 year

SPECIFICATION REQUIREMENTS

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

% COMPACTION: >95% Standard Proctor MOISTURE RANGE: -3% < OMC < +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 / 24487 COR. FACTOR: Moisture Correlation QA ID: DP/RP/SQ

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
368	See attached map West Berm	6" / 2	OSDF-19	20.0	102.2	20.4 22.4	126.1	104.8 103.0	100.8/+2.4	P		—	—	—
369	↓	2	↓	↓	↓	20.3 22.3	126.0	104.8 103.0	100.8/+2.3	P		—	—	—
370		2				19.9 21.8	121.6	101.4 99.8	97.7/+1.8	P		—	—	—
371		2				18.8 20.6	127.3	107.2 105.6	103.3/+0.6	P		—	—	—
372		3				14.4 16.1	124.2	108.6 107.0	104.7/-3.9		F	373	P	—
373		3				16.6 17.8	124.6	106.8 105.8	103.5/-2.2	P		—	—	—
374		1				23.1 25.3	120.4	97.8 96.1	94.0/+5.3		F	375		F
375		1				22.3 24.3	121.3	99.1 97.6	95.5/+4.3		F	379		F
376		3				26.0 28.4	118.9	94.4 92.6	90.6/+8.4		F	377		F
377		3				21.9 23.9	122.8	100.7 99.1	97.0/+3.9		F	378	P	

COMMENTS:

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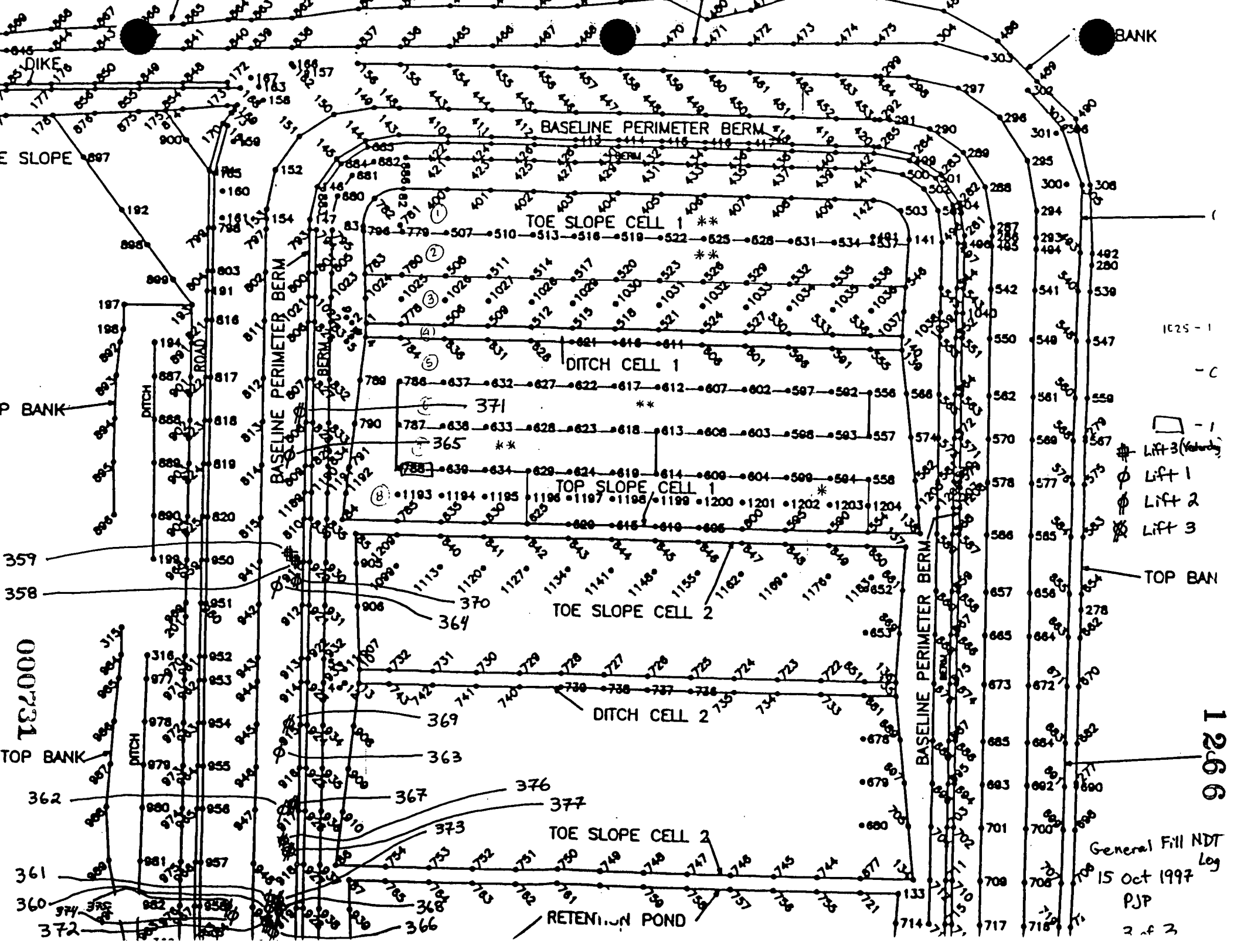
000730

1266


BANK
DIKE
E SLOPE
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
DITCH
P BANK
TOP BANK
TOP BAN
371
365
359
358
370
364
369
363
362
367
376
377
373
361
360
368
372
366
Lift 3 (Yesterday)
Lift 1
Lift 2
Lift 3
1025 - 1
General Fill NDT Log
15 Oct 1997
PJP
3 of 3
1266 9
000231

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 16 day OCT month 1997 year

SPECIFICATION REQUIREMENTS

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

% COMPACTION: 95% STANDARD PROCTOR 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/BN/PP/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
378		6" L3	OSDF-19	20.0	102.2	22.6	124.0	101.1	99.0	P		—	—	—
379		6" L1				24.1	122.0	98.3	96.2		F	382	P	—
380		6" L3				23.9	122.3	98.7	96.6		F	383	P	—
381		6" L1	OSDF-01	19.4	106.9	20.0	126.3	105.3	98.5	P		—	—	—
382		6" L1	OSDF-19	20.0	102.2	21.8	122.3	100.4	98.2	P		—	—	—
383		6" L3	OSDF-01	19.4	106.9	18.6	121.5	102.4	95.8	P		—	—	—

PP 10/14/97

COMMENTS:

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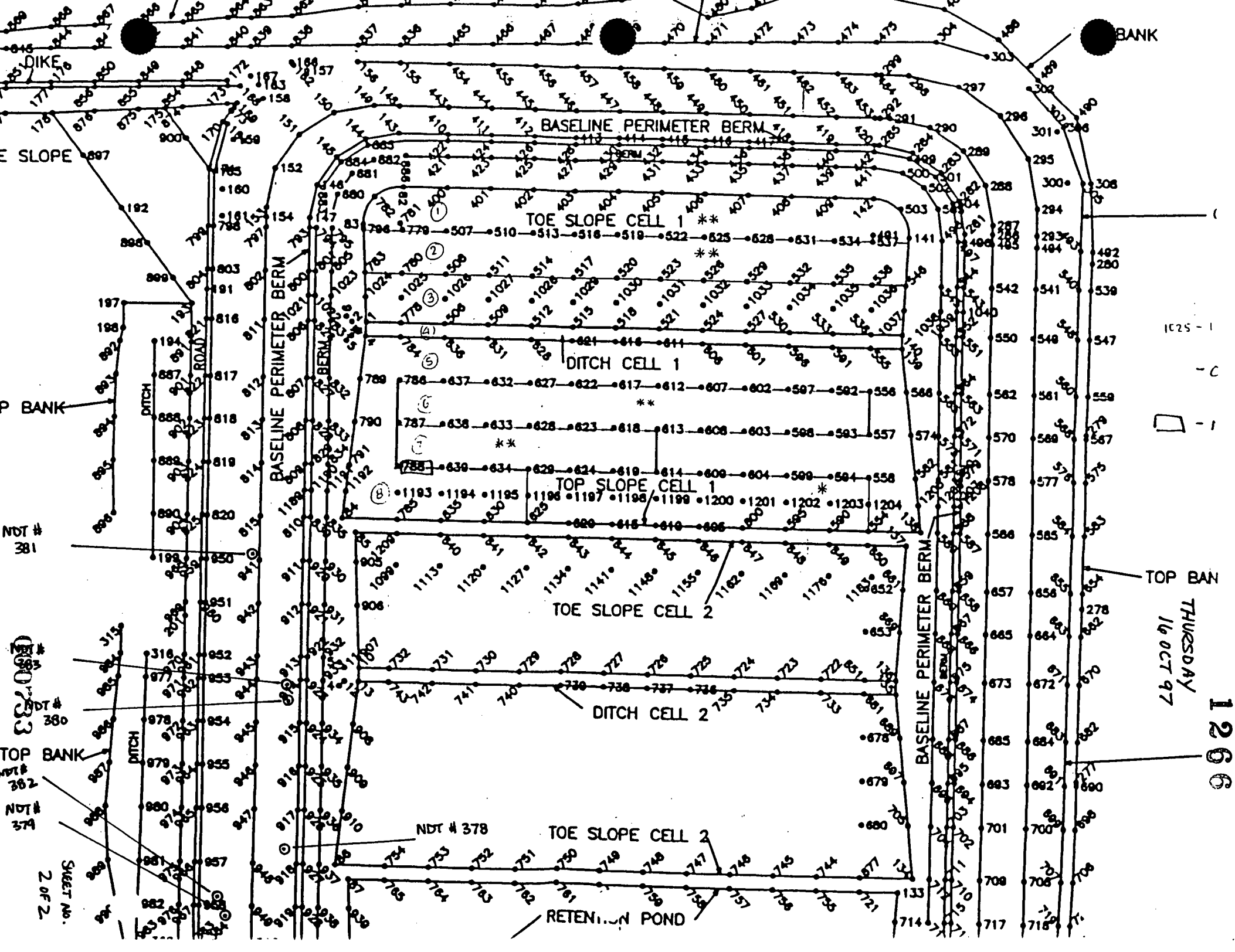
BANK
DIKE
BASELINE PERIMETER BERM
TOE SLOPE CELL 1
DITCH CELL 1
TOP SLOPE CELL 1
TOE SLOPE CELL 2
DITCH CELL 2
BASELINE PERIMETER BERM
TOP BANK
NDT # 381
NDT # 380
NDT # 382
NDT # 379
NDT # 378
TOE SLOPE CELL 2
RETENTION POND
ROAD
DITCH
THURSDAY 16 OCT 97
12969
SHEET NO. 2 OF 2

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 13/4/97 PROJECT NO.: GQ0166 TASK NO.: 04.1

DESCRIPTION: OSDF. ~~LCS~~ PHASE ONE - GIS NO.2 DATE: 28 day 10 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: moisture correlation QA ID: BK

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
384	See Attached dwg	8"/1	LCS-19	15.7	115.9	13.4	125.9	111.0	95.8	P		—	—	—
385	↓	↓ 2	↓	↓	↓	14.1	126.2	110.6	95.4	P		—	—	—
386		3				13.9	127.0	111.5	96.2	P		—	—	—

COMMENTS:

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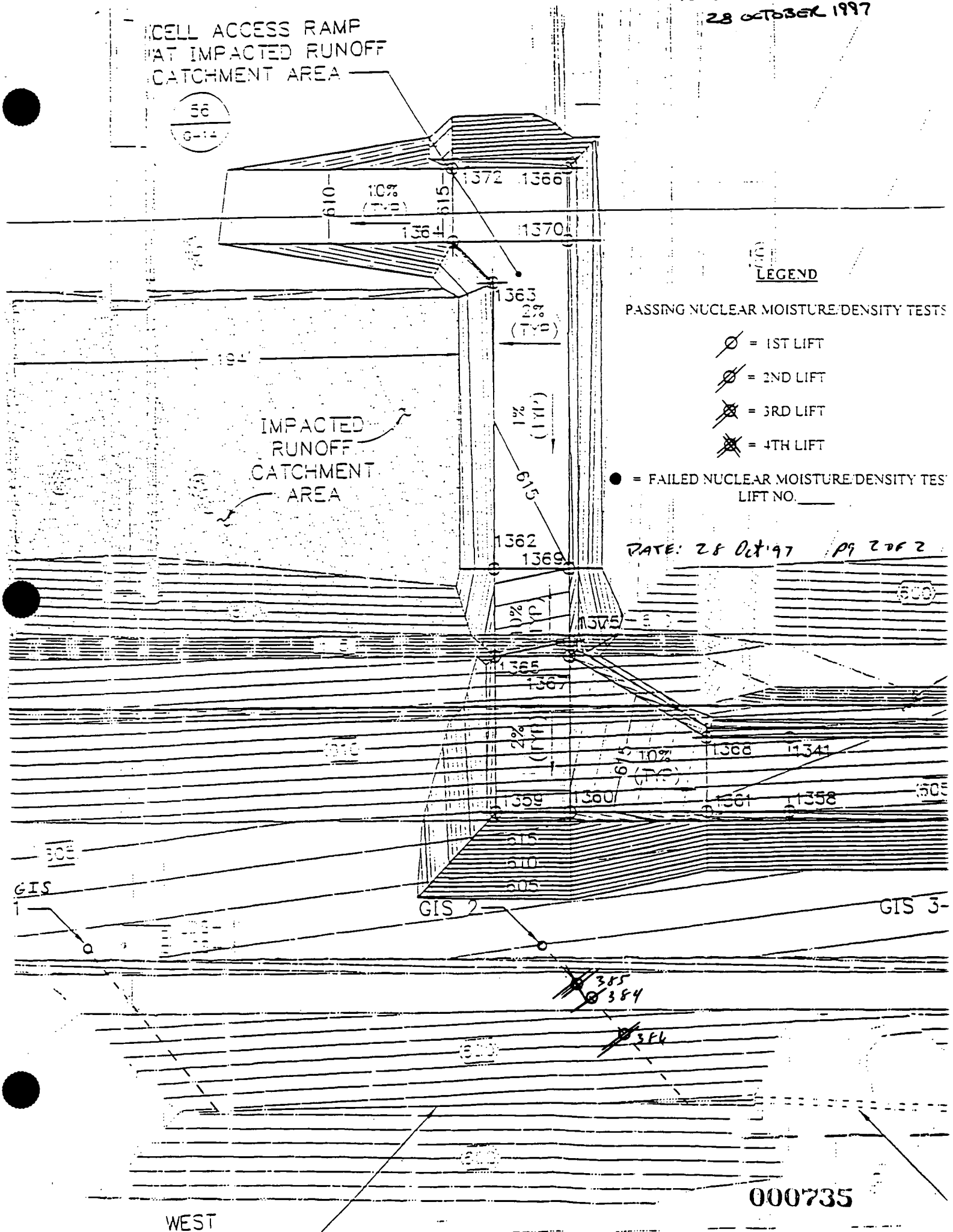
28 OCTOBER 1997



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: OSDF- PHASE ONE - GIS NO 2 DATE: 29 day 10 month 97 year

SPECIFICATION REQUIREMENTS

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

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

NUCLEAR GAUGE TYPE: 3440 NUCLEAR GAUGE SERIAL NO. 20979 COR. FACTOR: moisture correlation QA ID: 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
387	See Attached dwg	8"/1	LCS-19	15.7	115.9	14.8	129.6	112.9	97.4	P		—	—	—
388	↓	↓ /2	↓	↓	↓	15.9	128.4	110.8	95.6	P		—	—	—
389	↓	↓ /3	↓	↓	↓	14.2	129.8	113.7	98.1	P		—	—	—
390	↓	/2	LCS-16	20.5	104.0	17.9	117.0	99.2	95.4	P		—	—	—
391	↓	/3	↓	↓	↓	18.1	119.2	100.9	97.0	P		—	—	—
392	↓	↓ /3	↓	↓	↓	19.2	119.5	100.3	96.4	P		—	—	—

COMMENTS:

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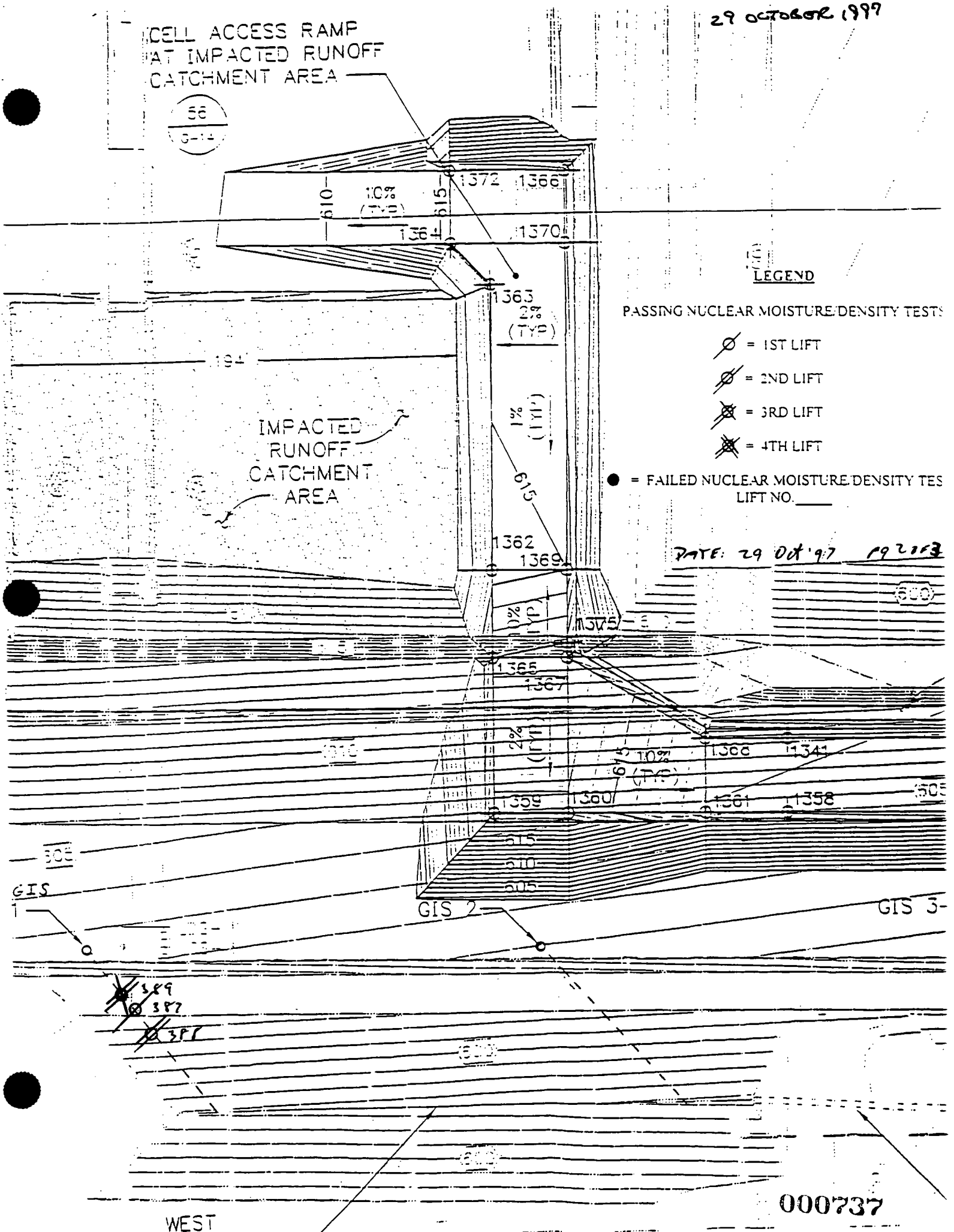
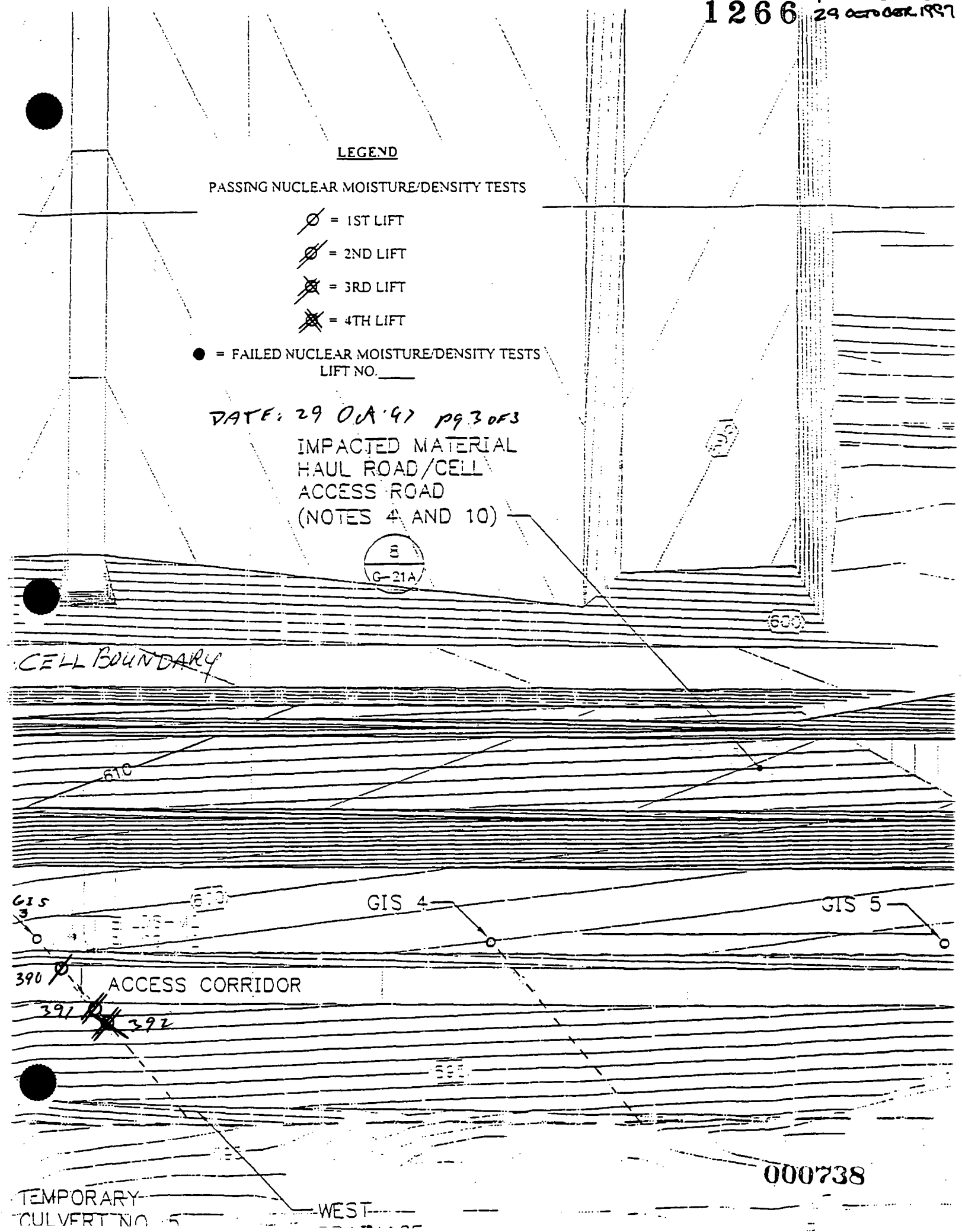
29 OCTOBER 1997




LEGEND
PASSING NUCLEAR MOISTURE/DENSITY TESTS
= 1ST LIFT
= 2ND LIFT
= 3RD LIFT
= 4TH LIFT
= FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____
DATE: 29 OCT '97 pg 3 of 3
IMPACTED MATERIAL
HAUL ROAD/CELL
ACCESS ROAD
(NOTES 4 AND 10)
8
G-21A
CELL BOUNDARY
610
GIS 3
GIS 4
GIS 5
390
391
392
ACCESS CORRIDOR
TEMPORARY
CULVERT NO. 5
WEST

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 - LCS (PHASE ONE) - GS No 4 DATE: 30 day 10 month 97 year

SPECIFICATION REQUIREMENTS

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

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

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

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
393	SEE Attached dwg.	8" / 1	LCS-19	15.7	115.9	14.2	127.6	111.7	96.4	P		—	—	—
394	↓	↓ 2	↓	↓	↓	15.9	131.8	113.7	98.1	P		—	—	—
395		3				15.0	130.2	113.2	97.7	P		—	—	—

COMMENTS:

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1266

000239

LEGEND

PASSING NUCLEAR MOISTURE/DENSITY TESTS

Ø = 1ST LIFT

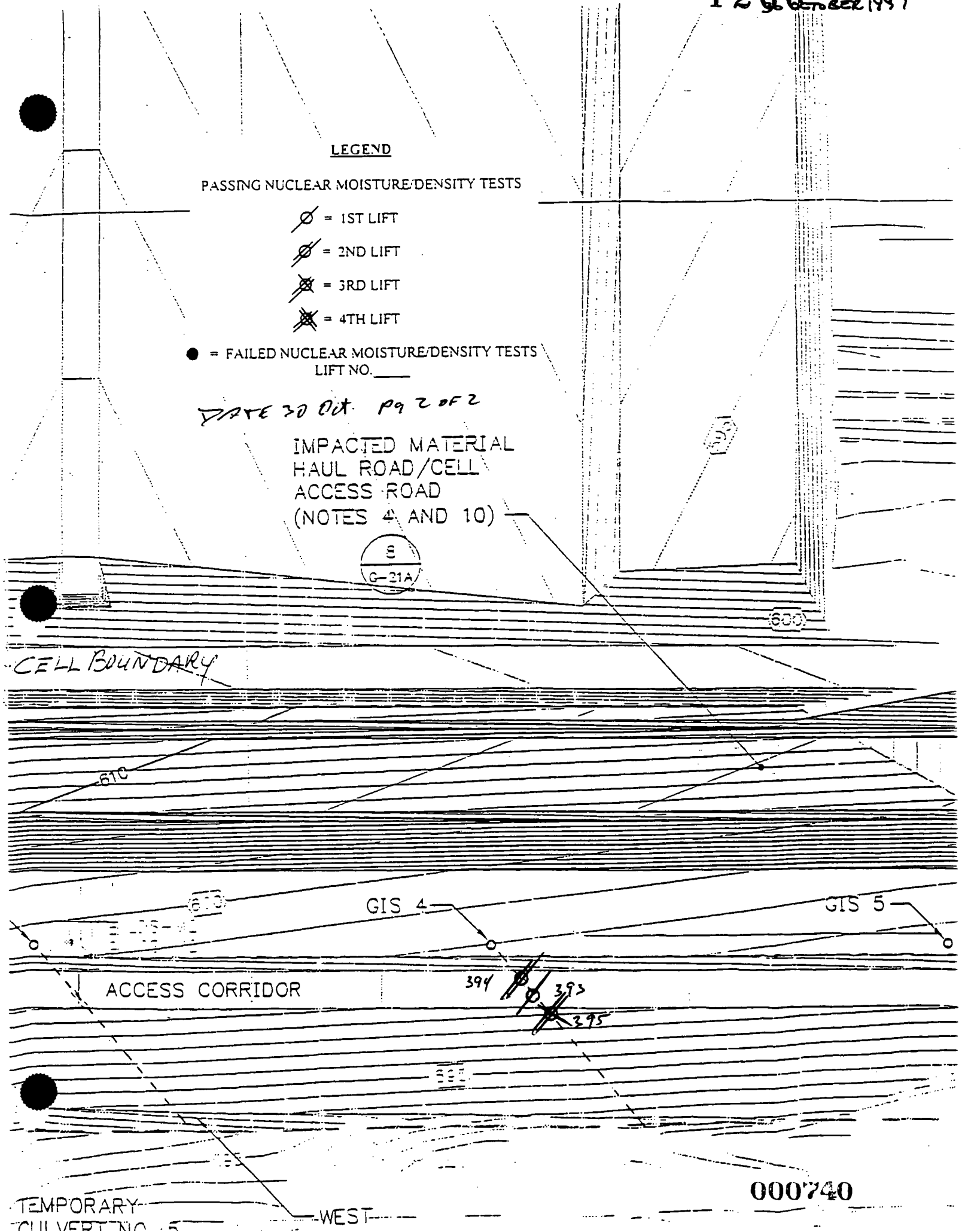
Ø = 2ND LIFT

⊗ = 3RD LIFT

⊗ = 4TH LIFT

● = FAILED NUCLEAR MOISTURE/DENSITY TESTS
LIFT NO.____

DATE 30 Oct. pg 2 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: OSDF. PHASE ONE DATE: 31 day 10 month 97 year

SPECIFICATION REQUIREMENTS

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

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

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

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
396	See Attached dwg	8"/3 *	OSDF-15	19.5	107.0	18.6	129.4	109.1	102.0	P		—	—	—
397	↓	↓/4 *	↓	↓	↓	18.0	128.0	108.5	101.4	P		—	—	—
398	↓	8"/2	LCS-19	15.7	115.9	16.2	131.1	112.8	97.3	P		—	—	—
399	↓	↓/3	↓	↓	↓	17.4	130.5	111.1	95.9	P		—	—	—
400	↓	8"/4 *	OSDF-15	19.7	107.0	18.2	121.5	102.8	96.1	P		—	—	—

COMMENTS: * Previous lifts placed and compacted today were "Rock Fill" (D.C.N. # 035) and not tested.

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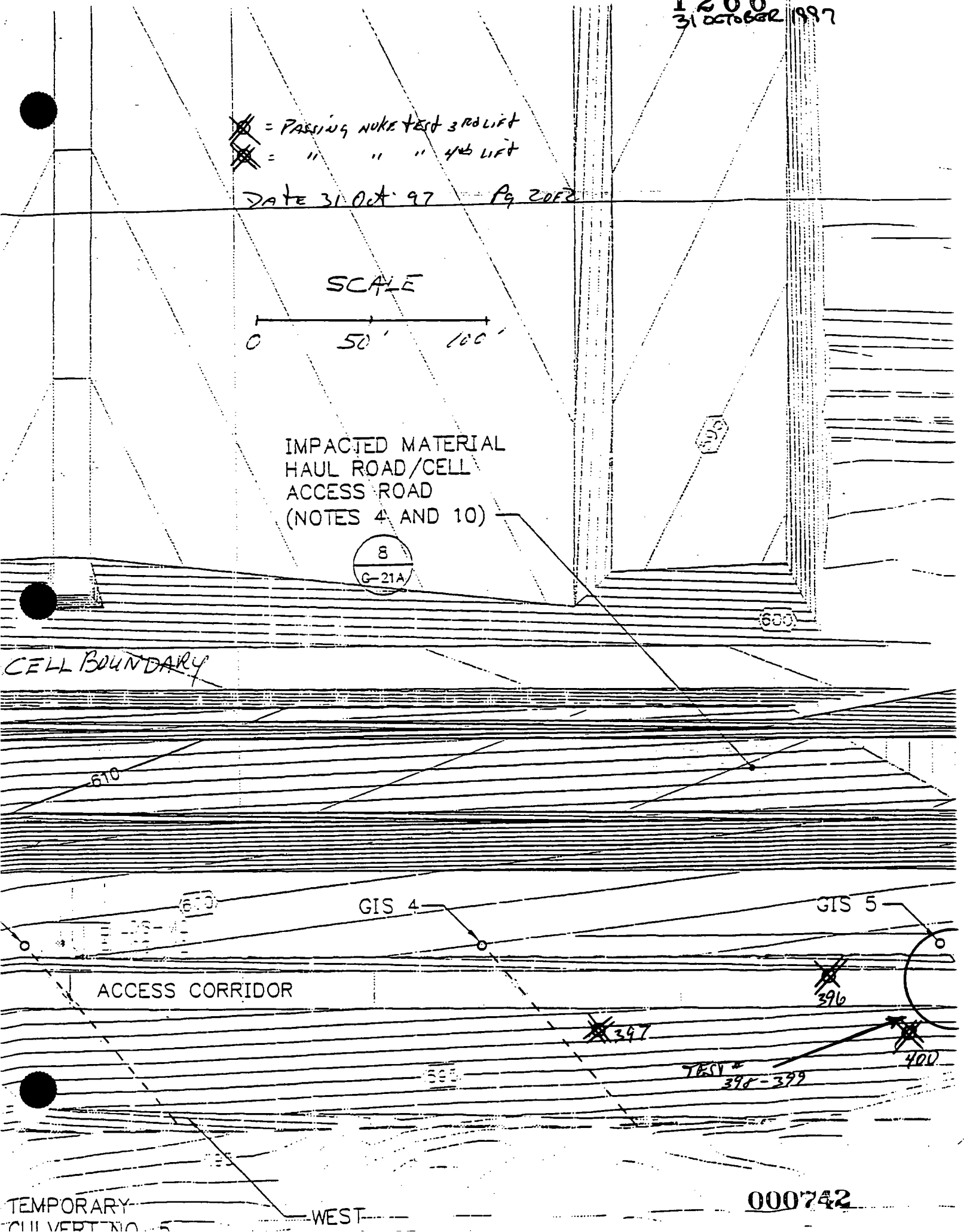
266


= PASSING NUKE TEST 3RD LIFT
= " " " 4TH LIFT
DATE 31 OCT 97 PG 2 OF 2
SCALE
0
50'
100'
IMPACTED MATERIAL
HAUL ROAD/CELL
ACCESS ROAD
(NOTES 4 AND 10)
8
G-21A
600
CELL BOUNDARY
610
610
GIS 4
GIS 5
ACCESS CORRIDOR
396
397
400
TEST # 398-399
TEMPORARY
CULVERT NO. 5
WEST

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 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: 100% MOISTURE RANGE: ±3% 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: 0 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
401	Cell Access rd (5' E of pt 9th) see sketch	6"	LP-326	17.5	110.0	15.4	128.0	111.0	100.9%	P		—	—	—
402	↓ (6' E of pt 362)	↓	↓	↓	↓	15.8	128.1	110.6	100.5%	P		—	—	—

COMMENTS:

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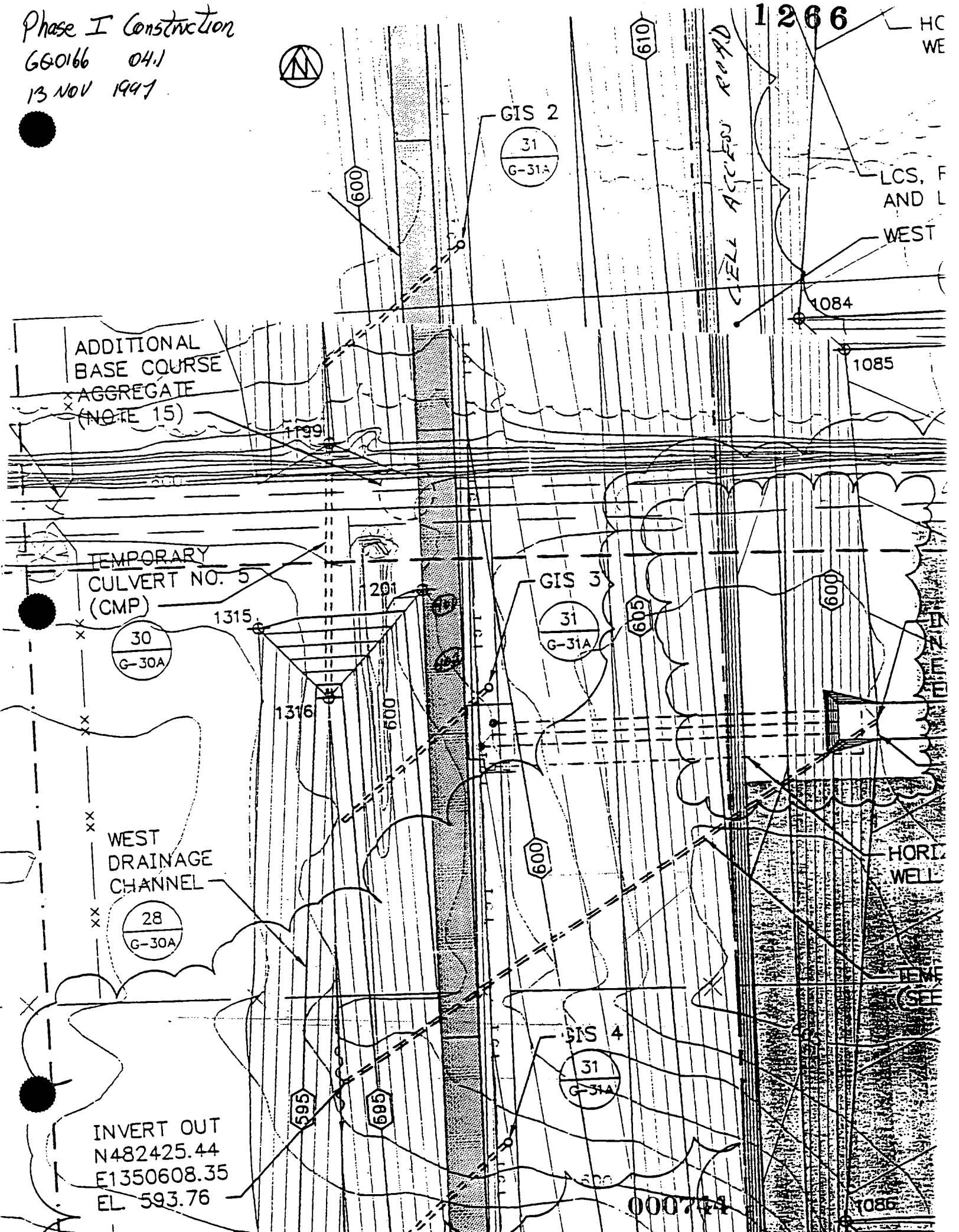
Phase I Construction
GG0166 04.1
13 NOV 1997

1266



000744

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 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: 100% MOISTURE RANGE: ±3% 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: 0 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
401	Cell Access rd (5' E of pt 9th) See sketch	6"	LP-326	17.5	110.0	15.4	128.0	111.0	100.9 %	P		—	—	—
402	↓ (6' E of pt 362)	↓	↓	↓	↓	15.8	128.1	110.6	100.5%	P		—	—	—

COMMENTS:

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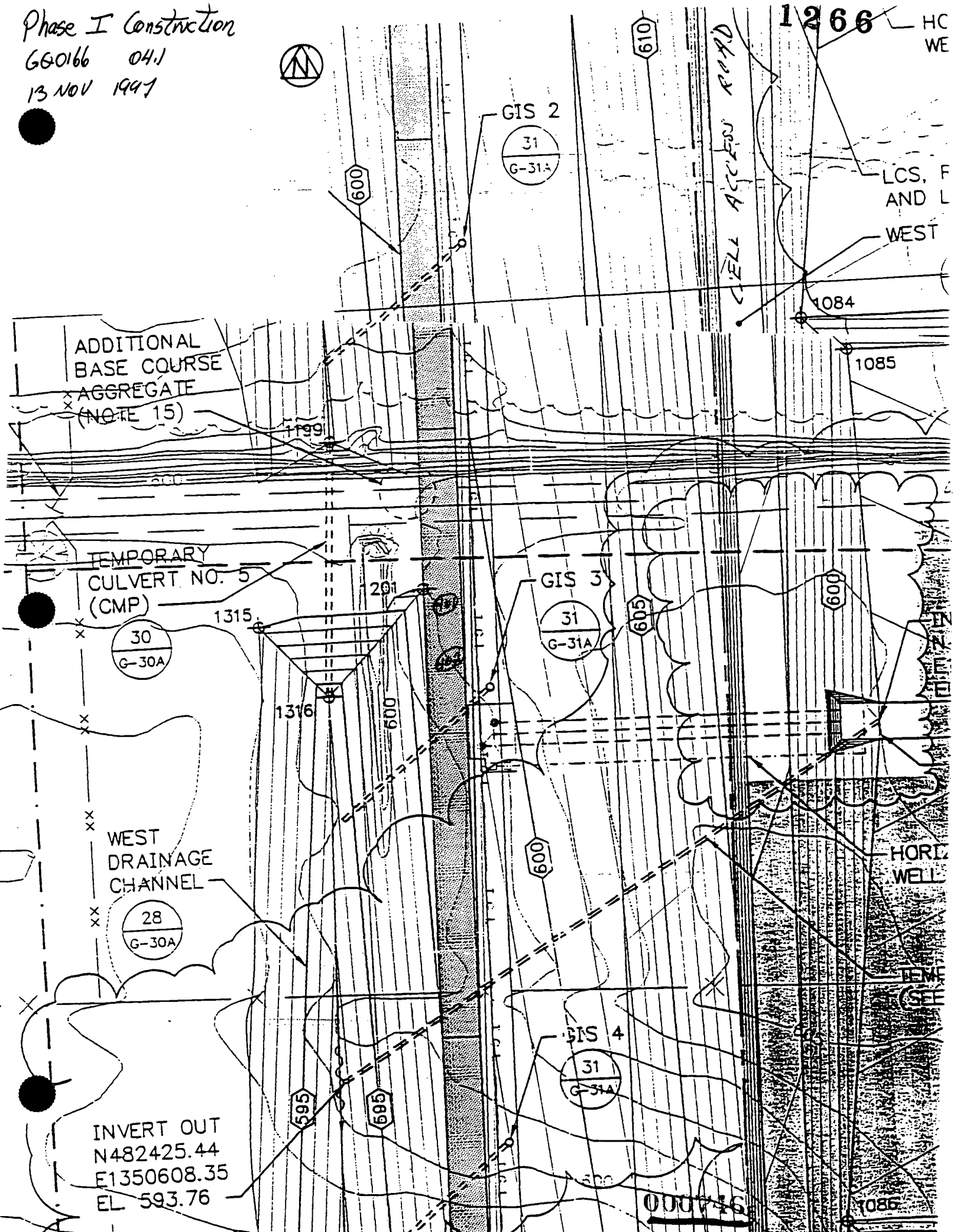
1266

Phase I Construction
GG0166 041
13 NOV 1991