5368

CONSTRUCTION QUALITY ASSURANCE

FINAL REPORT

PHASE IV - CELL 2 FINAL COVER AND PHASE V - CELL 6 LINER CONSTRUCTION ON-SITE DISPOSAL FACILITY

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

prepared by

GEOSYNTEC CONSULTANTS

Fernald Field Office
7400 Willey Road, MS:38
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under

Fluor Fernald, Inc.
Contract No. 03FF0699

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APPENDIX E

GEOTECHNICAL LABORATORY TEST RESULTS

COMPACTED FILL

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day March month 03 year

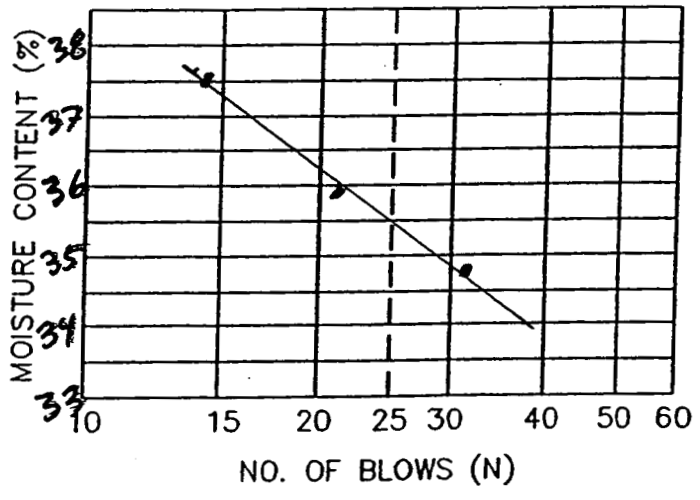
MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: Cell #6, (6TP1 - 6TP6) SAMPLE NO.: CF03-1

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.9	1.6	3.1	
A	WT. OF TARE	(grams)	28.56	28.87	28.38	
B	WT. OF WET SOIL & TARE	(grams)	44.79	45.00	47.27	
C	WT. OF DRY SOIL & TARE	(grams)	40.36	40.95	42.39	
D	WT. OF WATER = B-C	(grams)	4.43	4.25	4.88	
E	WT. OF DRY SOIL = C-A	(grams)	11.80	11.88	14.01	
F	MOISTURE CONTENT = (D/E)X100	(%)	37.5	35.8	34.8	
N	NUMBER OF BLOWS		14	21	31	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW/RE

	TARE NO.		2.1	1.8		
A	WT. OF TARE	(grams)	28.24	28.81		
B	WT. OF WET SOIL & TARE	(grams)	35.60	39.32		
C	WT. OF DRY SOIL & TARE	(grams)	34.54	37.84		
D	WT. OF WATER = B-C	(grams)	1.06	1.48		
E	WT. OF DRY SOIL = C-A	(grams)	6.30	9.03		
	MOISTURE CONTENT = (D/E)X100	(%)	16.8	16.4		

LIQUID LIMIT (LL) = 35.5 PLASTIC LIMIT (PL) = 16.6 PLASTICITY INDEX (PI) = 19

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FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE IIII DATE: 12 day Mar month 2003 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: CF03-1

SOIL SAMPLE SIZE +3/8 = 1847.5 gm -3/8 = 22684.5 gm MOISTURE = 963.0 TOTAL = 24995.0

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-7	L-7	L-1	L-1
WT. OF DRY SAMPLE PLUS TARE	(grams)	2039.8	1989.8	813.0	338.2
WT. OF TARE	(grams)	192.3	192.3	192.2	192.2
WT. OF DRY SAMPLE	(grams)	1847.5	1797.5	620.8	146.0

SIEVE ANALYSIS QA ID: DAE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	817.0	3.3	96.7		100
1 1/2in	38.1	1244.2	5.0	95.0		
1 in	25.4	1279.9	5.1	94.9		
3/4 in	19.1	1433.1	5.7	94.3		90-100
1/2 in	12.7	1673.4	6.7	93.3		
3/8 in	9.53	1797.1	7.2	92.8		.928
No. 4	4.75	17.4	2.8	97.2	90.2	
No. 10	2.00	40.4	6.5	93.5	86.8	
No. 20	0.850	64.9	10.5	89.5	83.1	
No. 40	0.425	86.0	13.9	86.1	79.9	
No. 60	0.250	102.5	16.5	83.5	77.5	
No. 100	0.125	122.4	19.7	80.3	74.5	
No. 200	0.075	145.8	~~23.5~~ 25.3	~~76.5~~ 74.6	~~71.0~~ 69.3	50-100
PAN	—		—			

COMMENTS:

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%FINER = 100 − Σ % RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: Cller SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase II DATE: ____ day ____ month ____ year

MATERIAL TYPE: Compacted fill

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

	SAMPLE NO.	CF03-1	CF03-2	CF03-3	CF03-4	CF03-5
	TARE NO.	664	657	21	36	52
A	WT. OF TARE	8.3	8.1	8.4	8.4	8.1
B	WT. OF WET SOIL & TARE	537.2	566.9	401.4	508.6	497.5
C	WT. OF DRY SOIL & TARE	471.3	466.1	319.8	428.1	416.7
D	WT. OF WATER = B-C	65.9	100.8	81.6	80.5	80.8
E	WT. OF DRY SOIL = C-A	463.0	458.0	311.4	419.7	408.6
F	MOISTURE CONTENT = (D/E) X 100	14.2	22.0	26.2	19.2	19.8
	FIELD DENSITY TEST (FDT) NO.					

~~MICROWAVE~~ Oven METHOD (ASTM D ~~4643~~ 2216): Recommended Mass Of Moist Sample 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%

	SAMPLE NO.	CF03-6	CF03-7	CF03-8	CF03-9	CF03-10
	TARE NO.	36	36	40	L-1	99
A	WT. OF TARE	8.3	8.3	8.1	192.1	8.4
B	WT. OF WET SOIL & TARE	331.7	408.0	456.0	2643.7	343.6
C	WT. OF DRY SOIL & TARE	273.1	353.0	404.0	2576.8	283.0
D	WT. OF WATER = B-C	58.6	55.0	52.0	66.9	60.6
E	WT. OF DRY SOIL = C-A	264.8	344.7	395.9	2384.7	274.6
F	MOISTURE CONTENT = (D/E) X 100	22.1	16.0	13.1	2.8	22.1
	FIELD DENSITY TEST (FDT) NO.					

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FLUOR FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase I DATE: ____ day ____ month ____ year

MATERIAL TYPE: Compacted fill

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

	SAMPLE NO.	CF03-11	CF03-12	CF03-13	CF03-14	
	TARE NO.	618	38	SP	SP	
A	WT. OF TARE	8.1	8.1	129.7	129.7	
B	WT. OF WET SOIL & TARE	345.6	427.0	1006.7	967.5	
C	WT. OF DRY SOIL & TARE	288.8	369.9	857.7	808.4	
D	WT. OF WATER = B-C	56.8	57.1	149.0	159.1	
E	WT. OF DRY SOIL = C-A	280.7	361.8	728.0	678.7	
F	MOISTURE CONTENT = (D/E) X 100	20.2	15.8	20.5	23.4	
	FIELD DENSITY TEST (FDT) NO.					

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

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000007

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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

DESCRIPTION: Phase IV

MATERIAL TYPE: Comp. fill

PROJECT NO. 6Q1341 TASK NO.: 04.1

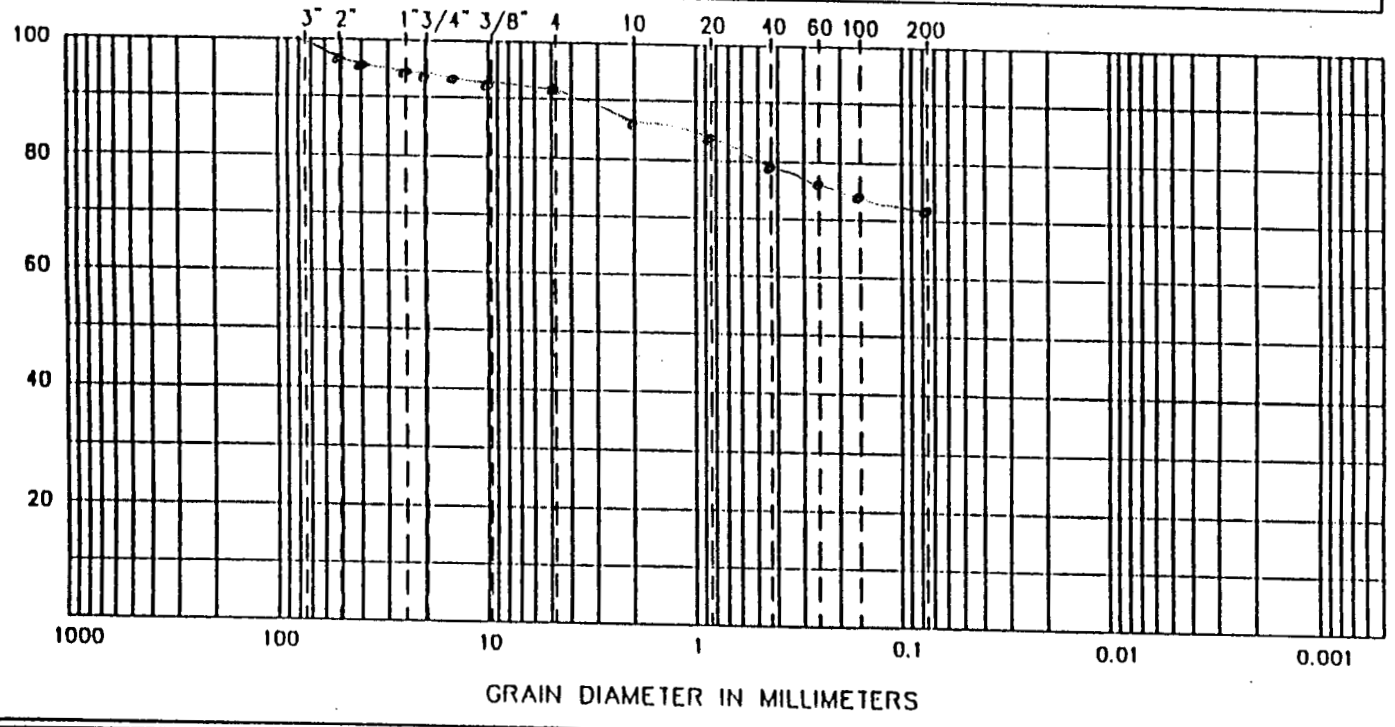
DATE: 17 day Mar month 2005 year

SAMPLE NO.: CF03-1 QA ID: DLC

CURVE COEFFICIENTS: $(C_u)\frac{D_{60}}{D_{10}} =$ ..... $(C_c)\frac{D_{30}^2}{D_{60} \times D_{10}} =$ .....

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

U.S. STANDARD SIEVE SIZES



ATTERBERG LIMITS

(LL) 36

(PL) 17

(PI) 19

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	96.7
1 1/2-in.	95.0
1-in.	94.9
3/4-in.	94.3
1/2-in.	93.3
3/8-in.	92.8
NO. 4	90.2
NO. 10	86.8
NO. 20	83.1
NO. 40	79.9
NO. 60	77.5
NO. 100	74.5
NO. 200	71.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	1
	5
	3
	6
	8

SOIL CLASSIFICATION (ASTM D 2487): CL lean clay w/ sand

800000

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 6Q134 — TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 12 day Mar month 2003 year

MATERIAL SOURCE: Test Pits 1 Thru 6 — SAMPLE NO.: CF03-1

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			13.36	13.62	13.70	13.58	
	WATER ADDED	(ml)	4% 100mL	6% 150mL	8% 200mL	10% 250mL	QA ID: MC
A	WT. OF SOIL & MOLD	(grams)	6060.1	6178.0	6214.3	6159.9	
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
C	WT. OF SOIL = A − B	(grams)	1859.2	1977.1	2013.4	1959.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	122.7	130.5	132.9	129.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.6	113.9	114.2	108.9	

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

	TARE NO.		#52	#36	#21	#664	QA ID: CHW
F	WT. OF TARE	(grams)	8.2	8.4	8.4	8.3	
G	WT. OF WET SOIL & TARE	(grams)	422.4	487.5	520.3	528.7	
H	WT. OF DRY SOIL & TARE	(grams)	377.9	426.5	448.2	446.9	
I	WT. OF WATER = G − H	(grams)	44.5	61.0	72.1	81.8	
J	WT. DRY SOIL = H − F	(grams)	369.7	418.1	439.8	438.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.0	14.6	16.4	18.7	5368

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G8134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 19 day Mar month 03 year

MATERIAL TYPE: Compacted Fill CF03-1

Weight of Total Sample	=	24995.0
Weight of Oversize Fraction	=	1797.1
Weight of Finer Fraction (- 3/8")	=	23157.9
Percentage of Oversize Fraction	= (P_C)	7.189838
Percentage of Finer Fraction (- 3/8")	= (P_F)	92.81016
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8", as decimal	=	0.156 ~~0.15~~ ~~0.015~~
(W_C) =	Water Content + 3/8", as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$ 14.6

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$ 117.7

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FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

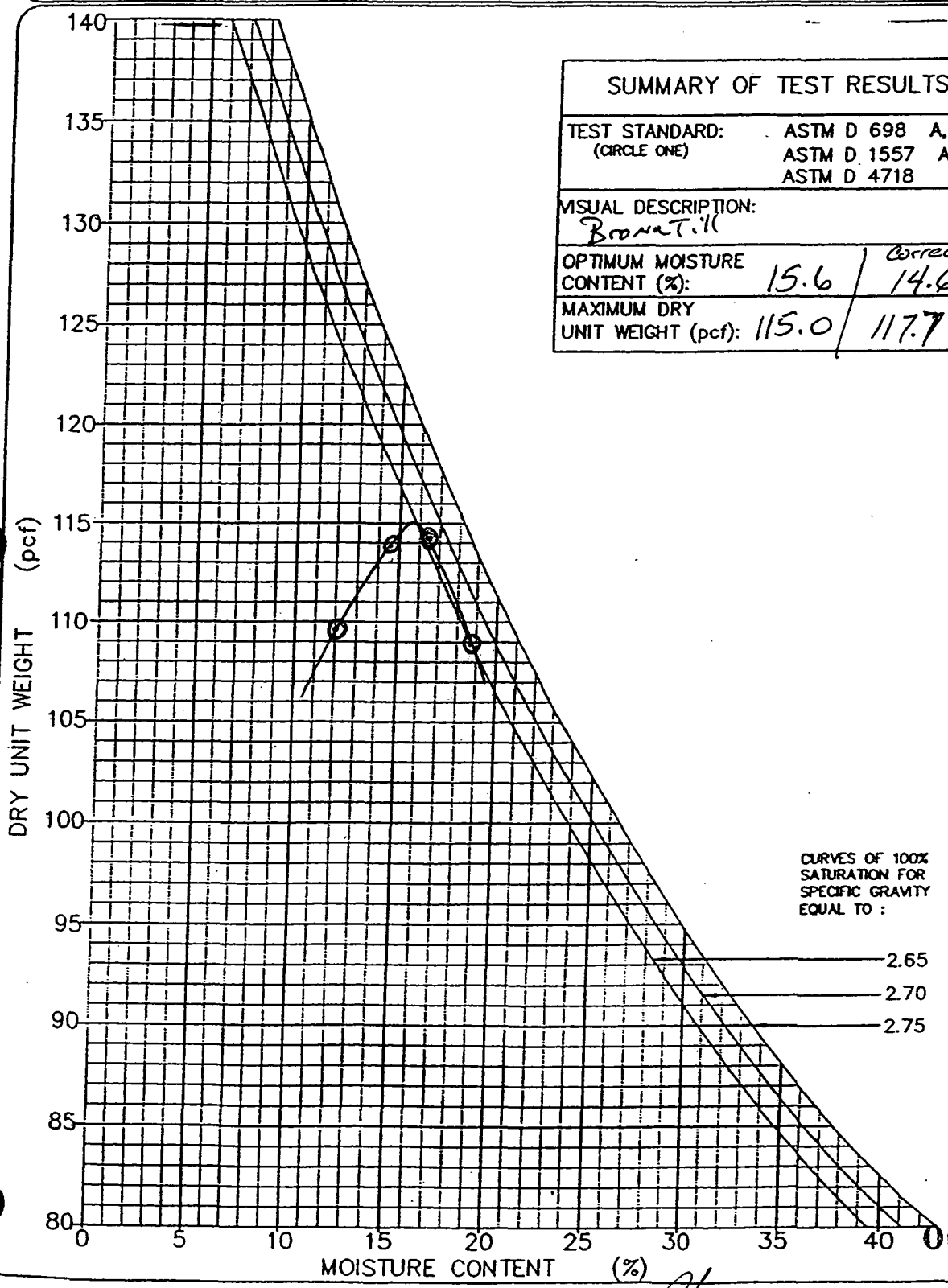
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day March month 03 year

MATERIAL TYPE: Compacted fill MATERIAL SOURCE: Cell #6 (6TP1→6TP6) SAMPLE NO.: CF03-1

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CL
VISUAL DESCRIPTION: Brown Till			CL
OPTIMUM MOISTURE CONTENT (%):	15.6	Corrected 14.6	CW
MAXIMUM DRY UNIT WEIGHT (pcf):	115.0	117.7	CW



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FLUOR FERNALD, INC.

ATTERBERG LIMITS TEST

(ASTM D 4318) 5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 69134 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 17 day Mar month 2003 year

MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: Test Pit 10 th 12 SAMPLE NO. CF03-2

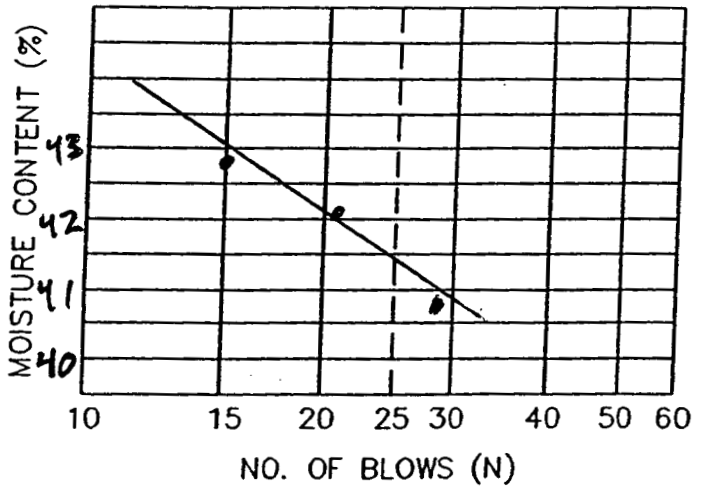
LIQUID LIMIT DETERMINATION

QA ID: AZ

	TARE NO.		1.8	3.2	2.9	
A	WT. OF TARE	(grams)	28.79	27.83	31.46	
B	WT. OF WET SOIL & TARE	(grams)	45.03	48.56	57.14	
C	WT. OF DRY SOIL & TARE	(grams)	40.17	42.42	45.46	
D	WT. OF WATER = B-C	(grams)	4.86	6.14	5.68	
E	WT. OF DRY SOIL = C-A	(grams)	11.38	14.59	14.00	
F	MOISTURE CONTENT = (D/E)X100	(%)	42.7	42.1	40.6	
N	NUMBER OF BLOWS		15	21	28	

DRYING TARE NO.

CURING TARE NO.



PLASTIC LIMIT DETERMINATION

QA ID: AZ

	TARE NO.		#223	#209		
A	WT. OF TARE	(grams)	3.60	3.46		
B	WT. OF WET SOIL & TARE	(grams)	11.81	13.68		
C	WT. OF DRY SOIL & TARE	(grams)	10.55	12.11		
D	WT. OF WATER = B-C	(grams)	1.26	1.57		
E	WT. OF DRY SOIL = C-A	(grams)	6.95	8.65		
F	MOISTURE CONTENT = (D/E)X100	(%)	18.1	18.2		

LIQUID LIMIT (LL) = 41 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 23

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: G0134 TASK NO.: 04.1

DESCRIPTION: PHASE IIII — DATE: 11 day MAR month 2003 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: CF03-2

SOIL SAMPLE SIZE	+3/8 = 834.5	MOISTURE = 458.0	TOTAL = 19572.6
	-3/8 = 18280.1		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	42.04 −1.74 = 40.30 (grams)	SAND	FINE GRAIN
		115	65

		BEFORE WASH +3/8	BEFORE WASH −3/8	AFTER WASH +3/8	AFTER WASH −3/8
TARE NO.		L-2	L-2	L-8 762.1	L-8
WT. OF DRY SAMPLE PLUS TARE	(grams)	1025.4	1000.7	~~192.0~~ CHW	306.9
WT. OF TARE	(grams)	190.9	190.9	193.0	193.0
WT. OF DRY SAMPLE	(grams)	834.5	809.8	569.1	113.9

SIEVE ANALYSIS — QA ID: DAE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	346.3	1.8	98.2		100
1 1/2in	38.1	346.3	1.8	98.2		
1 in	25.4	441.6	2.3	97.7		
3/4 in	19.1	524.5	2.7	97.3		90-100
1/2 in	12.7	669.3	3.4	96.6		
3/8 in	9.53	809.8	4.1	95.9		
No. 4	4.75	19.3	3.4	96.6	92.6	
No. 10	2.00	37.8	6.6	93.4	89.6	
No. 20	0.850	51.9	9.1	90.9	87.2	
No. 40	0.425	65.0	11.4	88.6	85.0	
No. 60	0.250	79.6	14.0	86.0	82.5	
No. 100	0.125	96.1	16.9	83.1	80.0	
No. 200	0.075	113.8	20.0	80.0	76.7	50-100
PAN	—		—	—		

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COMMENTS:

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%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. 6Q1341 TASK NO.: 041

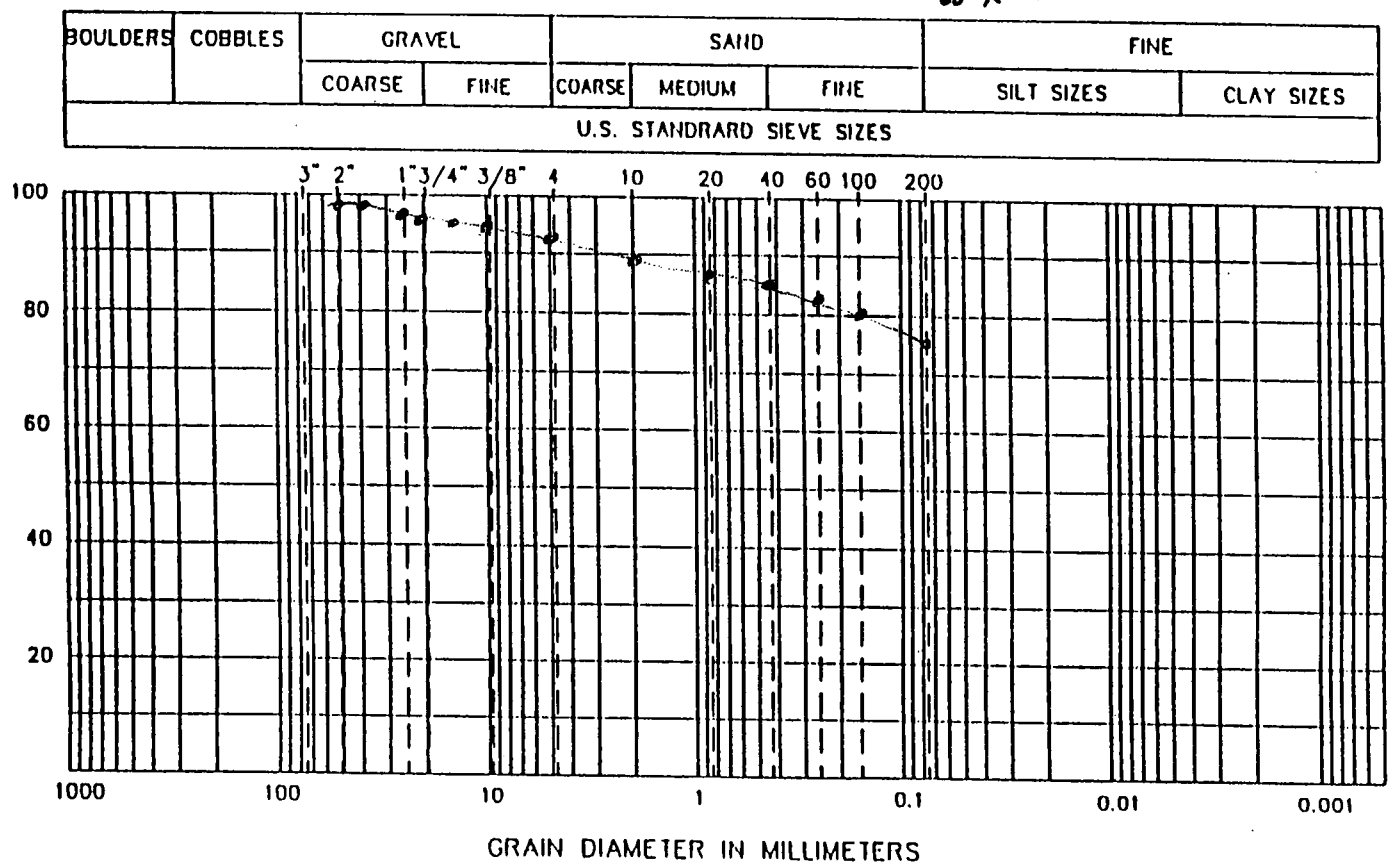
DESCRIPTION: Phase IV

DATE: 17 day Mar month 2003 year

MATERIAL TYPE: Compacted Soil

SAMPLE NO.: CF03-2 QA ID: DDE

CURVE COEFFICIENTS: $(C_u)\ \frac{D_{60}}{D_{10}} =$ ..... $(C_c)\ \frac{D_{30}^2}{D_{60} \times D_{10}} =$ .....



ATTERBERG LIMITS

(LL) 41

(PL) 18

(PI) 23

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	98.2
1 1/2-In.	98.2
1-In.	97.7
3/4-In.	97.3
1/2-In.	96.6
3/8-In.	95.9
NO. 4	92.6
NO. 10	89.6
NO. 20	87.2
NO. 40	85.0
NO. 60	82.5
NO. 100	80.0
NO. 200	76.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	51
	43
	36
	28

SOIL CLASSIFICATION (ASTM D 2487): CL lean clay w/ sand

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000014

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. GQ1341 — TASK NO.: 04.1

MATERIAL TYPE: Compacted Fill — MATERIAL SOURCE: Top P.7 7 Pm 9 — DATE: 14 day Mar month 2003 year — SAMPLE NO.: LF03-2

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			13	13.09	13.33	13.64	13.55
	WATER ADDED	(ml)	14%	6% 150mL	8% 200mL	10% 250mL	12% 300mL
A	WT. OF SOIL & MOLD	(grams)		5937.6	~~6086.3~~ 6045.5	~~6165.5~~ 6183.1	6146.3
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
C	WT. OF SOIL = A − B	(grams)		1736.7	~~1885.6~~ 1845.6	~~1964.6~~ 1982.2	1945.4
D	WET UNIT WT.(1) = C X 0.066	(pcf)		114.6	~~124.4~~ 121.8	~~129.7~~ 131.1	128.4
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		102.6	~~109.6~~ 107.3	113.2	109.3

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL. THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

	TARE NO.			#665	#27	#651	#656
F	WT. OF TARE	(grams)		8.3	8.2	8.2	8.2
G	WT. OF WET SOIL & TARE	(grams)		515.4	504.4	495.1	484.5
H	WT. OF DRY SOIL & TARE	(grams)		462.4	445.4	431.2	413.5
I	WT. OF WATER = G − H	(grams)		53.0	59.0	63.9	71.0
J	WT. DRY SOIL = H − F	(grams)		454.1	437.2	423.0	405.3
K	MOISTURE CONTENT = (I/J) X 100	(%)		11.7	13.5	15.1	17.5
				1.117	1.135	1.151	1.175

QA ID: ____

CHECKED BY: CHW

SHEET NO. 2 OF 2

000015

5368

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

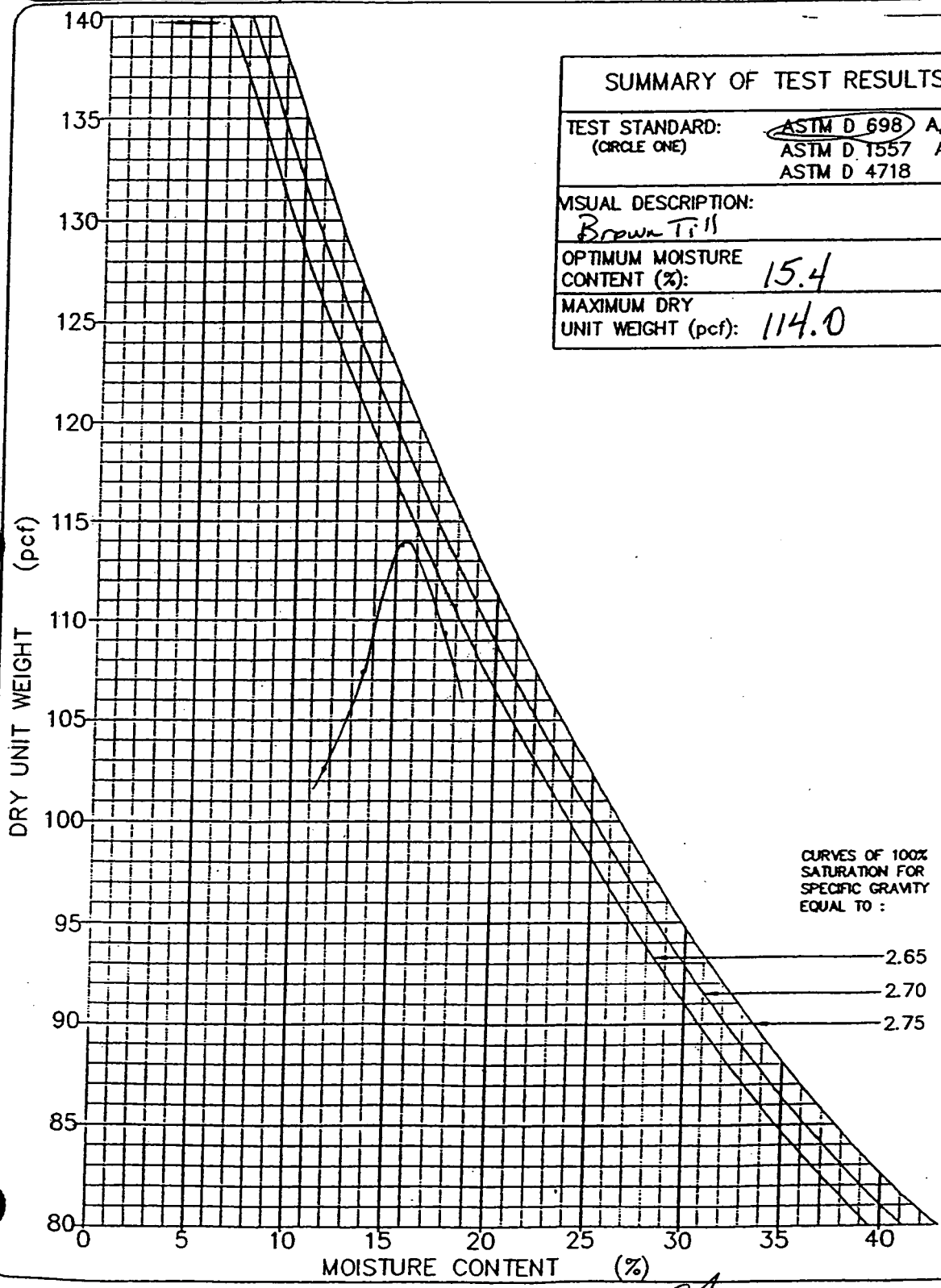
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day Mar month 2003 year

MATERIAL TYPE: Compacted fill MATERIAL SOURCE: Test Pit 7 thru 9 SAMPLE NO. CF03-2

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718	DLE
VISUAL DESCRIPTION: Brown Till		CA
OPTIMUM MOISTURE CONTENT (%):	15.4	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	114.0	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: D4.1

DESCRIPTION: Phase IV DATE: 17 day MAR month 03 year

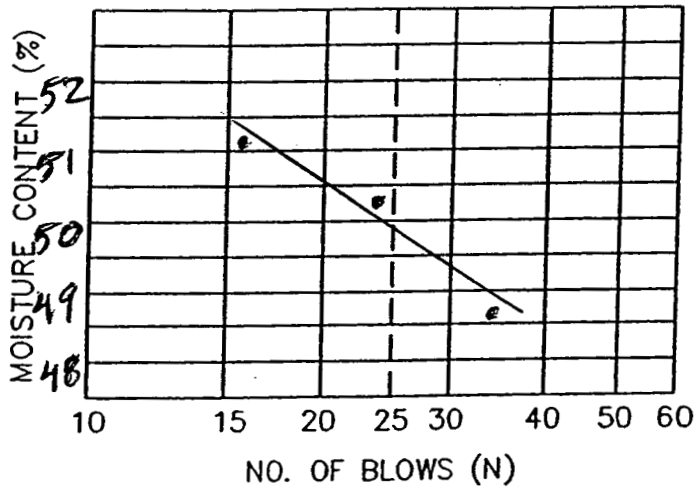
MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: 6TP10 → 6TP12 SAMPLE NO.: CFB3-3

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.6	1.9	2.1	
A	WT. OF TARE	(grams)	28.87	28.56	28.24	
B	WT. OF WET SOIL & TARE	(grams)	46.66	47.77	44.99	
C	WT. OF DRY SOIL & TARE	(grams)	40.64	41.34	39.51	
D	WT. OF WATER = B-C	(grams)	6.02	6.43	5.48	
E	WT. OF DRY SOIL = C-A	(grams)	11.77	12.78	11.27	
F	MOISTURE CONTENT = (D/E)X100	(%)	51.1	50.3	48.6	
N	NUMBER OF BLOWS		16	24	35	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW/DTE

	TARE NO.		2.6	3.1		
A	WT. OF TARE	(grams)	28.55	28.38		
B	WT. OF WET SOIL & TARE	(grams)	37.29	36.62		
C	WT. OF DRY SOIL & TARE	(grams)	36.00	35.41		
D	WT. OF WATER = B-C	(grams)	1.29	1.21		
E	WT. OF DRY SOIL = C-A	(grams)	7.45	7.03		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.3	17.2		

LIQUID LIMIT (LL) = 50 PLASTIC LIMIT (PL) = ~~17.0~~ PLASTICITY INDEX (PI) = ~~33.0~~

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 12 day Mar month 2003 year

MATERIAL TYPE: ~~Low Perm Clay~~ compacted C.W. SAMPLE NO.: CF03-3

SOIL SAMPLE SIZE	+3/8 = 86.9g	MOISTURE = 311.4g	TOTAL = 17444.6
	-3/8 = 17,046.3g		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-44	L-44	LL-6	LL-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	278.0	275.6	769.7	281.7
WT. OF TARE	(grams)	191.1	191.1	198.0	198.0
WT. OF DRY SAMPLE	(grams)	86.9	84.5	571.7	83.7

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	Ø	Ø	100		
3/4 in	19.1	25.6	0.1	99.9		90-100
1/2 in	12.7	70.4	0.4	99.6		
3/8 in	9.53	84.5	0.5	99.5		
No. 4	4.75	3.3	0.6	99.4	98.9	
No. 10	2.00	7.3	1.3	98.7	98.2	
No. 20	0.850	20.7	3.6	96.4	95.9	
No. 40	0.425	38.8	6.8	93.2	92.7	
No. 60	0.250	54.2	9.5	90.5	90.0	
No. 100	0.125	69.2	12.1	87.9	87.5	
No. 200	0.075	83.6	14.6	85.4	85.0	50-100
PAN	—		—	—		

COMMENTS:

000018

%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)

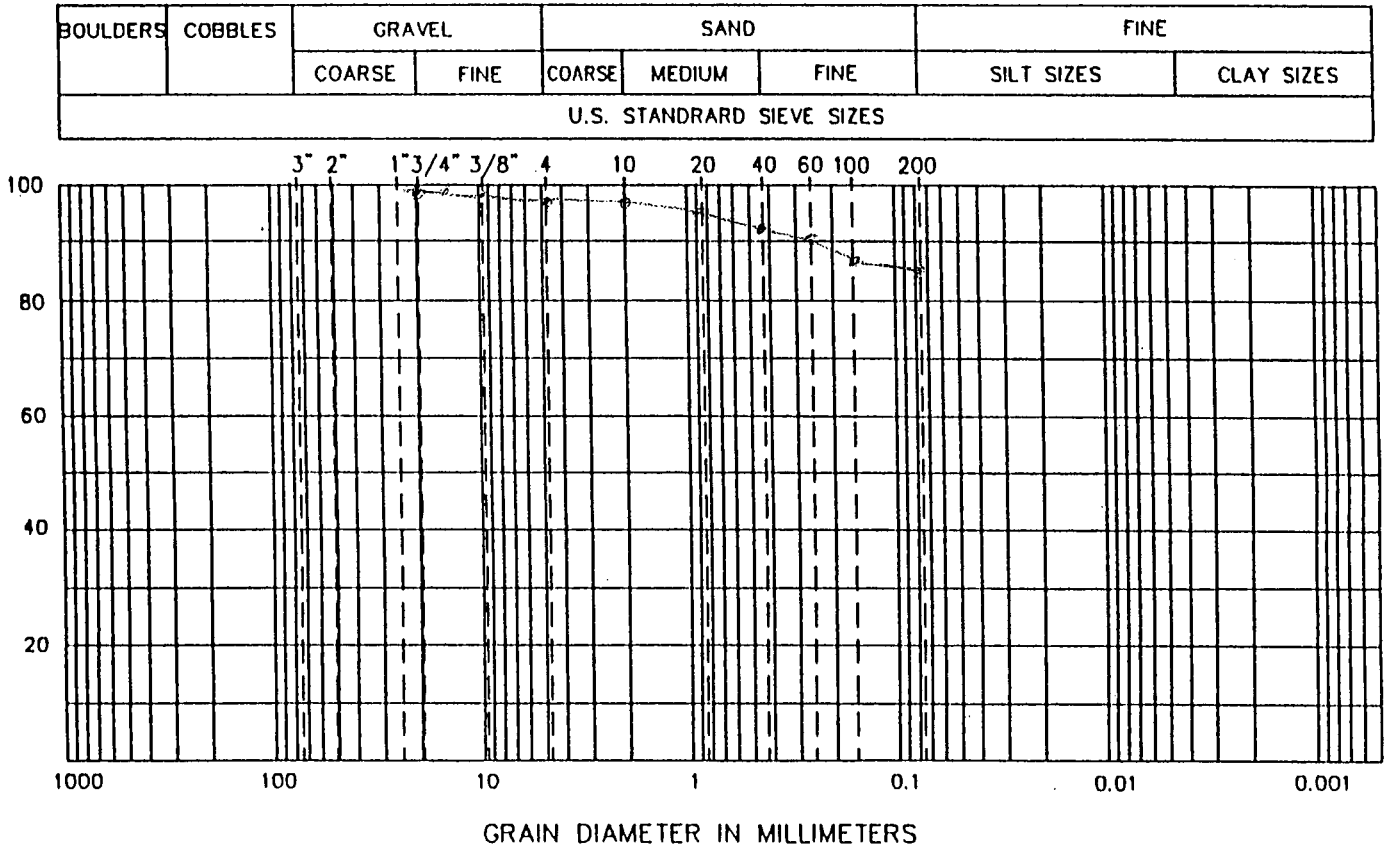
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO. 6Q1341 — TASK NO.: 041

DESCRIPTION: Phase II — DATE: 19 day Mar month 2003 year

MATERIAL TYPE: Compacted fill — SAMPLE NO. CF03-3 — QA ID: DAE

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 50

(PL) ~~17~~ 17

(PI) 33

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	99.9
1/2-in.	99.6
3/8-in.	99.5
NO. 4	98.9
NO. 10	98.2
NO. 20	95.9
NO. 40	92.7
NO. 60	90.0
NO. 100	87.5
NO. 200	85.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	5
	3
	6
	8

SOIL CLASSIFICATION (ASTM D 2487): CL lean Clay w/ Sand

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SHEET NO. 2 OF 2

000019

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. GQ1341 TASK NO.: 081

MATERIAL TYPE: Compacted Fill — MATERIAL SOURCE: Test pit 10 Thru 12 — SAMPLE NO.: CF03-3

DATE: 14 day Mar month 2003 year

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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.

13.38

COMPACTION OF SOIL

QA ID: DE

				12.90	13.19	13.46	
	WATER ADDED	(ml)		8% 200mL	10% 250mL	12% 300mL	14% 350mL
A	WT. OF SOIL & MOLD	(grams)		5851.4	5983.0	6078.2	6069.2
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
C	WT. OF SOIL = A − B	(grams)		1650.5	1782.1	1877.3	1868.3
D	WET UNIT WT.(1) = C X 0.066	(pcf)		108.9	117.6	123.9	123.3
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		95.7	100.9	104.4	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: DE

	TARE NO.			#24	#668	#10	#39
F	WT. OF TARE	(grams)		8.3	8.3	8.3	8.2
G	WT. OF WET SOIL & TARE	(grams)		444.7	417.0	522.0	428.5
H	WT. OF DRY SOIL & TARE	(grams)		391.9	358.9	441.0	360.9
I	WT. OF WATER = G − H	(grams)		52.8	58.1	81.0	67.6
J	WT. DRY SOIL = H − F	(grams)		383.6	350.6	432.7	352.7
K	MOISTURE CONTENT = (I/J) X 100	(%)		13.8	16.6	18.7	19.2

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CHECKED BY: CHW

1.138 1.166 1.187 1.197

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

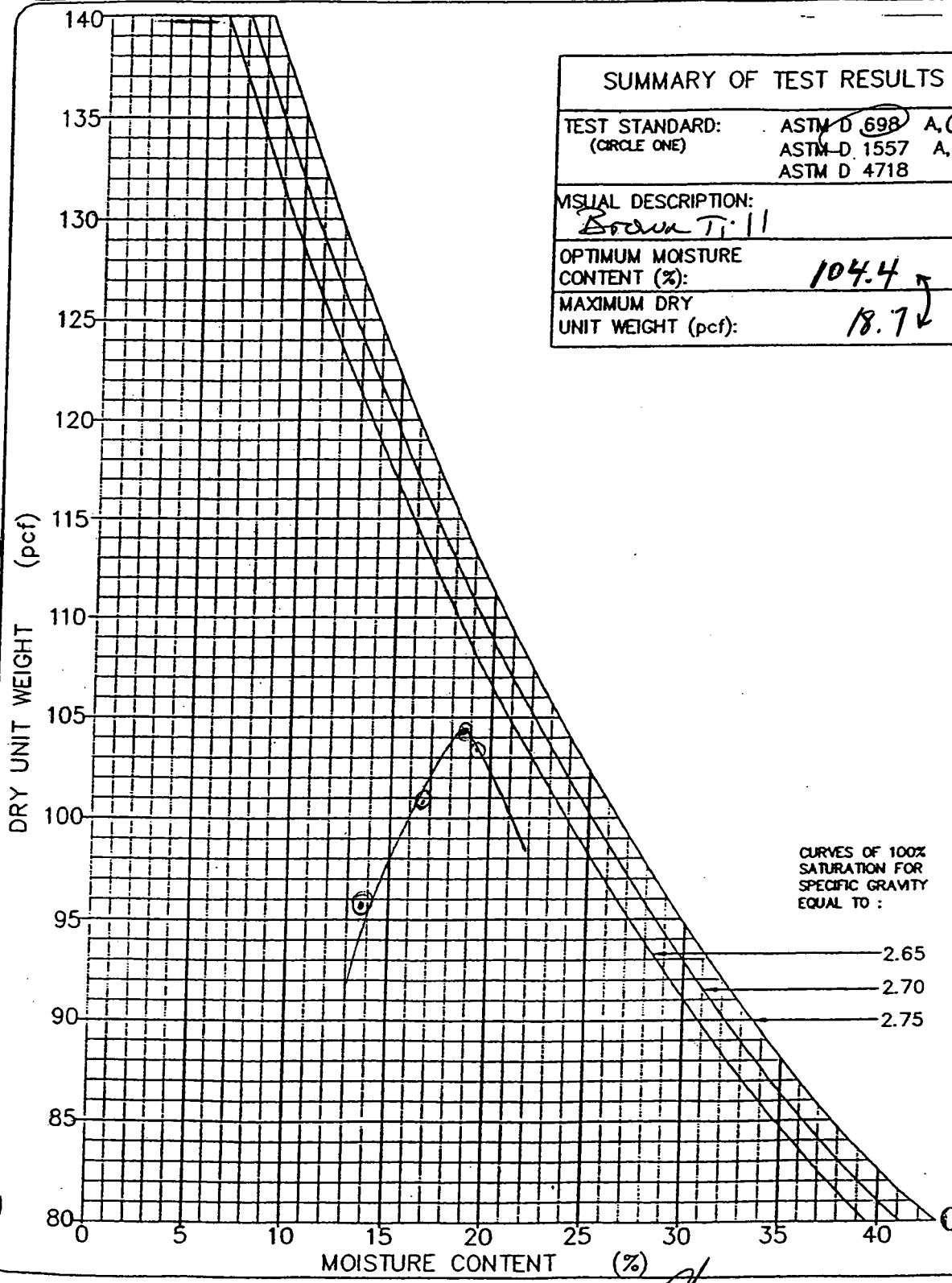
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6A1341 TASK NO.: 041

DESCRIPTION: Phase II DATE: 17 day Mar month 2003 year

MATERIAL TYPE: Comp fill MATERIAL SOURCE: Test Pit 10 Thru 12 SAMPLE NO. CF03-3

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718	PR
VISUAL DESCRIPTION: Brown Till		CHW
OPTIMUM MOISTURE CONTENT (%):	104.4	CHW
MAXIMUM DRY UNIT WEIGHT (pcf):	18.7	CHW



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.
5368

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day Mar month 2003 year

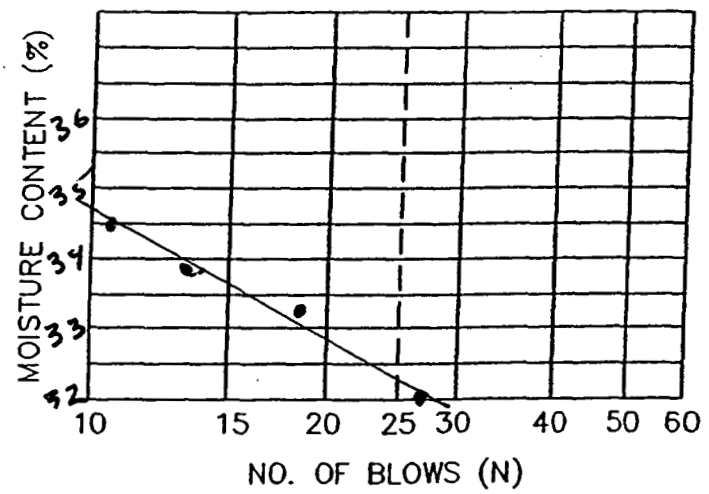
MATERIAL TYPE: Cement fill MATERIAL SOURCE: Test Pit B-17 SAMPLE NO. CF03-4

LIQUID LIMIT DETERMINATION

QA ID: DCE

	TARE NO.		2.6	3.1	1.6	2.9
A	WT. OF TARE	(grams)	28.55	28.38	28.86	31.46
B	WT. OF WET SOIL & TARE	(grams)	50.73	50.48	51.63	54.50
C	WT. OF DRY SOIL & TARE	(grams)	45.04	44.88	45.93	48.91
D	WT. OF WATER = B-C	(grams)	5.69	5.60	5.70	5.59
E	WT. OF DRY SOIL = C-A	(grams)	16.49	16.50	17.07	17.45
F	MOISTURE CONTENT = (D/E)X100	(%)	34.5	33.9	33.4	32.0
N	NUMBER OF BLOWS		11	13	17	22

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DCE

	TARE NO.		A-209	A-223		
A	WT. OF TARE	(grams)	3.46	3.61		
B	WT. OF WET SOIL & TARE	(grams)	14.04	12.43		
C	WT. OF DRY SOIL & TARE	(grams)	12.55	11.18		
D	WT. OF WATER = B-C	(grams)	1.49	1.25		
E	WT. OF DRY SOIL = C-A	(grams)	9.09	7.57		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.4	16.5		

LIQUID LIMIT (LL) = 25 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 9.0

GEOSYNTEC CONSULTANTS

FLUOR FERNALD
5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 041

DESCRIPTION: PHASE IIII DATE: 11 day Mar month 2003 year

MATERIAL TYPE: ~~Low Perm~~ CLAY (Comm. fill) SAMPLE NO.: CF03-4

SOIL SAMPLE SIZE	+3/8 = 779.4 gm	MOISTURE = 419.7	TOTAL = 24378.1 gm
	-3/8 = 23179.0	24378.1	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	52.94 − 1.84 = 51.10 (grams)	SAND	FINE GRAIN
		115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-3	L-3	L-9 797.3	L-9
WT. OF DRY SAMPLE PLUS TARE	(grams)	969.1	932.9	~~193.2~~ CAW	352.0
WT. OF TARE	(grams)	189.7	189.7	193.2	193.2
WT. OF DRY SAMPLE	(grams)	779.4	743.2	604.1	158.8

SIEVE ANALYSIS QA ID: PE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
3 in	76.2	0	0	100	
2 in	50.8	316.3	1.3	98.7	100
1 1/2in	38.1	316.3	1.3	98.7	
1 in	25.4	410.3	1.7	98.3	
3/4 in	19.1	458.4	1.9	98.1	90-100
1/2 in	12.7	609.3	2.5	97.5	
3/8 in	9.53	743.2	3.0	97.0	
No. 4	4.75	7.1	0.95 1.2 99.0	~~98.8~~ ~~95.8~~	96.0
No. 10	2.00	25.4	3.4 ~~4.2~~ 96.6	~~95.8~~ ~~92.9~~	93.6
No. 20	0.850	46.6	6.3 ~~7.7~~ 93.7	~~92.3~~ ~~89.5~~	90.9
No. 40	0.425	70.3	9.5 ~~11.6~~ 90.5	~~88.4~~ ~~85.7~~	87.8
No. 60	0.250	93.1	12.5 ~~15.4~~ 87.5	~~84.6~~ ~~82.1~~	84.8
No. 100	0.125	123.8	16.7 ~~20.5~~ 83.3	~~79.4~~ ~~77.5~~	77.1 80.8
No. 200	0.075	157.5	21.2 ~~26.1~~ 78.8	~~73.9~~ ~~71.7~~	76.4 50-100
PAN	—	158.8	—	—	

.97

COMMENTS:

000023

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CH 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

DESCRIPTION: phase IV

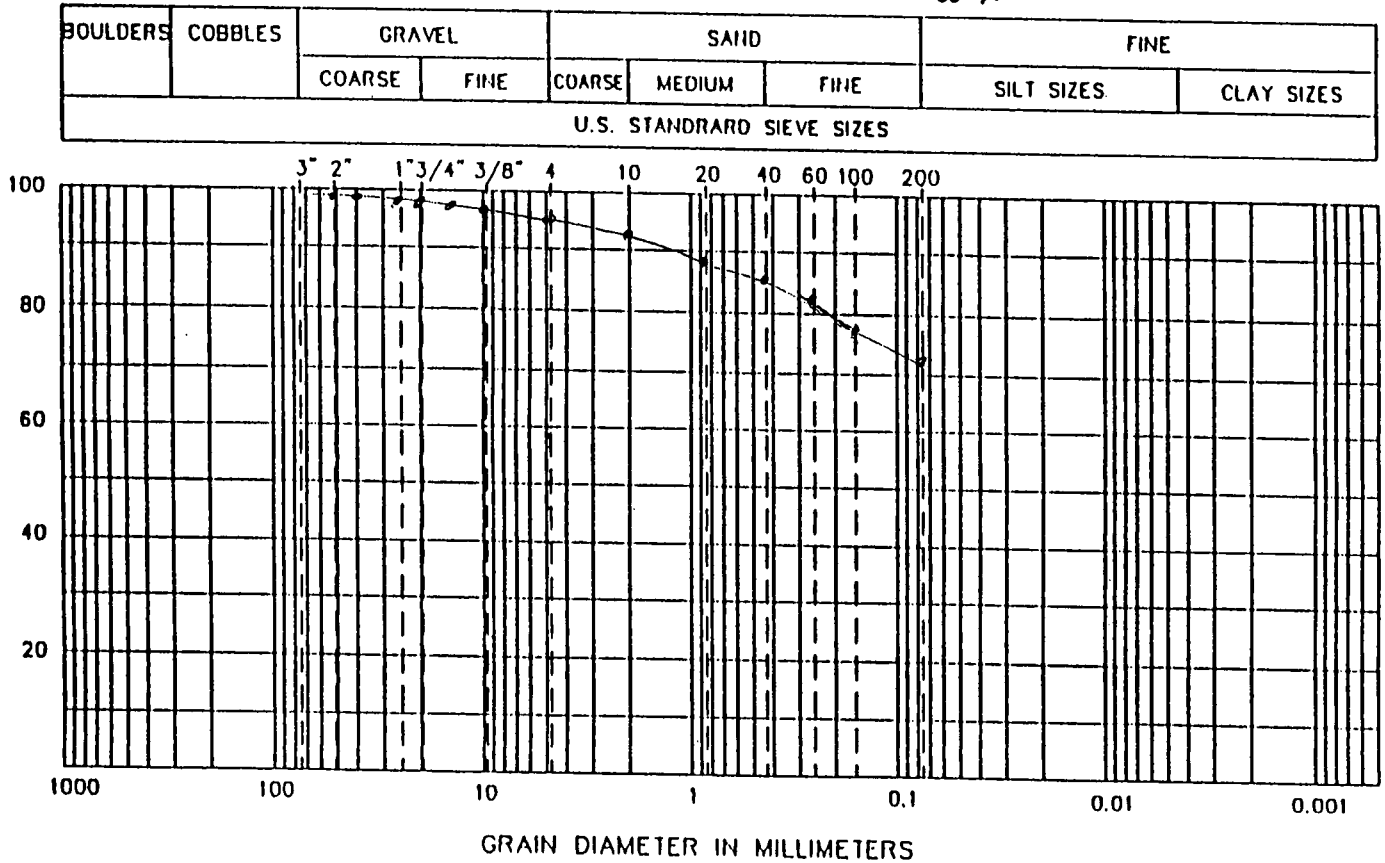
MATERIAL TYPE: Comp. Fill

PROJECT NO. GQ1341 TASK NO.: 041

DATE: 17 day Mar month 2003 year

SAMPLE NO.: CF-03-4 QA ID: [illegible]

CURVE COEFFICIENTS: $(C_u)\frac{D_{60}}{D_{10}} =$ ..... $(C_c)\frac{D_{30}^2}{D_{60} \times D_{10}} =$ .....



ATTERBERG LIMITS

(LL) 25

(PL) 16

(PI) 9

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	98.7
1 1/2-in.	98.7
1-in.	98.3
3/4-in.	98.1
1/2-in.	97.5
3/8-in.	97.0
NO. 4	95.8
NO. 10	92.9
NO. 20	89.5
NO. 40	85.7
NO. 60	82.1
NO. 100	77.5
NO. 200	71.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	57
	36
	8

SOIL CLASSIFICATION (ASTM D 2487): CL - lean Clay w Sand

000024

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CHECKED BY: [illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1341 TASK NO.: 044

MATERIAL TYPE: Compact F-F5 — DATE: 17 day Mar month 2005 year

MATERIAL SOURCE: Test pit 13 thru 17 — SAMPLE NO.: CF03-4

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED	(ml)	13.58 6% 150 mL	13.62 8% 200 mL	13.59 10% 250 mL		13.39 QA ID: ~~0~~ 4% 100 mL
A	WT. OF SOIL & MOLD	(grams)	6159.9	6178.0	6164.4		6073.7
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
C	WT. OF SOIL = A − B	(grams)	1959.0	1977.1	1963.5		1873.1
D	WET UNIT WT.(1) = C X 0.066	(pcf)	~~129.9~~ 129.3	130.5	129.6		123.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	~~113.8~~ 113.2	112.1	109.9		110.5

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

	TARE NO.		#36	#657	#25		QA ID: #52
F	WT. OF TARE	(grams)	8.3	8.1	8.3		8.1
G	WT. OF WET SOIL & TARE	(grams)	528.7	486.4	563.4		545.8
H	WT. OF DRY SOIL & TARE	(grams)	464.1	418.9	479.1		488.5
I	WT. OF WATER = G − H	(grams)	64.6	67.5	84.3		57.3
J	WT. DRY SOIL = H − F	(grams)	455.8	410.8	470.8		480.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	14.2 ~~14.17~~	~~16.43~~ 16.4	17.0		11.9

1.1417 1.1643 1.179 1.119

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

-- 5368

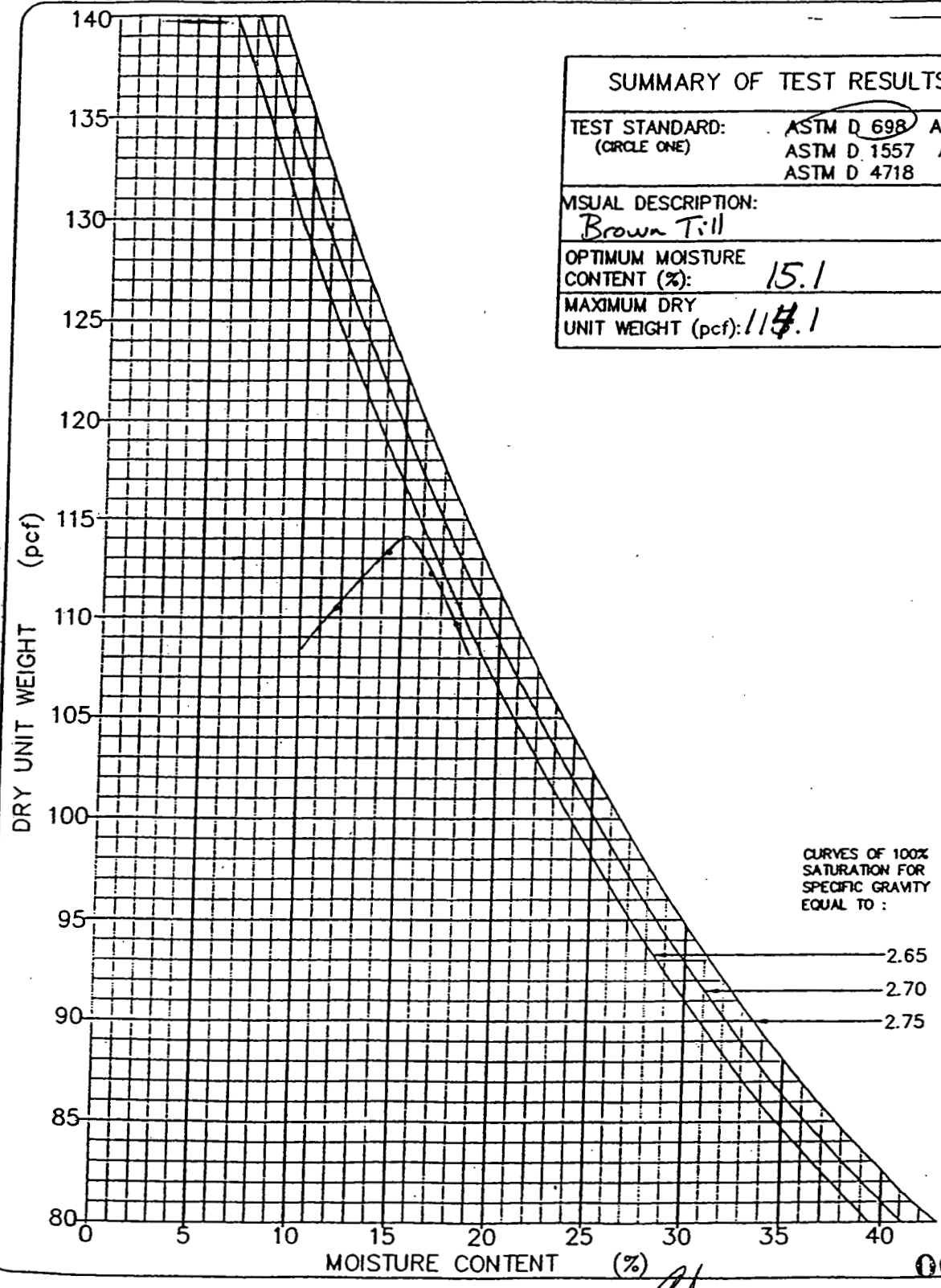
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 09.1

DESCRIPTION: Phase II DATE: 19 day Mar month 2003 year

MATERIAL TYPE: Comp. fill MATERIAL SOURCE: Test P.4 13th 17 SAMPLE NO. CF03-4

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718	pse
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%):	15.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	114.1	CJ



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FLUOR FERNALD, INC.

5368

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day March month 2003 year

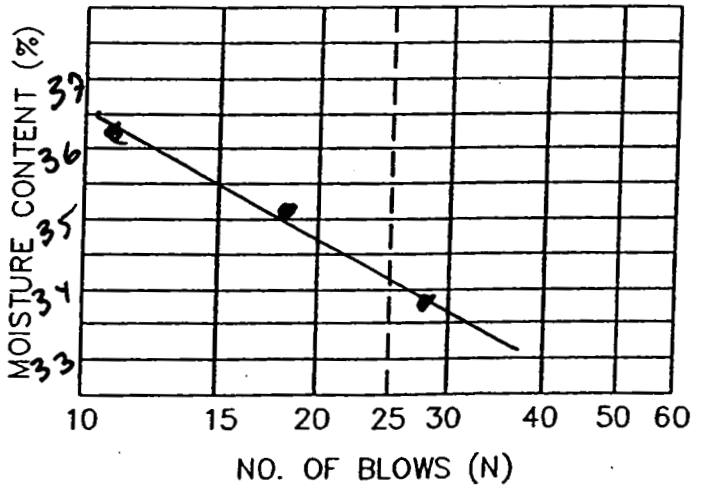
MATERIAL TYPE: Compacted S.LL MATERIAL SOURCE: Test Pits 18 Thru 21 SAMPLE NO. CFO3-5

LIQUID LIMIT DETERMINATION

QA ID: AJE

	TARE NO.		3.2	1.5	2.1	
A	WT. OF TARE	(grams)	27.83	28.50	28.24	
B	WT. OF WET SOIL & TARE	(grams)	50.65	50.76	51.29	
C	WT. OF DRY SOIL & TARE	(grams)	44.58	45.00	45.45	
D	WT. OF WATER = B-C	(grams)	6.07	5.76	5.84	
E	WT. OF DRY SOIL = C-A	(grams)	16.75	16.42	17.21	
F	MOISTURE CONTENT = (D/E)X100	(%)	36.2	35.1	33.9	
N	NUMBER OF BLOWS		12	18	28	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: AJE

	TARE NO.		A220	A214		
A	WT. OF TARE	(grams)	3.44	3.53		
B	WT. OF WET SOIL & TARE	(grams)	15.87	16.16		
C	WT. OF DRY SOIL & TARE	(grams)	14.03	14.28		
D	WT. OF WATER = B-C	(grams)	1.84	1.88		
E	WT. OF DRY SOIL = C-A	(grams)	10.59	10.75		
	MOISTURE CONTENT = (D/E)X100	(%)	17.4	17.5		

LIQUID LIMIT (LL) = 34 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 17

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 12 day MAR month 2003 year

MATERIAL TYPE: Low Perm CLAY Compacted f.LL SAMPLE NO.: KF03-5

SOIL SAMPLE SIZE	+3/8 = 747.5 gm	MOISTURE = 408.6 gm	TOTAL = 20588.2
	-3/8 = 19432.2	20588.2	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	44.65 − 1.81 = 42.84 (grams)	SAND	FINE GRAIN
		115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		LL-4	LL4	K	K 239.2
WT. OF DRY SAMPLE PLUS TARE	(grams)	892.8	849.4	650.9	~~650.9~~
WT. OF TARE	(grams)	145.3	145.3	101.6	101.6
WT. OF DRY SAMPLE	(grams)	747.5	704.1	549.3	~~650.9~~ 137.6

SIEVE ANALYSIS QA ID: DLE/BS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		100
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	381.9	1.9	98.1		
3/4 in	19.1	440.9	2.1	97.9		90-100
1/2 in	12.7	624.3	3.0	97.0		
3/8 in	9.53	702.4	3.4	96.6		.966
No. 4	4.75	5.9	1.1	98.9	95.5	
No. 10	2.00	21.5	3.9	96.1	92.8	
No. 20	0.850	42.9	7.8	92.2	89.1	
No. 40	0.425	64.3	11.7	88.3	85.3	
No. 60	0.250	83.7	15.2	84.8	~~84.5~~ 81.9	
No. 100	0.125	108.9	19.8	80.2	77.5	
No. 200	0.075	136.8	24.9	75.1	~~72.5~~ 125	50-100
PAN	—	137.6	—	—		

COMMENTS:

000028

%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)

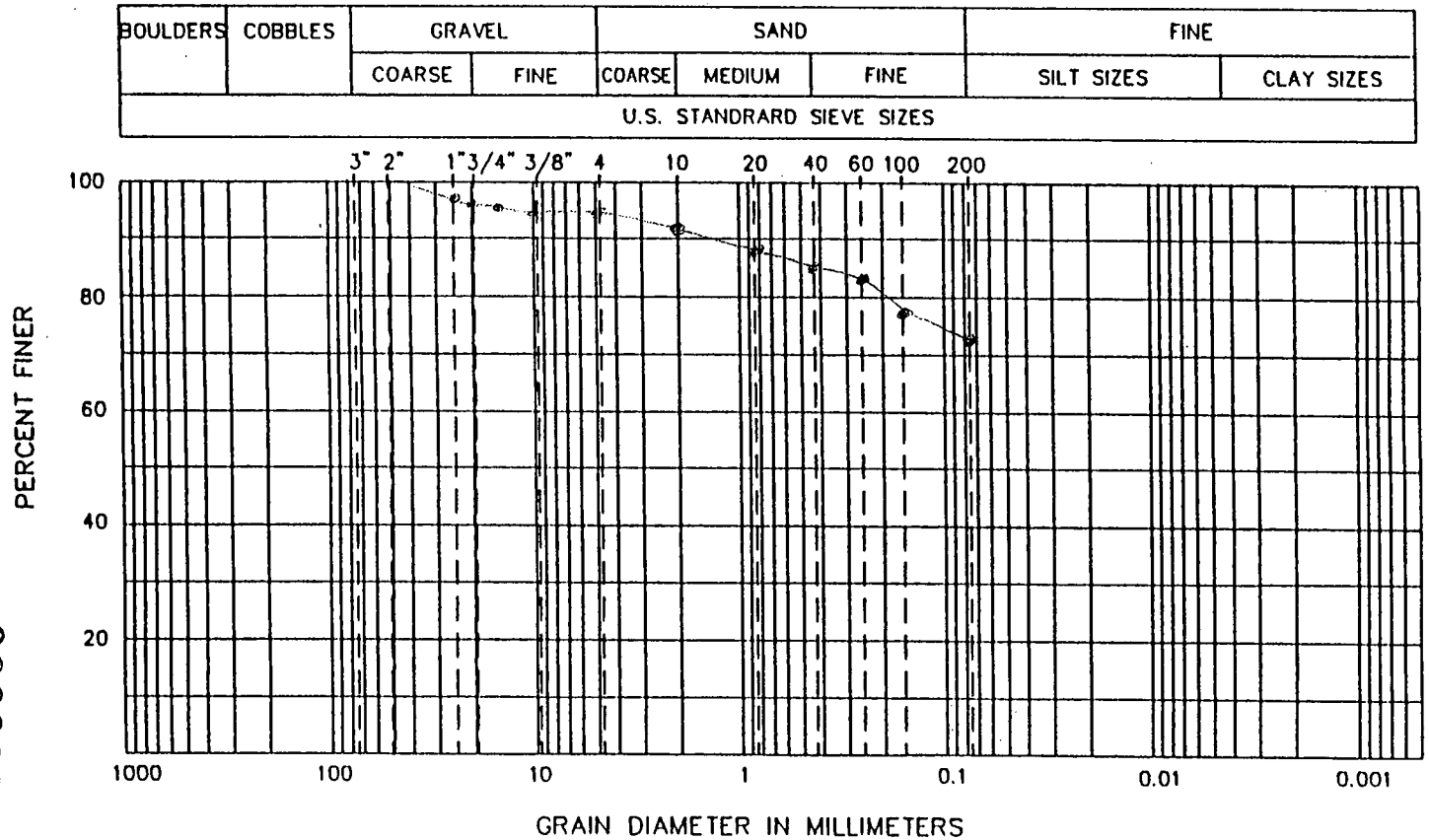
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO. GQ1341 — TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: 19 day Mar month 2003 year

MATERIAL TYPE: Compacted FLC — SAMPLE NO.: CE03-5 — QA ID: DLE

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 34

(PL) 17

(PI) 17

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.1
3/4-in.	97.9
1/2-in.	97.0
3/8-in.	96.6
NO. 4	95.5
NO. 10	92.8
NO. 20	89.1
NO. 40	85.3
NO. 60	84.5
NO. 100	79.5
NO. 200	72.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	57
	43
	36
	28

SOIL CLASSIFICATION (ASTM D 2487): CL - lean Clay w/sand

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000029

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

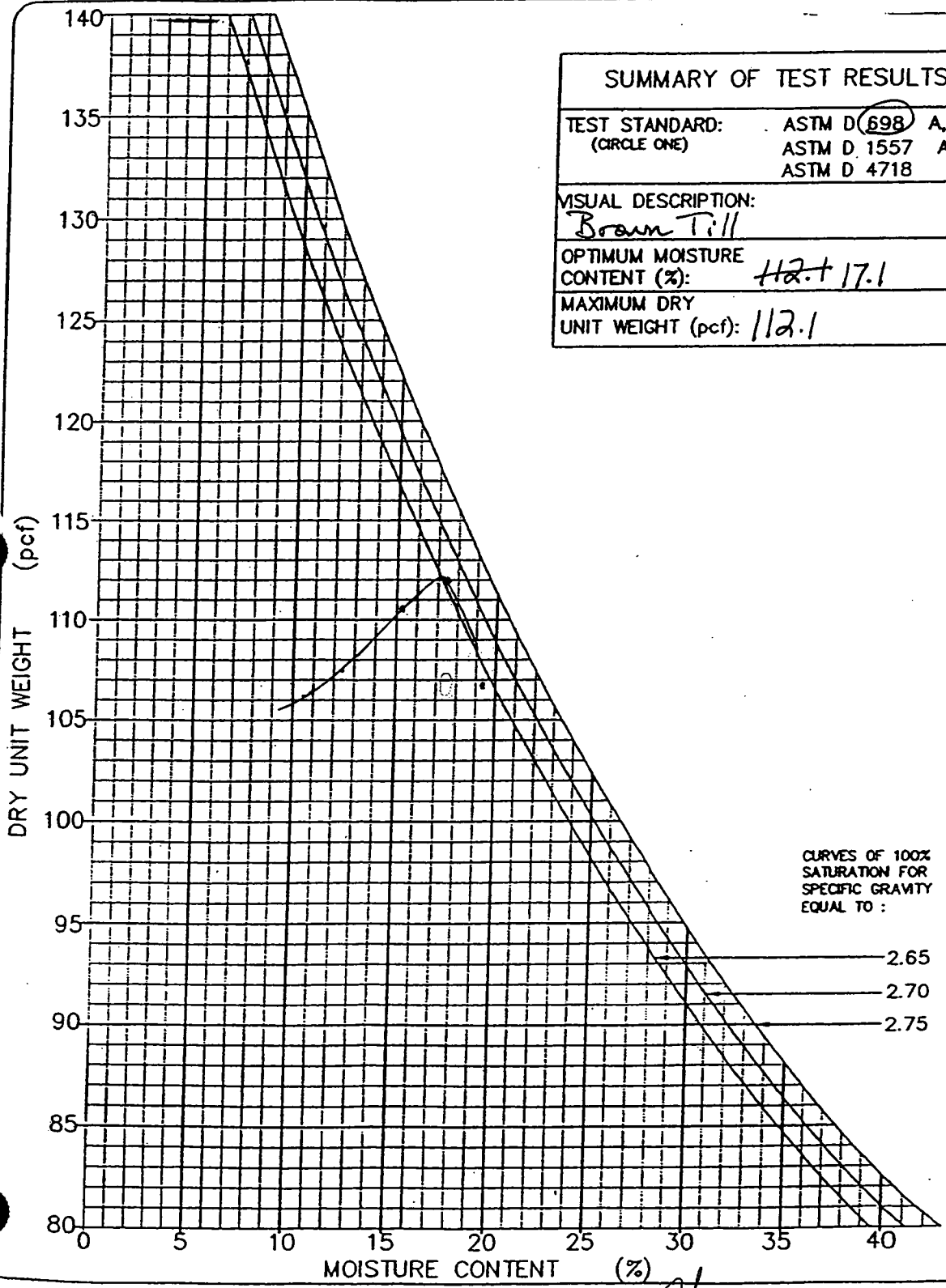
5368

PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 14 day Mar month 2003 year

MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: Cell-6 (6TP-18 & 6TP21) SAMPLE NO.: CF03-5



SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D (698) A, (B) C ASTM D 1557 A, B, C ASTM D 4718	
VISUAL DESCRIPTION:	Brown Till	
OPTIMUM MOISTURE CONTENT (%):	~~112.1~~ 17.1	
MAXIMUM DRY UNIT WEIGHT (pcf):	112.1	

000030

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 13 day March month 03 year

MATERIAL TYPE: Compacted Fill

MATERIAL SOURCE: Cell #6 (6TP18 → 6TP21)

SAMPLE NO.: CF03-5

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: CAW

			2%	4%	6%	8%	10%
	WATER ADDED	(ml)	50ml	100ml	150ml	200ml	250ml
A	WT. OF SOIL & MOLD	(grams)	5978.4	6032.9	6128.1	6191.6	6132.7
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
C	WT. OF SOIL = A − B	(grams)	1777.5	1832.0	~~1972.2~~ 1927.2	1990.7	1931.8
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.3	120.9	127.2	131.4	127.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	106.1	107.4	110.6	112.0	106.9

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: CAW

	TARE NO.		622	31	25	36	664
F	WT. OF TARE	(grams)	8.0	8.3	8.3	8.3	8.3
G	WT. OF WET SOIL & TARE	(grams)	512.8	503.9	521.2	437.4	402.2
H	WT. OF DRY SOIL & TARE	(grams)	464.8	448.7	454.1	374.2	338.5
I	WT. OF WATER = G − H	(grams)	48.0	55.2	67.1	63.2	63.7
J	WT. DRY SOIL = H − F	(grams)	456.8	440.4	445.8	365.9	330.2
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.51	12.53	15.05	17.27	19.29

000031

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FLUOR FERNALD, INC.

5368

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G-01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 31 day Mar month 2003 year

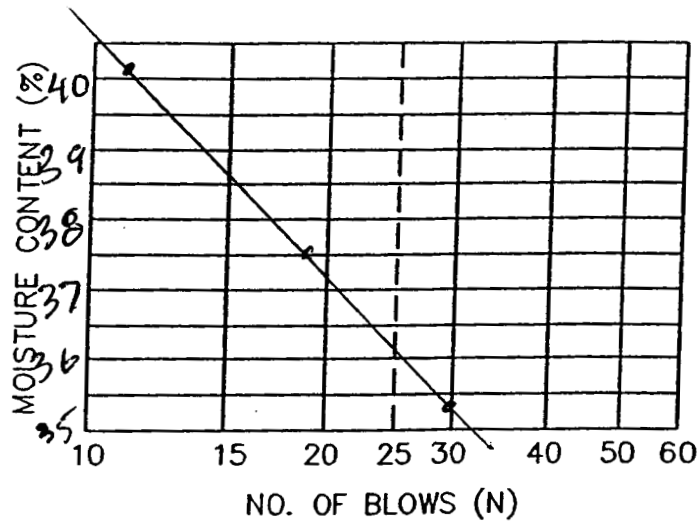
MATERIAL TYPE: Comp Fill MATERIAL SOURCE: Cell 6 EXCAVATION SAMPLE NO. CF-03-6

LIQUID LIMIT DETERMINATION

QA ID: DTE

	TARE NO.		2.1	3.2	2.9	1.1
A	WT. OF TARE	(grams)	28.24	27.82	31.46	28.77
B	WT. OF WET SOIL & TARE	(grams)	48.45	53.04	50.62	
C	WT. OF DRY SOIL & TARE	(grams)	42.66	46.16	45.61	
D	WT. OF WATER = B-C	(grams)	5.79	6.88	5.01	
E	WT. OF DRY SOIL = C-A	(grams)	14.42	18.34	14.15	
F	MOISTURE CONTENT = (D/E)X100	(%)	40.15	37.51	35.4	
N	NUMBER OF BLOWS		11	19	30	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DTE

	TARE NO.		A214	A223		
A	WT. OF TARE	(grams)	3.54	3.61		
B	WT. OF WET SOIL & TARE	(grams)	11.67	14.06		
C	WT. OF DRY SOIL & TARE	(grams)	10.30	12.29		
D	WT. OF WATER = B-C	(grams)	1.37	~~1.67~~		
E	WT. OF DRY SOIL = C-A	(grams)	6.76	8.68		
	MOISTURE CONTENT = (D/E)X100	(%)	20.3	~~19.2~~ 20.4		

LIQUID LIMIT (LL) = 36 PLASTIC LIMIT (PL) = ~~14~~ 20 PLASTICITY INDEX (PI) = 16

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: ~~PHASE III~~ Phase V DATE: 25 day Mar month 2003 year

MATERIAL TYPE: ~~Low Perm CLAY~~ compacted Fill SAMPLE NO.: EF03-6

SOIL SAMPLE SIZE	+3/8 = 2.8g	MOISTURE = 264.8g	TOTAL = 19,636.0g
	-3/8 = 19368.7g		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		#657	L-3	#657	L-3
WT. OF DRY SAMPLE PLUS TARE	(grams)	10.6	813.1	10.5	228.2
WT. OF TARE	(grams)	8.1	189.8	8.1	189.8
WT. OF DRY SAMPLE	(grams)	2.5	623.3	2.4	38.4

SIEVE ANALYSIS QA ID: DLE/TBB

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	0	0	100		
3/4 in	19.1	0	0	100		90-100
1/2 in	12.7	0	0	100		
3/8 in	9.53	2.4	0.01	99.99		
No. 4	4.75	0.3	0.05	99.95	99.9	
No. 10	2.00	3.5	0.6	99.4	99.4	
No. 20	0.850	12.2	2.0	98.0	98.0	
No. 40	0.425	21.0	3.4	96.6	96.6	
No. 60	0.250	26.7	4.3	95.7	95.7	
No. 100	0.125	32.2	5.2	94.8	94.8	
No. 200	0.075	38.4	6.2	93.8	93.8	50-100
PAN	—	38.4	—	—		

COMMENTS:

000033

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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.: GQ1341 TASK NO.: 04.1

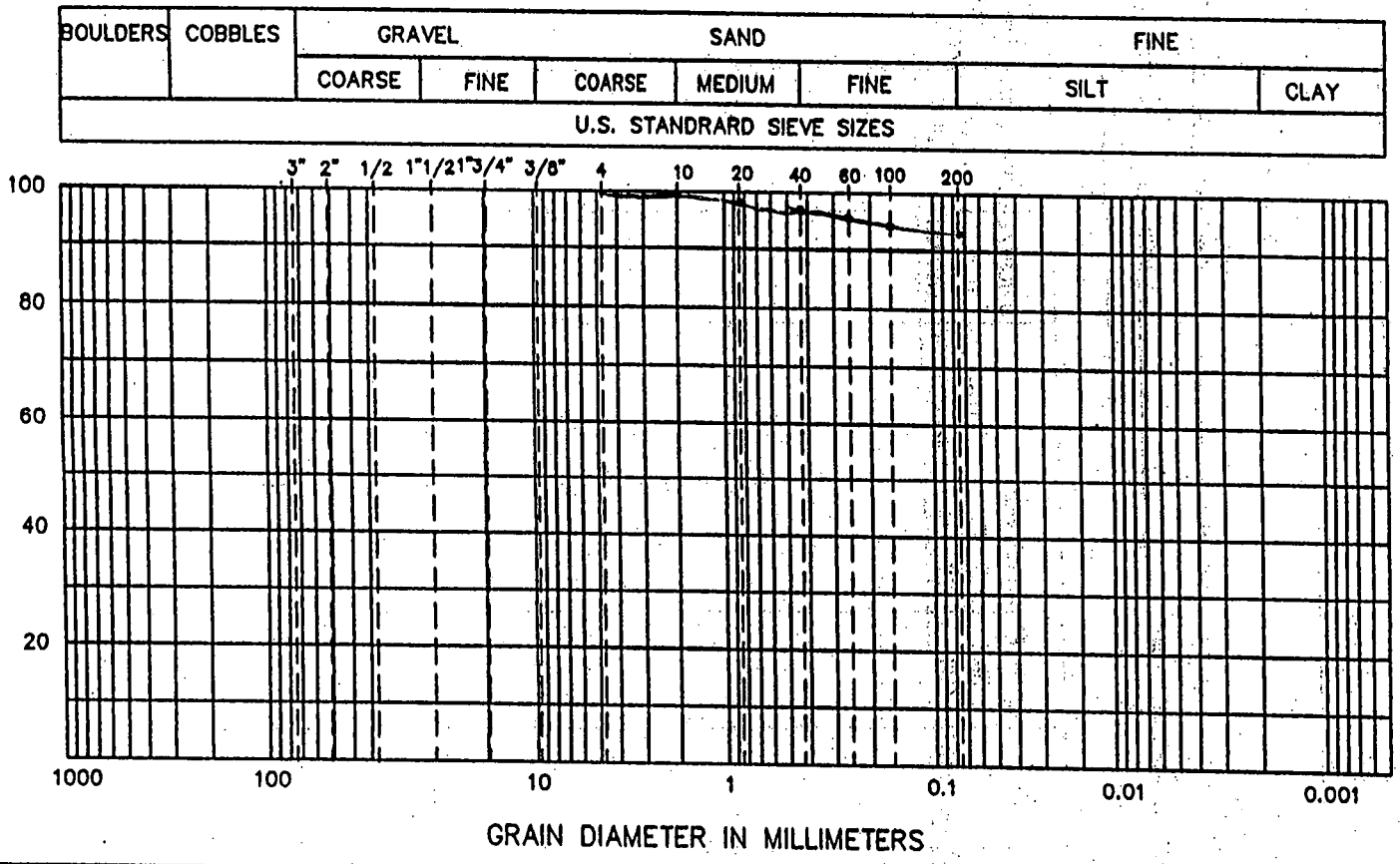
DESCRIPTION: Phase V

DATE: 25 day March month 2003 year

MATERIAL TYPE: Compacted Fill

SAMPLE NO.: CF03-6 QA ID: RJ

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 36

(PL) 20

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	100
3/4-In.	100
1/2-In.	100
3/8-In.	99.99
NO. 4	99.9
NO. 10	99.4
NO. 20.	98.0
NO. 40	96.6
NO. 60	95.9
NO. 100	94.8
NO. 200	93.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	53.8

SOIL CLASSIFICATION (ASTM D 2487): CL - lean Clay

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SHEET NO. 2 OF 2

0000034

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase V — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Till — DATE: 31 day March month 2003 year

MATERIAL SOURCE: Cell 6 excavation — SAMPLE NO.: CF03-6

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED	(ml)	6% 13.23	8% 13.34	10% 13.36	12% 13.33	QA ID: KS 14% 13.10
A	WT. OF SOIL & MOLD	(grams)	150 mL	200 mL	250 mL	300 mL	100 mL
B	WT. OF MOLD	(grams)	6001.1	6057.0	6060.1	6046.5	5942.2
C	WT. OF SOIL = A − B	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	1800.2	1850.1	1859.2	1845.6	1741.3
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.8	122.1	122.7	121.8	114.9
			102.1	~~104.0~~ 103.1	101.7	99.3	100.1

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

	TARE NO.		22	35	15	680	QA ID: KS 678
F	WT. OF TARE	(grams)	8.3	8.4	8.3	8.1	8.2
G	WT. OF WET SOIL & TARE	(grams)	311.6	405.8	412.9	359.9	316.5
H	WT. OF DRY SOIL & TARE	(grams)	269.1	344.1	343.7	295.1	297.6
I	WT. OF WATER = G − H	(grams)	42.5	61.7	69.2	64.8	38.9
J	WT. DRY SOIL = H − F	(grams)	260.8	335.7	335.4	287.0	269.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	16.30	~~17.4~~ 18.4	20.6	22.6	14.4

1.163 1.179 1.206 1.226 1.14

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SHEET NO. 1 OF 2

000035

5368

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

MOISTURE–DENSITY RELATIONSHIP

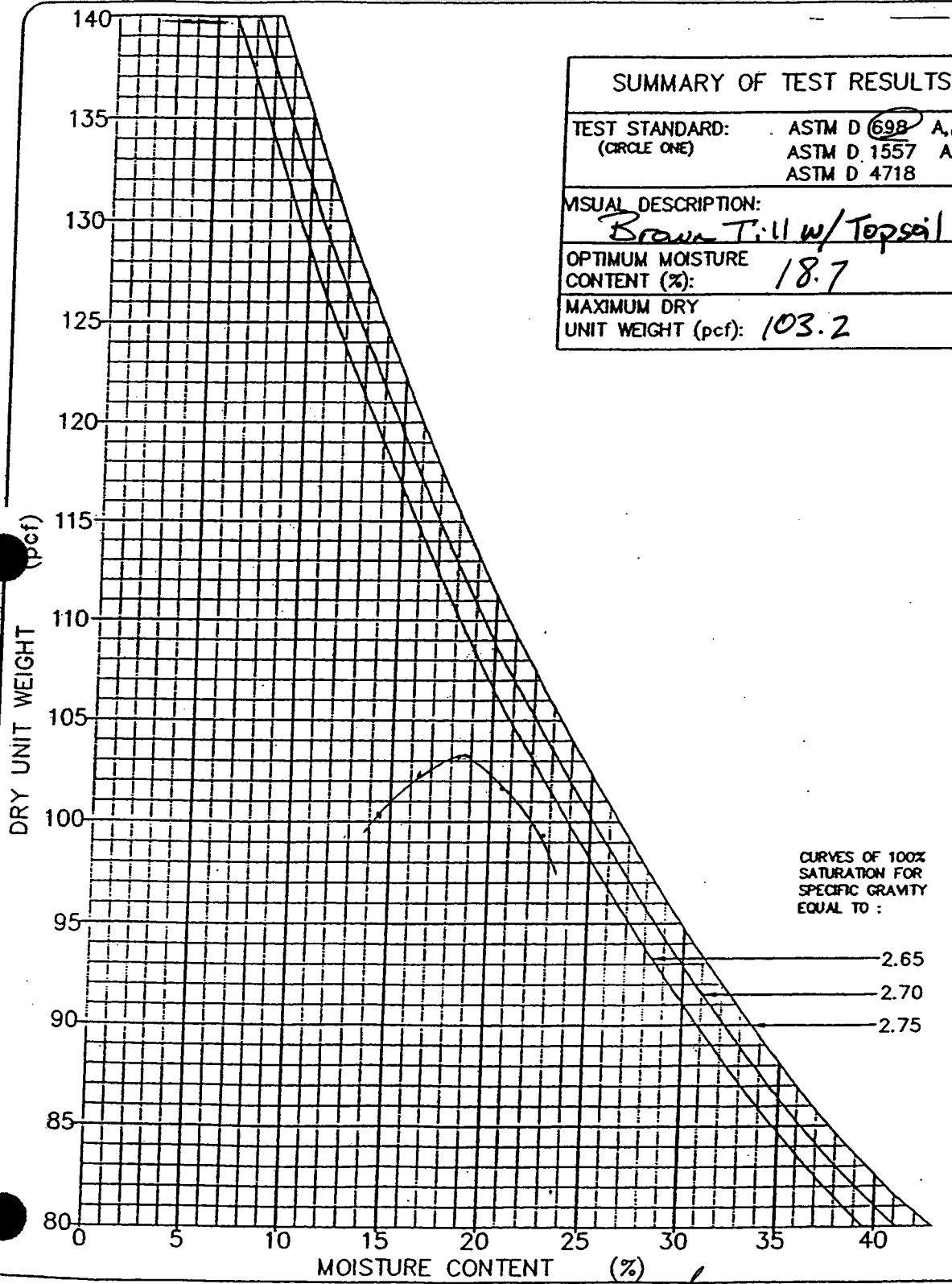
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 01 day Apr month 2003 year

MATERIAL TYPE: Till MATERIAL SOURCE: Cell 6 Excavation SAMPLE NO. CE036

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B C ASTM D 1557 A, B, C ASTM D 4718	DE
VISUAL DESCRIPTION:	Brown Till w/ Topsoil	CA
OPTIMUM MOISTURE CONTENT (%):	18.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	103.2	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: Φ4.1

DESCRIPTION: Phase V DATE: 29 day April month 2ΦΦ3 year

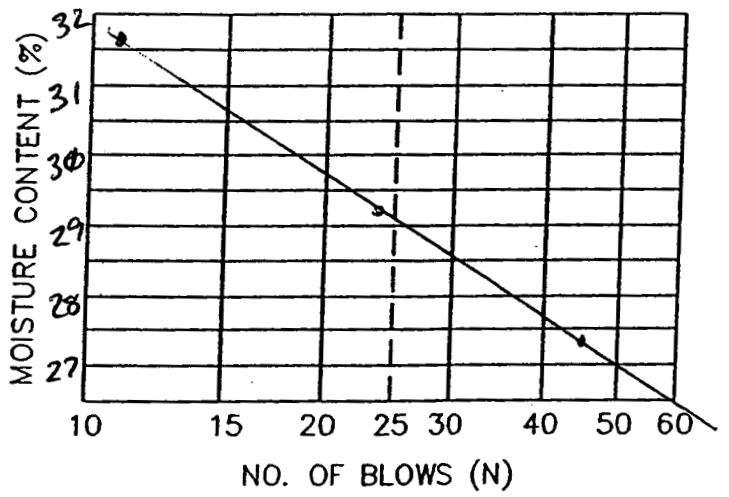
MATERIAL TYPE: compacted fill MATERIAL SOURCE: Sed Basin -2 excavation SAMPLE NO.: CFΦ3-7

LIQUID LIMIT DETERMINATION

QA ID: ES

	TARE NO.		1.4	1.7	2.1	
A	WT. OF TARE	(grams)	28.52	28.49	28.24	
B	WT. OF WET SOIL & TARE	(grams)	45.96	47.18	47.47	
C	WT. OF DRY SOIL & TARE	(grams)	41.77	42.96	43.33	
D	WT. OF WATER = B-C	(grams)	4.19	4.22	4.14	
E	WT. OF DRY SOIL = C-A	(grams)	13.25	14.47	15.09	
F	MOISTURE CONTENT = (D/E)X100	(%)	31.6	29.2	27.4	
N	NUMBER OF BLOWS		11	24	45	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: ES

	TARE NO.		2.6	2.8		
A	WT. OF TARE	(grams)	28.55	28.45		
B	WT. OF WET SOIL & TARE	(grams)	5Φ.78	5Φ.63		
C	WT. OF DRY SOIL & TARE	(grams)	47.73	47.63		
D	WT. OF WATER = B-C	(grams)	3.Φ5	3.ΦΦ		
E	WT. OF DRY SOIL = C-A	(grams)	19.18	19.18		
	MOISTURE CONTENT = (D/E)X100	(%)	15.9	15.6		

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE ~~III~~ V — DATE: 29 day April month ~~2003~~ year

MATERIAL TYPE: ~~Low Poorm Clay~~ KS compacted Fill — SAMPLE NO.: 1CF03-7

Sieve 798.9 Atterberg 619.2

SOIL SAMPLE SIZE	+3/8 = 1337.9	MOISTURE = 344.7	TOTAL = 22781.5
	-3/8 = 21098.9	50.22 LB's	

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

19681.7 21098.9 21098.9

		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		N	LL-6	N	LL-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	1439.6	KS ~~198.0~~ 990.7	1376.6	422.0
WT. OF TARE	(grams)	101.7	198.0	101.7	198.0
WT. OF DRY SAMPLE	(grams)	1337.9	792.7	1274.9	224.0

SIEVE ANALYSIS — QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	320.4	1.4	98.6		
1 in	25.4	628.0	2.8	97.2		
3/4 in	19.1	797.4	3.5	96.5		90-100
1/2 in	12.7	1083.9	4.8	95.2		
3/8 in	9.53	1273.7	5.6	94.4		
No. 4	4.75	24.3	3.1	96.9	91.5	
No. 10	2.00	57.5	7.3	92.7	87.5	
No. 20	0.850	90.8	11.5	88.5	83.5	
No. 40	0.425	121.2	15.3	84.7	80.0	
No. 60	0.250	148.2	18.7	81.3	76.7	
No. 100	0.125	181.0	22.8	77.2	72.9	
No. 200	0.075	222.8	28.1	71.9	67.9	50-100
PAN	—	225.2	—	—		

COMMENTS:

000038

%FINER = 100 − Σ% RETAINED

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FLUOR FERNALD, INC.

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.: GQ1841 TASK NO.: 041

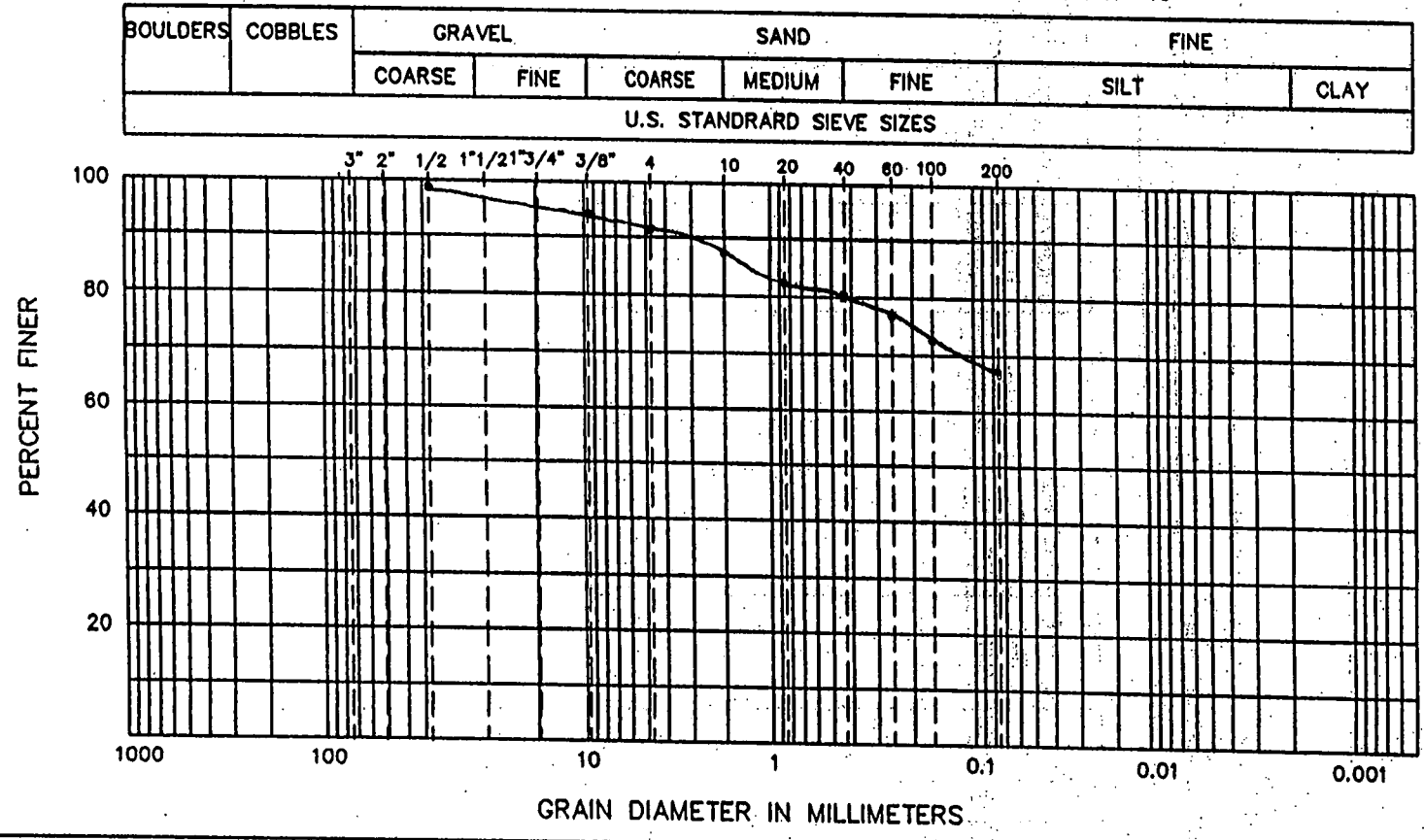
DESCRIPTION: Phase V

DATE: 29 day Apr month 2003 year

MATERIAL TYPE: Compacted Fill

SAMPLE NO.: CF03-7 QA ID: CA

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	98.6
1-in.	97.2
3/4-in.	96.5
1/2-in.	95.2
3/8-in.	94.4
NO. 4	91.5
NO. 10	87.5
NO. 20.	83.5
NO. 40	80.0
NO. 60	76.7
NO. 100	72.9
NO. 200	67.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	

SOIL CLASSIFICATION (ASTM D 2487): CL - Sandy lean Clay

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SHEET NO. 2 OF 2

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase V — PROJECT NO.: 6Q1341 TASK NO.: 04.5

MATERIAL TYPE: Compacted Fill — DATE: 28 day April month 2003 year

MATERIAL SOURCE: Sed Basin 2 Ex. Stock Pile — SAMPLE NO.: CF03-7

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			6% 13.32	8% 13.57	10% 13.82	12% 13.71	QA ID: KS
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6042.0	6155.4	6268.8	6218.9	
B	WT. OF MOLD	(grams)	4200.9	4200.9	4200.9	4200.9	
C	WT. OF SOIL = A − B	(grams)	1841.1	1954.5	2067.9	2018.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	121.5	129.0	136.5	133.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.3	115.6	120.5	115.3	

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: KS
	TARE NO.		37	650	659	38	
F	WT. OF TARE	(grams)	8.3	8.3	8.1	8.1	
G	WT. OF WET SOIL & TARE	(grams)	329.1	429.6	441.7	372.8	
H	WT. OF DRY SOIL & TARE	(grams)	302.2	386.0	390.9	323.9	
I	WT. OF WATER = G − H	(grams)	26.9	43.8	50.8	48.9	
J	WT. DRY SOIL = H − F	(grams)	293.9	377.7	382.8	315.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.2	11.6	13.3	15.5	

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5368

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase V DATE: 29 day Apr month 2003 year

MATERIAL TYPE: Compacted Fill CF03-7

Weight of Total Sample	=	22781.5
Weight of Oversize Fraction	=	1273.7
Weight of Finer Fraction (- 3/8)	=	21507.8
Percentage of Oversize Fraction	= (P_C)	5.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.131
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.7
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 12.5\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_\delta = 122.7$

2 of 3

000041

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

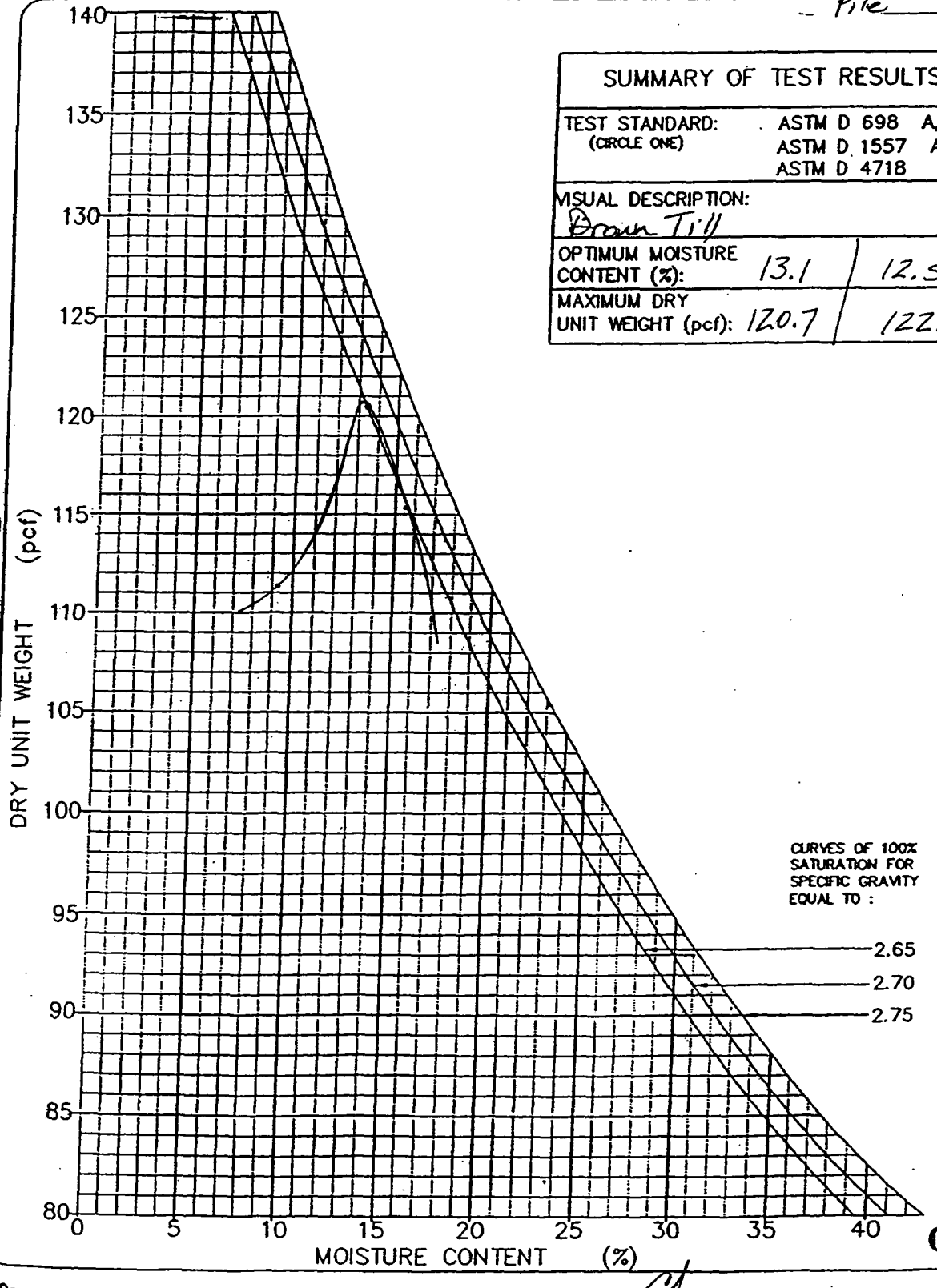
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase V DATE: 29 day April month 2003 year

MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: Sod Basin 2 Ex. Stock Pile SAMPLE NO.: CF03-7

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.1	12.5	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	120.7	122.7	CA



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5368

L-1

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GO3211 TASK NO.: 3

DESCRIPTION: PHASE V DATE: 03 day 06 month 03 year

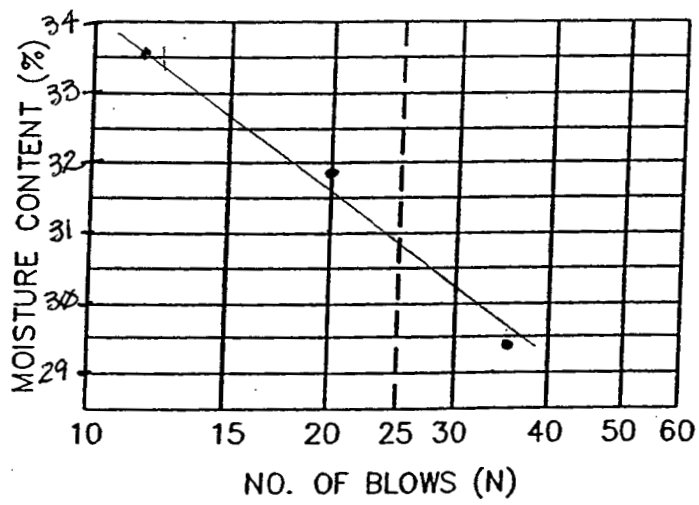
MATERIAL TYPE: Clay FILL MATERIAL SOURCE: Cell 6 Excavation SAMPLE NO.: CF03-8

LIQUID LIMIT DETERMINATION

QA ID: KH

	TARE NO.		14	17	21	
A	WT. OF TARE	(grams)	28.51	28.50	28.25	
B	WT. OF WET SOIL & TARE	(grams)	49.33	51.21	52.32	
C	WT. OF DRY SOIL & TARE	(grams)	44.60	45.50	46.50	
D	WT. OF WATER = B–C	(grams)	4.73	5.71	5.82	
E	WT. OF DRY SOIL = C–A	(grams)	16.1	17.0	18.25	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.4	33.6	31.9	
N	NUMBER OF BLOWS		36	12	20	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KH

	TARE NO.		26	28		
A	WT. OF TARE	(grams)	28.55	28.46		
B	WT. OF WET SOIL & TARE	(grams)	39.06	39.66		
C	WT. OF DRY SOIL & TARE	(grams)	37.70	38.10		
D	WT. OF WATER = B–C	(grams)	1.36	1.56		
E	WT. OF DRY SOIL = C–A	(grams)	9.15	9.64		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.9	16.2		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 15

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 3211 KU

LOCATION: FERNALD, OHIO PROJECT NO.: G0134 TASK NO.: ~~04.1~~ 3

DESCRIPTION: PHASE DATE: 02 day 06 month 03 year

MATERIAL TYPE: ~~Low Perm~~ CLAY FILL SAMPLE NO.: CF03-8

SOIL SAMPLE SIZE	+3/8 = 978.1	MOISTURE = 13.1	TOTAL = 17053.7
	-3/8 = 16075.6		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-1	LL-4	L-1	LL-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	1170.3	665.8	1075.2	281.4
WT. OF TARE	(grams)	192.2	145.1	192.2	145.1
WT. OF DRY SAMPLE	(grams)	978.1	~~281.4~~ 520.7	882.9	~~281.4~~ 136.3

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2					
2 in	50.8					100
1 1/2in	38.1	54.0	0.3	99.7		
1 in	25.4	263.7	1.5	98.5		
3/4 in	19.1	405.8	2.4	97.6		90-100
1/2 in	12.7	694.0	4.1	95.9		
3/8 in	9.53	875.2	5.1	94.9		
No. 4	4.75	11.74	2.3	97.7	92.7	
No. 10	2.00	35.41	6.8	93.2	88.4	
No. 20	0.850	55.37	10.6	89.4	84.8	
No. 40	0.425	73.03	14.0	86.0	81.6	
No. 60	0.250	88.96	17.1	82.9	78.7	
No. 100	0.125	109.2	21.0	79.0	75.0	
No. 200	0.075	135.1	25.9	74.1	70.3	50-100
PAN	—	136.4	—	—		
		T=~~281.4~~				

10.44

COMMENTS:

000044

%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

DESCRIPTION: Phase IV

MATERIAL TYPE: Clay Fill

PROJECT NO. GQ3211 TASK NO.: ~~04~~ 03 DAC

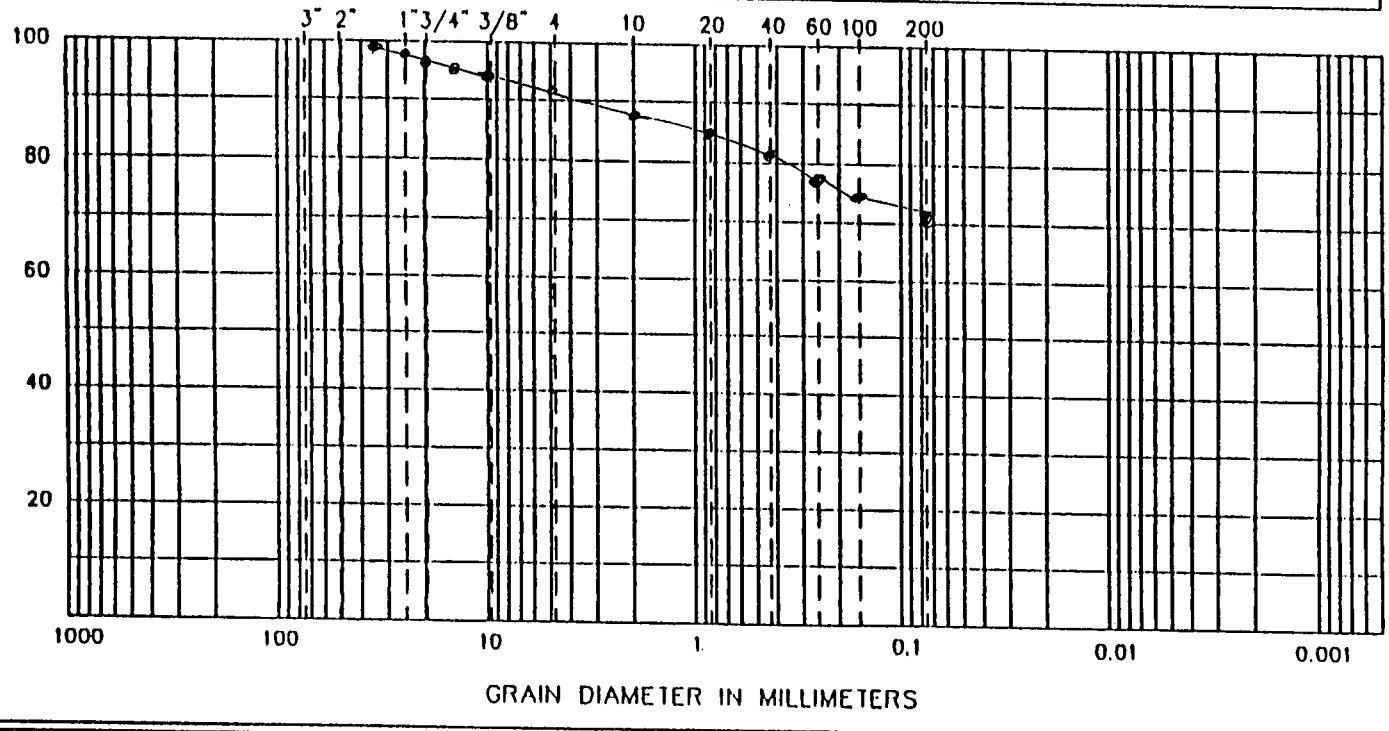
DATE: _____ day _____ month _____ year

SAMPLE NO.: CF03-8 QA ID: KH/DCF

CURVE COEFFICIENTS: $(C_u)\frac{D_{60}}{D_{10}} =$ ..... $(C_c)\frac{D_{30}^2}{D_{60} \times D_{10}} =$ .....

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

U.S. STANDARD SIEVE SIZES



ATTERBERG LIMITS

(LL) 31

(PL) 16

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	—
2-in.	—
1 1/2-in.	99.2
1-in.	98.3
3/4-in.	97.6
1/2-in.	95.9
3/8-in.	94.9
NO. 4	92.7
NO. 10	88.4
NO. 20	84.8
NO. 40	81.6
NO. 60	78.7
NO. 100	75.0
NO. 200	70.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	53.8

SOIL CLASSIFICATION (ASTM D 2487): Sandy lean clay - CL

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453.6

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: BROWN SILTY CLAY W/ TR F SAND + TR F GRAVEL

PROJECT NO.: G0134 TASK NO.: 04.1

MATERIAL TYPE: SUBGRADE

DATE: 30 day 05 month 03 year

MATERIAL SOURCE: NW SIDE OF BORROW AREA

SAMPLE NO.: CF03-8

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KMH

			6%	8%	10%	12%	
	WATER ADDED	(ml)	150 ml	200 ml	250 ml	300 ml	100 ml
A	WT. OF SOIL & MOLD	(grams)	13.72	13.79	13.69	13.60	13.52
B	WT. OF MOLD 9.26 lb	(grams)	4200.9				
C	WT. OF SOIL = A − B	(grams)	2023.1g	2054.8g	2009.4	1968.6	1932.3
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.53	135.6	132.6	129.9	127.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.1	118.0	113.3	108.8	115.0

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: _____

	TARE NO.		44	40	652	663	~~303~~ 605
F	WT. OF TARE	(grams)	8.46	8.14	8.27	8.42	8.3~~4~~
G	WT. OF WET SOIL & TARE	(grams)	439.4	460.3	283.9	442.1	440.2
H	WT. OF DRY SOIL & TARE	(grams)	389.4	401.50	243.86	371.64	397.6
I	WT. OF WATER = G − H	(grams)	50.0	58.8	40.04	70.46	42.6
J	WT. DRY SOIL = H − F	(grams)	380.94	393.36	235.59	363.22	389.3
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.1	14.9	17.0	19.4	10.9

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53.68

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ3211 TASK NO. 03.103

DESCRIPTION: Phase V DATE: 3 day June month 2003 year

MATERIAL TYPE: Compacted Fill CF03-8

Weight of Total Sample	=	17053.7
Weight of Oversize Fraction	=	875.2
Weight of Finer Fraction (- 3/8)	=	16178.5
Percentage of Oversize Fraction	= (P_C)	5.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.14
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 120.9 pcf

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 13.4 %

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

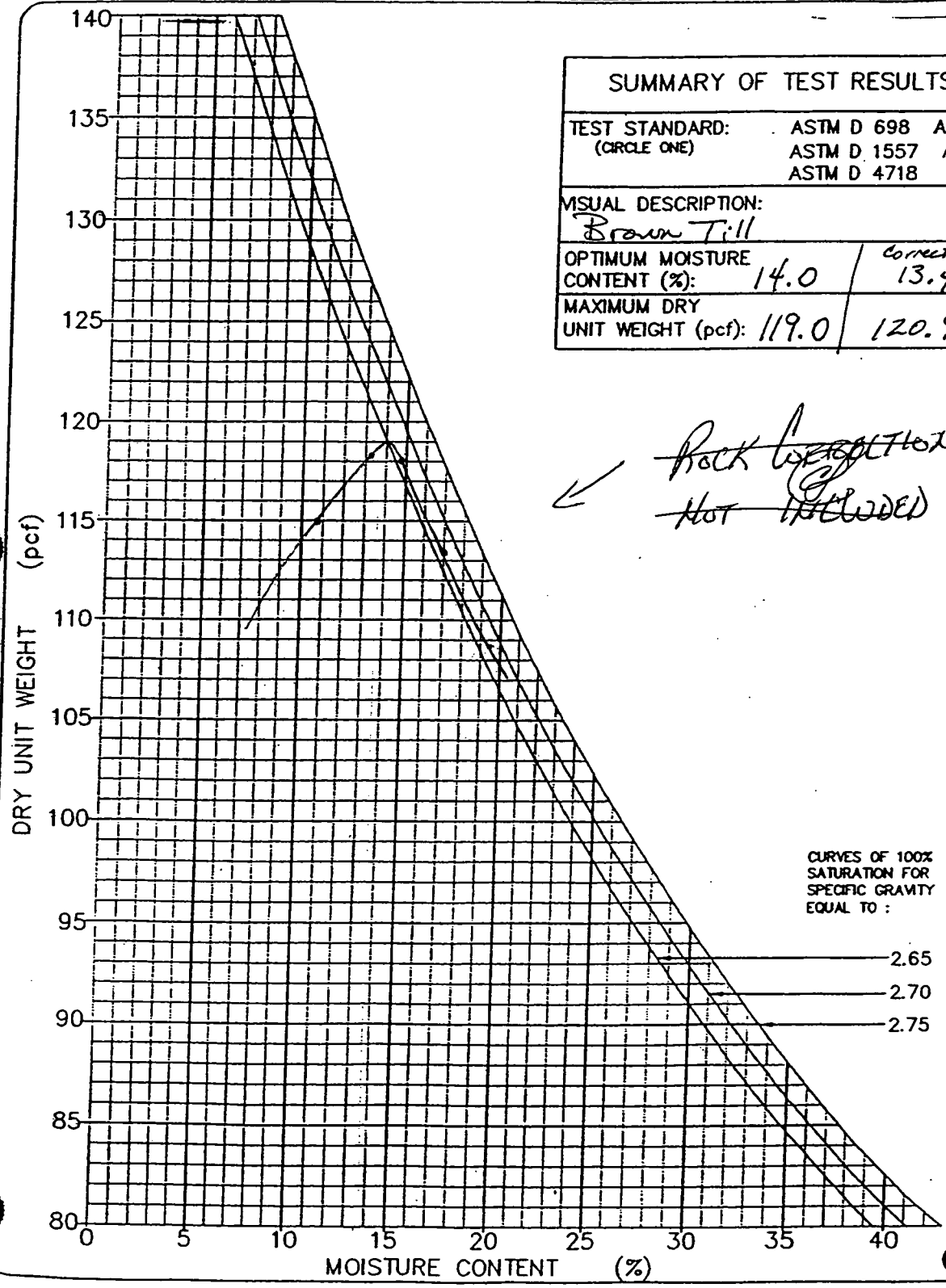
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: _____ TASK NO.: _____

DESCRIPTION: BROWN DATE: 03 day 06 month 02 year

MATERIAL TYPE: SUBGRADE MATERIAL SOURCE: NW BURROW AREA SAMPLE NO.: CF03-8

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, [B], C ASTM D 1557 A, B, C ASTM D 4718		KH
VISUAL DESCRIPTION: Brown Till			CL
OPTIMUM MOISTURE CONTENT (%):	14.0	Corrected 13.4	~~13.7~~ CL
MAXIMUM DRY UNIT WEIGHT (pcf):	119.0	120.9	~~118.6~~ CL



~~ROCK CORRECTION NOT INCLUDED~~

000048

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5368

ATTERBERG LIMITS TEST (ASTM D 4318)

OJECT: ON-SITE DISPOSAL FACILITY (OSDF)

ATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 27 day June month 2003 year

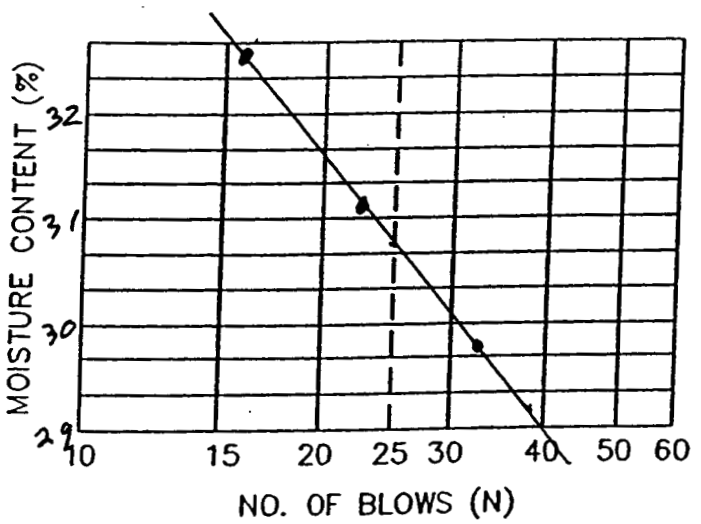
MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: ~~SP03-1~~ SPOILS FROM Cell 6 Ex. SAMPLE NO.: CF03-9

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.9	2.5	2.4	
A	WT. OF TARE	(grams)	28.54	28.41	27.37	
B	WT. OF WET SOIL & TARE	(grams)	47.87	46.26	46.56	
C	WT. OF DRY SOIL & TARE	(grams)	43.13	42.03	42.16	
D	WT. OF WATER = B-C	(grams)	4.74	4.23	4.40	
E	WT. OF DRY SOIL = C-A	(grams)	14.59	13.62	14.79	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.5	31.1	29.7	
N	NUMBER OF BLOWS		16	23	32	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW 6/18

	TARE NO.		3.2	2.7		
A	WT. OF TARE	(grams)	27.82	28.67		
B	WT. OF WET SOIL & TARE	(grams)	35.94	35.81		
C	WT. OF DRY SOIL & TARE	(grams)	34.91	34.92		
D	WT. OF WATER = B-C	(grams)	1.03	0.89		
E	WT. OF DRY SOIL = C-A	(grams)	7.09	6.25		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.5	14.2		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 14 PLASTICITY INDEX (PI) = 17

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: CH SHEET NO. 1 OF 1

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5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD

(ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: PHASE V — DATE: 26 day June month 2003 year

MATERIAL TYPE: Compacted Fill — SAMPLE NO.: 1CF03-9

SOIL SAMPLE SIZE	+3/8 = 2598.8	MOISTURE =	TOTAL = 36772.8
	-3/8 = 34174		

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

	BEFORE WASH +3/8	BEFORE WASH -3/8	AFTER WASH +3/8	AFTER WASH -3/8
TARE NO.	LL6	LL4	LL-6	LL-4
WT. OF DRY SAMPLE PLUS TARE (grams)	2796.8	~~916.0~~ 893.9 CHW	2734.1	392.8
WT. OF TARE (grams)	198.0	145.0	198.0	145.0
WT. OF DRY SAMPLE (grams)	2598.8	748.9	2536.1	247.8

SIEVE ANALYSIS — QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	547.6	1.5	98.5		100
2 in	50.8	547.6	1.5	98.5		
1 1/2in	38.1	733.1	2.0	98.0		
1 in	25.4	804.2	2.2	97.8		
3/4 in	19.1	1122.1	3.1	96.9		90 to 100
1/2 in	12.7	1899.9	5.2	94.8		
3/8 in	9.53	2528.4	6.9	93.1		.931
No. 4	4.75	45.5	6.1	93.9	87.4	
No. 10	2.00	86.9	11.6	88.4	82.3	
No. 20	0.850	124.0	16.6	83.4	77.6	
No. 40	0.425	156.3	20.9	79.1	73.6	
No. 60	0.250	183.8	24.5	75.5	70.3	
No. 100	0.125	215.5	28.8	71.2	66.3	
No. 200	0.075	246.8	33.0	67.0	62.4	50 to 100
PAN	—	247.2	—	—	—	

COMMENTS:

000050

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: CH — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

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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

DESCRIPTION: Phase IV

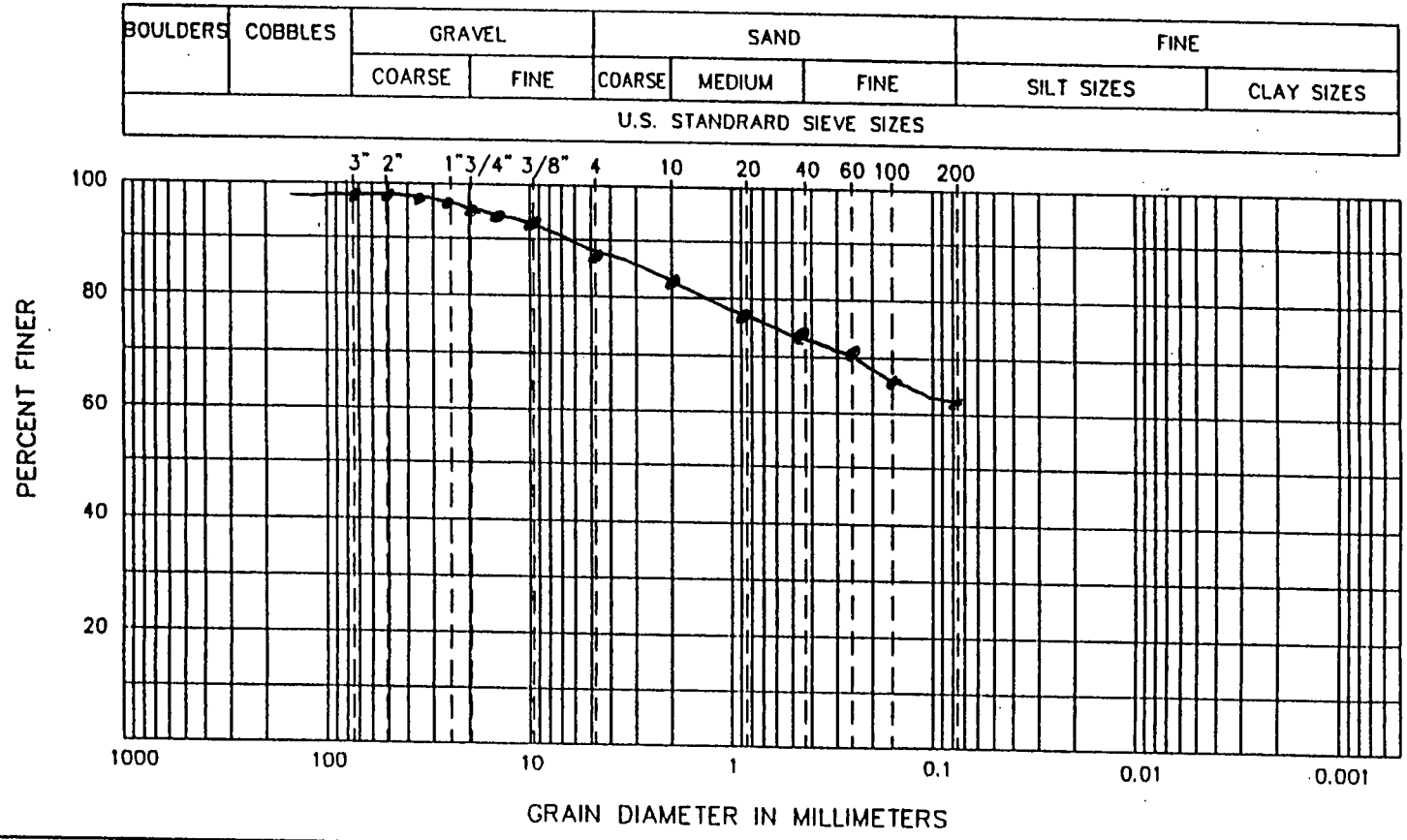
MATERIAL TYPE: Compacted fill

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 28 day June month 2003 year

SAMPLE NO.: CF-03-9 QA ID: DLE

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 31

(PL) 14

(PI) 17

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	98.5
2-in.	98.5
1 1/2-in.	98.0
1-in.	97.8
3/4-in.	96.9
1/2-in.	94.8
3/8-in.	93.1
NO. 4	87.4
NO. 10	82.3
NO. 20	77.6
NO. 40	73.6
NO. 60	70.3
NO. 100	66.3
NO. 200	62.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	57
	37
	26
	18

SOIL CLASSIFICATION (ASTM D 2487): CL ~~Lean~~ Sandy Lean clay

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SHEET NO. 2 OF 2

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase V

PROJECT NO.: GQ3211 TASK NO.: 3

MATERIAL TYPE: Compacted Fill

DATE: 29 day June month 2003 year

MATERIAL SOURCE: Spoils from Stockpile south of Cell #6

SAMPLE NO.: CF03-9

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED	(ml)	4% 13.22	6% 13.45	8% 13.68	10% 13.78	12% QA ID: Cfer 13.93
A	WT. OF SOIL & MOLD	(grams)	100ml	150ml	200ml	250ml	300ml
B	WT. OF MOLD	(grams)	5996.5	6100.9	6205.2	6250.6	6227.9
C	WT. OF SOIL = A − B	(grams)	4200.9	4200.9	4200.9	4200.9	4200.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	1795.6	1900.0	2004.3	2049.7	2027
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.5	125.4	132.3	135.3	133.8
			110.4	114.4	118.9	119.3	116.1

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

	TARE NO.		#47	#656	#653	#36	QA ID: Cfer #678
F	WT. OF TARE	(grams)	8.1	8.2	8.3	8.4	8.2
G	WT. OF WET SOIL & TARE	(grams)	374.9	408.2	445.0	514.9	448.35
H	WT. OF DRY SOIL & TARE	(grams)	349.9	373.3	400.5	455.0	390.20
I	WT. OF WATER = G − H	(grams)	25.0	35.0	44.5	59.9	58.1
J	WT. DRY SOIL = H − F	(grams)	341.8	365.1	392.2	446.6	382.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.3	9.6	11.3	13.4	15.2
			1.073	1.096	1.113	1.134	1.152

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SHEET NO 1 OF 3

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FILE NO. 2-05-FLC

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6A3211 TASK NO. 03

DESCRIPTION: Phase V DATE: 15 day July month 2003 year

MATERIAL TYPE: Compacted Fill CF02-9

Weight of Total Sample	=	36772.8
Weight of Oversize Fraction	=	2528.4
Weight of Finer Fraction (- 3/8)	=	34244.4
Percentage of Oversize Fraction	= (P_C)	6.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.122
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 11.5$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 122.5$$

2053

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5368

MOISTURE-DENSITY RELATIONSHIP

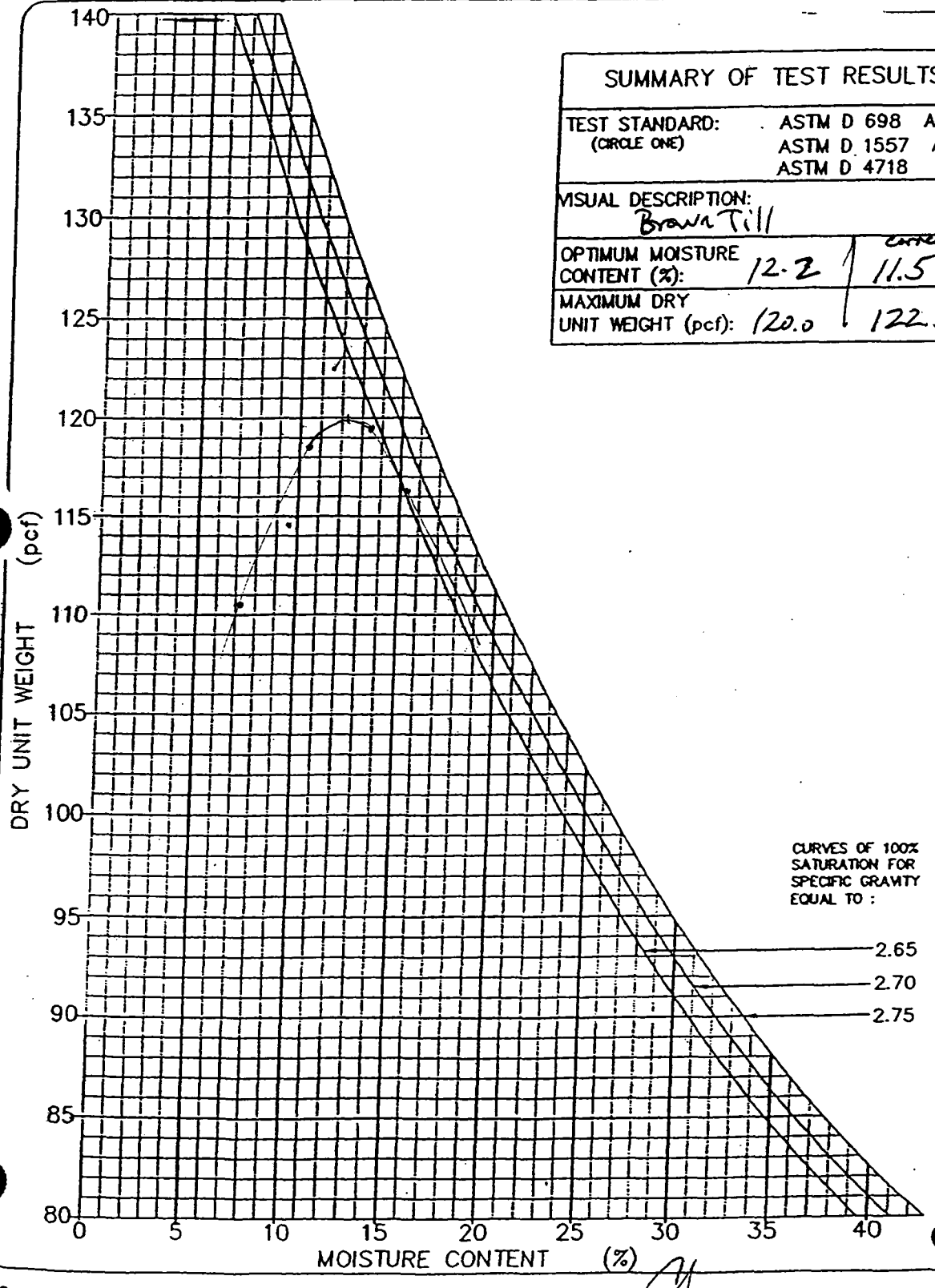
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G03211 TASK NO.: 3

DESCRIPTION: PHASE V DATE: 30 day 06 month 03 year

MATERIAL TYPE: Vegetative Cover MATERIAL SOURCE: STOCKPILE SAMPLE NO.: CF03-9

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A (B) C ASTM D 1557 A, B, C ASTM D 4718		KH
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	12.2	corrected 11.5	KH/CA
MAXIMUM DRY UNIT WEIGHT (pcf):	120.0	122.5	KH/CA



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5368

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 02 day Sept month 2003 year

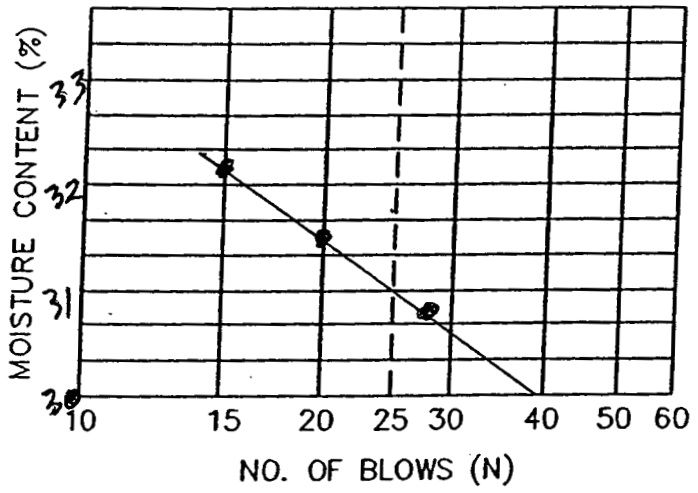
MATERIAL TYPE: Com. Fill MATERIAL SOURCE: SP-5 Pond T-134 SAMPLE NO. CF03-10

LIQUID LIMIT DETERMINATION

QA ID: DE

	TARE NO.		2.3	1.8	2.1	
A	WT. OF TARE	(grams)	31.19	28.78	28.23	
B	WT. OF WET SOIL & TARE	(grams)	59.29	54.24	55.60	
C	WT. OF DRY SOIL & TARE	(grams)	52.45	48.13	49.16	
D	WT. OF WATER = B-C	(grams)	6.84	6.11	6.44	
E	WT. OF DRY SOIL = C-A	(grams)	21.26	19.35	20.93	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.2	31.6	30.8	
N	NUMBER OF BLOWS		15	20	28	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DE

	TARE NO.		A-292	A-210		
A	WT. OF TARE	(grams)	3.55	3.55		
B	WT. OF WET SOIL & TARE	(grams)	12.83	14.35		
C	WT. OF DRY SOIL & TARE	(grams)	11.58	12.87		
D	WT. OF WATER = B-C	(grams)	1.25	1.48		
E	WT. OF DRY SOIL = C-A	(grams)	8.03	9.32		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.6	15.9		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 15

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FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: PHASE V — DATE: 26 day Aug month 2003 year

MATERIAL TYPE: Compacted Fill — SAMPLE NO.: ~~LP03-~~ CF03-10

SOIL SAMPLE SIZE	+3/8 = 22007 gm	MOISTURE = 274.6	22655.3 TOTAL = ~~19633.3~~
	-3/8 = 19580.0		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 3/8 0/300 17500 600	48.6 (grams)	SAND	FINE GRAIN
		115	65

22655.3 gr

AH. -3/8	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-1	L-7	L-1	L-7
WT. OF DRY SAMPLE PLUS TARE (grams)	2393.0	762.4	2237.3	
WT. OF TARE (grams)	192.3	192.9	192.3	192.9
WT. OF DRY SAMPLE (grams)	2200.7	569.5	2045.0	

SIEVE ANALYSIS — QA ID: DLE/CA

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	0		100
2 in	50.8	1049.0	0	95.4		
1 1/2in	38.1	1193.3	0	94.7		
1 in	25.4	1328.1	5.9	94.1		
3/4 in	19.1	1585.4	7.0	93.0		90 To 100
1/2 in	12.7	1896.7	8.4	91.6		
3/8 in	9.53	2033.7	9.0	91.0		
No. 4	4.75	13.7	2.4	97.6	88.8	
No. 10	2.00	39.1	6.9	93.1	84.8	
No. 20	0.850	66.5	11.7	88.3	80.4	
No. 40	0.425	91.3	16.0	84.0	76.4	
No. 60	0.250	111.2	19.5	80.5	73.3	
No. 100	0.125	134.2	23.6	76.4	69.6	
No. 200	0.075	161.9	28.4	71.6	65.1	50 To 100
PAN	—	164.3	—	—		

COMMENTS:

000056

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: CA — 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

DESCRIPTION: Phase V

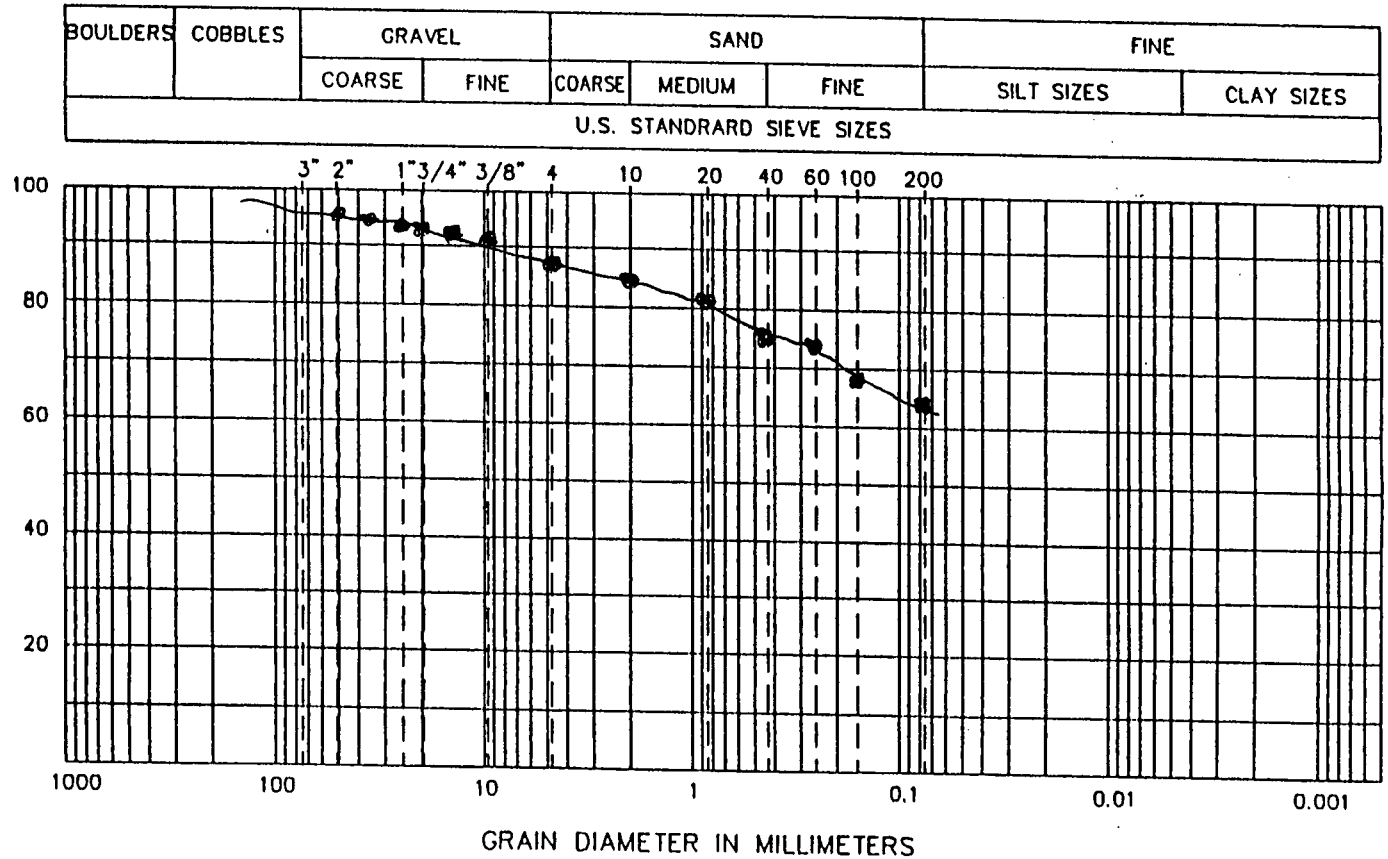
MATERIAL TYPE: Compacted Fill

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 02 day Sept month 2003 year

SAMPLE NO.: CF03-10 QA ID: PTC

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 31

(PL) 16

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	95.4
1 1/2-in.	94.7
1-in.	94.1
3/4-in.	93.0
1/2-in.	91.6
3/8-in.	91.0
NO. 4	88.8
NO. 10	84.8
NO. 20	80.4
NO. 40	76.4
NO. 60	73.3
NO. 100	69.6
NO. 200	65.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
N/A	53
	39
	28

SOIL CLASSIFICATION (ASTM D 2487): CL - Sandy Lean Clay

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SHEET NO. 2 OF 2

000057

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II — PROJECT NO. GQ3211 TASK NO.: 3

MATERIAL TYPE: Comp. fill — MATERIAL SOURCE: — DATE: 28 day Aug month 2003 year

SAMPLE NO.: CF03-10

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			13.75	13.87	13.86		13.45
	WATER ADDED	(ml)	6% 150mL	8% 200mL	10% 250mL		QA ID: ALE 4% 100mL
A	WT. OF SOIL & MOLD	(grams)	6237.0	6291.4	6286.9		6106.9
B	WT. OF MOLD	(grams)	4272.0	4272.0	4272.0	4272.0	4272.0
C	WT. OF SOIL = A − B	(grams)	1965.0	2019.4	2014.9		1828.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	133.3	133.0		120.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	117.1	117.3	114.7		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

	TARE NO.		#38	#57	#307		QA ID: #617
F	WT. OF TARE	(grams)	8.1	8.2	8.3		8.2
G	WT. OF WET SOIL & TARE	(grams)	460.0	566.3	578.0		498.1
H	WT. OF DRY SOIL & TARE	(grams)	416.3	499.4	499.7		458.7
I	WT. OF WATER = G − H	(grams)	43.7	66.9	78.3		39.4
J	WT. DRY SOIL = H − F	(grams)	408.2	491.2	491.4		450.5
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.7	13.6	15.9		8.7

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SHEET NO. 1 OF 3

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FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G03211 TASK NO. 03

DESCRIPTION: Phase V DATE: 28 day Aug month 2003 year

MATERIAL TYPE: Compacted Fill LP03-10

Weight of Total Sample	=	22655.3
Weight of Oversize Fraction	=	2033.3
Weight of Finer Fraction (- 3/8)	=	20622.0
Percentage of Oversize Fraction	= (P_C)	9.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	91.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.124
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 11.4%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 123.7 pcf

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FLUOR FERNALD, INC.

5368

MOISTURE–DENSITY RELATIONSHIP

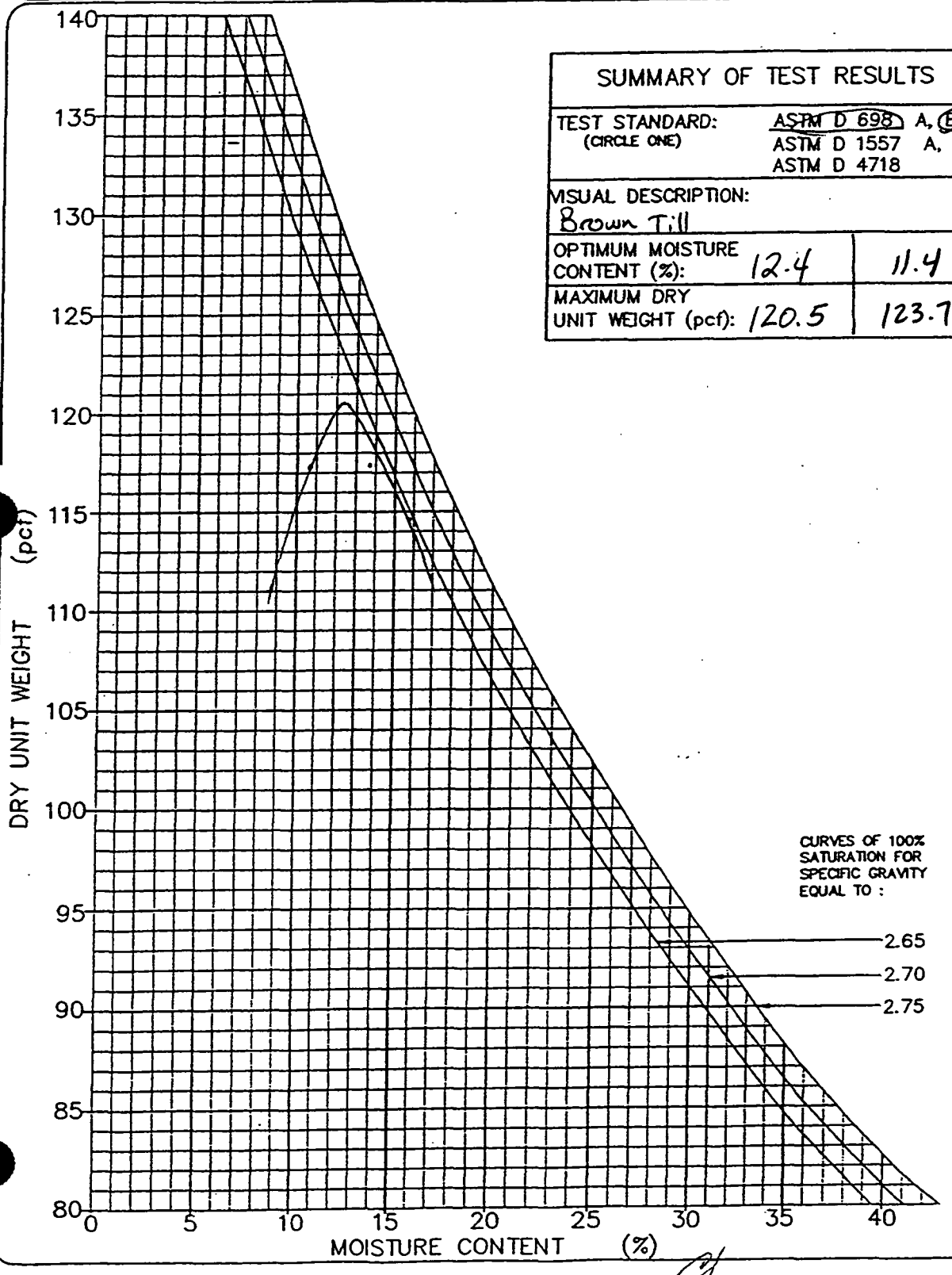
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ32 11 TASK NO.: 3

DESCRIPTION: Phase V DATE: 28 day Aug month 2003 year

MATERIAL TYPE: Compacted Fill MATERIAL SOURCE: SAMPLE NO.: CP3-10

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.4	11.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	120.5	123.7	CJ



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ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 03 day Sept month 2005 year

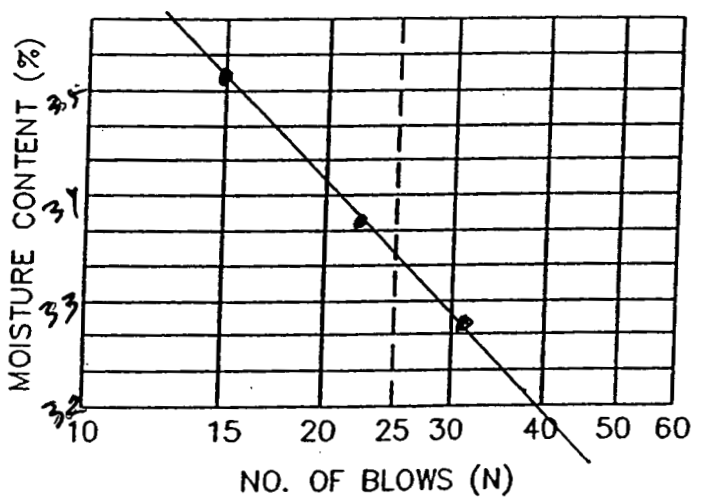
MATERIAL TYPE: Comp Fill MATERIAL SOURCE: SP-S/W of T-139 SAMPLE NO. CF03011

LIQUID LIMIT DETERMINATION

QA ID: OSP

	TARE NO.		2.7	1.6	2.9	
A	WT. OF TARE	(grams)	28.68	28.86	31.46	
B	WT. OF WET SOIL & TARE	(grams)	57.40	56.31	60.45	
C	WT. OF DRY SOIL & TARE	(grams)	49.93	49.39	53.29	
D	WT. OF WATER = B-C	(grams)	7.47	6.92	7.16	
E	WT. OF DRY SOIL = C-A	(grams)	21.25	20.53	21.83	
F	MOISTURE CONTENT = (D/E)X100	(%)	35.2	33.7	32.8	
N	NUMBER OF BLOWS		15	27	31	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: OSP

	TARE NO.		B-11	A-241		
A	WT. OF TARE	(grams)	3.43	3.20		
B	WT. OF WET SOIL & TARE	(grams)	11.61	11.27		
C	WT. OF DRY SOIL & TARE	(grams)	10.50	10.16		
D	WT. OF WATER = B-C	(grams)	1.11	1.11		
E	WT. OF DRY SOIL = C-A	(grams)	7.07 ~~7.16~~	6.96		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.7 ~~15.5~~	15.9		

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

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: PHASE V — DATE: 26 day Aug month 2003 year

MATERIAL TYPE: Compacted Fill — SAMPLE NO.: LP03-CF03-11

SOIL SAMPLE SIZE	+3/8 = 1685.1 gm	MOISTURE = 280.7 gm	TOTAL = 23788.5
	-3/8 = 21822.7		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 49.85 1.74 48.11 (grams)	SAND	FINE GRAIN
	115	65

	BEFORE WASH +3/8	BEFORE WASH -3/8	AFTER WASH +3/8	AFTER WASH -3/8
TARE NO.	L-7	L-1	L-7	L-1
WT. OF DRY SAMPLE PLUS TARE (grams)	1877.3	746.3	1793.5	325.1
WT. OF TARE (grams)	192.2	192.4	192.2	192.4
WT. OF DRY SAMPLE (grams)	1685.1	554.9	1601.3	132.7

SIEVE ANALYSIS — QA ID: [illegible]

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	916.4	3.9	96.1		100
2 in	50.8	916.4	3.9	96.1		
1 1/2in	38.1	1039.1	4.4	95.6		
1 in	25.4	1206.2	5.1	94.9		
3/4 in	19.1	1287.5	5.4	94.6		90 To 100
1/2 in	12.7	1500.3	6.3	93.7		
3/8 in	9.53	1601.1	6.7	93.3		.933
No. 4	4.75	8.7	1.6	98.4	91.8	
No. 10	2.00	24.6	4.1	95.6	89.2	
No. 20	0.850	44.8	8.1	91.9	85.7	
No. 40	0.425	65.3	11.8	88.2	82.3	
No. 60	0.250	84.4	15.2	84.8	79.1	
No. 100	0.125	107.5	19.4	80.6	75.2	
No. 200	0.075	132.0	23.8	76.2	71.1	50 To 100
PAN	—	132.5	—	—		

COMMENTS:

000062

%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.: GQ3211 TASK NO.: 3

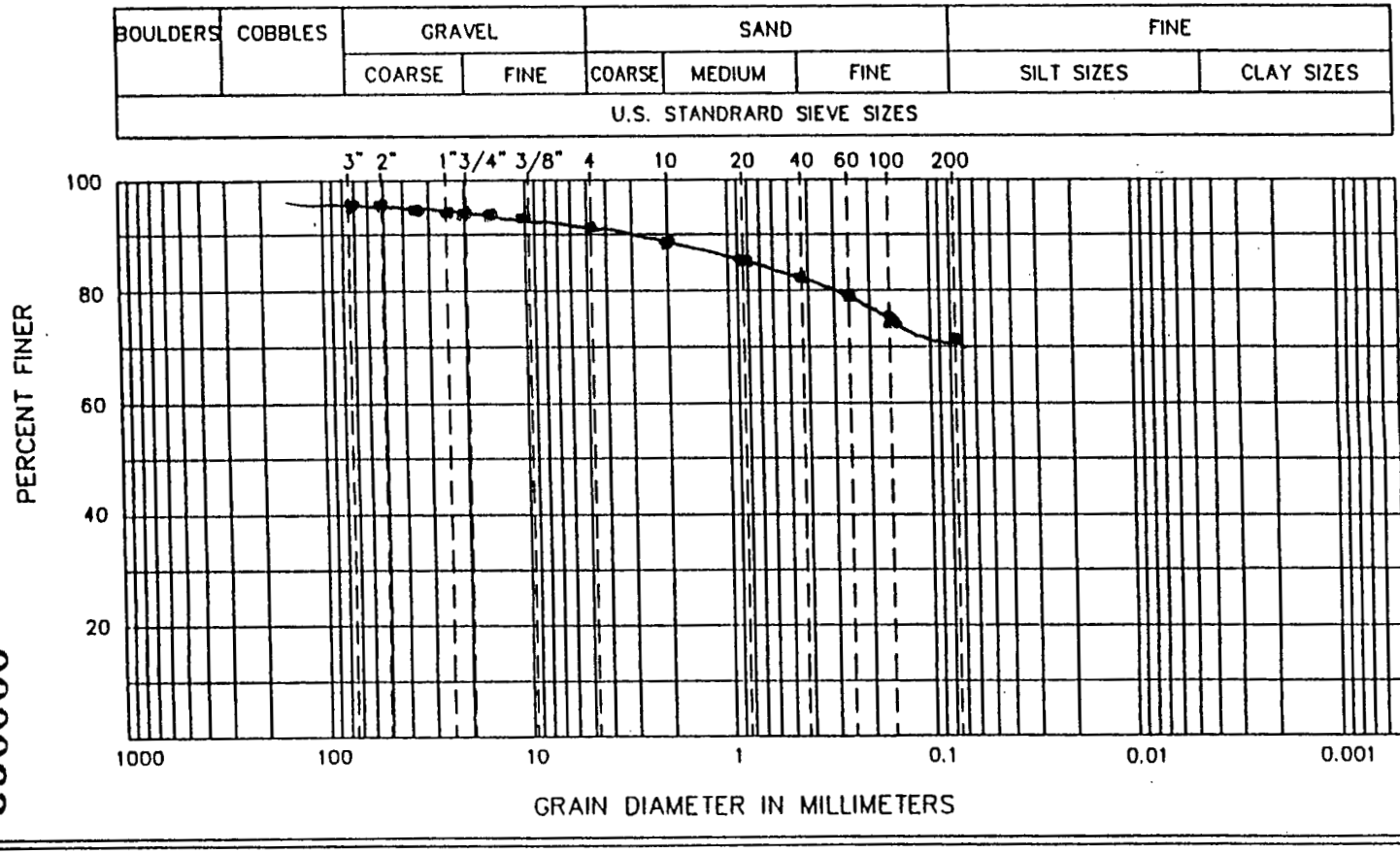
DESCRIPTION: Phase IV

DATE: 28 day Aug month 2003 year

MATERIAL TYPE: Compacted fill

SAMPLE NO.: SF05-11 QA ID: DJC

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 33

(PL) 16

(PI) 17

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	96.1
2-in.	96.1
1 1/2-in.	95.6
1-in.	94.9
3/4-in.	94.6
1/2-in.	93.7
3/8-in.	93.3
NO. 4	91.8
NO. 10	89.2
NO. 20	85.7
NO. 40	82.3
NO. 60	79.1
NO. 100	75.2
NO. 200	71.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	57
	43
	36
	28

SOIL CLASSIFICATION (ASTM D 2487): CL - lean Clay w/sand

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SHEET NO. 2 OF 2

000063

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase V

PROJECT NO.: GQ3211 TASK NO.: 3

MATERIAL TYPE: CFill

DATE: 27 day Aug month 2003 year

MATERIAL SOURCE:

SAMPLE NO.: CF03-11

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED	(ml)	13.16	13.32	12.93	13.69	13.61
A	WT. OF SOIL & MOLD	(grams)	2%	4%	0%	8%	QA ID: 55 10%
B	WT. OF MOLD	(grams)	5969.4	6042.0	5865.1	6209.8	~~6209.8~~ 6173.
C	WT. OF SOIL = A − B	(grams)	4272.0				4272.0
D	WET UNIT WT.(1) = C X 0.066	(pcf)	1697.4	1770	1593.1	1937.8	~~1937.8~~ 1901
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.0	116.8	105.1	127.9	~~127.9~~ 125.
			101.4	103.6	97.5	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

	TARE NO.		# 657	# 35	# 31	# 27	QA ID: # 602
F	WT. OF TARE	(grams)	8.1	8.4	8.3	8.2	8.3
G	WT. OF WET SOIL & TARE	(grams)	395.1	439.2	428.1	374.5	403.8
H	WT. OF DRY SOIL & TARE	(grams)	358.2	390.8	397.7	322.2	341.7
I	WT. OF WATER = G − H	(grams)	36.9	48.4	30.4	52.3	62.1
J	WT. DRY SOIL = H − F	(grams)	350.1	382.4	389.4	314.0	333.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.5	12.7	7.8	16.7	18.6

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SHEET NO. 1 OF 3

GeoSyntec Consultants

5368

FLUOR FERNALD

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G03211 TASK NO. 03

DESCRIPTION: Phase V DATE: 2 day Sept month 2003 year

MATERIAL TYPE: Compacted Fill CF03-11

Weight of Total Sample	=	23788.5
Weight of Oversize Fraction	=	1601.1
Weight of Finer Fraction (- 3/8)	=	22187.4
Percentage of Oversize Fraction	= (P_C)	6.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.169
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	109.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 15.9\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 112.6$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

MOISTURE–DENSITY RELATIONSHIP

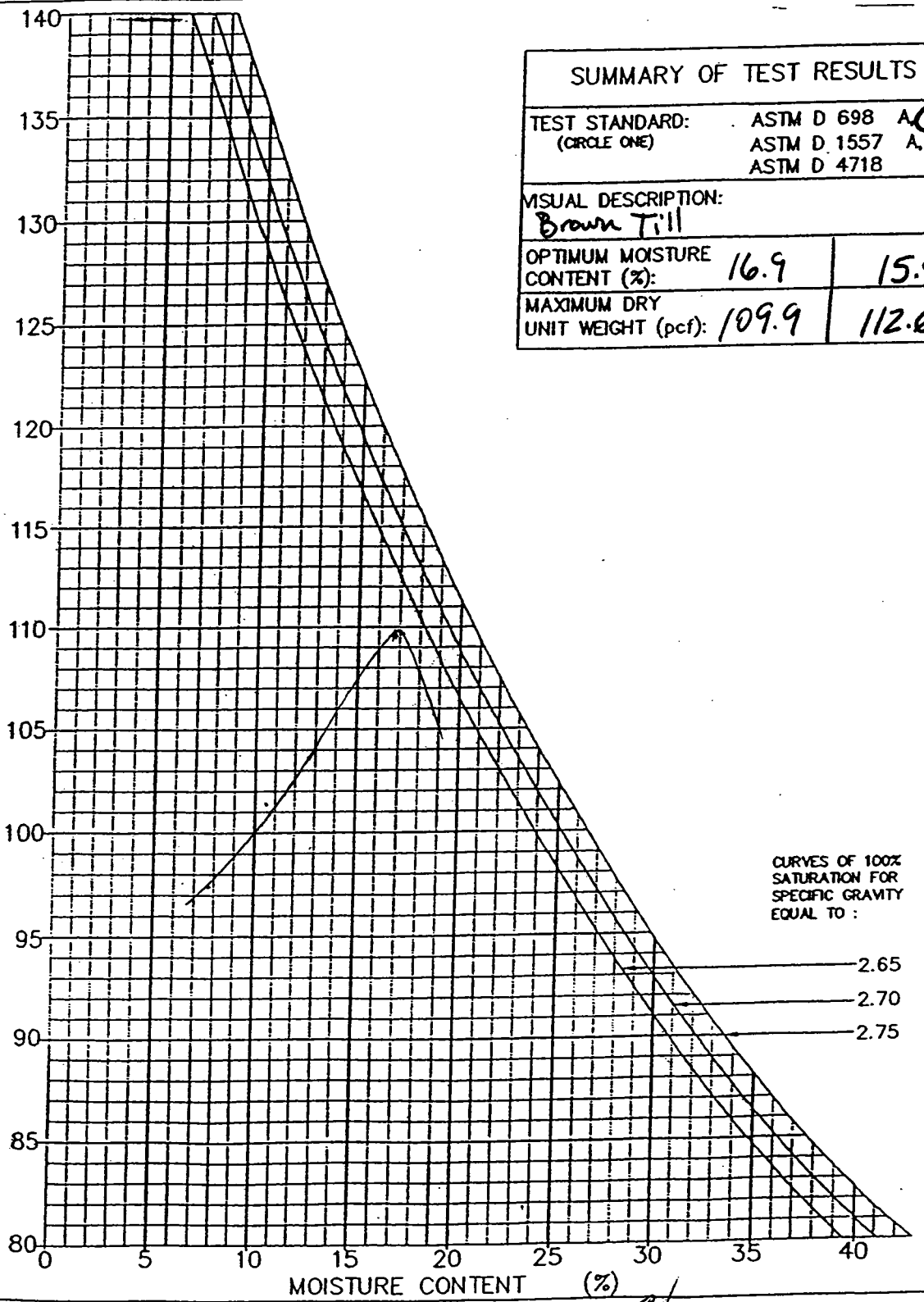
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 2 day Sept month 2003 year

MATERIAL TYPE: CF MATERIAL SOURCE: SAMPLE NO.: CF03-11

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		SS
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	16.9	15.9	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	109.9	112.6	CA



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5368

FLUOR FERNALD, INC.

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase II DATE: 24 day Oct month 2003 year

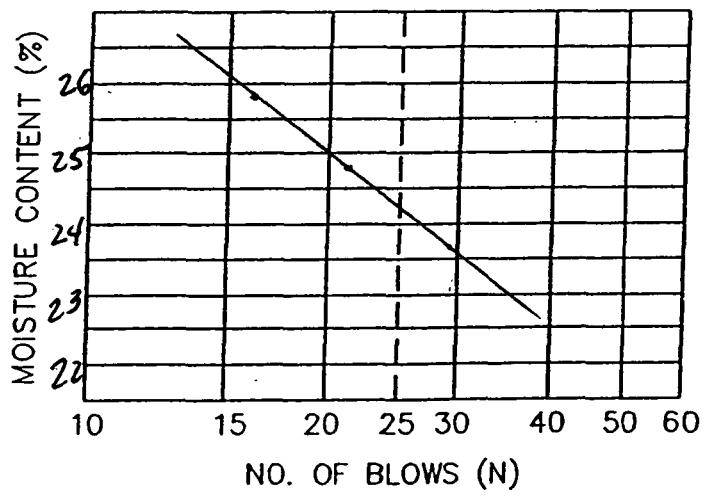
MATERIAL TYPE: ~~Gray Till~~ Compacted F-2 MATERIAL SOURCE: Stockpile SW of T-139 SAMPLE NO.: CF03-12

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.7	2.5	2.2	
A	WT. OF TARE	(grams)	28.48	28.44 42	27.62	
B	WT. OF WET SOIL & TARE	(grams)	47.92	43.71	45.68	
C	WT. OF DRY SOIL & TARE	(grams)	43.93	40.67	42.22	
D	WT. OF WATER = B-C	(grams)	3.99	3.04	3.46	
E	WT. OF DRY SOIL = C-A	(grams)	15.45	12.25	14.6	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.8	24.8	23.7	
N	NUMBER OF BLOWS		16	21	29	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.3	1.4		
A	WT. OF TARE	(grams)	28.64	28.49		
B	WT. OF WET SOIL & TARE	(grams)	38.02	40.94		
C	WT. OF DRY SOIL & TARE	(grams)	36.89	39.45		
D	WT. OF WATER = B-C	(grams)	1.13	1.49		
E	WT. OF DRY SOIL = C-A	(grams)	8.25	10.96		
	MOISTURE CONTENT = (D/E)X100	(%)	13.7	13.6		

LIQUID LIMIT (LL) = 24 PLASTIC LIMIT (PL) = 14 PLASTICITY INDEX (PI) = 10

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FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 60321 TASK NO.: 3

DESCRIPTION: PHASE V DATE: 23 day October month 2003 year

MATERIAL TYPE: Compacted Fill SAMPLE NO.: CFD3-12

SOIL SAMPLE SIZE	+3/8 = 1722.2	MOISTURE = ~	TOTAL = 23,023.3
	-3/8 = 21301.1		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	SB3	L-9	SB3	L-9
WT. OF DRY SAMPLE PLUS TARE (grams)	2018.6	855.2	1917.5	404.6
WT. OF TARE (grams)	296.4	193.2	296.4	193.2
WT. OF DRY SAMPLE (grams)	1722.2	662.0	1621.1	211.4

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100%		
2 in	50.8	238.5	1.0	99%		
1 1/2in	38.1	0 238.5	0 1.0	~~100%~~ 99		
1 in	25.4	609.2	2.6	97.4		
3/4 in	19.1	815.5	3.5	96.5		
1/2 in	12.7	1298.0	5.6	94.4		
3/8 in	9.53	1612.8	7.0	93.0		.93
No. 4	4.75	33.0	5.0	95	88.4	
No. 10	2.00	68.4	10.3	89.7	83.4	
No. 20	0.850	99.2	15.0	85.0	79.1	
No. 40	0.425	125.7	19	81.0	75.5	
No. 60	0.250	147.3	22.3	77.7	72.3	
No. 100	0.125	174.5	26.4	73.6	68.4	
No. 200	0.075	208.3	31.5	~~31~~ 68.5	63.7	
PAN	—	211.0	—	—		

COMMENTS:

000068

%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

DESCRIPTION: Phase V

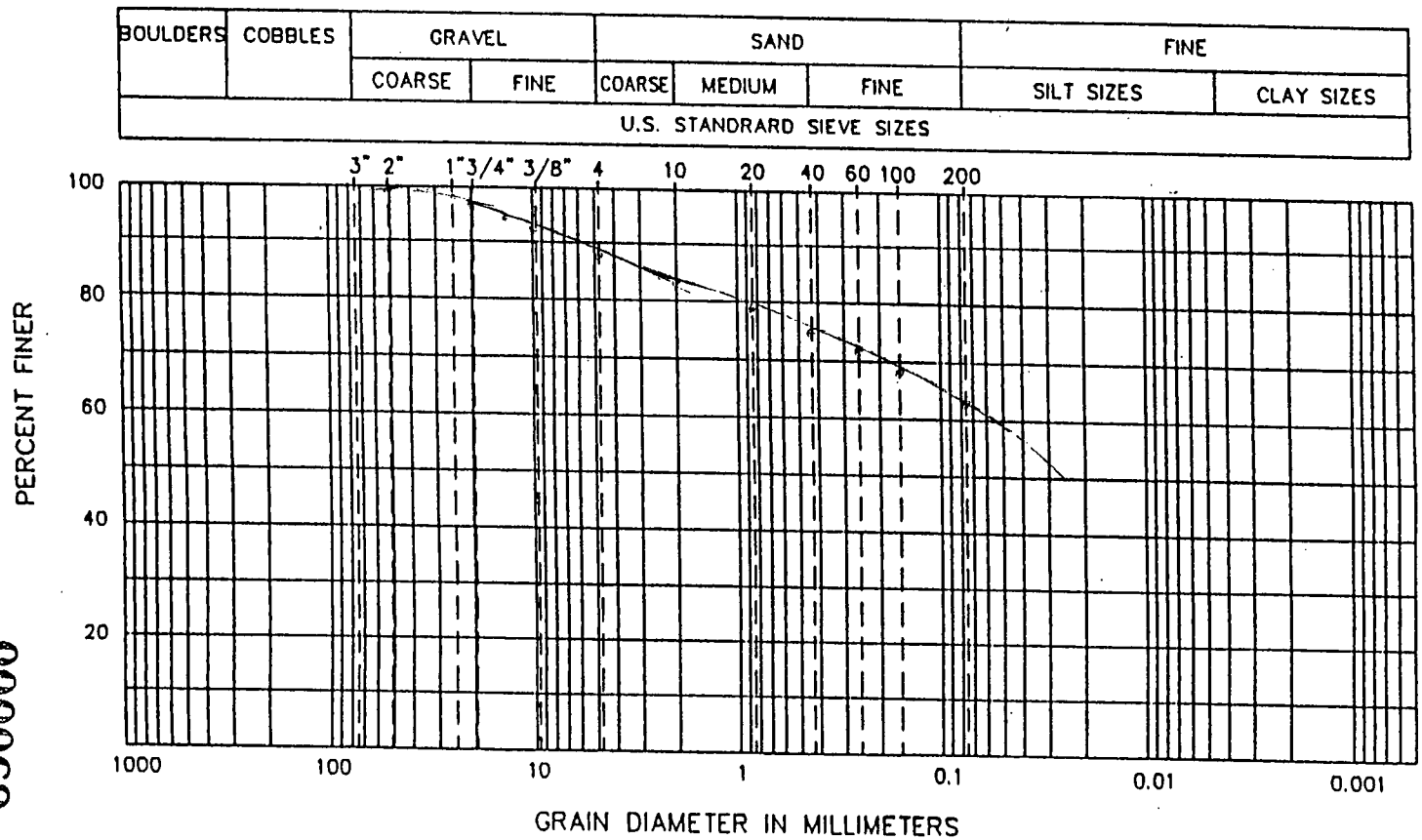
MATERIAL TYPE: Compacted Fill

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 27 day Oct month 2003 year

SAMPLE NO.: CF03-12 QA ID: 55

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 24

(PL) 14

(PI) 10

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	99
1 1/2-in.	100
1-in.	97.4
3/4-in.	96.5
1/2-in.	94.4
3/8-in.	93.0
NO. 4	88.4
NO. 10	83.4
NO. 20	79.1
NO. 40	75.3
NO. 60	72.3
NO. 100	68.4
NO. 200	63.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	91
	83
	69
	68

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SOIL CLASSIFICATION (ASTM D 2487): Sandy Lean Clay - CL

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SHEET NO 2 of 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase I

PROJECT NO.: GQ3211 TASK NO.: 2

MATERIAL TYPE: Gray Till / Compactal Fill

DATE: 28 day October month 2003 year

MATERIAL SOURCE: East Borrow area

SAMPLE NO.: CF03-12

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED	(ml)	13.64	13.72	13.94	13.88	QA ID: CHW
A	WT. OF SOIL & MOLD	(grams)	100	150	200	250	13.46
B	WT. OF MOLD	(grams)	6187.1	6223.4	6323.2	6296.0	100
C	WT. OF SOIL = A − B	(grams)	4200.9				6105.5
D	WET UNIT WT.(1) = C X 0.066	(pcf)	1986.2	2022.5	2122.3	2095.1	4200.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	131.1	133.5	140.1	138.3	1904.6
			121.8	122.0	125.0	121.6	125.7
							116.9

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

	TARE NO.		#47	#16	#664	#655	QA ID: CHW	
F	WT. OF TARE	(grams)	8.1	8.5	8.3	8.0	#4	
G	WT. OF WET SOIL & TARE	(grams)	508.9	463.8	459.7	617.6	8.1	
H	WT. OF DRY SOIL & TARE	(grams)	473.7	424.6	410.8	544.3	522.3	
I	WT. OF WATER = G − H	(grams)	35.2	39.2	48.9	73.3	486.0	5368
J	WT. DRY SOIL = H − F	(grams)	465.6	416.1	402.5	536.3	36.3	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.6	9.4	12.1	13.7	477.9	
							7.6	

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SHEET NO. 1 OF 3

GeoSyntec Consultants

5368

FLUOR FERNALD

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G03211 TASK NO. 03

DESCRIPTION: Phase V DATE: 30 day Oct month 2003 year

MATERIAL TYPE: Compacted Fill CF03-12 STD

Weight of Total Sample	=	23,023.3
Weight of Oversize Fraction	=	1612.8
Weight of Finer Fraction (-3/8)	=	21410.5
Percentage of Oversize Fraction	= (P_C)	7.0
Percentage of Finer Fraction (-3/8)	= (P_F)	93.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.115
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	126.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$C_W = 10.8\%$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$C_{\delta D} = 128.3$ pcf

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FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

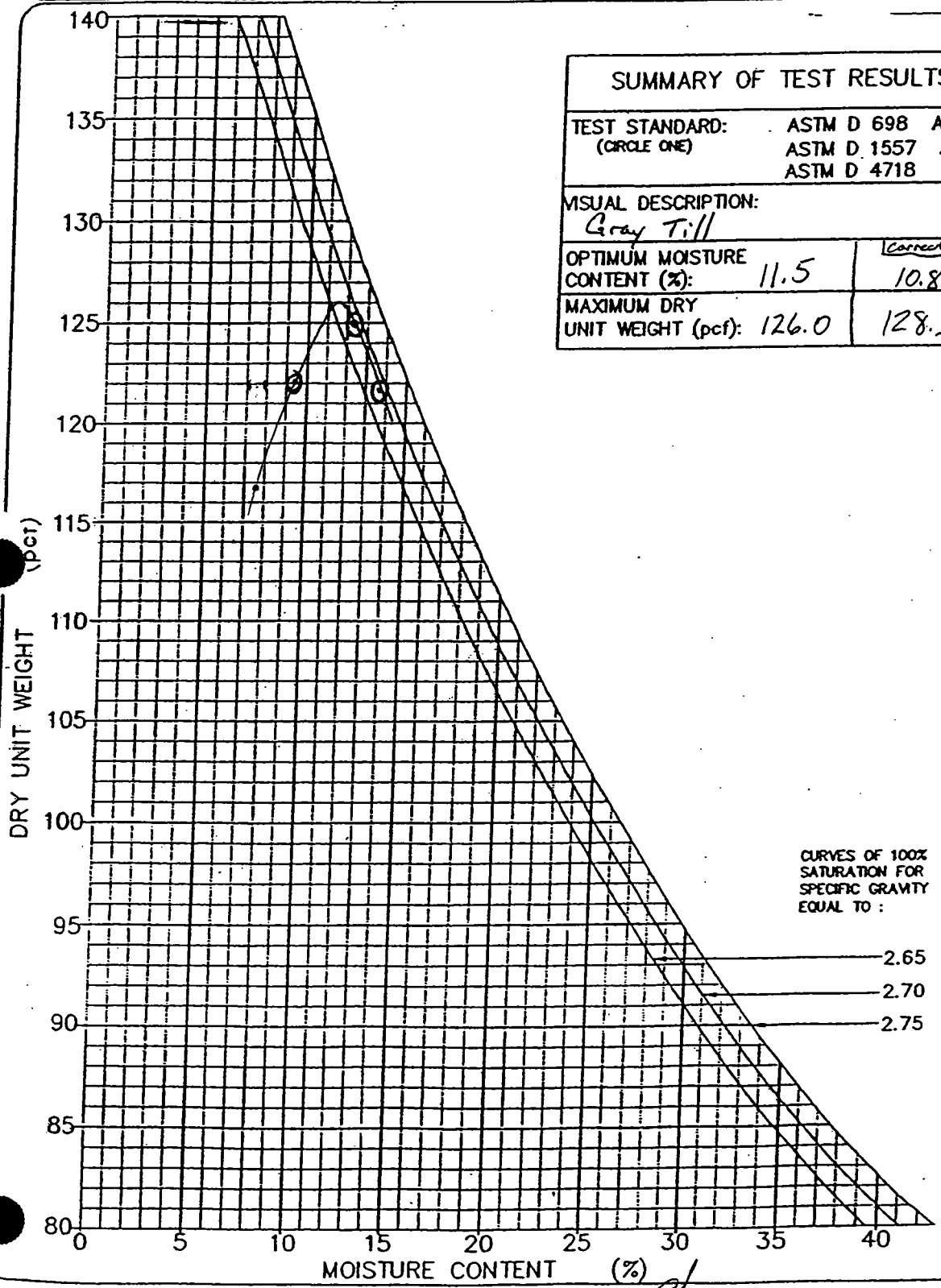
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 2

DESCRIPTION: Phase I DATE: 30 day Oct month 2003 year

MATERIAL TYPE: Compacted fill MATERIAL SOURCE: East Borrow area SAMPLE NO.: CF03-12

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Gray Till			CJ
OPTIMUM MOISTURE CONTENT (%):	11.5	(corrected) 10.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	126.0	128.3	CJ



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FLUOR FERNALD, INC.

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 24 day October month 2003 year

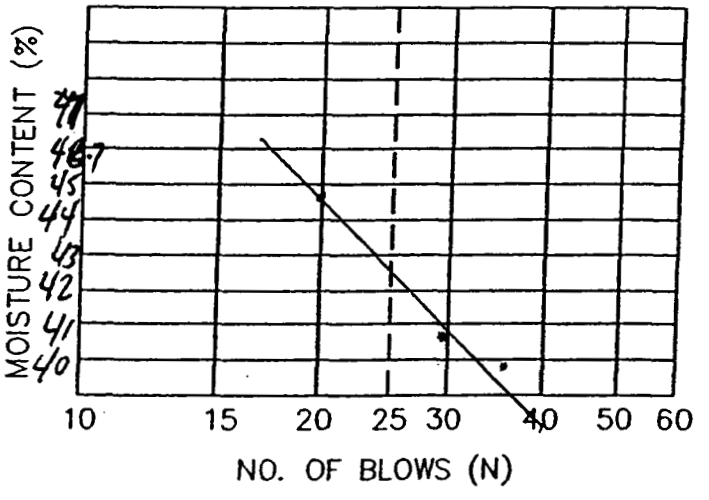
MATERIAL TYPE: Brown & Gray Till MATERIAL SOURCE: Cell #7 Cut SAMPLE NO.: CF03-13

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.2	1.6	2.7	
A	WT. OF TARE	(grams)	28.48	28.85	28.68	
B	WT. OF WET SOIL & TARE	(grams)	47.68	46.99	46.71	
C	WT. OF DRY SOIL & TARE	(grams)	42.20	41.65	41.14	
D	WT. OF WATER = B-C	(grams)	5.48	5.34	5.57	
E	WT. OF DRY SOIL = C-A	(grams)	13.72	12.80	12.46	
F	MOISTURE CONTENT = (D/E)X100	(%)	39.9 ~~13.72~~ ~~13.72~~	41.7	44.7	
N	NUMBER OF BLOWS		35	29	20	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		2.9	2.4		
A	WT. OF TARE	(grams)	31.46	27.37		
B	WT. OF WET SOIL & TARE	(grams)	42.00	37.09		
C	WT. OF DRY SOIL & TARE	(grams)	40.50	35.70		
D	WT. OF WATER = B-C	(grams)	1.50	1.39		
E	WT. OF DRY SOIL = C-A	(grams)	9.04	8.33		
	MOISTURE CONTENT = (D/E)X100	(%)	16.6	16.7		

LIQUID LIMIT (LL) = 43 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 26

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PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: PHASE V — DATE: 22 day Oct month 2003 year

MATERIAL TYPE: ~~Low Perm Clay~~ Brown & Gray Glacial Till CHW — SAMPLE NO.: ~~LP03~~ CHW CF03-13

SOIL SAMPLE SIZE	+3/8 = 889.9	MOISTURE = 728.0	TOTAL = 22,832.3
	-3/8 = 21214.9		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-1	L-7	L-1	L-7
WT. OF DRY SAMPLE PLUS TARE	(grams)	1082.2	837.3	1027.1	323.5
WT. OF TARE	(grams)	192.3	191.7	192.3	191.7
WT. OF DRY SAMPLE	(grams)	889.9	645.6	834.8	131.8

SIEVE ANALYSIS — QA ID: CHW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	—	100		100
2 in	50.8	0	—	100		
1 1/2in	38.1	0	—	100		
1 in	25.4	172.8	0.8	99.2		
3/4 in	19.1	250.0	1.1	98.9		90 To 100
1/2 in	12.7	563.5	2.5	97.5		
3/8 in	9.53	826.2	3.6	96.4		
No. 4	4.75	31.4	4.9	95.1	91.7	
No. 10	2.00	49.4	7.7	92.3	89.4	
No. 20	0.850	62.8	9.7	90.3	87.4	
No. 40	0.425	76.7	11.9	88.1	84.9	
No. 60	0.250	89.5	~~13.5~~ 13.9	86.1	83.4	
No. 100	0.125	106.8	16.5	83.5	80.5	
No. 200	0.075	129.2	20.4	79.6	77.1	50 To 100
PAN	—	132.1	—	—		

834.7 .964

COMMENTS:

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%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

DESCRIPTION: Phase II

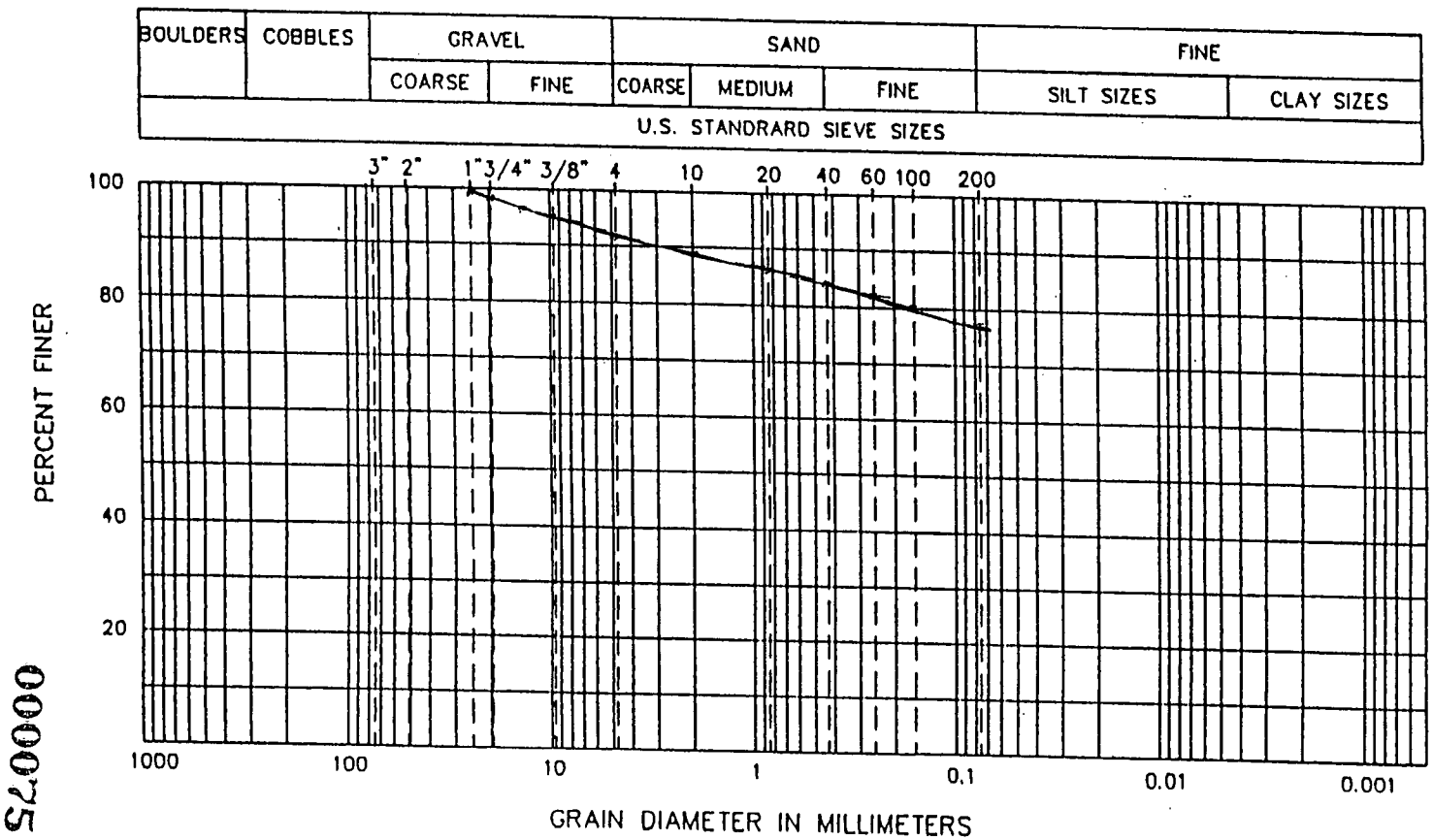
MATERIAL TYPE: Compacted Fill, Brown Till

PROJECT NO.: GQ3211 TASK NO.: 3

DATE: 22 day Oct month 2003 year

SAMPLE NO.: C503-13 QA ID: SS

CURVE COEFFICIENTS: (C_u) ..... (C_c) .....



ATTERBERG LIMITS

(LL) 43

(PL) 17

(PI) 26

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.2
3/4-in.	98.9
1/2-in.	97.5
3/8-in.	96.4
NO. 4	91.7
NO. 10	89.0
NO. 20	87.0
NO. 40	84.9
NO. 60	83.0
NO. 100	80.5
NO. 200	77.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER

SOIL CLASSIFICATION (ASTM D 2487): CL - Lean Clay with Sand

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SHEET NO. 2 of 2

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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD A)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q3211 TASK NO.: 2

DESCRIPTION: Phase V

DATE: 27 day Oct month 2003 year

MATERIAL TYPE: Brown & Gray Till MATERIAL SOURCE: Cell #7 Floor SAMPLE NO.: CF03-13

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.

13.54

COMPACTION OF SOIL

QA ID: CHW

			13.24	13.36	13.58	13.66	
	WATER ADDED	(ml)	100	150	200	250	300
A	WT. OF SOIL & MOLD	(grams)	6005.7	6060.1	6159.9	6196.2	6141.7
B	WT. OF MOLD	(grams)	4200.9	→	→	→	4200.9
C	WT. OF SOIL = A − B	(grams)	1804.8	1859.2	1959.0	1995.3	1940.8
D	WET UNIT WT.(1) = C X 0.066	(pcf)	119.1	122.7	129.3	131.7	128.1
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.0	108.2	112.0	112.0	107.0

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: CHW

	TARE NO.		#10	#40	#21	#614	#57
F	WT. OF TARE	(grams)	8.4	8.1	8.4	8.3	8.2
G	WT. OF WET SOIL & TARE	(grams)	476.4	457.5	475.9	371.6	541.4
H	WT. OF DRY SOIL & TARE	(grams)	428.7	404.3	413.4	317.2	453.6
I	WT. OF WATER = G − H	(grams)	47.7	53.2	62.5	54.4	87.8
J	WT. DRY SOIL = H − F	(grams)	420.3	396.2	405.0	308.9	445.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.3	13.4	15.4	17.6	19.7

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FLUOR FERNALD

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60321 TASK NO. 03

DESCRIPTION: Phase V DATE: 28 day Oct month 2003 year

MATERIAL TYPE: Clay Liner CF03-13

Weight of Total Sample	=	22,832.8
Weight of Oversize Fraction	=	826.2
Weight of Finer Fraction (- 3/8)	=	22,006.6
Percentage of Oversize Fraction	= (P_C)	3.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.166
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	113.5
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 16.1\ \%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 114.9$ pcf

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FLUOR FERNALD

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MOISTURE–DENSITY RELATIONSHIP

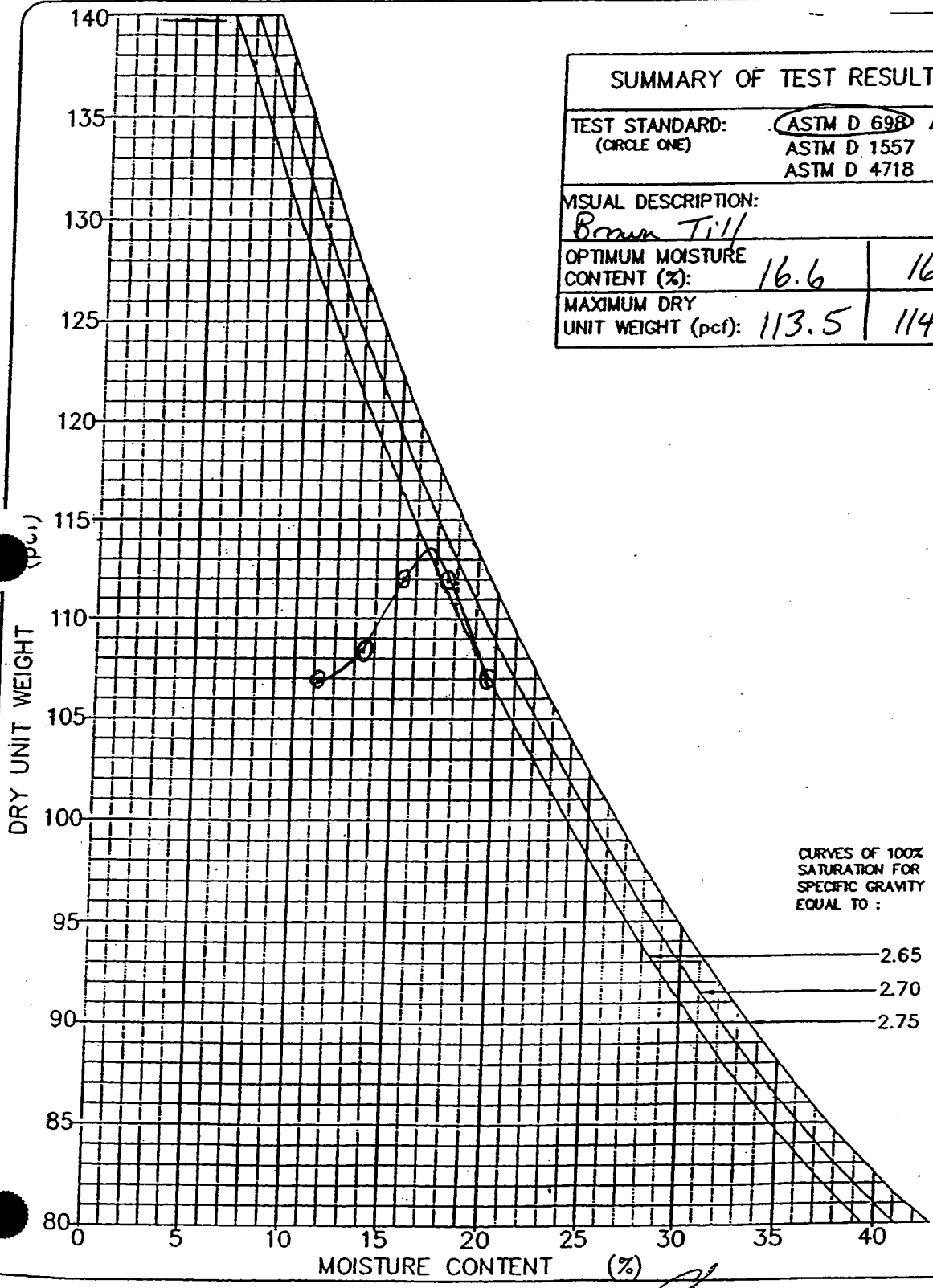
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 2

DESCRIPTION: Phase V DATE: 28 day Oct month 2003 year

MATERIAL TYPE: Brown & Gray Till MATERIAL SOURCE: Cell #7 Floor SAMPLE NO.: CF03-13

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	16.6	16.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	113.5	114.9	CJ



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FLUOR FERNALD, INC.

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 03

DESCRIPTION: Phase II DATE: 7 day Nov month 2003 year

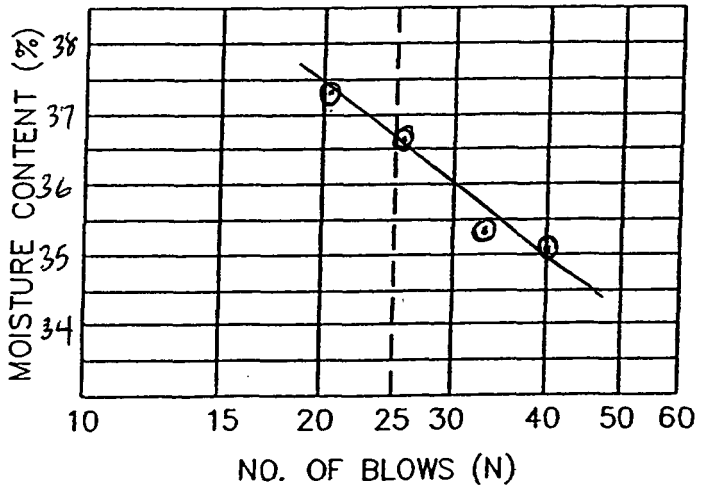
MATERIAL TYPE: CF MATERIAL SOURCE: Floor of Cell #7 SAMPLE NO.: CC03-14

LIQUID LIMIT DETERMINATION

QA ID: 55

	TARE NO.		3.1	3.2	2.9	2.6
A	WT. OF TARE	(grams)	28.41	27.84	31.48	28.55
B	WT. OF WET SOIL & TARE	(grams)	45.99	42.72	45.26	44.44
C	WT. OF DRY SOIL & TARE	(grams)	41.21	38.73	41.68	40.29
D	WT. OF WATER = B-C	(grams)	4.78	3.99	3.58	4.15
E	WT. OF DRY SOIL = C-A	(grams)	12.80	10.89	10.20	11.74
F	MOISTURE CONTENT = (D/E)X100	(%)	37.3	36.6	35.1	35.3
N	NUMBER OF BLOWS		21	26	40	33

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: _____

	TARE NO.		3.9	1.2		
A	WT. OF TARE	(grams)	20.99	28.49		
B	WT. OF WET SOIL & TARE	(grams)	33.93	39.99		
C	WT. OF DRY SOIL & TARE	(grams)	31.98	38.32		
D	WT. OF WATER = B-C	(grams)	1.95	1.67		
E	WT. OF DRY SOIL = C-A	(grams)	10.99	9.83		
	MOISTURE CONTENT = (D/E)X100	(%)	17.7	17.0		

LIQUID LIMIT (LL) = 37 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 20

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Total Sample Wt (lbs) 52.1
Total Sample Wt (grm) 23644.4
Sample Wt (-3/8 lb) 683.7

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GO3211 TASK NO.: 3

DESCRIPTION: PHASE V DATE: 6 day NOV month 2003 year

MATERIAL TYPE: Brown Gray Till w/ trace fines SAMPLE NO.: CF03-14

SOIL SAMPLE SIZE	+3/8 = 2989.2	MOISTURE = 678.7	TOTAL = 23644.4
	-3/8 = 19976.5		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		BSP	L-44	BSP	L-44
WT. OF DRY SAMPLE PLUS TARE	(grams)	3928.2	874.8	3773.9	329.1
WT. OF TARE	(grams)	939.0	191.1	939.0	191.1
WT. OF DRY SAMPLE	(grams)	2989.2	683.7	2834.9	138.0

SIEVE ANALYSIS QA ID: 44

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	597.4	2.5		97.5	
2 in	50.8	1945.2	8.2		91.8	
1 1/2in	38.1	2205.0	9.3		90.7	
1 in	25.4	2489.2	10.5		89.5	
3/4 in	19.1	2601.5	11.0		89.0	
1/2 in	12.7	2734.7	11.6		88.4	
3/8 in	9.53	2833.1	12.0		88.0	
No. 4	4.75	13.2	1.9	98.1	86.3	
No. 10	2.00	29.4	4.3	95.7	84.2	
No. 20	0.850	50.8	7.4	92.6	81.5	
No. 40	0.425	71.4	10.4	89.6	78.8	
No. 60	0.250	89.1	13.0	87.0	76.5	
No. 100	0.125	109.3	16.0	84.0	73.9	
No. 200	0.075	134.9	19.7	80.3	70.7	
PAN PAN	—	138.3	—	—	—	

COMMENTS:

000080

%FINER = 100 − Σ% RETAINED

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FLUOR FERNALD, INC.

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.: GQ3211 TASK NO.: 03.

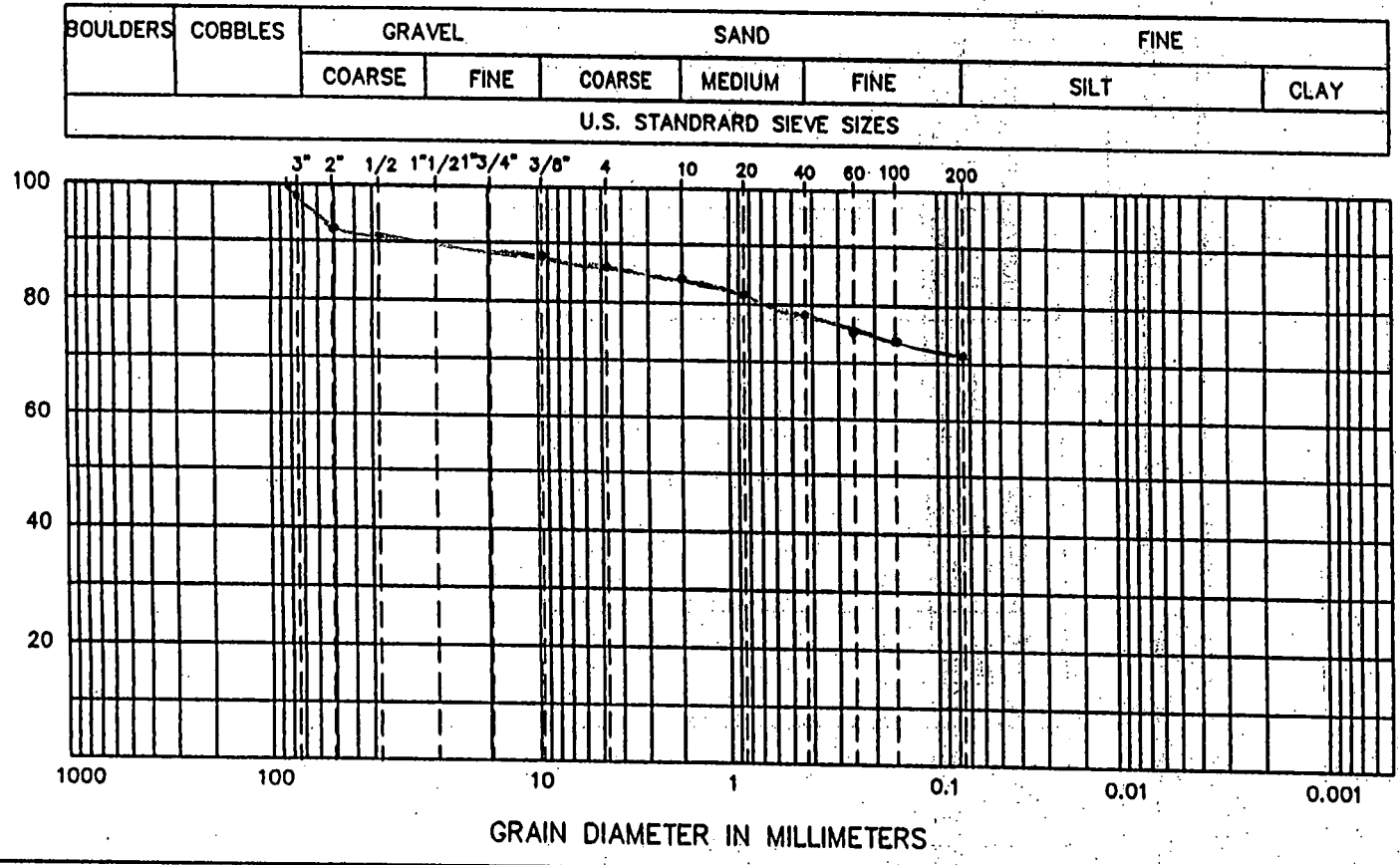
DESCRIPTION: Phase V

DATE: 6 day Nov month 2003 year

MATERIAL TYPE: Compacted Fill

SAMPLE NO.: CF03-14 QA ID: CL

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) ~~97.5~~ 37

(PL) ~~91.8~~ 17

(PI) ~~90.7~~ 20

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	97.5
2-in.	91.8
1 1/2-in.	90.7
1-in.	89.5
3/4-in.	89.0
1/2-in.	88.4
3/8-in.	88.0
NO. 4	86.3
NO. 10	84.2
NO. 20	81.5
NO. 40	78.8
NO. 60	76.5
NO. 100	73.9
NO. 200	70.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
	63
	63
	68
	68

SOIL CLASSIFICATION (ASTM D 2487): CL - Lean Clay w/sand

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

PROJECT NO.: GQ3211 TASK NO.: 2

MATERIAL TYPE: Brown & Gray Till w/ Topsoil

MATERIAL SOURCE: Cell #7 Floor

DATE: 7 day Nov month 2003 year

SAMPLE NO.: CF03-14

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: CHW

	WATER ADDED	(ml)	13.19 / 150	13.40 / 200	13.58 / 250	13.62 / 300	13.56 / 350
A	WT. OF SOIL & MOLD	(grams)	5983.0	6078.2	6159.9	6178.0	6150.8
B	WT. OF MOLD	(grams)	4200.9	~~[illegible]~~			4200.9
C	WT. OF SOIL = A − B	(grams)	1782.1	1877.3	1959.0	1977.1	1949.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.6	123.9	129.3	130.5	128.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	105.4	109.2	111.4	110.5	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: CHW

	TARE NO.		#4	X	#9	#59	#111
F	WT. OF TARE	(grams)	8.1	8.3	8.3	8.1	8.2
G	WT. OF WET SOIL & TARE	(grams)	492.0	537.4	458.5	468.6	450.9
H	WT. OF DRY SOIL & TARE	(grams)	441.7	474.4	396.2	398.1	377.2
I	WT. OF WATER = G − H	(grams)	50.3	63.0	62.3	70.5	73.7
J	WT. DRY SOIL = H − F	(grams)	433.6	466.1	387.9	390.0	369.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.6	13.5	16.1	18.1	20.0

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FLUOR FERNALD

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ321 TASK NO. 03

DESCRIPTION: Phase I DATE: 10 day Nov month 2003 year

MATERIAL TYPE: Clay Liner CF03-14 STD

Weight of Total Sample	=	23,644.4
Weight of Oversize Fraction	=	2833.1
Weight of Finer Fraction (-3/8)	=	20,811.3
Percentage of Oversize Fraction	= (P_C)	12.0
Percentage of Finer Fraction (-3/8)	= (P_F)	88.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.162
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	112.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 14.4$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 116.8$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

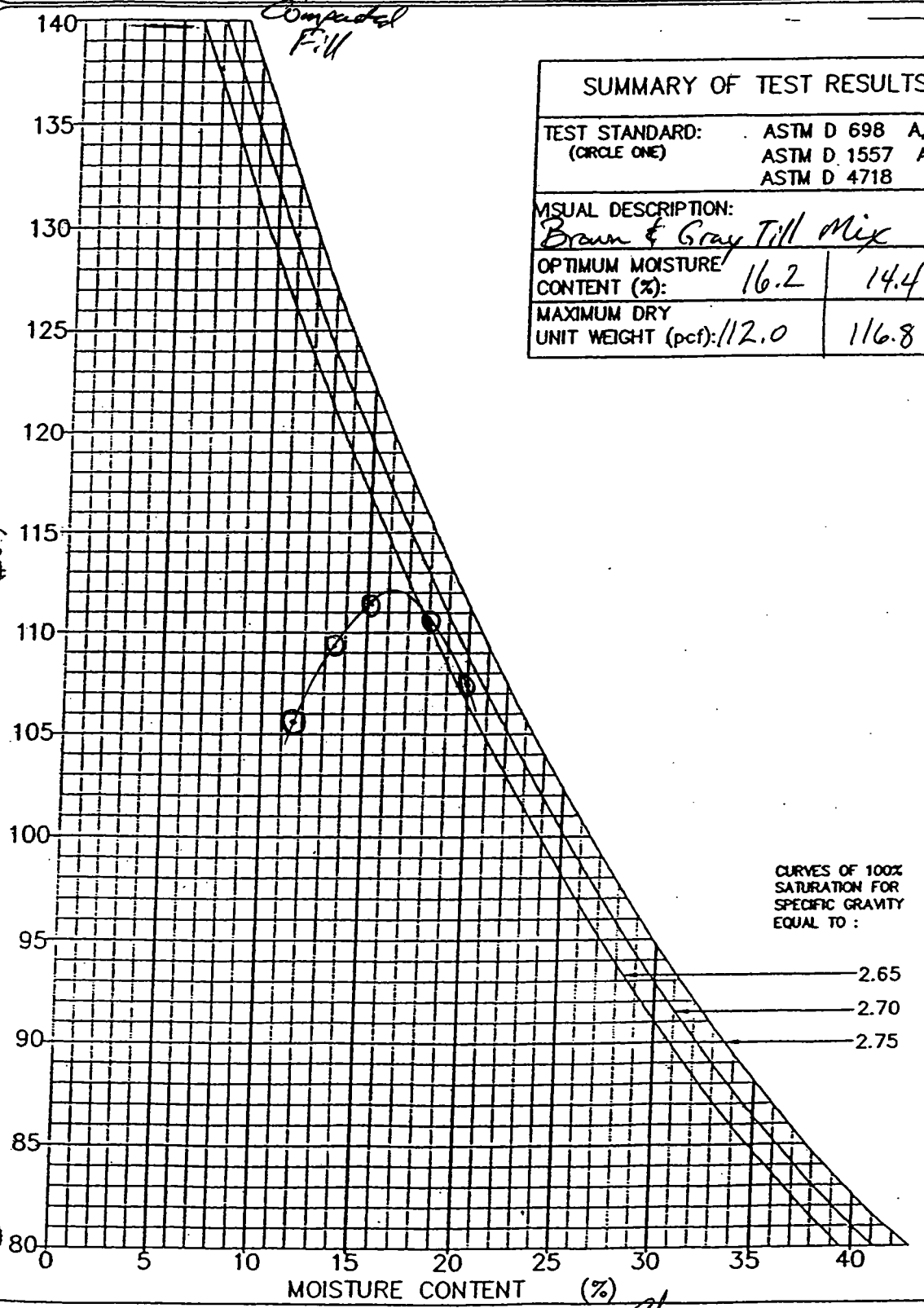
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ3211 TASK NO.: 3

DESCRIPTION: Phase V DATE: 10 day Nov month 2003 year

MATERIAL TYPE: ~~Brown & Gray Till~~ Compacted Fill MATERIAL SOURCE: Cell #7 Floor SAMPLE NO.: CF03-14

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown & Gray Till Mix			CA
OPTIMUM MOISTURE CONTENT (%):	16.2	14.4	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	112.0	116.8	CA



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CLAY LINER AND CAP MATERIAL

CONFORMANCE TEST RESULTS

MOISTURE CONTENTS

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL 5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6-01341 TASK NO. 04-1

DESCRIPTION: Phase III DATE: 07 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay

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

	SAMPLE NO.	LP02-107	LP02-108	LP02-109	LP02-110	LP02-113
	TARE NO.	#655	656	665	37	*670
A	WT. OF TARE	8.0	8.2	8.3	8.2	8.3
B	WT. OF WET SOIL & TARE	434.3	442.0	534.5	360.3	352.0
C	WT. OF DRY SOIL & TARE	387.7	398.3	475.9	319.3	313.2
D	WT. OF WATER = B-C	46.6	43.7	58.6	41.0	38.8
E	WT. OF DRY SOIL = C-A	379.7	390.1	467.6	311.1	304.9
F	MOISTURE CONTENT = (D/E) X 100	12.3	11.2	12.5	13.2	12.7
	FIELD DENSITY TEST (FDT) NO.					

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

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000088

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: ____ day ____ month ____ year

MATERIAL TYPE: Low Perm Clay

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

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

	SAMPLE NO.	LP02-102	LP02-103	LP02-104	LP02-105	LP02-106
	TARE NO.	647	33	33	#651	#36
A	WT. OF TARE	8.1	8.1	8.1	8.3	8.3
B	WT. OF WET SOIL & TARE	423.1	419.9	414.4	391.4	421.4
C	WT. OF DRY SOIL & TARE	373.7	363.2	368.3	345.5	375.0
D	WT. OF WATER = B-C	49.4	56.7	46.1	45.9	46.4
E	WT. OF DRY SOIL = C-A	365.6	355.1	360.2	337.2	366.7
F	MOISTURE CONTENT = (D/E) X 100	13.5	16.0	12.8	13.6	12.7
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000089

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 681341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: ____ day ____ month ____ year

MATERIAL TYPE: Low Perm CLAY

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

	SAMPLE NO.	LP02-95	LP02-98	LP02-99	LP02-100	LP02-101
	TARE NO.	#308	#98	#91	310	603
A	WT. OF TARE	8.1	8.2	8.2	8.1	8.2
B	WT. OF WET SOIL & TARE	426.8	386.3	343.5	384.4	367.6
C	WT. OF DRY SOIL & TARE	374.7	338.1	305.4	342.5	326.5
D	WT. OF WATER = B-C	52.1	48.2	38.1	41.9	41.1
E	WT. OF DRY SOIL = C-A	366.6	329.9	297.2	334.4	318.3
F	MOISTURE CONTENT = (D/E) X 100	14.2	14.6	12.8	12.5	12.9
	FIELD DENSITY TEST (FDT) NO.					

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

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.				000090	

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: Ø45

DESCRIPTION: Phase IV DATE: ____ day ____ month ____ year

MATERIAL TYPE: Low Perm Clay

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

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

	SAMPLE NO.	LPØ2-88	LPØ2-89	LPØ2-92	LP0293	LPØ2-94
	TARE NO.	6Ø2	49	1Ø3	#310	98
A	WT. OF TARE	8.2	8.2	8.3	8.1	8.2
B	WT. OF WET SOIL & TARE	369.9	350.4	356.7	442.9	304.9
C	WT. OF DRY SOIL & TARE	323.4	311.7	316.5	~~395.8~~ 374.8	270.7
D	WT. OF WATER = B-C	46.5	38.7	40.2	52.9	34.2
E	WT. OF DRY SOIL = C-A	315.2	303.5	308.2	386.9	262.5
F	MOISTURE CONTENT = (D/E) X 100	14.8	12.8	13.Ø	13.7	13.Ø
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000091

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: ____ day ____ month ____ year

MATERIAL TYPE: Low Perm Clay

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

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

	SAMPLE NO.	LP02-83	LP02-84	LP02-85	LP02-86	LP02-87
	TARE NO.	#48	#16	52	#16	#12
A	WT. OF TARE	8.3	8.4	8.2	8.4	8.3
B	WT. OF WET SOIL & TARE	373.2	327.1	388.3	363.9	392.8
C	WT. OF DRY SOIL & TARE	326.4	289.6	348.1	324.8	343.9
D	WT. OF WATER = B-C	46.8	37.5	40.2	39.1	48.9
E	WT. OF DRY SOIL = C-A	318.1	281.5	339.9	316.4	335.6
F	MOISTURE CONTENT = (D/E) X 100	14.7	13.3	11.8	12.4	14.6
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000092

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase IV DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Low Ferron Clay

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

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

	SAMPLE NO.	LPØ2-77	LPØ2-78	LPØ2-79	LPØ2-81	LPØ2-82
	TARE NO.	613	14	676	608	607
A	WT. OF TARE	8.2	8.3	8.3	8.2	8.2
B	WT. OF WET SOIL & TARE	331.Ø	369.6	429.5	393.8	401.9
C	WT. OF DRY SOIL & TARE	292.8	328.5	380.4	349.5	355.9
D	WT. OF WATER = B-C	38.2	41.1	49.1	44.3	46.0
E	WT. OF DRY SOIL = C-A	284.6	320.2	372.1	341.3	347.7
F	MOISTURE CONTENT = (D/E) X 100	13.4	12.8	13.2	13.0	13.2
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000093

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6-Q1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 09 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay

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

	SAMPLE NO.	LP02-73	~~LP02-74~~	LP02-74	LP02-75	LP02-76
	TARE NO.	#95	~~#63~~	#95	63	98
A	WT. OF TARE	8.1	~~8.2~~	8.1	8.2	8.2
B	WT. OF WET SOIL & TARE	396.0	~~284.4~~	284.4	317.4	386.0
C	WT. OF DRY SOIL & TARE	346.7		248.0	283.0	340.5
D	WT. OF WATER = B-C	49.3		36.4	34.4	45.5
E	WT. OF DRY SOIL = C-A	338.6		239.9	274.8	332.3
	MOISTURE CONTENT = (D/E) X 100	14.6		15.2	12.5	13.7
	FIELD DENSITY TEST (FDT) NO.					

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

	SAMPLE NO.					
	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					
	MOISTURE CONTENT = (D/E) X 100					
	FIELD DENSITY TEST (FDT) NO.					

000094

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL 5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 04 day Sept month 2002 year

MATERIAL TYPE: Low Poor Clay

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

QA ID: DLE/KS

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

	SAMPLE NO.	LP02-67	LP02-69	LP02-70	LP02-71	LP02-72
	TARE NO.	#98	310	#310	103	95
A	WT. OF TARE	8.2	8.1	8.1	8.4	8.1
B	WT. OF WET SOIL & TARE	364.3	409.4	365.7	332.8	341.4
C	WT. OF DRY SOIL & TARE	328.6	365.4	322.8	299.7	304.6
D	WT. OF WATER = B-C	35.7	44.0	42.9	33.1	36.8
E	WT. OF DRY SOIL = C-A	320.4	357.3	314.7	291.3	296.5
F	MOISTURE CONTENT = (D/E) X 100	11.1	12.3	13.6	11.4	12.4
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000095

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay

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

QA ID: 07E

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

	SAMPLE NO.	LP02-62	LP02-63	LP02-64	LP02-65	LP02-66
	TARE NO.	98	97	#90	#96	230
A	WT. OF TARE	8.2	8.2	8.2	8.1	8.3
B	WT. OF WET SOIL & TARE	368.4	316.9	359.8	292.0	313.7
C	WT. OF DRY SOIL & TARE	329.9	283.7	321.2	263.2	283.2
D	WT. OF WATER = B-C	41.5	33.2	38.6	28.8	30.5
E	WT. OF DRY SOIL = C-A	321.7	275.5	313.0	255.1	274.9
F	MOISTURE CONTENT = (D/E) X 100	12.9	12.1	12.3	11.3	11.1
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000096

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay

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

QA ID: 01 E

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

	SAMPLE NO.	LP02-57	LP02-58	LP02-59	LP02-60	LP02-61
	TARE NO.	227	309	12	97	90
A	WT. OF TARE	8.3	8.1	8.3	8.2	8.2
B	WT. OF WET SOIL & TARE	492.0	447.6	270.8	311.3	373.1
C	WT. OF DRY SOIL & TARE	444.7	402.5	242.5	280.4	335.7
D	WT. OF WATER = B-C	47.3	45.1	28.3	30.9	37.4
E	WT. OF DRY SOIL = C-A	436.4	394.4	234.2	272.2	327.5
F	MOISTURE CONTENT = (D/E) X 100	10.8	11.4	12.1	11.4	11.4
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000097

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay

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

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

	SAMPLE NO.	LP02-51	LP02-53	LP02-54	LP02-55	LP02-56
	TARE NO.	647	#48	#96	#308	636
A	WT. OF TARE	8.1	8.3	8.1	8.1	8.2
B	WT. OF WET SOIL & TARE	360.8	404.7	311.0	535.4	295.4
C	WT. OF DRY SOIL & TARE	324.5	359.6	278.8	482.1	263.7
D	WT. OF WATER = B-C	36.3	45.1	35.2	53.3	31.7
E	WT. OF DRY SOIL = C-A	316.4	351.3	267.7	474.0	255.5
F	MOISTURE CONTENT = (D/E) X 100	11.5	12.8	13.1	11.2	12.4
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000098

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase IV DATE: 14 day Aug month 2ØØ2 year

MATERIAL TYPE: Low Perm Clay

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

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

	SAMPLE NO.	LPØ2-46	LPØ2-47	LPØ2-48	LP02-49	LPØ2-5Ø
	TARE NO.	675	18	2ØØ	#645	#679
A	WT. OF TARE	8.3	8.4	8.2	8.2	8.1
B	WT. OF WET SOIL & TARE	4Ø2.7	414.6	456.Ø	433.Ø	446.8
C	WT. OF DRY SOIL & TARE	361.6	371.6	4Ø6.4	383.7	389.9
D	WT. OF WATER = B-C	41.1	43.Ø	49.6	49.3	56.9
E	WT. OF DRY SOIL = C-A	353.3	363.2	398.2	375.5	381.8
F	MOISTURE CONTENT = (D/E) X 100	11.6	11.8	12.5	13.1	14.9
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000099

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: ____ day ____ month ____ year

MATERIAL TYPE: LP Clay

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

	SAMPLE NO.	LP02-40	LP02-41	LP02-42	LP02-44	LP02-45
	TARE NO.	#103	#608	#114	#601	#107
A	WT. OF TARE	8.4	8.2	8.4	8.3	8.0
B	WT. OF WET SOIL & TARE	412.3	404.8	473.5	426.7	463.1
C	WT. OF DRY SOIL & TARE	367.3	361.1	421.1	375.4	410.5
D	WT. OF WATER = B-C	45.0	43.7	52.4	51.3	52.6
E	WT. OF DRY SOIL = C-A	358.9	352.9	412.7	367.1	402.5
F	MOISTURE CONTENT = (D/E) X 100	12.5	12.4	12.7	14.0	13.1
	FIELD DENSITY TEST (FDT) NO.					

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

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000100

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 041341 TASK NO.: 64.1

DESCRIPTION: Phase II DATE: ____ day ____ month ____ year

MATERIAL TYPE: Low Perm Clay

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

QA ID: DCE

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

	SAMPLE NO.	~~LP02-35~~	LP02-35	LP02-36	LP02-38	LP02-39
	TARE NO.	~~#110~~	647	#608	#601	#95
A	WT. OF TARE	~~8.0~~	8.1	8.2	8.2	8.1
B	WT. OF WET SOIL & TARE	~~394.0~~	341.1	534.1	503.1	464.9
C	WT. OF DRY SOIL & TARE		306.6	480.0	447.8	411.2
D	WT. OF WATER = B-C		34.5	54.1	55.3	53.7
E	WT. OF DRY SOIL = C-A		298.5	471.8	469.6	403.1
F	MOISTURE CONTENT = (D/E) X 100		11.6	11.5	11.8	13.3
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000101

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G-Q1341 TASK NO.: 04-1

DESCRIPTION: PHASE IV DATE: 30 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

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

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

	SAMPLE NO.	LP02-28	LP02-29	LP02-30	LP02-31	LP02-34
	TARE NO.	#615	#91	#607	#603	#614
A	WT. OF TARE	8.1	8.2	8.2	8.1	8.2
B	WT. OF WET SOIL & TARE	232.5	355.8	387.0	384.9	455.4
C	WT. OF DRY SOIL & TARE	205.7	319.0	340.8	345.5	409.6
D	WT. OF WATER = B-C	26.8	36.8	46.2	39.4	45.8
E	WT. OF DRY SOIL = C-A	197.6	310.8	332.6	337.4	401.4
F	MOISTURE CONTENT = (D/E) X 100	13.6	11.8	13.9	11.7	11.4
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000102

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 02134 TASK NO.: 041

DESCRIPTION: Phase IV DATE: ____ day July month 2002 year

MATERIAL TYPE: Low Perm Clay

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

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

	SAMPLE NO.	LP02-23	LP02-24	LP02-25	LP02-26	LP02-27
	TARE NO.	#18	#98	#95	#14	L-5
A	WT. OF TARE	8.4	8.3	8.3	8.3	106.3
B	WT. OF WET SOIL & TARE	355.7	300.2	366.7	273.8	605.9
C	WT. OF DRY SOIL & TARE	320.2	267.7	326.2	246.1	551.5
D	WT. OF WATER = B-C	35.5	32.5	40.5	27.7	54.4
E	WT. OF DRY SOIL = C-A	311.8	259.4	317.9	237.8	445.2
F	MOISTURE CONTENT = (D/E) X 100	11.4	12.5	12.7	11.6	11.95
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000103

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

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

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

Stockpile 03

	SAMPLE NO.	LP02-16	LP02-17	LP02-19	LP02-21	LP02-22
	TARE NO.	#65	#603	#614	#107	#93
A	WT. OF TARE	8.2	8.2	8.2	8.0	8.2
B	WT. OF WET SOIL & TARE	431.3	507.8	467.4	563.0	338.0
C	WT. OF DRY SOIL & TARE	387.2	451.0	414.0	500.3	302.1
D	WT. OF WATER = B-C	44.1	56.8	53.4	62.7	35.9
E	WT. OF DRY SOIL = C-A	379.0	442.8	405.8	492.3	293.9
F	MOISTURE CONTENT = (D/E) X 100	11.6	12.8	13.2	12.7	12.2
	FIELD DENSITY TEST (FDT) NO.					

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

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%

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000104

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q134/ TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 15 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY

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

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

	SAMPLE NO.	LP02-11	LP02-12	LP02-13	LP02-14	LP02-15
	TARE NO.	#92	#604	#107	#309	#603
A	WT. OF TARE	8.1	8.3	8.0	8.0	8.1
B	WT. OF WET SOIL & TARE	396.4	347.0	402.3	461.8	340.5
C	WT. OF DRY SOIL & TARE	355.0	306.0	364.7	415.3	303.3
D	WT. OF WATER = B-C	41.4	41.0	37.6	46.5	37.2
E	WT. OF DRY SOIL = C-A	346.9	297.7	356.7	407.3	295.2
F	MOISTURE CONTENT = (D/E) X 100	11.9	13.8	10.5	11.4	12.6
	FIELD DENSITY TEST (FDT) NO.					

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

	SAMPLE NO.					
	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					
	FIELD DENSITY TEST (FDT) NO.					

000105

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO.: 641

DESCRIPTION: Phase IV DATE: 02 day July month 2002 year

MATERIAL TYPE: Low Penn Clay

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

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

	SAMPLE NO.	LP02-6	LP02-7	LP02-8	LP02-9	LP02-10
	TARE NO.	636	18	615	607	63
A	WT. OF TARE	8.2	8.4	8.2	8.2	8.3
B	WT. OF WET SOIL & TARE	376.3	247.8	390.1	276.8	385.0
C	WT. OF DRY SOIL & TARE	330.7	208.0	347.3	246.2	345.9
D	WT. OF WATER = B-C	45.6	39.8	42.8	30.6	39.1
E	WT. OF DRY SOIL = C-A	322.5	199.6	339.1	238.0	337.6
	MOISTURE CONTENT = (D/E) X 100	14.1	19.9	12.6	12.9	11.6
	FIELD DENSITY TEST (FDT) NO.					

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

	SAMPLE NO.					
	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					
	MOISTURE CONTENT = (D/E) X 100					
	FIELD DENSITY TEST (FDT) NO.					

000106

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 24 day June month 2002 year

MATERIAL TYPE: Low Perm Clay

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

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

	SAMPLE NO.	LP02-1	LP02-2	LP02-3	LP02-4	LP-02-5
	TARE NO.	630	630	65	630	12
A	WT. OF TARE	8.1	8.1	8.3	8.1	8.3
B	WT. OF WET SOIL & TARE	431.0	355.2	375.9	397.8	314.3
C	WT. OF DRY SOIL & TARE	377.8	311.7	331.3	346.2	279.1
D	WT. OF WATER = B-C	53.2	43.5	44.6	51.6	35.2
E	WT. OF DRY SOIL = C-A	369.7	303.6	323.0	338.1	270.8
	MOISTURE CONTENT = (D/E) X 100	14.4	14.3	13.8	15.3	13.0
	FIELD DENSITY TEST (FDT) NO.					

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

	SAMPLE NO.					
	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					
	MOISTURE CONTENT = (D/E) X 100					
	FIELD DENSITY TEST (FDT) NO.					

000107

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5368

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 28 day June month 2002 year

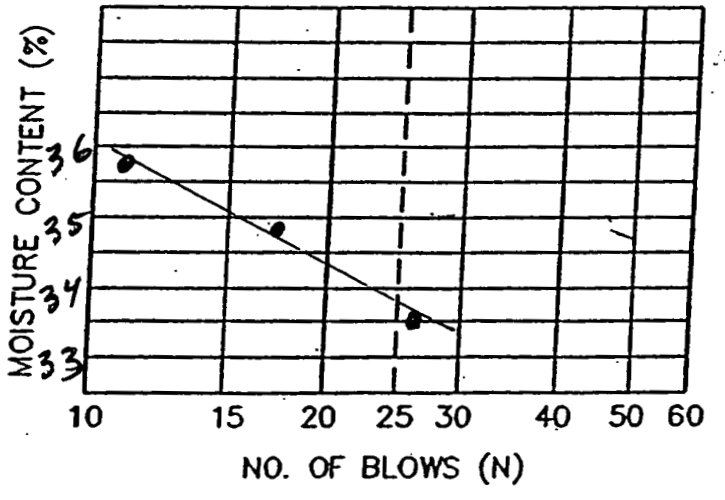
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Borrow Area SAMPLE NO.: LP02-1

LIQUID LIMIT DETERMINATION

QA ID: DZE

	TARE NO.		3.1	2.4	1.5	
A	WT. OF TARE	(grams)	28.39	27.39	28.60	
B	WT. OF WET SOIL & TARE	(grams)	49.93	53.51	52.76	
C	WT. OF DRY SOIL & TARE	(grams)	44.26	46.76	46.70	
D	WT. OF WATER = B-C	(grams)	5.67	6.75	6.06	
E	WT. OF DRY SOIL = C-A	(grams)	15.87	19.37	18.1	
F	MOISTURE CONTENT = (D/E)X100	(%)	35.7	34.8	33.5	
N	NUMBER OF BLOWS		12	17	26	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DZE

	TARE NO.		A218	A203		
A	WT. OF TARE	(grams)	3.58	3.58		
B	WT. OF WET SOIL & TARE	(grams)	17.66	14.57		
C	WT. OF DRY SOIL & TARE	(grams)	15.54	12.98		
D	WT. OF WATER = B-C	(grams)	2.12	1.59		
E	WT. OF DRY SOIL = C-A	(grams)	11.96	9.40		
	MOISTURE CONTENT = (D/E)X100	(%)	17.7	16.9		

LIQUID LIMIT (LL) = 34 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 17

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FLUOR FERNALD

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 27 day June month 2002 year

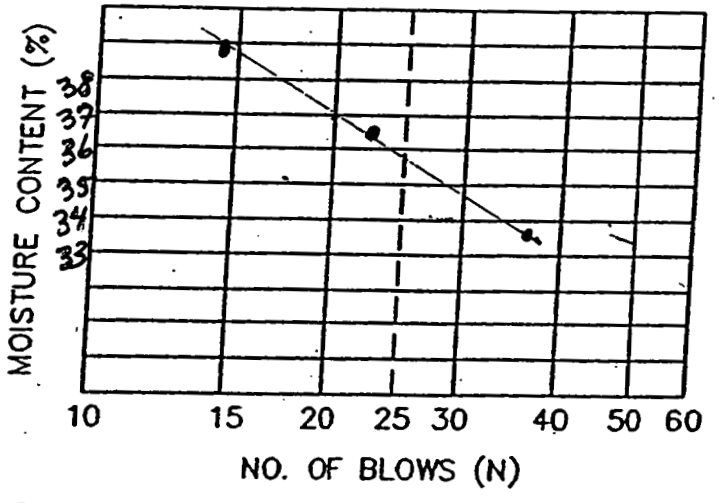
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Borrow Area SAMPLE NO.: 1P07-2

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.3	2.7	1.8	
A	WT. OF TARE	(grams)	28.64	28.67	28.81	
B	WT. OF WET SOIL & TARE	(grams)	50.39	51.06	51.26	
C	WT. OF DRY SOIL & TARE	(grams)	44.30	45.07	45.57	
D	WT. OF WATER = B-C	(grams)	6.09	5.99	5.69	
E	WT. OF DRY SOIL = C-A	(grams)	15.66	16.40	16.76	
F	MOISTURE CONTENT = (D/E)X100	(%)	38.9	36.5	33.9	
N	NUMBER OF BLOWS		14	23	32	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A223	A221		
A	WT. OF TARE	(grams)	3.68	3.53		
B	WT. OF WET SOIL & TARE	(grams)	16.38	15.49		
C	WT. OF DRY SOIL & TARE	(grams)	14.43	13.68		
D	WT. OF WATER = B-C	(grams)	1.95	1.81		
E	WT. OF DRY SOIL = C-A	(grams)	10.83	10.15		
	MOISTURE CONTENT = (D/E)X100	(%)	18.00	17.8		

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LIQUID LIMIT (LL) = 36 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 18

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 03 day July month 2002 year

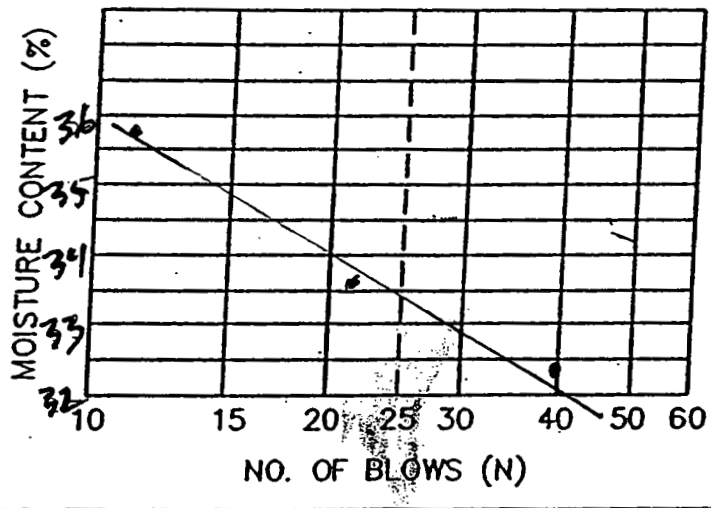
MATERIAL TYPE: LP Clay MATERIAL SOURCE: Borrow Area SAMPLE NO. LP02.3

LIQUID LIMIT DETERMINATION

QA ID: DLE / CW

	TARE NO.		1.3	1.5	2.7	
A	WT. OF TARE	(grams)	28.64	28.61	28.67	
B	WT. OF WET SOIL & TARE	(grams)	46.23	45.62	48.09	
C	WT. OF DRY SOIL & TARE	(grams)	41.59	41.35	43.30	
D	WT. OF WATER = B-C	(grams)	4.64	4.27	4.79	
E	WT. OF DRY SOIL = C-A	(grams)	12.95	12.74	14.63	
F	MOISTURE CONTENT = (D/E)X100	(%)	35.83	33.51	32.74	
N	NUMBER OF BLOWS		12	22	40	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A 218	A 203		
A	WT. OF TARE	(grams)	3.58	3.59		
B	WT. OF WET SOIL & TARE	(grams)	15.36	17.20		
C	WT. OF DRY SOIL & TARE	(grams)	13.67	15.23		
D	WT. OF WATER = B-C	(grams)	1.69	1.97		
F	WT. OF DRY SOIL = C-A	(grams)	10.09	11.64		
	MOISTURE CONTENT = (D/E)X100	(%)	16.7	16.9		

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

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 03 day July month 2002 year

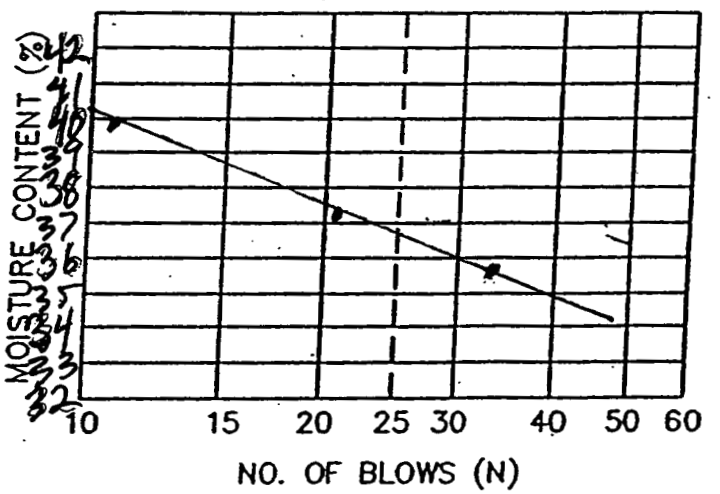
MATERIAL TYPE: LP Clay MATERIAL SOURCE: Borrow Area SAMPLE NO.: LP02-4

LIQUID LIMIT DETERMINATION

QA ID: CK

	TARE NO.		1.8	3.1	2.4	
A	WT. OF TARE	(grams)	28.81	28.38	27.39	
B	WT. OF WET SOIL & TARE	(grams)	50.42	45.86	48.65	
C	WT. OF DRY SOIL & TARE	(grams)	44.25	41.12	43.06	
D	WT. OF WATER = B-C	(grams)	6.17	4.74	5.59	
E	WT. OF DRY SOIL = C-A	(grams)	15.44	12.74	15.67	
F	MOISTURE CONTENT = (D/E)X100	(%)	39.96	37.21	35.67	
N	NUMBER OF BLOWS		11	21	33	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CK

	TARE NO.		A 223	A 221		
A	WT. OF TARE	(grams)	3.57	3.48		
B	WT. OF WET SOIL & TARE	(grams)	15.98	13.27		
C	WT. OF DRY SOIL & TARE	(grams)	14.23	11.91		
D	WT. OF WATER = B-C	(grams)	1.75	1.36		
F	WT. OF DRY SOIL = C-A	(grams)	10.66	8.43		
	MOISTURE CONTENT = (D/E)X100	(%)	16.4	16.1		

LIQUID LIMIT (LL) = 37 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 21

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 05 day July month 2002 year

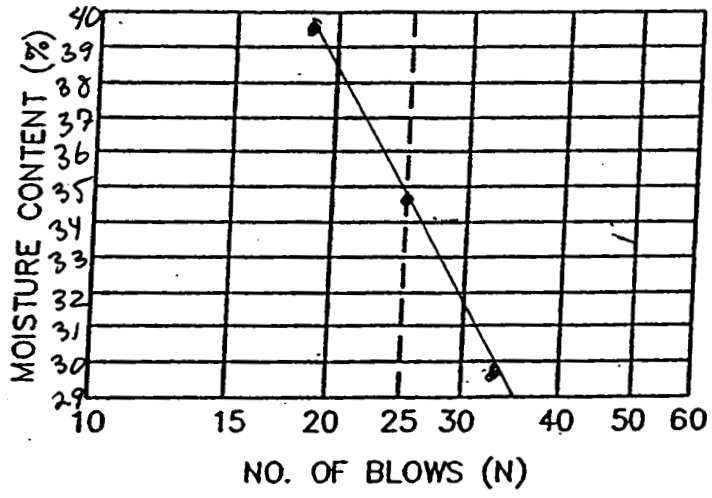
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Borrow Area SAMPLE NO.: LP-02-5

LIQUID LIMIT DETERMINATION

QA ID: CW/DLF

	TARE NO.		1.6	2.6	1.9	
A	WT. OF TARE	(grams)	28.87	28.55	28.56	
B	WT. OF WET SOIL & TARE	(grams)	48.59	49.09	47.74	
C	WT. OF DRY SOIL & TARE	(grams)	43.00	43.79	43.42	
D	WT. OF WATER = B-C	(grams)	5.59	5.3	4.32	
E	WT. OF DRY SOIL = C-A	(grams)	14.13	15.24	14.86	
F	MOISTURE CONTENT = (D/E)X100	(%)	39.56	34.77	29.07	
N	NUMBER OF BLOWS		18	25	33	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CW/DLF

	TARE NO.		A208	A-210		
A	WT. OF TARE	(grams)	3.58	3.54		
B	WT. OF WET SOIL & TARE	(grams)	15.22	19.39		
C	WT. OF DRY SOIL & TARE	(grams)	13.52	17.16		
D	WT. OF WATER = B-C	(grams)	1.70	2.23		
E	WT. OF DRY SOIL = C-A	(grams)	9.94	13.62		
	MOISTURE CONTENT = (D/E)X100	(%)	17.10	16.4		

LIQUID LIMIT (LL) = 35 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 18

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 09 day July month 2002 year

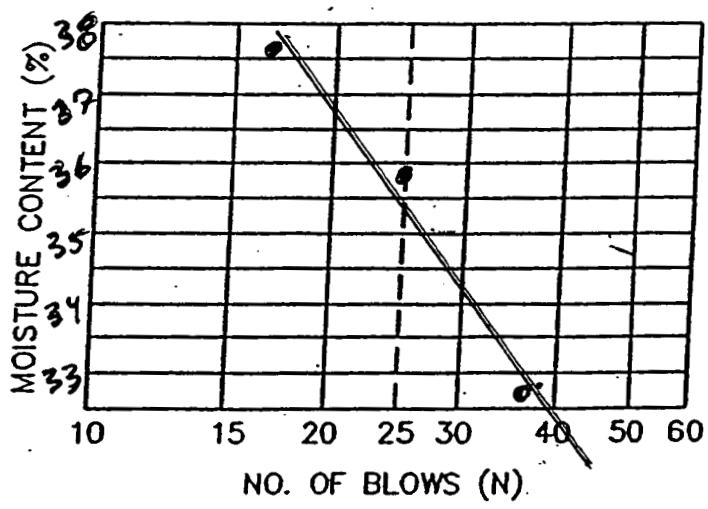
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Borrow Area SAMPLE NO. LP02-5

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.3	1.5	2.6	
A	WT. OF TARE	(grams)	28.64	28.61	28.55	
B	WT. OF WET SOIL & TARE	(grams)	52.07	52.85	51.96	
C	WT. OF DRY SOIL & TARE	(grams)	46.22	46.45	45.58	
D	WT. OF WATER = B-C	(grams)	5.85	6.40	6.40	
E	WT. OF DRY SOIL = C-A	(grams)	17.58	17.84	17.03	
F	MOISTURE CONTENT = (D/E)X100	(%)	33.3	35.9	37.6	
N	NUMBER OF BLOWS		38	25	16	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A220	A213		
A	WT. OF TARE	(grams)	3.46	3.46		
B	WT. OF WET SOIL & TARE	(grams)	14.56	14.10		
C	WT. OF DRY SOIL & TARE	(grams)	12.95	12.55		
D	WT. OF WATER = B-C	(grams)	1.61	1.55		
F	WT. OF DRY SOIL = C-A	(grams)	9.49	9.09		
	MOISTURE CONTENT = (D/E)X100	(%)	17.0	17.1		

LIQUID LIMIT (LL) = 35 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 18

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 10 day July month 2002 year

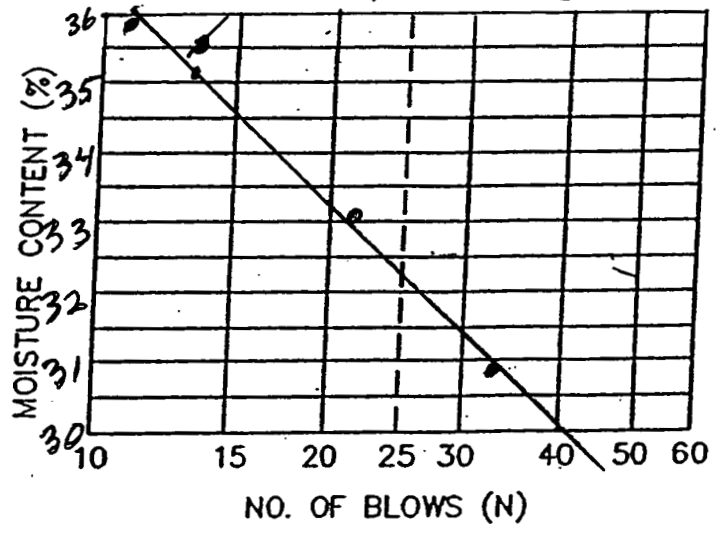
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Borrow Area SAMPLE NO. LP02-6

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.9	3.1	2.6	1.3
A	WT. OF TARE	(grams)	28.56	28.38	28.55	28.62
B	WT. OF WET SOIL & TARE	(grams)	50.81	50.12	51.28	48.69
C	WT. OF DRY SOIL & TARE	(grams)	44.95	44.47	45.63	43.97
D	WT. OF WATER = B-C	(grams)	5.86	5.65	5.65	4.72
E	WT. OF DRY SOIL = C-A	(grams)	16.39	16.09	17.08	15.35
F	MOISTURE CONTENT = (D/E)X100	(%)	35.8	35.1	33.1	30.7
N	NUMBER OF BLOWS		11	13	22	33

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		2.4	1.5		
A	WT. OF TARE	(grams)	27.39	28.61		
B	WT. OF WET SOIL & TARE	(grams)	38.54	39.94		
C	WT. OF DRY SOIL & TARE	(grams)	36.88	38.34		
D	WT. OF WATER = B-C	(grams)	1.66	1.60		
E	WT. OF DRY SOIL = C-A	(grams)	9.49	9.73		
	MOISTURE CONTENT = (D/E)X100	(%)	~~16.4~~ 17.5	16.4		

LIQUID LIMIT (LL) = 32 PLASTIC LIMIT (PL) = ~~16~~ 17 PLASTICITY INDEX (PI) = ~~16~~ 15

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 09 day July month 2002 year

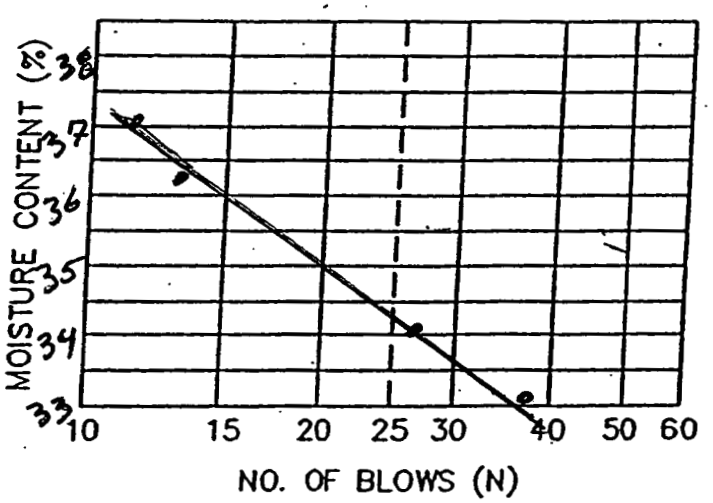
MATERIAL TYPE: Low Penn Clay MATERIAL SOURCE: Borrow Area SAMPLE NO. P02-7

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.6	2.7	3.1	1.9
A	WT. OF TARE	(grams)	28.87	28.67	28.38	28.56
B	WT. OF WET SOIL & TARE	(grams)	51.11	50.88	48.42	49.61
C	WT. OF DRY SOIL & TARE	(grams)	45.09	44.96	43.32	44.38
D	WT. OF WATER = B-C	(grams)	6.02	5.92	5.10	5.23
E	WT. OF DRY SOIL = C-A	(grams)	16.22	16.29	14.94	15.82
F	MOISTURE CONTENT = (D/E)X100	(%)	37.1	36.3	34.1	33.1
N	NUMBER OF BLOWS		12	13	22	38

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A-217	A-222		
A	WT. OF TARE	(grams)	3.61	3.55		
B	WT. OF WET SOIL & TARE	(grams)	13.51	14.64		
C	WT. OF DRY SOIL & TARE	(grams)	12.05	13.02		
D	WT. OF WATER = B-C	(grams)	1.46	1.62		
E	WT. OF DRY SOIL = C-A	(grams)	8.44	9.47		
	MOISTURE CONTENT = (D/E)X100	(%)	17.3	17.1		

LIQUID LIMIT (LL) = 34 PLASTIC LIMIT (PL) = 17.2 PLASTICITY INDEX (PI) = 17

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6-Q134/ TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day July month 2002 year

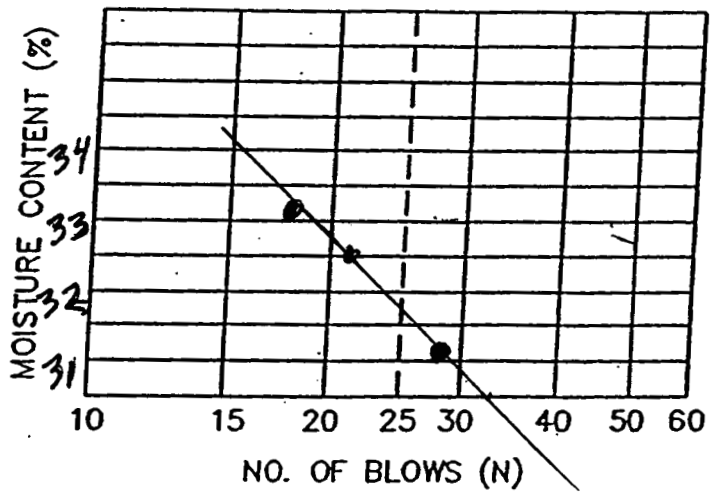
MATERIAL TYPE: Low Plasm Clay MATERIAL SOURCE: Stockpile 02-1 SAMPLE NO.: LP02-8

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.5	3.1	2.8	
A	WT. OF TARE	(grams)	28.61	28.38	28.46	
B	WT. OF WET SOIL & TARE	(grams)	47.33	50.79	48.62	
C	WT. OF DRY SOIL & TARE	(grams)	42.89	45.28	43.60	
D	WT. OF WATER = B-C	(grams)	4.44	5.49	5.02	
E	WT. OF DRY SOIL = C-A	(grams)	14.28	16.90	15.14	
F	MOISTURE CONTENT = (D/E)X100	(%)	31.1	32.5	33.2	
N	NUMBER OF BLOWS		28	21	18	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A 220	A 222		
A	WT. OF TARE	(grams)	3.45	3.54		
B	WT. OF WET SOIL & TARE	(grams)	16.40	17.98		
C	WT. OF DRY SOIL & TARE	(grams)	14.61	15.98		
D	WT. OF WATER = B-C	(grams)	1.79	2.00		
E	WT. OF DRY SOIL = C-A	(grams)	11.16	12.44		
	MOISTURE CONTENT = (D/E)X100	(%)	16.0	16.1		

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

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day July month 2002 year

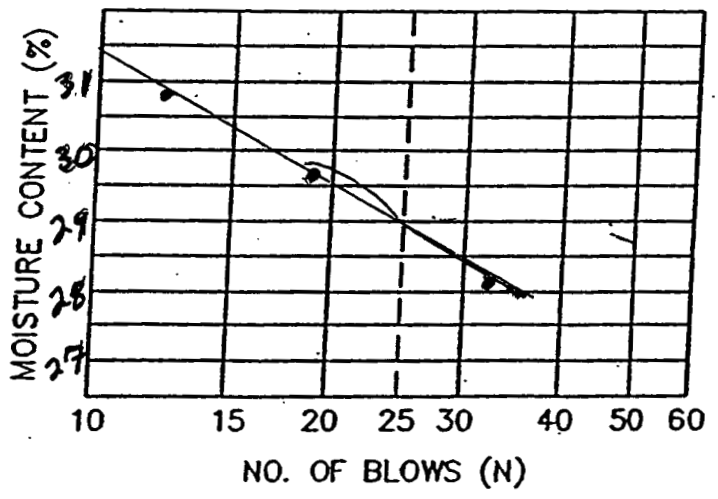
MATERIAL TYPE: Low Plas CLAY MATERIAL SOURCE: Stockpile 02-2 SAMPLE NO. LP02.9

LIQUID LIMIT DETERMINATION

QA ID: JKE

	TARE NO.		1.3	1.9	2.5	
A	WT. OF TARE	(grams)	28.64	28.56	28.42	
B	WT. OF WET SOIL & TARE	(grams)	54.52	49.50	48.15	
C	WT. OF DRY SOIL & TARE	(grams)	48.42	44.72	43.81	
D	WT. OF WATER = B−C	(grams)	6.10	4.78	4.34	
E	WT. OF DRY SOIL = C−A	(grams)	19.78	16.16	15.39	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.8	29.6	28.2	
N	NUMBER OF BLOWS		13	19	32	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: JKE

	TARE NO.		A-217	A 213		
A	WT. OF TARE	(grams)	3.59	3.46		
B	WT. OF WET SOIL & TARE	(grams)	14.74	21.14		
C	WT. OF DRY SOIL & TARE	(grams)	13.18	18.69		
D	WT. OF WATER = B−C	(grams)	1.56	2.45		
E	WT. OF DRY SOIL = C−A	(grams)	9.59	15.23		
	MOISTURE CONTENT = (D/E)X100	(%)	16.3 ~~16.6~~	16.1		

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

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day July month 2002 year

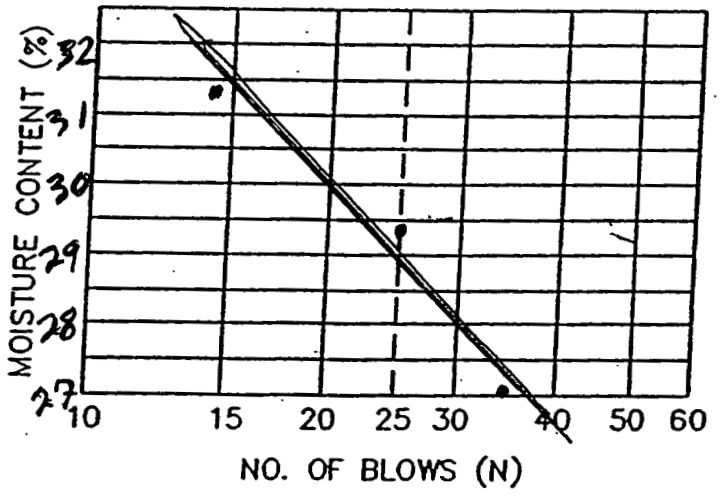
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-2 SAMPLE NO. LP02-9

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.6	2.7	1.8	
A	WT. OF TARE	(grams)	28.86	28.69	28.76	
B	WT. OF WET SOIL & TARE	(grams)	46.42	49.91	48.83	
C	WT. OF DRY SOIL & TARE	(grams)	42.69	45.08	44.04	
D	WT. OF WATER = B-C	(grams)	3.73	4.83	4.79	
E	WT. OF DRY SOIL = C-A	(grams)	13.83	16.41	15.28	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.0	29.4	31.3	
N	NUMBER OF BLOWS		35	25	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A219	A202		
A	WT. OF TARE	(grams)	3.59	3.58		
B	WT. OF WET SOIL & TARE	(grams)	13.60	13.98		
C	WT. OF DRY SOIL & TARE	(grams)	12.21	12.57		
D	WT. OF WATER = B-C	(grams)	1.39	1.41		
E	WT. OF DRY SOIL = C-A	(grams)	8.62	8.99		
	MOISTURE CONTENT = (D/E)X100	(%)	16.1	15.7		

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

©GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

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FLUOR FERNALD

5368

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 04-1

DESCRIPTION: Phase IV DATE: 22 day July month 2002 year

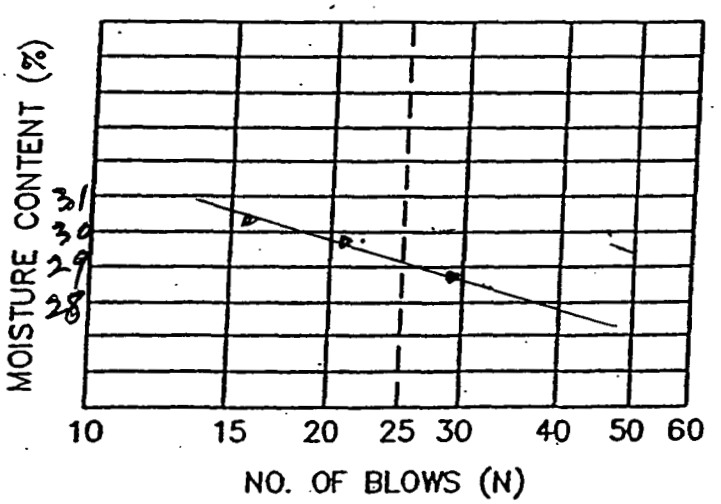
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-2 SAMPLE NO.: LP02-10

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		2.8	3.1	1.8	
A	WT. OF TARE	(grams)	28.46	28.38	28.78	
B	WT. OF WET SOIL & TARE	(grams)	47.66	50.37	49.29	
C	WT. OF DRY SOIL & TARE	(grams)	43.19	45.31	44.71	
D	WT. OF WATER = B−C	(grams)	4.47	5.06	4.58	
E	WT. OF DRY SOIL = C−A	(grams)	14.73	16.93	15.93	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.3	29.9	~~28.9~~ 28.8	
N	NUMBER OF BLOWS		16	21	28	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A-202	A-219		
A	WT. OF TARE	(grams)	3.58	3.59		
B	WT. OF WET SOIL & TARE	(grams)	17.67	18.23		
C	WT. OF DRY SOIL & TARE	(grams)	15.78	16.25		
D	WT. OF WATER = B−C	(grams)	1.89	1.98		
E	WT. OF DRY SOIL = C−A	(grams)	12.20	12.66		
	MOISTURE CONTENT = (D/E)X100	(%)	15.5	15.6		

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 22 day July month 2002 year

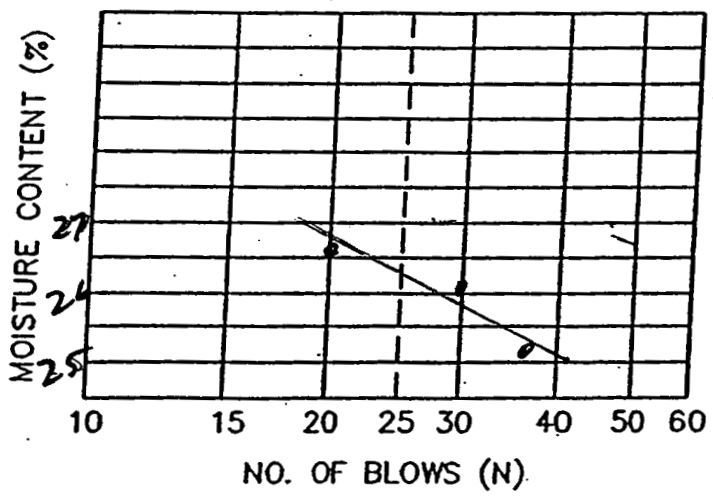
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-2 SAMPLE NO. LP02-11

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.4	2.7	1.9	
A	WT. OF TARE	(grams)	28.50	28.68	28.54	
B	WT. OF WET SOIL & TARE	(grams)	46.85	51.41	48.60	
C	WT. OF DRY SOIL & TARE	(grams)	43.00	46.71	44.57	
D	WT. OF WATER = B-C	(grams)	3.85	4.70	4.03	
E	WT. OF DRY SOIL = C-A	(grams)	14.50	18.03	16.03	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.6	26.1	25.1	
N	NUMBER OF BLOWS		20	30	36	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A-222	A-213		
A	WT. OF TARE	(grams)	3.54	3.47		
B	WT. OF WET SOIL & TARE	(grams)	15.69	14.18		
C	WT. OF DRY SOIL & TARE	(grams)	14.10	12.80		
D	WT. OF WATER = B-C	(grams)	1.59	1.38		
E	WT. OF DRY SOIL = C-A	(grams)	10.56	9.33		
	MOISTURE CONTENT = (D/E)X100	(%)	15.1	14.8		

000121

LIQUID LIMIT (LL) = 26 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 11

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6213'4 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 22 day July month 2002 year

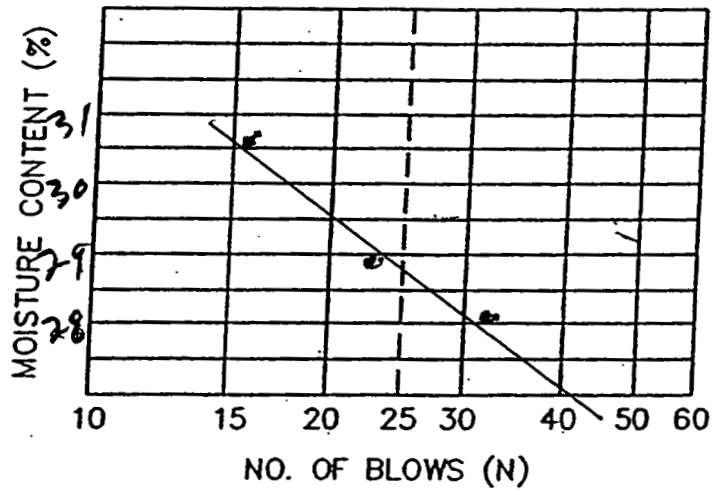
MATERIAL TYPE: Low Perm. Clay MATERIAL SOURCE: Stockpile 02-2 SAMPLE NO. 4802-12

LIQUID LIMIT DETERMINATION

QA ID: [illegible]

	TARE NO.		1.3	2.5	3.2	
A	WT. OF TARE	(grams)	28.64	28.42	27.82	
B	WT. OF WET SOIL & TARE	(grams)	50.58	47.53	45.53	
C	WT. OF DRY SOIL & TARE	(grams)	45.97	43.25	41.37	
D	WT. OF WATER = B-C	(grams)	4.81	4.28	4.16	
E	WT. OF DRY SOIL = C-A	(grams)	17.13	14.83	13.55	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.1	28.9	30.7	
N	NUMBER OF BLOWS		32	23	16	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A220	A217		
A	WT. OF TARE	(grams)	3.46	3.60		
B	WT. OF WET SOIL & TARE	(grams)	17.05	19.24		
C	WT. OF DRY SOIL & TARE	(grams)	15.28	17.21		
D	WT. OF WATER = B-C	(grams)	1.77	2.03		
E	WT. OF DRY SOIL = C-A	(grams)	11.82	13.61		
	MOISTURE CONTENT = (D/E)X100	(%)	14.97	14.92		

000122

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 22 day July month 2002 year

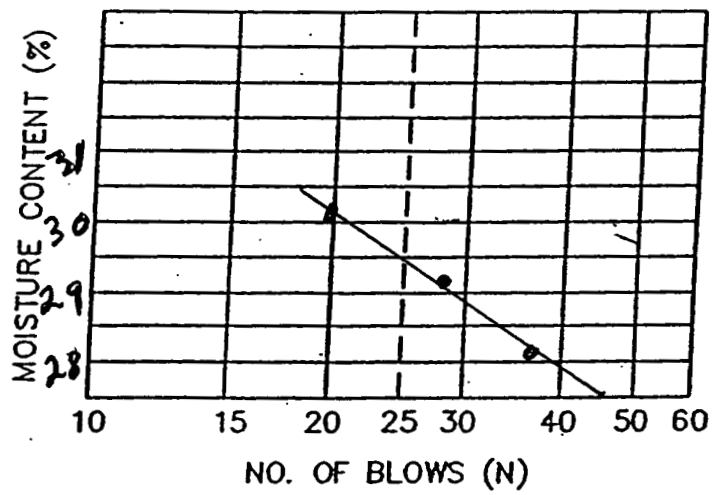
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-2 SAMPLE NO.: LP02-13

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.6	2.1	1.7	
A	WT. OF TARE	(grams)	28.87	28.24	28.49	
B	WT. OF WET SOIL & TARE	(grams)	48.28	47.81	48.73	
C	WT. OF DRY SOIL & TARE	(grams)	44.02	43.39	44.02	
D	WT. OF WATER = B–C	(grams)	4.26	4.42	4.71	
E	WT. OF DRY SOIL = C–A	(grams)	15.15	15.15	15.53	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.1	29.2	30.3	
N	NUMBER OF BLOWS		37	28	20	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A201	A-209		
A	WT. OF TARE	(grams)	3.54	3.46		
B	WT. OF WET SOIL & TARE	(grams)	13.93	14.82		
C	WT. OF DRY SOIL & TARE	(grams)	12.50	13.28		
D	WT. OF WATER = B–C	(grams)	1.43	1.54		
E	WT. OF DRY SOIL = C–A	(grams)	8.96	9.82		
	MOISTURE CONTENT = (D/E)X100	(%)	16.0	15.7		

000123

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

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 22 day July month 2002 year

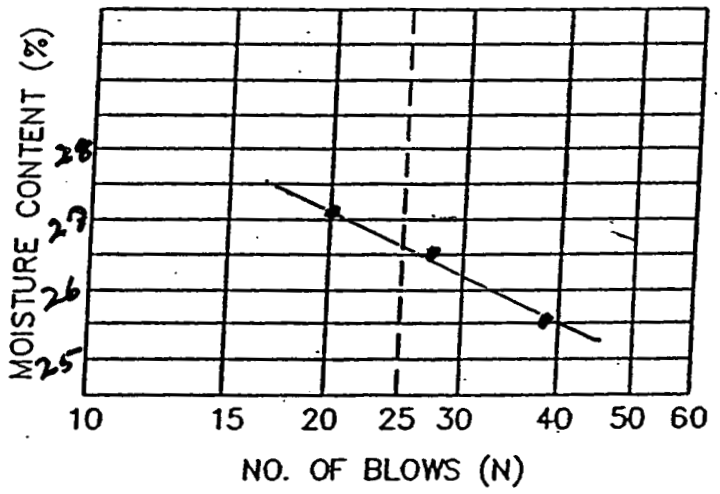
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO. 6P02-14

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		4.0	3.6	4.4	
A	WT. OF TARE	(grams)	21.11	21.44	21.34	
B	WT. OF WET SOIL & TARE	(grams)	42.76	41.49	42.53	
C	WT. OF DRY SOIL & TARE	(grams)	38.15	37.29	38.23	
D	WT. OF WATER = B-C	(grams)	4.61	4.20	4.30	
E	WT. OF DRY SOIL = C-A	(grams)	17.04	15.85	16.89	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.1	26.5	25.5	
N	NUMBER OF BLOWS		20	27	39	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A-208	A-210		
A	WT. OF TARE	(grams)	3.57	3.53		
B	WT. OF WET SOIL & TARE	(grams)	17.89	15.65		
C	WT. OF DRY SOIL & TARE	(grams)	15.99	14.02		
D	WT. OF WATER = B-C	(grams)	1.90	1.63		
E	WT. OF DRY SOIL = C-A	(grams)	12.42	10.49		
	MOISTURE CONTENT = (D/E)X100	(%)	15.3	15.5		

000124

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 12

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 22 day JULY month 2002 year

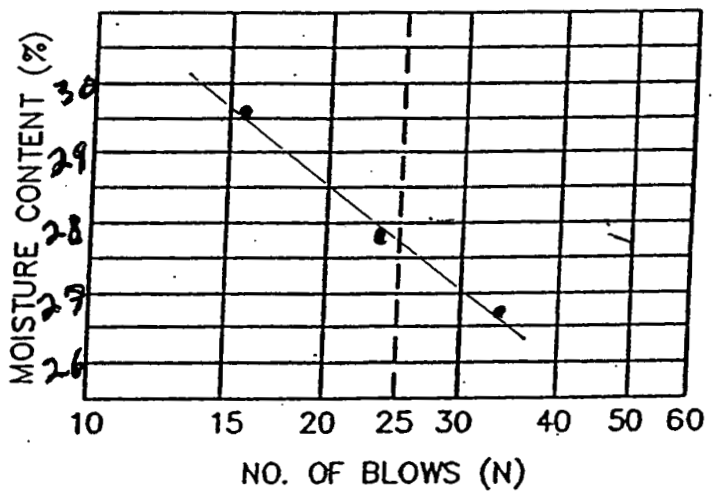
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Berrow Area SAMPLE NO.: ~~CE~~ WLS 02-15

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.1	2.3	2.9	
A	WT. OF TARE	(grams)	28.76	31.20	31.46	
B	WT. OF WET SOIL & TARE	(grams)	44.76	49.94	48.69	
C	WT. OF DRY SOIL & TARE	(grams)	41.39	45.88	44.75	
D	WT. OF WATER = B-C	(grams)	3.37	4.06	3.94	
E	WT. OF DRY SOIL = C-A	(grams)	12.63	14.68	13.29	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.7	27.7	29.6	
N	NUMBER OF BLOWS		34	24	16	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		A203	A218		
A	WT. OF TARE	(grams)	3.60	3.58		
B	WT. OF WET SOIL & TARE	(grams)	20.28	16.91		
C	WT. OF DRY SOIL & TARE	(grams)	18.04	15.14		
D	WT. OF WATER = B-C	(grams)	2.24	1.77		
E	WT. OF DRY SOIL = C-A	(grams)	14.44	11.56		
	MOISTURE CONTENT = (D/E)X100	(%)	15.5	15.3		

000125

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 13

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ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 621341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day July month 2002 year

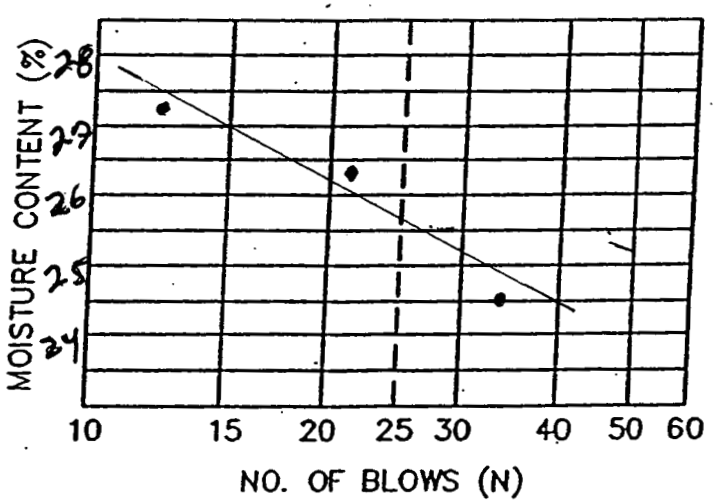
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LP02-16

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.8	2.3	3.2	
A	WT. OF TARE	(grams)	28.81	31.20	27.82	
B	WT. OF WET SOIL & TARE	(grams)	39.12	41.05	40.95	
C	WT. OF DRY SOIL & TARE	(grams)	36.91	38.96	38.37	
D	WT. OF WATER = B-C	(grams)	2.21	2.09	2.58	
E	WT. OF DRY SOIL = C-A	(grams)	8.1	7.76	10.55	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.3	26.9	24.5	
N	NUMBER OF BLOWS		13	22	34	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DJE

	TARE NO.		2.9	2.7		
A	WT. OF TARE	(grams)	31.46	28.67		
B	WT. OF WET SOIL & TARE	(grams)	44.34	40.73		
C	WT. OF DRY SOIL & TARE	(grams)	42.67	39.17		
D	WT. OF WATER = B-C	(grams)	1.67	1.56		
F	WT. OF DRY SOIL = C-A	(grams)	11.21	10.50		
	MOISTURE CONTENT = (D/E)X100	(%)	14.9	14.9		

000126

LIQUID LIMIT (LL) = 26 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 25 day July month 2002 year

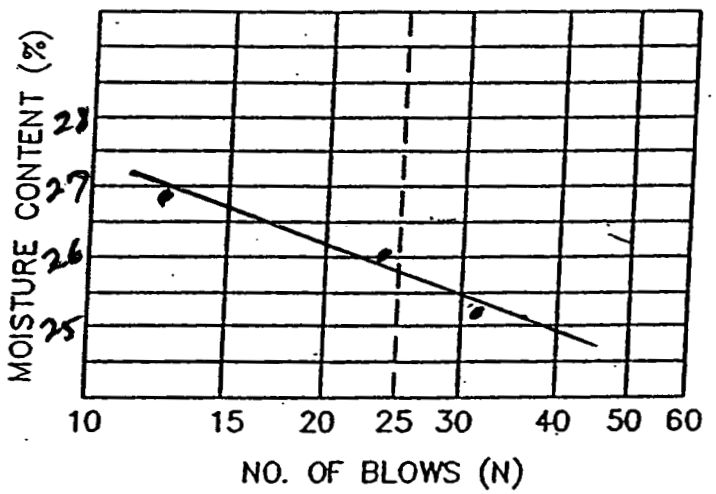
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LP02-17

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.8	2.9	2.3	
A	WT. OF TARE	(grams)	28.81	31.46	31.20	
B	WT. OF WET SOIL & TARE	(grams)	37.19	44.33	43.33	
C	WT. OF DRY SOIL & TARE	(grams)	35.42	41.67	40.89	
D	WT. OF WATER = B-C	(grams)	1.77	2.66	2.44	
E	WT. OF DRY SOIL = C-A	(grams)	6.61	10.21	9.69	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.8	26.1 ~~26.08~~	25.2	
N	NUMBER OF BLOWS		13	24	31	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DIE

	TARE NO.		2.7	3.2		
A	WT. OF TARE	(grams)	28.67	27.82		
B	WT. OF WET SOIL & TARE	(grams)	43.14	40.44		
C	WT. OF DRY SOIL & TARE	(grams)	41.18	38.74		
D	WT. OF WATER = B-C	(grams)	1.96	1.70		
E	WT. OF DRY SOIL = C-A	(grams)	12.51	10.92		
	MOISTURE CONTENT = (D/E)X100	(%)	15.7	15.6		

000127

LIQUID LIMIT (LL) = 26 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 10

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ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 27 day JULY month 2002 year

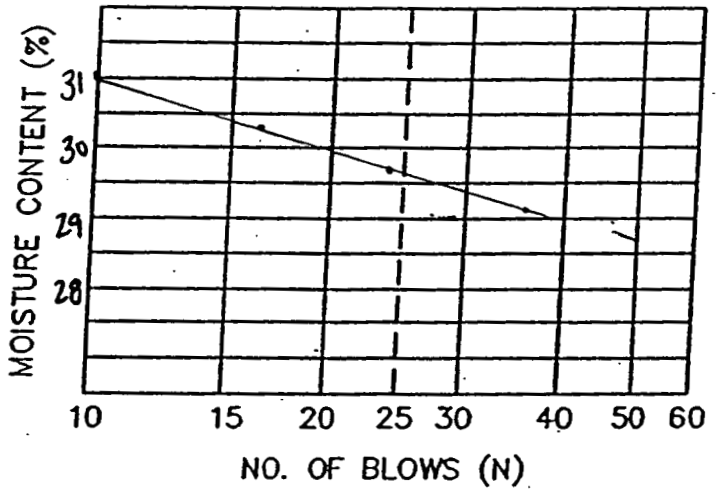
MATERIAL TYPE: LP Clay MATERIAL SOURCE: 02-3 Stockpile SAMPLE NO.: LP02-19

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		2.9	2.7	2.5	
A	WT. OF TARE	(grams)	31.46	28.67	28.42	
B	WT. OF WET SOIL & TARE	(grams)	48.98	46.99	45.70	
C	WT. OF DRY SOIL & TARE	(grams)	44.91	42.80	41.80	
D	WT. OF WATER = B-C	(grams)	4.07	4.19	3.90	
E	WT. OF DRY SOIL = C-A	(grams)	13.45	14.13	13.38	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.3	29.7	29.1	
N	NUMBER OF BLOWS		16	24	35	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: ____

	TARE NO.		1.8	2.3		
A	WT. OF TARE	(grams)	28.81	31.20		
B	WT. OF WET SOIL & TARE	(grams)	40.30	43.13		
C	WT. OF DRY SOIL & TARE	(grams)	38.75	41.55		
D	WT. OF WATER = B-C	(grams)	1.55	1.58		
E	WT. OF DRY SOIL = C-A	(grams)	9.94	10.35		
	MOISTURE CONTENT = (D/E)X100	(%)	15.6	15.3		

000128

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 15

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 27 day JULY month 2002 year

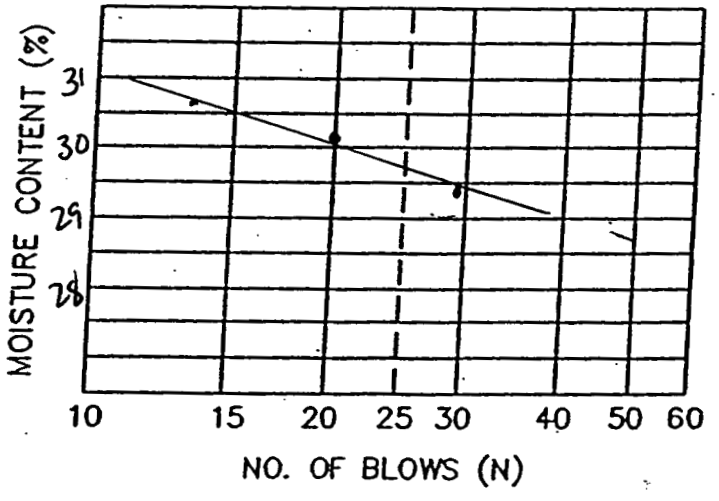
MATERIAL TYPE: LP Clay MATERIAL SOURCE: 02-3 Stockpile SAMPLE NO.: LP02-21

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		3.2	2.4	1.7	
A	WT. OF TARE	(grams)	27.82	27.39	28.49	
B	WT. OF WET SOIL & TARE	(grams)	45.75	45.53	45.57	
C	WT. OF DRY SOIL & TARE	(grams)	41.68	41.33	41.57	
D	WT. OF WATER = B-C	(grams)	4.07	4.20	4.00	
E	WT. OF DRY SOIL = C-A	(grams)	13.86	13.94	13.08	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.4	30.1	30.6	
N	NUMBER OF BLOWS		CHW ~~43~~ 29	20	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: _____

	TARE NO.		1.6	2.2		
A	WT. OF TARE	(grams)	28.87	27.63		
B	WT. OF WET SOIL & TARE	(grams)	42.37	38.88		
C	WT. OF DRY SOIL & TARE	(grams)	40.53	37.35		
D	WT. OF WATER = B-C	(grams)	1.84	1.53		
E	WT. OF DRY SOIL = C-A	(grams)	11.66	9.72		
	MOISTURE CONTENT = (D/E)X100	(%)	15.8	15.7		

000129

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 14

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ 1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

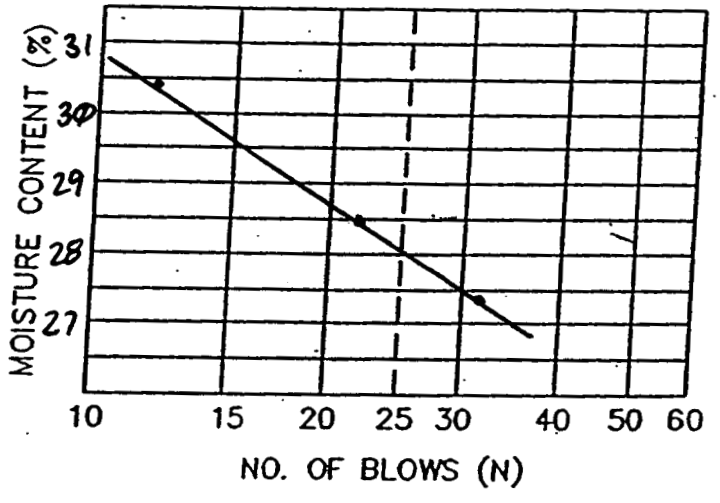
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LP02-22

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.8	2.2	1.6	
A	WT. OF TARE	(grams)	28.81	27.63	28.87	
B	WT. OF WET SOIL & TARE	(grams)	42.91	39.25	42.66	
C	WT. OF DRY SOIL & TARE	(grams)	39.62	36.67	39.69	
D	WT. OF WATER = B-C	(grams)	3.29	2.58	2.97	
E	WT. OF DRY SOIL = C-A	(grams)	10.81	9.04	10.82	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.4	28.5	27.4	
N	NUMBER OF BLOWS		12	22	31	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.3	2.5		
A	WT. OF TARE	(grams)	31.20	28.42		
B	WT. OF WET SOIL & TARE	(grams)	44.47	42.57		
C	WT. OF DRY SOIL & TARE	(grams)	42.61	40.60		
D	WT. OF WATER = B-C	(grams)	1.86	1.97		
F	WT. OF DRY SOIL = C-A	(grams)	11.41	12.18		
	MOISTURE CONTENT = (D/E)X100	(%)	16.3	16.2		

000130

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

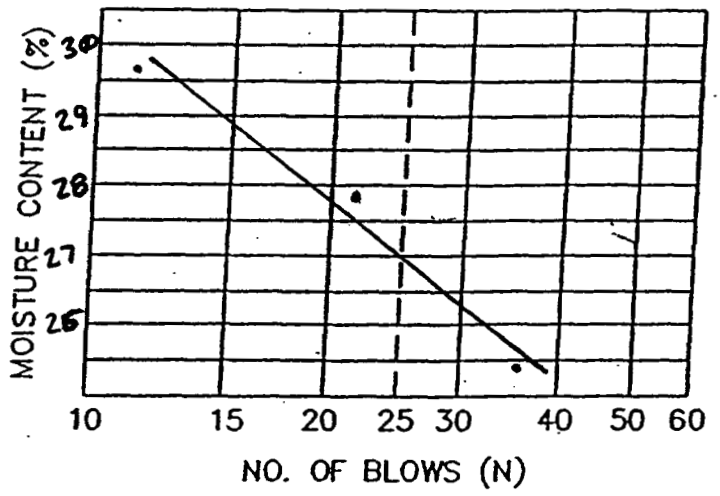
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-4 SAMPLE NO.: LP02-23

LIQUID LIMIT DETERMINATION

QA ID: LCS

	TARE NO.		1.1	1.7	1.3	
A	WT. OF TARE	(grams)	28.76	28.49	28.64	
B	WT. OF WET SOIL & TARE	(grams)	41.99	42.56	42.25	
C	WT. OF DRY SOIL & TARE	(grams)	38.96	39.50	39.49	
D	WT. OF WATER = B-C	(grams)	3.03	3.06	2.76	
E	WT. OF DRY SOIL = C-A	(grams)	10.2	11.01	10.85	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.7	27.8	25.4	
N	NUMBER OF BLOWS		12	22	36	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: LCS

	TARE NO.		1.4	2.6		
A	WT. OF TARE	(grams)	28.52	28.56		
B	WT. OF WET SOIL & TARE	(grams)	37.49	40.55		
C	WT. OF DRY SOIL & TARE	(grams)	36.26	38.93		
D	WT. OF WATER = B-C	(grams)	1.23	1.62		
E	WT. OF DRY SOIL = C-A	(grams)	7.74	10.37		
	MOISTURE CONTENT = (D/E)X100	(%)	15.9	15.6		

000131

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

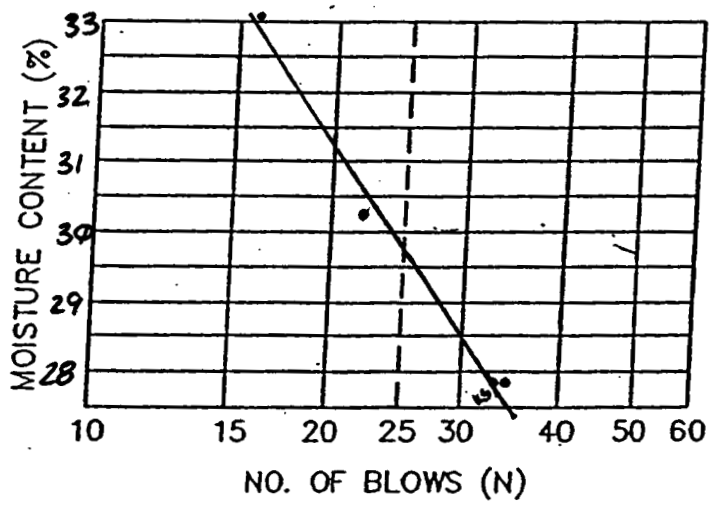
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-4 SAMPLE NO.: LP02-24

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.7	2.9	1.5	
A	WT. OF TARE	(grams)	28.67	31.46	28.61	
B	WT. OF WET SOIL & TARE	(grams)	43.00	43.78	38.17	
C	WT. OF DRY SOIL & TARE	(grams)	39.88	40.71	35.95	
D	WT. OF WATER = B-C	(grams)	3.12	3.07	2.22	
E	WT. OF DRY SOIL = C-A	(grams)	11.21	9.25	7.34	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.8	33.2	30.2	
N	NUMBER OF BLOWS		34	16	22	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		3.2	2.4		
A	WT. OF TARE	(grams)	27.82	27.39		
B	WT. OF WET SOIL & TARE	(grams)	36.61	36.42		
C	WT. OF DRY SOIL & TARE	(grams)	35.38	35.17		
D	WT. OF WATER = B-C	(grams)	1.23	1.25		
E	WT. OF DRY SOIL = C-A	(grams)	7.56	7.78		
	MOISTURE CONTENT = (D/E)X100	(%)	16.3	16.1		

000132

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 14

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

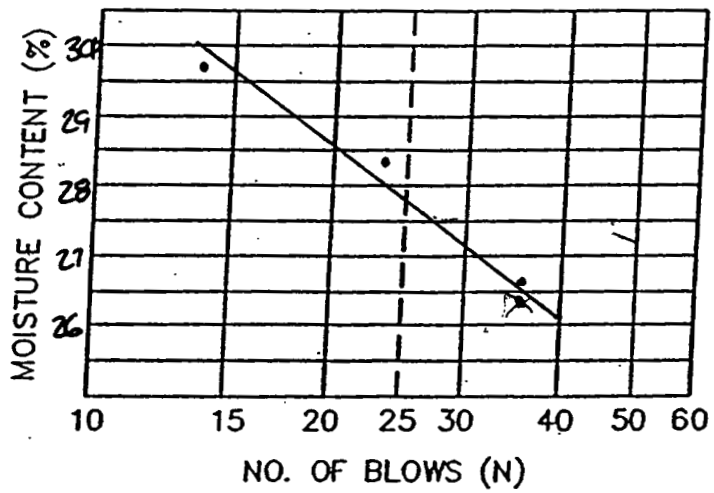
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-4 SAMPLE NO.: LP02-25

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		3.1	2.8	1.9	
A	WT. OF TARE	(grams)	28.38	28.45	28.56	
B	WT. OF WET SOIL & TARE	(grams)	42.45	42.57	41.09	
C	WT. OF DRY SOIL & TARE	(grams)	39.23	39.45	38.46	
D	WT. OF WATER = B-C	(grams)	3.22	3.12	2.63	
E	WT. OF DRY SOIL = C-A	(grams)	10.85	11.0	~~9.99~~ 9.90	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.7	28.4	~~26.3~~ 26.6	
N	NUMBER OF BLOWS		14	24	36	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	2.1		
A	WT. OF TARE	(grams)	28.50	28.24		
B	WT. OF WET SOIL & TARE	(grams)	38.50	39.66		
C	WT. OF DRY SOIL & TARE	(grams)	37.17	38.12		
D	WT. OF WATER = B-C	(grams)	1.33	1.54		
E	WT. OF DRY SOIL = C-A	(grams)	8.67	9.88		
	MOISTURE CONTENT = (D/E)X100	(%)	15.3	15.6		

000133

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ41

DESCRIPTION: Phase IV DATE: 1 day Aug month 2ΦΦ2 year

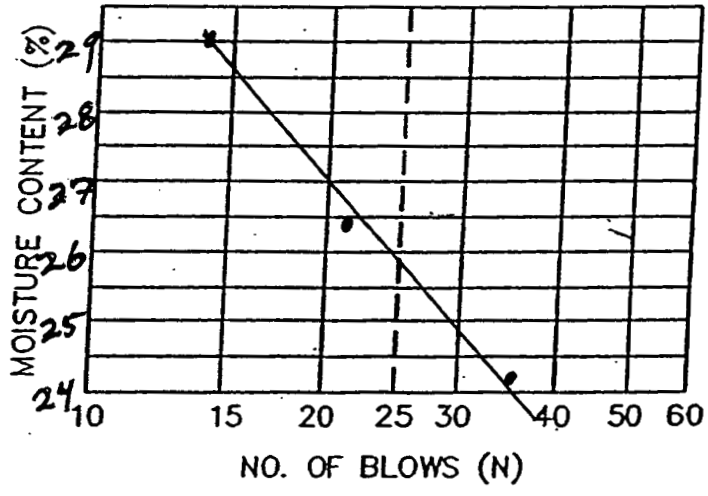
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-4 SAMPLE NO.: LPΦ2-26

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.9	1.2	2.3	
A	WT. OF TARE	(grams)	31.46	28.5Φ	31.2Φ	
B	WT. OF WET SOIL & TARE	(grams)	45.65	43.37	44.55	
C	WT. OF DRY SOIL & TARE	(grams)	42.46	4Φ.47	41.76	
D	WT. OF WATER = B−C	(grams)	3.19	2.9Φ	2.79	
E	WT. OF DRY SOIL = C−A	(grams)	11.ΦΦ	11.97	10.56	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.Φ	24.2	26.4Φ	
N	NUMBER OF BLOWS		14	36	21	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/RAE

	TARE NO.		2.8	3.1		
A	WT. OF TARE	(grams)	28.45	28.38		
B	WT. OF WET SOIL & TARE	(grams)	42.84	41.46		
C	WT. OF DRY SOIL & TARE	(grams)	40.93	39.78		
D	WT. OF WATER = B−C	(grams)	1.91	1.68		
E	WT. OF DRY SOIL = C−A	(grams)	12.48	11.40		
	MOISTURE CONTENT = (D/E)X100	(%)	15.3	14.70		

000134

LIQUID LIMIT (LL) = 26 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 1 day Aug month 2002 year

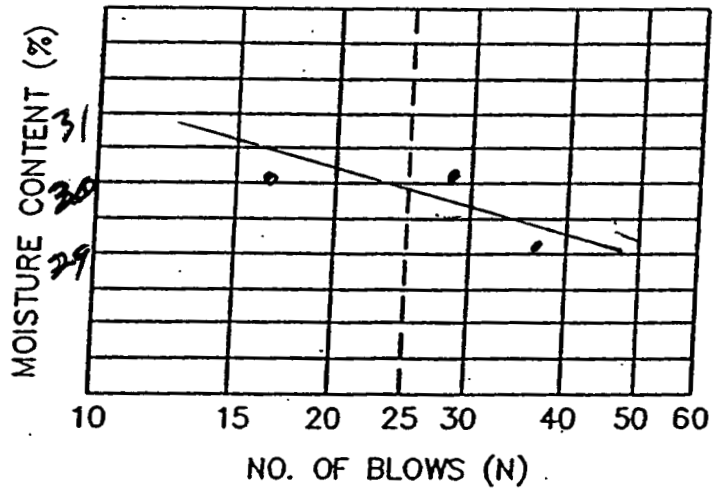
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-4 SAMPLE NO.: LA02-27

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.6	1.1	1.4	
A	WT. OF TARE	(grams)	28.87	28.76	28.52	
B	WT. OF WET SOIL & TARE	(grams)	42.18	43.73	40.18	
C	WT. OF DRY SOIL & TARE	(grams)	39.10	40.36	37.47	
D	WT. OF WATER = B-C	(grams)	3.08	3.37	2.71	
E	WT. OF DRY SOIL = C-A	(grams)	10.23	11.60	8.95	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.1	29.1	30.3	
N	NUMBER OF BLOWS		17	38	29	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.5	2.7		
A	WT. OF TARE	(grams)	28.42	28.67		
B	WT. OF WET SOIL & TARE	(grams)	41.56	39.23		
C	WT. OF DRY SOIL & TARE	(grams)	39.64	37.71		
D	WT. OF WATER = B-C	(grams)	1.92	1.52		
F	WT. OF DRY SOIL = C-A	(grams)	11.22	9.04		
	MOISTURE CONTENT = (D/E)X100	(%)	17.1	16.8		

000135

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 03 day Aug month 2002 year

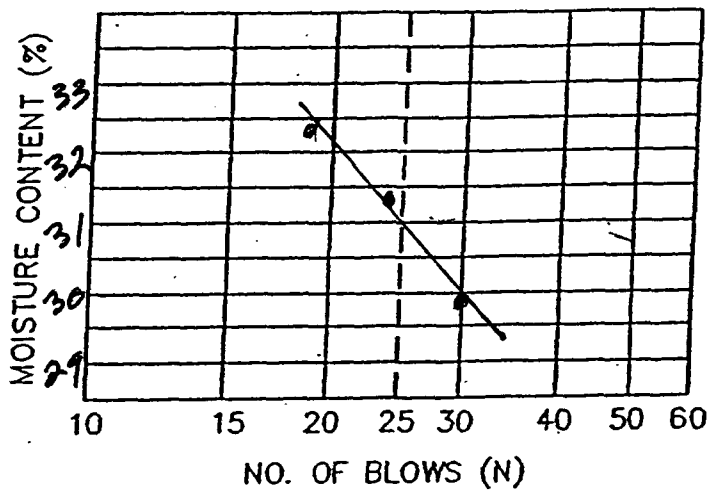
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP0228

LIQUID LIMIT DETERMINATION

QA ID: DLE/KS

	TARE NO.		1.2	1.1	2.9	
A	WT. OF TARE	(grams)	28.51	28.76	31.47	
B	WT. OF WET SOIL & TARE	(grams)	51.86	53.05	54.47	
C	WT. OF DRY SOIL & TARE	(grams)	46.14	47.25	49.21	
D	WT. OF WATER = B−C	(grams)	5.72	5.80	5.26	
E	WT. OF DRY SOIL = C−A	(grams)	17.63	18.49	17.74	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.4	31.4	29.7	
N	NUMBER OF BLOWS		18	24	30	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE/KS

	TARE NO.		1.6	2.1		
A	WT. OF TARE	(grams)	28.87	28.24		
B	WT. OF WET SOIL & TARE	(grams)	40.70	38.68		
C	WT. OF DRY SOIL & TARE	(grams)	39.06	37.23		
D	WT. OF WATER = B−C	(grams)	1.64	1.45		
E	WT. OF DRY SOIL = C−A	(grams)	10.19	8.99		
	MOISTURE CONTENT = (D/E)X100	(%)	16.1	16.1		

000136

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 15

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 03 day Aug month 2002 year

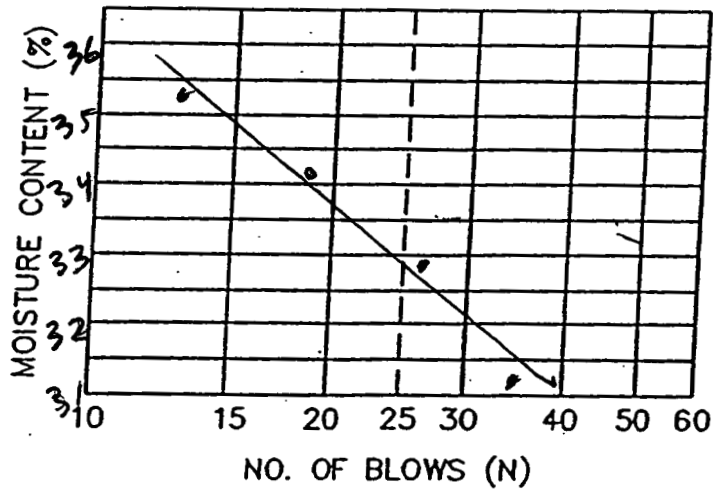
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO. LP02-29

LIQUID LIMIT DETERMINATION

QA ID: DLE/KS

	TARE NO.		2.5	1.9	2.7	1.5
A	WT. OF TARE	(grams)	28.42	28.56	28.67	28.61
B	WT. OF WET SOIL & TARE	(grams)	54.36	51.97	56.16	51.64
C	WT. OF DRY SOIL & TARE	(grams)	47.59	46.00	49.37	46.18
D	WT. OF WATER = B-C	(grams)	6.77	5.97	6.79	5.46
E	WT. OF DRY SOIL = C-A	(grams)	19.17	17.44	20.70	17.57
F	MOISTURE CONTENT = (D/E)X100	(%)	35.3	34.2	32.8	31.1
N	NUMBER OF BLOWS		13	18	26	35

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE/KS

	TARE NO.		1.3	2.6		
A	WT. OF TARE	(grams)	28.64	28.55		
B	WT. OF WET SOIL & TARE	(grams)	38.36	40.21		
C	WT. OF DRY SOIL & TARE	(grams)	36.96	38.52		
D	WT. OF WATER = B-C	(grams)	1.40	1.69		
E	WT. OF DRY SOIL = C-A	(grams)	8.32	9.97		
	MOISTURE CONTENT = (D/E)X100	(%)	16.8	17.0		

000137

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day August month 2002 year

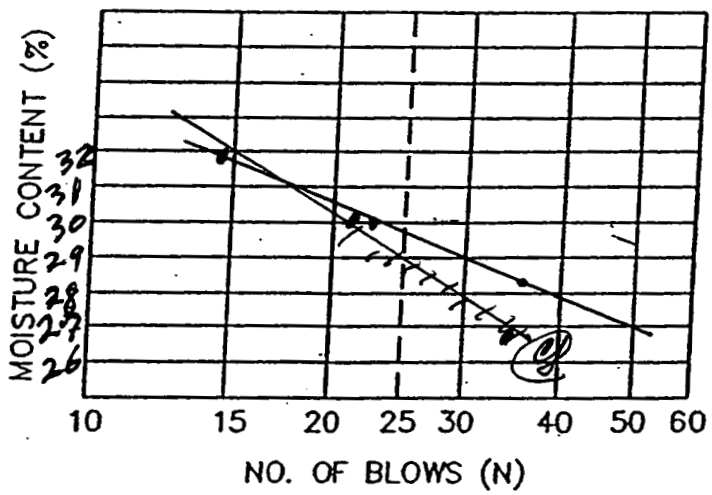
MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02.5 SAMPLE NO.: LP02-30

LIQUID LIMIT DETERMINATION

QA ID: CHW/DJE

	TARE NO.		2.7	1.9	2.2	
A	WT. OF TARE	(grams)	28.67	28.56	27.63	
B	WT. OF WET SOIL & TARE	(grams)	47.41	47.45	48.63	
C	WT. OF DRY SOIL & TARE	(grams)	42.88	43.09	44.00	
D	WT. OF WATER = B-C	(grams)	4.53	4.36	4.63	
E	WT. OF DRY SOIL = C-A	(grams)	14.21	14.53	16.37	
F	MOISTURE CONTENT = (D/E)X100	(%)	31.9	30.0	~~26.6~~ 28.3	
N	NUMBER OF BLOWS		14	22	35	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW/DJE

	TARE NO.		1.1	1.2		
A	WT. OF TARE	(grams)	28.76	28.50		
B	WT. OF WET SOIL & TARE	(grams)	41.10	39.26		
C	WT. OF DRY SOIL & TARE	(grams)	39.43	37.84		
D	WT. OF WATER = B-C	(grams)	1.67	1.42		
E	WT. OF DRY SOIL = C-A	(grams)	10.67	9.34		
	MOISTURE CONTENT = (D/E)X100	(%)	15.7	15.2		

000138

LIQUID LIMIT (LL) = ~~29~~ 30 PLASTIC LIMIT (PL) = ~~16~~ 15.0 PLASTICITY INDEX (PI) = ~~13~~ 15

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 5 day August month 2002 year

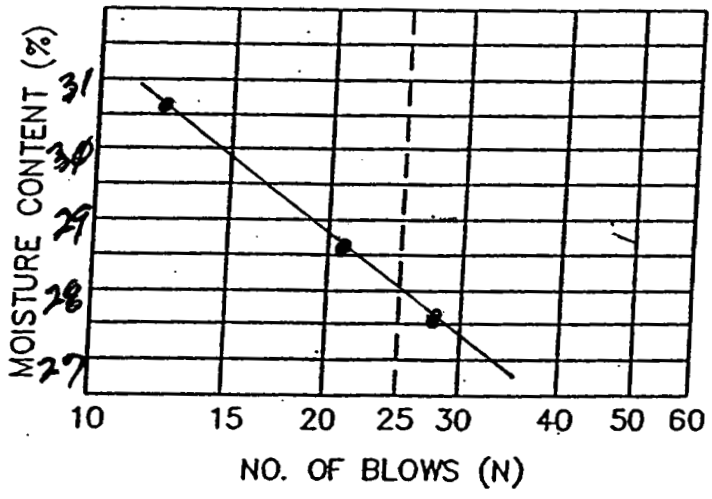
MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile-5 SAMPLE NO.: 2002-31

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		2.9	1.5	2.5	
A	WT. OF TARE	(grams)	31.46	28.61	28.42	
B	WT. OF WET SOIL & TARE	(grams)	52.22	47.67	51.65	
C	WT. OF DRY SOIL & TARE	(grams)	47.35	43.43	46.63	
D	WT. OF WATER = B-C	(grams)	4.87	4.24	5.02	
E	WT. OF DRY SOIL = C-A	(grams)	15.89	14.82	18.21	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.6	28.6	27.6	
N	NUMBER OF BLOWS		13	21	28	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.4	1.3		
A	WT. OF TARE	(grams)	28.52	28.64		
B	WT. OF WET SOIL & TARE	(grams)	41.91	44.09		
C	WT. OF DRY SOIL & TARE	(grams)	40.18	42.06		
D	WT. OF WATER = B-C	(grams)	1.73	2.03		
E	WT. OF DRY SOIL = C-A	(grams)	11.66	13.42		
	MOISTURE CONTENT = (D/E)X100	(%)	14.8	15.1		

000139

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day August month 2002 year

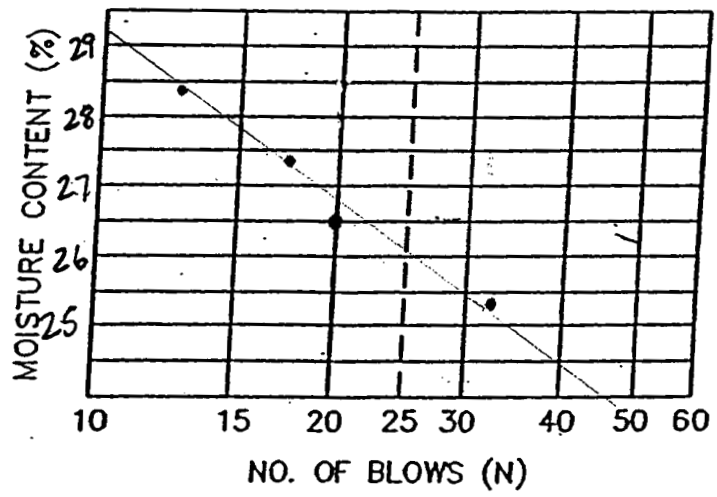
MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP 02-32

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.1	1.2	2.7	2.9
A	WT. OF TARE	(grams)	28.76	28.50	28.67	31.46
B	WT. OF WET SOIL & TARE	(grams)	47.97	46.64	49.06	49.86
C	WT. OF DRY SOIL & TARE	(grams)	43.72	42.71	44.79	46.14
D	WT. OF WATER = B-C	(grams)	4.25	3.93	4.27	3.72
E	WT. OF DRY SOIL = C-A	(grams)	14.96	14.21	16.12	14.68
F	MOISTURE CONTENT = (D/E)X100	(%)	28.4	27.7	26.5	25.3
N	NUMBER OF BLOWS		13	17	20	31

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.9	2.5		
A	WT. OF TARE	(grams)	28.56	28.42		
B	WT. OF WET SOIL & TARE	(grams)	40.50	42.39		
C	WT. OF DRY SOIL & TARE	(grams)	38.97	40.56		
D	WT. OF WATER = B-C	(grams)	1.53	1.83		
E	WT. OF DRY SOIL = C-A	(grams)	10.41	12.14		
	MOISTURE CONTENT = (D/E)X100	(%)	14.7	15.1		

000140

LIQUID LIMIT (LL) = 26 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day August month 2002 year

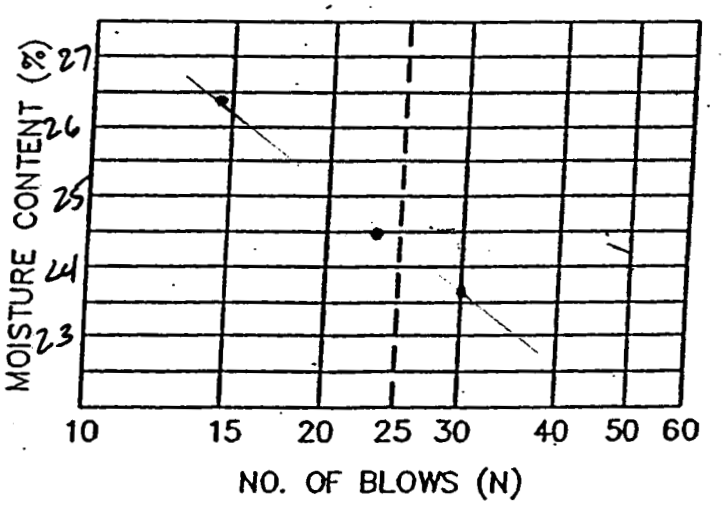
MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-35

LIQUID LIMIT DETERMINATION

QA ID: [illegible]

	TARE NO.		2.2	1.5	2.1	
A	WT. OF TARE	(grams)	27.63	28.61	28.24	
B	WT. OF WET SOIL & TARE	(grams)	49.52	50.00	47.97	
C	WT. OF DRY SOIL & TARE	(grams)	45.34	45.79	43.85	
D	WT. OF WATER = B-C	(grams)	4.18	4.21	4.12	
E	WT. OF DRY SOIL = C-A	(grams)	17.71	17.18	15.61	
F	MOISTURE CONTENT = (D/E)X100	(%)	23.6	24.5	26.4	
N	NUMBER OF BLOWS		30	23	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: [illegible]

	TARE NO.		1.3	1.4		
A	WT. OF TARE	(grams)	28.64	28.52		
B	WT. OF WET SOIL & TARE	(grams)	45.94	42.43		
C	WT. OF DRY SOIL & TARE	(grams)	43.78	40.73		
D	WT. OF WATER = B-C	(grams)	2.16	1.70		
E	WT. OF DRY SOIL = C-A	(grams)	15.14	12.21		
	MOISTURE CONTENT = (D/E)X100	(%)	14.3	13.9		

000141

LIQUID LIMIT (LL) = 24 PLASTIC LIMIT (PL) = 14 PLASTICITY INDEX (PI) = 10

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G0341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day August month 2002 year

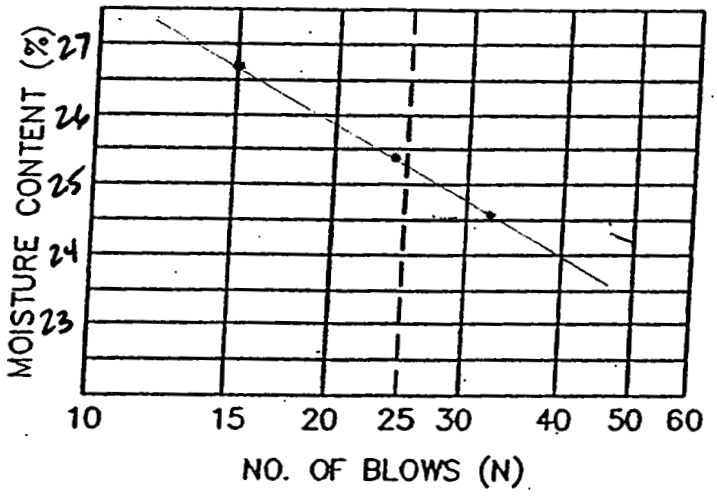
MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 42-5 SAMPLE NO.: LP0236

LIQUID LIMIT DETERMINATION

QA ID: CAW

	TARE NO.		2.4	1.6	2.6	
A	WT. OF TARE	(grams)	27.39	28.87	28.55	
B	WT. OF WET SOIL & TARE	(grams)	45.02	47.27	46.88	
C	WT. OF DRY SOIL & TARE	(grams)	41.45	43.64	43.01	
D	WT. OF WATER = B–C	(grams)	3.57	3.63	3.87	
E	WT. OF DRY SOIL = C–A	(grams)	14.06	14.77	14.46	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.4	24.6	26.7	
N	NUMBER OF BLOWS		24	31	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CAW

	TARE NO.		2.8	1.7		
A	WT. OF TARE	(grams)	28.45	28.49		
B	WT. OF WET SOIL & TARE	(grams)	42.24	40.54		
C	WT. OF DRY SOIL & TARE	(grams)	40.47	39.00		
D	WT. OF WATER = B–C	(grams)	1.77	1.54		
E	WT. OF DRY SOIL = C–A	(grams)	12.02	10.51		
	MOISTURE CONTENT = (D/E)X100	(%)	14.7	14.7		

000142

LIQUID LIMIT (LL) = 25 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 10

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

(ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 13 day Aug month 2ΦΦ2 year

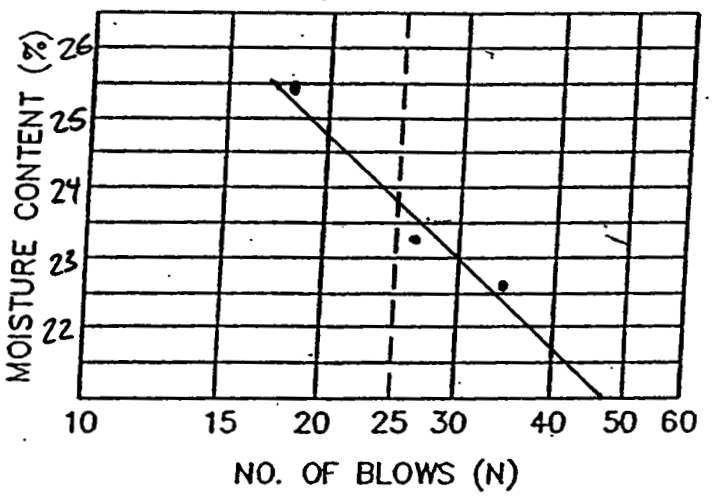
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-6 SAMPLE NO.: LPΦ2-38

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.5	2.8	1.4	
A	WT. OF TARE	(grams)	28.61	28.45	28.52	
B	WT. OF WET SOIL & TARE	(grams)	42.Φ8	38.62	4Φ.44	
C	WT. OF DRY SOIL & TARE	(grams)	39.60	36.70	38.02	
D	WT. OF WATER = B−C	(grams)	2.48	1.92	2.42	
E	WT. OF DRY SOIL = C−A	(grams)	1Φ.99	8.25	9.5Φ	
F	MOISTURE CONTENT = (D/E)X100	(%)	22.6	23.3	25.5	
N	NUMBER OF BLOWS		35	27	18	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	2.9		
A	WT. OF TARE	(grams)	28.76	31.46		
B	WT. OF WET SOIL & TARE	(grams)	42.78	45.87		
C	WT. OF DRY SOIL & TARE	(grams)	40.97	43.97		
D	WT. OF WATER = B−C	(grams)	1.81	1.9Φ		
E	WT. OF DRY SOIL = C−A	(grams)	12.21	12.51		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.8	15.2		

000143

LIQUID LIMIT (LL) = 24 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 9

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day Aug month 2002 year

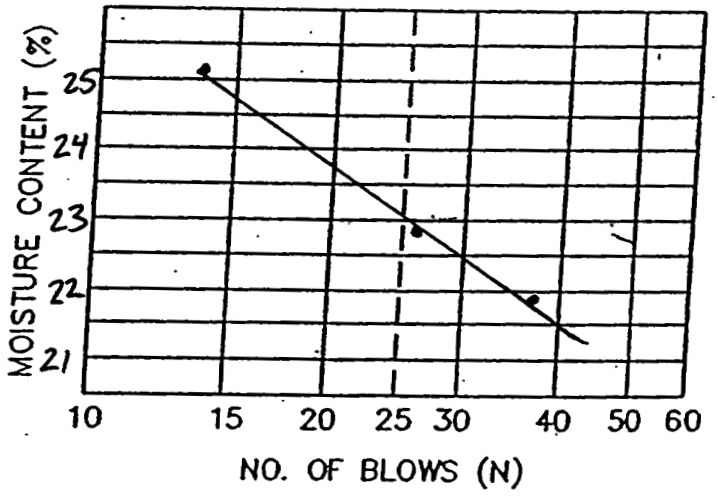
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-6 SAMPLE NO.: LP02-39

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	2.7	1.7	
A	WT. OF TARE	(grams)	28.50	28.67	28.49	
B	WT. OF WET SOIL & TARE	(grams)	40.67	42.91	44.78	
C	WT. OF DRY SOIL & TARE	(grams)	38.22	40.26	41.85	
D	WT. OF WATER = B−C	(grams)	2.45	2.65	2.93	
E	WT. OF DRY SOIL = C−A	(grams)	9.72	11.59	13.36	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.2	22.9	21.9	
N	NUMBER OF BLOWS		14	26	38	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.5	1.9		
A	WT. OF TARE	(grams)	28.42	28.56		
B	WT. OF WET SOIL & TARE	(grams)	41.52	43.61		
C	WT. OF DRY SOIL & TARE	(grams)	39.73	41.66		
D	WT. OF WATER = B−C	(grams)	1.79	1.95		
E	WT. OF DRY SOIL = C−A	(grams)	11.31	13.1		
	MOISTURE CONTENT = (D/E)X100	(%)	15.8	14.9		

000144

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day Aug month 2002 year

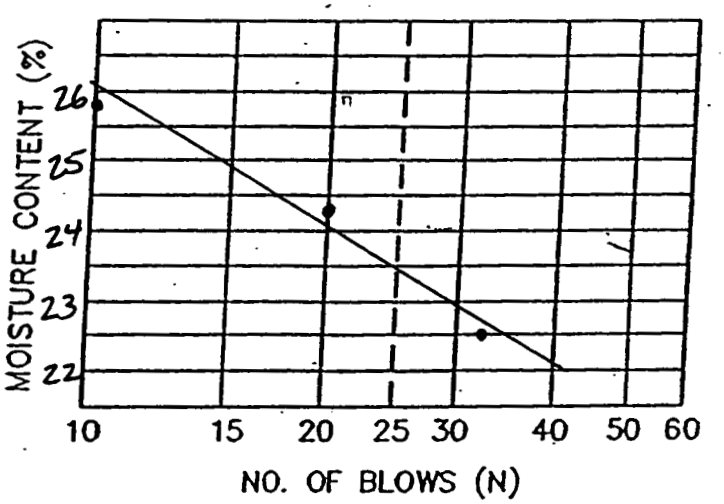
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-6 SAMPLE NO.: LP0240

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.3	2.2	2.4	
A	WT. OF TARE	(grams)	28.64	27.63	27.39	
B	WT. OF WET SOIL & TARE	(grams)	41.80	39.18	42.16	
C	WT. OF DRY SOIL & TARE	(grams)	39.10	36.92	39.45	
D	WT. OF WATER = B-C	(grams)	2.7	2.26	2.71	
E	WT. OF DRY SOIL = C-A	(grams)	10.46	9.29	12.06	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.8	24.3	22.5	
N	NUMBER OF BLOWS		10	20	32	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.1	1.6		
A	WT. OF TARE	(grams)	28.24	28.87		
B	WT. OF WET SOIL & TARE	(grams)	47.51	45.25		
C	WT. OF DRY SOIL & TARE	(grams)	45.06	43.10		
D	WT. OF WATER = B-C	(grams)	2.45	2.15		
E	WT. OF DRY SOIL = C-A	(grams)	16.82	14.23		
	MOISTURE CONTENT = (D/E)X100	(%)	14.6	15.1		

C00145

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 12 day Aug month 2ΦΦ2 year

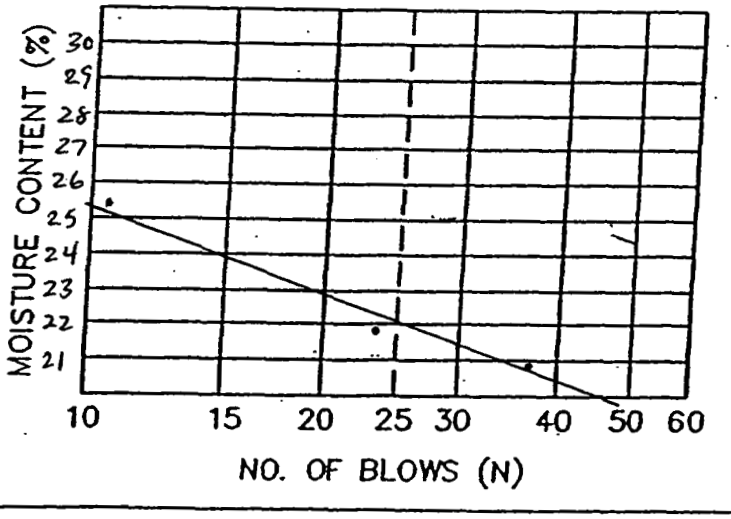
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-6 SAMPLE NO.: LPΦ2-41

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.5	1.2	1.3	
A	WT. OF TARE	(grams)	28.42	28.5Φ	28.64	
B	WT. OF WET SOIL & TARE	(grams)	39.38	42.ΦΦ	41.3Φ	
C	WT. OF DRY SOIL & TARE	(grams)	37.42	39.33	~~39.93~~ CHW	39.11
D	WT. OF WATER = B-C	(grams)	1.96	2.75	2.19	
E	WT. OF DRY SOIL = C-A	(grams)	9.00	10.83	10.47	
F	MOISTURE CONTENT = (D/E)X100	(%)	21.8	25.4	20.9	
N	NUMBER OF BLOWS		23	11	37	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.7	1.7		
A	WT. OF TARE	(grams)	28.67	28.49		
B	WT. OF WET SOIL & TARE	(grams)	4Φ.Φ5	4Φ.21		
C	WT. OF DRY SOIL & TARE	(grams)	38.61	38.73		
D	WT. OF WATER = B-C	(grams)	1.44	1.48		
E	WT. OF DRY SOIL = C-A	(grams)	9.94	10.24		000146
	MOISTURE CONTENT = (D/E)X100	(%)	14.5	14.5		

LIQUID LIMIT (LL) = 22 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 7

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 14 day Aug month 2002 year

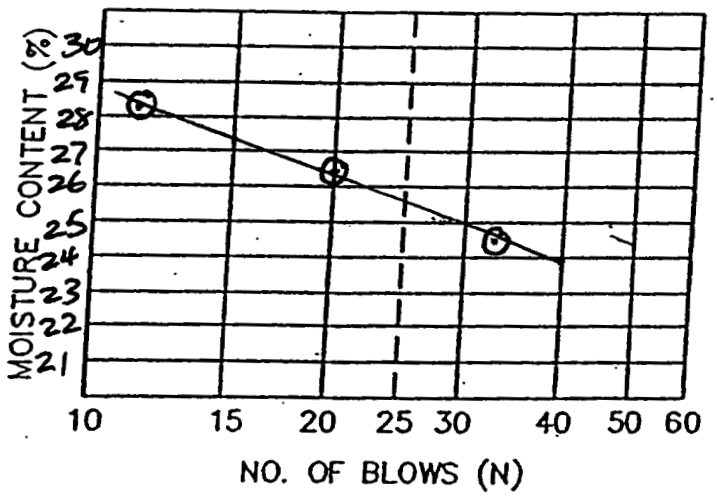
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-42

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.5	2.8	2.5	
A	WT. OF TARE	(grams)	28.61	28.45	28.42	
B	WT. OF WET SOIL & TARE	(grams)	41.12	39.37	42.57	
C	WT. OF DRY SOIL & TARE	(grams)	38.66	37.09	39.46	
D	WT. OF WATER = B-C	(grams)	2.46	2.28	3.11	
E	WT. OF DRY SOIL = C-A	(grams)	10.05	8.64	11.04	
F	MOISTURE CONTENT = (D/E)X100	(%)	24.5	26.4	28.2	
N	NUMBER OF BLOWS		33	20	12	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.6	2.4		
A	WT. OF TARE	(grams)	28.87	27.39		
B	WT. OF WET SOIL & TARE	(grams)	44.57	42.99		
C	WT. OF DRY SOIL & TARE	(grams)	42.38	40.79		
D	WT. OF WATER = B-C	(grams)	2.19	2.20		
E	WT. OF DRY SOIL = C-A	(grams)	13.51	13.40		
	MOISTURE CONTENT = (D/E)X100	(%)	16.2	16.4		

000147

JID LIMIT (LL) = 26 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 10

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 15 day Aug month 2002 year

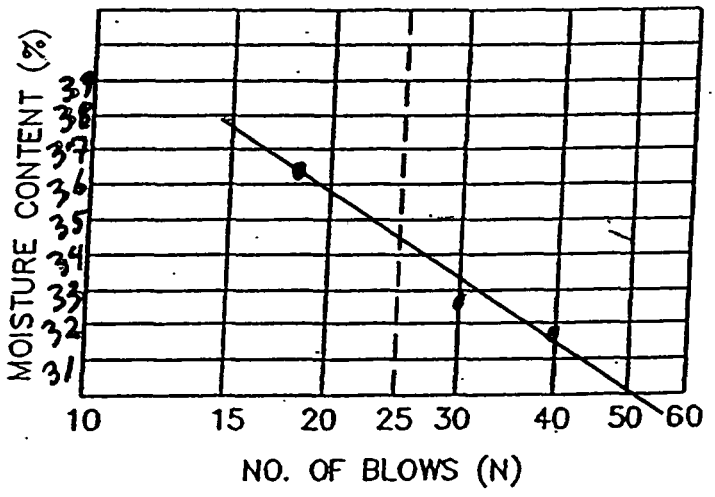
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-44

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	1.4	2.2	
A	WT. OF TARE	(grams)	29.50	28.52	27.63	
B	WT. OF WET SOIL & TARE	(grams)	40.20	40.32	39.10	
C	WT. OF DRY SOIL & TARE	(grams)	37.08	37.42	36.33	
D	WT. OF WATER = B-C	(grams)	3.12	2.90	2.77	
E	WT. OF DRY SOIL = C-A	(grams)	8.58	8.90	8.70	
F	MOISTURE CONTENT = (D/E)X100	(%)	36.4	32.6	31.8	
N	NUMBER OF BLOWS		18	30	40	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DFE

	TARE NO.		3.1	2.7		
A	WT. OF TARE	(grams)	28.38	28.67		
B	WT. OF WET SOIL & TARE	(grams)	38.91	39.71		
C	WT. OF DRY SOIL & TARE	(grams)	37.39	38.12		
D	WT. OF WATER = B-C	(grams)	1.52	1.59		
E	WT. OF DRY SOIL = C-A	(grams)	9.01	9.45		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.87	16.82		

LIQUID LIMIT (LL) = 34 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 17

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day Aug month 2002 year

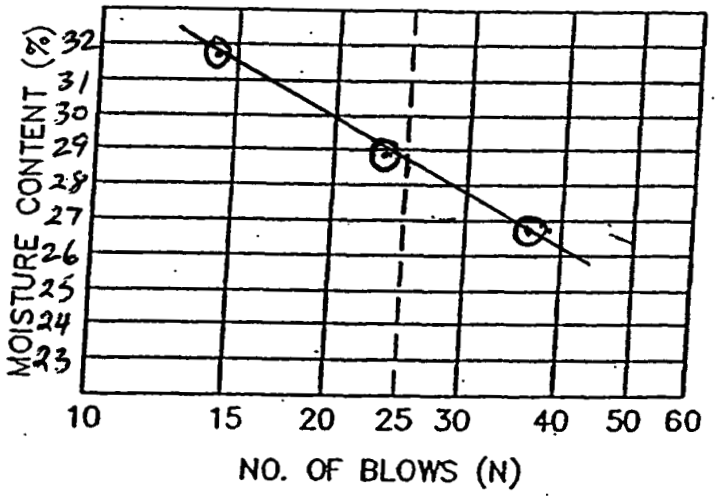
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-45

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		3.1	1.9	1.4	
A	WT. OF TARE	(grams)	28.38	28.56	28.52	
B	WT. OF WET SOIL & TARE	(grams)	39.38	40.41	40.37	
C	WT. OF DRY SOIL & TARE	(grams)	37.06	37.75	37.52	
D	WT. OF WATER = B-C	(grams)	2.32	2.66	2.85	
E	WT. OF DRY SOIL = C-A	(grams)	8.68	9.19	9.00	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.7	28.9	31.7	
N	NUMBER OF BLOWS		38	23	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	2.9		
A	WT. OF TARE	(grams)	28.50	31.46		
B	WT. OF WET SOIL & TARE	(grams)	44.68	48.23		
C	WT. OF DRY SOIL & TARE	(grams)	42.38	45.91		
D	WT. OF WATER = B-C	(grams)	2.30	2.32		
E	WT. OF DRY SOIL = C-A	(grams)	13.88	14.45		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.6	16.1		

000149

LIQUID LIMIT (LL) = ~~28.5~~ 29 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = ~~12.5~~ 13

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6021341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day Aug month 2002 year

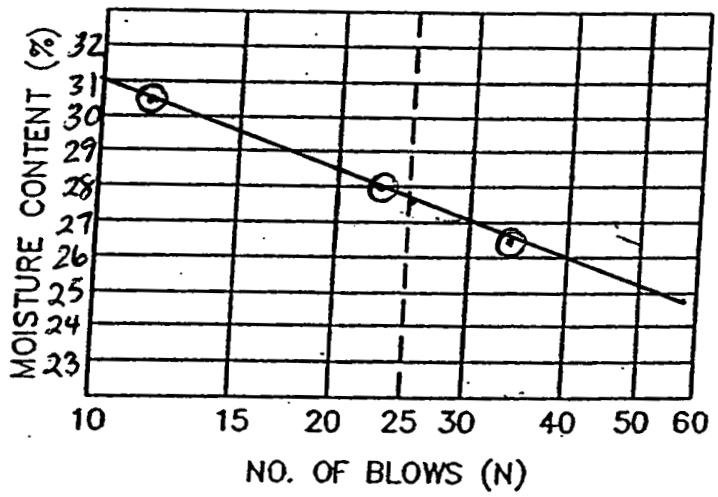
MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02.46 ?

LIQUID LIMIT DETERMINATION

QA ID: _____

	TARE NO.		1.3	2.7	2.2	
A	WT. OF TARE	(grams)	28.64	28.67	27.63	
B	WT. OF WET SOIL & TARE	(grams)	39.49	40.60	40.22	
C	WT. OF DRY SOIL & TARE	(grams)	37.22	37.99	37.28	
D	WT. OF WATER = B-C	(grams)	2.27	2.61	2.94	
E	WT. OF DRY SOIL = C-A	(grams)	8.58	9.32	9.65	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.5	28.0	30.5	
N	NUMBER OF BLOWS		34	23	17	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: _____

	TARE NO.		2.8	2.1		
A	WT. OF TARE	(grams)	28.45	28.24		
B	WT. OF WET SOIL & TARE	(grams)	44.97	44.90		
C	WT. OF DRY SOIL & TARE	(grams)	42.66	42.63		
D	WT. OF WATER = B-C	(grams)	2.31	2.27		
E	WT. OF DRY SOIL = C-A	(grams)	14.21	14.39		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.3	15.8		

000150

LIQUID LIMIT (LL) = ~~27.5~~ 28 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = ~~11.5~~ 12

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 20 day Aug month 2002 year

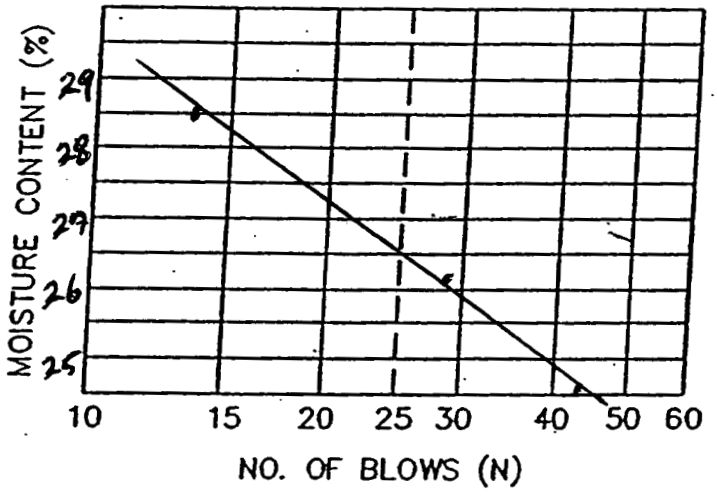
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-47

LIQUID LIMIT DETERMINATION

QA ID: RS

	TARE NO.		3.1	1.3	2.7	
A	WT. OF TARE	(grams)	28.38	28.64	28.67	
B	WT. OF WET SOIL & TARE	(grams)	38.75	40.42	40.12	
C	WT. OF DRY SOIL & TARE	(grams)	36.67	37.98	37.58	
D	WT. OF WATER = B−C	(grams)	2.08	2.44	2.54	
E	WT. OF DRY SOIL = C−A	(grams)	8.29	9.34	8.91	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.09	26.12	28.50	
N	NUMBER OF BLOWS		43	29	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: RS/DJE

	TARE NO.		1.4	2.2		
A	WT. OF TARE	(grams)	28.52	27.63		
B	WT. OF WET SOIL & TARE	(grams)	39.79	37.79		
C	WT. OF DRY SOIL & TARE	(grams)	38.27	36.42		
D	WT. OF WATER = B−C	(grams)	1.47	1.37		
E	WT. OF DRY SOIL = C−A	(grams)	9.75	8.79		
	MOISTURE CONTENT = (D/E)X100	(%)	15.1	15.6		

000151

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 15.4 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GG1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 20 day Aug month 2002 year

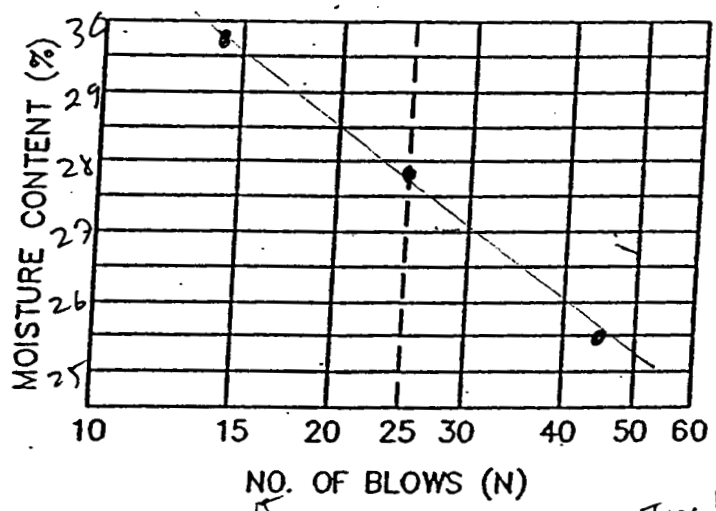
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LA02-48

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	1.9	2.1	
A	WT. OF TARE	(grams)	28.50	28.56	28.24	
B	WT. OF WET SOIL & TARE	(grams)	39.51	40.83	38.82	
C	WT. OF DRY SOIL & TARE	(grams)	37.27	38.15	36.40	
D	WT. OF WATER = B-C	(grams)	2.24	2.68	2.42	
E	WT. OF DRY SOIL = C-A	(grams)	8.77	9.59	8.16	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.5	27.9	29.7	
N	NUMBER OF BLOWS		45	25	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/01E

	TARE NO.		2.8 (Tare wt 28.45)	2.4 (Tare wt 27.39)		
A	WT. OF TARE	(grams)	45.23	42.94		
B	WT. OF WET SOIL & TARE	(grams)	43.03	40.88		
C	WT. OF DRY SOIL & TARE	(grams)	2.20	2.06		
D	WT. OF WATER = B-C	(grams)	14.50	13.49		
E	WT. OF DRY SOIL = C-A	(grams)				
	MOISTURE CONTENT = (D/E)X100	(%)	15.1	15.3		

000152

JID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

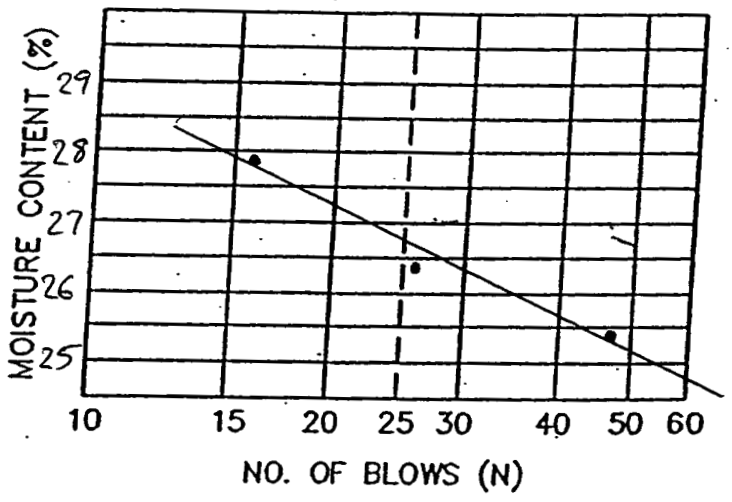
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-8 SAMPLE NO.: LP02-49

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	3.1	1.9	
A	WT. OF TARE	(grams)	28.50	28.38	28.56	
B	WT. OF WET SOIL & TARE	(grams)	41.24	40.94	40.72	
C	WT. OF DRY SOIL & TARE	(grams)	38.46	38.32	38.26	
D	WT. OF WATER = B-C	(grams)	2.78	2.62	2.46	
E	WT. OF DRY SOIL = C-A	(grams)	9.96	9.94	9.70	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.9	26.4	25.4	
N	NUMBER OF BLOWS		17	26	48	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.7	1.3		
A	WT. OF TARE	(grams)	28.67	28.64		
B	WT. OF WET SOIL & TARE	(grams)	42.92	44.34		
C	WT. OF DRY SOIL & TARE	(grams)	40.97	42.20		
D	WT. OF WATER = B-C	(grams)	1.95	2.14		
E	WT. OF DRY SOIL = C-A	(grams)	12.30	13.56		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.9	15.8		

000153

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GG1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 23 day Aug month 2002 year

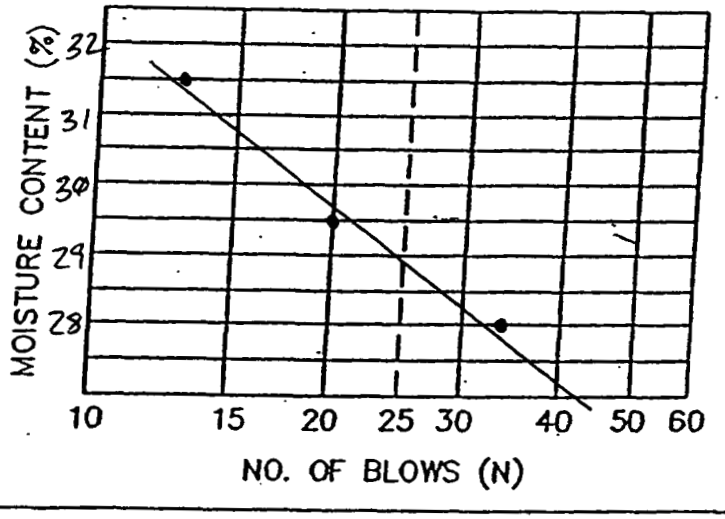
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02-50

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	1.3	3.1	
A	WT. OF TARE	(grams)	28.50	28.64	28.38	
B	WT. OF WET SOIL & TARE	(grams)	38.19	38.78	38.66	
C	WT. OF DRY SOIL & TARE	(grams)	36.07	36.47	36.20	
D	WT. OF WATER = B-C	(grams)	2.12	2.31	2.46	
E	WT. OF DRY SOIL = C-A	(grams)	7.57	7.83	7.82	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.0	29.5	31.5	
N	NUMBER OF BLOWS		34	20	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.4	1.9		
A	WT. OF TARE	(grams)	27.39	28.56		
B	WT. OF WET SOIL & TARE	(grams)	41.90	44.14		
C	WT. OF DRY SOIL & TARE	(grams)	39.91	42.00		
D	WT. OF WATER = B-C	(grams)	1.99	2.14		
E	WT. OF DRY SOIL = C-A	(grams)	12.52	13.44		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.9	15.9		

000154

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 23 day Aug month 2ΦΦ2 year

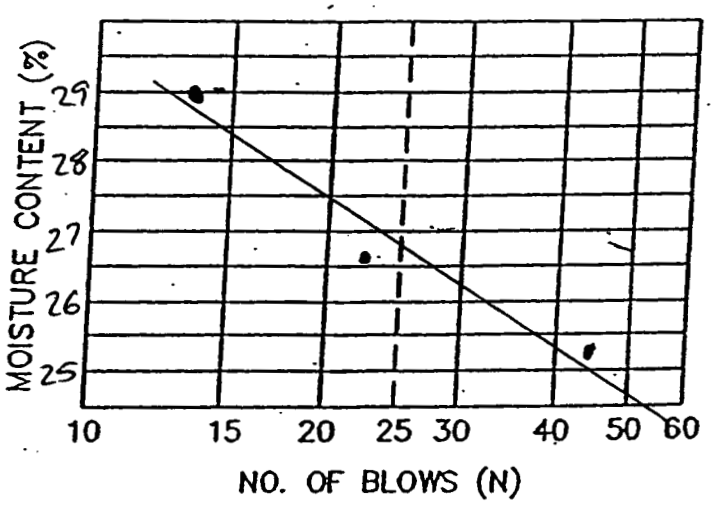
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-8 SAMPLE NO.: LPΦ2-51

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	2.7	1.5	
A	WT. OF TARE	(grams)	28.76	28.67	28.61	
B	WT. OF WET SOIL & TARE	(grams)	41.Φ5	4Φ.Φ2	4Φ.43	
C	WT. OF DRY SOIL & TARE	(grams)	38.47	37.73	37.77	
D	WT. OF WATER = B−C	(grams)	2.58	2.29	2.66	
E	WT. OF DRY SOIL = C−A	(grams)	9.71	9.Φ6	9.16	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.6	25.3	29.Φ	
N	NUMBER OF BLOWS		23	44	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

REDO PL

QA ID: KS

	TARE NO.		2.1	2.9	2.8	1.3
A	WT. OF TARE	(grams)	28.24	31.46	28.45	28.64
B	WT. OF WET SOIL & TARE	(grams)	42.Φ1	45.58	41.97	41.Φ3
C	WT. OF DRY SOIL & TARE	(grams)	4Φ.2Φ	42.75	40.17	39.42
D	WT. OF WATER = B−C	(grams)	1.81	2.83	1.80	1.61
E	WT. OF DRY SOIL = C−A	(grams)	11.96	11.29	11.72	10.78
F	MOISTURE CONTENT = (D/E)X100	(%)	15.1		15.4	14.9

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: _____ SHEET NO. ____ OF ____

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 621341 TASK NO.: 04.1

DESCRIPTION: Phase III DATE: 23 day Aug month 2002 year

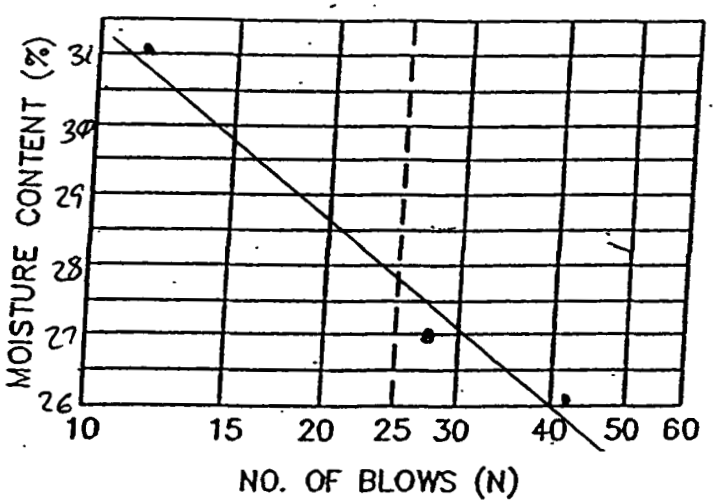
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02-53

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.4	2.2	2.6	
A	WT. OF TARE	(grams)	28.52	27.63	28.55	
B	WT. OF WET SOIL & TARE	(grams)	38.97	38.43	41.00	
C	WT. OF DRY SOIL & TARE	(grams)	36.75	36.19	38.05	
D	WT. OF WATER = B-C	(grams)	2.22	2.24	2.95	
E	WT. OF DRY SOIL = C-A	(grams)	8.23	8.56	9.50	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.0	26.2	31.1	
N	NUMBER OF BLOWS		28	42	12	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.8	2.5		
A	WT. OF TARE	(grams)	28.45	28.42		
B	WT. OF WET SOIL & TARE	(grams)	45.58	47.74		
C	WT. OF DRY SOIL & TARE	(grams)	43.27	45.13		
D	WT. OF WATER = B-C	(grams)	2.31	2.61		
E	WT. OF DRY SOIL = C-A	(grams)	14.82	16.71		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.6	15.6		

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

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

000156

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 24 day Aug month 2002 year

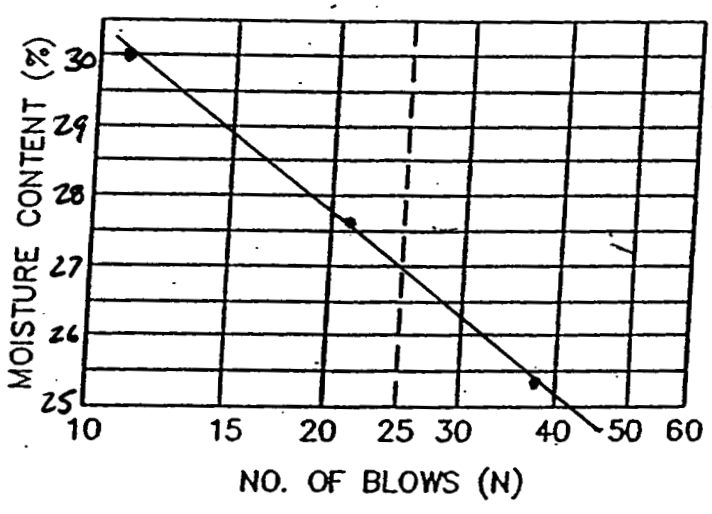
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02-54

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.9	2.7	1.1	
A	WT. OF TARE	(grams)	31.46	28.67	28.76	
B	WT. OF WET SOIL & TARE	(grams)	43.50	40.41	41.43	
C	WT. OF DRY SOIL & TARE	(grams)	40.72	37.87	38.86	
D	WT. OF WATER = B-C	(grams)	2.78	2.54	2.57	
E	WT. OF DRY SOIL = C-A	(grams)	9.26	9.2	10.1	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.0	27.6	25.4	
N	NUMBER OF BLOWS		11	21	38	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.5	2.4		
A	WT. OF TARE	(grams)	28.61	27.39		
B	WT. OF WET SOIL & TARE	(grams)	43.91	42.60		
C	WT. OF DRY SOIL & TARE	(grams)	41.83	40.52		
D	WT. OF WATER = B-C	(grams)	2.08	2.08		
E	WT. OF DRY SOIL = C-A	(grams)	13.22	13.13		
	MOISTURE CONTENT = (D/E)X100	(%)	15.7	15.8		

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 28 day Aug month 2002 year

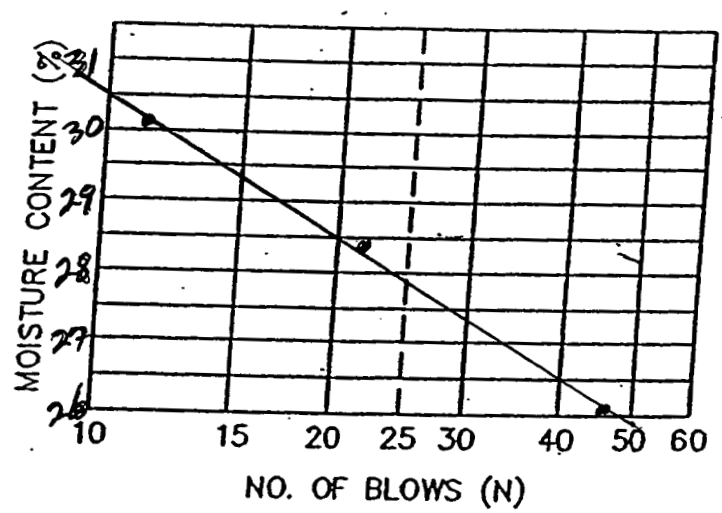
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-55

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	1.3	2.4	
A	WT. OF TARE	(grams)	28.76	28.64	27.39	
B	WT. OF WET SOIL & TARE	(grams)	39.54	38.40	38.69	
C	WT. OF DRY SOIL & TARE	(grams)	37.04	36.24	36.35	
D	WT. OF WATER = B-C	(grams)	2.50	2.16	2.34	
E	WT. OF DRY SOIL = C-A	(grams)	8.28	7.60	8.96	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.2	28.4	26.1	
N	NUMBER OF BLOWS		12	22	47	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DLE

	TARE NO.		2.7	2.8		
A	WT. OF TARE	(grams)	28.67	28.45		
B	WT. OF WET SOIL & TARE	(grams)	41.50	42.64		
C	WT. OF DRY SOIL & TARE	(grams)	39.72	40.70		
D	WT. OF WATER = B-C	(grams)	1.78	1.94		
E	WT. OF DRY SOIL = C-A	(grams)	11.05	12.25		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.1	15.8		

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

GEO SYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: CA SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

ATTERBERG LIMITS TEST

5368 **(ASTM D 4318)**

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 4 day Sept month 2002 year

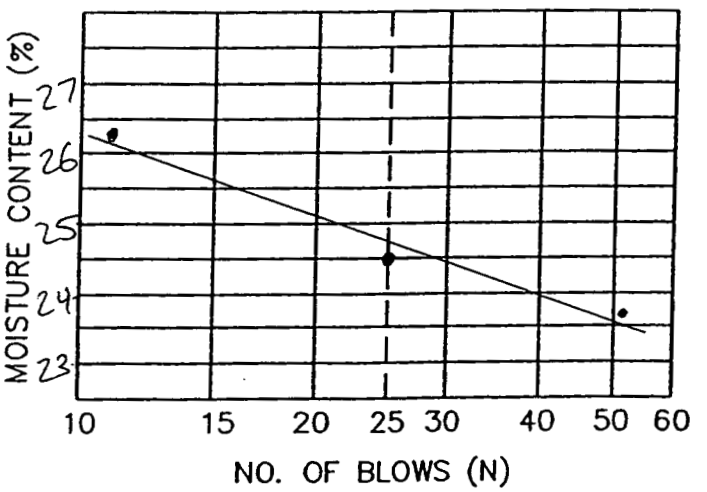
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO.: LP02-56

LIQUID LIMIT DETERMINATION

QA ID: ES/DOE

	TARE NO.		1.2	1.3	2.9	
A	WT. OF TARE	(grams)	28.50	28.64	31.46	
B	WT. OF WET SOIL & TARE	(grams)	50.41	42.91	42.23	
C	WT. OF DRY SOIL & TARE	(grams)	46.10	39.94	40.17	
D	WT. OF WATER = B-C	(grams)	4.31	2.97	2.06	
E	WT. OF DRY SOIL = C-A	(grams)	17.60	11.30	8.71	
F	MOISTURE CONTENT = (D/E)X100	(%)	24.5	26.3	23.7	
N	NUMBER OF BLOWS		25	11	51	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: ES

	TARE NO.		2.2	1.1		
A	WT. OF TARE	(grams)	27.63	28.76		
B	WT. OF WET SOIL & TARE	(grams)	41.75	43.79		
C	WT. OF DRY SOIL & TARE	(grams)	39.92	41.83		
D	WT. OF WATER = B-C	(grams)	1.83	1.96		
E	WT. OF DRY SOIL = C-A	(grams)	12.29	13.07		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.9	15.0		

LIQUID LIMIT (LL) = 25 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 10

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 602134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 28 day Aug month 2002 year

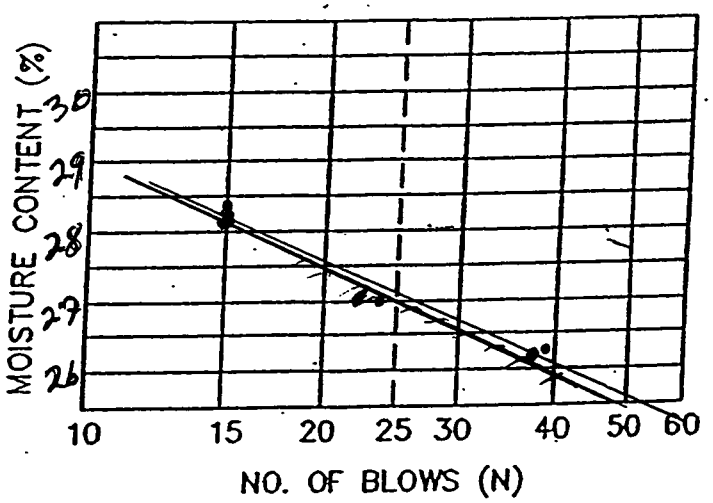
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO.: 402-57

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.9	2.6	2.2	
A	WT. OF TARE	(grams)	31.46	28.55	27.63	
B	WT. OF WET SOIL & TARE	(grams)	42.23	41.30	40.42	
C	WT. OF DRY SOIL & TARE	(grams)	39.85	38.48	37.76	
D	WT. OF WATER = B−C	(grams)	2.38	2.82	2.66	
E	WT. OF DRY SOIL = C−A	(grams)	8.39 ~~8.40~~	10.43	10.13	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.4 ~~28.3~~	27.0	26.3	
N	NUMBER OF BLOWS		15	23	39	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS 04E

	TARE NO.		1.5	1.9		
A	WT. OF TARE	(grams)	28.61	28.56		
B	WT. OF WET SOIL & TARE	(grams)	45.64	43.37		
C	WT. OF DRY SOIL & TARE	(grams)	43.30	41.32		
D	WT. OF WATER = B−C	(grams)	2.34	2.05		
E	WT. OF DRY SOIL = C−A	(grams)	14.69	12.76		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.92	16.06		

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: CA SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 4 day Oct month 2002 year

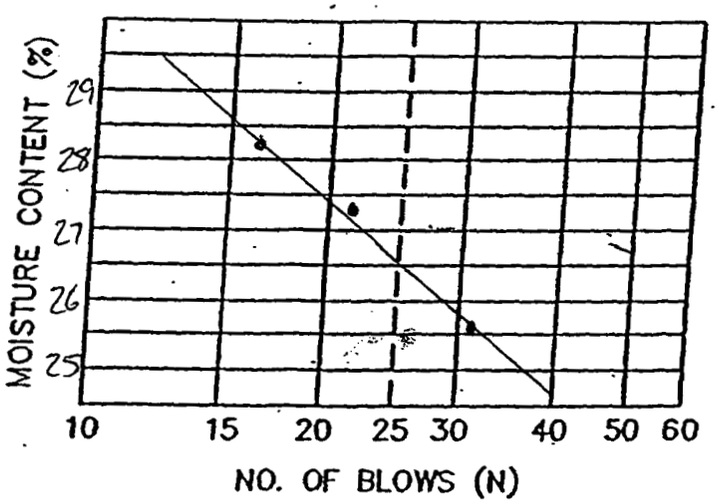
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO.: LP02-58

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	1.3	1.4	
A	WT. OF TARE	(grams)	28.76	28.64	28.52	
B	WT. OF WET SOIL & TARE	(grams)	41.29	43.86	42.36	
C	WT. OF DRY SOIL & TARE	(grams)	38.74	40.50	39.38	
D	WT. OF WATER = B-C	(grams)	2.55	3.36	2.98	
E	WT. OF DRY SOIL = C-A	(grams)	9.98	11.86	10.86	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.6	28.3	27.4	
N	NUMBER OF BLOWS		31	17	22	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.5	2.1		
A	WT. OF TARE	(grams)	28.61	28.24		
B	WT. OF WET SOIL & TARE	(grams)	44.75	43.01		
C	WT. OF DRY SOIL & TARE	(grams)	42.56	41.02		
D	WT. OF WATER = B-C	(grams)	2.19	1.99		
E	WT. OF DRY SOIL = C-A	(grams)	13.95	12.78		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.7	15.6		

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO: 6Q134 — TASK NO.: 041

DESCRIPTION: Phase IV — DATE: 03 day Sept month 2002 year

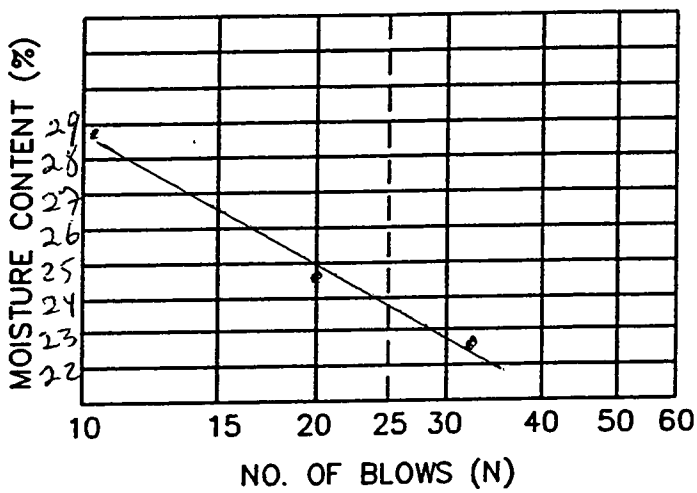
MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02.58

LIQUID LIMIT DETERMINATION

QA ID: DJE

	TARE NO.		2.7	27 2.4 39 DJE	2.9	
A	WT. OF TARE	(grams)	28.67	~~28.39~~	31.46	
B	WT. OF WET SOIL & TARE	(grams)	49.21	48.87	47.53	
C	WT. OF DRY SOIL & TARE	(grams)	44.60	42.84	44.55	
D	WT. OF WATER = B-C	(grams)	4.61	3.83	2.98	
E	WT. OF DRY SOIL = C-A	(grams)	15.93	15.45	13.09	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.94	24.79	22.77	
N	NUMBER OF BLOWS		11	20	32	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DJE

	TARE NO.		1.3	2.2		
A	WT. OF TARE	(grams)	28.64	27.63		
B	WT. OF WET SOIL & TARE	(grams)	43.08	39.69		
C	WT. OF DRY SOIL & TARE	(grams)	41.25	38.16		
D	WT. OF WATER = B-C	(grams)	1.83	1.53		
E	WT. OF DRY SOIL = C-A	(grams)	12.61	10.53		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.5	14.5		

000162

LIQUID LIMIT (LL) = 24 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 9

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 04 day Sept month 2002 year

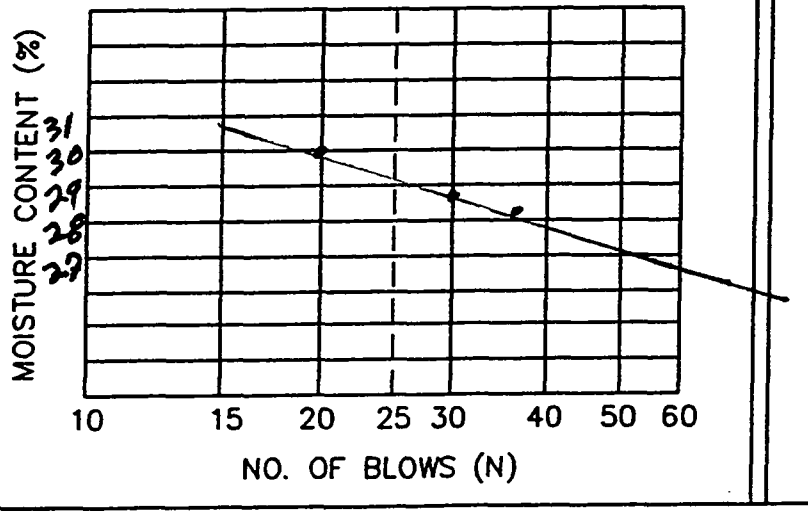
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: 2P02-59

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		2.4	1.3	2.7	~~1.1~~
A	WT. OF TARE	(grams)	27.39	28.64	28.67	~~28.96~~
B	WT. OF WET SOIL & TARE	(grams)	44.51	48.29	50.40	
C	WT. OF DRY SOIL & TARE	(grams)	40.72	43.91	45.38	
D	WT. OF WATER = B-C	(grams)	3.79	4.38	5.02	
E	WT. OF DRY SOIL = C-A	(grams)	13.33	15.27	16.71	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.4	28.7	30.0	
N	NUMBER OF BLOWS		37	30	20	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		2.9	2.2		
A	WT. OF TARE	(grams)	31.46	27.63		
B	WT. OF WET SOIL & TARE	(grams)	42.74	36.90		
C	WT. OF DRY SOIL & TARE	(grams)	41.22	35.64		
D	WT. OF WATER = B-C	(grams)	1.52	1.26		
E	WT. OF DRY SOIL = C-A	(grams)	9.76	8.01		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.6	15.7		

000163

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

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134/ TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 04 day Sept month 2002 year

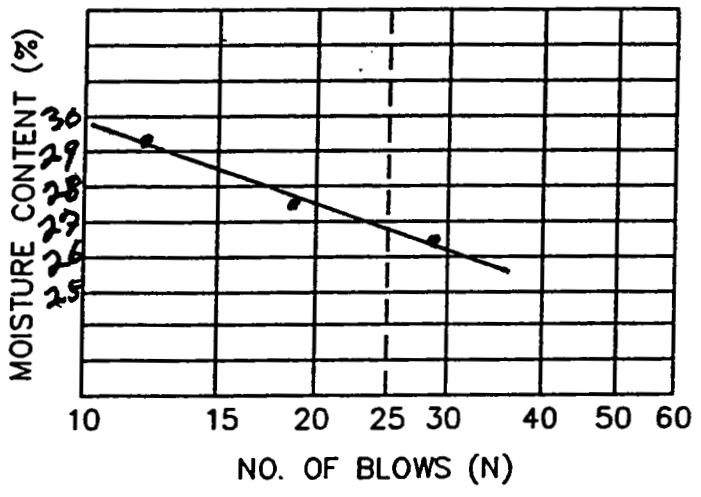
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-60

LIQUID LIMIT DETERMINATION

QA ID: D13

	TARE NO.		1.1	2.8	1.9	
A	WT. OF TARE	(grams)	28.76	28.45	28.56	
B	WT. OF WET SOIL & TARE	(grams)	48.61	47.25	51.03	
C	WT. OF DRY SOIL & TARE	(grams)	44.44	43.21	45.94	
D	WT. OF WATER = B-C	(grams)	4.17	4.04	5.09	
E	WT. OF DRY SOIL = C-A	(grams)	15.68	14.76	17.38	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.6	27.4	29.3	
N	NUMBER OF BLOWS		28	18	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: D12

	TARE NO.		1.4	2.6		
A	WT. OF TARE	(grams)	28.52	28.55		
B	WT. OF WET SOIL & TARE	(grams)	39.93	41.26		
C	WT. OF DRY SOIL & TARE	(grams)	38.41	39.59		
D	WT. OF WATER = B-C	(grams)	1.52	1.67		
E	WT. OF DRY SOIL = C-A	(grams)	9.89	11.04		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.4	15.1		

000164

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO: GQ1341 — TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: 04 day Sept month 2002 year

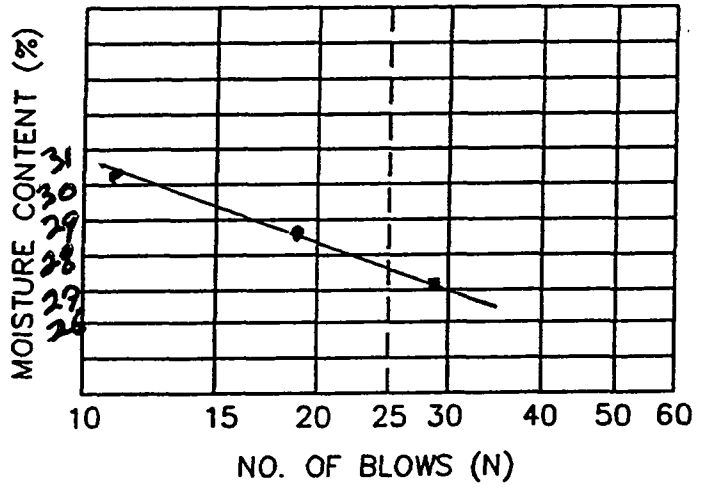
MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02. 61

LIQUID LIMIT DETERMINATION

QA ID: DHE

	TARE NO.		1.5	1.7	3.1	
A	WT. OF TARE	(grams)	28.60	28.48	28.35	
B	WT. OF WET SOIL & TARE	(grams)	52.83	51.80	53.05	
C	WT. OF DRY SOIL & TARE	(grams)	47.23	46.58	47.79	
D	WT. OF WATER = B-C	(grams)	5.60	5.22	5.26	
E	WT. OF DRY SOIL = C-A	(grams)	18.63	18.10	19.44	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.1	28.8	27.1	
N	NUMBER OF BLOWS		12	18	29	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: PLE

	TARE NO.		A-217	A-224		
A	WT. OF TARE	(grams)	3.59	3.57		
B	WT. OF WET SOIL & TARE	(grams)	15.69	15.73		
C	WT. OF DRY SOIL & TARE	(grams)	14.12	14.12		
D	WT. OF WATER = B-C	(grams)	1.57	1.61		
E	WT. OF DRY SOIL = C-A	(grams)	10.53	10.55		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.9	15.3		

000165

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase II — DATE: 04 day Sept month 2002 year

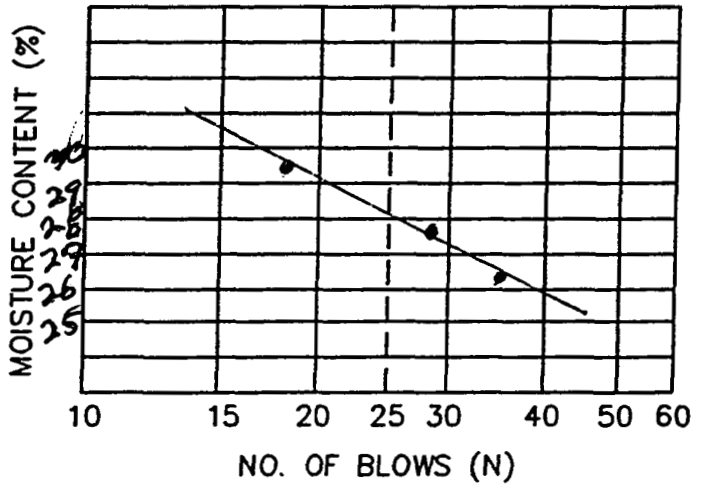
MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02-62

LIQUID LIMIT DETERMINATION

QA ID: DTE

	TARE NO.		2.3	1.6	2.5	
A	WT. OF TARE	(grams)	31.20	28.85	28.42	
B	WT. OF WET SOIL & TARE	(grams)	56.87	56.63	53.87	
C	WT. OF DRY SOIL & TARE	(grams)	51.29	50.31	48.55	
D	WT. OF WATER = B-C	(grams)	5.58	6.32	5.32	
E	WT. OF DRY SOIL = C-A	(grams)	20.09	21.46	20.13	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.8	29.5	26.4	
N	NUMBER OF BLOWS		28	17	35	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DTE

	TARE NO.		A214	A210		
A	WT. OF TARE	(grams)	3.54	3.54		
B	WT. OF WET SOIL & TARE	(grams)	13.91	13.95		
C	WT. OF DRY SOIL & TARE	(grams)	12.56	12.52		
D	WT. OF WATER = B-C	(grams)	1.35	1.43		
E	WT. OF DRY SOIL = C-A	(grams)	9.02	8.98		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.96	15.9		

000166

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GG1341 TASK NO.: 04

DESCRIPTION: Phase IV DATE: 5 day Sept month 2002 year

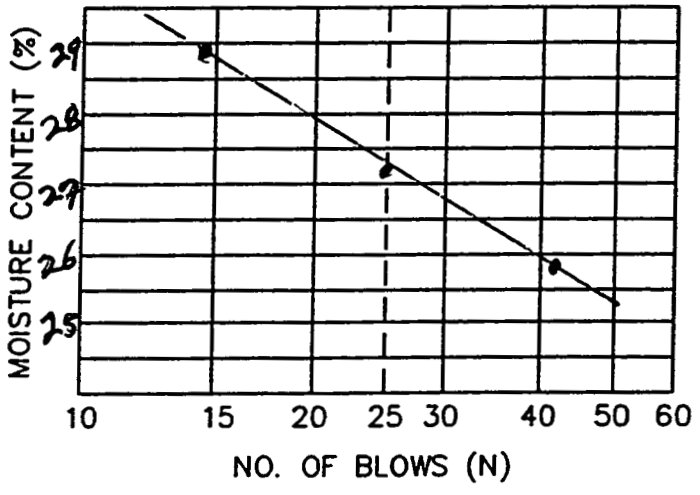
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-63

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.4	3.2	2.2	
A	WT. OF TARE	(grams)	28.52	27.82	27.63	
B	WT. OF WET SOIL & TARE	(grams)	40.74	42.45	39.51	
C	WT. OF DRY SOIL & TARE	(grams)	38.23	39.17	36.96	
D	WT. OF WATER = B-C	(grams)	2.51	3.28	2.55	
E	WT. OF DRY SOIL = C-A	(grams)	9.71	11.35	9.33	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.8	28.9	27.3	
N	NUMBER OF BLOWS		41	KS 27 74	25	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DJE

	TARE NO.		1.8	2.6		
A	WT. OF TARE	(grams)	28.81	28.55		
B	WT. OF WET SOIL & TARE	(grams)	43.24	40.80		
C	WT. OF DRY SOIL & TARE	(grams)	41.36	39.19		
D	WT. OF WATER = B-C	(grams)	1.88	1.61		
E	WT. OF DRY SOIL = C-A	(grams)	12.55	10.64		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.0	15.1		

000167

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q1341 TASK NO.: 04

DESCRIPTION: Phase IV DATE: 6 day Sept month 2002 year

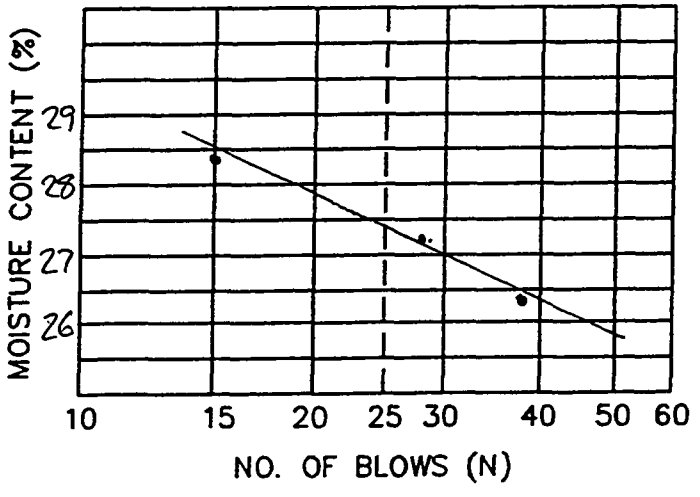
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-64

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.9	2.4	2.7	
A	WT. OF TARE	(grams)	28.56	27.39	28.67	
B	WT. OF WET SOIL & TARE	(grams)	40.06	38.75	40.84	
C	WT. OF DRY SOIL & TARE	(grams)	37.60	36.38	38.15	
D	WT. OF WATER = B-C	(grams)	2.46	2.37	2.69	
E	WT. OF DRY SOIL = C-A	(grams)	9.04	8.99	9.48	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.2	26.4	28.4	
N	NUMBER OF BLOWS		28	39	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.8	2.9		
A	WT. OF TARE	(grams)	28.45	31.46		
B	WT. OF WET SOIL & TARE	(grams)	44.97	47.60		
C	WT. OF DRY SOIL & TARE	(grams)	42.76	45.47		
D	WT. OF WATER = B-C	(grams)	2.21	2.13		
E	WT. OF DRY SOIL = C-A	(grams)	14.31	14.01		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.4	15.2		

000168

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GG1341 TASK NO.: 04

DESCRIPTION: Phase IV DATE: 6 day Sept month 2002 year

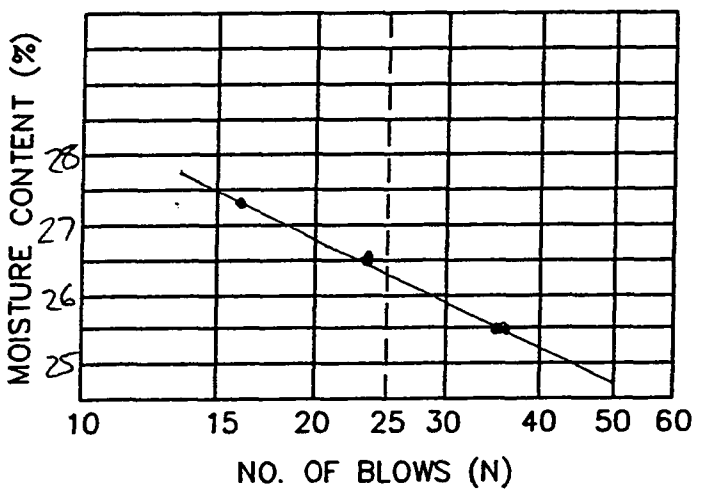
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-6.5

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	1.2	1.3	
A	WT. OF TARE	(grams)	28.76	28.50	28.64	
B	WT. OF WET SOIL & TARE	(grams)	41.60	40.29	41.70	
C	WT. OF DRY SOIL & TARE	(grams)	38.99	37.82	38.90	
D	WT. OF WATER = B-C	(grams)	2.61	2.47	2.80	
E	WT. OF DRY SOIL = C-A	(grams)	10.23	9.32	10.26	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.5	26.5	27.3	
N	NUMBER OF BLOWS		36	24	17	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.6	2.3		
A	WT. OF TARE	(grams)	28.87	31.20		
B	WT. OF WET SOIL & TARE	(grams)	45.81	46.75		
C	WT. OF DRY SOIL & TARE	(grams)	43.54	44.66		
D	WT. OF WATER = B-C	(grams)	2.27	2.09		
E	WT. OF DRY SOIL = C-A	(grams)	14.67	13.46		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.5	15.5		

000169

LIQUID LIMIT (LL) = 26 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 10

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 7 day Sept month 2002 year

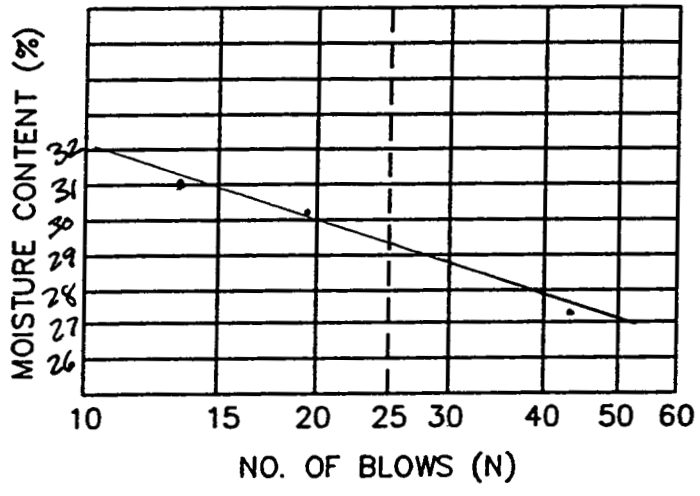
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-66

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.4	1.8	2.2	
A	WT. OF TARE	(grams)	28.52	28.81	27.63	
B	WT. OF WET SOIL & TARE	(grams)	40.72	39.79	41.06	
C	WT. OF DRY SOIL & TARE	(grams)	38.11	37.25	37.88	
D	WT. OF WATER = B-C	(grams)	2.61	2.54	3.18	
E	WT. OF DRY SOIL = C-A	(grams)	9.59	8.44	~~7.25~~ 10.25	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.2	30.1	~~43.9~~ 31.0	
N	NUMBER OF BLOWS		44	19	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.6	3.2		
A	WT. OF TARE	(grams)	28.55	27.82		
B	WT. OF WET SOIL & TARE	(grams)	46.52	47.43		
C	WT. OF DRY SOIL & TARE	(grams)	44.07	44.78		
D	WT. OF WATER = B-C	(grams)	2.45	2.65		
E	WT. OF DRY SOIL = C-A	(grams)	15.52	16.96		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.8	15.6		

000170

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

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO: 6Q1341 — TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: 19 day Sept month 2002 year

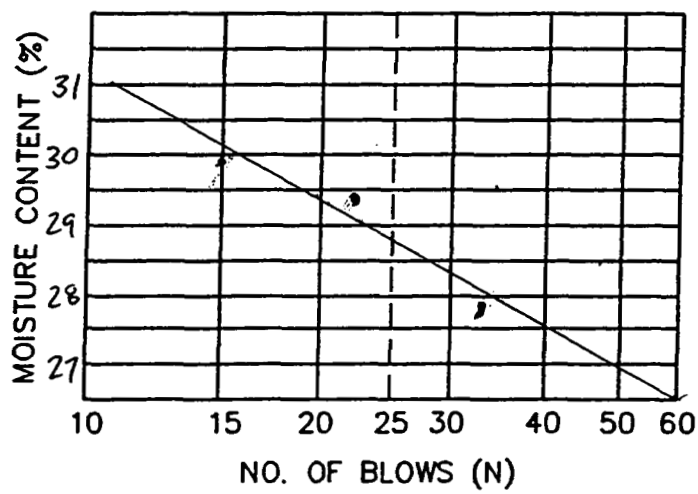
MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: ~~LP02-67~~ LP02-67

LIQUID LIMIT DETERMINATION

QA ID: PZE

	TARE NO.		2-6	1.4	3.2	1.2
A	WT. OF TARE	(grams)	28.56	28.50	27.83	28.49
B	WT. OF WET SOIL & TARE	(grams)	50.38	47.87	50.36	49.89
C	WT. OF DRY SOIL & TARE	(grams)	45.63	43.66	45.26	44.96
D	WT. OF WATER = B-C	(grams)	4.75	4.21	5.10	4.93
E	WT. OF DRY SOIL = C-A	(grams)	17.07	15.16	17.43	16.47
F	MOISTURE CONTENT = (D/E)X100	(%)	27.8	27.8	29.3	29.9
N	NUMBER OF BLOWS		32	32	22	15

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: _____

	TARE NO.		A-218	A-203		
A	WT. OF TARE	(grams)	3.59	3.59		
B	WT. OF WET SOIL & TARE	(grams)	15.16	15.19		
C	WT. OF DRY SOIL & TARE	(grams)	13.57	13.56		
D	WT. OF WATER = B-C	(grams)	1.59	1.63		
E	WT. OF DRY SOIL = C-A	(grams)	9.98	9.97		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.9	16.3		

000171

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

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO: 60134 1 — TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: 11 day Sept month 2002 year

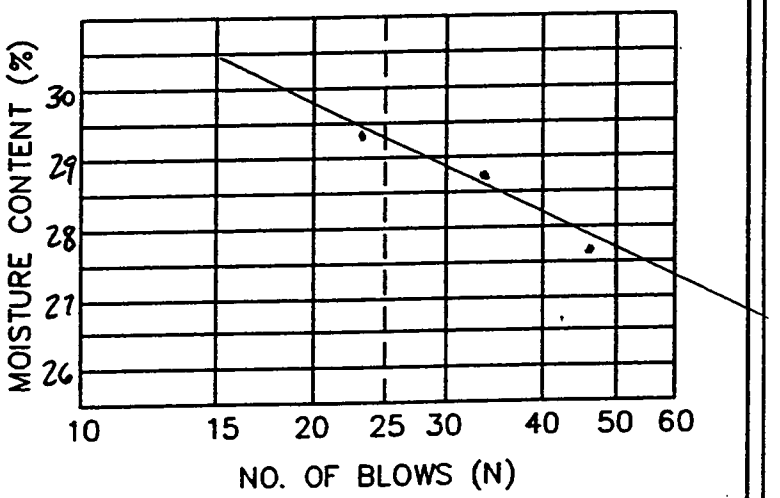
MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02-69

LIQUID LIMIT DETERMINATION

QA ID: DAE

	TARE NO.		2.2	1.6	2.9	X-8
A	WT. OF TARE	(grams)	27.64	28.88	31.47	28.77
B	WT. OF WET SOIL & TARE	(grams)	49.54	49.10	53.95	
C	WT. OF DRY SOIL & TARE	(grams)	44.58	44.59	48.93	
D	WT. OF WATER = B−C	(grams)	4.96	4.51	4.82	
E	WT. OF DRY SOIL = C−A	(grams)	16.94	15.71	17.46	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.3	28.7	27.6	
N	NUMBER OF BLOWS		23	33	45	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: _____

	TARE NO.		A-208	A-224		
A	WT. OF TARE	(grams)	3.58	3.58		
B	WT. OF WET SOIL & TARE	(grams)	15.50	15.70		
C	WT. OF DRY SOIL & TARE	(grams)	13.86	14.02		
D	WT. OF WATER = B−C	(grams)	1.64	1.68		
E	WT. OF DRY SOIL = C−A	(grams)	10.28	10.44		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.0	16.1		

000172

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

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO: 61341 — TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: 11 day Sept month 2002 year

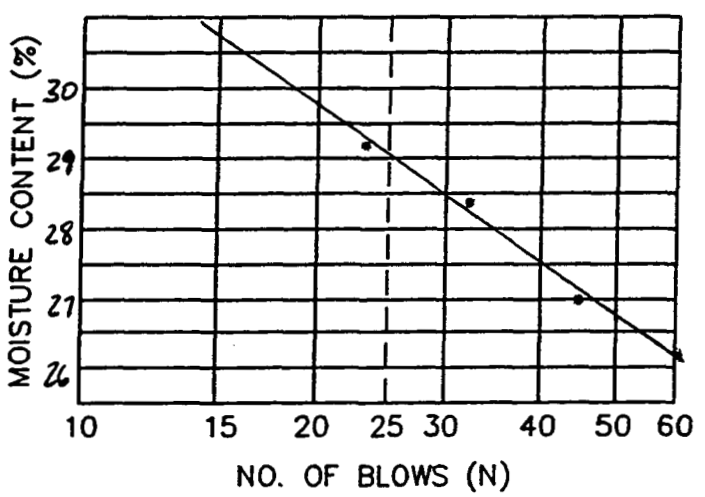
MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02-70

LIQUID LIMIT DETERMINATION

QA ID: WAE

	TARE NO.		1.8	2.7	1.1	2.3
A	WT. OF TARE	(grams)	28.77	28.67	28.77	31.19
B	WT. OF WET SOIL & TARE	(grams)	50.62	55.66	54.34	
C	WT. OF DRY SOIL & TARE	(grams)	45.97	49.69	48.57	
D	WT. OF WATER = B-C	(grams)	4.65	5.97	5.77	
E	WT. OF DRY SOIL = C-A	(grams)	17.20	21.02	19.80	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.0	28.4	29.1	
N	NUMBER OF BLOWS		44	31	23	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: _____

	TARE NO.		A-210	A-214		
A	WT. OF TARE	(grams)	3.54	3.52		
B	WT. OF WET SOIL & TARE	(grams)	15.70	15.84		
C	WT. OF DRY SOIL & TARE	(grams)	14.02	14.12		
D	WT. OF WATER = B-C	(grams)	1.68	1.72		
E	WT. OF DRY SOIL = C-A	(grams)	10.48	10.60		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.0	16.2		

000173

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

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 6Q134/ TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day Sept. month 2002 year

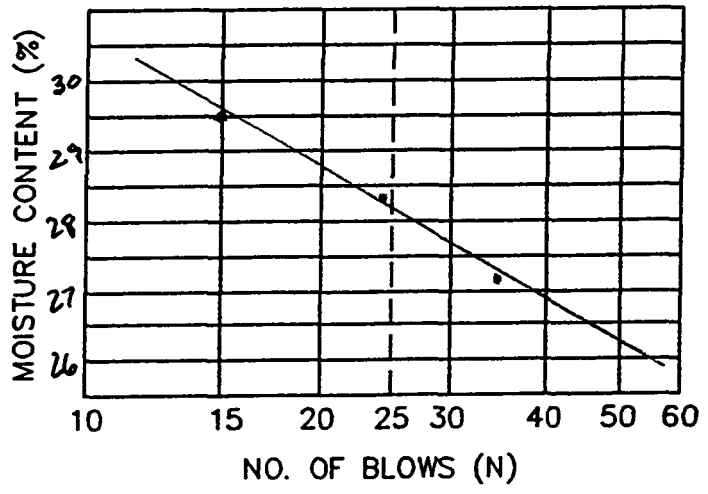
MATERIAL TYPE: Lower Pecan Clay SAMPLE NO.: LP02-71

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		2.2	1.6	2.6	1.1
A	WT. OF TARE	(grams)	27.63	28.87	28.55	28.76
B	WT. OF WET SOIL & TARE	(grams)	48.26	55.46	55.52	
C	WT. OF DRY SOIL & TARE	(grams)	43.85	49.60	49.38	
D	WT. OF WATER = B-C	(grams)	4.41	5.86	6.14	
E	WT. OF DRY SOIL = C-A	(grams)	16.22	20.73	20.83	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.2	28.3	29.5	
N	NUMBER OF BLOWS		34	24	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: _____

	TARE NO.		A214	A224		
A	WT. OF TARE	(grams)	3.52	3.57		
B	WT. OF WET SOIL & TARE	(grams)	17.14	17.00		
C	WT. OF DRY SOIL & TARE	(grams)	15.36	15.24		
D	WT. OF WATER = B-C	(grams)	1.78	1.76		
E	WT. OF DRY SOIL = C-A	(grams)	11.84	11.67		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.0	15.1		

000174

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 15. PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 13 day Sept month 2002 year

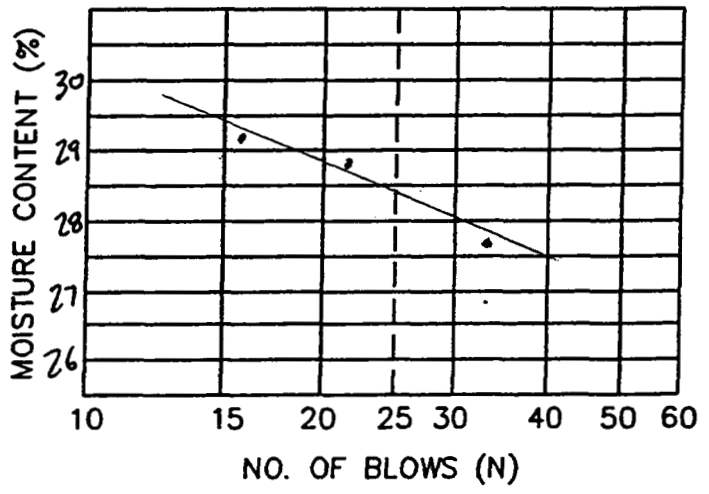
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02.72

LIQUID LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		1.1	2.7	1.9	2.9
A	WT. OF TARE	(grams)	28.76	28.67	28.56	31.46
B	WT. OF WET SOIL & TARE	(grams)	50.46	51.06	50.90	
C	WT. OF DRY SOIL & TARE	(grams)	45.77	46.06	45.85	
D	WT. OF WATER = B-C	(grams)	4.69	5.0	5.05	
E	WT. OF DRY SOIL = C-A	(grams)	17.01	17.39	17.29	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.6	28.8	29.2	
N	NUMBER OF BLOWS		33	27	16	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DLE

	TARE NO.		~~A-219~~	A-218	A-210	A-218
A	WT. OF TARE	(grams)	~~3.53~~	3.58	3.53	3.58
B	WT. OF WET SOIL & TARE	(grams)	~~50.46~~	51.06	16.48	16.01
C	WT. OF DRY SOIL & TARE	(grams)			14.81	14.39
D	WT. OF WATER = B-C	(grams)			1.67	1.62
E	WT. OF DRY SOIL = C-A	(grams)			11.28	10.81
F	MOISTURE CONTENT = (D/E)X100	(%)			14.8	15.0

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 15 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 16 day Sept month 2002 year

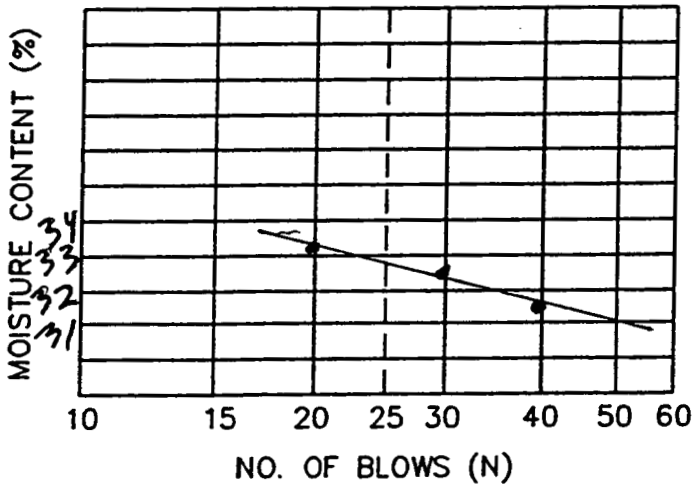
MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-73

LIQUID LIMIT DETERMINATION

QA ID: AE

	TARE NO.		1.4	3.2	2.9	1.8
A	WT. OF TARE	(grams)	28.52	27.82	31.46	28.81
B	WT. OF WET SOIL & TARE	(grams)	49.57	45.64	54.68	
C	WT. OF DRY SOIL & TARE	(grams)	44.32	41.26	49.16	
D	WT. OF WATER = B-C	(grams)	5.25	4.38	5.52	
E	WT. OF DRY SOIL = C-A	(grams)	15.80	13.44	17.70	
F	MOISTURE CONTENT = (D/E)X100	(%)	33.2	32.6	31.2	
N	NUMBER OF BLOWS		20	30	40	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: AE

	TARE NO.		A203	A-208		
A	WT. OF TARE	(grams)	3.60	3.57		
B	WT. OF WET SOIL & TARE	(grams)	13.60	16.36		
C	WT. OF DRY SOIL & TARE	(grams)	12.17	14.50		
D	WT. OF WATER = B-C	(grams)	1.43	1.86		
E	WT. OF DRY SOIL = C-A	(grams)	8.57	10.93		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.7	17.0		

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

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 69134 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 16 day Sept. month 2002 year

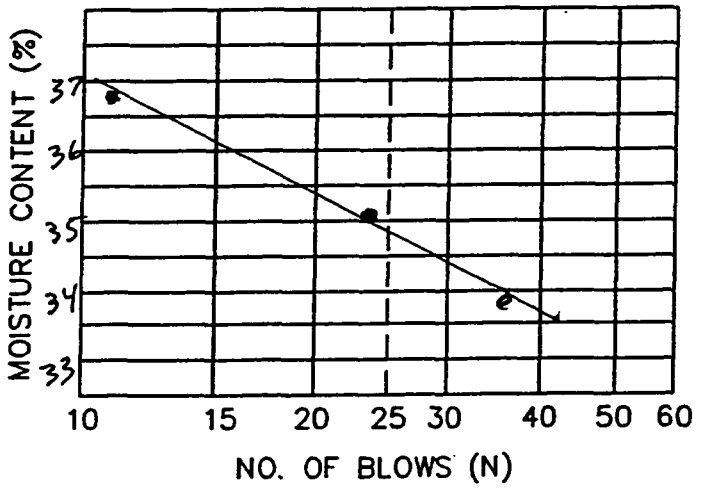
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-74

LIQUID LIMIT DETERMINATION

QA ID: D1E

	TARE NO.		2.6	2.7	1.9	
A	WT. OF TARE	(grams)	28.55	28.67	28.56	
B	WT. OF WET SOIL & TARE	(grams)	56.18	56.14	54.34	
C	WT. OF DRY SOIL & TARE	(grams)	48.74	49.01	47.84	
D	WT. OF WATER = B-C	(grams)	7.44	7.13	6.50	
E	WT. OF DRY SOIL = C-A	(grams)	20.19	20.34	19.28	
F	MOISTURE CONTENT = (D/E)X100	(%)	36.8	35.1	33.7	
N	NUMBER OF BLOWS		12	24	37	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: D1E

	TARE NO.		A-214	A-224		
A	WT. OF TARE	(grams)	3.52	3.57		
B	WT. OF WET SOIL & TARE	(grams)	13.13	12.55		
C	WT. OF DRY SOIL & TARE	(grams)	11.71	11.23		
D	WT. OF WATER = B-C	(grams)	1.42 ~~9.61~~ DIE	1.32 ~~7.66~~ DIE		
E	WT. OF DRY SOIL = C-A	(grams)	8.19	7.66		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.3	17.2		

000177

LIQUID LIMIT (LL) = 35 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 18

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 16 day Sept month 2002 year

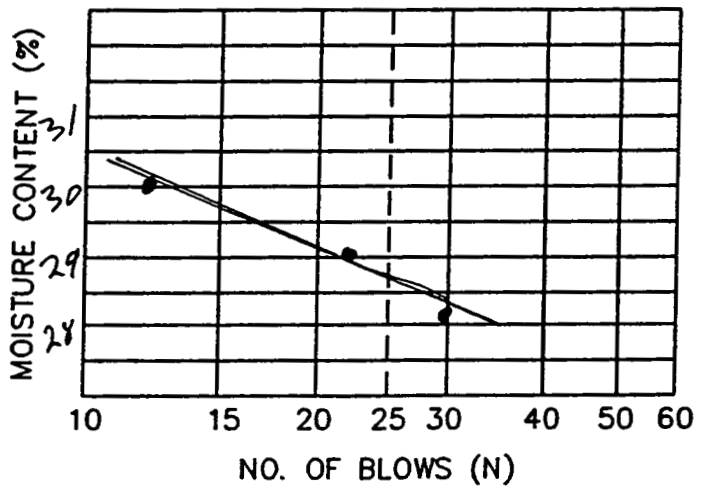
MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.75

LIQUID LIMIT DETERMINATION

QA ID: DCE

	TARE NO.		2.2	1.1	3.1	2.3
A	WT. OF TARE	(grams)	27.63	28.36	28.38	31.20
B	WT. OF WET SOIL & TARE	(grams)	51.21	59.67	54.93	
C	WT. OF DRY SOIL & TARE	(grams)	45.77	52.70	48.93	
D	WT. OF WATER = B-C	(grams)	5.44	6.97	5.80	
E	WT. OF DRY SOIL = C-A	(grams)	18.14	23.94	20.55	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.0	29.1	28.2	
N	NUMBER OF BLOWS		13	23	30	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DCE

	TARE NO.		A-218	A-210		
A	WT. OF TARE	(grams)	3.59	3.53		
B	WT. OF WET SOIL & TARE	(grams)	16.89	16.26		
C	WT. OF DRY SOIL & TARE	(grams)	15.10	14.51		
D	WT. OF WATER = B-C	(grams)	1.79	1.75		
E	WT. OF DRY SOIL = C-A	(grams)	11.51	10.98		
F	MOISTURE CONTENT = (D/E)X100	(%)	15.6	15.9		

000178

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

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

5368

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: 62341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 16 day Sept month 2002 year

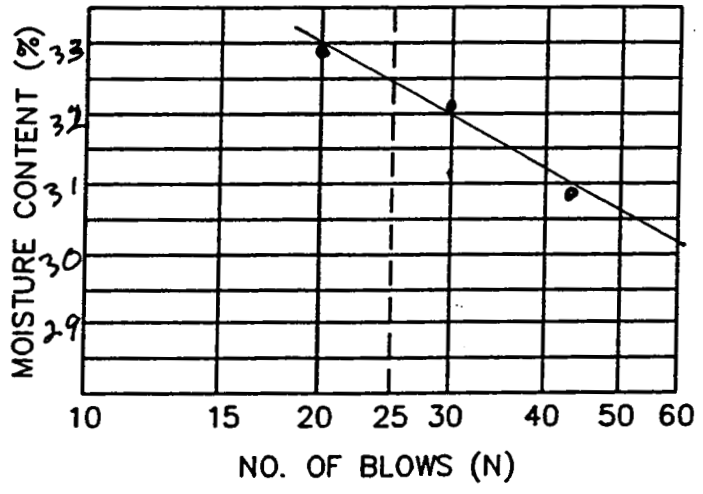
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-76

LIQUID LIMIT DETERMINATION

QA ID: DAE

	TARE NO.		1-6	2-8	1.2	2.3
A	WT. OF TARE	(grams)	28.87	28.45	28.50	31.20
B	WT. OF WET SOIL & TARE	(grams)	54.58	50.57	56.53	
C	WT. OF DRY SOIL & TARE	(grams)	48.22	45.20	49.93	
D	WT. OF WATER = B-C	(grams)	6.36	5.37	6.60	
E	WT. OF DRY SOIL = C-A	(grams)	19.35	16.75	21.43	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.9	32.1	30.8	
N	NUMBER OF BLOWS		20	30	43	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: DAE

	TARE NO.		A-217	A223		
A	WT. OF TARE	(grams)	3.61	3.60		
B	WT. OF WET SOIL & TARE	(grams)	14.81	13.31		
C	WT. OF DRY SOIL & TARE	(grams)	13.15	11.85		
D	WT. OF WATER = B-C	(grams)	1.66	1.46		
E	WT. OF DRY SOIL = C-A	(grams)	9.54	8.25		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.4	17.7		

000179

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

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04

DESCRIPTION: Phase IV DATE: 21 day Sept month 02 year

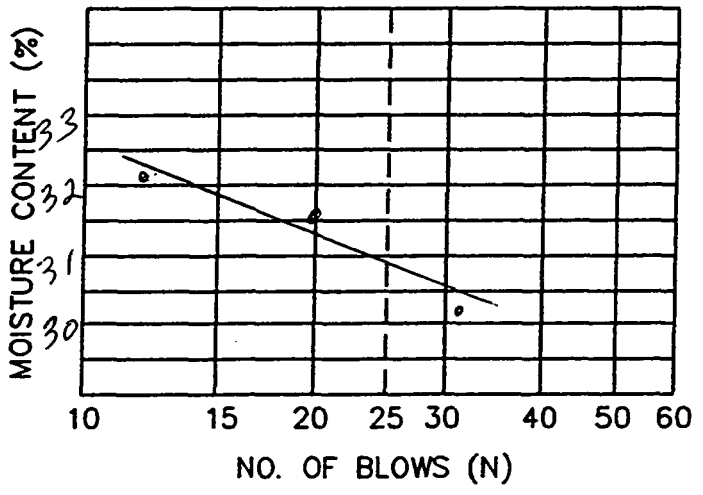
MATERIAL TYPE: LP Clay SAMPLE NO.: LP02-77

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.8	1.1	2.9	
A	WT. OF TARE	(grams)	28.81	28.76	31.46	
B	WT. OF WET SOIL & TARE	(grams)	49.48	45.43	51.18	
C	WT. OF DRY SOIL & TARE	(grams)	44.46	41.43	46.60	
D	WT. OF WATER = B-C	(grams)	5.02	4.00	4.58	
E	WT. OF DRY SOIL = C-A	(grams)	15.65	12.67	15.14	
F	MOISTURE CONTENT = (D/E)X100	(%)	32.1	31.6	30.3	
N	NUMBER OF BLOWS		13	20	31	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW/DKE

	TARE NO.		3.1	3.2		
A	WT. OF TARE	(grams)	28.38	27.82		
B	WT. OF WET SOIL & TARE	(grams)	41.41	37.23		
C	WT. OF DRY SOIL & TARE	(grams)	39.57	35.91		
D	WT. OF WATER = B-C	(grams)	1.84	1.32		
E	WT. OF DRY SOIL = C-A	(grams)	11.19	8.09		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.4	16.3		

000180

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 15

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

(ASTM D 4318)

5366

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

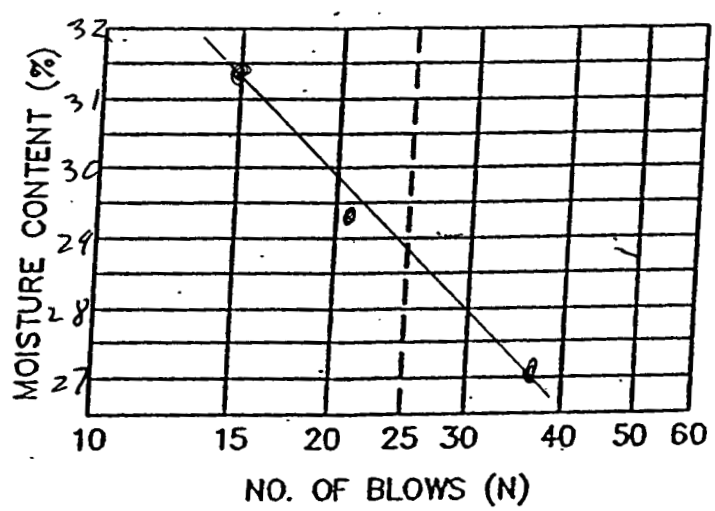
MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-28

LIQUID LIMIT DETERMINATION

QA ID: CHW

	TARE NO.		1.4	1.9	1.2	
A	WT. OF TARE	(grams)	28.52	28.56	28.50	
B	WT. OF WET SOIL & TARE	(grams)	49.24	51.40	47.46	
C	WT. OF DRY SOIL & TARE	(grams)	44.88	46.21	42.92	
D	WT. OF WATER = B-C	(grams)	4.41	5.19	4.54	
E	WT. OF DRY SOIL = C-A	(grams)	16.36	17.65	14.42	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.0 ~~29.0~~	29.40	31.48	
N	NUMBER OF BLOWS		37	21	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: CHW/DAE

	TARE NO.		2.6	2.8		
A	WT. OF TARE	(grams)	28.55	28.45		
B	WT. OF WET SOIL & TARE	(grams)	39.55	39.23		
C	WT. OF DRY SOIL & TARE	(grams)	38.13	37.84		
D	WT. OF WATER = B-C	(grams)	1.42	1.39		
E	WT. OF DRY SOIL = C-A	(grams)	9.58	9.39		
F	MOISTURE CONTENT = (D/E)X100	(%)	14.8	14.8		

000131

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

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

~~5368~~

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

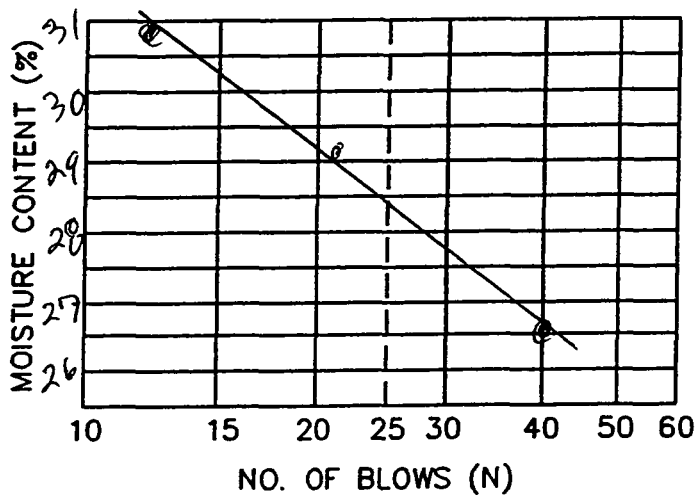
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-79

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.3	1.6	2.2	
A	WT. OF TARE	(grams)	28.64	28.87	27.63	
B	WT. OF WET SOIL & TARE	(grams)	39.22	42.11	38.00	
C	WT. OF DRY SOIL & TARE	(grams)	37.00	39.12	35.56	
D	WT. OF WATER = B-C	(grams)	2.22	2.99	2.44	
E	WT. OF DRY SOIL = C-A	(grams)	8.36	10.25	7.93	
F	MOISTURE CONTENT = (D/E)X100	(%)	26.60	29.2	30.8	
N	NUMBER OF BLOWS		40	22	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.3	2.7		
A	WT. OF TARE	(grams)	31.20	28.67		
B	WT. OF WET SOIL & TARE	(grams)	46.02	41.29		
C	WT. OF DRY SOIL & TARE	(grams)	43.85	39.48		
D	WT. OF WATER = B-C	(grams)	2.17	1.81		
E	WT. OF DRY SOIL = C-A	(grams)	12.65	10.81		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.2	16.7		

000182

LIQUID LIMIT (LL) = 28 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 11.0

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

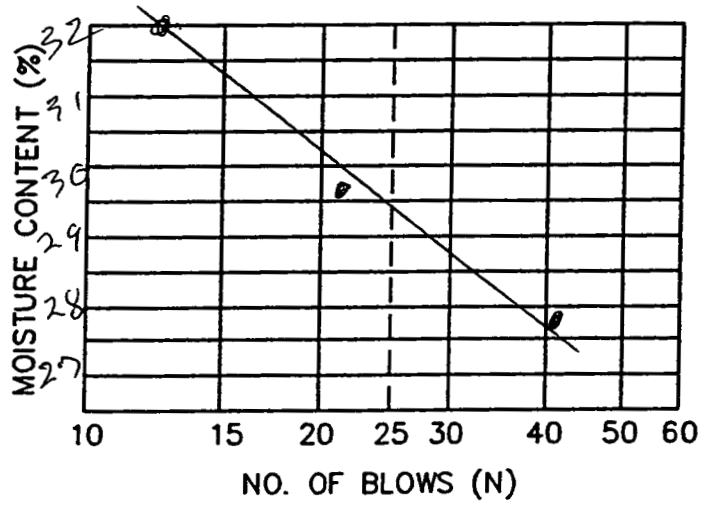
MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-81

LIQUID LIMIT DETERMINATION

QA ID: LS

	TARE NO.		1.5	1.7	2.1	
A	WT. OF TARE	(grams)	28.61	28.49	28.24	
B	WT. OF WET SOIL & TARE	(grams)	40.39	38.74	39.30	
C	WT. OF DRY SOIL & TARE	(grams)	37.83	36.40	36.62	
D	WT. OF WATER = B-C	(grams)	2.56	2.34	2.68	
E	WT. OF DRY SOIL = C-A	(grams)	9.22	7.91	8.38	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.8	29.6	32.0	
N	NUMBER OF BLOWS		41	21	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: LS

	TARE NO.		2.4	2.5		
A	WT. OF TARE	(grams)	27.39	28.42		
B	WT. OF WET SOIL & TARE	(grams)	45.60	44.13		
C	WT. OF DRY SOIL & TARE	(grams)	42.87	41.85		
D	WT. OF WATER = B-C	(grams)	2.73	2.28		
E	WT. OF DRY SOIL = C-A	(grams)	15.48	13.43		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.6	17.0		

000183

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Sept month 2002 year

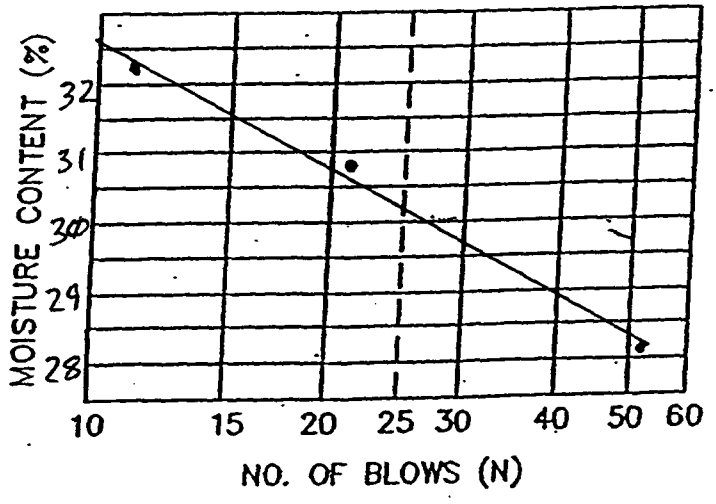
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-12 SAMPLE NO.: LP02-82

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.3	1.5	1.6	
A	WT. OF TARE	(grams)	28.64	28.61	28.87	
B	WT. OF WET SOIL & TARE	(grams)	38.63	39.74	41.02	
C	WT. OF DRY SOIL & TARE	(grams)	36.44	37.12	38.06	
D	WT. OF WATER = B-C	(grams)	2.19	2.62	2.96	
E	WT. OF DRY SOIL = C-A	(grams)	7.8	8.51	9.19	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.1	30.8	32.2	
N	NUMBER OF BLOWS		52	21	12	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.7	2.1		
A	WT. OF TARE	(grams)	28.49	28.24		
B	WT. OF WET SOIL & TARE	(grams)	40.37	42.98		
C	WT. OF DRY SOIL & TARE	(grams)	38.71	40.91		
D	WT. OF WATER = B-C	(grams)	1.66	2.07		
E	WT. OF DRY SOIL = C-A	(grams)	10.22	12.67		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.2	16.3		

000184

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 14

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Sept month 2002 year

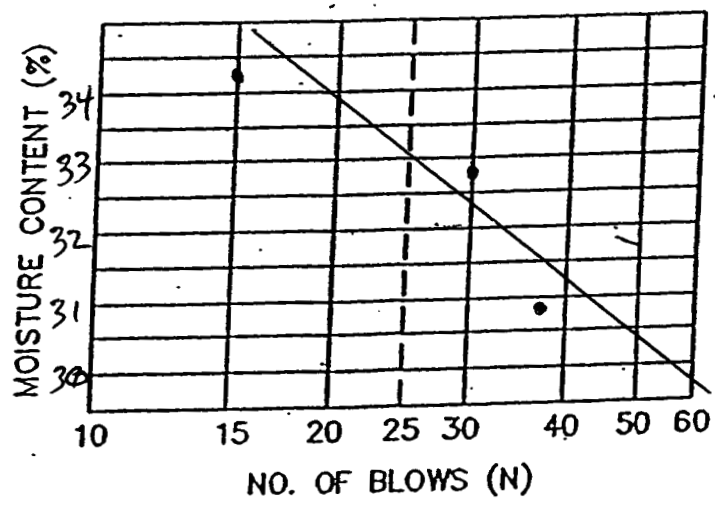
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-83

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	1.2	1.8	
A	WT. OF TARE	(grams)	28.76	28.50	28.81	
B	WT. OF WET SOIL & TARE	(grams)	39.41	38.51	41.11	
C	WT. OF DRY SOIL & TARE	(grams)	36.90	36.04	37.97	
D	WT. OF WATER = B-C	(grams)	2.51	2.47	3.14	
E	WT. OF DRY SOIL = C-A	(grams)	8.14	7.54	9.16	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.8	32.8	34.3	
N	NUMBER OF BLOWS		38	30	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.2	2.9		
A	WT. OF TARE	(grams)	27.63	31.46		
B	WT. OF WET SOIL & TARE	(grams)	39.61	43.15		
C	WT. OF DRY SOIL & TARE	(grams)	37.78	41.37		
D	WT. OF WATER = B-C	(grams)	1.83	1.78		
E	WT. OF DRY SOIL = C-A	(grams)	10.15	9.91		
F	MOISTURE CONTENT = (D/E)X100	(%)	18.0	18.0		

000185

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

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Sept month 2002 year

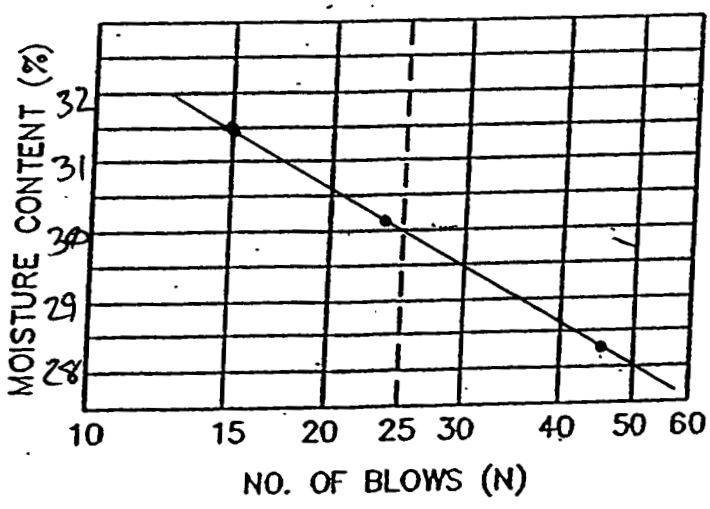
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-84

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.4	1.9	2.3	
A	WT. OF TARE	(grams)	28.52	28.56	31.20	
B	WT. OF WET SOIL & TARE	(grams)	38.17	39.03	43.01	
C	WT. OF DRY SOIL & TARE	(grams)	36.04	36.61	40.18	
D	WT. OF WATER = B-C	(grams)	2.13	2.42	2.83	
E	WT. OF DRY SOIL = C-A	(grams)	7.52	8.05	8.98	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.3	30.1	31.5	
N	NUMBER OF BLOWS		46	24	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.5	2.8		
A	WT. OF TARE	(grams)	28.42	28.45		
B	WT. OF WET SOIL & TARE	(grams)	44.51	45.27		
C	WT. OF DRY SOIL & TARE	(grams)	42.26	42.88		
D	WT. OF WATER = B-C	(grams)	2.31	2.39		
E	WT. OF DRY SOIL = C-A	(grams)	13.78	14.43		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.8	16.6		

000186

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

(ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Sept month 2002 year

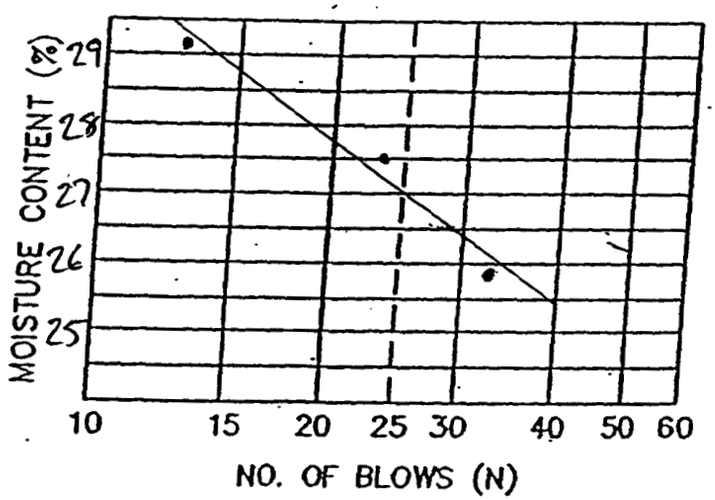
MATERIAL TYPE: Cow Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-85

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.4	2.6	2.7	
A	WT. OF TARE	(grams)	27.39	28.55	28.67	
B	WT. OF WET SOIL & TARE	(grams)	38.51	39.83	40.53	
C	WT. OF DRY SOIL & TARE	(grams)	36.22	37.40	37.86	
D	WT. OF WATER = B-C	(grams)	2.29	2.43	2.67	
E	WT. OF DRY SOIL = C-A	(grams)	8.83	8.85	9.19	
F	MOISTURE CONTENT = (D/E)X100	(%)	25.9	27.5	29.1	
N	NUMBER OF BLOWS		33	24	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		3.1	3.2		
A	WT. OF TARE	(grams)	28.38	27.82		
B	WT. OF WET SOIL & TARE	(grams)	43.23	40.78		
C	WT. OF DRY SOIL & TARE	(grams)	41.16	39.00		
D	WT. OF WATER = B-C	(grams)	2.07	1.78		
E	WT. OF DRY SOIL = C-A	(grams)	12.78	11.18		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.2	15.9		

000187

LIQUID LIMIT (LL) = 27 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 11

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Sept month 2002 year

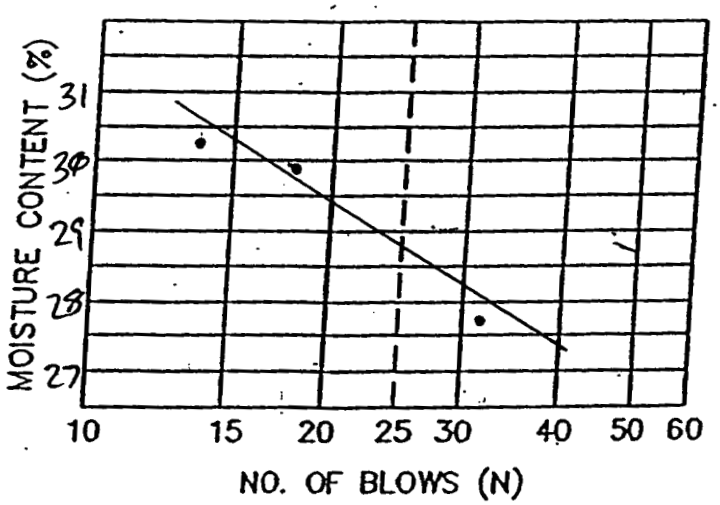
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-86

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		A203	A208	A217	
A	WT. OF TARE	(grams)	3.59	3.58	3.60	
B	WT. OF WET SOIL & TARE	(grams)	14.90	14.27	16.84	
C	WT. OF DRY SOIL & TARE	(grams)	12.45	11.81	13.95	
D	WT. OF WATER = B-C	(grams)	2.45	2.46	3.09	
E	WT. OF DRY SOIL = C-A	(grams)	8.86	8.23	10.15	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.7	29.9	30.4	
N	NUMBER OF BLOWS		32	18	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		A218	A223		
A	WT. OF TARE	(grams)	3.59	3.59		
B	WT. OF WET SOIL & TARE	(grams)	20.31	21.36		
C	WT. OF DRY SOIL & TARE	(grams)	17.89	18.82		
D	WT. OF WATER = B-C	(grams)	2.42	2.54		
E	WT. OF DRY SOIL = C-A	(grams)	14.3	15.23		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.9	16.7		

000188

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

(ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 621341 TASK NO.: 04.1

DESCRIPTION: Phase III DATE: 26 day Sept month 2002 year

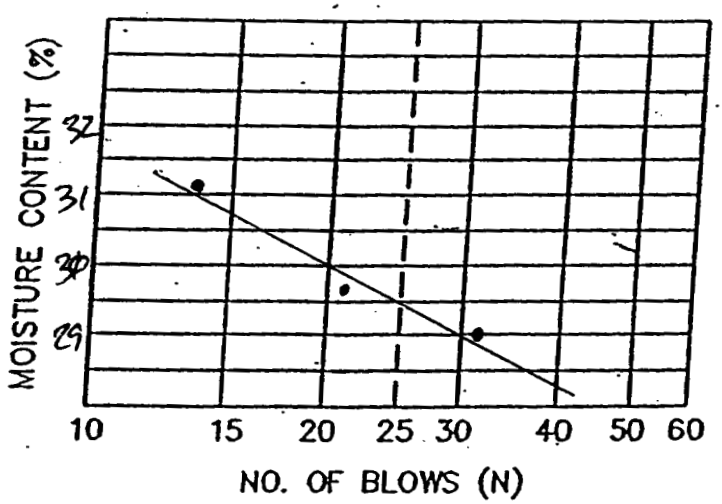
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-07

LIQUID LIMIT DETERMINATION

QA ID: LS

	TARE NO.		3.5	3.6	3.9	
A	WT. OF TARE	(grams)	21.20	21.44	21.01	
B	WT. OF WET SOIL & TARE	(grams)	30.91	32.17	31.08	
C	WT. OF DRY SOIL & TARE	(grams)	28.73	29.72	28.69	
D	WT. OF WATER = B-C	(grams)	2.18	2.45	2.39	
E	WT. OF DRY SOIL = C-A	(grams)	7.53	8.28	7.68	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.0	29.6	31.1	
N	NUMBER OF BLOWS		31	21	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: LS

	TARE NO.		4.0	4.4		
A	WT. OF TARE	(grams)	21.11	21.34		
B	WT. OF WET SOIL & TARE	(grams)	42.82	40.76		
C	WT. OF DRY SOIL & TARE	(grams)	39.63	37.92		
D	WT. OF WATER = B-C	(grams)	3.19	2.84		
E	WT. OF DRY SOIL = C-A	(grams)	18.52	16.58		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.2	17.1		

000189

LIQUID LIMIT (LL) = 29 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Sept month 2002 year

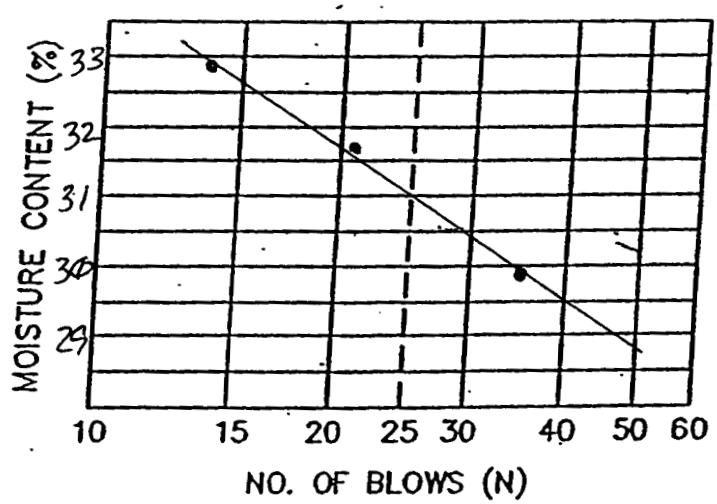
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LA02-88

LIQUID LIMIT DETERMINATION

QA ID: RS

	TARE NO.		3.7	3.8	4.1	
A	WT. OF TARE	(grams)	21.29	21.08	21.07	
B	WT. OF WET SOIL & TARE	(grams)	33.07	31.81	31.60	
C	WT. OF DRY SOIL & TARE	(grams)	30.36	29.23	29.00	
D	WT. OF WATER = B-C	(grams)	2.71	2.58	2.6	
E	WT. OF DRY SOIL = C-A	(grams)	9.07	8.15	7.93	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.9	31.7	32.8	
N	NUMBER OF BLOWS		36	21	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: RS

	TARE NO.		4.2	3.3		
A	WT. OF TARE	(grams)	21.19	21.44		
B	WT. OF WET SOIL & TARE	(grams)	40.34	38.71		
C	WT. OF DRY SOIL & TARE	(grams)	37.28	35.92		
D	WT. OF WATER = B-C	(grams)	3.06	2.74		
E	WT. OF DRY SOIL = C-A	(grams)	16.09	14.53		
F	MOISTURE CONTENT = (D/E)X100	(%)	19.0	18.9		

000190

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 19 PLASTICITY INDEX (PI) = 12

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 27 day Sept month 2002 year

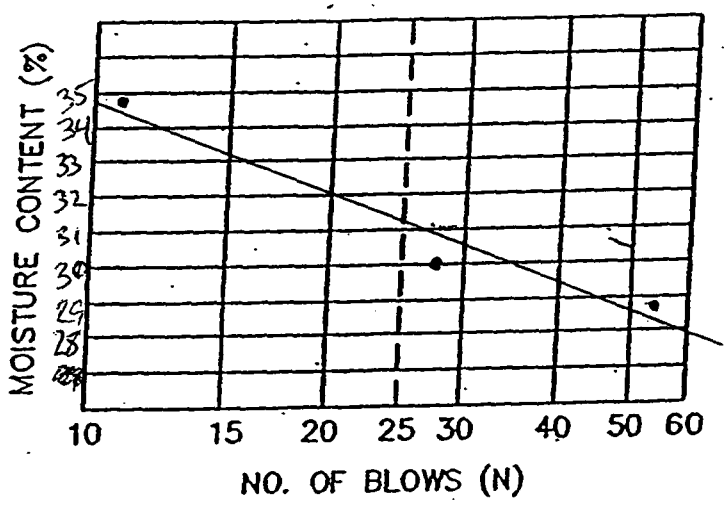
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: LP02-14 SAMPLE NO.: LP02-89

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.6	1.7	2.1	
A	WT. OF TARE	(grams)	28.81	28.49	28.24	
B	WT. OF WET SOIL & TARE	(grams)	39.54	39.54	40.35	
C	WT. OF DRY SOIL & TARE	(grams)	37.08	37.07	37.22	
D	WT. OF WATER = B−C	(grams)	2.46	2.47	3.13	
E	WT. OF DRY SOIL = C−A	(grams)	8.21	8.58	8.98	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.0	28.8	34.9	
N	NUMBER OF BLOWS		28	54	11	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.2	2.9		
A	WT. OF TARE	(grams)	27.63	31.46		
B	WT. OF WET SOIL & TARE	(grams)	46.73	50.28		
C	WT. OF DRY SOIL & TARE	(grams)	43.91	47.49		
D	WT. OF WATER = B−C	(grams)	2.82	2.79		
E	WT. OF DRY SOIL = C−A	(grams)	16.28	16.03		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.3	17.4		

000191

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 14

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

(ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G0134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 27 day Sept month 2002 year

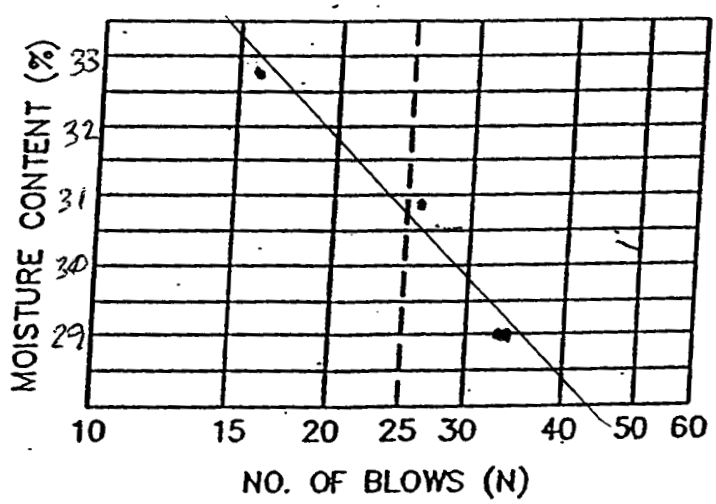
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-14 SAMPLE NO.: 4002-92

LIQUID LIMIT DETERMINATION

QA ID: 15

	TARE NO.		1.4	2.5	2.8	
A	WT. OF TARE	(grams)	28.52	28.42	28.45	
B	WT. OF WET SOIL & TARE	(grams)	39.82	38.76	40.03	
C	WT. OF DRY SOIL & TARE	(grams)	37.28	36.32	37.17	
D	WT. OF WATER = B-C	(grams)	2.54	2.44	2.86	
E	WT. OF DRY SOIL = C-A	(grams)	8.76	7.90	8.72	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.0	30.9	32.8	
N	NUMBER OF BLOWS		34	26	16	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: 15

	TARE NO.		3.1	3.2		
A	WT. OF TARE	(grams)	28.38	27.82		
B	WT. OF WET SOIL & TARE	(grams)	43.17	44.01		
C	WT. OF DRY SOIL & TARE	(grams)	40.91	41.53		
D	WT. OF WATER = B-C	(grams)	2.26	2.48		
E	WT. OF DRY SOIL = C-A	(grams)	12.53	13.71		
F	MOISTURE CONTENT = (D/E)X100	(%)	18.0	18.1		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 27 day Sept month 2002 year

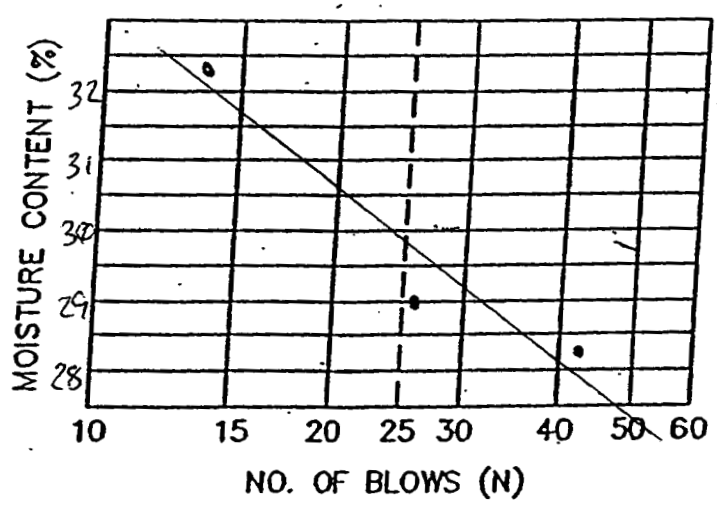
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-14 SAMPLE NO.: 6002-93

LIQUID LIMIT DETERMINATION

QA ID: TS

	TARE NO.		1.1	1.2	1.3	
A	WT. OF TARE	(grams)	28.76	28.50	28.64	
B	WT. OF WET SOIL & TARE	(grams)	42.43	39.94	41.09	
C	WT. OF DRY SOIL & TARE	(grams)	39.36	37.42	38.64	
D	WT. OF WATER = B-C	(grams)	3.07	2.52	3.05	
E	WT. OF DRY SOIL = C-A	(grams)	10.6	8.92	9.40	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.0	28.3	32.4	
N	NUMBER OF BLOWS		26	43	14	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: TS

	TARE NO.		1.5	2.7		
A	WT. OF TARE	(grams)	28.61	28.67		
B	WT. OF WET SOIL & TARE	(grams)	43.22	43.47		
C	WT. OF DRY SOIL & TARE	(grams)	41.12	41.36		
D	WT. OF WATER = B-C	(grams)	2.10	2.11		
E	WT. OF DRY SOIL = C-A	(grams)	12.51	12.69		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.8	16.6		

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 13

GEO SYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

(ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 4 day Oct month 2002 year

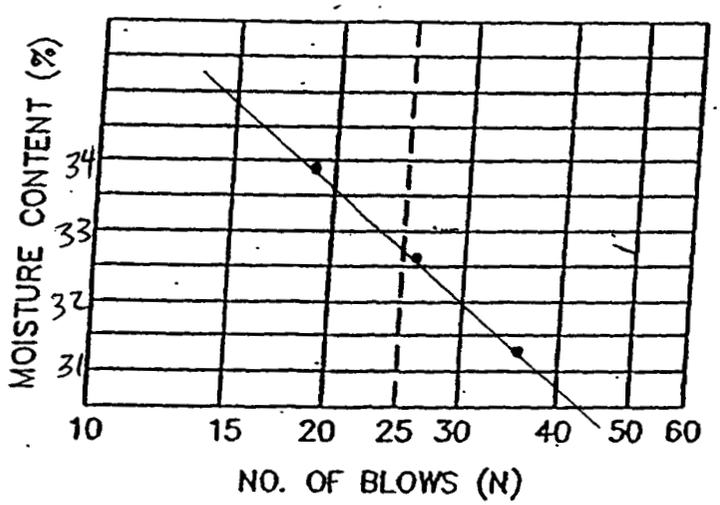
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-14 SAMPLE NO.: LP02-94

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.6	2.2	2.7	
A	WT. OF TARE	(grams)	28.87	27.63	28.67	
B	WT. OF WET SOIL & TARE	(grams)	43.85	43.07	43.21	
C	WT. OF DRY SOIL & TARE	(grams)	40.28	39.27	39.53	
D	WT. OF WATER = B–C	(grams)	3.57	3.80	3.68	
E	WT. OF DRY SOIL = C–A	(grams)	11.41	11.64	10.86	
F	MOISTURE CONTENT = (D/E)X100	(%)	31.3	32.6	33.9	
N	NUMBER OF BLOWS		36	26	19	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.9	3.1		
A	WT. OF TARE	(grams)	31.46	28.38		
B	WT. OF WET SOIL & TARE	(grams)	50.51	47.76		
C	WT. OF DRY SOIL & TARE	(grams)	47.75	44.97		
D	WT. OF WATER = B–C	(grams)	2.76	2.79		
E	WT. OF DRY SOIL = C–A	(grams)	16.29	16.59		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.9	16.8		

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 4 day Oct month 2002 year

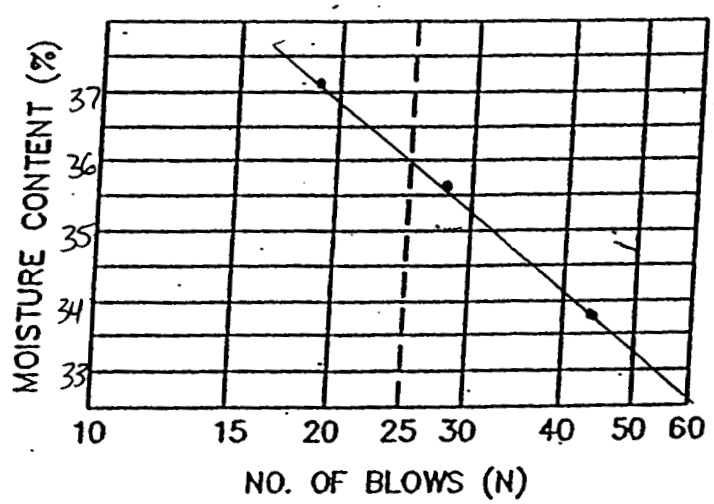
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-14 SAMPLE NO.: LP02-95

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.7	1.8	2.5	
A	WT. OF TARE	(grams)	28.49	28.81	28.42	
B	WT. OF WET SOIL & TARE	(grams)	39.73	42.21	41.03	
C	WT. OF DRY SOIL & TARE	(grams)	36.89	38.69	37.62	
D	WT. OF WATER = B-C	(grams)	2.84	3.52	3.41	
E	WT. OF DRY SOIL = C-A	(grams)	8.40	9.88	9.20	
F	MOISTURE CONTENT = (D/E)X100	(%)	33.8	35.6	37.1	
N	NUMBER OF BLOWS		44	28	19	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.8	3.2		
A	WT. OF TARE	(grams)	28.45	27.82		
B	WT. OF WET SOIL & TARE	(grams)	52.60	53.73		
C	WT. OF DRY SOIL & TARE	(grams)	48.94	49.72		
D	WT. OF WATER = B-C	(grams)	3.66	4.01		
E	WT. OF DRY SOIL = C-A	(grams)	20.49	21.90		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.9	18.3		

LIQUID LIMIT (LL) = 36 PLASTIC LIMIT (PL) = 18 PLASTICITY INDEX (PI) = 18

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: Q SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

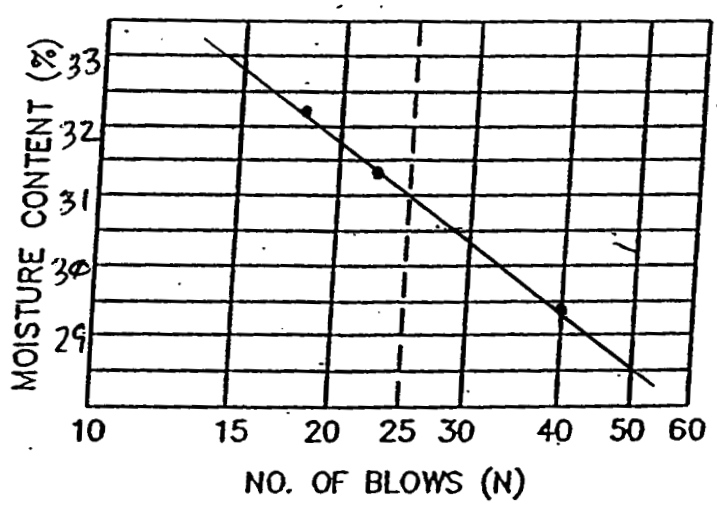
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Ø2-15 SAMPLE NO.: LPØ2-98

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	1.3	1.6	
A	WT. OF TARE	(grams)	28.76	28.64	28.87	
B	WT. OF WET SOIL & TARE	(grams)	44.47	43.Ø7	44.Ø2	
C	WT. OF DRY SOIL & TARE	(grams)	4Ø.9Ø	39.62	4Ø.33	
D	WT. OF WATER = B–C	(grams)	3.57	3.45	3.69	
E	WT. OF DRY SOIL = C–A	(grams)	12.14	1Ø.98	11.46	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.4	31.4	32.2	
N	NUMBER OF BLOWS		4Ø	23	18	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.8	2.2		
A	WT. OF TARE	(grams)	28.81	27.63		
B	WT. OF WET SOIL & TARE	(grams)	46.1Ø	45.51		
C	WT. OF DRY SOIL & TARE	(grams)	45.34	43.Ø2		
D	WT. OF WATER = B–C	(grams)	2.76	2.49		
E	WT. OF DRY SOIL = C–A	(grams)	16.53	15.39		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.7 ~~14.9~~	16.2		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = ~~16.8~~ 16 PLASTICITY INDEX (PI) = 15

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

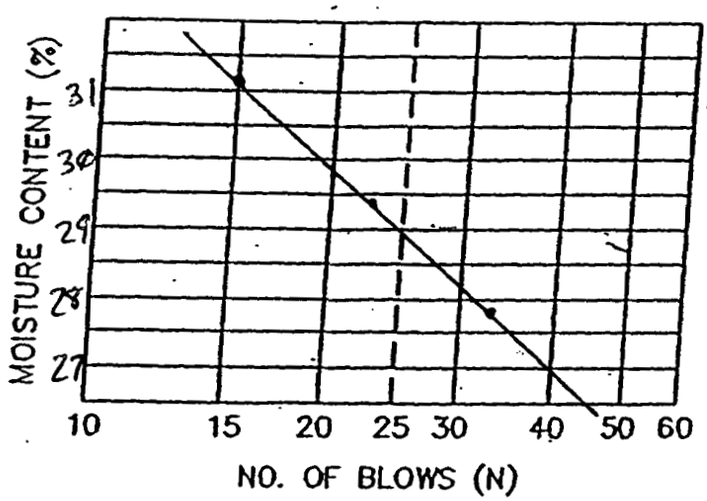
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-99

LIQUID LIMIT DETERMINATION

QA ID: 15

	TARE NO.		1.4	1.7	2.1	
A	WT. OF TARE	(grams)	28.52	28.49	28.24	
B	WT. OF WET SOIL & TARE	(grams)	47.66	43.59	44.32	
C	WT. OF DRY SOIL & TARE	(grams)	43.50	40.16	40.51	
D	WT. OF WATER = B-C	(grams)	4.16	3.43	3.81	
E	WT. OF DRY SOIL = C-A	(grams)	14.98	11.67	12.27	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.8	29.4	31.1	
N	NUMBER OF BLOWS		33	23	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: 15

	TARE NO.		2.7	3.1		
A	WT. OF TARE	(grams)	28.67	28.38		
B	WT. OF WET SOIL & TARE	(grams)	47.12	49.26		
C	WT. OF DRY SOIL & TARE	(grams)	44.56	46.36		
D	WT. OF WATER = B-C	(grams)	2.56	2.90		
E	WT. OF DRY SOIL = C-A	(grams)	15.89	17.98		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.1	16.1		

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

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 11 day Oct month 2002 year

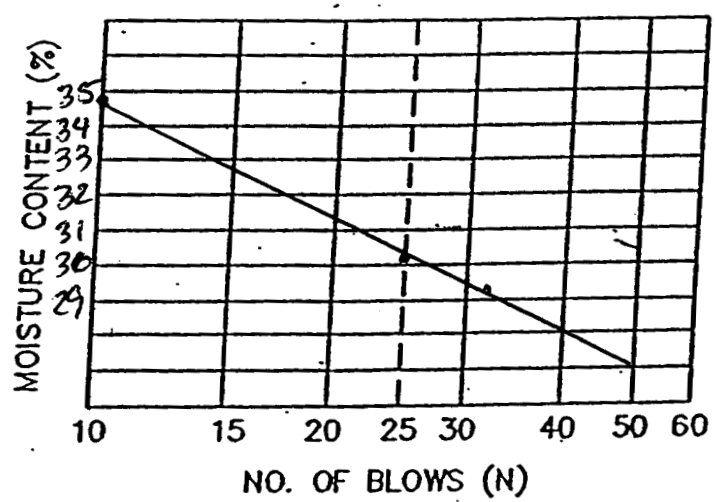
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LH02-100

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.8	2.1	2.3	
A	WT. OF TARE	(grams)	28.81	28.24	31.20	
B	WT. OF WET SOIL & TARE	(grams)	42.41	42.85	48.41	
C	WT. OF DRY SOIL & TARE	(grams)	39.26	39.54	43.96	
D	WT. OF WATER = B-C	(grams)	3.15	3.31	4.45	
E	WT. OF DRY SOIL = C-A	(grams)	10.45	11.30	12.76	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.1	29.3	34.9	
N	NUMBER OF BLOWS		25	32	10	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		2.5	2.6		
A	WT. OF TARE	(grams)	28.42	28.55		
B	WT. OF WET SOIL & TARE	(grams)	57.40	55.16		
C	WT. OF DRY SOIL & TARE	(grams)	53.26	51.36		
D	WT. OF WATER = B-C	(grams)	4.14	3.80		
E	WT. OF DRY SOIL = C-A	(grams)	24.84	22.81		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.7	16.7		

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: _____ SHEET NO. ____ OF ____

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

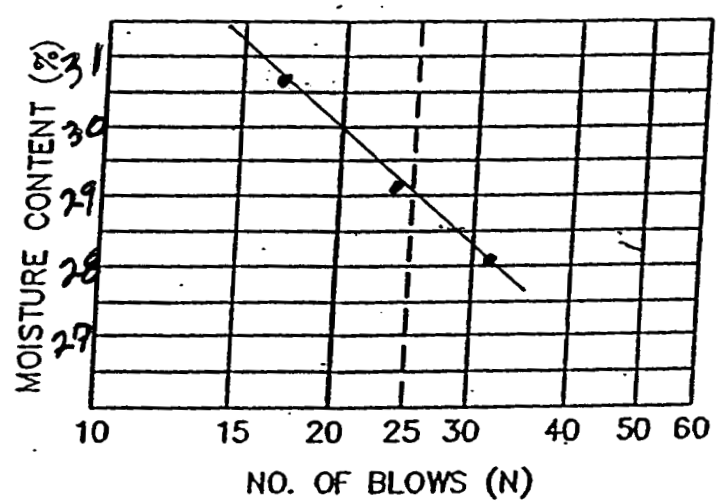
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-01

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.5	2.5	2.8	
A	WT. OF TARE	(grams)	28.61	28.42	28.45	
B	WT. OF WET SOIL & TARE	(grams)	44.57	44.20	43.09	
C	WT. OF DRY SOIL & TARE	(grams)	40.97	40.73	39.66	
D	WT. OF WATER = B-C	(grams)	3.60	3.47	3.43	
E	WT. OF DRY SOIL = C-A	(grams)	12.36	12.31	11.21	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.1	28.2	30.6	
N	NUMBER OF BLOWS		24	31	17	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DE

	TARE NO.		2.9	3.2		
A	WT. OF TARE	(grams)	31.46	27.82		
B	WT. OF WET SOIL & TARE	(grams)	52.57	49.90		
C	WT. OF DRY SOIL & TARE	(grams)	49.63	46.81		
D	WT. OF WATER = B-C	(grams)	2.94	3.09		
E	WT. OF DRY SOIL = C-A	(grams)	18.17	18.99		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.2	16.3		

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

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

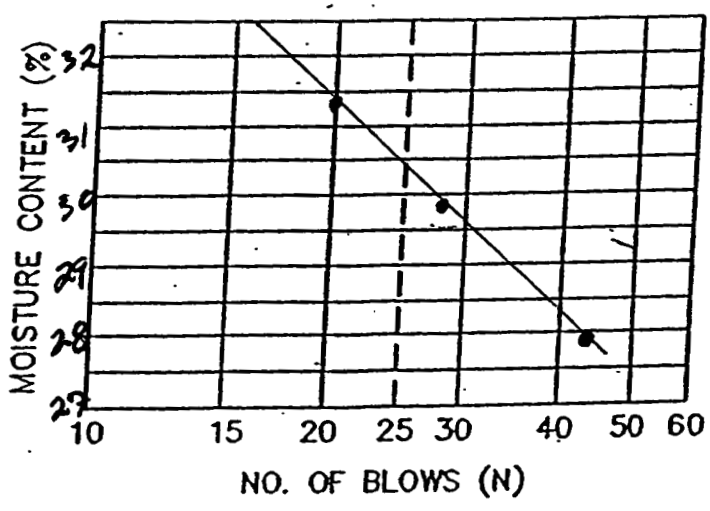
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-102

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	1.3	1.4	
A	WT. OF TARE	(grams)	28.76	28.64	28.52	
B	WT. OF WET SOIL & TARE	(grams)	45.57	45.02	44.94	
C	WT. OF DRY SOIL & TARE	(grams)	41.90	41.25	41.02	
D	WT. OF WATER = B–C	(grams)	3.67	3.77	3.92	
E	WT. OF DRY SOIL = C–A	(grams)	13.14	12.61	12.50	
F	MOISTURE CONTENT = (D/E)X100	(%)	27.9	29.9	31.4	
N	NUMBER OF BLOWS		44	27	20	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DME

	TARE NO.		1.7	1.8		
A	WT. OF TARE	(grams)	28.49	28.81		
B	WT. OF WET SOIL & TARE	(grams)	49.37	47.97		
C	WT. OF DRY SOIL & TARE	(grams)	46.29	45.16		
D	WT. OF WATER = B–C	(grams)	3.08	2.81		
E	WT. OF DRY SOIL = C–A	(grams)	17.80	16.35		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.3	17.2		

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 13

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 of

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1311 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

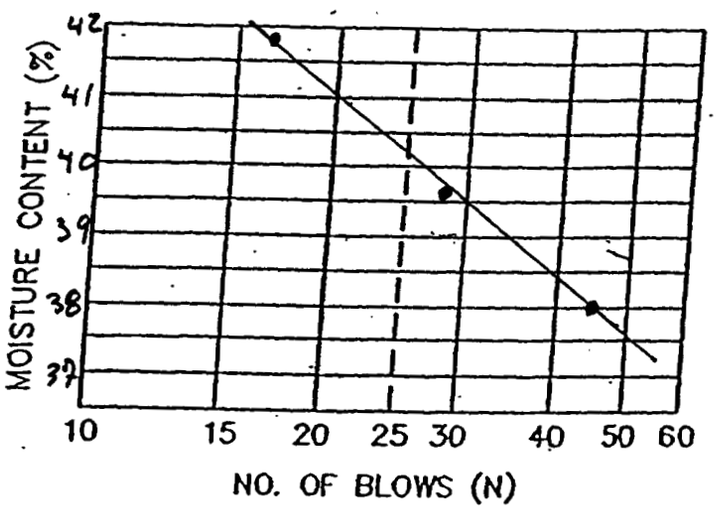
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-103

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.6	2.1	2.2	
A	WT. OF TARE	(grams)	28.87	28.24	27.63	
B	WT. OF WET SOIL & TARE	(grams)	43.13	43.04	41.63	
C	WT. OF DRY SOIL & TARE	(grams)	39.20	38.84	37.50	
D	WT. OF WATER = B–C	(grams)	3.93	4.20	4.13	
E	WT. OF DRY SOIL = C–A	(grams)	10.33	10.60	9.87	
F	MOISTURE CONTENT = (D/E)X100	(%)	38.0	39.6	41.8	
N	NUMBER OF BLOWS		45	28	17	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DKE

	TARE NO.		2.7	3.1		
A	WT. OF TARE	(grams)	28.67	28.38		
B	WT. OF WET SOIL & TARE	(grams)	49.01	48.55		
C	WT. OF DRY SOIL & TARE	(grams)	45.80	45.36		
D	WT. OF WATER = B–C	(grams)	3.21	3.19		
E	WT. OF DRY SOIL = C–A	(grams)	17.13	16.98		
F	MOISTURE CONTENT = (D/E)X100	(%)	18.7	18.8		

LIQUID LIMIT (LL) = 40 PLASTIC LIMIT (PL) = 19 PLASTICITY INDEX (PI) = 21

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

(ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: 9 day Oct month 2002 year

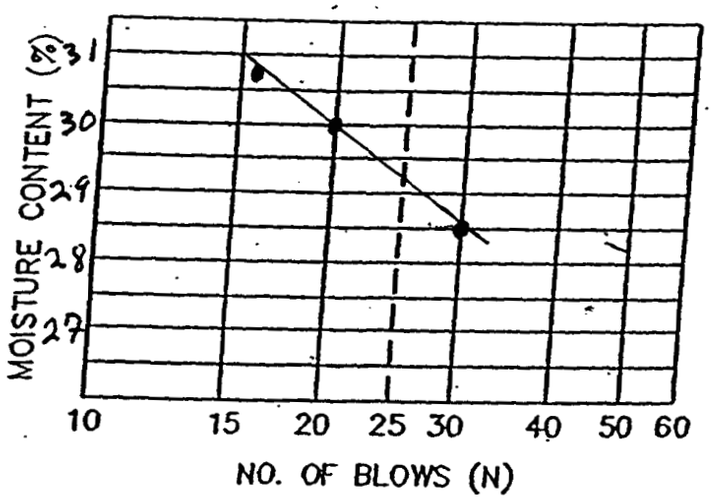
MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-16 — SAMPLE NO.: LP02-104

LIQUID LIMIT DETERMINATION

QA ID: 75

	TARE NO.		1.2	1.9	23	
A	WT. OF TARE	(grams)	28.50	28.56	31.20	
B	WT. OF WET SOIL & TARE	(grams)	43.53	45.40	46.53	
C	WT. OF DRY SOIL & TARE	(grams)	40.20	41.51	42.92	
D	WT. OF WATER = B-C	(grams)	3.33	3.89	3.61	
E	WT. OF DRY SOIL = C-A	(grams)	11.70	12.95	11.72	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.5	30.0	30.8	
N	NUMBER OF BLOWS		30	20	16	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DG

	TARE NO.		2.4	2.6		
A	WT. OF TARE	(grams)	27.39	28.55		
B	WT. OF WET SOIL & TARE	(grams)	48.08	51.01		
C	WT. OF DRY SOIL & TARE	(grams)	45.19	47.90		
D	WT. OF WATER = B-C	(grams)	2.89	3.11		
E	WT. OF DRY SOIL = C-A	(grams)	17.80	19.35		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.2	16.1		

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

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: CA SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 10 day Oct month 2002 year

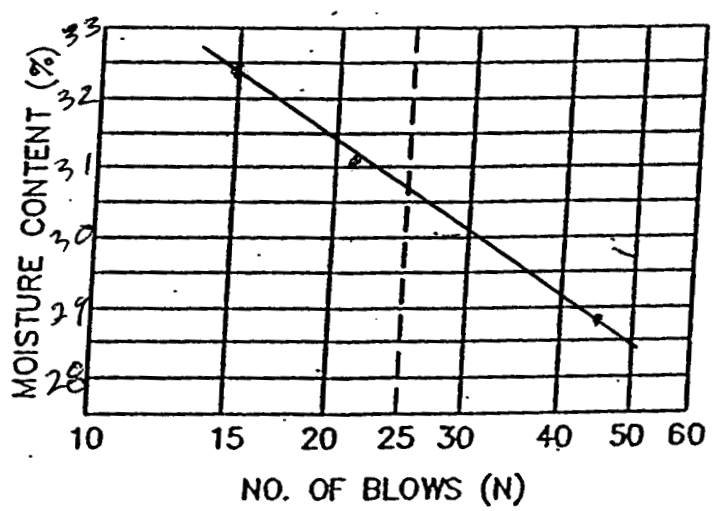
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-105

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	1.3	1.5	
A	WT. OF TARE	(grams)	28.50	28.64	28.61	
B	WT. OF WET SOIL & TARE	(grams)	45.53	42.09	44.42	
C	WT. OF DRY SOIL & TARE	(grams)	41.73	38.90	40.55	
D	WT. OF WATER = B−C	(grams)	3.80	3.19	3.87	
E	WT. OF DRY SOIL = C−A	(grams)	13.23	10.26	11.94	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.7	31.1	32.4	
N	NUMBER OF BLOWS		45	22	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS/DYE

	TARE NO.		1.6	1.7		
A	WT. OF TARE	(grams)	28.87	28.49		
B	WT. OF WET SOIL & TARE	(grams)	50.88	47.99		
C	WT. OF DRY SOIL & TARE	(grams)	47.77	45.26		
D	WT. OF WATER = B−C	(grams)	3.11	2.73		
E	WT. OF DRY SOIL = C−A	(grams)	18.9	16.77		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.5	16.3		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = ~~18~~ 16 KS PLASTICITY INDEX (PI) = ~~13~~ 15 KS

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

000203

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

ATTERBERG LIMITS TEST

(ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 15 day Oct month 2002 year

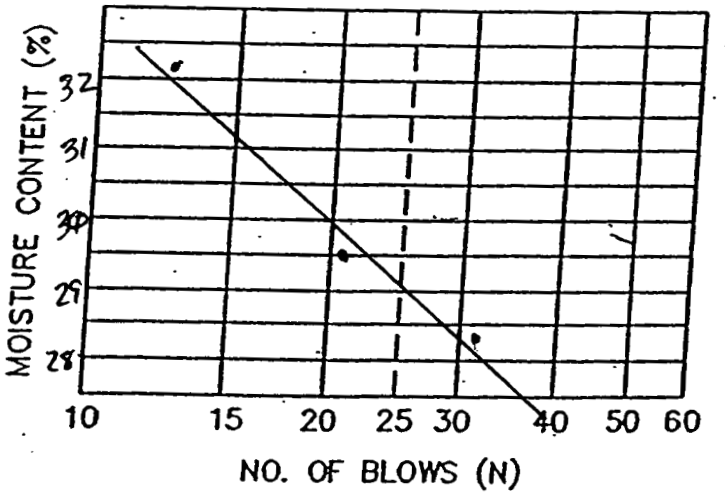
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-107

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.1	1.3	1.4	
A	WT. OF TARE	(grams)	28.76	28.64	28.52	
B	WT. OF WET SOIL & TARE	(grams)	45.09	44.35	41.85	
C	WT. OF DRY SOIL & TARE	(grams)	41.37	40.88	38.60	
D	WT. OF WATER = B–C	(grams)	3.72	3.47	3.25	
E	WT. OF DRY SOIL = C–A	(grams)	12.61	12.24	10.08	
F	MOISTURE CONTENT = (D/E)X100	(%)	29.5	28.3	322	
N	NUMBER OF BLOWS		21	32	13	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.5	1.9		
A	WT. OF TARE	(grams)	28.61	28.56		
B	WT. OF WET SOIL & TARE	(grams)	46.65	47.37		
C	WT. OF DRY SOIL & TARE	(grams)	44.13	44.72		
D	WT. OF WATER = B–C	(grams)	2.52	2.65		
E	WT. OF DRY SOIL = C–A	(grams)	15.52	16.16		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.2	16.4		

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

GEOSYNTEC CONSULTANTS FILE NO. 2-13-ALT CHECKED BY: [illegible] SHEET NO. 1 OF 1

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

5368

ATTERBERG LIMITS TEST (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO
DESCRIPTION: PHASE IV
MATERIAL TYPE: Low Permeability Clay

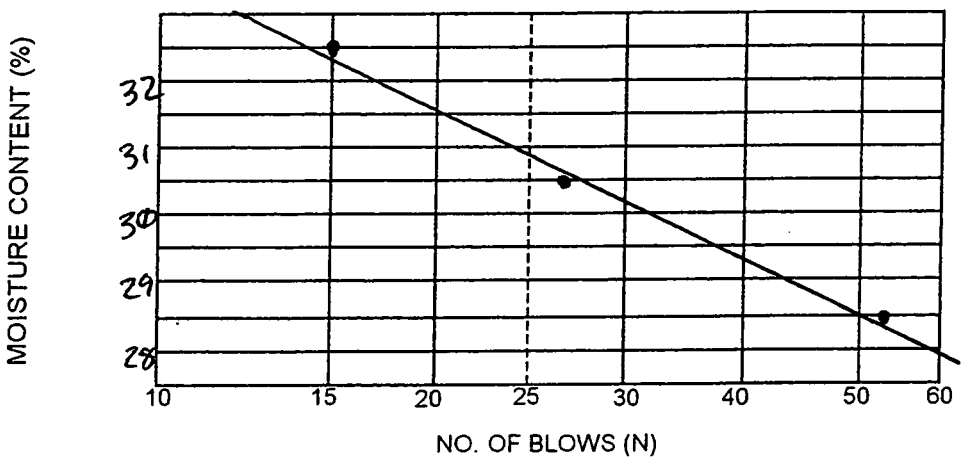
PROJECT NO: GQ 1341 TASK NO.: 04.1
DATE: 21 day Oct month 2002 year
SAMPLE NO.: LP02-109

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	1.5	1.9	
A	WT. OF TARE	(grams)	28.50	28.61	28.56	
B	WT. OF WET SOIL & TARE	(grams)	46.20	45.34	46.98	
C	WT. OF DRY SOIL & TARE	(grams)	42.27	41.43	42.46	
D	WT. Of WATER = B-C	(grams)	3.93	3.91	4.52	
E	WT. OF DRY SOIL = C-A	(grams)	13.77	12.82	13.90	
F	MOISTURE CONTENT = (D/E)x100	(%)	28.5	30.5	32.5	
N	NUMBER OF BLOWS		53	27	15	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		A-220	A-224		
A	WT. OF TARE	(grams)	3.44	3.58		
B	WT. OF WET SOIL & TARE	(grams)	25.41	25.82		
C	WT. OF DRY SOIL & TARE	(grams)	22.30	22.67		
D	WT. Of WATER = B-C	(grams)	3.11	3.15		
E	WT. OF DRY SOIL = C-A	(grams)	18.86	19.09		
F	MOISTURE CONTENT = (D/E)x100	(%)	16.5	16.5		

LIQUID LIMIT (LL) = 31 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 14

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000205

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

ATTERBERG LIMITS TEST (ASTM D 4318)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO
DESCRIPTION: PHASE IV
MATERIAL TYPE: Low Perm Clay

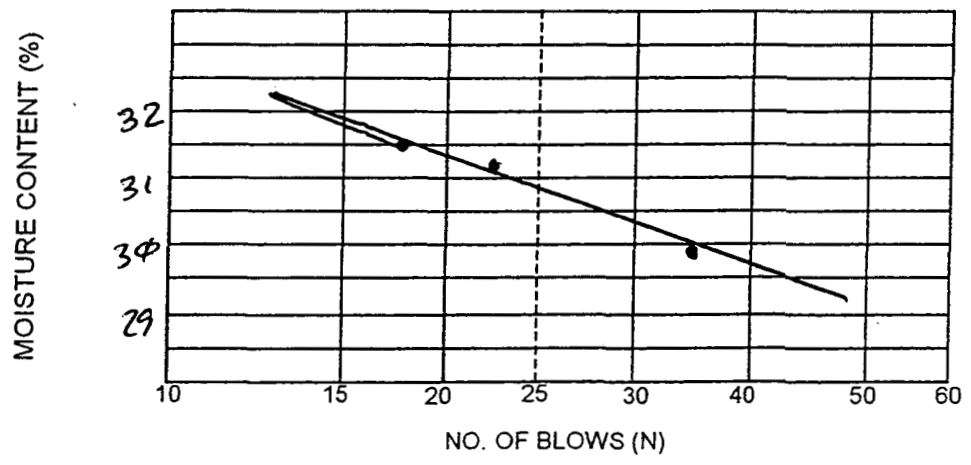
PROJECT NO: GQ1341 TASK NO.: Φ4.1
DATE: 22 day OCT month 2000 year
SAMPLE NO.: LPΦ2-11Φ

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.2	1.8	2.5	
A	WT. OF TARE	(grams)	28.5Φ	28.81	28.24	
B	WT. OF WET SOIL & TARE	(grams)	46.68	54.11	45.67	
C	WT. OF DRY SOIL & TARE	(grams)	42.32	48.28	41.53	
D	WT. Of WATER = B-C	(grams)	4.36	5.83	4.14	
E	WT. OF DRY SOIL = C-A	(grams)	13.82	19.47	13.29	
F	MOISTURE CONTENT = (D/E)x100	(%)	31.5	29.9	31.2	
N	NUMBER OF BLOWS		18	35	23	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		A-21Φ	A-2Φ2		
A	WT. OF TARE	(grams)	3.54	3.58		
B	WT. OF WET SOIL & TARE	(grams)	19.97	18.83		
C	WT. OF DRY SOIL & TARE	(grams)	17.67	16.70		
D	WT. Of WATER = B-C	(grams)	2.3Φ	2.13		
E	WT. OF DRY SOIL = C-A	(grams)	14.13	13.12		
F	MOISTURE CONTENT = (D/E)x100	(%)	16.3	16.2		

LIQUID LIMIT (LL) = 81 PLASTIC LIMIT (PL) = 16 PLASTICITY INDEX (PI) = 15

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

ATTERBERG LIMITS TEST

(ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 28 day Oct month 2002 year

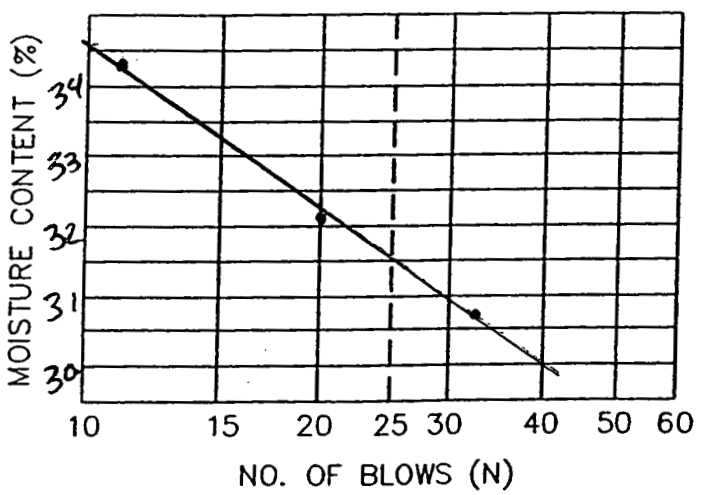
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-17 SAMPLE NO.: LP02-113

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.3	1.4	2.3	
A	WT. OF TARE	(grams)	28.64	28.52	31.20	
B	WT. OF WET SOIL & TARE	(grams)	45.28	48.74	51.05	
C	WT. OF DRY SOIL & TARE	(grams)	41.37	43.83	45.98	
D	WT. OF WATER = B-C	(grams)	3.91	4.91	5.07	
E	WT. OF DRY SOIL = C-A	(grams)	12.73	15.31	14.78	
F	MOISTURE CONTENT = (D/E)X100	(%)	30.7	32.1	34.3	
N	NUMBER OF BLOWS		32	20	12	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		A214	A218		
A	WT. OF TARE	(grams)	3.53	3.58		
B	WT. OF WET SOIL & TARE	(grams)	22.33	20.46		
C	WT. OF DRY SOIL & TARE	(grams)	19.70	18.13		
D	WT. OF WATER = B-C	(grams)	2.63	2.33		
E	WT. OF DRY SOIL = C-A	(grams)	16.17	14.55		
F	MOISTURE CONTENT = (D/E)X100	(%)	16.3	16.0		

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

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

ATTERBERG LIMITS TEST

5368 (ASTM D 4318)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 1 day Nov month 2002 year

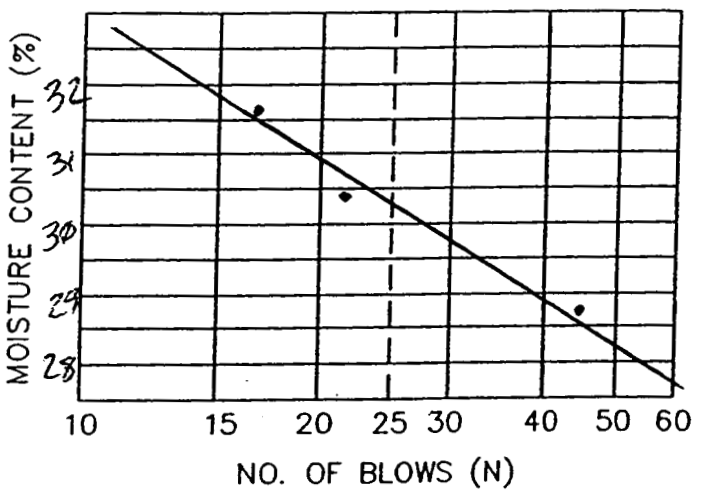
MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-17 SAMPLE NO.: LP02-114

LIQUID LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.5	1.6	1.7	
A	WT. OF TARE	(grams)	28.61	28.87	28.49	
B	WT. OF WET SOIL & TARE	(grams)	50.44	54.26	50.46	
C	WT. OF DRY SOIL & TARE	(grams)	45.57	48.17	45.34	
D	WT. OF WATER = B-C	(grams)	4.87	6.09	5.12	
E	WT. OF DRY SOIL = C-A	(grams)	16.96	19.30	16.85	
F	MOISTURE CONTENT = (D/E)X100	(%)	28.7	31.6	30.4	
N	NUMBER OF BLOWS		45	17	21	

DRYING TARE NO.



CURING TARE NO.

PLASTIC LIMIT DETERMINATION

QA ID: KS

	TARE NO.		1.9	3.1		
A	WT. OF TARE	(grams)	28.56	28.38		
B	WT. OF WET SOIL & TARE	(grams)	50.35	47.42		
C	WT. OF DRY SOIL & TARE	(grams)	47.14	44.60		
D	WT. OF WATER = B-C	(grams)	3.21	2.82		
E	WT. OF DRY SOIL = C-A	(grams)	18.58	16.22		
F	MOISTURE CONTENT = (D/E)X100	(%)	17.3	17.4		

LIQUID LIMIT (LL) = 30 PLASTIC LIMIT (PL) = 17 PLASTICITY INDEX (PI) = 13

SIEVE ANALYSES

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 25 day June month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-1

359528 - Total cylinder wts

SOIL SAMPLE SIZE	+3/8 = 1443.7gm	MOISTURE = 372.8	TOTAL = 39054.7
	-3/8 = 35952.8 + 577.6 + 702.9		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-9	L-44	L-9	L-44
WT. OF DRY SAMPLE PLUS TARE (grams)	1637.3	894.83	1572.3	322.35
WT. OF TARE (grams)	193.6	191.93	193.6	191.93
WT. OF DRY SAMPLE (grams)	1443.7	702.9	1378.7	130.42 702.9

SIEVE ANALYSIS QA ID: PJE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	281.9 ~~281.9~~ DJE	.7	99.3		
1 in	25.4	514.1	1.3	98.7		
3/4 in	19.1	681.8	1.7	98.3		90-100
1/2 in	12.7	1118.6	2.9	97.1		
3/8 in	9.53	1378.6	3.5	96.5		
No. 4	4.75	15.0	2.1	97.9	94.5	
No. 10	2.00	35.7	5.1	94.9	91.6	
No. 20	0.850	53.7	7.6	92.4	89.2	
No. 40	0.425	70.4	10.0	90.0	86.9	
No. 60	0.250	85.5	12.2	87.8	84.7	
No. 100	0.125	105.5	15.0	85.0	82.0	
No. 200	0.075	129.7	18.5	81.5	78.6	50-100
PAN	—	130.4	—	—	—	

COMMENTS:

000210

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CA SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

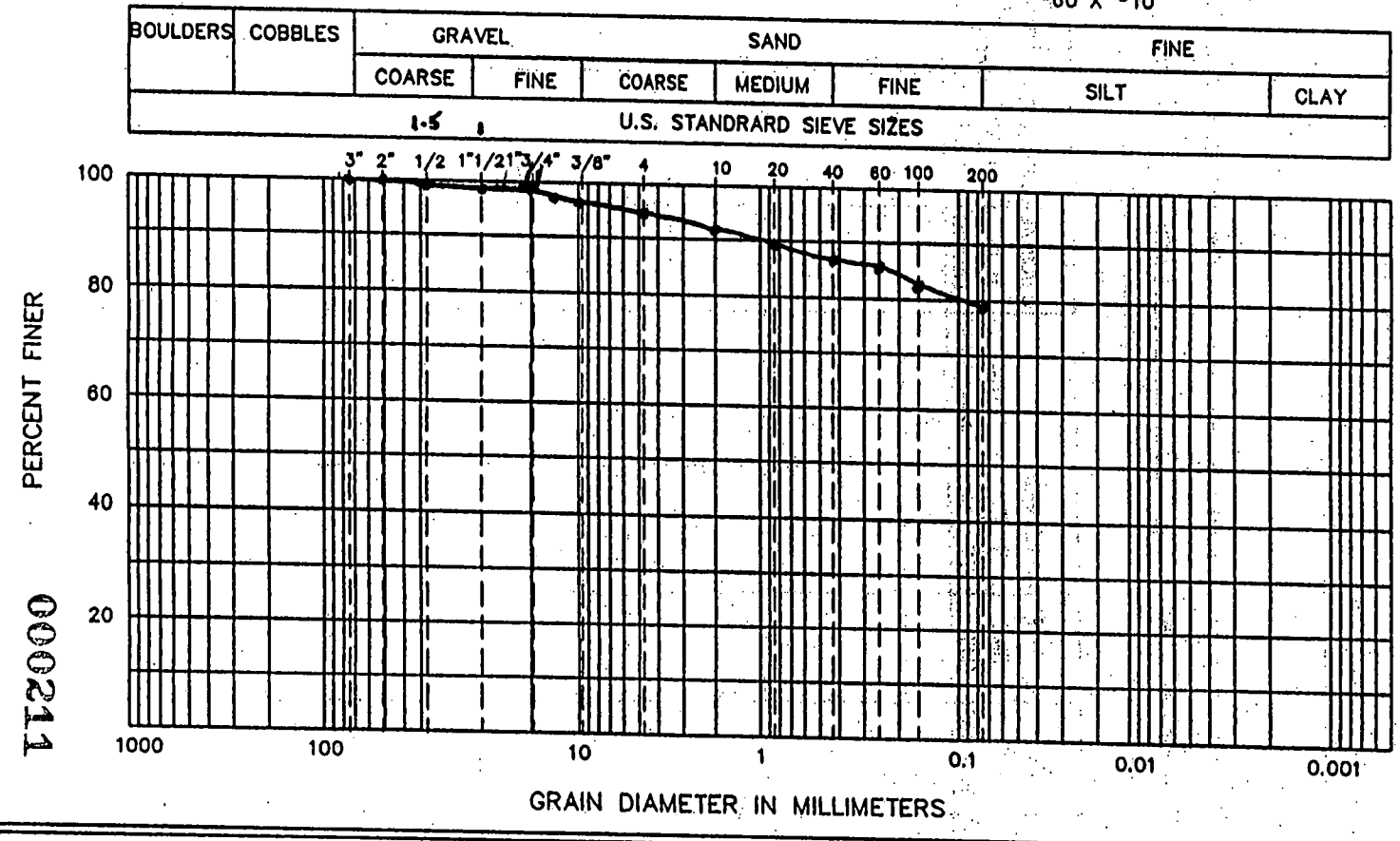
MATERIAL TYPE: Low Perm. Clay

PROJECT NO.: GR1341 TASK NO.: 04.1

DATE: 19 day July month 2002 year

SAMPLE NO.: LP02-1 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 34

(PL) 17

(PI) 17

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.	~~98.1~~ 97.1
3/8-in.	96.5
NO. 4	94.5
NO. 10	91.6
NO. 20.	89.2
NO. 40	86.9
NO. 60	84.7
NO. 100	82.0
NO. 200	78.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	73.0
0.02	60.0
0.005	38.0
0.002	29.0

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. OF

000211

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 1
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.36
Dry Soil & Tare (gm)	49.60
Tare Weight (gm)	3.21
Moisture Content (%)	1.64

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	817.30	
Tare Weight (gm)	235.84	
Total Weight (gm)	572.09	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	53.80
Calculated Dry Wt. used in test (gm)	52.93
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	0.74	0.74	93.2	#10	medium sand
#20	2.14	2.14	90.7	#20	medium sand
#40	3.69	3.69	87.9	#40	fine sand
#60	5.43	5.43	84.8	#60	fine sand
#100	7.42	7.42	81.3	#100	fine sand
#200	9.91	9.91	76.8	#200	fines

HYDROMETER CALCULATIONS

DATE 7/3/02	TIME 9:05	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/3/02	9:07	2.00	46.0	22.50	0.013	7.00	39.00	9.9	0.99
7/3/02	9:10	5.00	41.0	22.50	0.013	7.00	34.00	10.7	0.99
7/3/02	9:20	15.00	36.0	22.50	0.013	7.00	29.00	11.5	0.99
7/3/02	9:35	30.00	32.0	22.50	0.013	7.00	25.00	12.2	0.99
7/3/02	10:05	60.00	29.0	22.50	0.013	7.00	22.00	12.7	0.99
7/3/02	13:15	250.00	25.0	22.50	0.013	7.00	18.00	13.3	0.99
7/4/02	9:05	1440.00	22.0	22.50	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0291	68.9		
0.0192	60.1	% GRAVEL	5.50
0.0115	51.3	% COARSE SAND	1.32
0.0084	44.2	% MEDIUM SAND	5.27
0.0060	38.9	% FINE SAND	11.10
0.0030	31.8	% FINES	76.81
0.0013	26.5	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some medium to fine sand, little gravel.

USCS (CL)

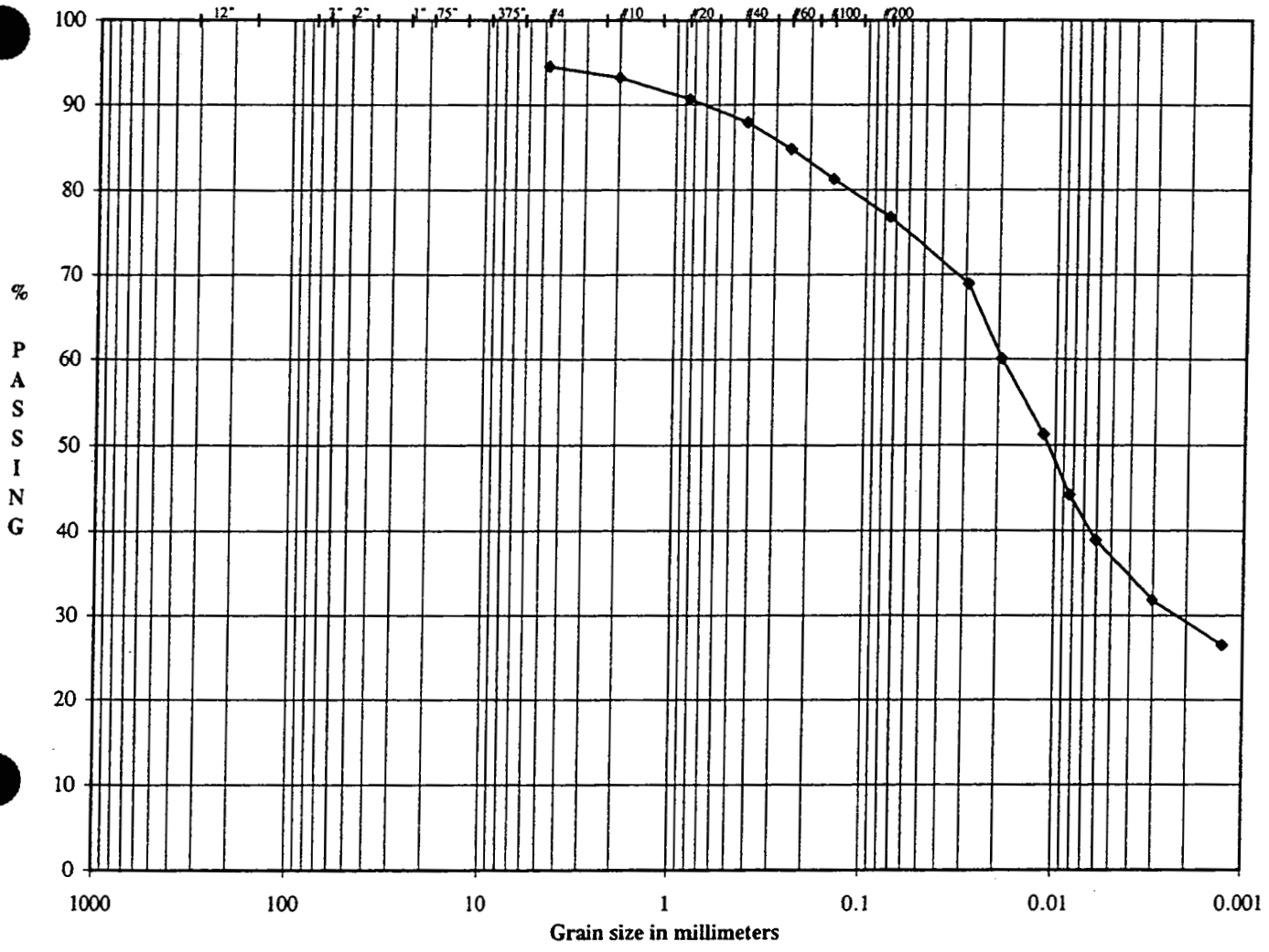
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/2/02
CHECK	
REVIEW	

000212

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	Gravel		SAND			FINES

SAMPLE ID	LP02 - 1
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some medium to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/2/02
CHECK	
REVIEW	

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 041

DESCRIPTION: PHASE III — DATE: 26 day June month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-2

SOIL SAMPLE SIZE: +3/8 = 491.8 | MOISTURE = 303.6 gm | -3/8 = 6243 + 5700 + 19876.75 | TOTAL = 21866.5 gm

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		K	L-44	K	L-44
WT. OF DRY SAMPLE PLUS TARE	(grams)	593.3	816.2	567.1	313.40
WT. OF TARE	(grams)	101.5	191.9	101.5	191.9
WT. OF DRY SAMPLE	(grams)	491.8	624.3	465.6	121.5

SIEVE ANALYSIS — QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	Ø		
2 in	50.8	Ø	Ø	Ø		100
1 1/2in	38.1	Ø	Ø	Ø		
1 in	25.4	149.7	.7	99.3		
3/4 in	19.1	219.2	1.0	99.0		90-100
1/2 in	12.7	381.2	1.7	98.3		
3/8 in	9.53	465.6	2.1	97.9		
No. 4	4.75	13.3	2.1	97.9	95.8	
No. 10	2.00	29.9	4.8	95.2	93.2	
No. 20	0.850	46.6	7.5	92.5	90.6	
No. 40	0.425	62.8	10.1	89.9	88.0	
No. 60	0.250	77.7	12.4	87.6	85.8	
No. 100	0.125	97.9	15.7	84.3	82.5	
No. 200	0.075	121.3	19.4	80.6	78.9	50-100
PAN	—	121.5	—	—		

COMMENTS:

000214

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: _____ — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

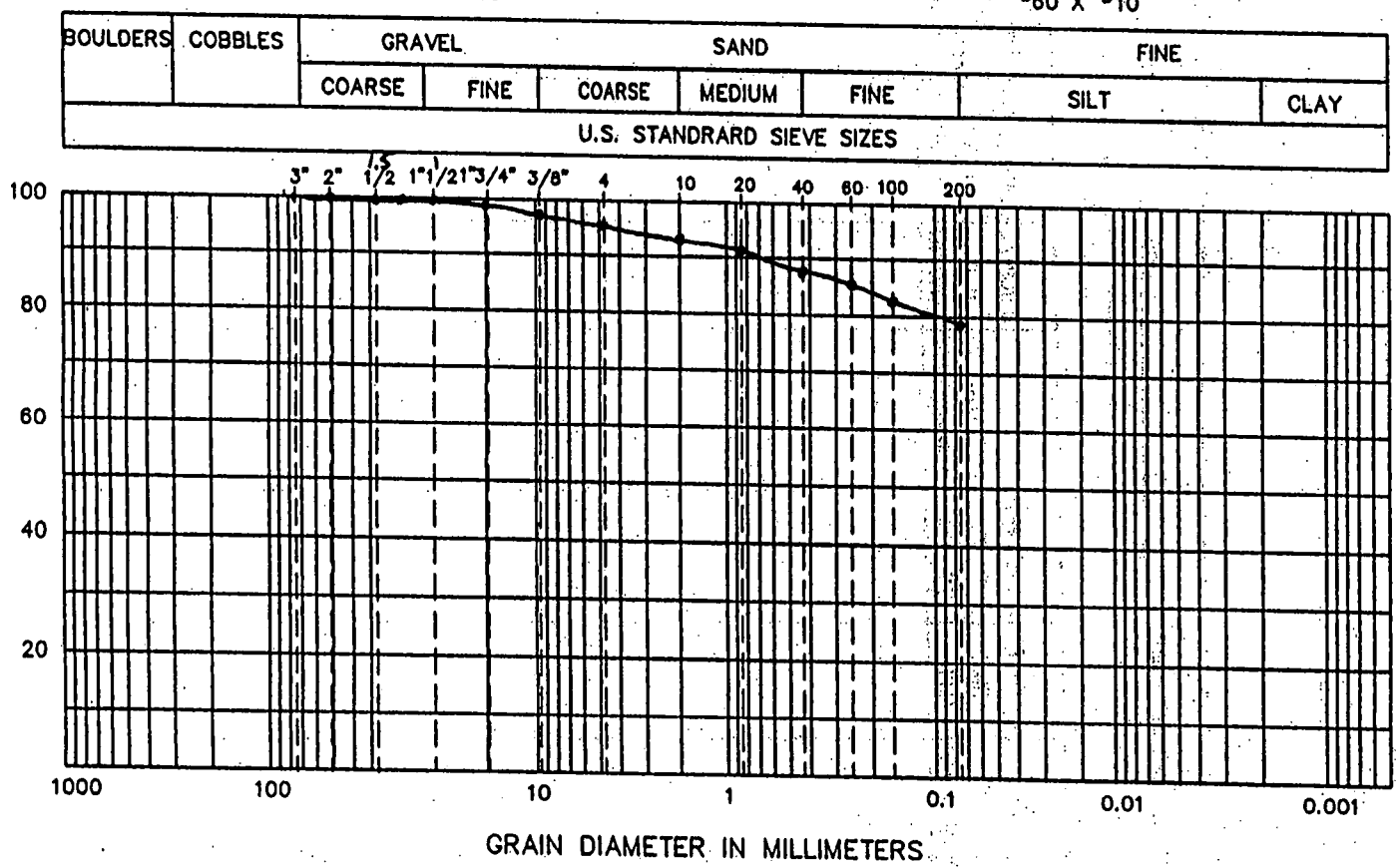
MATERIAL TYPE: Low Perm. Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 19 day July month 2002 year

SAMPLE NO.: 4P02-2 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 36

(PL) 18

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.3
3/4-in.	99.0
1/2-in.	98.3
3/8-in.	97.9
NO. 4	95.8
NO. 10	93.2
NO. 20.	90.6
NO. 40	88.0
NO. 60	85.8
NO. 100	82.5
NO. 200	78.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	75.0
0.02	69.0
0.005	40.0
0.002	32.0

SOIL CLASSIFICATION (ASTM D 2487): CL

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

SHEET NO. OF

000215

5968

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 2
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.41
Dry Soil & Tare (gm)	50.00
Tare Weight (gm)	3.21
Moisture Content (%)	0.88

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	798.65	
Tare Weight (gm)	233.78	
Total Weight (gm)	559.96	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			95.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	53.62
Calculated Dry Wt. used in test (gm)	53.15
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	95.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.48	1.48	93.1	#10	medium sand
#20	3.07	3.07	90.3	#20	medium sand
#40	4.56	4.56	87.6	#40	fine sand
#60	6.07	6.07	84.9	#60	fine sand
#100	7.85	7.85	81.7	#100	fine sand
#200	10.08	10.08	77.6	#200	fines

HYDROMETER CALCULATIONS

DATE 7/3/02	TIME 9:07	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/3/02	9:09	2.00	48.0	22.50	0.013	7.00	41.00	9.6	0.99
7/3/02	9:12	5.00	45.0	22.50	0.013	7.00	38.00	10.1	0.99
7/3/02	9:22	15.00	37.0	22.50	0.013	7.00	30.00	11.4	0.99
7/3/02	9:37	30.00	33.0	22.50	0.013	7.00	26.00	12.0	0.99
7/3/02	10:07	60.00	30.0	22.50	0.013	7.00	23.00	12.5	0.99
7/3/02	13:17	250.00	26.0	22.50	0.013	7.00	19.00	13.2	0.99
7/4/02	9:07	1440.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0287	73.2		
0.0186	67.8	% GRAVEL	4.20
0.0114	53.5	% COARSE SAND	2.67
0.0083	46.4	% MEDIUM SAND	5.55
0.0060	41.0	% FINE SAND	9.95
0.0030	33.9	% FINES	77.63
0.0013	28.5	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

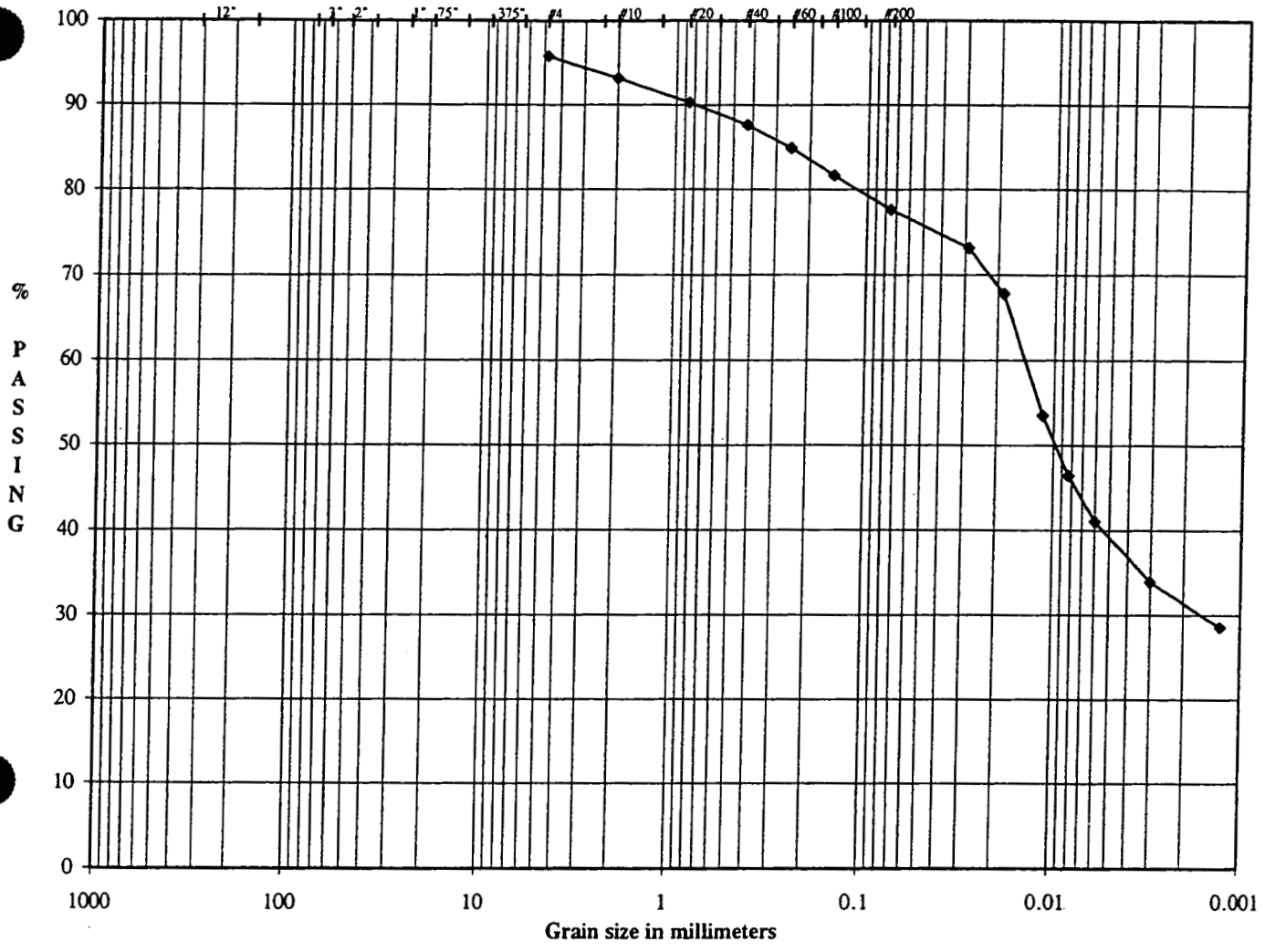
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/2/02
CHECK	
REVIEW	

000216

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 2
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/2/02
CHECK	
REVIEW	

000217

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 — TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 29 day June month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-3

SOIL SAMPLE SIZE	+3/8 = 1617.4	MOISTURE = 323.0	TOTAL = 41658.1
	-3/8 = 571.9 + 6266 + 38519.7		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		K	L-44	K	L-44
WT. OF DRY SAMPLE PLUS TARE	(grams)	1718.9	817.9	1644.4	335.4
WT. OF TARE	(grams)	101.5	191.8	101.5	191.8
WT. OF DRY SAMPLE	(grams)	1617.4	626.1	1542.9	143.6

SIEVE ANALYSIS — QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		100
2 in	50.8	0	0	100		100
1 1/2in	38.1	316.6	0.8	99.2		
1 in	25.4	524.0	1.3	98.7		
3/4 in	19.1	875.4	2.1	97.9		90-100
1/2 in	12.7	1359.4	3.3	96.7		
3/8 in	9.53	1542.7	3.7	96.3		
No. 4	4.75	10.4	1.7	98.3	99.7	
No. 10	2.00	34.1	5.4	94.6	91.1	
No. 20	0.850	56.9	9.1	90.9	89.5	
No. 40	0.425	77.5	12.4	87.6	84.4	
No. 60	0.250	95.1	15.2	84.8	81.7	
No. 100	0.125	117.3	18.7	81.3	78.3	
No. 200	0.075	142.7	22.8	77.2	74.3	50-100
PAN	—	143.6	—	—		

COMMENTS:

000218

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: _____

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

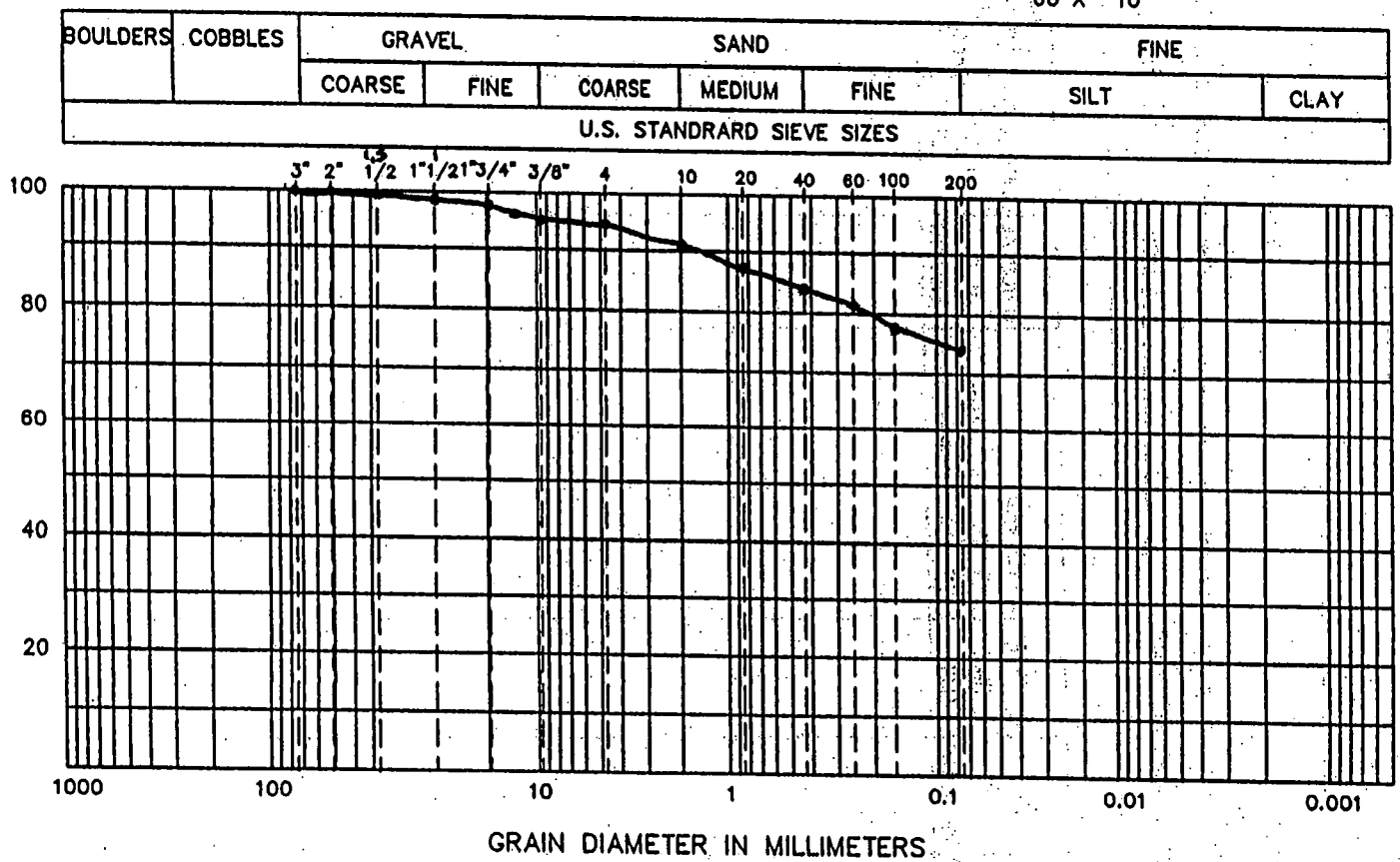
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-3 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 33

(PL) 17

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.2
1-In.	98.7
3/4-In.	97.9
1/2-In.	96.7
3/8-In.	96.3
NO. 4	94.7
NO. 10	91.1
NO. 20.	87.5
NO. 40	84.4
NO. 60	81.7
NO. 100	78.3
NO. 200	74.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	72
0.002	59
0.0005	38
0.0002	30

SOIL CLASSIFICATION (ASTM D 2487): CL

0002219

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

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 3
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.36
Dry Soil & Tare (gm)	49.55
Tare Weight (gm)	3.24
Moisture Content (%)	1.75

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	806.05	
Tare Weight (gm)	234.47	
Total Weight (gm)	561.75	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	53.21
Calculated Dry Wt. used in test (gm)	52.30
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.48	1.48	92.0	#10	medium sand
#20	3.08	3.08	89.1	#20	medium sand
#40	4.56	4.56	86.4	#40	fine sand
#60	6.10	6.10	83.7	#60	fine sand
#100	7.89	7.89	80.4	#100	fine sand
#200	10.08	10.08	76.4	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/3/02	9:09								
7/3/02	9:11	2.00	45.0	22.50	0.013	7.00	38.00	10.1	0.99
7/3/02	9:14	5.00	40.0	22.50	0.013	7.00	33.00	10.9	0.99
7/3/02	9:24	15.00	34.5	22.50	0.013	7.00	27.50	11.9	0.99
7/3/02	9:39	30.00	31.0	22.50	0.013	7.00	24.00	12.4	0.99
7/3/02	10:09	60.00	29.0	22.50	0.013	7.00	22.00	12.7	0.99
7/3/02	13:19	250.00	25.0	22.50	0.013	7.00	18.00	13.3	0.99
7/4/02	9:09	1440.00	22.0	22.50	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0294	68.1
0.0193	59.2
0.0117	49.3
0.0084	43.0
0.0060	39.4
0.0030	32.3
0.0013	26.9

% GRAVEL	5.30
% COARSE SAND	2.68
% MEDIUM SAND	5.58
% FINE SAND	10.00
% FINES	76.45
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

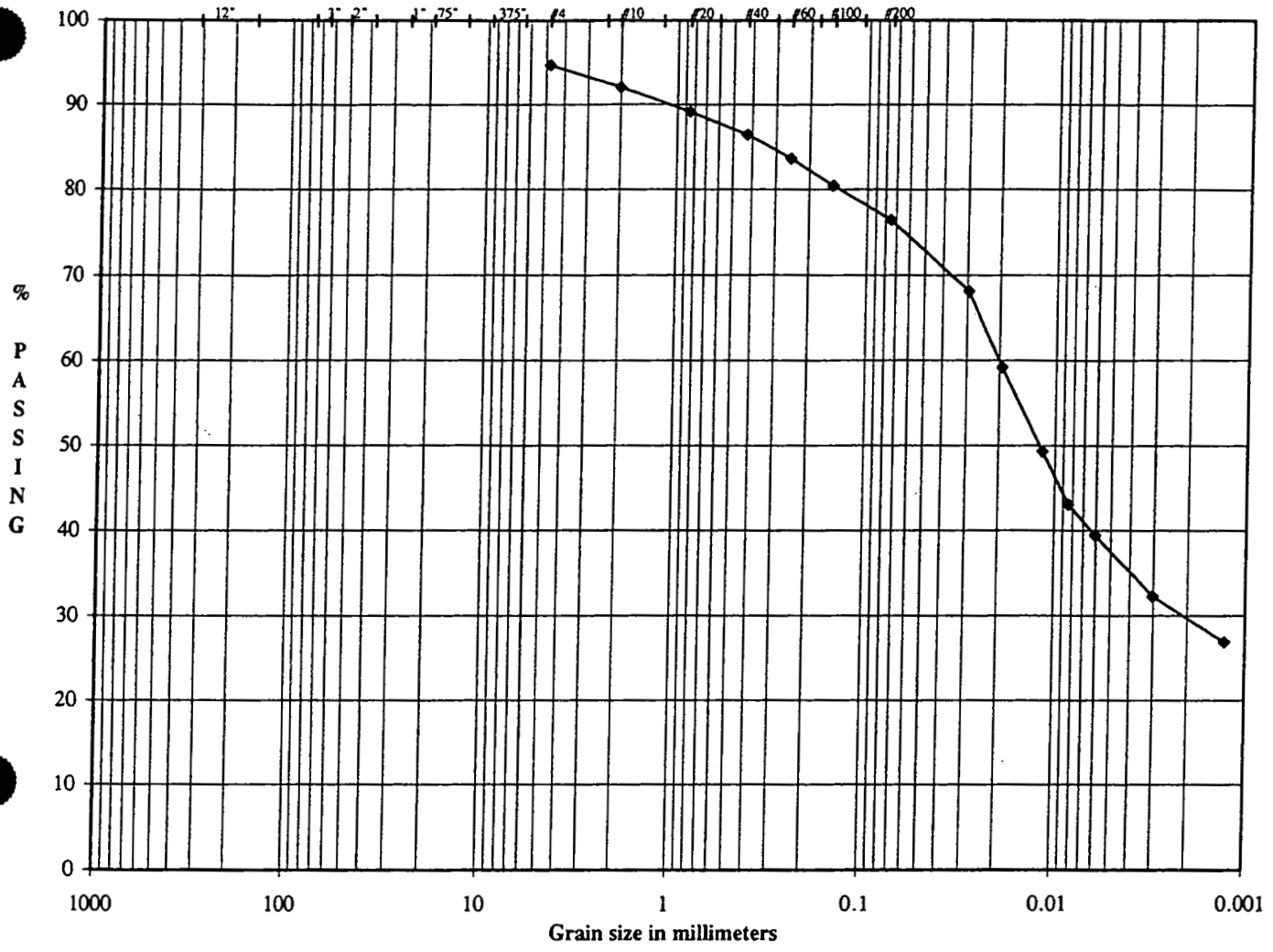
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/2/02
CHECK	
REVIEW	AJM

000220

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 3
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/2/02
CHECK	
REVIEW	

000221

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 01 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-4

SOIL SAMPLE SIZE	+3/8 = 271.1	MOISTURE = 270.8	TOTAL = 23507.7
	-3/8 = 22965.77		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		LL.4	L-9	L-9	L-9
WT. OF DRY SAMPLE PLUS TARE	(grams)	377.9	863.5	455.6	325.9
WT. OF TARE	(grams)	106.8	193.4	193.4	193.4
WT. OF DRY SAMPLE	(grams)	271.1	670.1	262.2	159.5

SIEVE ANALYSIS QA ID: AE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	24.7	0.1	99.9		
3/4 in	19.1	66.5	0.3	~~99.9~~ 99.7		90-100
1/2 in	12.7	201.0	0.9	99.1		
3/8 in	9.53	262.1	1.1	98.9		
No. 4	4.75	15.1	2.3	97.7	96.6	
No. 10	2.00	34.4	5.1	94.9	93.9	
No. 20	0.850	54.6	8.1	91.9	90.9	
No. 40	0.425	77.7	11.6	88.4	87.4	
No. 60	0.250	99.4	14.8	85.2	84.3	
No. 100	0.125	125.5	18.7	81.3	80.4	
No. 200	0.075	155.9	23.3	76.7	75.8	50-100
PAN	—		—	—		

COMMENTS:

000222

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CA SHEET NO. ____ OF ____

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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.: 6Q1341 TASK NO.: 04.1

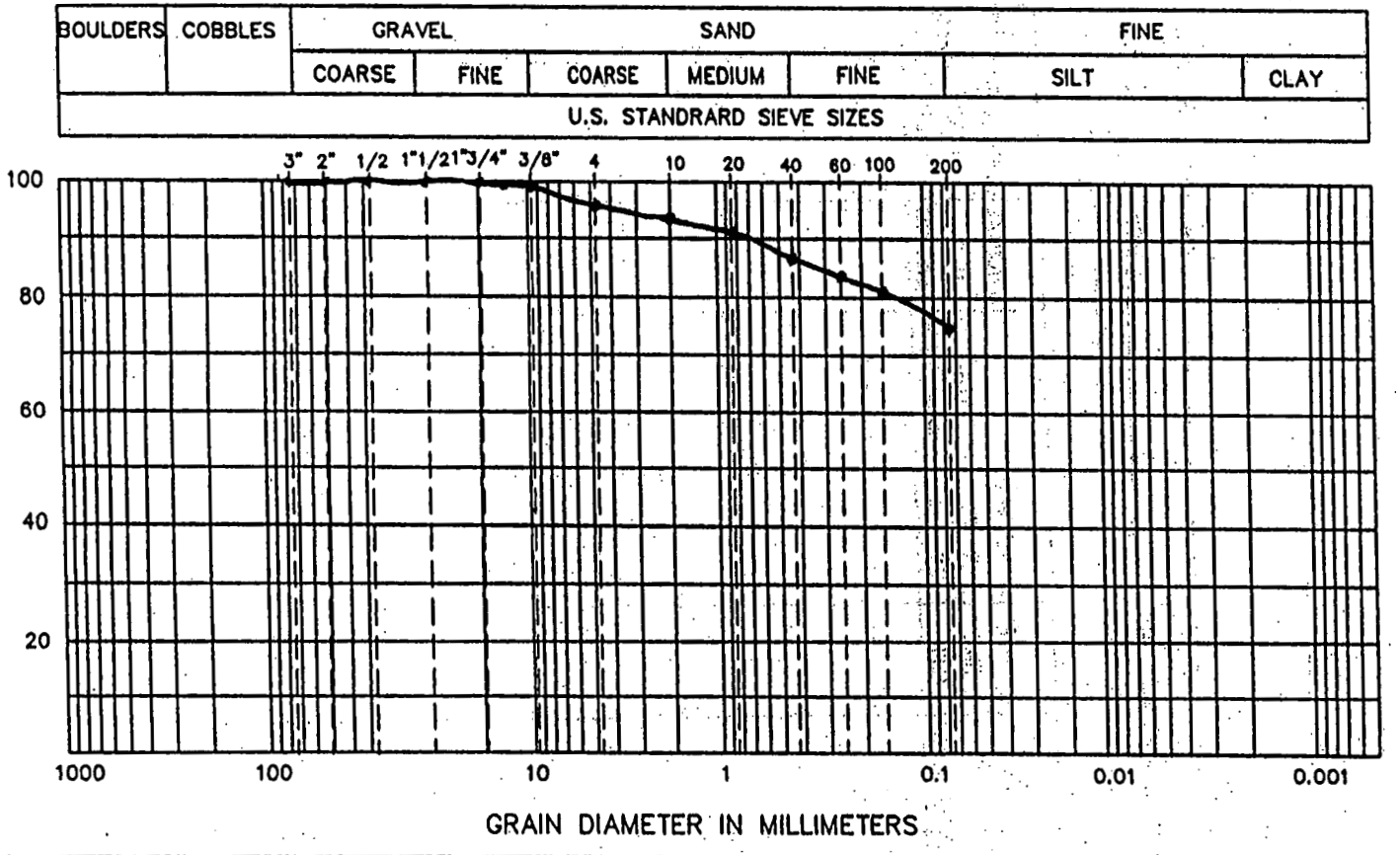
DESCRIPTION: Phase IV

DATE: 24 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-4 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 37

(PL) 16

(PI) 21

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.9
3/4-in.	99.7
1/2-in.	99.1
3/8-in.	98.9
NO. 4	96.6
NO. 10	93.9
NO. 20.	90.9
NO. 40	87.4
NO. 60	84.3
NO. 100	80.4
NO. 200	75.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	75
0.002	58
0.0005	38
0.0002	30

SOIL CLASSIFICATION (ASTM D 2487): CL

0002223

5368

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: _____ SHEET NO. ____ OF

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 4
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.26
Dry Soil & Tare (gm)	47.54
Tare Weight (gm)	3.24
Moisture Content (%)	6.14

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	843.60	
Tare Weight (gm)	242.61	
Total Weight (gm)	566.22	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			96.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.23
Calculated Dry Wt. used in test (gm)	52.98
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	96.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.16	1.16	94.5	#10	medium sand
#20	2.73	2.73	91.6	#20	medium sand
#40	4.49	4.49	88.4	#40	fine sand
#60	6.11	6.11	85.5	#60	fine sand
#100	7.97	7.97	82.1	#100	fine sand
#200	10.42	10.42	77.6	#200	fines

HYDROMETER CALCULATIONS

DATE 7/12/02	TIME 9:00	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/12/02	9:02	2.00	47.0	22.50	0.013	7.00	40.00	9.7	0.99
7/12/02	9:05	5.00	39.0	22.50	0.013	7.00	32.00	11.1	0.99
7/12/02	9:15	15.00	35.0	22.50	0.013	7.00	28.00	11.7	0.99
7/12/02	9:30	30.00	32.0	22.50	0.013	7.00	25.00	12.2	0.99
7/12/02	10:00	60.00	29.0	22.50	0.013	7.00	22.00	12.7	0.99
7/12/02	13:10	250.00	25.0	22.50	0.013	7.00	18.00	13.3	0.99
7/13/02	9:00	1440.00	22.5	22.00	0.013	7.00	15.50	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0288	72.2		
0.0195	57.8	% GRAVEL	3.40
0.0116	50.5	% COARSE SAND	2.12
0.0084	45.1	% MEDIUM SAND	6.07
0.0060	39.7	% FINE SAND	10.81
0.0030	32.5	% FINES	77.60
0.0013	28.0	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS: (CL)

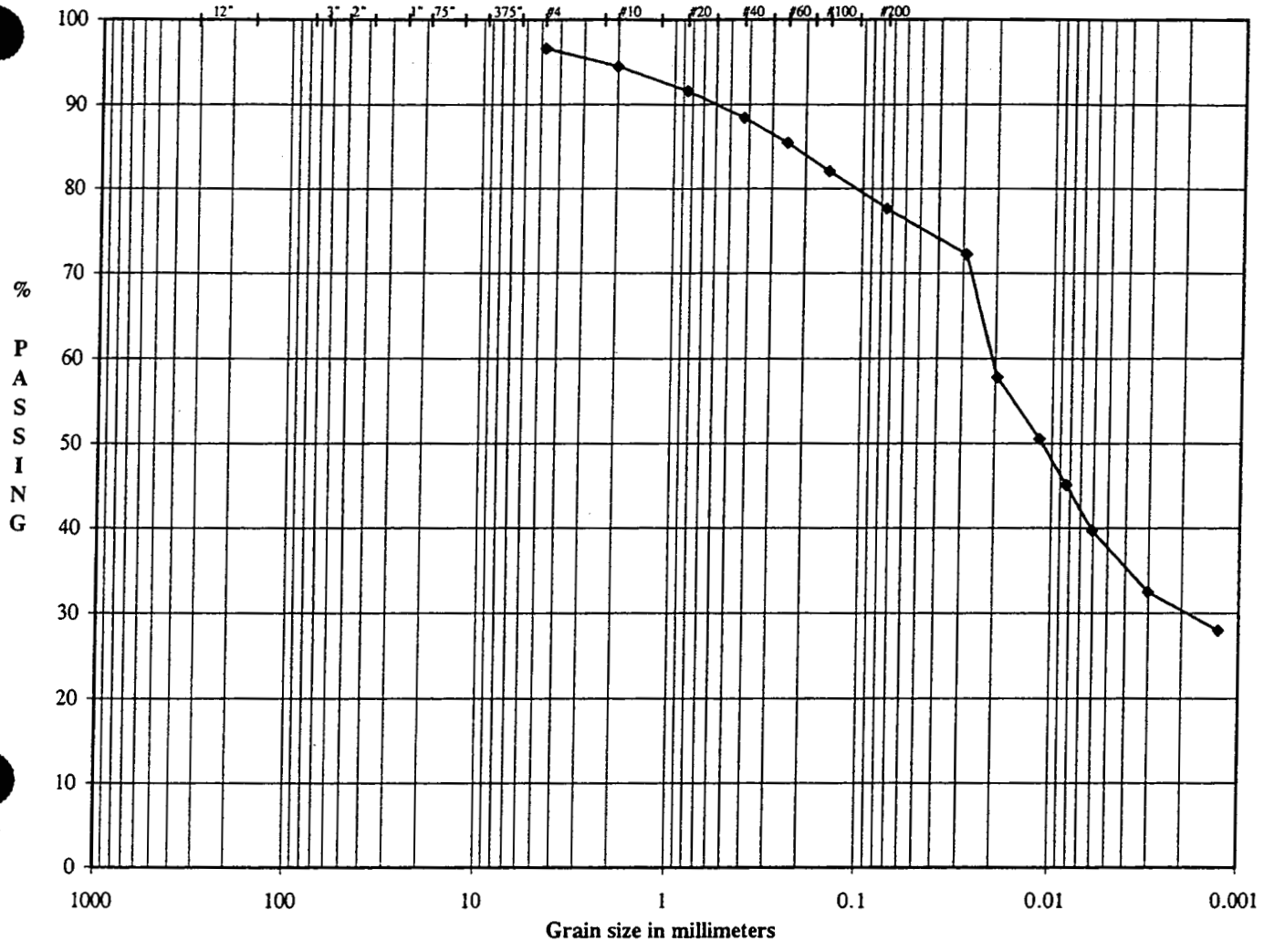
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/11/02
CHECK	
REVIEW	

000224

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 4
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/11/02
CHECK	BS
REVIEW	

000225

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 — TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 5 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-5

SOIL SAMPLE SIZE	+3/8 = 965.6	MOISTURE = 270.8	TOTAL = 44614.2
	-3/8 = 43377.8		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	N	L-3	N	L-3
WT. OF DRY SAMPLE PLUS TARE (grams)	1067.2	796.2	976.8	325.5
WT. OF TARE (grams)	101.60	190.8	101.6	190.8
WT. OF DRY SAMPLE (grams)	965.60	605.4	875.2	134.7

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100	
2 in	50.8	Ø	Ø	100	1ØØ
1 1/2in	38.1	Ø	Ø	100	
1 in	25.4	213.9	.5	99.5	
3/4 in	19.1	376.8	.8	99.2	9Ø-1ØØ
1/2 in	12.7	700.8	1.6	98.4	
3/8 in	9.53	874.9	2.2	~~97.8~~	98.0
No. 4	4.75	12.6	2.1	97.9	~~95.7~~ 96.0
No. 10	2.00	31.6	5.2	94.8	~~92.7~~ ~~92.9~~ 92.9
No. 20	0.850	51.0	8.4	91.6	~~89.6~~ 89.8
No. 40	0.425	70.8	11.7	88.3	~~86.4~~ 86.6
No. 60	0.250	88.2	14.6	85.4	~~83.5~~ 83.8
No. 100	0.125	110.2	18.2	81.8	~~80.0~~ 80.2
No. 200	0.075	133.8	22.1	77.9	~~76.2~~ 76.4 5Ø-1ØØ
PAN	—	134.6	—	—	

COMMENTS:

000226

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

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SHEET NO. ____ OF ____

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

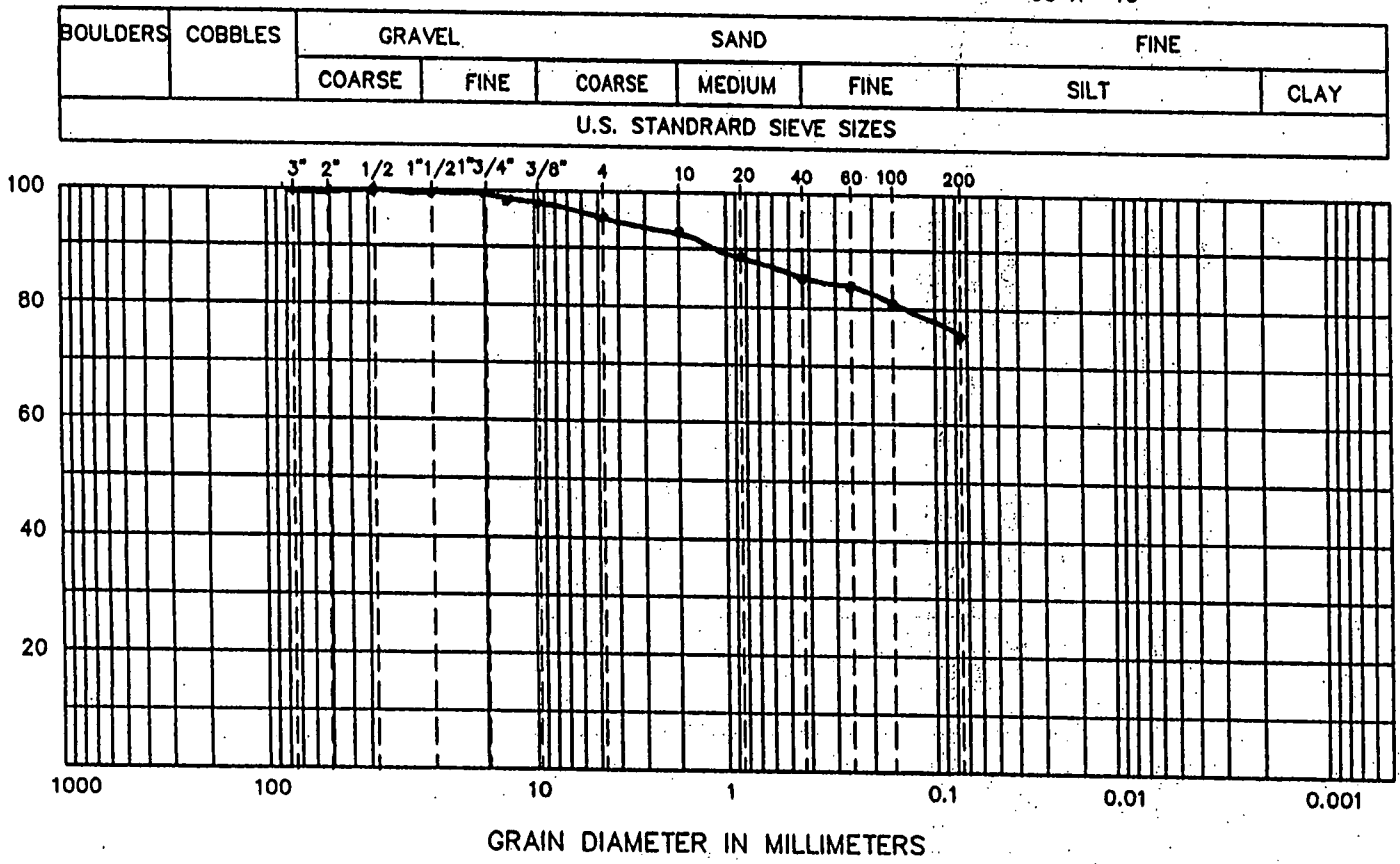
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-5 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 35

(PL) 17

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.5
3/4-In.	99.2
1/2-In.	98.4
3/8-In.	98.0
NO. 4	96.0
NO. 10	92.9
NO. 20.	89.8
NO. 40	86.6
NO. 60	83.8
NO. 100	80.2
NO. 200	76.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	74
0.02	59
0.005	39
0.002	30

SOIL CLASSIFICATION (ASTM D 2487): CL

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

000227

5368

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 5
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.54
Dry Soil & Tare (gm)	47.13
Tare Weight (gm)	3.22
Moisture Content (%)	5.49

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	854.74	
Tare Weight (gm)	242.45	
Total Weight (gm)	580.43	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			96.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.23
Calculated Dry Wt. used in test (gm)	55.20
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	96.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.40	2.40	91.8	#10	medium sand
#20	4.10	4.10	88.9	#20	medium sand
#40	5.41	5.41	86.6	#40	fine sand
#60	6.62	6.62	84.5	#60	fine sand
#100	8.11	8.11	81.9	#100	fine sand
#200	10.30	10.30	78.1	#200	fines

HYDROMETER CALCULATIONS

DATE 7/12/02	TIME 9:02	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/12/02	9:04	2.00	47.0	22.50	0.013	7.00	40.00	9.7	0.99
7/12/02	9:07	5.00	41.0	22.50	0.013	7.00	34.00	10.7	0.99
7/12/02	9:17	15.00	37.0	22.50	0.013	7.00	30.00	11.4	0.99
7/12/02	9:32	30.00	34.0	22.50	0.013	7.00	27.00	11.9	0.99
7/12/02	10:02	60.00	31.0	22.50	0.013	7.00	24.00	12.4	0.99
7/12/02	13:12	250.00	26.0	22.50	0.013	7.00	19.00	13.2	0.99
7/13/02	9:02	1440.00	23.5	22.00	0.013	7.00	16.50	13.7	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0288	68.9		
0.0192	58.5	% GRAVEL	4.00
0.0114	51.7	% COARSE SAND	4.17
0.0083	46.5	% MEDIUM SAND	5.23
0.0060	41.3	% FINE SAND	8.50
0.0030	32.7	% FINES	78.09
0.0013	28.4	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS: (CL)

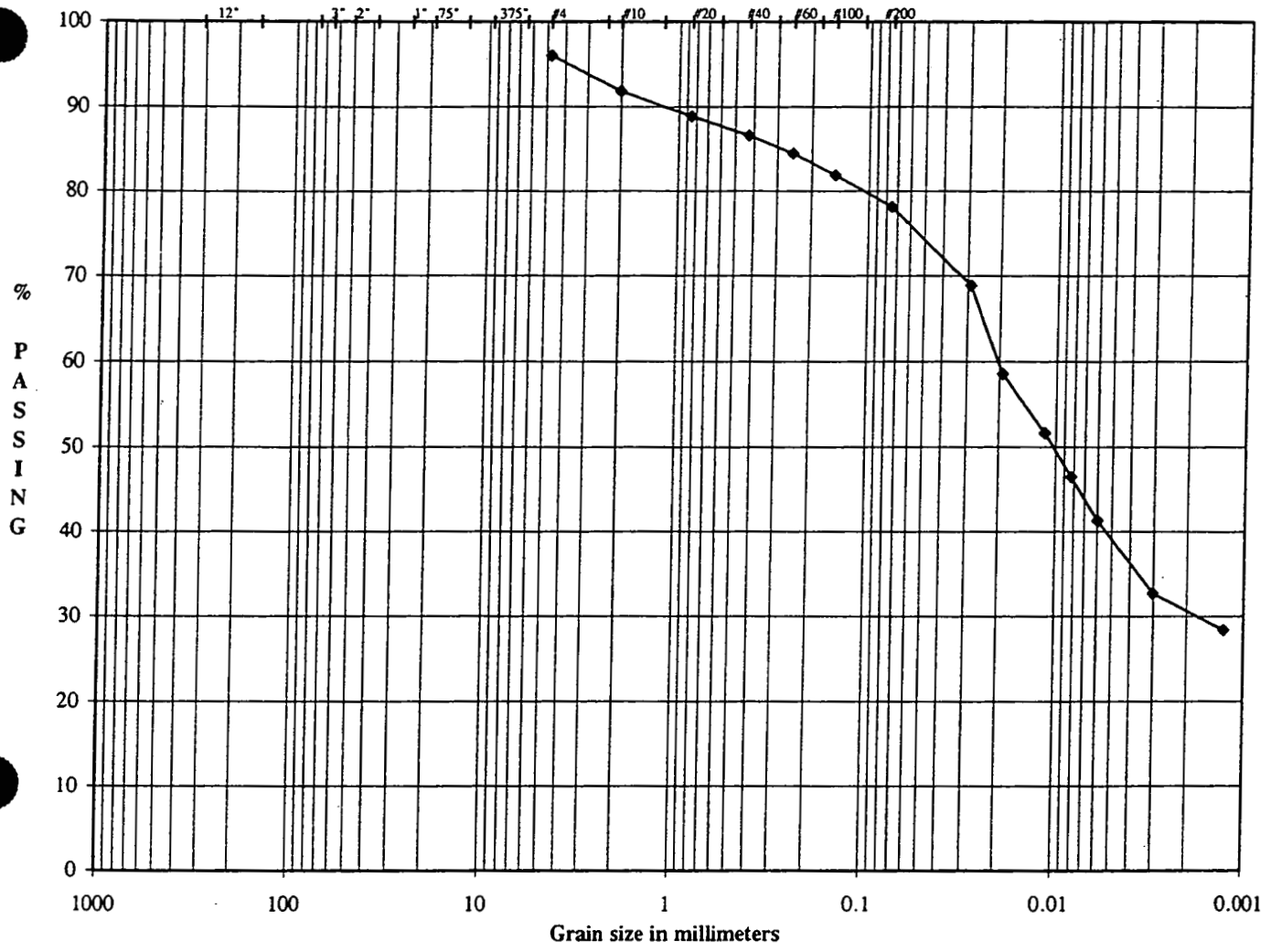
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/12/02
CHECK	
REVIEW	

000228

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 5
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/12/02
CHECK	BSS
REVIEW	

000229

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 03 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-6

SOIL SAMPLE SIZE	+3/8 = 794.4	MOISTURE = 322.5	TOTAL = 20694.3
	-3/8 = 19577.4 grams		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		LL-9	L-7	LL-9	L-7
WT. OF DRY SAMPLE PLUS TARE	(grams)	901.1	799.4	854.4	348.8
WT. OF TARE	(grams)	106.7	194.0	106.7	194.0
WT. OF DRY SAMPLE	(grams)	794.4	605.7	747.7	154.8

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		1ØØ
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	139.6	.7	99.3		
3/4 in	19.1	388.7	1.9	98.1		9Ø-1ØØ
1/2 in	12.7	635.6	3.1	96.9		
3/8 in	9.53	747.7	3.6	96.4		
No. 4	4.75	15.3	2.5	97.5	94.0	
No. 10	2.00	38.9	6.4	93.6	90.2	
No. 20	0.850	60.3	10.0	90.0	86.8	
No. 40	0.425	81.7	13.5	86.5	83.4	
No. 60	0.250	101.1	16.7	83.3	80.3	
No. 100	0.125	125.6	20.7	79.3	76.4	
No. 200	0.075	153.6	25.4	74.6	71.9	5Ø-1ØØ
PAN	—	154.8	—	—		

COMMENTS:

000230

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [illegible] — SHEET NO. ____ OF ____

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

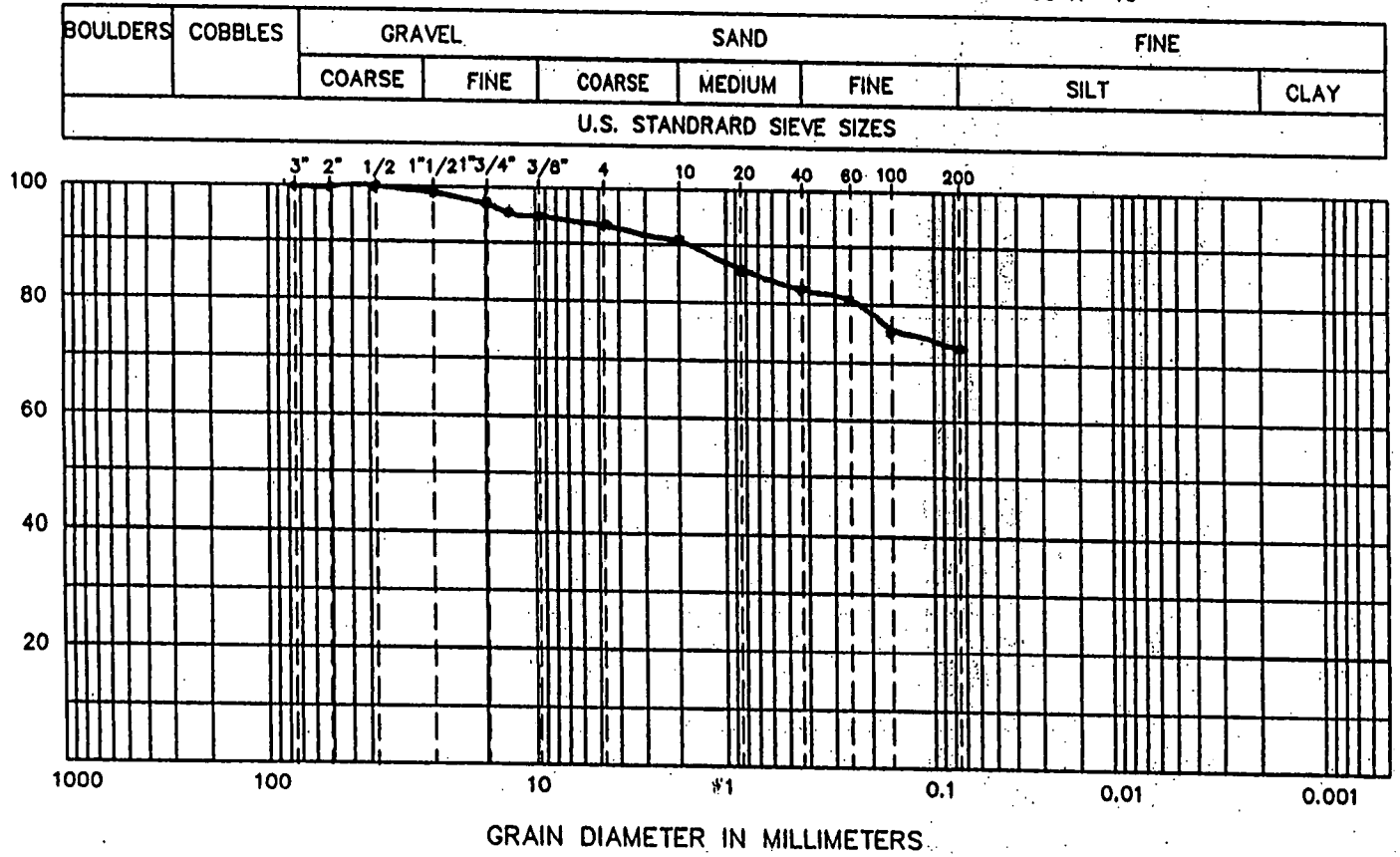
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-6 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 32

(PL) 17

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.3
3/4-In.	98.1
1/2-In.	96.9
3/8-In.	96.4
NO. 4	94.0
NO. 10	90.2
NO. 20.	86.8
NO. 40	83.4
NO. 60	80.3
NO. 100	76.4
NO. 200	71.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	70
0.02	59
0.005	39
0.002	31

SOIL CLASSIFICATION (ASTM D 2487): CL

000231

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: _____ SHEET NO. ___ OF

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 6
'JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.52
Dry Soil & Tare (gm)	46.82
Tare Weight (gm)	3.24
Moisture Content (%)	6.20

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	846.53	
Tare Weight (gm)	236.33	
Total Weight (gm)	574.60	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.45
Calculated Dry Wt. used in test (gm)	52.22
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.70	1.70	90.9	#10	medium sand
#20	3.31	3.31	88.0	#20	medium sand
#40	4.55	4.55	85.8	#40	fine sand
#60	5.84	5.84	83.5	#60	fine sand
#100	7.41	7.41	80.7	#100	fine sand
#200	9.64	9.64	76.6	#200	fines

HYDROMETER CALCULATIONS

DATE 7/12/02	TIME 9:04	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/12/02	9:06	2.00	42.0	22.50	0.013	7.00	35.00	10.6	0.99
7/12/02	9:09	5.00	40.0	22.50	0.013	7.00	33.00	10.9	0.99
7/12/02	9:19	15.00	36.0	22.50	0.013	7.00	29.00	11.5	0.99
7/12/02	9:34	30.00	33.0	22.50	0.013	7.00	26.00	12.0	0.99
7/12/02	10:04	60.00	30.0	22.50	0.013	7.00	23.00	12.5	0.99
7/12/02	13:14	250.00	26.0	22.50	0.013	7.00	19.00	13.2	0.99
7/13/02	9:04	1440.00	22.5	22.00	0.013	7.00	15.50	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0302	62.4		
0.0193	58.8	% GRAVEL	6.00
0.0115	51.7	% COARSE SAND	3.06
0.0083	46.3	% MEDIUM SAND	5.13
0.0060	41.0	% FINE SAND	9.16
0.0030	33.9	% FINES	76.65
0.0013	27.6	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

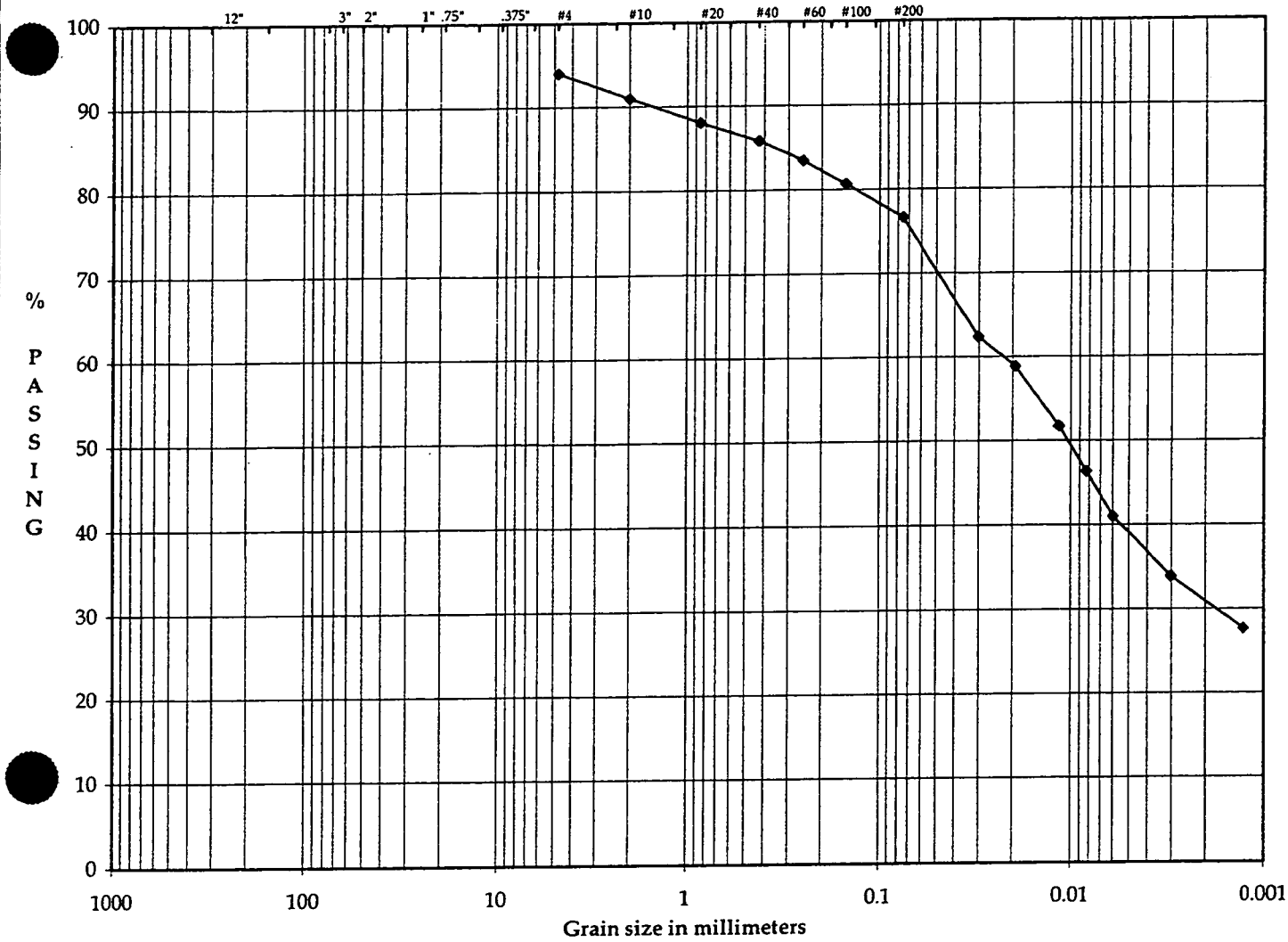
TECH	TJ
DATE	7/11/02
CHECK	
REVIEW	

000232

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 6
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/11/02
CHECK	BGS
REVIEW	[illegible]

000233

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 05 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-7

99.87 LBS

SOIL SAMPLE SIZE	+3/8 = 1705.2 gm	MOISTURE = 199.6 gm	TOTAL = 45300.7
	-3/8 = 43395.9		

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

		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		L-9	L-2	L-9	L-2
WT. OF DRY SAMPLE PLUS TARE	(grams)	1898.6	825.9	1755.8	342.8
WT. OF TARE	(grams)	193.4	191.8	193.4	191.8
WT. OF DRY SAMPLE	(grams)	1705.2	634.1	1562.4	151.0

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	409.8	.90	99.1		
3/4 in	19.1	825.4	1.8	98.2		90-100
1/2 in	12.7	1288.5	2.8	97.2	~~97.5~~ @	
3/8 in	9.53	1562.2	3.4	96.6		
No. 4	4.75	13.2	2.1	97.9	94.6	
No. 10	2.00	30.1	4.7	95.3	92.1	
No. 20	0.850	50.7	8.0	92.0	88.9	
No. 40	0.425	74.3	11.7	88.3	85.3	
No. 60	0.250	95.1	15.0	85.0	82.1	
No. 100	0.125	120.6	19.0	81.0	78.2	
No. 200	0.075	149.6	23.6	76.4	~~71.3~~ @ 73.8	50-100
PAN	—	151.0	—	—		

COMMENTS:
45300.7

000234

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: _____ SHEET NO. ____ OF ____

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

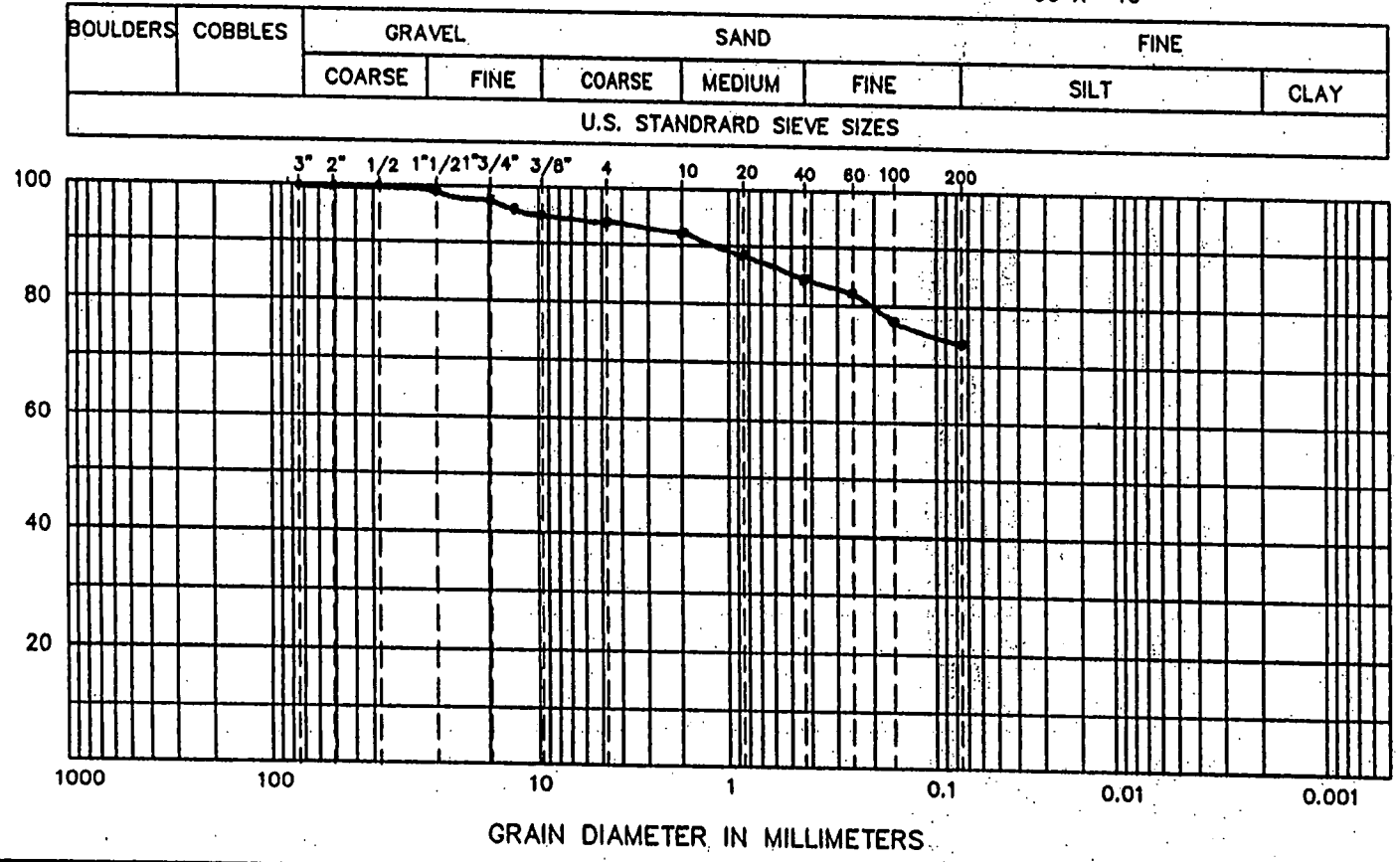
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 601341 TASK NO.: 04.1

DATE: 24 day July month 2000 year

SAMPLE NO.: 4P02-7 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 34

(PL) 17

(PI) 17

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.1
3/4-in.	98.2
1/2-in.	97.2
3/8-in.	96.6
NO. 4	94.6
NO. 10	92.1
NO. 20.	88.9
NO. 40	85.3
NO. 60	82.1
NO. 100	78.2
NO. 200	73.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	74
0.002	61
0.0005	39
0.0002	31

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000235

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 7
JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.82
Dry Soil & Tare (gm)	48.05
Tare Weight (gm)	3.19
Moisture Content (%)	3.95

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	849.15	
Tare Weight (gm)	242.46	
Total Weight (gm)	583.66	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.23
Calculated Dry Wt. used in test (gm)	54.10
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.67	1.67	91.7	#10	medium sand
#20	3.11	3.11	89.2	#20	medium sand
#40	4.42	4.42	86.9	#40	fine sand
#60	5.75	5.75	84.5	#60	fine sand
#100	7.42	7.42	81.6	#100	fine sand
#200	9.77	9.77	77.5	#200	fines

HYDROMETER CALCULATIONS

DATE 7/12/02	TIME 9:06	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/12/02	9:08	2.00	47.0	41.00	0.012	7.00	40.00	9.7	0.99
7/12/02	9:11	5.00	41.0	41.00	0.012	7.00	34.00	10.7	0.99
7/12/02	9:21	15.00	37.0	41.00	0.012	7.00	30.00	11.4	0.99
7/12/02	9:36	30.00	33.0	41.00	0.012	7.00	26.00	12.0	0.99
7/12/02	10:06	60.00	30.0	41.00	0.012	7.00	23.00	12.5	0.99
7/12/02	13:16	250.00	26.0	41.00	0.012	7.00	19.00	13.2	0.99
7/13/02	9:06	1440.00	23.0	22.00	0.013	7.00	16.00	13.7	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0266	69.3		
0.0177	58.9	% GRAVEL	5.40
0.0105	51.9	% COARSE SAND	2.92
0.0077	45.0	% MEDIUM SAND	4.81
0.0055	39.8	% FINE SAND	9.36
0.0028	32.9	% FINES	77.51
0.0013	27.7	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

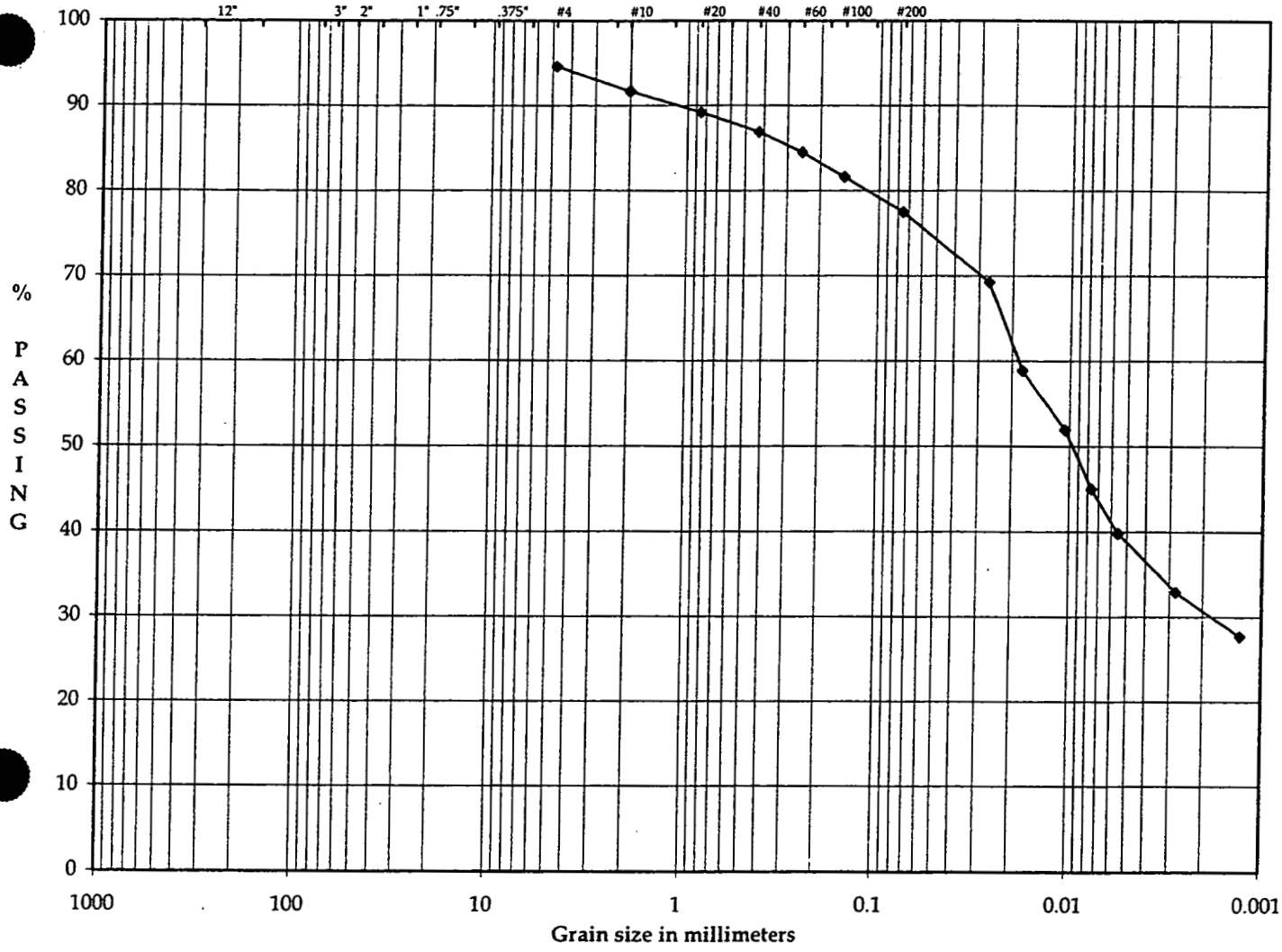
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/11/02
CHECK	BSS
REVIEW	

000236

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 7
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/11/02
CHECK	BES
REVIEW	

000237

36116.8

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 11 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.8

600 A Hardy

650 - 3/8 sieve

SOIL SAMPLE SIZE			
+3/8 = 884.5	MOISTURE = 339.1	3733.1	TOTAL = 02
-3/8 = 36116.8	37340.4		37340.4

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE, GRAIN
	115	65 44806.6 gm

32500.0

2366.8

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L.8	N	L.8	N
WT. OF DRY SAMPLE PLUS TARE (grams)	1077.7	731.3	1029.3	247.9
WT. OF TARE (grams)	193.2	101.6	193.2	101.6
WT. OF DRY SAMPLE (grams)	884.5	629.7	836.1	146.3

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	225.2	.5	99.5		
3/4 in	19.1	394.7	.9	99.1		90-100
1/2 in	12.7	631.7	1.4	98.6		
3/8 in	9.53	836.1	1.9	~~98.3~~	98.1	
No. 4	4.75	9.8	1.6	98.4	~~96.7~~	96.6
No. 10	2.00	29.6	4.7	95.3	~~93.7~~	93.5
No. 20	0.850	51.5	8.2	91.8	~~90.2~~	90.1
No. 40	0.425	74.3	11.8	88.2	~~86.7~~	86.6
No. 60	0.250	94.1	14.9	85.1	~~83.7~~	83.5
No. 100	0.125	117.4	18.6	81.4	~~80.0~~	79.8
No. 200	0.075	144.3	22.9	77.1	~~75.8~~	50-100
PAN	—	146.0	—	—		75.6

98.8 LBS

COMMENTS:

000238

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: CL

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

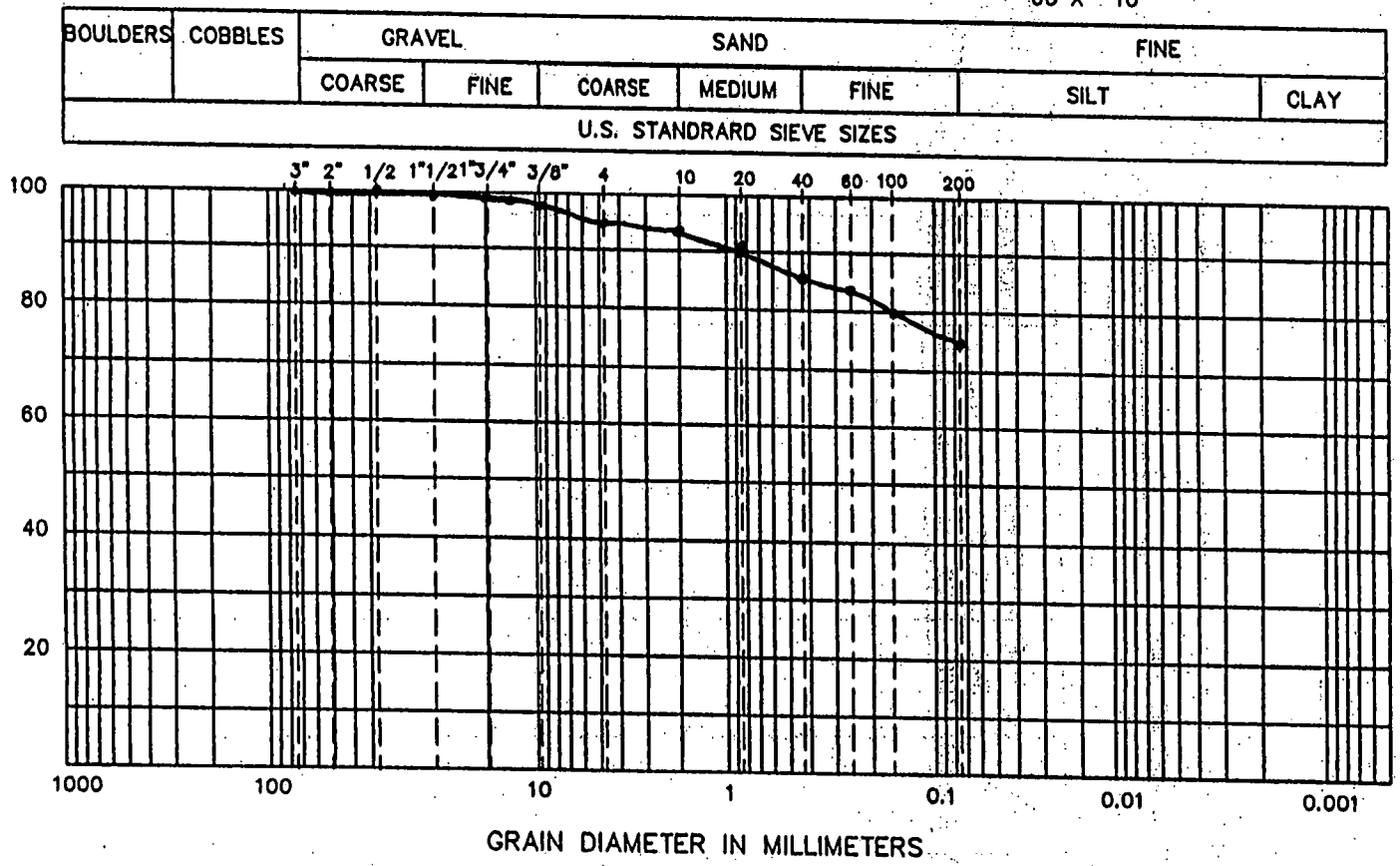
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-8 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 32

(PL) 16

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.5
3/4-in.	99.1
1/2-in.	98.6
3/8-in.	98.1
NO. 4	96.6
NO. 10	93.5
NO. 20	90.1
NO. 40	86.6
NO. 60	83.5
NO. 100	79.8
NO. 200	75.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	75
0.02	62
0.005	38
0.002	31

SOIL CLASSIFICATION (ASTM D 2487):

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

SHEET NO. OF

000239

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 8
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.28
Dry Soil & Tare (gm)	48.68
Tare Weight (gm)	3.26
Moisture Content (%)	3.52

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	762.67	
Tare Weight (gm)	242.33	
Total Weight (gm)	502.63	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			98.1	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.82
Calculated Dry Wt. used in test (gm)	53.92
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	98.10

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.18	1.18	96.0	#10	medium sand
#20	2.70	2.70	93.2	#20	medium sand
#40	4.26	4.26	90.3	#40	fine sand
#60	5.89	5.89	87.4	#60	fine sand
#100	7.74	7.74	84.0	#100	fine sand
#200	10.08	10.08	79.8	#200	fines

HYDROMETER CALCULATIONS

DATE 7/20/02	TIME 10:15	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/20/02	10:17	2.00	46.0	22.00	0.013	7.00	39.00	9.9	0.99
7/20/02	10:20	5.00	41.5	22.00	0.013	7.00	34.50	10.7	0.99
7/20/02	10:30	15.00	36.5	22.00	0.013	7.00	29.50	11.5	0.99
7/20/02	10:45	30.00	33.0	22.00	0.013	7.00	26.00	12.0	0.99
7/20/02	11:15	60.00	29.0	22.00	0.013	7.00	22.00	12.7	0.99
7/20/02	14:25	250.00	25.5	22.00	0.013	7.00	18.50	13.3	0.99
7/21/02	10:15	1440.00	22.5	22.00	0.013	7.00	15.50	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0291	70.2
0.0192	62.1
0.0115	53.1
0.0083	46.8
0.0060	39.6
0.0030	33.3
0.0013	27.9

% GRAVEL	1.90
% COARSE SAND	2.15
% MEDIUM SAND	5.60
% FINE SAND	10.59
% FINES	79.76
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS: (CL)

-	LL
-	PL
-	PI

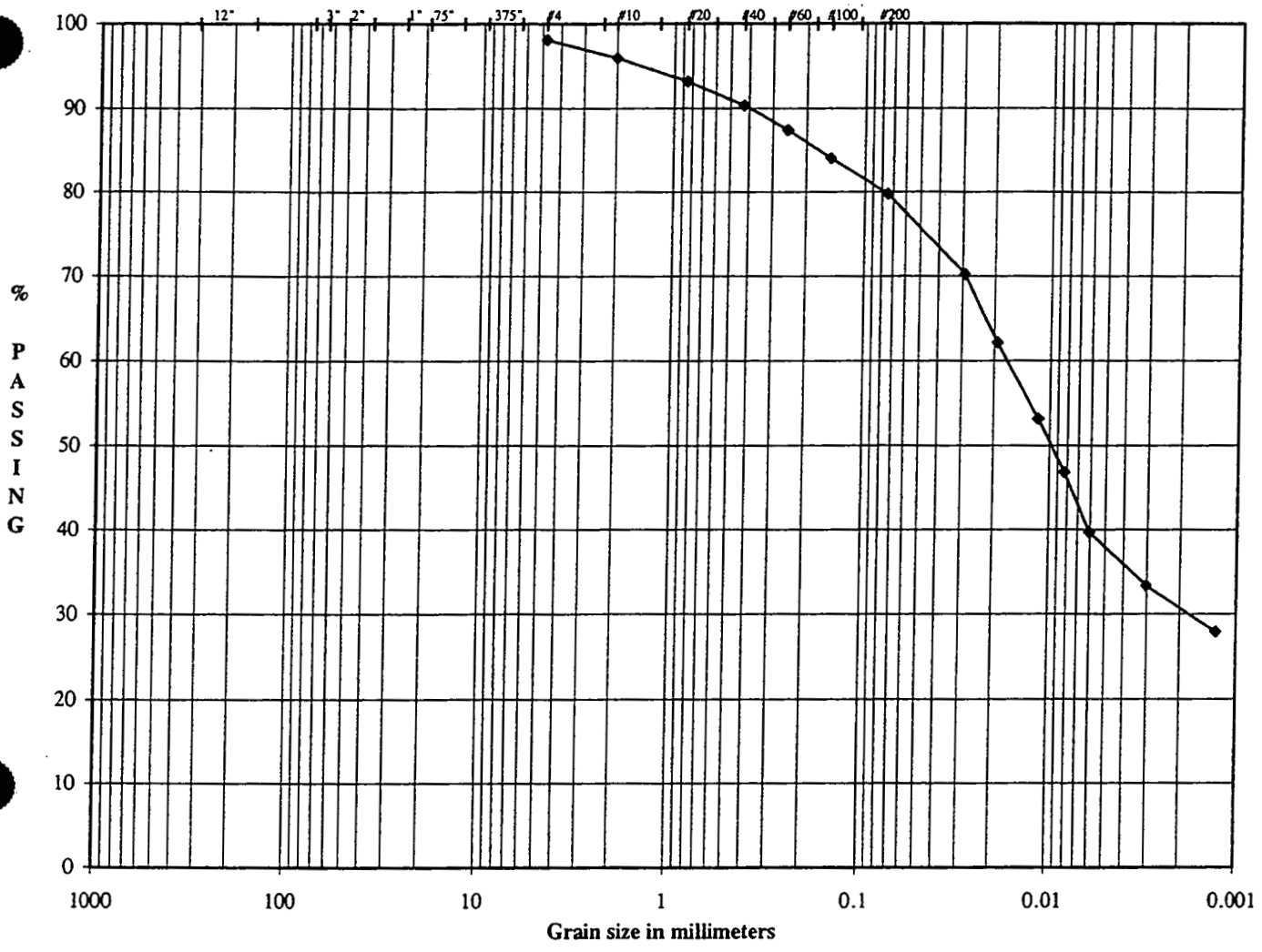
TECH	TJ/JH
DATE	7/19/02
CHECK	[illegible]
REVIEW	[illegible]

000240

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 8
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/JH
DATE	7/19/02
CHECK	BS
REVIEW	KM

000241

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

5368

46.20 LBS

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 12 day July month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-9

SOIL SAMPLE SIZE	+3/8 = 880.2 gr	MOISTURE = 238.0 gr	TOTAL = 22074.5
	-3/8 = 20956.3 gr	22074.5	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
	115	65 1" OVEN

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-4	L-1	L-4	L-1
WT. OF DRY SAMPLE PLUS TARE (grams)	1025.6	962.5	957.5	447.5
WT. OF TARE (grams)	145.4	192.4	145.4	192.4
WT. OF DRY SAMPLE (grams)	880.2	770.1	812.1	255.1

SIEVE ANALYSIS — QA ID: DJE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	89.5	0.4	99.6		
1 in	25.4	245.4	1.1	98.9		
3/4 in	19.1	371.8	1.7	98.3		90-100
1/2 in	12.7	669.5	3.0	97.0		
3/8 in	9.53	811.2	3.7	96.3		
No. 4	4.75	18.4	2.4	97.6	94.0	
No. 10	2.00	51.6	6.7	93.6	~~90.1~~ 89.9	
No. 20	0.850	97.7	12.7	87.3	84.1	
No. 40	0.425	145.2	18.9	81.1	78.1	
No. 60	0.250	179.8	23.3	76.7	73.9	
No. 100	0.125	215.3	28.0	72.0	69.3	
No. 200	0.075	251.6	32.7	67.3	64.8	50-100
PAN	—	255.0	—	—		

COMMENTS:

000242

*%FINER = 100 − ∑% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: CH

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

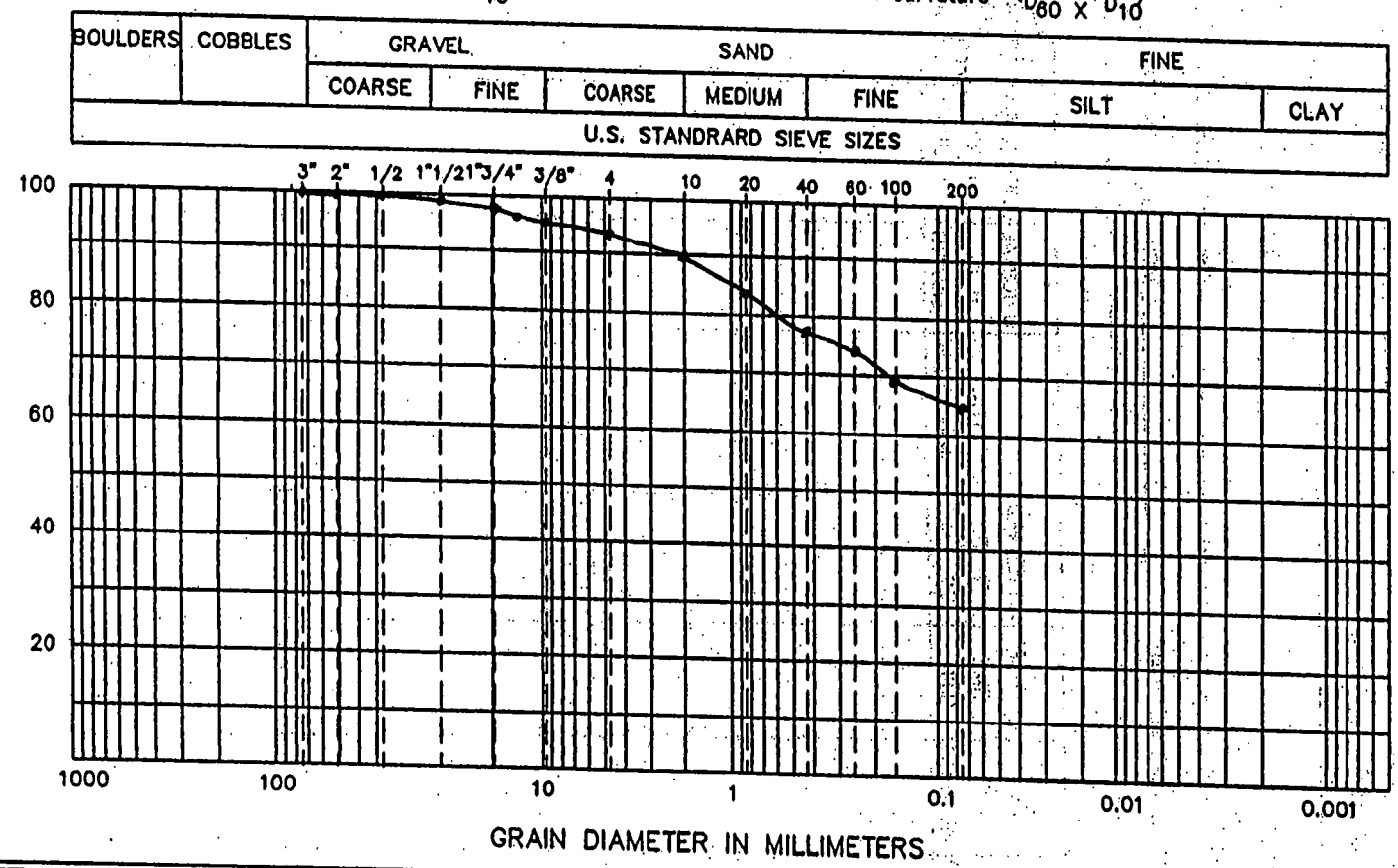
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-9 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.6
1-in.	98.9
3/4-in.	98.3
1/2-in.	97.0
3/8-in.	96.3
NO. 4	94.0
NO. 10	89.9
NO. 20.	84.1
NO. 40	78.1
NO. 60	73.9
NO. 100	69.3
NO. 200	64.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	57
0.005	35
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000243

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 9
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.27
Dry Soil & Tare (gm)	48.69
Tare Weight (gm)	3.19
Moisture Content (%)	3.47

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	749.42	
Tare Weight (gm)	242.43	
Total Weight (gm)	489.98	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	54.15
Calculated Dry Wt. used in test (gm)	52.33
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.43	2.43	89.6	#10	medium sand
#20	4.50	4.50	85.9	#20	medium sand
#40	6.26	6.26	82.8	#40	fine sand
#60	8.12	8.12	79.4	#60	fine sand
#100	10.12	10.12	75.8	#100	fine sand
#200	12.72	12.72	71.2	#200	fines

HYDROMETER CALCULATIONS

DATE 7/20/02	TIME 10:17	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/20/02	10:19	2.00	43.0	22.00	0.013	7.00	36.00	10.4	0.99
7/20/02	10:22	5.00	38.5	22.00	0.013	7.00	31.50	11.2	0.99
7/20/02	10:32	15.00	33.5	22.00	0.013	7.00	26.50	12.0	0.99
7/20/02	10:47	30.00	30.5	22.00	0.013	7.00	23.50	12.5	0.99
7/20/02	11:17	60.00	28.0	22.00	0.013	7.00	21.00	12.9	0.99
7/20/02	14:27	250.00	23.5	22.00	0.013	7.00	16.50	13.7	0.99
7/21/02	10:17	1440.00	20.0	22.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	64.0		
0.0196	56.0	% GRAVEL	6.00
0.0117	47.1	% COARSE SAND	4.36
0.0085	41.8	% MEDIUM SAND	6.88
0.0061	37.3	% FINE SAND	11.60
0.0031	29.3	% FINES	71.15
0.0013	23.1	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

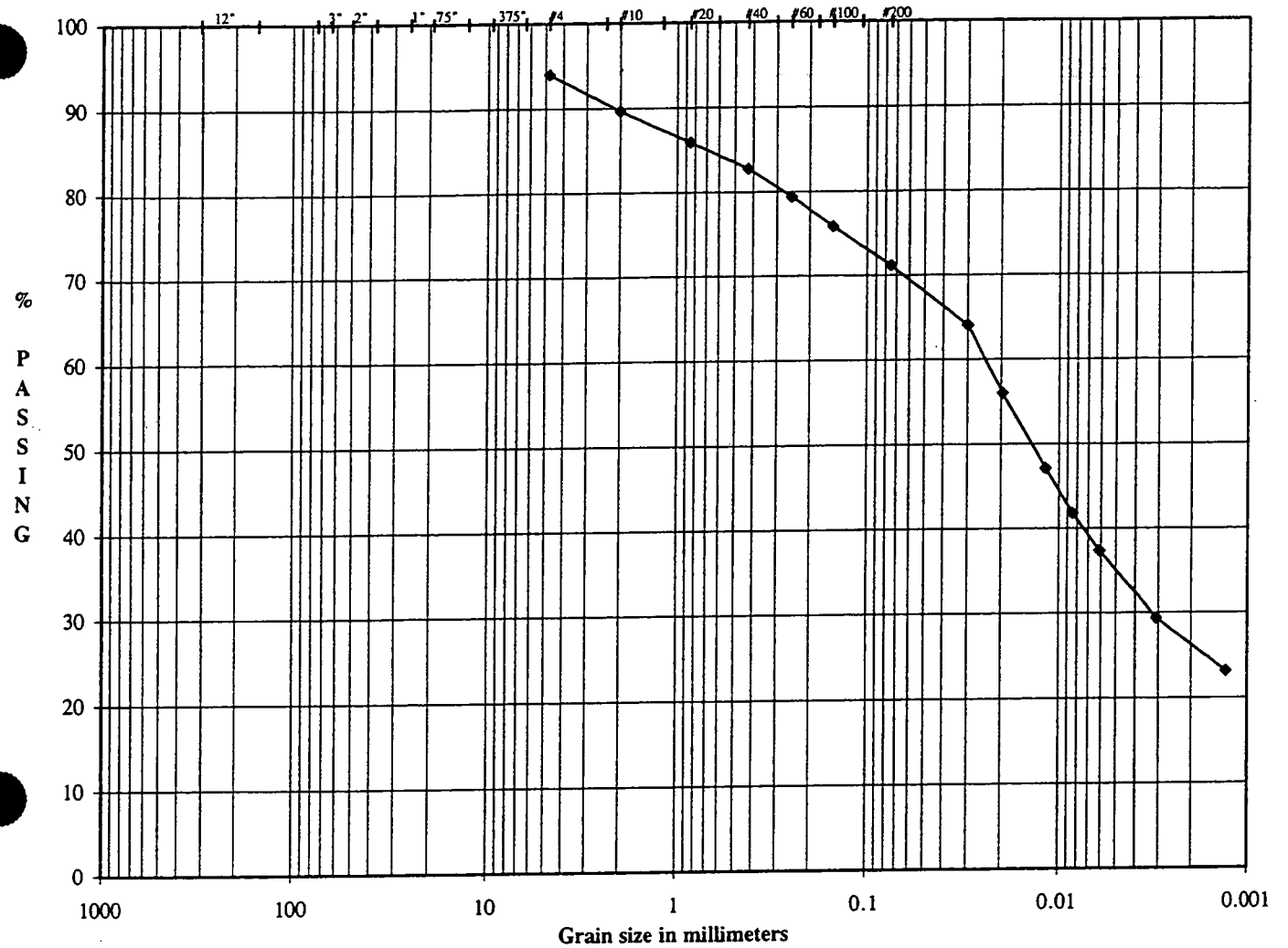
-	LL
-	PL
-	PI

TECH	TJ/JH
DATE	7/19/02
CHECK	BSS
REVIEW	RWM

000244

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 9
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/JH
DATE	7/19/02
CHECK	BES
REVIEW	[illegible]

000245

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

Total of 10 5.6 lbs

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 13 day July month 2002 year

MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02-10

SOIL SAMPLE SIZE	+3/8 = 2368.6 gm	MOISTURE = 337.6 gm	TOTAL = 47900.5
	-3/8 = 1250 gm + 43944.3	= 47900.5	

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-6	L-4	L-6	L-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	2567.1	639.9	2463.7	308.1
WT. OF TARE	(grams)	198.5	145.4	198.5	145.4
WT. OF DRY SAMPLE	(grams)	2368.6	494.5	2265.2	162.7

SIEVE ANALYSIS — QA ID: DLG

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	185.2	0.4	99.6		
1 in	25.4	931.5	1.9	98.1		
3/4 in	19.1	1367.4	2.9	97.1		90-100
1/2 in	12.7	1949.8	~~3.4~~ 4.1	~~96.6~~ 95.9		
3/8 in	9.53	2259.3	4.7	95.3		
No. 4	4.75	17.3	3.5	96.5	92.0	
No. 10	2.00	39.0	7.9	92.1	87.8	
No. 20	0.850	64.2	13.0	87.0	82.9	
No. 40	0.425	88.4	17.9	82.1	78.2	
No. 60	0.250	109.1	22.1	77.9	74.2	
No. 100	0.125	134.2	27.1	72.9	69.5	
No. 200	0.075	162.2	32.8	67.2	64.0	50-100
PAN	—	162.7	—	—		

COMMENTS:

000246

% FINER = 100 − Σ % RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

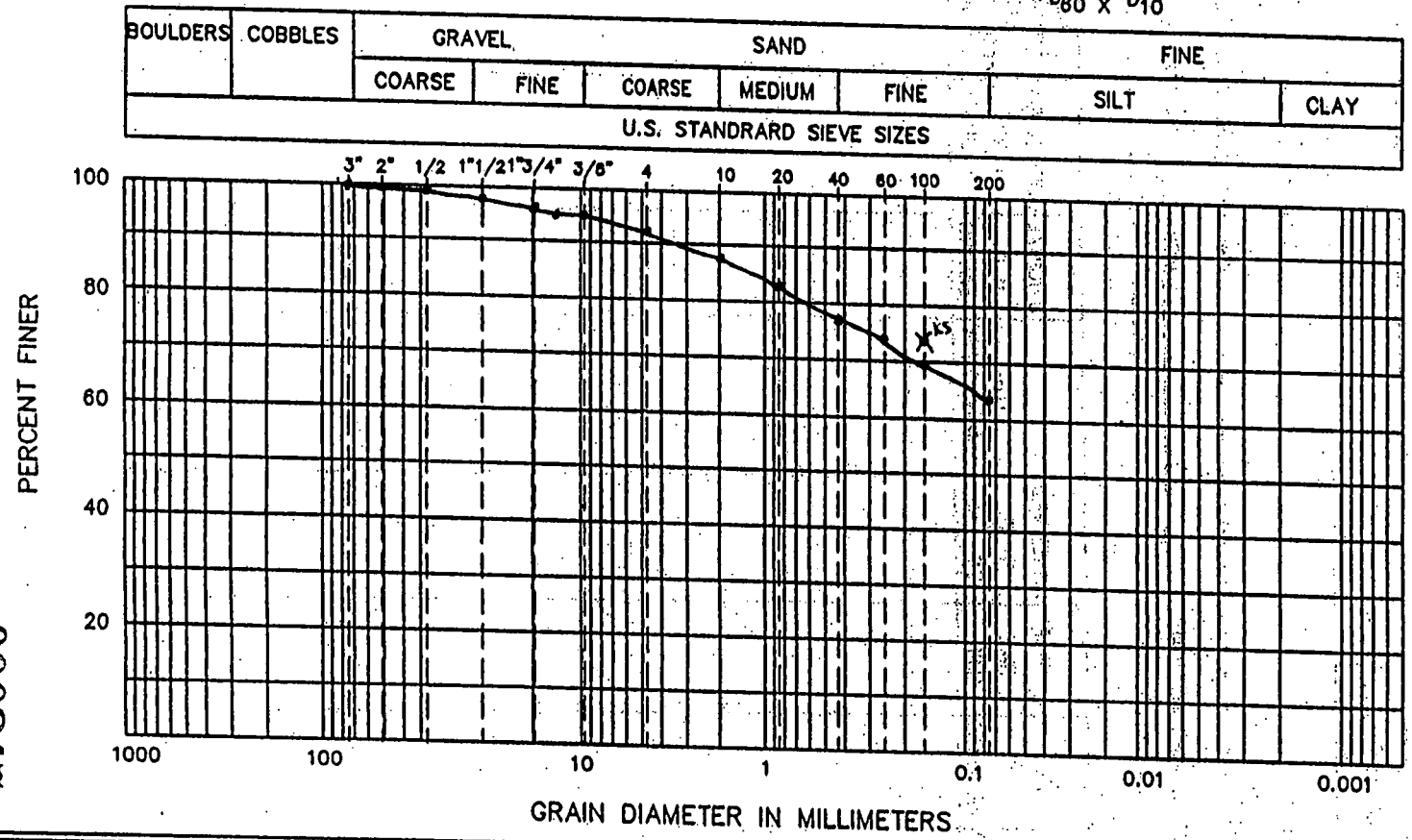
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-10 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.6
1-in.	98.1
3/4-in.	97.1
1/2-in.	95.9
3/8-in.	95.3
NO. 4	92.0
NO. 10	87.8
NO. 20.	82.9
NO. 40	78.2
NO. 60	74.2
NO. 100	69.5
NO. 200	64.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	58
0.005	35
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000247

000308

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 10
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.61
Dry Soil & Tare (gm)	47.74
Tare Weight (gm)	3.22
Moisture Content (%)	6.45

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	780.60	
Tare Weight (gm)	242.27	
Total Weight (gm)	505.73	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.43
Calculated Dry Wt. used in test (gm)	53.95
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.11	2.11	88.4	#10	medium sand
#20	4.14	4.14	84.9	#20	medium sand
#40	6.14	6.14	81.5	#40	fine sand
#60	8.02	8.02	78.3	#60	fine sand
#100	10.06	10.06	74.8	#100	fine sand
#200	12.78	12.78	70.2	#200	fines

HYDROMETER CALCULATIONS

DATE 7/20/02	TIME 10:19	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/20/02	10:21	2.00	45.0	22.00	0.013	7.00	38.00	10.1	0.99
7/20/02	10:24	5.00	40.5	22.00	0.013	7.00	33.50	10.9	0.99
7/20/02	10:34	15.00	35.0	22.00	0.013	7.00	28.00	11.7	0.99
7/20/02	10:49	30.00	31.5	22.00	0.013	7.00	24.50	12.4	0.99
7/20/02	11:19	60.00	28.5	22.00	0.013	7.00	21.50	12.9	0.99
7/20/02	14:29	250.00	24.0	22.00	0.013	7.00	17.00	13.5	0.99
7/21/02	10:19	1440.00	21.0	22.00	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0294	64.2		
0.0193	56.6	% GRAVEL	8.00
0.0116	47.3	% COARSE SAND	3.60
0.0084	41.4	% MEDIUM SAND	6.87
0.0061	36.3	% FINE SAND	11.32
0.0030	28.7	% FINES	70.21
0.0013	23.6	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

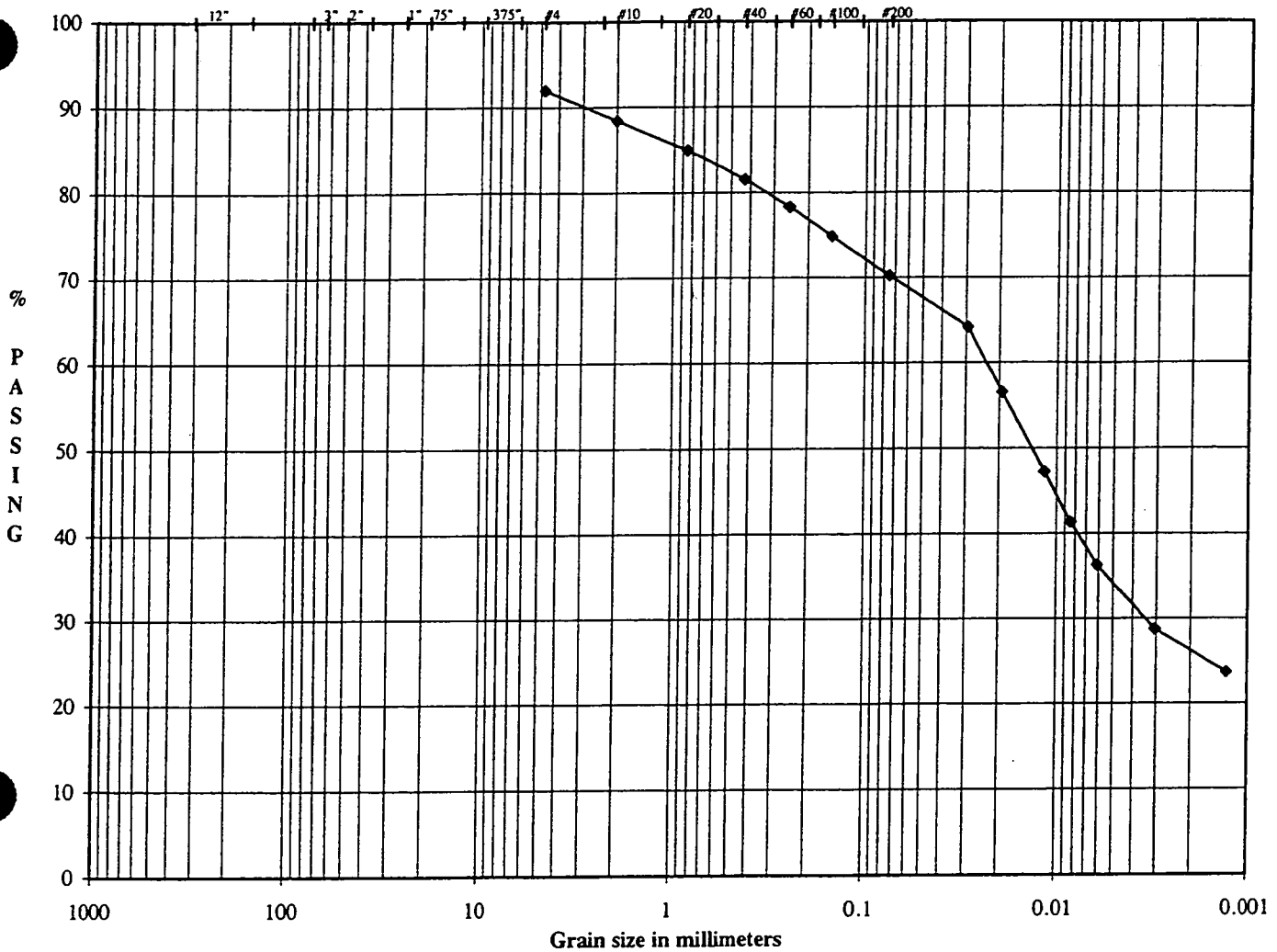
USCS: (CL)

-	LL
-	PL
-	PI

TECH	TJ/JH
DATE	7/19/02
CHECK	BJS
REVIEW	[illegible]

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 10
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/JH
DATE	7/19/02
CHECK	
REVIEW	

000249

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD 5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 15 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP 02-11

SOIL SAMPLE SIZE	+3/8 = 1030.4	MOISTURE = 346.9	48.25 LB's	TOTAL = 21888.1 gm
	-3/8 = 666.0 gr + 600 gr + 19250.8 gm			

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-1	L-3	L-1	L-3
WT. OF DRY SAMPLE PLUS TARE	(grams)	838.2	784.5	988.0	378.5
WT. OF TARE	(grams)	192.2	189.7	192.2	189.7
WT. OF DRY SAMPLE	(grams)	1030.4	594.8	795.8	188.8

SIEVE ANALYSIS QA ID: PLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	288.1	1.3	98.7		
3/4 in	19.1	378.7	1.7	98.3		90-100
1/2 in	12.7	618.9	2.8	97.2		
3/8 in	9.53	795.8	3.6	96.4		
No. 4	4.75	22.4	3.8	96.2	92.7	
No. 10	2.00	52.5	8.8	91.2	87.9	
No. 20	0.850	82.4	13.9	86.1	83.0	
No. 40	0.425	109.1	18.3	81.7	78.8	
No. 60	0.250	130.8	22.0	78.0	75.2	
No. 100	0.125	157.4	26.5	73.5	70.9	
No. 200	0.075	187.1	31.5	68.5	66.0	50-100
PAN	—	188.8	—	—		

COMMENTS:

000250

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CJ SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

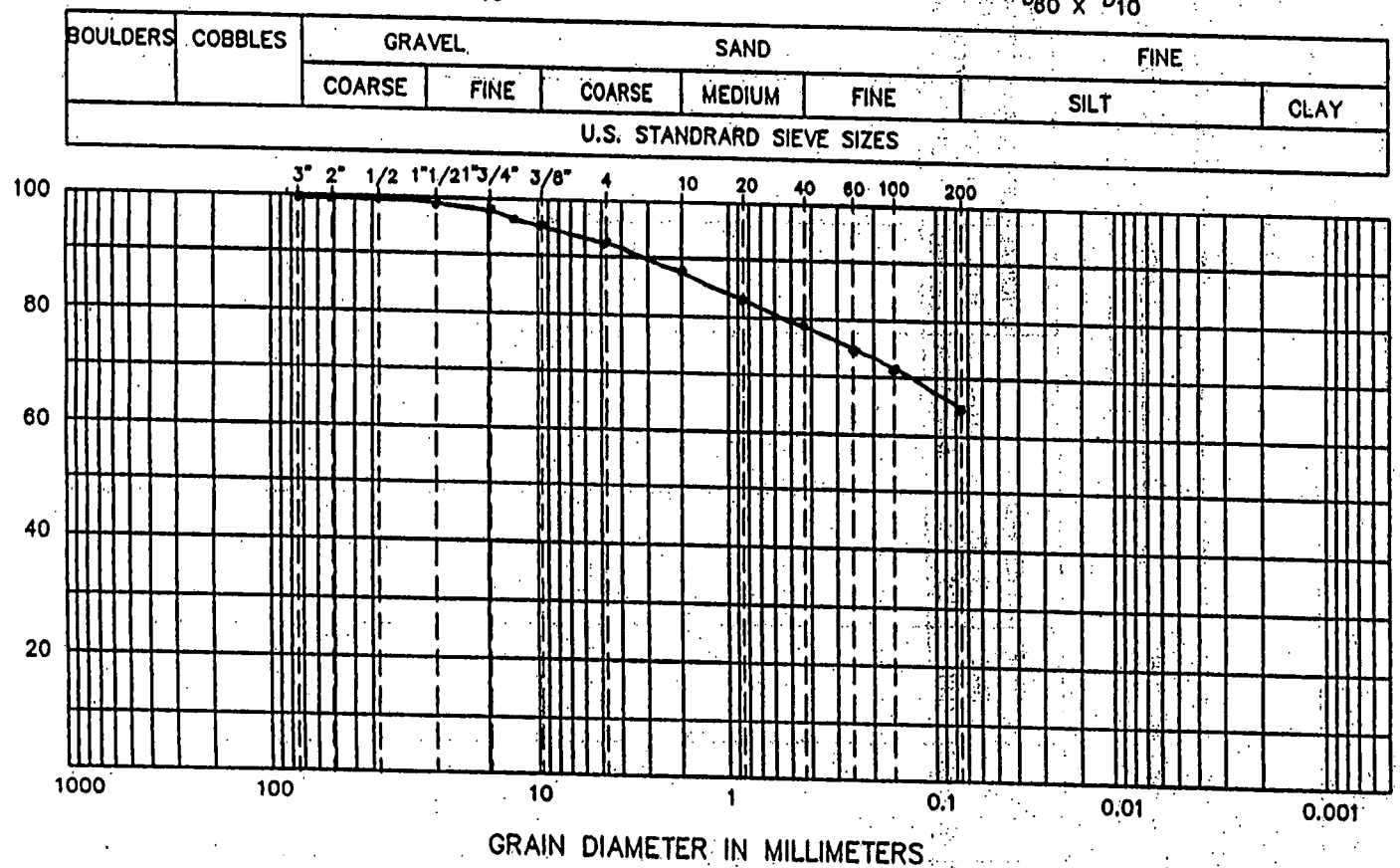
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-11 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 26

(PL) 15

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.7
3/4-in.	98.3
1/2-in.	97.2
3/8-in.	96.4
NO. 4	92.7
NO. 10	87.9
NO. 20.	83.0
NO. 40	78.8
NO. 60	75.2
NO. 100	70.9
NO. 200	66.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	63
0.02	53
0.005	32
0.002	24

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000251

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 11
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4 = W1-W2)	
Weight of Dry Soil (gm)	(W5 = W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.29
Dry Soil & Tare (gm)	48.49
Tare Weight (gm)	3.23
Moisture Content (%)	3.98

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	774.67	
Tare Weight (gm)	242.30	
Total Weight (gm)	512.01	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.69
Calculated Dry Wt. used in test (gm)	56.45
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	3.25	3.25	87.4	#10	medium sand
#20	6.18	6.18	82.6	#20	medium sand
#40	8.41	8.41	78.9	#40	fine sand
#60	10.50	10.50	75.5	#60	fine sand
#100	12.67	12.67	71.9	#100	fine sand
#200	15.74	15.74	66.9	#200	fines

HYDROMETER CALCULATIONS

DATE 7/20/02	TIME 10:21	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/20/02	10:23	2.00	43.0	22.00	0.013	7.00	36.00	10.4	0.99
7/20/02	10:26	5.00	39.5	22.00	0.013	7.00	32.50	11.1	0.99
7/20/02	10:36	15.00	34.5	22.00	0.013	7.00	27.50	11.9	0.99
7/20/02	10:51	30.00	31.0	22.00	0.013	7.00	24.00	12.4	0.99
7/20/02	11:21	60.00	28.0	22.00	0.013	7.00	21.00	12.9	0.99
7/20/02	14:31	250.00	23.5	22.00	0.013	7.00	16.50	13.7	0.99
7/21/02	10:21	1440.00	20.5	22.00	0.013	7.00	13.50	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0299	58.5
0.0195	52.8
0.0117	44.7
0.0084	39.0
0.0061	34.1
0.0031	26.8
0.0013	21.9

% GRAVEL	7.30
% COARSE SAND	5.34
% MEDIUM SAND	8.47
% FINE SAND	12.04
% FINES	66.85
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

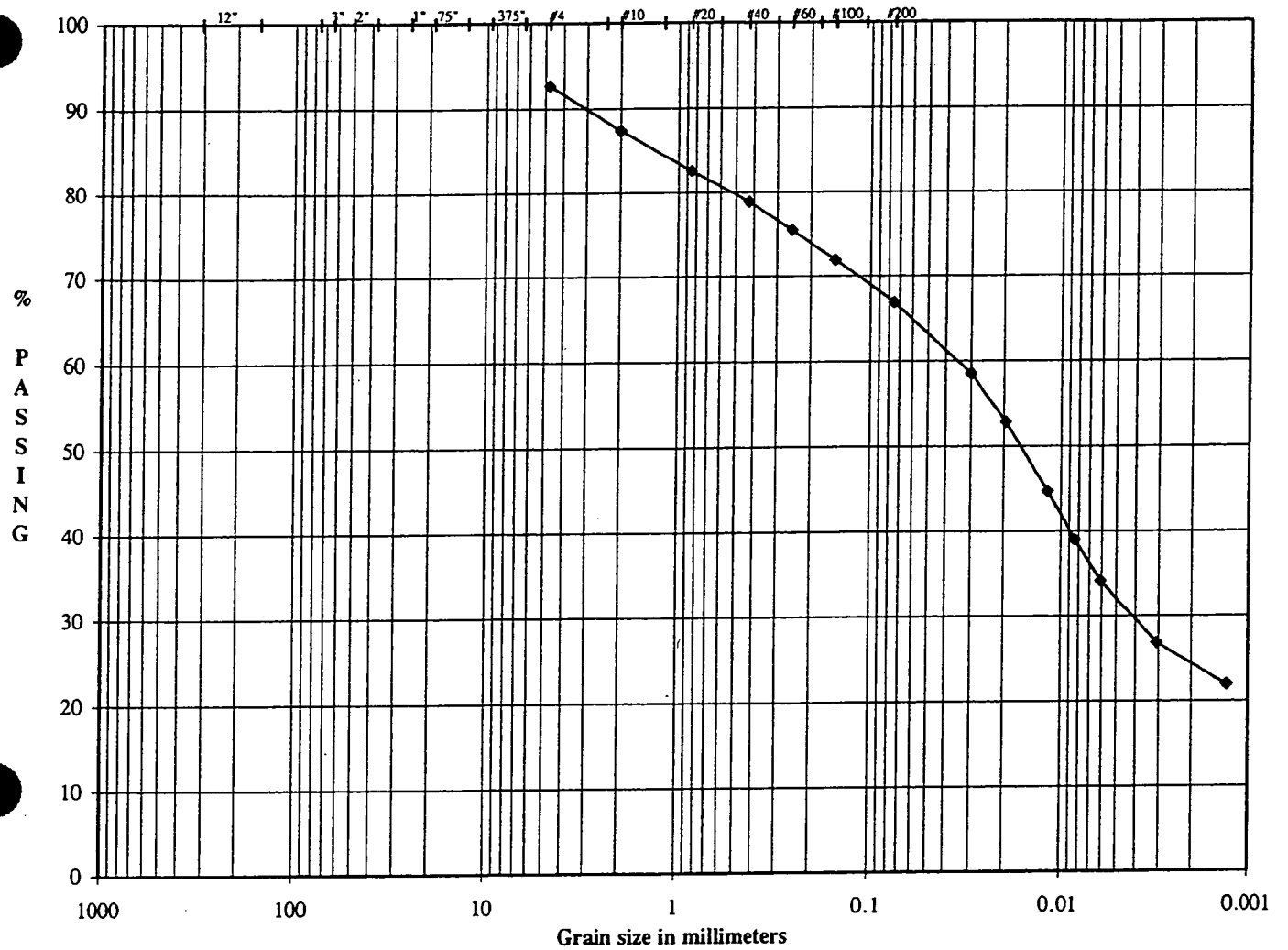
-	LL
-	PL
-	PI

TECH	TJ/JH
DATE	7/19/02
CHECK	BSS
REVIEW	RWA

000252

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 11
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/JH
DATE	7/19/02
CHECK	[illegible]
REVIEW	[illegible]

000253

39.58
1.73
37.85

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 16 day July month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02.12

42.19
41.97
1.89
37.85
40.08
77.93

SOIL SAMPLE SIZE	+3/8 = 1616.8 gram	MOISTURE = 297.7 gm	TOTAL = 3726.3.5
	-3/8 = 3534.9.0 gram		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-9	L-4	L-9	L-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	1810.3	783.9	1701.2	322.9
WT. OF TARE	(grams)	193.4	145.4	193.4	145.4
WT. OF DRY SAMPLE	(grams)	1616.8	638.5	1507.8	177.5

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		1ØØ
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	327.9	.9	99.1		
3/4 in	19.1	606.2	1.6	98.4		9Ø-1ØØ
1/2 in	12.7	1135.3	3.0	97.0		
3/8 in	9.53	1507.Ø	4.0	96.0		
No. 4	4.75	21.5	3.4	96.6	92.7	
No. 10	2.00	48.5	7.6	92.4	88.7	
No. 20	0.850	75.9	11.8	88.2	~~84.7~~ 84.5	
No. 40	0.425	101.4	15.9	84.1	80.7	
No. 60	0.250	123.7	19.4	80.6	77.4	
No. 100	0.125	149.7	23.4	76.6	73.5	
No. 200	0.075	177.3	27.8	72.2	69.3	5Ø-1ØØ
PAN	—	177.5	—	—		

Atterberg on over

COMMENTS:

000254

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: CH

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

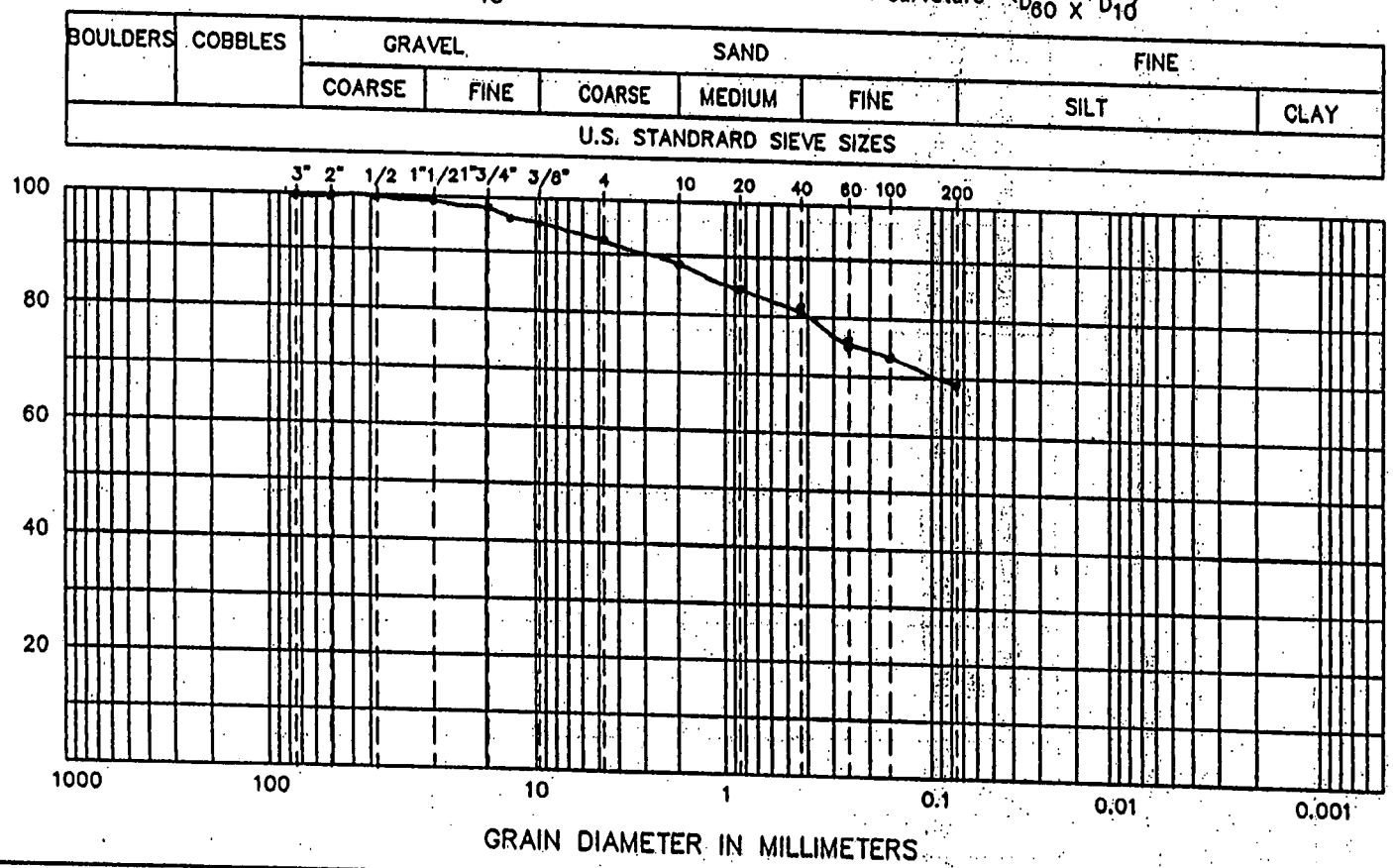
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-12 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 15

(PI) 14

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.1
3/4-in.	98.4
1/2-in.	97.0
3/8-in.	96.0
NO. 4	92.7
NO. 10	88.7
NO. 20.	84.5
NO. 40	80.7
NO. 60	77.4
NO. 100	73.5
NO. 200	69.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	57
0.005	33
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000255

000255

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 12
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.29
Dry Soil & Tare (gm)	48.70
Tare Weight (gm)	3.22
Moisture Content (%)	3.50

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	787.12	
Tare Weight (gm)	292.25	
Total Weight (gm)	478.15	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	53.32
Calculated Dry Wt. used in test (gm)	51.52
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.54	1.54	89.9	#10	medium sand
#20	3.74	3.74	86.0	#20	medium sand
#40	5.80	5.80	82.3	#40	fine sand
#60	7.72	7.72	78.8	#60	fine sand
#100	9.93	9.93	74.8	#100	fine sand
#200	12.88	12.88	69.5	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/20/02	10:23								
7/20/02	10:25	2.00	43.0	22.00	0.013	7.00	36.00	10.4	0.99
7/20/02	10:28	5.00	38.5	22.00	0.013	7.00	31.50	11.2	0.99
7/20/02	10:38	15.00	33.5	22.00	0.013	7.00	26.50	12.0	0.99
7/20/02	10:53	30.00	30.5	22.00	0.013	7.00	23.50	12.5	0.99
7/20/02	11:23	60.00	27.0	22.00	0.013	7.00	20.00	13.0	0.99
7/20/02	14:33	250.00	23.0	22.00	0.013	7.00	16.00	13.7	0.99
7/21/02	10:23	1440.00	20.0	22.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	64.1		
0.0196	56.1	% GRAVEL	7.30
0.0117	47.2	% COARSE SAND	2.77
0.0085	41.9	% MEDIUM SAND	7.67
0.0061	35.6	% FINE SAND	12.74
0.0031	28.5	% FINES	69.52
0.0013	23.2	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

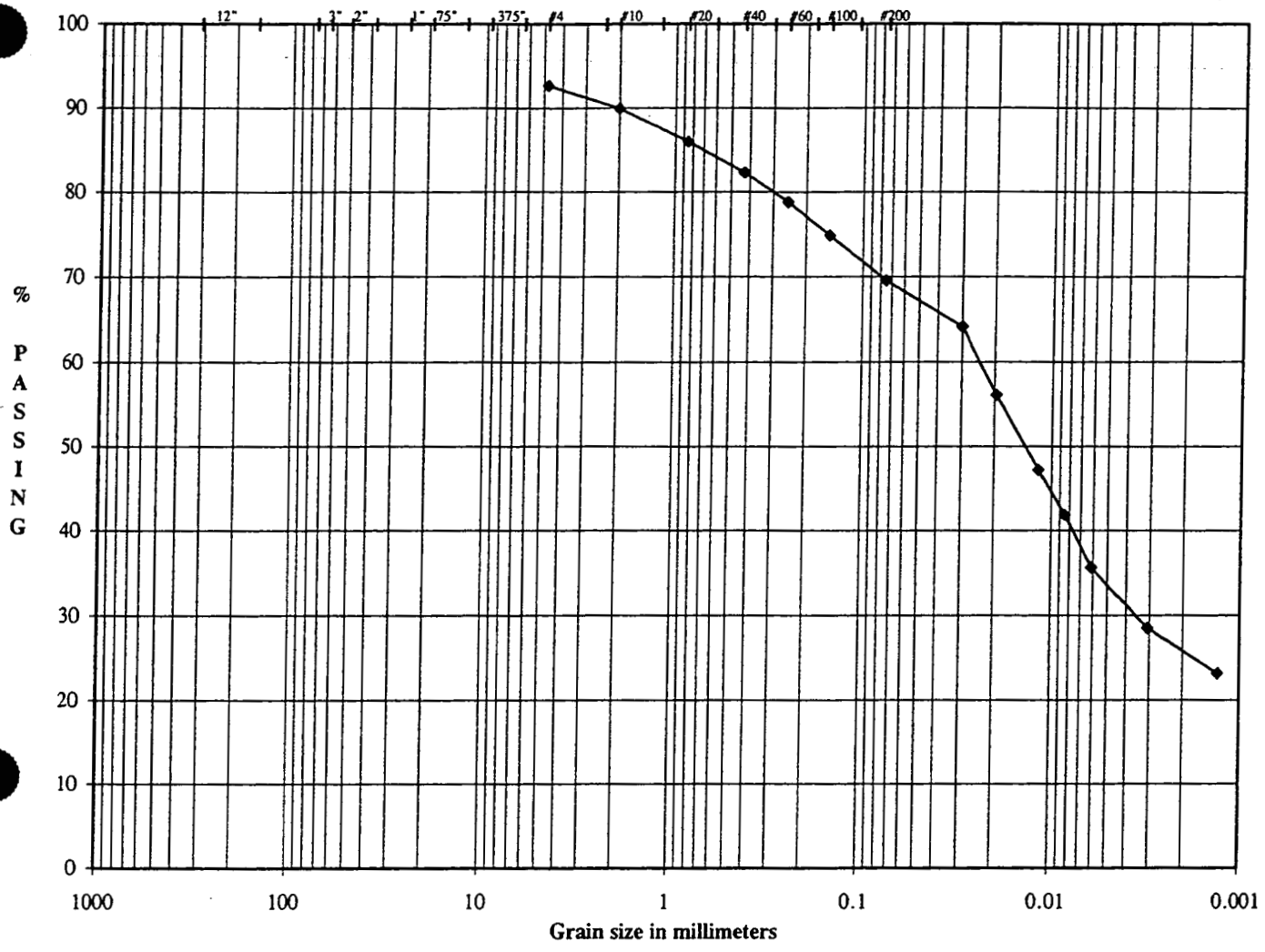
-	LL
-	PL
-	PI

TECH	TJ/JH
DATE	7/19/02
CHECK	BN
REVIEW	[illegible]

000256

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 12
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/JH
DATE	7/19/02
CHECK	BSS
REVIEW	AWG

000257

Bucket Sample
53.50
-1.73
-1.77

GEOSYNTEC CONSULTANTS

5368
FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 19 day JULY month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-13

SOIL SAMPLE SIZE	+3/8 = 1186.2 gm	MOISTURE = 356.7	TOTAL = 25025.8
	-3/8 = 23482.9		

25025.8

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-3	L-1	L-3	L-1
WT. OF DRY SAMPLE PLUS TARE (grams)	1376.1	760.9	1305.2	343.0
WT. OF TARE (grams)	189.9	192.4	189.9	192.4
WT. OF DRY SAMPLE (grams)	1186.2	568.5	1115.3	150.6

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	102.0	0.4	99.6		
1 in	25.4	197.8	2.0	98.0		
3/4 in	19.1	652.6	2.6	97.4		90-100
1/2 in	12.7	964.7	3.9	96.1		
3/8 in	9.53	1115.1	4.5	95.5		
No. 4	4.75	21.5	3.8	96.2	91.9	
No. 10	2.00	39.8	7.0	93.0	88.8	
No. 20	0.850	56.0	9.9	90.0	86.0	
No. 40	0.425	73.2	12.9	87.1	83.2	
No. 60	0.250	94.2	16.6	83.4	79.6	
No. 100	0.125	122.9	21.6	78.4	74.9	
No. 200	0.075	149.7	26.3	73.7	70.4	50-100
PAN	—	150.4	—	—		

COMMENTS:

000258

*%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [illegible] — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

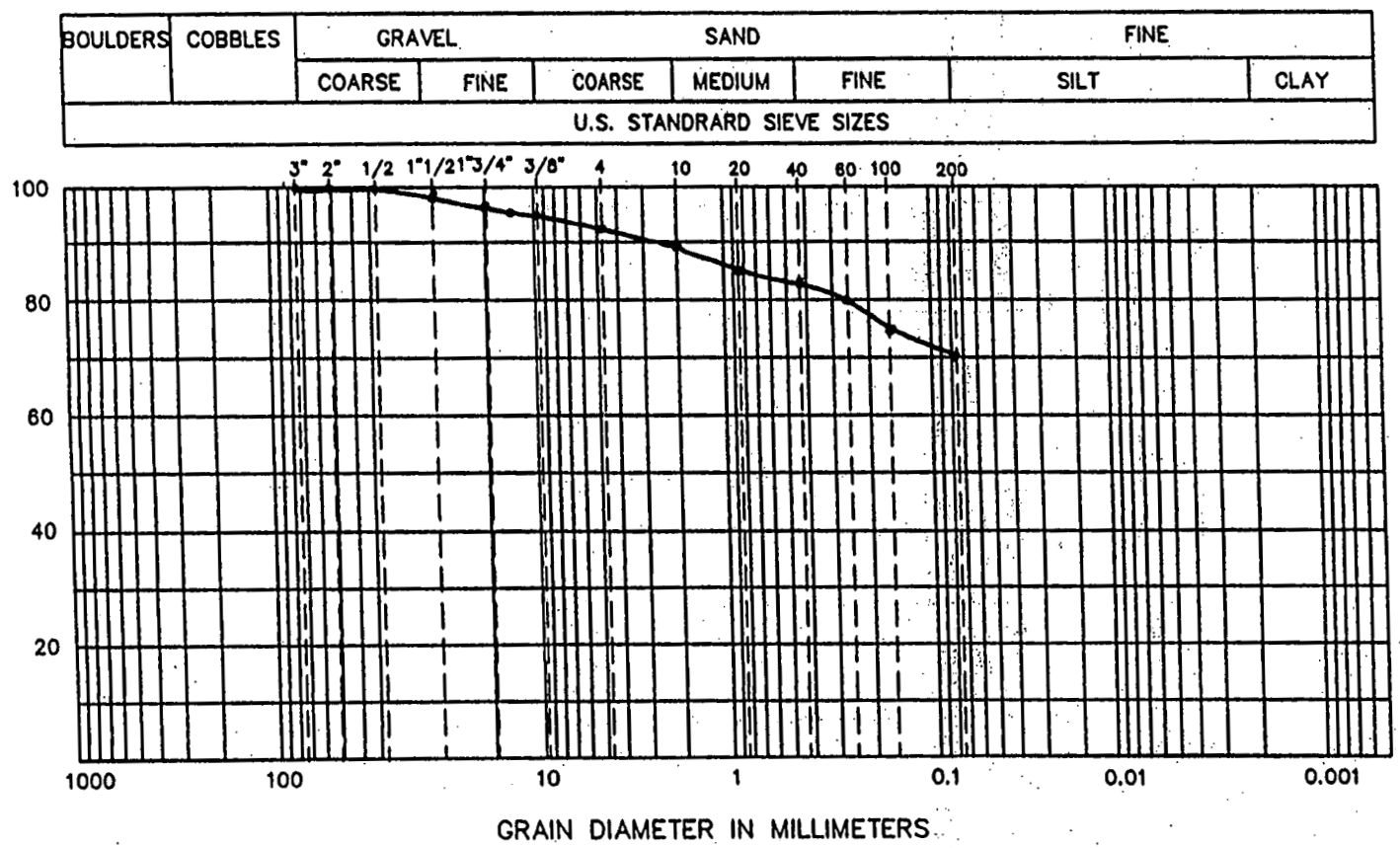
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: 30 day July month 2002 year

MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02-13 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.6
1-in.	98.0
3/4-in.	97.4
1/2-in.	96.1
3/8-in.	95.5
NO. 4	91.9
NO. 10	88.8
NO. 20.	86.0
NO. 40	83.2
NO. 60	79.6
NO. 100	74.9
NO. 200	70.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	69
0.02	59
0.005	34
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

002259

5368

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ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 13
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.45
Dry Soil & Tare (gm)	48.18
Tare Weight (gm)	3.19
Moisture Content (%)	5.05

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	836.40	
Tare Weight (gm)	236.25	
Total Weight (gm)	571.32	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			91.9	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.66
Calculated Dry Wt. used in test (gm)	53.94
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	91.90

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.24	1.24	89.8	#10	medium sand
#20	3.28	3.28	86.3	#20	medium sand
#40	5.17	5.17	83.1	#40	fine sand
#60	6.81	6.81	80.3	#60	fine sand
#100	8.73	8.73	77.0	#100	fine sand
#200	11.28	11.28	72.7	#200	fines

HYDROMETER CALCULATIONS

DATE 7/25/02	TIME 9:35	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/25/02	9:37	2.00	45.0	22.50	0.013	7.50	37.50	10.2	0.99
7/25/02	9:40	5.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
7/25/02	9:50	15.00	35.0	22.50	0.013	7.50	27.50	11.9	0.99
7/25/02	10:05	30.00	32.0	22.50	0.013	7.50	24.50	12.4	0.99
7/25/02	10:35	60.00	29.0	22.50	0.013	7.50	21.50	12.9	0.99
7/25/02	13:45	250.00	24.0	22.50	0.013	7.50	16.50	13.7	0.99
7/26/02	9:35	1440.00	22.0	22.50	0.013	7.50	14.50	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0296	63.3		
0.0192	58.2	% GRAVEL	8.10
0.0117	46.4	% COARSE SAND	2.11
0.0084	41.3	% MEDIUM SAND	6.70
0.0061	36.3	% FINE SAND	10.41
0.0031	27.8	% FINES	72.68
0.0013	24.5	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

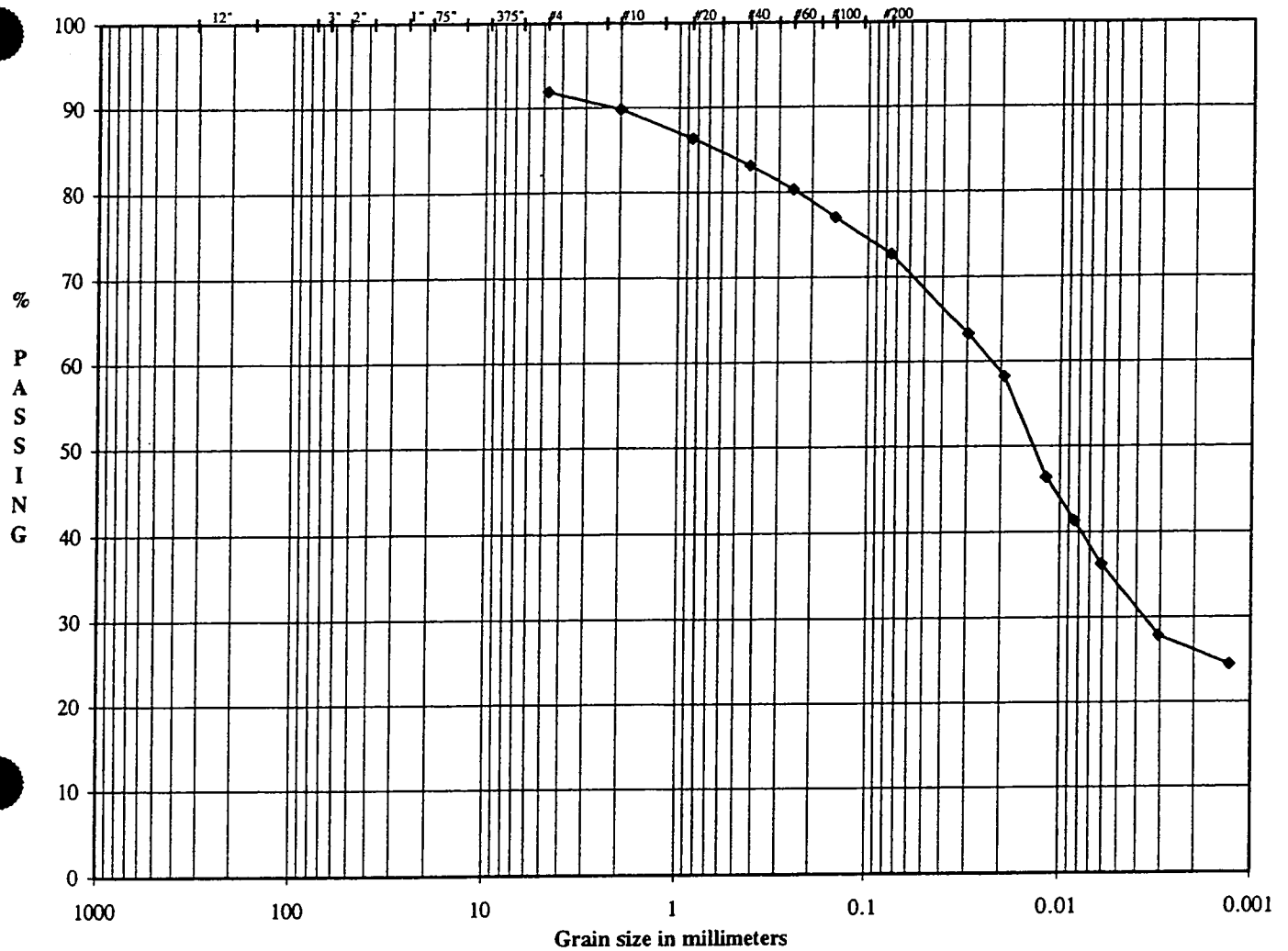
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/24/02
CHECK	BS
REVIEW	PWM

000260

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 13
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/24/02
CHECK	BS
REVIEW	DWM

000261

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

4 3
43.3

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 19 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-14

48.02
1.89
46.13
43.39
89.43

SOIL SAMPLE SIZE	+3/8 = 3386.5	MOISTURE = 407.3	TOTAL = 44359.3
	-3/8 = 40565.5		

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

44359.3

	BEFORE WASH +3/8	BEFORE WASH -3/8	AFTER WASH +3/8	AFTER WASH -3/8
TARE NO.	SB-1	L-6	SB-1	L-6
WT. OF DRY SAMPLE PLUS TARE (grams)	3672.1	810.8	3495.9	397.8
WT. OF TARE (grams)	285.6	199.1	285.6	199.1
WT. OF DRY SAMPLE (grams)	3386.5	611.7	3210.3	198.7

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	150.1	0.3	99.7		
1 in	25.4	1013.4	2.3	97.7		
3/4 in	19.1	1692.0	3.8	96.2		90-100
1/2 in	12.7	2784.1	6.3	93.7		
3/8 in	9.53	3208.6	7.2	92.8		
No. 4	4.75	30.1	4.9	95.1	88.3	
No. 10	2.00	57.3	9.4	90.6	84.1	
No. 20	0.850	85.7	14.0	86.0	79.8	
No. 40	0.425	112.1	18.3	81.7	75.8	
No. 60	0.250	138.0	22.6	77.4	71.8	
No. 100	0.125	168.3	27.5	72.5	67.3	
No. 200	0.075	197.3	32.3	67.7	62.8	50-100
PAN	—	198.6	—	—		

COMMENTS:

000262

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [illegible] — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

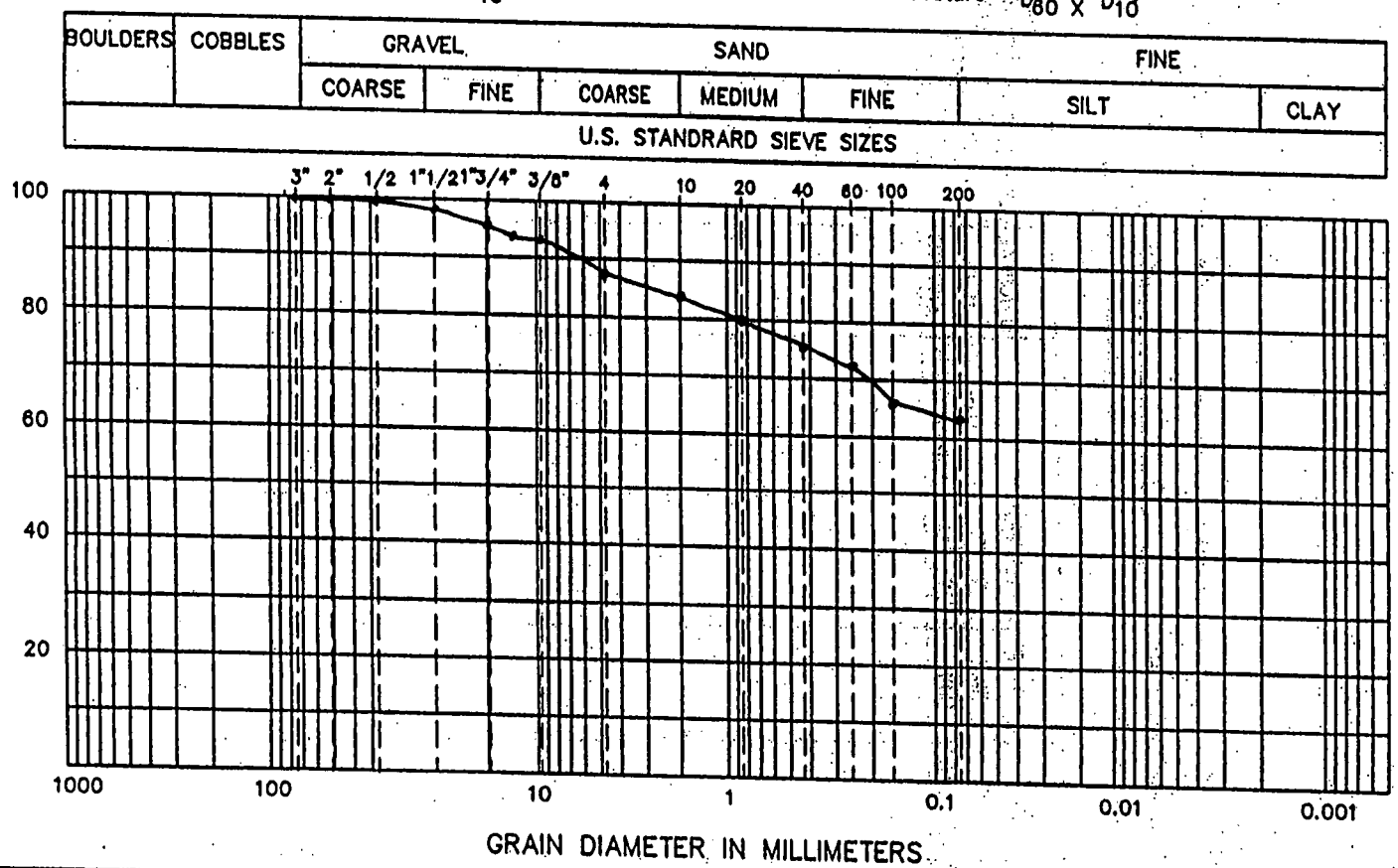
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DATE: 3Φ day July month 2ΦΦ2 year

SAMPLE NO.: LPΦ2-14 QA ID: LCS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 27

(PL) 15

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	1ΦΦ
2-in.	1ΦΦ
1 1/2-in.	99.7
1-in.	97.7
3/4-in.	96.2
1/2-in.	93.7
3/8-in.	92.8
NO. 4	88.3
NO. 10	84.1
NO. 20	79.8
NO. 40	75.8
NO. 60	71.8
NO. 100	67.3
NO. 200	62.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
Φ.Φ5	62
Φ.Φ2	51
Φ.ΦΦ5	29
Φ.ΦΦ2	22

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY: _____

SHEET NO. _____ OF _____

000263

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 14
OJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.44
Dry Soil & Tare (gm)	47.48
Tare Weight (gm)	3.21
Moisture Content (%)	6.69

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	843.60	
Tare Weight (gm)	242.30	
Total Weight (gm)	563.62	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			88.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.15
Calculated Dry Wt. used in test (gm)	53.57
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	88.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	3.07	3.07	83.2	#10	medium sand
#20	5.49	5.49	79.3	#20	medium sand
#40	7.42	7.42	76.1	#40	fine sand
#60	9.18	9.18	73.2	#60	fine sand
#100	11.39	11.39	69.5	#100	fine sand
#200	14.45	14.45	64.5	#200	fines

HYDROMETER CALCULATIONS

DATE 7/25/02	TIME 9:37	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/25/02	9:39	2.00	44.0	22.50	0.013	7.50	36.50	10.4	0.99
7/25/02	9:42	5.00	39.0	22.50	0.013	7.50	31.50	11.2	0.99
7/25/02	9:52	15.00	34.0	22.50	0.013	7.50	26.50	12.0	0.99
7/25/02	10:07	30.00	30.0	22.50	0.013	7.50	22.50	12.7	0.99
7/25/02	10:37	60.00	27.0	22.50	0.013	7.50	19.50	13.2	0.99
7/25/02	13:47	250.00	22.0	22.50	0.013	7.50	14.50	14.0	0.99
7/26/02	9:37	1440.00	20.0	22.50	0.013	7.50	12.50	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	59.6		
0.0196	51.4	% GRAVEL	11.70
0.0117	43.2	% COARSE SAND	5.06
0.0085	36.7	% MEDIUM SAND	7.17
0.0061	31.8	% FINE SAND	11.59
0.0031	23.7	% FINES	64.48
0.0013	20.4	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

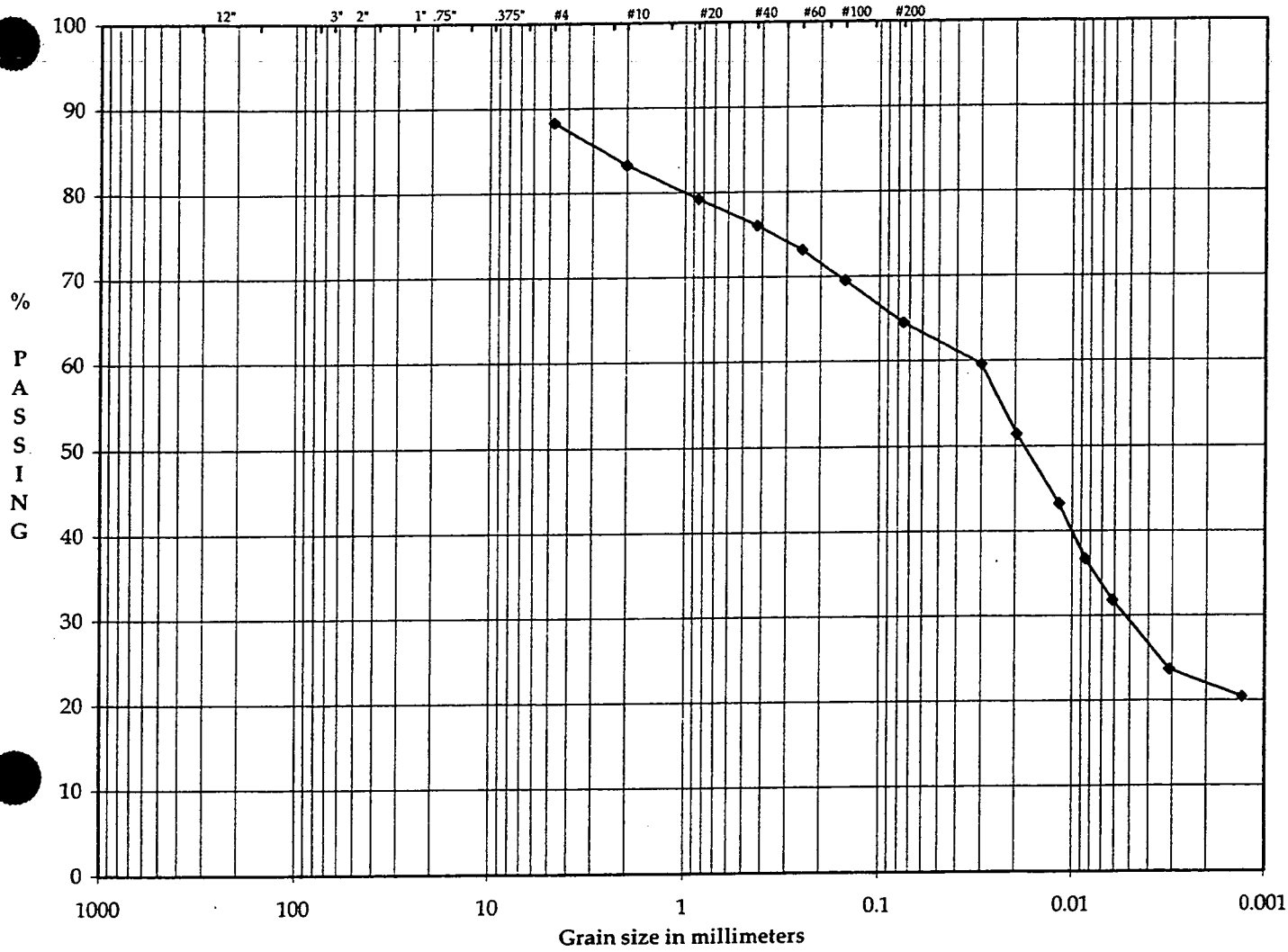
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/24/02
CHECK	BK
REVIEW	RWM

000264

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 14
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000265

TECH	TJ
DATE	7/24/02
CHECK	
REVIEW	

Golder Associates Inc.

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

5368

189469

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 19 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02.15

SOIL SAMPLE SIZE	+3/8 = 858.5 gm	MOISTURE = 295.2 gm	TOTAL = 20100.6 gm
	-3/8 = 18946.9 gm	20100.6	

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

43.50
1.77
41.73

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	N	L-9	N	L-9
WT. OF DRY SAMPLE PLUS TARE (grams)	960.2	796.6	908.5	377.3
WT. OF TARE (grams)	101.7	193.4	101.7	193.4
WT. OF DRY SAMPLE (grams)	858.5	603.2	806.9	183.9

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	228.1	1.1	98.9		
1 in	25.4	283.7	1.4	98.6		
3/4 in	19.1	378.3	1.9	98.1		90-100
1/2 in	12.7	706.3	3.5	96.5		
3/8 in	9.53	806.7	4.0	96.0		
No. 4	4.75	12.6	2.1	97.9	94.0	
No. 10	2.00	37.8	6.3	93.7	90.0	
No. 20	0.850	65.5	10.9	89.1	85.5	
No. 40	0.425	93.2	15.5	84.5	81.1	
No. 60	0.250	118.5	19.6	80.4	77.2	
No. 100	0.125	148.6	24.6	75.4	72.4	
No. 200	0.075	182.5	30.3	69.7	66.9	50-100
PAN	—	183.9	—	—		

COMMENTS:

000266

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [illegible] — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

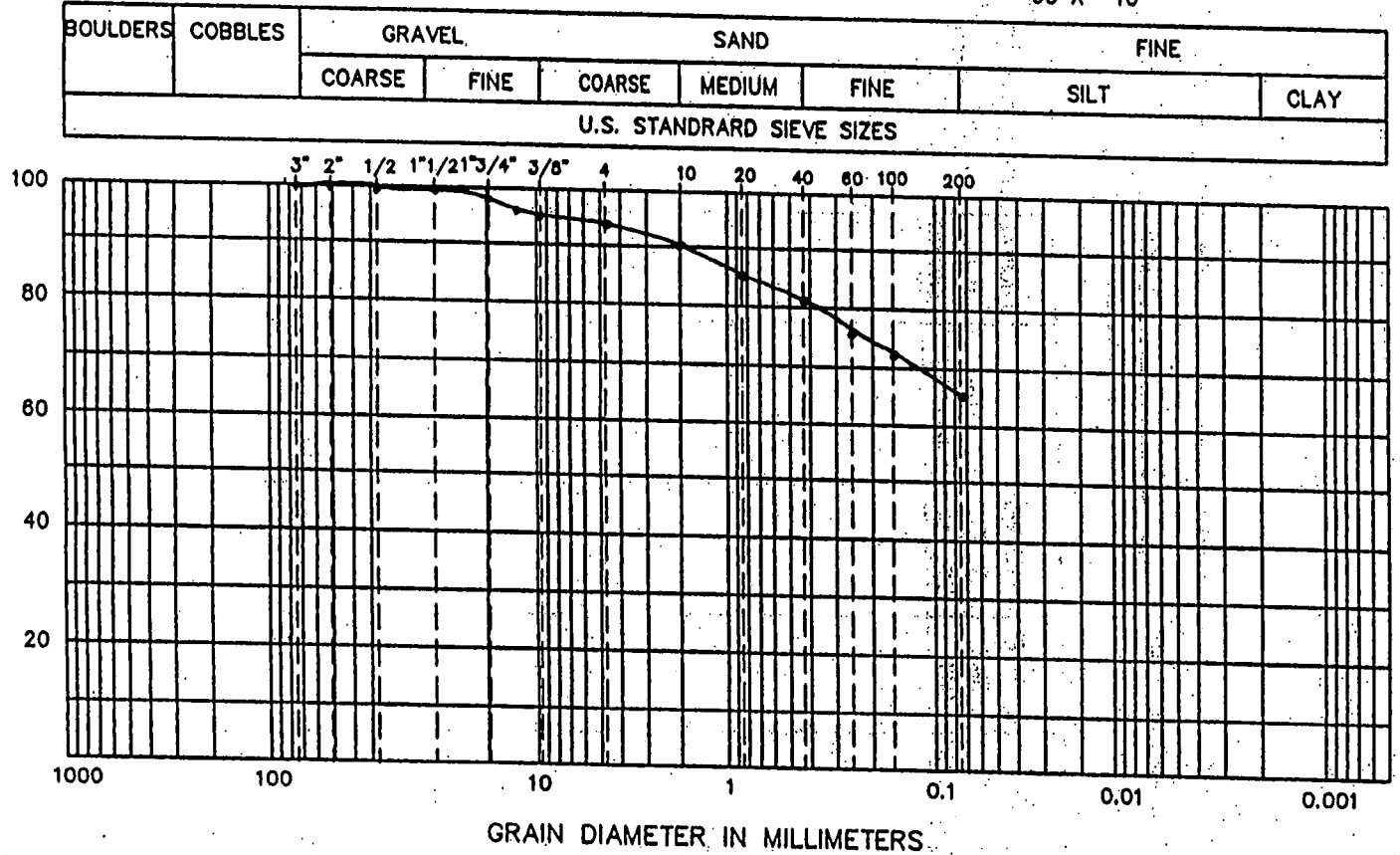
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 30 day July month 2002 year

SAMPLE NO.: LP02-15 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 28

(PL) 15

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	98.9
1-In.	98.6
3/4-In.	98.1
1/2-In.	96.5
3/8-In.	96.0
NO. 4	94.0
NO. 10	90.0
NO. 20.	85.5
NO. 40	81.1
NO. 60	77.2
NO. 100	72.4
NO. 200	66.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	66
0.02	54
0.005	31
0.002	22

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

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000267

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 15
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.33
Dry Soil & Tare (gm)	47.37
Tare Weight (gm)	3.23
Moisture Content (%)	6.71

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	836.50	
Tare Weight (gm)	235.66	
Total Weight (gm)	563.08	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.49
Calculated Dry Wt. used in test (gm)	52.94
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.93	1.93	90.6	#10	medium sand
#20	4.19	4.19	86.6	#20	medium sand
#40	6.27	6.27	82.9	#40	fine sand
#60	8.21	8.21	79.4	#60	fine sand
#100	10.47	10.47	75.4	#100	fine sand
#200	13.59	13.59	69.9	#200	fines

HYDROMETER CALCULATIONS

DATE 7/25/02	TIME 9:39	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/25/02	9:41	2.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
7/25/02	9:44	5.00	38.0	22.50	0.013	7.50	30.50	11.4	0.99
7/25/02	9:54	15.00	33.0	22.50	0.013	7.50	25.50	12.2	0.99
7/25/02	10:09	30.00	30.0	22.50	0.013	7.50	22.50	12.7	0.99
7/25/02	10:39	60.00	27.0	22.50	0.013	7.50	19.50	13.2	0.99
7/25/02	13:49	250.00	21.0	22.50	0.013	7.50	13.50	14.2	0.99
7/26/02	9:39	1440.00	19.5	22.50	0.013	7.50	12.00	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	60.6		
0.0198	53.6	% GRAVEL	6.00
0.0118	44.8	% COARSE SAND	3.43
0.0085	39.6	% MEDIUM SAND	7.71
0.0061	34.3	% FINE SAND	13.00
0.0031	23.7	% FINES	69.87
0.0013	21.1	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

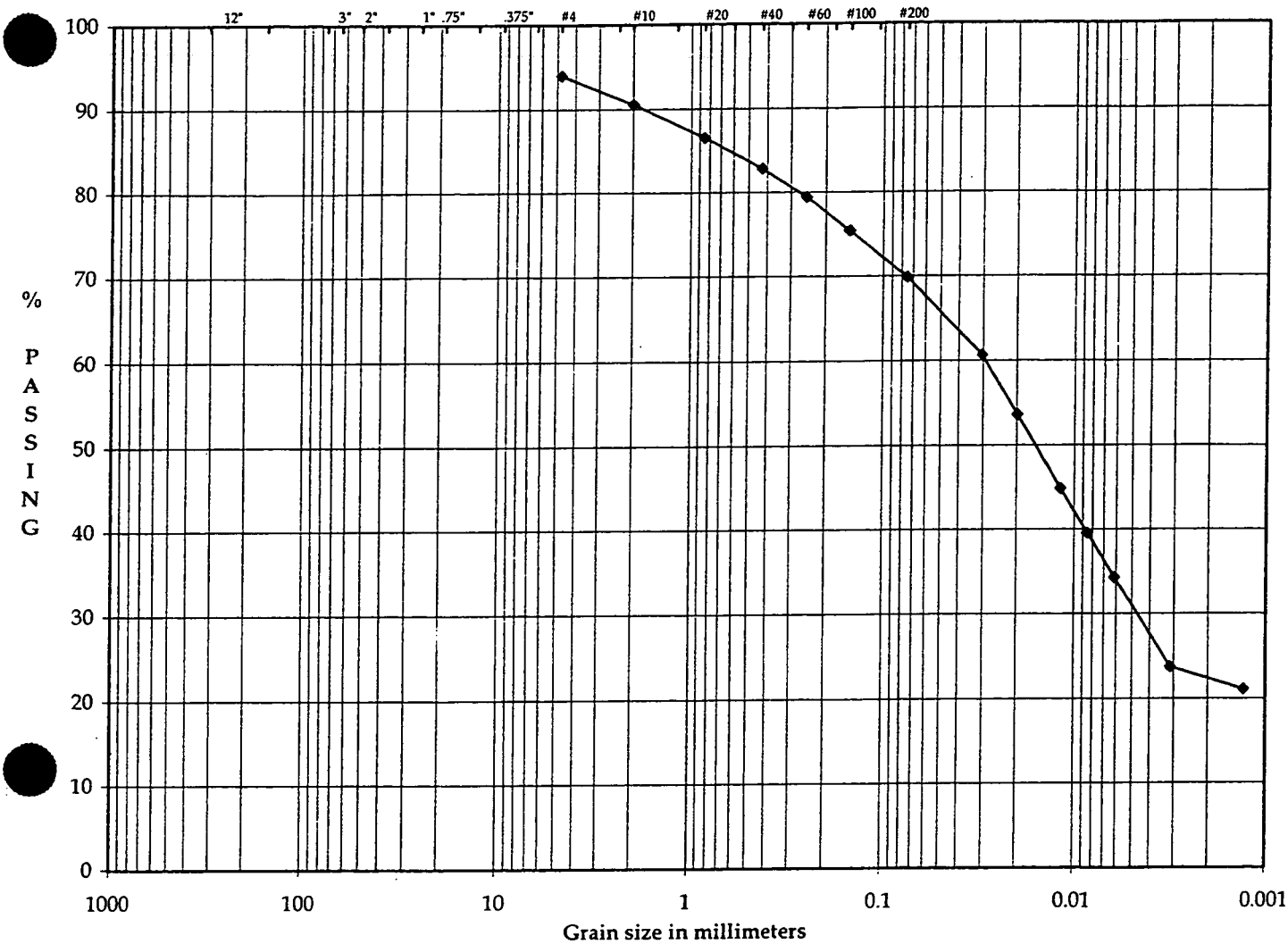
TECH	TJ
DATE	7/24/02
CHECK	BJS
REVIEW	[illegible]

000268

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 15
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/24/02
CHECK	
REVIEW	

000269

Golder Associates Inc.

38076.0

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 19 day JULY month 2002 year

MATERIAL TYPE: Low Poem CLAY SAMPLE NO.: LP02-16

SOIL SAMPLE SIZE	+3/8 = 1817.2	MOISTURE = 399.0	TOTAL = 38076.0
	-3/8 = 35879.8		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-4	LL-4	L-4	LL-4
WT. OF DRY SAMPLE PLUS TARE (grams)	2008.3	812.5	1873.8	345.2
WT. OF TARE (grams)	191.1	145.4	191.1	145.4
WT. OF DRY SAMPLE (grams)	1817.2	667.1	1682.7	199.8

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	105.9	0.3	99.7		
1 in	25.4	498.3	1.3	98.7		
3/4 in	19.1	821.6	2.2	97.8		90-100
1/2 in	12.7	1372.3	3.6	96.4		
3/8 in	9.53	1676.2	4.4	95.6		
No. 4	4.75	12.9	1.9	98.1	93.8	
No. 10	2.00	41.3	6.2	93.8	89.7	
No. 20	0.850	74.3	11.1	88.9	85.0	
No. 40	0.425	105.4	15.8	84.2	80.5	
No. 60	0.250	131.5	19.7	80.3	76.8	
No. 100	0.125	162.3	24.3	75.7	72.4	
No. 200	0.075	199.0	29.8	70.2	67.1	50-100
PAN	—	199.7	—	—	—	

COMMENTS:

000270

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: CA

SHEET NO. 1 OF 2

1.5 Bowl
5.73
.89
48.84

2" Bucket
31.99
-1.73
30.26
48.84
79.10

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

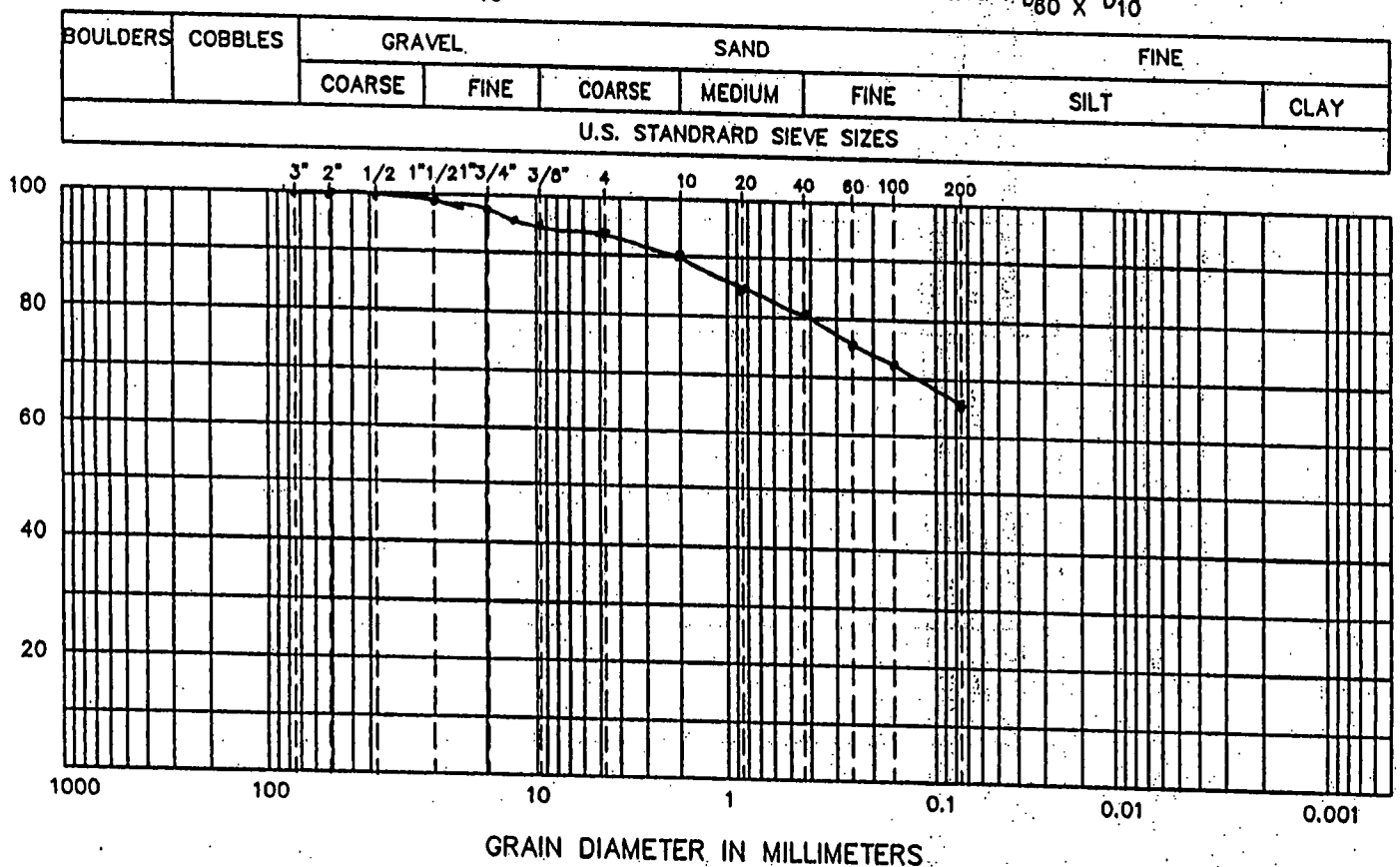
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 30 day July month 2002 year

SAMPLE NO.: 4002-16 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 26

(PL) 15

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.7
1-in.	98.7
3/4-in.	97.8
1/2-in.	96.4
3/8-in.	95.6
NO. 4	93.8
NO. 10	89.7
NO. 20.	85.0
NO. 40	80.5
NO. 60	76.8
NO. 100	72.4
NO. 200	67.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	64
0.02	52
0.005	30
0.002	21

SOIL CLASSIFICATION (ASTM D 2487): CL

000271

5368

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 16
)JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.44
Dry Soil & Tare (gm)	48.14
Tare Weight (gm)	3.22
Moisture Content (%)	5.12

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	842.05	
Tare Weight (gm)	242.22	
Total Weight (gm)	570.61	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.76
Calculated Dry Wt. used in test (gm)	54.00
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.73	1.73	90.8	#10	medium sand
#20	4.22	4.22	86.5	#20	medium sand
#40	6.50	6.50	82.5	#40	fine sand
#60	8.73	8.73	78.6	#60	fine sand
#100	11.27	11.27	74.2	#100	fine sand
#200	14.75	14.75	68.2	#200	fines

HYDROMETER CALCULATIONS

DATE 7/25/02	TIME 9:41	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/25/02	9:43	2.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
7/25/02	9:46	5.00	38.0	22.50	0.013	7.50	30.50	11.4	0.99
7/25/02	9:56	15.00	33.0	22.50	0.013	7.50	25.50	12.2	0.99
7/25/02	10:11	30.00	30.0	22.50	0.013	7.50	22.50	12.7	0.99
7/25/02	10:41	60.00	27.0	22.50	0.013	7.50	19.50	13.2	0.99
7/25/02	13:51	250.00	21.0	22.50	0.013	7.50	13.50	14.2	0.99
7/26/02	9:41	1440.00	19.0	22.50	0.013	7.50	11.50	14.5	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	59.3		
0.0198	52.5	% GRAVEL	6.20
0.0118	43.9	% COARSE SAND	3.01
0.0085	38.7	% MEDIUM SAND	8.29
0.0061	33.5	% FINE SAND	14.33
0.0031	23.2	% FINES	68.18
0.0013	19.8	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

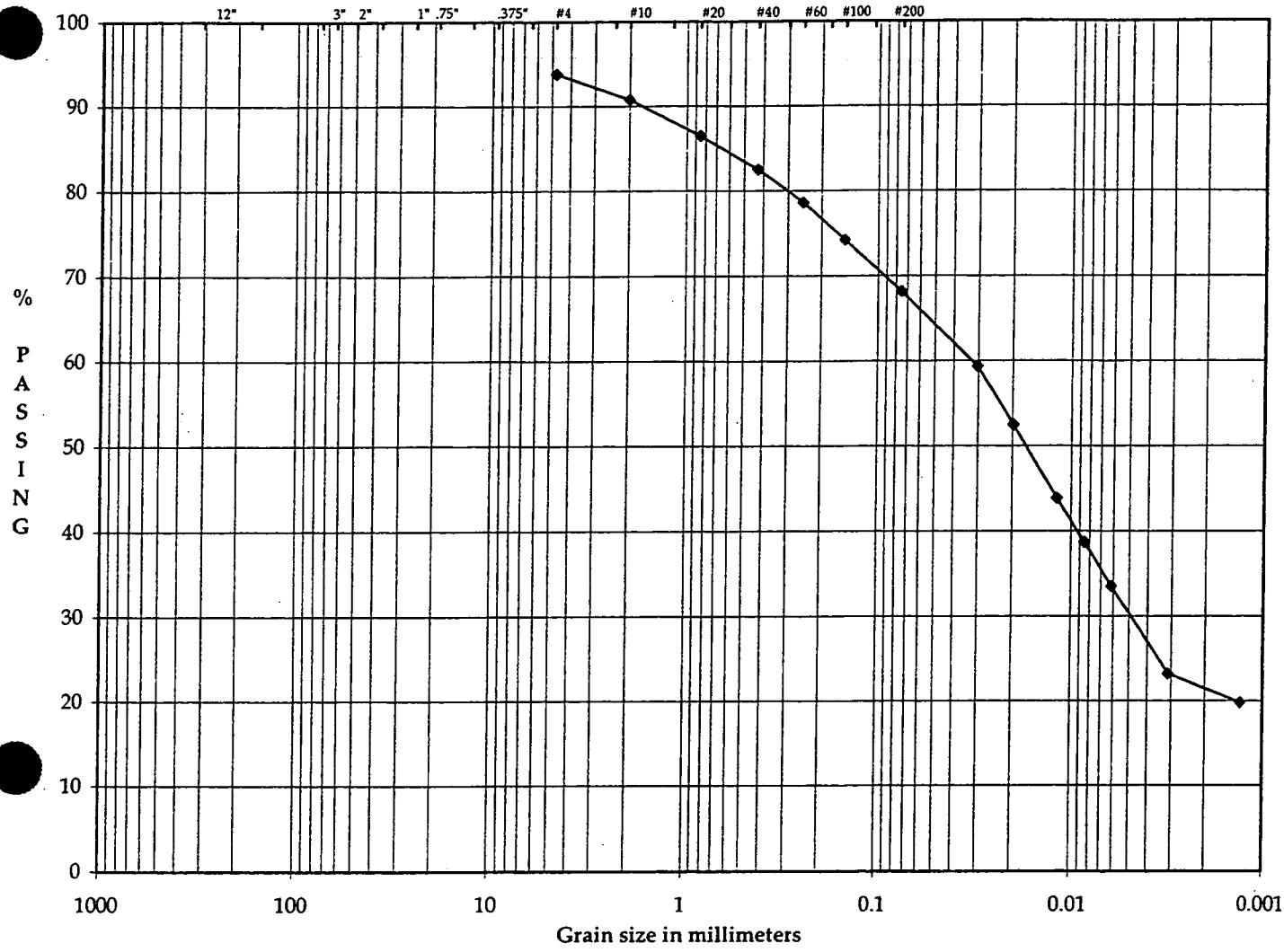
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/24/02
CHECK	BG
REVIEW	PWG

000272

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 16
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000273

TECH	TJ
DATE	7/24/02
CHECK	
REVIEW	

51.36

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

5368

23294

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 041

DESCRIPTION: PHASE III — DATE: 22 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-17

SOIL SAMPLE SIZE	+3/8 = 852.5 gm	MOISTURE = 442.8 gm	TOTAL = 24587.7
	-3/8 = 23292.4		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	K	L-9	K	L-9
WT. OF DRY SAMPLE PLUS TARE (grams)	954.0	832.5	896.9	398.7
WT. OF TARE (grams)	101.5	193.4	101.5	193.4
WT. OF DRY SAMPLE (grams)	852.5	639.1	795.4	205.3

SIEVE ANALYSIS — QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	80.2	0.3	99.7		
1 in	25.4	203.7	0.8	99.2		
3/4 in	19.1	232.1	0.9	99.1		90-100
1/2 in	12.7	576.2	2.3	97.7		
3/8 in	9.53	795.1	3.2	96.8		
No. 4	4.75	15.3	2.4	97.6	94.4	
No. 10	2.00	48.0	7.5	92.5	89.5	
No. 20	0.850	82.1	12.8	87.2	84.3	
No. 40	0.425	113.3	17.7	82.3	79.6	
No. 60	0.250	139.5	21.8	78.2	75.6	
No. 100	0.125	170.7	26.7	73.3	70.9	
No. 200	0.075	204.6	32.0	68.0	65.8	50-100
PAN	—	205.7	—	—		

COMMENTS:

000274

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

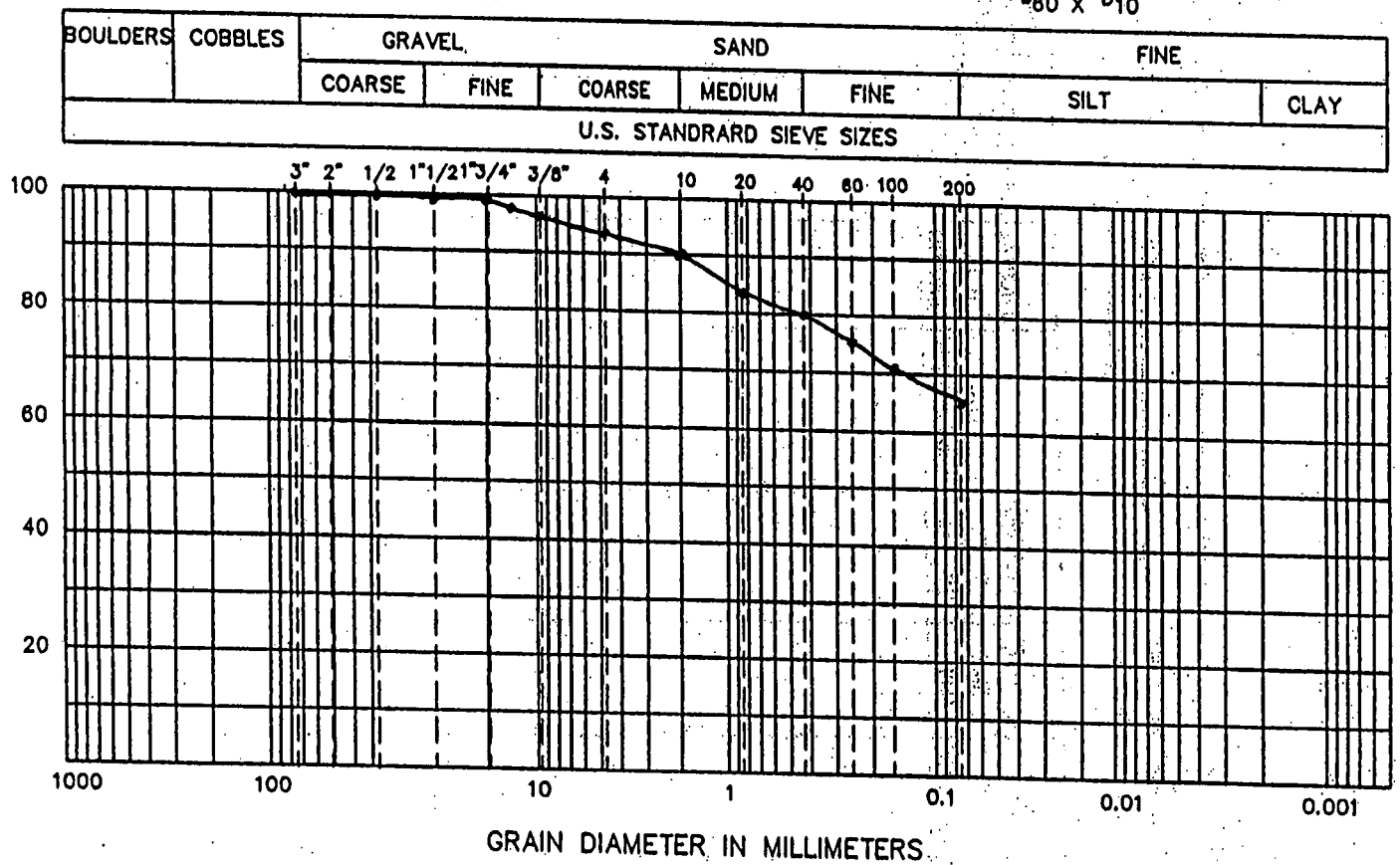
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 30 day July month 2002 year

SAMPLE NO.: LP02-17 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 26

(PL) 16

(PI) 10

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.7
1-in.	99.2
3/4-in.	99.1
1/2-in.	97.7
3/8-in.	96.8
NO. 4	94.4
NO. 10	89.5
NO. 20	84.3
NO. 40	79.6
NO. 60	75.6
NO. 100	70.9
NO. 200	65.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	67
0.002	60
0.005	00
0.002	

SOIL CLASSIFICATION (ASTM D 2487):

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CHECKED BY:

SHEET NO. ____ OF ____

000275

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 17
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.32
Dry Soil & Tare (gm)	48.36
Tare Weight (gm)	3.23
Moisture Content (%)	4.34

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	742.89	
Tare Weight (gm)	243.36	
Total Weight (gm)	478.74	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.4	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.21
Calculated Dry Wt. used in test (gm)	53.87
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.40

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.54	2.54	89.9	#10	medium sand
#20	5.14	5.14	85.4	#20	medium sand
#40	7.66	7.66	81.0	#40	fine sand
#60	9.98	9.98	76.9	#60	fine sand
#100	12.55	12.55	72.4	#100	fine sand
#200	15.63	15.63	67.0	#200	fines

HYDROMETER CALCULATIONS

DATE 7/31/02	TIME 9:30	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/31/02	9:32	2.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
7/31/02	9:35	5.00	37.0	22.50	0.013	7.50	29.50	11.5	0.99
7/31/02	9:45	15.00	32.0	22.50	0.013	7.50	24.50	12.4	0.99
7/31/02	10:00	30.00	29.0	22.50	0.013	7.50	21.50	12.9	0.99
7/31/02	10:30	60.00	26.0	22.50	0.013	7.50	18.50	13.3	0.99
7/31/02	13:40	250.00	22.0	22.50	0.013	7.50	14.50	14.0	0.99
8/1/02	9:30	1440.00	18.0	22.50	0.013	7.50	10.50	14.7	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	59.9		
0.0199	51.2	% GRAVEL	5.60
0.0119	42.5	% COARSE SAND	4.45
0.0086	37.3	% MEDIUM SAND	8.97
0.0062	32.1	% FINE SAND	13.97
0.0031	25.2	% FINES	67.01
0.0013	18.2	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

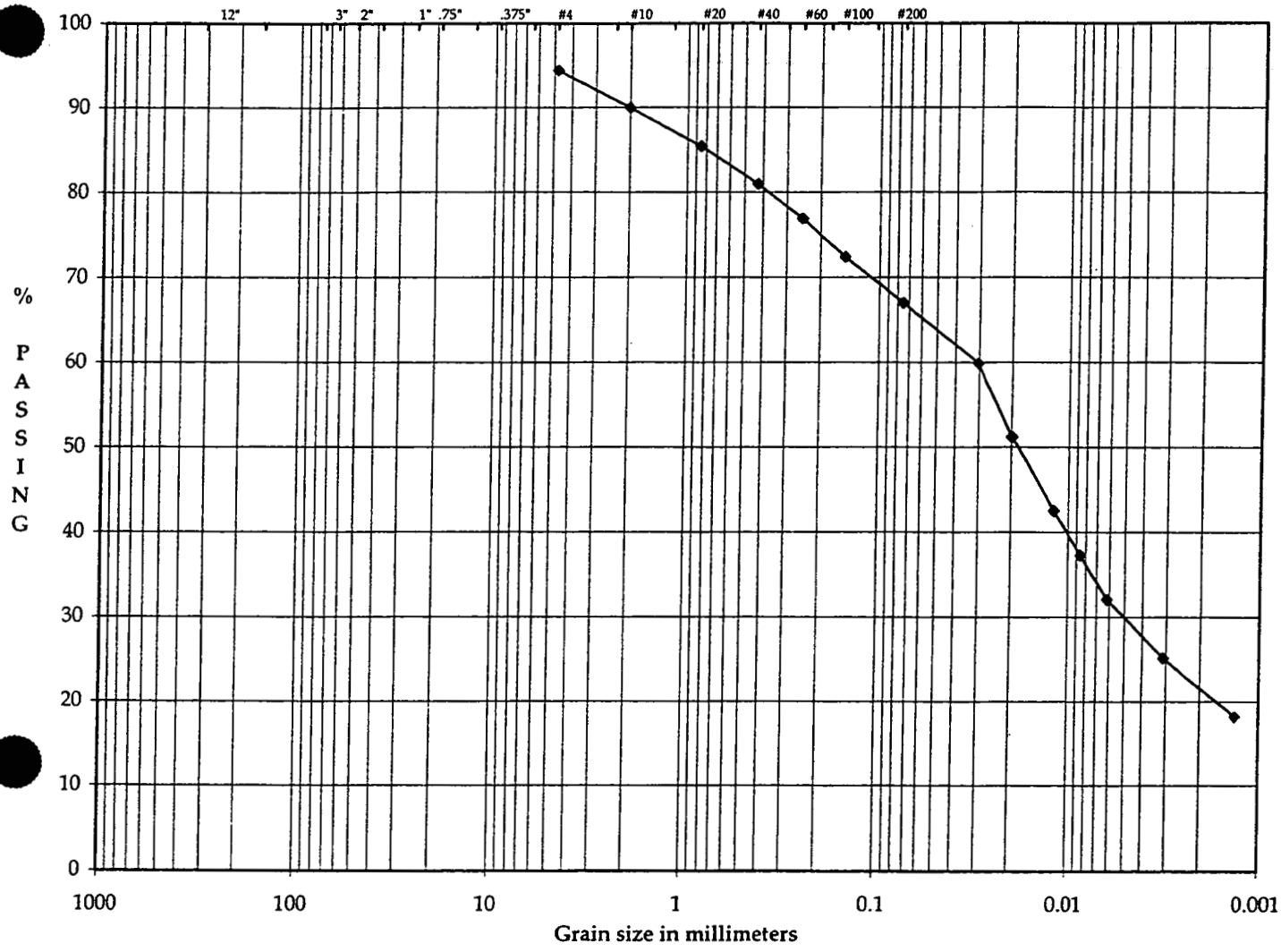
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/30/02
CHECK	BK
REVIEW	[illegible]

000276

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 17
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/30/02
CHECK	BSS
REVIEW	PWM

000277

GEOSYNTEC CONSULTANTS

FLUOR FERNALD
5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 27 day July month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-19

SOIL SAMPLE SIZE	+3/8 = 984.5	MOISTURE = 405.8	TOTAL = 40005.3
	-3/8 = 38615.0	40065.3	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-6	LL-4	L-6	LL-4
WT. OF DRY SAMPLE PLUS TARE (grams)	1183.0	790.9	1129.3	340.0
WT. OF TARE (grams)	198.5	145.4	198.5	145.4
WT. OF DRY SAMPLE (grams)	984.5	645.5	930.8	194.6

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	142.9	.4	99.6		
3/4 in	19.1	225.2	.6	99.4		90-100
1/2 in	12.7	667.7	1.7	98.3		
3/8 in	9.53	929.4	2.3	97.7		
No. 4	4.75	23.4	3.6	96.4	94.2	
No. 10	2.00	53.5	8.3	91.7	89.6	
No. 20	0.850	85.8	13.3	86.7	84.7	
No. 40	0.425	114.5	17.7	82.3	80.4	
No. 60	0.250	136.9	21.2	78.8	77.0	
No. 100	0.125	163.3	25.3	74.7	73.0	
No. 200	0.075	192.8	29.9	70.1	68.5	50-100
PAN	—	194.6	—	—		

COMMENTS:

000278

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

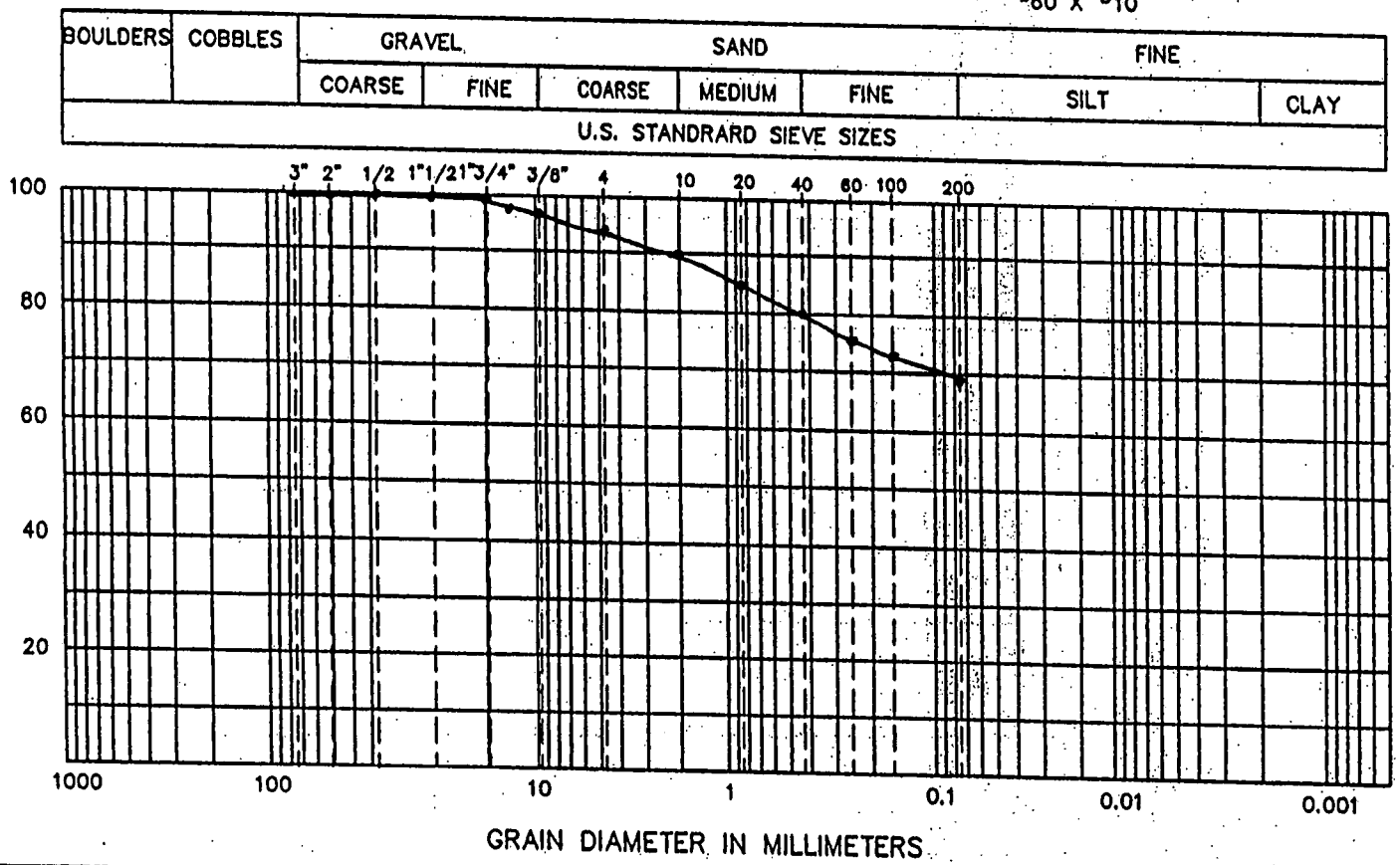
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DATE: 3Φ day July month 2ΦΦ2 year

SAMPLE NO.: LPΦ2-19 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 3Φ

(PL) 15

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	1ΦΦ
2-in.	1ΦΦ
1 1/2-in.	1ΦΦ
1-in.	99.6
3/4-in.	99.4
1/2-in.	98.3
3/8-in.	97.7
NO. 4	94.2
NO. 10	89.6
NO. 20	84.7
NO. 40	8Φ.4
NO. 60	77.Φ
NO. 100	73.Φ
NO. 200	68.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
Φ.Φ5	
Φ.Φ2	
Φ.ΦΦ5	
Φ.ΦΦ2	

SOIL CLASSIFICATION (ASTM D 2487):

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CHECKED BY:

SHEET NO. ____ OF ____

000279

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NO.	023-3313

SAMPLE ID	LP02 - 19
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4 = W1-W2)	
Weight of Dry Soil (gm)	(W5 = W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.97
Dry Soil & Tare (gm)	49.44
Tare Weight (gm)	3.21
Moisture Content (%)	3.31

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	812.92	
Tare Weight (gm)	316.69	
Total Weight (gm)	480.33	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.2	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.54
Calculated Dry Wt. used in test (gm)	54.73
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.20

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.03	2.03	90.7	#10	medium sand
#20	4.36	4.36	86.7	#20	medium sand
#40	6.20	6.20	83.5	#40	fine sand
#60	7.84	7.84	80.7	#60	fine sand
#100	9.76	9.76	77.4	#100	fine sand
#200	12.27	12.27	73.1	#200	fines

HYDROMETER CALCULATIONS

DATE 7/31/02	TIME 9:32	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/31/02	9:34	2.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
7/31/02	9:37	5.00	40.0	22.50	0.013	7.50	32.50	11.1	0.99
7/31/02	9:47	15.00	33.0	22.50	0.013	7.50	25.50	12.2	0.99
7/31/02	10:02	30.00	31.0	22.50	0.013	7.50	23.50	12.5	0.99
7/31/02	10:32	60.00	28.0	22.50	0.013	7.50	20.50	13.0	0.99
7/31/02	13:42	250.00	24.0	22.50	0.013	7.50	16.50	13.7	0.99
8/1/02	9:32	1440.00	21.0	22.50	0.013	7.50	13.50	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	58.8		
0.0195	55.4	% GRAVEL	5.80
0.0118	43.5	% COARSE SAND	3.49
0.0085	40.0	% MEDIUM SAND	7.18
0.0061	34.9	% FINE SAND	10.45
0.0031	28.1	% FINES	73.08
0.0013	23.0	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

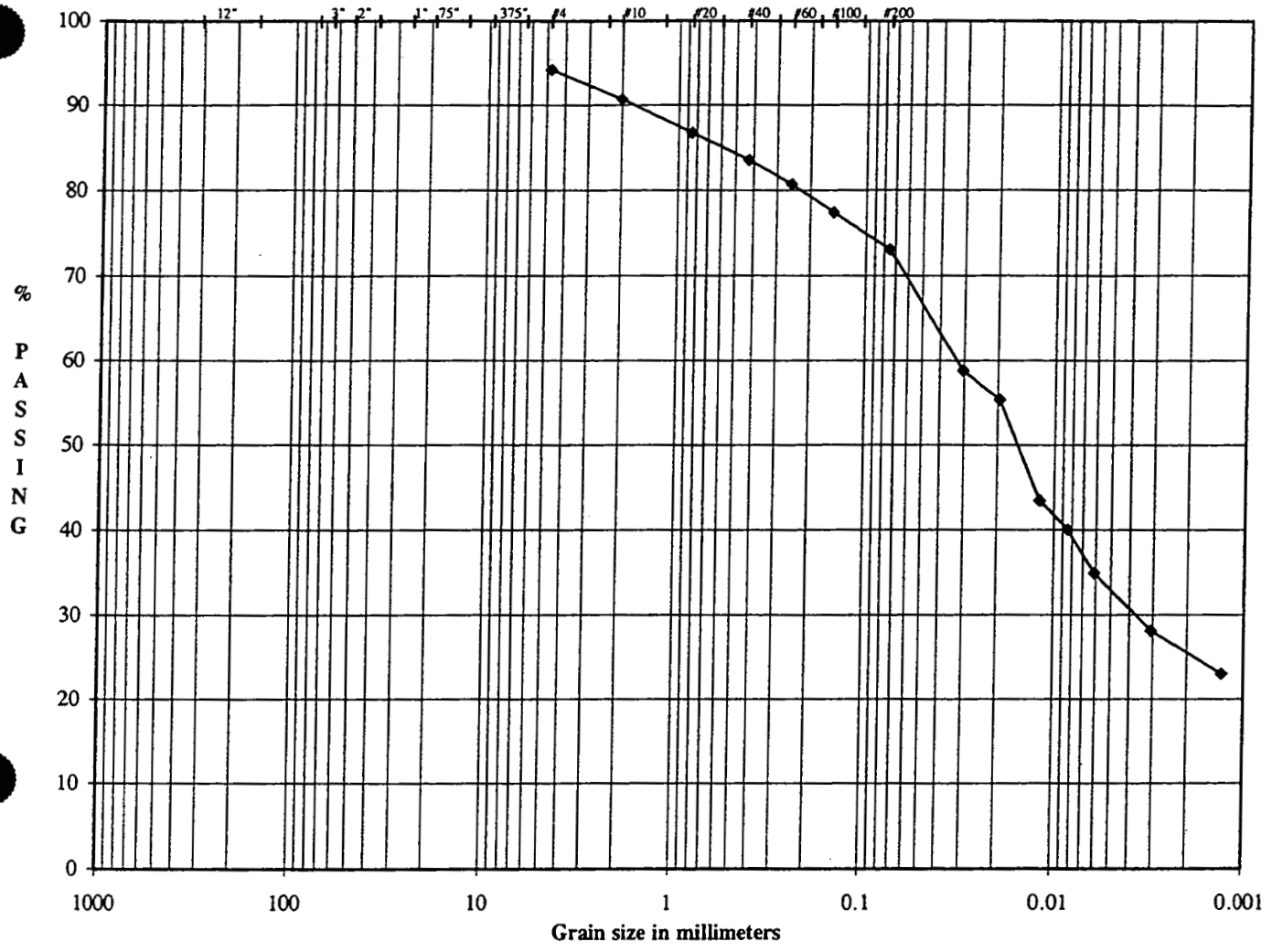
-	LL
-	PL
-	PI

TECH	TJ
DATE	7/30/02
CHECK	BS
REVIEW	[illegible]

000280

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 19
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/30/02
CHECK	BSG
REVIEW	[illegible]

000281

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 27 day July month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-21

SOIL SAMPLE SIZE	+3/8 = 1145.0 gm	MOISTURE = 492.3 gm	TOTAL = 21065.0 g
	-3/8 = 19,427.7 g		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-1	L-5	L-1	L-5
WT. OF DRY SAMPLE PLUS TARE	(grams)	1637.4	682.1	1469.7	277.8
WT. OF TARE	(grams)	192.4	106.4	192.4	106.4
WT. OF DRY SAMPLE	(grams)	1145.0	580.7	1277.3	171.4

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	00	0	100		
2 in	50.8	0.0	0	100		100
1 1/2in	38.1	0.0	0	100		
1 in	25.4	391.4	1.9	98.1		
3/4 in	19.1	631.0	3.0	97.0		90-100
1/2 in	12.7	1024.6	4.9	95.1		
3/8 in	9.53	1269.5	6.0	94.0		
No. 4	4.75	200	3.4	96.6	90.8	
No. 10	2.00	51.2	8.8	91.2	85.7	
No. 20	0.850	76.4	13.2	86.8	81.6	
No. 40	0.425	98.6	17.0	83.0	78.0	
No. 60	0.250	117.7	20.3	79.7	74.9	
No. 100	0.125	142.1	24.5	75.5	70.9	
No. 200	0.075	170.0	29.3	70.7	66.5	50-100
PAN	—	171.3	—	—		

COMMENTS:

000282

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [illegible] SHEET NO. 1 OF 4

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

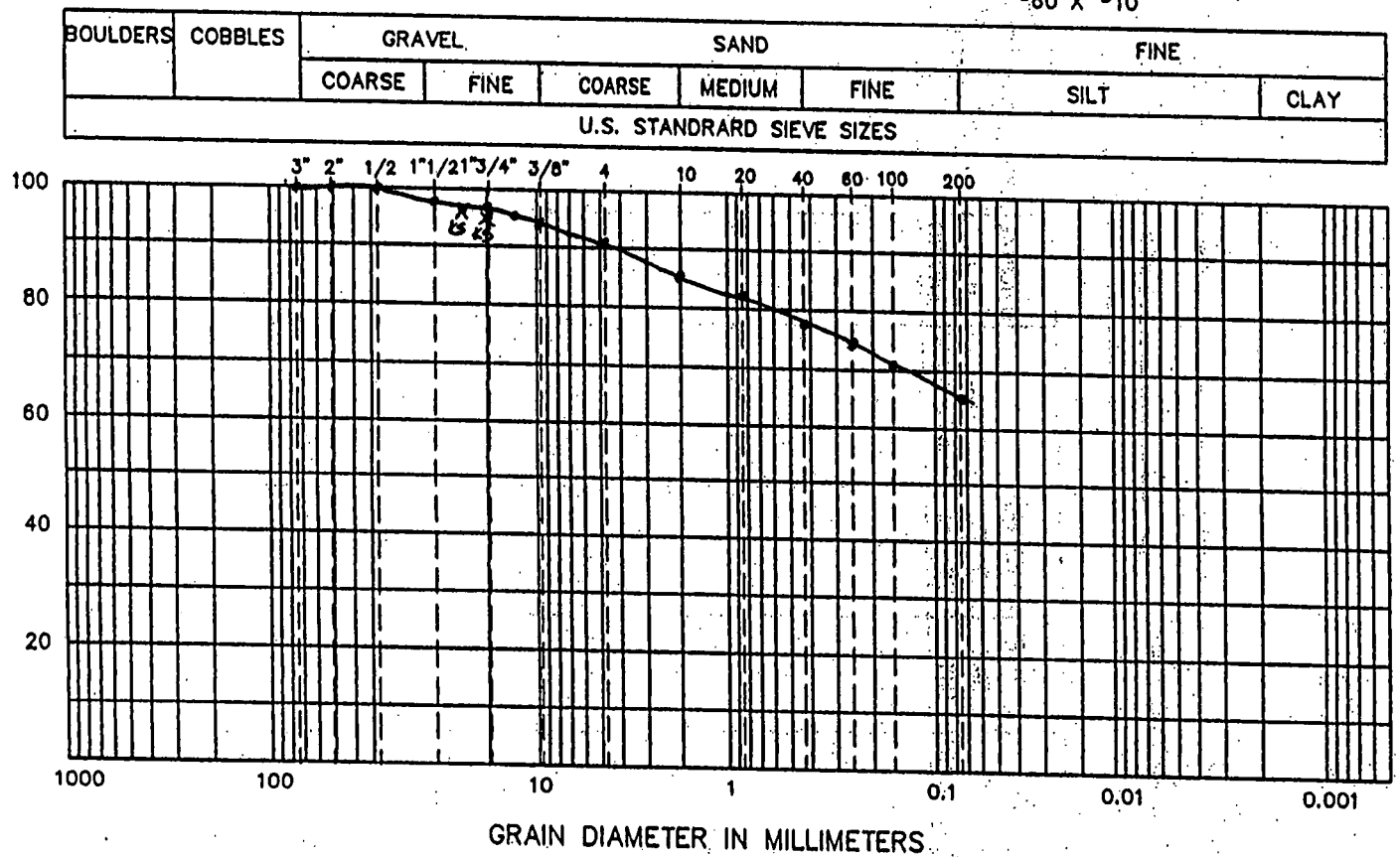
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: Ø4.1

DATE: 3Ø day July month 2ØØØ year

SAMPLE NO.: LPØ2-21 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 3Ø

(PL) 16

(PI) 14

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	1ØØ
2-in.	1ØØ
1 1/2-in.	1ØØ
1-in.	98.1
3/4-in.	97.Ø
1/2-in.	95.1
3/8-in.	94.Ø
NO. 4	9Ø.8
NO. 10	85.7
NO. 20.	81.6
NO. 40	78.Ø
NO. 60	74.9
NO. 100	7Ø.9
NO. 200	66.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
Ø.Ø5	
Ø.ØØ2	
Ø.ØØØ5	
Ø.ØØØ2	

SOIL CLASSIFICATION (ASTM D 2487):

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000283

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 21
)JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.29
Dry Soil & Tare (gm)	48.67
Tare Weight (gm)	3.21
Moisture Content (%)	3.56

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.69	
Tare Weight (gm)	236.01	
Total Weight (gm)	482.49	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			90.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.65
Calculated Dry Wt. used in test (gm)	55.67
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	90.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.31	2.31	87.0	#10	medium sand
#20	4.24	4.24	83.9	#20	medium sand
#40	5.75	5.75	81.4	#40	fine sand
#60	7.23	7.23	79.0	#60	fine sand
#100	9.05	9.05	76.0	#100	fine sand
#200	11.56	11.56	71.9	#200	fines

HYDROMETER CALCULATIONS

DATE 7/31/02	TIME 9:34	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/31/02	9:36	2.00	47.0	22.50	0.013	7.50	39.50	9.9	0.99
7/31/02	9:39	5.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
7/31/02	9:49	15.00	34.0	22.50	0.013	7.50	26.50	12.0	0.99
7/31/02	10:04	30.00	32.0	22.50	0.013	7.50	24.50	12.4	0.99
7/31/02	10:34	60.00	30.0	22.50	0.013	7.50	22.50	12.7	0.99
7/31/02	13:44	250.00	25.0	22.50	0.013	7.50	17.50	13.5	0.99
8/1/02	9:34	1440.00	22.0	22.50	0.013	7.50	14.50	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0291	63.8		
0.0192	55.7	% GRAVEL	9.20
0.0117	42.8	% COARSE SAND	3.77
0.0084	39.6	% MEDIUM SAND	5.61
0.0060	36.3	% FINE SAND	9.48
0.0030	28.3	% FINES	71.94
0.0013	23.4	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

TECH	TJ
DATE	7/30/02
CHECK	BEL
REVIEW	W.Y.

000284

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368

Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 21
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/30/02
CHECK	[illegible]
REVIEW	[illegible]

000285

Golder Associates Inc.

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD 5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 29 day July month 2002 year

MATERIAL TYPE: Low Poorm CLAY SAMPLE NO.: LP02-22

SOIL SAMPLE SIZE	+3/8 = 22840 gm	MOISTURE = 293.9 gm	TOTAL = 46817.5
	-3/8 = 44,239.6 g		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		N	L-2	N	L-2
WT. OF DRY SAMPLE PLUS TARE	(grams)	2385.6	759.3	2123.9	361.5
WT. OF TARE	(grams)	101.6	191.3	101.6	191.3
WT. OF DRY SAMPLE	(grams)	2284.0	569.0	2022.3	170.2

SIEVE ANALYSIS QA ID: AJC

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	68.1	0.1	99.9		
1 in	25.4	558.8	1.2	98.8		
3/4 in	19.1	967.5	2.1	97.9		90-100
1/2 in	12.7	1610.3	3.4	96.6		
3/8 in	9.53	2021.4	4.3	95.7		
No. 4	4.75	17.3	3.0	97.0	92.8	
No. 10	2.00	42.9	7.5	92.5	88.5	
No. 20	0.850	69.5	12.2	87.8	84.0	
No. 40	0.425	94.6	16.6	83.4	79.8	
No. 60	0.250	115.3	20.3	79.7	76.3	
No. 100	0.125	140.3	24.7	75.3	72.1	
No. 200	0.075	169.5	29.8	70.2	~~76.2~~ 67.2	50-100
PAN	—	170.1	—	—		

COMMENTS:

000286

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: AJC SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

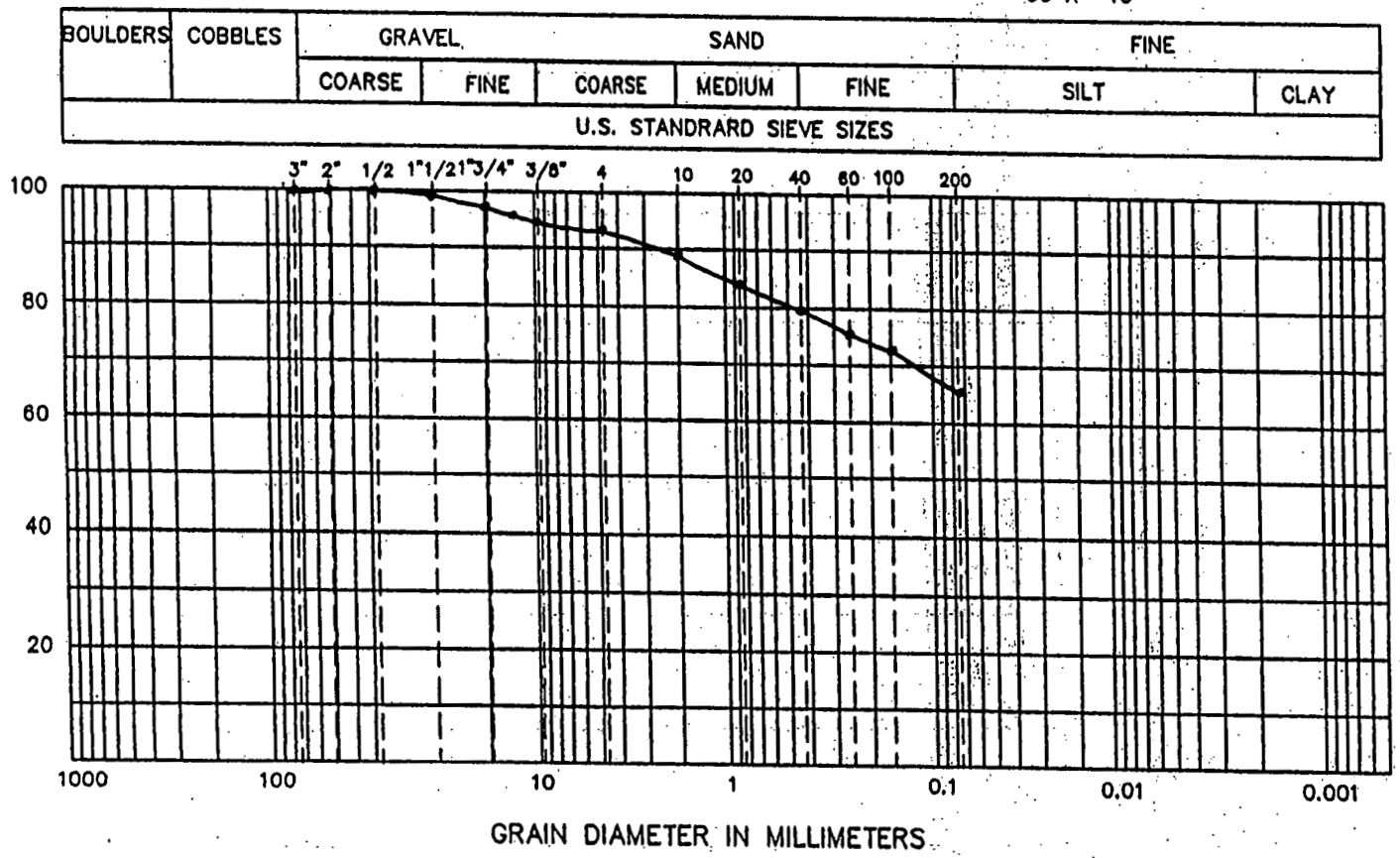
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 30 day July month 2002 year

SAMPLE NO.: LP02-22 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.9
1-in.	98.8
3/4-in.	97.9
1/2-in.	96.6
3/8-in.	95.7
NO. 4	92.8
NO. 10	88.5
NO. 20.	84.0
NO. 40	79.8
NO. 60	76.3
NO. 100	72.1
NO. 200	67.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	
0.002	
0.005	
0.002	

SOIL CLASSIFICATION (ASTM D 2487):

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY:

SHEET NO. ____ OF ____

000287

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 22
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.21
Dry Soil & Tare (gm)	47.59
Tare Weight (gm)	3.27
Moisture Content (%)	5.91

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	734.24	
Tare Weight (gm)	234.67	
Total Weight (gm)	471.69	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.98
Calculated Dry Wt. used in test (gm)	55.69
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.50	2.50	88.6	#10	medium sand
#20	4.68	4.68	85.0	#20	medium sand
#40	6.81	6.81	81.5	#40	fine sand
#60	8.72	8.72	78.3	#60	fine sand
#100	11.00	11.00	74.5	#100	fine sand
#200	14.05	14.05	69.4	#200	fines

HYDROMETER CALCULATIONS

DATE 7/31/02	TIME 9:36	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/31/02	9:38	2.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
7/31/02	9:41	5.00	40.0	22.50	0.013	7.50	32.50	11.1	0.99
7/31/02	9:51	15.00	32.0	22.50	0.013	7.50	24.50	12.4	0.99
7/31/02	10:06	30.00	30.0	22.50	0.013	7.50	22.50	12.7	0.99
7/31/02	10:36	60.00	27.0	22.50	0.013	7.50	19.50	13.2	0.99
7/31/02	13:46	250.00	23.0	22.50	0.013	7.50	15.50	13.8	0.99
8/1/02	9:36	1440.00	20.0	22.50	0.013	7.50	12.50	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0303	56.9
0.0195	53.6
0.0119	40.4
0.0085	37.1
0.0061	32.2
0.0031	25.6
0.0013	20.6

% GRAVEL	7.20
% COARSE SAND	4.17
% MEDIUM SAND	7.18
% FINE SAND	12.06
% FINES	69.39
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

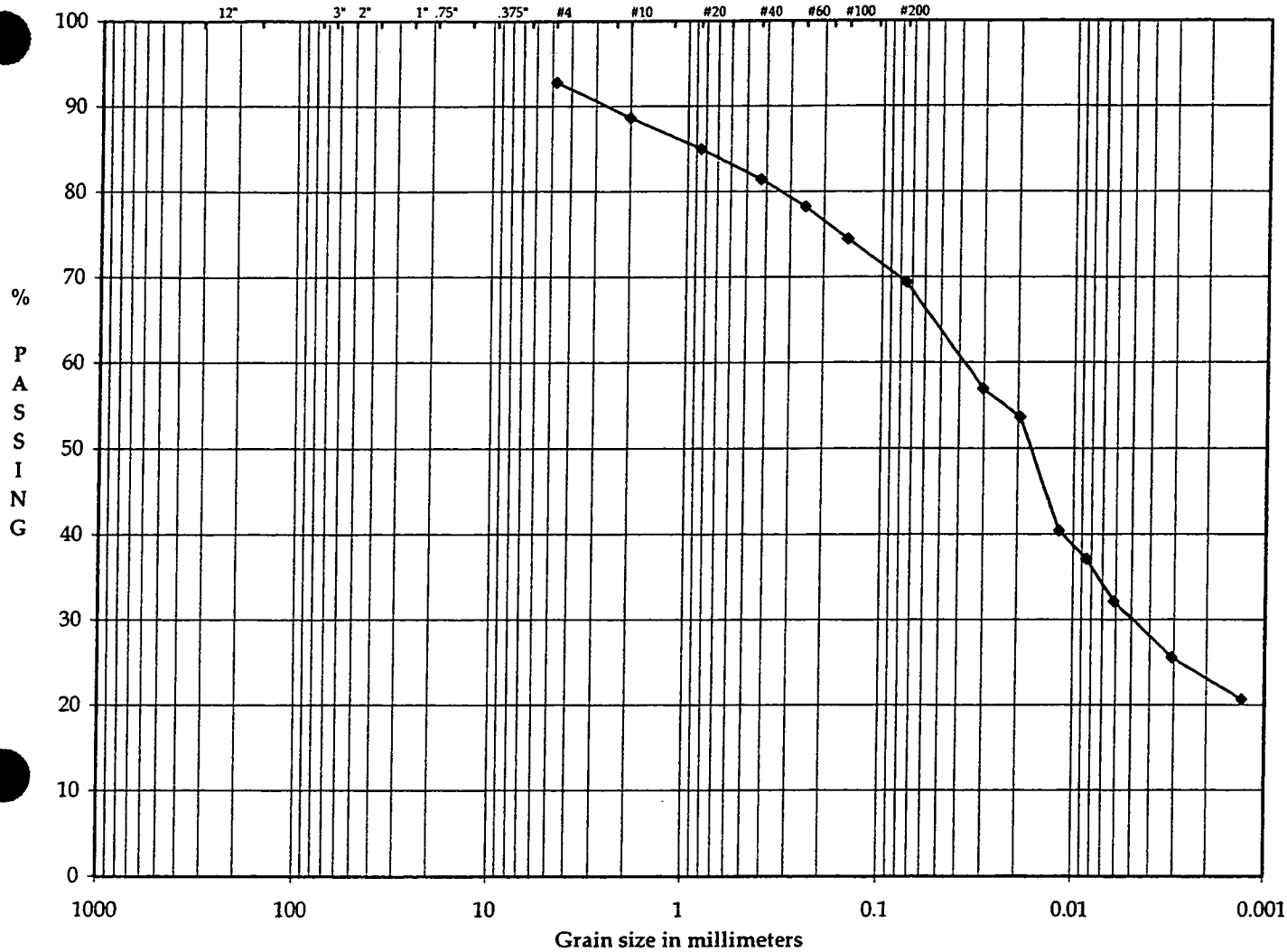
TECH	TJ
DATE	7/30/02
CHECK	BSS
REVIEW	PWM

000288

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 22
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000289

TECH	TJ
DATE	7/30/02
CHECK	BSS
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 29 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-23

SOIL SAMPLE SIZE: +3/8 = 2323.5 -3/8 = 44144.4 MOISTURE = 311.8 gm 46,779.7 TOTAL = 44407.9.7

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-2	LL-4	L-2	LL-4
WT. OF DRY SAMPLE PLUS TARE (grams)	2514.4	716.9	2288.3	297.0
WT. OF TARE (grams)	190.9	145.4	190.9	145.4
WT. OF DRY SAMPLE (grams)	2323.5	571.5	2097.4	151.6

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	112.0	0.2	99.8		
1 in	25.4	661.0	1.4	98.6		
3/4 in	19.1	1047.0	2.2	97.8		90-100
1/2 in	12.7	1698.7	3.6	96.4		
3/8 in	9.53	2095.4	4.5	95.5		
No. 4	4.75	16.7	2.9	97.1	92.7	
No. 10	2.00	41.7	7.3	92.7	88.6	
No. 20	0.850	64.0	11.2	88.8	84.8	
No. 40	0.425	84.8	14.8	85.2	81.3	
No. 60	0.250	102.6	18.0	82.0	78.4	
No. 100	0.125	125.0	21.9	78.1	76.4	
No. 200	0.075	150.8	26.4	73.6	70.3	50-100
PAN	—	151.4	—	—		

COMMENTS:

000290

% FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

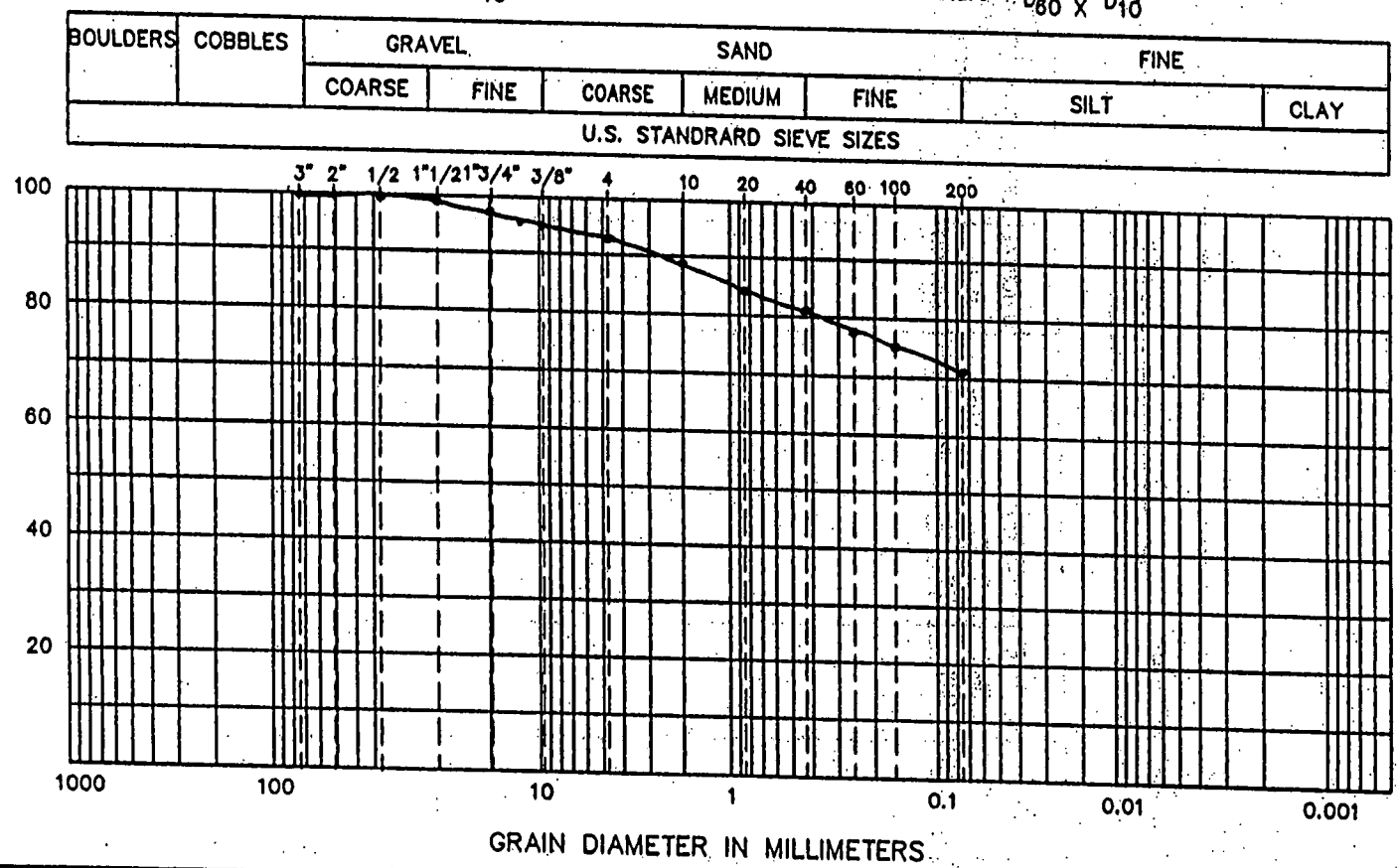
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 30 day July month 2002 year

SAMPLE NO.: LP02-23 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.8
1-in.	98.6
3/4-in.	97.8
1/2-in.	96.4
3/8-in.	95.5
NO. 4	92.7
NO. 10	88.6
NO. 20.	84.8
NO. 40	81.3
NO. 60	78.4
NO. 100	76.4
NO. 200	70.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	
0.02	
0.005	
0.002	

SOIL CLASSIFICATION (ASTM D 2487):

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000291

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 23
JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.42
Dry Soil & Tare (gm)	47.37
Tare Weight (gm)	3.28
Moisture Content (%)	6.92

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.16	
Tare Weight (gm)	235.88	
Total Weight (gm)	466.98	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
gth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.60
Calculated Dry Wt. used in test (gm)	53.87
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.54	1.54	90.1	#10	medium sand
#20	3.69	3.69	86.4	#20	medium sand
#40	5.95	5.95	82.5	#40	fine sand
#60	7.95	7.95	79.0	#60	fine sand
#100	10.21	10.21	75.1	#100	fine sand
#200	13.18	13.18	70.0	#200	fines

HYDROMETER CALCULATIONS

DATE 7/31/02	TIME 9:38	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/31/02	9:40	2.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
7/31/02	9:43	5.00	39.0	22.50	0.013	7.50	31.50	11.2	0.99
7/31/02	9:53	15.00	33.0	22.50	0.013	7.50	25.50	12.2	0.99
7/31/02	10:08	30.00	30.0	22.50	0.013	7.50	22.50	12.7	0.99
7/31/02	10:38	60.00	27.0	22.50	0.013	7.50	19.50	13.2	0.99
7/31/02	13:48	250.00	23.0	22.50	0.013	7.50	15.50	13.8	0.99
8/1/02	9:38	1440.00	20.0	22.50	0.013	7.50	12.50	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	58.8		
0.0196	53.7	% GRAVEL	7.30
0.0118	43.4	% COARSE SAND	2.65
0.0085	38.3	% MEDIUM SAND	7.59
0.0061	33.2	% FINE SAND	12.44
0.0031	26.4	% FINES	70.02
0.0013	21.3	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

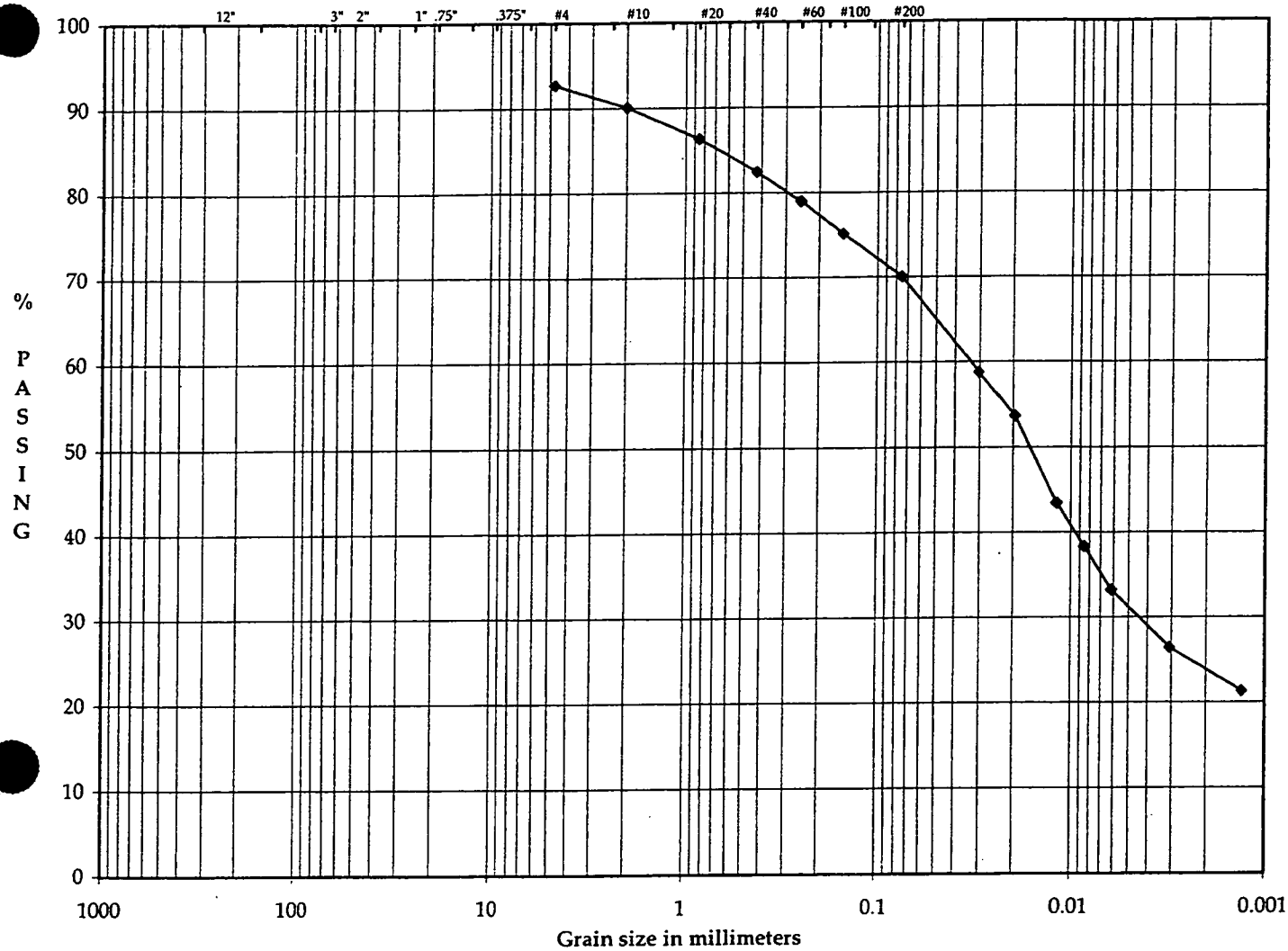
TECH	TJ
DATE	7/30/02
CHECK	
REVIEW	

000292

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 23
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/30/02
CHECK	BZS
REVIEW	RWY

000293

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 26 day July month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-24

42.17 − 1.89 = 40.28 lbs

18271.0 g

SOIL SAMPLE SIZE	+3/8 = 534.5	MOISTURE = 259.4 gm	TOTAL = 19064.9 gm
	-3/8 = 18271.0	19064.9	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-9	L-9	L-9	L-9
WT. OF DRY SAMPLE PLUS TARE (grams)	727.9	813.6	700.1	356.3
WT. OF TARE (grams)	193.4	193.4	193.4	193.4
WT. OF DRY SAMPLE (grams)	534.5	620.2	506.7	162.9

SIEVE ANALYSIS QA ID: DLB

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		100
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	133.5	0.7	99.3		
3/4 in	19.1	189.3	1.0	99.0		90-100
1/2 in	12.7	381.0	2.0	98.0		
3/8 in	9.53	502.1	2.6	97.4		
No. 4	4.75	20.4	3.3	96.7	94.2	
No. 10	2.00	43.7	7.0	93.0	90.6	
No. 20	0.850	69.3	11.2	88.8	86.5	
No. 40	0.425	92.7	14.9	85.1	82.9	
No. 60	0.250	111.4	18.0	82.0	79.9	
No. 100	0.125	135.9	21.9	78.1	76.1	
No. 200	0.075	161.4	26.0	74.0	72.1	50-100
PAN	—	162.9	—	—		

COMMENTS:

000294

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

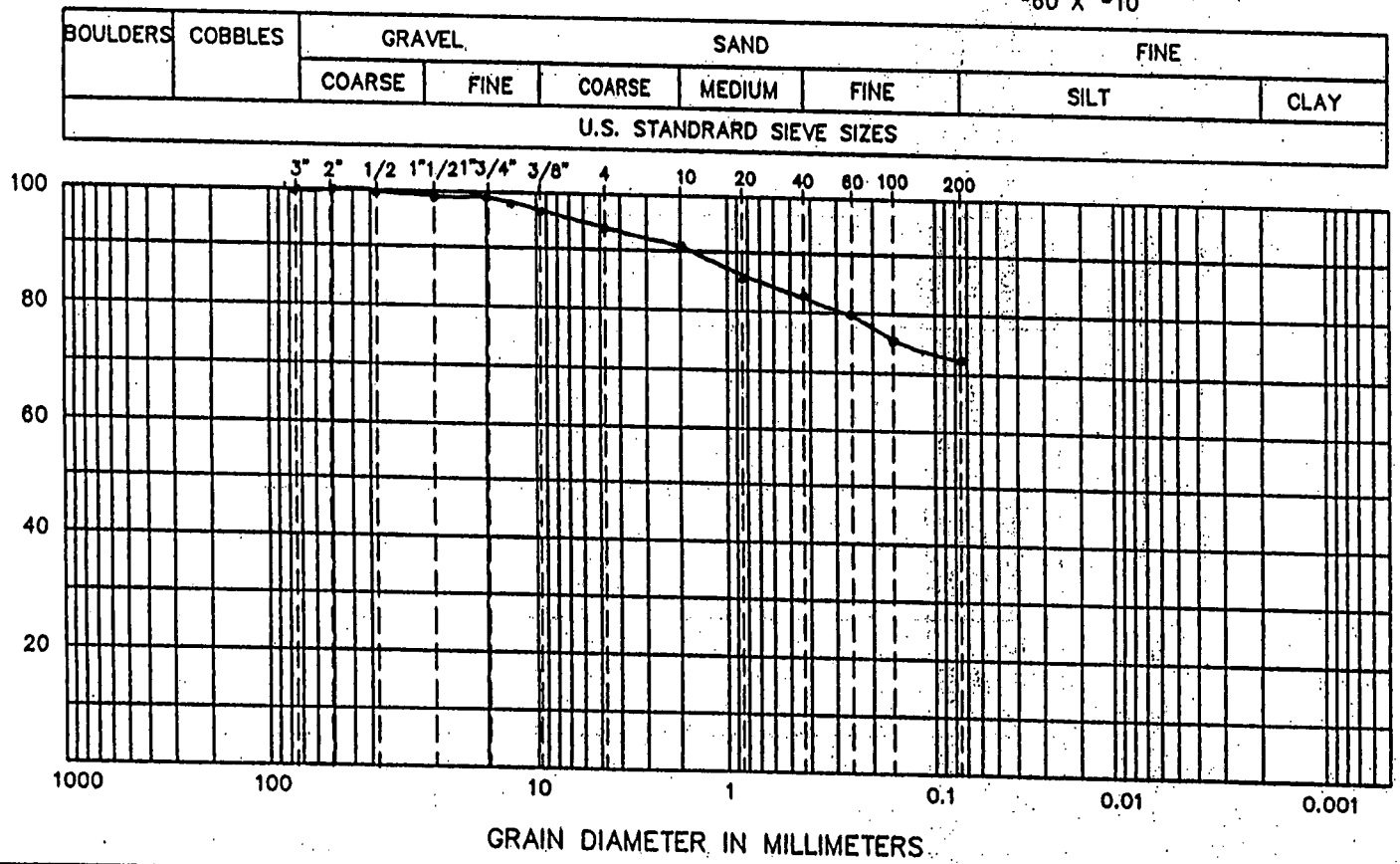
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 30 day July month 2002 year

SAMPLE NO.: LP02-24 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) .....

(PL) .....

(PI) .....

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.3
3/4-in.	99.0
1/2-in.	98.0
3/8-in.	97.4
NO. 4	94.2
NO. 10	90.6
NO. 20.	86.5
NO. 40	82.9
NO. 60	79.9
NO. 100	76.1
NO. 200	72.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	
0.02	
0.005	
0.002	

SOIL CLASSIFICATION (ASTM D 2487):

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CHECKED BY:

SHEET NO. ____ OF ____

0002295

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 24
)JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.09
Dry Soil & Tare (gm)	47.22
Tare Weight (gm)	3.23
Moisture Content (%)	6.52

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.69	
Tare Weight (gm)	235.76	
Total Weight (gm)	469.31	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.2	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
:ific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
th of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.68
Calculated Dry Wt. used in test (gm)	53.21
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.20

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.72	1.72	91.2	#10	medium sand
#20	4.04	4.04	87.0	#20	medium sand
#40	6.16	6.16	83.3	#40	fine sand
#60	7.97	7.97	80.1	#60	fine sand
#100	10.01	10.01	76.5	#100	fine sand
#200	12.70	12.70	71.7	#200	fines

HYDROMETER CALCULATIONS

DATE 7/31/02	TIME 9:40	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
7/31/02	9:42	2.00	43.0	22.50	0.013	7.50	35.50	10.6	0.99
7/31/02	9:45	5.00	37.0	22.50	0.013	7.50	29.50	11.5	0.99
7/31/02	9:55	15.00	32.0	22.50	0.013	7.50	24.50	12.4	0.99
7/31/02	10:10	30.00	30.0	22.50	0.013	7.50	22.50	12.7	0.99
7/31/02	10:40	60.00	27.0	22.50	0.013	7.50	19.50	13.2	0.99
7/31/02	13:50	250.00	23.0	22.50	0.013	7.50	15.50	13.8	0.99
8/1/02	9:40	1440.00	20.0	22.50	0.013	7.50	12.50	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0302	62.2		
0.0199	51.7	% GRAVEL	5.80
0.0119	42.9	% COARSE SAND	3.05
0.0085	39.4	% MEDIUM SAND	7.86
0.0061	34.2	% FINE SAND	11.58
0.0031	27.2	% FINES	71.72
0.0013	21.9	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

TECH	TJ
DATE	7/30/02
CHECK	
REVIEW	

000296

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368

Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 24
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	7/30/02
CHECK	BS
REVIEW	[illegible]

000297

Golder Associates Inc.

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

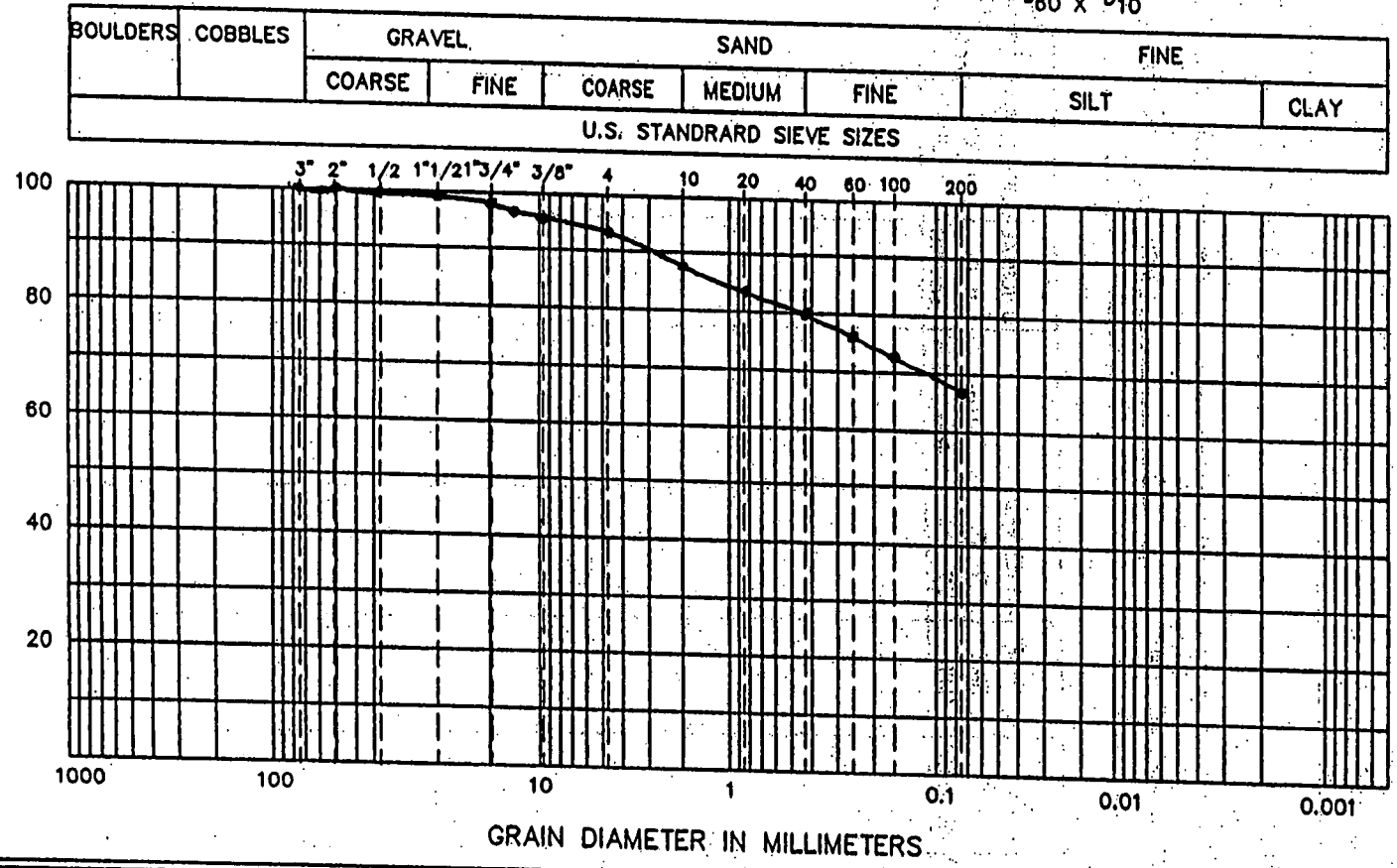
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-25 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 28

(PL) 15

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.8
1-in.	99.2
3/4-in.	98.4
1/2-in.	97.0
3/8-in.	96.1
NO. 4	92.7
NO. 10	88.4
NO. 20	83.9
NO. 40	79.9
NO. 60	76.5
NO. 100	72.4
NO. 200	67.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	63
0.02	50
0.005	31
0.002	24

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000038

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 25
)JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	82.09
Dry Soil & Tare (gm)	78.88
Tare Weight (gm)	3.25
Moisture Content (%)	4.24

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	499.53	
Tare Weight (gm)	0.00	
Total Weight (gm)	479.19	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	62.12
Calculated Dry Wt. used in test (gm)	59.59
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	3.36	3.36	87.5	#10	medium sand
#20	6.12	6.12	83.2	#20	medium sand
#40	8.45	8.45	79.6	#40	fine sand
#60	10.45	10.45	76.4	#60	fine sand
#100	12.85	12.85	72.7	#100	fine sand
#200	15.91	15.91	68.0	#200	fines

HYDROMETER CALCULATIONS

DATE 8/4/02	TIME 15:20	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/4/02	15:22	2.00	44.0	22.50	0.013	7.50	36.50	10.4	0.99
8/4/02	15:25	5.00	40.0	22.50	0.013	7.50	32.50	11.1	0.99
8/4/02	15:35	15.00	35.0	22.50	0.013	7.50	27.50	11.9	0.99
8/4/02	15:50	30.00	32.0	22.50	0.013	7.50	24.50	12.4	0.99
8/4/02	16:20	60.00	29.0	22.50	0.013	7.50	21.50	12.9	0.99
8/4/02	19:30	250.00	25.0	22.50	0.013	7.50	17.50	13.5	0.99
8/5/02	15:20	1440.00	21.0	23.00	0.013	7.50	13.50	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	56.2		
0.0195	50.1	% GRAVEL	7.30
0.0117	42.4	% COARSE SAND	5.23
0.0084	37.7	% MEDIUM SAND	7.92
0.0061	33.1	% FINE SAND	11.60
0.0030	27.0	% FINES	67.95
0.0013	20.8	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

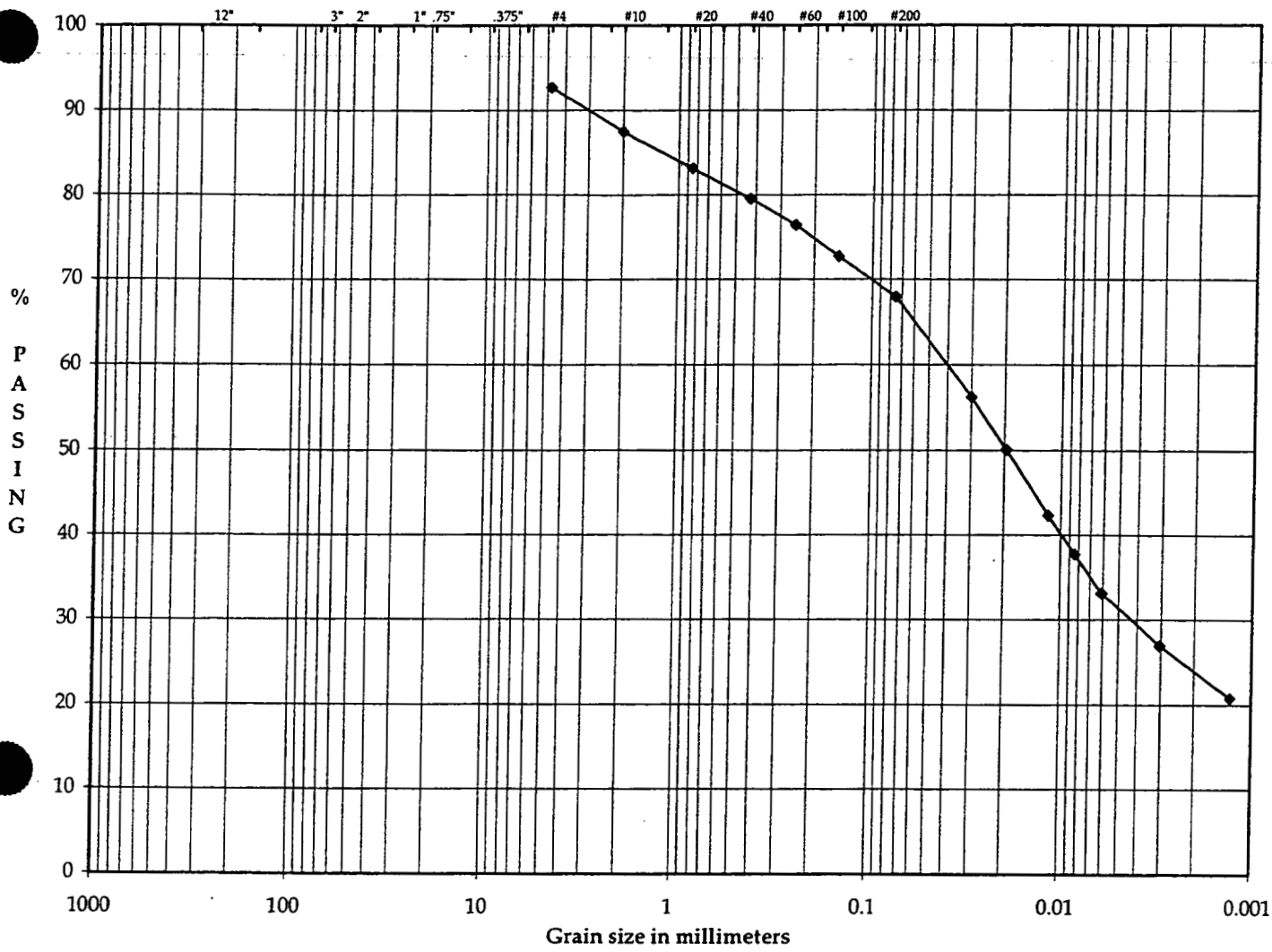
TECH	SW/TJ
DATE	8/3/02
CHECK	BSK
REVIEW	RWM

000299

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 25
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000300

TECH	SW/TJ
DATE	8/3/02
CHECK	BSJ
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 30 day July month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-26

SOIL SAMPLE SIZE	+3/8 = 677.6	MOISTURE = 246.1	TOTAL = 21940.9
	-3/8 = 21017.2		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		N	LL-4	N	LL-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	779.5	717.5	735.1	319.5
WT. OF TARE	(grams)	101.9	145.4	101.9	145.4
WT. OF DRY SAMPLE	(grams)	677.6	572.1	633.2	174.1

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	102.4	0.5	99.5		
3/4 in	19.1	236.4	1.1	98.9		90-100
1/2 in	12.7	~~408.9~~ 447.9	2.2	97.8		
3/8 in	9.53	630.1	2.9	97.1		
No. 4	4.75	15.0	2.6	97.4 ~~94.7~~	~~92.0~~ 94.6	
No. 10	2.00	37.8	6.6	93.4	90.7	
No. 20	0.850	65.8	11.5	88.5	85.9	
No. 40	0.425	92.4	16.2	83.8	81.4	
No. 60	0.250	115.0	20.1	79.9	77.6	
No. 100	0.125	142.5	24.9	75.1	72.9	
No. 200	0.075	173.4	30.3	69.7	67.7	50-100
PAN	—	174.0	—	—		

COMMENTS:

000301

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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.: 6Q1341 TASK NO.: 04.1

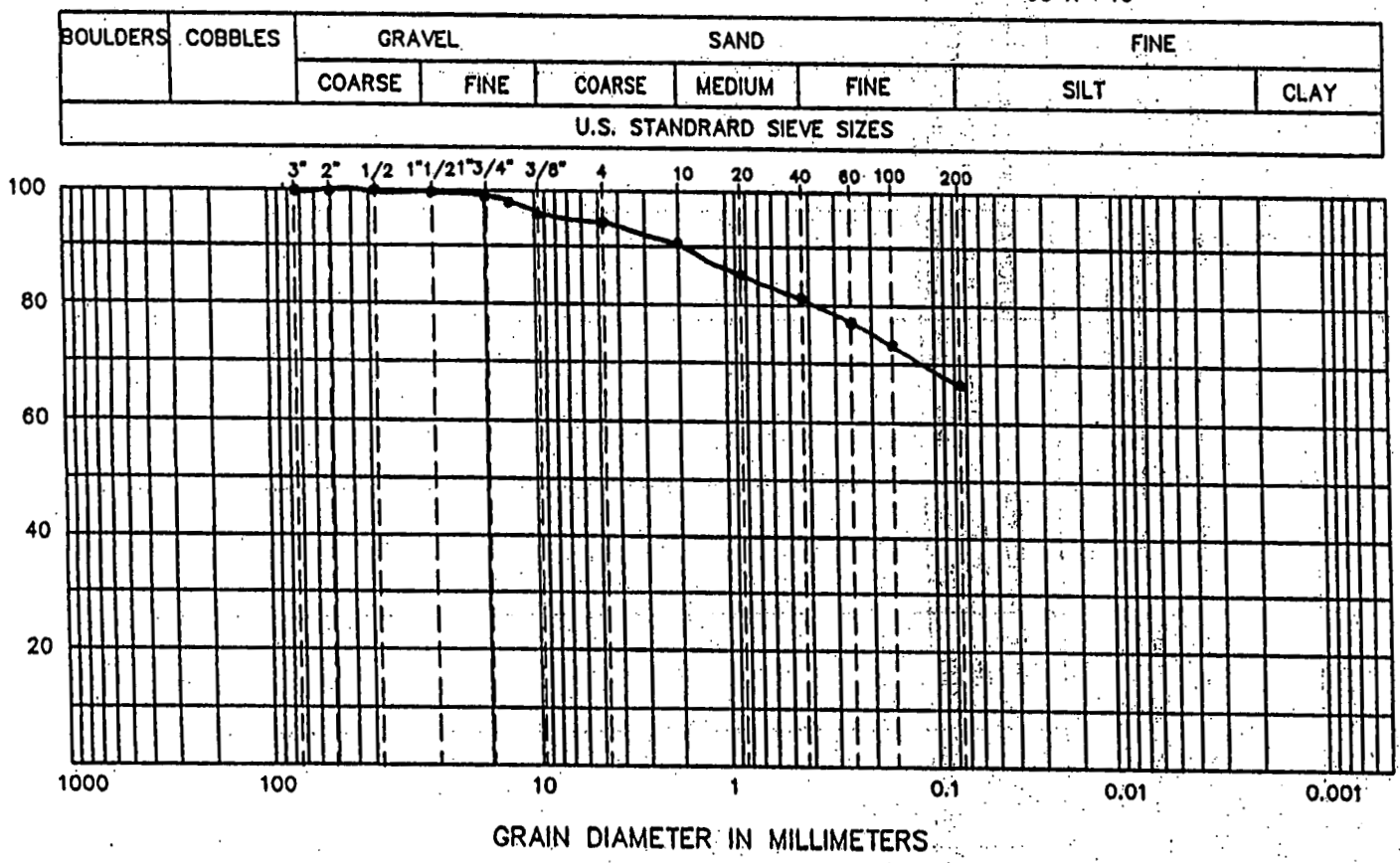
DESCRIPTION: Phase IV

DATE: 24 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-26 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 26

(PL) 15

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.5
3/4-in.	98.9
1/2-in.	97.8
3/8-in.	97.1
NO. 4	94.6
NO. 10	90.7
NO. 20.	85.9
NO. 40	81.4
NO. 60	77.6
NO. 100	72.9
NO. 200	67.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	63
0.02	50
0.005	30
0.002	23

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000302

7-5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 26
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	76.97
Dry Soil & Tare (gm)	73.85
Tare Weight (gm)	3.20
Moisture Content (%)	4.42

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	499.90	
Tare Weight (gm)	0.00	
Total Weight (gm)	478.76	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	65.46
Calculated Dry Wt. used in test (gm)	62.69
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	3.11	3.11	89.9	#10	medium sand
#20	6.54	6.54	84.7	#20	medium sand
#40	9.08	9.08	80.9	#40	fine sand
#60	11.16	11.16	77.8	#60	fine sand
#100	13.68	13.68	74.0	#100	fine sand
#200	17.25	17.25	68.6	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/4/02	15:22								
8/4/02	15:24	2.00	46.0	22.50	0.013	7.50	38.50	10.1	0.99
8/4/02	15:27	5.00	41.0	22.50	0.013	7.50	33.50	10.9	0.99
8/4/02	15:37	15.00	36.0	22.50	0.013	7.50	28.50	11.7	0.99
8/4/02	15:52	30.00	32.0	22.50	0.013	7.50	24.50	12.4	0.99
8/4/02	16:22	60.00	29.0	22.50	0.013	7.50	21.50	12.9	0.99
8/4/02	19:32	250.00	25.0	22.50	0.013	7.50	17.50	13.5	0.99
8/5/02	15:22	1440.00	21.0	23.00	0.013	7.50	13.50	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0294	57.5		
0.0193	50.0	% GRAVEL	5.40
0.0116	42.6	% COARSE SAND	4.69
0.0084	36.6	% MEDIUM SAND	9.01
0.0061	32.1	% FINE SAND	12.33
0.0030	26.1	% FINES	68.57
0.0013	20.2	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

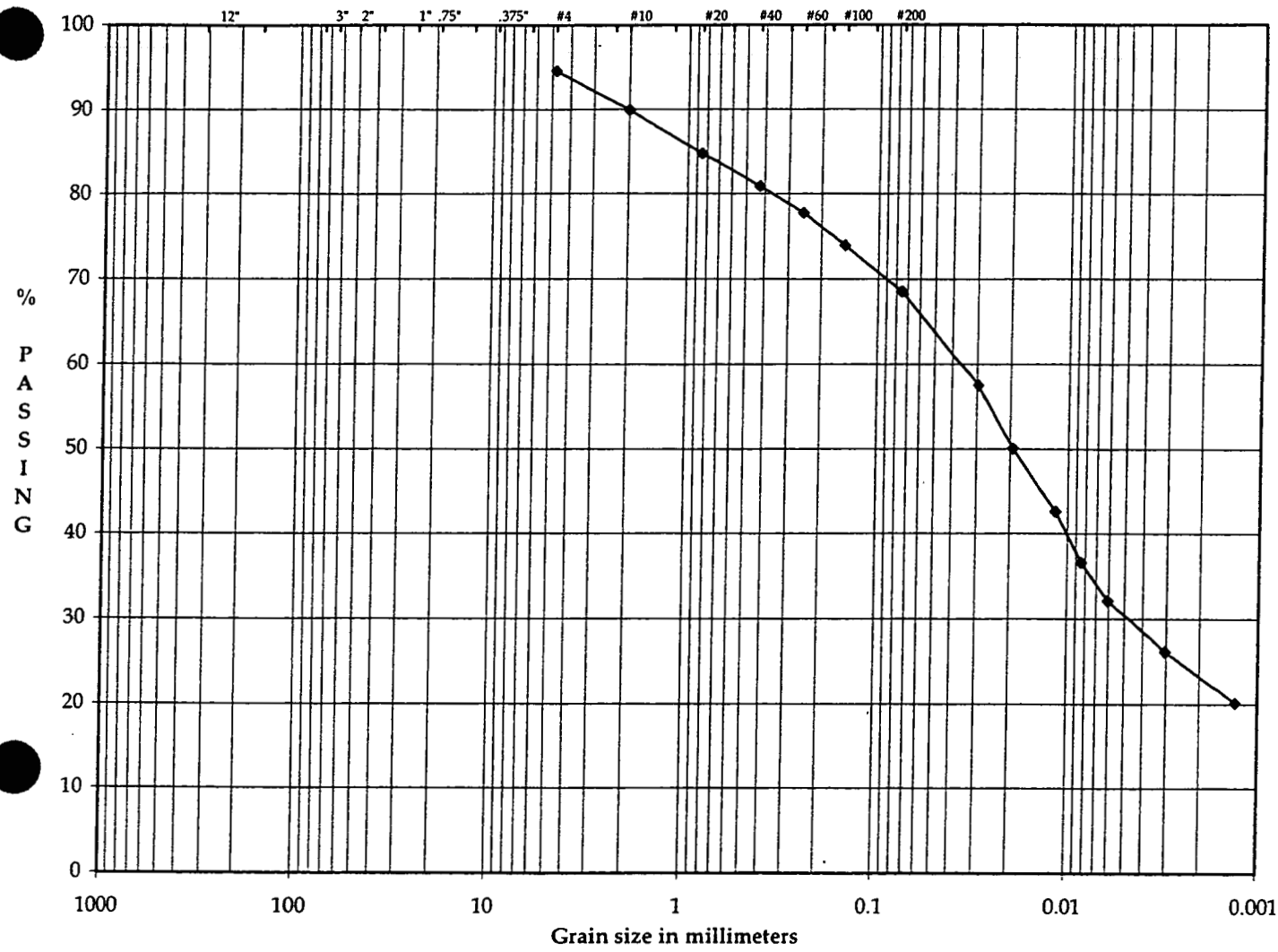
000303

TECH	SW/TJ
DATE	8/3/02
CHECK	
REVIEW	

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 26
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/TJ
DATE	8/3/02
CHECK	BSK
REVIEW	RWM

000304

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 29 day July month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-27

40.56 37.01 27.57

SOIL SAMPLE SIZE	+3/8 = 2256.1	MOISTURE = 445.2	TOTAL = 37887.1
	-3/8 = 35185.8		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-9	L-6	L-9	L-6
WT. OF DRY SAMPLE PLUS TARE (grams)	2449.5	775.5	2025.2	332.5
WT. OF TARE (grams)	193.4	199.1	193.4	199.1
WT. OF DRY SAMPLE (grams)	2256.1	576.4	1831.8	133.4

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	208.5	.5	99.5		
1 in	25.4	1415.5	1.2	98.8		
3/4 in	19.1	784.8	2.1	97.9		90-100
1/2 in	12.7	1454.2	3.8	96.2		
3/8 in	9.53	1827.7	4.8	95.2		
No. 4	4.75	13.0	2.3	97.7	93.0	
No. 10	2.00	34.0	5.9	94.1	89.6	
No. 20	0.850	52.5	9.1	90.9	86.5	
No. 40	0.425	70.3	12.2	87.8	83.6	
No. 60	0.250	86.2	15.0	85.0	80.9	
No. 100	0.125	107.6	18.7	81.3	77.4	
No. 200	0.075	133.0	23.1	76.9	73.2	50-100
PAN	—	133.3	—	—	—	

COMMENTS:

000305

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

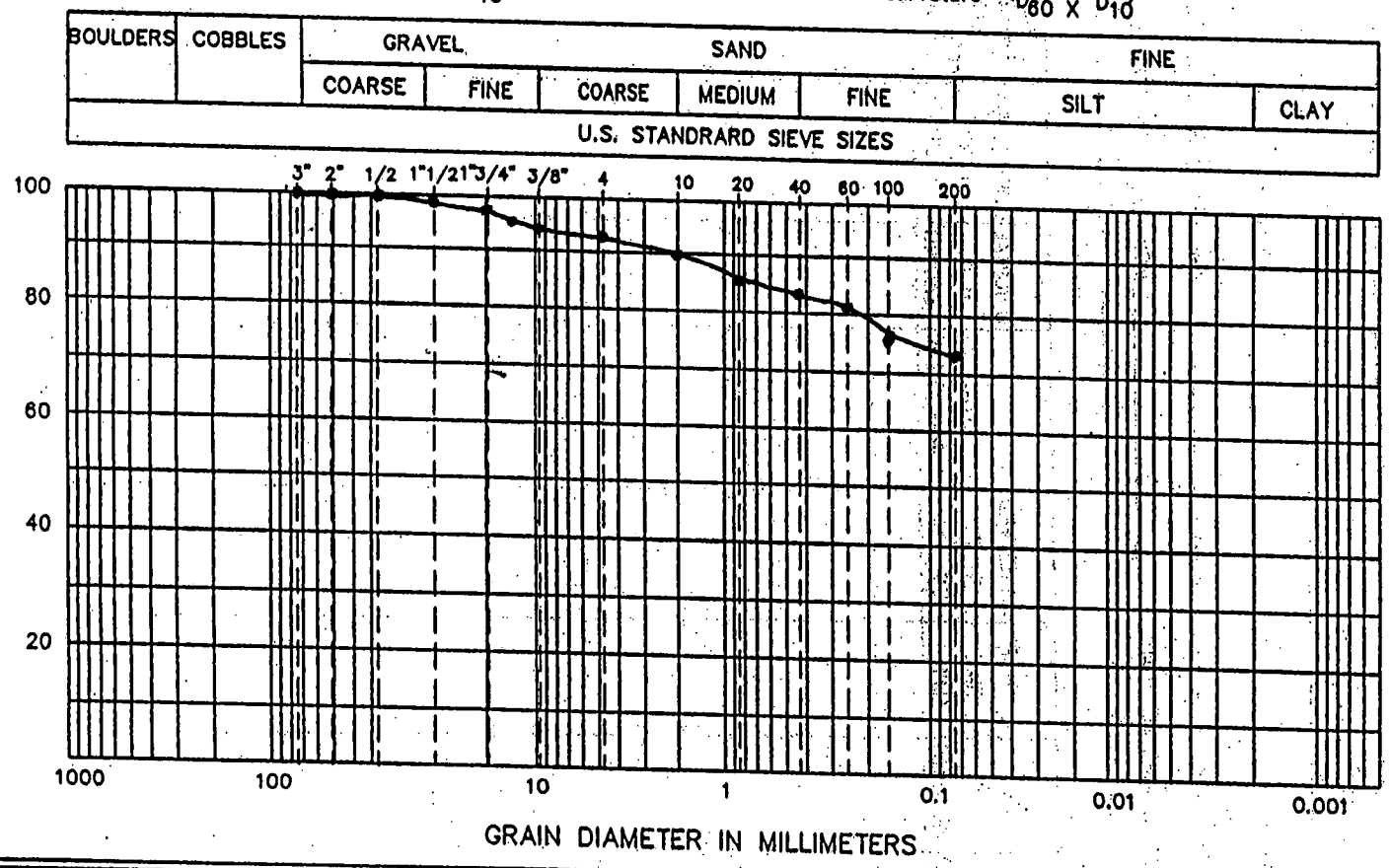
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-27 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 30

(PL) 17

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.5
1-in.	98.8
3/4-in.	97.9
1/2-in.	96.2
3/8-in.	95.2
NO. 4	93.0
NO. 10	89.6
NO. 20.	86.5
NO. 40	83.6
NO. 60	80.9
NO. 100	77.4
NO. 200	73.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	70
0.002	58
0.0005	35
0.0002	28

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000306

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE: GEOSYNTEC/FLUOR FERNALD/OH
PROJECT NO.: 023-3313

SAMPLE ID: LP02 - 27
SAMPLE TYPE: Bag
SAMPLE DEPTH: -

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	76.43
Dry Soil & Tare (gm)	73.59
Tare Weight (gm)	3.27
Moisture Content (%)	4.04

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	499.73	
Tare Weight (gm)	0.00	
Total Weight (gm)	480.33	(W6)

Plus #4 Material Sieve

TARE WEIGHT: 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	64.85
Calculated Dry Wt. used in test (gm)	62.33
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.00

TARE WEIGHT: 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.30	2.30	89.6	#10	medium sand
#20	4.46	4.46	86.3	#20	medium sand
#40	6.14	6.14	83.8	#40	fine sand
#60	7.87	7.87	81.3	#60	fine sand
#100	9.83	9.83	78.3	#100	fine sand
#200	12.12	12.12	74.9	#200	fines

HYDROMETER CALCULATIONS

DATE 8/4/02	TIME 15:24	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/4/02	15:26	2.00	50.0	22.50	0.013	7.50	42.50	9.4	0.99
8/4/02	15:29	5.00	46.0	22.50	0.013	7.50	38.50	10.1	0.99
8/4/02	15:39	15.00	40.0	22.50	0.013	7.50	32.50	11.1	0.99
8/4/02	15:54	30.00	36.0	22.50	0.013	7.50	28.50	11.7	0.99
8/4/02	16:24	60.00	33.0	22.50	0.013	7.50	25.50	12.2	0.99
8/4/02	19:34	250.00	28.0	22.50	0.013	7.50	20.50	13.0	0.99
8/5/02	15:24	1440.00	25.0	23.00	0.013	7.50	17.50	13.5	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0284	62.8		
0.0186	56.9	% GRAVEL	7.00
0.0113	48.0	% COARSE SAND	3.43
0.0082	42.1	% MEDIUM SAND	5.73
0.0059	37.7	% FINE SAND	8.92
0.0030	30.3	% FINES	74.92
0.0013	25.8	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

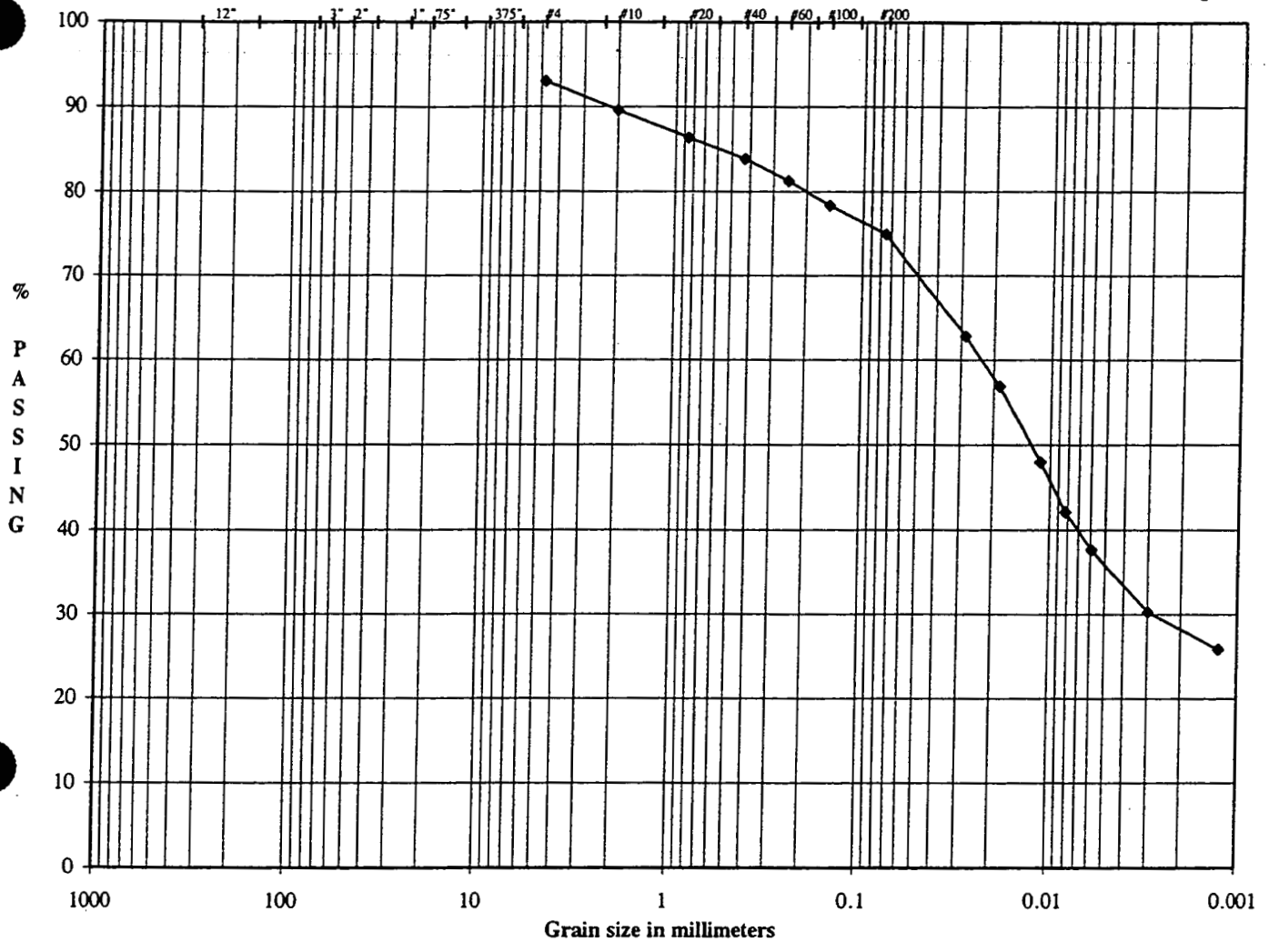
TECH	SW/TJ
DATE	8/3/02
CHECK	BGS
REVIEW	[illegible]

000307

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 27
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/TJ
DATE	8/3/02
CHECK	[illegible]
REVIEW	[illegible]

000308

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 29 day Jul month 02 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: CP02-28

Buck 56.34 -1.73 54.6 LBS

SOIL SAMPLE SIZE	+3/8 = 1198.5	MOISTURE = 197.6	TOTAL = 26167.2
	-3/8 = 24971.1	26167.2	

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-3	~~L-3~~ L-7	L-3	L-3
WT. OF DRY SAMPLE PLUS TARE	(grams)	1388.4	~~1388.3~~ 720.9	1215.6	344.6
WT. OF TARE	(grams)	189.9	~~189.9~~ 194.0	189.9	189.9
WT. OF DRY SAMPLE	(grams)	1198.5	~~720.9~~ 526.9	1025.7	154.7

SIEVE ANALYSIS 526.9 QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	58.4	.2	99.8		
1 in	25.4	226.8	.9	99.1		
3/4 in	19.1	446.8	1.7	98.3		90-100
1/2 in	12.7	757.8	2.9	97.1		
3/8 in	9.53	1024.5	3.9	96.1		96
No. 4	4.75	21.8	4.1	95.9	92.2	
No. 10	2.00	47.4	9.0	91.0	87.5	
No. 20	0.850	69.6	13.2	86.8	83.4	
No. 40	0.425	88.6	16.8	83.2	80.0	
No. 60	0.250	105.1	19.9	80.1	77.0	
No. 100	0.125	126.9	24.1	75.9	72.9	
No. 200	0.075	153.3	29.1	70.9	68.1	50-100
PAN	—	154.1	—	—		

COMMENTS:

000309

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: _____ SHEET NO. ____ OF ____

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

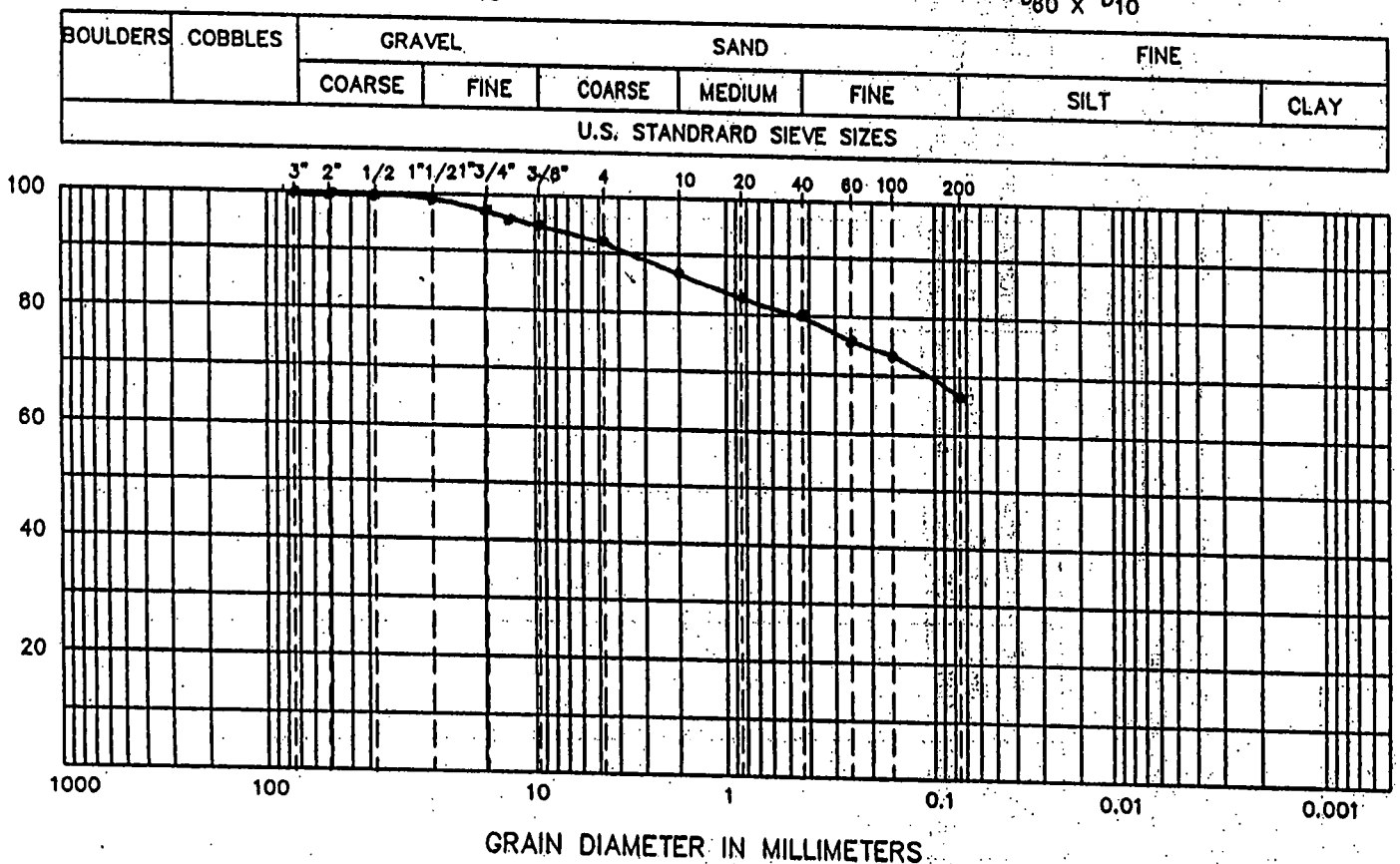
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-28 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 31

(PL) 16

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.8
1-in.	99.1
3/4-in.	98.3
1/2-in.	97.1
3/8-in.	96.1
NO. 4	92.2
NO. 10	87.5
NO. 20.	83.4
NO. 40	80.0
NO. 60	77.0
NO. 100	72.9
NO. 200	68.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	64
0.02	50
0.005	33
0.002	25
	25

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000340

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 28
JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	79.67
Dry Soil & Tare (gm)	76.71
Tare Weight (gm)	3.20
Moisture Content (%)	4.03

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	500.15	
Tare Weight (gm)	0.00	
Total Weight (gm)	480.79	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.2	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	63.57
Calculated Dry Wt. used in test (gm)	61.11
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.20

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.13	2.13	89.0	#10	medium sand
#20	4.05	4.05	86.1	#20	medium sand
#40	5.98	5.98	83.2	#40	fine sand
#60	7.87	7.87	80.3	#60	fine sand
#100	10.15	10.15	76.9	#100	fine sand
#200	12.99	12.99	72.6	#200	fines

HYDROMETER CALCULATIONS

DATE 8/4/02	TIME 15:26	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/4/02	15:28	2.00	44.0	22.50	0.013	7.50	36.50	10.4	0.99
8/4/02	15:31	5.00	41.0	22.50	0.013	7.50	33.50	10.9	0.99
8/4/02	15:41	15.00	37.0	22.50	0.013	7.50	29.50	11.5	0.99
8/4/02	15:56	30.00	34.0	22.50	0.013	7.50	26.50	12.0	0.99
8/4/02	16:26	60.00	31.0	22.50	0.013	7.50	23.50	12.5	0.99
8/4/02	19:36	250.00	26.0	22.50	0.013	7.50	18.50	13.3	0.99
8/5/02	15:26	1440.00	23.0	23.00	0.013	7.50	15.50	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	54.5		
0.0193	50.0	% GRAVEL	7.80
0.0115	44.1	% COARSE SAND	3.21
0.0083	39.6	% MEDIUM SAND	5.81
0.0060	35.1	% FINE SAND	10.58
0.0030	27.6	% FINES	72.60
0.0013	23.2	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

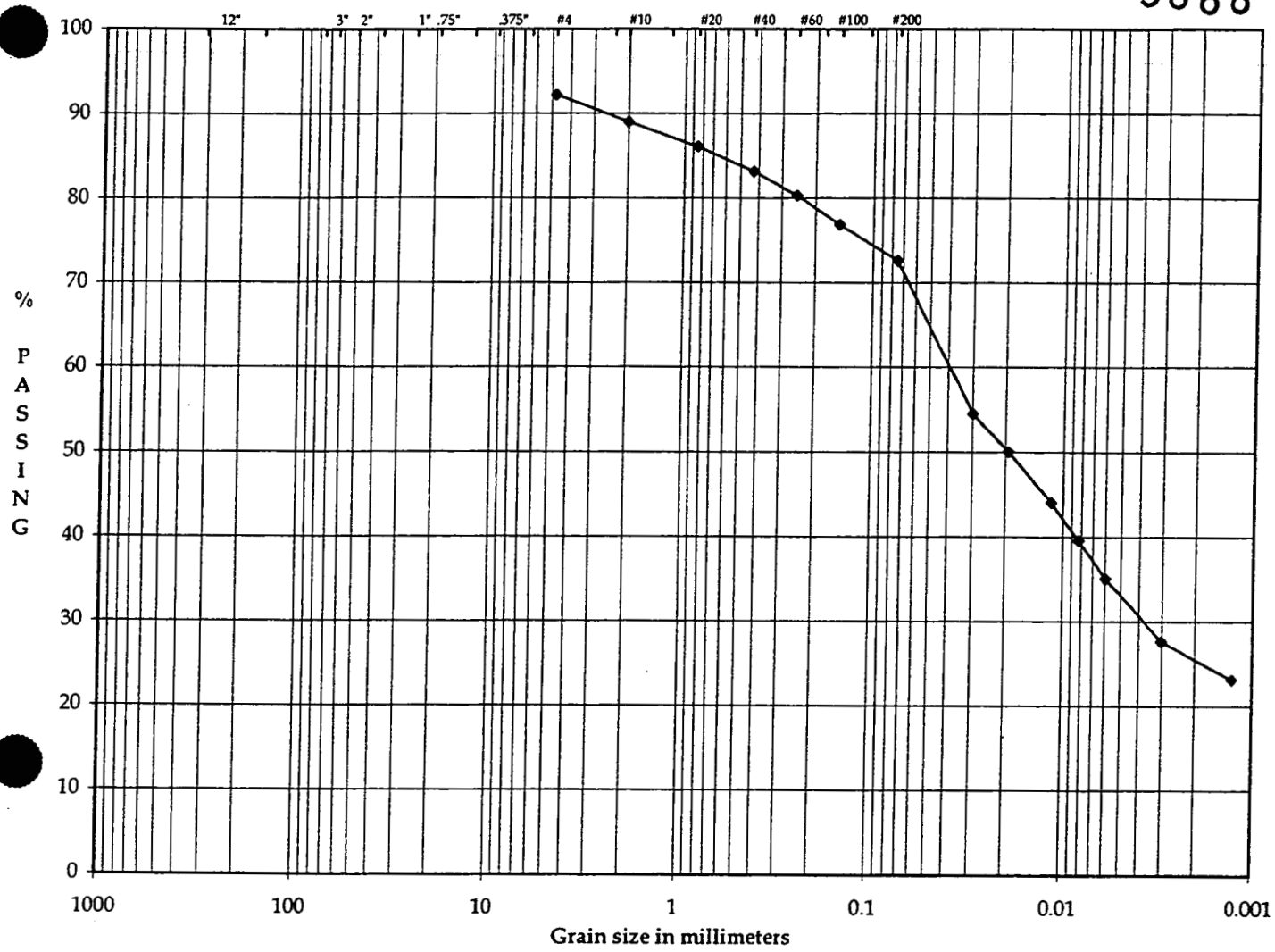
-	LL
-	PL
-	PI

000311

TECH	SW/TJ
DATE	8/3/02
CHECK	BJS
REVIEW	CWY

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 28
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/TJ
DATE	8/3/02
CHECK	BSS
REVIEW	BNY

000312

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 02 day Aug month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-29

SOIL SAMPLE SIZE	+3/8 = 1174.6	MOISTURE = 310.8	TOTAL = 34616.3
	-3/8 = 33130.9	34616.3	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	K	L-6	K	L-6
WT. OF DRY SAMPLE PLUS TARE (grams)	1276.1	782.3	1218.1	349.3
WT. OF TARE (grams)	101.5	199.1	101.5	199.1
WT. OF DRY SAMPLE (grams)	1174.6	583.2	1116.6	150.2

1116.6

SIEVE ANALYSIS — QA ID: CHW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	156.1	.5	99.5		
1 in	25.4	CHW ~~56.4~~ 2125	.6	99.4		
3/4 in	19.1	CHW ~~164.5~~ 3710	1.1	98.9		90-100
1/2 in	12.7	CHW ~~346.1~~ 7531	2.2	97.8		
3/8 in	9.53	CHW ~~351.7~~ 11048	3.2	96.8		
No. 4	4.75	20.3	3.5	96.5	~~92.4~~ 93.4	
No. 10	2.00	44.5	7.6	92.4	89.4	
No. 20	0.850	63.5	10.9	89.1	86.2	
No. 40	0.425	82.0	14.1	85.9	83.2	
No. 60	0.250	99.4	17.0	83.0	80.3	
No. 100	0.125	121.9	20.9	79.1	76.6	
No. 200	0.075	148.9	25.5	74.5	72.1	50-100
PAN	—	150.1	—	—		

COMMENTS:

000313

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: CH

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

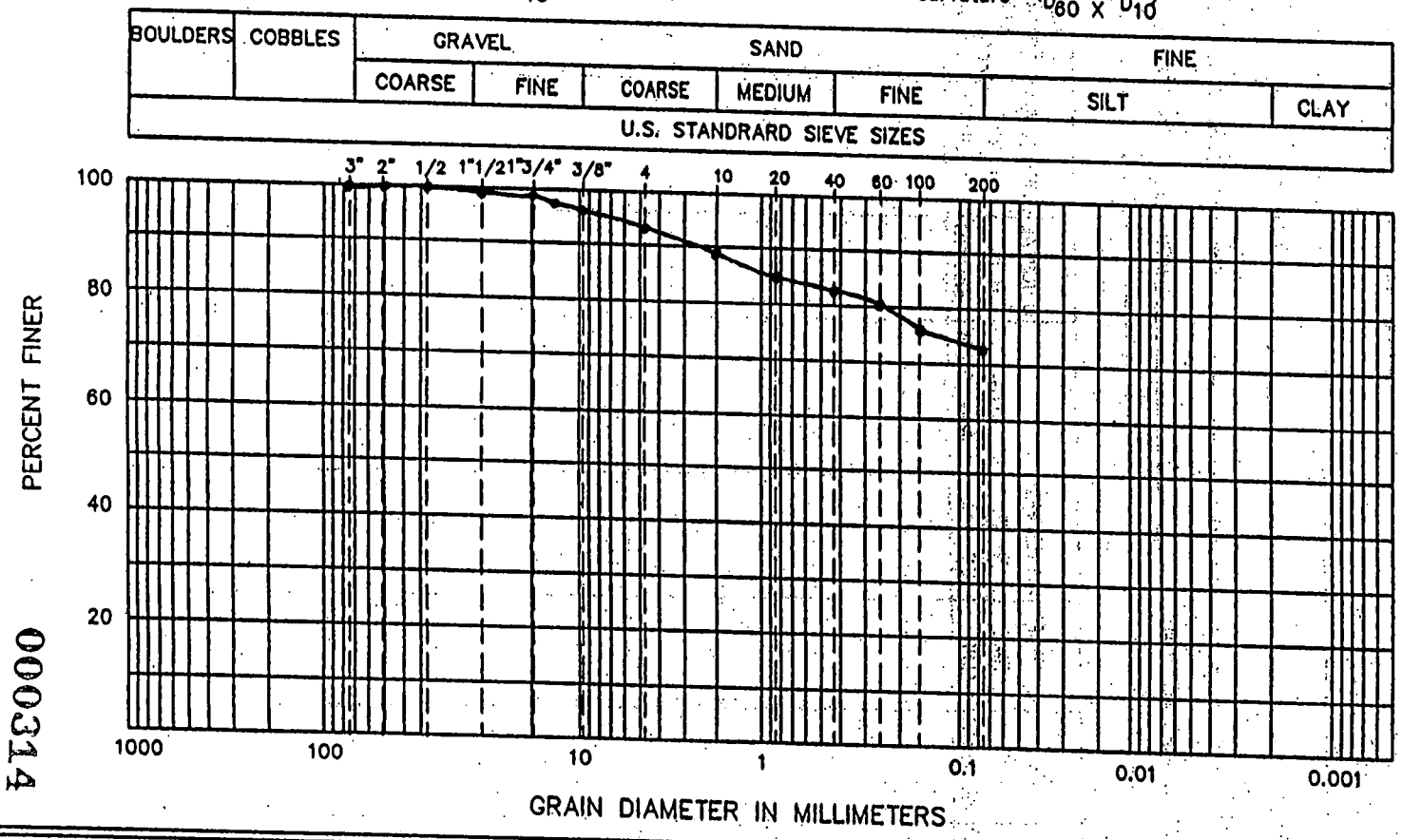
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-29 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 33

(PL) 17

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.5
1-In.	99.4
3/4-In.	98.9
1/2-In.	97.8
3/8-In.	96.8
NO. 4	93.4
NO. 10	89.4
NO. 20.	86.2
NO. 40	83.2
NO. 60	80.3
NO. 100	76.6
NO. 200	72.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	63
0.02	51
0.005	33
0.002	28

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000314

5 of 8

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 29
JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	79.53
Dry Soil & Tare (gm)	75.78
Tare Weight (gm)	3.23
Moisture Content (%)	5.17

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	499.46	
Tare Weight (gm)	0.00	
Total Weight (gm)	474.91	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.4	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	61.04
Calculated Dry Wt. used in test (gm)	58.04
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.40

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.63	1.63	89.8	#10	medium sand
#20	3.90	3.90	86.2	#20	medium sand
#40	5.98	5.98	82.9	#40	fine sand
#60	7.87	7.87	79.9	#60	fine sand
#100	10.02	10.02	76.4	#100	fine sand
#200	12.82	12.82	72.0	#200	fines

HYDROMETER CALCULATIONS

DATE 8/4/02	TIME 15:28	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/4/02	15:30	2.00	42.0	22.50	0.013	7.50	34.50	10.7	0.99
8/4/02	15:33	5.00	40.0	22.50	0.013	7.50	32.50	11.1	0.99
8/4/02	15:43	15.00	36.0	22.50	0.013	7.50	28.50	11.7	0.99
8/4/02	15:58	30.00	33.0	22.50	0.013	7.50	25.50	12.2	0.99
8/4/02	16:28	60.00	30.0	22.50	0.013	7.50	22.50	12.7	0.99
8/4/02	19:38	250.00	26.0	22.50	0.013	7.50	18.50	13.3	0.99
8/5/02	15:28	1440.00	23.0	23.00	0.013	7.50	15.50	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	54.4		
0.0195	51.2	% GRAVEL	7.60
0.0116	44.9	% COARSE SAND	2.59
0.0084	40.2	% MEDIUM SAND	6.93
0.0060	35.5	% FINE SAND	10.89
0.0030	29.2	% FINES	71.99
0.0013	24.4	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

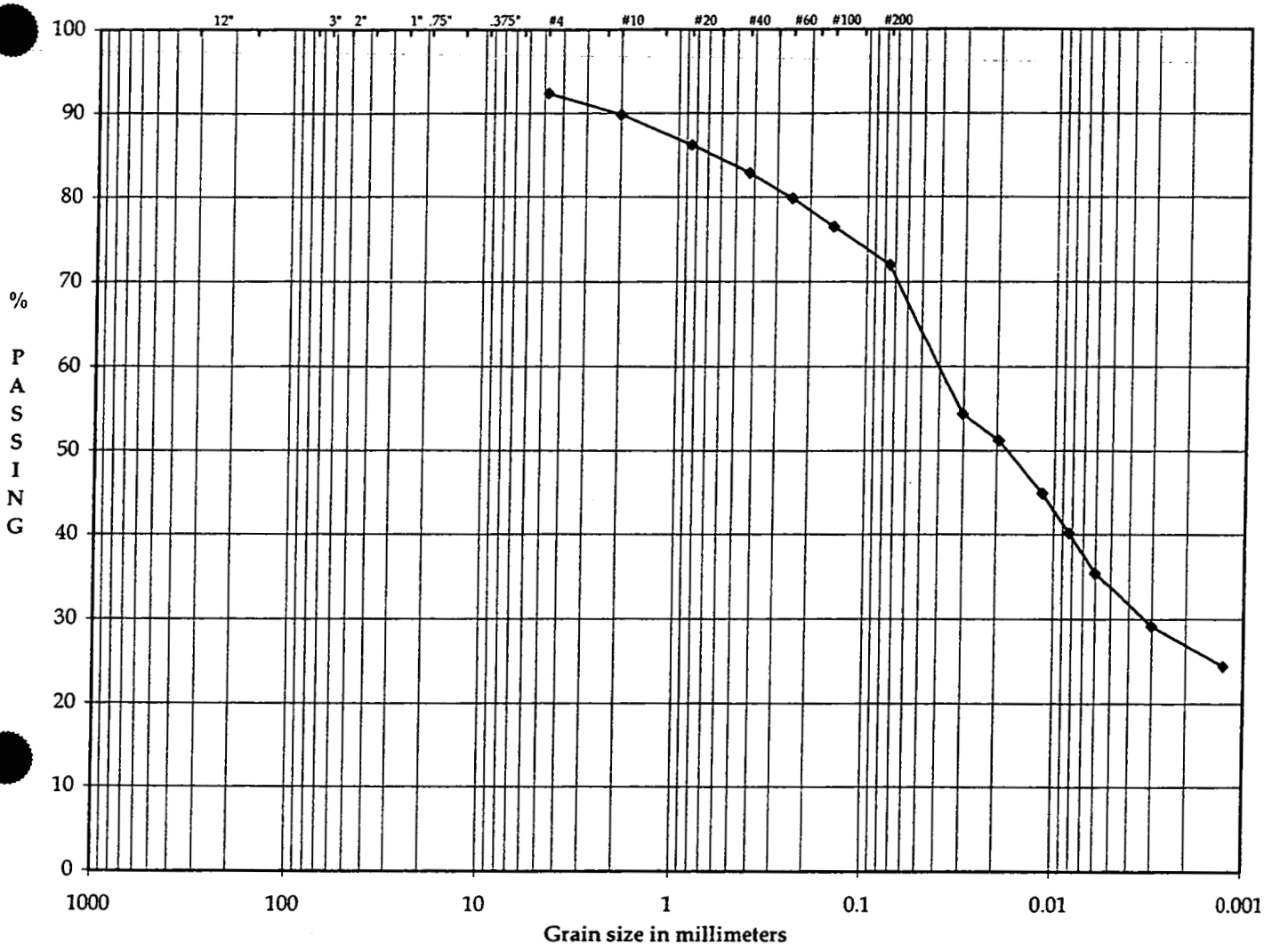
-	LL
-	PL
-	PI

TECH	SW/TJ
DATE	8/3/02
CHECK	
REVIEW	

000315

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 29
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/TJ
DATE	8/3/02
CHECK	BES
REVIEW	[illegible]

000316

5368

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 02 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: 2P02-30

17.
-1.72
20774.88

SOIL SAMPLE SIZE	+3/8 = 782.4	MOISTURE = 332.6	TOTAL = 22389.9
	-3/8 = 500g Hydro / 20774.9	22389.9	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-2	L-5	L-2	L-5
WT. OF DRY SAMPLE PLUS TARE (grams)	973.4	679.7	938.6	272.3
WT. OF TARE (grams)	191.0	106.4	191.0	106.4
WT. OF DRY SAMPLE (grams)	782.4	573.3	747.6	165.9

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	137.4	0.6	99.4		
1 in	25.4	287.4	1.3	98.7		
3/4 in	19.1	346.5	1.5	98.5		90-100
1/2 in	12.7	593.5	2.7	97.3		
3/8 in	9.53	748.2	3.3	96.7		
No. 4	4.75	24.1	4.2	95.8	92.6	
No. 10	2.00	50.4	8.8	91.2	88.2	
No. 20	0.850	74.3	13.0	87.0	84.1	
No. 40	0.425	95.5	16.7	83.3	80.6	
No. 60	0.250	114.1	19.9	80.1	77.5	
No. 100	0.125	138.2	24.1	75.9	73.3	
No. 200	0.075	164.9	28.8	71.2	68.9	50-100
PAN	—	165.7	—	—		

COMMENTS:

000317

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [illegible] — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

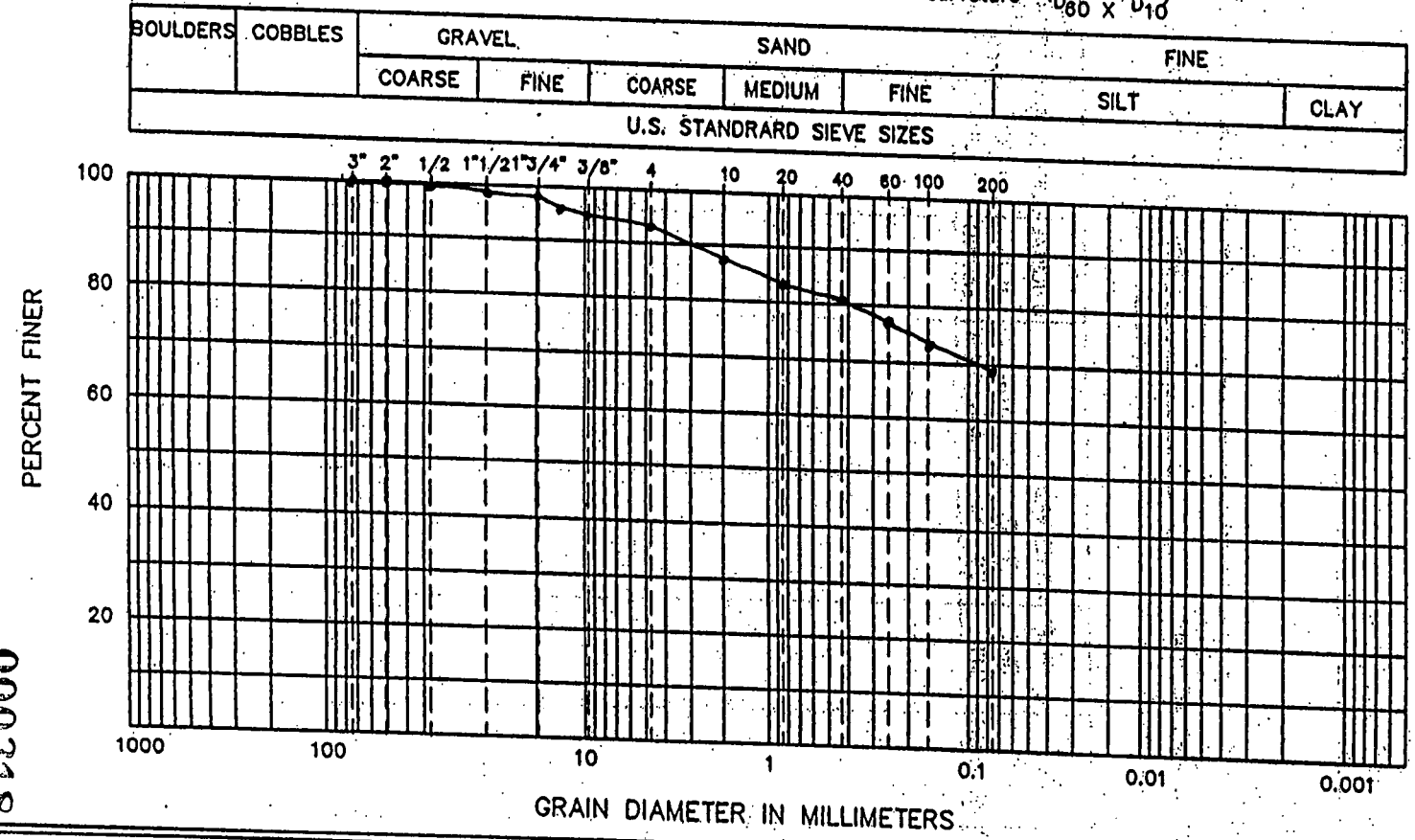
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-30 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 30

(PL) 15

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.4
1-in.	98.7
3/4-in.	98.5
1/2-in.	97.3
3/8-in.	96.7
NO. 4	92.6
NO. 10	88.2
NO. 20.	84.1
NO. 40	80.6
NO. 60	77.5
NO. 100	73.3
NO. 200	68.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	52
0.005	33
0.002	28

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000318

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 30
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	70.32
Dry Soil & Tare (gm)	67.16
Tare Weight (gm)	3.20
Moisture Content (%)	4.94

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	499.71	
Tare Weight (gm)	0.00	
Total Weight (gm)	476.18	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	64.78
Calculated Dry Wt. used in test (gm)	61.73
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.01	2.01	89.6	#10	medium sand
#20	4.43	4.43	86.0	#20	medium sand
#40	6.73	6.73	82.5	#40	fine sand
#60	8.76	8.76	79.5	#60	fine sand
#100	11.04	11.04	76.0	#100	fine sand
#200	14.02	14.02	71.6	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/4/02	15:30								
8/4/02	15:32	2.00	47.0	22.50	0.013	7.50	39.50	9.9	0.99
8/4/02	15:35	5.00	43.0	22.50	0.013	7.50	35.50	10.6	0.99
8/4/02	15:45	15.00	38.0	22.50	0.013	7.50	30.50	11.4	0.99
8/4/02	16:00	30.00	34.0	22.50	0.013	7.50	26.50	12.0	0.99
8/4/02	16:30	60.00	31.0	22.50	0.013	7.50	23.50	12.5	0.99
8/4/02	19:40	250.00	27.0	22.50	0.013	7.50	19.50	13.2	0.99
8/5/02	15:30	1440.00	24.0	23.00	0.013	7.50	16.50	13.7	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0291	58.7		
0.0191	52.7	% GRAVEL	7.40
0.0114	45.3	% COARSE SAND	3.02
0.0083	39.4	% MEDIUM SAND	7.08
0.0060	34.9	% FINE SAND	10.94
0.0030	29.0	% FINES	71.57
0.0013	24.5	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

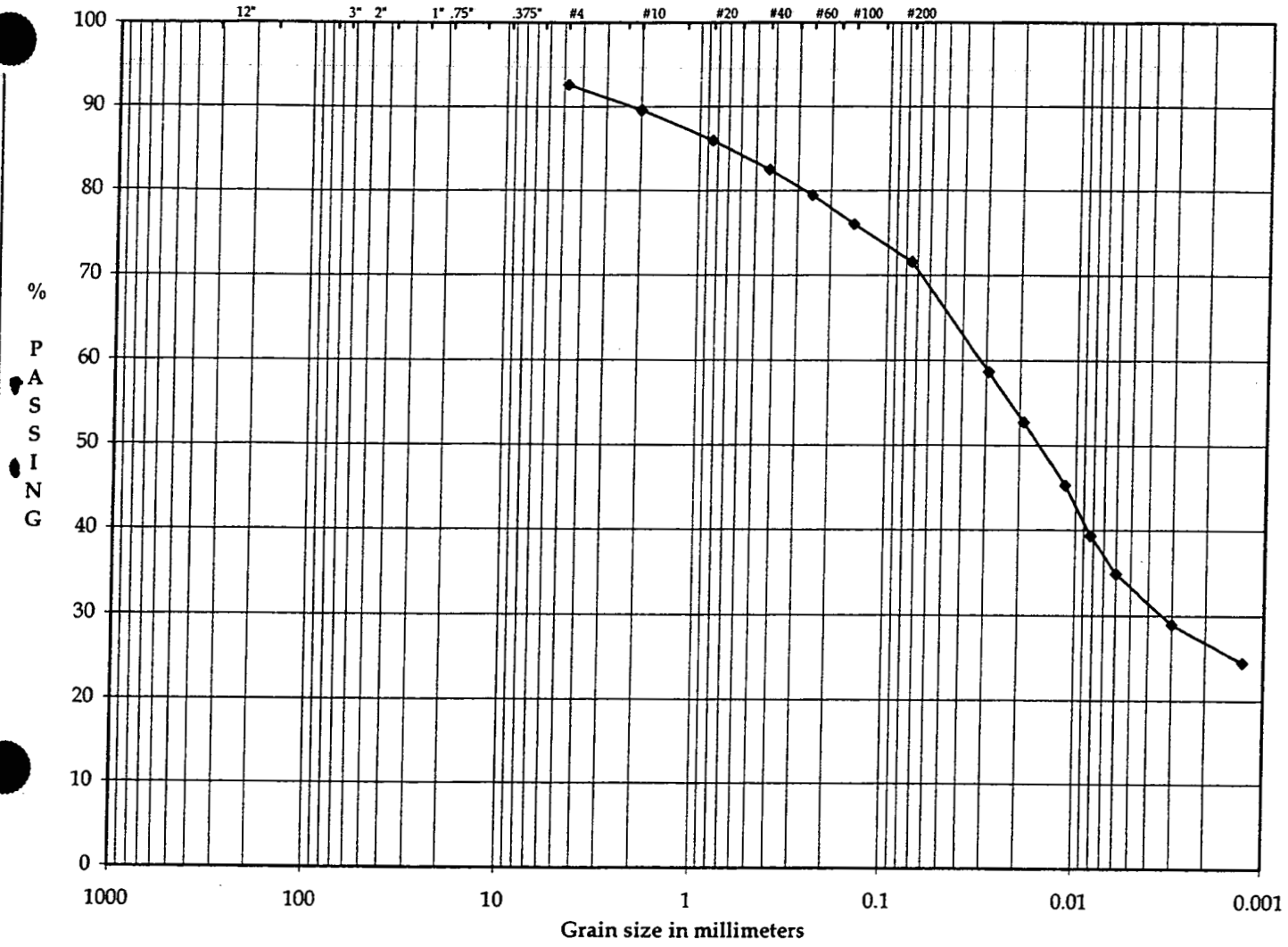
-	LL
-	PL
-	PI

TECH	SW/TJ
DATE	8/3/02
CHECK	NS
REVIEW	[illegible]

000319

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 30
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/TJ
DATE	8/3/02
CHECK	
REVIEW	

000320

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 02 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-31

SOIL SAMPLE SIZE	+3/8 = 3640.1	MOISTURE = 337.4	TOTAL = 47252.0
	-3/8 = 500gm 42774.5	47252.0	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	~~NE-3~~ 58	L-7	~~NE-3~~ 58	L-7
WT. OF DRY SAMPLE PLUS TARE (grams)	3937.1	772.0	3724.8	368.3
WT. OF TARE (grams)	297.0 ~~189.9~~	194.0	297.0 ~~189.9~~	194.0
WT. OF DRY SAMPLE (grams)	3640.1	578.0	3427.8	174.3

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	720.8	1.5	98.5		
3/4 in	19.1	1525.3	3.2	96.8		90-100
1/2 in	12.7	2855.0	6.0	94.0		
3/8 in	9.53	3425.9	7.3	92.7		
No. 4	4.75	27.4	4.7	95.3	88.3	
No. 10	2.00	53.8	9.3	90.7	84.1	
No. 20	0.850	77.5	13.4	86.6	80.3	
No. 40	0.425	99.4	17.2	82.8	76.8	
No. 60	0.250	118.9	20.6	79.4	73.6	
No. 100	0.125	141.2	24.9	75.1	~~68.7~~ 69.6	
No. 200	0.075	174.0	30.1	69.6	~~64.5~~ 64.8	50-100
PAN	—	174.3	—	—		

COMMENTS:

000321

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CH SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

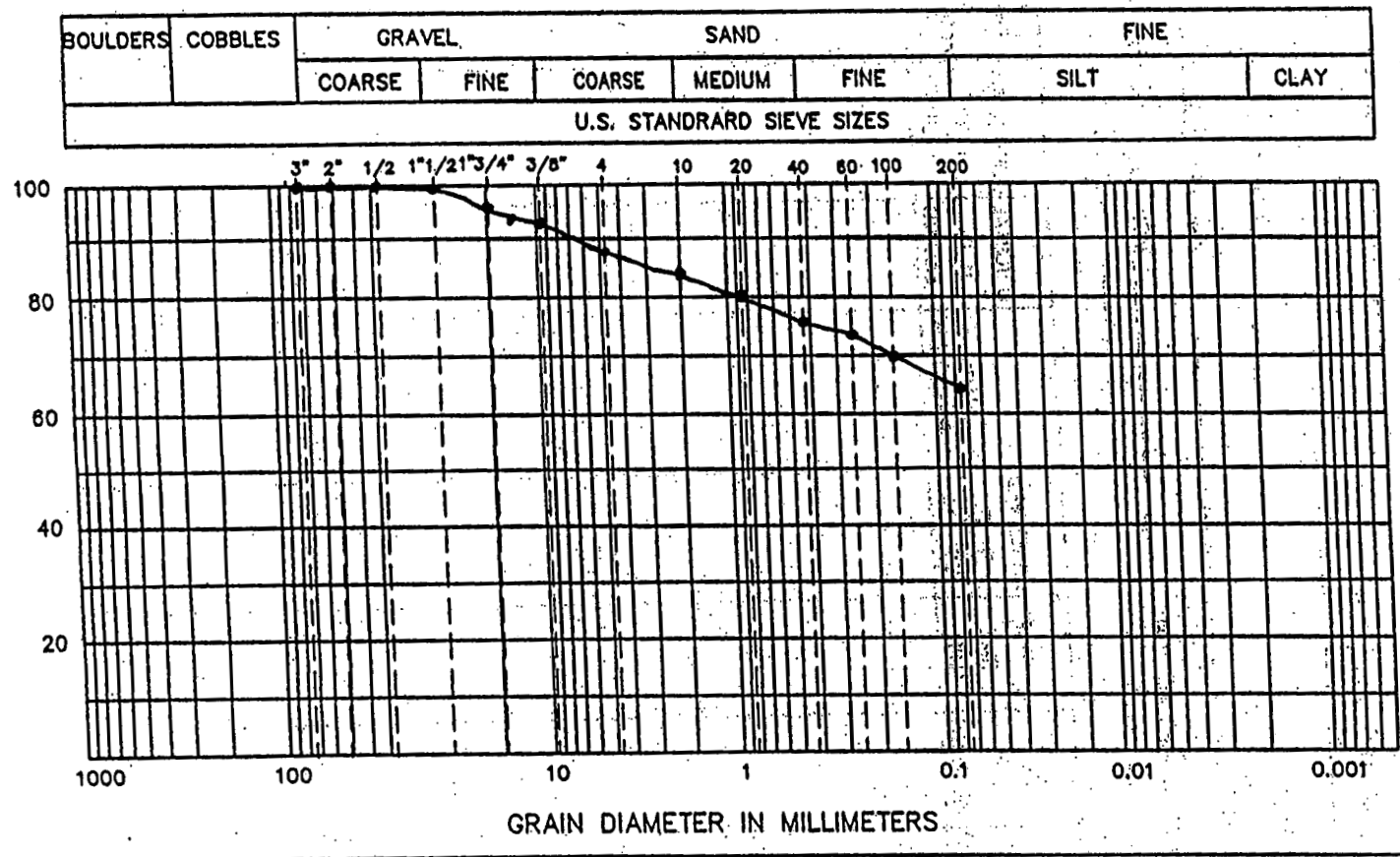
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: 24 day July month 2002 year

MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02-31 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 28

(PL) 15

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.5
3/4-in.	96.8
1/2-in.	94.0
3/8-in.	92.7
NO. 4	88.3
NO. 10	84.1
NO. 20.	80.3
NO. 40	76.8
NO. 60	73.6
NO. 100	69.6
NO. 200	64.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	61
0.02	50
0.005	31
0.002	25

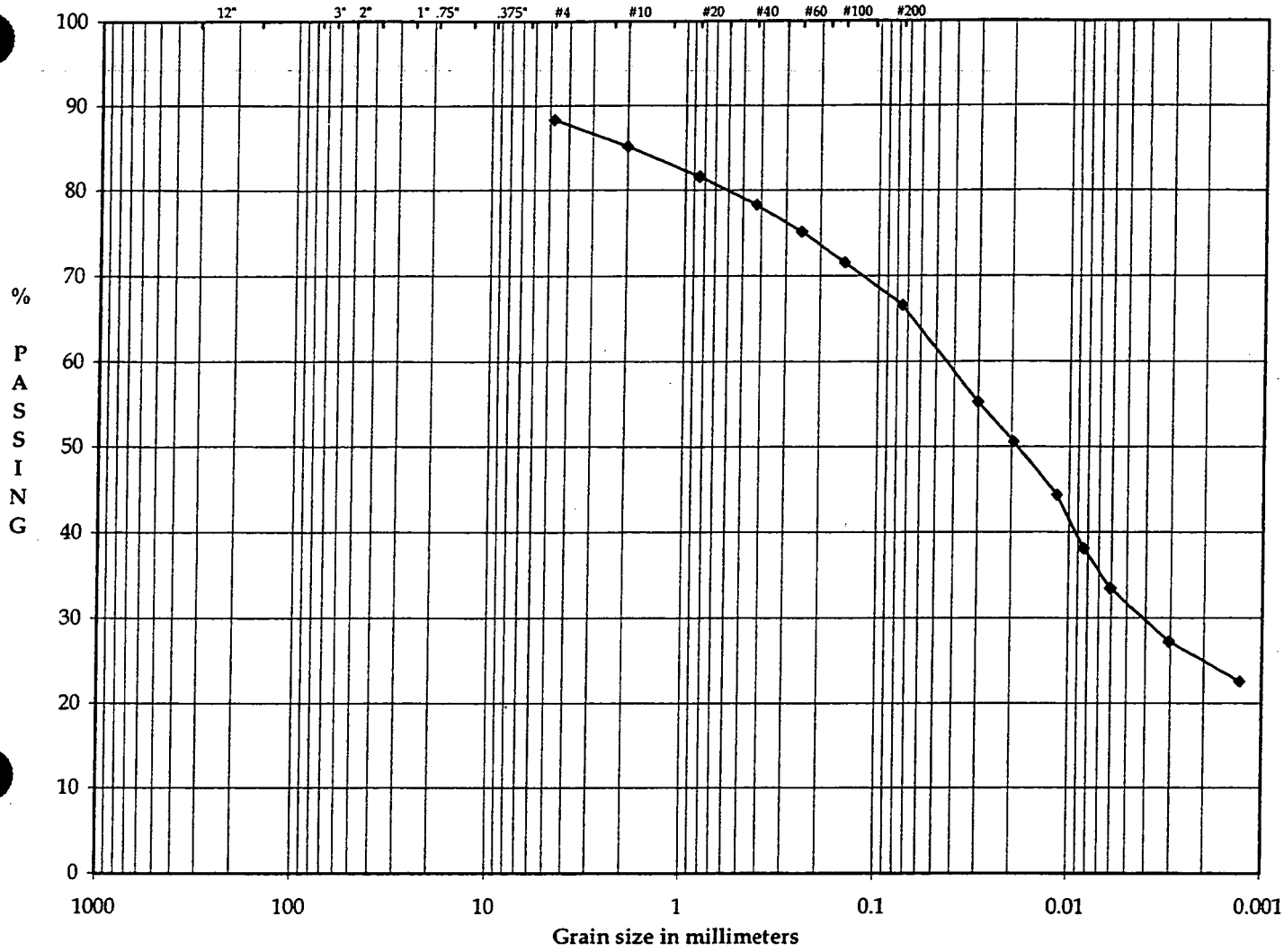
SOIL CLASSIFICATION (ASTM D 2487): CL

000322

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD CHECKED BY: _____ SHEET NO. ____ OF ____

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 31
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000323

TECH	SW/TJ
DATE	8/3/02
CHECK	BSS
REVIEW	[illegible]

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 31
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	71.61
Dry Soil & Tare (gm)	68.38
Tare Weight (gm)	3.20
Moisture Content (%)	4.96

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	499.74	
Tare Weight (gm)	0.00	
Total Weight (gm)	476.14	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			88.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.97
Calculated Dry Wt. used in test (gm)	56.19
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	88.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.02	2.02	85.1	#10	medium sand
#20	4.28	4.28	81.6	#20	medium sand
#40	6.37	6.37	78.3	#40	fine sand
#60	8.36	8.36	75.2	#60	fine sand
#100	10.67	10.67	71.5	#100	fine sand
#200	13.82	13.82	66.6	#200	fines

HYDROMETER CALCULATIONS

DATE 8/4/02	TIME 15:32	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/4/02	15:34	2.00	43.0	22.50	0.013	7.50	35.50	10.6	0.99
8/4/02	15:37	5.00	40.0	22.50	0.013	7.50	32.50	11.1	0.99
8/4/02	15:47	15.00	36.0	22.50	0.013	7.50	28.50	11.7	0.99
8/4/02	16:02	30.00	32.0	22.50	0.013	7.50	24.50	12.4	0.99
8/4/02	16:32	60.00	29.0	22.50	0.013	7.50	21.50	12.9	0.99
8/4/02	19:42	250.00	25.0	22.50	0.013	7.50	17.50	13.5	0.99
8/5/02	15:32	1440.00	22.0	23.00	0.013	7.50	14.50	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0302	55.2		
0.0195	50.6	% GRAVEL	11.70
0.0116	44.3	% COARSE SAND	3.17
0.0084	38.1	% MEDIUM SAND	6.84
0.0061	33.5	% FINE SAND	11.71
0.0030	27.2	% FINES	66.58
0.0013	22.6	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

TECH	SW/TJ
DATE	8/3/02
CHECK	BS
REVIEW	[illegible]

000324

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

-1.80
49.15

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 06 day ~~July~~ Aug month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-34

SOIL SAMPLE SIZE	+3/8 = 1561.5	MOISTURE = 401.4	TOTAL = 24257.3
	-3/8 = 22294.4	24257.3	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-8	L-1	L-8	L-1
WT. OF DRY SAMPLE PLUS TARE (grams)	1754.7	777.4	1564.6	360.8
WT. OF TARE (grams)	193.2	192.4	193.2	192.4
WT. OF DRY SAMPLE (grams)	1561.5	585.0	1371.3	168.4

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	439.3	1.8	98.2		
3/4 in	19.1	746.7	3.1	96.9		90-100
1/2 in	12.7	1080.5	4.5	95.5		
3/8 in	9.53	1370.5	5.6	94.4		
No. 4	4.75	22.7	3.9	96.1	90.7	
No. 10	2.00	49.0	8.4	91.6	86.5	
No. 20	0.850	68.1	11.6	88.4	83.4	
No. 40	0.425	84.8	14.5	85.5	80.7	
No. 60	0.250	105.9	18.1	81.9	77.3	
No. 100	0.125	136.9	23.4	76.6	72.3	
No. 200	0.075	167.5	28.6	71.4	69.4	50-100
PAN	—	168.1	—	—		

COMMENTS:

000325

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

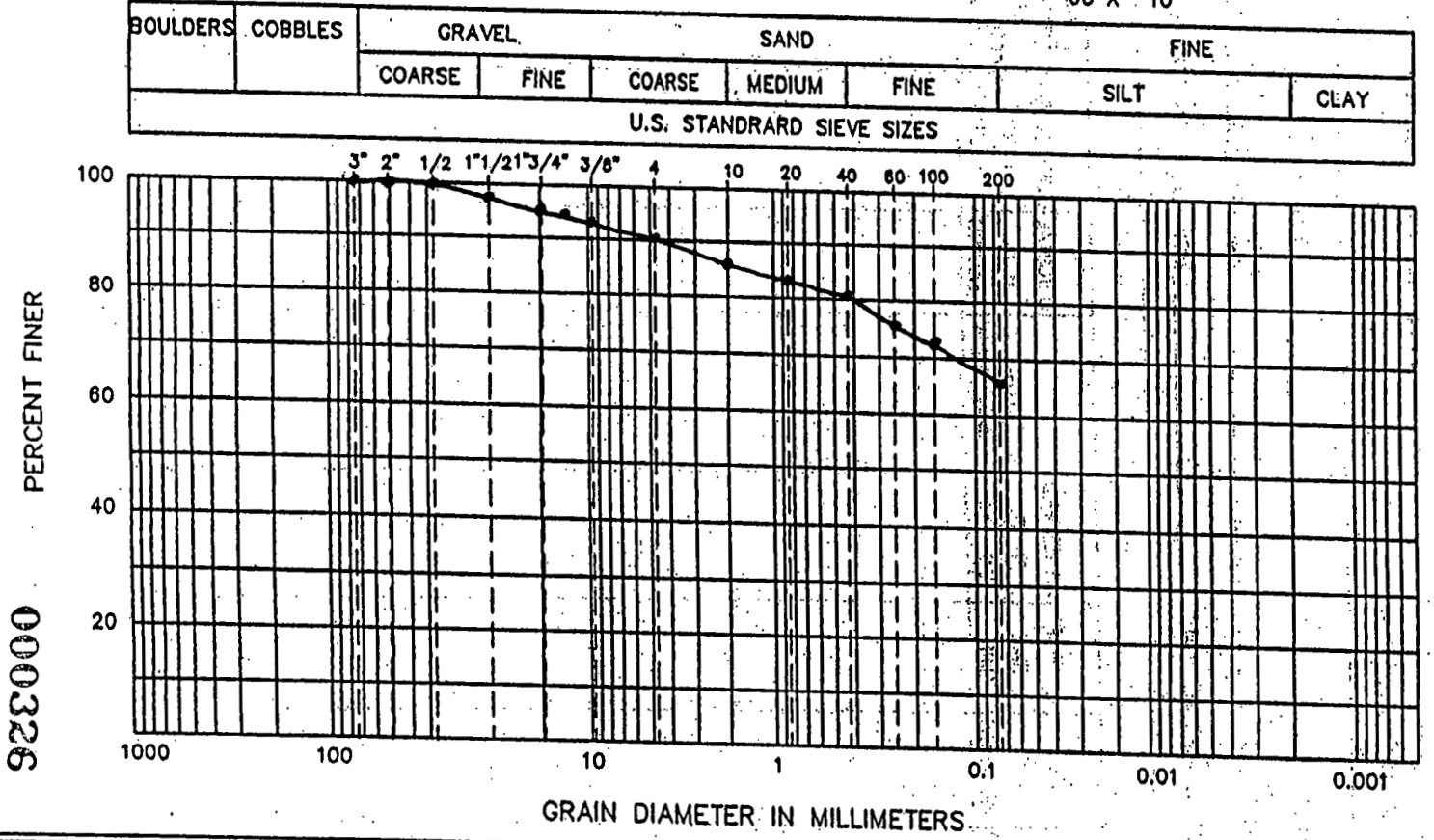
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-34 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 26

(PL) 15

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.2
3/4-in.	96.9
1/2-in.	95.5
3/8-in.	94.4
NO. 4	90.7
NO. 10	86.5
NO. 20	83.4
NO. 40	80.7
NO. 60	77.3
NO. 100	72.3
NO. 200	67.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	60
0.02	48
0.005	27
0.002	20

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

0003326

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 34
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.28
Dry Soil & Tare (gm)	48.79
Tare Weight (gm)	3.20
Moisture Content (%)	3.27

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.31	
Tare Weight (gm)	235.20	
Total Weight (gm)	484.28	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			90.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.29
Calculated Dry Wt. used in test (gm)	56.45
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	90.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.40	2.40	86.8	#10	medium sand
#20	4.80	4.80	83.0	#20	medium sand
#40	6.99	6.99	79.5	#40	fine sand
#60	9.16	9.16	76.0	#60	fine sand
#100	11.69	11.69	71.9	#100	fine sand
#200	15.17	15.17	66.3	#200	fines

HYDROMETER CALCULATIONS

DATE 8/9/02	TIME 9:05	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/9/02	9:07	2.00	40.5	22.50	0.013	7.50	33.00	10.9	0.99
8/9/02	9:10	5.00	37.0	22.50	0.013	7.50	29.50	11.5	0.99
8/9/02	9:20	15.00	33.0	22.50	0.013	7.50	25.50	12.2	0.99
8/9/02	9:35	30.00	29.5	22.50	0.013	7.50	22.00	12.7	0.99
8/9/02	10:05	60.00	26.0	22.50	0.013	7.50	18.50	13.3	0.99
8/9/02	13:15	250.00	20.5	22.00	0.013	7.50	13.00	14.2	0.99
8/10/02	9:05	1440.00	19.0	22.00	0.013	7.50	11.50	14.5	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0306	52.5		
0.0199	46.9	% GRAVEL	9.30
0.0118	40.6	% COARSE SAND	3.86
0.0085	35.0	% MEDIUM SAND	7.38
0.0062	29.4	% FINE SAND	13.14
0.0031	20.7	% FINES	66.32
0.0013	18.3	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

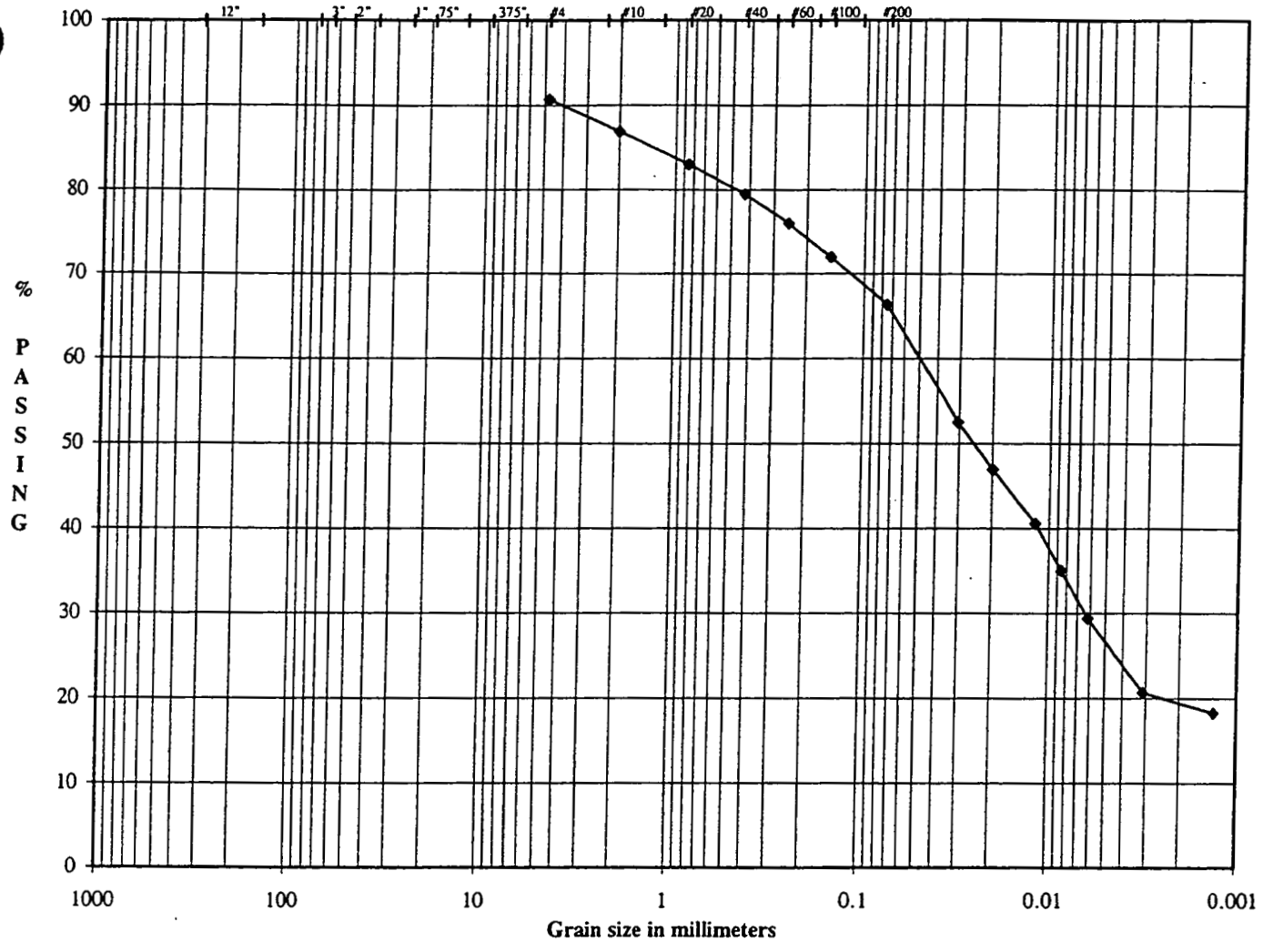
-	LL
-	PL
-	PI

TECH	TJ/DA
DATE	8/8/02
CHECK	
REVIEW	

000327

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 34
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DA
DATE	8/8/02
CHECK	BSS
REVIEW	[illegible]

000328

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 06 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-35

SOIL SAMPLE SIZE	+3/8 = 1822.1	MOISTURE = ~~34.5~~ CHW 298.5	TOTAL = 44147.8
	-3/8 = 42027.2		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-2	K	L-2	K
WT. OF DRY SAMPLE PLUS TARE (grams)	2013.4	685.7	1858.1	271.3
WT. OF TARE (grams)	191.3	101.5	191.3	101.5
WT. OF DRY SAMPLE (grams)	1822.1	584.2	1666.8	169.8

SIEVE ANALYSIS — QA ID: GHW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	112.8	0.26	99.7		
1 in	25.4	534.4	1.21	98.8		
3/4 in	19.1	861.4	1.95	98.1		90-100
1/2 in	12.7	1304.8	2.96	97.0		
3/8 in	9.53	1665.2	3.77	96.2		
No. 4	4.75	15.6	2.7	97.3	93.6	
No. 10	2.00	39.9	6.8	93.2	89.7	
No. 20	0.850	62.9	10.8	89.2	85.8	
No. 40	0.425	85.5	14.6	85.4	82.2	
No. 60	0.250	105.9	18.0	82.0	78.9	
No. 100	0.125	132.2	22.6	77.4	74.5	
No. 200	0.075	165.2	28.3	71.7	69.0	50-100
PAN	—	168.7	—	—		

COMMENTS:

000329

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [signature] — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

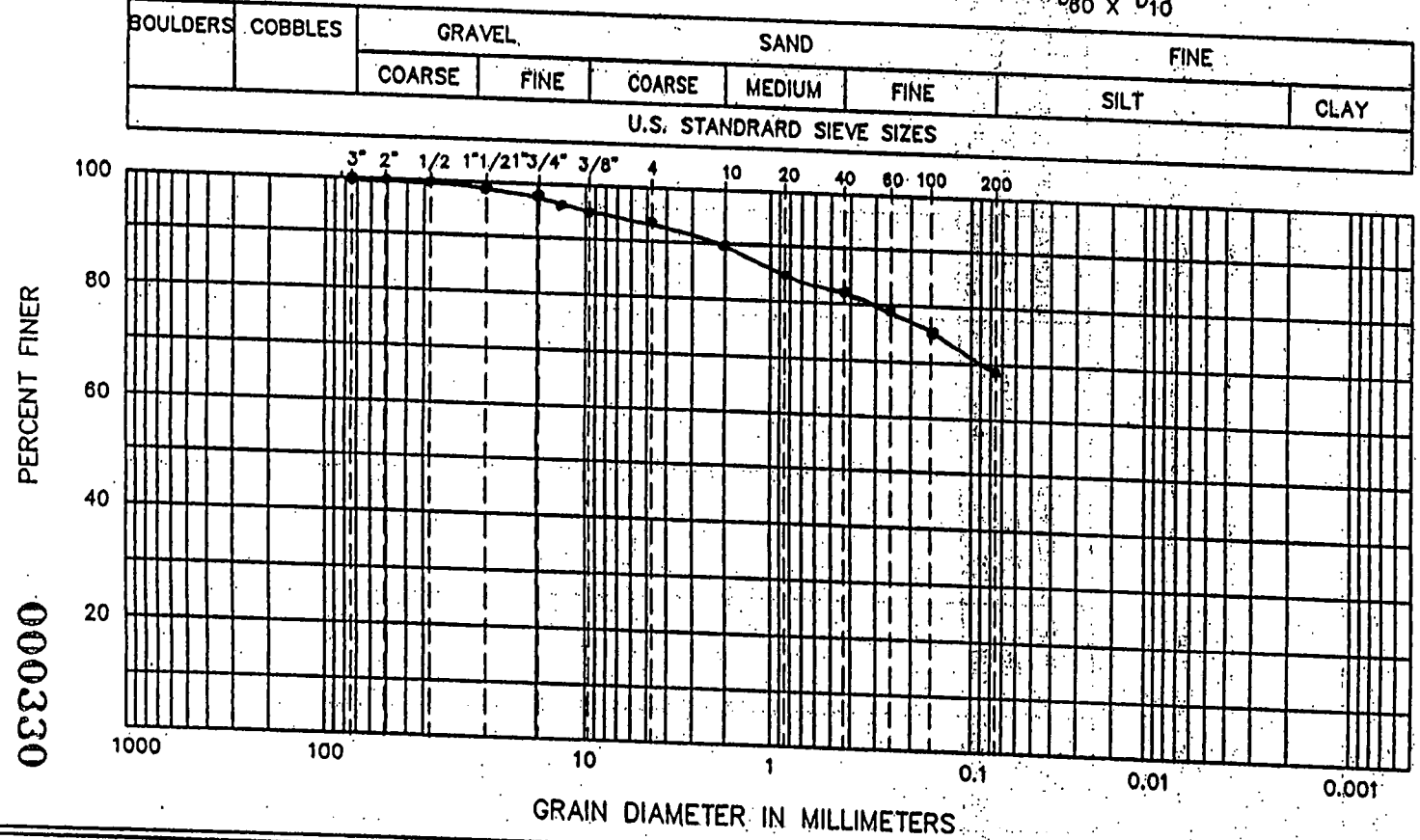
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 24 day July month 2002 year

SAMPLE NO.: LP02-35 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 24

(PL) 14

(PI) 10

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.7
1-in.	98.8
3/4-in.	98.1
1/2-in.	97.0
3/8-in.	96.2
NO. 4	93.6
NO. 10	89.7
NO. 20.	85.8
NO. 40	82.2
NO. 60	78.9
NO. 100	74.5
NO. 200	69.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	62
0.02	49
0.005	28
0.002	20

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

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SHEET NO. _____ OF _____

000330

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 35
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.39
Dry Soil & Tare (gm)	49.13
Tare Weight (gm)	3.17
Moisture Content (%)	2.74

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	722.37	
Tare Weight (gm)	219.03	
Total Weight (gm)	489.91	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.15
Calculated Dry Wt. used in test (gm)	55.63
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.80	1.80	90.6	#10	medium sand
#20	4.23	4.23	86.5	#20	medium sand
#40	6.60	6.60	82.5	#40	fine sand
#60	8.80	8.80	78.8	#60	fine sand
#100	11.46	11.46	74.3	#100	fine sand
#200	15.43	15.43	67.6	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/9/02	9:07								
8/9/02	9:09	2.00	40.5	22.50	0.013	7.50	33.00	10.9	0.99
8/9/02	9:12	5.00	37.0	22.50	0.013	7.50	29.50	11.5	0.99
8/9/02	9:22	15.00	31.5	22.50	0.013	7.50	24.00	12.4	0.99
8/9/02	9:37	30.00	28.0	22.50	0.013	7.50	20.50	13.0	0.99
8/9/02	10:07	60.00	25.0	22.50	0.013	7.50	17.50	13.5	0.99
8/9/02	15:17	370.00	20.0	22.00	0.013	7.50	12.50	14.3	0.99
8/10/02	9:07	1440.00	18.5	22.00	0.013	7.50	11.00	14.5	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0306	55.0		
0.0199	49.1	% GRAVEL	6.40
0.0119	40.0	% COARSE SAND	3.03
0.0086	34.2	% MEDIUM SAND	8.08
0.0062	29.2	% FINE SAND	14.86
0.0026	20.8	% FINES	67.64
0.0013	18.3	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

-	LL
-	PL
-	PI

TECH	TJ/DA
DATE	8/8/02
CHECK	
REVIEW	

000331

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 9 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-36

SOIL SAMPLE SIZE	+3/8 = 490.9	MOISTURE = 471.8	TOTAL = 19882.3
	-3/8 = 18919.6		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	N	LL-9	N	N after
WT. OF DRY SAMPLE PLUS TARE (grams)	592.5	710.9	559.7	~~205.9~~ 307.7
WT. OF TARE (grams)	101.6	107.1	101.6	107.1 after
WT. OF DRY SAMPLE (grams)	490.9	603.8	458.1	~~98.8~~ 200.6

SIEVE ANALYSIS QA ID: CAW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	106.3	.53	99.5		
3/4 in	19.1	144.6	.73	99.3		90-100
1/2 in	12.7	322.1	1.62	98.4		
3/8 in	9.53	445.9	2.24	97.7		
No. 4	4.75	28.5	4.7	95.3	93.1	
No. 10	2.00	64.3	10.6	89.4	87.3	
No. 20	0.850	93.3	15.5	84.5	82.6	
No. 40	0.425	117.6	19.5	80.5	78.6	
No. 60	0.250	138.2	22.9	77.1	75.3	
No. 100	0.125	164.7	27.3	72.7	71.0	
No. 200	0.075	197.2	32.7	67.3	65.8	50-100
PAN	—	200.5	—	—	—	

COMMENTS:

000332

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CA SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 12 day Aug month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-38

SOIL SAMPLE SIZE +3/8 = 1034.9 gm MOISTURE = 496.6 -3/8 = 39095.8 g TOTAL = 40627.3

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-1	L-6	L-1	L-6
WT. OF DRY SAMPLE PLUS TARE (grams)	1227.3	862.5	1156.4	~~306~~ 413.3
WT. OF TARE (grams)	192.4	199.1	192.4	199.1
WT. OF DRY SAMPLE (grams)	1034.9	663.4	964.0	214.2

SIEVE ANALYSIS QA ID: CHN

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	152.7	.37	99.6		
3/4 in	19.1	255.9	.63	99.4		90-100
1/2 in	12.7	647.9	1.59	98.4		
3/8 in	9.53	957.9	2.36	97.6		
No. 4	4.75	29.7	4.5	95.5	93.3	
No. 10	2.00	58.7	8.8	91.2	89.0	
No. 20	0.850	89.8	13.5	86.5	84.4	
No. 40	0.425	119.1	18.0	82.0	80.1	
No. 60	0.250	143.6	21.6	78.4	76.5	
No. 100	0.125	173.8	26.2	73.8	72.0	
No. 200	0.075	210.1	31.7	68.3	~~67~~ 66.7	50-100
PAN	—	214.0	—	—		

COMMENTS:

000333

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

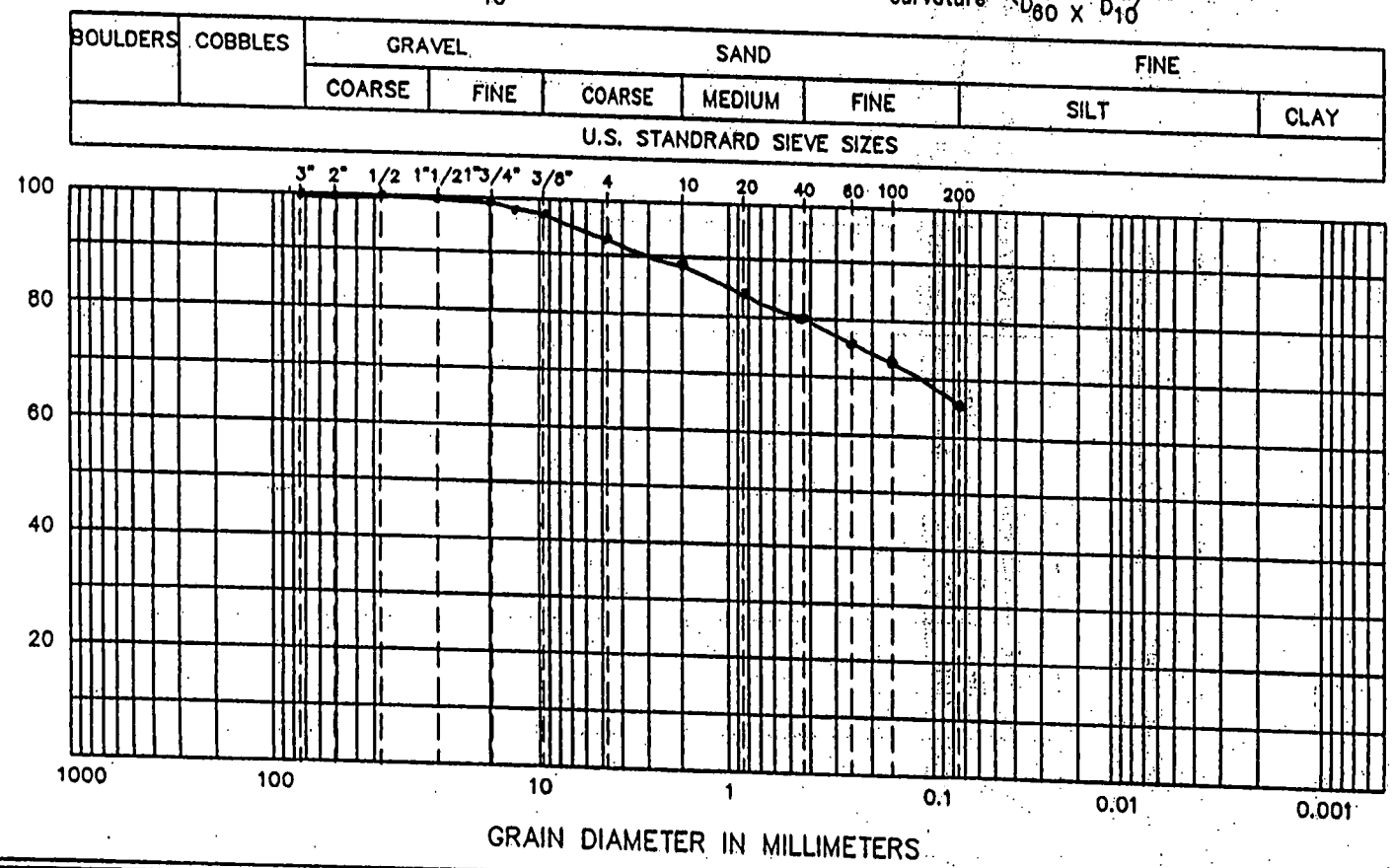
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 15 day Oct month 2002 year

SAMPLE NO.: LP02-38 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 24

(PL) 15

(PI) 9

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.6
3/4-in.	99.4
1/2-in.	98.4
3/8-in.	97.6
NO. 4	93.3
NO. 10	89.0
NO. 20.	84.4
NO. 40	80.1
NO. 60	76.5
NO. 100	72.0
NO. 200	66.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	64
0.02	55
0.005	32
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

0003334

5 of 8

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 38
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	48.68
Dry Soil & Tare (gm)	48.21
Tare Weight (gm)	3.27
Moisture Content (%)	1.05

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	585.21	
Tare Weight (gm)	114.81	
Total Weight (gm)	465.53	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.64
Calculated Dry Wt. used in test (gm)	56.05
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	4.65	4.65	85.6	#10	medium sand
#20	7.04	7.04	81.6	#20	medium sand
#40	8.98	8.98	78.4	#40	fine sand
#60	10.85	10.85	75.2	#60	fine sand
#100	12.96	12.96	71.7	#100	fine sand
#200	16.09	16.09	66.5	#200	fines

HYDROMETER CALCULATIONS

DATE 8/14/02	TIME 8:52	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/14/02	8:54	2.00	44.0	22.50	0.013	7.00	37.00	10.2	0.99
8/14/02	8:57	5.00	40.0	22.50	0.013	7.00	33.00	10.9	0.99
8/14/02	9:07	15.00	34.0	22.50	0.013	7.00	27.00	11.9	0.99
8/14/02	9:22	30.00	30.0	22.50	0.013	7.00	23.00	12.5	0.99
8/14/02	9:52	60.00	27.0	22.50	0.013	7.00	20.00	13.0	0.99
8/14/02	15:17	370.00	23.0	22.00	0.013	7.00	16.00	13.7	0.99
8/15/02	8:52	1440.00	20.0	22.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0296	61.0
0.0193	54.4
0.0117	44.5
0.0085	37.9
0.0061	33.0
0.0025	26.4
0.0013	21.4

% GRAVEL	6.70
% COARSE SAND	7.74
% MEDIUM SAND	7.21
% FINE SAND	11.83
% FINES	66.52
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

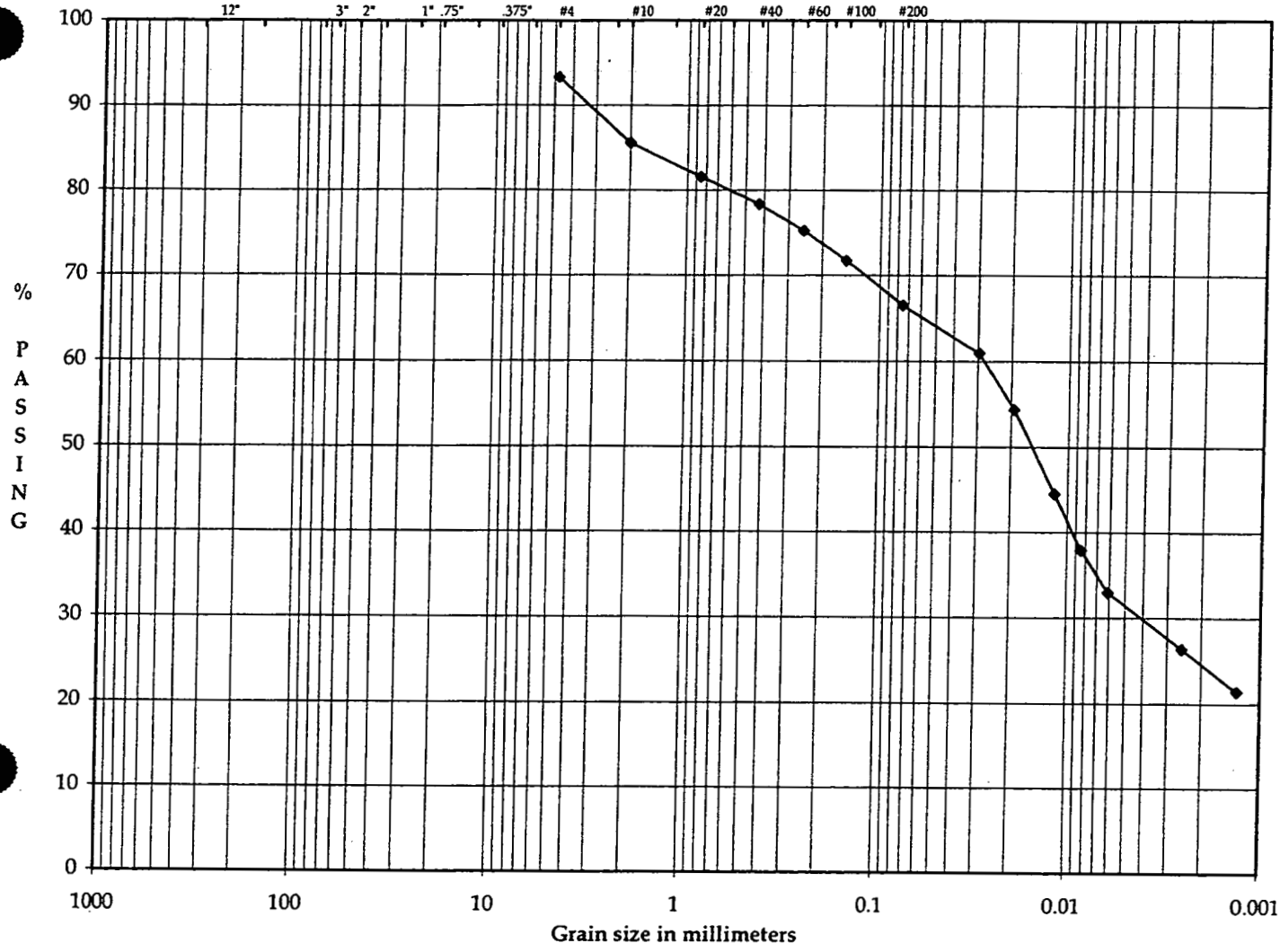
TECH	JH/TJ
DATE	8/13/02
CHECK	BJS
REVIEW	[illegible]

000335

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 38
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000336

TECH	JH/TJ
DATE	8/13/02
CHECK	
REVIEW	

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 13 day, Aug month 2002 year

MATERIAL TYPE: Low Poem CLAY SAMPLE NO.: LP02-39

SOIL SAMPLE SIZE	+3/8 = 1773.4	MOISTURE = 403.1 gm	TOTAL = 26590.9
	-3/8 = 24414.4 gm	26590.9	

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-3	L-6	L-3	L-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	1963.3	795.8	1703.8	394.8
WT. OF TARE	(grams)	189.9	199.1	189.9	199.1
WT. OF DRY SAMPLE	(grams)	1773.4	596.7	1513.9	195.7

SIEVE ANALYSIS QA ID: [illegible]

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	256.2	.96	99.0		
1 in	25.4	704.8	2.65	97.4		
3/4 in	19.1	874.6	3.28	96.7		90-100
1/2 in	12.7	1277.8	4.81	95.2		
3/8 in	9.53	1510.3	5.68	94.3		
No. 4	4.75	23.1	3.98	96.1	90.6	
No. 10	2.00	53.99	9.1	90.9	85.7	
No. 20	0.850	82.71	13.9	86.1	81.9	81.2
No. 40	0.425	109.30	18.3	81.7	77.0	
No. 60	0.250	131.87	22.1	77.9	73.5	
No. 100	0.125	160.25	26.9	73.1	68.9	
No. 200	0.075	193.29	32.4	67.6	63.7	50-100
PAN	—	195.68	—	—		

COMMENTS:

000337

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [illegible] SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

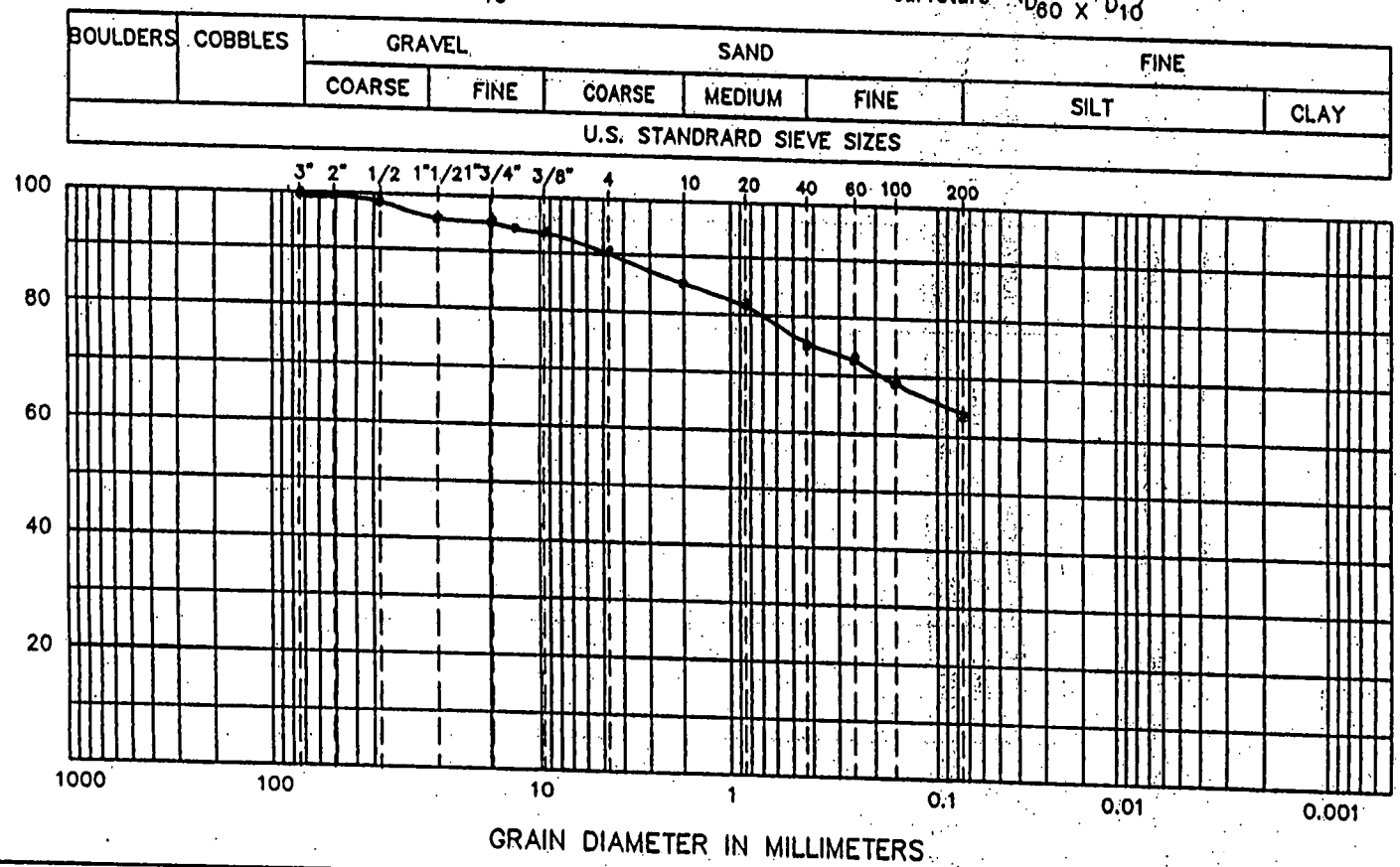
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 15 day Oct month 2002 year

SAMPLE NO.: LP02-39 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 23

(PL) 15

(PI) 8

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.0
1-in.	97.4
3/4-in.	96.7
1/2-in.	95.2
3/8-in.	94.3
NO. 4	90.6
NO. 10	85.7
NO. 20.	81.2
NO. 40	77.0
NO. 60	73.5
NO. 100	68.9
NO. 200	63.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	
0.02	53
0.005	36
0.002	28

SOIL CLASSIFICATION (ASTM D 2487):

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000338

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 13 day Aug month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-40

600

600

SOIL SAMPLE SIZE	+3/8 = 1655.1 gm	MOISTURE = 358.9 gm	TOTAL = 57686.2
	-3/8 =		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-7	LL-4	L-7	LL4
WT. OF DRY SAMPLE PLUS TARE (grams)	1848.4	740.6	1727.3	333.90
WT. OF TARE (grams)	193.3	145.4	193.3	145.4
WT. OF DRY SAMPLE (grams)	1655.1	595.2	1534.1	188.5

SIEVE ANALYSIS QA ID: CHW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	247.2	0.4	99.6		
3/4 in	19.1	562.6	0.9	99.1		90-100
1/2 in	12.7	1167.1	2.0	98.0		
3/8 in	9.53	1527.4	2.6	97.4		
No. 4	4.75	15.6	2.6	97.4	94.8	
No. 10	2.00	42.9	7.2	92.8	90.3	
No. 20	0.850	72.4	~~12.8~~ 12.2	87.8	85.5	
No. 40	0.425	100.2	16.8	83.2	~~80.9~~ 81.0	
No. 60	0.250	124.0	20.8	79.2	77.1	
No. 100	0.125	153.7	25.8	74.2	72.2	
No. 200	0.075	187.6	31.5	68.5	66.7	50-100
PAN	—	188.3	—	—		

COMMENTS:

000339

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

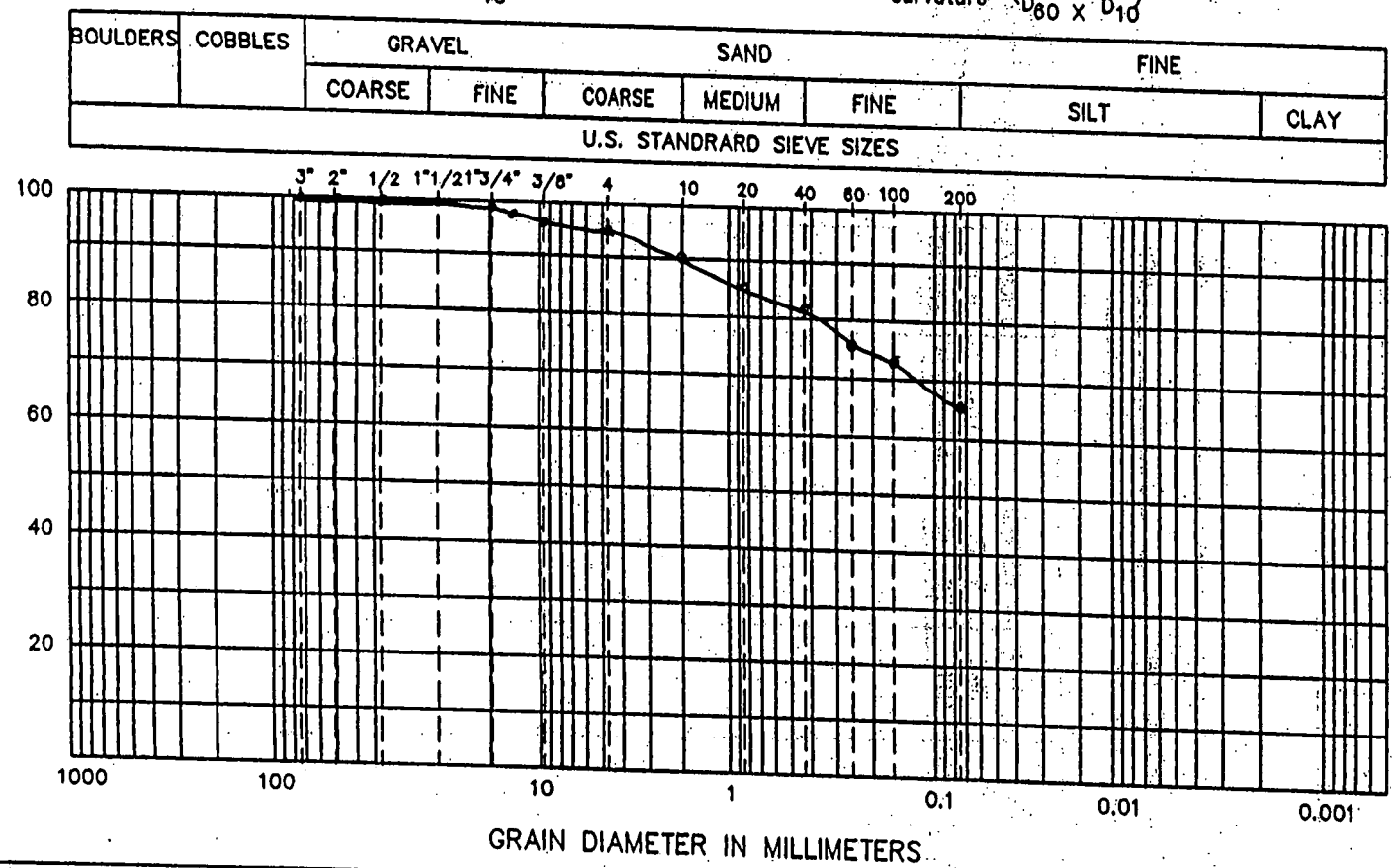
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 15 day Oct month 2002 year

SAMPLE NO.: LP02-40 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 23

(PL) 15

(PI) 8

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.6
3/4-in.	99.1
1/2-in.	98.0
3/8-in.	97.4
NO. 4	94.8
NO. 10	90.3
NO. 20	85.5
NO. 40	81.0
NO. 60	77.1
NO. 100	72.2
NO. 200	66.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	
0.02	
0.005	
0.002	

SOIL CLASSIFICATION (ASTM D 2487):

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SHEET NO. ____ OF ____

000340

5368

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III — DATE: 10 day Aug month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-41

SOIL SAMPLE SIZE	+3/8 = 442.2	MOISTURE = 352.9	TOTAL = 22570.6
	-3/8 = 21795.48	22570.6	

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		N	~~K~~ L-8	N	L-8
WT. OF DRY SAMPLE PLUS TARE	(grams)	544.0	~~510.4~~ 596.1	510.4	399.9
WT. OF TARE	(grams)	101.8	~~101.5~~ 193.2	101.8	193.2
WT. OF DRY SAMPLE	(grams)	442.2	~~408.9~~ 502.9	408.9	206.7

SIEVE ANALYSIS — QA ID: CHW

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	~~0 96.5~~	0	100		100
1 1/2in	38.1	96.5	.42	99.6		
1 in	25.4	122.1	.54	99.5		
3/4 in	19.1	154.2	.68	99.4		90-100
1/2 in	12.7	273.4	1.21	98.8		
3/8 in	9.53	408.7	1.81	98.2		
No. 4	4.75	~~10.859~~	2.2	97.8	96.0	
No. 10	2.00	32.7	6.5	93.5	91.8	
No. 20	0.850	66.6	13.2	86.8	85.2	
No. 40	0.425	101.3	20.1	79.9	78.5	
No. 60	0.250	130.0	25.9	74.1	72.8	
No. 100	0.125	164.4	32.7	67.3	66.1	
No. 200	0.075	203.3	40.4	59.6	58.5	50-100
PAN	—	205.8	—	—		

COMMENTS:

000341

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: CH — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

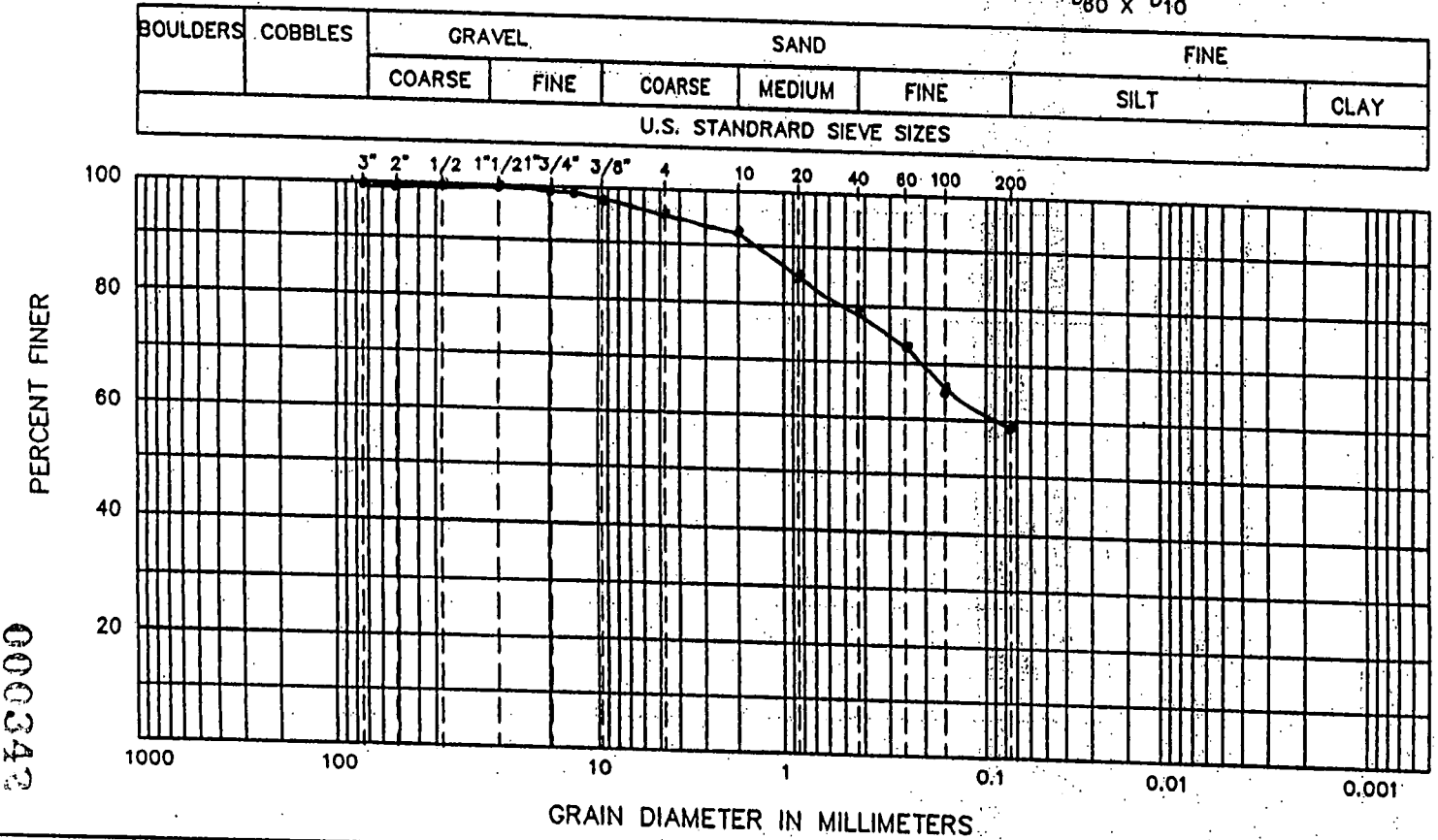
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 15 day Oct month 2002 year

SAMPLE NO.: LP02-41 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 22

(PL) 15

(PI) 7

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.6
1-In.	99.5
3/4-In.	99.4
1/2-In.	98.8
3/8-In.	98.2
NO. 4	96.0
NO. 10	91.8
NO. 20.	85.2
NO. 40	78.5
NO. 60	72.8
NO. 100	66.1
NO. 200	58.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	
0.02	53
0.005	36
0.002	8

SOIL CLASSIFICATION (ASTM D 2487):

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000342

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 14 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-42

SOIL SAMPLE SIZE	+3/8 = 1736.2 gm	MOISTURE = 412.7	TOTAL = 54178.1
	-3/8 = 52029.2	119.4 LBS	

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

Coarse Sieve
Coarse Filter

		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		L-6	N 707.7	L-6	N
WT. OF DRY SAMPLE PLUS TARE	(grams)	1934.6	~~701.6~~ 808.1	1784.4	302.9
WT. OF TARE	(grams)	198.4	101.6	198.4	101.6
WT. OF DRY SAMPLE	(grams)	1736.2	~~600.0~~ 606.1	1586.0	201.3

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	254.5	.5	99.5		
1 in	25.4	414.6	.8	99.2		
3/4 in	19.1	631.1	1.2	98.8		90-100
1/2 in	12.7	1221.5	2.3	97.7		
3/8 in	9.53	1585.7	2.9	97.1		
No. 4	4.75	23.9	3.9	96.1	93.3	
No. 10	2.00	53.5	8.8	91.2	88.6	
No. 20	0.850	84.5	13.9	86.1	83.6	
No. 40	0.425	113.0	18.6	81.4	79.0	
No. 60	0.250	137.2	22.6	77.4	75.2	
No. 100	0.125	164.9	27.2	72.8	70.7	
No. 200	0.075	199.2	32.9	67.1	65.2	50-100
PAN	—	201.1	—	—	—	

COMMENTS:

000343

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

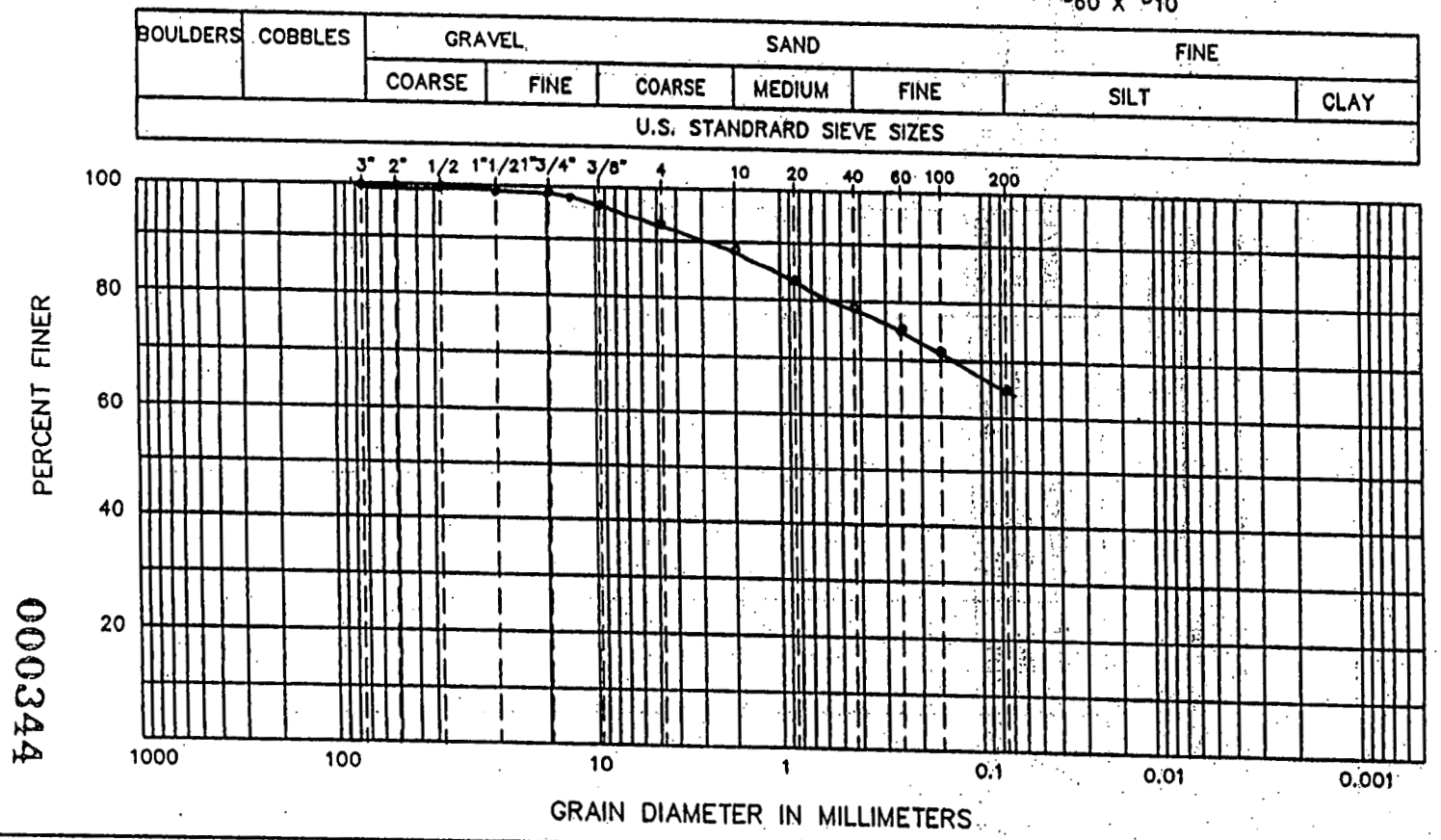
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 15 day Oct month 2002 year

SAMPLE NO.: LP02-42 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 26

(PL) 16

(PI) 10

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.5
1-in.	99.2
3/4-in.	98.8
1/2-in.	97.7
3/8-in.	97.1
NO. 4	93.3
NO. 10	88.6
NO. 20.	83.6
NO. 40	79.0
NO. 60	75.2
NO. 100	70.7
NO. 200	65.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	51
0.005	32
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0000344

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 42
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.15
Dry Soil & Tare (gm)	49.00
Tare Weight (gm)	3.21
Moisture Content (%)	2.51

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	834.28	
Tare Weight (gm)	234.60	
Total Weight (gm)	584.99	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
nount Dispersing Agent (ml)		125.00
ype Dispersion Device		Mechanical
ngth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.77
Calculated Dry Wt. used in test (gm)	54.40
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.46	2.46	89.1	#10	medium sand
#20	5.09	5.09	84.6	#20	medium sand
#40	7.39	7.39	80.6	#40	fine sand
#60	9.45	9.45	77.1	#60	fine sand
#100	11.79	11.79	73.1	#100	fine sand
#200	14.82	14.82	67.9	#200	fines

HYDROMETER CALCULATIONS

DATE 8/22/02	TIME 9:15	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/22/02	9:17	2.00	44.0	22.50	0.013	7.00	37.00	10.2	0.99
8/22/02	9:20	5.00	37.0	22.50	0.013	7.00	30.00	11.4	0.99
8/22/02	9:30	15.00	32.0	22.50	0.013	7.00	25.00	12.2	0.99
8/22/02	9:45	30.00	30.0	22.50	0.013	7.00	23.00	12.5	0.99
8/22/02	10:15	60.00	27.0	22.50	0.013	7.00	20.00	13.0	0.99
8/22/02	15:17	370.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99
8/23/02	9:15	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0296	62.8
0.0198	50.9
0.0118	42.4
0.0085	39.0
0.0061	34.0
0.0025	27.2
0.0013	22.1

% GRAVEL	6.70
% COARSE SAND	4.22
% MEDIUM SAND	8.45
% FINE SAND	12.74
% FINES	67.88
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

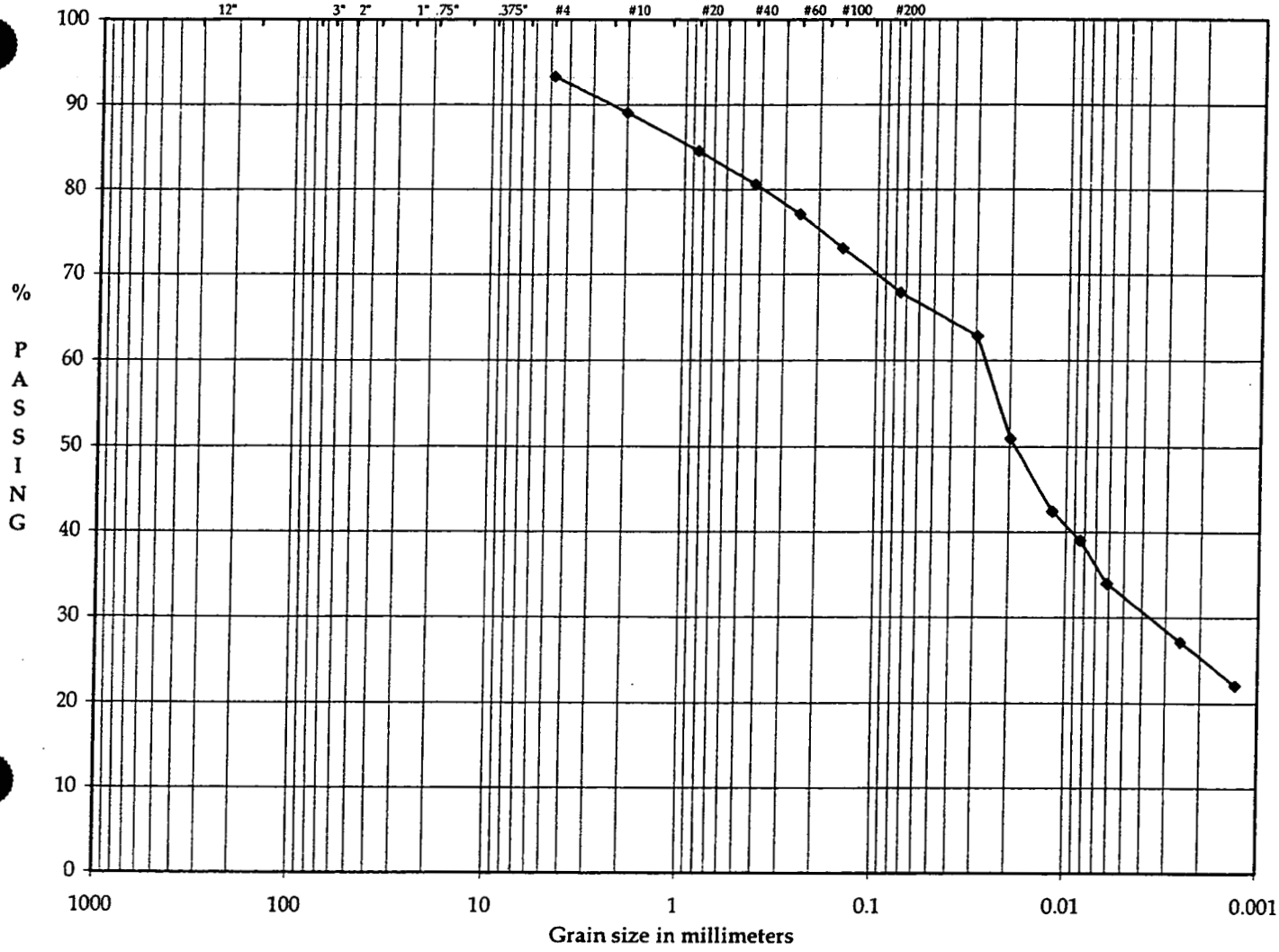
000345

TECH	TJ
DATE	8/21/02
CHECK	BES
REVIEW	PWM

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 42
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000346

TECH	TJ
DATE	8/21/02
CHECK	[illegible]
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 15 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-44

SOIL SAMPLE SIZE	+3/8 = 527.7 gm	MOISTURE = 367.1	TOTAL = 21343.1
	-3/8 = 20448.3	21343.1	

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

	+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.	LL-4	K	LL4	K
WT. OF DRY SAMPLE PLUS TARE (grams)	673.1	699.4 ~~701.5~~	523.3	246.4
WT. OF TARE (grams)	145.4	101.5	145.4	101.5
WT. OF DRY SAMPLE (grams)	527.7	~~600.0~~ 597.9	377.9	144.9

Sieve / After

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	0	0	100		
3/4 in	19.1	49.8	0.2	99.8		90-100
1/2 in	12.7	243.0	1.1	98.9		
3/8 in	9.53	378.5	1.8	98.2		
No. 4	4.75	14.0	2.3	97.7	95.9	
No. 10	2.00	34.3	5.7	94.3	92.6	
No. 20	0.850	55.9	9.3	90.7	89.0	
No. 40	0.425	76.5	12.8	87.2	85.6	
No. 60	0.250	96.1	16.1	83.9	82.4	
No. 100	0.125	119.4	20.0	80.0	78.6	
No. 200	0.075	143.3	24.0	76.0	74.6	50-100
PAN	—	144.8	—	—		

COMMENTS:

000347

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CH SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

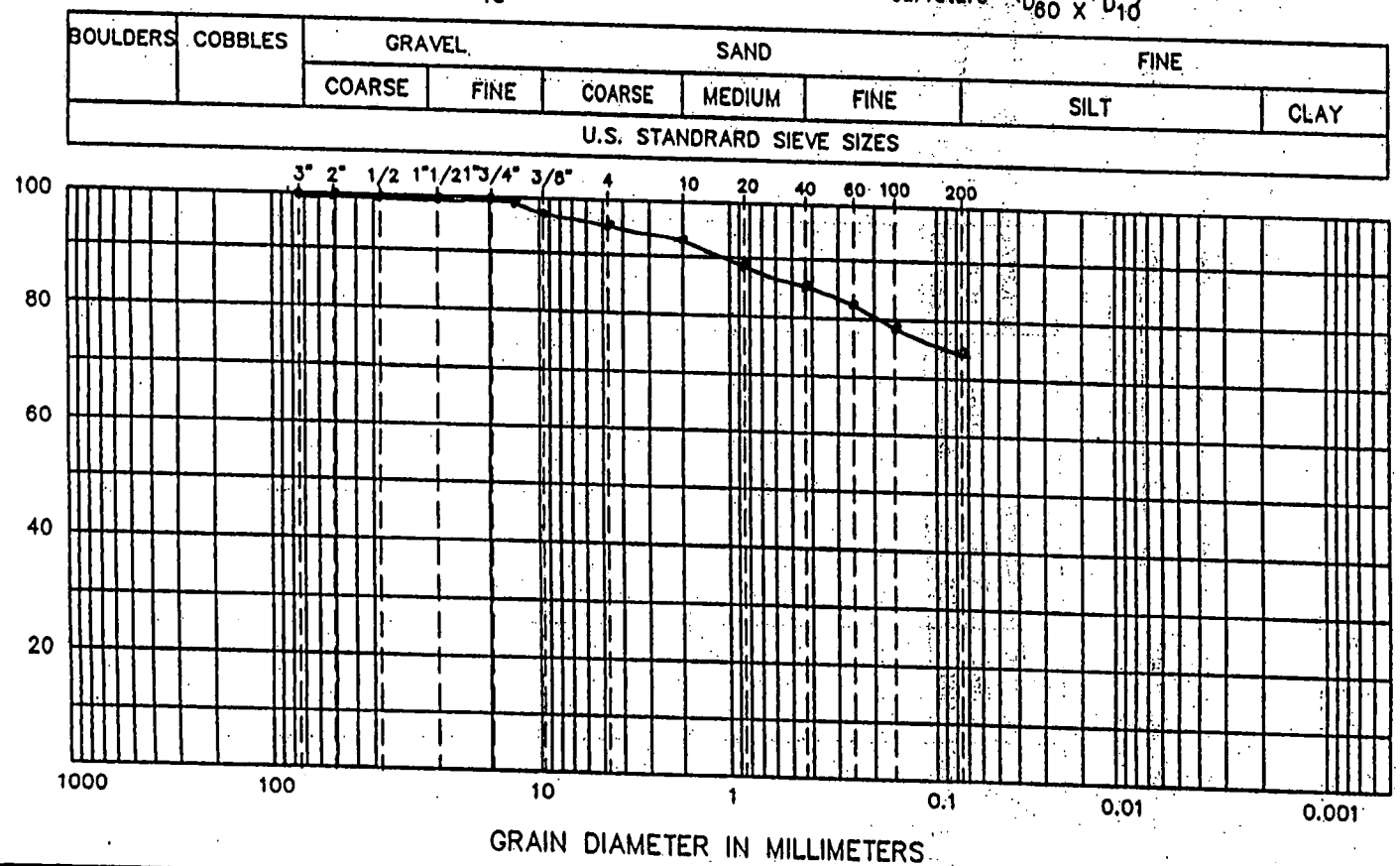
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 15 day Oct month 2002 year

SAMPLE NO.: LP02-44 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 34

(PL) 17

(PI) 17

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	100
3/4-In.	99.8
1/2-In.	98.9
3/8-In.	98.2
NO. 4	95.9
NO. 10	92.6
NO. 20.	89.0
NO. 40	85.6
NO. 60	82.4
NO. 100	78.6
NO. 200	74.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	74
0.02	58
0.005	36
0.002	29

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000348

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 44
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.31
Dry Soil & Tare (gm)	48.96
Tare Weight (gm)	3.20
Moisture Content (%)	2.95

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	835.02	
Tare Weight (gm)	234.44	
Total Weight (gm)	583.37	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			95.9	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.23
Calculated Dry Wt. used in test (gm)	55.59
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	95.90

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.25	1.25	93.7	#10	medium sand
#20	2.79	2.79	91.1	#20	medium sand
#40	4.50	4.50	88.1	#40	fine sand
#60	6.10	6.10	85.4	#60	fine sand
#100	7.94	7.94	82.2	#100	fine sand
#200	10.39	10.39	78.0	#200	fines

HYDROMETER CALCULATIONS

DATE 8/22/02	TIME 9:17	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/22/02	9:19	2.00	48.0	22.50	0.013	7.00	41.00	9.6	0.99
8/22/02	9:22	5.00	41.0	22.50	0.013	7.00	34.00	10.7	0.99
8/22/02	9:32	15.00	35.0	22.50	0.013	7.00	28.00	11.7	0.99
8/22/02	9:47	30.00	32.0	22.50	0.013	7.00	25.00	12.2	0.99
8/22/02	10:17	60.00	29.0	22.50	0.013	7.00	22.00	12.7	0.99
8/22/02	15:17	370.00	25.0	22.50	0.013	7.00	18.00	13.3	0.99
8/23/02	9:17	1440.00	22.0	22.50	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0287	70.0
0.0192	58.1
0.0116	47.8
0.0084	42.7
0.0060	37.6
0.0025	30.7
0.0013	25.6

% GRAVEL	4.10
% COARSE SAND	2.16
% MEDIUM SAND	5.61
% FINE SAND	10.16
% FINES	77.98
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

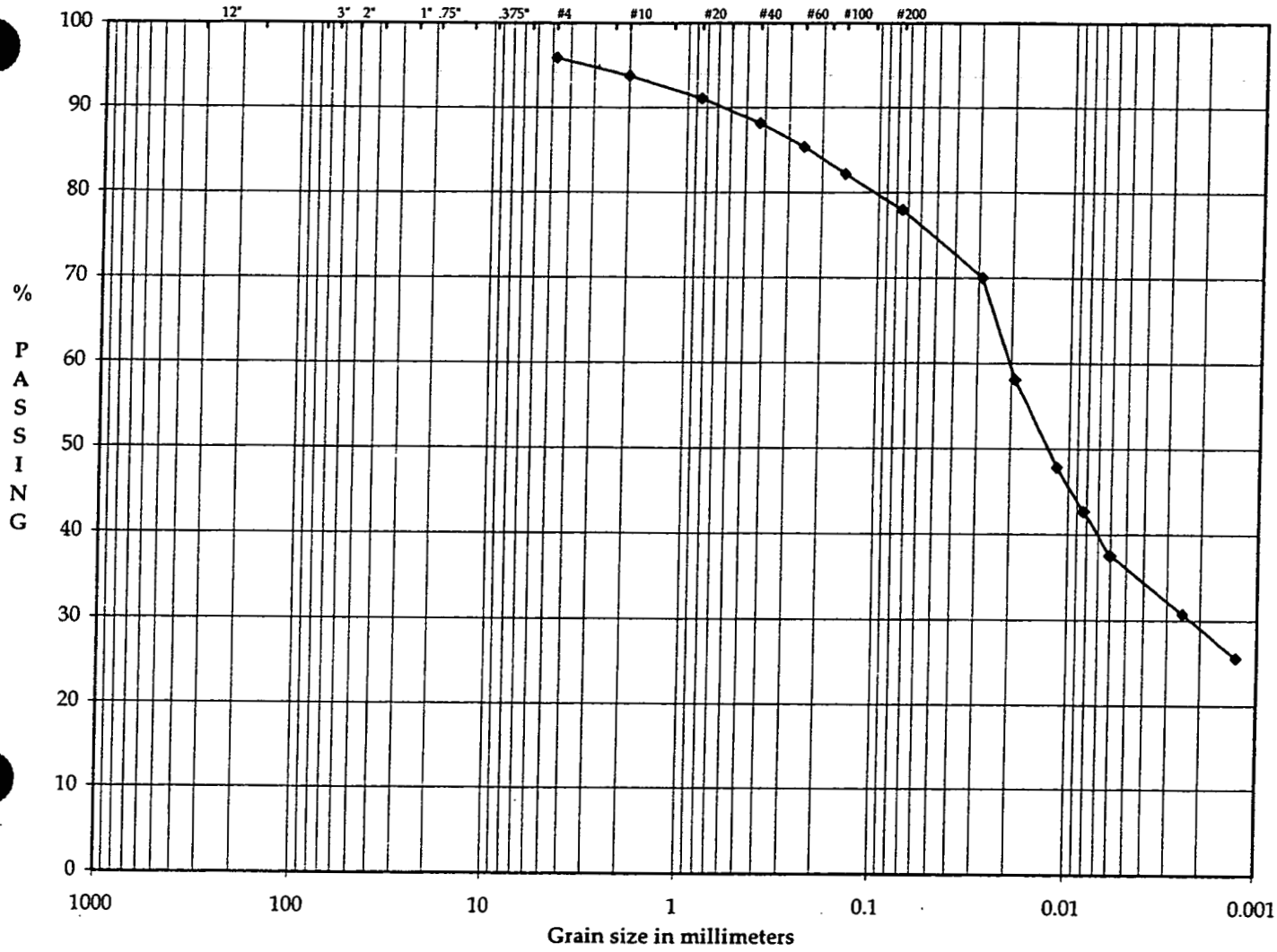
TECH	TJ
DATE	8/21/02
CHECK	
REVIEW	

000349

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 44
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000350

TECH	TJ
DATE	8/21/02
CHECK	BK
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 16 day Aug month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-45

SOIL SAMPLE SIZE			TOTAL =
	+3/8 = 1003.7 gm	MOISTURE = 402.5 gm	45831.8
	-3/8 = 44425.6 gm	45831.8	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	N	L-3	N	L-3
WT. OF DRY SAMPLE PLUS TARE (grams)	1105.3	788.0	1072.3	365.4
WT. OF TARE (grams)	101.6	189.9	101.6	189.9
WT. OF DRY SAMPLE (grams)	1003.7	598.1	970.7	175.5

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0			
2 in	50.8	0	0			100
1 1/2in	38.1	0	0			
1 in	25.4	101.8	.2	99.8		
3/4 in	19.1	194.9	.4	99.6		90-100
1/2 in	12.7	655.3	1.4	98.6		
3/8 in	9.53	956.9	2.1	97.9		
No. 4	4.75	26.5	4.4	95.6	93.6	
No. 10	2.00	58.2	9.7	90.3	88.4	
No. 20	0.850	83.9	14.0	86.0	84.2	
No. 40	0.425	105.6	17.7	82.3	80.6	
No. 60	0.250	124.0	20.7	79.3	77.6	
No. 100	0.125	148.0	24.7	75.3	73.7	
No. 200	0.075	174.7	29.2	70.8	69.3	50-100
PAN	—	175.4	—	—		

COMMENTS:

000351

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

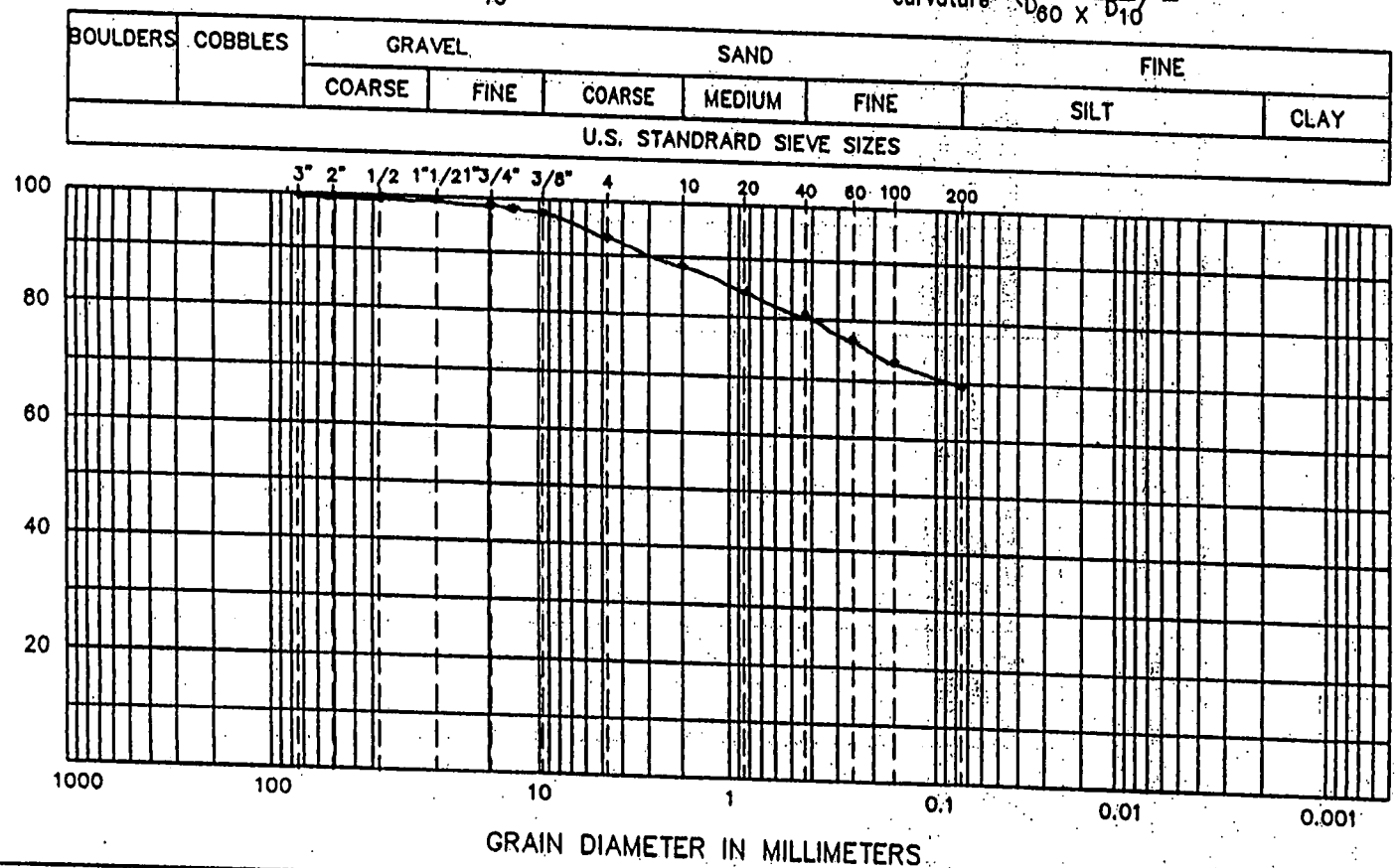
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-45 QA ID: ~~KS~~ CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.8
3/4-in.	99.6
1/2-in.	98.6
3/8-in.	97.9
NO. 4	93.6
NO. 10	88.4
NO. 20.	84.2
NO. 40	80.6
NO. 60	77.6
NO. 100	73.7
NO. 200	69.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	68
0.002	57
0.0005	33
0.0002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000352

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 45
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.75
Dry Soil & Tare (gm)	48.55
Tare Weight (gm)	3.26
Moisture Content (%)	4.86

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	834.07	
Tare Weight (gm)	234.48	
Total Weight (gm)	571.81	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.29
Calculated Dry Wt. used in test (gm)	53.68
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	3.23	3.23	88.0	#10	medium sand
#20	5.59	5.59	83.9	#20	medium sand
#40	7.42	7.42	80.7	#40	fine sand
#60	9.05	9.05	77.8	#60	fine sand
#100	10.94	10.94	74.5	#100	fine sand
#200	13.68	13.68	69.7	#200	fines

HYDROMETER CALCULATIONS

DATE 8/22/02	TIME 9:19	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/22/02	9:21	2.00	46.0	22.50	0.013	7.00	39.00	9.9	0.99
8/22/02	9:24	5.00	40.0	22.50	0.013	7.00	33.00	10.9	0.99
8/22/02	9:34	15.00	34.0	22.50	0.013	7.00	27.00	11.9	0.99
8/22/02	9:49	30.00	31.0	22.50	0.013	7.00	24.00	12.4	0.99
8/22/02	10:19	60.00	27.0	22.50	0.013	7.00	20.00	13.0	0.99
8/22/02	15:17	370.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99
8/23/02	9:19	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0291	67.3
0.0193	57.0
0.0117	46.6
0.0084	41.4
0.0061	34.5
0.0025	27.6
0.0013	22.4

% GRAVEL	6.40
% COARSE SAND	5.63
% MEDIUM SAND	7.31
% FINE SAND	10.91
% FINES	69.75
% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

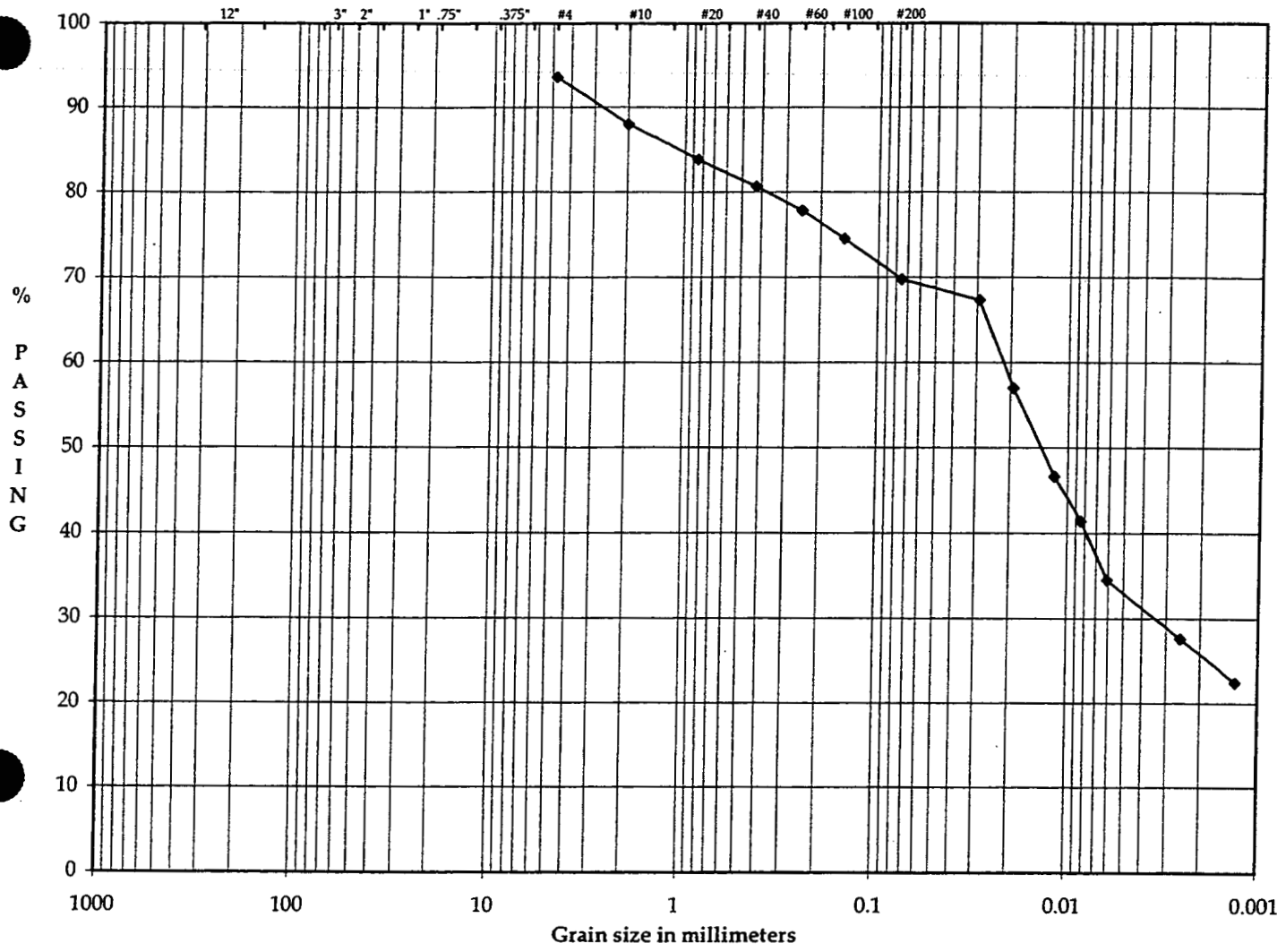
-	LL
-	PL
-	PI

TECH	TJ
DATE	8/21/02
CHECK	BK
REVIEW	Pcly

000353

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 45
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000354

TECH	TJ
DATE	8/21/02
CHECK	BS
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III — DATE: 18 day August month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP-02-46

SOIL SAMPLE SIZE	+3/8 = 1480.7	MOISTURE = 353.3	TOTAL = 24015.0
	-3/8 = 22181.0	24015.0	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	(grams)	SAND	FINE GRAIN
50.79 / 1.89 / 48.90		115	65

		BEFORE WASH +3/8	BEFORE WASH -3/8	AFTER WASH +3/8	AFTER WASH -3/8
TARE NO.		L-44	L-6	L-41 ~~1647.1~~ DKE	L-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	1672.6	765.7	1647.1	363.4
WT. OF TARE	(grams)	191.9	199.1	191.9	199.1
WT. OF DRY SAMPLE	(grams)	1480.7	566.6	1455.2	164.3

SIEVE ANALYSIS — QA ID: DKE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	103.6	0.4	99.6		
1 in	25.4	473.8	2.0	98.0		
3/4 in	19.1	718.4	3.0	97.0		90-100
1/2 in	12.7	1174.1	4.9	95.1		
3/8 in	9.53	1454.3	6.1	93.9		.939
No. 4	4.75	28.4	5.0	95.0	89.2	
No. 10	2.00	53.8	9.5	90.5	85.0	
No. 20	0.850	74.5	13.1	86.9	81.6	
No. 40	0.425	93.8	16.6	83.4	78.3	
No. 60	0.250	111.8	19.7	80.3	75.4	
No. 100	0.125	134.9	23.8	76.2	71.6	
No. 200	0.075	163.9	28.9	71.1	66.8	50-100
PAN	—	164.2	—	—	—	

COMMENTS:

000355

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [signature] — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

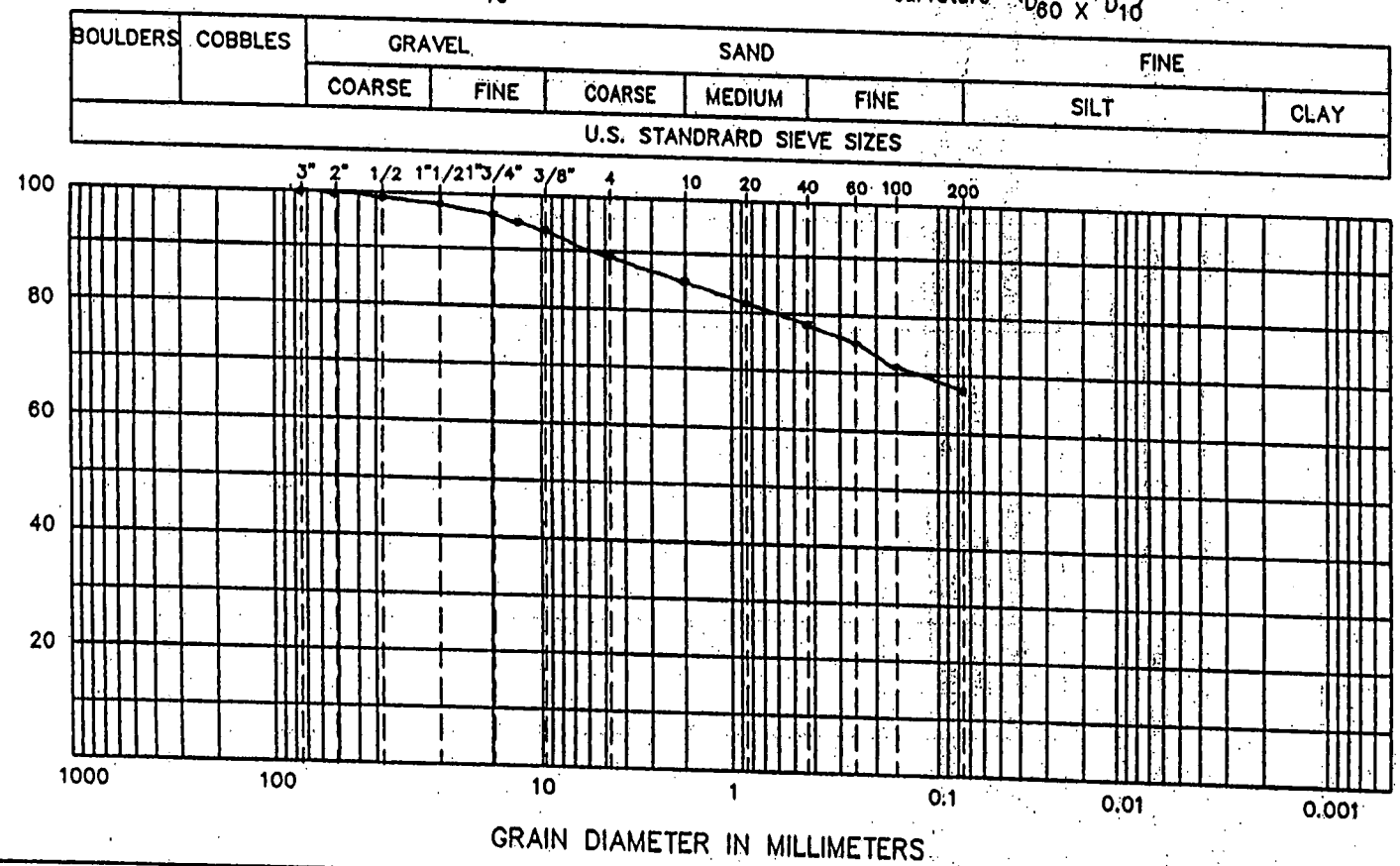
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-46 QA ID: KS CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 28

(PL) 16

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.6
1-in.	98.0
3/4-in.	97.0
1/2-in.	95.1
3/8-in.	93.9
NO. 4	89.2
NO. 10	85.0
NO. 20.	81.6
NO. 40	78.3
NO. 60	75.4
NO. 100	71.6
NO. 200	66.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	64
0.02	54
0.005	31
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000356

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 46
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.30
Dry Soil & Tare (gm)	47.50
Tare Weight (gm)	3.21
Moisture Content (%)	6.32

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	833.62	
Tare Weight (gm)	233.70	
Total Weight (gm)	564.25	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			89.2	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.16
Calculated Dry Wt. used in test (gm)	53.76
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	89.20

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	3.06	3.06	84.1	#10	medium sand
#20	5.18	5.18	80.6	#20	medium sand
#40	7.04	7.04	77.5	#40	fine sand
#60	8.85	8.85	74.5	#60	fine sand
#100	10.98	10.98	71.0	#100	fine sand
#200	13.65	13.65	66.6	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/22/02	9:21								
8/22/02	9:23	2.00	44.0	22.50	0.013	7.00	37.00	10.2	0.99
8/22/02	9:26	5.00	40.0	22.50	0.013	7.00	33.00	10.9	0.99
8/22/02	9:36	15.00	34.0	22.50	0.013	7.00	27.00	11.9	0.99
8/22/02	9:51	30.00	31.0	22.50	0.013	7.00	24.00	12.4	0.99
8/22/02	10:21	60.00	27.0	22.50	0.013	7.00	20.00	13.0	0.99
8/22/02	15:17	370.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99
8/23/02	9:21	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0296	60.8		
0.0193	54.2	% GRAVEL	10.80
0.0117	44.4	% COARSE SAND	5.08
0.0084	39.4	% MEDIUM SAND	6.60
0.0061	32.9	% FINE SAND	10.97
0.0025	26.3	% FINES	66.55
0.0013	21.4	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

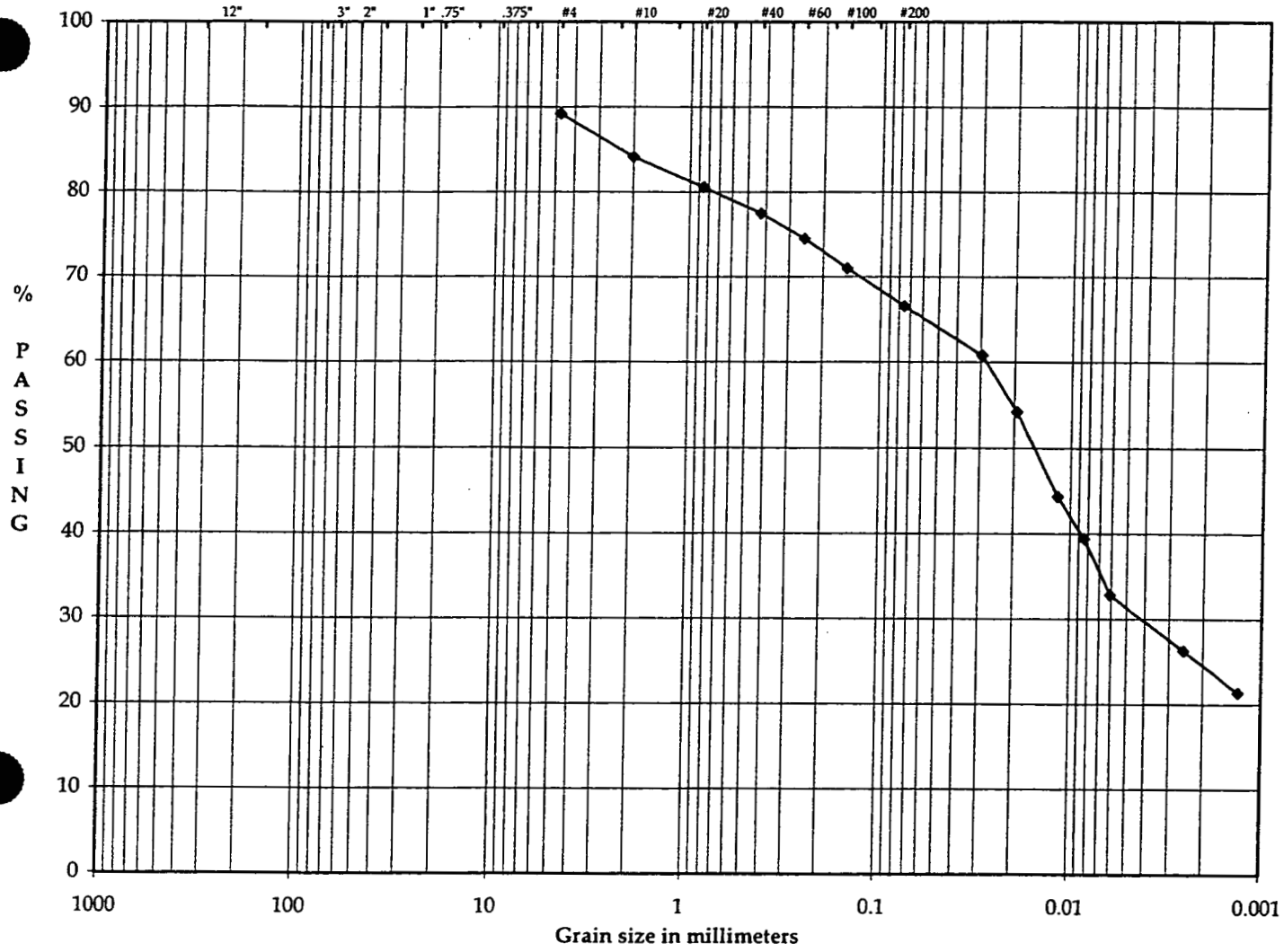
-	LL
-	PL
-	PI

TECH	TJ
DATE	8/21/02
CHECK	BSG
REVIEW	KCM

000357

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 46
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000358

TECH	TJ
DATE	8/21/02
CHECK	JSS
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 15 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-47

SOIL SAMPLE SIZE	+3/8 = 3291.2	MOISTURE = 363.2	TOTAL = 45558.0
	-3/8 = 41903.6	45558.0	

50.84 lbs
-1.84

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	50.79 lbs -1.84 (grams)	SAND	FINE GRAIN
		115	65

49.00
43.38
92.38

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		5B	LL.9	5B	L-1
WT. OF DRY SAMPLE PLUS TARE	(grams)	3576.8	828.8	3431.3	~~828.8~~ 379.9
WT. OF TARE	(grams)	285.6	192.4 ~~106.7~~ TARE	285.6	192.4 ~~106.7~~ DUE
WT. OF DRY SAMPLE	(grams)	3291.2	636.4	3145.7	187.5

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	199.8	.4	99.6		
3/4 in	19.1	816.6	1.8	98.2		90-100
1/2 in	12.7	1421.2	3.1	96.9		
3/8 in	9.53	~~[illegible]~~ 1333.0	3.8	96.2		
No. 4	4.75	28.0	4.4	95.6	92.0	
No. 10	2.00	56.1	8.8	91.2	87.7	
No. 20	0.850	82.1	12.9	87.1	83.8	
No. 40	0.425	107.9	17.0	83.0	79.8	
No. 60	0.250	136.3	21.4	78.6	75.6	
No. 100	0.125	166.8	26.2	73.8	71.0	
No. 200	0.075	187.1	29.4	70.6	67.9	50-100
PAN	—	187.4	—	—		

15.18
1.80
17.38

COMMENTS:

000359

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [illegible] SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

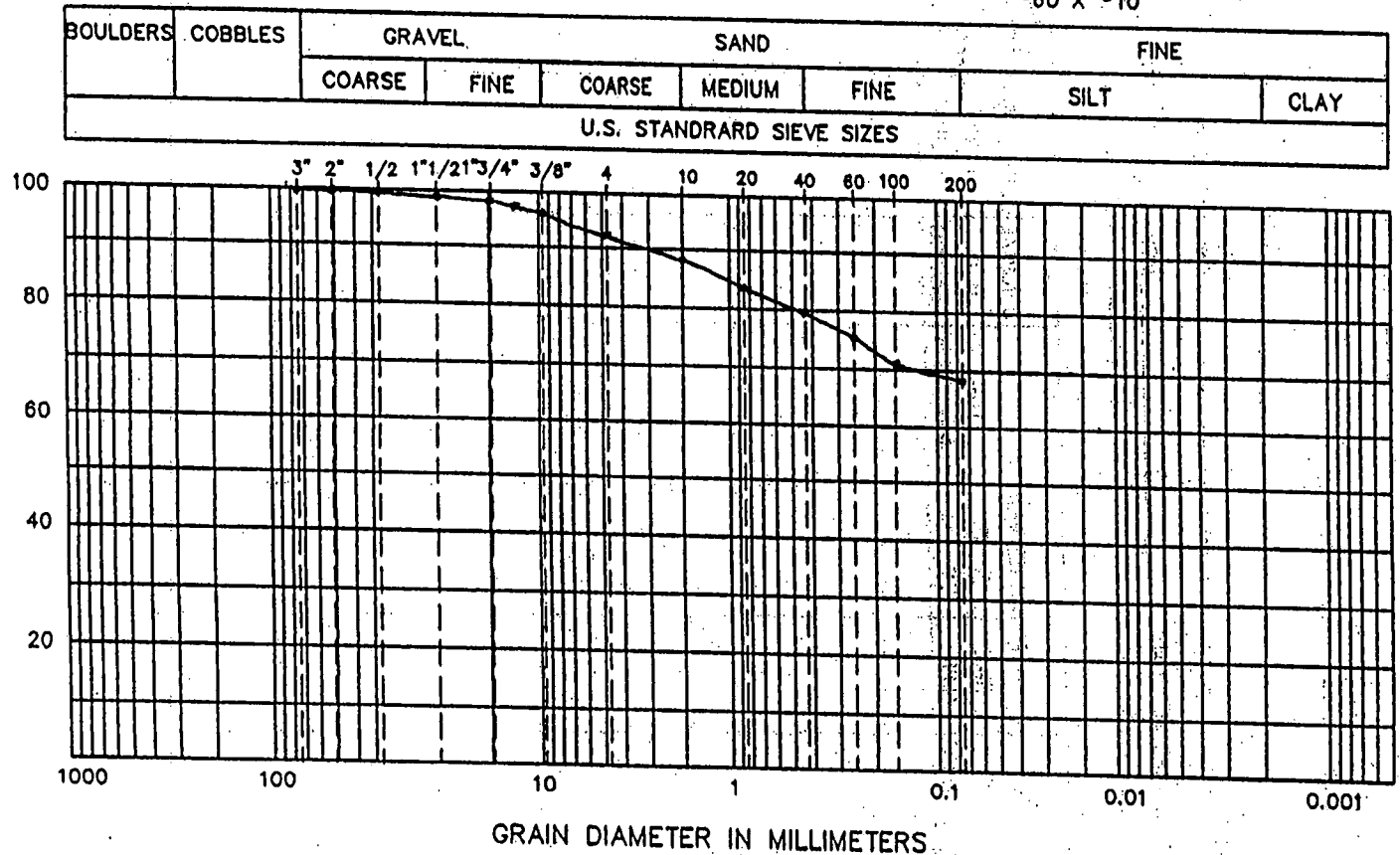
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-47 QA ID: ~~KS~~ CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 27

(PL) 15

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.6
3/4-in.	98.2
1/2-in.	96.9
3/8-in.	96.2
NO. 4	92.0
NO. 10	87.7
NO. 20.	83.8
NO. 40	79.8
NO. 60	75.6
NO. 100	71.0
NO. 200	67.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	65
0.002	57
0.005	32
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000360

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 47
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.46
Dry Soil & Tare (gm)	48.70
Tare Weight (gm)	3.30
Moisture Content (%)	3.88

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	834.51	
Tare Weight (gm)	234.45	
Total Weight (gm)	577.67	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ecific Gravity	(tested)	
mount Dispersing Agent (ml)		125.00
ype Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.37
Calculated Dry Wt. used in test (gm)	55.23
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.64	2.64	87.6	#10	medium sand
#20	5.07	5.07	83.6	#20	medium sand
#40	7.06	7.06	80.2	#40	fine sand
#60	9.02	9.02	77.0	#60	fine sand
#100	11.26	11.26	73.2	#100	fine sand
#200	14.02	14.02	68.6	#200	fines

HYDROMETER CALCULATIONS

DATE 8/22/02	TIME 9:23	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/22/02	9:25	2.00	43.0	22.50	0.013	7.00	36.00	10.4	0.99
8/22/02	9:28	5.00	41.0	22.50	0.013	7.00	34.00	10.7	0.99
8/22/02	9:38	15.00	35.0	22.50	0.013	7.00	28.00	11.7	0.99
8/22/02	9:53	30.00	31.0	22.50	0.013	7.00	24.00	12.4	0.99
8/22/02	10:23	60.00	27.0	22.50	0.013	7.00	20.00	13.0	0.99
8/22/02	15:17	370.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99
8/23/02	9:23	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0299	59.4
0.0192	56.1
0.0116	46.2
0.0084	39.6
0.0061	33.0
0.0025	26.4
0.0013	23.1

% GRAVEL	8.00
% COARSE SAND	4.40
% MEDIUM SAND	7.36
% FINE SAND	11.59
% FINES	68.65
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

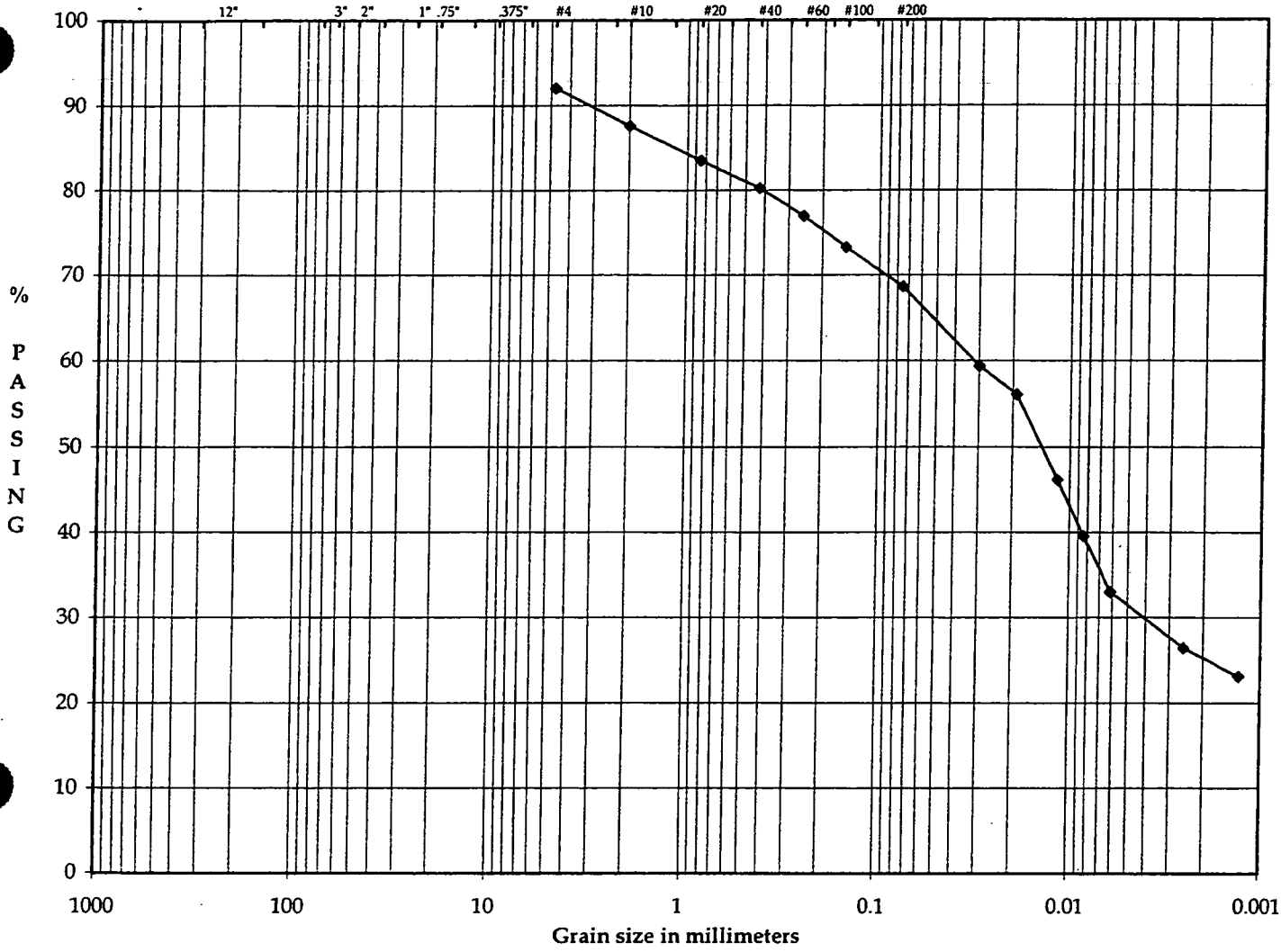
-	LL
-	PL
-	PI

000361

TECH	TJ
DATE	8/21/02
CHECK	DG
REVIEW	AWM

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 47
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000362

TECH	TJ
DATE	8/21/02
CHECK	[illegible]
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD

5368 (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 16 day August month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-48

49.08
-1.84
47.24

SOIL SAMPLE SIZE	+3/8 = 1019.8	MOISTURE = 398.2	TOTAL = 22846.1
	-3/8 = 21428.1	22846.1	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 47.24 LBS = 21428.1 (grams)	SAND	FINE GRAIN
	115	65

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	K	L-7	K	L-7
WT. OF DRY SAMPLE PLUS TARE (grams)	1121.3	771.7	1039.5	364.1
WT. OF TARE (grams)	101.5	193.9	101.5	193.9
WT. OF DRY SAMPLE (grams)	1019.8	577.8	~~938.0~~ 938.0	170.2

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0			
2 in	50.8	0	0			100
1 1/2in	38.1	0	0			
1 in	25.4	263.3	1.2	98.8		
3/4 in	19.1	454.1	3.0	98.0		90-100
1/2 in	12.7	691.7	3.0	97.0		
3/8 in	9.53	935.2	~~4.0~~ 4.1	~~96.0~~ 95.9		
No. 4	4.75	15.1	2.6	97.4	~~93.5~~	93.4
No. 10	2.00	39.5	6.8	93.2	~~89.5~~	89.4
No. 20	0.850	64.3	11.1	88.9	~~85.3~~	85.2
No. 40	0.425	90.0	15.6	84.4	~~81.0~~	81.0
No. 60	0.250	111.6	19.3	80.7	~~77.5~~	77.4
No. 100	0.125	139.2	24.1	75.9	~~72.9~~	72.8
No. 200	0.075	169.6	29.4	70.6	67.8	50-100
PAN	—	170.1	—	—		

COMMENTS:

000363

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

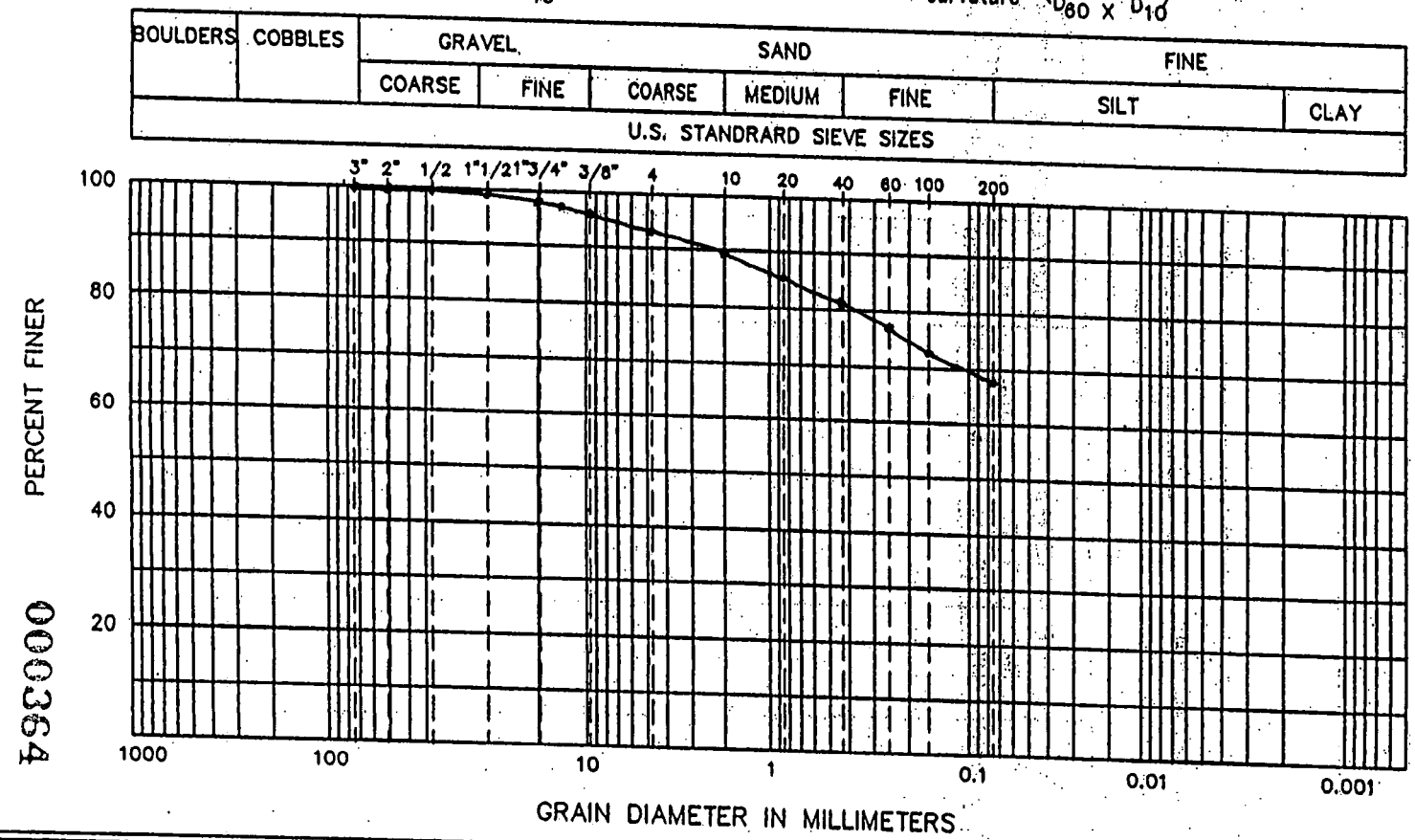
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-48 QA ID: ~~KS~~ CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 28

(PL) 15

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.8
3/4-in.	98.0
1/2-in.	97.0
3/8-in.	95.9
NO. 4	93.4
NO. 10	89.4
NO. 20.	85.2
NO. 40	81.0
NO. 60	77.4
NO. 100	72.8
NO. 200	67.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	65.5
0.002	56.3
0.0005	32.6
0.0002	25.8

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

000364

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 48
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.56
Dry Soil & Tare (gm)	48.88
Tare Weight (gm)	3.27
Moisture Content (%)	3.68

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	833.35	
- Tare Weight (gm)	233.77	
Total Weight (gm)	578.28	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.4	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.33
Calculated Dry Wt. used in test (gm)	56.26
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.40

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.21	2.21	89.7	#10	medium sand
#20	4.64	4.64	85.7	#20	medium sand
#40	6.91	6.91	81.9	#40	fine sand
#60	9.01	9.01	78.4	#60	fine sand
#100	11.42	11.42	74.4	#100	fine sand
#200	14.71	14.71	69.0	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
8/22/02	9:25								
8/22/02	9:27	2.00	43.0	22.50	0.013	7.00	36.00	10.4	0.99
8/22/02	9:30	5.00	41.0	22.50	0.013	7.00	34.00	10.7	0.99
8/22/02	9:40	15.00	35.0	22.50	0.013	7.00	28.00	11.7	0.99
8/22/02	9:55	30.00	31.0	22.50	0.013	7.00	24.00	12.4	0.99
8/22/02	10:25	60.00	27.0	22.50	0.013	7.00	20.00	13.0	0.99
8/22/02	15:17	370.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99
8/23/02	9:25	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0299	59.2
0.0192	55.9
0.0116	46.0
0.0084	39.4
0.0061	32.9
0.0025	26.3
0.0013	21.4

% GRAVEL	6.60
% COARSE SAND	3.67
% MEDIUM SAND	7.80
% FINE SAND	12.95
% FINES	68.98
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

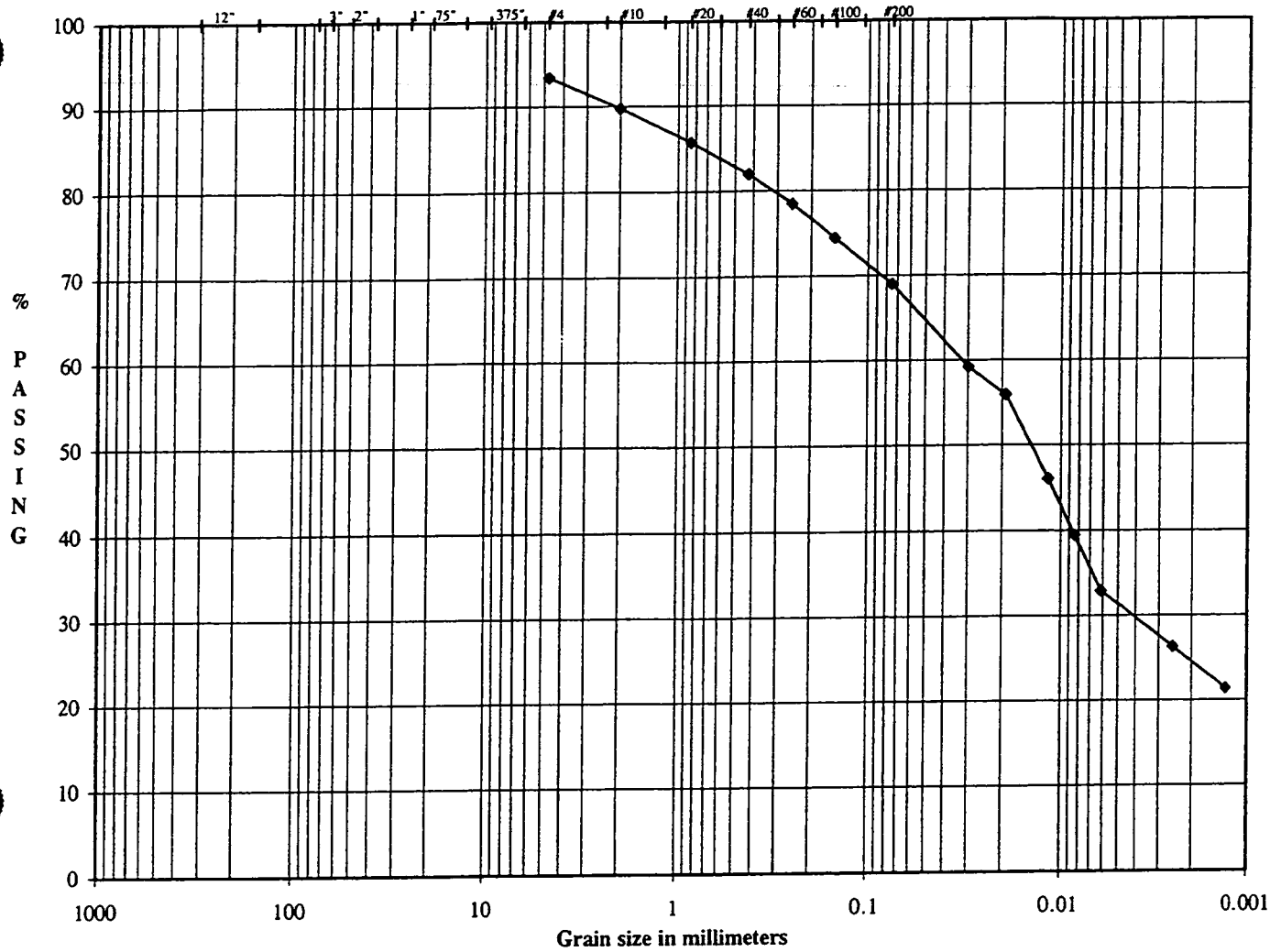
-	LL
-	PL
-	PI

TECH	TJ
DATE	8/21/02
CHECK	BK
REVIEW	BJM

000365

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 48
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	8/21/02
CHECK	[illegible]
REVIEW	[illegible]

000366

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 16 day August month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-49

~~50 LBS~~
21.23
50.00
71.23

SOIL SAMPLE SIZE | +3/8 = 1822.2 gr | MOISTURE = 375.5 | -3/8 = 33509.9 | 35707.6 | TOTAL = 35707.6

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 600gr Mechanical oven and 600gr -3/8 air oven 1200gm (grams)

SAND	FINE GRAIN
115	65

32309.9
1200.0

	+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.	L-9	L-7	L-9	L-7
WT. OF DRY SAMPLE PLUS TARE (grams)	2015.6	770.4	1908.6	372.1
WT. OF TARE (grams)	193.4	194.0	193.4	194.0
WT. OF DRY SAMPLE (grams)	1822.2	576.4	1715.2	178.1

SIEVE ANALYSIS QA ID: DAE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	410.6	1.1	98.9		
3/4 in	19.1	750.0	2.1	97.9		90-100
1/2 in	12.7	1389.1	3.9	96.1		
3/8 in	9.53	1697.2	4.8	95.2		
No. 4	4.75	15.4	2.7	97.3	92.6	
No. 10	2.00	46.8	8.1	91.9	87.5	
No. 20	0.850	75.7	13.1	86.9	82.7	
No. 40	0.425	99.6	17.3	82.7	78.7	
No. 60	0.250	120.5	20.9	79.1	75.3	
No. 100	0.125	147.7	25.6	74.4	70.8	
No. 200	0.075	177.8	30.8	69.2	65.9	50-100
PAN	—	178.1	—	—		

COMMENTS:

000367

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

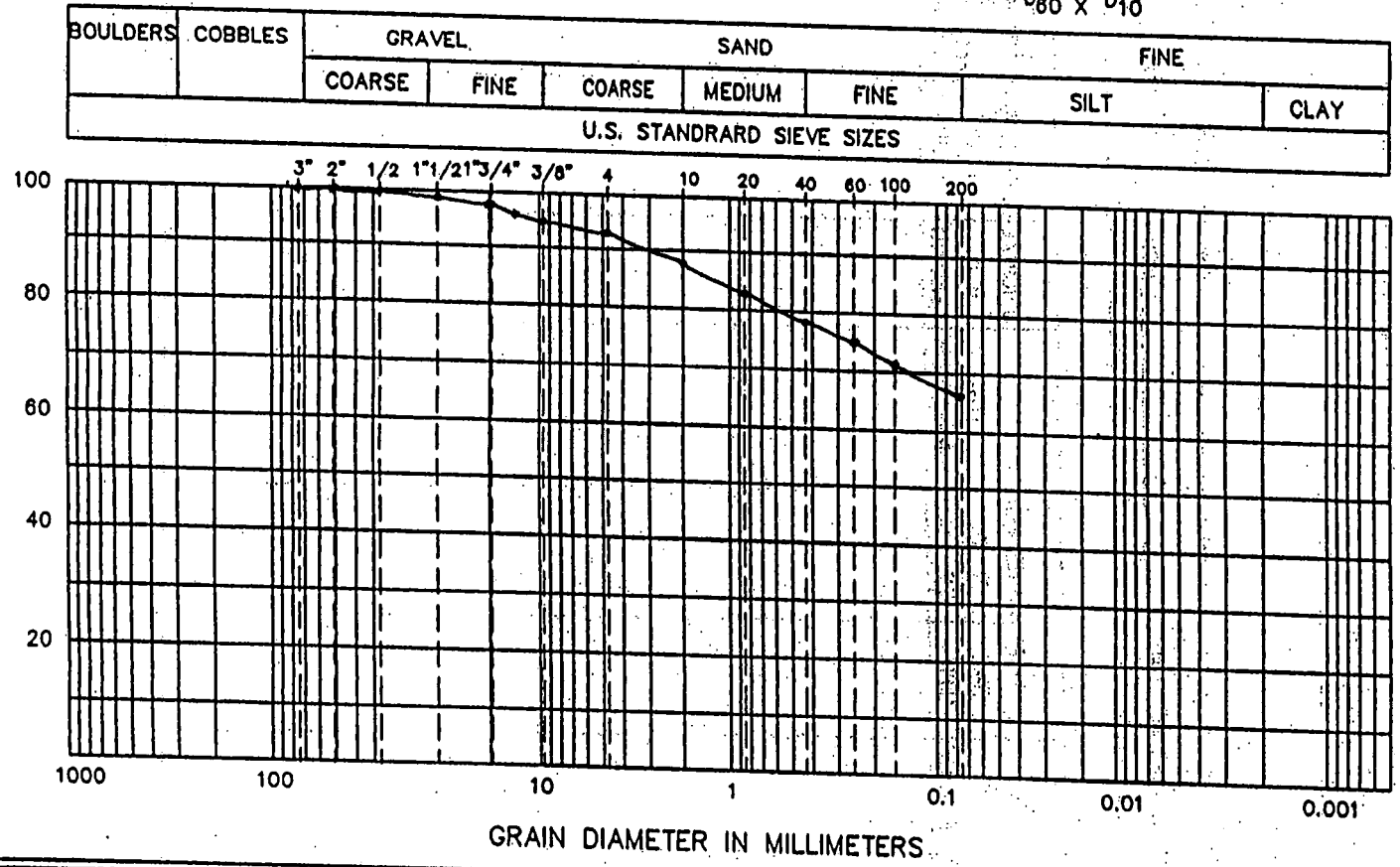
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-49 QA ID: KS CAW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 27

(PL) 16

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.9
3/4-in.	97.9
1/2-in.	96.1
3/8-in.	95.2
NO. 4	92.6
NO. 10	87.5
NO. 20.	82.7
NO. 40	78.7
NO. 60	75.3
NO. 100	70.8
NO. 200	65.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	60
0.02	51
0.005	30
0.002	24

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0003368

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 49
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.15
Dry Soil & Tare (gm)	48.43
Tare Weight (gm)	3.22
Moisture Content (%)	3.80

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	734.94	
Tare Weight (gm)	235.62	
Total Weight (gm)	481.02	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.65
Calculated Dry Wt. used in test (gm)	54.57
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.65	1.65	89.8	#10	medium sand
#20	4.88	4.88	84.3	#20	medium sand
#40	7.46	7.46	79.9	#40	fine sand
#60	9.67	9.67	76.2	#60	fine sand
#100	12.20	12.20	71.9	#100	fine sand
#200	15.43	15.43	66.4	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	9:52								
9/11/02	9:54	2.00	39.0	23.00	0.013	7.00	32.00	11.1	0.99
9/11/02	9:57	5.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
9/11/02	10:07	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/11/02	10:22	30.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/11/02	10:52	60.00	26.0	23.00	0.013	7.00	19.00	13.2	0.99
9/11/02	14:02	250.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99
9/12/02	9:52	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0306	53.8		
0.0196	50.4	% GRAVEL	7.40
0.0117	42.0	% COARSE SAND	2.80
0.0085	37.0	% MEDIUM SAND	9.86
0.0061	31.9	% FINE SAND	13.52
0.0031	25.2	% FINES	66.42
0.0013	21.8	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

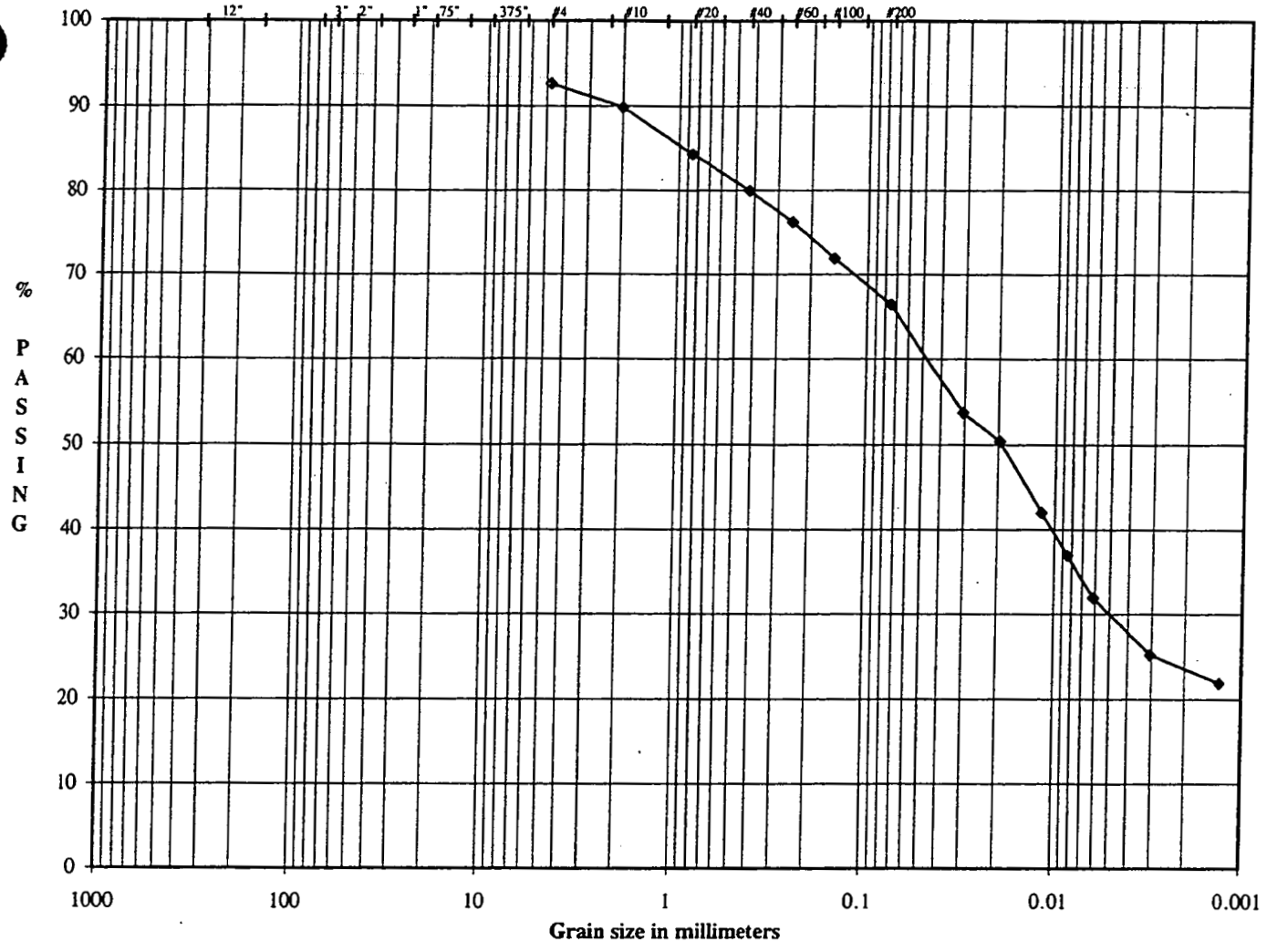
-	LL
-	PL
-	PI

TECH	TJ
DATE	9/10/02
CHECK	[illegible]
REVIEW	[illegible]

000369

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 49
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/10/02
CHECK	BJS
REVIEW	PWM

000370

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 16 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP82.50

SOIL SAMPLE SIZE	+3/8 = 748.9 gram	MOISTURE = 381.8	TOTAL = 20064.0
	-3/8 = 18933.3	20064.0	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
43.58 − 1.84 = 41.74 (grams)	115	65

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-6	LL-4	L-6	LL-4
WT. OF DRY SAMPLE PLUS TARE (grams)	947.2	721.0	868.3	320.8
WT. OF TARE (grams)	198.3	145.4	198.3	145.4
WT. OF DRY SAMPLE (grams)	748.9	575.6	670.0	175.4

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	Ø	Ø	100		
3/4 in	19.1	89.6	.4	99.6		90-100
1/2 in	12.7	397.8	2.0	98.0		
3/8 in	9.53	668.7	3.3	96.7		
No. 4	4.75	29.0	5.0	95.0	91.9	
No. 10	2.00	57.8	10.0	90.0	87.0	
No. 20	0.850	84.0	14.6	85.4	82.6	
No. 40	0.425	105.9	18.4	81.6	78.9	
No. 60	0.250	124.5	21.6	78.4	75.8	
No. 100	0.125	148.8	25.9	74.1	71.7	
No. 200	0.075	174.9	30.4	69.6	67.3	50-100
PAN	—	175.2	—	—		

COMMENTS:

000371

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

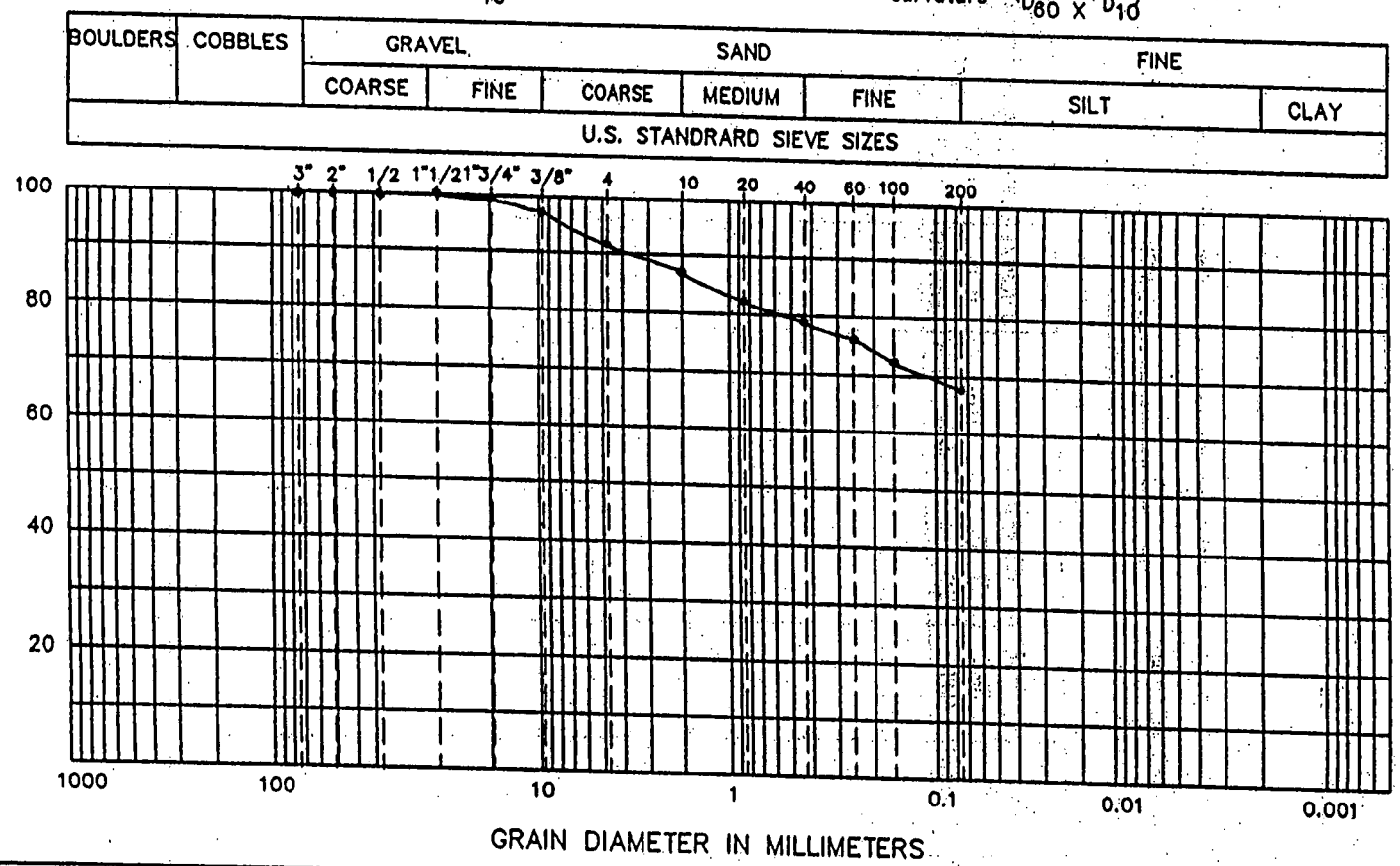
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-50 QA ID: ~~KS~~ CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	99.6
1/2-in.	98.0
3/8-in.	96.7
NO. 4	91.9
NO. 10	87.0
NO. 20.	82.6
NO. 40	78.9
NO. 60	75.8
NO. 100	71.7
NO. 200	67.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	50
0.005	31
0.002	25
	8

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000372

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 50
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.29
Dry Soil & Tare (gm)	48.49
Tare Weight (gm)	3.26
Moisture Content (%)	3.98

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	733.98	
Tare Weight (gm)	234.58	
Total Weight (gm)	480.29	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			91.9	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.86
Calculated Dry Wt. used in test (gm)	55.65
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	91.90

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.89	2.89	87.1	#10	medium sand
#20	5.37	5.37	83.0	#20	medium sand
#40	7.28	7.28	79.9	#40	fine sand
#60	8.89	8.89	77.2	#60	fine sand
#100	10.92	10.92	73.9	#100	fine sand
#200	13.63	13.63	69.4	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	9:54								
9/11/02	9:56	2.00	43.0	23.00	0.013	7.00	36.00	10.4	0.99
9/11/02	9:59	5.00	37.5	23.00	0.013	7.00	30.50	11.4	0.99
9/11/02	10:09	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/11/02	10:24	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/11/02	10:54	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
9/11/02	14:04	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/12/02	9:54	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0296	58.9		
0.0196	49.9	% GRAVEL	8.10
0.0117	40.9	% COARSE SAND	4.77
0.0084	37.6	% MEDIUM SAND	7.25
0.0061	32.7	% FINE SAND	10.49
0.0030	26.2	% FINES	69.39
0.0013	22.9	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

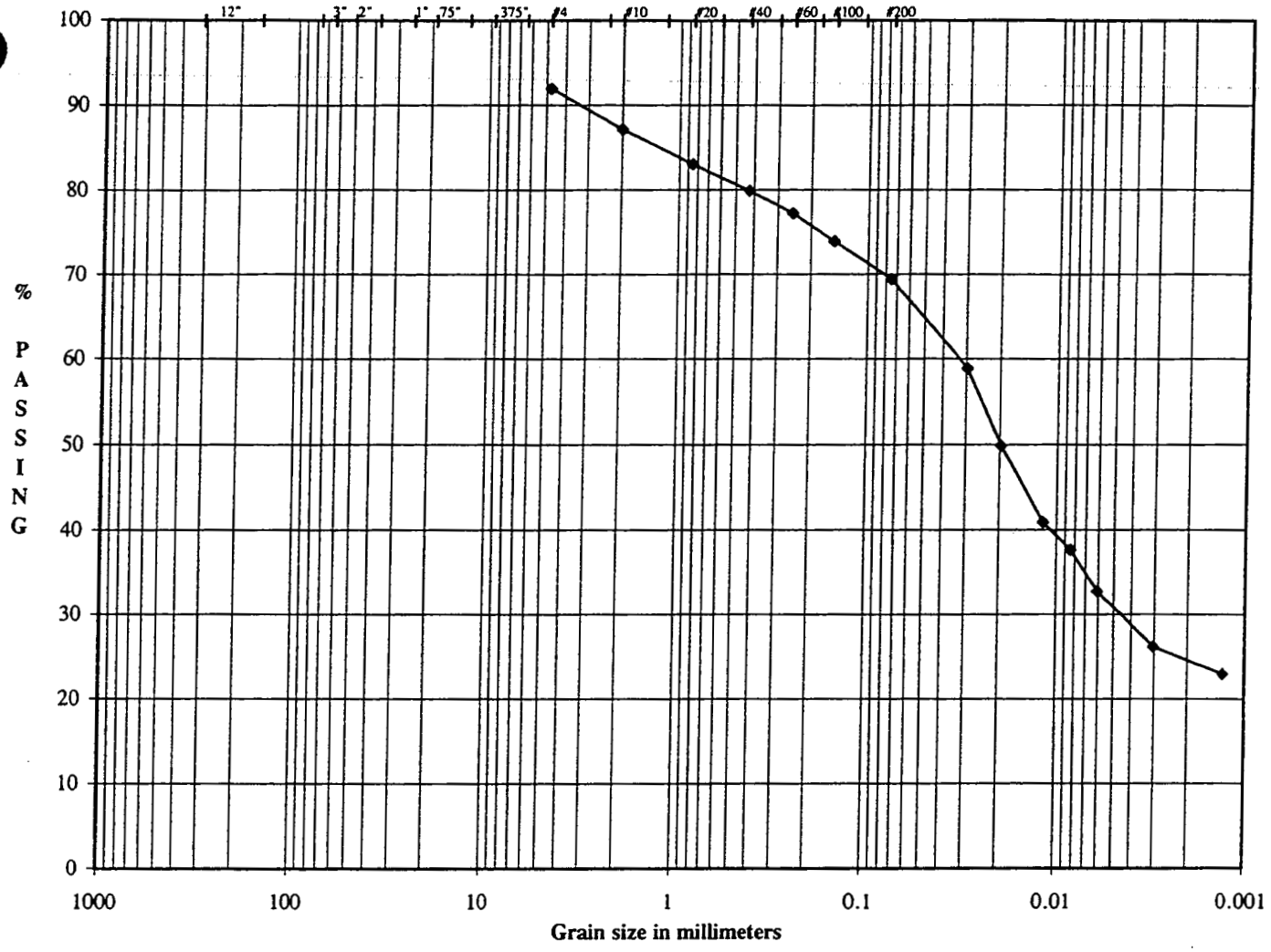
-	LL
-	PL
-	PI

TECH	TJ
DATE	9/10/02
CHECK	BSS
REVIEW	CWM

000373

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 50
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/10/02
CHECK	[illegible]
REVIEW	[illegible]

000374

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G0134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 20 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-51

SOIL SAMPLE SIZE	+3/8 = 2900.3	MOISTURE = 316.4	TOTAL = 46013.9
	-3/8 = 42797.2	46013.9	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
50 lbs = 22680.0 gm 44.35 lbs = 20117.2 (grams)	115	65

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-1	L-1	L-1	L-1
WT. OF DRY SAMPLE PLUS TARE (grams)	3092.5	782.6	2939.0	375.4
WT. OF TARE (grams)	192.2	192.2	192.2	192.2
WT. OF DRY SAMPLE (grams)	2900.3	590.4	2746.8	183.2

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	324.3	.7	99.3		
1 in	25.4	1062.8	2.3	97.7		
3/4 in	19.1	1474.4	3.2	96.8		90-100
1/2 in	12.7	2290.5	5.0	95.0		
3/8 in	9.53	2746.6	6.0	94.0		
No. 4	4.75	27.0	4.6	95.4	89.7	
No. 10	2.00	62.0	10.5	89.5	84.1	
No. 20	0.850	90.9	15.4	84.6	79.5	
No. 40	0.425	114.3	19.4	80.6	75.8	
No. 60	0.250	137.3	23.3	76.7	72.1	
No. 100	0.125	162.3	27.5	72.5	68.2	
No. 200	0.075	183.1	31.0	69.0	64.9	50-100
PAN	—	183.2	—	—		

COMMENTS:

000375

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: _____ SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

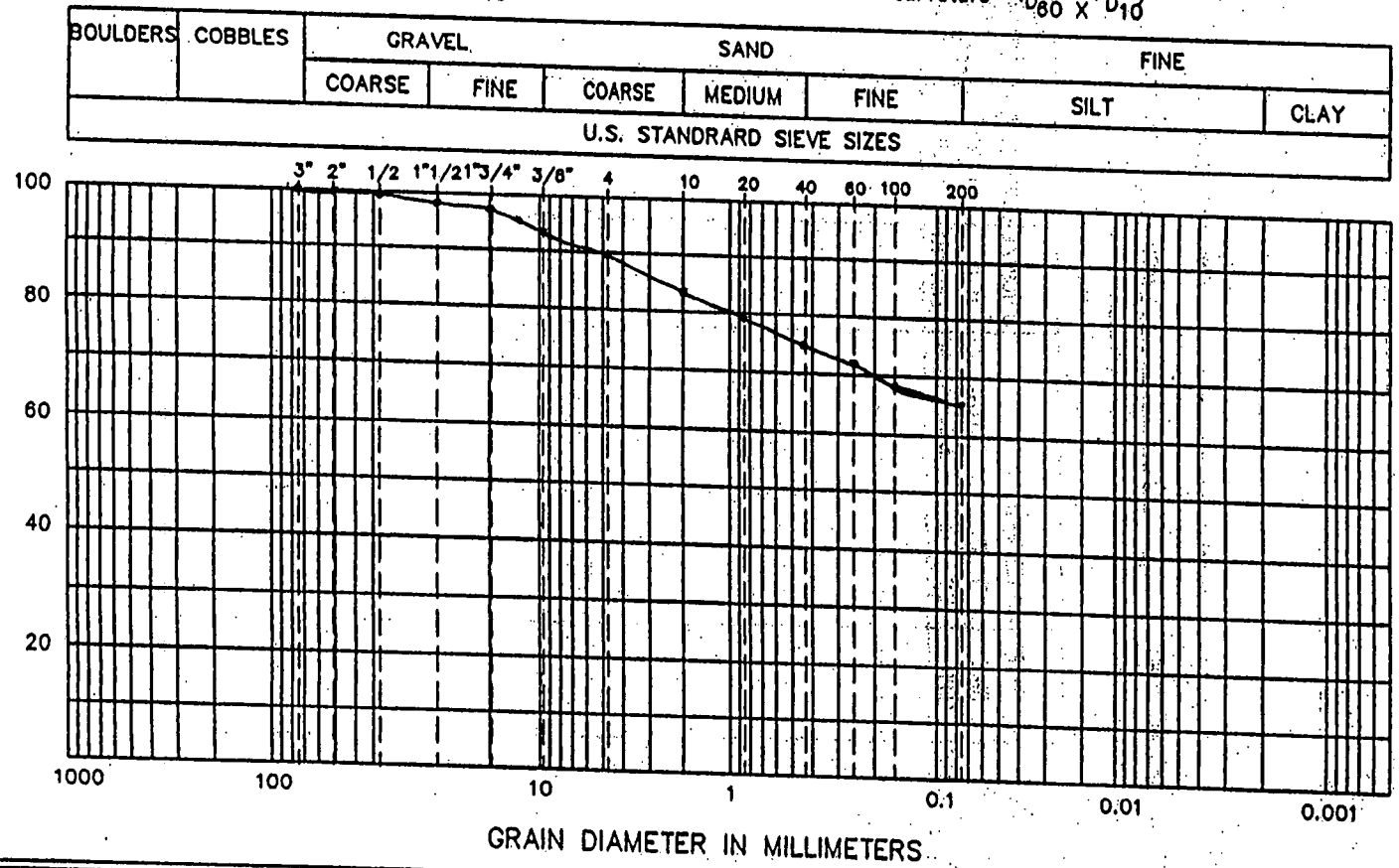
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-51 QA ID: KS CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 27

(PL) 15

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.3
1-In.	97.7
3/4-In.	96.8
1/2-In.	95.0
3/8-In.	94.0
NO. 4	89.7
NO. 10	84.1
NO. 20.	79.5
NO. 40	75.8
NO. 60	72.1
NO. 100	68.2
NO. 200	64.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	61.5
0.02	50.3
0.005	29.6
0.002	23.8

SOIL CLASSIFICATION (ASTM D 2487):

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000376

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 51
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.80
Dry Soil & Tare (gm)	48.12
Tare Weight (gm)	3.17
Moisture Content (%)	5.96

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	736.70	
Tare Weight (gm)	236.24	
Total Weight (gm)	472.30	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			89.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.66
Calculated Dry Wt. used in test (gm)	53.47
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	89.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.66	1.66	86.9	#10	medium sand
#20	4.70	4.70	81.8	#20	medium sand
#40	7.00	7.00	78.0	#40	fine sand
#60	9.09	9.09	74.5	#60	fine sand
#100	11.47	11.47	70.5	#100	fine sand
#200	14.55	14.55	65.3	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	9:56								
9/11/02	9:58	2.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/11/02	10:01	5.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
9/11/02	10:11	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/11/02	10:26	30.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/11/02	10:56	60.00	26.0	23.00	0.013	7.00	19.00	13.2	0.99
9/11/02	14:06	250.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99
9/12/02	9:56	1440.00	19.0	22.50	0.013	7.00	12.00	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	54.8		
0.0196	49.8	% GRAVEL	10.30
0.0117	41.5	% COARSE SAND	2.78
0.0085	36.5	% MEDIUM SAND	8.96
0.0061	31.6	% FINE SAND	12.67
0.0031	24.9	% FINES	65.29
0.0013	19.9	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

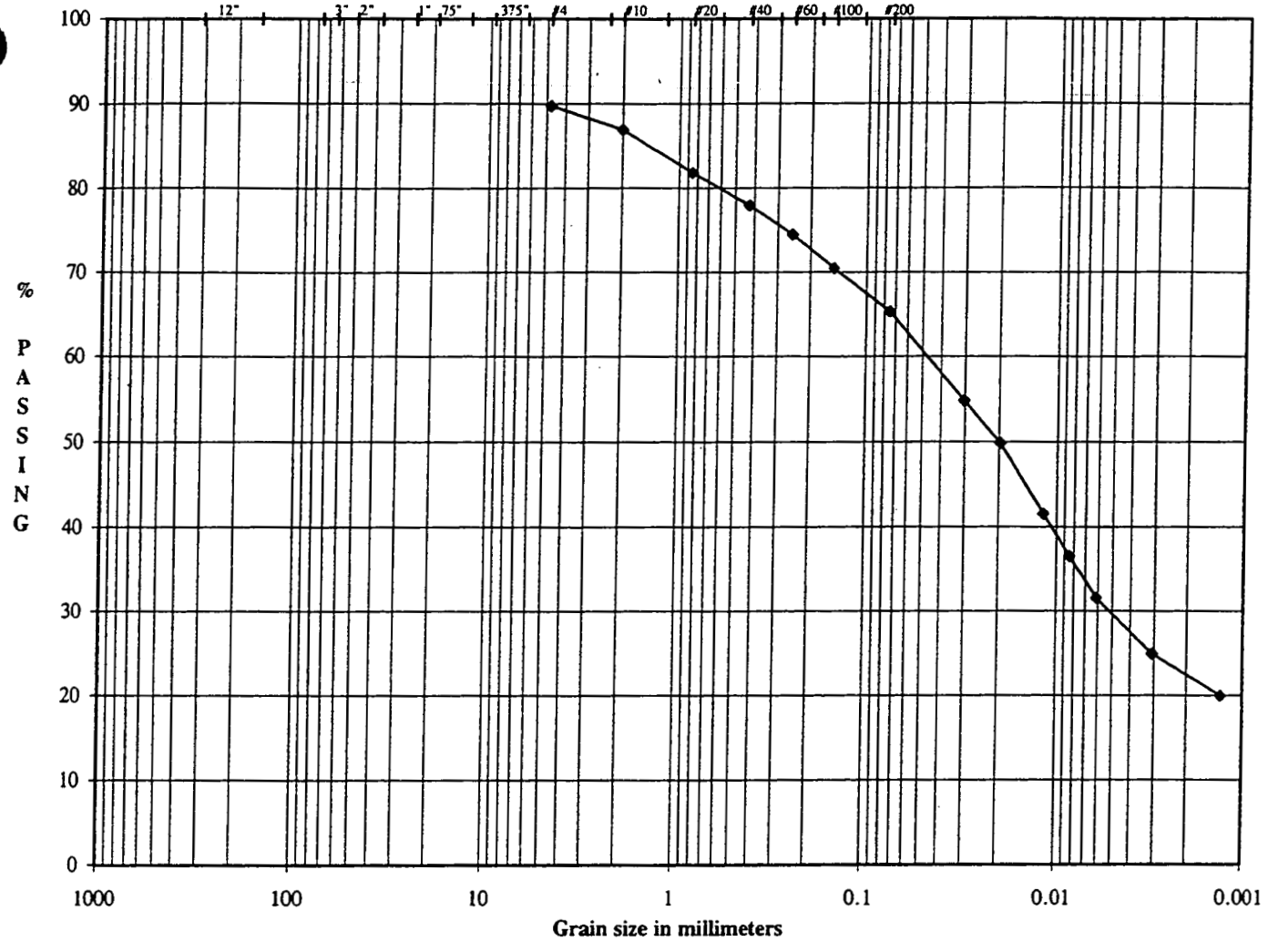
-	LL
-	PL
-	PI

TECH	TJ
DATE	9/10/02
CHECK	BM
REVIEW	PJM

000377

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	Gravel		SAND			FINES

SAMPLE ID	LP02 - 51
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/10/02
CHECK	BAS
REVIEW	PWY

000378

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 21 day Aug month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-53

500g Atterberg

600g Sieve

SOIL SAMPLE SIZE			
+3/8 = 717.2	MOISTURE = 351.3		TOTAL = 23025.2
-3/8 = 21956.7	23025.2		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-9	L-9	L-9	L-9
WT. OF DRY SAMPLE PLUS TARE (grams)	910.6	~~793.4~~ 792.1	872.7	368.6
WT. OF TARE (grams)	193.4	~~193.4~~ 193.4	193.4	193.4
WT. OF DRY SAMPLE (grams)	717.2	578.7	679.3	175.2

SIEVE ANALYSIS — QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	121.2	~~5.3~~ 0.5	99.5		
3/4 in	19.1	156.9	~~6.8~~ 0.7	99.3		90-100
1/2 in	12.7	496.4	2.2	97.8		
3/8 in	9.53	679.2	2.9	97.1		
No. 4	4.75	14.2	2.5	97.5	94.7	
No. 10	2.00	40.8	7.1	92.9	90.2	
No. 20	0.850	68.8	11.9	88.1	85.5	
No. 40	0.425	96.1	16.6	83.4	80.9	
No. 60	0.250	118.3	20.4	79.6	77.2	
No. 100	0.125	144.2	24.9	75.1	72.9	
No. 200	0.075	173.1	29.9	70.1	68.0	50-100
PAN	—	175.1	—	—		

COMMENTS:

000379

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: CJ

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

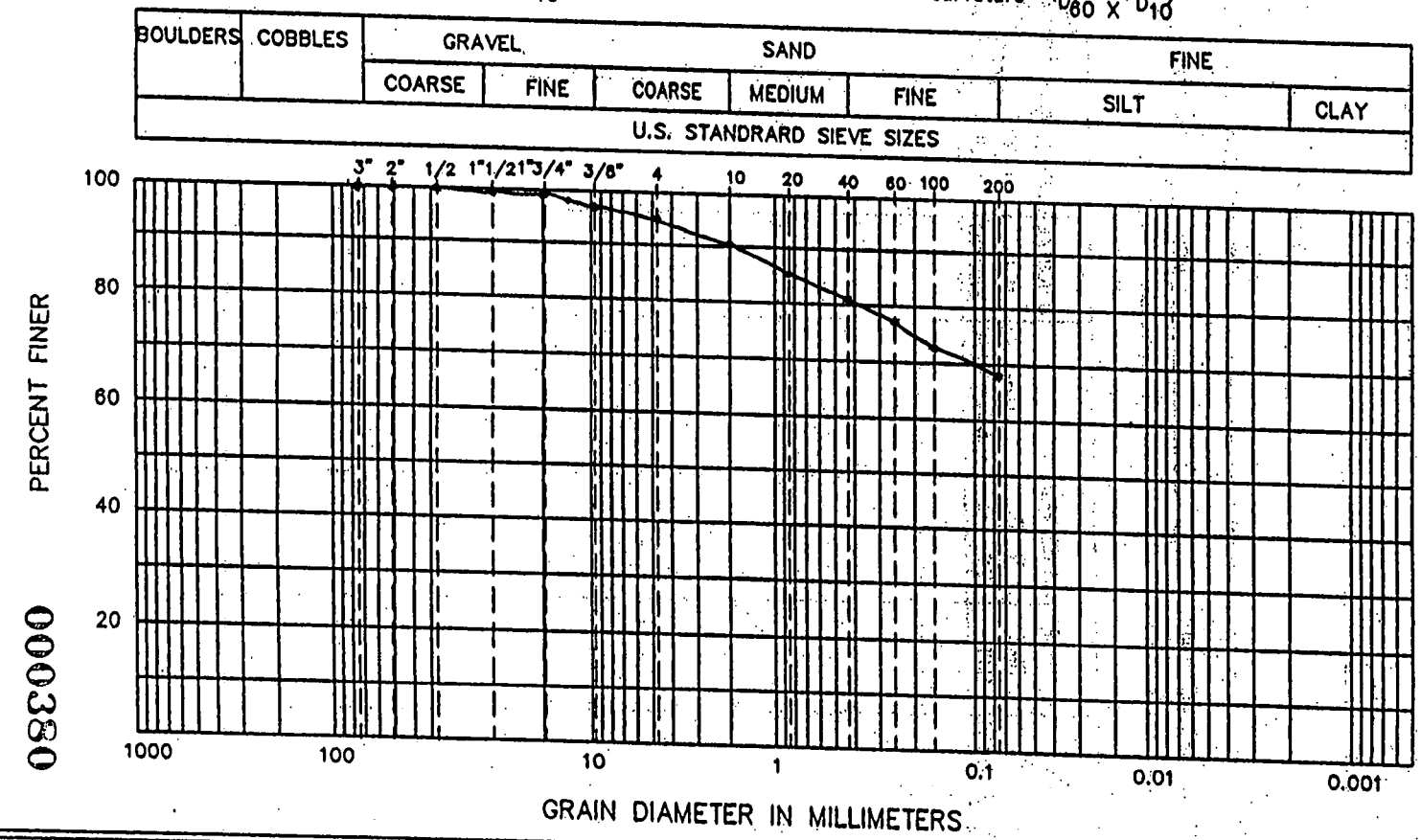
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-53 QA ID: KSCHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 28

(PL) 16

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.5
3/4-in.	99.3
1/2-in.	97.8
3/8-in.	97.1
NO. 4	94.7
NO. 10	90.2
NO. 20.	85.5
NO. 40	80.9
NO. 60	77.2
NO. 100	72.9
NO. 200	68.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	52
0.005	32
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

000380

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

-- 5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 53
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.14
Dry Soil & Tare (gm)	48.75
Tare Weight (gm)	3.19
Moisture Content (%)	3.05

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	736.03	
Tare Weight (gm)	235.63	
Total Weight (gm)	485.59	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.94
Calculated Dry Wt. used in test (gm)	55.25
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.64	2.64	90.2	#10	medium sand
#20	5.44	5.44	85.4	#20	medium sand
#40	7.72	7.72	81.5	#40	fine sand
#60	9.54	9.54	78.3	#60	fine sand
#100	11.72	11.72	74.6	#100	fine sand
#200	14.46	14.46	69.9	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	9:58								
9/11/02	10:00	2.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/11/02	10:03	5.00	38.0	23.00	0.013	7.00	31.00	11.2	0.99
9/11/02	10:13	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
9/11/02	10:28	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/11/02	10:58	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
9/11/02	14:08	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/12/02	9:58	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	59.4		
0.0195	52.6	% GRAVEL	5.30
0.0116	44.1	% COARSE SAND	4.52
0.0084	39.0	% MEDIUM SAND	8.71
0.0061	33.9	% FINE SAND	11.55
0.0030	27.1	% FINES	69.92
0.0013	23.8	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

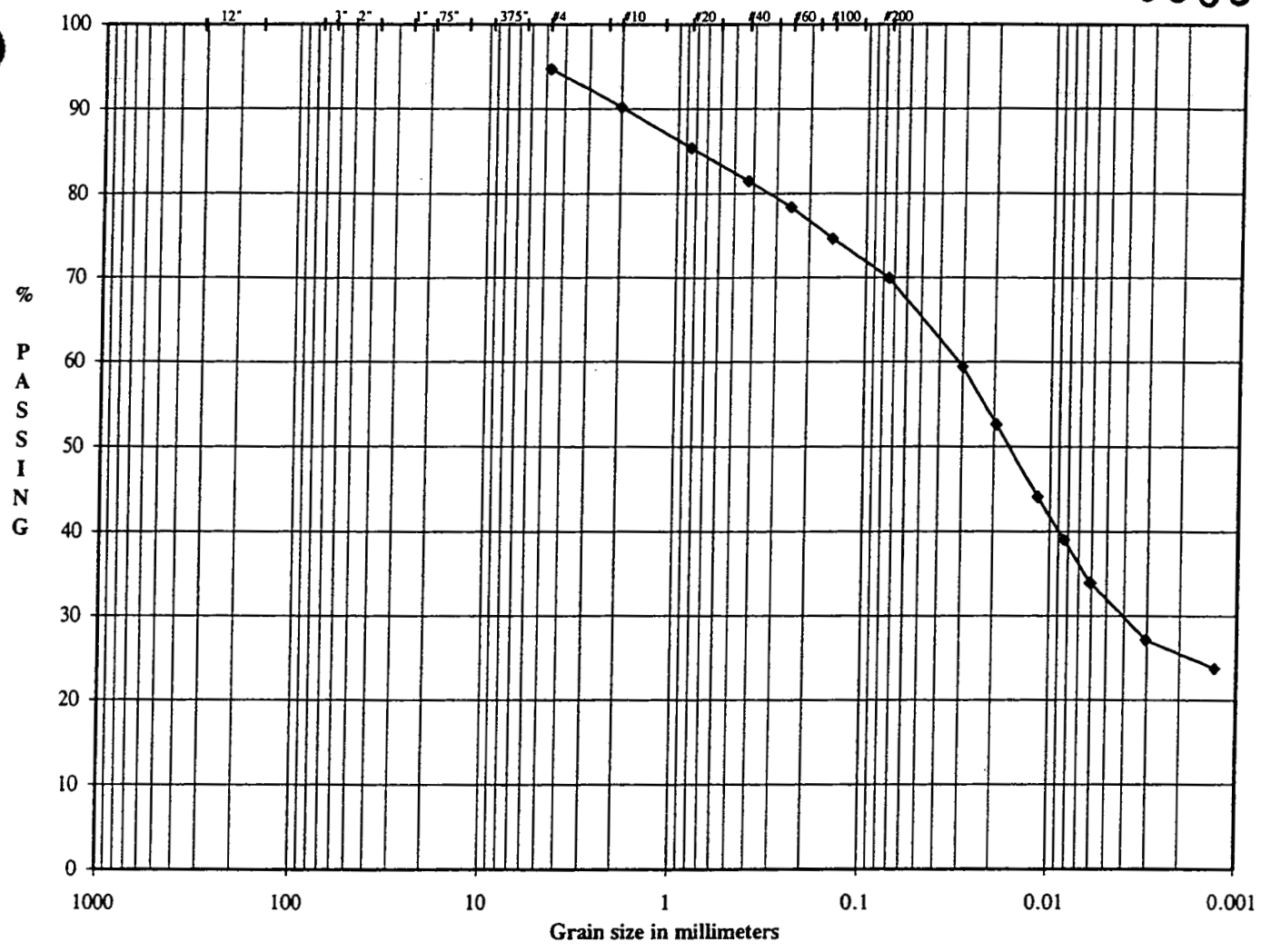
-	LL
-	PL
-	PI

TECH	TJ
DATE	9/10/02
CHECK	BJG
REVIEW	[illegible]

000381

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 53
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/10/02
CHECK	BJS
REVIEW	DWA

000382

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-54

SOIL SAMPLE SIZE	+3/8 = 2332.0 gr	MOISTURE = 267.1	TOTAL = 45429.3
	-3/8 =	41629.6	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
600 gm +Hordsy 600 gm -3/8 in out Bucket WT. ____ = ____ (grams)	115	65

ADD 1200 gram To Bucket Total	+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.	L-1	L-3	L-1	L-3
WT. OF DRY SAMPLE PLUS TARE (grams)	2524.2	758.1	2329.3	~~1754.0~~ 357.5
WT. OF TARE (grams)	192.2	189.9	192.2	189.9
WT. OF DRY SAMPLE (grams)	2332.0	568.2	2137.1	167.6

SIEVE ANALYSIS QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	87.1	0.2	99.2		
1 in	25.4	630.7	1.4	98.6		
3/4 in	19.1	1073.6	2.4	97.6		90-100
1/2 in	12.7	1723.0	3.8	96.2		
3/8 in	9.53	2117.9	4.7	95.3		
No. 4	4.75	18.2	3.2	96.8	92.3	
No. 10	2.00	46.9	8.3	91.7	87.5	
No. 20	0.850	71.4	12.6	87.4	83.4	
No. 40	0.425	93.8	16.5	83.5	79.6	
No. 60	0.250	112.8	19.9	80.1	76.4	
No. 100	0.125	136.4	24.0	76.0	72.5	
No. 200	0.075	166.1	29.2	70.8	67.5	50-100
PAN	—	167.3	—	—		

COMMENTS:

000383

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

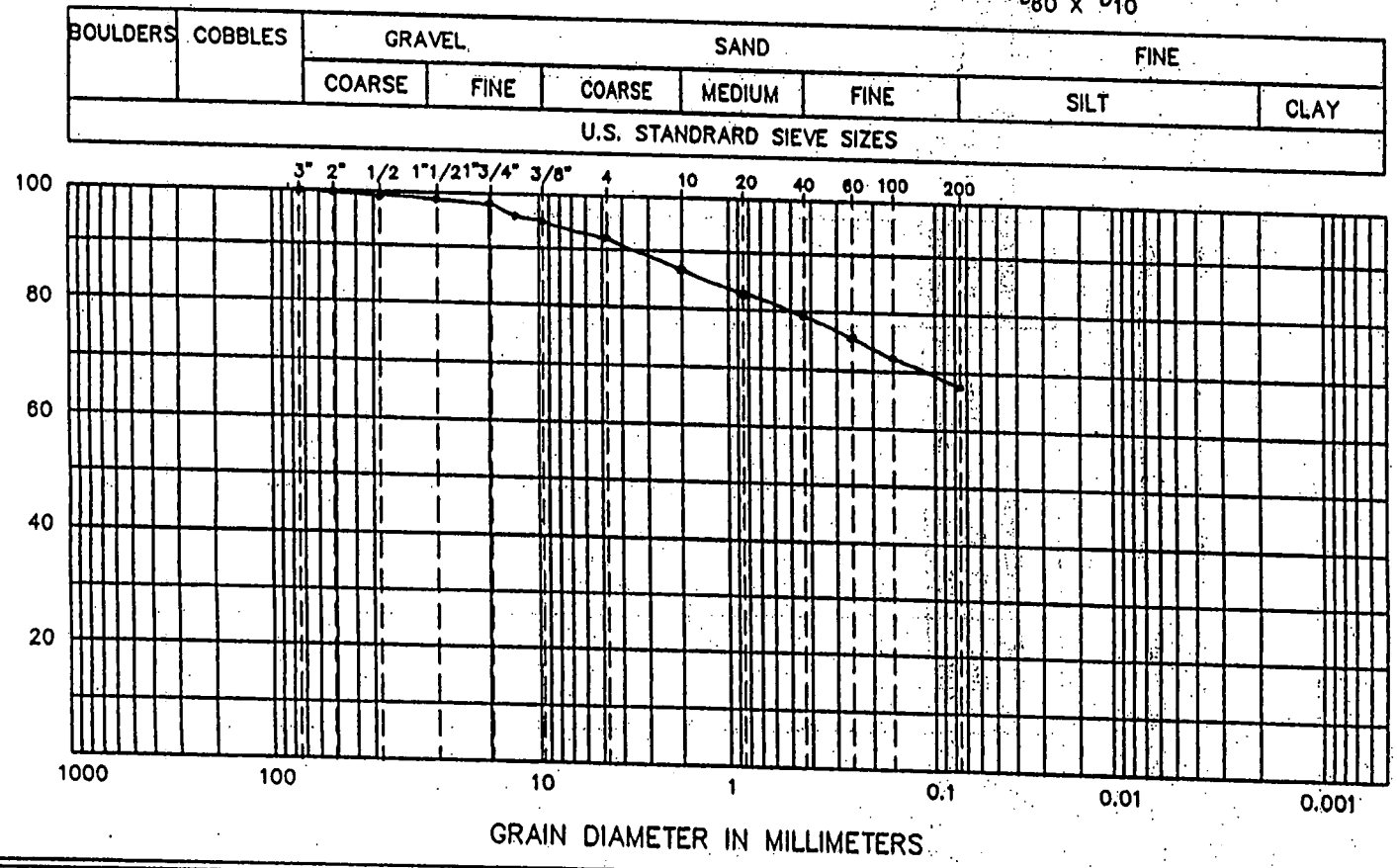
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-54 QA ID: KS CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 27

(PL) 16

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	98.2
1-In.	98.6
3/4-In.	97.6
1/2-In.	96.2
3/8-In.	95.3
NO. 4	92.3
NO. 10	87.5
NO. 20.	83.4
NO. 40	79.6
NO. 60	76.4
NO. 100	72.5
NO. 200	67.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	52
0.005	32
0.002	24

SOIL CLASSIFICATION (ASTM D 2487): CL

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SHEET NO. ____ OF ____

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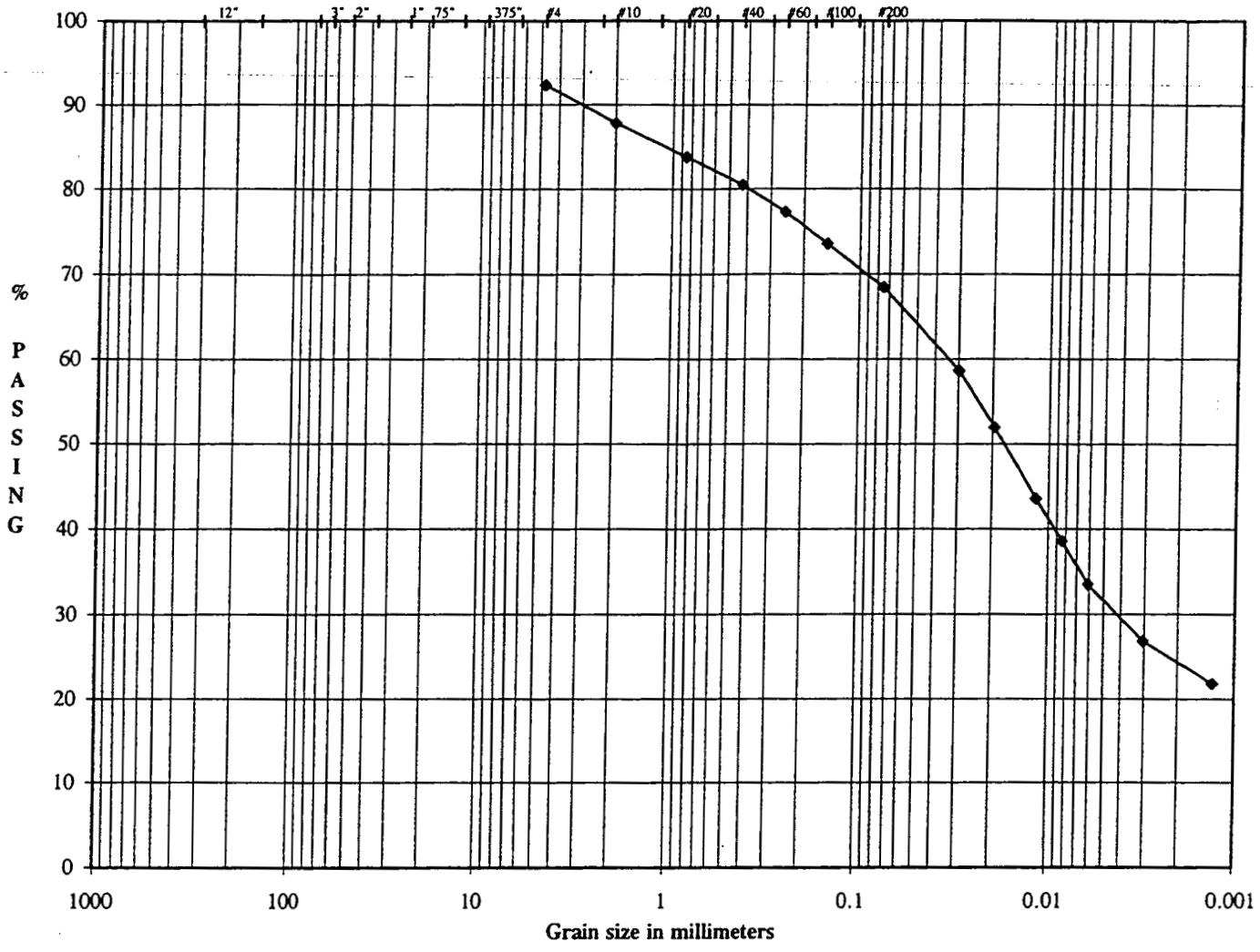
5368

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 54
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/10/02
CHECK	
REVIEW	

000385

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: 2B62.55

SOIL SAMPLE SIZE			
+3/8 = 3414.1 g NAP	MOISTURE = ~~600~~ 471.0 KS	TOTAL = 52977.4	
-3/8 = ~~600~~ 1200 g KS	47889.3	52503.4 KS	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	Small Bowl	L-1	Small Bowl	L-1
WT. OF DRY SAMPLE PLUS TARE (grams)	3706.9	792.4		359.4
WT. OF TARE (grams)	292.8	192.4	292.8	192.4
WT. OF DRY SAMPLE (grams)	3414.1	600.0		167.0

SIEVE ANALYSIS — QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	348.0	0.66	99.3		
1 in	25.4	1263.1	2.4	97.6		
3/4 in	19.1	1860.4	3.5	96.5		90-100
1/2 in	12.7	2745.6	5.2	94.8		
3/8 in	9.53	3236.9	6.1	93.9		
No. 4	4.75	21.4	3.6	96.4	90.5	
No. 10	2.00	45.4	7.6	92.4	88.8	
No. 20	0.850	68.8	11.5	88.5	83.1	
No. 40	0.425	91.1	15.2	84.8	79.6	
No. 60	0.250	110.9	18.5	81.5	76.5	
No. 100	0.125	135.6	22.6	77.4	72.7	
No. 200	0.075	165.0	27.5	72.5	68.1	50-100
PAN	—	166.3	—	—		

COMMENTS:

000386

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

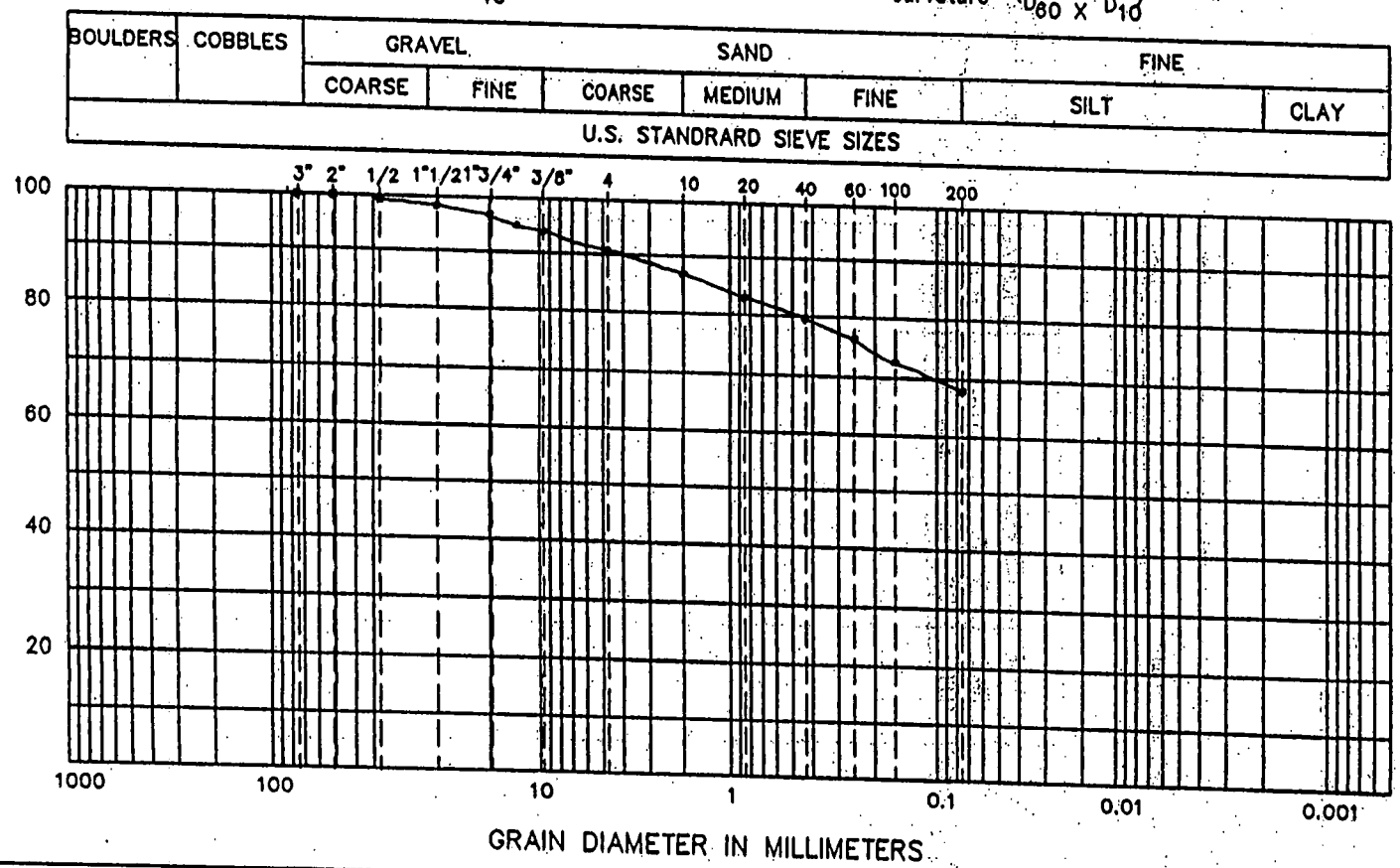
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-55 QA ID: KS-CAW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



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.	97.6
3/4-in.	96.5
1/2-in.	94.8
3/8-in.	93.9
NO. 4	90.5
NO. 10	86.8
NO. 20	83.1
NO. 40	79.6
NO. 60	76.5
NO. 100	72.7
NO. 200	68.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	54
0.005	33
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

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5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 55
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	63.76
Dry Soil & Tare (gm)	62.29
Tare Weight (gm)	3.20
Moisture Content (%)	2.49

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.44	
Tare Weight (gm)	235.53	
Total Weight (gm)	487.78	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			90.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.26
Calculated Dry Wt. used in test (gm)	54.89
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	90.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.68	1.68	87.7	#10	medium sand
#20	4.04	4.04	83.8	#20	medium sand
#40	6.14	6.14	80.4	#40	fine sand
#60	8.10	8.10	77.1	#60	fine sand
#100	10.36	10.36	73.4	#100	fine sand
#200	13.36	13.36	68.5	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	10:02								
9/11/02	10:04	2.00	44.0	23.00	0.013	7.00	37.00	10.2	0.99
9/11/02	10:07	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/11/02	10:17	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
9/11/02	10:32	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
9/11/02	11:02	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/11/02	14:12	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
9/12/02	10:02	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0294	60.4		
0.0192	53.9	% GRAVEL	9.50
0.0115	45.7	% COARSE SAND	2.77
0.0084	39.2	% MEDIUM SAND	7.35
0.0060	34.3	% FINE SAND	11.90
0.0030	27.7	% FINES	68.47
0.0013	22.8	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

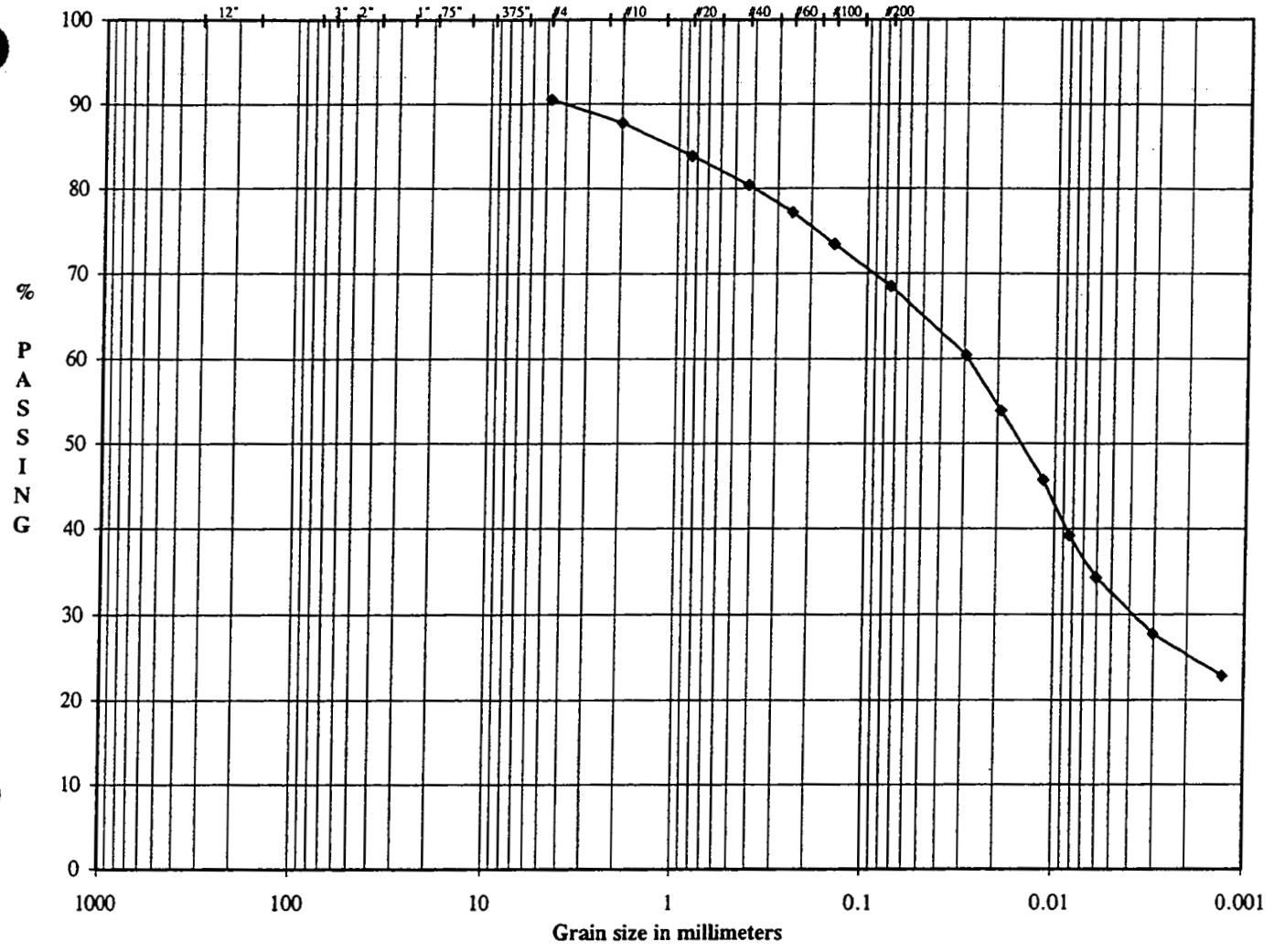
-	LL
-	PL
-	PI

TECH	TJ/NA
DATE	9/10/02
CHECK	
REVIEW	

000388

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 55
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000389

TECH	TJ/NA
DATE	9/10/02
CHECK	BS
REVIEW	PWM

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.56

SOIL SAMPLE SIZE	+3/8 = 962.4 gram	MOISTURE = 255.5	TOTAL = 24829.7
	-3/8 = 22411.8 + 1200		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-3	LL-4	L-3	LL-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	1152.3	745.4	1089.9	338.1
WT. OF TARE	(grams)	189.9	145.4	189.9	145.4
WT. OF DRY SAMPLE	(grams)	962.4	600.0	900.0	192.7

SIEVE ANALYSIS QA ID: DLE/KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	121.8	0.5	99.5		
3/4 in	19.1	350.0	1.4	98.6		90-100
1/2 in	12.7	685.8	2.8	97.2		
3/8 in	9.53	887.3	3.6	96.4		
No. 4	4.75	17.3	2.9	97.1	93.6	
No. 10	2.00	51.5	8.6	91.4	88.1	
No. 20	0.850	82.0	13.7	86.3	83.2	
No. 40	0.425	109.6	18.3	81.7	78.8	
No. 60	0.250	133.9	22.3	77.7	74.9	
No. 100	0.125	161.5	26.9	73.1	70.5	
No. 200	0.075	191.5	31.9	68.1	65.7	50-100
PAN	—	192.5	—	—		

COMMENTS:

000390

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

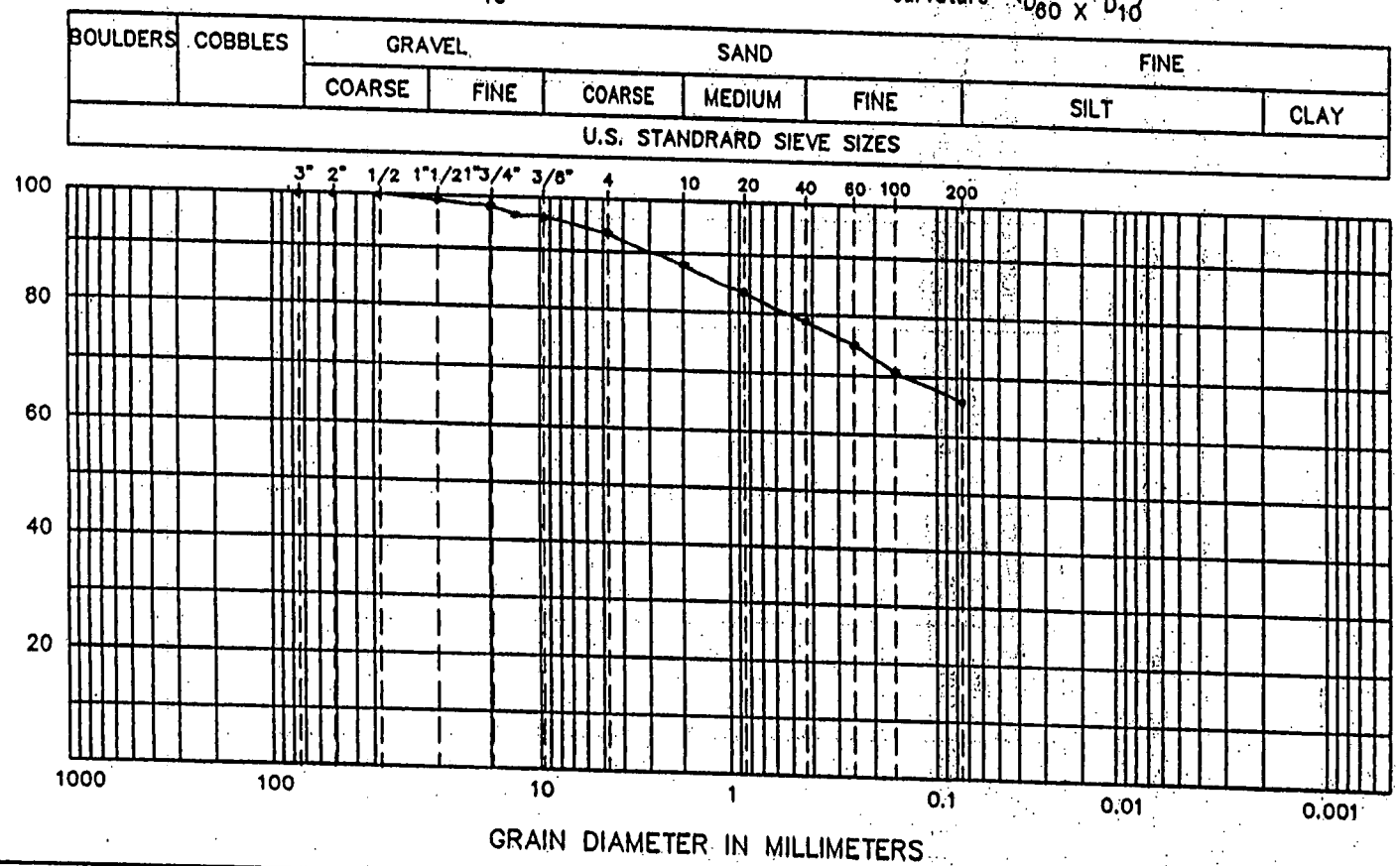
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-56 QA ID: ~~KS~~ CMW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 25

(PL) 15

(PI) 10

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.5
3/4-In.	98.6
1/2-In.	97.2
3/8-In.	96.4
NO. 4	93.6
NO. 10	88.1
NO. 20.	83.2
NO. 40	78.8
NO. 60	74.9
NO. 100	70.5
NO. 200	65.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	63
0.002	52
0.0005	30
0.0002	23

SOIL CLASSIFICATION (ASTM D 2487): CL

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SHEET NO. ____ OF ____

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5 of 8

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 56
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	66.36
Dry Soil & Tare (gm)	64.67
Tare Weight (gm)	3.28
Moisture Content (%)	2.75

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.04	
Tare Weight (gm)	235.62	
Total Weight (gm)	486.04	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.21
Calculated Dry Wt. used in test (gm)	53.73
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.40	1.40	91.2	#10	medium sand
#20	4.02	4.02	86.6	#20	medium sand
#40	6.58	6.58	82.1	#40	fine sand
#60	9.07	9.07	77.8	#60	fine sand
#100	11.86	11.86	72.9	#100	fine sand
#200	15.28	15.28	67.0	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET	READING	TEMP	TEMP.COR.	HYD.COR.	READING	EFFECTIVE	
9/11/02	10:04	(min)	R	T	K	Cc	C	LENGTH	A
9/11/02	10:06	2.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/11/02	10:09	5.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
9/11/02	10:19	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/11/02	10:34	30.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/11/02	11:04	60.00	26.0	23.00	0.013	7.00	19.00	13.2	0.99
9/11/02	14:14	250.00	21.0	23.00	0.013	7.00	14.00	14.0	0.99
9/12/02	10:04	1440.00	19.0	22.50	0.013	7.00	12.00	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	56.9		
0.0196	51.7	% GRAVEL	6.40
0.0117	43.1	% COARSE SAND	2.44
0.0085	36.2	% MEDIUM SAND	9.02
0.0061	32.8	% FINE SAND	15.16
0.0031	24.1	% FINES	66.98
0.0013	20.7	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

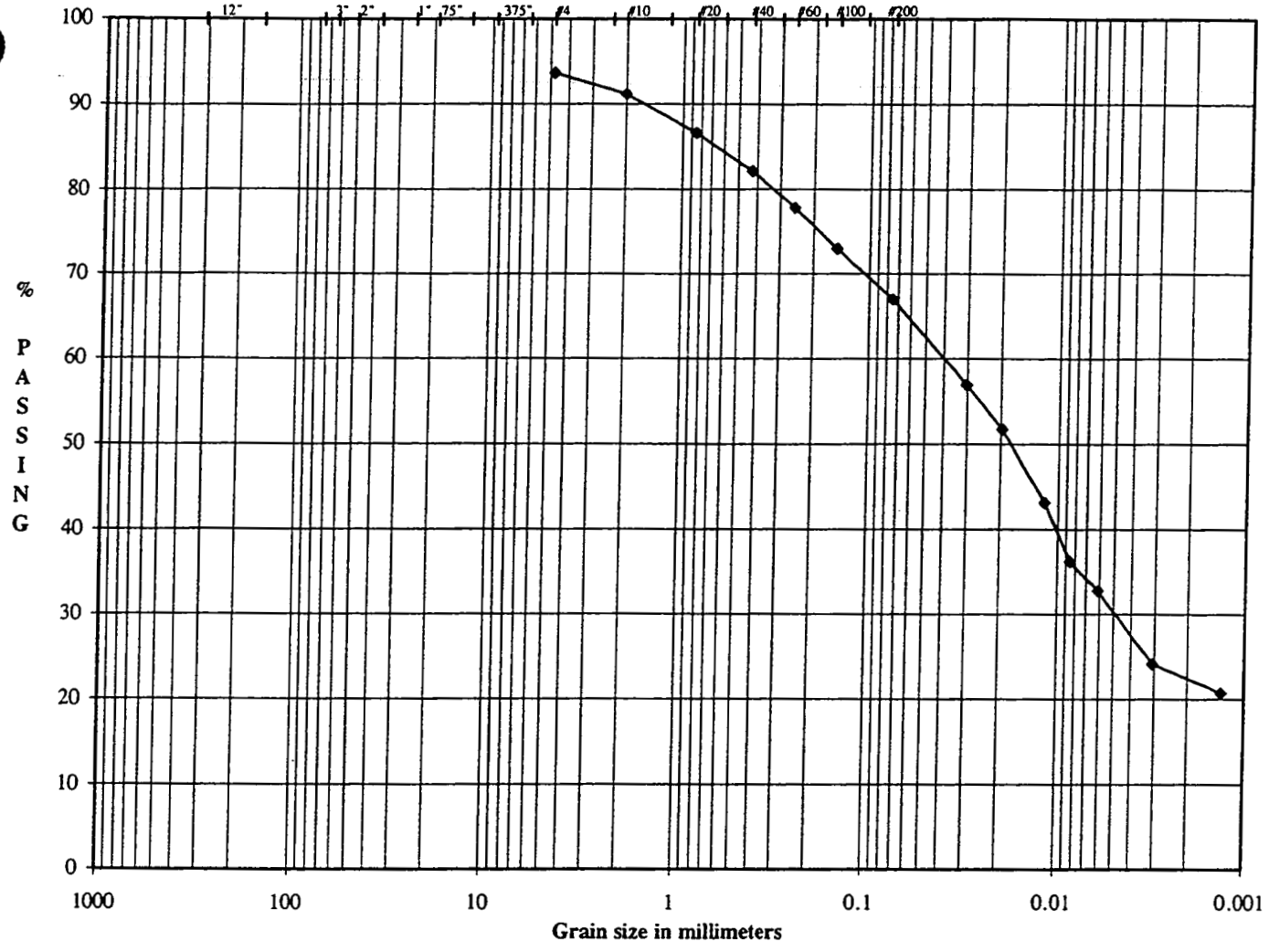
-	LL
-	PL
-	PI

TECH	TJ/NA
DATE	9/10/02
CHECK	
REVIEW	

000392

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 56
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/NA
DATE	9/10/02
CHECK	BBS
REVIEW	[illegible]

000393

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-57

SOIL SAMPLE SIZE	+3/8 = 2998.0	MOISTURE = 436.4 gm	TOTAL = 4485.5
	-3/8 = 41371.1	41371.1g	

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		Small bowl	L-7	L-8	L-7
WT. OF DRY SAMPLE PLUS TARE	(grams)	3290.2	~~793.1~~ 780.7	2994.7	389.8
WT. OF TARE	(grams)	292.2	193.1	193.2	193.1
WT. OF DRY SAMPLE	(grams)	2998.0	~~600.0~~ 587.6	2801.5	196.7

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	419.9	0.9	99.1		
1 in	25.4	939.2	2.1	97.9		
3/4 in	19.1	1440.3	3.2	96.8		90-100
1/2 in	12.7	2347.1	5.2	94.8		
3/8 in	9.53	2793.7	6.2	93.8		
No. 4	4.75	25.1	4.3	95.7	89.8	
No. 10	2.00	61.3	10.4	89.6	84.0	
No. 20	0.850	90.7	15.4	84.6	79.3	
No. 40	0.425	115.6	19.7	80.3	75.3	
No. 60	0.250	137.2	23.3	76.7	71.9	
No. 100	0.125	163.3	27.8	72.2	67.7	
No. 200	0.075	193.9	33.0	67.0	62.8	50-100
PAN	—	196.6	—	—		

COMMENTS:

000394

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

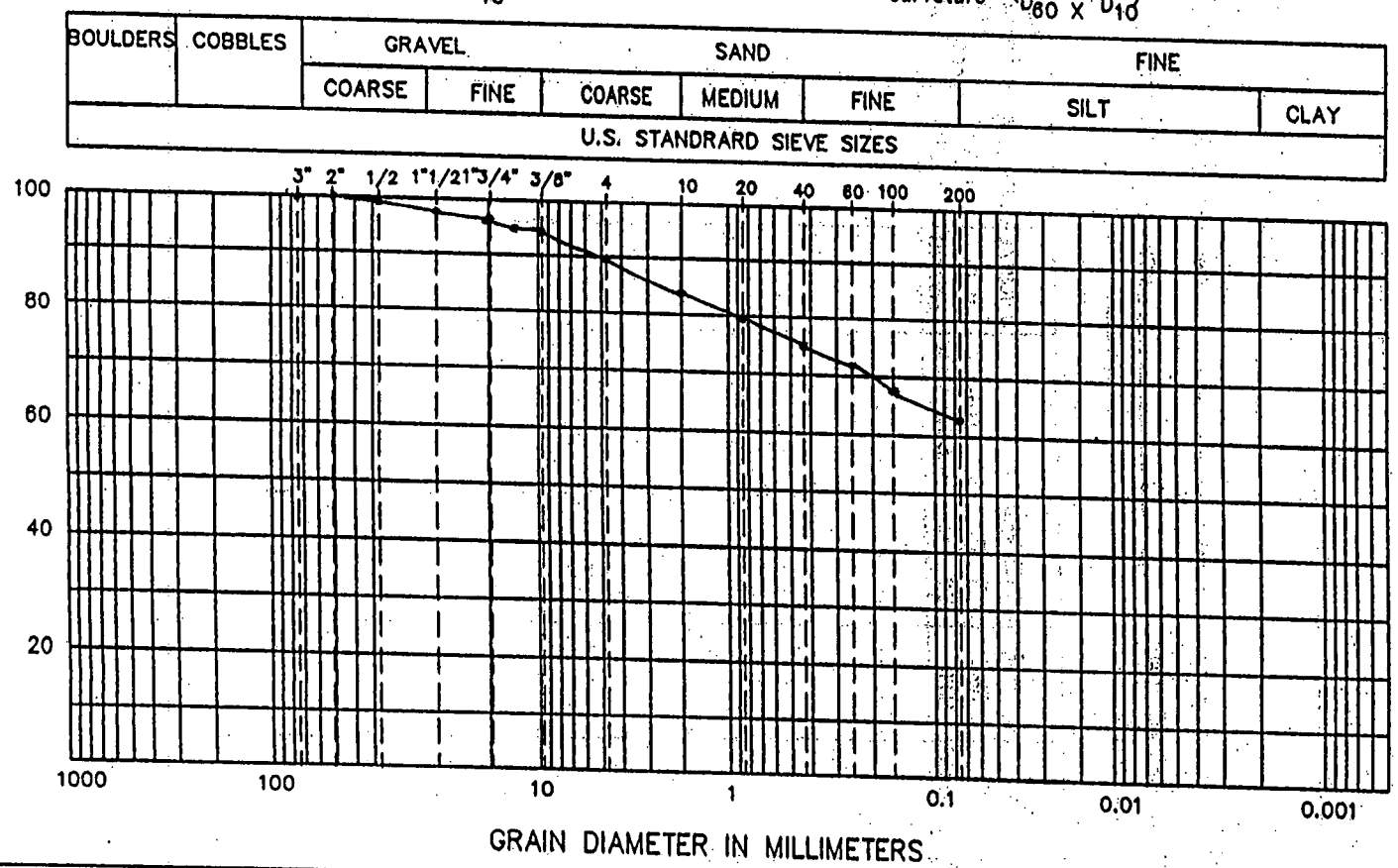
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-57 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 27

(PL) 16

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.1
1-In.	97.9
3/4-In.	96.8
1/2-In.	94.8
3/8-In.	93.8
NO. 4	89.8
NO. 10	84.0
NO. 20.	79.3
NO. 40	75.3
NO. 60	71.9
NO. 100	67.7
NO. 200	62.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	62
0.02	49
0.005	29
0.002	22

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

000395

000396

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 57
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	71.88
Dry Soil & Tare (gm)	70.58
Tare Weight (gm)	3.21
Moisture Content (%)	1.93

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.17	
Tare Weight (gm)	235.68	
Total Weight (gm)	490.03	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			89.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.06
Calculated Dry Wt. used in test (gm)	54.02
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	89.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.92	1.92	86.6	#10	medium sand
#20	4.86	4.86	81.7	#20	medium sand
#40	7.26	7.26	77.7	#40	fine sand
#60	9.45	9.45	74.1	#60	fine sand
#100	11.86	11.86	70.1	#100	fine sand
#200	14.98	14.98	64.9	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	14:12								
9/11/02	14:14	2.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/11/02	14:17	5.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
9/11/02	14:27	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/11/02	14:42	30.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/11/02	15:12	60.00	26.0	23.00	0.013	7.00	19.00	13.2	0.99
9/11/02	18:22	250.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99
9/12/02	14:12	1440.00	18.0	22.50	0.013	7.00	11.00	14.5	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	57.6		
0.0196	49.4	% GRAVEL	10.20
0.0117	41.1	% COARSE SAND	3.19
0.0085	36.2	% MEDIUM SAND	8.88
0.0061	31.3	% FINE SAND	12.83
0.0031	24.7	% FINES	64.90
0.0013	18.1	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

-	LL
-	PL
-	PI

TECH	TJ/NA
DATE	7/30/02
CHECK	[illegible]
REVIEW	[illegible]

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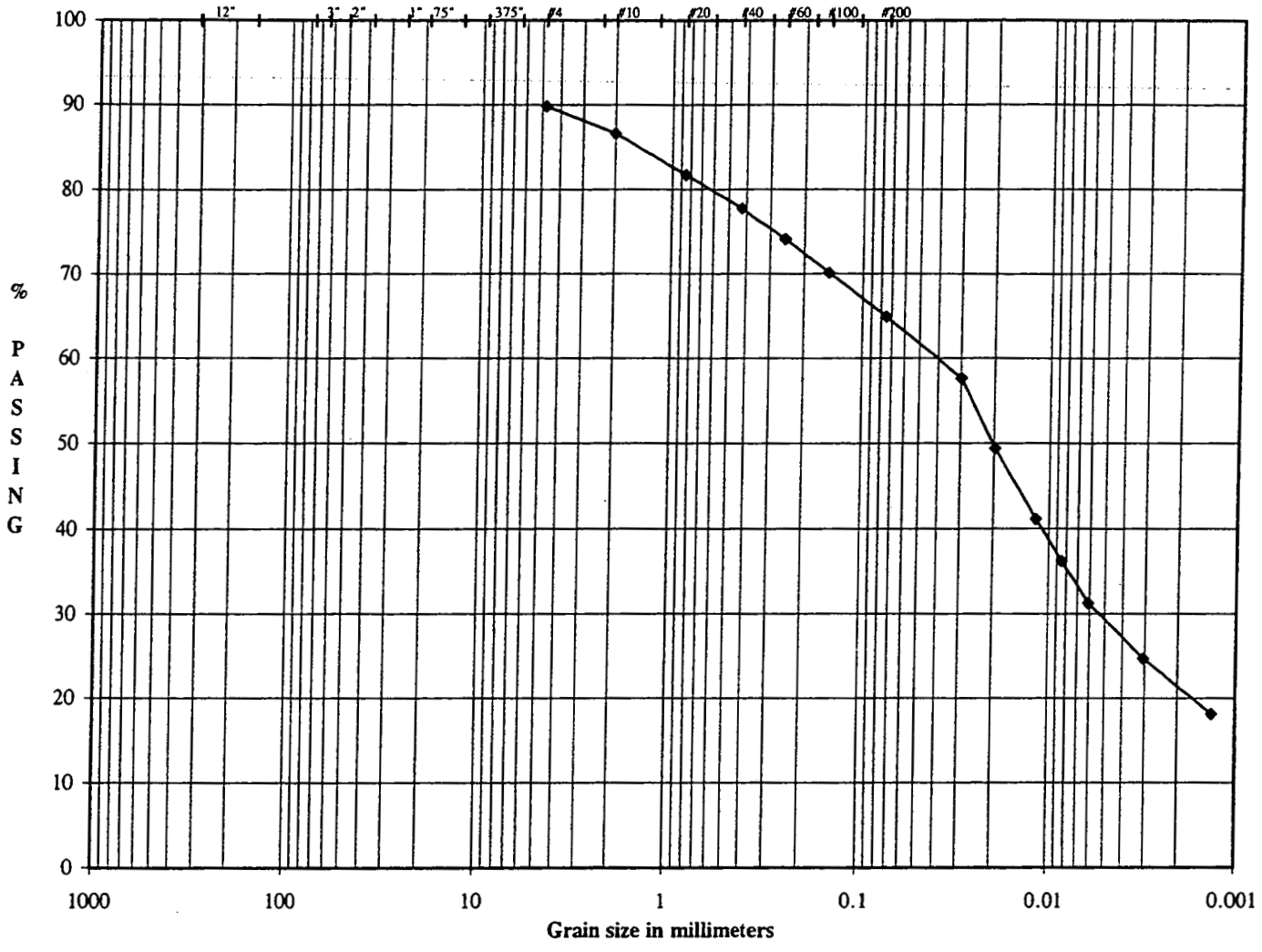
PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 57
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/NA
DATE	7/30/02
CHECK	
REVIEW	

000397

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III — DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-58

SOIL SAMPLE SIZE	+3/8 = 2137.1 gr	MOISTURE = 394.4 gr	TOTAL = 13702.7
	-3/8 = 11171.2	13702.7	

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

500g Sieve / 500g After.

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		Small bowl	L-3	N	L-3
WT. OF DRY SAMPLE PLUS TARE	(grams)	2422.7	774.3	2057.5	372.0
WT. OF TARE	(grams)	285.6	189.9	101.6	189.9
WT. OF DRY SAMPLE	(grams)	2137.1	584.4	1955.9	182.1

SIEVE ANALYSIS — QA ID: DJE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	185.0	.4	99.6		
3/4 in	19.1	685.2	1.6	98.4		90-100
1/2 in	12.7	1469.1	3.4	96.6		
3/8 in	9.53	1948.8	4.5	95.5		
No. 4	4.75	12.2	2.1	97.9	93.5	
No. 10	2.00	41.1	7.0	93.0	88.8	
No. 20	0.850	69.9	12.0	88.0	84.0	
No. 40	0.425	98.5	16.9	83.1	79.4	
No. 60	0.250	124.7	21.3	78.7	75.2	
No. 100	0.125	157.0	~~26.7~~ 26.9	~~73.3~~ 73.1	~~70.3~~ 69.9	
No. 200	0.075	180.9	31.0	69.0	65.9	50-100
PAN	—	182.1	—	—		

.16. 41.0 8.8 12 — 39971.2 — .955

COMMENTS:

000398

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: GS — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

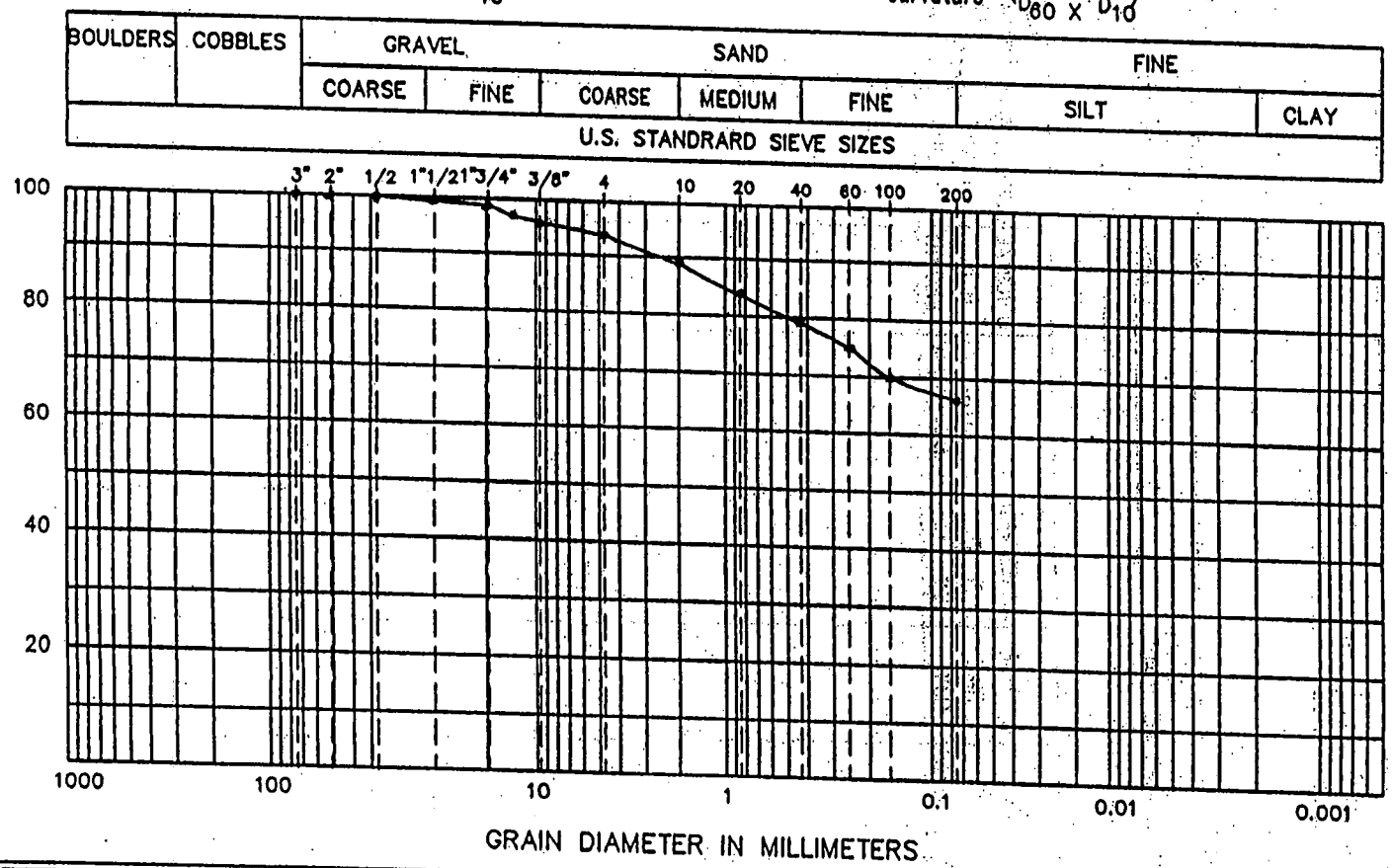
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-58 QA ID: ~~KS~~ CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 27

(PL) 16

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.6
3/4-In.	98.4
1/2-In.	96.6
3/8-In.	95.5
NO. 4	93.5
NO. 10	88.8
NO. 20	84.0
NO. 40	79.4
NO. 60	75.2
NO. 100	69.9
NO. 200	65.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	67
0.02	57
0.005	34
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

000399

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 58
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	64.43
Dry Soil & Tare (gm)	63.24
Tare Weight (gm)	3.27
Moisture Content (%)	1.98

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	736.80	
Tare Weight (gm)	235.71	
Total Weight (gm)	491.34	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.21
Calculated Dry Wt. used in test (gm)	54.14
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.86	1.86	90.3	#10	medium sand
#20	4.43	4.43	85.8	#20	medium sand
#40	6.56	6.56	82.2	#40	fine sand
#60	8.43	8.43	78.9	#60	fine sand
#100	10.65	10.65	75.1	#100	fine sand
#200	13.52	13.52	70.1	#200	fines

HYDROMETER CALCULATIONS

DATE 9/11/02	TIME 14:14	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	14:16	2.00	44.0	23.00	0.013	7.00	37.00	10.2	0.99
9/11/02	14:19	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/11/02	14:29	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
9/11/02	14:44	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
9/11/02	15:14	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/11/02	18:24	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
9/12/02	14:14	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0294	63.3		
0.0192	56.4	% GRAVEL	6.50
0.0116	46.2	% COARSE SAND	3.21
0.0084	41.0	% MEDIUM SAND	8.12
0.0060	35.9	% FINE SAND	12.02
0.0030	29.1	% FINES	70.15
0.0013	22.2	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

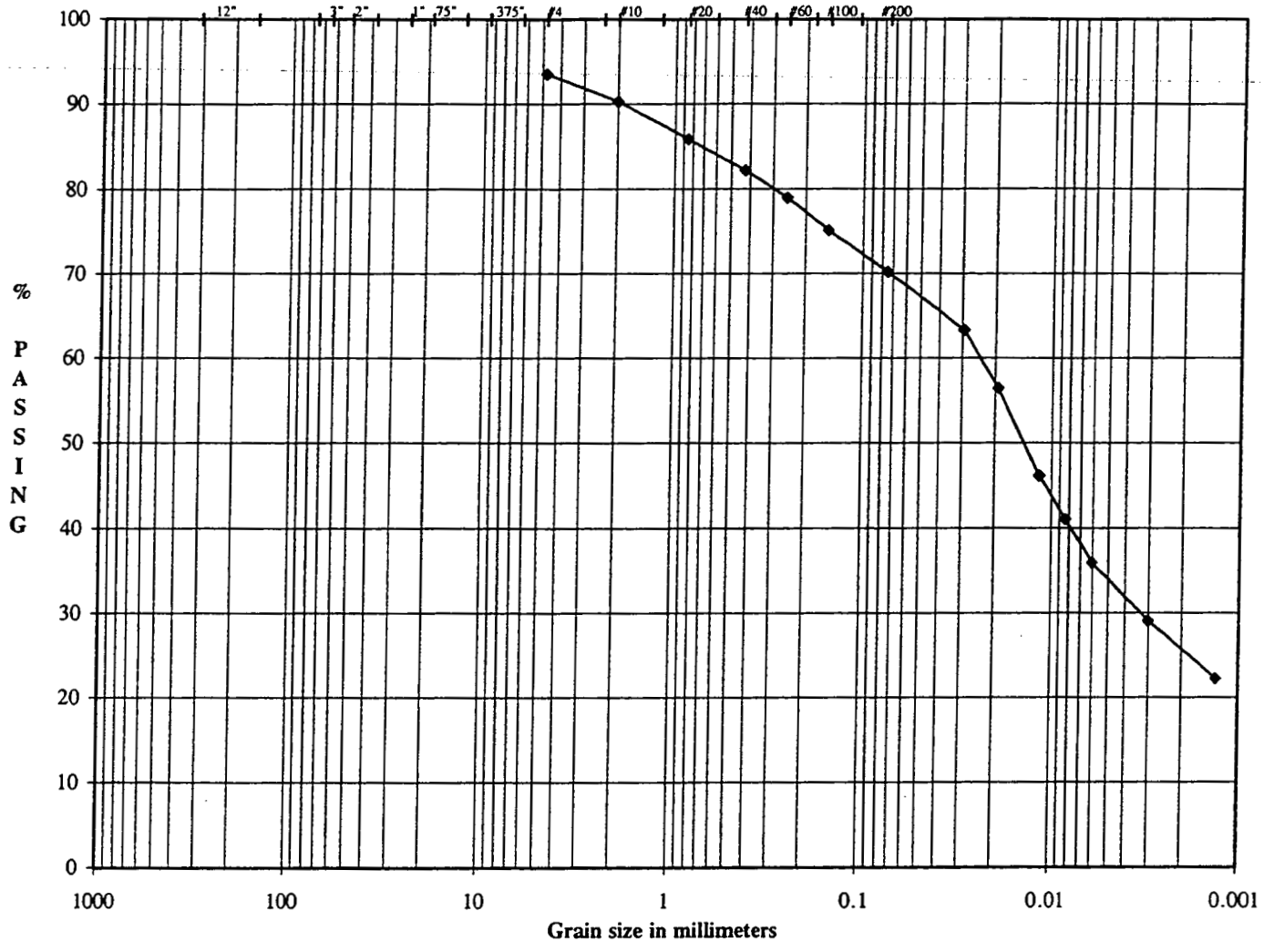
USCS (CL)

-	LL
-	PL
-	PI

TECH	TJ/NA
DATE	9/10/02
CHECK	BSS
REVIEW	[illegible]

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 58
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000401

TECH	TJ/NA
DATE	9/10/02
CHECK	BGS
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-59

SOIL SAMPLE SIZE	+3/8 = 1331.0	MOISTURE = 2342	TOTAL = 20213.2
	-3/8 = 19979.0		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
18779.0 / 1200 = 11.40 (grams) (Bucket 43.24 − 1.84)	115	65

19979.0

		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		L-1	K	L-1	K
WT. OF DRY SAMPLE PLUS TARE	(grams)	1523.4	680.3	1435.9	273.4
WT. OF TARE	(grams)	192.4	101.5	192.4	101.5
WT. OF DRY SAMPLE	(grams)	1331.0	578.8	1243.5	171.9

2000g Sieve

2000g After.

SIEVE ANALYSIS QA ID: DVK

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	75.0	.4	99.96		
1 in	25.4	379.5	1.9	98.1		
3/4 in	19.1	644.8	3.2	96.8		90-100
1/2 in	12.7	1019.6	5.0	95.0		
3/8 in	9.53	1236.8	6.1	93.9		
No. 4	4.75	17.8	3.1	96.9	91.0	
No. 10	2.00	42.8	7.4	92.6	87.0	
No. 20	0.850	69.2	12.0	88.0	82.6	
No. 40	0.425	94.3	16.3	83.7	78.6	
No. 60	0.250	118.3	20.4	79.6	74.7	
No. 100	0.125	149.0	25.7	74.3	69.8	
No. 200	0.075	170.5	29.5	70.5	66.2	50-100
PAN	—	171.8	—	—		

COMMENTS:

000402

% FINER = 100 − Σ % RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CH SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

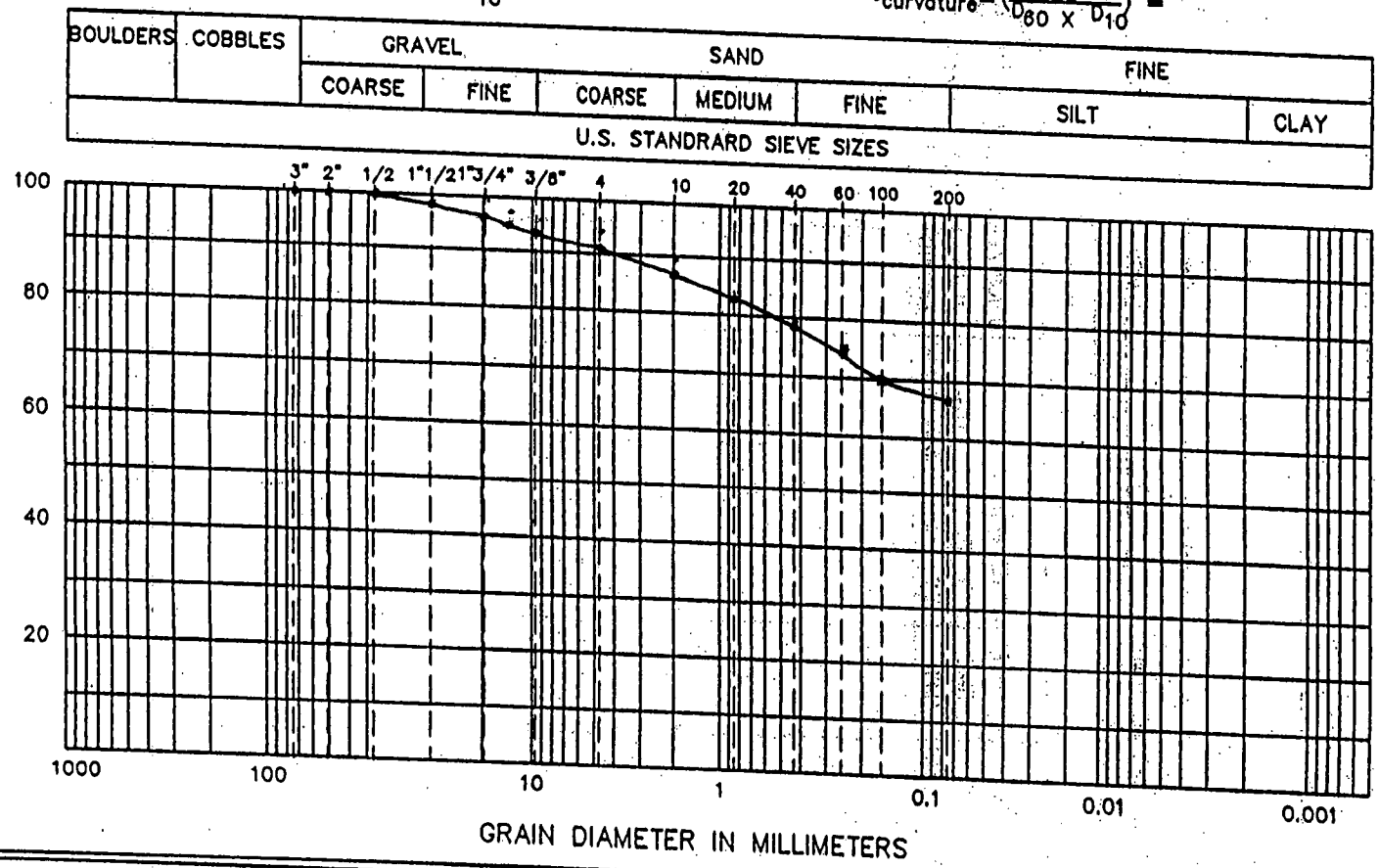
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-59 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	98.1
3/4-In.	96.8
1/2-In.	95.0
3/8-In.	93.9
NO. 4	91.0
NO. 10	87.0
NO. 20.	82.6
NO. 40	78.6
NO. 60	74.7
NO. 100	69.8
NO. 200	66.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	52
0.005	32
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000403

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 59
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	65.08
Dry Soil & Tare (gm)	62.84
Tare Weight (gm)	3.23
Moisture Content (%)	3.76

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.44	
Tare Weight (gm)	235.67	
Total Weight (gm)	481.67	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			91.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.51
Calculated Dry Wt. used in test (gm)	53.50
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	91.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.30	2.30	87.1	#10	medium sand
#20	4.35	4.35	83.6	#20	medium sand
#40	5.82	5.82	81.1	#40	fine sand
#60	7.31	7.31	78.6	#60	fine sand
#100	9.21	9.21	75.3	#100	fine sand
#200	11.75	11.75	71.0	#200	fines

HYDROMETER CALCULATIONS

DATE 9/11/02	TIME 14:16	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	14:18	2.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
9/11/02	14:21	5.00	38.0	23.00	0.013	7.00	31.00	11.2	0.99
9/11/02	14:31	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
9/11/02	14:46	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/11/02	15:16	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
9/11/02	18:26	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/12/02	14:16	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0301	57.3		
0.0195	52.2	% GRAVEL	9.00
0.0116	43.8	% COARSE SAND	3.91
0.0084	38.7	% MEDIUM SAND	5.99
0.0061	33.7	% FINE SAND	10.09
0.0030	26.9	% FINES	71.01
0.0013	23.6	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

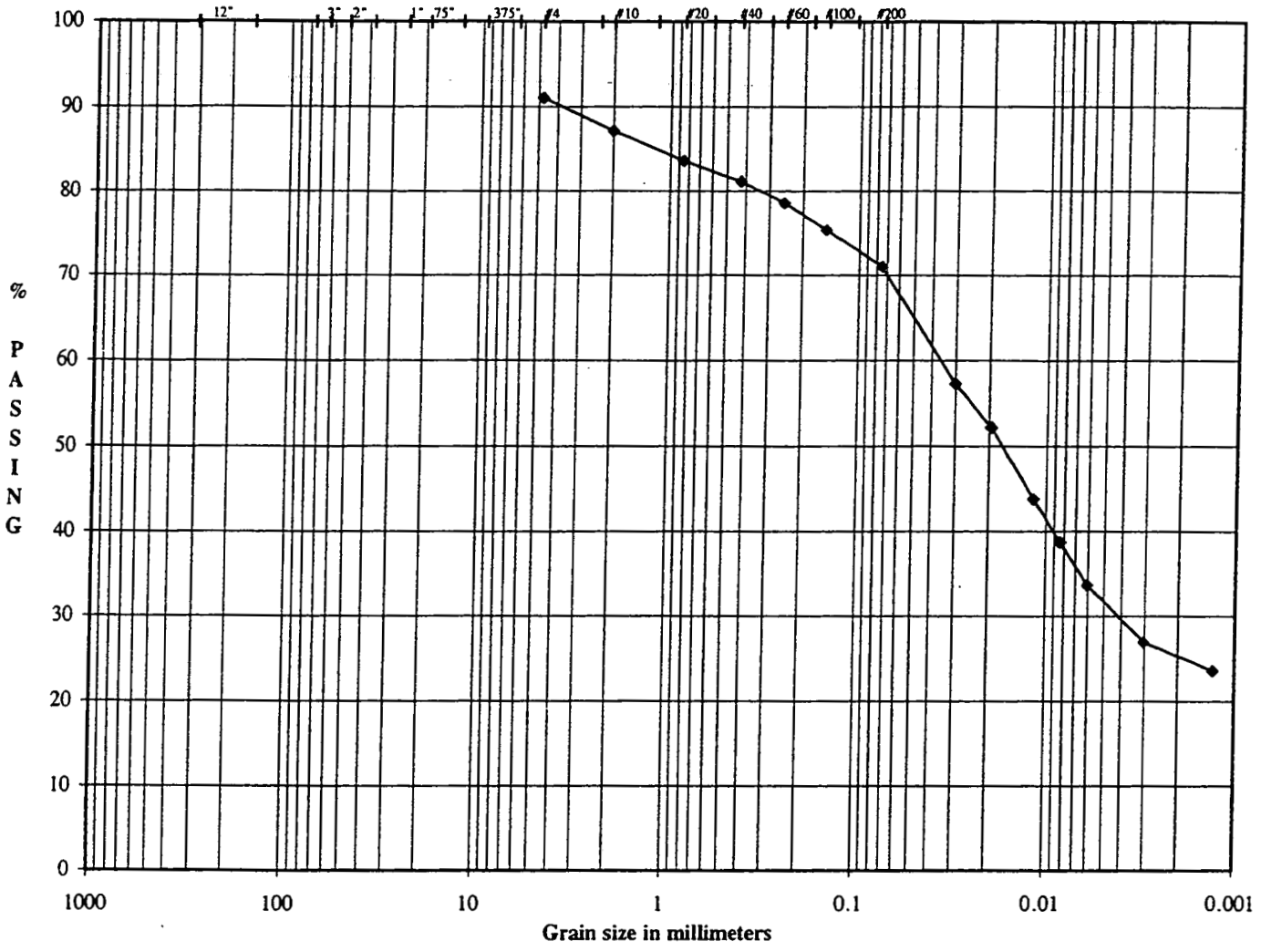
-	LL
-	PL
-	PI

TECH	TJ/NA
DATE	9/10/02
CHECK	BSS
REVIEW	[illegible]

000404

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 59
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/NA
DATE	9/10/02
CHECK	BJS
REVIEW	[illegible]

000405

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 28 day Aug month 2002 year

50 LB'S MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LPC2-60

SOIL SAMPLE SIZE	+3/8 = 2394.3 gr	MOISTURE = 272.2 gr	TOTAL = 47826.9 gr
	-3/8 = 45160.4	(105.43 LB's)	

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-9	L-3	L-9	L-3
WT. OF DRY SAMPLE PLUS TARE (grams)	2587.6	761.3	2377.5	365.2
WT. OF TARE (grams)	193.3	189.9	193.3	189.9
WT. OF DRY SAMPLE (grams)	2394.3	571.4	2184.2	175.3

SIEVE ANALYSIS QA ID: DHE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	725.Ø	1.5	98.5		
3/4 in	19.1	1054.Ø	2.2	97.8		90-100
1/2 in	12.7	1762.2	3.7	96.3		
3/8 in	9.53	2155.7	4.5	95.5		
No. 4	4.75	10.9	1.9	98.1	93.7	
No. 10	2.00	38.8	6.8	93.2	89.Ø	
No. 20	0.850	67.4	11.8	88.2	84.2	
No. 40	0.425	95.Ø	16.6	83.4	79.6	
No. 60	0.250	117.5	20.6	79.4	75.8	
No. 100	0.125	145.3	25.4	74.6	71.2	
No. 200	0.075	173.9	30.4	69.6	66.5	50-100
PAN	—	175.2	—	—		

COMMENTS:

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CH

000406

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

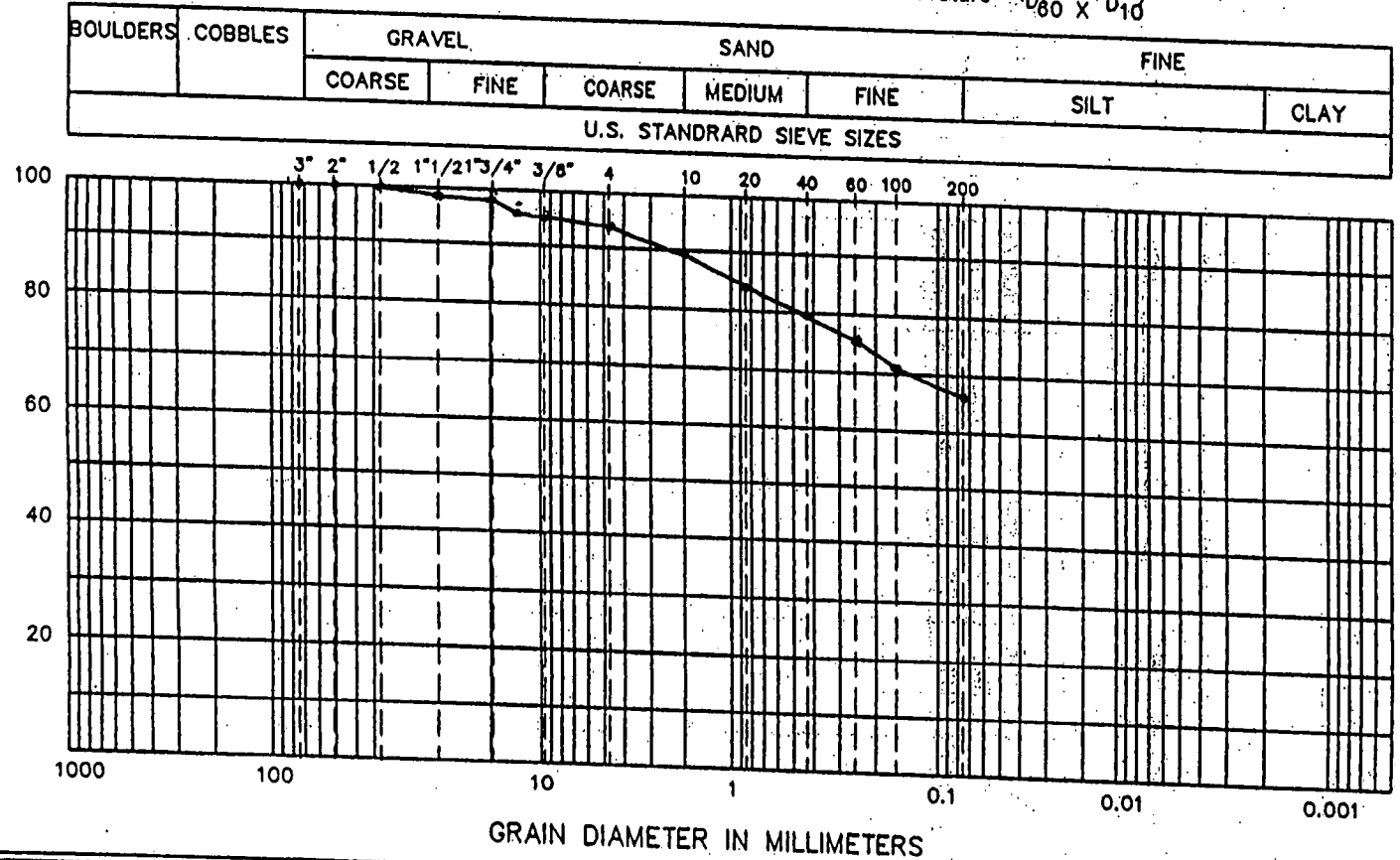
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-60 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 27

(PL) 15

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.5
3/4-in.	97.8
1/2-in.	96.3
3/8-in.	95.5
NO. 4	93.7
NO. 10	89.0
NO. 20.	84.2
NO. 40	79.6
NO. 60	75.8
NO. 100	71.2
NO. 200	66.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	64.5
0.02	53.3
0.005	31.9
0.002	24.8

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

000407

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 60
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	62.09
Dry Soil & Tare (gm)	59.11
Tare Weight (gm)	3.20
Moisture Content (%)	5.33

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.50	
Tare Weight (gm)	235.66	
Total Weight (gm)	474.55	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.83
Calculated Dry Wt. used in test (gm)	53.00
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.94	1.94	90.3	#10	medium sand
#20	4.77	4.77	85.3	#20	medium sand
#40	7.04	7.04	81.3	#40	fine sand
#60	9.14	9.14	77.5	#60	fine sand
#100	11.33	11.33	73.7	#100	fine sand
#200	14.21	14.21	68.6	#200	fines

HYDROMETER CALCULATIONS

DATE 9/11/02	TIME 14:18	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	14:20	2.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/11/02	14:23	5.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
9/11/02	14:33	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/11/02	14:48	30.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/11/02	15:18	60.00	26.0	23.00	0.013	7.00	19.00	13.2	0.99
9/11/02	18:28	250.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99
9/12/02	14:18	1440.00	19.0	22.50	0.013	7.00	12.00	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	57.8		
0.0196	52.5	% GRAVEL	6.30
0.0117	43.8	% COARSE SAND	3.43
0.0085	38.5	% MEDIUM SAND	9.02
0.0061	33.3	% FINE SAND	12.67
0.0031	26.3	% FINES	68.58
0.0013	21.0	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

TECH	TJ/NA
DATE	9/10/02
CHECK	[illegible]
REVIEW	[illegible]

000408

Golder Associates Inc.

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 29 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-61

SOIL SAMPLE SIZE	+3/8 = 1773.6	MOISTURE = 227.5	TOTAL = 23987.3
	-3/8 = 21886.2	23987.3	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
50.09 − 1.84 = 48.25 (grams)	115	65

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	K	LL-4	K	LL-4
WT. OF DRY SAMPLE PLUS TARE (grams)	1875.1	723.1	1757.8	328.1
WT. OF TARE (grams)	101.5	145.4	101.5	145.4
WT. OF DRY SAMPLE (grams)	1773.6	577.7	1656.3	182.7

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	197.6	.8	99.2		
1 in	25.4	550.7	2.3	97.7		
3/4 in	19.1	887.4	3.7	96.3		90-100
1/2 in	12.7	1419.9	5.9	94.1		
3/8 in	9.53	1652.7	6.9	93.1		
No. 4	4.75	22.5	3.9	96.1	89.5	
No. 10	2.00	50.4	8.7	91.3	85.0	
No. 20	0.850	78.8	13.6	86.4	80.4	
No. 40	0.425	105.1	18.2	81.8	76.2	
No. 60	0.250	126.0	21.8	78.2	72.8	
No. 100	0.125	152.2	26.3	73.7	68.6	
No. 200	0.075	180.3	31.2	68.8	64.1	50-100
PAN	—	182.7	—	—		

COMMENTS:

000409

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CS SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

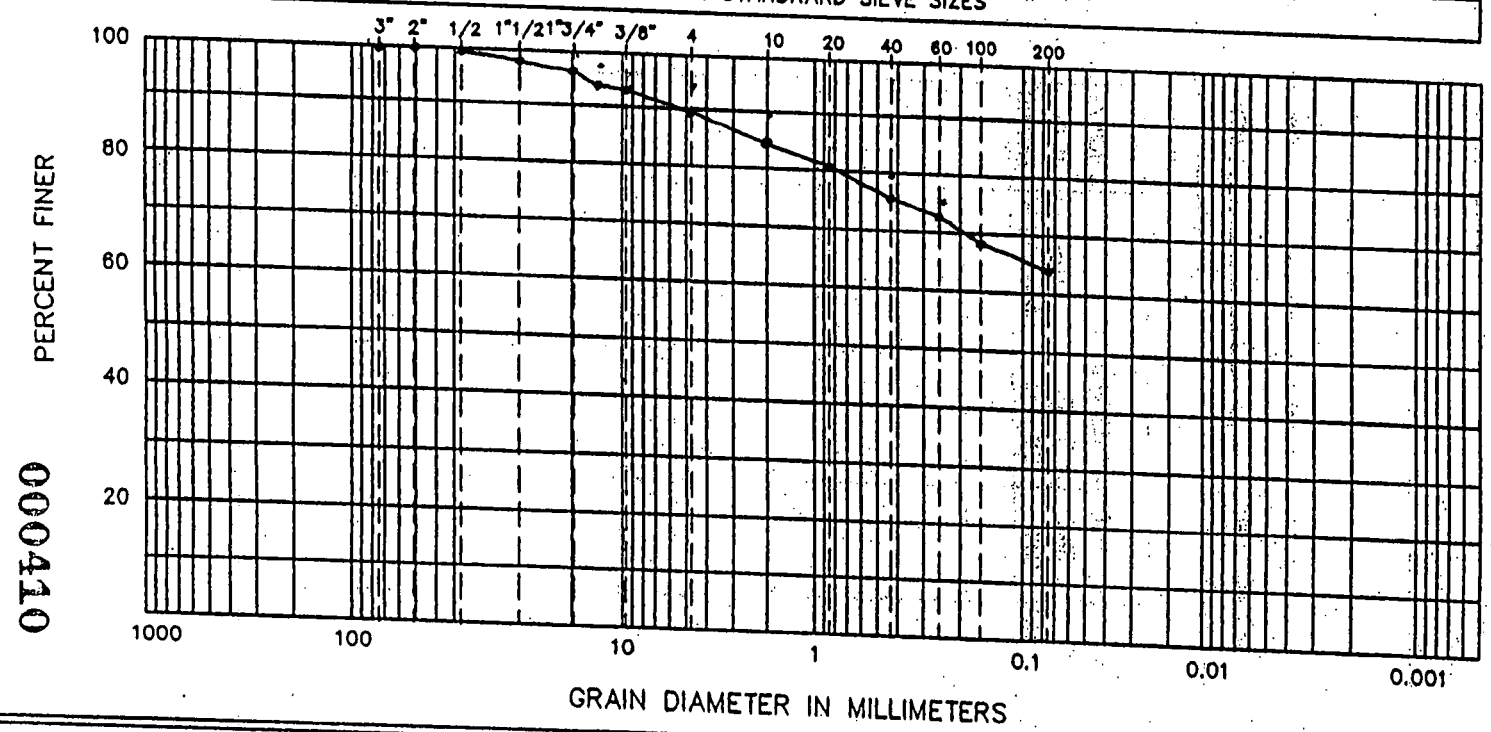
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-61 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 28

(PL) 15

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.2
1-In.	97.7
3/4-In.	96.3
1/2-In.	94.1
3/8-In.	93.1
NO. 4	89.5
NO. 10	85.0
NO. 20	80.4
NO. 40	76.2
NO. 60	72.8
NO. 100	68.6
NO. 200	64.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	64
0.02	48
0.005	29
0.002	23

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

000410

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 61
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	74.18
Dry Soil & Tare (gm)	71.62
Tare Weight (gm)	3.14
Moisture Content (%)	3.74

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.44	
Tare Weight (gm)	235.58	
Total Weight (gm)	481.85	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			89.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.15
Calculated Dry Wt. used in test (gm)	53.16
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	89.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.75	1.75	86.6	#10	medium sand
#20	3.94	3.94	82.9	#20	medium sand
#40	5.89	5.89	79.6	#40	fine sand
#60	7.76	7.76	76.4	#60	fine sand
#100	9.88	9.88	72.9	#100	fine sand
#200	12.58	12.58	68.3	#200	fines

HYDROMETER CALCULATIONS

DATE 9/11/02	TIME 14:20	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	14:22	2.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
9/11/02	14:25	5.00	36.0	23.00	0.013	7.00	29.00	11.5	0.99
9/11/02	14:35	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/11/02	14:50	30.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/11/02	15:20	60.00	26.0	23.00	0.013	7.00	19.00	13.2	0.99
9/11/02	18:30	250.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99
9/12/02	14:20	1440.00	19.0	22.50	0.013	7.00	12.00	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0301	56.7		
0.0197	48.3	% GRAVEL	10.50
0.0117	41.7	% COARSE SAND	2.95
0.0085	36.7	% MEDIUM SAND	6.97
0.0061	31.7	% FINE SAND	11.26
0.0031	25.0	% FINES	68.32
0.0013	20.0	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

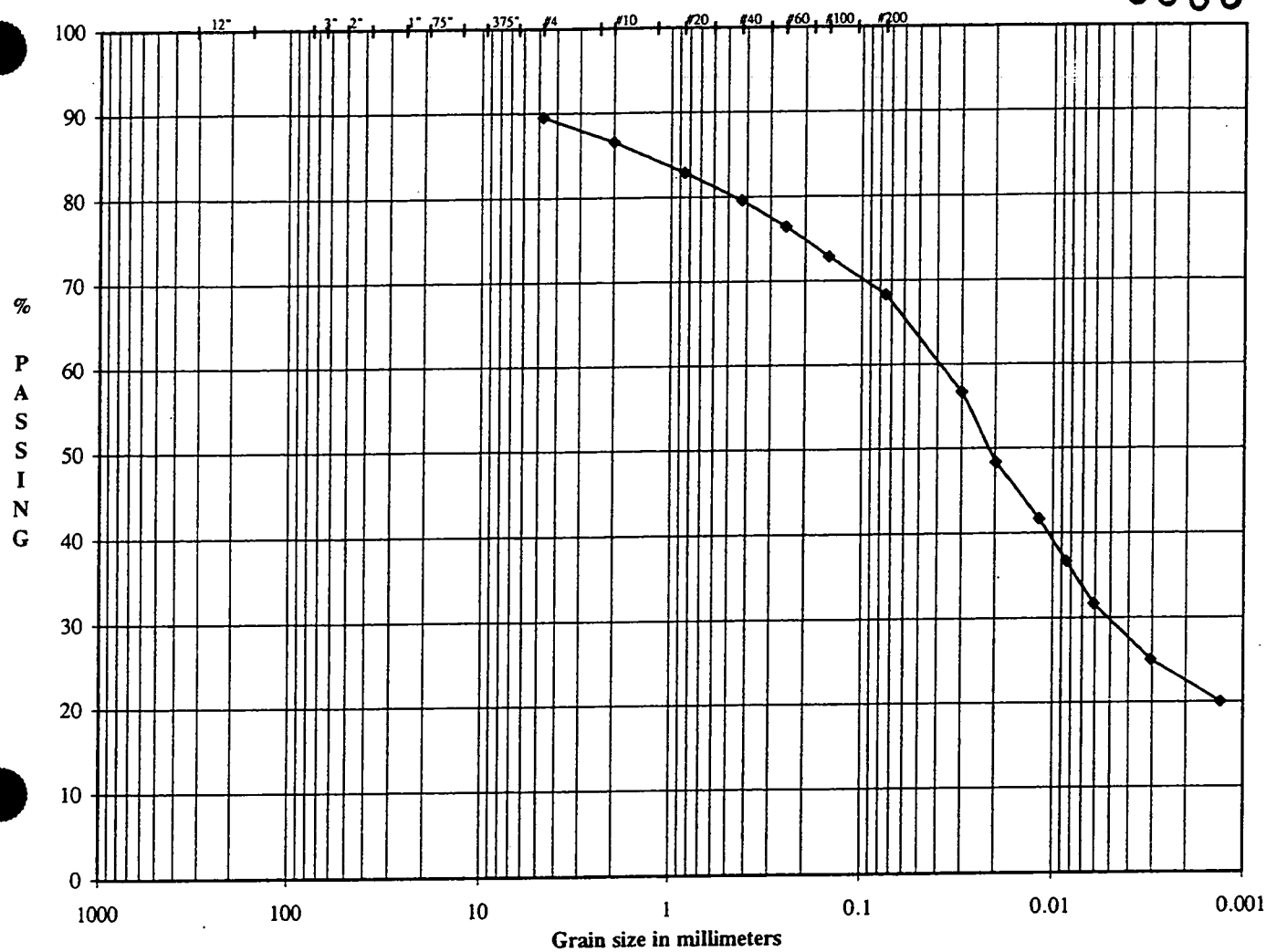
-	LL
-	PL
-	PI

000411

TECH	TJ/NA
DATE	9/10/02
CHECK	
REVIEW	

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 61
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/NA
DATE	9/10/02
CHECK	
REVIEW	

000412

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 29 day Aug month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: L-002-62

SOIL SAMPLE SIZE +3/8 = 735.7 gm MOISTURE = 321.7 gm -3/8 = 2009.5 TOTAL = 2157.9

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 416.13 − 1.83 = 44.30 (grams)

SAND	FINE GRAIN
115	65

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	N	L-9	N	L-9
WT. OF DRY SAMPLE PLUS TARE (grams)	837.4	766.8	789.2	374.3
WT. OF TARE (grams)	101.7	193.4	101.7	193.4
WT. OF DRY SAMPLE (grams)	735.7	573.4	687.5	180.9

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	100.5	.5	99.5		
1 in	25.4	135.9	.6	99.4		
3/4 in	19.1	255.4	1.2	98.8		90-100
1/2 in	12.7	528.9	2.5	97.5		
3/8 in	9.53	687.4	3.2	96.8		
No. 4	4.75	17.2	3.0	97.0	93.9	
No. 10	2.00	41.4	7.2	92.8	89.8	
No. 20	0.850	71.7	12.5	87.5	84.7	
No. 40	0.425	99.9	17.4	82.6	80.0	
No. 60	0.250	122.2	21.3	78.7	76.2	
No. 100	0.125	149.7	26.1	73.9	71.5	
No. 200	0.075	179.2	31.3	68.7	66.5	50-100
PAN	—	180.8	—	—		

.968

COMMENTS:

000413

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CA SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

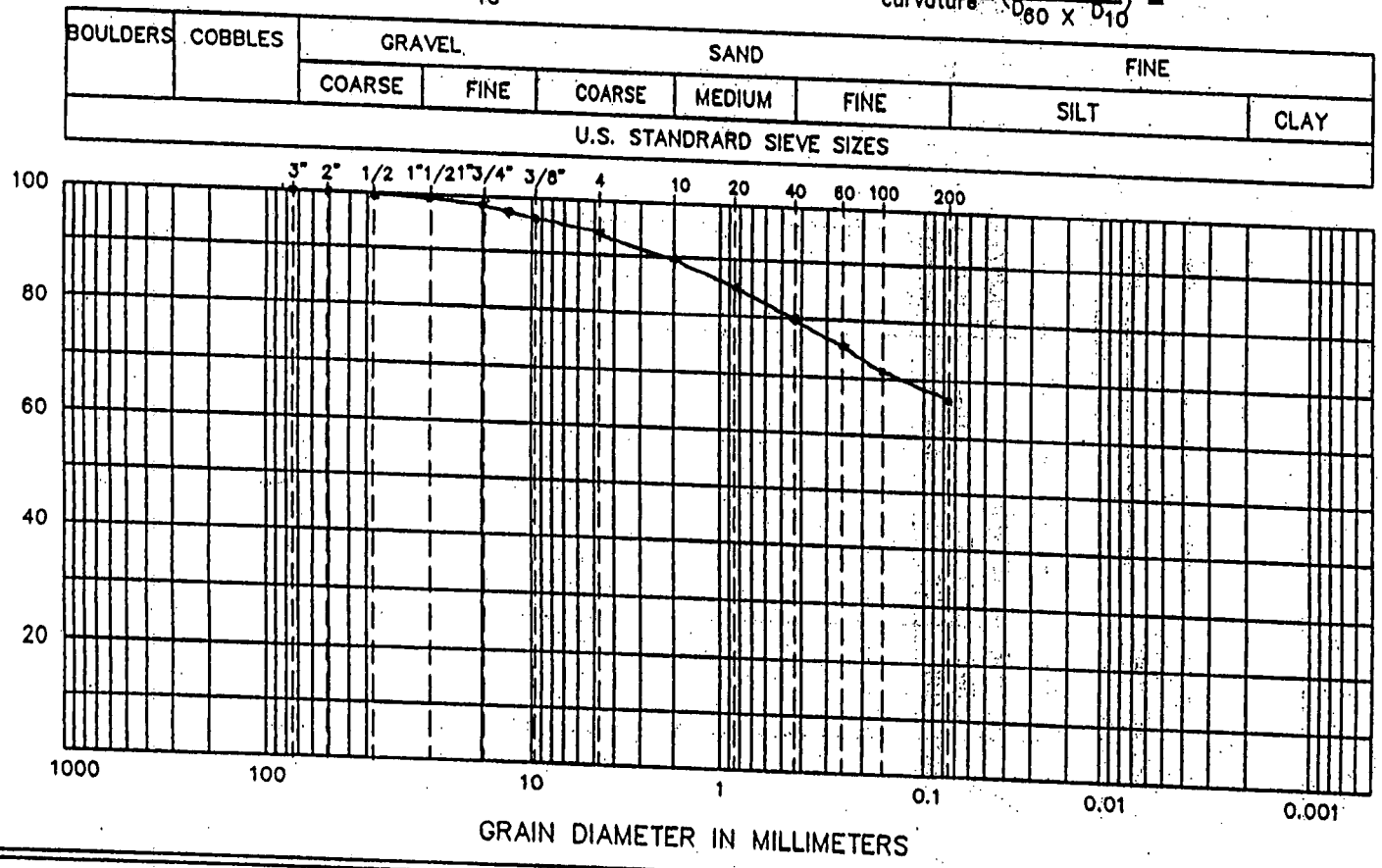
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-62 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 28

(PL) 15

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.5
1-In.	99.4
3/4-In.	98.8
1/2-In.	97.5
3/8-In.	96.8
NO. 4	93.9
NO. 10	89.8
NO. 20	84.7
NO. 40	80.0
NO. 60	76.2
NO. 100	71.5
NO. 200	66.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	53
0.005	32
0.002	24

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

000414

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 62
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	67.99
Dry Soil & Tare (gm)	65.45
Tare Weight (gm)	3.21
Moisture Content (%)	4.08

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	734.96	
Tare Weight (gm)	235.61	
Total Weight (gm)	479.77	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.9	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.23
Calculated Dry Wt. used in test (gm)	53.06
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.90

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.43	2.43	89.6	#10	medium sand
#20	5.06	5.06	84.9	#20	medium sand
#40	7.17	7.17	81.2	#40	fine sand
#60	8.97	8.97	78.0	#60	fine sand
#100	11.15	11.15	74.2	#100	fine sand
#200	13.91	13.91	69.3	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	14:22								
9/11/02	14:24	2.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
9/11/02	14:27	5.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
9/11/02	14:37	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/11/02	14:52	30.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/11/02	15:22	60.00	26.0	23.00	0.013	7.00	19.00	13.2	0.99
9/11/02	18:32	250.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99
9/12/02	14:22	1440.00	19.0	22.50	0.013	7.00	12.00	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0301	59.6		
0.0196	52.6	% GRAVEL	6.10
0.0117	43.8	% COARSE SAND	4.30
0.0085	38.5	% MEDIUM SAND	8.39
0.0061	33.3	% FINE SAND	11.93
0.0031	26.3	% FINES	69.29
0.0013	21.0	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

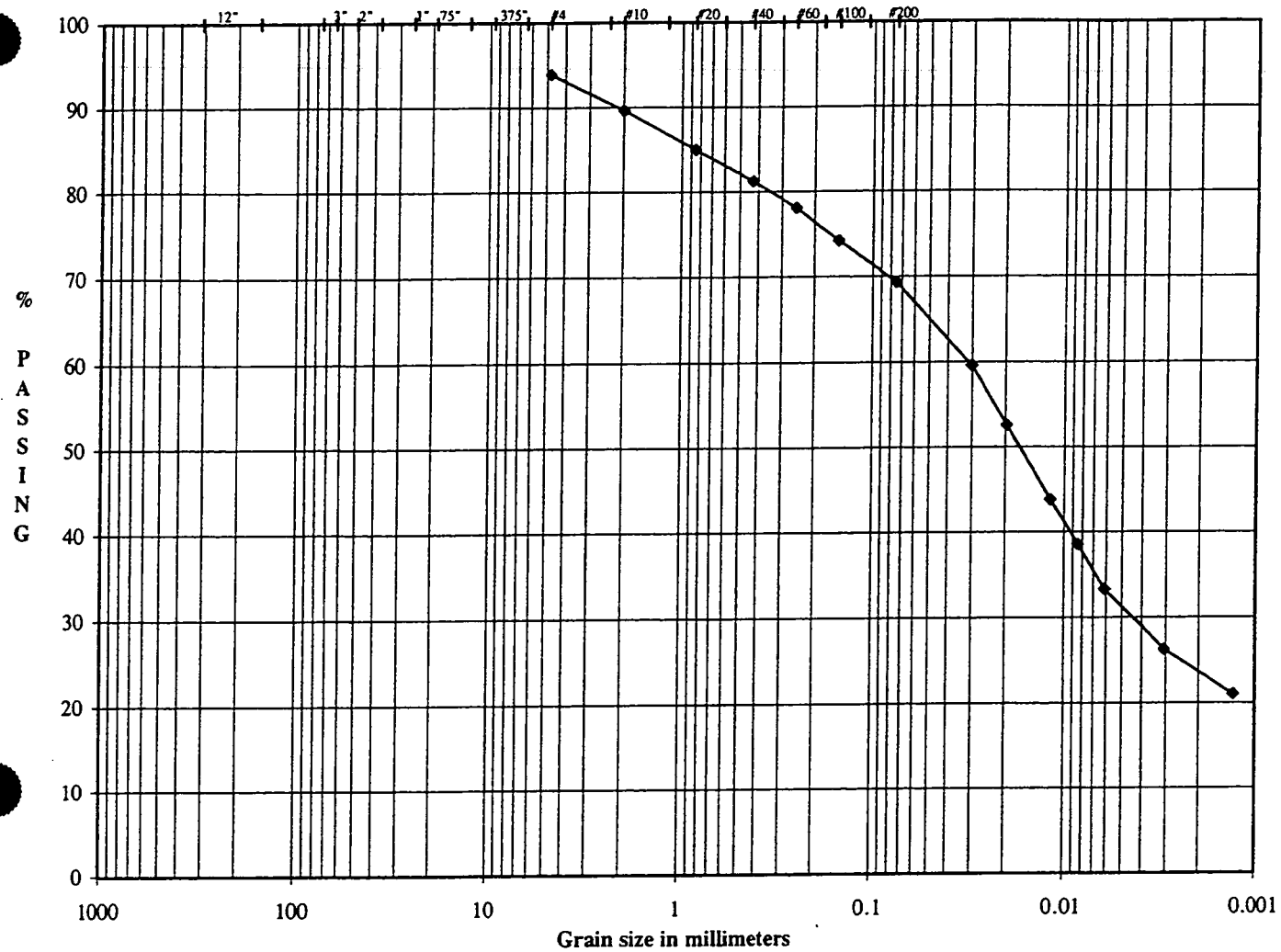
-	LL
-	PL
-	PI

TECH	TJ/NA
DATE	9/10/02
CHECK	
REVIEW	

000415

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 62
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000416

TECH	TJ/NA
DATE	9/10/02
CHECK	BS
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5368

ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G0134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 29 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-63

SOIL SAMPLE SIZE	+3/8 = 1881.3	MOISTURE = 275.5	TOTAL = 43906.1
	-3/8 = 41749.3		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	50 LB'S 42.04 / 92.04 (grams)	SAND	FINE GRAIN
		115	65

92.04 = 41749.3		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		L-6	L-7	L-6	L-7
WT. OF DRY SAMPLE PLUS TARE	(grams)	2080.0	774.1	1950.9	376.3
WT. OF TARE	(grams)	198.7	193.9	198.7	193.9
WT. OF DRY SAMPLE	(grams)	1881.3	580.2	1752.2	182.4

SIEVE ANALYSIS QA ID: DE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	122.6	0.3	99.7		
1 in	25.4	432.2	1.0	99.0		
3/4 in	19.1	763.1	1.7	98.3		90-100
1/2 in	12.7	1415.4	3.2	96.8		
3/8 in	9.53	1748.3	4.0	96.0		
No. 4	4.75	243	4.2	95.8	92.0	
No. 10	2.00	562	9.7	90.3	86.7	
No. 20	0.850	841.1	14.5	85.5	82.1	
No. 40	0.425	1077.9	18.6	81.4	78.1	
No. 60	0.250	1278	22.0	78.0	74.9	
No. 100	0.125	1523	26.2	73.8	70.8	
No. 200	0.075	1814	31.3	68.7	66.0	50-100
PAN	—	1823	—	—		

.96

COMMENTS:

000417

%FINER = 100 − Σ% RETAINED

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CHECKED BY: CH

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

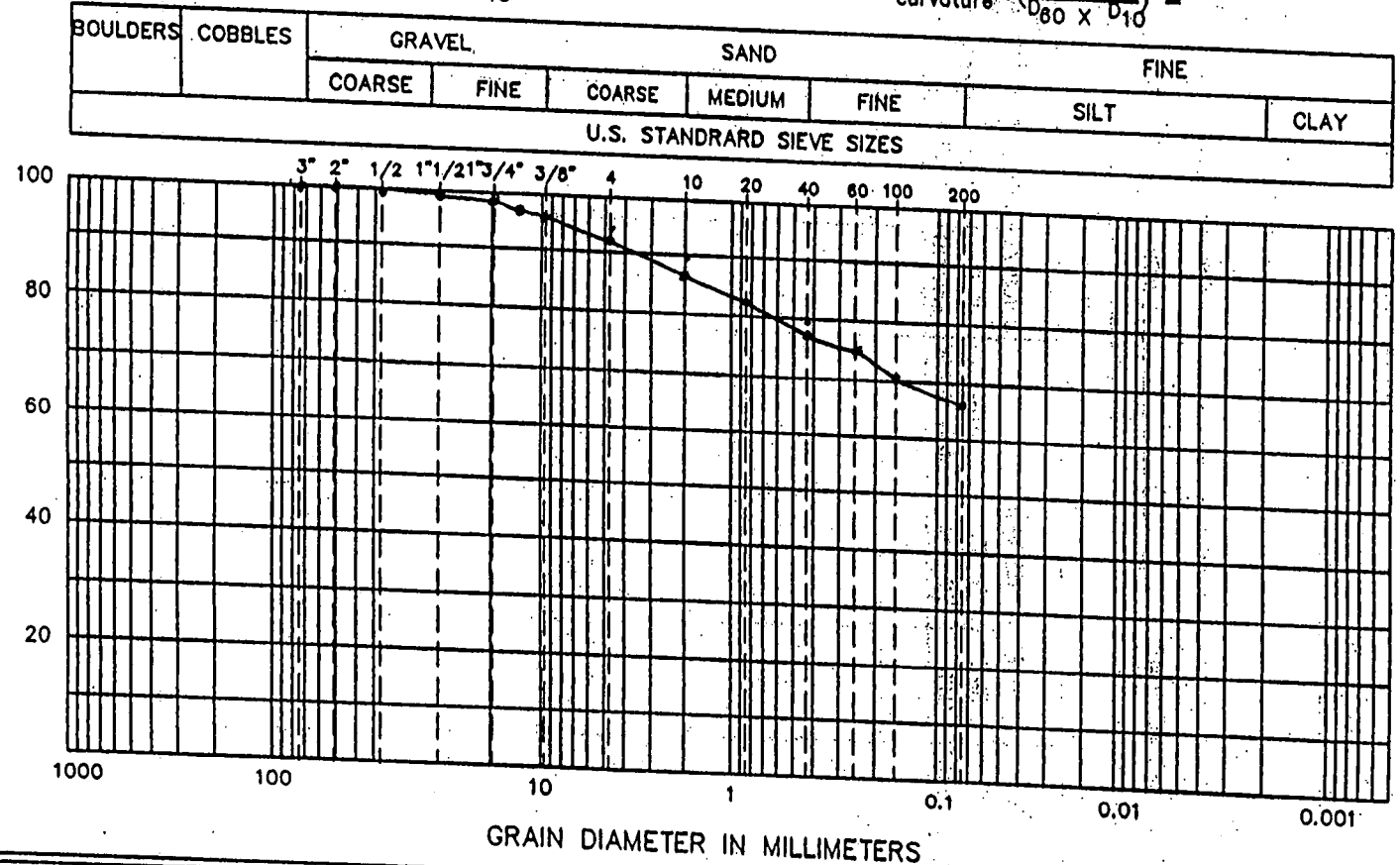
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-63 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 27

(PL) 15

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.7
1-in.	99.0
3/4-in.	98.3
1/2-in.	96.8
3/8-in.	96.0
NO. 4	92.0
NO. 10	86.7
NO. 20.	82.1
NO. 40	78.1
NO. 60	74.9
NO. 100	70.8
NO. 200	66.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	66
0.02	57
0.005	32
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000418

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 63
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	72.50
Dry Soil & Tare (gm)	69.88
Tare Weight (gm)	3.25
Moisture Content (%)	3.93

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	780.15	
Tare Weight (gm)	238.68	
Total Weight (gm)	520.98	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.29
Calculated Dry Wt. used in test (gm)	53.20
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.03	2.03	88.5	#10	medium sand
#20	4.47	4.47	84.3	#20	medium sand
#40	6.75	6.75	80.3	#40	fine sand
#60	8.82	8.82	76.7	#60	fine sand
#100	11.12	11.12	72.8	#100	fine sand
#200	13.98	13.98	67.8	#200	fines

HYDROMETER CALCULATIONS

DATE 9/11/02	TIME 14:24	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/11/02	14:26	2.00	44.0	23.00	0.013	7.00	37.00	10.2	0.99
9/11/02	14:29	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/11/02	14:39	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
9/11/02	14:54	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/11/02	15:24	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
9/11/02	18:34	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/12/02	14:24	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0294	63.3		
0.0192	56.5	% GRAVEL	8.00
0.0116	46.2	% COARSE SAND	3.51
0.0084	39.4	% MEDIUM SAND	8.16
0.0061	34.2	% FINE SAND	12.50
0.0030	27.4	% FINES	67.82
0.0013	22.3	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

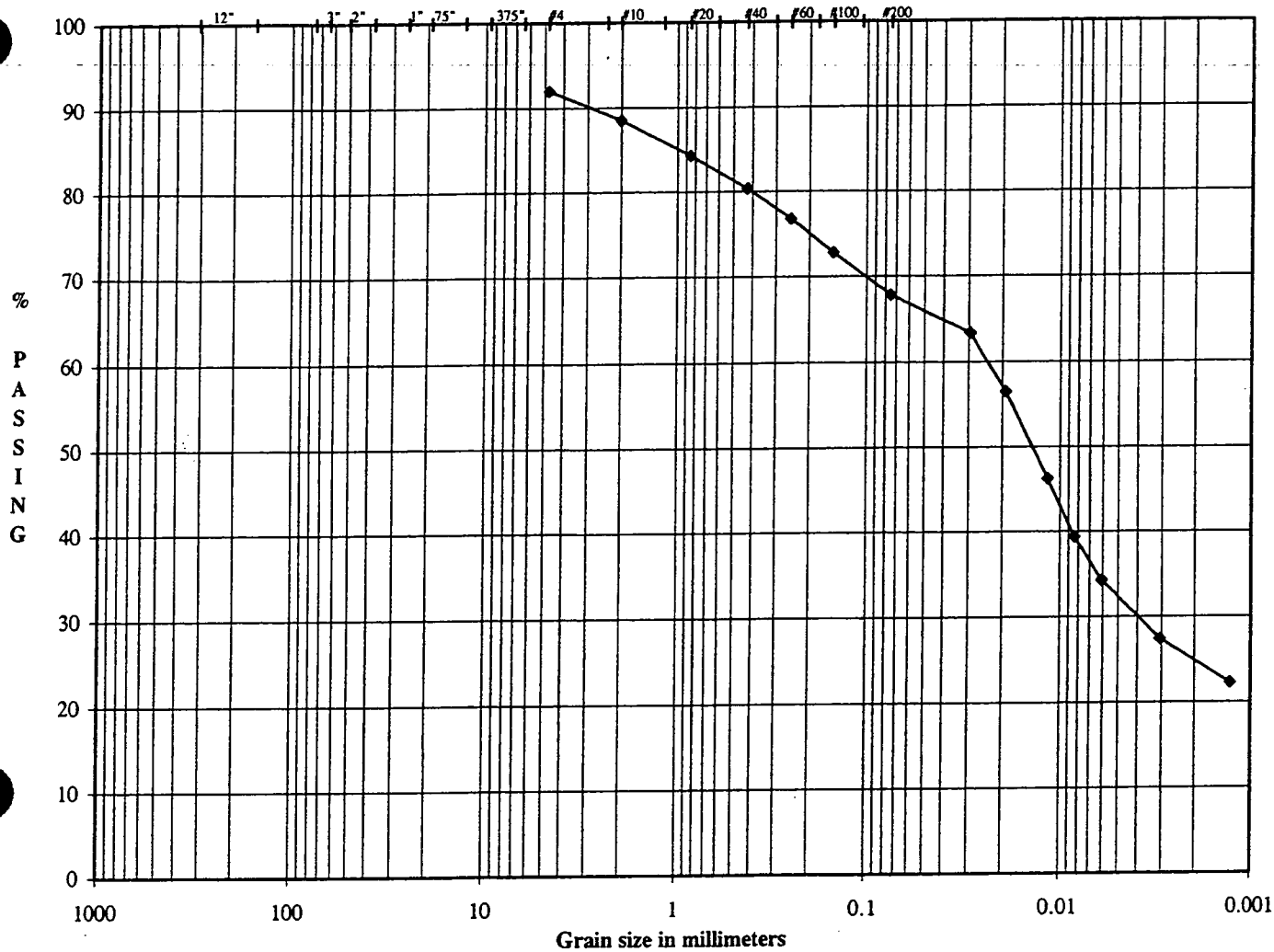
-	LL
-	PL
-	PI

TECH	TJ/NA
DATE	9/10/02
CHECK	BS
REVIEW	[illegible]

000419

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 63
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000420

TECH	TJ/NA
DATE	9/10/02
CHECK	BSS
REVIEW	PWM

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 29 day Aug month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-64

SOIL SAMPLE SIZE	+3/8 = 944.6 gram	MOISTURE = 313.0	TOTAL = 22155.0
	-3/8 = 20897.4	22155.0	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	Bucket 47.90 − 1.83 = 46.07 (grams)	SAND	FINE GRAIN
		115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-1	L-9	L-1	L-9
WT. OF DRY SAMPLE PLUS TARE	(grams)	1136.9	782.3	1072.7	372.3
WT. OF TARE	(grams)	192.3	193.4	192.3	193.4
WT. OF DRY SAMPLE	(grams)	944.6	588.9	880.4	178.9

SIEVE ANALYSIS QA ID: PLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	300.7	1.4	98.6		
3/4 in	19.1	421.0	1.9	98.1		90-100
1/2 in	12.7	687.5	3.1	96.9		
3/8 in	9.53	880.2	4.0	96.0		
No. 4	4.75	16.4	2.8	97.2	93.3	
No. 10	2.00	42.5	7.2	92.8	89.1	
No. 20	0.850	69.7	11.8	88.2	84.7	
No. 40	0.425	95.6	16.2	83.8	80.4	
No. 60	0.250	117.3	19.9	80.1	76.9	
No. 100	0.125	143.6	24.4	75.6	92.6	
No. 200	0.075	175.1	29.7	70.3	67.5	50-100
PAN	—	178.8	—	—		

.960

COMMENTS:

000421

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

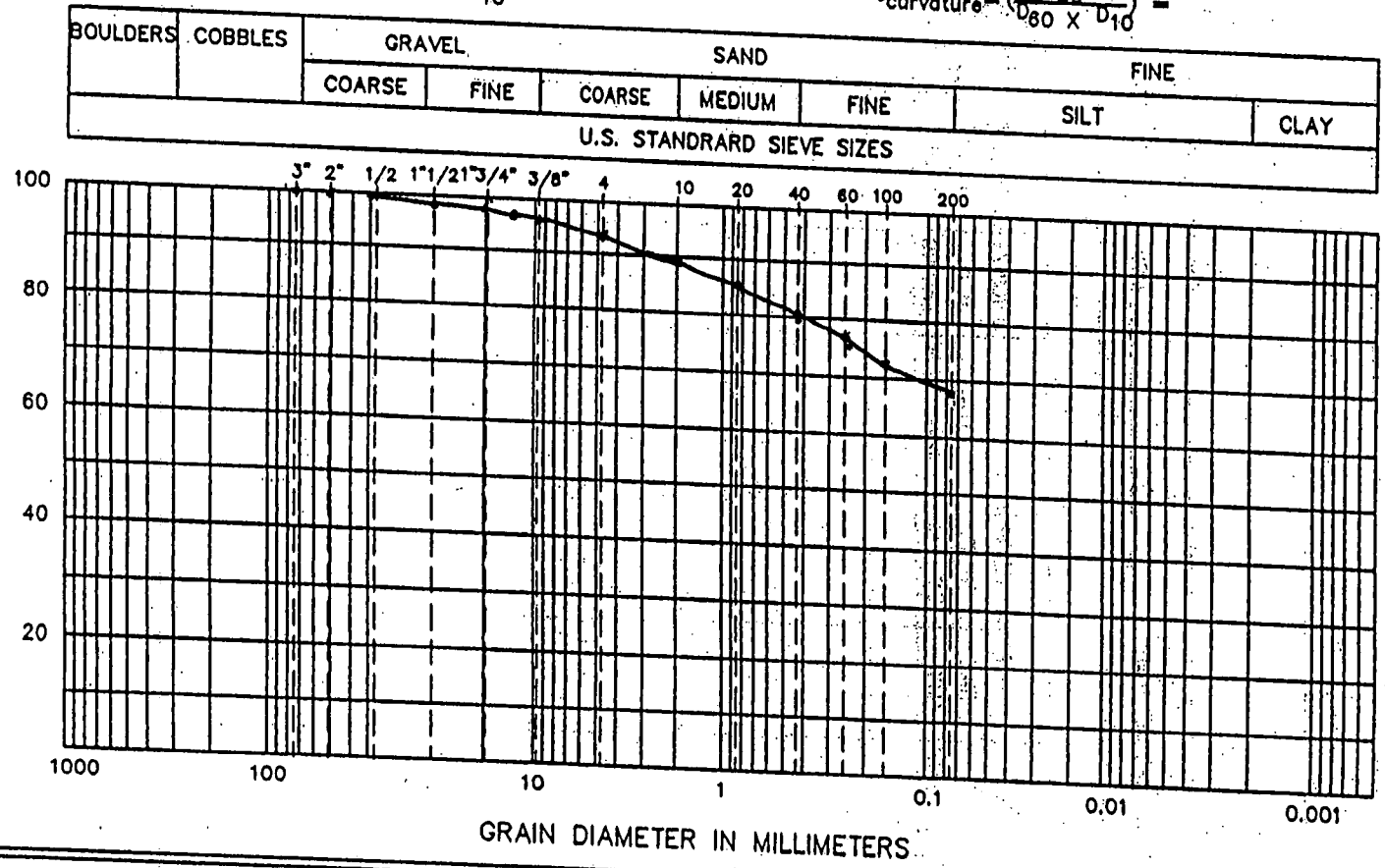
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-64 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 27 E

(PL) 15

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.6
3/4-in.	98.1
1/2-in.	96.9
3/8-in.	96.0
NO. 4	93.3
NO. 10	89.1
NO. 20.	84.7
NO. 40	80.4
NO. 60	76.9
NO. 100	72.6
NO. 200	67.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	64
0.02	50
0.005	32
0.002	24

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

0004422

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 64
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	98.49
Dry Soil & Tare (gm)	96.78
Tare Weight (gm)	3.20
Moisture Content (%)	1.83

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	735.16	
Tare Weight (gm)	733.92	
Total Weight (gm)	1.22	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
nount Dispersing Agent (ml)		125.00
ſype Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.69
Calculated Dry Wt. used in test (gm)	57.64
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.72	2.72	88.9	#10	medium sand
#20	5.55	5.55	84.3	#20	medium sand
#40	7.80	7.80	80.7	#40	fine sand
#60	9.78	9.78	77.5	#60	fine sand
#100	12.03	12.03	73.8	#100	fine sand
#200	15.16	15.16	68.8	#200	fines

HYDROMETER CALCULATIONS

DATE 9/15/02	TIME 11:34	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/15/02	11:36	2.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/15/02	11:39	5.00	38.0	23.00	0.013	7.00	31.00	11.2	0.99
9/15/02	11:49	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
9/15/02	12:04	30.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/15/02	12:34	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/15/02	15:44	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/16/02	11:34	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	56.1	-	
0.0195	49.7	% GRAVEL	6.70
0.0115	44.9	% COARSE SAND	4.40
0.0083	40.1	% MEDIUM SAND	8.22
0.0060	33.7	% FINE SAND	11.91
0.0030	25.6	% FINES	68.76
0.0013	22.4	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

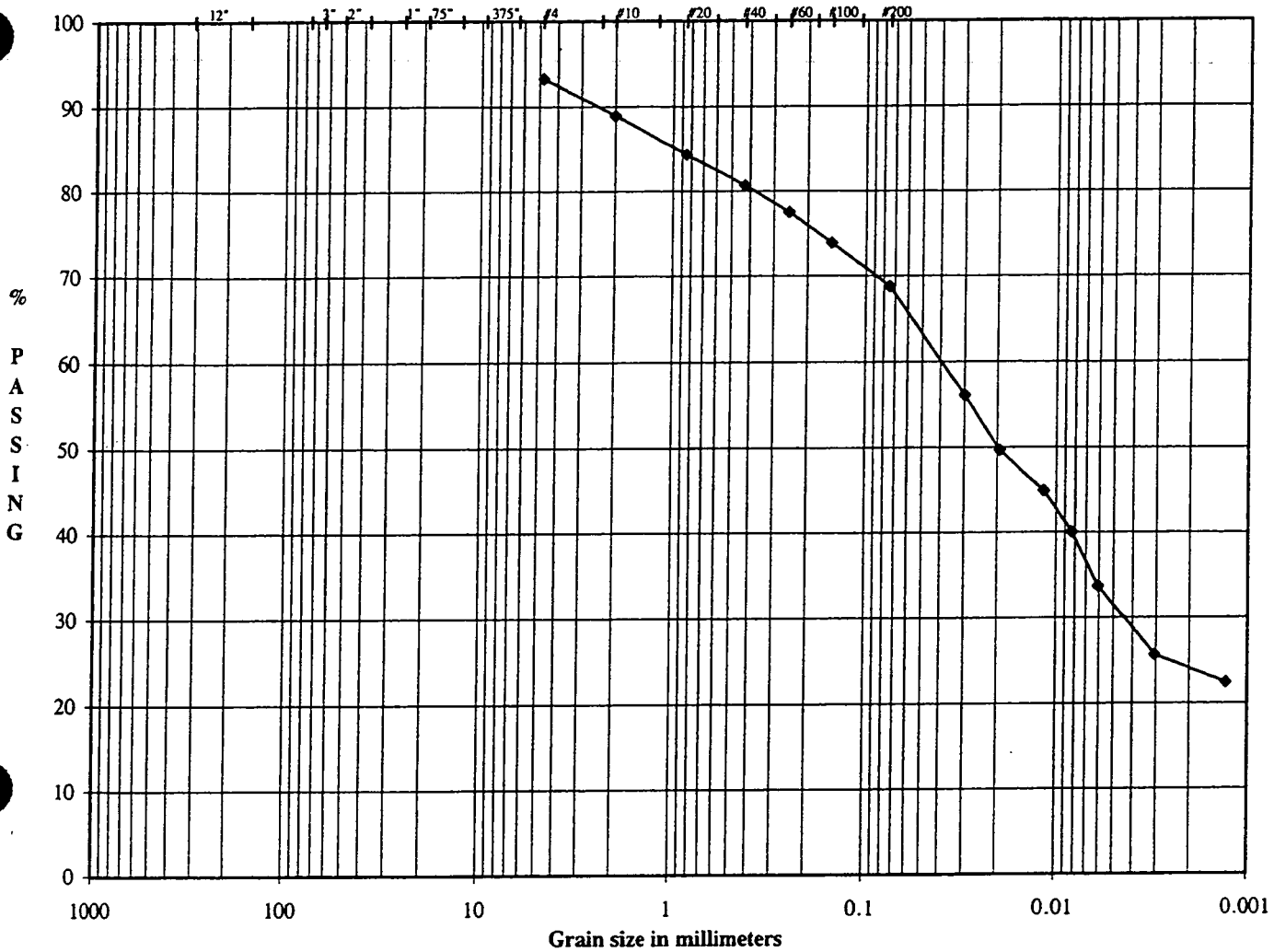
-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	BK
REVIEW	RWM

000423

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 64
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	DW/TJ
DATE	9/13/02
CHECK	DB
REVIEW	PWM

000424

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 1 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-65

SOIL SAMPLE SIZE	+3/8 = 687.1 gm	MOISTURE = 255.1 gm	TOTAL = 42337.7
	-3/8 = 41395.5	42337.7	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)		SAND	FINE GRAIN
43.10 - 1.84	50.00 41.26 91.26 (grams)	115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		K	L-8	K	L-8
WT. OF DRY SAMPLE PLUS TARE	(grams)	788.6	768.9	745.4	373.8
WT. OF TARE	(grams)	101.5	193.2	101.5	193.2
WT. OF DRY SAMPLE	(grams)	687.1	575.7	643.9	180.6

SIEVE ANALYSIS QA ID: DLF

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	34.4	0.1	99.9		
3/4 in	19.1	135.0	0.3	99.7		90-100
1/2 in	12.7	441.0	1.0	99.0		
3/8 in	9.53	641.7	1.5	98.5		
No. 4	4.75	11.4	2.0	98.0	96.5	.985
No. 10	2.00	37.8	6.6	93.4	92.0	
No. 20	0.850	70.2	12.2	87.8	86.5	
No. 40	0.425	99.3	17.2	82.8	81.6	
No. 60	0.250	121.7	21.1	78.9	77.7	
No. 100	0.125	147.5	25.6	74.4	73.3	
No. 200	0.075	178.3	31.0	69.0	68.0	50-100
PAN	—	180.6	—	—		

COMMENTS:

000425

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CJ SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

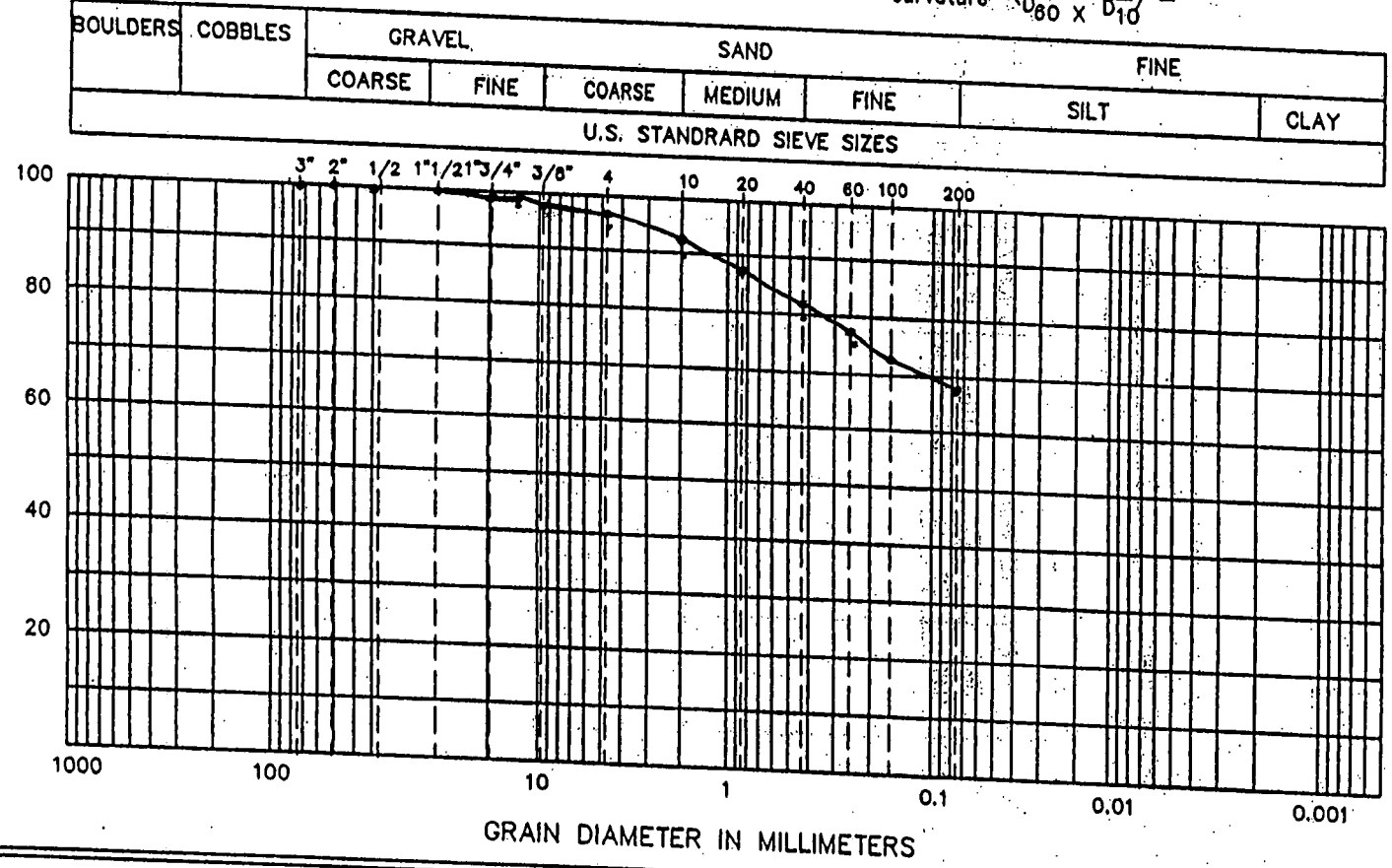
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-65 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 26

(PL) 16

(PI) 10

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.9
3/4-in.	99.7
1/2-in.	99.0
3/8-in.	98.5
NO. 4	96.5
NO. 10	92.0
NO. 20.	86.5
NO. 40	81.6
NO. 60	77.7
NO. 100	73.3
NO. 200	68.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	66.5
0.02	53.3
0.005	33.6
0.002	25.8

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0004426

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 65
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	86.18
Dry Soil & Tare (gm)	83.09
Tare Weight (gm)	3.17
Moisture Content (%)	3.87

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	734.04	
Tare Weight (gm)	733.85	
Total Weight (gm)	0.18	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			98.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.37
Calculated Dry Wt. used in test (gm)	55.23
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	98.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.48	1.48	95.9	#10	medium sand
#20	3.85	3.85	91.6	#20	medium sand
#40	6.55	6.55	86.8	#40	fine sand
#60	9.05	9.05	82.4	#60	fine sand
#100	11.74	11.74	77.6	#100	fine sand
#200	15.17	15.17	71.4	#200	fines

HYDROMETER CALCULATIONS

DATE 9/15/02	TIME 11:36	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/15/02	11:38	2.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
9/15/02	11:41	5.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
9/15/02	11:51	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
9/15/02	12:06	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/15/02	12:36	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
9/15/02	15:46	250.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99
9/16/02	11:36	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0301	60.0		
0.0196	53.0	% GRAVEL	1.50
0.0116	45.9	% COARSE SAND	2.64
0.0084	40.6	% MEDIUM SAND	9.04
0.0061	35.3	% FINE SAND	15.37
0.0031	26.5	% FINES	71.45
0.0013	23.0	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS (CL)

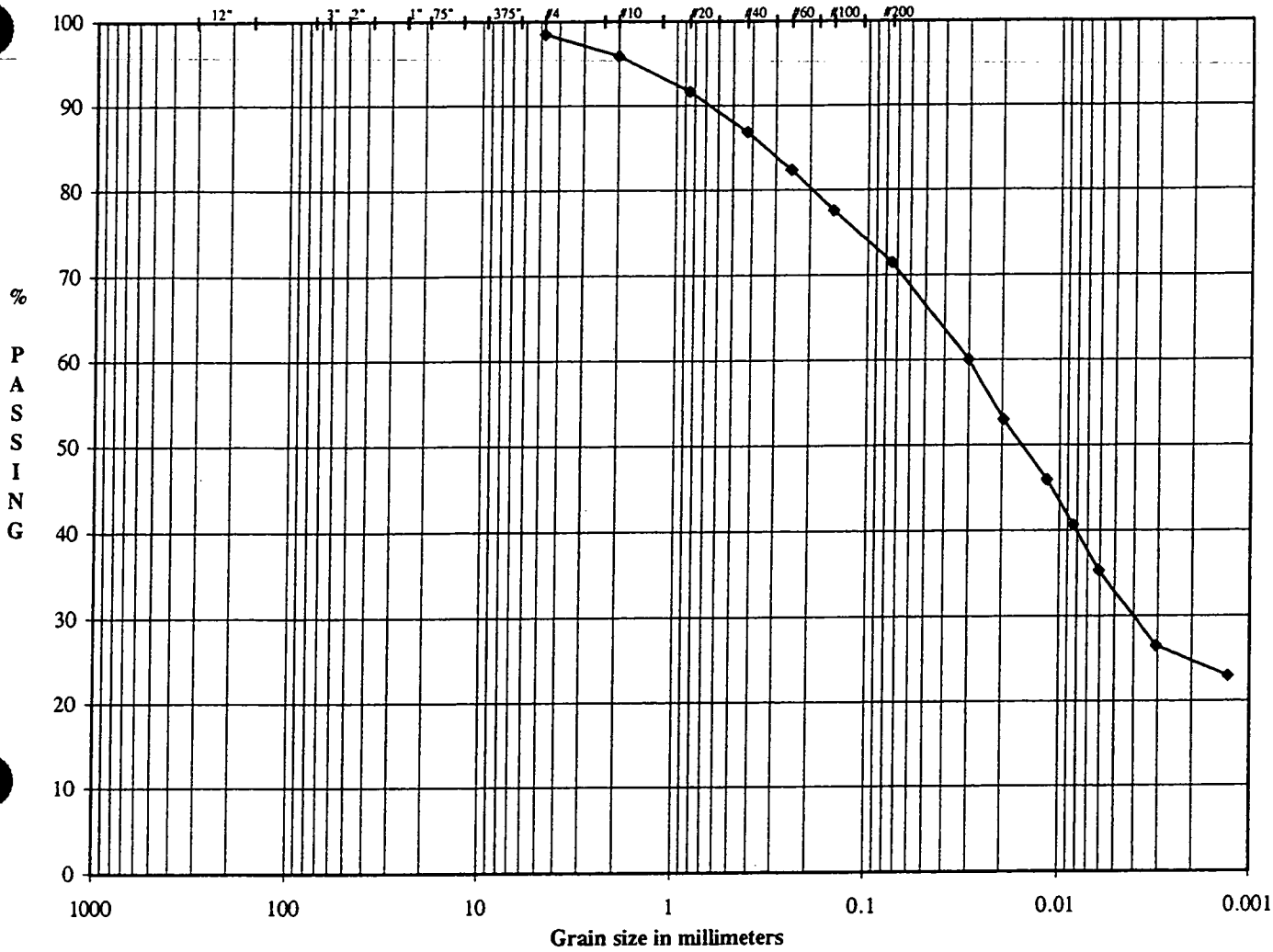
-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	
REVIEW	

000427

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 65
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	DW/TJ
DATE	9/13/02
CHECK	BSS
REVIEW	[illegible]

000428

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 10 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-66

SOIL SAMPLE SIZE	+3/8 = 827.6	MOISTURE = 274.9g	TOTAL = 21650.6
	-3/8 = 20548.1	21650.6 21650.6	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
Bucket Sample 47.14 1.84 45.30 (grams) 45.30 lb's = 20548.1	115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-9	L-6	L-9	L-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	1020.9	786.4	966.2	379.7
WT. OF TARE	(grams)	193.3	199.1	193.3	199.1
WT. OF DRY SAMPLE	(grams)	827.6	587.3	772.9	180.6

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	201.7	.9	99.1		
3/4 in	19.1	361.3	1.7	98.3		90-100
1/2 in	12.7	660.8	3.1	96.9		
3/8 in	9.53	772.9	3.6	96.4		.964
No. 4	4.75	25.2	4.3	95.7	92.3	
No. 10	2.00	57.0	9.7	90.3	87.0	
No. 20	0.850	85.2	14.5	85.5	82.4	
No. 40	0.425	108.8	18.5	81.5	78.6	
No. 60	0.250	128.3	21.8	78.2	75.4	
No. 100	0.125	152.9	26.0	74.0	71.3	
No. 200	0.075	180.0	30.6	69.4	66.9	50-100
PAN	—	181.5	—	—	—	

COMMENTS:

000429

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

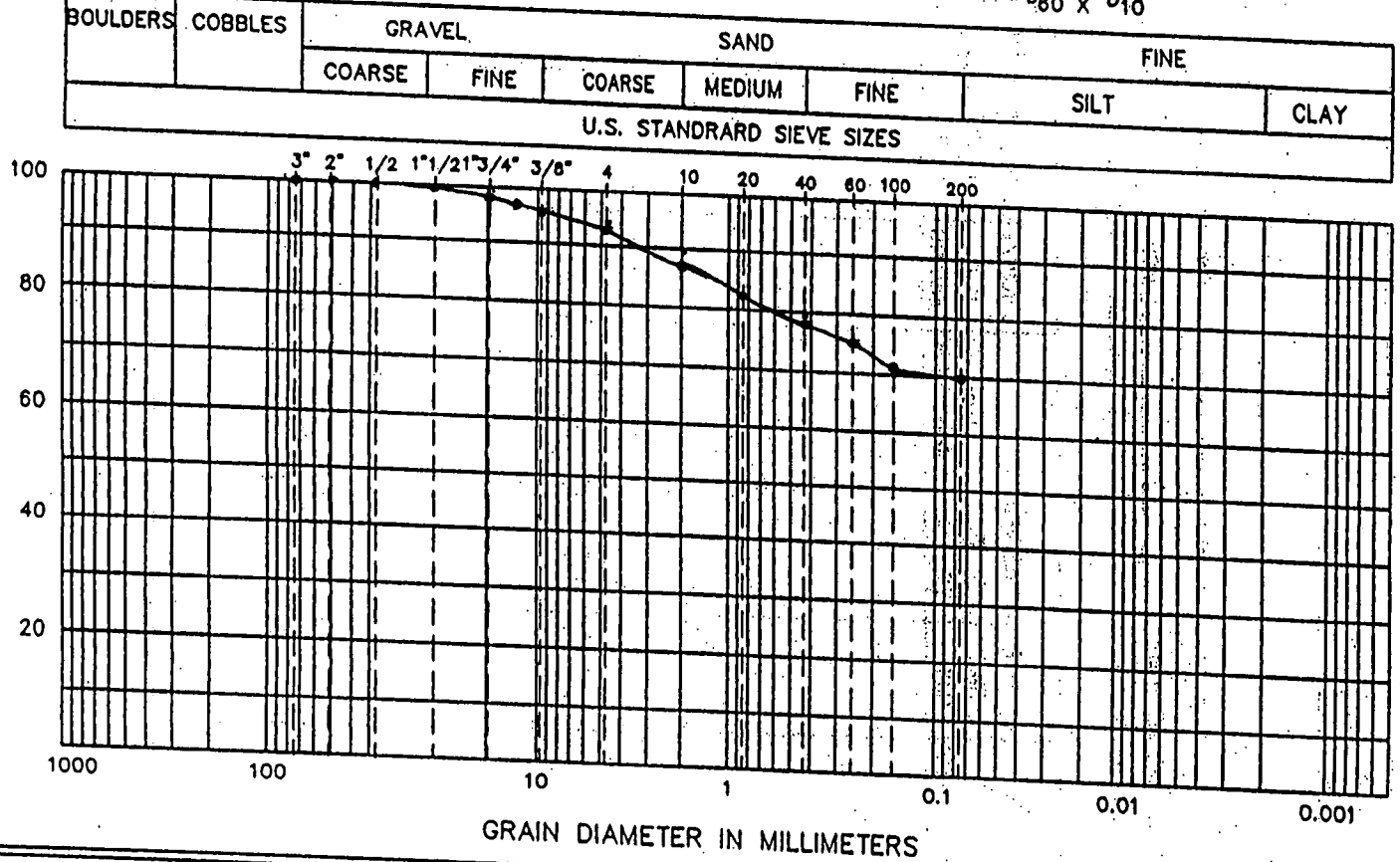
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-66 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.1
3/4-in.	98.3
1/2-in.	96.9
3/8-in.	96.4
NO. 4	92.3
NO. 10	87.0
NO. 20.	82.4
NO. 40	78.6
NO. 60	75.4
NO. 100	71.3
NO. 200	66.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	66
0.02	54
0.005	34
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0000430

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 66
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	105.30
Dry Soil & Tare (gm)	103.37
Tare Weight (gm)	3.27
Moisture Content (%)	1.93

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	733.88	
Tare Weight (gm)	233.87	
Total Weight (gm)	490.55	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	52.23
Calculated Dry Wt. used in test (gm)	51.24
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.38	1.38	89.8	#10	medium sand
#20	3.11	3.11	86.7	#20	medium sand
#40	5.00	5.00	83.3	#40	fine sand
#60	6.76	6.76	80.1	#60	fine sand
#100	8.68	8.68	76.7	#100	fine sand
#200	11.25	11.25	72.0	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/15/02	11:38								
9/15/02	11:40	2.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/15/02	11:43	5.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
9/15/02	11:53	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
9/15/02	12:08	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/15/02	12:38	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
9/15/02	15:48	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/16/02	11:38	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0303	58.8
0.0196	53.5
0.0116	46.4
0.0084	41.0
0.0061	35.7
0.0030	28.5
0.0013	23.2

% GRAVEL	7.70
% COARSE SAND	2.49
% MEDIUM SAND	6.52
% FINE SAND	11.26
% FINES	72.04
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

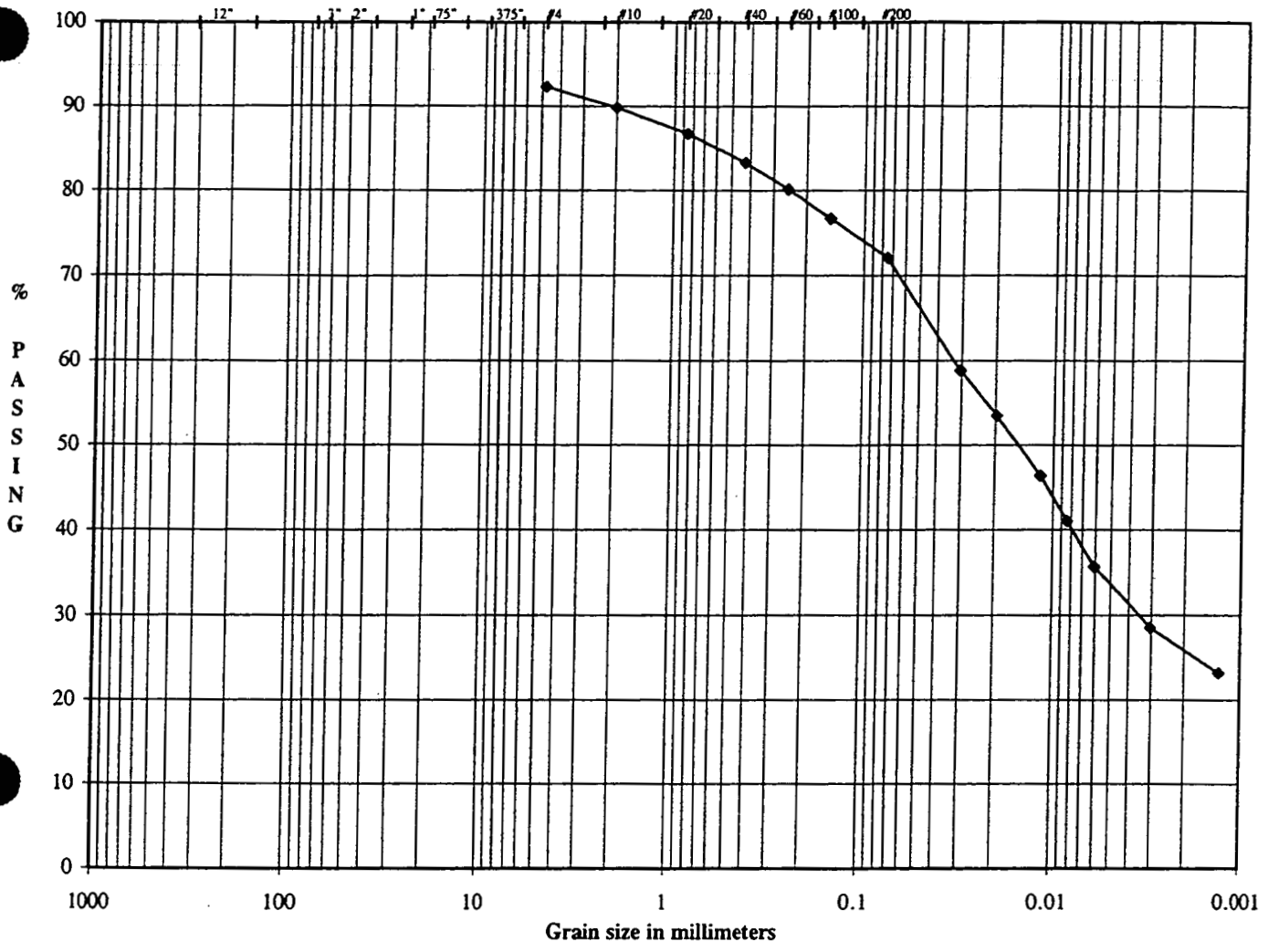
-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	
REVIEW	

000431

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 66
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	DW/TJ
DATE	9/13/02
CHECK	
REVIEW	

000432

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 10 day Sept month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-67

SOIL SAMPLE SIZE	+3/8 = 1158.9	MOISTURE = 320.4	TOTAL = 44680.2
	-3/8 = 43200.9	44680.2	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	50.00 lb's 45.24 95.24 (grams)	SAND	FINE GRAIN
		115	65

17.08
1.84
5.24

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-6	L-2	L-6	L-2
WT. OF DRY SAMPLE PLUS TARE	(grams)	1357.3	774.5	1296.5	361.5
WT. OF TARE	(grams)	198.4	191.3	188.4	191.3
WT. OF DRY SAMPLE	(grams)	1158.9	583.2	1098.1	170.2

SIEVE ANALYSIS QA ID: DJE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	86.0	.2	99.8		
1 in	25.4	361.7	.8	99.2		
3/4 in	19.1	555.5	1.2	98.8		90-100
1/2 in	12.7	931.0	2.1	97.9		
3/8 in	9.53	1097.4	2.5	97.5		
No. 4	4.75	15.6	2.7	97.3	94.9	.975
No. 10	2.00	39.3	6.7	93.3 ~~93.6~~	~~91.3~~ 91.0	
No. 20	0.850	63.9	11.0	89.0	86.8	
No. 40	0.425	90.1	15.4	84.6	82.5	
No. 60	0.250	117.7	20.2	79.8	77.8	
No. 100	0.125	147.0	25.2	74.8	72.9	
No. 200	0.075	169.7	29.1	70.9	69.1	50-100
PAN	—	170.2	—	—	—	

COMMENTS:

000433

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

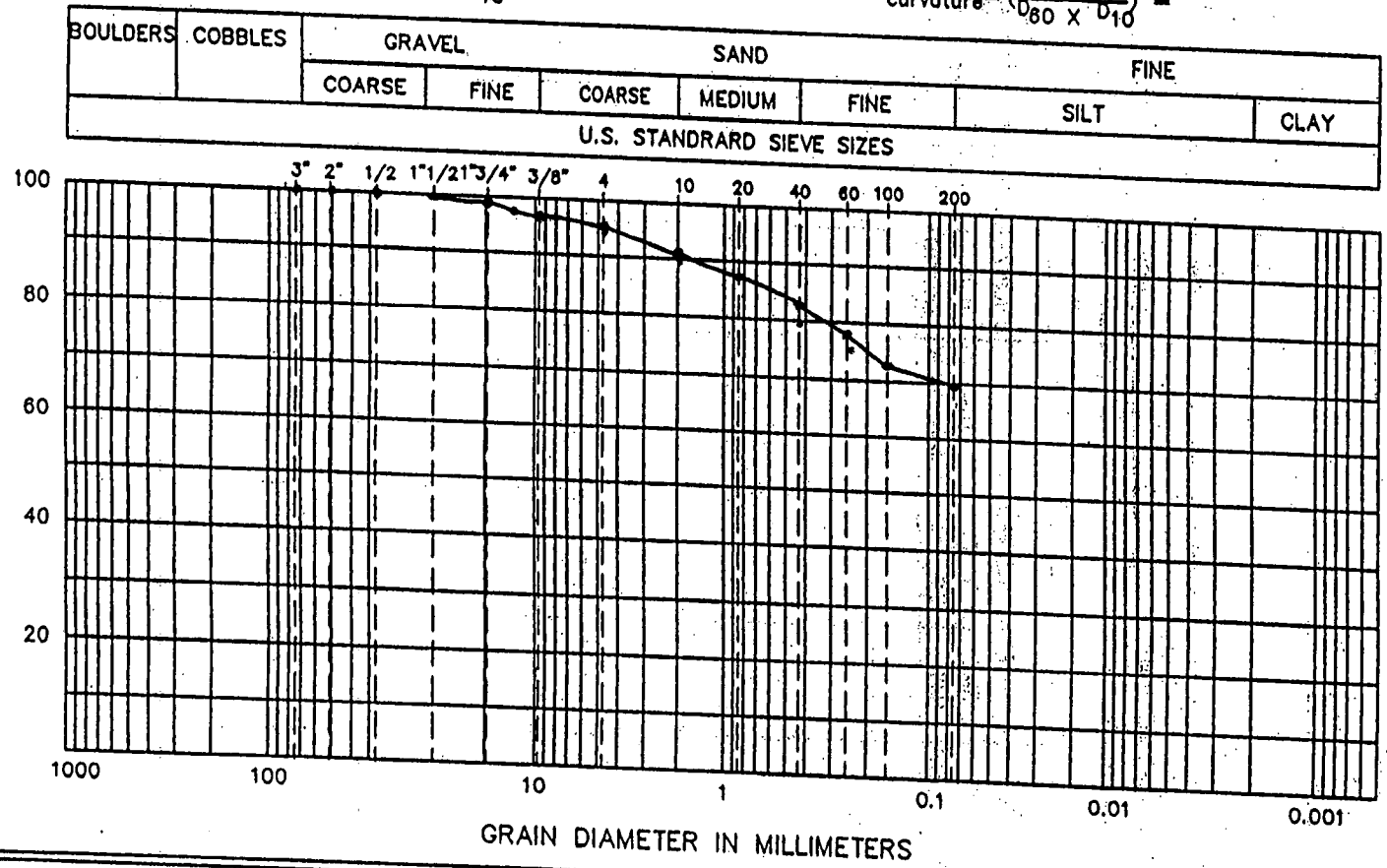
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-67 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.8
1-in.	99.2
3/4-in.	98.8
1/2-in.	97.9
3/8-in.	97.5
NO. 4	94.9
NO. 10	91.0
NO. 20.	86.8
NO. 40	82.6
NO. 60	77.8
NO. 100	72.9
NO. 200	69.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	67
0.02	55
0.005	33
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

0004434

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

ROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 67
ROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	101.95
Dry Soil & Tare (gm)	99.39
Tare Weight (gm)	3.29
Moisture Content (%)	2.66

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	733.74	
Tare Weight (gm)	233.89	
Total Weight (gm)	486.88	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.9	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
pe Dispersion Device		Mechanical
ngth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	53.94
Calculated Dry Wt. used in test (gm)	52.54
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.90

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.12	2.12	91.1	#10	medium sand
#20	3.76	3.76	88.1	#20	medium sand
#40	5.73	5.73	84.6	#40	fine sand
#60	7.70	7.70	81.0	#60	fine sand
#100	9.93	9.93	77.0	#100	fine sand
#200	12.94	12.94	71.5	#200	fines

HYDROMETER CALCULATIONS

DATE 9/15/02	TIME 11:40	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/15/02	11:42	2.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/15/02	11:45	5.00	38.0	23.00	0.013	7.00	31.00	11.2	0.99
9/15/02	11:55	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
9/15/02	12:10	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/15/02	12:40	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
9/15/02	15:50	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/16/02	11:40	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	62.6		
0.0195	55.4	% GRAVEL	5.10
0.0116	48.3	% COARSE SAND	3.83
0.0084	41.1	% MEDIUM SAND	6.52
0.0061	35.8	% FINE SAND	13.02
0.0030	28.6	% FINES	71.53
0.0013	23.2	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

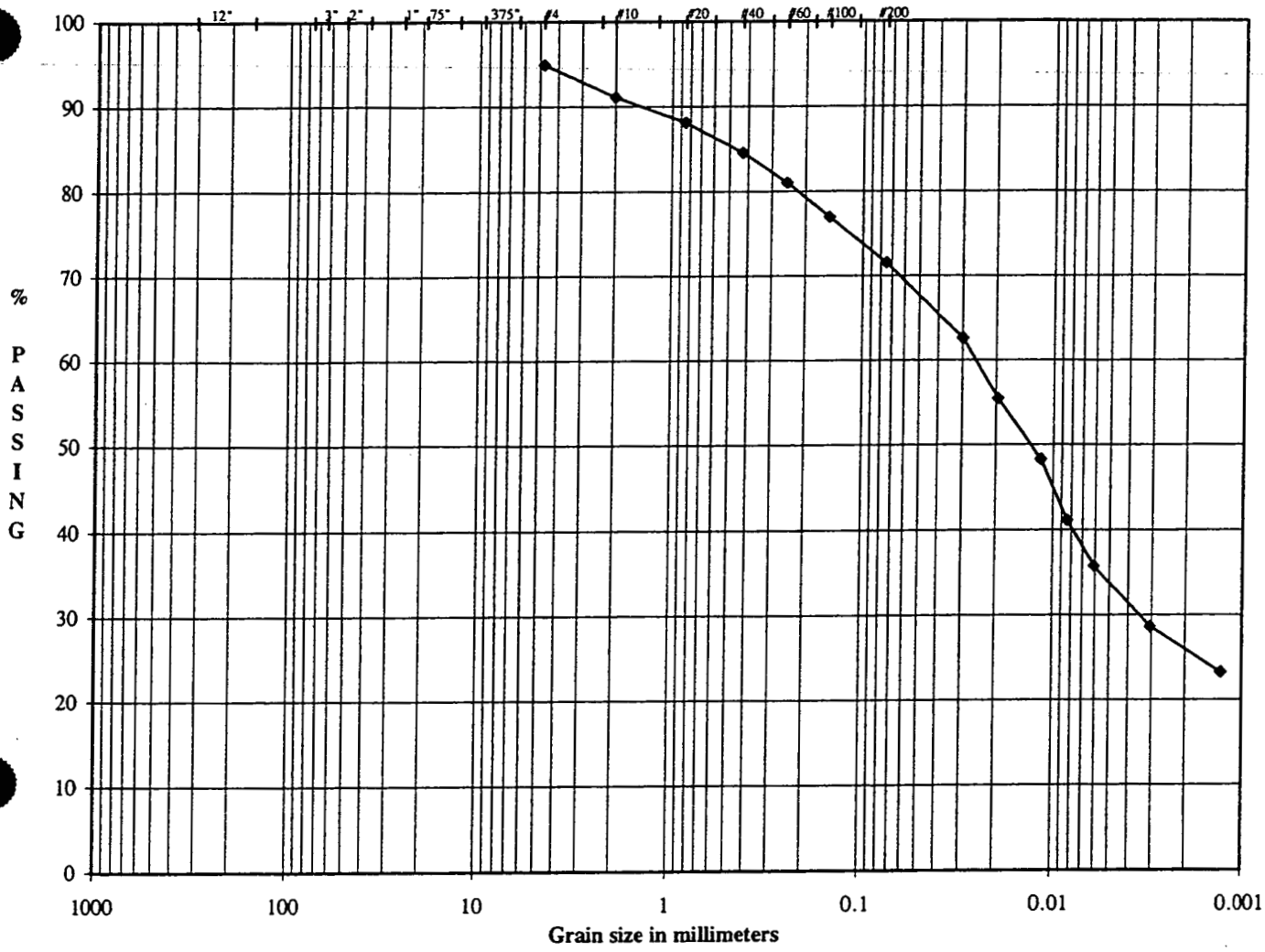
-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	BS
REVIEW	[illegible]

000435

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	Gravel		SAND			FINES

SAMPLE ID	LP02 - 67
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	DW/TJ
DATE	9/13/02
CHECK	[illegible]
REVIEW	[illegible]

000436

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 05 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-69

SOIL SAMPLE SIZE: +3/8 = 1432.2 gm; -3/8 = 45332.8; MOISTURE = 357.3; 47122.3; TOTAL = 47122.3

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE): 99.94 Lb's; 52.44 − 1.84 = 50.6; 51.17 − 1.83 = 49.34 (grams)

SAND	FINE GRAIN
115	65

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-2	L-3	L-2	L-3
WT. OF DRY SAMPLE PLUS TARE (grams)	1623.3	773.1	1583.8	362.2
WT. OF TARE (grams)	191.1	189.9	191.1	189.9
WT. OF DRY SAMPLE (grams)	1432.2	583.2	1392.7	172.3

SIEVE ANALYSIS — QA ID: DCE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	126.3	~~2.7~~ 0.3	99.7		
1 in	25.4	192.6	1.0	99.0		
3/4 in	19.1	667.1	1.4	98.6		90-100
1/2 in	12.7	1244.3	2.6	97.4		
3/8 in	9.53	1392.2	3.0	97.0		
No. 4	4.75	15.7	2.7	97.3	94.4	
No. 10	2.00	38.6	6.6	93.4	90.6	
No. 20	0.850	67.1	11.5	88.5	85.9	
No. 40	0.425	93.8	16.1	83.9	81.4	
No. 60	0.250	115.8	19.9	80.1	77.8	
No. 100	0.125	142.3	24.4	75.6	73.4	
No. 200	0.075	170.7	29.3	70.7	68.6	50-100
PAN	—	172.2	—	—		

COMMENTS:

000437

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

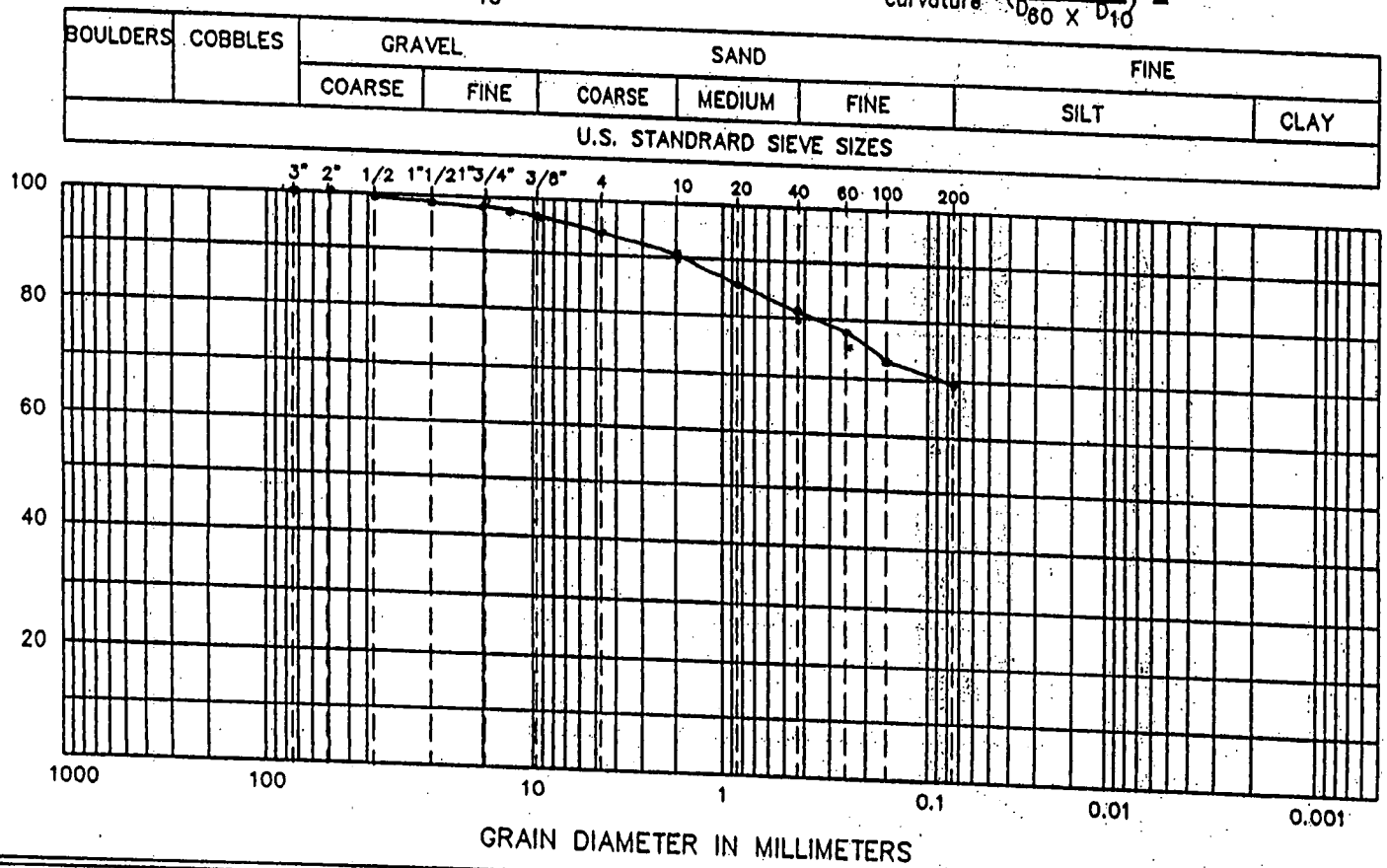
LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-69 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 29

(PL) 13

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.7
1-in.	99.0
3/4-in.	98.6
1/2-in.	97.4
3/8-in.	97.0
NO. 4	94.4
NO. 10	90.6
NO. 20	85.9
NO. 40	81.4
NO. 60	77.8
NO. 100	73.4
NO. 200	68.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	66
0.02	56
0.005	37
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

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0004438

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 69
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.27
Dry Soil & Tare (gm)	49.16
Tare Weight (gm)	3.21
Moisture Content (%)	2.42

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	773.70	
Tare Weight (gm)	233.87	
Total Weight (gm)	527.10	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			97.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.48
Calculated Dry Wt. used in test (gm)	57.10
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	97.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.87	1.87	93.8	#10	medium sand
#20	4.16	4.16	89.9	#20	medium sand
#40	6.29	6.29	86.3	#40	fine sand
#60	8.47	8.47	82.6	#60	fine sand
#100	10.75	10.75	78.7	#100	fine sand
#200	13.68	13.68	73.8	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/16/02	8:45								
9/16/02	8:47	2.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/16/02	8:50	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/16/02	9:00	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
9/16/02	9:15	30.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/16/02	9:45	60.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/16/02	12:55	250.00	25.0	23.00	0.013	7.00	18.00	13.3	0.99
9/17/02	8:45	1440.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	58.9		
0.0192	55.5	% GRAVEL	3.00
0.0115	47.1	% COARSE SAND	3.18
0.0083	42.0	% MEDIUM SAND	7.51
0.0059	38.7	% FINE SAND	12.55
0.0030	30.3	% FINES	73.76
0.0013	25.2	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS: (CL)

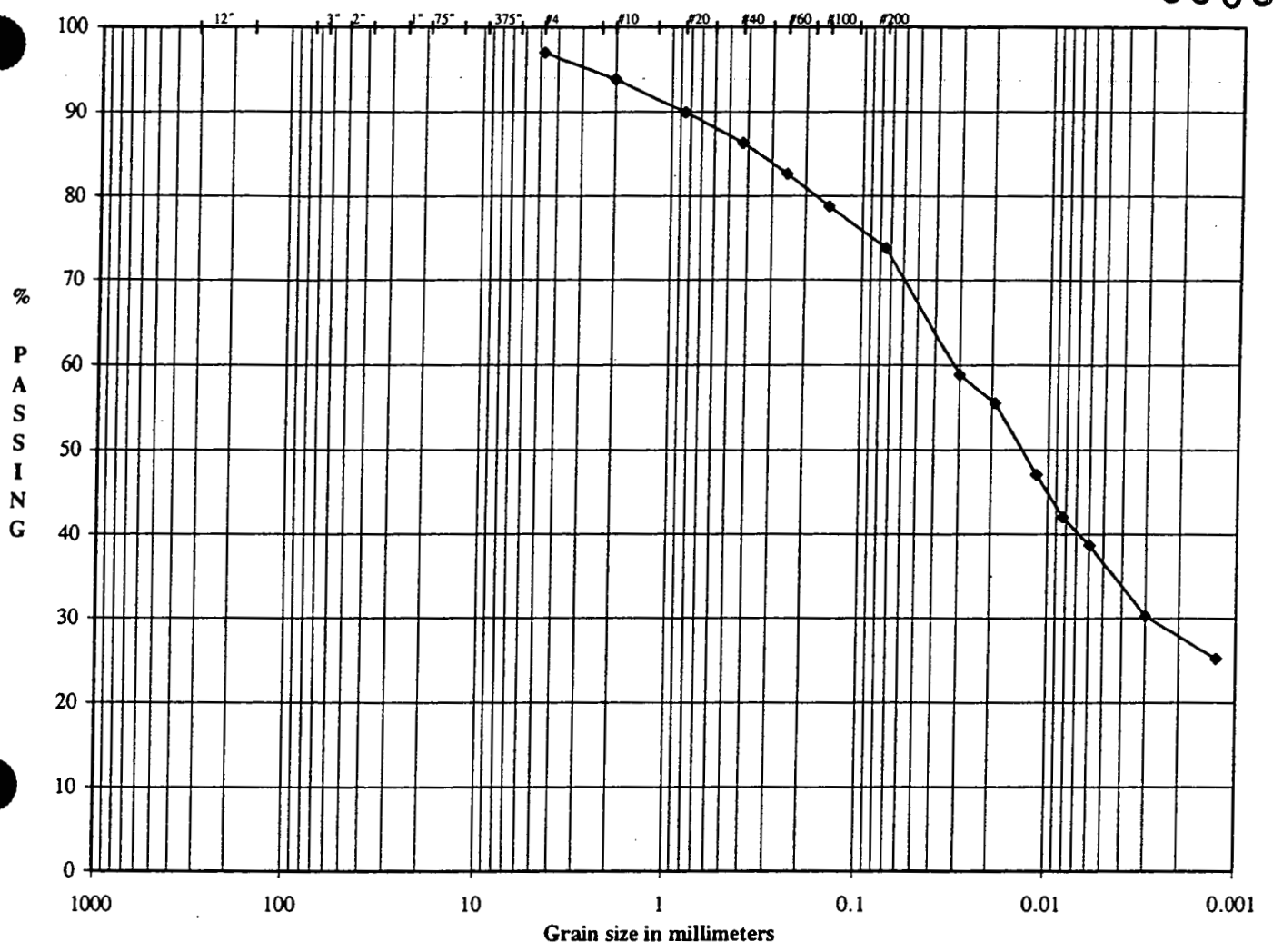
-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	BSA
REVIEW	PWM

000439

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 69
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000440

TECH	DW/TJ
DATE	9/13/02
CHECK	[illegible]
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 06 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.70

SOIL SAMPLE SIZE	+3/8 = 821.8 gram	MOISTURE = 314.7 gm	TOTAL = 2033.5 gm
	-3/8 = 1889.7.0.	2033.5 gm	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
600, AHerbm 600 g -3/8 2697.0 gm 15000 (grams)	115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE ~~No. 250~~ 1250		L-8	LL-4	L-8	LL-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	1015.0	736.5	968.0	309.7
WT. OF TARE	(grams)	193.2	145.4	193.2	145.4
WT. OF DRY SAMPLE	(grams)	821.8	591.1	774.8	164.3

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100	
2 in	50.8	Ø	Ø	100	100
1 1/2in	38.1	Ø	Ø	100	
1 in	25.4	194.7	1.0	99.0	
3/4 in	19.1	438.7	2.2	97.8	90-100
1/2 in	12.7	711.6	3.6	96.4	
3/8 in	9.53	774.8	3.9	96.1	
No. 4	4.75	16.7	2.8 ~~2.2~~ 97.2	~~97.8~~ ~~94.1~~	~~93.4~~ 93.4
No. 10	2.00	41.8	7.1 ~~5.4~~ 92.9	~~94.6~~ ~~90.9~~	~~89.3~~ 89.3
No. 20	0.850	66.7	11.3 ~~8.6~~ 88.7	~~91.4~~ ~~87.9~~	~~85.1~~ 85.3
No. 40	0.425	90.6	15.4 ~~11.7~~ 84.7	~~88.3~~ ~~84.9~~	~~81.2~~ 81.4
No. 60	0.250	110.2	18.6 ~~14.2~~ 81.4	~~85.8~~ ~~82.5~~	~~78.0~~ 78.2
No. 100	0.125	134.8	23.8 ~~17.4~~ 76.2	~~82.6~~ ~~79.4~~	~~75.9~~ 74.2
No. 200	0.075	163.3	28.0 ~~21.7~~ 72.4	~~78.9~~ ~~75.9~~	~~69.5~~ 70-100
PAN	—	164.2	27.6 —	—	69.6

COMMENTS:

000441

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CJ SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

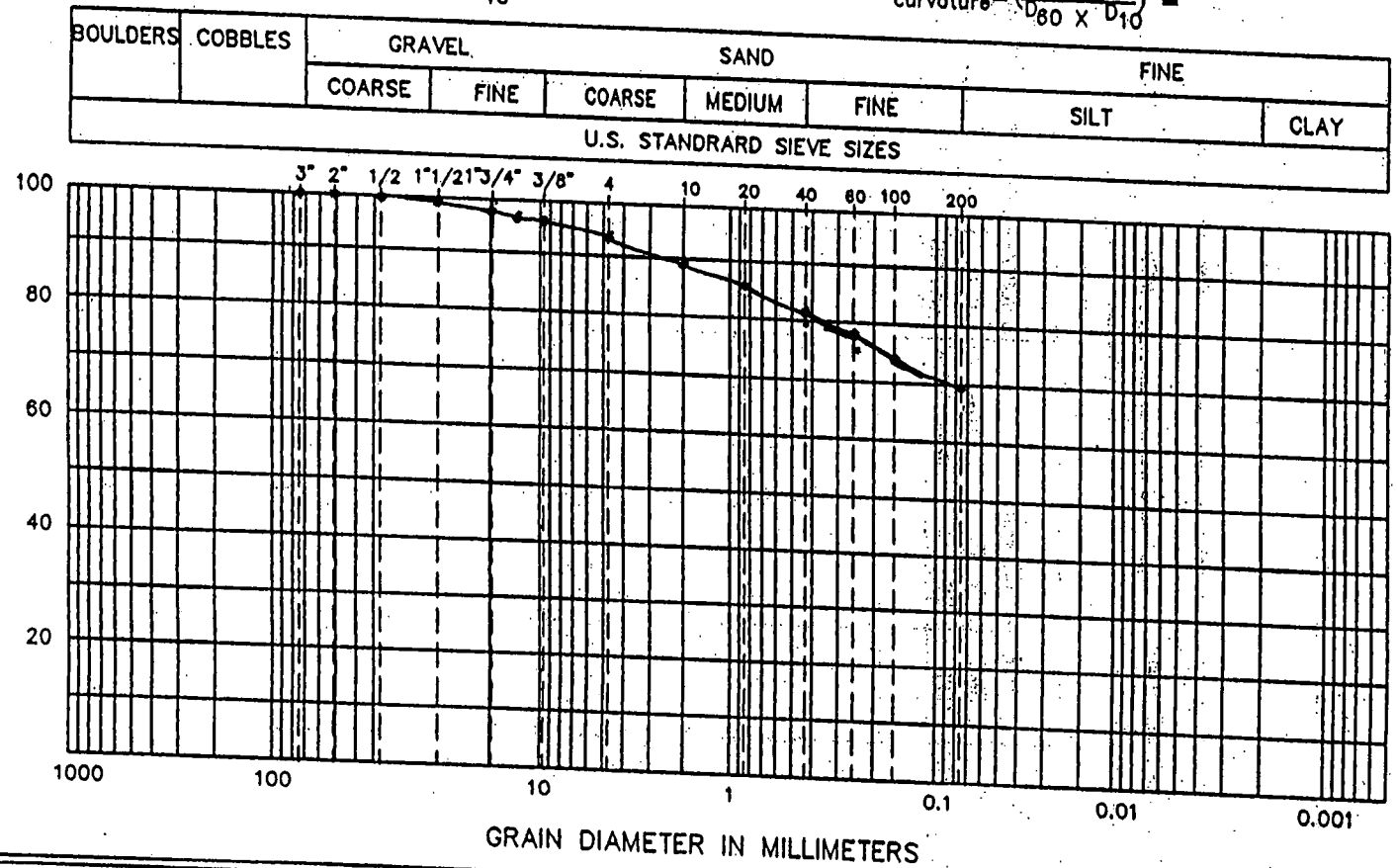
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-70 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.0
3/4-In.	97.8
1/2-In.	96.4
3/8-In.	96.1
NO. 4	93.4
NO. 10	88.3
NO. 20.	85.3
NO. 40	81.4
NO. 60	78.2
NO. 100	74.2
NO. 200	68.6

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	53
0.005	34
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000442

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 70
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	101.29
Dry Soil & Tare (gm)	99.74
Tare Weight (gm)	3.20
Moisture Content (%)	1.61

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	734.43	
Tare Weight (gm)	233.87	
Total Weight (gm)	492.65	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			96.1	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.10
Calculated Dry Wt. used in test (gm)	55.21
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	96.10

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.35	1.35	93.8	#10	medium sand
#20	3.17	3.17	90.6	#20	medium sand
#40	5.50	5.50	86.5	#40	fine sand
#60	7.69	7.69	82.7	#60	fine sand
#100	10.02	10.02	78.7	#100	fine sand
#200	13.14	13.14	73.2	#200	fines

HYDROMETER CALCULATIONS

DATE 9/15/02	TIME 13:00	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/15/02	13:02	2.00	44.0	23.00	0.013	7.00	37.00	10.2	0.99
9/15/02	13:05	5.00	38.0	23.00	0.013	7.00	31.00	11.2	0.99
9/15/02	13:15	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
9/15/02	13:30	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
9/15/02	14:00	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/15/02	17:10	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/16/02	13:00	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0294	63.8
0.0195	53.4
0.0116	46.5
0.0084	41.4
0.0060	36.2
0.0030	27.6
0.0013	22.4

% GRAVEL	3.90
% COARSE SAND	2.35
% MEDIUM SAND	7.22
% FINE SAND	13.30
% FINES	73.23
% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS (CL)

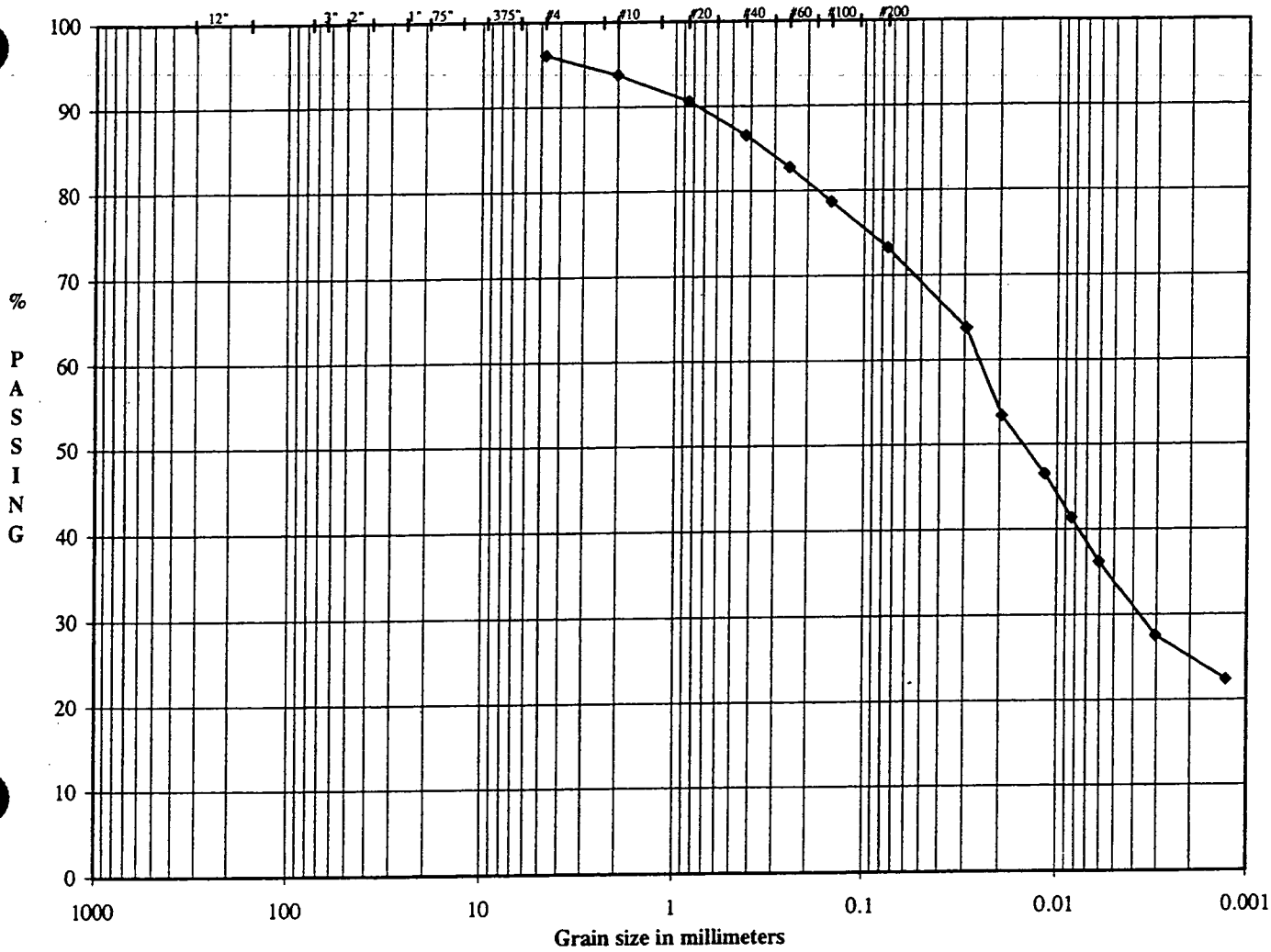
-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	DK
REVIEW	[illegible]

000443

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 70
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000444

TECH	DW/TJ
DATE	9/13/02
CHECK	DSI
REVIEW	Jwy

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.71

SOIL SAMPLE SIZE	+3/8 = 2301.0 gm	MOISTURE = 291.3 gm	TOTAL = 43507.0
	-3/8 = 40914.7		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
47.00 46.88 − 1.84 −1.84 = 45.16 45.04 = 90.20 (grams)	115	65

45.16 45.04

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-9	L-44	L-9	L-44
WT. OF DRY SAMPLE PLUS TARE (grams)	2494.2	675.6	2344.9	341.7
WT. OF TARE (grams)	193.2	191.2	193.2	191.2
WT. OF DRY SAMPLE (grams)	2301.0	484.4	2151.7	150.5

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	175.9	0.4	99.6		
1 in	25.4	856.7	2.0	98.0		
3/4 in	19.1	1144.3	2.6	97.4		90-100
1/2 in	12.7	1886.8	4.3	95.7		
3/8 in	9.53	2148.5	4.9	95.1		
No. 4	4.75	~~675.6~~ 16.9	3.5	96.5	91.7	
No. 10	2.00	35.8	7.4	92.6	88.0	
No. 20	0.850	59.1	12.2	87.8	83.5	
No. 40	0.425	81.6	16.8	83.2	79.0	
No. 60	0.250	100.7	20.8	79.2	75.3	
No. 100	0.125	123.1	25.5	74.5	70.8	
No. 200	0.075	148.4	30.6	69.4	65.9	50-100
PAN	—	150.4	—	—		

COMMENTS:

000445

% FINER = 100 − Σ % RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [illegible] SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

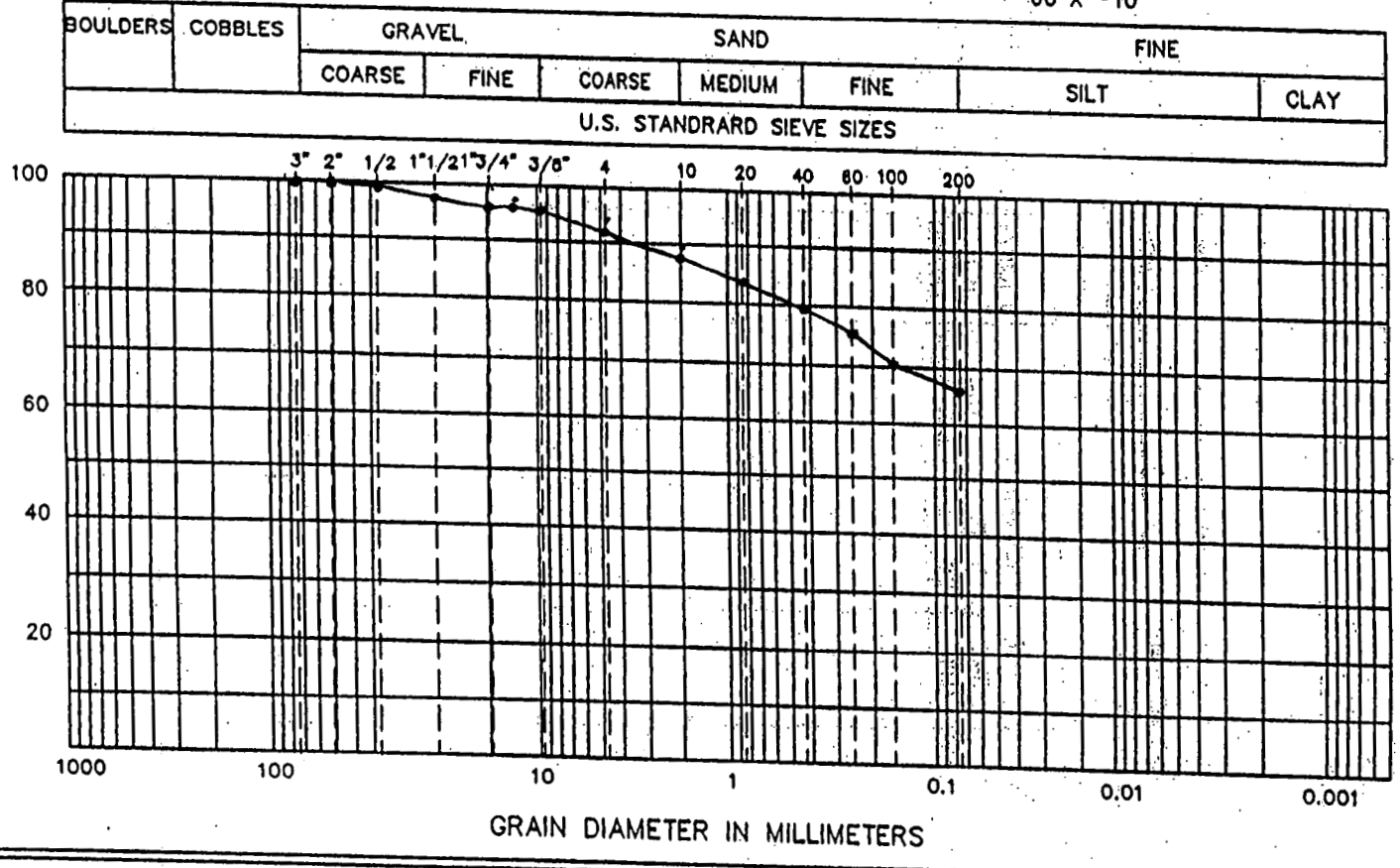
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 1 day Nov month 2002 year

SAMPLE NO.: LP02-71 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 28

(PL) 15

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.6
1-In.	98.0
3/4-In.	97.4
1/2-In.	95.7
3/8-In.	95.1
NO. 4	91.7
NO. 10	88.0
NO. 20.	83.5
NO. 40	79.0
NO. 60	75.3
NO. 100	70.8
NO. 200	65.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65.5
0.02	50.3
0.005	32.9
0.002	25.8

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000446

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 71
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	94.63
Dry Soil & Tare (gm)	91.98
Tare Weight (gm)	3.20
Moisture Content (%)	2.98

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	499.33	
Tare Weight (gm)	0.00	
Total Weight (gm)	484.86	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			91.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	52.39
Calculated Dry Wt. used in test (gm)	50.87
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	91.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	3.61	3.61	85.2	#10	medium sand
#20	5.68	5.68	81.5	#20	medium sand
#40	7.48	7.48	78.2	#40	fine sand
#60	9.11	9.11	75.3	#60	fine sand
#100	11.01	11.01	71.9	#100	fine sand
#200	13.51	13.51	67.3	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/15/02	13:02								
9/15/02	13:04	2.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/15/02	13:07	5.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
9/15/02	13:17	15.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/15/02	13:32	30.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/15/02	14:02	60.00	26.0	23.00	0.013	7.00	19.00	13.2	0.99
9/15/02	17:12	250.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99
9/16/02	13:02	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0299	62.5
0.0199	50.0
0.0117	44.6
0.0085	39.3
0.0061	33.9
0.0031	26.8
0.0013	23.2

% GRAVEL	8.30
% COARSE SAND	6.51
% MEDIUM SAND	6.98
% FINE SAND	10.87
% FINES	67.35
% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

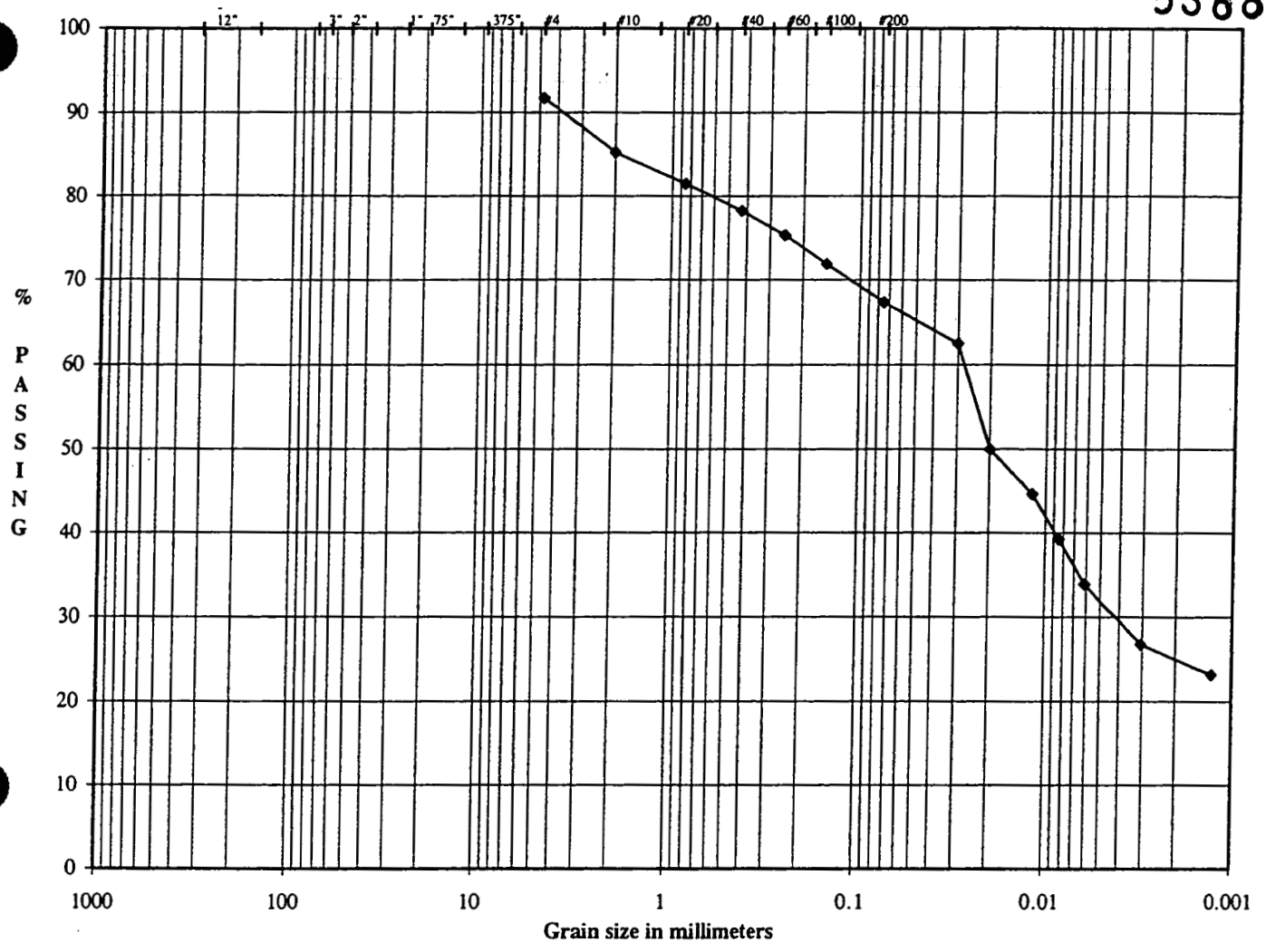
-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	BK
REVIEW	[illegible]

000447

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 71
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	DW/TJ
DATE	9/13/02
CHECK	[illegible]
REVIEW	[illegible]

000448

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 09 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-72

SOIL SAMPLE SIZE	+3/8 = 914.6	MOISTURE = 296.5	TOTAL = 22816.1
	-3/8 = 21605.0	22816.1	

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

49.44 1.81 47.63 = 21665.0

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-7	L-6	L-7	L-6
WT. OF DRY SAMPLE PLUS TARE (grams)	1107.6	675.5	1044.2	375.3
WT. OF TARE (grams)	193.0	198.2	193.0	198.2
WT. OF DRY SAMPLE (grams)	914.6	507.3	851.2	~~179.1~~ 177.

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	267.1	1.2	98.8		
3/4 in	19.1	446.8	2.0	98.0		90-100
1/2 in	12.7	759.2	3.3	96.7		
3/8 in	9.53	851.1	3.7	96.3		
No. 4	4.75	11.2	2.2	97.8	94.1	
No. 10	2.00	30.1	5.9	94.1	90.6	
No. 20	0.850	55.8	11.0	89.0	85.7	
No. 40	0.425	84.4	16.6	83.3	80.3	
No. 60	0.250	110.0	21.7	78.3	75.4	
No. 100	0.125	141.1	27.8	72.2	69.5	
No. 200	0.075	170.9	33.7	66.3	63.8	50-100
PAN	—	177.0	—	—		

COMMENTS:

000449

% FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

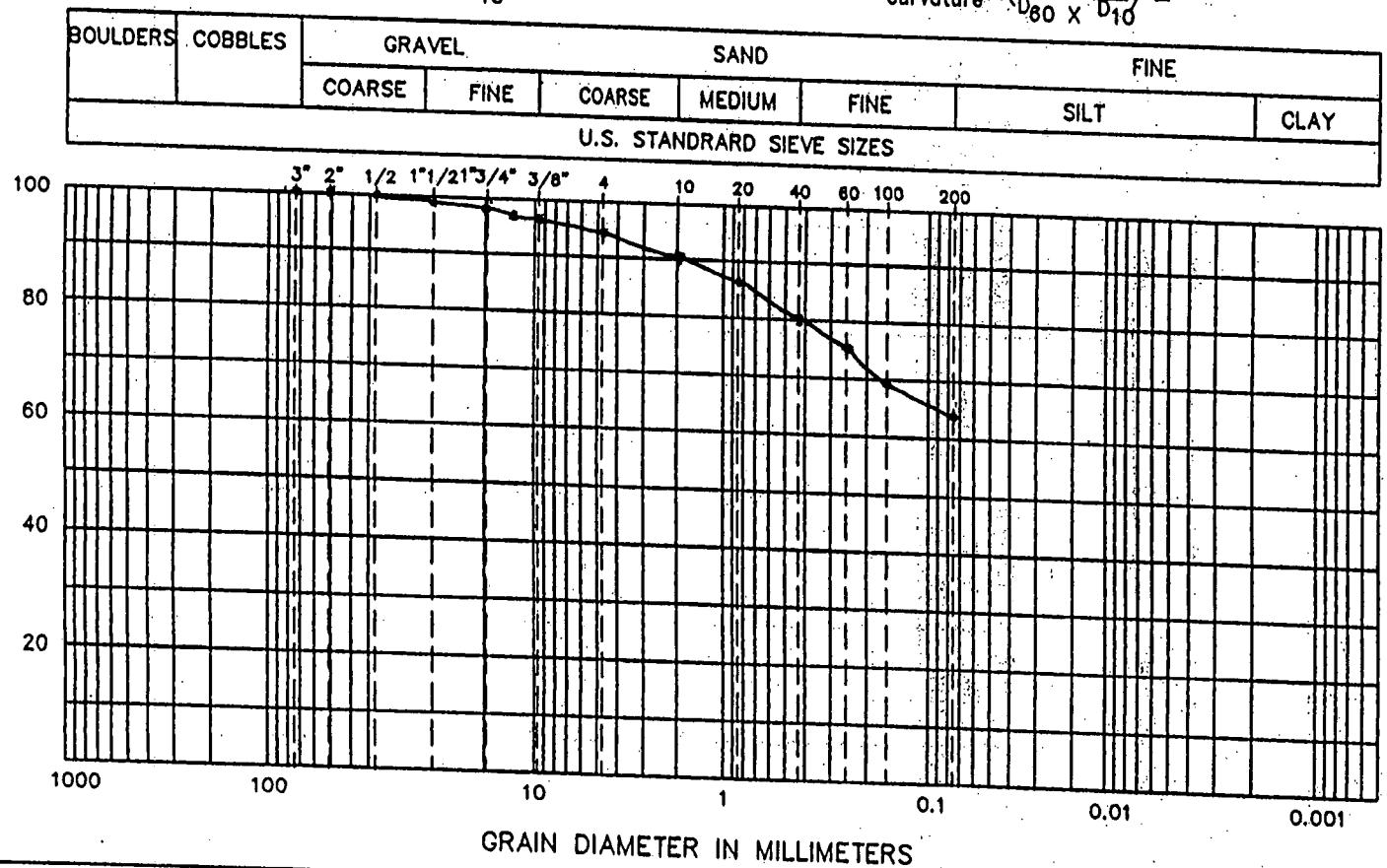
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-72 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 28

(PL) 15

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	98.8
3/4-In.	98.0
1/2-In.	96.7
3/8-In.	96.3
NO. 4	94.1
NO. 10	90.6
NO. 20.	85.7
NO. 40	80.3
NO. 60	75.4
NO. 100	69.5
NO. 200	63.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	66
0.02	52
0.005	35
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

000450

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

ROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 72
ROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	84.28
Dry Soil & Tare (gm)	80.94
Tare Weight (gm)	3.22
Moisture Content (%)	4.30

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.77	
Tare Weight (gm)	6.67	
Total Weight (gm)	479.49	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.1	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
ype Dispersion Device		Mechanical
ength of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.25
Calculated Dry Wt. used in test (gm)	55.85
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.10

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.08	2.08	90.6	#10	medium sand
#20	4.44	4.44	86.6	#20	medium sand
#40	6.57	6.57	83.0	#40	fine sand
#60	8.44	8.44	79.9	#60	fine sand
#100	10.68	10.68	76.1	#100	fine sand
#200	13.64	13.64	71.1	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/15/02	13:04								
9/15/02	13:06	2.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/15/02	13:09	5.00	38.0	23.00	0.013	7.00	31.00	11.2	0.99
9/15/02	13:19	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
9/15/02	13:34	30.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/15/02	14:04	60.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/15/02	17:14	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
9/16/02	13:04	1440.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0299	58.4
0.0195	51.7
0.0115	46.7
0.0083	41.7
0.0060	36.7
0.0030	28.4
0.0013	25.0

% GRAVEL	5.90
% COARSE SAND	3.50
% MEDIUM SAND	7.57
% FINE SAND	11.91
% FINES	71.12
% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

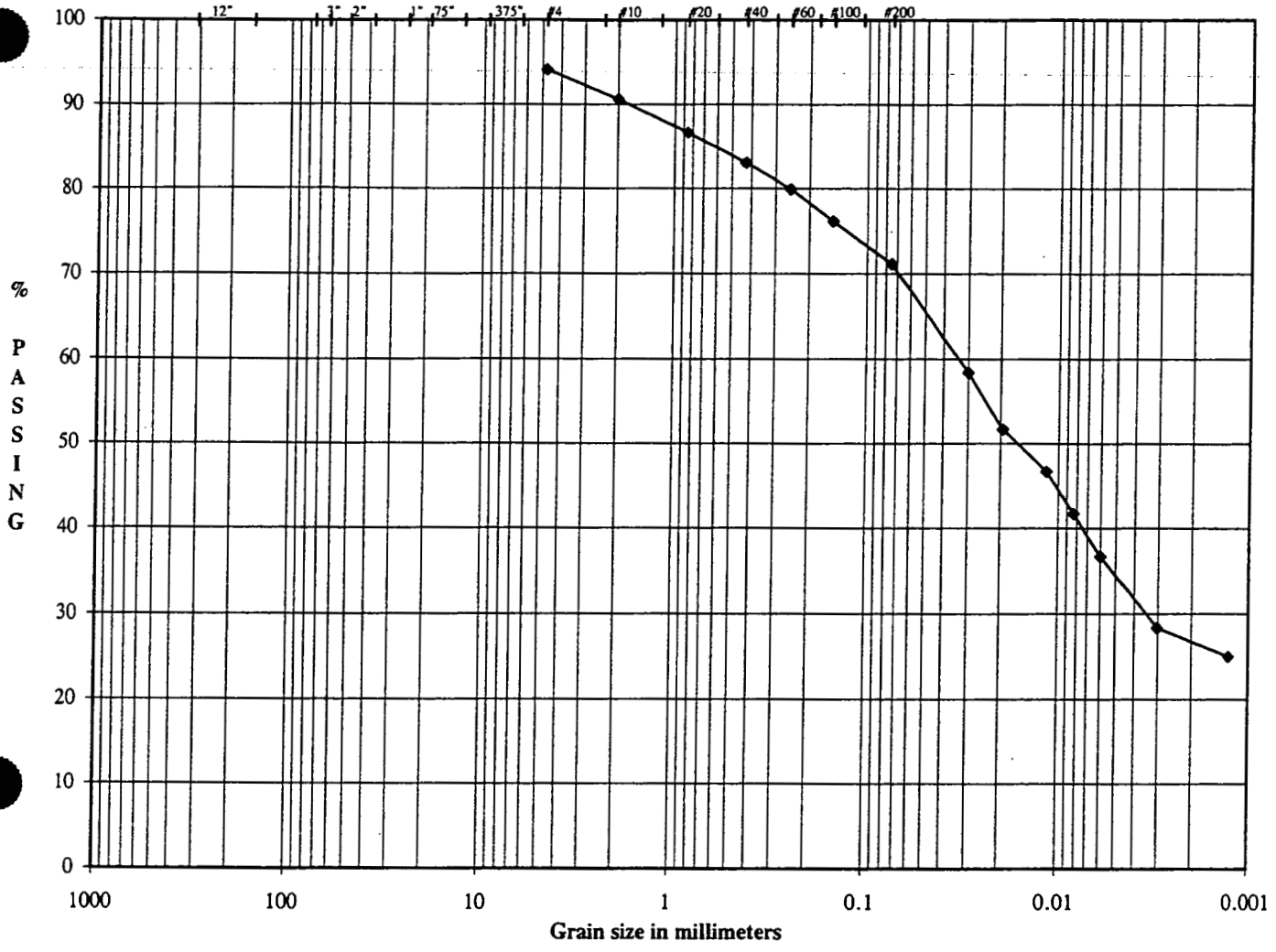
-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	BSG
REVIEW	[illegible]

000451

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 72
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	DW/TJ
DATE	9/13/02
CHECK	[illegible]
REVIEW	[illegible]

000452

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 10 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.73

SOIL SAMPLE SIZE			
+3/8 = 1615.7	MOISTURE = 338.6		TOTAL = 36930.9
-3/8 = 34977.1		36930.9	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
50.00 LB'S + 27.11 = 77.11 (grams)	115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-44	L-9	L-44	L-9
WT. OF DRY SAMPLE PLUS TARE	(grams)	1806.4	665.8	1702.0	301.3
WT. OF TARE	(grams)	191.2	193.4	191.2	193.4
WT. OF DRY SAMPLE	(grams)	1615.2	472.4	1510.8	107.9

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	~~0~~	~~0~~	~~100~~		
2 in	50.8	~~0~~	~~0~~	~~100~~		100
1 1/2in	38.1	276.5	~~7.5~~ 0.7	99.3		
1 in	25.4	737.8	2.0	98.0		
3/4 in	19.1	984.6	2.7	97.3		90-100
1/2 in	12.7	1370.9	3.7	96.3		
3/8 in	9.53	1510.2	4.1	95.9		
No. 4	4.75	3.8	0.8	99.2	95.1	
No. 10	2.00	12.7	2.7	97.3	93.3	
No. 20	0.850	26.9	5.7	94.3	90.4	
No. 40	0.425	45.5	9.6	90.4	86.7	
No. 60	0.250	61.9	13.1	86.9	83.3	
No. 100	0.125	81.9	17.3	82.7	79.3	
No. 200	0.075	104.6	22.1	77.9	74.7	50-100
PAN	—	107.8	—	—		

COMMENTS:

000453

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [illegible] SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

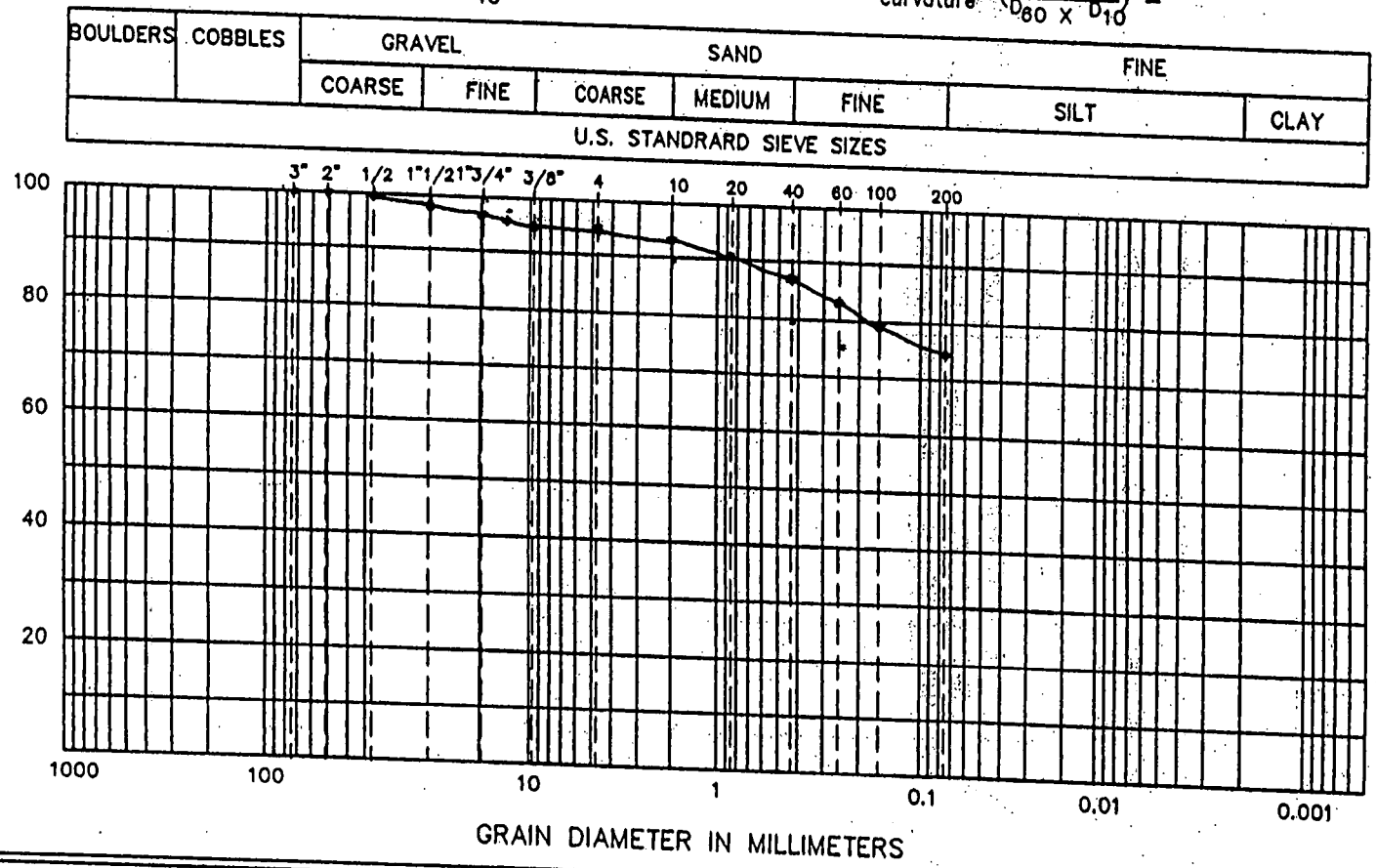
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-73 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 33

(PL) 17

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.3
1-in.	98.0
3/4-in.	97.3
1/2-in.	96.3
3/8-in.	95.9
NO. 4	95.1
NO. 10	93.3
NO. 20	90.4
NO. 40	86.7
NO. 60	83.3
NO. 100	78.3
NO. 200	74.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	75
0.002	61
0.0005	37
0.0002	29

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

000454

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

ROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 73
ROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	76.93
Dry Soil & Tare (gm)	74.05
Tare Weight (gm)	3.17
Moisture Content (%)	4.06

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.30	
Tare Weight (gm)	6.76	
Total Weight (gm)	480.04	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			95.1	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
pe Dispersion Device		Mechanical
ngth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	53.36
Calculated Dry Wt. used in test (gm)	51.28
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	95.10

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.23	1.23	92.8	#10	medium sand
#20	2.29	2.29	90.9	#20	medium sand
#40	3.50	3.50	88.6	#40	fine sand
#60	4.74	4.74	86.3	#60	fine sand
#100	6.23	6.23	83.5	#100	fine sand
#200	8.19	8.19	79.9	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/15/02	13:06								
9/15/02	13:08	2.00	44.0	23.00	0.013	7.00	37.00	10.2	0.99
9/15/02	13:11	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/15/02	13:21	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
9/15/02	13:36	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
9/15/02	14:06	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/15/02	17:16	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
9/16/02	13:06	1440.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0294	67.9
0.0192	60.6
0.0116	49.6
0.0084	44.1
0.0060	38.6
0.0030	31.2
0.0013	27.5

% GRAVEL	4.90
% COARSE SAND	2.28
% MEDIUM SAND	4.21
% FINE SAND	8.70
% FINES	79.91
% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS (CL)

-	LL
-	PL
-	PI

TECH	DW/TJ
DATE	9/13/02
CHECK	[illegible]
REVIEW	[illegible]

000455

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368

Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 73
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	DW/TJ
DATE	9/13/02
CHECK	DSA
REVIEW	[illegible]

000456

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

'ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 10 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP 02.74

SOIL SAMPLE SIZE	+3/8 = 754.2 gm	MOISTURE = 239.9 gm	TOTAL = 40799.6 gm
	-3/8 = 38805.5	40799.6	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	500 gm -3/8 + 500 gm Atterberg = 1000 (grams)	SAND	FINE GRAIN
50 LBS		115	65

37.36 35.57 35.55 / 85.55 38805.5

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L.2	L.44	L.2	L.44
WT. OF DRY SAMPLE PLUS TARE	(grams)	945.3	~~1669.3~~ 1660.3	892.3	332.6
WT. OF TARE	(grams)	191.1	~~1194.0~~ 1191.8	191.1	191.8
WT. OF DRY SAMPLE	(grams)	754.2	~~475.3~~ 468.3	701.2	140.8

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	237.8	.6	99.4		
3/4 in	19.1	351.7	.9	99.1		90-100
1/2 in	12.7	612.0	1.5	98.5		
3/8 in	9.53	700.9	1.7	98.3		
No. 4	4.75	9.0	1.9	98.1	~~96.2~~ 96.4	
No. 10	2.00	24.3	5.1	94.9	93.3	
No. 20	0.850	48.4	10.2	89.8	88.3	
No. 40	0.425	78.9	16.6	83.4	82.0	
No. 60	0.250	96.7	20.3	79.7	78.3	
No. 100	0.125	119.9	25.2	74.8	73.5	
No. 200	0.075	137.6	29.0	71.0	69.8	50-100
PAN	—	139.7	—	—		

.983

COMMENTS:

000457

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: _____ SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

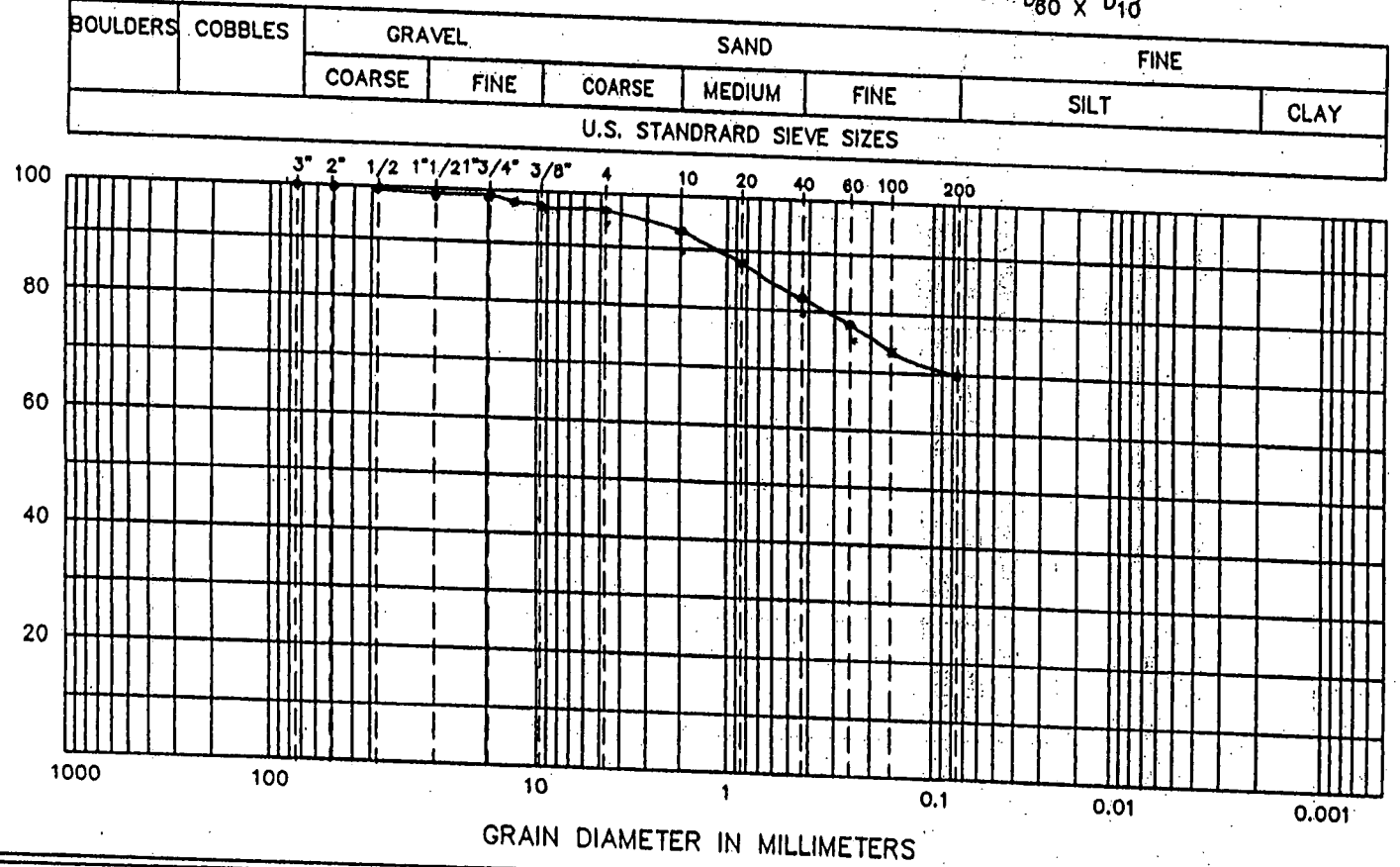
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-74 QA ID: CAW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 35

(PL) 17

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.4
3/4-in.	99.1
1/2-in.	98.5
3/8-in.	98.3
NO. 4	96.4
NO. 10	93.3
NO. 20.	88.3
NO. 40	82.0
NO. 60	78.3
NO. 100	73.5
NO. 200	69.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	76
0.02	64
0.005	39
0.002	30

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

000458

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 74
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.65	
Dry Soil & Tare (gm)	47.16	
Tare Weight (gm)	3.24	
Moisture Content (%)	5.67	

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	501.50	
Tare Weight (gm)	6.71	
Total Weight (gm)	468.24	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			96.4	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.88
Calculated Dry Wt. used in test (gm)	53.83
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	96.40

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	0.88	0.88	94.8	#10	medium sand
#20	2.34	2.34	92.2	#20	medium sand
#40	3.81	3.81	89.6	#40	fine sand
#60	5.26	5.26	87.0	#60	fine sand
#100	6.82	6.82	84.2	#100	fine sand
#200	8.60	8.60	81.0	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/21/02	8:15								
9/21/02	8:17	2.00	46.0	22.50	0.013	6.50	39.50	9.9	0.99
9/21/02	8:20	5.00	42.0	22.50	0.013	6.50	35.50	10.6	0.99
9/21/02	8:30	15.00	35.0	22.50	0.013	6.50	28.50	11.7	0.99
9/21/02	8:45	30.00	33.0	22.50	0.013	6.50	26.50	12.0	0.99
9/21/02	9:15	60.00	30.0	22.50	0.013	6.50	23.50	12.5	0.99
9/21/02	12:25	250.00	25.0	22.50	0.013	6.50	18.50	13.3	0.99
9/22/02	8:15	1440.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0291	70.0
0.0191	62.9
0.0116	50.5
0.0083	47.0
0.0060	41.7
0.0030	32.8
0.0013	26.6

% GRAVEL	3.60
% COARSE SAND	1.58
% MEDIUM SAND	5.25
% FINE SAND	8.58
% FINES	81.00
% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS (CL)

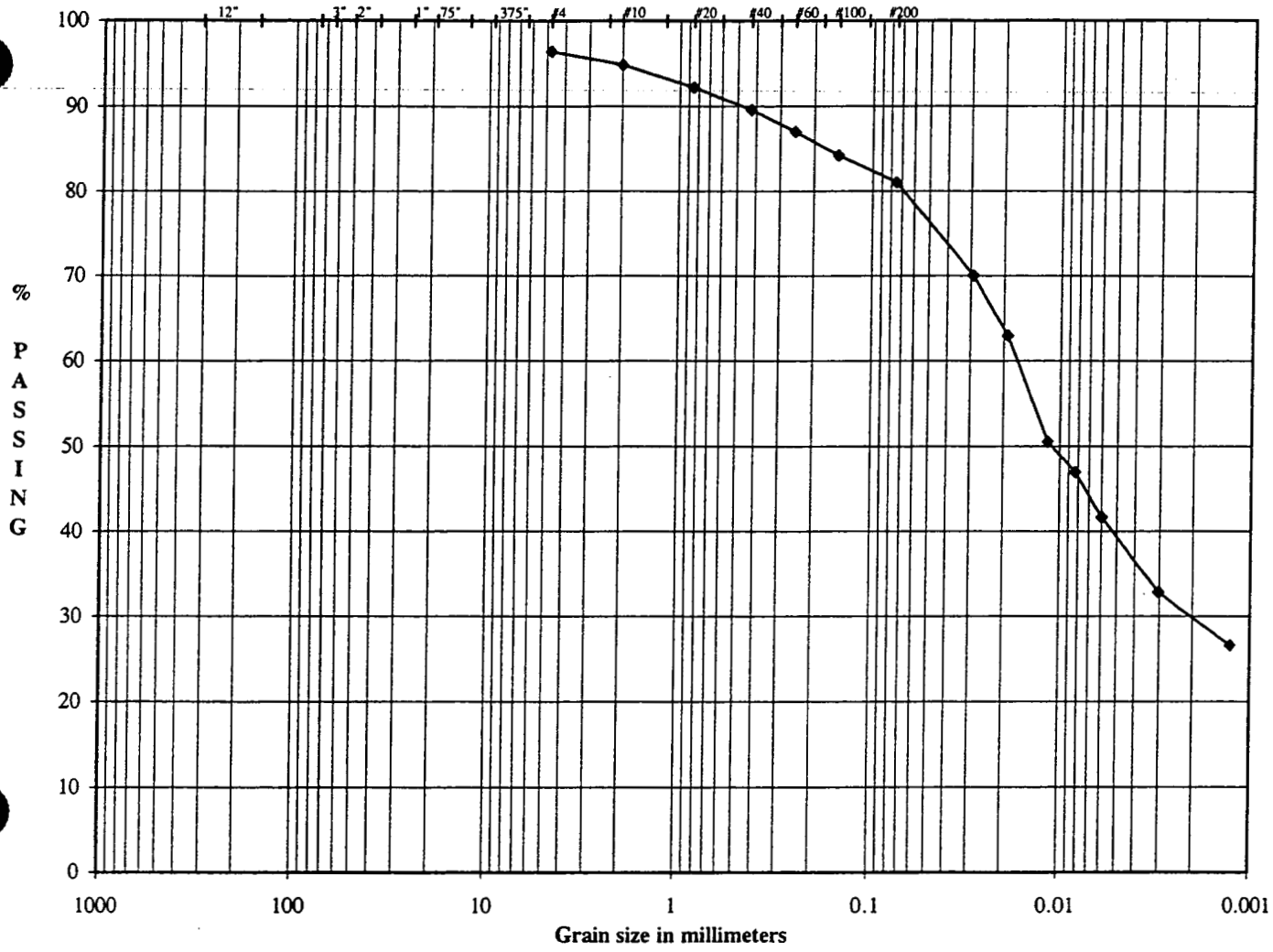
-	LL
-	PL
-	PI

TECH	SW/TJ
DATE	9/22/02
CHECK	BA
REVIEW	CWM

000459

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 74
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/TJ
DATE	9/22/02
CHECK	BS
REVIEW	[illegible]

000460

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 10 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay SAMPLE NO.: LP02-75

SOIL SAMPLE SIZE	+3/8 = 708.9 gm	MOISTURE = 274.8 gm	TOTAL = 22135.1 gm
	-3/8 = 21151.4 gm	22135.1	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
46.40 -	115	65

1.77 / 46.63 < 21151.4 gm

		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		L-8	N	L-8	N
WT. OF DRY SAMPLE PLUS TARE	(grams)	902.2	580.3	854.4	252.8
WT. OF TARE	(grams)	193.3	101.6	193.3	101.6
WT. OF DRY SAMPLE	(grams)	708.9	478.7	661.1	151.2

SIEVE ANALYSIS QA ID: DAE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	77.6	.4	99.6		
1 in	25.4	108.3	.5	99.5		
3/4 in	19.1	219.3	1.0	99.0		90-100
1/2 in	12.7	522.9	2.4	97.6		
3/8 in	9.53	660.4	3.0	97.0		
No. 4	4.75	15.8	3.3	96.7	93.8	
No. 10	2.00	37.0	7.7	92.3	89.5	
No. 20	0.850	60.1	12.6	87.4	84.8	
No. 40	0.425	82.4	17.2	82.8	80.3	
No. 60	0.250	101.3	21.2	78.8	76.4	
No. 100	0.125	125.2	26.2	73.8	71.6	
No. 200	0.075	149.5	31.2	68.8	66.7	50-100
PAN	—	151.2	—	—		

.970

COMMENTS:

000461

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

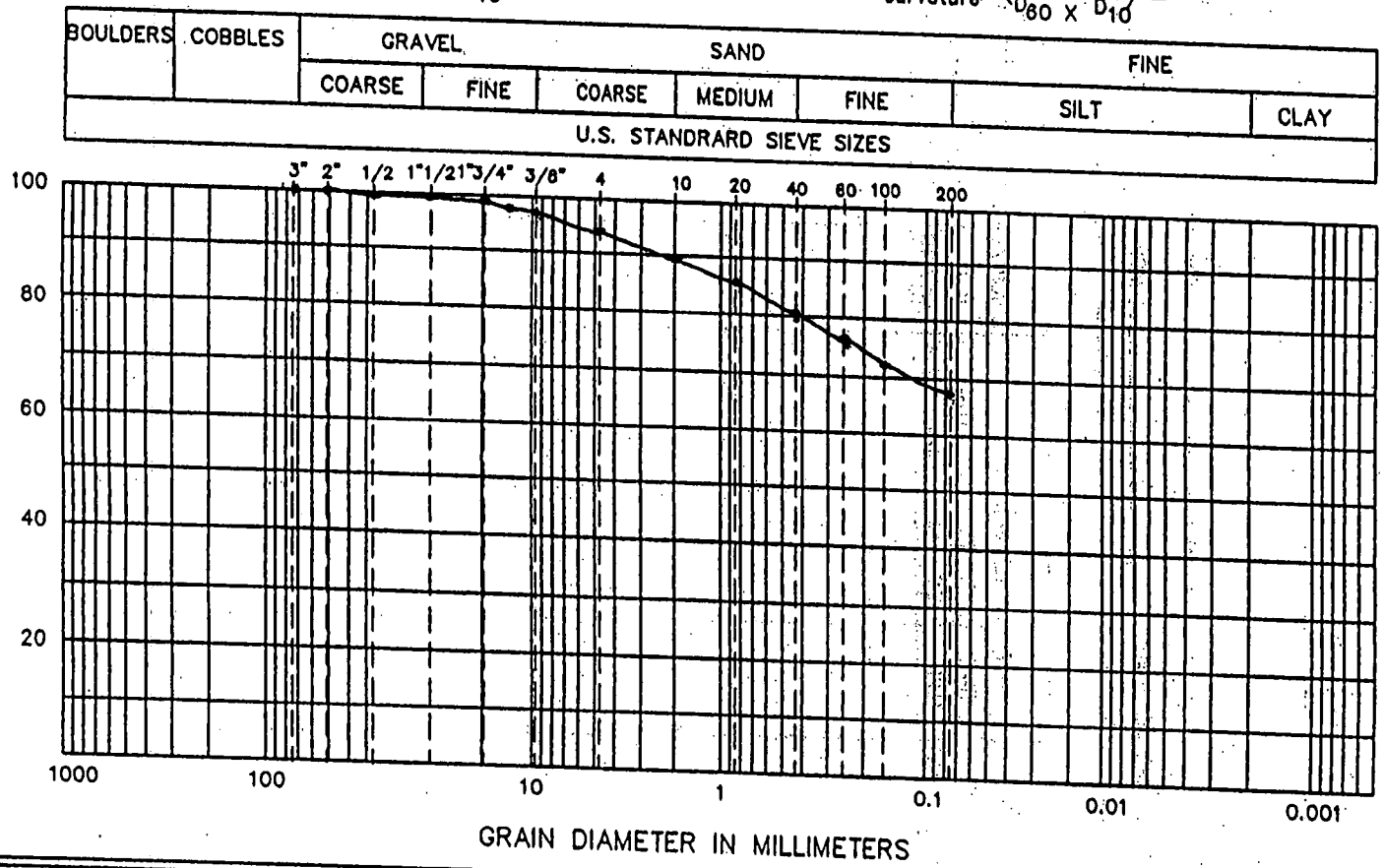
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-75 QA ID: CAW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.6
1-In.	99.85
3/4-In.	99.0
1/2-In.	97.6
3/8-In.	97.0
NO. 4	93.8
NO. 10	89.5
NO. 20	84.8
NO. 40	80.3
NO. 60	76.4
NO. 100	71.6
NO. 200	66.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	66
0.02	66
0.005	35
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000452

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 75
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.25
Dry Soil & Tare (gm)	46.84
Tare Weight (gm)	3.16
Moisture Content (%)	5.52

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	503.07	
Tare Weight (gm)	6.77	
Total Weight (gm)	470.35	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.58
Calculated Dry Wt. used in test (gm)	53.62
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.62	1.62	91.0	#10	medium sand
#20	3.75	3.75	87.2	#20	medium sand
#40	5.84	5.84	83.6	#40	fine sand
#60	7.82	7.82	80.1	#60	fine sand
#100	10.05	10.05	76.2	#100	fine sand
#200	12.89	12.89	71.3	#200	fines

HYDROMETER CALCULATIONS

DATE 9/21/02	TIME 8:17	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/21/02	8:19	2.00	41.5	22.50	0.013	6.50	35.00	10.6	0.99
9/21/02	8:22	5.00	38.5	22.50	0.013	6.50	32.00	11.1	0.99
9/21/02	8:32	15.00	33.5	22.50	0.013	6.50	27.00	11.9	0.99
9/21/02	8:47	30.00	30.0	22.50	0.013	6.50	23.50	12.5	0.99
9/21/02	9:17	60.00	28.0	22.50	0.013	6.50	21.50	12.9	0.99
9/21/02	12:27	250.00	23.5	22.50	0.013	6.50	17.00	13.5	0.99
9/22/02	8:17	1440.00	21.0	23.00	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0302	60.6		
0.0195	55.4	% GRAVEL	6.20
0.0117	46.8	% COARSE SAND	2.83
0.0085	40.7	% MEDIUM SAND	7.38
0.0061	37.2	% FINE SAND	12.33
0.0030	29.4	% FINES	71.25
0.0013	24.2	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

-	LL
-	PL
-	PI

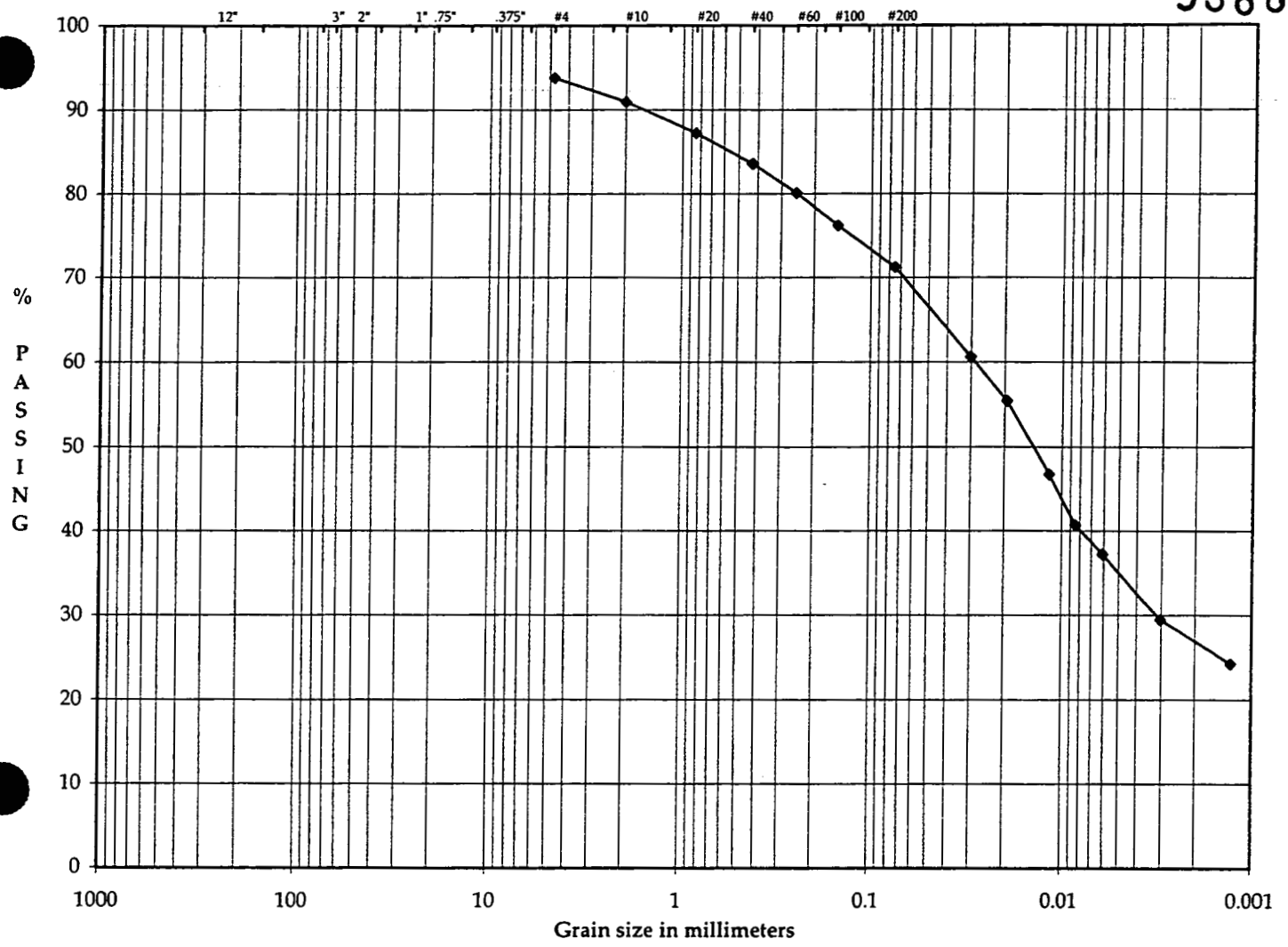
TECH	SW/1
DATE	9/22/02
CHECK	BS
REVIEW	[illegible]

000463

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

-- 5368



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	Gravel		SAND			FINES

SAMPLE ID	LP02 - 75
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000464

TECH	SW/
DATE	9/22/
CHECK	BS
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 10 day Sept month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-76

SOIL SAMPLE SIZE	+3/8 = 230.5 grams	MOISTURE = 332.3 g	TOTAL = 20439.6
	-3/8 = 19876.8	20439.6	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
45.65	115	65

$\frac{1683}{43.82} = 19876.8$

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-1	L-9	L-1	L-9
WT. OF DRY SAMPLE PLUS TARE (grams)	422.8	663.3	410.1	322.5
WT. OF TARE (grams)	192.3	193.4	192.3	193.4
WT. OF DRY SAMPLE (grams)	230.5	469.9	217.8	129.2

SIEVE ANALYSIS QA ID: DJE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	Ø	Ø	100		
3/4 in	19.1	60.2	.3	99.7		90-100
1/2 in	12.7	162.1	.8	99.2		
3/8 in	9.53	217.9	1.1	98.9		
No. 4	4.75	13.1	2.8	97.2	98.3	
No. 10	2.00	29.6	6.3	93.7	92.7	
No. 20	0.850	50.0	10.6	89.4	88.4	
No. 40	0.425	70.6	15.0	85.0	84.1	
No. 60	0.250	88.1	18.7	81.3	80.4	
No. 100	0.125	107.9	23.0	77.0	76.2	
No. 200	0.075	127.8	27.2	72.8	72.0	50-100
PAN	—	129.2	—	—		

.989

COMMENTS:

000465

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

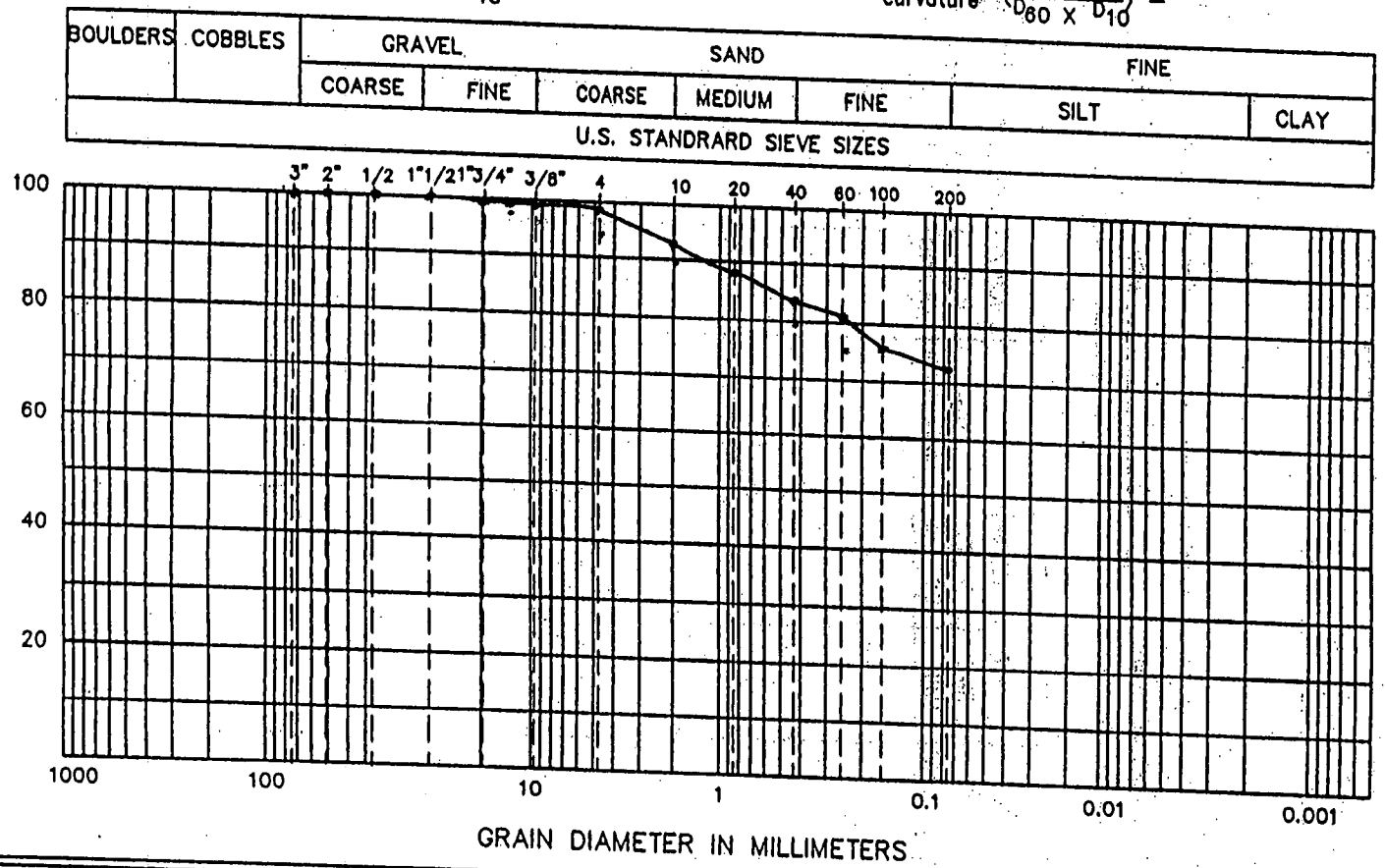
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-76 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 33

(PL) 18

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	100
3/4-in.	99.7
1/2-in.	99.2
3/8-in.	98.9
NO. 4	98.3
NO. 10	92.7
NO. 20.	88.4
NO. 40	84.1
NO. 60	80.4
NO. 100	76.2
NO. 200	72.0

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	76
0.02	65
0.005	42
0.002	33

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000466

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 76
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.43
Dry Soil & Tare (gm)	46.55
Tare Weight (gm)	3.26
Moisture Content (%)	6.65

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	503.08	
Tare Weight (gm)	7.07	
Total Weight (gm)	465.07	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			98.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.11
Calculated Dry Wt. used in test (gm)	52.61
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	98.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.49	1.49	95.5	#10	medium sand
#20	2.89	2.89	92.9	#20	medium sand
#40	4.30	4.30	90.3	#40	fine sand
#60	5.75	5.75	87.6	#60	fine sand
#100	7.40	7.40	84.5	#100	fine sand
#200	9.50	9.50	80.5	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/21/02	8:19								
9/21/02	8:21	2.00	45.0	22.50	0.013	6.50	38.50	10.1	0.99
9/21/02	8:24	5.00	41.5	22.50	0.013	6.50	35.00	10.6	0.99
9/21/02	8:34	15.00	35.5	22.50	0.013	6.50	29.00	11.5	0.99
9/21/02	8:49	30.00	32.0	22.50	0.013	6.50	25.50	12.2	0.99
9/21/02	9:19	60.00	30.0	22.50	0.013	6.50	23.50	12.5	0.99
9/21/02	12:29	250.00	25.5	22.50	0.013	6.50	19.00	13.2	0.99
9/22/02	8:19	1440.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0294	71.2		
0.0191	64.7	% GRAVEL	1.70
0.0115	53.6	% COARSE SAND	2.78
0.0084	47.2	% MEDIUM SAND	5.25
0.0060	43.5	% FINE SAND	9.72
0.0030	35.1	% FINES	80.55
0.0013	29.6	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS (CL)

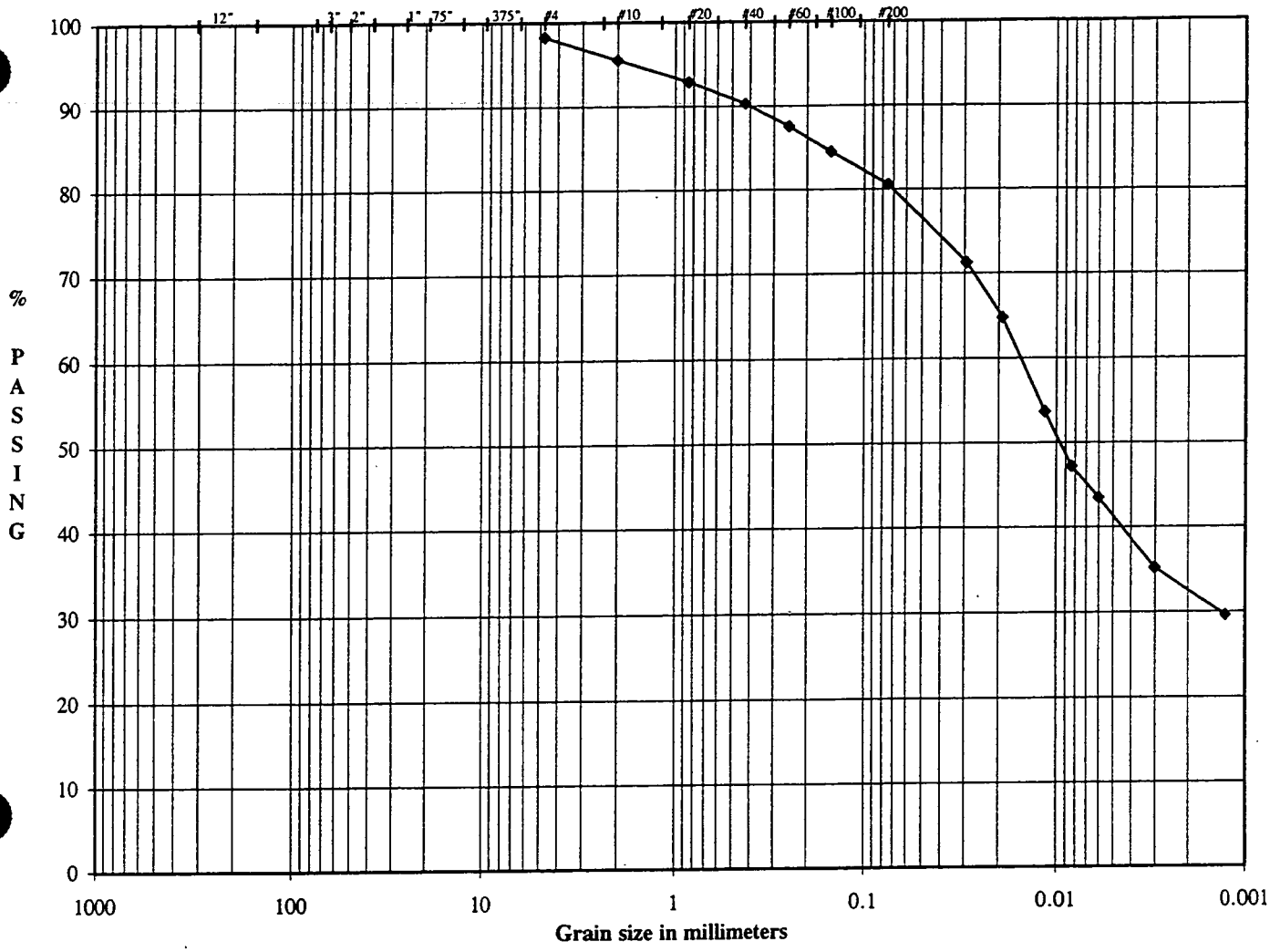
-	LL
-	PL
-	PI

TECH	SW/TJ
DATE	9/22/02
CHECK	BJS
REVIEW	PWY

000467

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 76
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/TJ
DATE	9/22/0
CHECK	
REVIEW	

000468

GEOSYNTEC CONSULTANTS

FLUOR FERNALD D368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 10 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-77

SOIL SAMPLE SIZE	+3/8 = 508.3 gm	MOISTURE = 284.6 gm	TOTAL = 21867.2 gm
	-3/8 = 21074.3 gm	21867.2	

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

48.24 - 1.78 46.46 = 210743

	BEFORE WASH +3/8	BEFORE WASH -3/8	AFTER WASH +3/8	AFTER WASH -3/8
TARE NO.	K	L-44	K	L-44
WT. OF DRY SAMPLE PLUS TARE (grams)	609.9	660.1	576.0	334.7
WT. OF TARE (grams)	101.6	191.8	101.6	191.8
WT. OF DRY SAMPLE (grams)	508.3	468.3	474.4	142.9

SIEVE ANALYSIS QA ID: DAE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	93.8	.4	99.6		
3/4 in	19.1	195.7	.9	99.1		90-100
1/2 in	12.7	388.8	1.8	98.2		
3/8 in	9.53	474.3	2.2	97.8		
No. 4	4.75	15.4	3.3	96.7	94.6	
No. 10	2.00	31.5	6.7	93.3	91.2	
No. 20	0.850	54.2	11.6	88.4	86.5	.978
No. 40	0.425	77.6	16.6	83.4	81.6	
No. 60	0.250	96.5	20.6	79.4	77.7	
No. 100	0.125	118.3	25.3	74.7	73.1	
No. 200	0.075	142.4	30.4	69.6	68.1	50-100
PAN	—	142.8	—	—		

COMMENTS:

000469

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CA SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

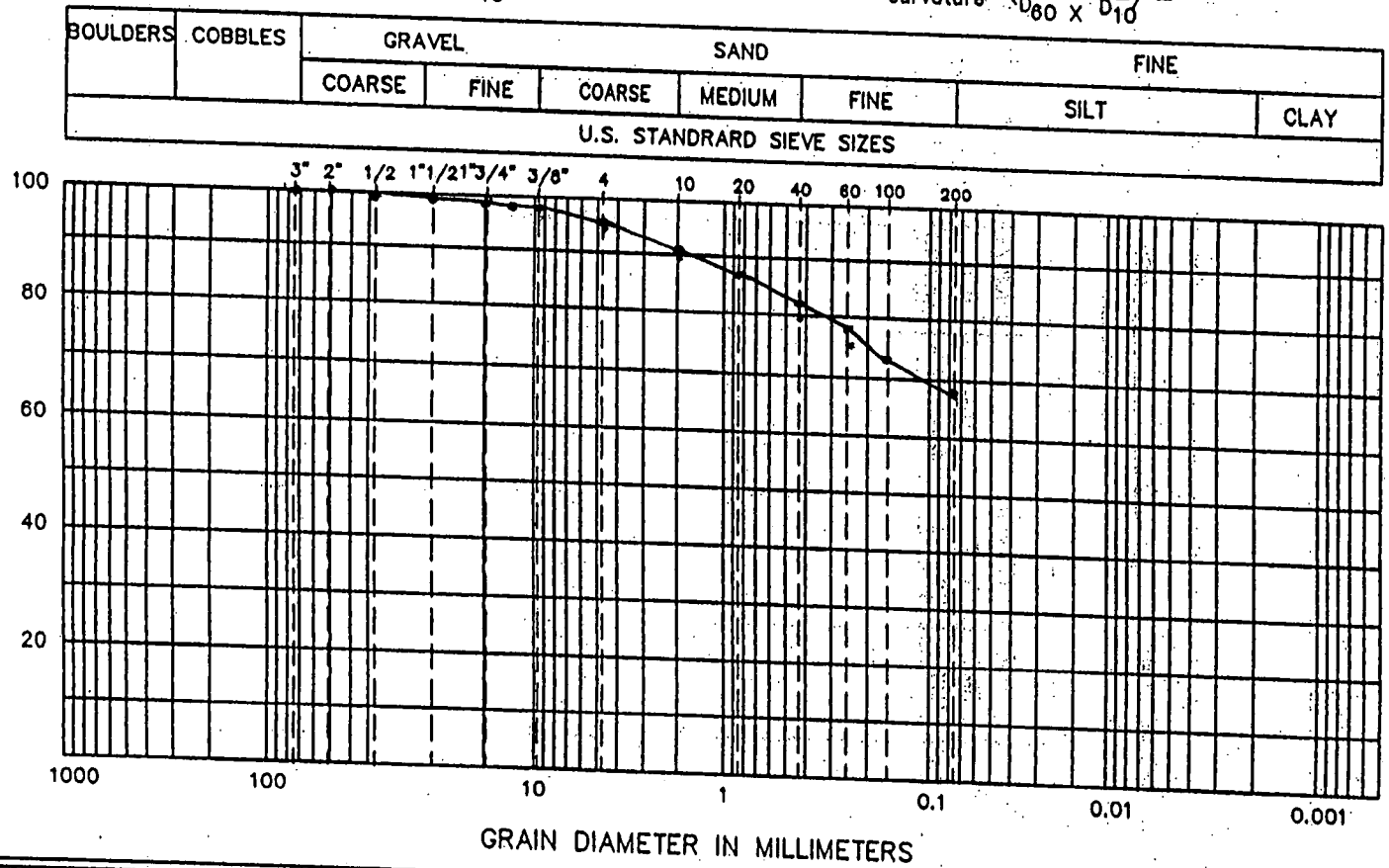
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-77 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 31

(PL) 16

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.6
3/4-in.	99.1
1/2-in.	98.2
3/8-in.	97.8
NO. 4	94.6
NO. 10	91.2
NO. 20	86.5
NO. 40	81.6
NO. 60	77.7
NO. 100	73.1
NO. 200	68.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	73
0.02	69
0.005	38
0.002	30

SOIL CLASSIFICATION (ASTM D 2487):

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CHECKED BY:

SHEET NO. ____ OF ____

000470

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 77
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.17	
Dry Soil & Tare (gm)	46.14	
Tare Weight (gm)	3.20	
Moisture Content (%)	7.06	

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	503.36	
Tare Weight (gm)	6.84	
Total Weight (gm)	463.79	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.89
Calculated Dry Wt. used in test (gm)	53.14
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.15	1.15	92.6	#10	medium sand
#20	2.88	2.88	89.5	#20	medium sand
#40	4.54	4.54	86.5	#40	fine sand
#60	6.15	6.15	83.7	#60	fine sand
#100	8.00	8.00	80.4	#100	fine sand
#200	10.57	10.57	75.8	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/21/02	8:21								
9/21/02	8:23	2.00	45.5	22.50	0.013	6.50	39.00	9.9	0.99
9/21/02	8:26	5.00	40.0	22.50	0.013	6.50	33.50	10.9	0.99
9/21/02	8:36	15.00	35.0	22.50	0.013	6.50	28.50	11.7	0.99
9/21/02	8:51	30.00	32.0	22.50	0.013	6.50	25.50	12.2	0.99
9/21/02	9:21	60.00	29.5	22.50	0.013	6.50	23.00	12.5	0.99
9/21/02	12:31	250.00	25.0	22.50	0.013	6.50	18.50	13.3	0.99
9/22/02	8:21	1440.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0291	68.7		
0.0193	59.0	% GRAVEL	5.40
0.0116	50.2	% COARSE SAND	2.05
0.0084	44.9	% MEDIUM SAND	6.03
0.0060	40.5	% FINE SAND	10.73
0.0030	32.6	% FINES	75.78
0.0013	26.4	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

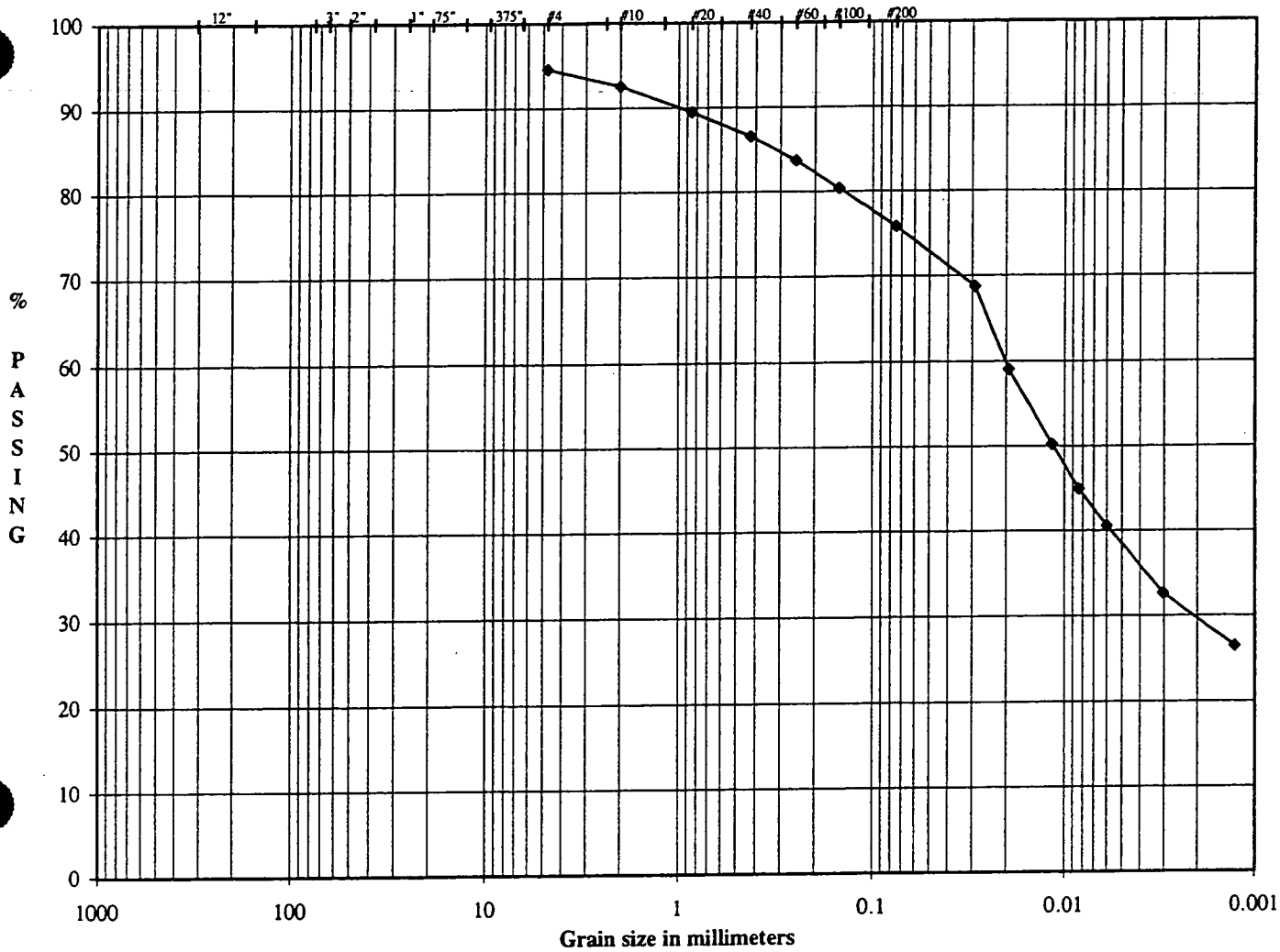
-	LL
-	PL
-	PI

TECH	SW/TJ
DATE	9/22/02
CHECK	
REVIEW	

000471

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 77
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/TJ
DATE	9/22/0
CHECK	SK
REVIEW	TWY

000472

Golder Associates Inc.

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.78

SOIL SAMPLE SIZE	+3/8 = 2040.4 gm	MOISTURE = 320.2 gm	TOTAL = 43647.3
	-3/8 = 41286.7 gm	43647.3	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
30.14 31.87 34.41 1.78 41286.7 (grams)	115	65

1.84 / 28.30 1.78 / 30.09 32.63 = 91.02

	+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.	L-2	L-6	L-2	L-6
WT. OF DRY SAMPLE PLUS TARE (grams)	2231.5	680.7	2106.5	350.9
WT. OF TARE (grams)	191.1	199.1	191.1	199.1
WT. OF DRY SAMPLE (grams)	2040.4	481.6	1915.4	151.8

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	739.9	1.7	98.3		
3/4 in	19.1	1022.5	2.3	97.7		90-100
1/2 in	12.7	1678.6	3.8	96.2		
3/8 in	9.53	1914.9	4.4	95.6		
No. 4	4.75	15.3	3.2	96.8	92.6	
No. 10	2.00	32.4	6.7	93.6	89.2	
No. 20	0.850	53.7	11.2	88.8	85.0	
No. 40	0.425	78.0	16.2	83.9	80.1	
No. 60	0.250	103.6	21.5	~~88.6~~ 78.5	75.0	
No. 100	0.125	130.1	27.0	~~83.4~~ 72.9	69.8	
No. 200	0.075	150.8	31.3	68.7	65.7	50-100
PAN	—	151.6	—	—		

COMMENTS:

000473

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

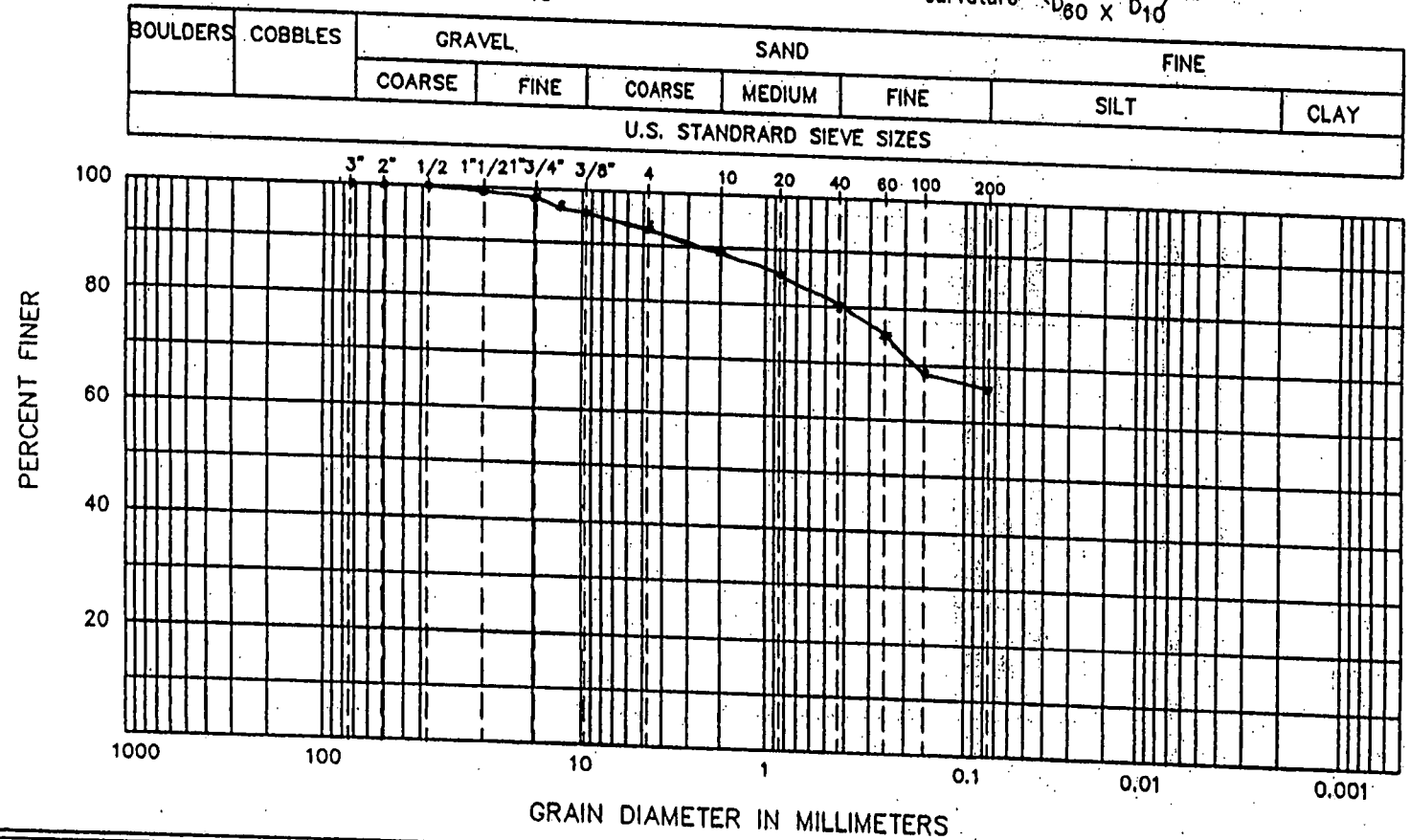
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-78 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 15

(PI) 14

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	98.3
3/4-In.	97.7
1/2-In.	96.2
3/8-In.	95.6
NO. 4	92.5
NO. 10	89.2
NO. 20	85.0
NO. 40	80.1
NO. 60	75.0
NO. 100	69.8
NO. 200	65.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	67.3
0.02	56.6
0.005	34.8
0.002	27.5

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

000474

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 78
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.21
Dry Soil & Tare (gm)	47.75
Tare Weight (gm)	3.19
Moisture Content (%)	3.28

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	504.45	
Tare Weight (gm)	6.13	
Total Weight (gm)	482.51	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.15
Calculated Dry Wt. used in test (gm)	54.37
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.15	2.15	88.9	#10	medium sand
#20	4.24	4.24	85.4	#20	medium sand
#40	6.16	6.16	82.1	#40	fine sand
#60	7.87	7.87	79.2	#60	fine sand
#100	9.88	9.88	75.8	#100	fine sand
#200	12.36	12.36	71.5	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/21/02	8:23								
9/21/02	8:25	2.00	43.5	22.50	0.013	6.50	37.00	10.2	0.99
9/21/02	8:28	5.00	39.5	22.50	0.013	6.50	33.00	10.9	0.99
9/21/02	8:38	15.00	34.5	22.50	0.013	6.50	28.00	11.7	0.99
9/21/02	8:53	30.00	31.0	22.50	0.013	6.50	24.50	12.4	0.99
9/21/02	9:23	60.00	28.0	22.50	0.013	6.50	21.50	12.9	0.99
9/21/02	12:33	250.00	24.0	22.50	0.013	6.50	17.50	13.5	0.99
9/22/02	8:23	1440.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0296	62.4		
0.0193	55.6	% GRAVEL	7.40
0.0116	47.2	% COARSE SAND	3.66
0.0084	41.3	% MEDIUM SAND	6.83
0.0061	36.3	% FINE SAND	10.56
0.0030	29.5	% FINES	71.55
0.0013	25.3	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

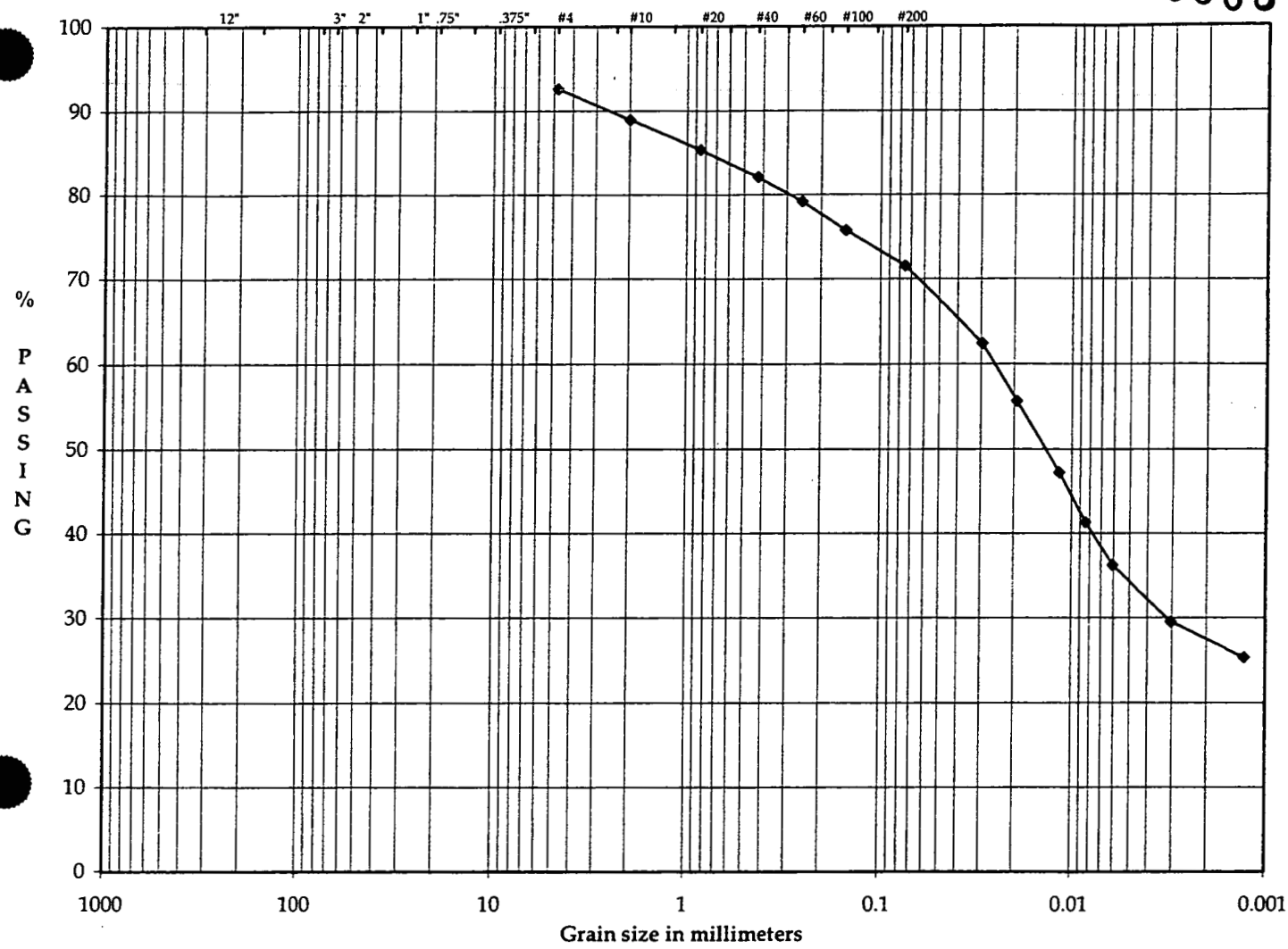
-	LL
-	PL
-	PI

TECH	SW/TJ
DATE	9/22/02
CHECK	BS
REVIEW	[illegible]

000475

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 78
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW/
DATE	9/22/02
CHECK	BRS
REVIEW	[illegible]

000476

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-79

SOIL SAMPLE SIZE	+3/8 = 1268.9 gm	MOISTURE = 372.1	TOTAL = 23713.2
	-3/8 = 22072.2 gram	23713.2	

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

50.47 − 1.81 Bucket sample 48.66 = 22072.2 gm

		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		L-8	L-9	L-8	L-9
WT. OF DRY SAMPLE PLUS TARE	(grams)	1462.1	705.2	1346.5	357.9
WT. OF TARE	(grams)	193.2	193.4	193.2	193.4
WT. OF DRY SAMPLE	(grams)	1268.9	511.8	1153.3	164.5

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	384.0	1.6	98.4		
3/4 in	19.1	600.4	2.5	97.5		90-100
1/2 in	12.7	991.1	4.2	95.8		
3/8 in	9.53	1152.9	4.9	95.1		
No. 4	4.75	17.9	3.5	96.5	91.8	
No. 10	2.00	37.0	7.2	92.8	88.3	
No. 20	0.850	58.0	11.3	88.7	84.4	
No. 40	0.425	79.7	15.6	84.4	80.3	
No. 60	0.250	99.8	19.5	80.5	76.3	
No. 100	0.125	124.0	24.2	7.8 75.8	72.1	
No. 200	0.075	155.8	29.5	70.5	67.1	50-100
PAN	—	164.5				

COMMENTS:

000477

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: _____ SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

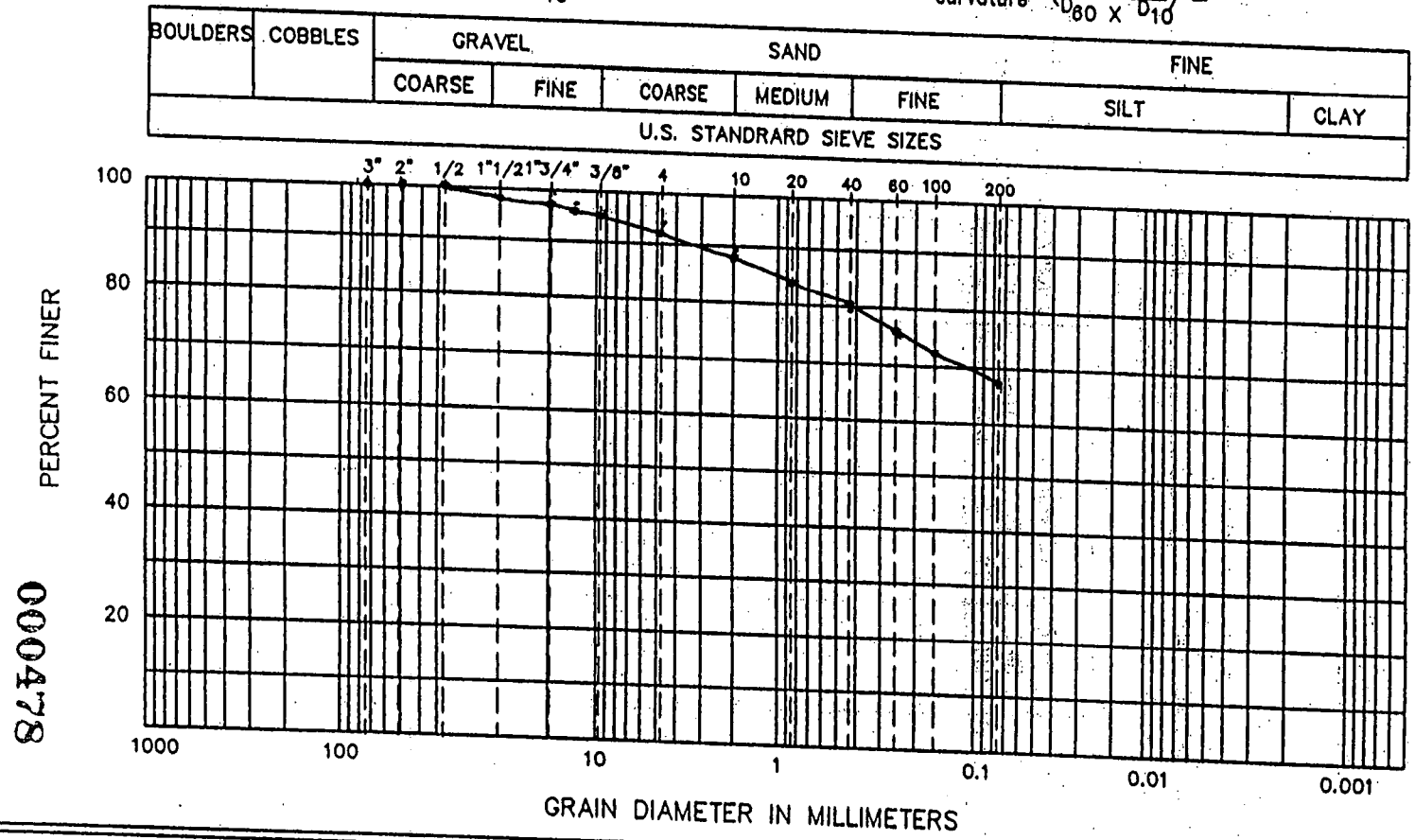
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-79 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 28

(PL) 17

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.4
3/4-in.	97.5
1/2-in.	95.8
3/8-in.	95.1
NO. 4	91.8
NO. 10	88.3
NO. 20.	84.4
NO. 40	80.3
NO. 60	76.3
NO. 100	72.1
NO. 200	67.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65
0.02	53
0.005	33
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000478

5 of 8

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

ROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 79
ROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.37	
Dry Soil & Tare (gm)	46.15	
Tare Weight (gm)	3.22	
Moisture Content (%)	7.50	

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	503.27	
Tare Weight (gm)	6.43	
Total Weight (gm)	462.17	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			91.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
e Dispersion Device		Mechanical
gth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.19
Calculated Dry Wt. used in test (gm)	52.27
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	91.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.80	1.80	88.6	#10	medium sand
#20	2.91	2.91	86.7	#20	medium sand
#40	5.92	5.92	81.4	#40	fine sand
#60	7.97	7.97	77.8	#60	fine sand
#100	10.35	10.35	73.6	#100	fine sand
#200	13.24	13.24	68.5	#200	fines

HYDROMETER CALCULATIONS

DATE 9/21/02	TIME 8:25	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/21/02	8:27	2.00	41.0	22.50	0.013	6.50	34.50	10.7	0.99
9/21/02	8:30	5.00	37.0	22.50	0.013	6.50	30.50	11.4	0.99
9/21/02	8:40	15.00	32.5	22.50	0.013	6.50	26.00	12.0	0.99
9/21/02	8:55	30.00	29.0	22.50	0.013	6.50	22.50	12.7	0.99
9/21/02	9:25	60.00	26.5	22.50	0.013	6.50	20.00	13.0	0.99
9/21/02	12:35	250.00	22.0	22.50	0.013	6.50	15.50	13.8	0.99
9/22/02	8:25	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0303	60.0		
0.0198	53.0	% GRAVEL	8.20
0.0117	45.2	% COARSE SAND	3.16
0.0085	39.1	% MEDIUM SAND	7.24
0.0061	34.8	% FINE SAND	12.86
0.0031	27.0	% FINES	68.55
0.0013	22.6	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

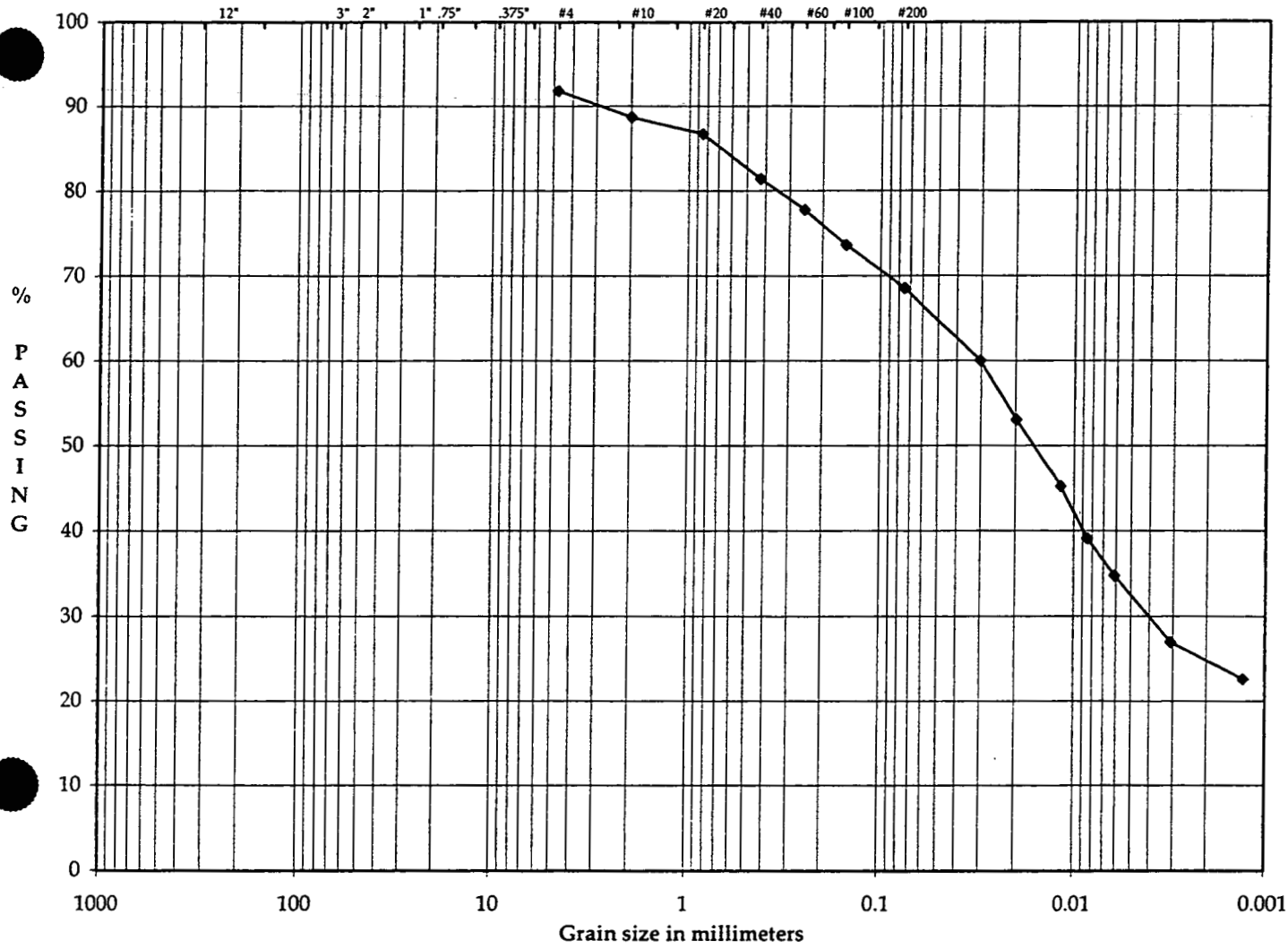
TECH	SW/T
DATE	9/22/02
CHECK	BS
REVIEW	Fully

000479

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	Gravel		SAND			FINES

SAMPLE ID	LP02 - 79
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW
DATE	9/22/02
CHECK	[illegible]
REVIEW	[illegible]

000480

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 16 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-81

11.29
-1.78

SOIL SAMPLE SIZE	+3/8 = 1805.3 grm	MOISTURE = 349.5 gm	TOTAL = 42756.5 gm
	-3/8 = 40601.7 gm	42756.5 gm	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
50.00 LBs 69.51 LBs 39.51 (grams)	115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-7	L-1	L-7	L-1
WT. OF DRY SAMPLE PLUS TARE	(grams)	1998.3	757.5	1895.5	358.8
WT. OF TARE	(grams)	193.0	192.4	193.0	192.4
WT. OF DRY SAMPLE	(grams)	1805.3	565.1	1702.5	166.4

SIEVE ANALYSIS QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	273.5	0.64	99.4		
1 in	25.4	546.4	1.3	98.7		
3/4 in	19.1	906.9	2.1	97.9		90-100
1/2 in	12.7	1493.3	3.5	96.5		
3/8 in	9.53	1698.9	4.0	96.0		
No. 4	4.75	18.7	3.3	96.7	92.8	
No. 10	2.00	41.6	7.4	92.6	~~88.6~~	89.0
No. 20	0.850	65.6	11.6	88.4	84.9	
No. 40	0.425	89.4	15.8	84.2	80.8	
No. 60	0.250	110.6	19.6	80.4	77.2	
No. 100	0.125	137.4	24.3	75.7	72.7	
No. 200	0.075	165.3	29.3	70.7	67.9	50-100
PAN	—	166.6	—	—		

COMMENTS:

000481

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

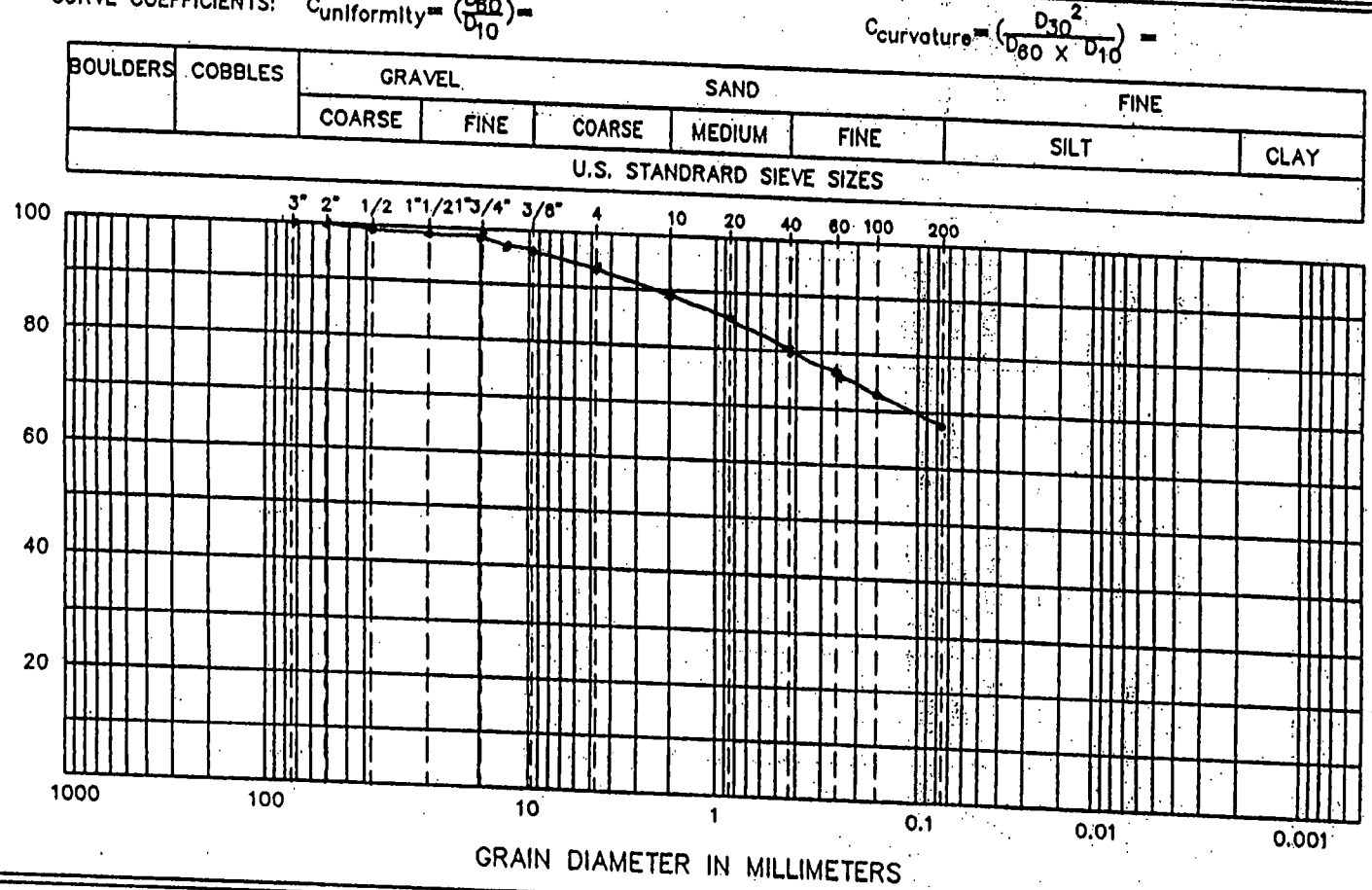
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-81 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 17

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.4
1-in.	98.7
3/4-in.	97.9
1/2-in.	96.5
3/8-in.	96.0
NO. 4	92.8
NO. 10	89.0
NO. 20.	84.9
NO. 40	80.8
NO. 60	77.2
NO. 100	72.7
NO. 200	67.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	67.0
0.02	54.0
0.005	35.0
0.002	27.0

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000482

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

ROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 81
ROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.59
Dry Soil & Tare (gm)	47.19
Tare Weight (gm)	3.17
Moisture Content (%)	5.45

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	502.50	
Tare Weight (gm)	6.77	
Total Weight (gm)	470.10	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
pe Dispersion Device		Mechanical
ngth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.96
Calculated Dry Wt. used in test (gm)	54.02
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.20	2.20	89.0	#10	medium sand
#20	3.94	3.94	86.0	#20	medium sand
#40	5.74	5.74	82.9	#40	fine sand
#60	7.38	7.38	80.1	#60	fine sand
#100	9.42	9.42	76.6	#100	fine sand
#200	12.14	12.14	71.9	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/21/02	8:27								
9/21/02	8:29	2.00	43.5	22.50	0.013	6.50	37.00	10.2	0.99
9/21/02	8:32	5.00	40.0	22.50	0.013	6.50	33.50	10.9	0.99
9/21/02	8:42	15.00	34.5	22.50	0.013	6.50	28.00	11.7	0.99
9/21/02	8:57	30.00	31.0	22.50	0.013	6.50	24.50	12.4	0.99
9/21/02	9:27	60.00	28.5	22.50	0.013	6.50	22.00	12.7	0.99
9/21/02	12:37	250.00	24.0	22.50	0.013	6.50	17.50	13.5	0.99
9/22/02	8:27	1440.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0296	62.9		
0.0193	57.0	% GRAVEL	7.20
0.0116	47.6	% COARSE SAND	3.78
0.0084	41.7	% MEDIUM SAND	6.08
0.0060	37.4	% FINE SAND	11.00
0.0030	29.8	% FINES	71.94
0.0013	25.5	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

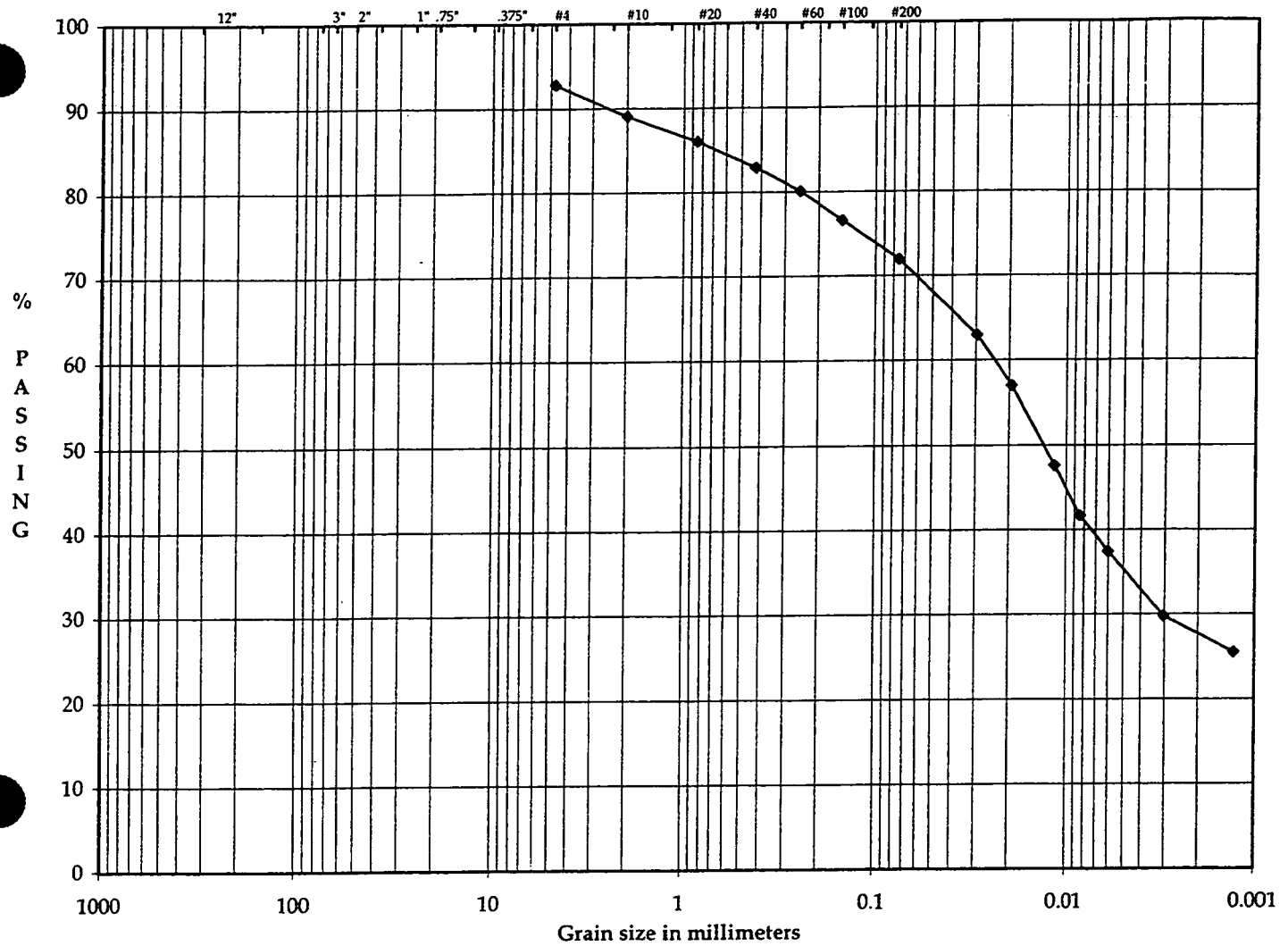
TECH	SW/T.
DATE	9/22/02
CHECK	
REVIEW	

000433

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 81
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	SW
DATE	9/22/02
CHECK	BS
REVIEW	[illegible]

000484

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-82

SOIL SAMPLE SIZE	+3/8 = 1321.4 gram	MOISTURE = 355.9	TOTAL = 23,930.9
	-3/8 = 22253.6		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
50.87 49.06 lb's (grams)	115	65

— 1.81 / 49.06	+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.	L-8	L-3	L-8	L-3
WT. OF DRY SAMPLE PLUS TARE (grams)	1514.6	749.3	1445.8	353.5
WT. OF TARE (grams)	193.2	189.8	193.2	189.8
WT. OF DRY SAMPLE (grams)	1321.4	559.5	1252.6	163.7

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	194.8	0.8	99.2		
1 in	25.4	588.8	2.4	97.6		
3/4 in	19.1	820.8	3.4	96.6		90-100
1/2 in	12.7	1149.6	4.8	95.2		
3/8 in	9.53	1252.6	5.3	94.7		
No. 4	4.75	18.3	3.3	96.7	91.6	
No. 10	2.00	39.6	7.1	92.9	88.0	
No. 20	0.850	62.7	11.2	88.8	84.1	
No. 40	0.425	86.2	15.4	84.6 ~~84.6~~	80.1	
No. 60	0.250	108.2	19.3	80.7	76.4	
No. 100	0.125	135.0	24.1	75.9	71.9	
No. 200	0.075	162.3	29.0	71.0	67.2	50-100
PAN	—	163.7	—	—		

COMMENTS:

000485

% FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: _____ SHEET NO. ____ OF ____

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

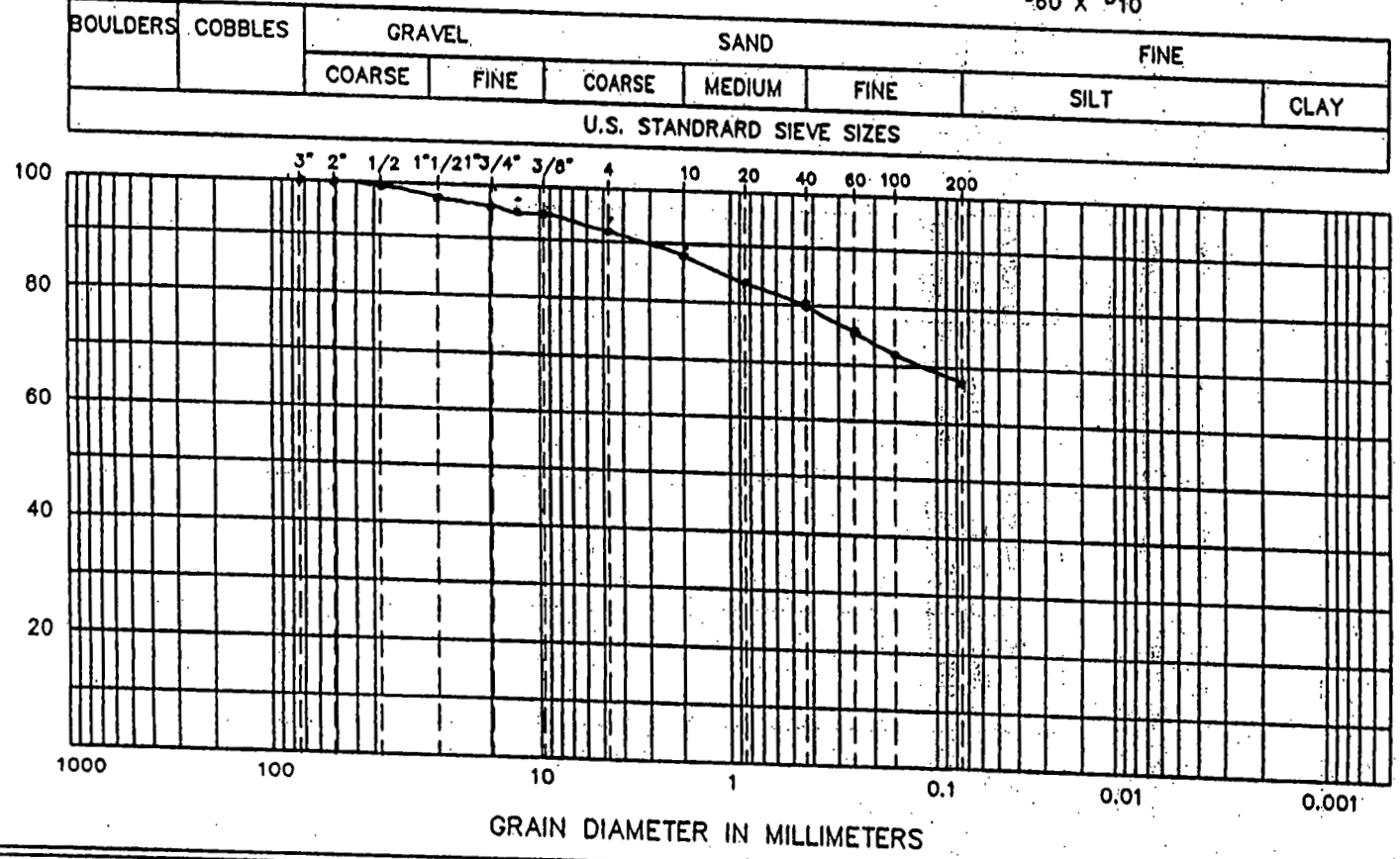
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-82 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 30

(PL) 16

(PI) 14

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.2
1-in.	97.5
3/4-in.	96.6
1/2-in.	95.2
3/8-in.	94.7
NO. 4	91.6
NO. 10	88.0
NO. 20.	84.1
NO. 40	80.1
NO. 60	76.4
NO. 100	71.9
NO. 200	67.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	66
0.02	54
0.005	33
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000436

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

ROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 82
ROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	49.21
Dry Soil & Tare (gm)	46.18
Tare Weight (gm)	3.21
Moisture Content (%)	7.05

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	503.62	
Tare Weight (gm)	5.96	
Total Weight (gm)	464.88	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			91.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
pe Dispersion Device		Mechanical
ngth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.38
Calculated Dry Wt. used in test (gm)	52.67
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	91.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.08	1.08	89.7	#10	medium sand
#20	3.05	3.05	86.3	#20	medium sand
#40	5.15	5.15	82.6	#40	fine sand
#60	7.13	7.13	79.2	#60	fine sand
#100	9.42	9.42	75.2	#100	fine sand
#200	11.83	11.83	71.0	#200	fines

HYDROMETER CALCULATIONS

DATE 9/21/02	TIME 8:29	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/21/02	8:31	2.00	42.0	22.50	0.013	6.50	35.50	10.6	0.99
9/21/02	8:34	5.00	38.0	22.50	0.013	6.50	31.50	11.2	0.99
9/21/02	8:44	15.00	33.0	22.50	0.013	6.50	26.50	12.0	0.99
9/21/02	8:59	30.00	29.5	22.50	0.013	6.50	23.00	12.5	0.99
9/21/02	9:29	60.00	27.0	22.50	0.013	6.50	20.50	13.0	0.99
9/21/02	12:39	250.00	23.0	22.50	0.013	6.50	16.50	13.7	0.99
9/22/02	8:29	1440.00	21.0	23.00	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0302	61.1		
0.0196	54.2	% GRAVEL	8.40
0.0117	45.6	% COARSE SAND	1.88
0.0085	39.6	% MEDIUM SAND	7.08
0.0061	35.3	% FINE SAND	11.62
0.0031	28.4	% FINES	71.02
0.0013	24.1	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

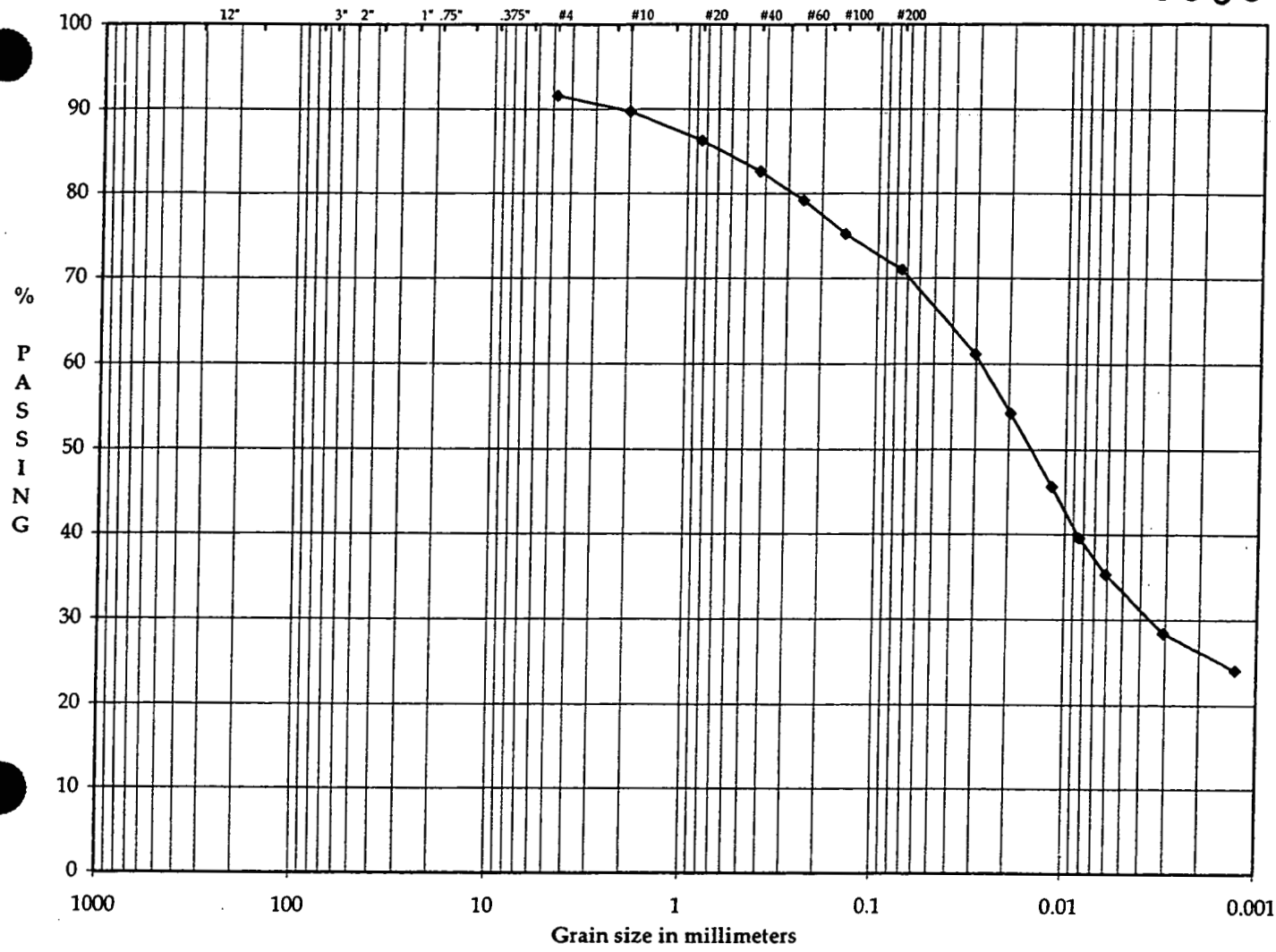
TECH	SW/1
DATE	9/22/02
CHECK	BS
REVIEW	[illegible]

000487

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 82
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000488

TECH	SW/
DATE	9/22/02
CHECK	BJS
REVIEW	PWH

GEOSYNTEC CONSULTANTS

FLUOR FERNALD
5368

ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 20 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02.83

SOIL SAMPLE SIZE: +3/8 = 863.7 gram; -3/8 = 3.9903.2; MOISTURE = 318.1; 41085.0 gm; TOTAL = 41085.0

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
50.00 / 37.97	115	65

39.77
1.80
37.97
87.97

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-44	L-3	L-44	L-3
WT. OF DRY SAMPLE PLUS TARE	(grams)	1054.7	489.7	1006.4	294.7
WT. OF TARE	(grams)	191.0	189.8	191.0	189.8
WT. OF DRY SAMPLE	(grams)	863.7	~~499.9~~ 465.3	815.4	104.9

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	169.6	0.4	99.6		
1 in	25.4	324.1	0.8	99.2		
3/4 in	19.1	520.8	1.3	98.7		90-100
1/2 in	12.7	728.6	1.8	98.2		
3/8 in	9.53	815.1	2.0	98.0		
No. 4	4.75	10.4	2.2	97.8	95.8	
No. 10	2.00	24.2	5.2	94.8	92.9	
No. 20	0.850	38.9	8.4	91.6	89.8	
No. 40	0.425	54.2	11.6	88.4	86.6	
No. 60	0.250	67.7	14.5	85.5	83.8	
No. 100	0.125	85.8	18.4	81.6	80.0	
No. 200	0.075	103.7	22.3	77.7	76.1	50-100
PAN	—	104.8	—	—		

.98

COMMENTS:

000489

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [illegible] — SHEET NO. 1 OF 3

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

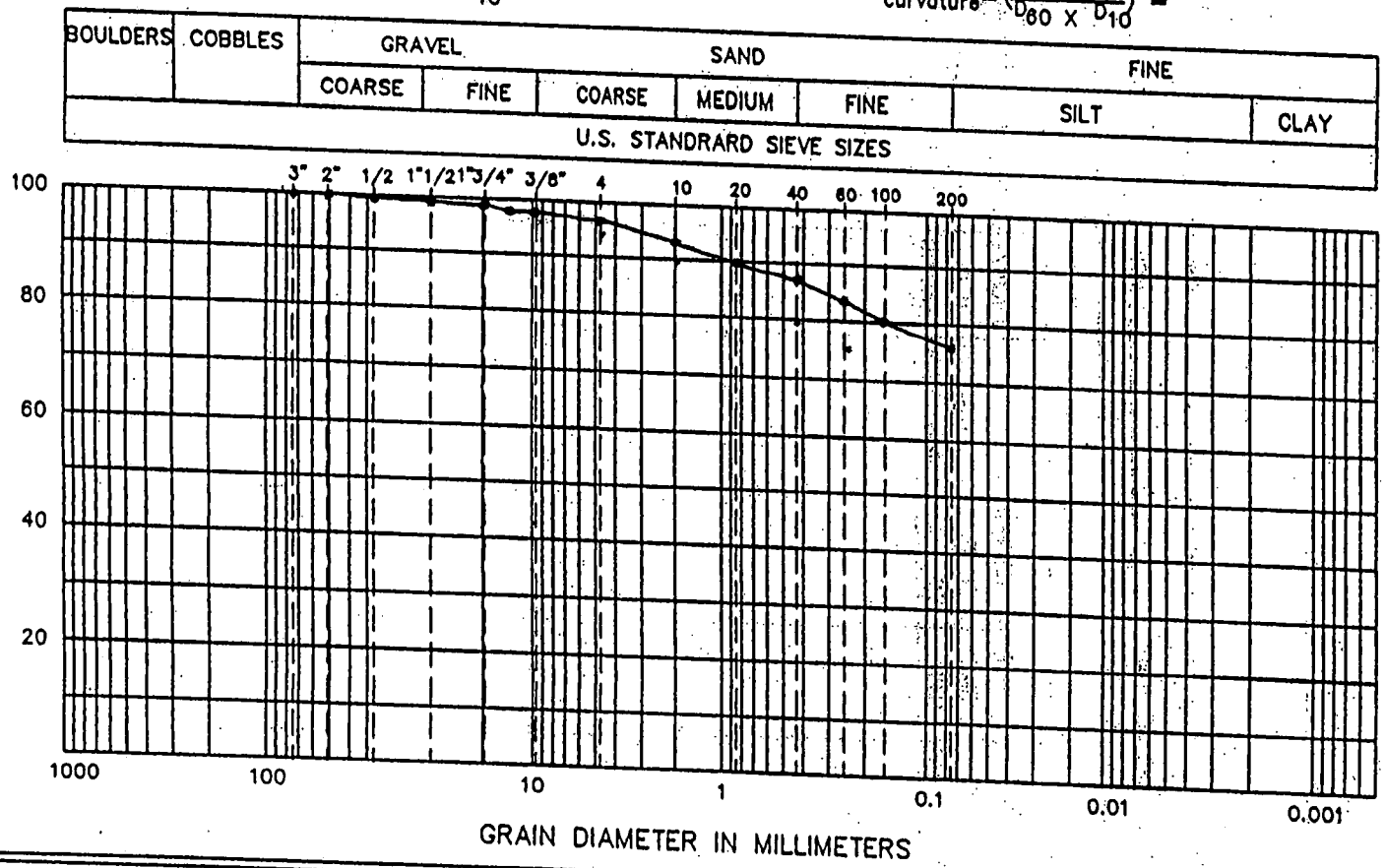
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-83 QA ID: CAW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 33

(PL) 18

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.6
1-In.	99.2
3/4-In.	98.7
1/2-In.	98.2
3/8-In.	98.0
NO. 4	95.8
NO. 10	92.9
NO. 20.	89.8
NO. 40	86.6
NO. 60	83.8
NO. 100	80.0
NO. 200	76.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	76.5
0.02	62.3
0.005	34.9
0.002	27.8

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000490

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 83
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.69
Dry Soil & Tare (gm)	47.55
Tare Weight (gm)	3.17
Moisture Content (%)	7.08

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	507.03	
Tare Weight (gm)	7.05	
Total Weight (gm)	466.94	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			95.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.22
Calculated Dry Wt. used in test (gm)	52.51
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	95.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.29	1.29	93.4	#10	medium sand
#20	2.60	2.60	91.1	#20	medium sand
#40	3.87	3.87	88.7	#40	fine sand
#60	5.15	5.15	86.4	#60	fine sand
#100	6.76	6.76	83.5	#100	fine sand
#200	8.85	8.85	79.7	#200	fines

HYDROMETER CALCULATIONS

DATE 9/26/02	TIME 9:15	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/26/02	9:17	2.00	47.0	23.00	0.013	7.00	40.00	9.7	0.99
9/26/02	9:20	5.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
9/26/02	9:30	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
9/26/02	9:45	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/26/02	10:15	60.00	27.0	23.00	0:013	7.00	20.00	13.0	0.99
9/26/02	13:25	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/27/02	9:15	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0286	72.3
0.0190	61.4
0.0116	47.0
0.0084	41.5
0.0061	36.1
0.0030	28.9
0.0013	25.3

% GRAVEL	4.20
% COARSE SAND	2.35
% MEDIUM SAND	4.71
% FINE SAND	9.09
% FINES	79.65
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS: (CL)

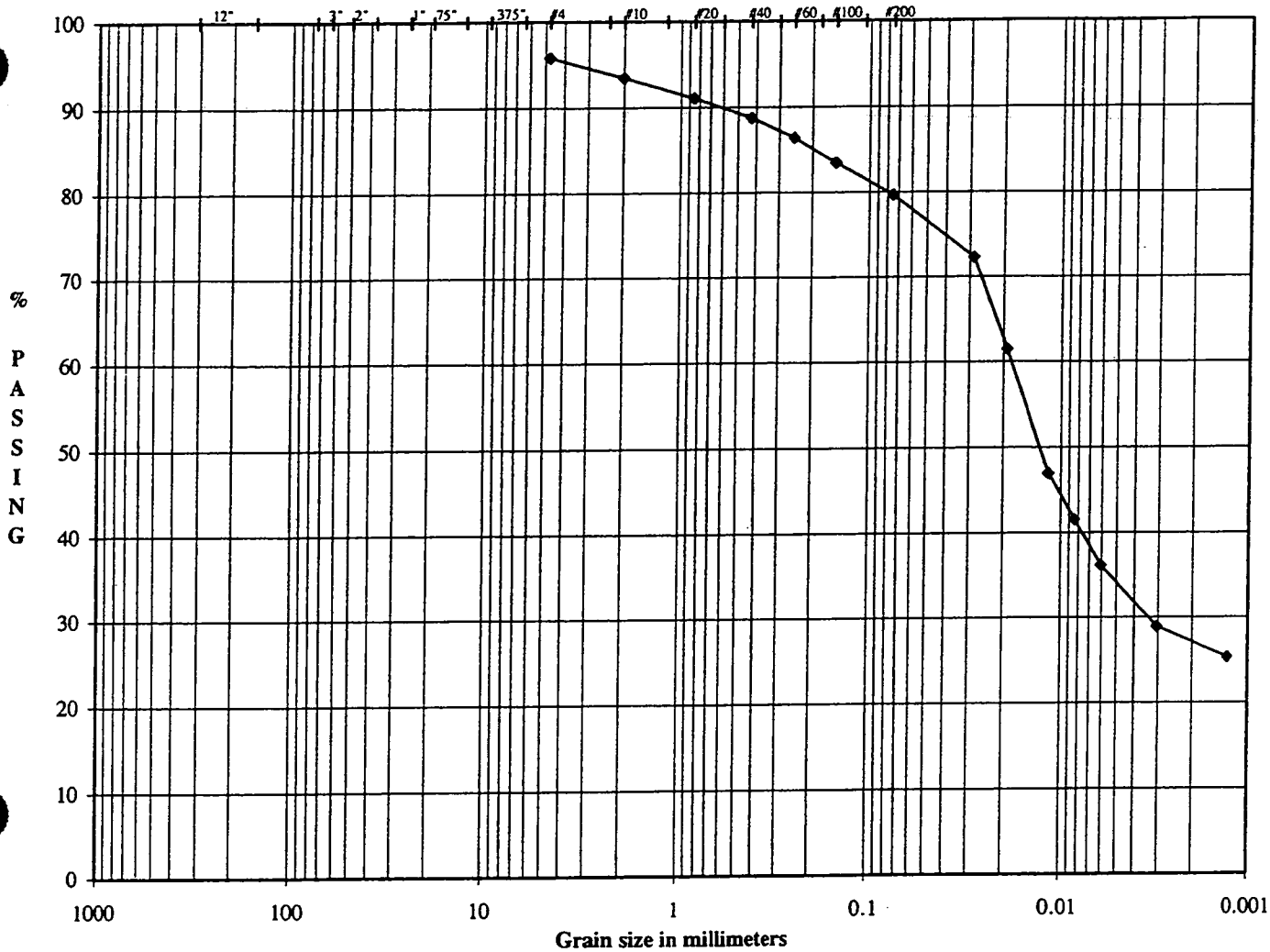
-	LL
-	PL
-	PI

TECH	TJ
DATE	9/25/02
CHECK	[illegible]
REVIEW	[illegible]

000491

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 83
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/25/0
CHECK	BSS
REVIEW	PWA

000432

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 16 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-84

SOIL SAMPLE SIZE	+3/8 = 1013.9	MOISTURE = 281.5	TOTAL = 21415.0
	-3/8 = 21119.6	22415.0	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 48.34 - 1.78 = 46.56 (grams)	SAND	FINE GRAIN
	115	65

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-2	L-5	L-2	L-5
WT. OF DRY SAMPLE PLUS TARE (grams)	1205.0	691.6	1127.5	274.3
WT. OF TARE (grams)	191.1	106.4	191.1	106.4
WT. OF DRY SAMPLE (grams)	1013.9	585.2	936.4	167.9

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	260.5	1.2	98.8		
3/4 in	19.1	468.8	2.2	97.8		90-100
1/2 in	12.7	851.7	4.0	96.0		
3/8 in	9.53	935.7	4.4	95.6		
No. 4	4.75	19.9	3.4	96.6	92.4	
No. 10	2.00	45.3	7.7	92.3	88.2	
No. 20	0.850	70.4	12.0	88.0	84.1	
No. 40	0.425	93.6	16.0	84.0	80.3	
No. 60	0.250	113.2	19.3	80.7	77.1	
No. 100	0.125	138.1	23.6	76.4	73.1	
No. 200	0.075	166.2	28.4	71.6	68.5	50-100
PAN	—	167.9	—	—		

COMMENTS:

000493

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: _____

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

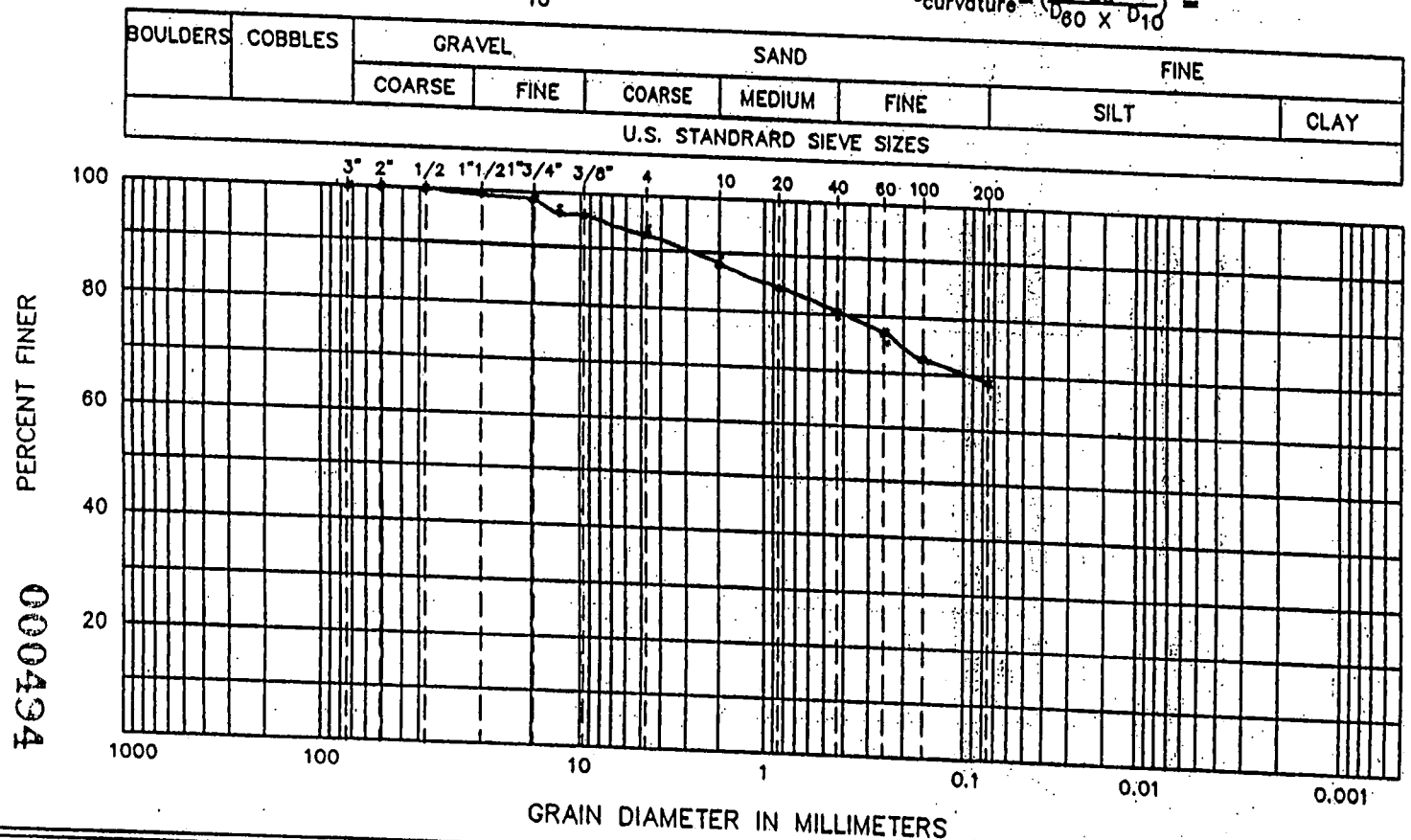
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-84 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 30

(PL) 17

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.8
3/4-in.	97.8
1/2-in.	96.0
3/8-in.	95.6
NO. 4	92.4
NO. 10	88.2
NO. 20	84.1
NO. 40	80.3
NO. 60	77.1
NO. 100	73.1
NO. 200	68.5

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	69
0.02	57
0.005	33
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000434

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 84
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.52
Dry Soil & Tare (gm)	49.20
Tare Weight (gm)	3.24
Moisture Content (%)	2.87

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.83	
Tare Weight (gm)	6.87	
Total Weight (gm)	486.00	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.4	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
e Dispersion Device		Mechanical
gth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.14
Calculated Dry Wt. used in test (gm)	55.54
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.40

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.32	1.32	90.2	#10	medium sand
#20	3.50	3.50	86.6	#20	medium sand
#40	5.57	5.57	83.1	#40	fine sand
#60	7.36	7.36	80.2	#60	fine sand
#100	9.45	9.45	76.7	#100	fine sand
#200	12.31	12.31	71.9	#200	fines

HYDROMETER CALCULATIONS

DATE 9/26/02	TIME 9:17	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/26/02	9:19	2.00	47.0	23.00	0.013	7.00	40.00	9.7	0.99
9/26/02	9:22	5.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
9/26/02	9:32	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
9/26/02	9:47	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
9/26/02	10:17	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/26/02	13:27	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
9/27/02	9:17	1440.00	21.5	22.50	0.013	7.00	14.50	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0286	65.9		
0.0190	56.0	% GRAVEL	7.60
0.0115	46.1	% COARSE SAND	2.20
0.0084	39.5	% MEDIUM SAND	7.07
0.0060	34.6	% FINE SAND	11.21
0.0030	28.0	% FINES	71.92
0.0013	23.9	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

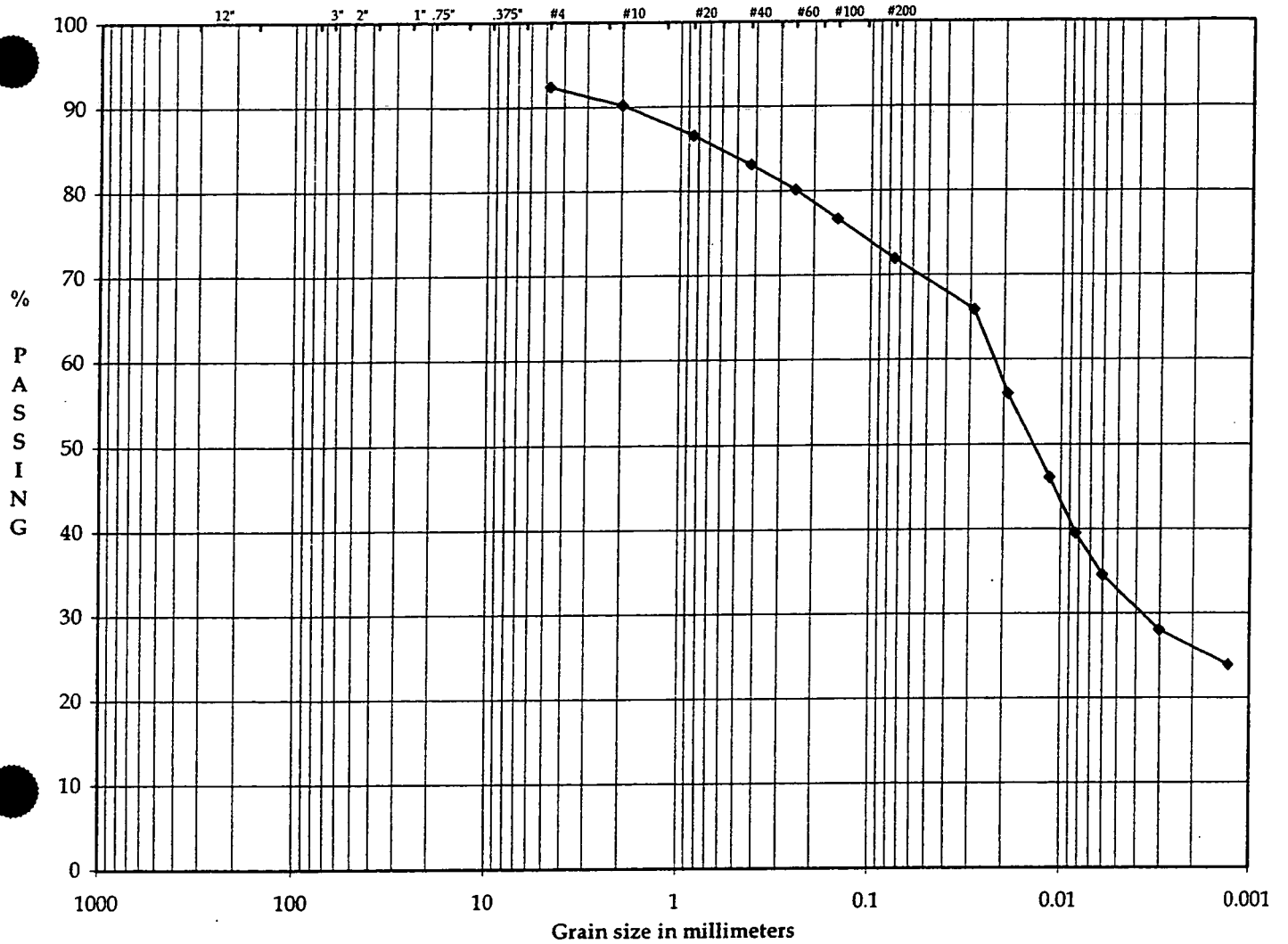
TECH	TJ
DATE	9/25/02
CHECK	BSS
REVIEW	D.V.M

000495

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 84
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	T.
DATE	9/25/02
CHECK	[illegible]
REVIEW	[illegible]

000496

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 17 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.85

SOIL SAMPLE SIZE	+3/8 = 1288.4	MOISTURE = 339.9	TOTAL = 45076.6
	-3/8 = 43448.3		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		N	LL.4	N	LL.4
WT. OF DRY SAMPLE PLUS TARE	(grams)	1390.0	728.9	1288.4	317.5
WT. OF TARE	(grams)	101.6	145.4	101.6	145.4
WT. OF DRY SAMPLE	(grams)	1288.4	583.5	1186.8	172.1

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	286.5	0.6	99.4		
3/4 in	19.1	493.5	1.1	98.9		90-100
1/2 in	12.7	926.1	2.1	97.9		
3/8 in	9.53	1186.2	2.6	97.4		
No. 4	4.75	23.2	4.0	96.0	93.5	
No. 10	2.00	48.8	8.4	91.6	89.2	
No. 20	0.850	73.4	12.6	87.4	85.1	
No. 40	0.425	97.3	16.7	83.3	81.1	
No. 60	0.250	118.3	20.3	79.7	77.6	
No. 100	0.125	145.8	25.0	75.0	73.0	
No. 200	0.075	171.6	29.4	70.6	68.7	50-100
PAN	—	172.0	—	—		

COMMENTS:

000497

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: SH SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

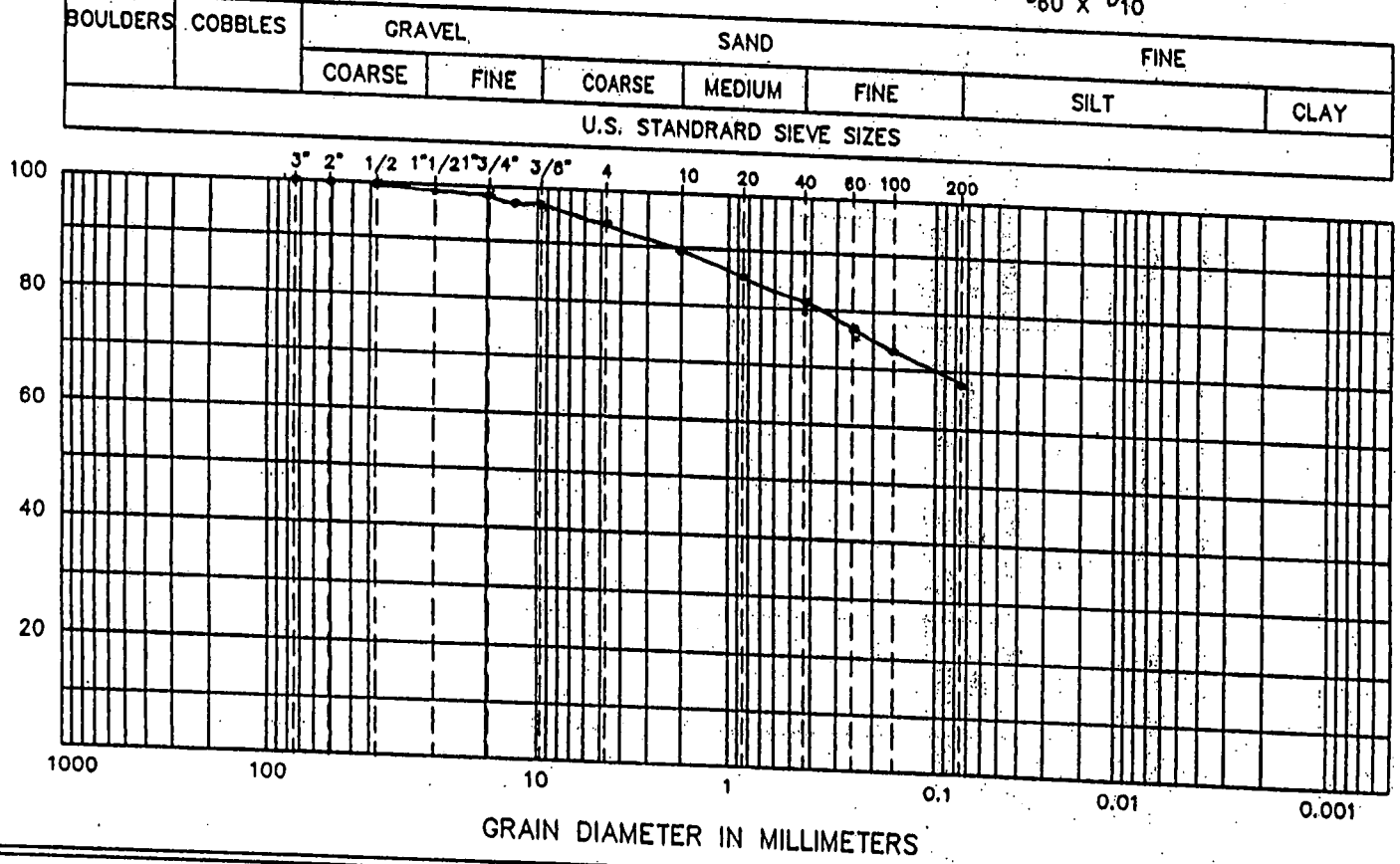
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-85 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 27

(PL) 16

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.4
3/4-in.	98.9
1/2-in.	97.9
3/8-in.	97.4
NO. 4	93.5
NO. 10	89.2
NO. 20.	85.1
NO. 40	81.1
NO. 60	77.6
NO. 100	73.0
NO. 200	68.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	57
0.005	34
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-10-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

000498

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 85
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.69
Dry Soil & Tare (gm)	48.89
Tare Weight (gm)	3.24
Moisture Content (%)	3.94

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.10	
Tare Weight (gm)	6.85	
Total Weight (gm)	480.31	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
pe Dispersion Device		Mechanical
gth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.34
Calculated Dry Wt. used in test (gm)	54.20
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.39	2.39	89.4	#10	medium sand
#20	4.80	4.80	85.2	#20	medium sand
#40	6.77	6.77	81.8	#40	fine sand
#60	8.50	8.50	78.8	#60	fine sand
#100	10.56	10.56	75.3	#100	fine sand
#200	13.34	13.34	70.5	#200	fines

HYDROMETER CALCULATIONS

DATE 9/26/02	TIME 9:19	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/26/02	9:21	2.00	45.0	23.00	0.013	7.00	38.00	10.1	0.99
9/26/02	9:24	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/26/02	9:34	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
9/26/02	9:49	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/26/02	10:19	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/26/02	13:29	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
9/27/02	9:19	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0292	64.9		
0.0192	56.4	% GRAVEL	6.50
0.0116	46.1	% COARSE SAND	4.12
0.0084	39.3	% MEDIUM SAND	7.56
0.0060	35.9	% FINE SAND	11.33
0.0030	29.0	% FINES	70.49
0.0013	22.2	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

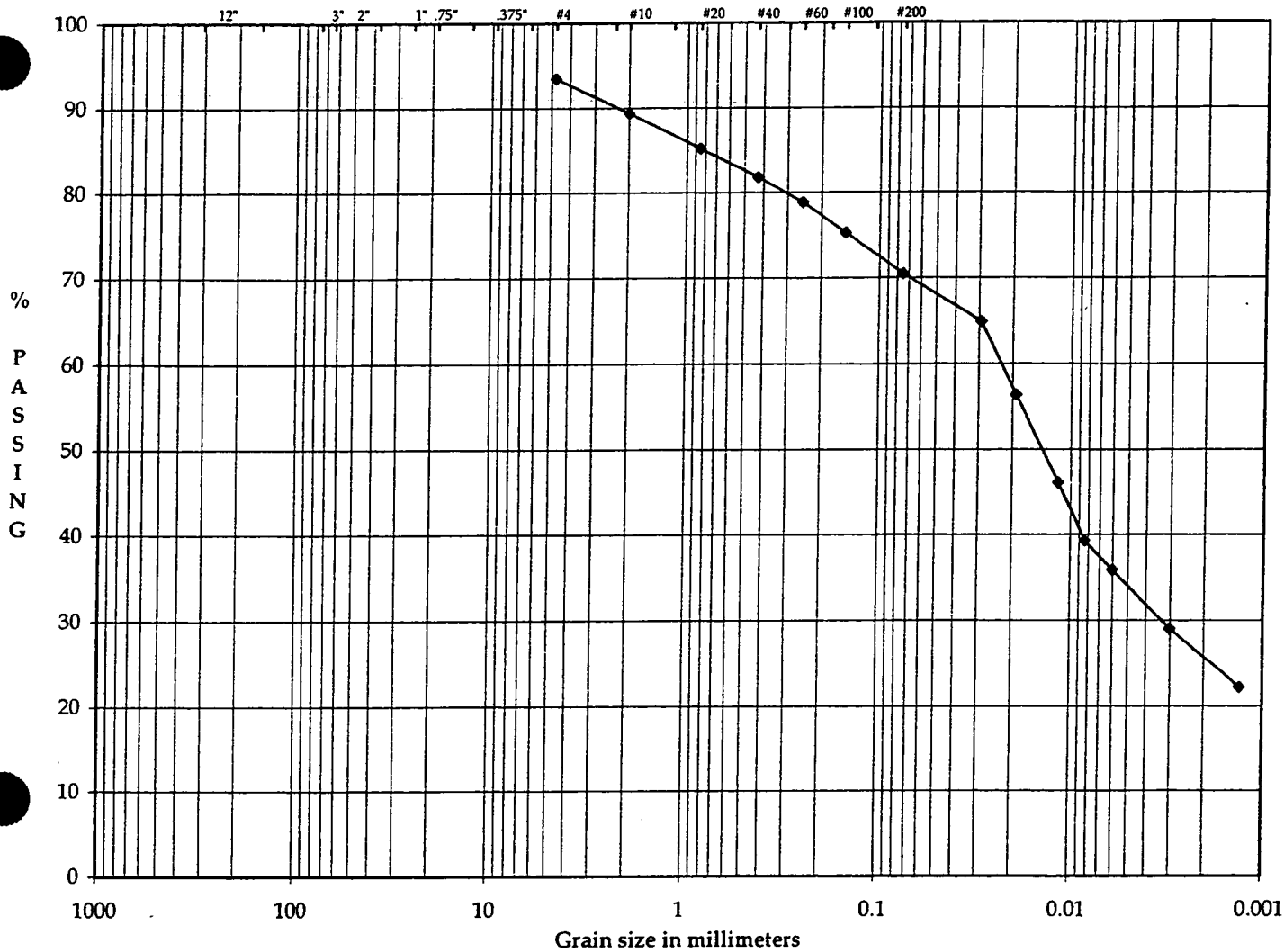
000439

TECH	TJ
DATE	9/25/02
CHECK	
REVIEW	

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	Gravel		SAND			FINES

SAMPLE ID	LP02 - 85
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000500

TECH	T
DATE	9/25/02
CHECK	
REVIEW	

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

ARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP 02-86

SOIL SAMPLE SIZE	+3/8 = 396.6 gm	MOISTURE = 316.4 gm	TOTAL = 20633.1
	-3/8 = 19926.1		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
Bucket wt - 43.08 18720.1 Add 1200 grams	115	65

1.81 / 41.27

		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		L-9	K	L-9	K
WT. OF DRY SAMPLE PLUS TARE	(grams)	589.8	679.9	570.2	278.9
WT. OF TARE	(grams)	193.2	101.6	193.2	101.6
WT. OF DRY SAMPLE	(grams)	396.6	578.3	377.0	177.3

SIEVE ANALYSIS QA ID: DCF

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	104.9	0.5	99.5		
3/4 in	19.1	149.8	0.7	99.3		90-100
1/2 in	12.7	281.7	1.4	98.6		
3/8 in	9.53	376.9	1.8	98.2		
No. 4	4.75	21.1	3.6	96.4	94.6	
No. 10	2.00	49.9	8.6	91.4	~~91.4~~	89.7
No. 20	0.850	77.6	13.4	86.6	~~86.6~~	85.0
No. 40	0.425	103.2	17.8	82.2	~~82.2~~	80.7
No. 60	0.250	125.0	21.6	78.4	~~78.4~~	77.0
No. 100	0.125	150.0	25.9	74.1	~~74.1~~	72.7
No. 200	0.075	176.3	30.5	69.5	68.2	50-100
PAN	—	177.3	—	—		

COMMENTS:

000501

%FINER = 100 − Σ% RETAINED

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

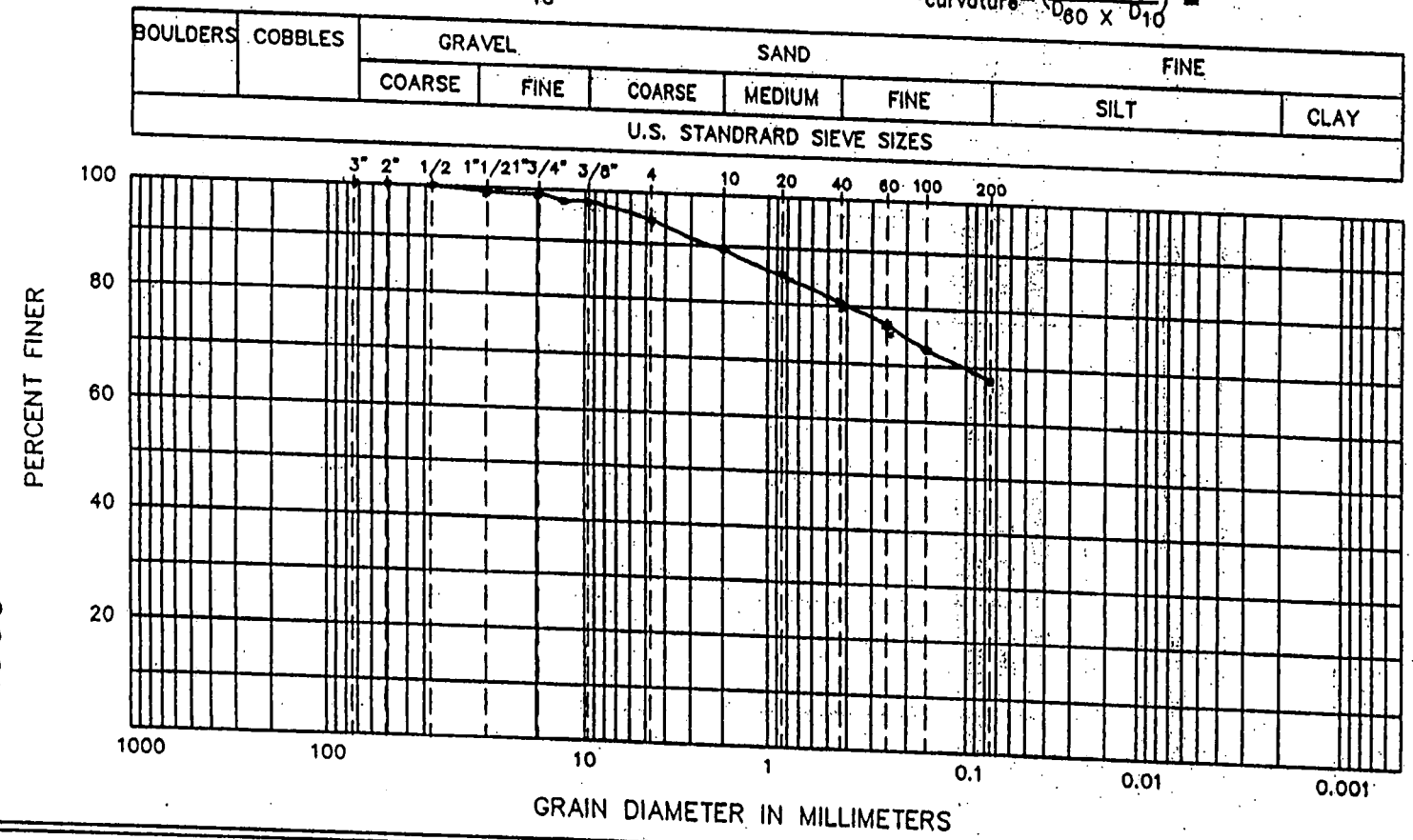
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-86 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 17

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.5
3/4-in.	99.3
1/2-in.	98.6
3/8-in.	98.2
NO. 4	94.6
NO. 10	89.7
NO. 20	85.0
NO. 40	80.7
NO. 60	77.0
NO. 100	72.7
NO. 200	68.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	58
0.005	34 33
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

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000502

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 86
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.63
Dry Soil & Tare (gm)	49.37
Tare Weight (gm)	3.21
Moisture Content (%)	2.73

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.80	
Tare Weight (gm)	7.01	
Total Weight (gm)	486.51	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	54.81
Calculated Dry Wt. used in test (gm)	53.35
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.61	2.61	90.0	#10	medium sand
#20	5.13	5.13	85.5	#20	medium sand
#40	7.48	7.48	81.3	#40	fine sand
#60	9.41	9.41	77.9	#60	fine sand
#100	11.37	11.37	74.4	#100	fine sand
#200	14.48	14.48	68.9	#200	fines

HYDROMETER CALCULATIONS

DATE 9/26/02	TIME 9:21	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/26/02	9:23	2.00	45.0	23.00	0.013	7.00	38.00	10.1	0.99
9/26/02	9:26	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
9/26/02	9:36	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
9/26/02	9:51	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
9/26/02	10:21	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
9/26/02	13:31	250.00	23.0	23.00	0.013	7.00	16.00	13.7	0.99
9/27/02	9:21	1440.00	20.0	22.50	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0292	66.7		
0.0192	57.9	% GRAVEL	5.40
0.0116	45.6	% COARSE SAND	4.63
0.0084	40.4	% MEDIUM SAND	8.63
0.0061	35.1	% FINE SAND	12.41
0.0030	28.1	% FINES	68.93
0.0013	22.8	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

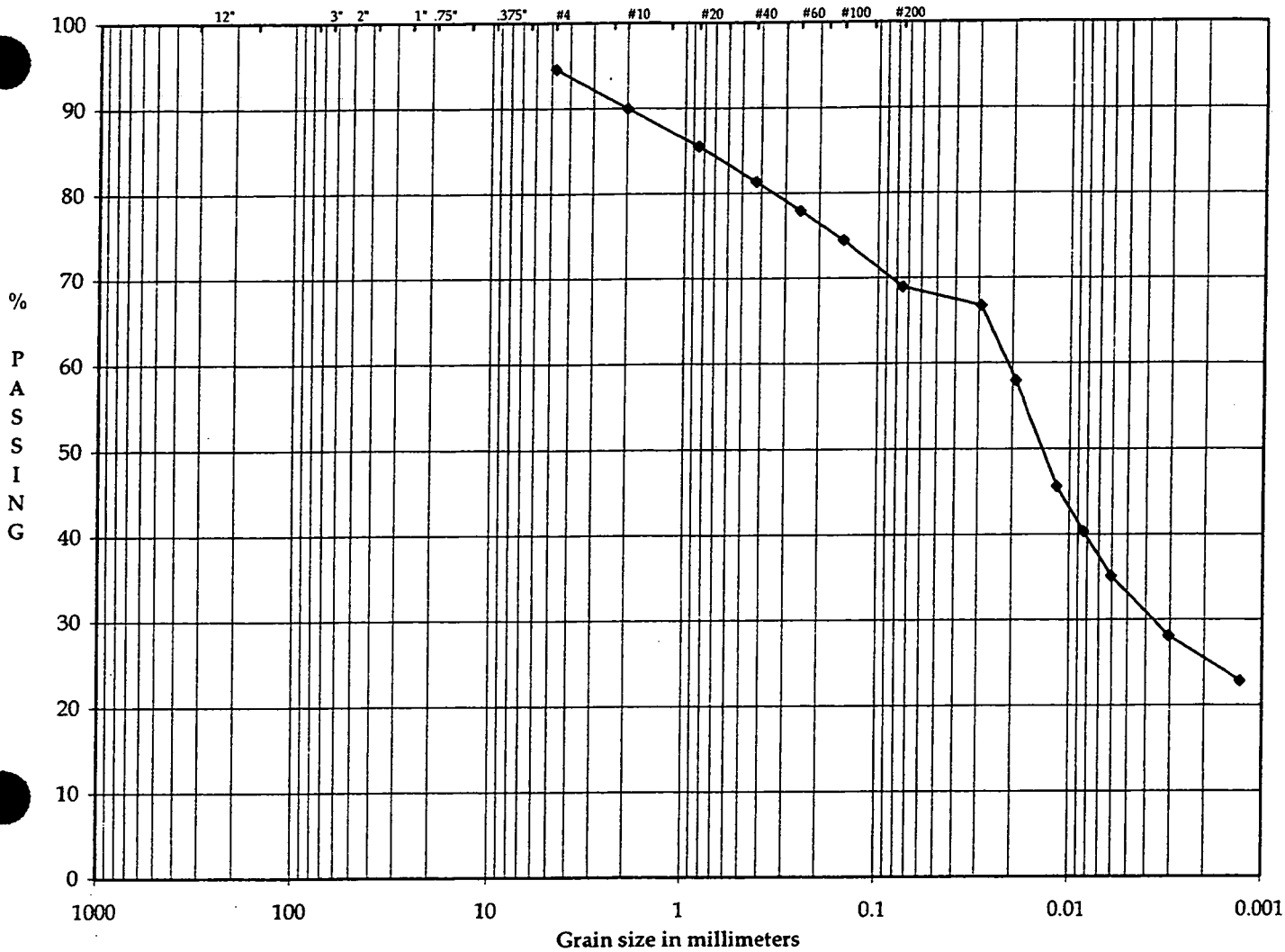
-	LL
-	PL
-	PI

TECH	TJ
DATE	9/25/02
CHECK	
REVIEW	

000503

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 86
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/25/02
CHECK	
REVIEW	

000504

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 19 day SEPT month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-87

SOIL SAMPLE SIZE	+3/8 = ~~3355~~ 1314.9g	MOISTURE = 335.6	TOTAL = 40546.7
	-3/8 = 38896.2	40546.7	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
50.00 + 35.75 = 85.75 (grams); 37.49	115	65

-1.74 / 35.75

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-7	L-44	L-7	L-44
WT. OF DRY SAMPLE PLUS TARE	(grams)	1508.0	759.2	1441.3	341.5
WT. OF TARE	(grams)	193.1	191.9	193.1	191.9
WT. OF DRY SAMPLE	(grams)	1314.9	567.3	1248.2	149.6

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	94.4	.2	99.8		
1 in	25.4	358.4	.9	99.1		
3/4 in	19.1	645.9	1.6	98.4		90-100
1/2 in	12.7	1047.0	2.6	97.4		
3/8 in	9.53	1247.4	3.1	96.9		
No. 4	4.75	17.4	3.1	96.9	93.9	
No. 10	2.00	38.1	6.7	93.3	90.4	
No. 20	0.850	59.7	10.5	89.5	86.9	
No. 40	0.425	80.5	14.2	85.8	83.1	
No. 60	0.250	98.9	17.4	82.6	80.0	
No. 100	0.125	124.9	22.0	78.0	75.6	
No. 200	0.075	149.4	26.4	73.6	71.3	50-100
PAN	—	149.6	—	—		

969

COMMENTS:

000505

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: CA SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

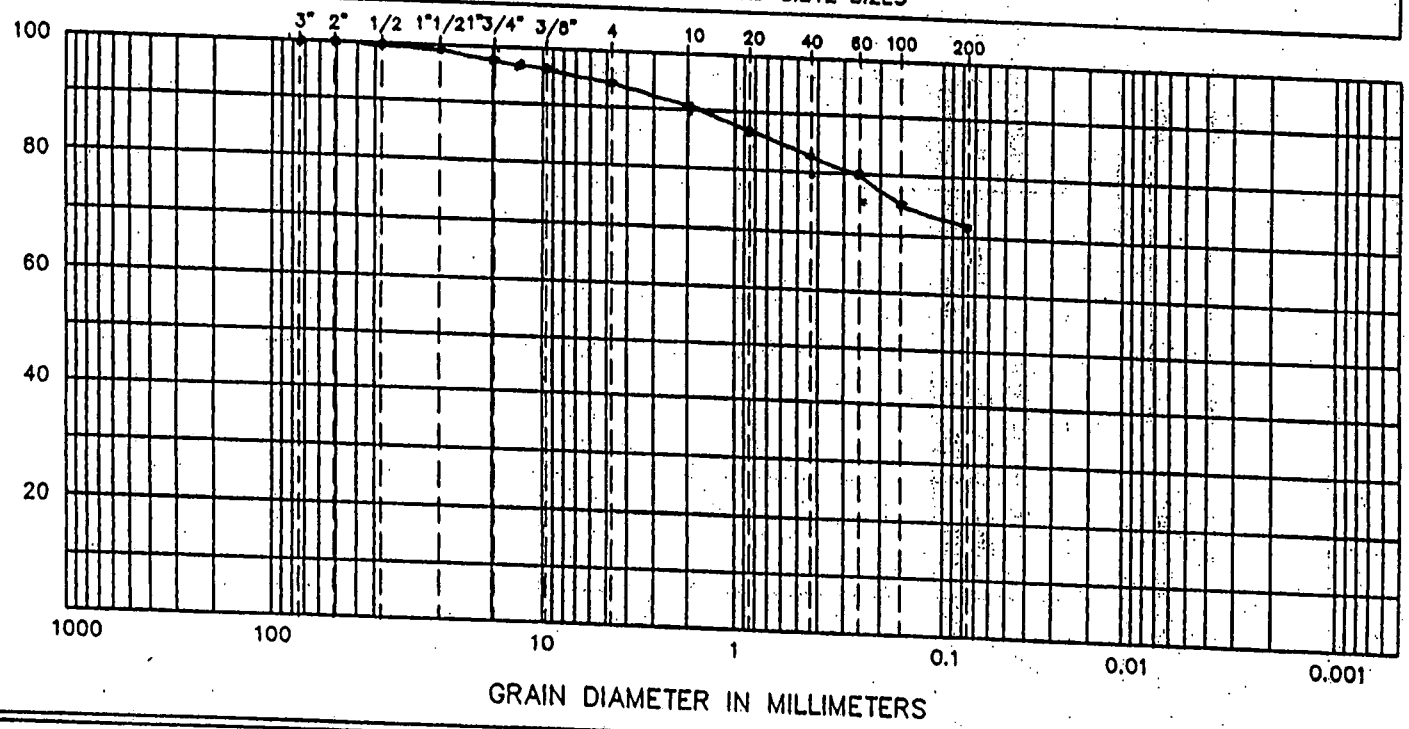
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-87 QA ID: CAW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 17

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.8
1-in.	98.1
3/4-in.	98.4
1/2-in.	97.4
3/8-in.	96.9
NO. 4	93.9
NO. 10	90.4
NO. 20.	86.9
NO. 40	83.1
NO. 60	80.0
NO. 100	75.6
NO. 200	71.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.005	69.6
0.002	57.8
0.0005	34
0.0002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

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000506

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

ROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 87
ROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.21
Dry Soil & Tare (gm)	48.62
Tare Weight (gm)	3.23
Moisture Content (%)	3.50

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.60	
Tare Weight (gm)	6.90	
Total Weight (gm)	482.79	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.9	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
e Dispersion Device		Mechanical
gth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.46
Calculated Dry Wt. used in test (gm)	56.48
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.90

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.45	2.45	89.8	#10	medium sand
#20	4.53	4.53	86.4	#20	medium sand
#40	6.32	6.32	83.4	#40	fine sand
#60	8.04	8.04	80.5	#60	fine sand
#100	10.06	10.06	77.2	#100	fine sand
#200	13.06	13.06	72.2	#200	fines

HYDROMETER CALCULATIONS

DATE 9/26/02	TIME 9:23	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/26/02	9:25	2.00	47.0	23.00	0.013	7.00	40.00	9.7	0.99
9/26/02	9:28	5.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
9/26/02	9:38	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
9/26/02	9:53	30.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/26/02	10:23	60.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/26/02	13:33	250.00	25.0	23.00	0.013	7.00	18.00	13.3	0.99
9/27/02	9:23	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0286	65.8		
0.0190	56.0	% GRAVEL	6.10
0.0115	46.1	% COARSE SAND	4.07
0.0083	41.1	% MEDIUM SAND	6.43
0.0060	36.2	% FINE SAND	11.21
0.0030	29.6	% FINES	72.19
0.0013	23.0	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

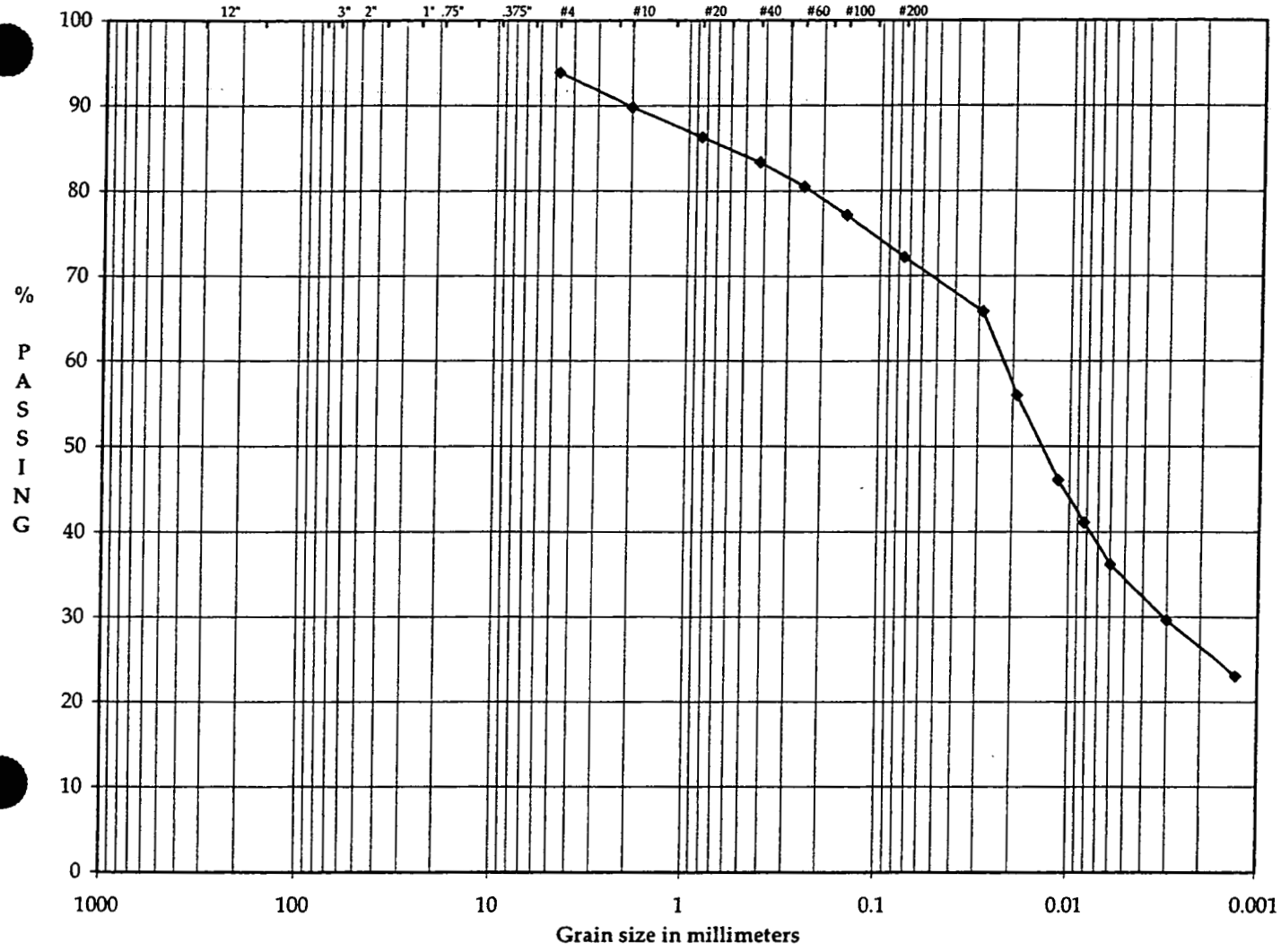
TECH	TJ
DATE	9/25/02
CHECK	
REVIEW	

000507

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 87
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/25/02
CHECK	[illegible]
REVIEW	[illegible]

000508

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP-02-88

SOIL SAMPLE SIZE	+3/8 = 721.4	MOISTURE = 315.2	TOTAL = 22367.4
	-3/8 = 21330.8	22367.4	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
600 gr when 600 gm -3/8 ADD 1200 TO Total Bucket sample	115	65

43.38 = 20130.8

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-44	L-7	L-44	L-7
WT. OF DRY SAMPLE PLUS TARE (grams)	912.6	748.8	873.7	325.2
WT. OF TARE (grams)	191.2	194.0	191.2	194.0
WT. OF DRY SAMPLE (grams)	721.4	554.8	682.5	131.2

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	87.7	.4	99.6		
1 in	25.4	313.9	1.4	98.6		
3/4 in	19.1	420.7	1.9	98.1		90-100
1/2 in	12.7	635.4	2.8	97.2		
3/8 in	9.53	682.1	3.0	97.0		
No. 4	4.75	13.9	2.5	97.5	94.6	.97
No. 10	2.00	31.6	5.7	94.3	91.5	
No. 20	0.850	51.8	9.3	90.7	88.0	
No. 40	0.425	71.1	12.8	87.2	84.6	
No. 60	0.250	87.1	15.7	84.3	81.8	
No. 100	0.125	106.9	19.3	80.7	78.3	
No. 200	0.075	130.4	23.5	76.5	74.2	50-100
PAN	—	131.1	—	—		

COMMENTS:

000509

%FINER = 100 − Σ% RETAINED

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CHECKED BY: A

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

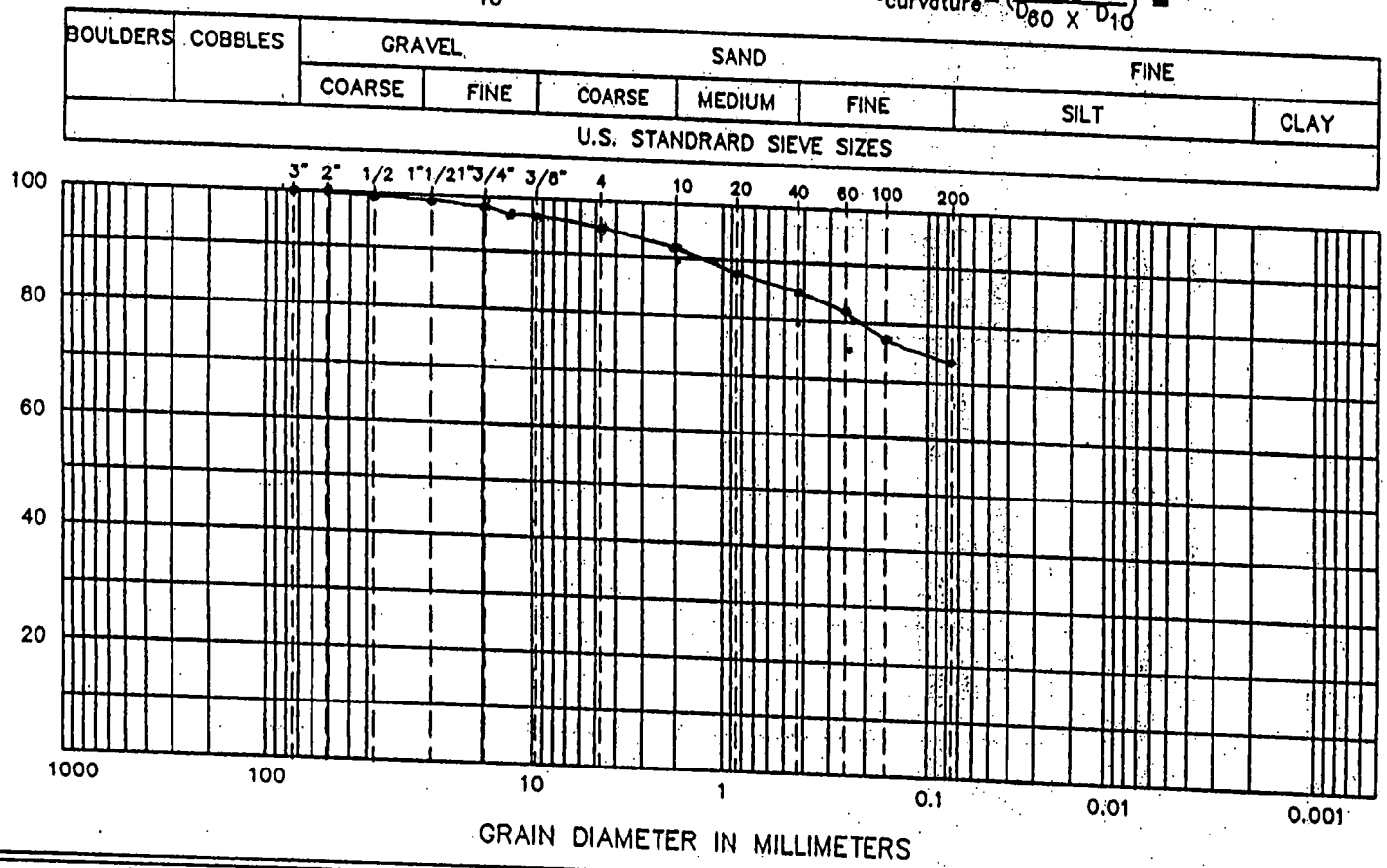
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-88 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 31

(PL) 19

(PI) 12

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.6
1-in.	98.6
3/4-in.	98.1
1/2-in.	97.2
3/8-in.	97.0
NO. 4	94.6
NO. 10	91.5
NO. 20.	88.0
NO. 40	84.6
NO. 60	81.8
NO. 100	78.3
NO. 200	74.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	73
0.02	61
0.005	35
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000510

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 88
OJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.04
Dry Soil & Tare (gm)	48.05
Tare Weight (gm)	3.27
Moisture Content (%)	4.44

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.82	
Tare Weight (gm)	7.01	
Total Weight (gm)	478.54	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
fic Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.43
Calculated Dry Wt. used in test (gm)	54.03
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.65	1.65	91.7	#10	medium sand
#20	3.37	3.37	88.7	#20	medium sand
#40	5.09	5.09	85.7	#40	fine sand
#60	6.77	6.77	82.7	#60	fine sand
#100	8.71	8.71	79.3	#100	fine sand
#200	11.50	11.50	74.5	#200	fines

HYDROMETER CALCULATIONS

DATE 9/26/02	TIME 9:25	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/26/02	9:27	2.00	48.0	23.00	0.013	7.00	41.00	9.6	0.99
9/26/02	9:30	5.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/26/02	9:40	15.00	36.0	23.00	0.013	7.00	29.00	11.5	0.99
9/26/02	9:55	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
9/26/02	10:25	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/26/02	13:35	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
9/27/02	9:25	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0285	71.1		
0.0189	60.7	% GRAVEL	5.40
0.0114	50.3	% COARSE SAND	2.89
0.0084	41.6	% MEDIUM SAND	6.02
0.0060	36.4	% FINE SAND	11.22
0.0030	29.5	% FINES	74.46
0.0013	24.3	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

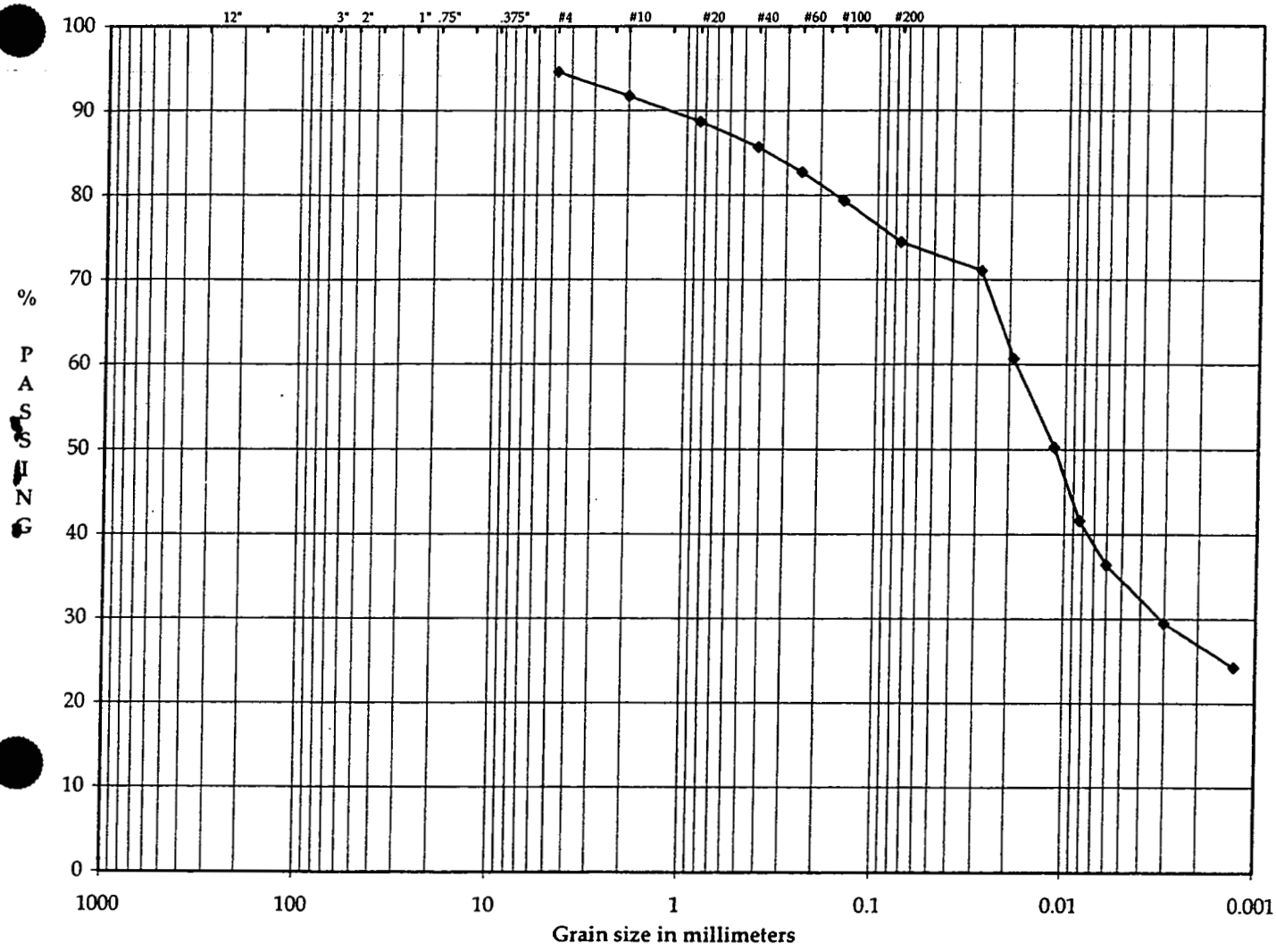
-	LL
-	PL
-	PI

TECH	TJ
DATE	9/25/02
CHECK	BS
REVIEW	[illegible]

000511

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 88
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ
DATE	9/25/02
CHECK	
REVIEW	

000512

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-89

SOIL SAMPLE SIZE +3/8 = 1945.2 gm MOISTURE = 303.5 gm -3/8 = 45970.8 TOTAL = 48219.5

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 610.8

50 lbs
50 lbs
100 = 45360.0 (grams)

SAND	FINE GRAIN
115	65

953600

	+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.	L-8	L2	L-8	L2
WT. OF DRY SAMPLE PLUS TARE (grams)	2138.4	739.3	2021.8	339.5
WT. OF TARE (grams)	193.2	191.8	193.2	191.8
WT. OF DRY SAMPLE (grams)	1945.2	547.5	1828.6	147.7

SIEVE ANALYSIS QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	354.8	17	99.3		
1 in	25.4	842.9	1.7	98.3		
3/4 in	19.1	1118.6	2.3	97.7		90-100
1/2 in	12.7	1582.0	3.3	96.7		
3/8 in	9.53	1827.9	3.8	96.2		
No. 4	4.75	11.4	2.1	97.9	94.2	.962
No. 10	2.00	29.5	5.4	94.6	91.0	
No. 20	0.850	52.3	9.6	90.4	~~87.0~~ 87.0	
No. 40	0.425	76.9	14.0	86.0	82.7	
No. 60	0.250	97.9	17.9	82.1	79.0	
No. 100	0.125	125.5	22.9	77.1	74.2	
No. 200	0.075	147.5	26.9	73.1	70.3	50-100
PAN	—	147.7	—	—		

COMMENTS:

000513

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [illegible] SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

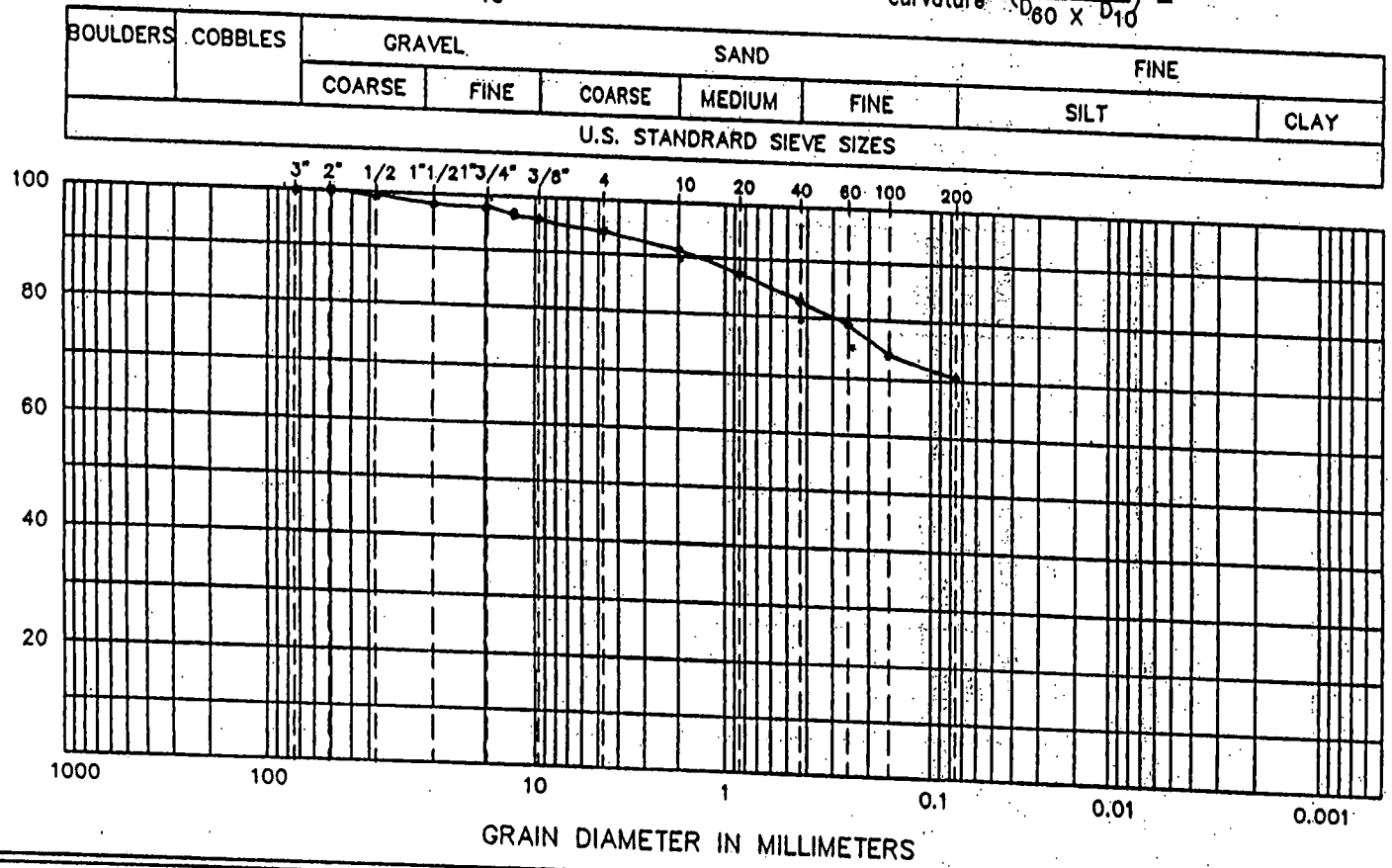
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: ____ day ____ month 2002 year

SAMPLE NO.: LP02-89 QA ID: CAW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 31

(PL) 17

(PI) 14

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.3
1-in.	98.3
3/4-in.	97.7
1/2-in.	96.7
3/8-in.	96.2
NO. 4	94.2
NO. 10	91.0
NO. 20	87.0
NO. 40	82.7
NO. 60	79.0
NO. 100	74.2
NO. 200	70.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	73.5
0.02	63.3
0.005	37.6
0.002	29.8

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: ____

SHEET NO. ____ OF ____

000514

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 89
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.57
Dry Soil & Tare (gm)	47.85
Tare Weight (gm)	3.26
Moisture Content (%)	6.10

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	507.41	
Tare Weight (gm)	6.80	
Total Weight (gm)	471.83	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.2	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.98
Calculated Dry Wt. used in test (gm)	52.76
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.20

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.11	1.11	92.2	#10	medium sand
#20	2.95	2.95	88.9	#20	medium sand
#40	4.68	4.68	85.8	#40	fine sand
#60	6.36	6.36	82.8	#60	fine sand
#100	8.24	8.24	79.5	#100	fine sand
#200	10.82	10.82	74.9	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/26/02	9:27								
9/26/02	9:29	2.00	47.0	23.00	0.013	7.00	40.00	9.7	0.99
9/26/02	9:32	5.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
9/26/02	9:42	15.00	36.0	23.00	0.013	7.00	29.00	11.5	0.99
9/26/02	9:57	30.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
9/26/02	10:27	60.00	29.0	23.00	0.013	7.00	22.00	12.7	0.99
9/26/02	13:37	250.00	25.0	23.00	0.013	7.00	18.00	13.3	0.99
9/27/02	9:27	1440.00	22.0	22.50	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0286	70.7		
0.0189	61.9	% GRAVEL	5.80
0.0114	51.3	% COARSE SAND	1.98
0.0083	44.2	% MEDIUM SAND	6.37
0.0060	38.9	% FINE SAND	10.96
0.0030	31.8	% FINES	74.88
0.0013	26.5	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

-	LL
-	PL
-	PI

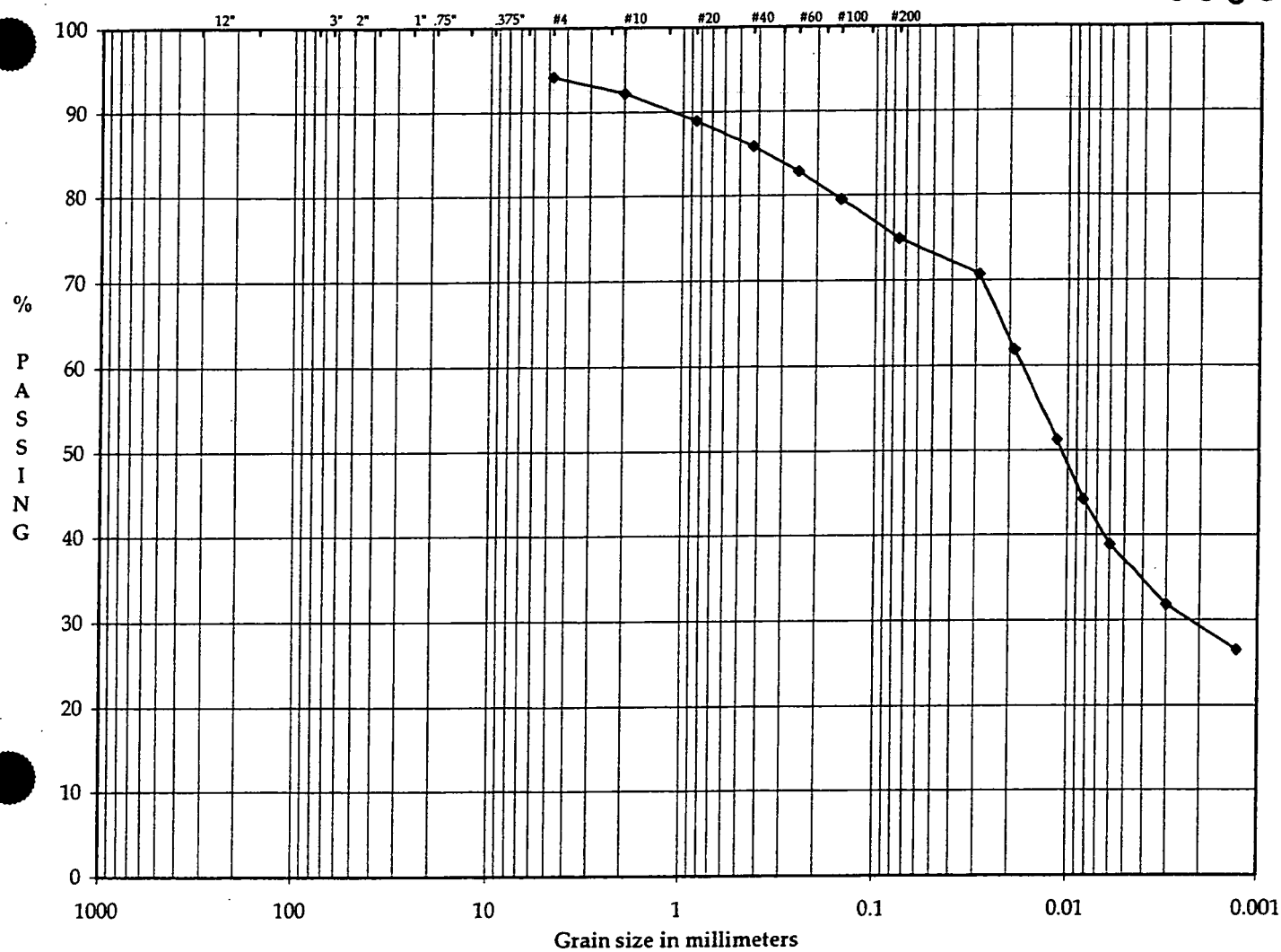
TECH	TJ
DATE	9/25/02
CHECK	[illegible]
REVIEW	[illegible]

000515

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 89
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000516

TECH	TJ
DATE	9/25/02
CHECK	BJ
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-92

SOIL SAMPLE SIZE	+3/8 = 995.8 gm	MOISTURE = 308.2 gm	TOTAL = 22741.1 gm
	-3/8 = 21437.1 gm	22741.1	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 49.0 LB's (grams)	SAND	FINE GRAIN
	115	65

1.94 / 47.26	+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.	L-2	LL-4	L-2	LL-4
WT. OF DRY SAMPLE PLUS TARE (grams)	1186.9	696.0	1116.1	306.4
WT. OF TARE (grams)	191.1	145.4	191.1	145.4
WT. OF DRY SAMPLE (grams)	995.8	550.6	925.0	161.0

SIEVE ANALYSIS QA ID: DE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	78.7	.3	99.7		
1 in	25.4	253.0	1.1	98.9		
3/4 in	19.1	469.9	2.1	97.9		90-100
1/2 in	12.7	792.9	3.5	96.5		
3/8 in	9.53	924.1	4.1	95.9		
No. 4	4.75	15.6	2.8	97.2	93.2	
No. 10	2.00	41.5	7.5	92.5	88.7	
No. 20	0.850	66.9	12.2	87.8	84.2	
No. 40	0.425	90.2	16.4	83.6	80.2	
No. 60	0.250	110.1	20.0	80.0	83.4	76.8
No. 100	0.125	135.4	24.6	75.4	72.3	
No. 200	0.075	159.8	29.0	71.0	68.1	50-100
PAN	—	161.0	—	—		

.959

COMMENTS:

000517

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

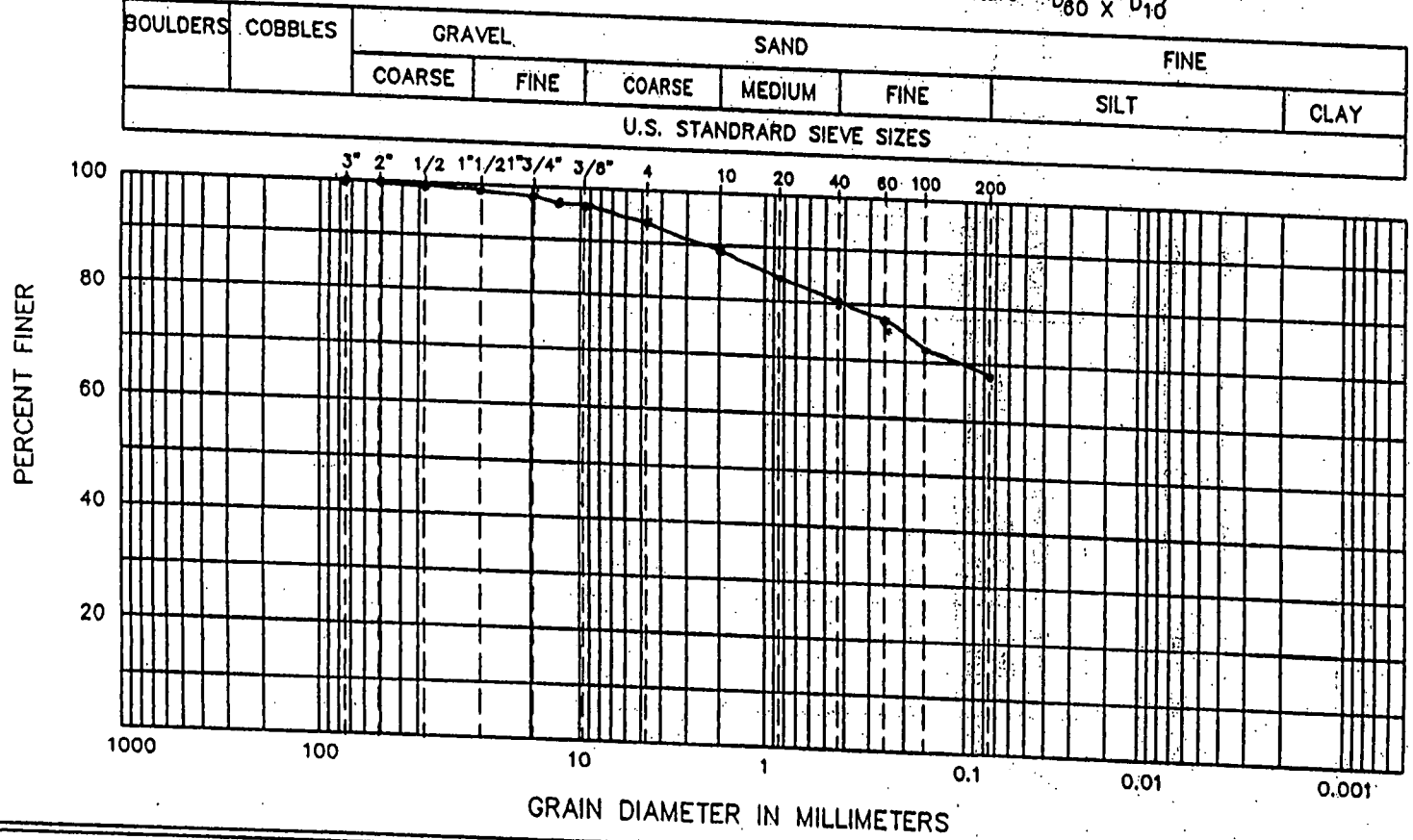
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-92 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 31

(PL) 18

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.7
1-In.	98.9
3/4-In.	97.9
1/2-In.	96.5
3/8-In.	95.9
NO. 4	93.2
NO. 10	88.7
NO. 20.	84.2
NO. 40	80.2
NO. 60	76.8
NO. 100	72.3
NO. 200	68.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	73
0.02	62
0.005	34
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

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5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 92
OJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.11
Dry Soil & Tare (gm)	47.54
Tare Weight (gm)	3.18
Moisture Content (%)	5.79

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.38	
Tare Weight (gm)	6.85	
Total Weight (gm)	472.17	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.2	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
fic Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.06
Calculated Dry Wt. used in test (gm)	54.88
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.20

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.55	1.55	90.6	#10	medium sand
#20	3.23	3.23	87.7	#20	medium sand
#40	4.70	4.70	85.2	#40	fine sand
#60	6.08	6.08	82.9	#60	fine sand
#100	7.75	7.75	80.0	#100	fine sand
#200	9.86	9.86	76.5	#200	fines

HYDROMETER CALCULATIONS

DATE 9/26/02	TIME 9:29	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
9/26/02	9:31	2.00	47.0	23.00	0.013	7.00	40.00	9.7	0.99
9/26/02	9:34	5.00	43.0	23.00	0.013	7.00	36.00	10.4	0.99
9/26/02	9:44	15.00	36.0	23.00	0.013	7.00	29.00	11.5	0.99
9/26/02	9:59	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
9/26/02	10:29	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
9/26/02	13:39	250.00	25.0	23.00	0.013	7.00	18.00	13.3	0.99
9/27/02	9:29	1440.00	21.0	22.50	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0286	67.3		
0.0187	60.5	% GRAVEL	6.80
0.0114	48.8	% COARSE SAND	2.63
0.0084	40.4	% MEDIUM SAND	5.35
0.0060	35.3	% FINE SAND	8.76
0.0030	30.3	% FINES	76.46
0.0013	23.5	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

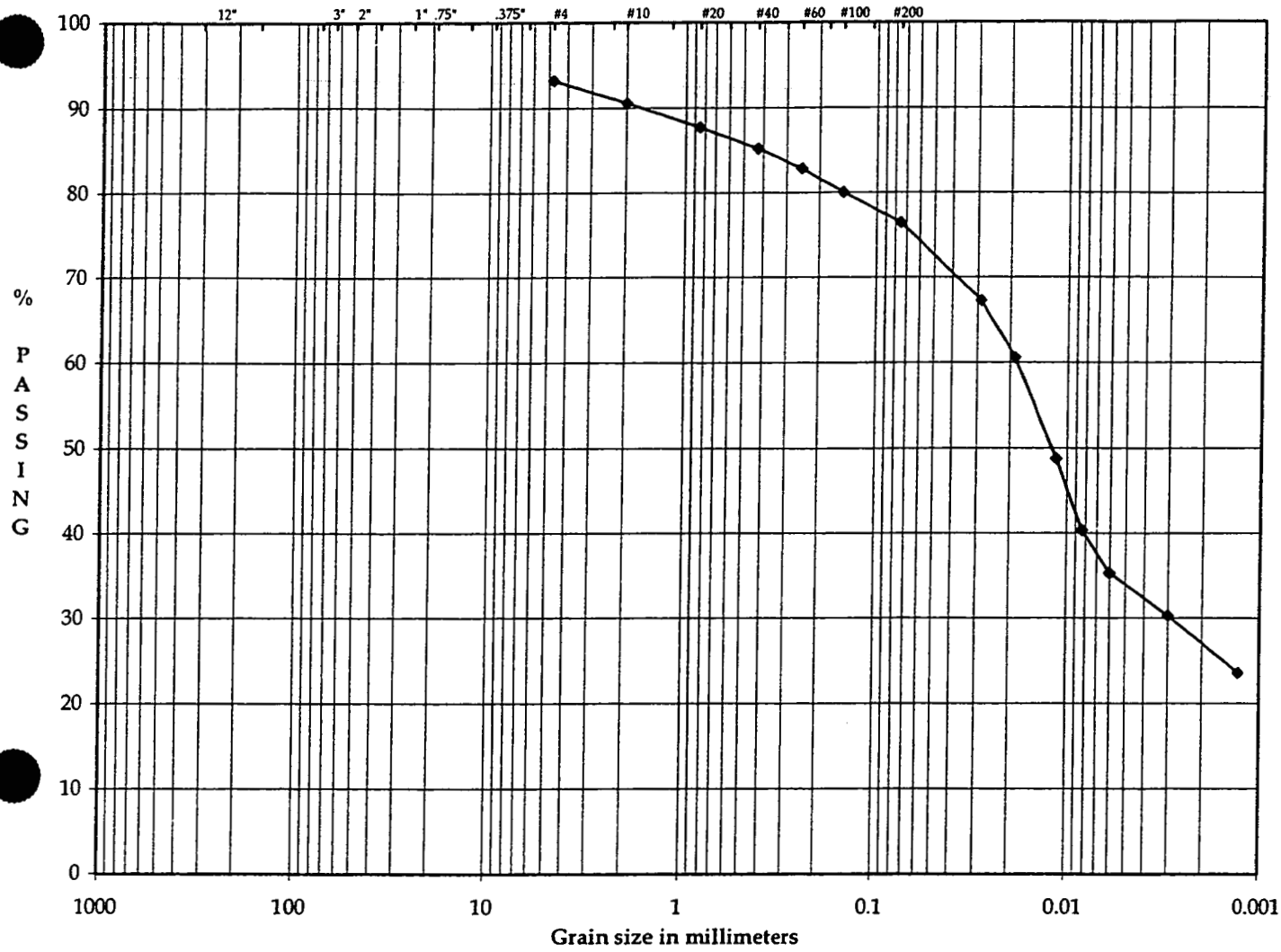
-	LL
-	PL
-	PI

TECH	TJ
DATE	9/25/02
CHECK	
REVIEW	

000519

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 92
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000520

TECH	TJ
DATE	9/25/02
CHECK	[illegible]
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 24 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02-93

SOIL SAMPLE SIZE: +3/8 = 2177.6; -3/8 = 37007.2; MOISTURE = 386.4; TOTAL = 39571.7

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

600g Sieve
600g After

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-44	K	L-44	K
WT. OF DRY SAMPLE PLUS TARE (grams)	2368.7	~~2015~~ 684.1	2222.5	266.2
WT. OF TARE (grams)	191.1	101.5	191.1	101.5
WT. OF DRY SAMPLE (grams)	2177.6	~~500.0~~ 582.6	2031.4	164.7

SIEVE ANALYSIS — QA ID: DZE/KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		100
1 1/2in	38.1	67.3	.2	99.8		
1 in	25.4	760.9	1.9	98.1		
3/4 in	19.1	1175.6	3.0	97.0		90-100
1/2 in	12.7	1805.5	4.6	95.4		
3/8 in	9.53	2030.6	5.1	94.9		
No. 4	4.75	24.8	3.6	96.4	91.5	.94
No. 10	2.00	42.9	7.4	92.6	87.9	
No. 20	0.850	67.1	11.5	88.5	84.0	
No. 40	0.425	91.2	15.7	84.3	80.0	
No. 60	0.250	111.6	19.2	80.8	76.7	
No. 100	0.125	136.7	23.5	76.5	72.6	
No. 200	0.075	163.9	28.1	71.9	68.2	50-100
PAN	—	165.0	—	—		

COMMENTS:

000521

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

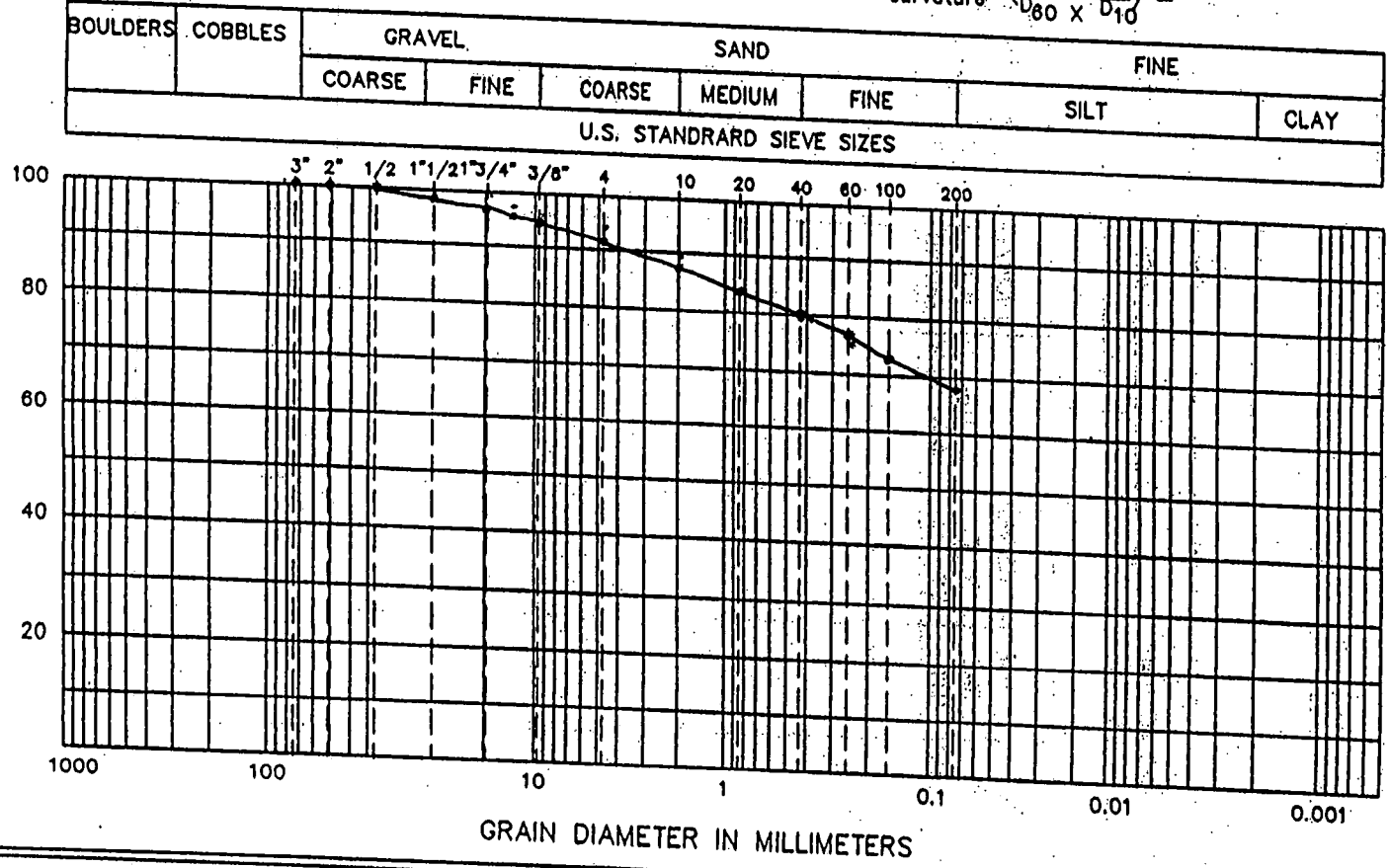
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-93 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 30

(PL) 17

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.8
1-in.	98.1
3/4-in.	97.0
1/2-in.	95.4
3/8-in.	94.9
NO. 4	91.5
NO. 10	87.9
NO. 20.	84.0
NO. 40	80.0
NO. 60	76.7
NO. 100	72.6
NO. 200	68.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	65.5
0.02	56.3
0.005	33.6
0.002	27.8

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY: _____

SHEET NO. ____ OF ____

000522

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 93
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	42.49
Dry Soil & Tare (gm)	41.34
Tare Weight (gm)	3.25
Moisture Content (%)	3.02

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.76	
Tare Weight (gm)	6.82	
Total Weight (gm)	485.29	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			91.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ecific Gravity	(tested)	
.nount Dispersing Agent (ml)		125.00
pe Dispersion Device		Mechanical
ength of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.96
Calculated Dry Wt. used in test (gm)	54.32
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	91.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.24	2.24	87.7	#10	medium sand
#20	4.53	4.53	83.9	#20	medium sand
#40	6.58	6.58	80.4	#40	fine sand
#60	8.33	8.33	77.5	#60	fine sand
#100	10.37	10.37	74.0	#100	fine sand
#200	13.28	13.28	69.1	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET	READING	TEMP	TEMP.COR.	HYD.COR.	READING	EFFECTIVE	
10/16/02	9:30	(min)	R	T	K	Cc	C	LENGTH	A
10/16/02	9:32	2.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
10/16/02	9:35	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
10/16/02	9:45	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
10/16/02	10:00	30.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
10/16/02	10:30	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
10/16/02	13:40	250.00	25.0	23.00	0.013	7.00	18.00	13.3	0.99
10/17/02	9:30	1440.00	21.0	23.00	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	58.4		
0.0192	55.0	% GRAVEL	8.50
0.0115	46.7	% COARSE SAND	3.77
0.0083	41.7	% MEDIUM SAND	7.31
0.0060	35.0	% FINE SAND	11.29
0.0030	30.0	% FINES	69.13
0.0013	23.3	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

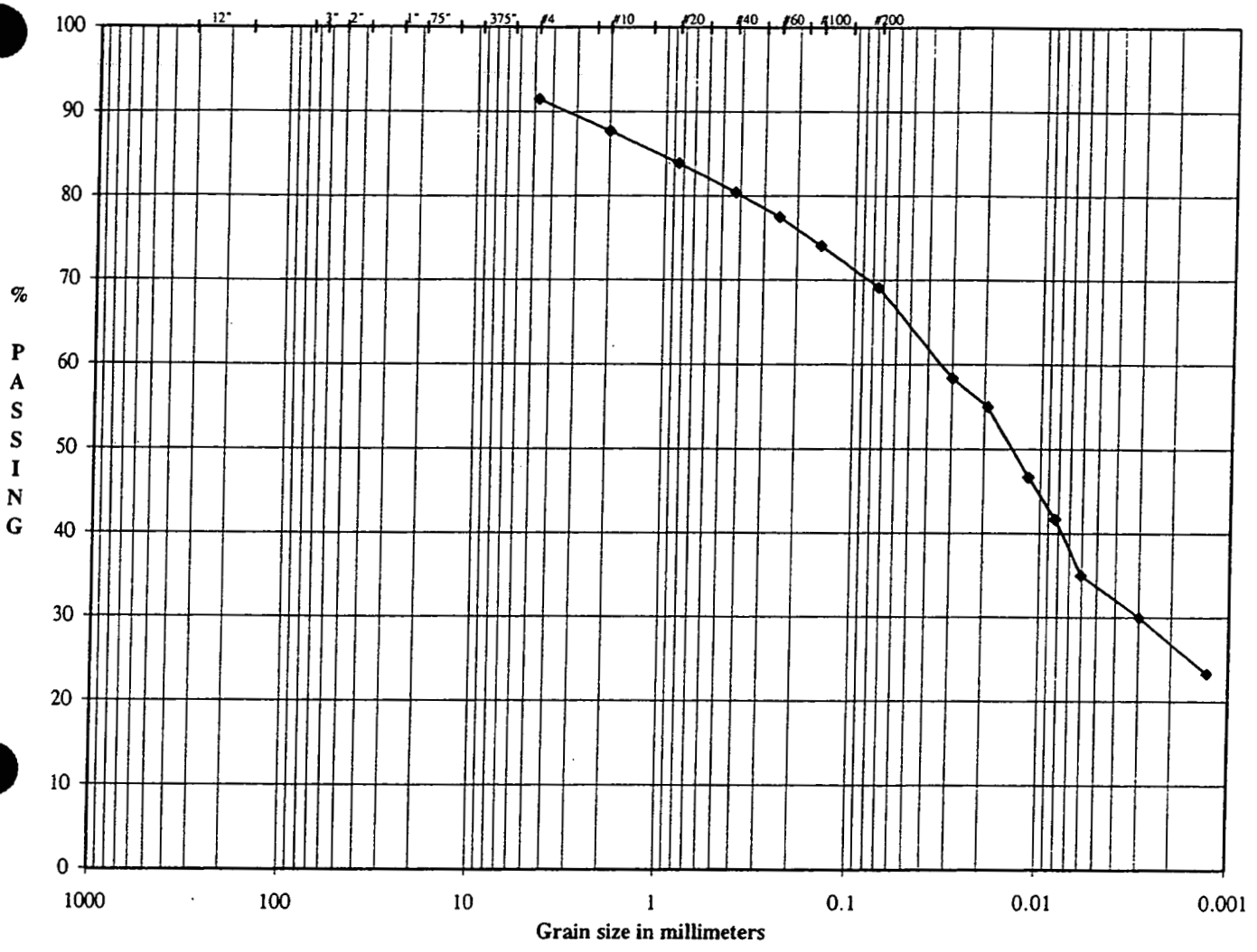
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	TWM
REVIEW	DA

000523

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 93
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DW
DATE	10/15/02
CHECK	BG
REVIEW	DA

000524

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 — TASK NO.: 041

DESCRIPTION: PHASE III — DATE: 24 day Sep month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-94

SOIL SAMPLE SIZE	+3/8 = 677.2 gram	MOISTURE = 262.5 gm	TOTAL = 23324.9
	-3/8 = 22385.2		

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

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-7	LL-4	L-7	LL-4
WT. OF DRY SAMPLE PLUS TARE	(grams)	870.1	715.9	819.7	298.8
WT. OF TARE	(grams)	192.9	145.4	192.9	145.4
WT. OF DRY SAMPLE	(grams)	677.2	570.5	626.8	153.4

SIEVE ANALYSIS — QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER	PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100	
2 in	50.8	Ø	Ø	100	100
1 1/2in	38.1	79.0	.3	99.7	
1 in	25.4	226.8	1.0	99.0	
3/4 in	19.1	310.0	1.3	98.7	90-100
1/2 in	12.7	553.4	2.4	97.6	
3/8 in	9.53	626.8	2.7	~~97.8~~ 97.3	
No. 4	4.75	13.4	2.0	98.0 ~~95.8~~	95.0
No. 10	2.00	34.5	6.0	94.0 ~~91.9~~	91.4
No. 20	0.850	59.2	10.4	89.6 ~~87.6~~	87.2
No. 40	0.425	83.0	14.5	85.5 ~~83.6~~	83.2
No. 60	0.250	103.8	18.2	81.8 ~~80.0~~	79.6
No. 100	0.125	130.2	22.8	77.2 ~~75.5~~	75.1
No. 200	0.075	152.9	26.8	73.2 ~~71.6~~	71.2 50-100
PAN	—	153.3	—	—	

.978

COMMENTS:

000525

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

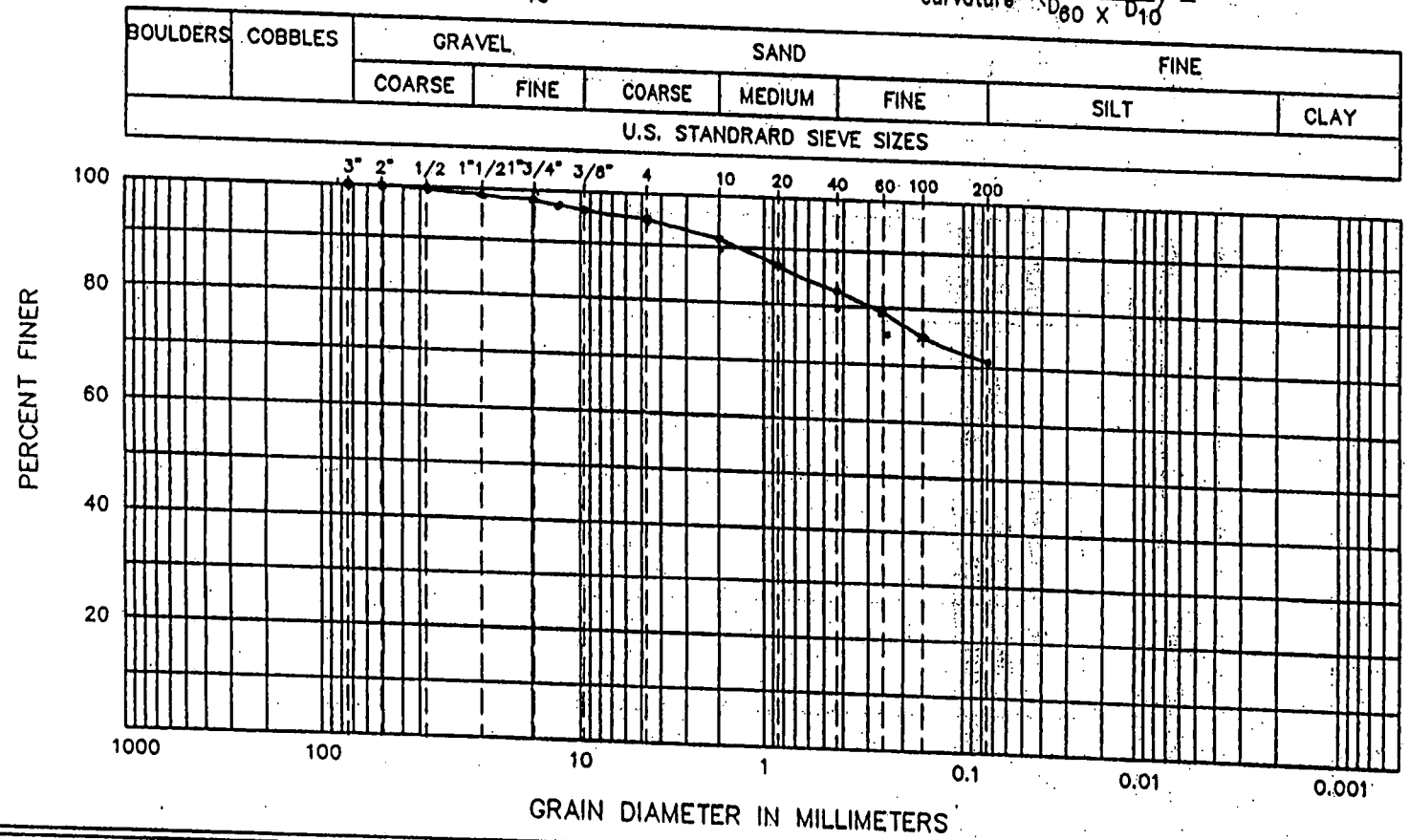
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-94 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 33

(PL) 17

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.7
1-in.	99.0
3/4-in.	98.7
1/2-in.	97.6
3/8-in.	97.3
NO. 4	95.0
NO. 10	91.4
NO. 20.	87.2
NO. 40	83.2
NO. 60	79.6
NO. 100	75.1
NO. 200	71.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68.5
0.02	57.3
0.005	35.9
0.002	27.8

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY: _____

SHEET NO. _____ OF _____

000526

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 94
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	42.34
Dry Soil & Tare (gm)	40.46
Tare Weight (gm)	3.21
Moisture Content (%)	5.05

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.86	
Tare Weight (gm)	6.88	
Total Weight (gm)	475.96	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			95.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.01
Calculated Dry Wt. used in test (gm)	52.37
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	95.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.09	2.09	91.2	#10	medium sand
#20	4.19	4.19	87.4	#20	medium sand
#40	5.70	5.70	84.7	#40	fine sand
#60	7.10	7.10	82.1	#60	fine sand
#100	8.74	8.74	79.1	#100	fine sand
#200	11.04	11.04	75.0	#200	fines

HYDROMETER CALCULATIONS

DATE 10/16/02	TIME 9:32	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:34	2.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
10/16/02	9:37	5.00	39.0	23.00	0.013	7.00	32.00	11.1	0.99
10/16/02	9:47	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
10/16/02	10:02	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
10/16/02	10:32	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
10/16/02	13:42	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
10/17/02	9:32	1440.00	21.0	23.00	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0301	61.1		
0.0194	57.5	% GRAVEL	5.00
0.0116	46.7	% COARSE SAND	3.79
0.0084	43.1	% MEDIUM SAND	6.55
0.0061	35.9	% FINE SAND	9.69
0.0030	30.5	% FINES	74.97
0.0013	25.1	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

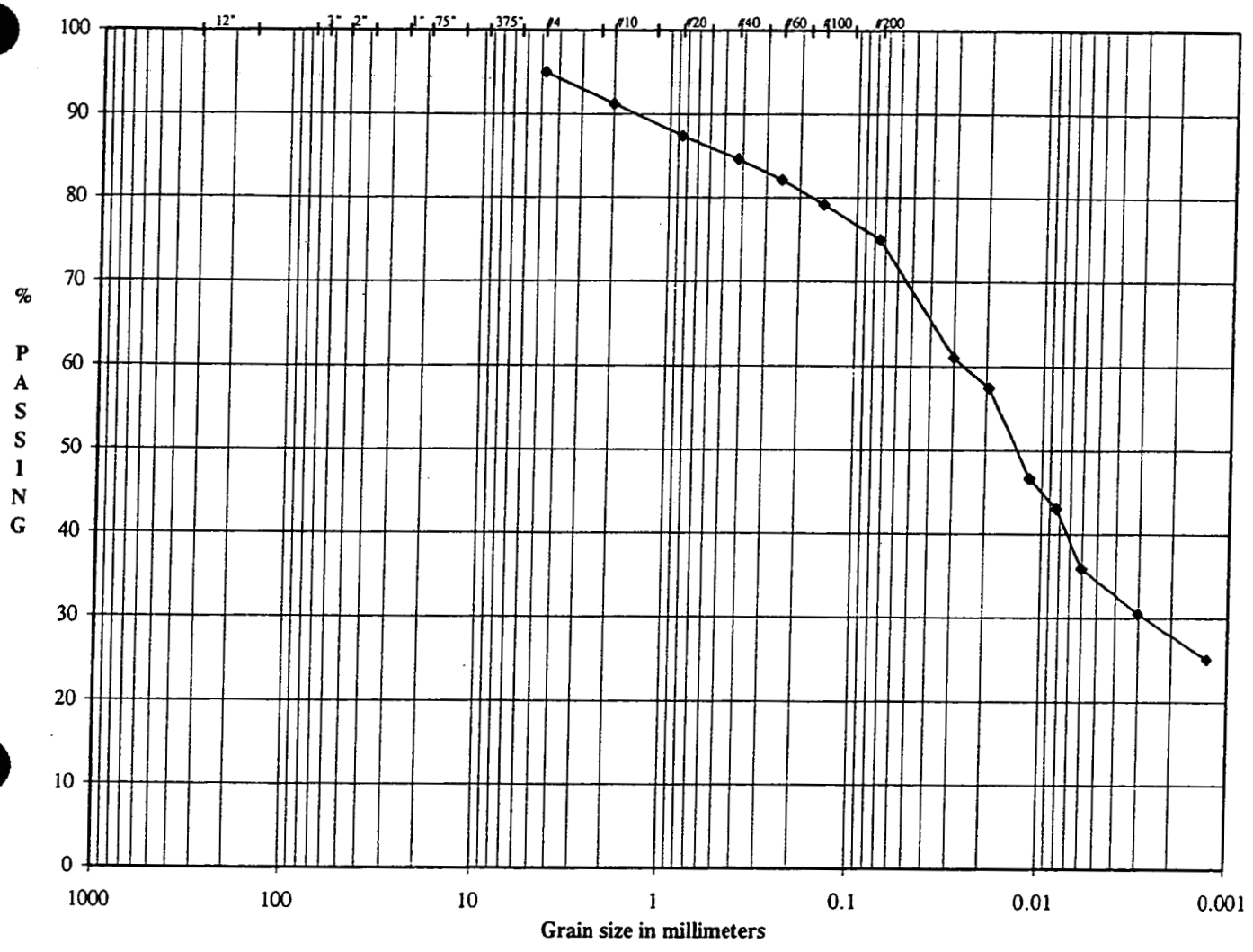
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	
REVIEW	

000527

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 94
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000528

TECH	TJ/DW
DATE	10/15/02
CHECK	BGS
REVIEW	DA

GEOSYNTEC CONSULTANTS

FLUOR FERNALD 5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 27 day Sept month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-95

SOIL SAMPLE SIZE	+3/8 = 1367.7 gm	MOISTURE = 366.6 gm	TOTAL = 46568.1
	-3/8 = 44833.8		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	5000 LB / 48.84 / 98.84 (grams)	SAND	FINE GRAIN
		115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-44	L-2	L-44	L-2
WT. OF DRY SAMPLE PLUS TARE	(grams)	1558.9	751.6	1468.4	342.1
WT. OF TARE	(grams)	191.2	191.1	191.9	191.1
WT. OF DRY SAMPLE	(grams)	1367.7	560.5	1276.5	151.0

SIEVE ANALYSIS, QA ID: KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	263.5	.6	99.4		
3/4 in	19.1	534.5	1.1	98.9		90-100
1/2 in	12.7	1010.1	2.2	97.8		
3/8 in	9.53	1279.2	2.7	97.3		
No. 4	4.75	11.4	2.0	98.0	95.4	
No. 10	2.00	28.4	5.1	94.9	92.3	
No. 20	0.850	50.0	8.9	91.1	88.6	
No. 40	0.425	73.5	13.1	86.9	84.6	
No. 60	0.250	94.7	16.9	83.1	80.9	
No. 100	0.125	121.6	21.7	78.3	76.2	
No. 200	0.075	147.4	26.3	73.7	71.7	50-100
PAN	—	151.0	—	—		

-92

COMMENTS:

000529

%FINER = 100 − Σ% RETAINED

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

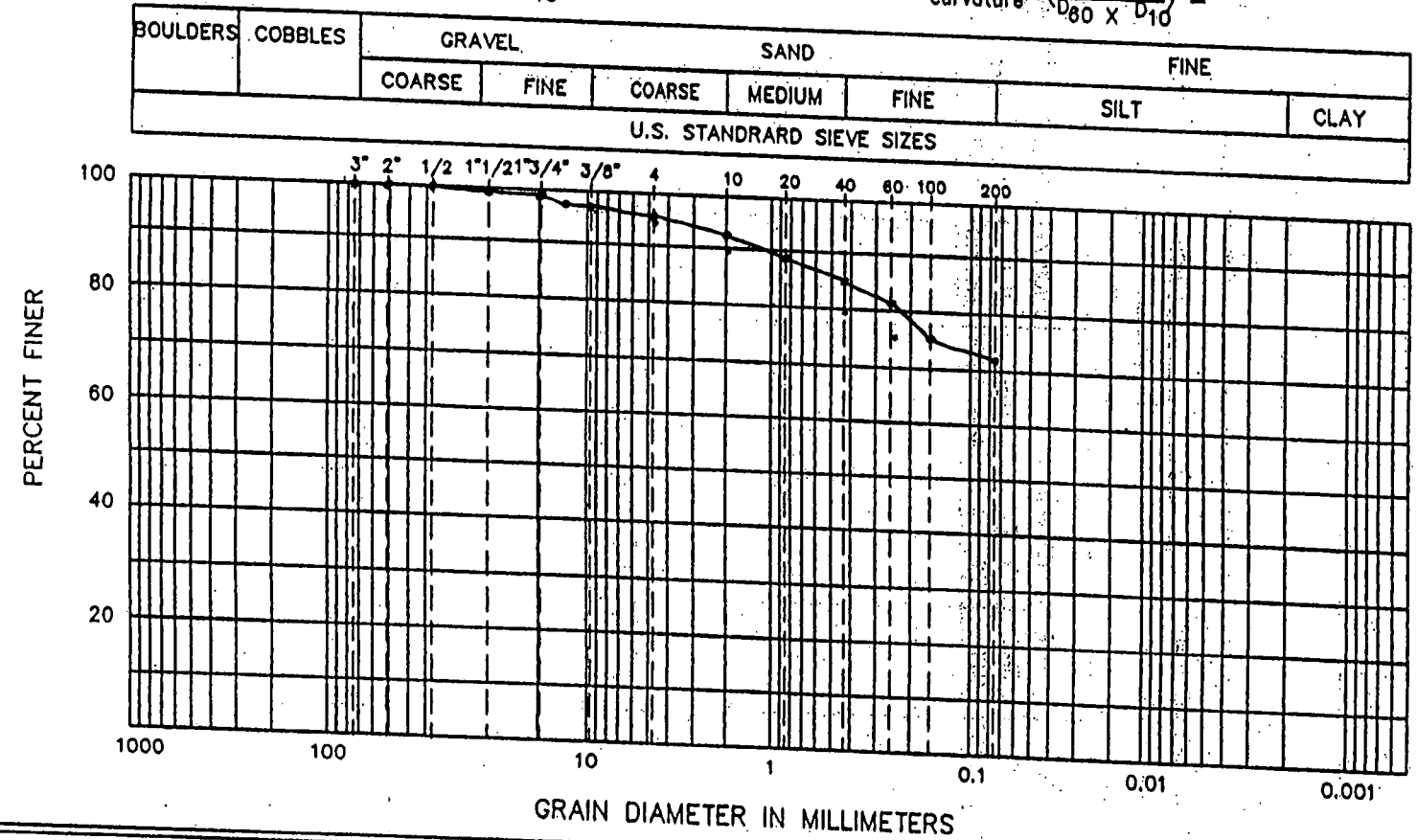
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-95 QA ID: CAW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 36

(PL) 18

(PI) 18

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	98.4
3/4-In.	98.9
1/2-In.	97.8
3/8-In.	97.3
NO. 4	95.4
NO. 10	92.3
NO. 20	88.6
NO. 40	84.6
NO. 60	80.9
NO. 100	76.2
NO. 200	71.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	75
0.02	62
0.005	37
0.002	30

SOIL CLASSIFICATION (ASTM D 2487): CL

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SHEET NO. ____ OF ____

0000530

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 95
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4 = W1-W2)	
Weight of Dry Soil (gm)	(W5 = W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	46.40
Dry Soil & Tare (gm)	43.60
Tare Weight (gm)	3.20
Moisture Content (%)	6.93

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.57	
Tare Weight (gm)	6.86	
Total Weight (gm)	467.32	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			95.4	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.75
Calculated Dry Wt. used in test (gm)	52.14
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	95.40

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.61	1.61	92.5	#10	medium sand
#20	2.91	2.91	90.1	#20	medium sand
#40	4.16	4.16	87.8	#40	fine sand
#60	5.45	5.45	85.4	#60	fine sand
#100	7.02	7.02	82.6	#100	fine sand
#200	9.30	9.30	78.4	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:34								
10/16/02	9:36	2.00	46.0	23.00	0.013	7.00	39.00	9.9	0.99
10/16/02	9:39	5.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
10/16/02	9:49	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
10/16/02	10:04	30.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
10/16/02	10:34	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
10/16/02	13:44	250.00	25.0	23.00	0.013	7.00	18.00	13.3	0.99
10/17/02	9:34	1440.00	22.0	23.00	0.013	7.00	15.00	13.8	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0289	70.6		
0.0190	61.6	% GRAVEL	4.60
0.0115	50.7	% COARSE SAND	2.95
0.0083	45.3	% MEDIUM SAND	4.67
0.0060	38.0	% FINE SAND	9.41
0.0030	32.6	% FINES	78.38
0.0013	27.2	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS: (CL)

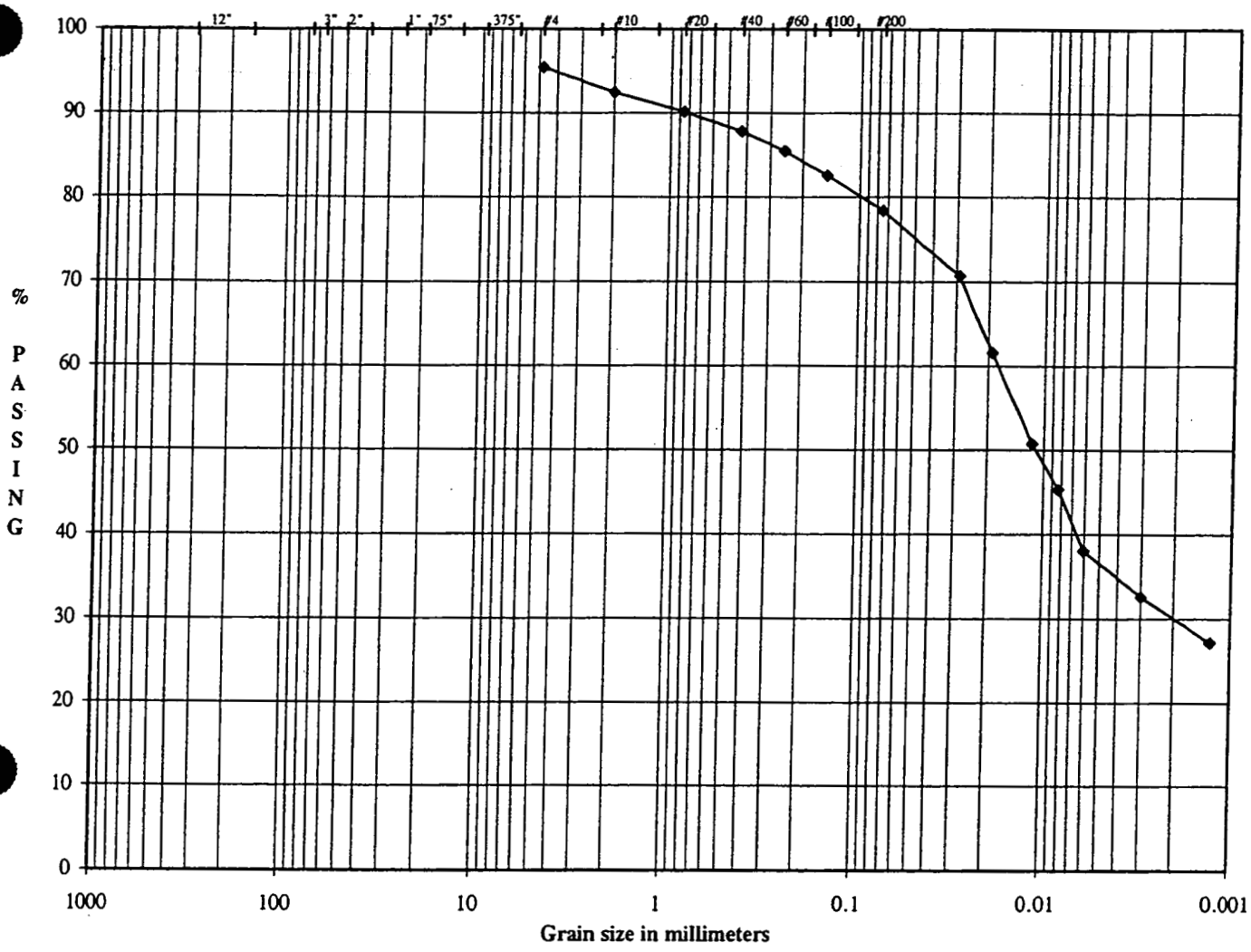
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	BS
REVIEW	DA

000531

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 95
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DW
DATE	10/15/02
CHECK	BSK
REVIEW	DA

000532

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 27 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02.98

41871.8

SOIL SAMPLE SIZE	+3/8 = 1692.9 gm	MOISTURE = 329.9	TOTAL = 43894.6
	-3/8 = 41871.8	43894.6	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	50.00 / 42.31 / 92.31 (grams)	SAND	FINE GRAIN
		115	65

94.12 / 1.81 / 42.31

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-8	L-7	L-8	L-7
WT. OF DRY SAMPLE PLUS TARE	(grams)	1886.2	758.5	1749.1	360.1
WT. OF TARE	(grams)	193.3	193.0	193.3	193.0
WT. OF DRY SAMPLE	(grams)	1692.9	565.5	1555.8	167.1

SIEVE ANALYSIS QA ID: KS/DAE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	1ØØ		
2 in	50.8	Ø	Ø	1ØØ		1ØØ
1 1/2in	38.1	Ø	Ø	1ØØ		
1 in	25.4	167.7	.4	99.6		
3/4 in	19.1	475.5	1.1	98.9		9Ø-1ØØ
1/2 in	12.7	1127.4	2.6	97.4		
3/8 in	9.53	1556.4	3.5	96.5		
No. 4	4.75	14.5	2.6	97.4	94.Ø	
No. 10	2.00	38.5	6.8	93.2	89.9	
No. 20	0.850	64.6	11.4	88.6	85.5	
No. 40	0.425	89.4	15.8	84.2	81.3	
No. 60	0.250	11Ø.1	19.5	80.5	77.7	
No. 100	0.125	135.4	23.9	76.1	73.4	
No. 200	0.075	165.4	29.2	7Ø.8	68.3	5Ø-1ØØ
PAN	—	167.Ø	—	—	—	

.965

COMMENTS:

000533

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

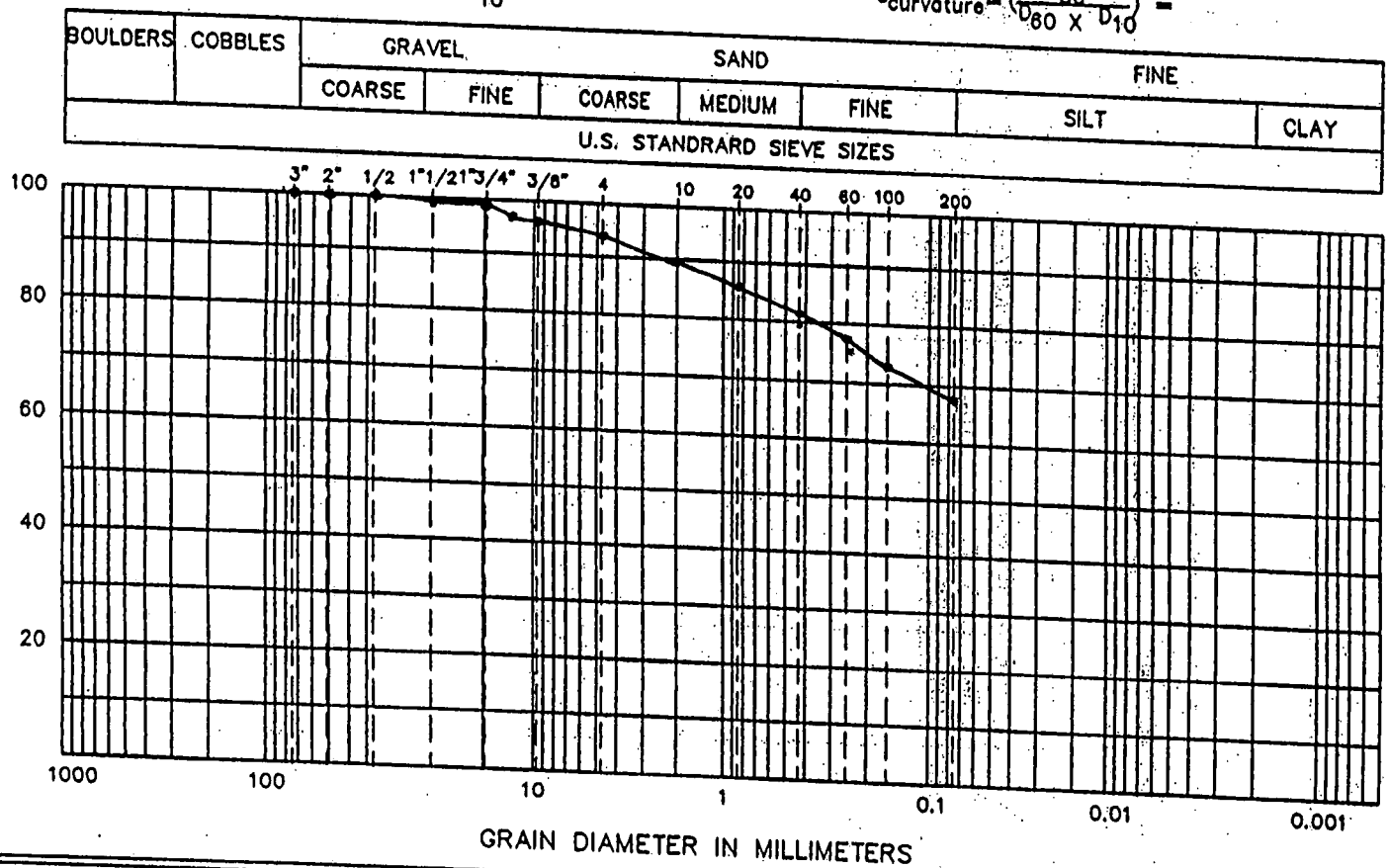
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: ____ day ____ month 2002 year

SAMPLE NO.: LP02-98 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 31

(PL) 16

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.6
3/4-In.	98.9
1/2-In.	97.4
3/8-In.	96.5
NO. 4	94.0
NO. 10	89.9
NO. 20.	85.5
NO. 40	81.3
NO. 60	77.7
NO. 100	73.4
NO. 200	68.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	70
0.02	60
0.005	34
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

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SHEET NO. ____ OF ____

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5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 98
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	46.15
Dry Soil & Tare (gm)	43.84
Tare Weight (gm)	3.22
Moisture Content (%)	5.69

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	503.69	
Tare Weight (gm)	6.86	
Total Weight (gm)	470.10	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.70
Calculated Dry Wt. used in test (gm)	52.70
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.57	2.57	89.4	#10	medium sand
#20	4.32	4.32	86.3	#20	medium sand
#40	5.98	5.98	83.3	#40	fine sand
#60	7.64	7.64	80.4	#60	fine sand
#100	9.67	9.67	76.8	#100	fine sand
#200	12.37	12.37	71.9	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET	READING	TEMP	TEMP.COR.	HYD.COR.	READING	EFFECTIVE	
10/16/02	9:36	(min)	R	T	K	Cc	C	LENGTH	A
10/16/02	9:38	2.00	45.0	23.00	0.013	7.00	38.00	10.1	0.99
10/16/02	9:41	5.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
10/16/02	9:51	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
10/16/02	10:06	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
10/16/02	10:36	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
10/16/02	13:46	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
10/17/02	9:36	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0292	67.1		
0.0190	60.0	% GRAVEL	6.00
0.0116	47.7	% COARSE SAND	4.58
0.0084	42.4	% MEDIUM SAND	6.08
0.0061	35.3	% FINE SAND	11.40
0.0030	30.0	% FINES	71.94
0.0013	23.0	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

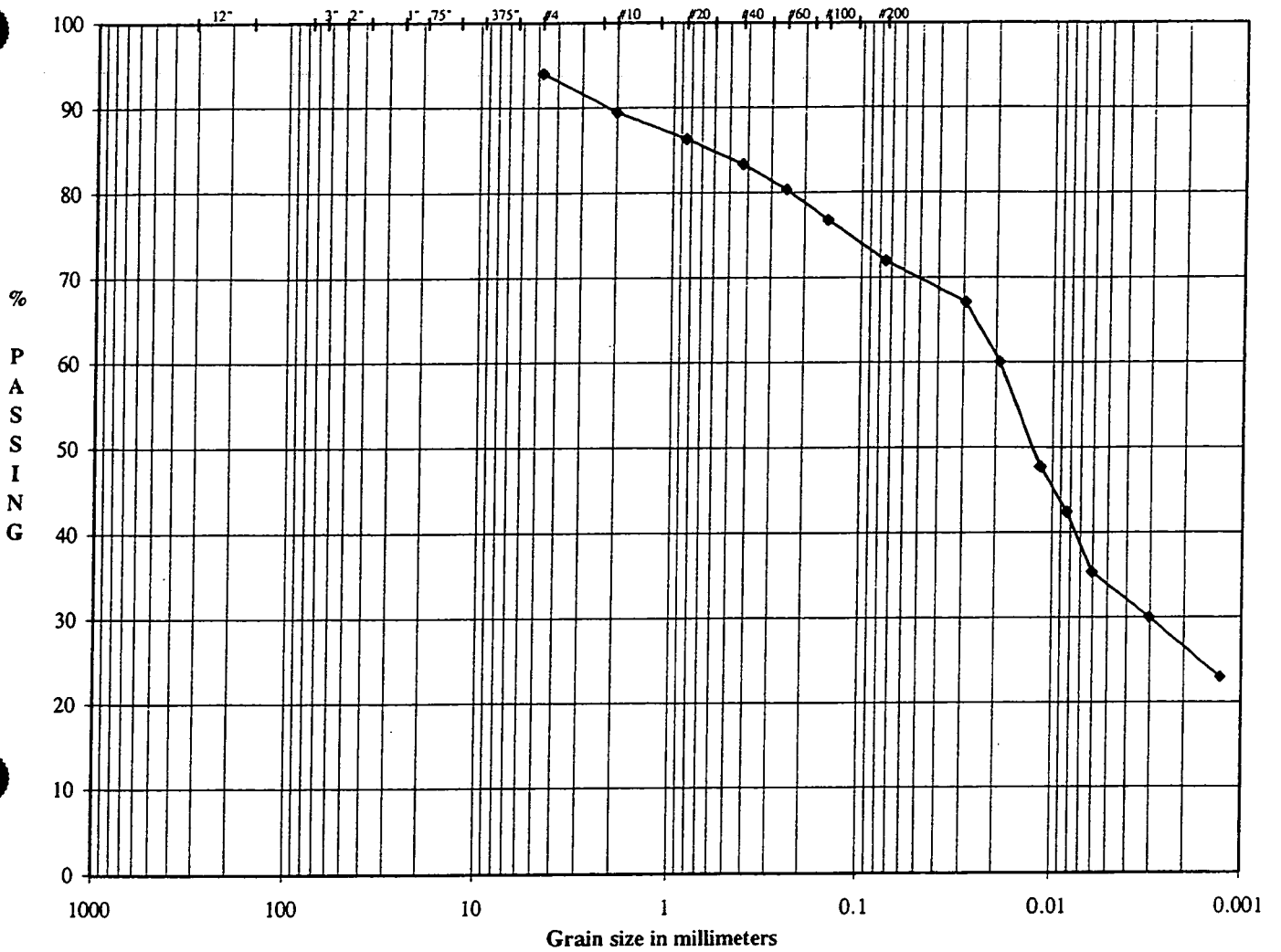
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	BS
REVIEW	JA

000535

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 98
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DW
DATE	10/15/02
CHECK	BS
REVIEW	DA

000536

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 — TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 27 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-99

SOIL SAMPLE SIZE: +3/8 = 1440.1 gm; -3/8 = 22546.4; MOISTURE = 297.2; TOTAL = 24283.7

After oven 600gm

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
ADD 1200 gm To Bucket Sump	115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-7	L-8	L-7	L-8
WT. OF DRY SAMPLE PLUS TARE	(grams)	1633.1	751.1	1518.5	356.4
WT. OF TARE	(grams)	193.0	193.0	193.0	193.0
WT. OF DRY SAMPLE	(grams)	1440.1	558.1	1325.5	163.4

SIEVE ANALYSIS — QA ID: KS/DJP

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	~~0~~ 63.9	.3	99.7		
1 in	25.4	519.1	2.1	97.9		
3/4 in	19.1	803.4	3.3	96.7		90-100
1/2 in	12.7	1137.8	4.7	95.3		
3/8 in	9.53	1325.7	5.5	94.5		
No. 4	4.75	~~10.0~~	~~1.8~~ 1.8 98	~~98.5~~	~~93.1~~	92.8
No. 10	2.00	34.2	6.1	93.9	88.7	
No. 20	0.850	62.1	11.1	88.9	84.0	
No. 40	0.425	87.7	15.7	84.3	79.7	
No. 60	0.250	108.1	19.4	80.6	76.2	
No. 100	0.125	133.8	24.0	76.0	71.8	
No. 200	0.075	162.0	29.0	71.0	67.1	50-100
PAN	—	163.4	—	—	—	

48.92 / 1.24 — 47.06 — 21346.4 / 1200.0 — .94:

COMMENTS:

000537

%FINER = 100 − Σ % RETAINED

CHECKED BY: CA

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

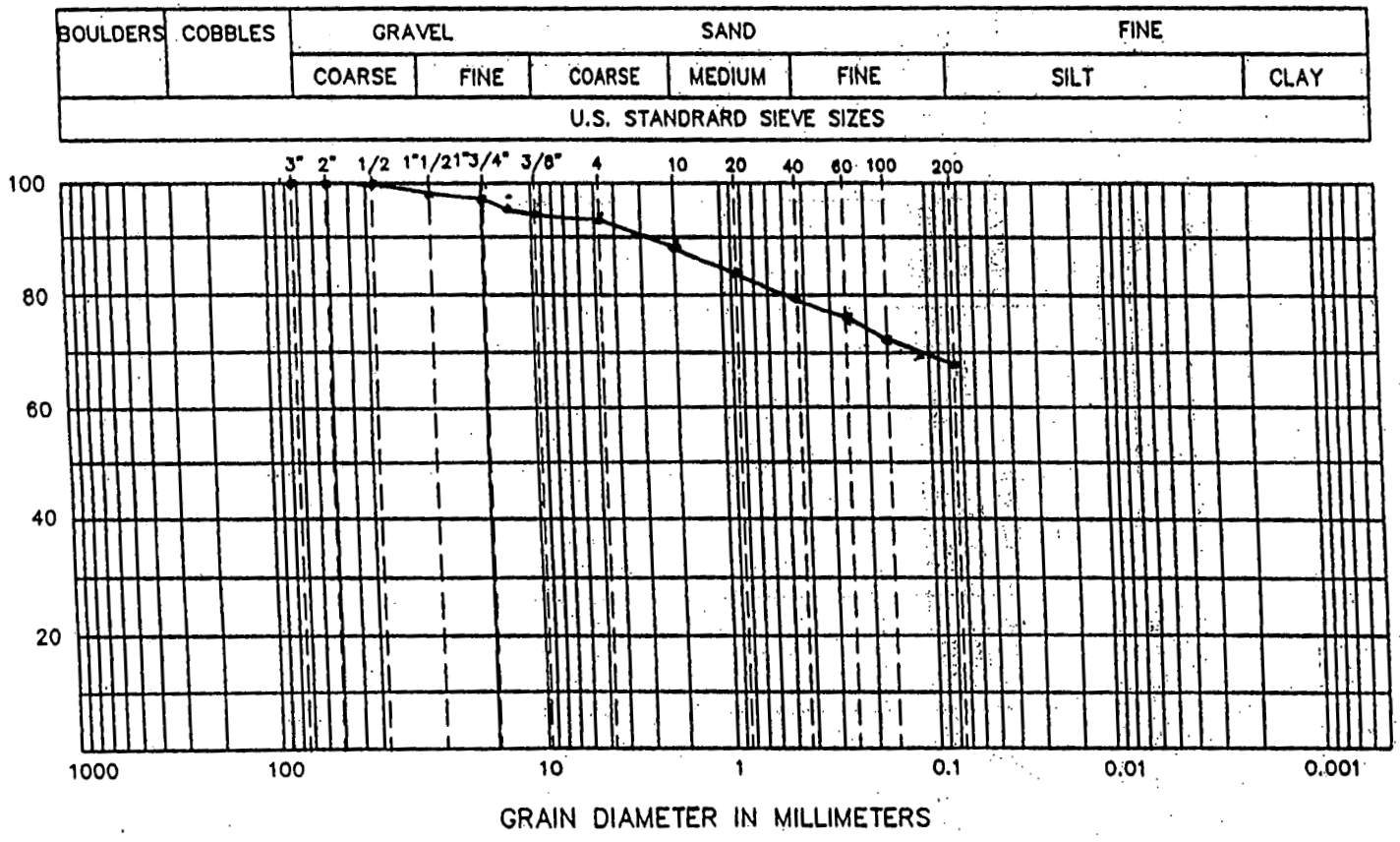
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV — DATE: ___ day ___ month 2002 year

MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02-99 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	98.7
1-in.	97.9
3/4-in.	96.7
1/2-in.	95.3
3/8-in.	94.5
NO. 4	92.8
NO. 10	88.7
NO. 20	84.0
NO. 40	78.7
NO. 60	76.2
NO. 100	71.8
NO. 200	67.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	57
0.005	33
0.002	27

SOIL CLASSIFICATION (ASTM D 2487): CL

000538

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 99
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	47.72
Dry Soil & Tare (gm)	45.28
Tare Weight (gm)	3.17
Moisture Content (%)	5.79

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.17	
Tare Weight (gm)	6.80	
Total Weight (gm)	472.02	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.8	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.73
Calculated Dry Wt. used in test (gm)	55.51
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.80

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.69	2.69	88.3	#10	medium sand
#20	4.41	4.41	85.4	#20	medium sand
#40	6.18	6.18	82.5	#40	fine sand
#60	7.99	7.99	79.4	#60	fine sand
#100	10.08	10.08	75.9	#100	fine sand
#200	13.08	13.08	70.9	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:38								
10/16/02	9:40	2.00	46.0	23.00	0.013	7.00	39.00	9.9	0.99
10/16/02	9:43	5.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
10/16/02	9:53	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
10/16/02	10:08	30.00	32.0	23.00	0.013	7.00	25.00	12.2	0.99
10/16/02	10:38	60.00	28.0	23.00	0.013	7.00	21.00	12.9	0.99
10/16/02	13:48	250.00	25.0	23.00	0.013	7.00	18.00	13.3	0.99
10/17/02	9:38	1440.00	21.0	23.00	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0289	64.5		
0.0190	56.3	% GRAVEL	7.20
0.0115	46.3	% COARSE SAND	4.50
0.0083	41.4	% MEDIUM SAND	5.83
0.0060	34.8	% FINE SAND	11.53
0.0030	29.8	% FINES	70.93
0.0013	23.2	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

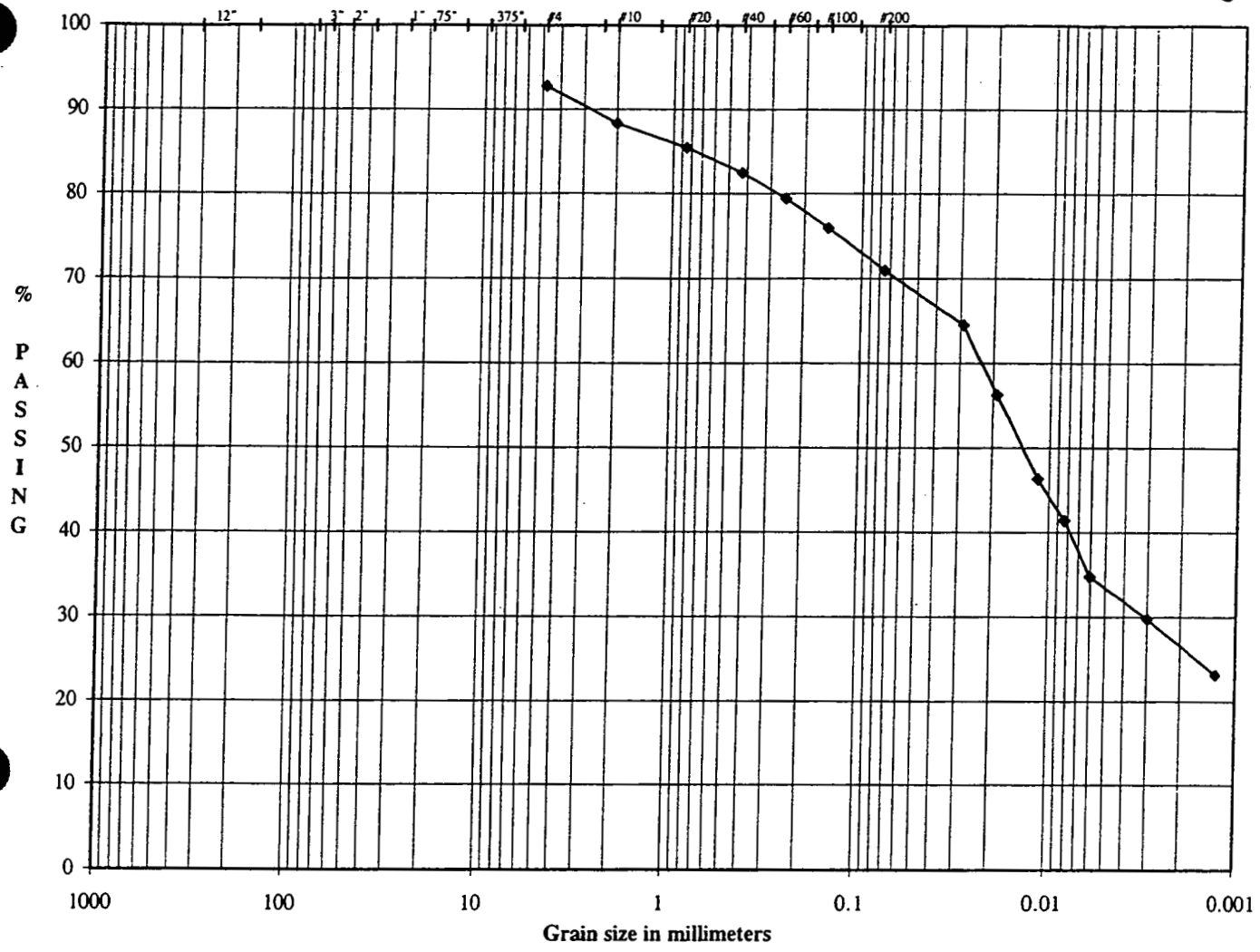
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	
REVIEW	

000539

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 99
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DW
DATE	10/15/02
CHECK	BU
REVIEW	DA

000540

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 01 day Oct month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02.100

SOIL SAMPLE SIZE	+3/8 = 1925.0 gram	MOISTURE = 334.4 gm	TOTAL = 41237.2
	-3/8 = 38977.8		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
50.00 lb's + 35.93 = 85.93 (grams)	115	65

1.88
51.83
1.83
50.00

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-2	L-2	L-2	L-2
WT. OF DRY SAMPLE PLUS TARE	(grams)	2116.1	766.4	1913.1	363.8
WT. OF TARE	(grams)	191.1	191.1	191.1	191.1
WT. OF DRY SAMPLE	(grams)	1925.0	575.3	1722.0	172.7

2.24

39.76
1.83
93

SIEVE ANALYSIS — QA ID: DLE/KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	83.2	.2	99.8		
1 in	25.4	750.8	1.8	98.2		
3/4 in	19.1	1045.9	2.5	97.5		90-100
1/2 in	12.7	1435.8	3.5	96.5		
3/8 in	9.53	1720.9	4.2	95.8		
No. 4	4.75	16.9	2.9	97.1	93.0	
No. 10	2.00	45.5	7.9	92.1	88.2	
No. 20	0.850	74.6	13.0	87.0	83.3	
No. 40	0.425	100.2	17.4	82.6	79.1	
No. 60	0.250	120.4	20.9	79.1	75.8	
No. 100	0.125	143.9	25.0	75.0	71.9	
No. 200	0.075	170.5	29.6	70.4	67.4	50-100
PAN	—	172.8	—	—		

.958

COMMENTS:

000541

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

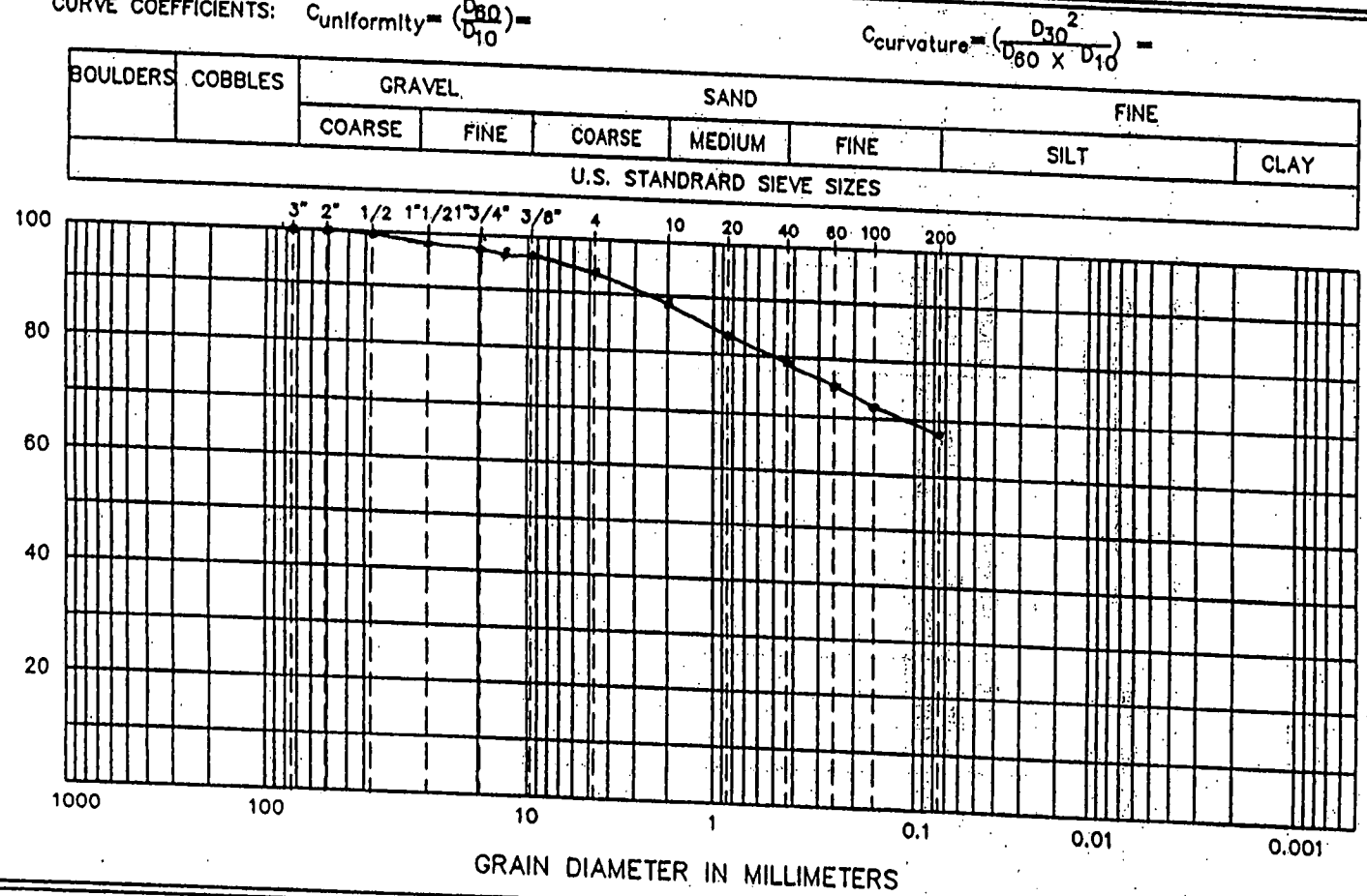
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-100 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 30

(PL) 17

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.8
1-in.	98.2
3/4-in.	97.5
1/2-in.	96.5
3/8-in.	95.8
NO. 4	93.0
NO. 10	88.2
NO. 20.	83.3
NO. 40	79.1
NO. 60	75.8
NO. 100	71.9
NO. 200	67.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	69
0.02	57
0.005	32
0.002	25

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000542

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 100
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	45.83
Dry Soil & Tare (gm)	44.15
Tare Weight (gm)	3.19
Moisture Content (%)	4.10

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.51	
Tare Weight (gm)	6.80	
Total Weight (gm)	480.02	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	58.97
Calculated Dry Wt. used in test (gm)	56.65
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.62	1.62	90.3	#10	medium sand
#20	3.68	3.68	87.0	#20	medium sand
#40	5.57	5.57	83.9	#40	fine sand
#60	7.43	7.43	80.8	#60	fine sand
#100	9.54	9.54	77.3	#100	fine sand
#200	12.27	12.27	72.9	#200	fines

HYDROMETER CALCULATIONS

DATE 10/16/02	TIME 9:40	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:42	2.00	47.0	23.00	0.013	7.00	40.00	9.7	0.99
10/16/02	9:45	5.00	42.0	23.00	0.013	7.00	35.00	10.6	0.99
10/16/02	9:55	15.00	35.0	23.00	0.013	7.00	28.00	11.7	0.99
10/16/02	10:10	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
10/16/02	10:40	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
10/16/02	13:50	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
10/17/02	9:40	1440.00	21.0	23.00	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0286	65.0		
0.0189	56.9	% GRAVEL	7.00
0.0115	45.5	% COARSE SAND	2.66
0.0084	39.0	% MEDIUM SAND	6.48
0.0061	32.5	% FINE SAND	11.00
0.0030	27.6	% FINES	72.86
0.0013	22.8	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

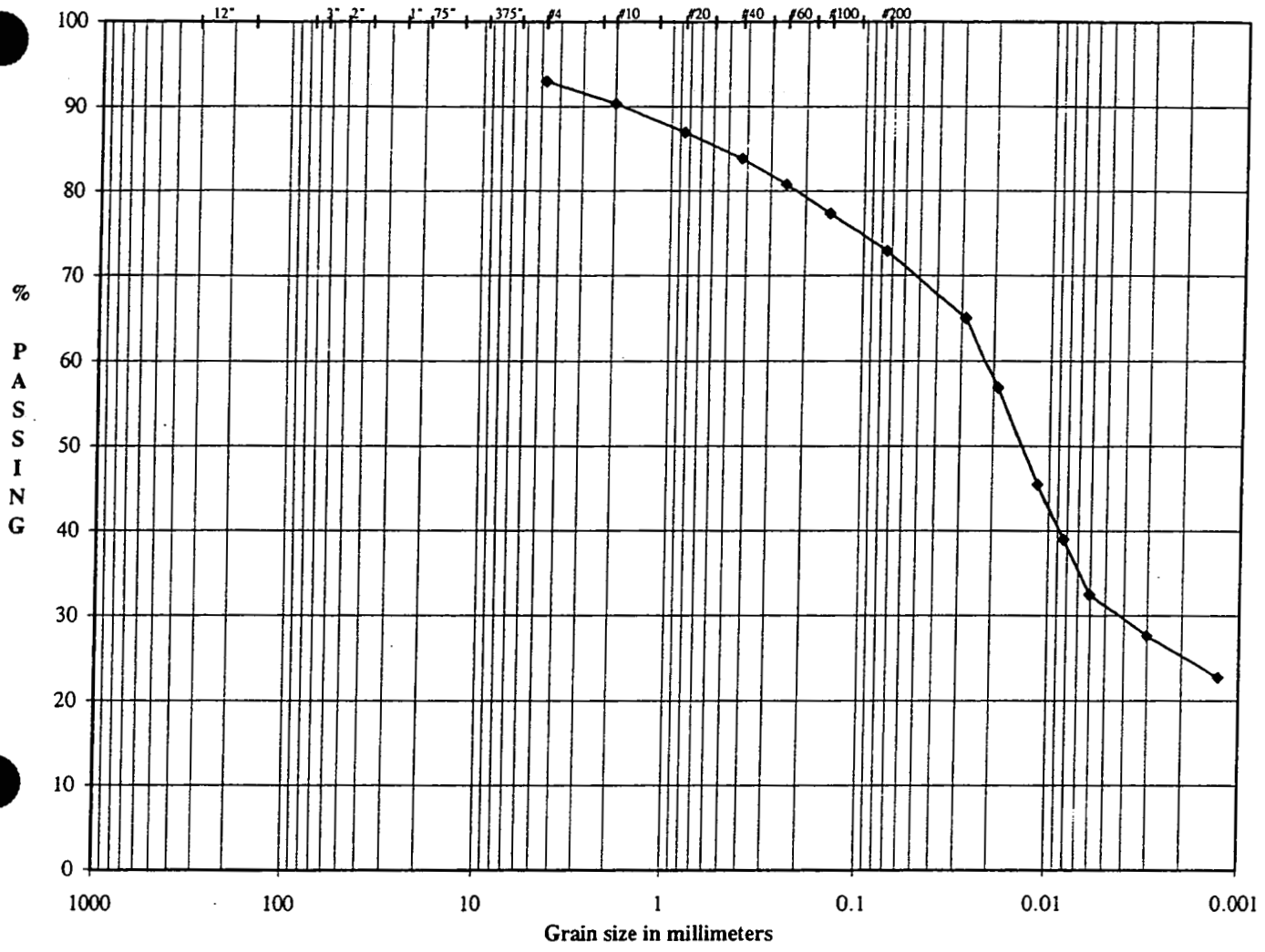
-	LL
-	PL
-	PI

TECH	TJ
DATE	10/15/02
CHECK	
REVIEW	

000543

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 100
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000544

TECH	TJ
DATE	10/15/02
CHECK	BH
REVIEW	DA

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 27 day Sept month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-101

SOIL SAMPLE SIZE	+3/8 = 1109.4 gm	MOISTURE = 318.3 gm	TOTAL = 21694.5
	-3/8 = 20266.8		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	(grams)	SAND	FINE GRAIN
44.68 lbs = 20266.8		115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-2	L-6	L-2	L-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	1300.5	766.8	1205.0	375.2
WT. OF TARE	(grams)	191.1	198.1	191.1	198.1
WT. OF DRY SAMPLE	(grams)	1109.4	568.7	1013.9	177.1

SIEVE ANALYSIS — QA ID: KS

44.51 23 / 44.08

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	81.3	.4	99.6		
1 in	25.4	283.6	1.3	98.7		
3/4 in	19.1	505.9	2.3	97.7		90-100
1/2 in	12.7	824.7	3.8	96.2		
3/8 in	9.53	1014.4	4.7	95.3		
No. 4	4.75	7.8	1.4	98.6	94.0	.95
No. 10	2.00	32.3	5.7	94.3	89.9	
No. 20	0.850	61.1	10.7	89.3	85.1	
No. 40	0.425	90.1	15.8	84.2	80.2	
No. 60	0.250	113.8	20.0	80.0	76.2	
No. 100	0.125	143.0	25.1	74.9	71.4	
No. 200	0.075	174.2	30.6	69.4	66.1	50-100
PAN	—	177.1	—	—		

COMMENTS:

000545

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

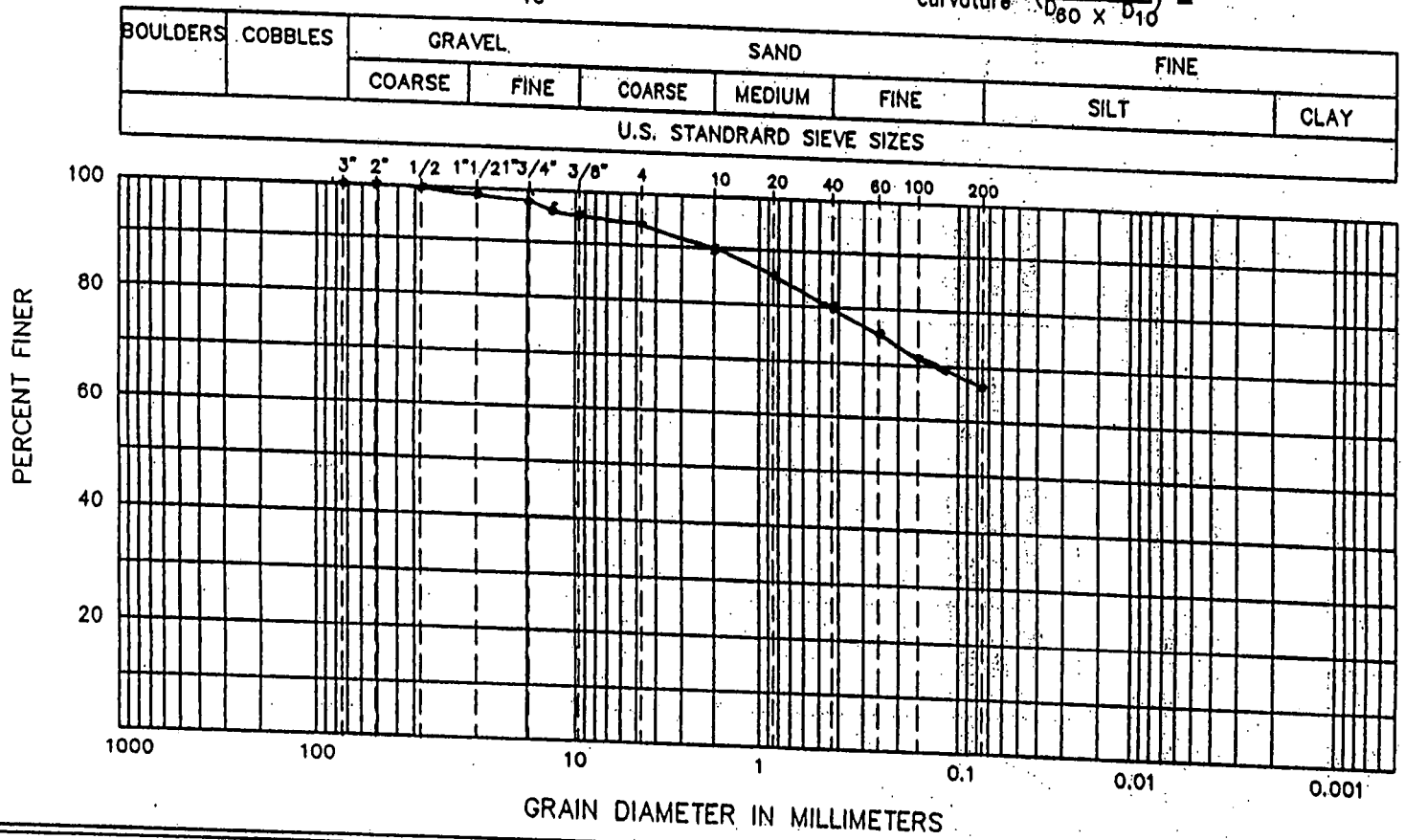
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-101 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.6
1-In.	98.7
3/4-In.	97.7
1/2-In.	96.2
3/8-In.	95.3
NO. 4	94.0
NO. 10	89.9
NO. 20.	85.1
NO. 40	80.2
NO. 60	76.2
NO. 100	71.4
NO. 200	66.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	59
0.005	33
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

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SHEET NO. ____ OF ____

0000546

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 101
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	46.83
Dry Soil & Tare (gm)	44.96
Tare Weight (gm)	3.17
Moisture Content (%)	4.47

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	507.61	
Tare Weight (gm)	6.72	
Total Weight (gm)	479.44	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.50
Calculated Dry Wt. used in test (gm)	54.08
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.65	2.65	89.4	#10	medium sand
#20	4.74	4.74	85.8	#20	medium sand
#40	6.65	6.65	82.4	#40	fine sand
#60	8.41	8.41	79.4	#60	fine sand
#100	10.44	10.44	75.9	#100	fine sand
#200	13.35	13.35	70.8	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:42								
10/16/02	9:44	2.00	46.0	23.00	0.013	7.00	39.00	9.9	0.99
10/16/02	9:47	5.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
10/16/02	9:57	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
10/16/02	10:12	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
10/16/02	10:42	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
10/16/02	13:52	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
10/17/02	9:42	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0289	67.1		
0.0190	58.5	% GRAVEL	6.00
0.0116	46.5	% COARSE SAND	4.61
0.0084	39.6	% MEDIUM SAND	6.95
0.0061	34.4	% FINE SAND	11.65
0.0030	29.3	% FINES	70.80
0.0013	22.4	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

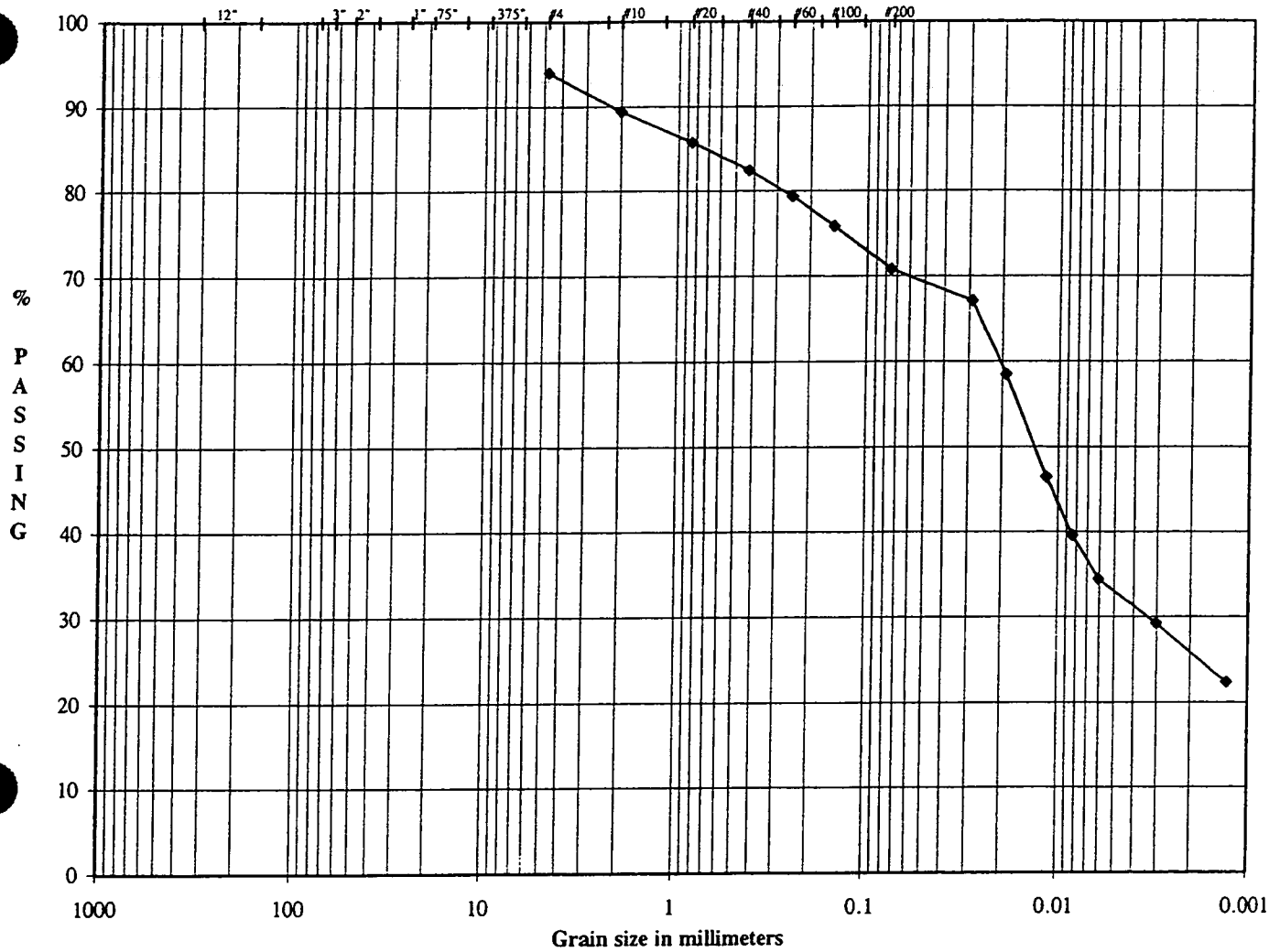
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	
REVIEW	

000547

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 101
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DW
DATE	10/15/02
CHECK	BB
REVIEW	DA

000548

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III — DATE: 02 day Oct month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-102

SOIL SAMPLE SIZE	+3/8 = 2079.7	MOISTURE = 365.6 gr	TOTAL = 40624.8
	-3/8 = 38179.5 gr	40624.8	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	50.00 / 34.17 / 84.17 (grams)	SAND	FINE GRAIN
		115	65

51.90 − 1.90 = 50.00

35.89 − 1.72 = 34.17

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L.44	L-7	L.44	L-7
WT. OF DRY SAMPLE PLUS TARE	(grams)	2270.9	764.4	2117.4	341.2
WT. OF TARE	(grams)	191.2	192.9	191.2	192.9
WT. OF DRY SAMPLE	(grams)	2079.7	571.5	1926.2	148.3

SIEVE ANALYSIS — QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		1ØØ
1 1/2in	38.1	348.5	.9	99.1		
1 in	25.4	810.1	2.0	98.0		
3/4 in	19.1	1113.5	2.7	97.3		9Ø-1ØØ
1/2 in	12.7	1668.4	4.1	95.9		
3/8 in	9.53	1924.2	4.7	95.3		
No. 4	4.75	1Ø.7	1.9	98.1	93.5	
No. 10	2.00	33.5	5.9	94.1	89.7	
No. 20	0.850	55.9	9.8	9Ø.2	86.Ø	
No. 40	0.425	77.6	13.6	86.4	82.3	
No. 60	0.250	96.9	17.0	83.Ø	79.1	
No. 100	0.125	121.1	21.2	78.8	75.1	
No. 200	0.075	147.6	25.8	74.2	70.7	5Ø-1ØØ
PAN	—	148.3	—	—		

953

COMMENTS:

000549

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

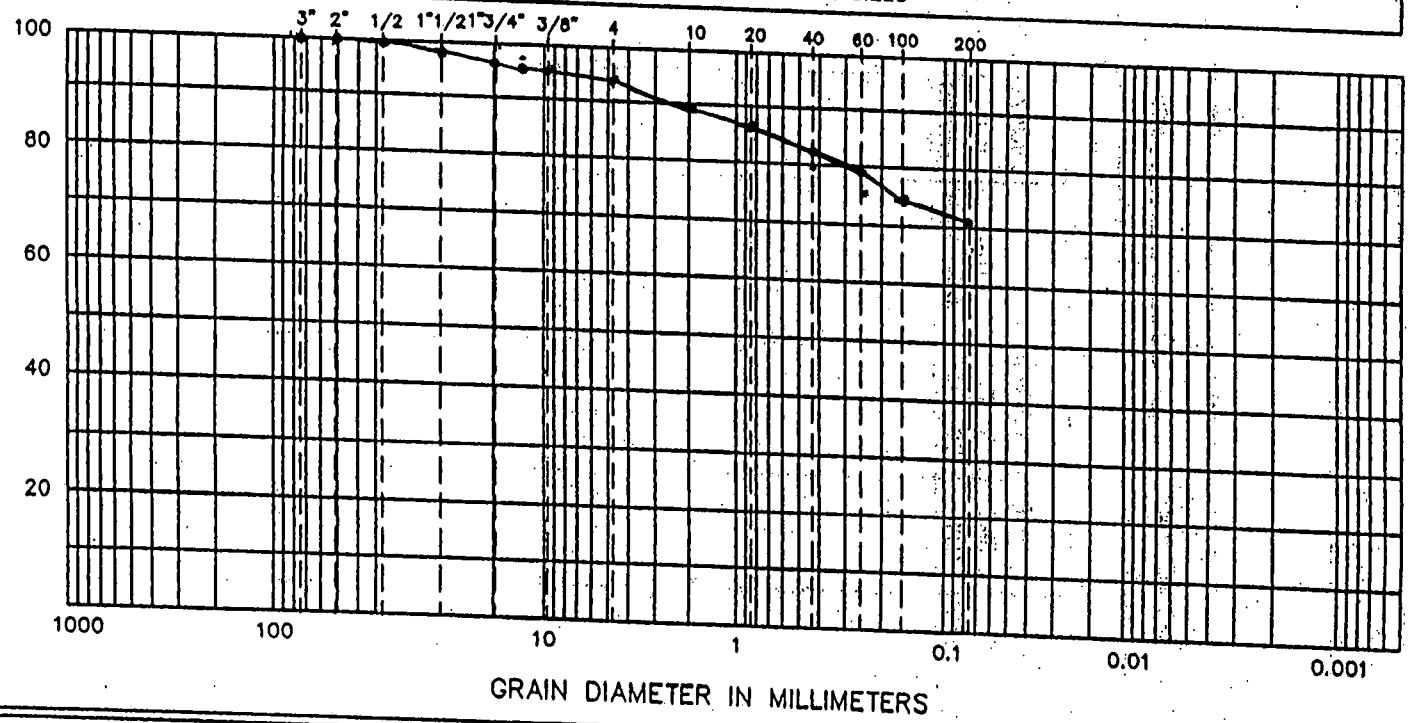
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-102 QA ID: CAW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 30

(PL) 17

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.7
1-In.	98.0
3/4-In.	97.3
1/2-In.	95.9
3/8-In.	95.3
NO. 4	93.5
NO. 10	89.7
NO. 20.	86.0
NO. 40	82.3
NO. 60	79.1
NO. 100	75.1
NO. 200	70.7

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	~~68~~ 70
0.02	58
0.005	33
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000550

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 102
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	47.35
Dry Soil & Tare (gm)	45.46
Tare Weight (gm)	3.26
Moisture Content (%)	4.48

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.84	
Tare Weight (gm)	6.90	
Total Weight (gm)	478.51	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.60
Calculated Dry Wt. used in test (gm)	53.22
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.60	1.60	90.7	#10	medium sand
#20	3.44	3.44	87.5	#20	medium sand
#40	5.31	5.31	84.2	#40	fine sand
#60	7.08	7.08	81.1	#60	fine sand
#100	9.18	9.18	77.4	#100	fine sand
#200	11.84	11.84	72.7	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:44								
10/16/02	9:46	2.00	45.0	23.00	0.013	7.00	38.00	10.1	0.99
10/16/02	9:49	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
10/16/02	9:59	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
10/16/02	10:14	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
10/16/02	10:44	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
10/16/02	13:54	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
10/17/02	9:44	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0292	66.1
0.0192	57.4
0.0116	45.2
0.0084	40.0
0.0061	34.8
0.0030	29.6
0.0013	22.6

% GRAVEL	6.50
% COARSE SAND	2.81
% MEDIUM SAND	6.52
% FINE SAND	11.47
% FINES	72.70
% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

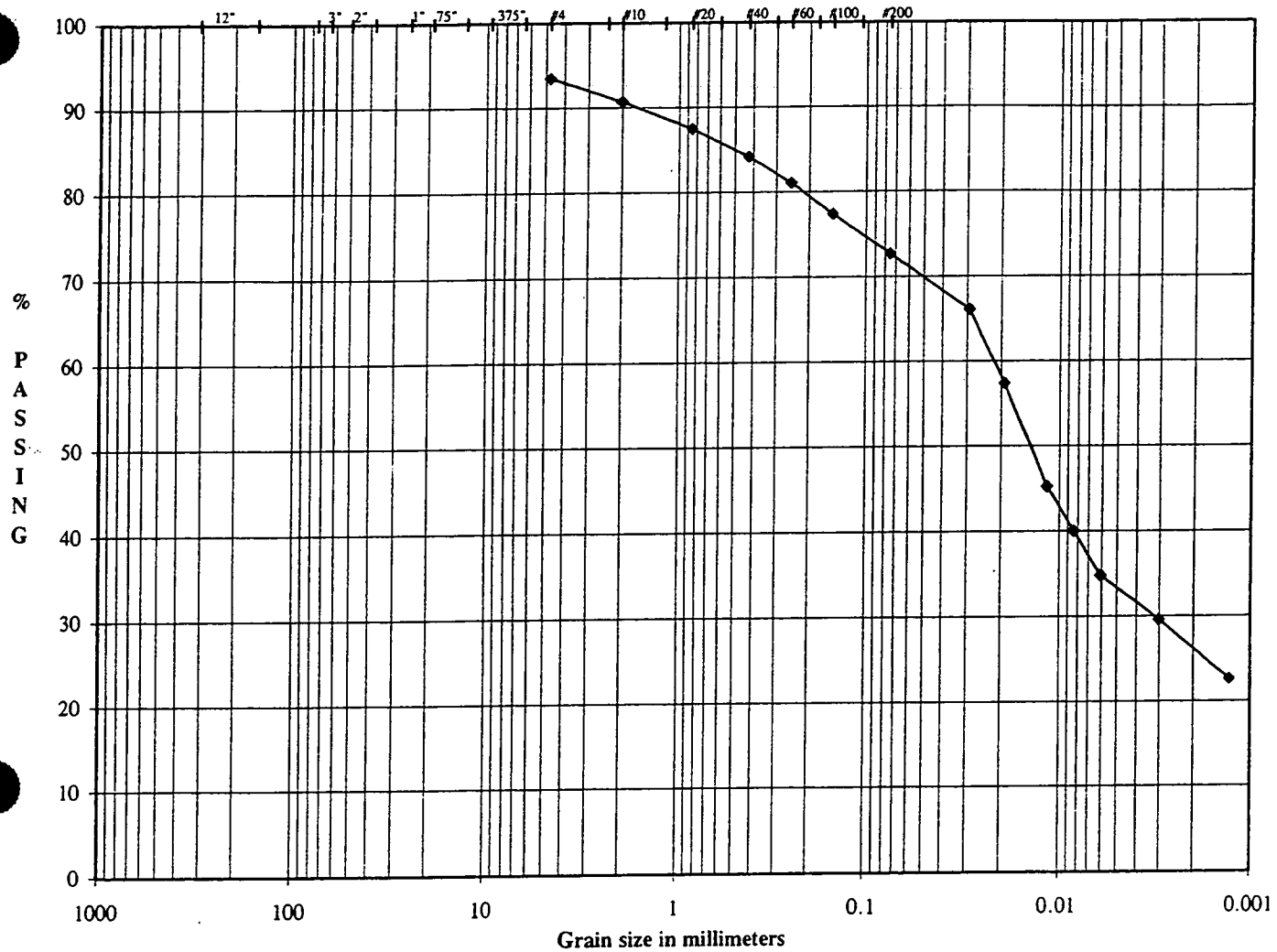
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	BS
REVIEW	DP

000551

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 102
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000552

TECH	TJ/DW
DATE	10/15/02
CHECK	BJ
REVIEW	DA

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 03 day OCT month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-103

SOIL SAMPLE SIZE	+3/8 = 685.7 grams	MOISTURE = 355.1 grams	TOTAL = 20740.6
	-3/8 = 19699.8		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	(grams)	SAND	FINE GRAIN
43.43 lb's * 19699.8		115	65

45.24
1.81
43.43

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-41	L-44	L-44	L-44
WT. OF DRY SAMPLE PLUS TARE	(grams)	876.9	764.9	829.8	360.5
WT. OF TARE	(grams)	191.2	191.2	191.2	191.2
WT. OF DRY SAMPLE	(grams)	685.7	573.7	638.6	169.3

SIEVE ANALYSIS — QA ID: DLE/KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	82.3	0.4	99.6		
1 in	25.4	236.0	1.1	98.9		
3/4 in	19.1	318.8	1.5	98.5		90-100
1/2 in	12.7	528.3	2.5	97.5		
3/8 in	9.53	638.6	3.1	96.9		
No. 4	4.75	8.9	1.6	98.4	95.4	
No. 10	2.00	26.2	4.6	95.4	92.5	
No. 20	0.850	49.9	8.7	91.3	88.5	
No. 40	0.425	78.2	13.6	86.4	83.7	
No. 60	0.250	101.8	17.7	82.3	79.7	
No. 100	0.125	132.1	23.0	77.0	74.6	
No. 200	0.075	164.5	28.7	71.3	69.1	50-100
PAN	—	169.5	—	—		

COMMENTS:

000553

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: [signature] — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

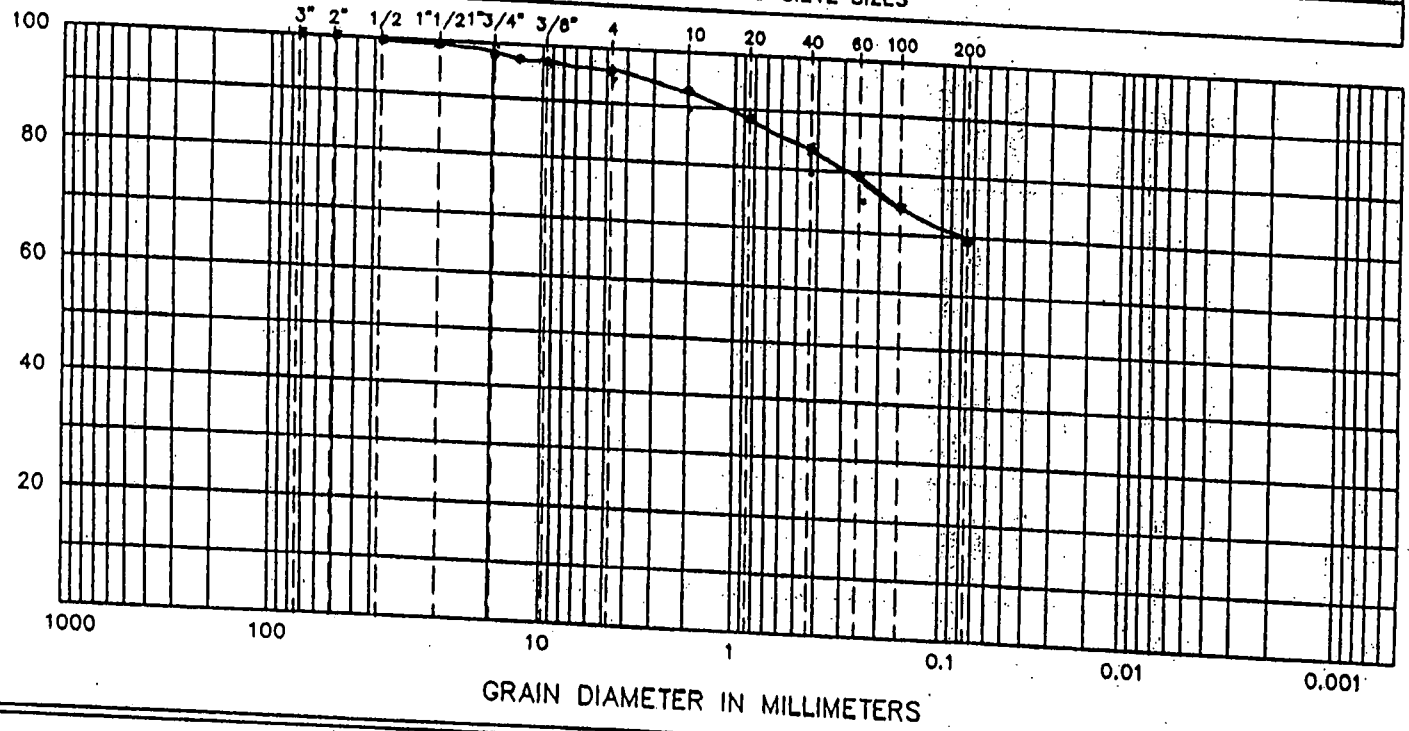
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: ____ day ____ month 2002 year

SAMPLE NO.: LP02-103 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 40

(PL) 19

(PI) 21

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.6
1-In.	98.9
3/4-In.	98.5
1/2-In.	97.5
3/8-In.	96.9
NO. 4	95.4
NO. 10	92.5
NO. 20.	88.5
NO. 40	83.7
NO. 60	79.7
NO. 100	74.6
NO. 200	69.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	75
0.02	63
0.005	40
0.002	32

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY: ____

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000554

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 103
OJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	41.66
Dry Soil & Tare (gm)	40.00
Tare Weight (gm)	3.18
Moisture Content (%)	4.51

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.46	
Tare Weight (gm)	6.73	
Total Weight (gm)	478.17	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			95.4	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
fic Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
th of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	57.39
Calculated Dry Wt. used in test (gm)	54.91
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	95.40

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.64	2.64	90.8	#10	medium sand
#20	4.31	4.31	87.9	#20	medium sand
#40	5.67	5.67	85.5	#40	fine sand
#60	6.98	6.98	83.3	#60	fine sand
#100	8.42	8.42	80.8	#100	fine sand
#200	10.60	10.60	77.0	#200	fines

HYDROMETER CALCULATIONS

DATE 10/16/02	TIME 9:46	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:48	2.00	48.0	23.00	0.013	7.00	41.00	9.6	0.99
10/16/02	9:51	5.00	43.0	23.00	0.013	7.00	36.00	10.4	0.99
10/16/02	10:01	15.00	37.0	23.00	0.013	7.00	30.00	11.4	0.99
10/16/02	10:16	30.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
10/16/02	10:46	60.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
10/16/02	13:56	250.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
10/17/02	9:46	1440.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0285	70.5		
0.0187	61.9	% GRAVEL	4.60
0.0113	51.6	% COARSE SAND	4.59
0.0082	46.4	% MEDIUM SAND	5.26
0.0059	41.3	% FINE SAND	8.56
0.0030	34.4	% FINES	76.99
0.0013	29.2	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS: (CL)

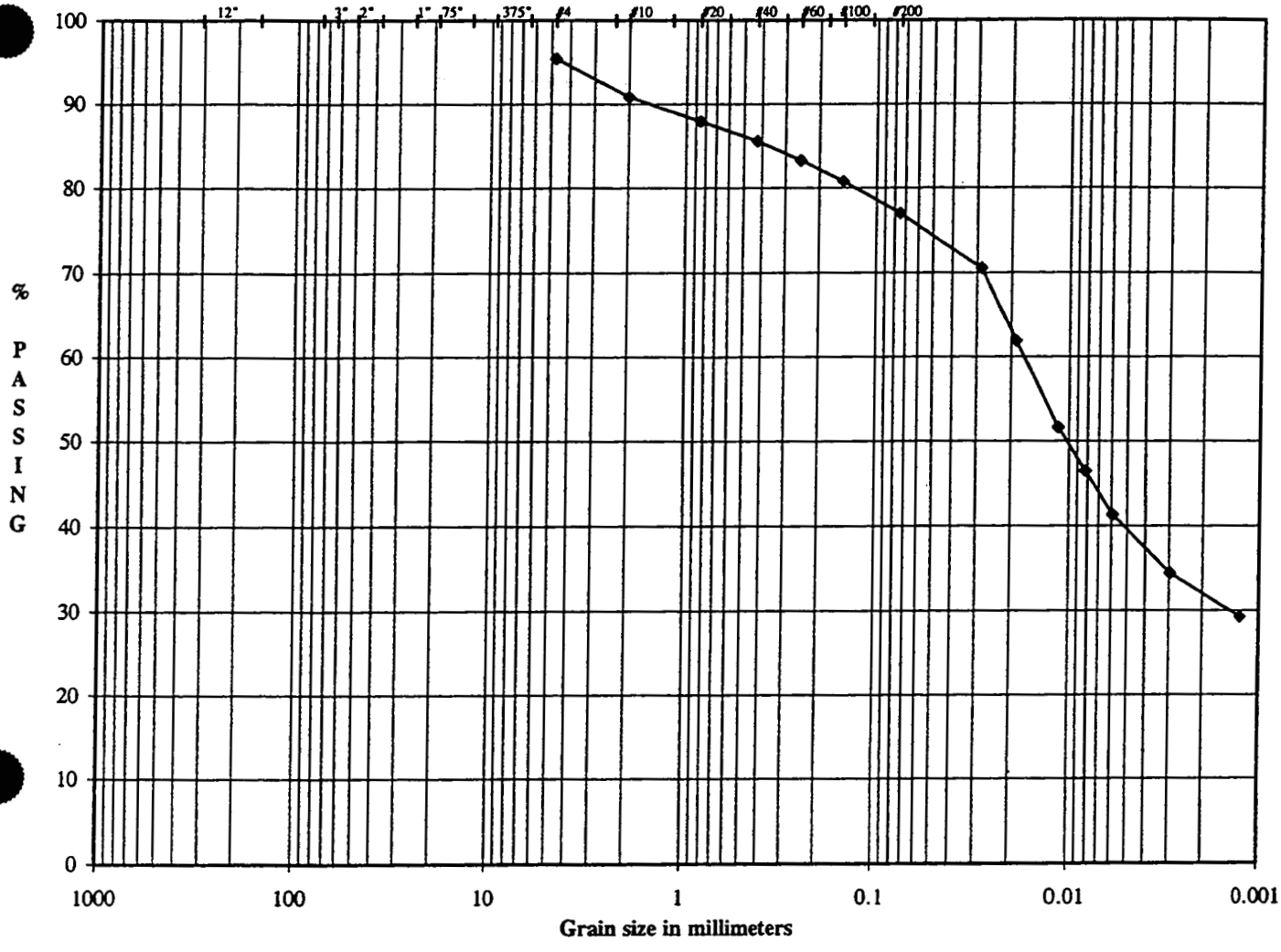
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	BSS
REVIEW	DA

000555

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 103
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DW
DATE	10/15/02
CHECK	BS
REVIEW	D.A

000556

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: PHASE III — DATE: 03 day OCT month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP 02-104

SOIL SAMPLE SIZE	+3/8 = 1093.7 gm	MOISTURE = 360.2 gm	TOTAL = 4098.7
	-3/8 = 3953.8		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	50.00 lb's + 39.16 = 89.16 (grams)	SAND	FINE GRAIN
		115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-9	L-6	L-9	L-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	1286.9	776.3	1208.0	376.2
WT. OF TARE	(grams)	193.2	199.1	193.2	199.1
WT. OF DRY SAMPLE	(grams)	1093.7	577.2	1014.8	177.1

39.00
184
35.6

SIEVE ANALYSIS — QA ID: DLE/KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	Ø	Ø	100		
2 in	50.8	Ø	Ø	100		1ØØ
1 1/2in	38.1	Ø	Ø	100		
1 in	25.4	290.2	.7	99.3		
3/4 in	19.1	372.8	.9	99.1		9Ø-1ØØ
1/2 in	12.7	760.4	1.9	98.1		
3/8 in	9.53	1014.3	2.5	97.5		
No. 4	4.75	8.8	1.5	98.5	96.Ø	
No. 10	2.00	33.8	5.9	94.1	91.7	
No. 20	0.850	63.6	11.Ø	89.Ø	86.8	
No. 40	0.425	93.5	16.2	83.8	81.7	
No. 60	0.250	118.1	2Ø.5	79.5	77.5	
No. 100	0.125	146.Ø	25.3	74.7	72.8	
No. 200	0.075	176.3	3Ø.5	69.5	67.8	5Ø-1ØØ
PAN	—	177.9	—	—		

.97

COMMENTS:

000557

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

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SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

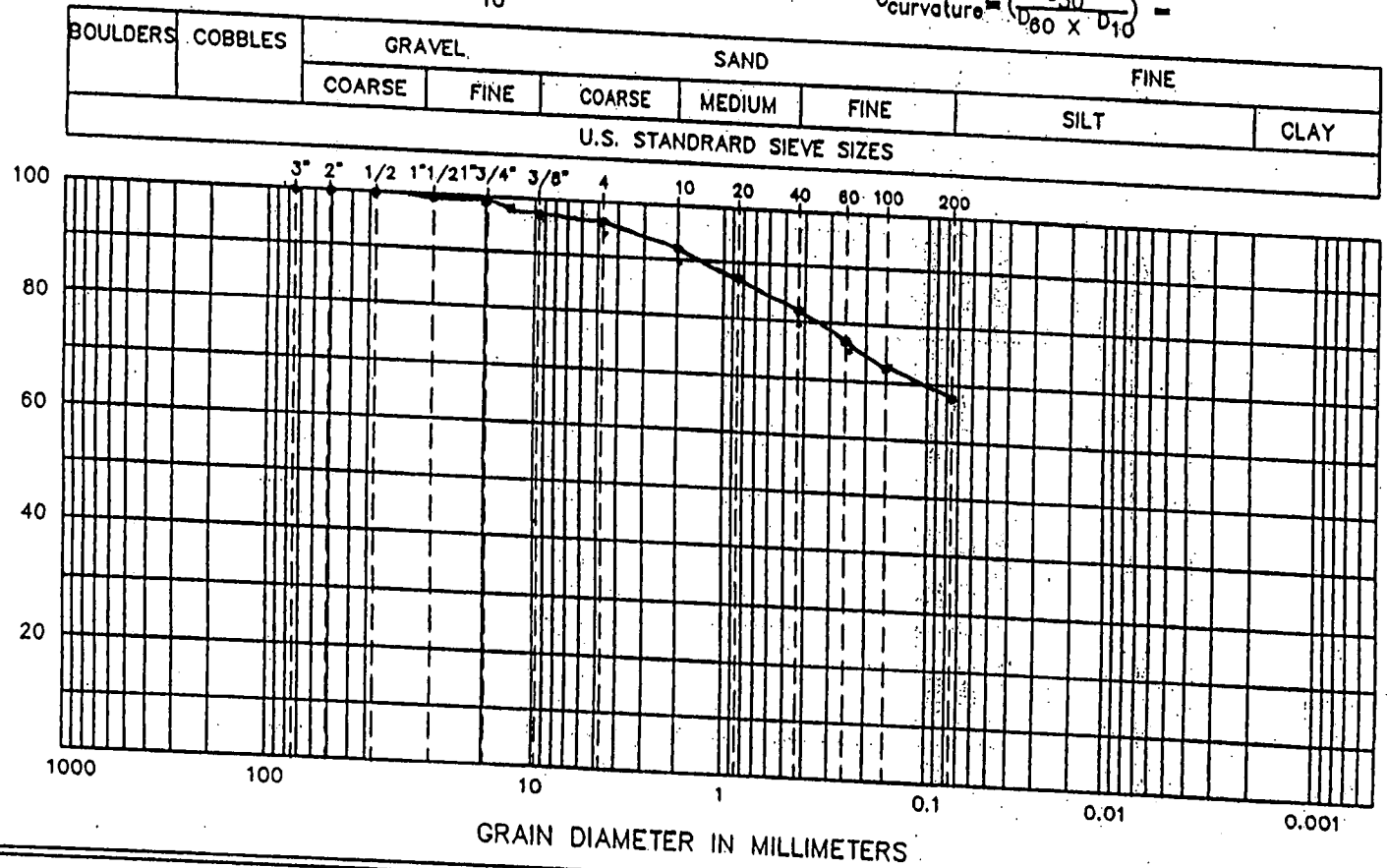
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-104 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.3
3/4-In.	99.1
1/2-In.	98.1
3/8-In.	97.5
NO. 4	96.0
NO. 10	91.7
NO. 20	86.8
NO. 40	81.7
NO. 60	77.5
NO. 100	72.8
NO. 200	67.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68.5
0.02	58.3
0.005	34.9
0.002	26.8

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000558

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 104
JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	48.51
Dry Soil & Tare (gm)	46.94
Tare Weight (gm)	3.28
Moisture Content (%)	3.60

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	505.41	
Tare Weight (gm)	6.72	
Total Weight (gm)	481.38	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			96.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.38
Calculated Dry Wt. used in test (gm)	54.42
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	96.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.79	1.79	92.8	#10	medium sand
#20	4.32	4.32	88.4	#20	medium sand
#40	6.65	6.65	84.3	#40	fine sand
#60	8.69	8.69	80.7	#60	fine sand
#100	11.04	11.04	76.5	#100	fine sand
#200	14.06	14.06	71.2	#200	fines

HYDROMETER CALCULATIONS

DATE 10/16/02	TIME 9:48	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:50	2.00	44.0	23.00	0.013	7.00	37.00	10.2	0.99
10/16/02	9:53	5.00	40.0	23.00	0.013	7.00	33.00	10.9	0.99
10/16/02	10:03	15.00	33.0	23.00	0.013	7.00	26.00	12.0	0.99
10/16/02	10:18	30.00	30.0	23.00	0.013	7.00	23.00	12.5	0.99
10/16/02	10:48	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
10/16/02	13:58	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
10/17/02	9:48	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0294	64.6		
0.0192	57.6	% GRAVEL	4.00
0.0116	45.4	% COARSE SAND	3.16
0.0084	40.2	% MEDIUM SAND	8.57
0.0061	34.9	% FINE SAND	13.07
0.0030	29.7	% FINES	71.20
0.0013	22.7	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

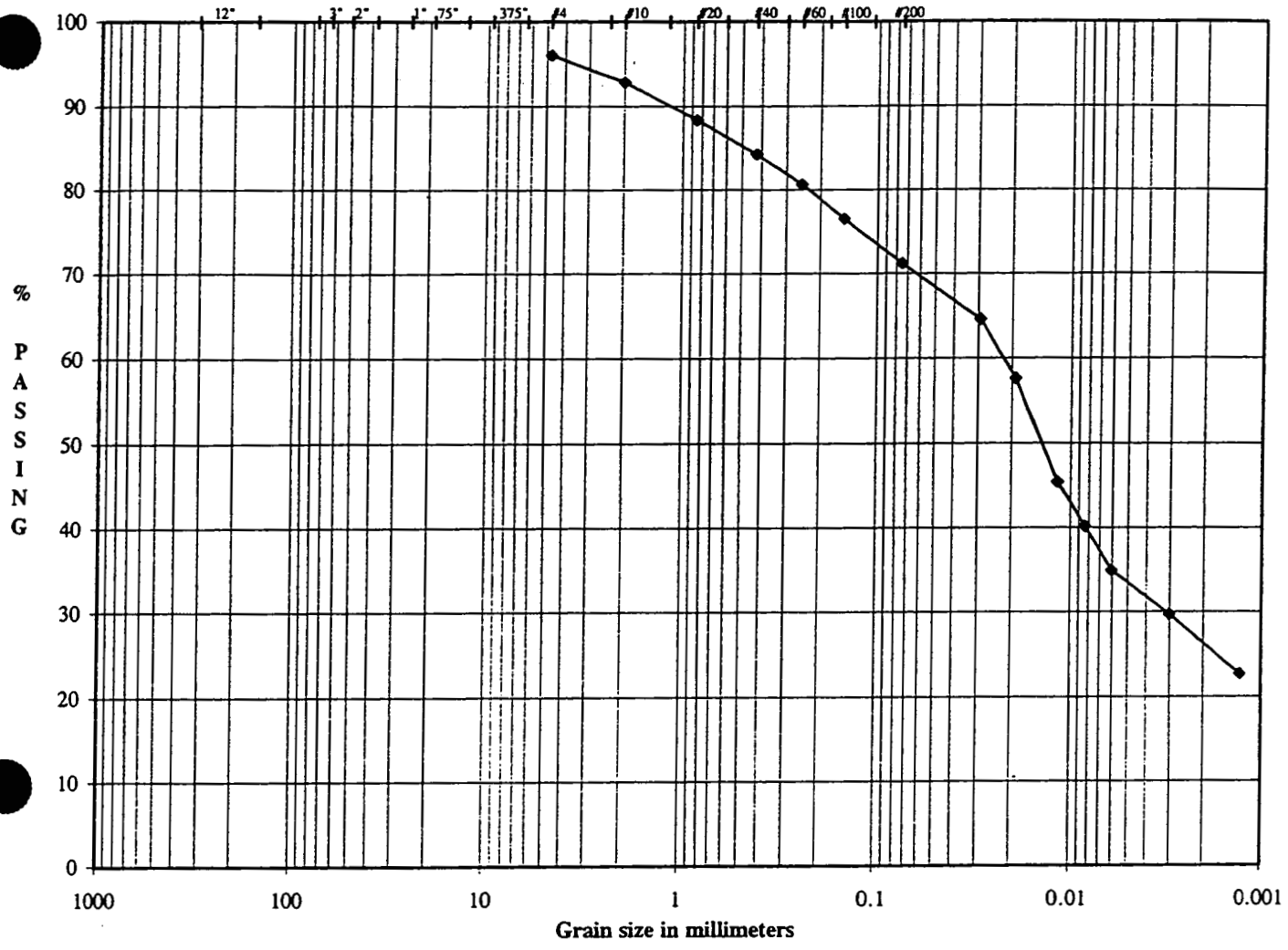
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	BS
REVIEW	DA

000559

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 104
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DW
DATE	10/15/02
CHECK	BK
REVIEW	DA

000560

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 04 day Oct month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LP02-105

SOIL SAMPLE SIZE	+3/8 = 716.7 gm	MOISTURE = 337.2 gm	TOTAL = 22597.7
	-3/8 = 21543.8 gm	22592.7	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
500.gm +3/8 600.gm Aerbrg 20443.8 (grams)	115	65

46.91
1.84
45.07

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-8	L-8	L-8	L-8
WT. OF DRY SAMPLE PLUS TARE	(grams)	909.8	670.7	866.7	333.0
WT. OF TARE	(grams)	193.1	193.1	193.1	193.1
WT. OF DRY SAMPLE	(grams)	716.7	477.6	673.6	139.9

SIEVE ANALYSIS — QA ID: DLE/KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	85.2	.4	99.6		
3/4 in	19.1	252.4	1.1	98.9		90-100
1/2 in	12.7	551.1	2.4	97.6		
3/8 in	9.53	673.5	3.0	97.0		
No. 4	4.75	12.1	2.5	97.5	94.6	
No. 10	2.00	32.6	6.8	93.2	90.4	
No. 20	0.850	54.9	11.5	88.5	85.8	
No. 40	0.425	76.5	16.0	84.0	81.5	
No. 60	0.250	94.6	19.8	80.2	77.8	
No. 100	0.125	115.9	24.3	75.7	73.4	
No. 200	0.075	138.6	29.0	71.0	68.9	50-100
PAN	—	140.1	—	—		

.932

COMMENTS:

000561

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

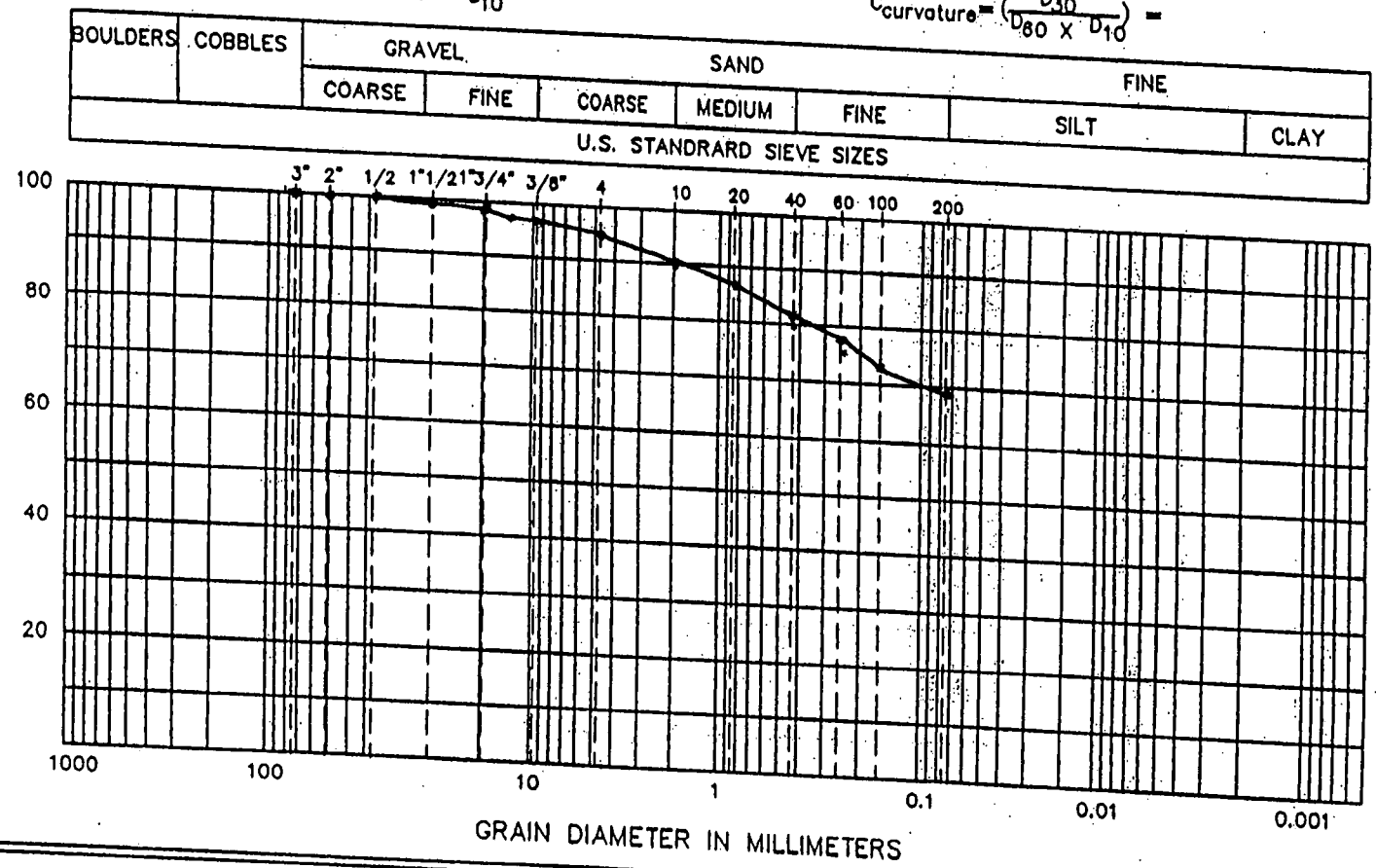
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-105 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 31

(PL) 16

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	99.6
3/4-In.	98.9
1/2-In.	97.6
3/8-In.	97.0
NO. 4	94.6
NO. 10	90.4
NO. 20	85.8
NO. 40	81.5
NO. 60	77.8
NO. 100	73.4
NO. 200	68.9

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	59
0.005	33
0.002	26

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

000582

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 105
OJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	44.20
Dry Soil & Tare (gm)	42.72
Tare Weight (gm)	3.19
Moisture Content (%)	3.74

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	506.73	
Tare Weight (gm)	6.79	
Total Weight (gm)	481.90	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.6	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
gth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	56.22
Calculated Dry Wt. used in test (gm)	54.19
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.60

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.34	2.34	90.5	#10	medium sand
#20	4.35	4.35	87.0	#20	medium sand
#40	6.51	6.51	83.2	#40	fine sand
#60	8.36	8.36	80.0	#60	fine sand
#100	10.40	10.40	76.4	#100	fine sand
#200	13.34	13.34	71.3	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
10/16/02	9:50								
10/16/02	9:52	2.00	45.0	23.00	0.013	7.00	38.00	10.1	0.99
10/16/02	9:55	5.00	41.0	23.00	0.013	7.00	34.00	10.7	0.99
10/16/02	10:05	15.00	34.0	23.00	0.013	7.00	27.00	11.9	0.99
10/16/02	10:20	30.00	31.0	23.00	0.013	7.00	24.00	12.4	0.99
10/16/02	10:50	60.00	27.0	23.00	0.013	7.00	20.00	13.0	0.99
10/16/02	14:00	250.00	24.0	23.00	0.013	7.00	17.00	13.5	0.99
10/17/02	9:50	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0292	65.7		
0.0190	58.8	% GRAVEL	5.40
0.0116	46.7	% COARSE SAND	4.08
0.0084	41.5	% MEDIUM SAND	7.28
0.0061	34.6	% FINE SAND	11.92
0.0030	29.4	% FINES	71.31
0.0013	22.5	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

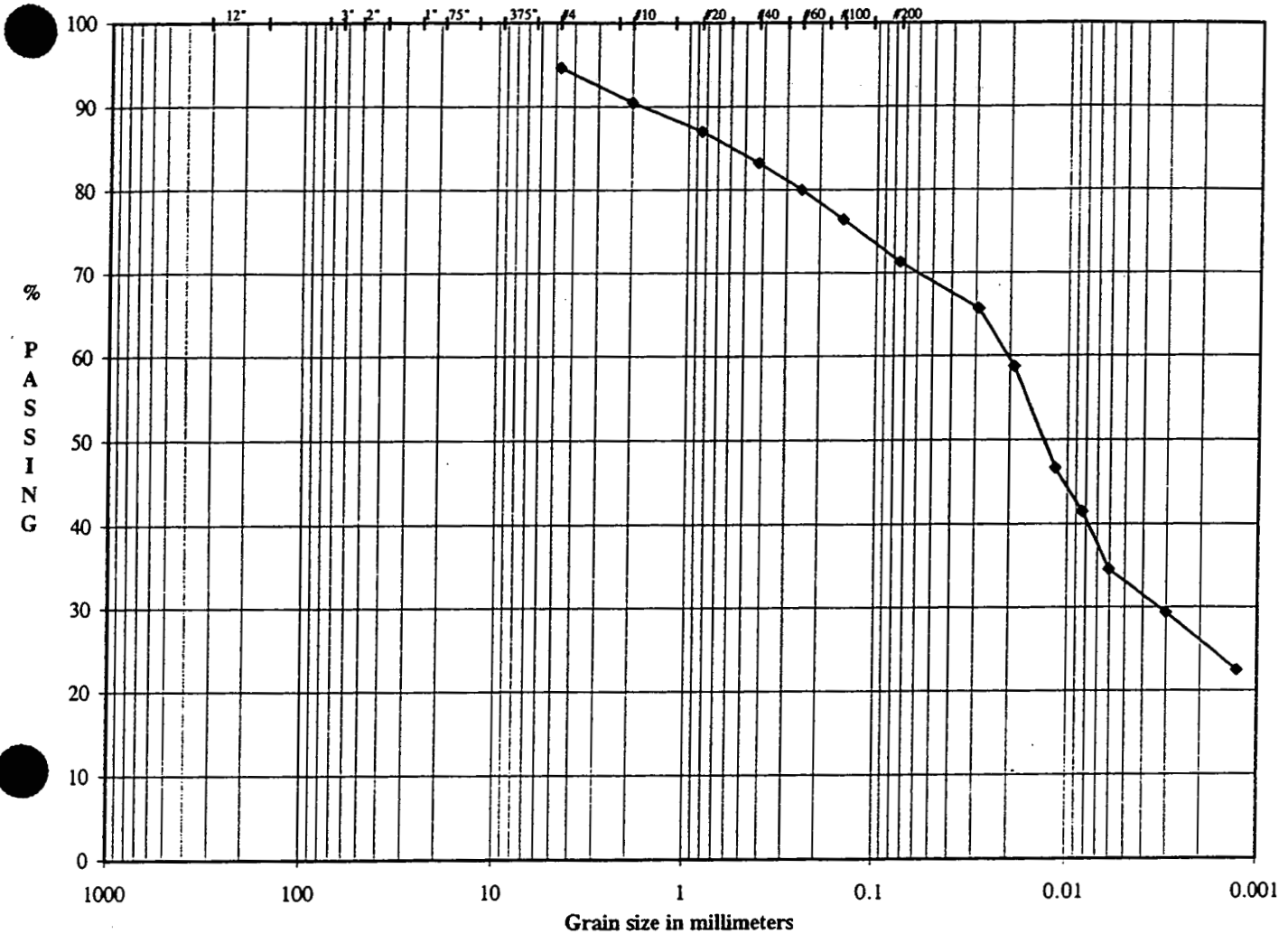
-	LL
-	PL
-	PI

TECH	TJ/DW
DATE	10/15/02
CHECK	BS
REVIEW	DA

000563

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 105
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/DW
DATE	10/15/02
CHECK	BY
REVIEW	DA

000564

G. oSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 07 day Oct month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-106

SOIL SAMPLE SIZE	+3/8 = 2491.8	MOISTURE = 379.7	TOTAL = 48803.0
	-3/8 = 45931.5		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)		SAND	FINE GRAIN
50.00 lbs 51.26 10.1.26	(grams)	115	65

53.00
- 1.74
51.26

		+3/8 BEFORE WASH	-3/8	+3/8 AFTER WASH	-3/8
TARE NO.		Small Bowl	2-6	Small Bowl	~~Ick-6~~ LL-1
WT. OF DRY SAMPLE PLUS TARE	(grams)	2784.1	713.4	2600.1	319.6
WT. OF TARE	(grams)	292.3	199.1	292.3	~~199.1~~ 145.3
WT. OF DRY SAMPLE	(grams)	2491.8	514.3	2307.8	~~124.5~~ 174.3

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	239.6	0.5	99.5		
1 in	25.4	914.0	1.9	98.1		
3/4 in	19.1	1351.2	2.8	97.2		90-100
1/2 in	12.7	1988.9	4.1	95.9		
3/8 in	9.53	2301.8	4.7	95.3		
No. 4	4.75	14.0	2.7	97.3	92.7	
No. 10	2.00	35.9	~~6~~ 7.0	93.0	88.6	
No. 20	0.850	64.6	12.6	87.4	83.3	
No. 40	0.425	93.3	18.1	81.9	80.0	
No. 60	0.250	116.1	22.6	77.4	73.8	
No. 100	0.125	142.9	27.8	72.2	68.8	
No. 200	0.075	173.0	33.6	66.4	63.2	50-100
PAN	—	174.3	—	—		

COMMENTS:

000565

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: [signature] SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

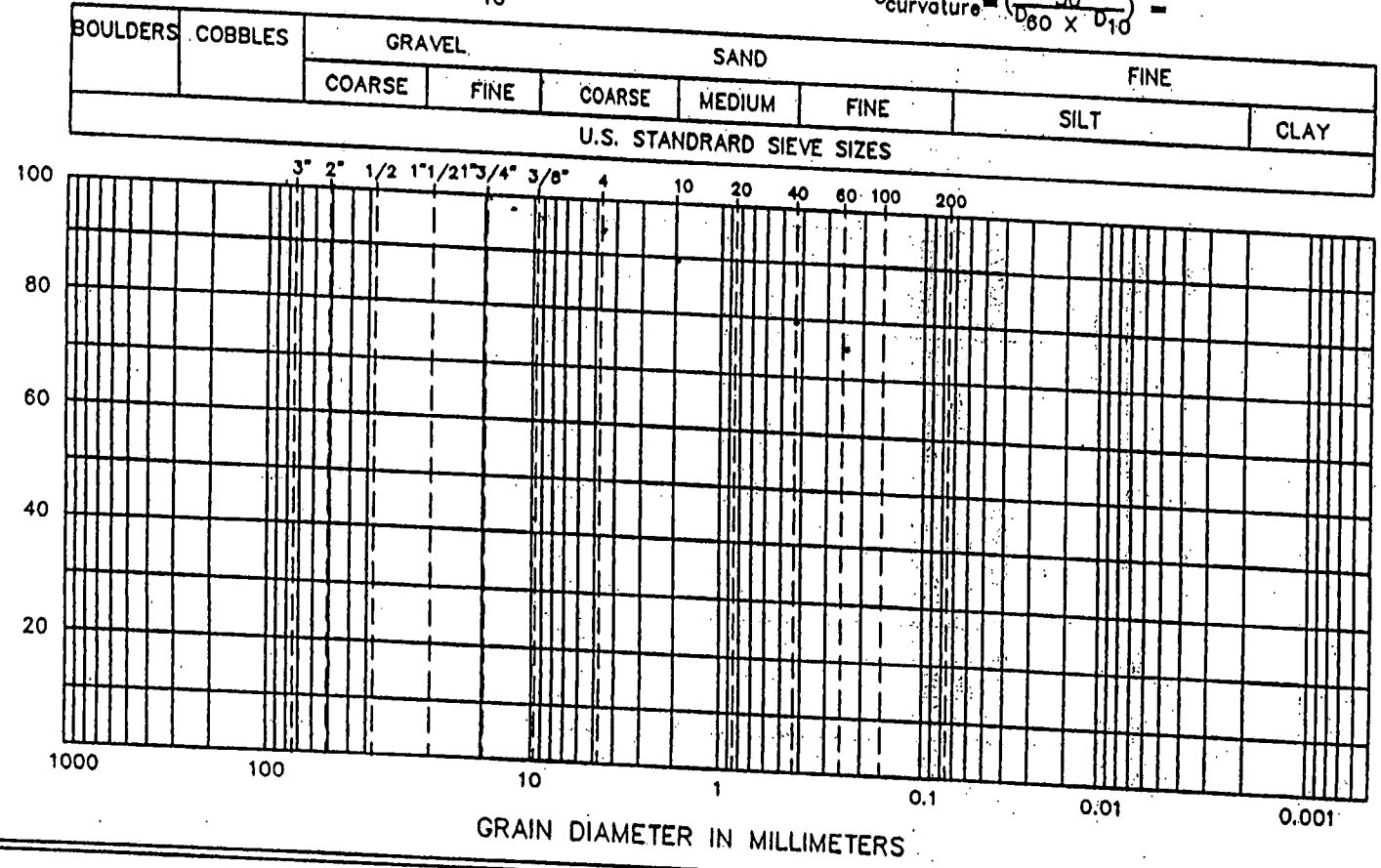
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 4 day Nov month 2002 year

SAMPLE NO.: LP02-106 QA ID: CHW

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 27

(PL) 16

(PI) 11

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.5
1-in.	98.1
3/4-in.	97.2
1/2-in.	95.9
3/8-in.	95.3
NO. 4	92.7
NO. 10	88.6
NO. 20	83.3
NO. 40	80.0
NO. 60	73.8
NO. 100	68.8
NO. 200	63.2

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	57
0.02	43
0.005	36
0.002	28

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000556

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 106
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	91.53
Dry Soil & Tare (gm)	87.42
Tare Weight (gm)	3.21
Moisture Content (%)	4.88

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	498.63	
Tare Weight (gm)	0.00	
Total Weight (gm)	475.43	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.7	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	52.29
Calculated Dry Wt. used in test (gm)	49.86
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.70

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.15	1.15	90.6	#10	medium sand
#20	3.28	3.28	86.6	#20	medium sand
#40	5.21	5.21	83.0	#40	fine sand
#60	6.92	6.92	79.8	#60	fine sand
#100	8.88	8.88	76.2	#100	fine sand
#200	11.56	11.56	71.2	#200	fines

HYDROMETER CALCULATIONS

DATE 11/4/02	TIME 11:15	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
11/4/02	11:17	2.00	42.0	22.50	0.013	7.00	35.00	10.6	0.99
11/4/02	11:20	5.00	37.0	22.50	0.013	7.00	30.00	11.4	0.99
11/4/02	11:30	15.00	32.0	22.50	0.013	7.00	25.00	12.2	0.99
11/4/02	11:45	30.00	28.5	22.50	0.013	7.00	21.50	12.9	0.99
11/4/02	12:15	60.00	26.0	22.50	0.013	7.00	19.00	13.2	0.99
11/4/02	15:25	250.00	22.0	22.50	0.013	7.00	15.00	13.8	0.99
11/5/02	11:15	1440.00	19.0	23.00	0.013	7.00	12.00	14.3	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0302	64.4		
0.0198	55.2	% GRAVEL	7.30
0.0118	46.0	% COARSE SAND	2.14
0.0086	39.6	% MEDIUM SAND	7.55
0.0061	35.0	% FINE SAND	11.81
0.0031	27.6	% FINES	71.21
0.0013	22.1	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS: (CL)

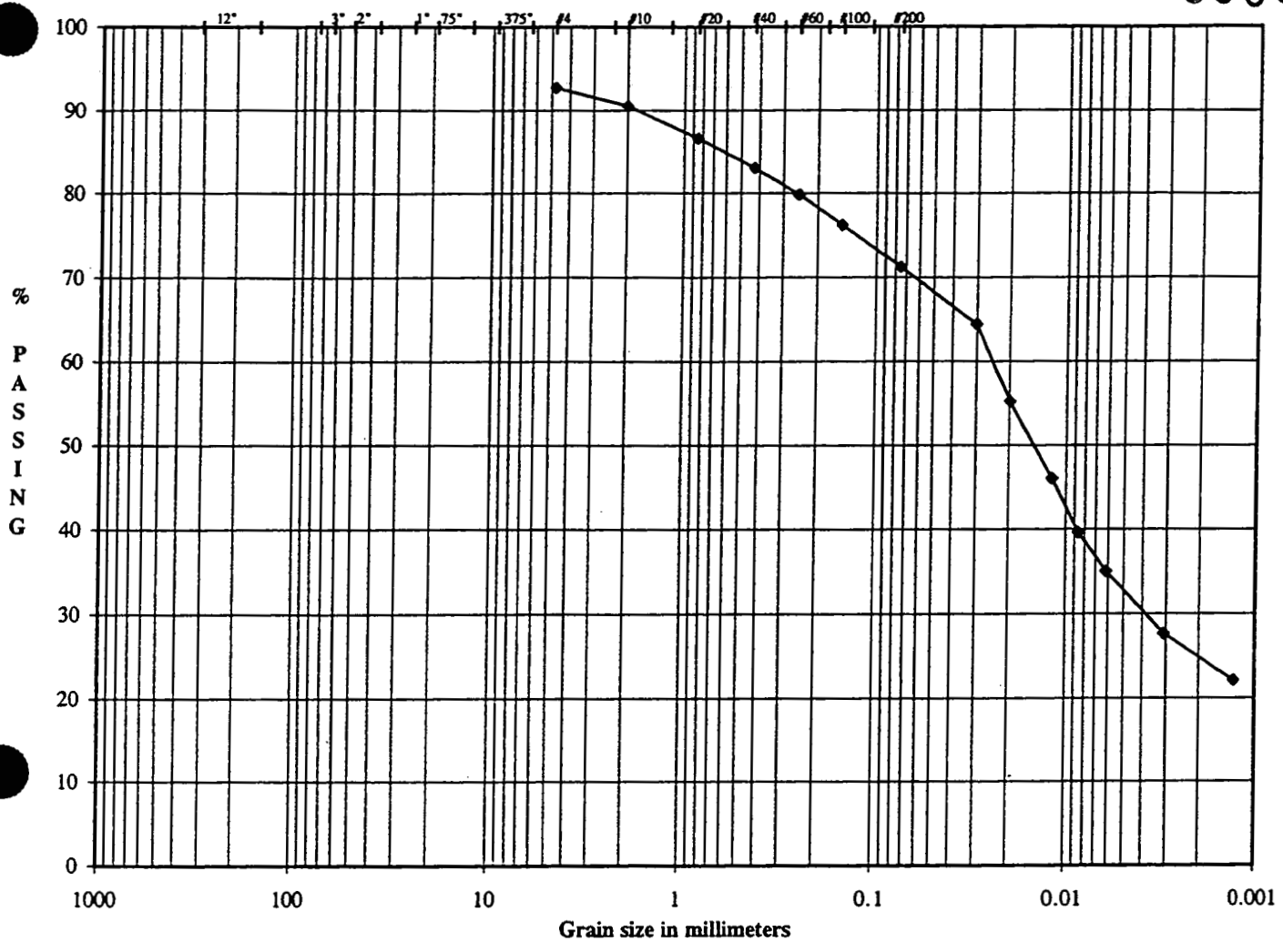
-	LL
-	PL
-	PI

TECH	TJ/TH
DATE	11/3/02
CHECK	BS
REVIEW	[illegible]

000537

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 106
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/TH
DATE	11/3/02
CHECK	
REVIEW	

000568

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 08 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay — SAMPLE NO.: LP02.107

SOIL SAMPLE SIZE			TOTAL =
	+3/8 = 1092.0 gm	MOISTURE = 399.7 gm	24362.4
	-3/8 = 22898.7	24362.4	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
+ 500 gm All +3/8 + 500 gm -3/8 = 21890.7	115	65

50.00
-1.74
48.26

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-1	L-2	L-1	L-2
WT. OF DRY SAMPLE PLUS TARE	(grams)	1284.3	660.0	1215.7	330.9
WT. OF TARE	(grams)	192.3	191.1	192.3	191.1
WT. OF DRY SAMPLE	(grams)	1092.0 ✓	468.9 ✓	1023.4 ✓	139.8 ✓

SIEVE ANALYSIS — QA ID: DLE/KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	264.0	1.1 ✓	98.9 ✓		
3/4 in	19.1	504.0	2.1 ✓	97.9 ✓		90-100
1/2 in	12.7	821.5	3.4 ✓	96.6 ✓		
3/8 in	9.53	1020.2	4.2 ✓	95.8 ✓		
No. 4	4.75	17.5	3.7 ✓	96.3 ✓	92.3 ✓	.93
No. 10	2.00	39.1	8.3 ✓	91.7 ✓	87.8 ✓	
No. 20	0.850	60.3	12.9 ✓	~~87.1~~ 87.1	~~82.5~~ 83.5	
No. 40	0.425	79.6	17.0 ✓	83.0	79.5 ✓	
No. 60	0.250	96.4	20.6 ✓	79.4 ✓	76.1 ✓	
No. 100	0.125	116.9	24.9 ✓	75.1 ✓	71.9 ✓	
No. 200	0.075	139.0	29.6 ✓	70.4 ✓	67.4 ✓	50-100
PAN	—	139.8	—	—		

COMMENTS:

000569

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS — CHECKED BY: TBW — SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

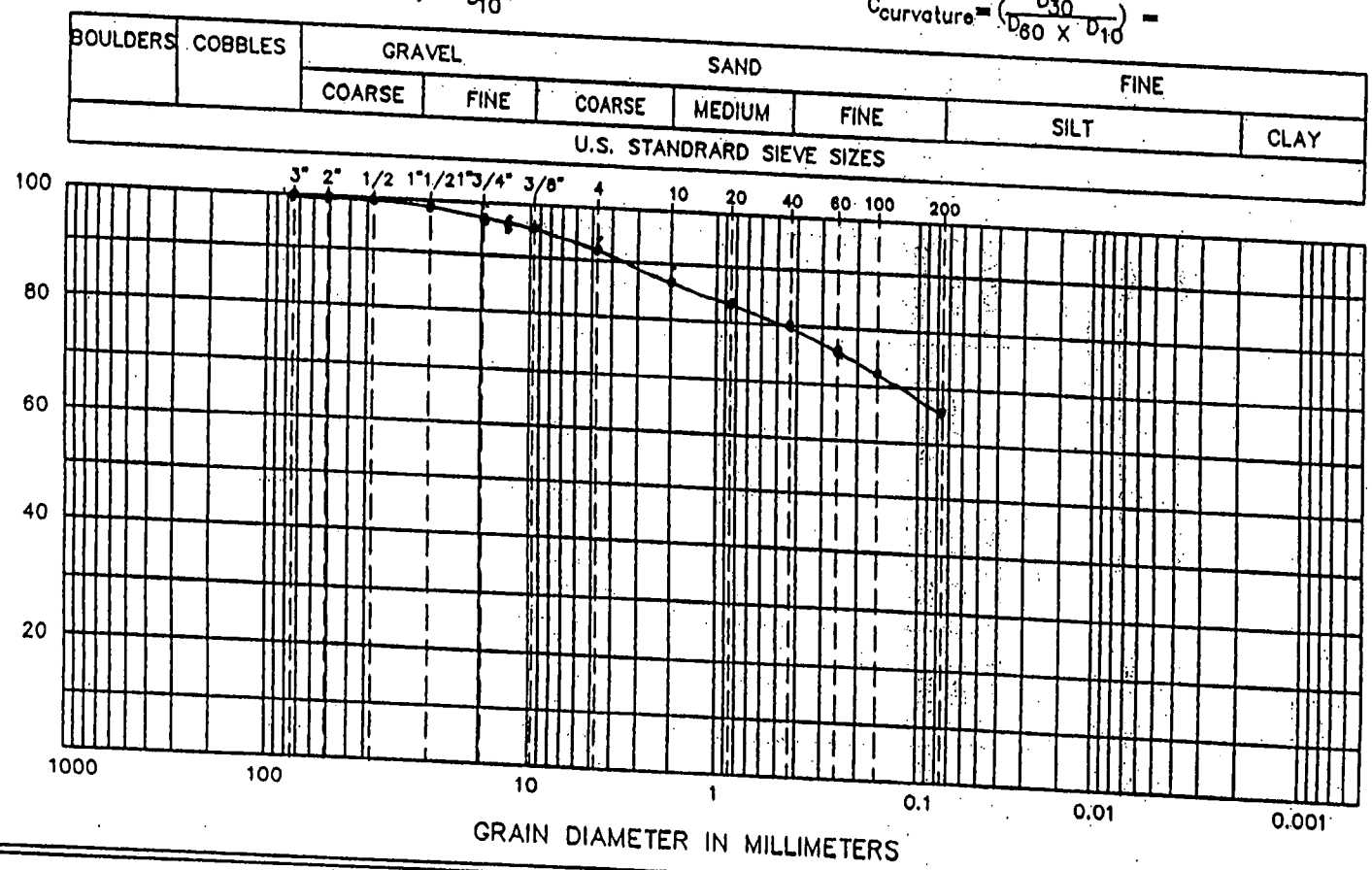
PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 6 day NOV month 2002 year

SAMPLE NO.: LP02-107 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 16

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	100
1-In.	98.9
3/4-In.	97.9
1/2-In.	96.6
3/8-In.	95.8
NO. 4	92.3
NO. 10	87.8
NO. 20.	83.5
NO. 40	79.5
NO. 60	76.1
NO. 100	71.9
NO. 200	67.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	68
0.02	55
0.005	34
0.002	24

SOIL CLASSIFICATION (ASTM D 2487): CL

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CHECKED BY:

SHEET NO. ____ OF ____

000570

5368

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

JECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 107
JECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	104.22
Dry Soil & Tare (gm)	98.71
Tare Weight (gm)	3.19
Moisture Content (%)	5.77

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	608.42	
Tare Weight (gm)	109.17	
Total Weight (gm)	472.02	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			92.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
fic Gravity	(tested)	
nt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
h of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	52.65
Calculated Dry Wt. used in test (gm)	49.78
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	92.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	2.06	2.06	88.5	#10	medium sand
#20	4.08	4.08	84.7	#20	medium sand
#40	5.83	5.83	81.5	#40	fine sand
#60	7.46	7.46	78.5	#60	fine sand
#100	9.39	9.39	74.9	#100	fine sand
#200	12.12	12.12	69.8	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
11/4/02	11:17								
11/4/02	11:19	2.00	42.0	22.50	0.013	7.00	35.00	10.6	0.99
11/4/02	11:22	5.00	37.0	22.50	0.013	7.00	30.00	11.4	0.99
11/4/02	11:32	15.00	32.0	22.50	0.013	7.00	25.00	12.2	0.99
11/4/02	11:47	30.00	28.0	22.50	0.013	7.00	21.00	12.9	0.99
11/4/02	12:17	60.00	26.5	22.50	0.013	7.00	19.50	13.2	0.99
11/4/02	15:27	250.00	22.0	22.50	0.013	7.00	15.00	13.8	0.99
11/5/02	11:17	1440.00	18.5	23.00	0.013	7.00	11.50	14.5	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING
0.0302	64.2
0.0198	55.1
0.0118	45.9
0.0086	38.5
0.0061	35.8
0.0031	27.5
0.0013	21.1

% GRAVEL	7.70
% COARSE SAND	3.82
% MEDIUM SAND	6.99
% FINE SAND	11.66
% FINES	69.83
% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

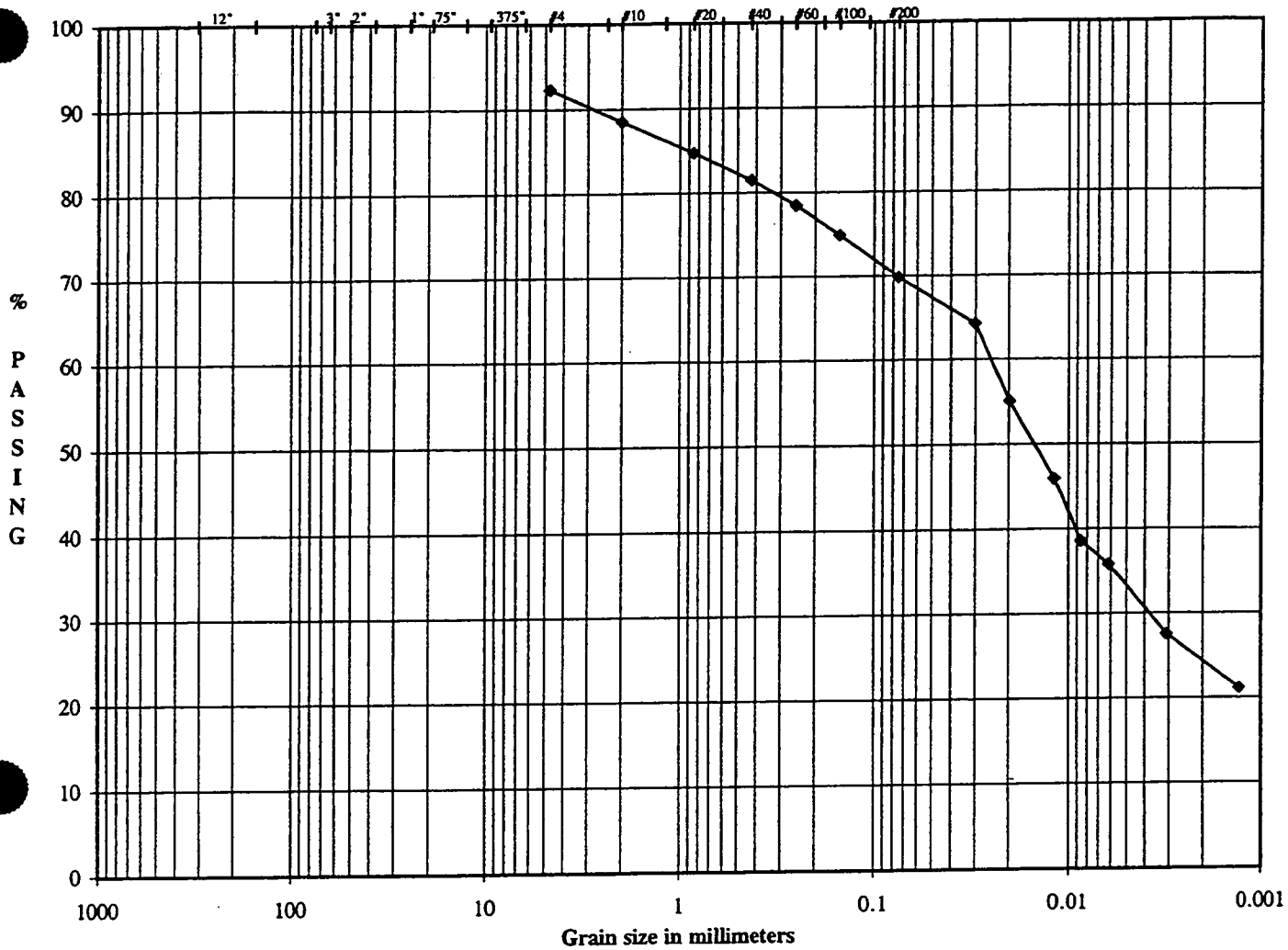
-	LL
-	PL
-	PI

TECH	TJ/TH
DATE	11/3/02
CHECK	
REVIEW	

000571

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 107
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000572

TECH	TJ/TH
DATE	11/3/02
CHECK	
REVIEW	

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 10 day Oct month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-109

SOIL SAMPLE SIZE	+3/8 = 1842.5 gm	MOISTURE = 390.1 g	TOTAL = 48971.5 g
	-3/8 = 46738.9 gm		

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE)	SAND	FINE GRAIN
50.00 LB's + 53.04 = 103.04 (grams)	115	65

54.83
1.81
53.04

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	L-44	L-8	L-44	L-8
WT. OF DRY SAMPLE PLUS TARE (grams)	2033.6	757.6	1930.6	358.2
WT. OF TARE (grams)	191.1	193.1	191.1	193.1
WT. OF DRY SAMPLE (grams)	1842.5	564.5	1739.5	165.1

SIEVE ANALYSIS QA ID: 018

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	178.5	0.4	99.6		
1 in	25.4	654.2	1.3	98.7		
3/4 in	19.1	888.0	1.8	98.2		90-100
1/2 in	12.7	1480.5	3.0	97.0		
3/8 in	9.53	1739.3	3.6	96.4		
No. 4	4.75	19.1	3.2	96.8	~~93.7~~ TBR 93.3	.96%
No. 10	2.00	42.3	7.5	92.5	89.2	
No. 20	0.850	67.1	11.9	88.1	~~94.1~~ TBR 84.9	
No. 40	0.425	91.2	16.2	83.8	80.8	
No. 60	0.250	112.5	19.9	80.1	77.2	
No. 100	0.125	137.7	24.4	75.6	72.9	
No. 200	0.075	164.0	29.1	70.9	68.3	50-100
PAN	—	165.0	—	—		

COMMENTS:

000573

% FINER = 100 − Σ % RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: TBR SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

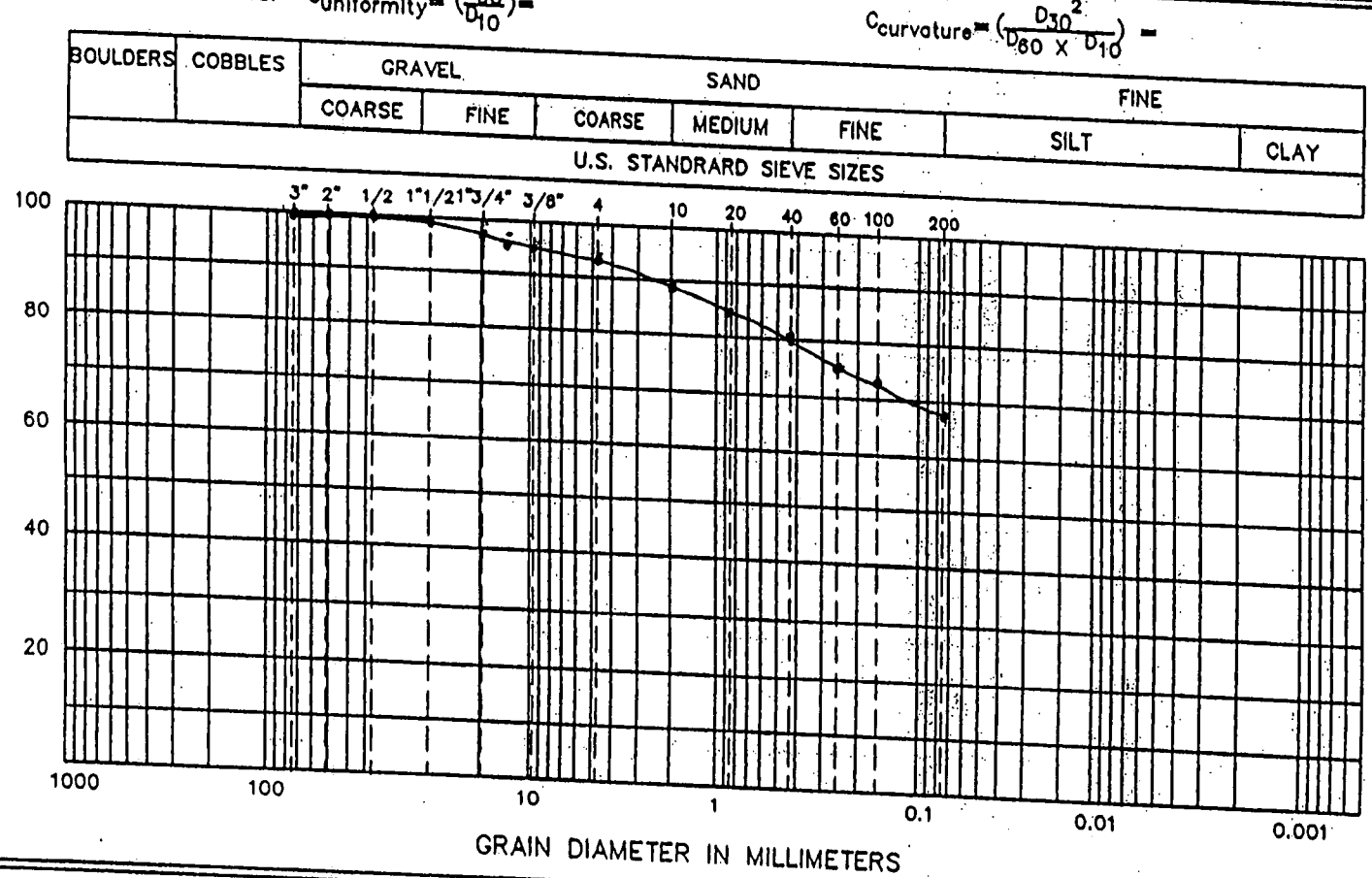
PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 6 day NOV month 2002 year

SAMPLE NO.: LP02-108 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 29

(PL) 15

(PI) 14

SIEVE RESULTS

SIEVE SIZE	% FINER
3-In.	100
2-In.	100
1 1/2-In.	99.6
1-In.	98.7
3/4-In.	98.2
1/2-In.	97.0
3/8-In.	96.4
NO. 4	93.3
NO. 10	89.2
NO. 20.	84.9
NO. 40	80.8
NO. 60	77.2
NO. 100	72.9
NO. 200	68.3

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	70.5
0.02	59.3
0.005	35.6
0.002	28.8

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY: _____

SHEET NO. _____ OF _____

000574

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 108
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	102.07
Dry Soil & Tare (gm)	96.78
Tare Weight (gm)	3.20
Moisture Content (%)	5.65

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	708.71	
Tare Weight (gm)	109.17	
Total Weight (gm)	567.46	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			93.3	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
e Dispersion Device		Mechanical
ngth of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	52.03
Calculated Dry Wt. used in test (gm)	49.25
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	93.30

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.04	1.04	91.3	#10	medium sand
#20	2.99	2.99	87.6	#20	medium sand
#40	4.72	4.72	84.4	#40	fine sand
#60	6.48	6.48	81.0	#60	fine sand
#100	8.44	8.44	77.3	#100	fine sand
#200	10.97	10.97	72.5	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
11/4/02	11:19								
11/4/02	11:21	2.00	43.0	22.50	0.013	7.00	36.00	10.4	0.99
11/4/02	11:24	5.00	38.0	22.50	0.013	7.00	31.00	11.2	0.99
11/4/02	11:34	15.00	33.0	22.50	0.013	7.00	26.00	12.0	0.99
11/4/02	11:49	30.00	30.0	22.50	0.013	7.00	23.00	12.5	0.99
11/4/02	12:19	60.00	27.0	22.50	0.013	7.00	20.00	13.0	0.99
11/4/02	15:29	250.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99
11/5/02	11:19	1440.00	20.5	23.00	0.013	7.00	13.50	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0299	67.5		
0.0196	58.1	% GRAVEL	6.70
0.0117	48.8	% COARSE SAND	1.97
0.0085	43.1	% MEDIUM SAND	6.97
0.0061	37.5	% FINE SAND	11.84
0.0031	30.0	% FINES	72.52
0.0013	25.3	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

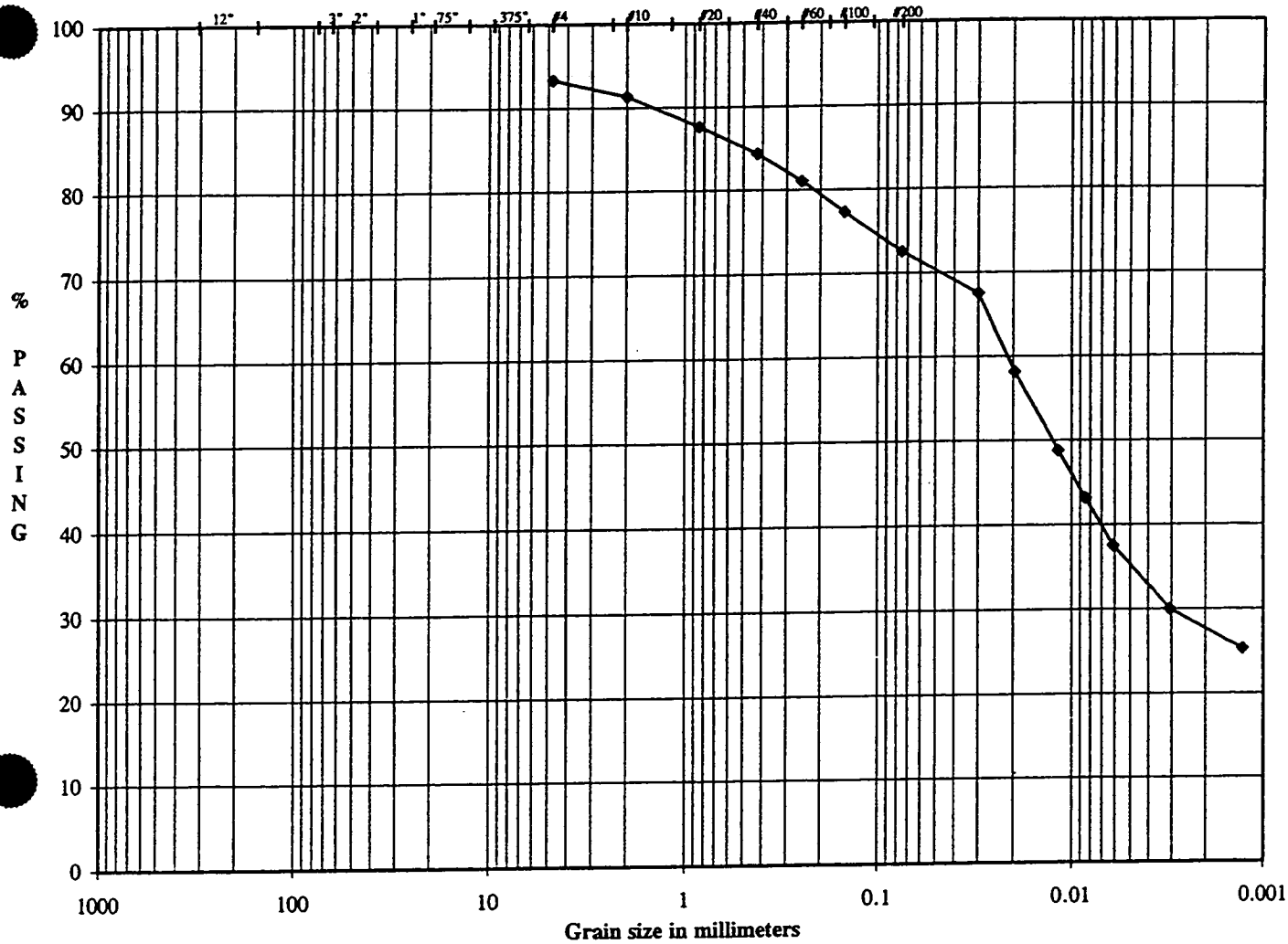
-	LL
-	PL
-	PI

TECH	TJ/TH
DATE	11/3/02
CHECK	BS
REVIEW	[illegible]

000575

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 108
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000576

TECH	TJ/TH
DATE	11/3/02
CHECK	[illegible]
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 5368/422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 10 day Oct month 2002 year

MATERIAL TYPE: Low Perm CLAY — SAMPLE NO.: LR02-109

SOIL SAMPLE SIZE	+3/8 = 973.8	MOISTURE = 467.6	TOTAL = 24175.8
	-3/8 = 22734.4	24175.8	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) 50.12 Lbs = (grams)	SAND	FINE GRAIN
	115	65

51.90
1.78
50.12

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-1	L-44	L-1	L-44
WT. OF DRY SAMPLE PLUS TARE	(grams)	1166.0	741.3	1089.2	353.7
WT. OF TARE	(grams)	192.2	191.2	192.2	191.2
WT. OF DRY SAMPLE	(grams)	973.8	550.1	897.0	162.5

SIEVE ANALYSIS — QA ID: DLE/KS

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	83.1	0.3	99.7		
1 in	25.4	296.3	1.2	98.8		
3/4 in	19.1	374.8	1.6	98.4		90-100
1/2 in	12.7	688.9	2.8	97.2		
3/8 in	9.53	897.0	3.7	96.3		
No. 4	4.75	10.3	1.9	98.1	94.5	.96
No. 10	2.00	30.4	5.5	94.5	91.0	
No. 20	0.850	55.9	10.2	89.8	86.5	
No. 40	0.425	85.5	15.5	84.5	81.4	
No. 60	0.250	109.9	20.0	80.0	77.0	
No. 100	0.125	136.7	24.9	75.1	72.3	
No. 200	0.075	161.1	29.3	70.7	68.1	50-100
PAN	—	162.4				

COMMENTS:

000577

%FINER = 100 − Σ% RETAINED

GEO SYNTEC CONSULTANTS FILE NO. 2-14-PMS

CHECKED BY: TBU

SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

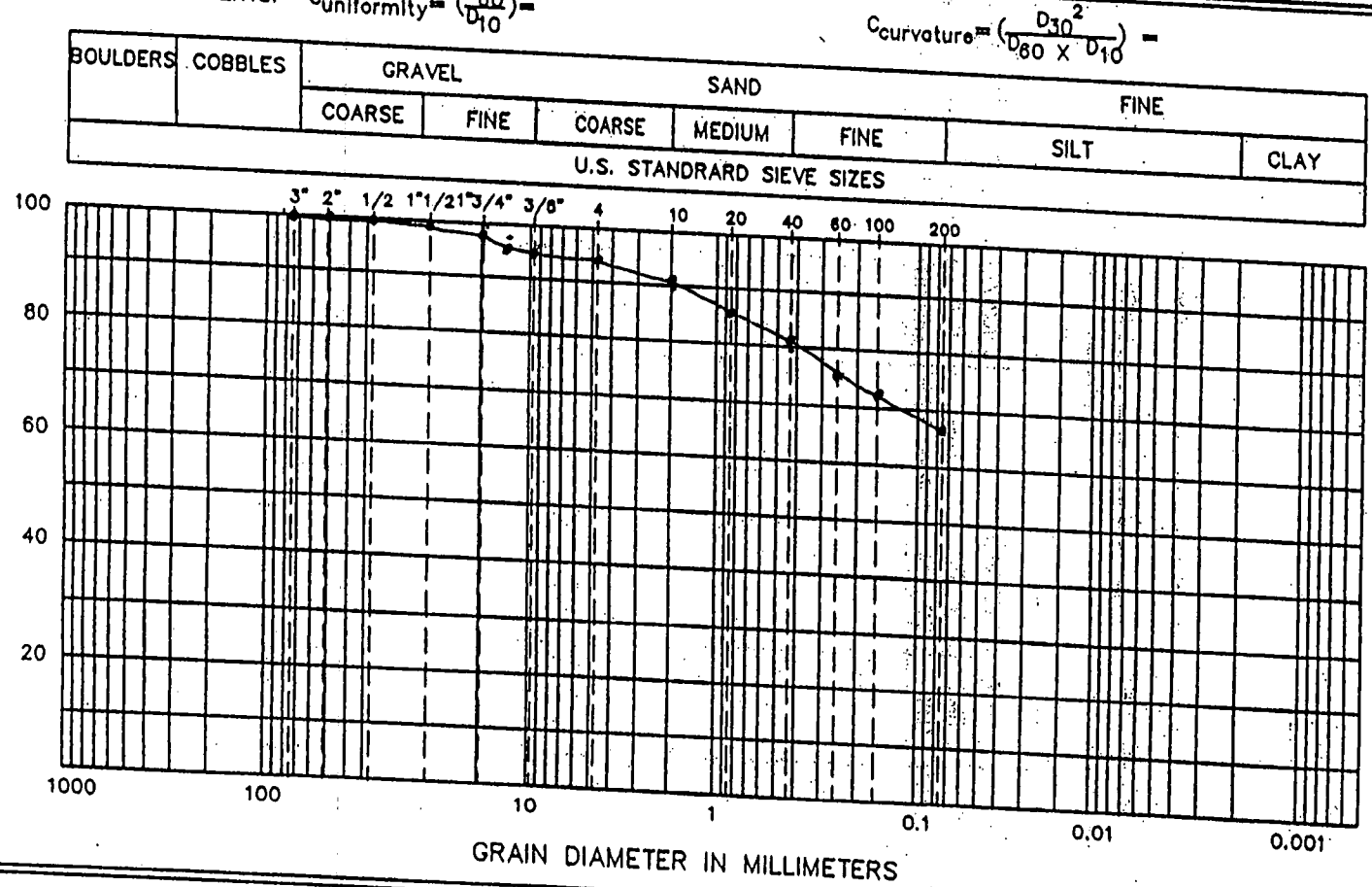
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 6 day Nov month 2002 year

SAMPLE NO.: LP02-109 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 31

(PL) 17

(PI) 14

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.7
1-in.	98.8
3/4-in.	98.4
1/2-in.	97.2
3/8-in.	96.3
NO. 4	94.5
NO. 10	91.0
NO. 20	86.5
NO. 40	81.4
NO. 60	77.0
NO. 100	72.3
NO. 200	68.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	70
0.02	60
0.005	35
0.002	28

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEOSYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000578

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

OJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 109
OJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	87.59
Dry Soil & Tare (gm)	82.70
Tare Weight (gm)	3.17
Moisture Content (%)	6.15

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	608.61	
Tare Weight (gm)	109.17	
Total Weight (gm)	470.51	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			94.5	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
fic Gravity	(tested)	
unt Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
th of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	53.19
Calculated Dry Wt. used in test (gm)	50.11
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	94.50

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.20	1.20	92.2	#10	medium sand
#20	3.07	3.07	88.7	#20	medium sand
#40	4.75	4.75	85.5	#40	fine sand
#60	6.32	6.32	82.6	#60	fine sand
#100	8.27	8.27	78.9	#100	fine sand
#200	10.90	10.90	73.9	#200	fines

HYDROMETER CALCULATIONS

DATE 11/4/02	TIME 11:21	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
11/4/02	11:23	2.00	42.0	22.50	0.013	7.00	35.00	10.6	0.99
11/4/02	11:26	5.00	39.0	22.50	0.013	7.00	32.00	11.1	0.99
11/4/02	11:36	15.00	33.0	22.50	0.013	7.00	26.00	12.0	0.99
11/4/02	11:51	30.00	30.0	22.50	0.013	7.00	23.00	12.5	0.99
11/4/02	12:21	60.00	27.0	22.50	0.013	7.00	20.00	13.0	0.99
11/4/02	15:31	250.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99
11/5/02	11:21	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0302	65.3		
0.0195	59.7	% GRAVEL	5.50
0.0117	48.5	% COARSE SAND	2.26
0.0085	42.9	% MEDIUM SAND	6.69
0.0061	37.3	% FINE SAND	11.60
0.0031	29.9	% FINES	73.94
0.0013	24.3	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.

USCS (CL)

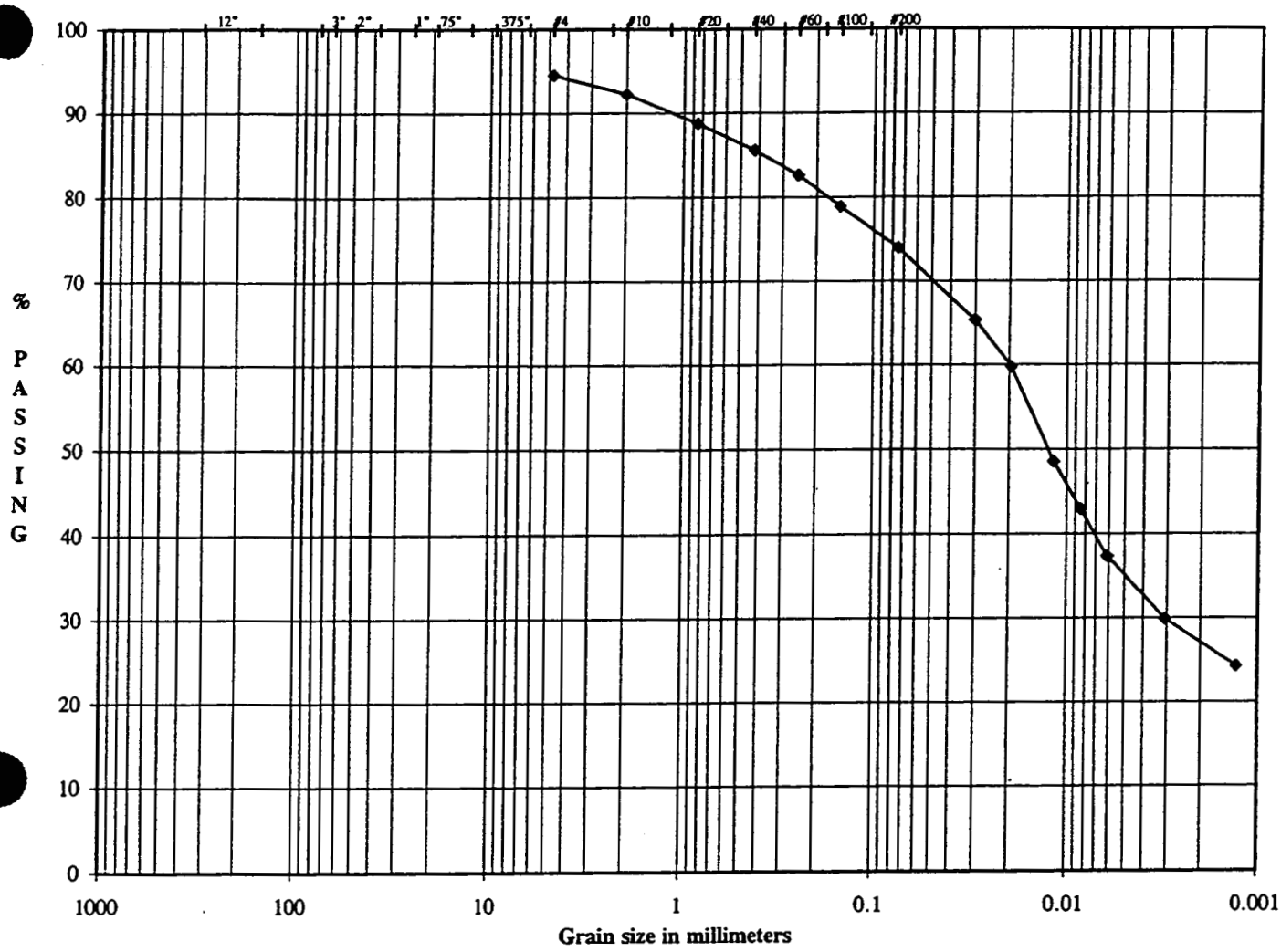
-	LL
-	PL
-	PI

TECH	TJ/TH
DATE	11/3/02
CHECK	BSH
REVIEW	TWM

000579

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 109
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, little gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000580

TECH	TJ/TH
DATE	11/3/02
CHECK	[illegible]
REVIEW	[illegible]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO — PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III — DATE: 11 day Oct month 2002 year

MATERIAL TYPE: LOW PERM CLAY — SAMPLE NO.: LP02-110

SOIL SAMPLE SIZE			TOTAL = 39638.6
	+3/8 = 1127.5	MOISTURE = 311.1	
	-3/8 = 38200.0	39638.6	

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN
~~+600 gm~~ ~~+600 gm~~ a Hobby -3/8	115	65

Bucket wt's →

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		L-6	LL-6	L-6	LL-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	1325.8	759.8	1233.9	347.8
WT. OF TARE	(grams)	198.3	198.0	198.3	198.0
WT. OF DRY SAMPLE	(grams)	1127.5	561.8	1035.6	149.8

500 3000 3000 3000 2500 x1

SIEVE ANALYSIS — QA ID: DLE

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	223.6	.6	99.4		
3/4 in	19.1	341.6	.9	99.1		90-100
1/2 in	12.7	852.3	2.2	97.8		
3/8 in	9.53	1035.1	2.6	97.4		
No. 4	4.75	7.4	1.3	98.7	96.1	
No. 10	2.00	25.1	4.5	95.5	93.0	
No. 20	0.850	48.2	8.6	91.4	89.0	
No. 40	0.425	73.7	13.1	86.9	84.6	
No. 60	0.250	96.1	17.1	82.9	80.7	
No. 100	0.125	123.4	22.0	78.0	76.0	
No. 200	0.075	118.0	26.3	73.7	71.8	50-100
PAN	—	149.8	—	—		

.97

COMMENTS:

000581

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

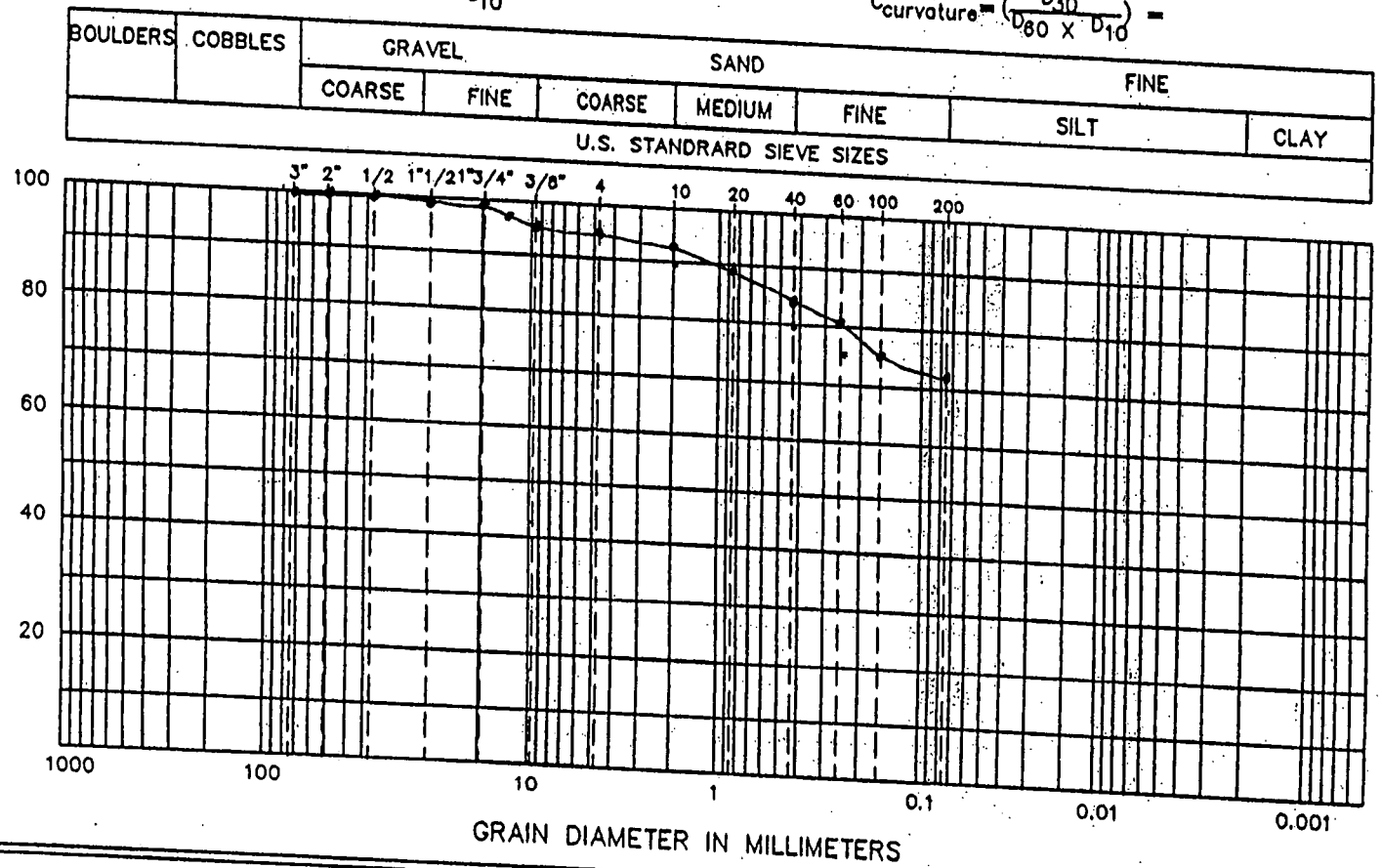
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 6 day Nov month 2002 year

SAMPLE NO.: LP02-110 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 31

(PL) 16

(PI) 15

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	99.4
3/4-in.	99.1
1/2-in.	97.8
3/8-in.	97.4
NO. 4	96.1
NO. 10	93.0
NO. 20.	89.0
NO. 40	84.6
NO. 60	80.7
NO. 100	76.0
NO. 200	71.8

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	73
0.02	61
0.005	35
0.002	28

SOIL CLASSIFICATION (ASTM D 2487): CL

*GEO SYNTEC CONSULTANTS FILE NO. 2-16-PSD

CHECKED BY:

SHEET NO. ____ OF ____

000582

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 110
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	97.95
Dry Soil & Tare (gm)	93.82
Tare Weight (gm)	3.19
Moisture Content (%)	4.56

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	608.80	
Tare Weight (gm)	109.17	
Total Weight (gm)	477.85	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			96.1	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
ific Gravity	(tested)	
ount Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
ength of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	51.60
Calculated Dry Wt. used in test (gm)	49.35
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	96.10

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.52	1.52	93.1	#10	medium sand
#20	3.48	3.48	89.3	#20	medium sand
#40	5.25	5.25	85.9	#40	fine sand
#60	6.89	6.89	82.7	#60	fine sand
#100	8.71	8.71	79.1	#100	fine sand
#200	11.13	11.13	74.4	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
11/4/02	11:23								
11/4/02	11:25	2.00	44.0	22.50	0.013	7.00	37.00	10.2	0.99
11/4/02	11:28	5.00	39.0	22.50	0.013	7.00	32.00	11.1	0.99
11/4/02	11:38	15.00	33.0	22.50	0.013	7.00	26.00	12.0	0.99
11/4/02	11:53	30.00	29.0	22.50	0.013	7.00	22.00	12.7	0.99
11/4/02	12:23	60.00	26.5	22.50	0.013	7.00	19.50	13.2	0.99
11/4/02	15:33	250.00	23.0	22.50	0.013	7.00	16.00	13.7	0.99
11/5/02	11:23	1440.00	20.0	23.00	0.013	7.00	13.00	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0296	71.3		
0.0195	61.7	% GRAVEL	3.90
0.0117	50.1	% COARSE SAND	2.96
0.0085	42.4	% MEDIUM SAND	7.26
0.0061	37.6	% FINE SAND	11.45
0.0031	30.8	% FINES	74.43
0.0013	25.1	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS: (CL)

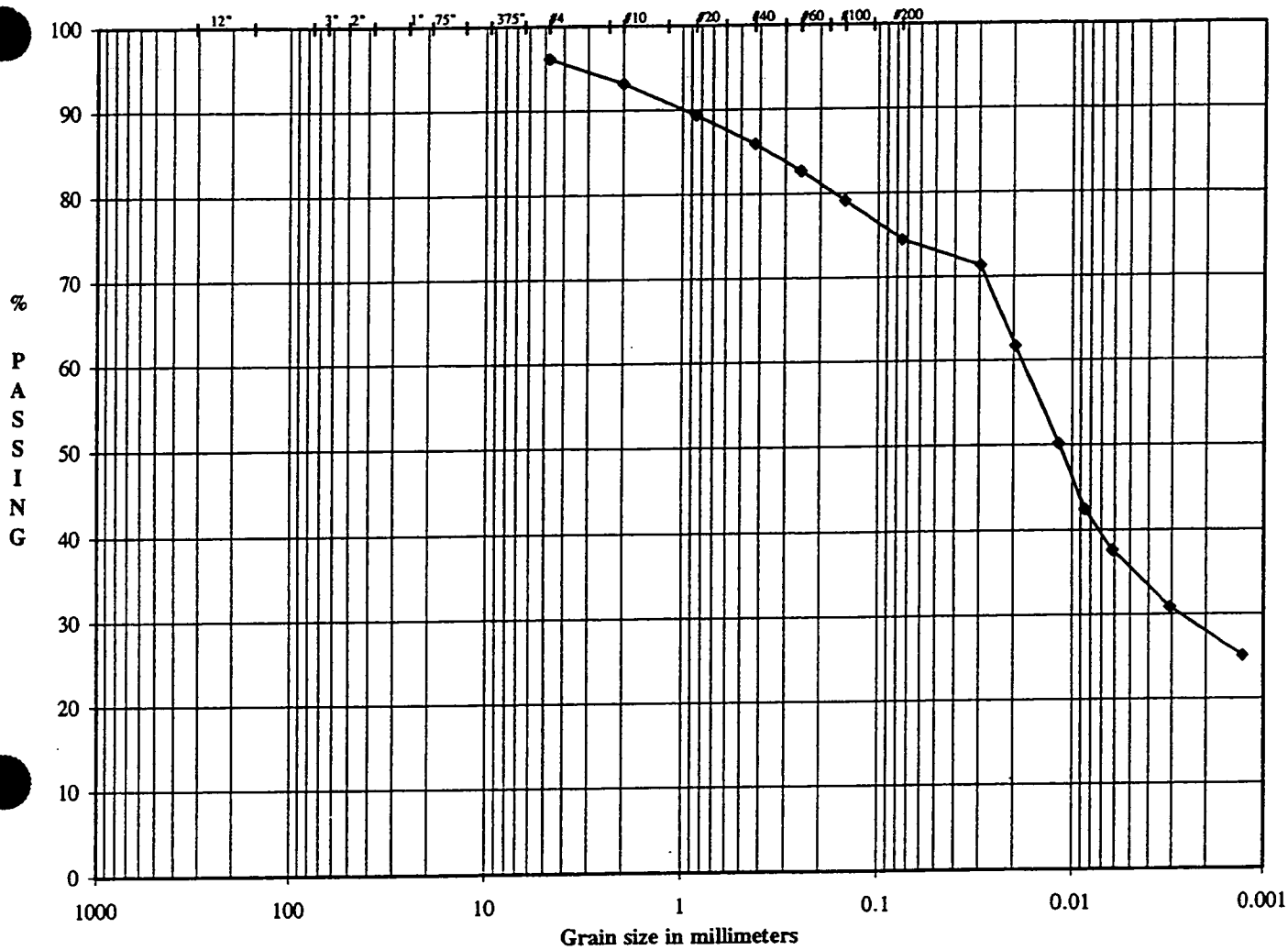
-	LL
-	PL
-	PI

TECH	TJ/TH
DATE	11/3/02
CHECK	BJS
REVIEW	PWY

000583

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 110
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/TH
DATE	11/3/02
CHECK	BJS
REVIEW	[illegible]

000584

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS–SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 041

DESCRIPTION: PHASE III DATE: 22 day Oct month 2002 year

MATERIAL TYPE: LOW PERM CLAY SAMPLE NO.: LP02-113

SOIL SAMPLE SIZE	+3/8 = 712.0	MOISTURE = 304.9	21102.8 g	TOTAL = 21814.8 g
	-3/8 = 21102.8			

APPROXIMATE MINIMUM WT. OF SAMPLE (PASSING NO. 10 SIEVE) (grams)	SAND	FINE GRAIN 22119.7 g
	115	65

		+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.		LL-6	LL-6	LL-6	LL-6
WT. OF DRY SAMPLE PLUS TARE	(grams)	910.0	767.5	868.5	338.3
WT. OF TARE	(grams)	198.0	197.9	198.0	197.9
WT. OF DRY SAMPLE	(grams)	712.0	569.6	670.5	

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	0	0	100		
1 in	25.4	275.0	1.2	98.8		
3/4 in	19.1	319.1	1.4	98.6		90-100
1/2 in	12.7	555.6	2.5	97.5		
3/8 in	9.53	670.4	3.0	97.0		
No. 4	4.75	17.2	3.0	97.0	94.0	
No. 10	2.00	39.3	6.9	93.1	90.3	
No. 20	0.850	59.4	10.4	89.6	86.9	
No. 40	0.425	78.3	13.7	86.3	83.6	
No. 60	0.250	95.2	16.7	83.3	80.8	
No. 100	0.125	116.0	20.4	79.6	77.2	
No. 200	0.075	140.0	24.6	75.4	73.1	50-100
PAN	—	141.0	—	—		

COMMENTS:

000585

%FINER = 100 − Σ% RETAINED

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

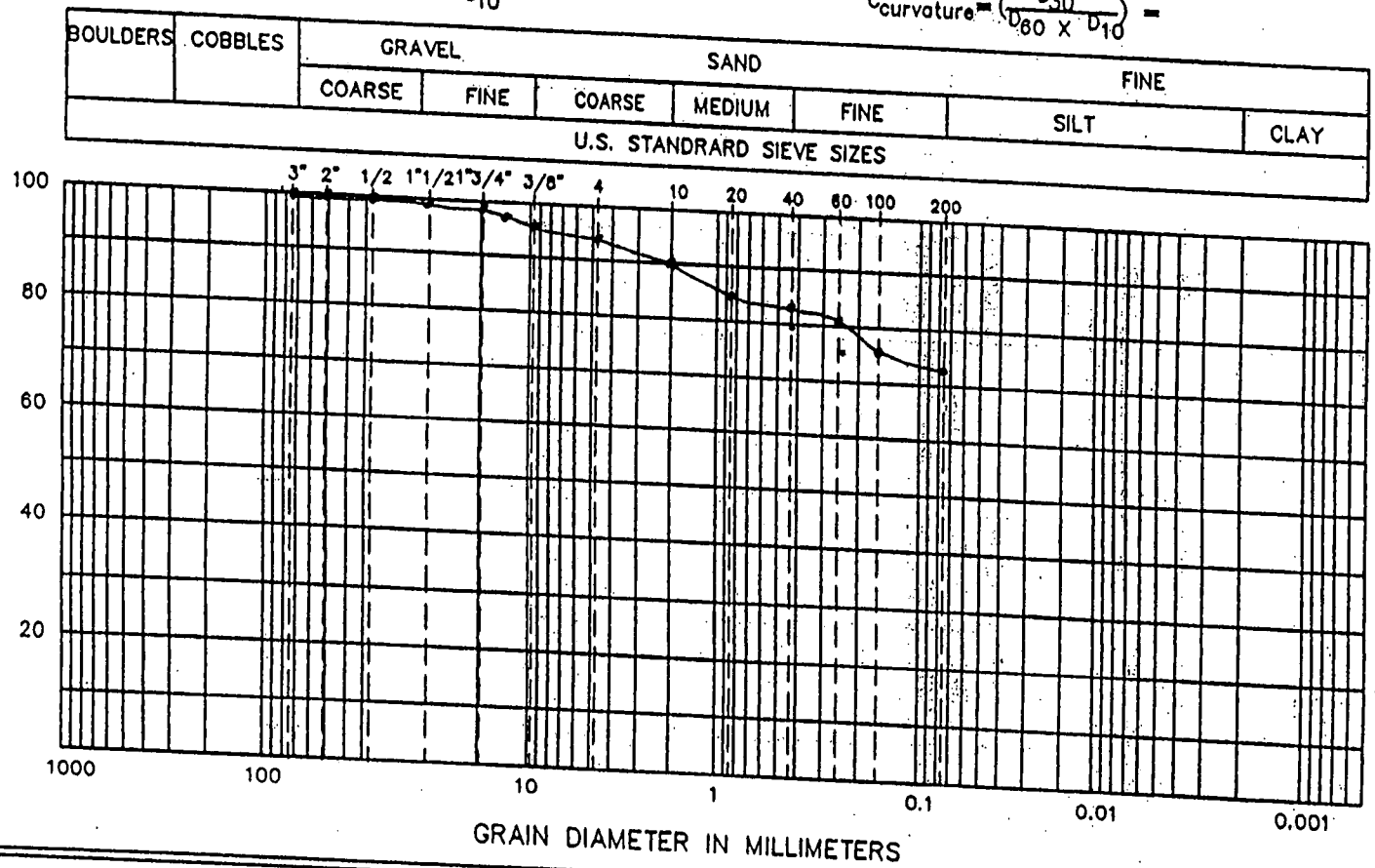
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 6 day Nov month 2002 year

SAMPLE NO.: LP02-113 QA ID: KS

CURVE COEFFICIENTS: $C_{uniformity} = \left(\frac{D_{60}}{D_{10}}\right) =$ $C_{curvature} = \left(\frac{D_{30}^2}{D_{60} \times D_{10}}\right) =$



ATTERBERG LIMITS

(LL) 32

(PL) 16

(PI) 16

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	100
1-in.	98.8
3/4-in.	98.6
1/2-in.	97.5
3/8-in.	97.0
NO. 4	94.0
NO. 10	90.3
NO. 20.	86.9
NO. 40	83.6
NO. 60	80.8
NO. 100	77.2
NO. 200	73.1

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	74
0.02	63
0.005	38
0.002	29

SOIL CLASSIFICATION (ASTM D 2487): CL

©GEO SYNTEC CONSULTANTS FILE NO. 2-18-PSD

CHECKED BY: _____

SHEET NO. ____ OF ____

0005586

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 113
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	101.01
Dry Soil & Tare (gm)	96.69
Tare Weight (gm)	3.23
Moisture Content (%)	4.62

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	708.60	
Tare Weight (gm)	109.17	
Total Weight (gm)	572.95	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"				0.375"	fine gravel
#4			97.0	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	52.97
Calculated Dry Wt. used in test (gm)	50.63
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	97.00

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.82	1.82	93.5	#10	medium sand
#20	3.52	3.52	90.3	#20	medium sand
#40	5.06	5.06	87.3	#40	fine sand
#60	6.55	6.55	84.5	#60	fine sand
#100	8.34	8.34	81.0	#100	fine sand
#200	10.71	10.71	76.5	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
11/4/02	11:25								
11/4/02	11:27	2.00	44.0	22.50	0.013	7.00	37.00	10.2	0.99
11/4/02	11:30	5.00	40.0	22.50	0.013	7.00	33.00	10.9	0.99
11/4/02	11:40	15.00	33.0	22.50	0.013	7.00	26.00	12.0	0.99
11/4/02	11:55	30.00	30.0	22.50	0.013	7.00	23.00	12.5	0.99
11/4/02	12:25	60.00	28.0	22.50	0.013	7.00	21.00	12.9	0.99
11/4/02	15:35	250.00	24.0	22.50	0.013	7.00	17.00	13.5	0.99
11/5/02	11:25	1440.00	21.0	23.00	0.013	7.00	14.00	14.0	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0296	70.2		
0.0193	62.6	% GRAVEL	3.00
0.0117	49.3	% COARSE SAND	3.49
0.0085	43.6	% MEDIUM SAND	6.21
0.0061	39.8	% FINE SAND	10.82
0.0030	32.2	% FINES	76.48
0.0013	26.6	% TOTAL SAMPLE	100.00

Description Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.

USCS (CL)

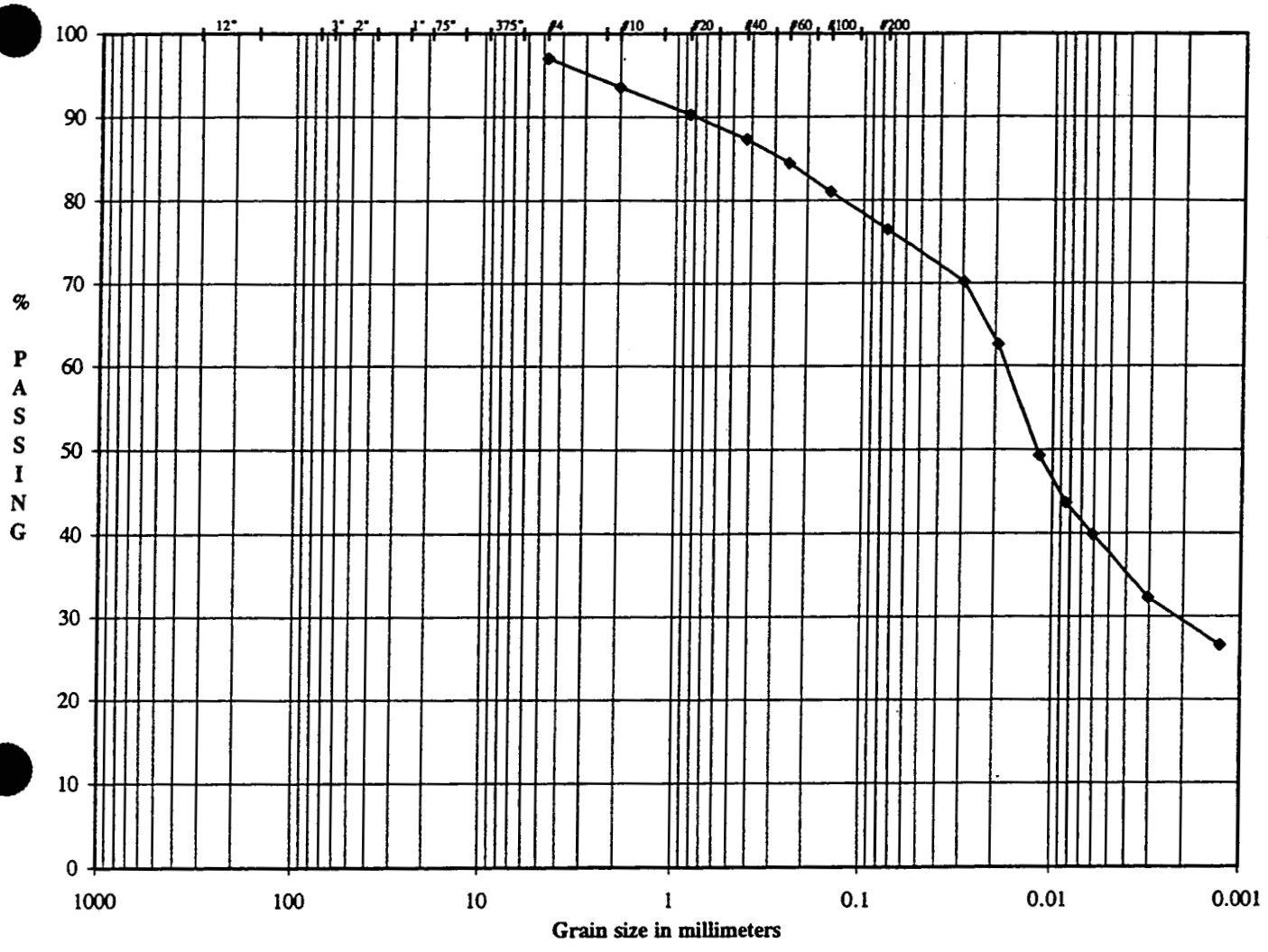
-	LL
-	PL
-	PI

TECH	TJ/TH
DATE	11/3/02
CHECK	
REVIEW	

000587

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 113
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	-
PL	-
PI	-

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace gravel.
USCS	(CL)

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

000588

TECH	TJ/TH
DATE	11/3/02
CHECK	
REVIEW	

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

PARTICLE SIZE ANALYSIS—SIEVE METHOD (ASTM D 422)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ134 TASK NO.: 04.1

DESCRIPTION: PHASE III DATE: 30 day OCT month 2002 year

MATERIAL TYPE: Low Perm CLAY SAMPLE NO.: LP02-114

SOIL SAMPLE SIZE	+3/8 = 4048.6	MOISTURE = 354.6	TOTAL = 73269.1
	-3/8 = 68865.9		

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

	+3/8 BEFORE WASH	-3/8 BEFORE WASH	+3/8 AFTER WASH	-3/8 AFTER WASH
TARE NO.	bowl	L-7	bowl	L-7
WT. OF DRY SAMPLE PLUS TARE (grams)	4341.0	756.4	4015.1	339.4
WT. OF TARE (grams)	292.4	192.9	292.4	192.9
WT. OF DRY SAMPLE (grams)	4048.6	563.5	3722.7	146.5

SIEVE ANALYSIS QA ID: _____

SIEVE NO.	DIAMETER (mm)	WT. RETAINED (grams)	% RETAINED	% FINER		PROJECT SPECIFICATIONS
3 in	76.2	0	0	100		
2 in	50.8	0	0	100		100
1 1/2in	38.1	KS ~~1144~~ 407.5	KS ~~10.1~~ 10.5	KS ~~89.999~~ 99.4		
1 in	25.4	1466.0	KS ~~36.22~~ 36.0	KS ~~63.898~~ 63.8		
3/4 in	19.1	1717.5	KS ~~42.9~~ 42.3	97.7		90-100
1/2 in	12.7	3019.8	4.1	95.9		
3/8 in	9.53	3666.0	5.0	95.0		
No. 4	4.75	~~54~~ + ~~21.7~~ 21.7	3.9	96.1	~~88.7~~	91.3
No. 10	2.00	44.9	8.0	92.0	87.4	
No. 20	0.850	65.5	11.6	88.4	84.0	
No. 40	0.425	84.0	14.9	85.1	80.8	
No. 60	0.250	99.8	17.7	82.3	78.2	
No. 100	0.125	120.6	21.4	78.6	74.7	
No. 200	0.075	145.9	25.9	74.1	70.4	50-100
PAN	—	147.5	—	—		

COMMENTS:

000589

% FINER = 100 − Σ % RETAINED

GEOSYNTEC CONSULTANTS FILE NO. 2-14-PMS CHECKED BY: _____ SHEET NO. 1 OF 2

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

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

DESCRIPTION: Phase IV

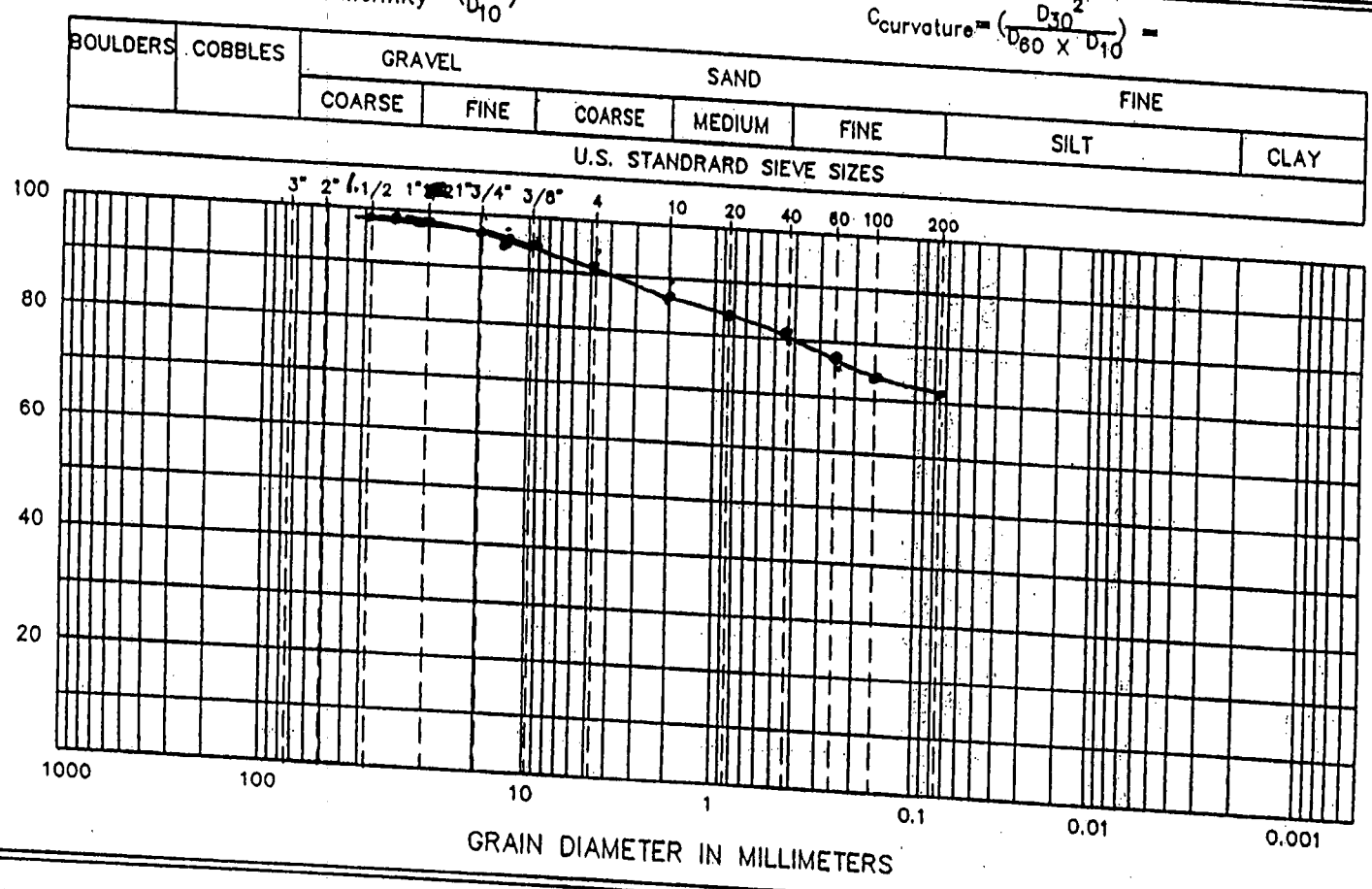
MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: ___ day ___ month 2002 year

SAMPLE NO.: LP02- QA ID: DCE

CURVE COEFFICIENTS: $C_{uniformity} = (\frac{D_{60}}{D_{10}}) =$ $C_{curvature} = (\frac{D_{30}^2}{D_{60} \times D_{10}}) =$



ATTERBERG LIMITS

(LL) 30

(PL) 17

(PI) 13

SIEVE RESULTS

SIEVE SIZE	% FINER
3-in.	100
2-in.	100
1 1/2-in.	99.4
1-in.	98.0
3/4-in.	97.7
1/2-in.	95.9
3/8-in.	95.8
NO. 4	91.3
NO. 10	87.4
NO. 20	84.0
NO. 40	80.8
NO. 60	78.2
NO. 100	74.7
NO. 200	70.4

HYDROMETER RESULTS

PARTICLE DIA.	% FINER
0.05	
0.02	
0.005	
0.002	

SOIL CLASSIFICATION (ASTM D 2487): CL Lean Clay w/ Sand

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CHECKED BY: ___

SHEET NO. ___ OF ___

000590

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ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

5368

PROJECT TITLE	GEOSYNTEC/FLUOR FERNALD/OH	SAMPLE ID	LP02 - 114
PROJECT NO.	023-3313	SAMPLE TYPE	Bag
		SAMPLE DEPTH	-

AS RECEIVED WATER CONTENT

Tare No.		
Wt. Wet Soil & Tare (gm)	(W1)	
Wt. Dry Soil & Tare (gm)	(W2)	
Weight of Tare (gm)	(W3)	
Weight of Water (gm)	(W4=W1-W2)	
Weight of Dry Soil (gm)	(W5=W2-W3)	
Moisture Content (%)	(W4/W5)*100	

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	50.09
Dry Soil & Tare (gm)	47.59
Tare Weight (gm)	3.21
Moisture Content (%)	5.63

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	834.58	
Tare Weight (gm)	235.25	
Total Weight (gm)	567.37	(W6)

Plus #4 Material Sieve

TARE WEIGHT 0.00

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"				12.0"	cobbles
3.0"				3.0"	coarse gravel
2.5"				2.5"	coarse gravel
2.0"				2.0"	coarse gravel
1.5"				1.5"	coarse gravel
1.0"				1.0"	coarse gravel
0.75"				0.75"	fine gravel
0.50"				0.50"	fine gravel
0.375"	0.00	0.0	100.0	0.375"	fine gravel
#4	21.79	3.8	96.2	#4	coarse sand

NOTE: Client provided the percent passing #4 sieve.

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.720
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	55.45
Calculated Dry Wt. used in test (gm)	52.49
Hydrometer Bulb Number	704004
% Pass #4 Sieve For Whole Sample	96.16

TARE WEIGHT 0.00

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	1.37	1.37	93.6	#10	medium sand
#20	3.42	3.42	89.9	#20	medium sand
#40	5.22	5.22	86.6	#40	fine sand
#60	6.88	6.88	83.6	#60	fine sand
#100	8.81	8.81	80.0	#100	fine sand
#200	11.39	11.39	75.3	#200	fines

HYDROMETER CALCULATIONS

DATE 11/6/02	TIME 10:21	ET (min)	READING R	TEMP T	TEMP.COR. K	HYD.COR. Cc	READING C	EFFECTIVE LENGTH	A
11/6/02	10:23	2.00	46.0	22.00	0.013	7.50	38.50	10.1	0.99
11/6/02	10:26	5.00	40.0	22.00	0.013	7.50	32.50	11.1	0.99
11/6/02	10:36	15.00	34.0	22.00	0.013	7.50	26.50	12.0	0.99
11/6/02	10:51	30.00	31.0	22.00	0.013	7.50	23.50	12.5	0.99
11/6/02	11:21	60.00	28.0	22.00	0.013	7.50	20.50	13.0	0.99
11/6/02	14:31	250.00	23.0	22.00	0.013	7.50	15.50	13.8	0.99
11/7/02	10:21	1440.00	21.0	23.00	0.013	7.50	13.50	14.2	0.99

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0294	69.8		
0.0195	58.9	% GRAVEL	3.84
0.0117	48.1	% COARSE SAND	2.51
0.0085	42.6	% MEDIUM SAND	7.05
0.0061	37.2	% FINE SAND	11.30
0.0031	28.1	% FINES	75.29
0.0013	24.5	% TOTAL SAMPLE	100.00

Description: Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.

USCS: CL

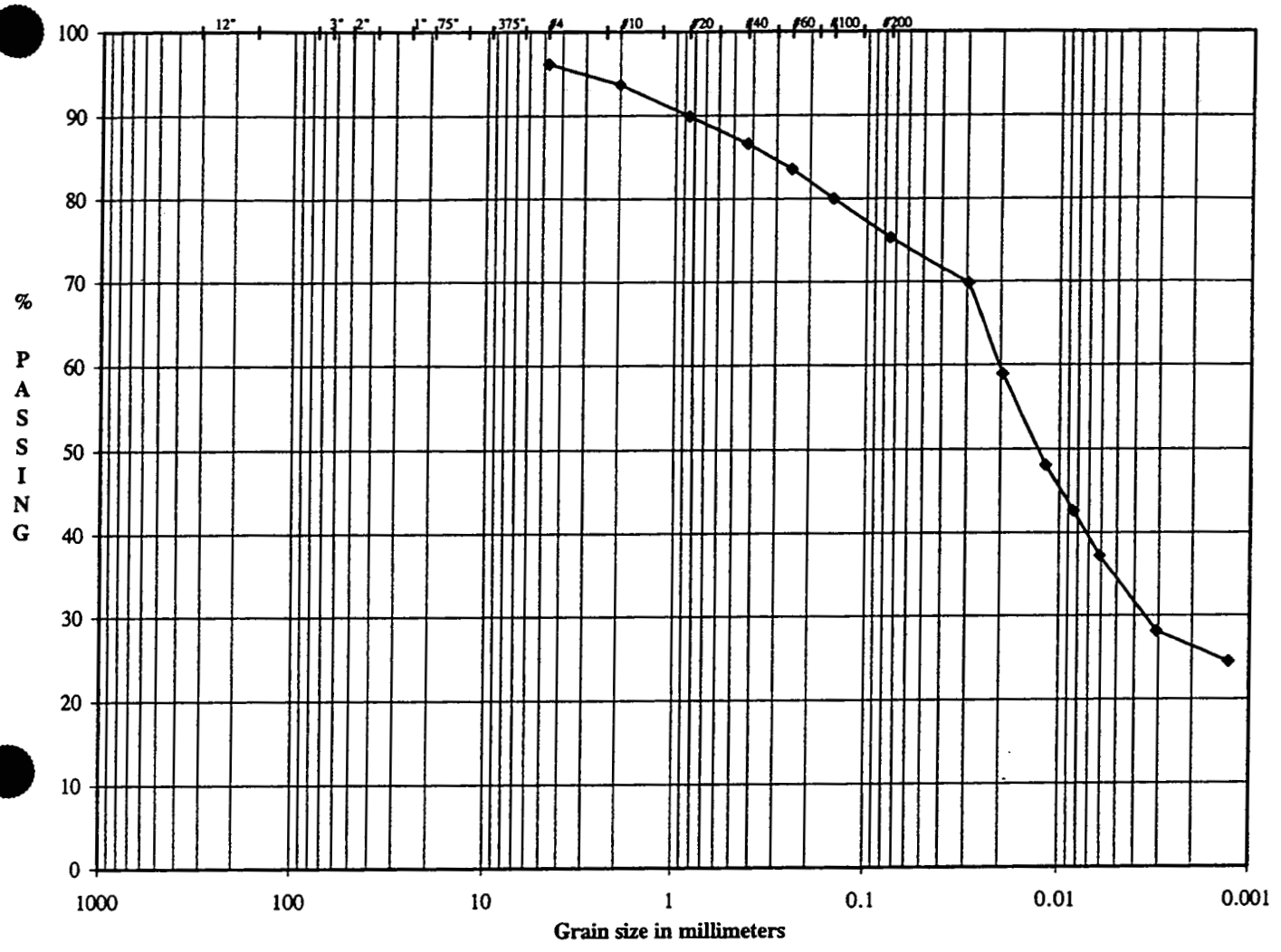
30	LL
16	PL
14	PI

TECH	TJ/TH
DATE	11/5/02
CHECK	PAS
REVIEW	PLM

000591

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES

5368



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		Gravel		SAND			FINES

SAMPLE ID	LP02 - 114
SAMPLE TYPE	Bag
SAMPLE DEPTH	-

LL	30
PL	16
PI	14

DESCRIPTION	Yellowish Brown, SILTY CLAY, some coarse to fine sand, trace fine gravel.
USCS	CL

GEOSYNTEC/FLUOR FERNALD/OH
023-3313

TECH	TJ/TH
DATE	11/5/02
CHECK	BJS
REVIEW	PWN

PROCTOR COMPACTION

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase II

DATE: 25 day June month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-1

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DZE

			13.63		13.51	13.68	13.72
	WATER ADDED	(ml)	12%		6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6182.6		6128.1	6205.2	6223.4
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1978.1		1923.6	2000.7	2018.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.6		127.0	132.0	133.2
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.4		112.4	114.9 ~~114.8~~ ①	114.2 ~~114.1~~ 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: _____

	TARE NO.		#65		#114	#18	#616
F	WT. OF TARE	(grams)	8.1		8.4	8.4	8.2
G	WT. OF WET SOIL & TARE	(grams)	439.8		478.0	449.0	474.7
H	WT. OF DRY SOIL & TARE	(grams)	371.2		423.9	391.7	407.9
I	WT. OF WATER = G - H	(grams)	68.6		54.1	57.3	66.8
J	WT. DRY SOIL = H - F	(grams)	363.1		415.5	383.3	399.7
K	MOISTURE CONTENT = (I/J) X 100	(%)	18.9		13.02	14.9 ~~14.95~~ ①	16.71

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

1.189 CHECKED BY: _____ 1.1302 1.1495 SHEET NO. 1 OF 3 1.1671

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134/TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 26 day June month 2002 year

MATERIAL TYPE: Clay liner and Cap LP02-1 Standard

Weight of Total Sample	=	~~21866.5~~	39054.7
Weight of Oversize Fraction	=	~~465.6~~	1378.6
Weight of Finer Fraction (- 3/8)	=	~~21400.9~~	37676.1
Percentage of Oversize Fraction	= (P_C)	~~2.1~~	3.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	~~97.9~~	96.5
Specific Gravity (Assumed)	= (G_M)	2.72	

(W_F) =	Water Content - 3/8 , as decimal	=	0.156
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.8
(δ_W) =	Unit Weight of Water	=	2.72

$$C_W=(W_F P_F)+(W_C P_C)$$

~~Cw = 15.3%~~ ~~Cw = 14.9%~~

Cw = 15.1%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

~~Cδ = 116.6 pcf~~

Cδ = 117.1 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

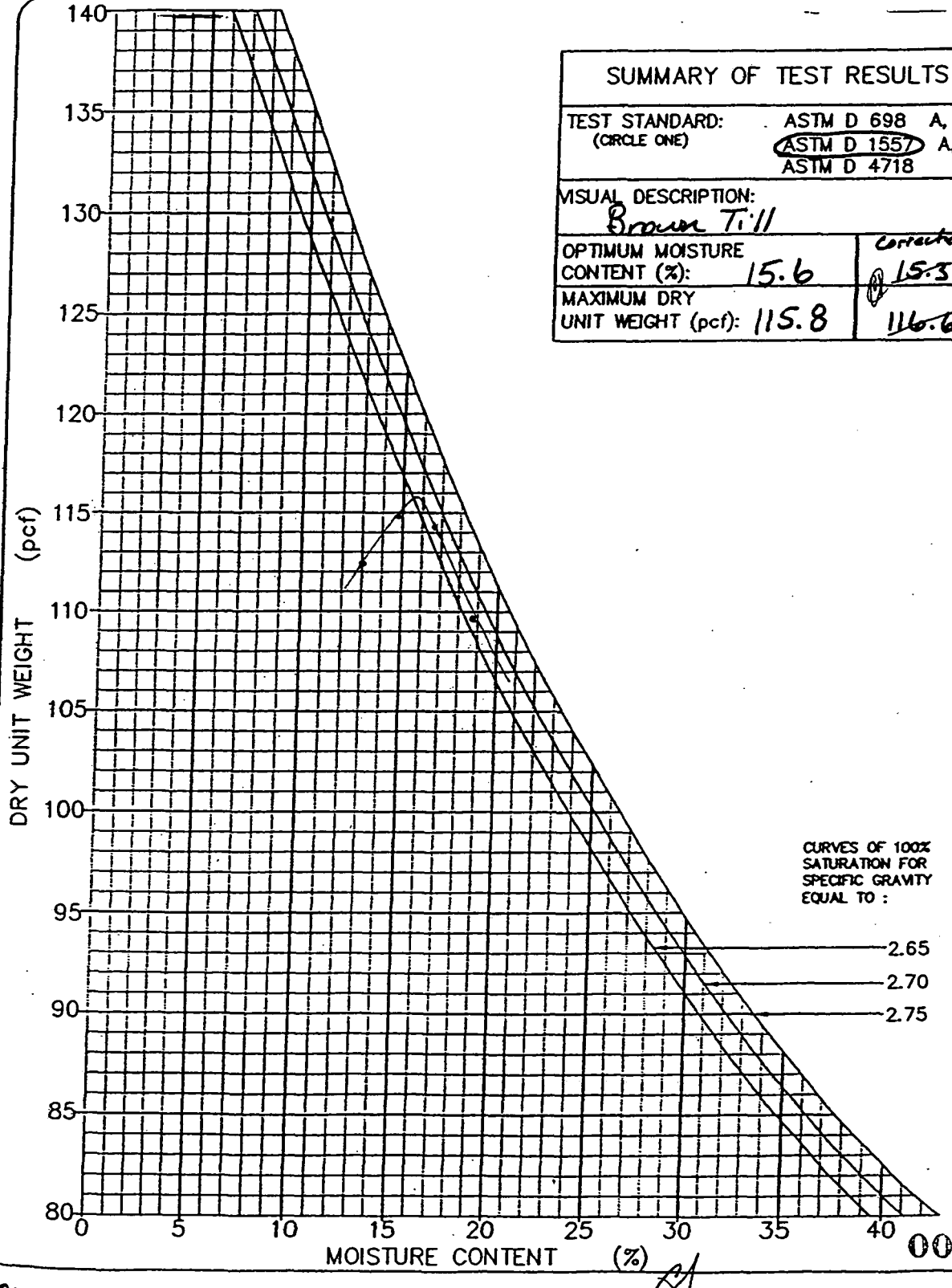
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day June month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: LP02-1

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till		CA
OPTIMUM MOISTURE CONTENT (%): 15.6	Corrected 15.3 15.1	CA
MAXIMUM DRY UNIT WEIGHT (pcf): 115.8	116.6 117.1	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase III — PROJECT NO.: 6Q1341 TASK NO.: 004.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: borrow area — DATE: 25 day June month 2002 year — SAMPLE NO.: LP02-1

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

	WATER ADDED	(ml)	2% 13.71	4% 13.90	6% 13.96	8% 13.87	
A	WT. OF SOIL & MOLD	(grams)	50% 6218.9	100% 6305.0	150% 6332.3	200% 6291.4	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2014.4	2100.5	2127.8	2086.9	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.0	138.6	140.4	137.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	122.8 ~~122.9~~	126.0 ~~125.9~~	125.1	120.5	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL. THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: DKE

	TARE NO.		103	110	616	#18	
F	WT. OF TARE	(grams)	8.3	8.0	8.2	8.4	
G	WT. OF WET SOIL & TARE	(grams)	332.9	363.3	249.2	292.1	
H	WT. OF DRY SOIL & TARE	(grams)	308.2	330.8	222.9	256.5	
I	WT. OF WATER = G − H	(grams)	24.7	32.5	26.3	35.6	
J	WT. DRY SOIL = H − F	(grams)	299.9	322.8	214.7	248.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.2	10.1	12.2	14.3	
			1.082	1.101	1.122	1.143	

000597

5368

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 26 day June month 2002 year

MATERIAL TYPE: Clay liner and Cap LP02-1 modified

Weight of Total Sample	=	~~21866.5 g~~	39054.7
Weight of Oversize Fraction	=	~~465.6~~	1378.6
Weight of Finer Fraction (- 3/8)	=	~~21400.9~~	37676.1
Percentage of Oversize Fraction	= (P_C)	~~2.1~~	3.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	~~97.9~~	96.5
Specific Gravity (Assumed)	= (G_M)	2.72	

(W_F) =	Water Content - 3/8 , as decimal	=	11.2
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	127.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

~~$C_w = 11.0\%$~~ $C_w = 10.9\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

~~$C_{\delta D} = 127.8$ pcf~~ $C_{\delta D} = 128.2$ pcf

2 of 3

000598

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 691341 TASK NO.: 04.1

DESCRIPTION: Phase II

DATE: 01 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-3

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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. 13.45

COMPACTION OF SOIL

QA ID: DLE

				13.60	13.72	13.64	
	WATER ADDED	(ml)		6%	8%	10%	4%
A	WT. OF SOIL & MOLD	(grams)		6168.0	6223.4	6187.1	6100.9
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)		1964.5	2018.9	1982.6	1896.4
D	WET UNIT WT.(1) = C X 0.066	(pcf)		129.7	133.2	130.9	125.2
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		114.4	~~114.6~~ 114.7	~~111.1~~ 111.0	112.0

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: DLE

	TARE NO.			#679	#630	#675	#638
F	WT. OF TARE	(grams)		8.6	8.1	8.3	8.2
G	WT. OF WET SOIL & TARE	(grams)		489.9	479.3	534.0	490.3
H	WT. OF DRY SOIL & TARE	(grams)		433.2	413.6	454.3	439.6
I	WT. OF WATER = G - H	(grams)		56.7	65.7	79.7	50.7
J	WT. DRY SOIL = H - F	(grams)		425.1	405.5	446.0	431.4
K	MOISTURE CONTENT = (I/J) X 100	(%)		13.33	16.20	17.86	11.75

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-3

Weight of Total Sample	=	41658.1
Weight of Oversize Fraction	=	1542.7
Weight of Finer Fraction (- 3/8)	=	40115.4
Percentage of Oversize Fraction	= (P_C)	3.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.151
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	116.3
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 14.6\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 117.7$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

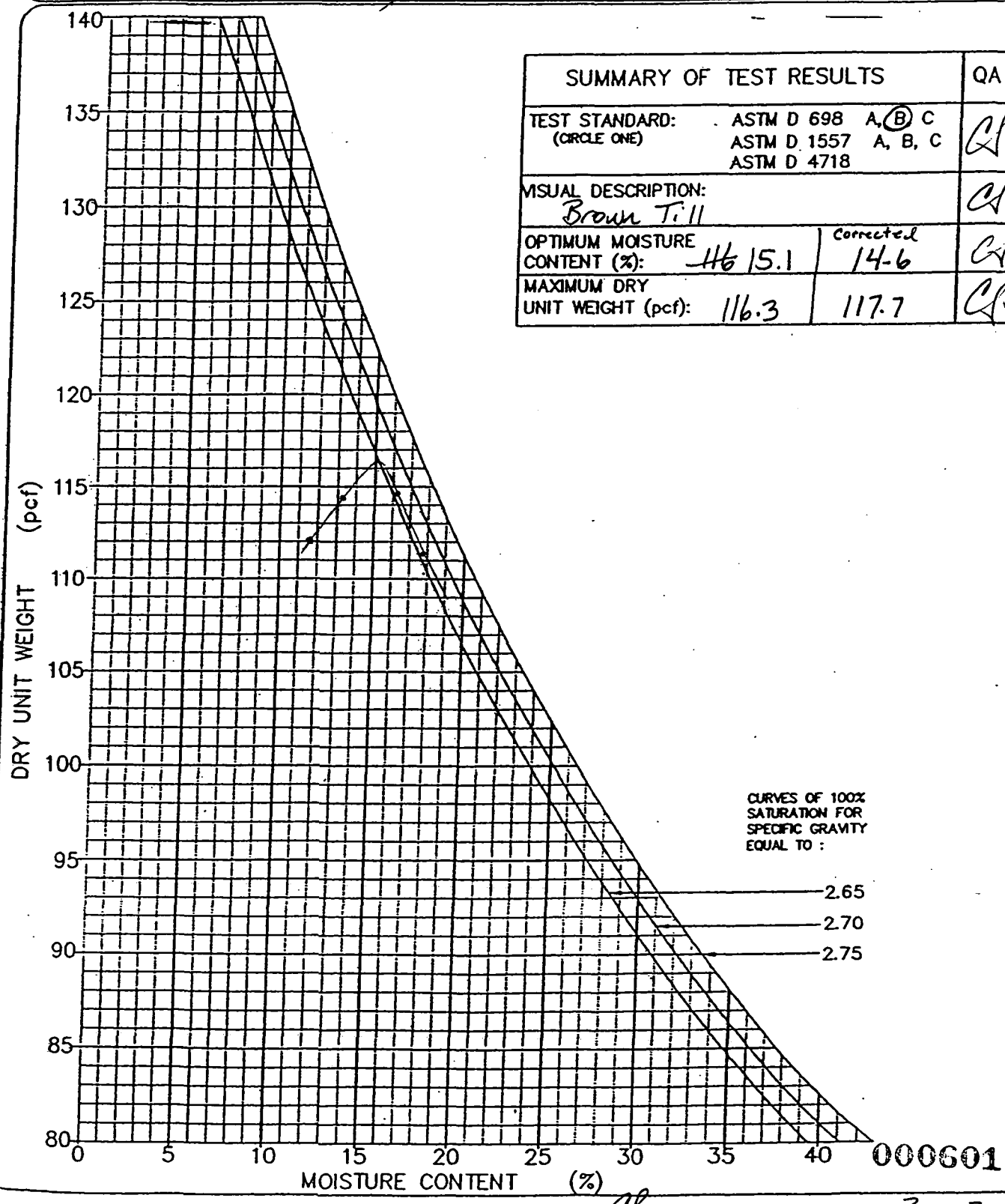
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 2 day July month 2002 year

MATERIAL TYPE: Compacted Clay MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: LP02-3

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	~~16~~ 15.1	Corrected 14.6	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	116.3	117.7	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 01 day July month 2002 year

MATERIAL TYPE: Low Penn Clay MATERIAL SOURCE: Borrow Area SAMPLE NO.: LP02-3

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: DLE

			13.67	13.87	13.90	13.84	
	WATER ADDED	(ml)	2%	4%	6%	8%	
A	WT. OF SOIL & MOLD	(grams)	6200.7	6291.4	6305.0	6277.8	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1996.2	2086.9	2100.5	2073.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.7	137.7	138.6	136.8	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	120.6 ~~120.5~~	123.9	121.9	~~118.6~~ 118.7	

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: DLE

	TARE NO.		#202	#65	#230	#200	
F	WT. OF TARE	(grams)	8.2	8.2	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	433.5	497.5	452.7	420.1	
H	WT. OF DRY SOIL & TARE	(grams)	397.4	448.3	399.2	365.4	
I	WT. OF WATER = G − H	(grams)	36.1	49.2	53.5	54.7	
J	WT. DRY SOIL = H − F	(grams)	389.2	440.1	390.9	357.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.27	11.17	13.68	15.31	

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1.0927 1.1117 1.1368 1.1531

SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 1 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-3 MOD

Weight of Total Sample	=	41658.1
Weight of Oversize Fraction	=	1542.7
Weight of Finer Fraction (-3/8)	=	40115.4
Percentage of Oversize Fraction	= (P_C)	3.7
Percentage of Finer Fraction (-3/8)	= (P_F)	96.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.12
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	124.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$C_W = 11.6\%$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$C_{\delta D} = 127.4$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

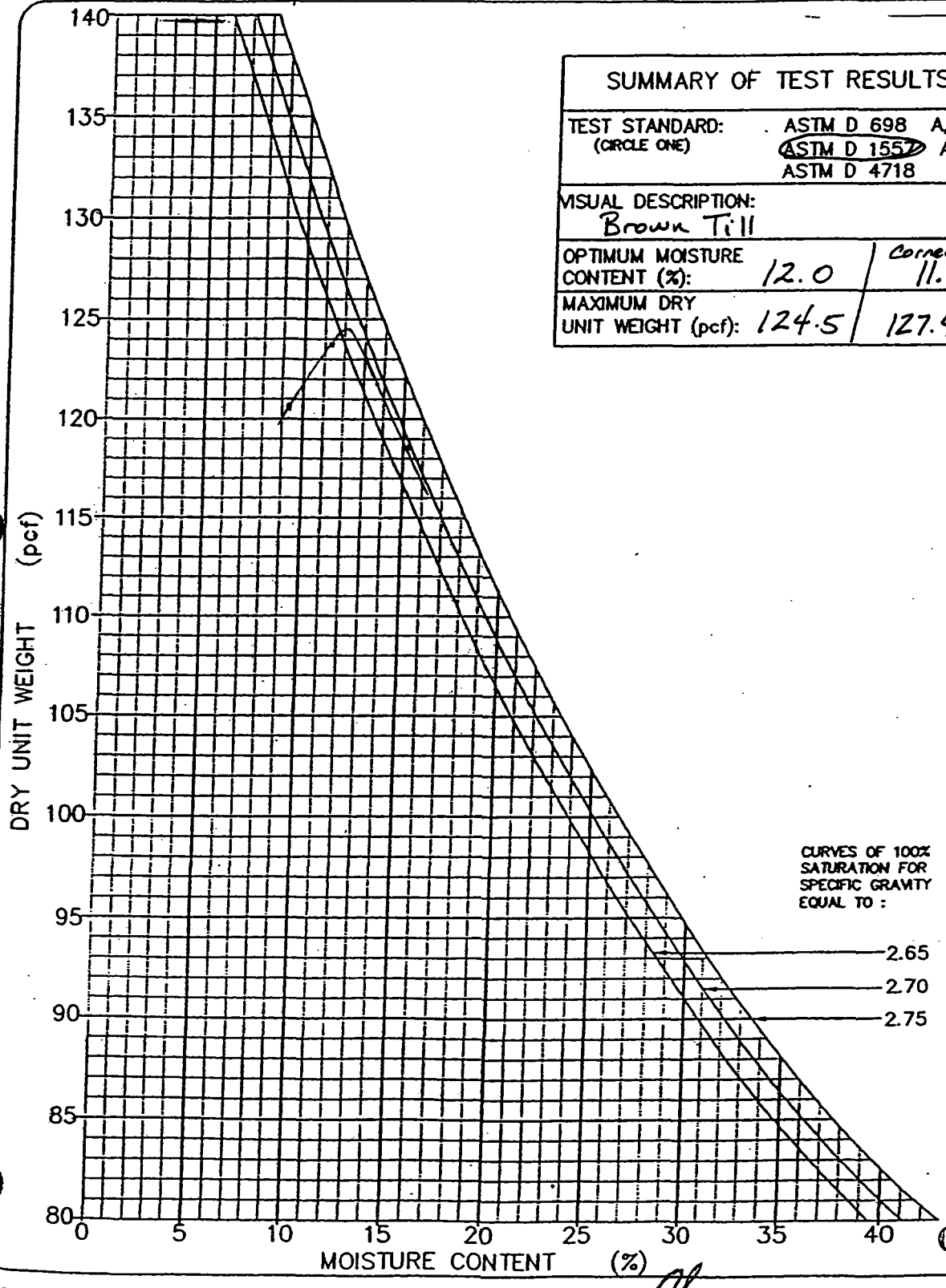
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 2 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: LP02-3

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.0	Corrected 11.6	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	124.5	127.4	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO. 69134 TASK NO.: 04.1

DATE: 02 day July month 2002 year

SAMPLE NO.: LP02-4

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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.

13.68

COMPACTION OF SOIL

QA ID: DLE

			13.55	13.32	13.58	13.70		
	WATER ADDED	(ml)	12%	4%	150 ml 6%	8%	10%	
A	WT. OF SOIL & MOLD	(grams)	6146.3	6042.0	6159.9	6214.3	6205.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1941.8	1837.5	1955.4	2009.8	2000.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	128.2	121.3	129.1	132.6	132.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.6	109.1 ~~108.1~~	113.9	114.9	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: DLE

	TARE NO.		#52	#107	#616	#605	#107	
F	WT. OF TARE	(grams)	8.1	8.0	8.2	8.3	8.1	
G	WT. OF WET SOIL & TARE	(grams)	512.9	509.2	477.4	498.3	567.9	5368
H	WT. OF DRY SOIL & TARE	(grams)	432.1	459.1	422.5	432.8	485.8	
I	WT. OF WATER = G - H	(grams)	80.8	50.1	54.9	65.5	82.1	
J	WT. DRY SOIL = H - F	(grams)	424.0	451.1 ~~409.0~~	414.3	424.5	477.7	
K	MOISTURE CONTENT = (I/J) X 100	(%)	19.1	11.1 ~~12.75~~	13.3	15.4	17.2	

1.191 1.1225 1.133 1.154 1.132

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SHEET NO. 1 OF 3

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 69134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 8 day July month 2002 year

MATERIAL TYPE: Clay Liner LB02-4

Weight of Total Sample	=	23507.7
Weight of Oversize Fraction	=	262.1
Weight of Finer Fraction (- 3/8)	=	23245.6
Percentage of Oversize Fraction	= (P_C)	1.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.150
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	116.0
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 14.8\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 116.4$ pcf

2 of 3

000606

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

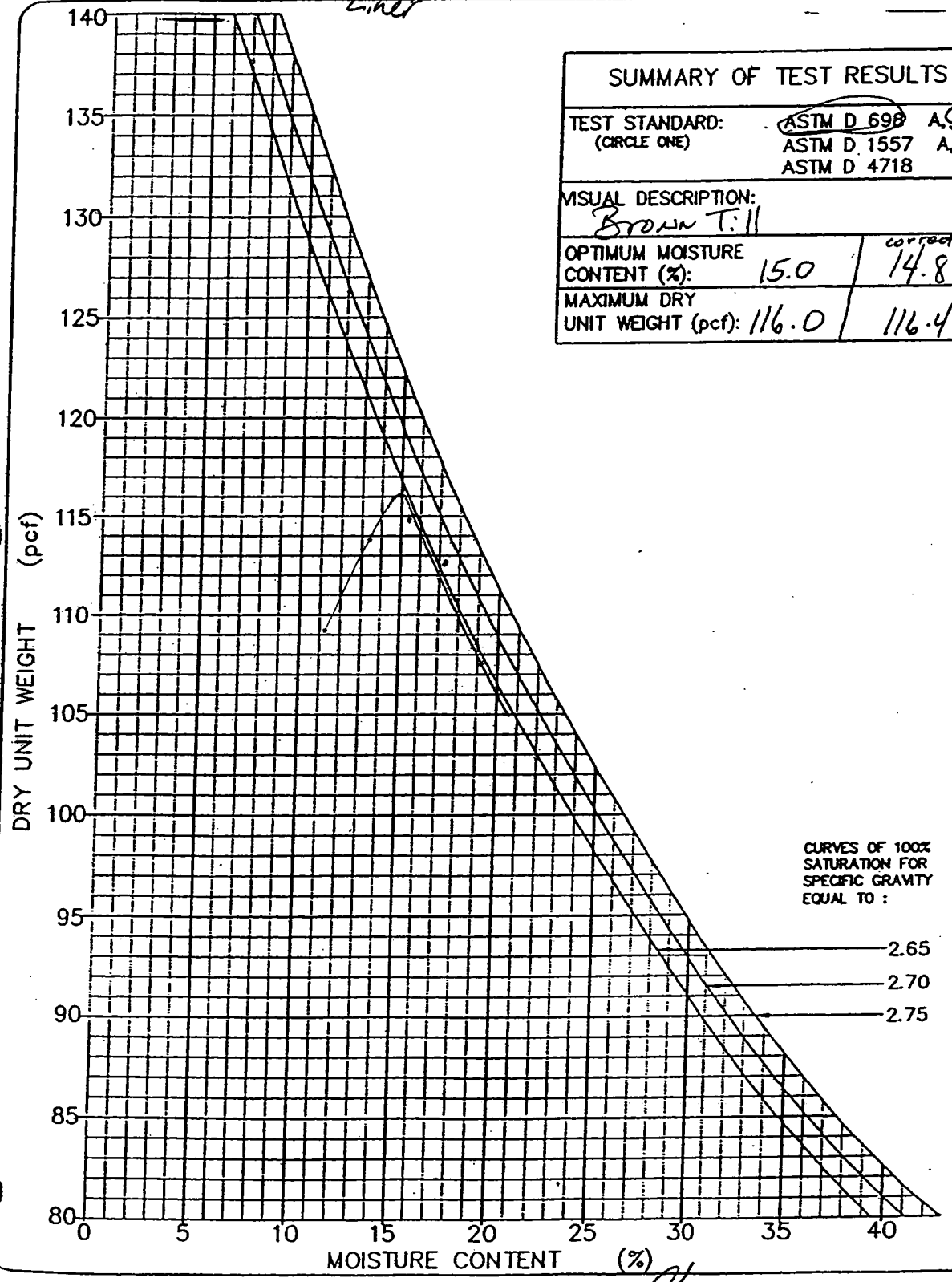
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day July month 2002 year

MATERIAL TYPE: Compacted Clay Liner MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: LP02-4

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	15.0	corrected 14.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	116.0	116.4	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 691341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 03 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP025

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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. 13.51

COMPACTION OF SOIL

QA ID: DCE

			13.64	13.217	13.48	13.64	
	WATER ADDED	(ml)	12%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6187.1	6019.3	6114.5	6187.1	6128.1
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1982.6	1814.8	1910.0	1982.6	1923.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.9	119.8	126.1	130.9	127.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.9	109.0	112.0	114.4	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: DCE

	TARE NO.		#92	#309	#636	#14	#94
F	WT. OF TARE	(grams)	8.2	8.1	8.3	8.3	8.1
G	WT. OF WET SOIL & TARE	(grams)	537.7	501.4	455.8	514.7	546.5
H	WT. OF DRY SOIL & TARE	(grams)	456.6	457.1	405.9	451.1	484.4
I	WT. OF WATER = G − H	(grams)	81.1	44.3	49.9	63.6	62.1
J	WT. DRY SOIL = H − F	(grams)	448.4	449.0	397.6	442.8	476.3
K	MOISTURE CONTENT = (I/J) X 100	(%)	18.08	9.9	12.55	14.4	13.03
			1.1808	1.099	1.1255	1.144	1.1303

*GEO SYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 4

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 49134 TASK NO.: 04.1

DATE: 09 day July month 2002 year

SAMPLE NO.: LP02-5

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: [illegible]

	WATER ADDED	(ml)	13.65 11%				
A	WT. OF SOIL & MOLD	(grams)	6191.6				
B	WT. OF MOLD	(grams)	4204.5				
C	WT. OF SOIL = A - B	(grams)	1987.1				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	~~131.1~~ 131.2				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	~~112.1~~ 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: [illegible]

	TARE NO.		#18				
F	WT. OF TARE	(grams)	8.4				
G	WT. OF WET SOIL & TARE	(grams)	427.4				
H	WT. OF DRY SOIL & TARE	(grams)	366.8				
I	WT. OF WATER = G - H	(grams)	60.6				
J	WT. DRY SOIL = H - F	(grams)	358.4				
K	MOISTURE CONTENT = (I/J) X 100	(%)	16.9				

000609

5368

*GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 2 OF 4

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 10 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-5 STD

Weight of Total Sample	=	44614.2
Weight of Oversize Fraction	=	874.9
Weight of Finer Fraction (- 3/8)	=	~~43740.0~~ 43739.3
Percentage of Oversize Fraction	= (P_C)	2.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.154
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 15.1\ \%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 116.6$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

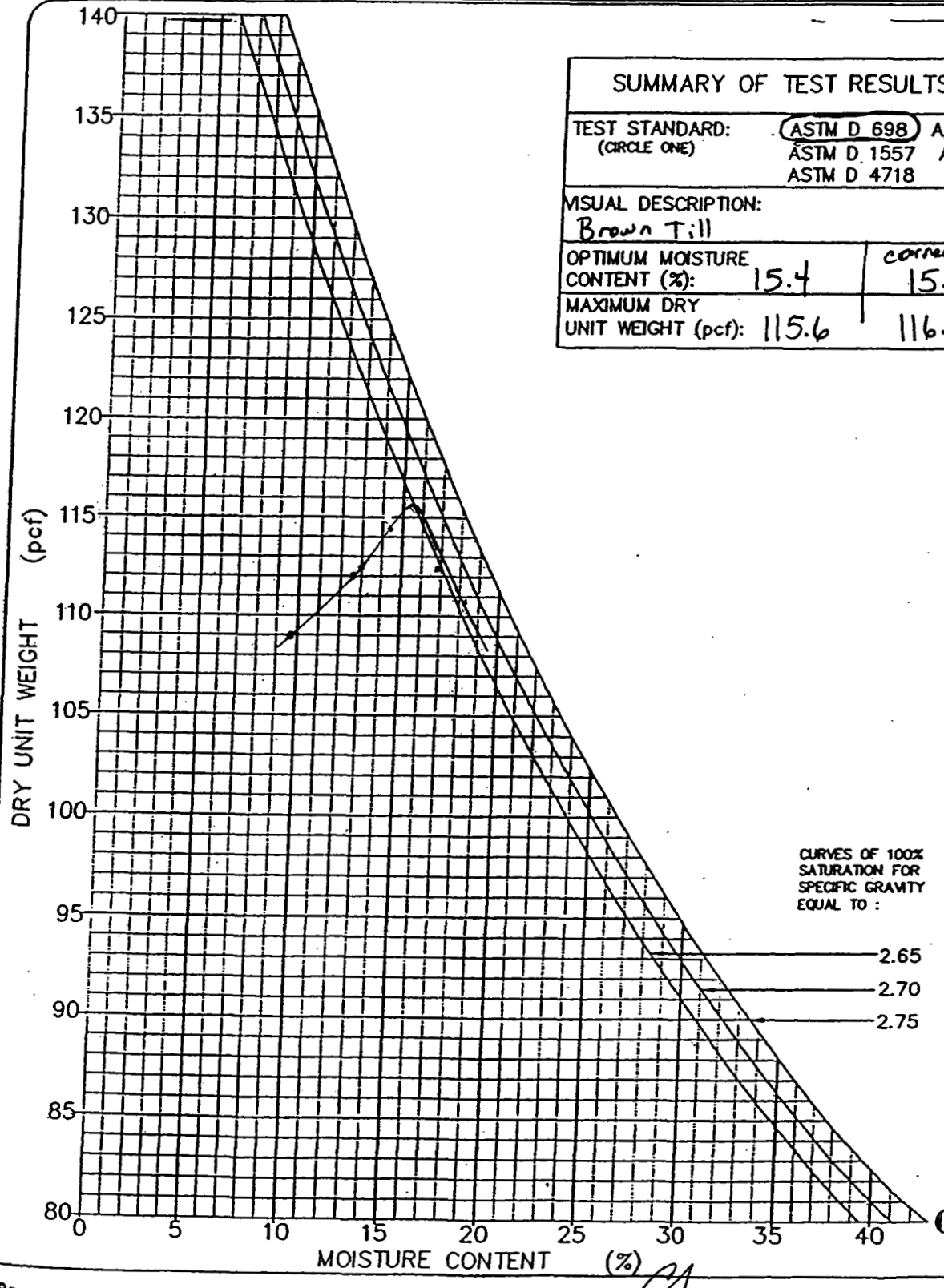
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 10 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: CP02-5

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, (B), C; ASTM D 1557 A, B, C; ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till		CA
OPTIMUM MOISTURE CONTENT (%): 15.4	corrected 15.1	CA
MAXIMUM DRY UNIT WEIGHT (pcf): 115.6	116.6	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. GQ134 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 03 day July month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Borrow Area SAMPLE NO.: LP02-5

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

13.63 c/w

COMPACTION OF SOIL — QA ID: DAC

			13.76	13.93	13.87	13.74	
	WATER ADDED	(ml)	4%	6%	8%	10%	2%
A	WT. OF SOIL & MOLD	(grams)	6241.5	6318.6	6291.4	6232.5	6182.6
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	2037.0	2114.1	2086.9	2028.0	1978.1
D	WET UNIT WT.(1) = C X 0.066	(pcf)	134.4	139.5	137.7	133.8	130.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	122.3	124.4	120.9	114.8	121.2

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: DAC

	TARE NO.		#607	#63	#96	#601	#103
F	WT. OF TARE	(grams)	8.2	8.2	8.2	8.2	8.3
G	WT. OF WET SOIL & TARE	(grams)	364.0	387.9	430.1	449.7	335.9
H	WT. OF DRY SOIL & TARE	(grams)	332.0	346.8	378.5	387.0	312.1
I	WT. OF WATER = G − H	(grams)	32.0	41.1	51.6	62.7	23.8
J	WT. DRY SOIL = H − F	(grams)	323.8	338.6	370.3	378.8	303.8
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.88	12.1	13.9	16.55	7.8
			1.0988	1.121	1.139	1.1655	1.078

000612

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 10 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-5

Weight of Total Sample	=	44614.2
Weight of Oversize Fraction	=	~~605.4~~ 874.9
Weight of Finer Fraction (- 3/8)	=	43739.3
Percentage of Oversize Fraction	= (P_C)	2.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.119
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	125.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 11.7%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 125.6 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

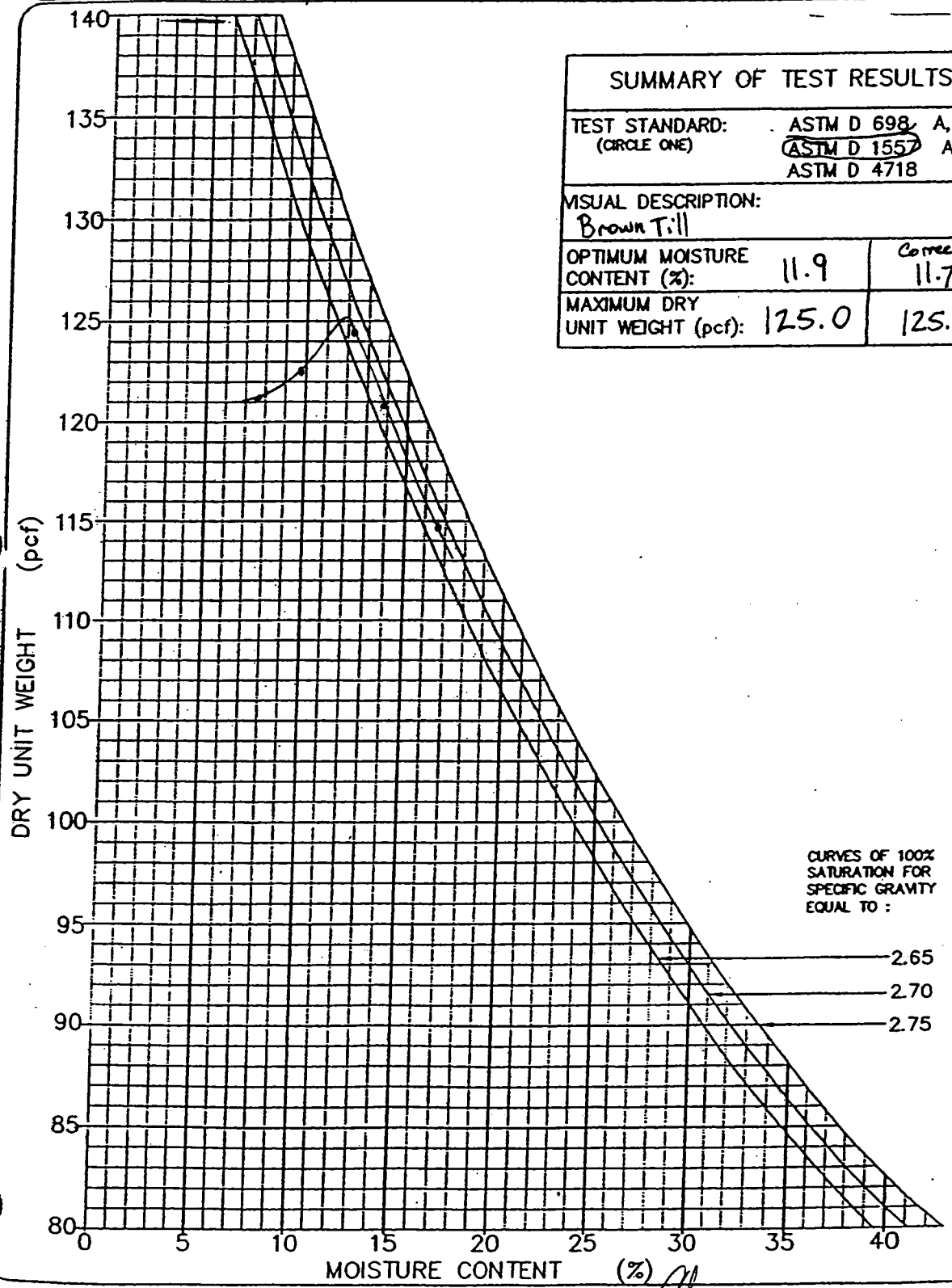
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 10 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: LP02-5

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	11.9	Corrected 11.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	125.0	125.6	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

MATERIAL TYPE: Low Perm Clay

PROJECT NO. 691341 TASK NO.: 04.1

DATE: 09 day July month 2002 year

SAMPLE NO.: LP02-6

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DLE

			13.35	13.53	13.74	13.66	
	WATER ADDED	(ml)	4%	6%	8%	10%	
A	WT. OF SOIL & MOLD	(grams)	6055.6	6137.2	6232.5	6196.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1851.1	1932.7	2028.0	1991.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	122.2	127.6	133.9	131.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.1	112.7	115.9	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: DLE

	TARE NO.		#616	#93	#107	#52	
F	WT. OF TARE	(grams)	8.2	8.2	8.0	8.1	
G	WT. OF WET SOIL & TARE	(grams)	458.4	565.0	483.2	451.7	
H	WT. OF DRY SOIL & TARE	(grams)	413.7	500.0	419.5	386.2	5368
I	WT. OF WATER = G - H	(grams)	44.7	65.0	63.7	65.5	
J	WT. DRY SOIL = H - F	(grams)	405.5	491.8	411.5	378.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.0	13.2	15.5	17.3	
			1.110	1.132	1.155	1.173	

GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

000635

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G21341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 10 day July month 2002 year

MATERIAL TYPE: Clay Liner CP02-6

Weight of Total Sample	=	20694.2
Weight of Oversize Fraction	=	747.7
Weight of Finer Fraction (- 3/8)	=	19946.5
Percentage of Oversize Fraction	= (P_C)	3.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.155
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 15.0\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 117.2$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

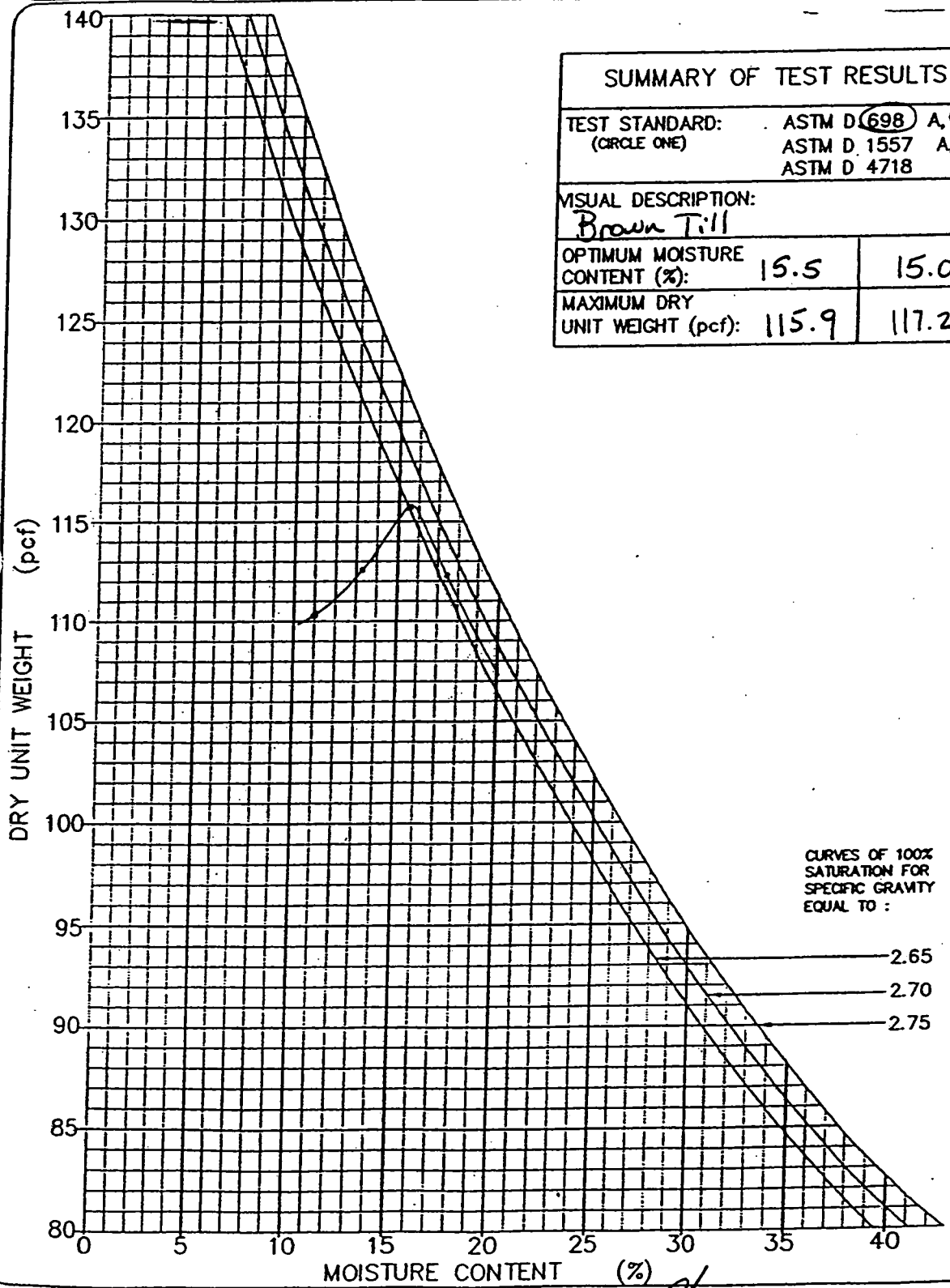
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 09 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: LP02-6

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	15.5	15.0	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	115.9	117.2	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 69341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 08 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP 02-7

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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. 13.52

COMPACTION OF SOIL

QA ID: DTE/CW

			13.28 6%	13.41 8%	13.62 10%	13.6 12%	
	WATER ADDED	(ml)	6%	8%	10%	12%	14%
A	WT. OF SOIL & MOLD	(grams)	6023.8	6082.8	6178.0	6187.1	6132.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1819.3	1878.3	1973.5	1982.6	1928.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.1	124.0	130.3	130.9	127.3
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.9	108.8	112.7	111.7	~~104.6~~ 106.1

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: DTE

	TARE NO.		#94	#49	#607	#95	#607
F	WT. OF TARE	(grams)	8.1	8.2	8.2	8.1	8.2
G	WT. OF WET SOIL & TARE	(grams)	549.4	418.0	505.9	502.5	468.7
H	WT. OF DRY SOIL & TARE	(grams)	494.3	367.8	438.8	429.9	392.0
I	WT. OF WATER = G - H	(grams)	55.1	50.2	67.1	72.6	76.7
J	WT. DRY SOIL = H - F	(grams)	486.2	359.6	430.6	421.8	~~353.8~~ 383.8
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.33	13.95	15.58	17.21	~~21.7~~ 20.0

1.1133 1.1395 1.1558 1.1721

000618

GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 11 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-7

Weight of Total Sample	=	45300.7
Weight of Oversize Fraction	=	1562.2
Weight of Finer Fraction (- 3/8)	=	43738.5
Percentage of Oversize Fraction	= (P_C)	3.4
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.162
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	113.8
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 15.7\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 115.1$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

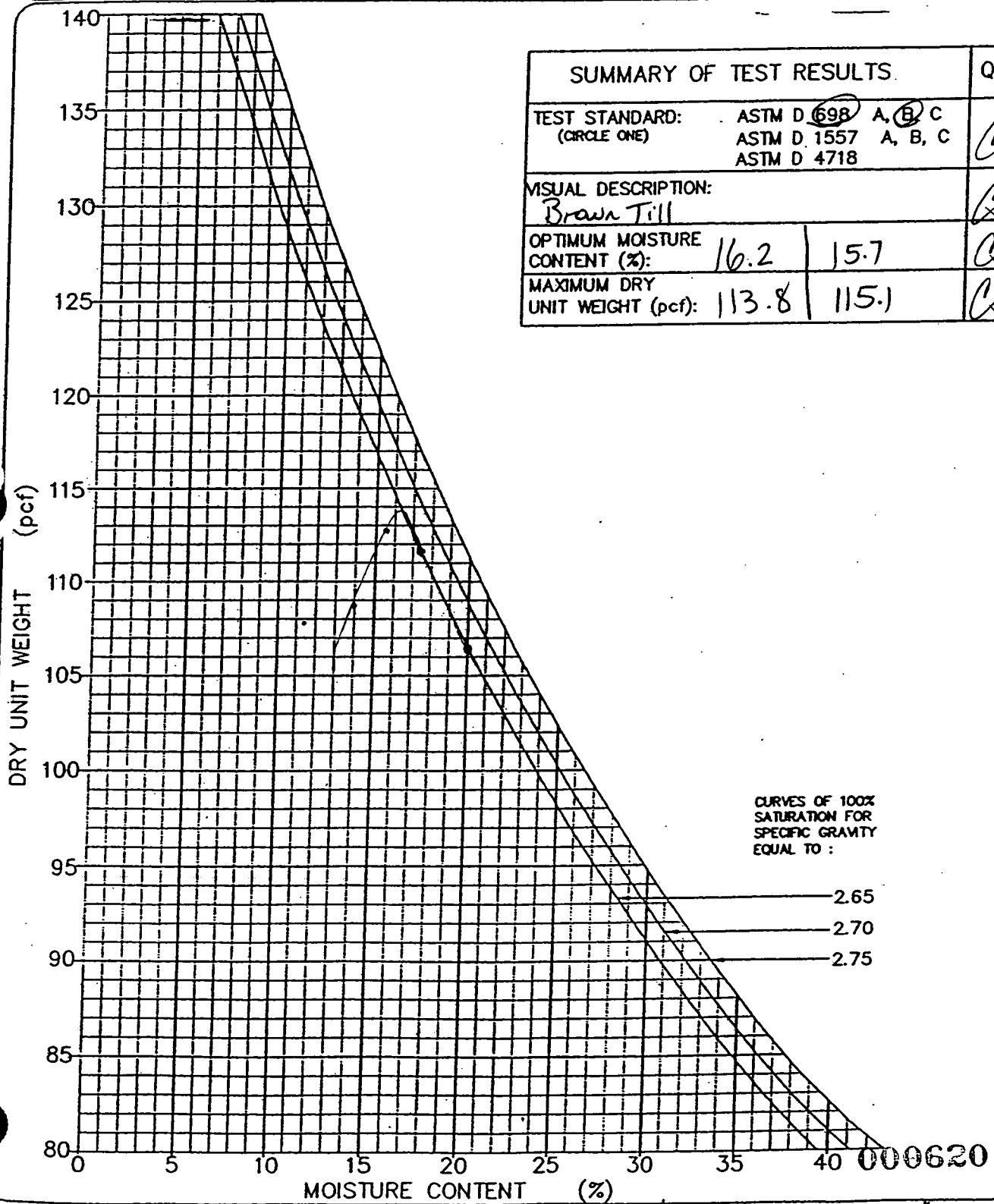
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 18 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: SAMPLE NO.: LP02-7

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	16.2	15.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	113.8	115.1	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 8 day July month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: on-site SAMPLE NO.: LP02-7

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: RS

			2% 13.51	4% 13.76	6% 13.88	13.90	
	WATER ADDED	(ml)	2%	4%	6%	8%	10% 13.80
A	WT. OF SOIL & MOLD	(grams)	6128.1	6241.5	6296.0	6305.0	6259.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1923.6	2037.0	2091.5	2100.5	2055.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.0	134.4	138.0	138.6	135.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.9	123.3	124.0	123.3	117.5

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: DFS

	TARE NO.		#96	#63	#14	#615	97
F	WT. OF TARE	(grams)	8.2	8.3	8.3	8.2	8.2
G	WT. OF WET SOIL & TARE	(grams)	346.6	295.1	328.7	362.6	330.4
H	WT. OF DRY SOIL & TARE	(grams)	325.2	271.5	296.2	323.5	287.4
I	WT. OF WATER = G − H	(grams)	21.4	23.6	32.5	39.1	43.0
J	WT. DRY SOIL = H − F	(grams)	317.0	263.2	287.9	315.3	279.2
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.8	9.0	11.3	12.4	15.4
			1.068	1.09	1.113	1.124	1.154

0006221

5368

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 10 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-7

Weight of Total Sample	=	45300.7
Weight of Oversize Fraction	=	1562.2
Weight of Finer Fraction (- 3/8)	=	43738.5
Percentage of Oversize Fraction	= (P_C)	3.4
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.6
Specific Gravity (Assumed)	= (G_M)	62.4

(W_F) =	Water Content - 3/8 , as decimal	=	10.4
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	124.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 10.1\ \%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 125.6$ pcf

000622

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

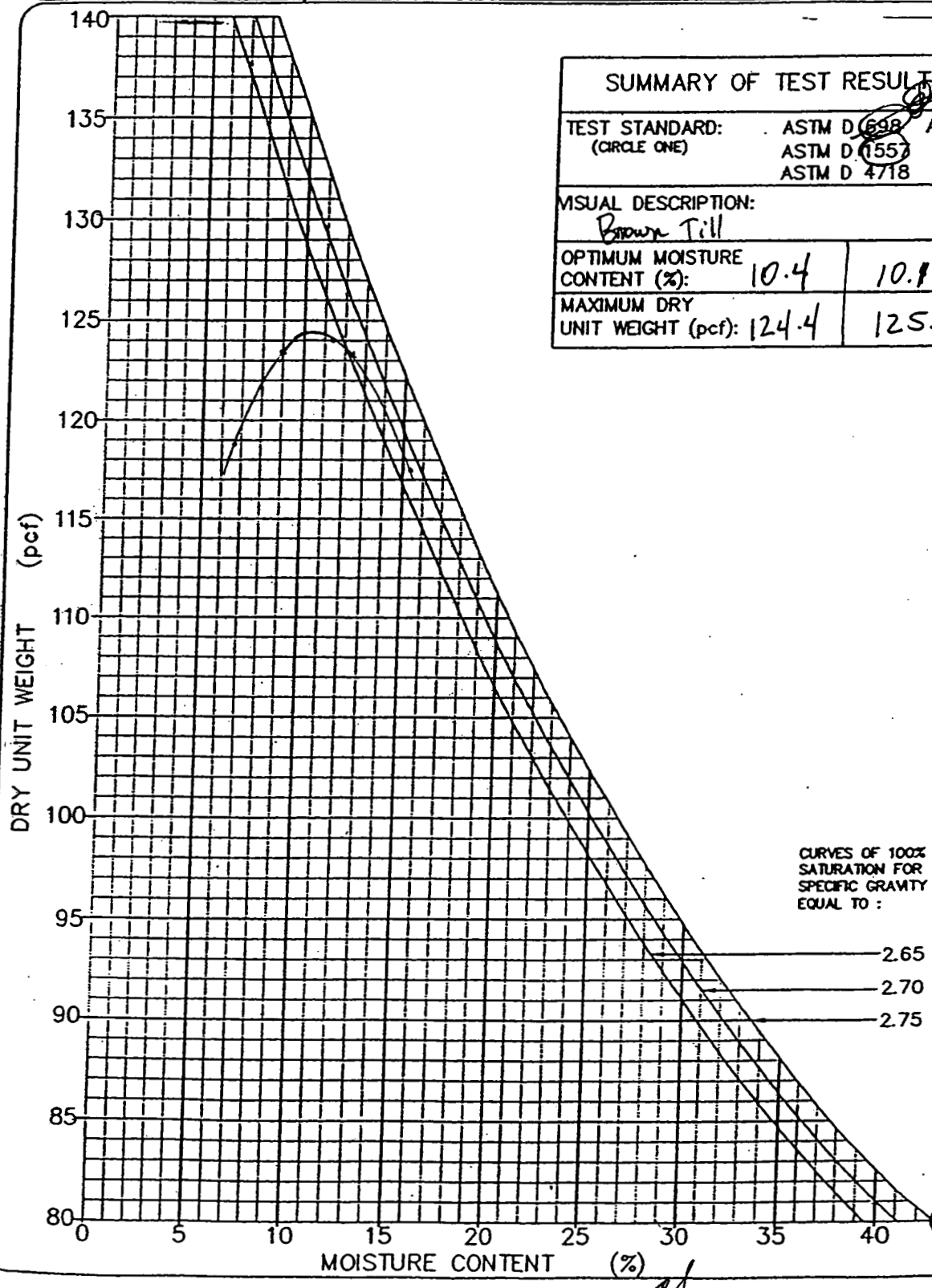
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 10 day July month 2002 year

MATERIAL TYPE: B Clay Liner MATERIAL SOURCE: STOCKPILE Ø2-1 SAMPLE NO.: LPØ2-7

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	10.4	10.8	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	124.4	125.6	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 60341 TASK NO.: 04.1

DESCRIPTION: Phase II

DATE: 12 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-8

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: RLE

				13.24	13.47	13.58	13.63
	WATER ADDED	(ml)		6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)		6005.7	6110.0	6159.9	6187.6
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)		1801.2	1905.5	1955.4	1983.1
D	WET UNIT WT.(1) = C X 0.066	(pcf)		118.9	125.8	129.1	~~130.5~~ 130.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		108.8	112.8	113.1	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: RLE

	TARE NO.			#98	#49	#602	#309
F	WT. OF TARE	(grams)		8.2	8.2	8.2	8.0
G	WT. OF WET SOIL & TARE	(grams)		416.0	417.1	470.8	529.4
H	WT. OF DRY SOIL & TARE	(grams)		381.3	374.9	413.5	458.2
I	WT. OF WATER = G − H	(grams)		34.7	42.2	57.3	71.2
J	WT. DRY SOIL = H − F	(grams)		373.1	366.7	405.3	450.2
K	MOISTURE CONTENT = (I/J) X 100	(%)		9.3	11.5	14.1	15.8
				1.093	1.115	1.141	1.158

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SHEET NO. 1 OF 4

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 15 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP 02-8

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: [illegible]

			13.63	13.73	13.68		
	WATER ADDED	(ml)	10%	12%	13%		
A	WT. OF SOIL & MOLD	(grams)	6182.6	6227.9	6205.2		
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5		
C	WT. OF SOIL = A − B	(grams)	1978.1	2023.4	2000.7		
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.6	133.5	132.0		
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.4	116.5	113.6		

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: [illegible]

	TARE NO.		#604	#52	#604		
F	WT. OF TARE	(grams)	8.3	8.1	8.3		
G	WT. OF WET SOIL & TARE	(grams)	425.2	500.2	471.3		
H	WT. OF DRY SOIL & TARE	(grams)	376.7	437.5	406.7		
I	WT. OF WATER = G − H	(grams)	48.5	62.7	64.6		
J	WT. DRY SOIL = H − F	(grams)	368.4	429.4	398.4		
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.2	14.6	16.2		
			1.132	1.146	1.162		

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SHEET NO. 2 OF 4

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 18 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-8

Weight of Total Sample	=	44806.6
Weight of Oversize Fraction	=	836.1
Weight of Finer Fraction (-3/8)	=	43970.5
Percentage of Oversize Fraction	= (P_C)	1.87
Percentage of Finer Fraction (-3/8)	= (P_F)	98.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.146
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	116.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 14.4\ \%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 117.2$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

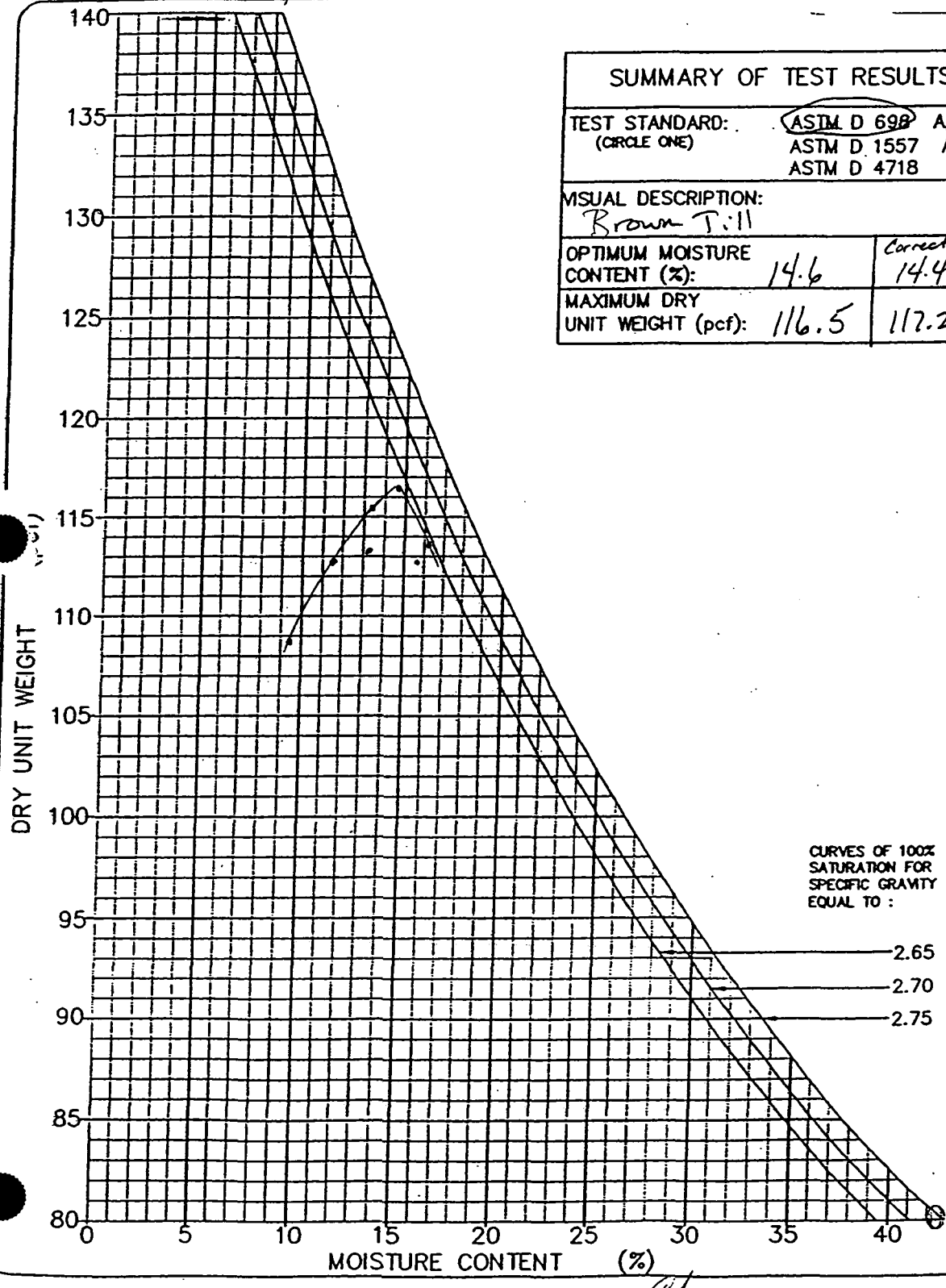
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 18 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: LP02-8

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	14.6	Correction 14.4	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	116.5	117.2	CS



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. GQ341 TASK NO.: 041

DESCRIPTION: Phase IV

DATE: 12 day July month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Borrow Area SAMPLE NO.: LP02-8

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL — QA ID: KS

			13.59 KS	13.83	13.92	13.86	
	WATER ADDED	(ml)	4%	6%	8%	10%	
A	WT. OF SOIL & MOLD	(grams)	6169.0	6273.3	6314.1	6286.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1964.5	2068.8	2109.6	2082.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	136.5	139.2	137.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	121.4	124.9	125.4	121.5	

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: [illegible]

	TARE NO.		#608	#605	#92	#601	
F	WT. OF TARE	(grams)	8.2	8.3	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	332.0	362.1	418.9	412.7	
H	WT. OF DRY SOIL & TARE	(grams)	311.5	332.0	378.1	366.0	5368
I	WT. OF WATER = G − H	(grams)	20.5	30.1	40.8	46.7	
J	WT. DRY SOIL = H − F	(grams)	303.3	323.7	369.9	357.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.8	9.3	11.0	13.1	
			1.068	1.093	1.110	1.131	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134/ TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day July month 2002 year

MATERIAL TYPE: Low Perm Clay Liner LP#9-2 mod

Weight of Total Sample	=	44806.6
Weight of Oversize Fraction	=	836.1
Weight of Finer Fraction (- 3/8)	=	43970.5
Percentage of Oversize Fraction	= (P_C)	1.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.110
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	125.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 10.8\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 126.0$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

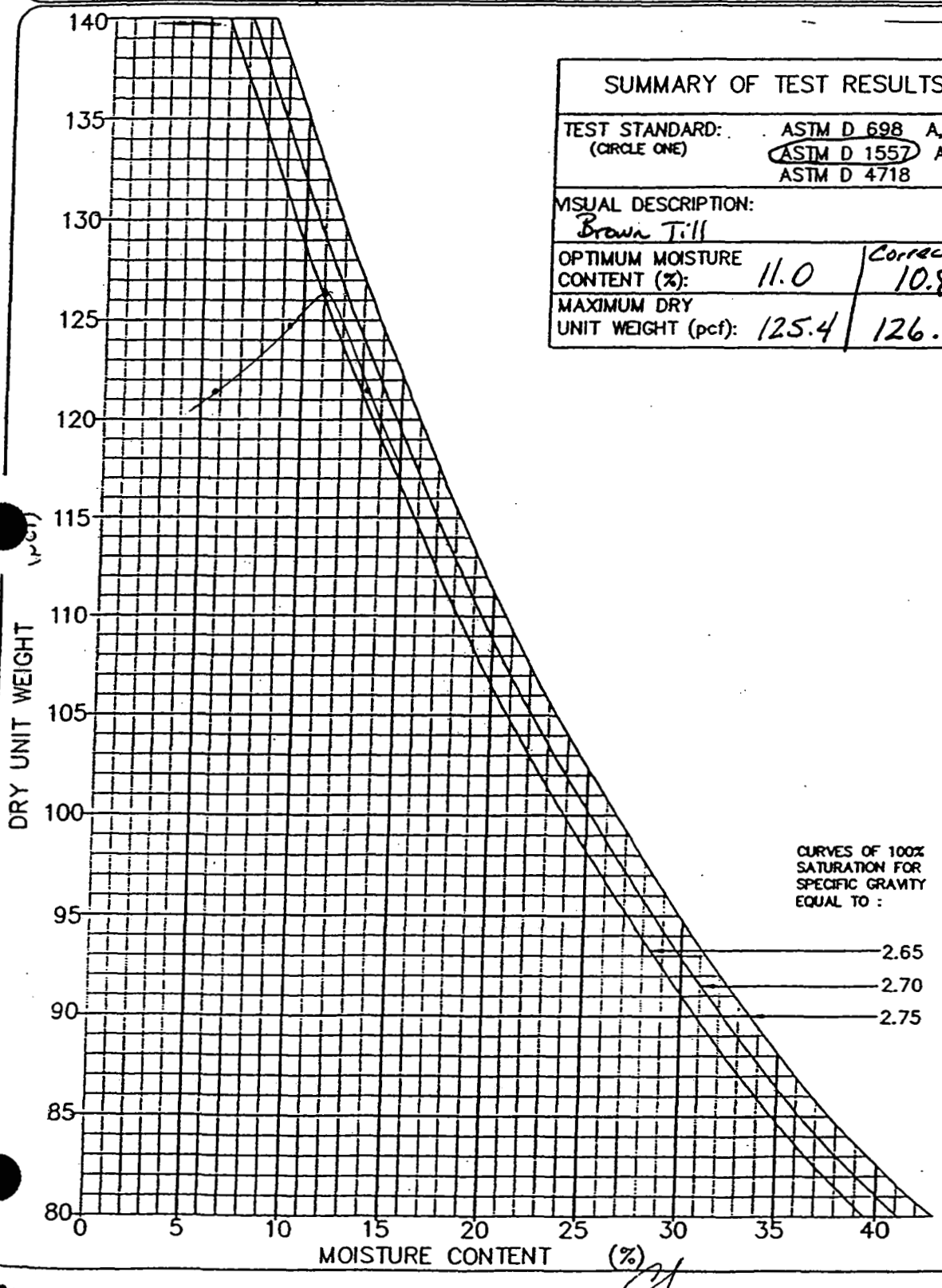
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 16 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-1 SAMPLE NO.: LP02-8

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, (B) C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	11.0	Corrected 10.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	125.4	126.0	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 69341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 13 day Jul month 02 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP-02-~~10~~ 9

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: CB/DTE

				13.29	13.57	13.68	13.6
	WATER ADDED	(ml)	4%	6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)		6028.3	6155.4	6205.2	6205.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)		1823.8	1950.9	2000.7	2000.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)		120.4	128.8	132.0	132.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.5	~~108.8~~	114.7	116.4	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: CB/DTE

	TARE NO.			#607	#14	#97	#18
F	WT. OF TARE	(grams)		8.1	8.3	8.2	8.4
G	WT. OF WET SOIL & TARE	(grams)		379.3	416.5	444.0	418.7
H	WT. OF DRY SOIL & TARE	(grams)		345.9	371.7	392.6	363.0
I	WT. OF WATER = G − H	(grams)		33.4	44.8	51.4	55.7
J	WT. DRY SOIL = H − F	(grams)	337.8	~~312.5~~	363.4	384.4	354.6
K	MOISTURE CONTENT = (I/J) X 100	(%)		9.9	~~10.7~~ 12.3	13.4	15.7

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GEO SYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day July month 2002 year

MATERIAL TYPE: Clay Liner CP02-9

Weight of Total Sample	=	22074.5
Weight of Oversize Fraction	=	811.2
Weight of Finer Fraction (- 3/8)	=	21263.3
Percentage of Oversize Fraction	= (P_C)	3.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.141
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	117.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = ~~10.7%~~ = 13.6%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = ~~126.6 pcf~~ = 118.4 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

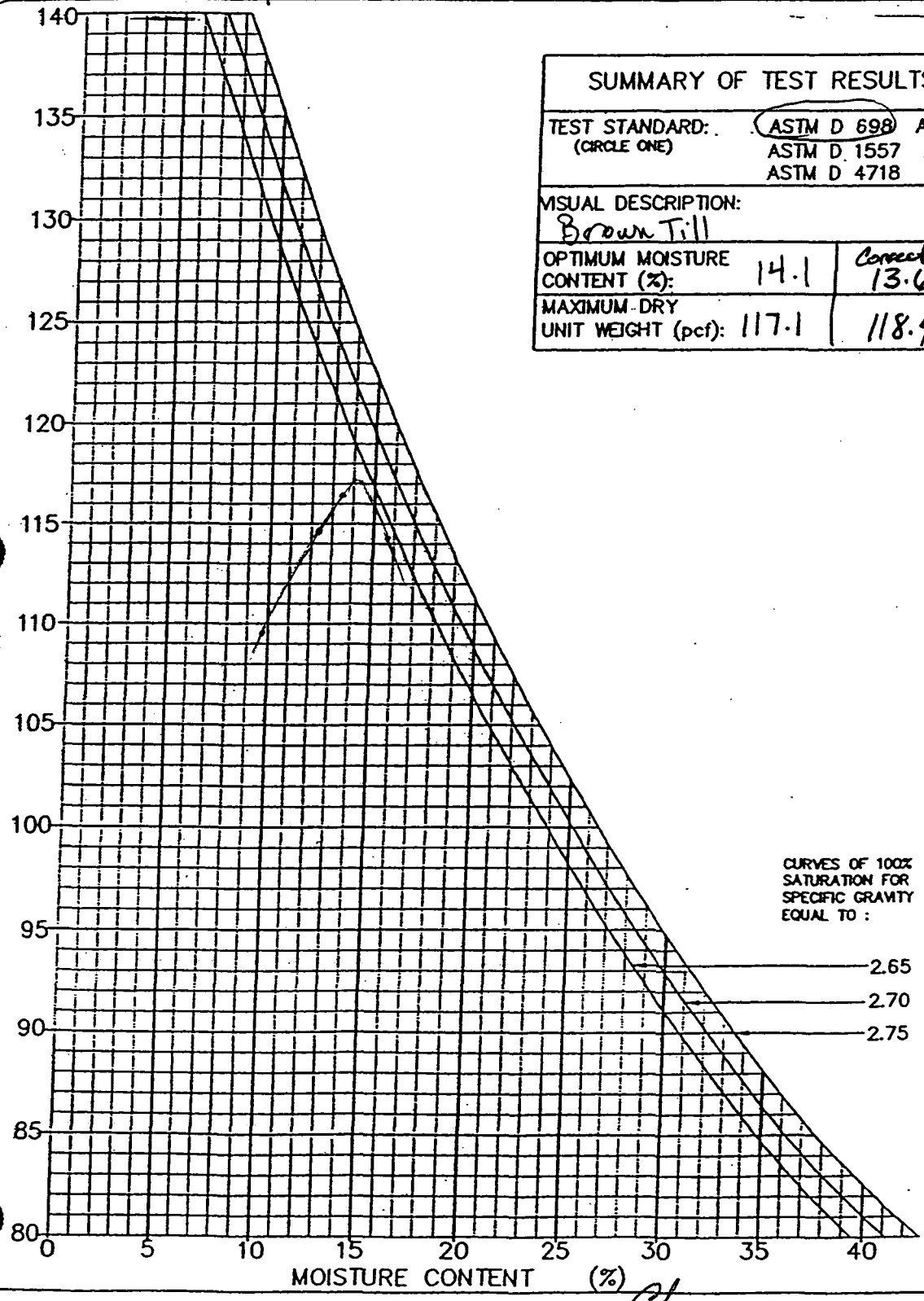
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 15 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE Ø2-2 SAMPLE NO.: LPØ2-9

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	14.1	Corrected 13.6	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	117.1	118.4	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 69341 TASK NO.: 04.1

DATE: 15 day July month 2002 year

SAMPLE NO.: LP02-D

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DLE

			13.46	13.73	13.77	13.66		
	WATER ADDED	(ml)	4%	6%	8%	10%		
A	WT. OF SOIL & MOLD	(grams)	6105.5	6227.9	6246.1	6196.2		
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5		4204.5
C	WT. OF SOIL = A - B	(grams)	1901.0 ~~1801.0~~	2023.4	2041.6	1991.7		
D	WET UNIT WT.(1) = C X 0.066	(pcf)	125.5 ~~118.9~~	133.5	134.7	131.5		
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.5 ~~108.6~~	119.2	117.3 ~~117.1~~	112.5		

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: DLE

	TARE NO.		#615	#636	#95	~~#8.4~~ #103		
F	WT. OF TARE	(grams)	8.2	8.2	8.1	8.4		
G	WT. OF WET SOIL & TARE	(grams)	411.1	485.5	508.8	464.2		
H	WT. OF DRY SOIL & TARE	(grams)	376.0	434.5	443.9	398.2		5368
I	WT. OF WATER = G - H	(grams)	35.1	51.0	~~65.2~~ 64.9	66.0		
J	WT. DRY SOIL = H - F	(grams)	367.8	426.3	435.8	389.8		
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.5	12.0	~~15.0~~ 14.9	16.9		
			1.095	1.120	1.15	1.169		

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GEO SYNTEC CONSULTANTS FILE NO. 2-05-FLC CHECKED BY: SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day July month 2002 year

MATERIAL TYPE: Clay Liner and Cap LP02-10

Weight of Total Sample	=	47900.5
Weight of Oversize Fraction	=	2259.3
Weight of Finer Fraction (-3/8)	=	45641.2
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (-3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.13
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$C_W = 12.5\%$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$C_{\delta D} = 122.7$ pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

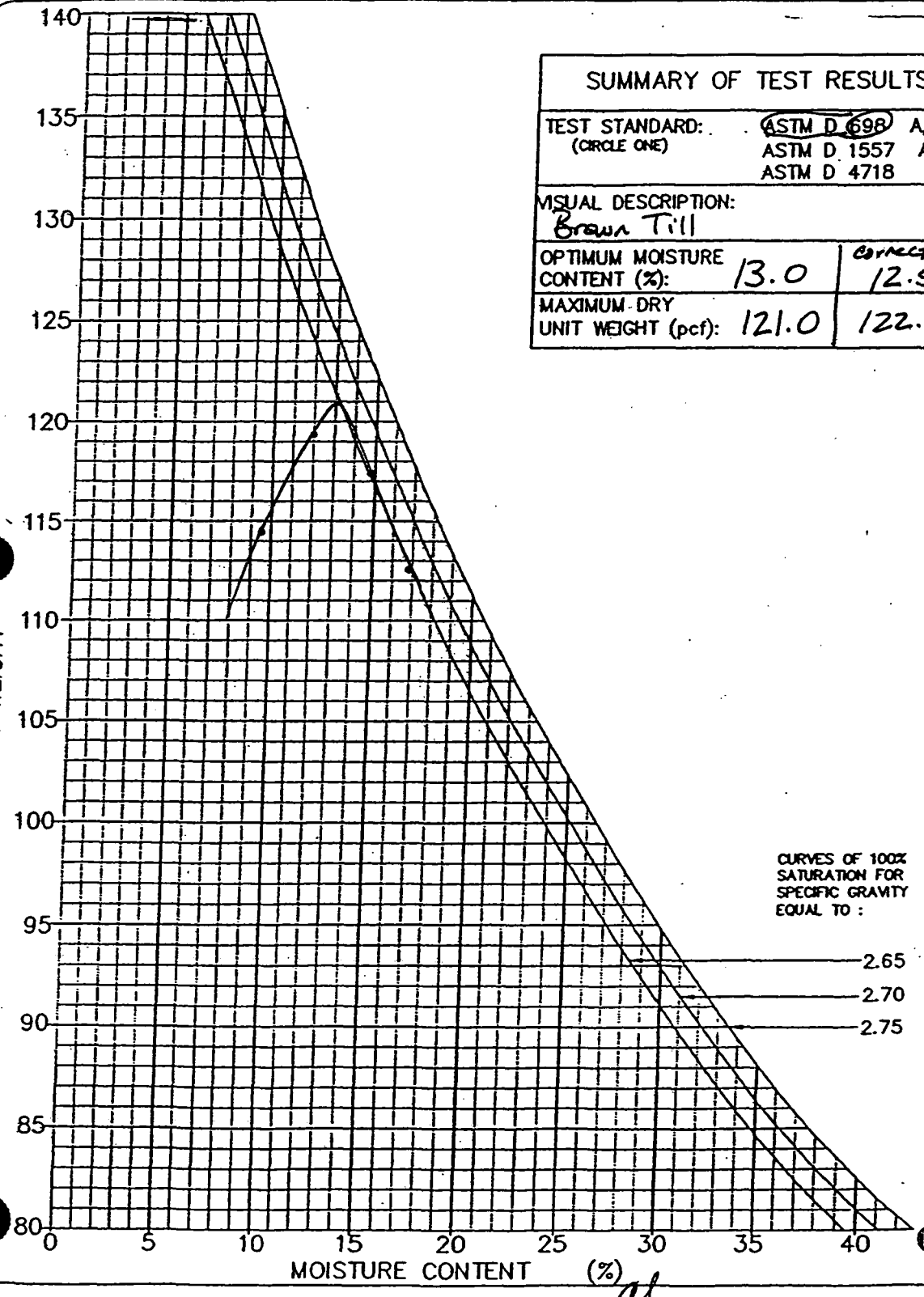
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 16 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE Ø2-1 SAMPLE NO.: LPØ2-1d

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.0	corrected 12.5	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	121.0	122.7	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase IV

DATE: 15 day July month 2002 year

MATERIAL TYPE: LP-Ø2-1Ø (Low Perm Clay) MATERIAL SOURCE: STOCKPILE Ø2-2 SAMPLE NO.: LPØ2-1Ø

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

								QA ID: [illegible]
			13.88	14.04	13.97	13.78		13.68
	WATER ADDED	(ml)	2%	4%	6%	8%		0%
A	WT. OF SOIL & MOLD	(grams)	6296.Ø	6368.5	6336.8	6250.6		6205.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5		4204.5
C	WT. OF SOIL = A − B	(grams)	2Ø91.5	2164.Ø	2132.3	2046.1		2000.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	138.Ø	142.8	140.7	135.Ø		132.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	127.4	128.8	124.6	117.6		123.6

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: DLE

	TARE NO.		#96	#1Ø7	#97	#309	#92
F	WT. OF TARE	(grams)	8.1	8.Ø	8.2	8.Ø	8.2
G	WT. OF WET SOIL & TARE	(grams)	397.8	560.7	453.0	518.4	398.05
H	WT. OF DRY SOIL & TARE	(grams)	368.0	506.6	402.1	445.5	373.1
I	WT. OF WATER = G − H	(grams)	29.8	54.1	50.9	64.9	24.98
J	WT. DRY SOIL = H − F	(grams)	359.9	498.6	393.9	437.5	364.9
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.3	10.9	12.9	14.8	6.8
			1.083	1.109	1.129	1.148	1.068

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SHEET NO. 1 OF 3

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GeoSyntec Consultants

FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 18 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-10 MOD

Weight of Total Sample	=	47900.5
Weight of Oversize Fraction	=	2259.3
Weight of Finer Fraction (-3/8)	=	45641.2
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (-3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content -3/8, as decimal	=	0.10
(W_C) =	Water Content +3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	130.0
(δ_W) =	Unit Weight of Water	=	62.5

$$C_W = (W_F P_F) + (W_C P_C)$$

C_W = 9.6 %

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$C_{\delta D}$ = 131.5 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

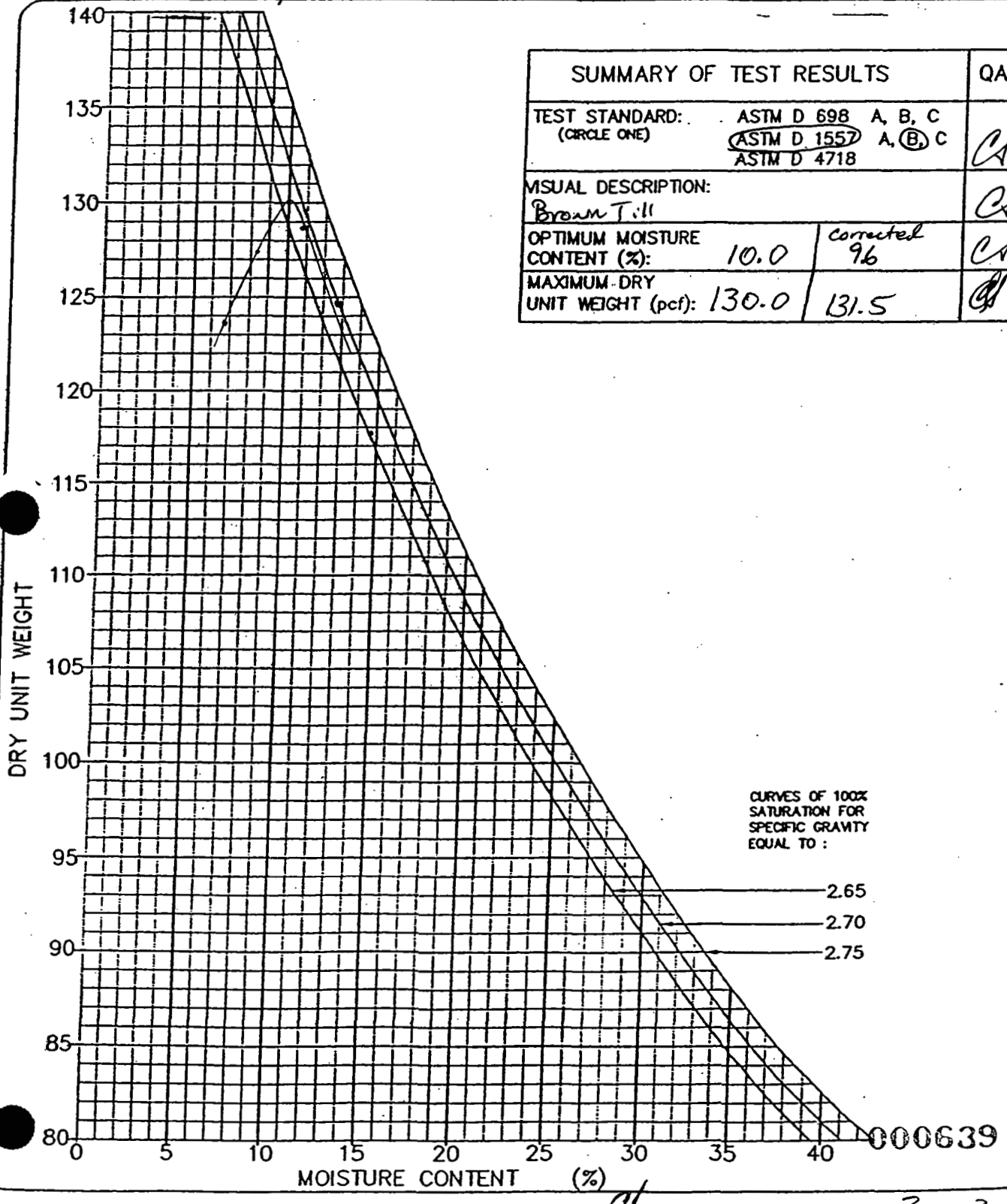
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 18 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE #2-2 SAMPLE NO.: LA02-10

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, (B), C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	10.0	Corrected 9.6	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	130.0	131.5	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 6-Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 17 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-11

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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.

13.

COMPACTION OF SOIL

QA ID: DCE

			13.47	13.67	13.80	13.81	
	WATER ADDED	(ml)	100 mL 4%	150 mL 6%	200 mL 8%	250 mL 10%	12%
A	WT. OF SOIL & MOLD	(grams)	6110.0	6200.7	6259.7	6264.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1905.5	1996.2	2055.2	2059.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	125.8	131.7	135.6	135.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.8	119.2	120.4	118.9	

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: DCE

	TARE NO.		#614	#202	#679	#65	
F	WT. OF TARE	(grams)	8.3	8.2	8.1	8.2	
G	WT. OF WET SOIL & TARE	(grams)	479.1	446.4	524.4	530.1	
H	WT. OF DRY SOIL & TARE	(grams)	441.7	404.9	466.7	464.9	
I	WT. OF WATER = G − H	(grams)	37.4	41.5	57.7	65.2	
J	WT. DRY SOIL = H − F	(grams)	433.4	396.7	458.6	456.7	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.6	10.5	12.6	14.3	
			1.086	1.105	1.126	1.143	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 18 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-11 STD

Weight of Total Sample	=	21888.1
Weight of Oversize Fraction	=	795.8
Weight of Finer Fraction (- 3/8)	=	21092.3
Percentage of Oversize Fraction	= (P_C)	3.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.123
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 11.9 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 121.7 pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

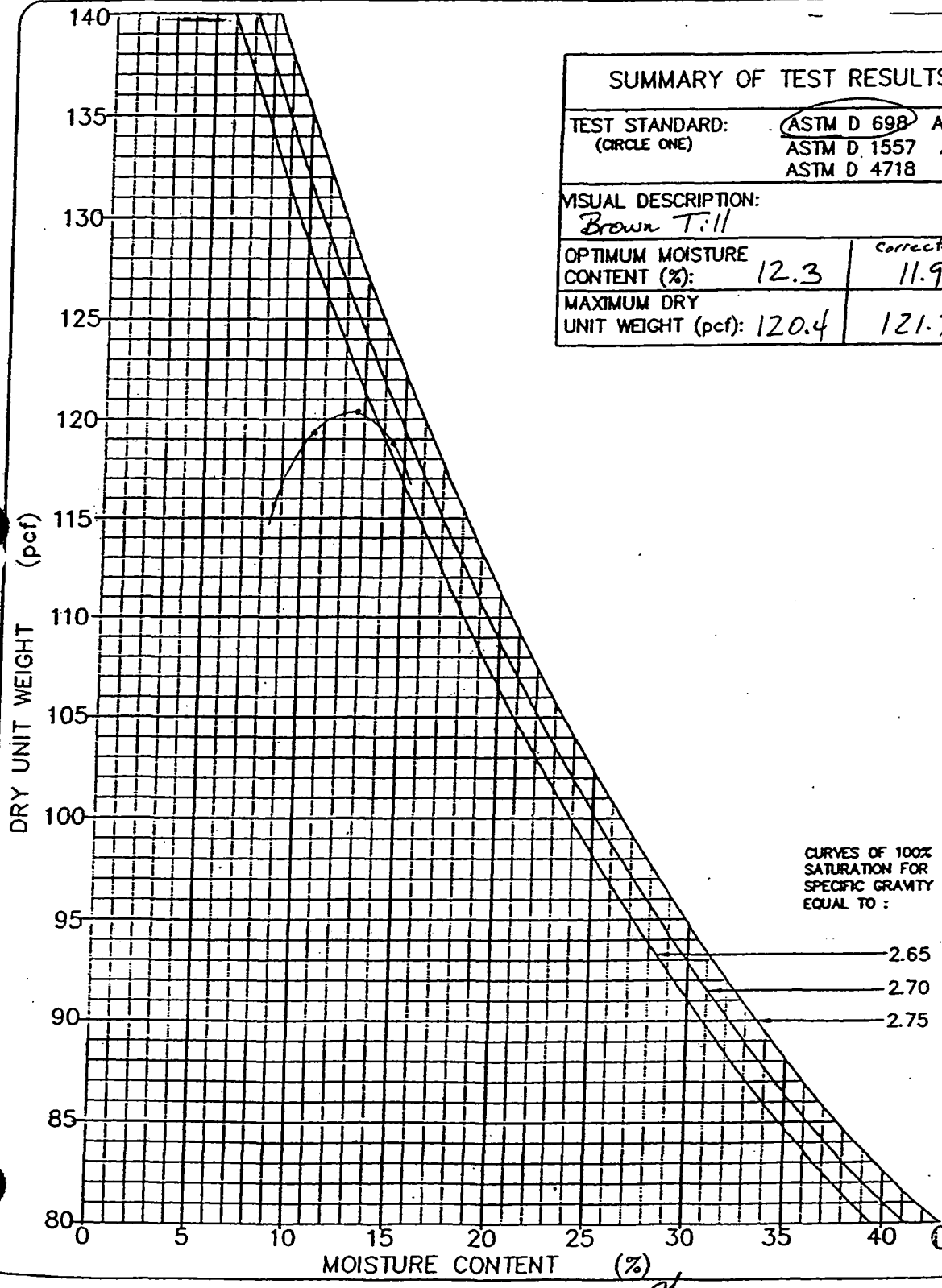
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 18 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-2 SAMPLE NO.: LP02-11

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.3	Corrected 11.9	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	120.4	121.7	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 66134 TASK NO.: 04.1

DESCRIPTION:

DATE: 18 day July month 2002 year

MATERIAL TYPE:

SAMPLE NO.: LP02-12

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DLE

			13.29	13.54	13.74	13.77	
	WATER ADDED	(ml)	4%	6%	8%	10%	
A	WT. OF SOIL & MOLD	(grams)	6028.3	6141.7	6232.5	6246.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1823.8	1937.2	2028.0	2041.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.4	127.9	133.8	134.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.8	116.3	119.6	117.5	

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: DLE

	TARE NO.		#630	#230	#96	#675	
F	WT. OF TARE	(grams)	8.1	8.3	8.1	8.3	
G	WT. OF WET SOIL & TARE	(grams)	422.4	550.9	533.4	569.4	
H	WT. OF DRY SOIL & TARE	(grams)	393.0	502.0	477.5	497.6	
I	WT. OF WATER = G − H	(grams)	29.4	48.9	55.9	71.8	
J	WT. DRY SOIL = H − F	(grams)	384.9	493.7	469.4	489.3	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.6	9.9	11.9	14.7	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 20 day July month 2002 year

MATERIAL TYPE: Clay liner LP02-12 STD

Weight of Total Sample	=	37263.5
Weight of Oversize Fraction	=	1507.0
Weight of Finer Fraction (-3/8)	=	35756.5
Percentage of Oversize Fraction	= (P_C)	4.0
Percentage of Finer Fraction (-3/8)	= (P_F)	96.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.14
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 13.5\ \%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 122.4$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

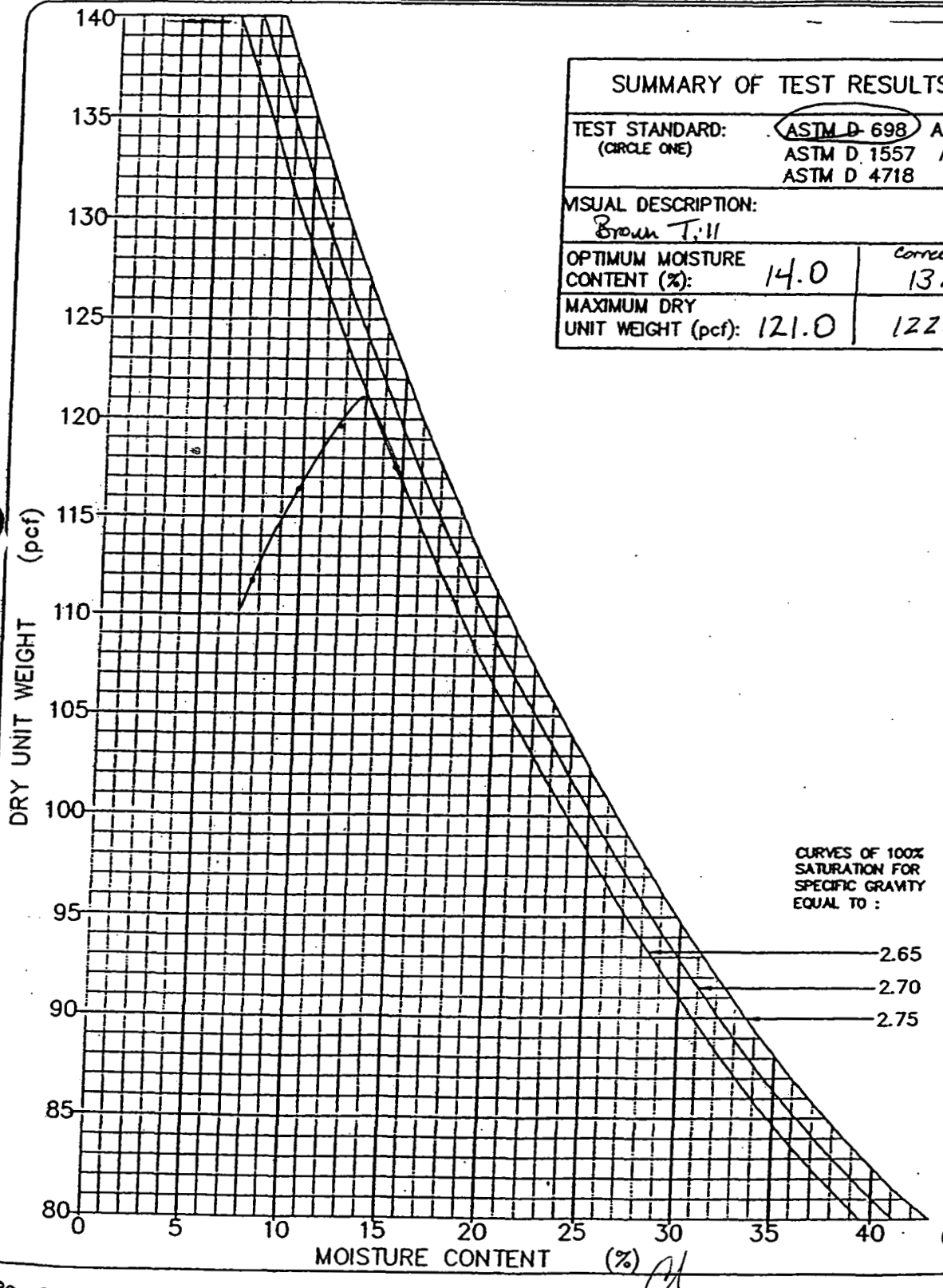
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 20 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-2 SAMPLE NO.: LPØ2-12

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	14.0	Corrected 13.5	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	121.0	122.4	CA



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 18 day July month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-2 SAMPLE NO. LP-02-12

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: PCE K/S

				13.64	13.86	14.02	13.96
	WATER ADDED	(ml)		2%	4%	6%	8%
A	WT. OF SOIL & MOLD	(grams)		6187.1	6286.9	6359.5	6332.3
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)		1982.5	2082.4	2155.0	2127.8
D	WET UNIT WT.(1) = C X 0.066	(pcf)		130.9	137.4	142.2	140.4
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		124.0	127.9	130.2	126.0

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: PCE

	TARE NO.			92	309	107	12
F	WT. OF TARE	(grams)		8.2	8.0	8.0	8.3
G	WT. OF WET SOIL & TARE	(grams)		259.8	300.8	264.8	306.0
H	WT. OF DRY SOIL & TARE	(grams)		246.6	280.4	243.1	275.5
I	WT. OF WATER = G - H	(grams)		13.2	20.4	21.7	30.5
J	WT. DRY SOIL = H - F	(grams)		238.4	272.4	235.1	267.2
K	MOISTURE CONTENT = (I/J) X 100	(%)		5.5	7.5	9.2	11.4

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G02134 TASK NO. 041

DESCRIPTION: Phase IV DATE: 20 day July month 2003 year

MATERIAL TYPE: Clay Liner LP02-12

Weight of Total Sample	=	37263.5
Weight of Oversize Fraction	=	1507.0
Weight of Finer Fraction (- 3/8)	=	35756.5
Percentage of Oversize Fraction	= (P_C)	4.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.095
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	130.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 9.2 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 131.8 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

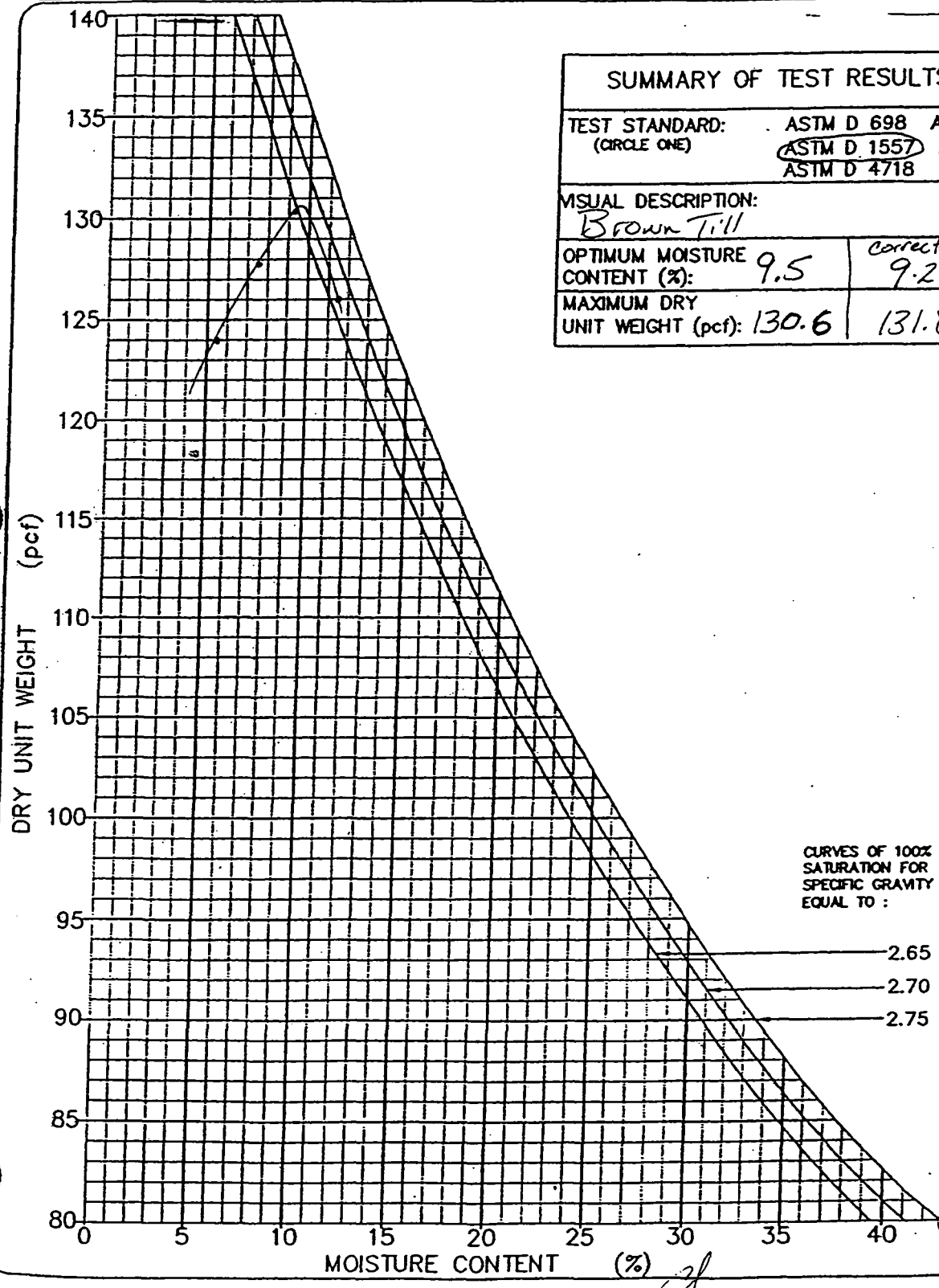
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 20 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-2 SAMPLE NO.: LP02-12

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		GJ
VISUAL DESCRIPTION: Brown Till			GJ
OPTIMUM MOISTURE CONTENT (%):	9.5	corrected 9.2	GJ
MAXIMUM DRY UNIT WEIGHT (pcf):	130.6	131.8	GJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm. Clay

PROJECT NO.: 6Q1341 TASK NO.: 04

DATE: 21 day July month 2002 year

SAMPLE NO.: LP02-13

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.14	6% 13.42	8% 13.68	10% 13.66	
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	5960.3	6087.3	6205.2	6196.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1755.8	1882.8	2000.7	1991.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	115.9	124.3	132.0	131.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	106.5	111.6	115.8	113.2	

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: KS/DE

	TARE NO.		93	601	616	52	
F	WT. OF TARE	(grams)	8.2	8.3	8.2	8.1	
G	WT. OF WET SOIL & TARE	(grams)	313.7	352.1	339.8	337.5	
H	WT. OF DRY SOIL & TARE	(grams)	289.0	316.8	299.2	291.6	
I	WT. OF WATER = G − H	(grams)	24.7	35.3	40.6	45.9	
J	WT. DRY SOIL = H − F	(grams)	280.8	308.5	291.0	283.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.8	11.4	14.0	16.2	
			1.088	1.114	1.140	1.162	

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 22 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-13 STD

Weight of Total Sample	=	25025.8
Weight of Oversize Fraction	=	1115.1
Weight of Finer Fraction (- 3/8)	=	23910.7
Percentage of Oversize Fraction	= (P_C)	4.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.144
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	116.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 13.8%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 117.7 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

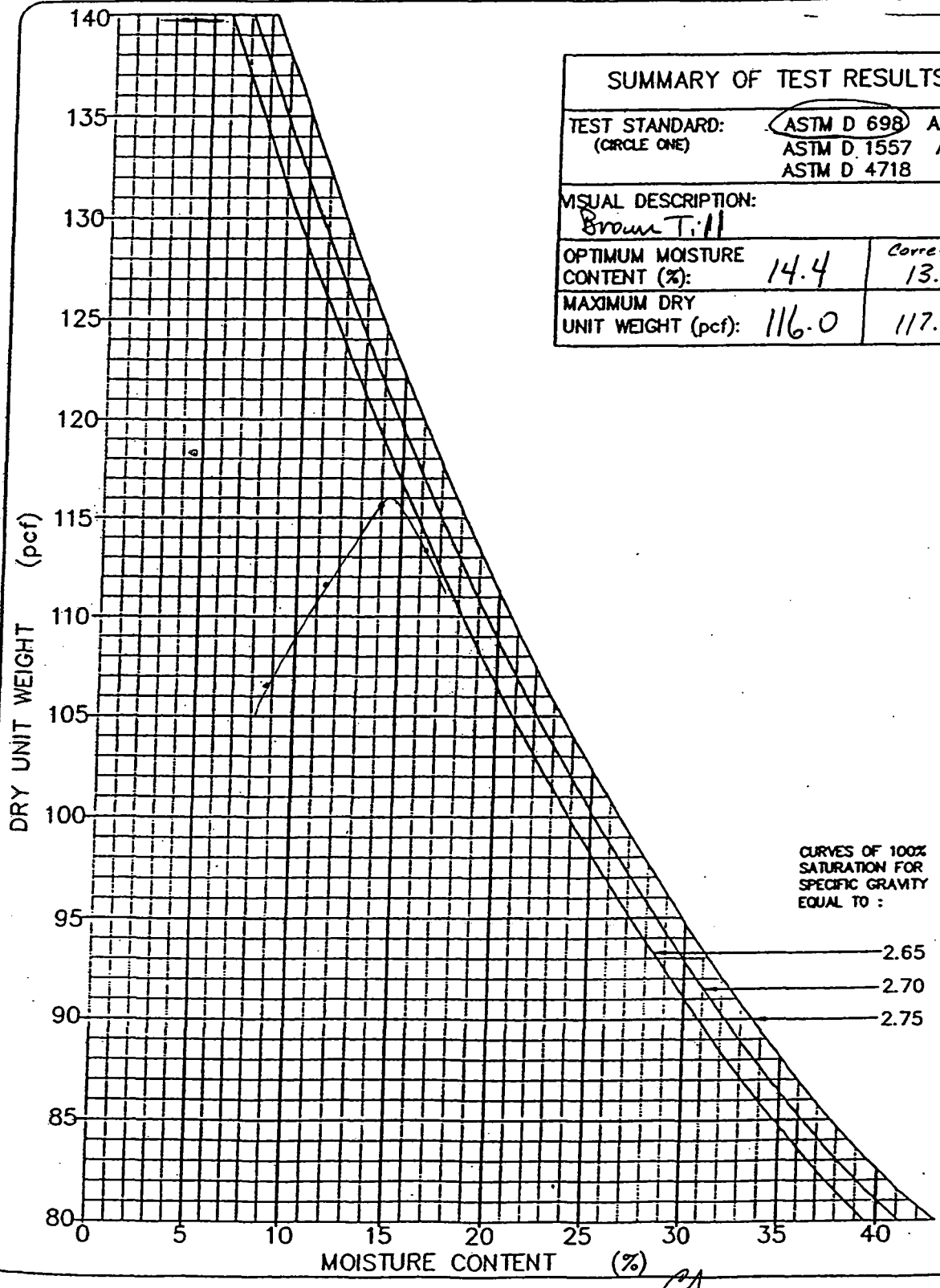
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 22 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LP02-13

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	14.4	Correction 13.8	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	116.0	117.7	CA



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO. 69341 TASK NO.: 04.1

DATE: 22 day July month 2002 year

SAMPLE NO.: LP02-14

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DCE

				13.40	13.60	13.81	13.20
	WATER ADDED	(ml)		2%	4%	6%	8%
A	WT. OF SOIL & MOLD	(grams)		6078.2	6169.0	6264.2	6259.7
B	WT. OF MOLD	(grams)		4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)		1873.7	1964.5	2059.7	2055.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)		123.7	129.7	135.9	135.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		114.5	117.7	120.8	118.6

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: DLE

	TARE NO.			#92	#630	#107	#12
F	WT. OF TARE	(grams)		8.2	8.1	8.0	8.3
G	WT. OF WET SOIL & TARE	(grams)		440.6	503.1	515.6	524.7
H	WT. OF DRY SOIL & TARE	(grams)		408.4	457.4	459.2	460.0
I	WT. OF WATER = G - H	(grams)		32.2	45.7	56.4	64.7
J	WT. DRY SOIL = H - F	(grams)		400.2	449.3	451.2	451.7
K	MOISTURE CONTENT = (I/J) X 100	(%)		8.0	10.2	12.5	14.3

1.08 1.102 1.125 1.143

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO **PROJECT NO.** GQ134 **TASK NO.** 04.1

DESCRIPTION: Phase II **DATE:** 23 **day** July **month** 2002 **year**

MATERIAL TYPE: Clay Liner CP02-14 STD

Weight of Total Sample	=	44359.3
Weight of Oversize Fraction	=	3208.6
Weight of Finer Fraction (-3/8)	=	41150.7
Percentage of Oversize Fraction	= (P_C)	7.2
Percentage of Finer Fraction (-3/8)	= (P_F)	92.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.13
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.1
(δ_W) =	Unit Weight of Water	=	~~64~~ 62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 12.2\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 123.7 \text{ pcf}$$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

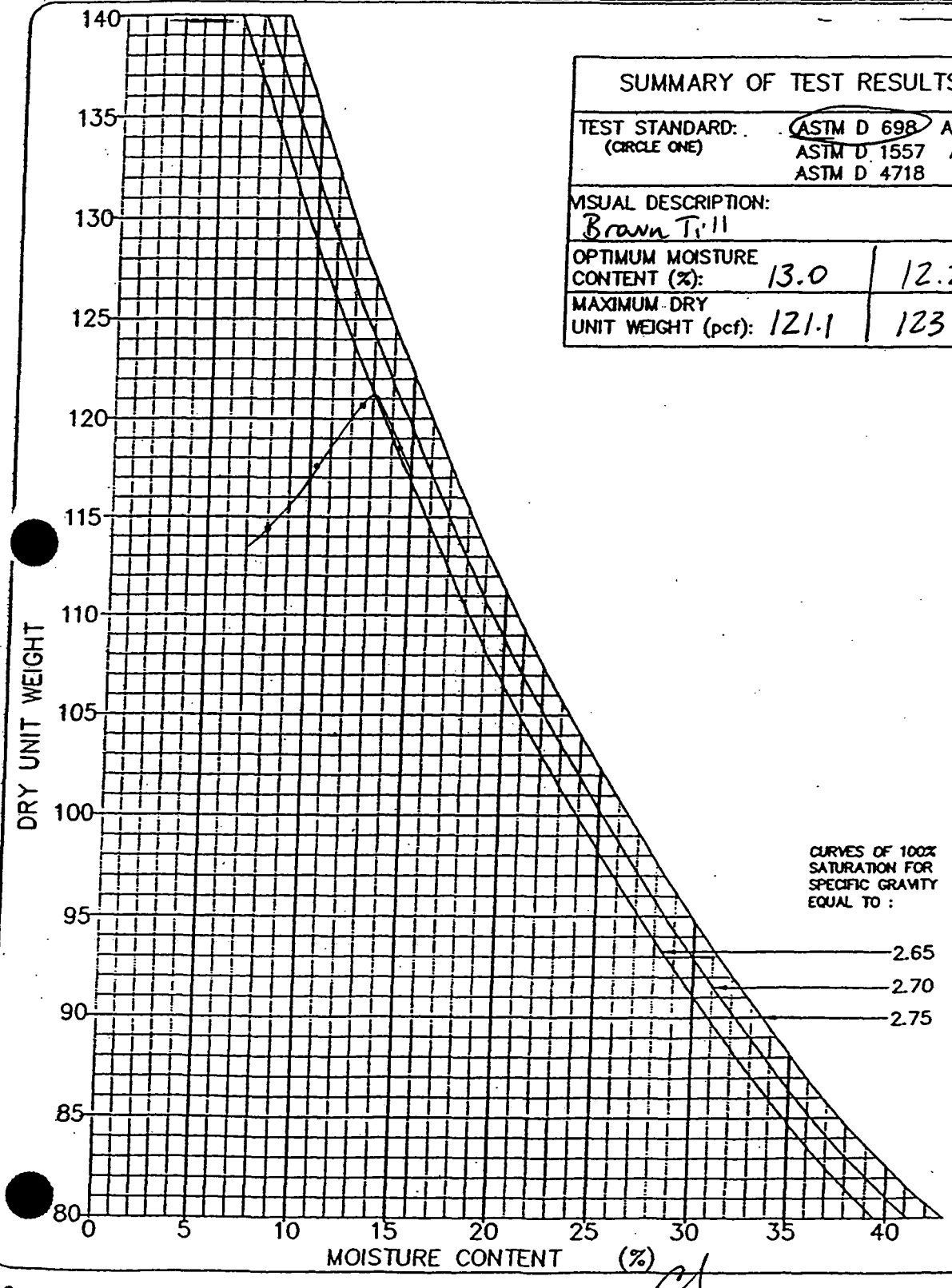
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 23 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-3 SAMPLE NO.: LP02-14

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.0	12.2	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	121.1	123.7	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GG1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 21 day July month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LP02-14

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS/DLF

			2% 13.91	4% 14.02	6% 13.91	0% ~~8%~~ 13.64	
	WATER ADDED	(ml)	50 mL	100 mL	150 mL	0 ~~200 mL~~ KS	
A	WT. OF SOIL & MOLD	(grams)	6309.6	6359.5	6309.6	6187.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2105.1	2155.0	2105.1	1982.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	138.9	142.2	138.9	130.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	128.4	129.3	123.6	123.4	

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: KS/DLF

	TARE NO.		94	615	95	636	
F	WT. OF TARE	(grams)	8.1	8.2	8.0	8.3	
G	WT. OF WET SOIL & TARE	(grams)	353.0	293.5	336.0	331.0	
H	WT. OF DRY SOIL & TARE	(grams)	327.0	267.6	299.7	312.5	
I	WT. OF WATER = G − H	(grams)	26.0	25.9	36.3	18.5	
J	WT. DRY SOIL = H − F	(grams)	318.9	259.4	291.7	304.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.2	10.0	12.4	6.1	
			1.092	1.10	1.124	1.061	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 22 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-14 MOD

Weight of Total Sample	=	44359.3
Weight of Oversize Fraction	=	3208.6
Weight of Finer Fraction (- 3/8)	=	41150.7
Percentage of Oversize Fraction	= (P_C)	7.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	92.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.095
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	130.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 8.9%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\gamma D}$ = 132.4 pcf

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MOISTURE–DENSITY RELATIONSHIP

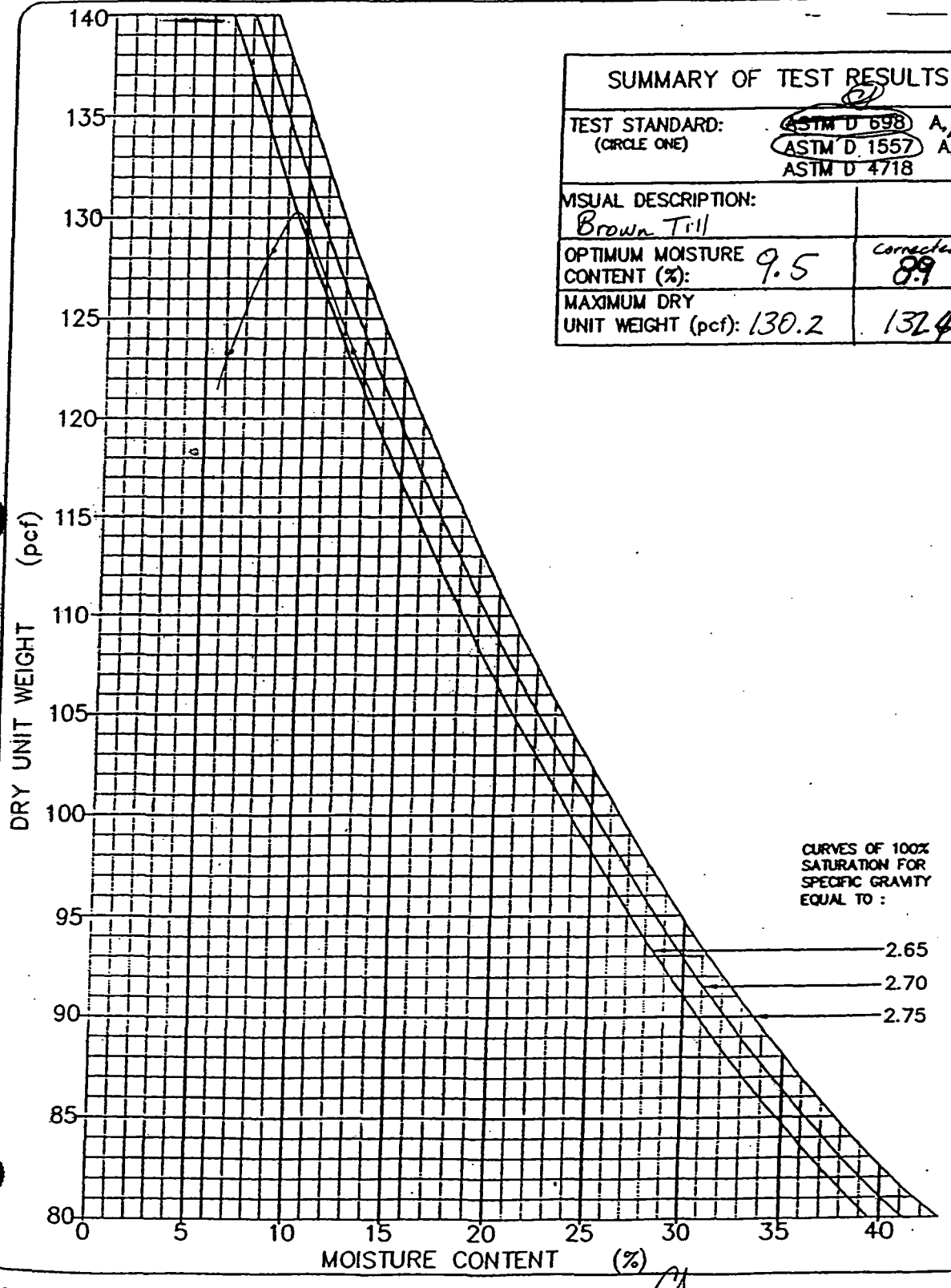
5368

PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase III DATE: 22 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-3 SAMPLE NO.: ~~[illegible]~~ LPØ2-14



SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ~~ASTM D 698~~ A, ~~B~~ C; ASTM D 1557 A, B, C; ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till		CA
OPTIMUM MOISTURE CONTENT (%): 9.5	corrected 8.9	CA
MAXIMUM DRY UNIT WEIGHT (pcf): 130.2	132.4	CA

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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 69134 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 22 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-15

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DLE

			13.54	13.68	13.84	13.72	
	WATER ADDED	(ml)	2%	4%	6%	8%	
A	WT. OF SOIL & MOLD	(grams)	6141.7	6205.2	6277.8	6223.4	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1937.2	2000.7	2073.3	2018.9	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.9	132.0	136.8	133.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	117.1	119.0	120.8	115.4	

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: DLE

	TARE NO.		#230	#65	#679	#603	
F	WT. OF TARE	(grams)	8.4	8.2	8.1	8.2	
G	WT. OF WET SOIL & TARE	(grams)	476.3	487.2	564.4	539.6	
H	WT. OF DRY SOIL & TARE	(grams)	437.0	440.2	499.4	468.9	5368
I	WT. OF WATER = G - H	(grams)	39.3	47.0	65.0	70.9	
J	WT. DRY SOIL = H - F	(grams)	428.6	432.0	491.3	460.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.2	10.9	13.2	15.4	

1.097 1.109 1.132 1.154

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 23 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-15 STD

Weight of Total Sample	=	38076.0
Weight of Oversize Fraction	=	1676.2
Weight of Finer Fraction (- 3/8)	=	36399.8
Percentage of Oversize Fraction	= (P_C)	4.4
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.129
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 12.4%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 122.7 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

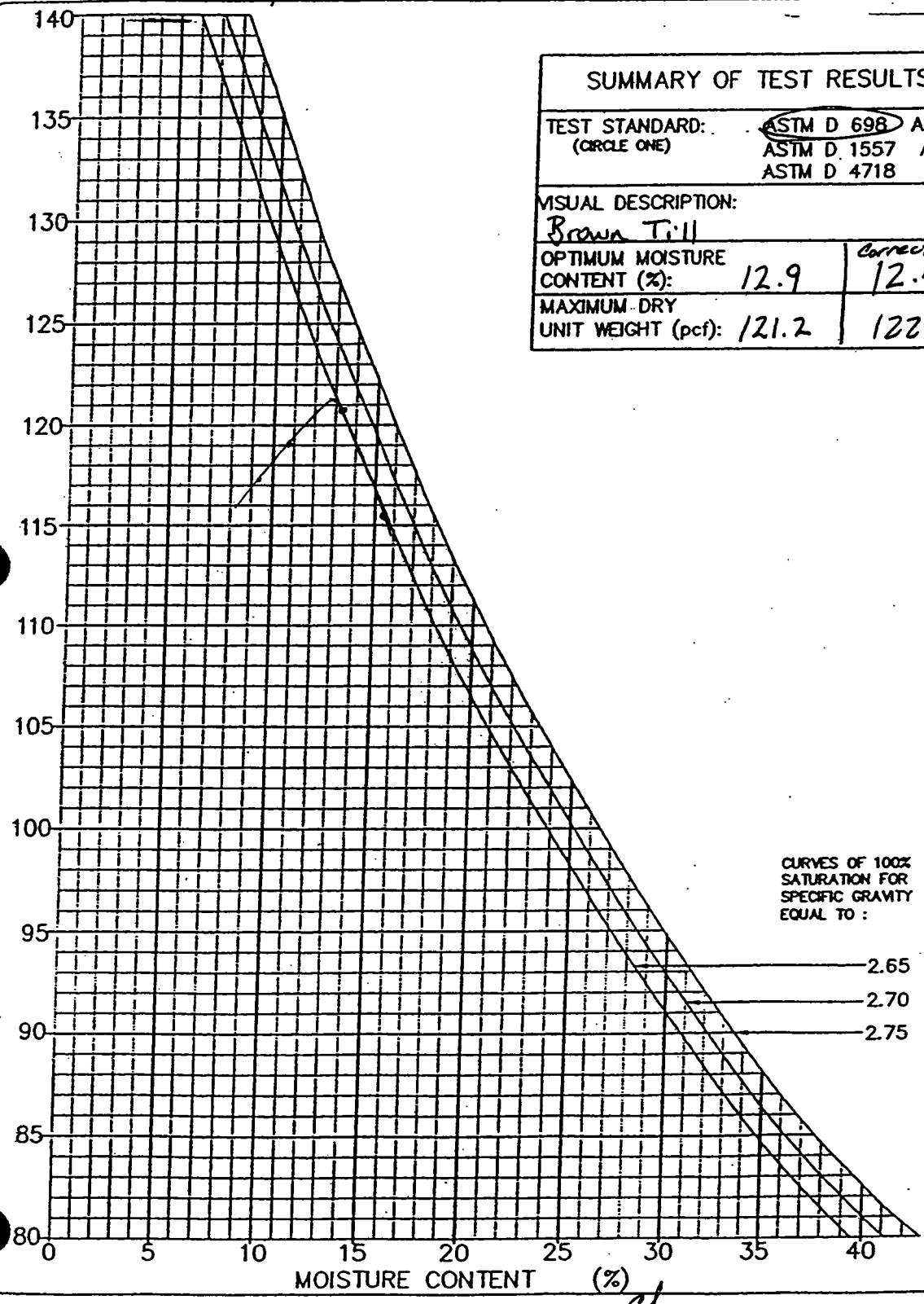
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 23 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE SAMPLE NO. LP-02-15

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	12.9	Corrected 12.4	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	121.2	122.7	CA



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 691341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 23 day July month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-16

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DLE

			1009. 13.67	13.29	13.41	13.71	13.79
	WATER ADDED	(ml)	250 mL	2%	4%	6%	8%
A	WT. OF SOIL & MOLD	(grams)	6200.7	6028.3	6082.8	6218.9	6255.1
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1996.2	~~1821.1~~ 1823.8	1878.3	2014.4	2050.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.8	~~120.2~~ 120.4	124.0	133.0	135.3
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.0	113.2	114.0	119.6	119.2

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: DLE

	TARE NO.		603	# 94	# 636	# 95	103
F	WT. OF TARE	(grams)	8.2	8.1	8.2	8.1	8.3
G	WT. OF WET SOIL & TARE	(grams)	387.2	362.3	514.5	455.8	362.3
H	WT. OF DRY SOIL & TARE	(grams)	336.0	341.2	474.0	411.0	320.0
I	WT. OF WATER = G − H	(grams)	51.2	21.1	40.5	44.8	42.3
J	WT. DRY SOIL = H − F	(grams)	327.8	333.1	465.8	402.9	311.7
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.6	6.3	8.7	11.1	13.6

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 23 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-16

STD

Weight of Total Sample	=	38076.0
Weight of Oversize Fraction	=	1676.2
Weight of Finer Fraction (-3/8)	=	~~4.4~~ 36399.8
Percentage of Oversize Fraction	= (P_C)	~~95.6~~ 4.4
Percentage of Finer Fraction (-3/8)	= (P_F)	95.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content -3/8, as decimal	=	0.126
(W_C) =	Water Content +3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 12.1\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 122.9$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

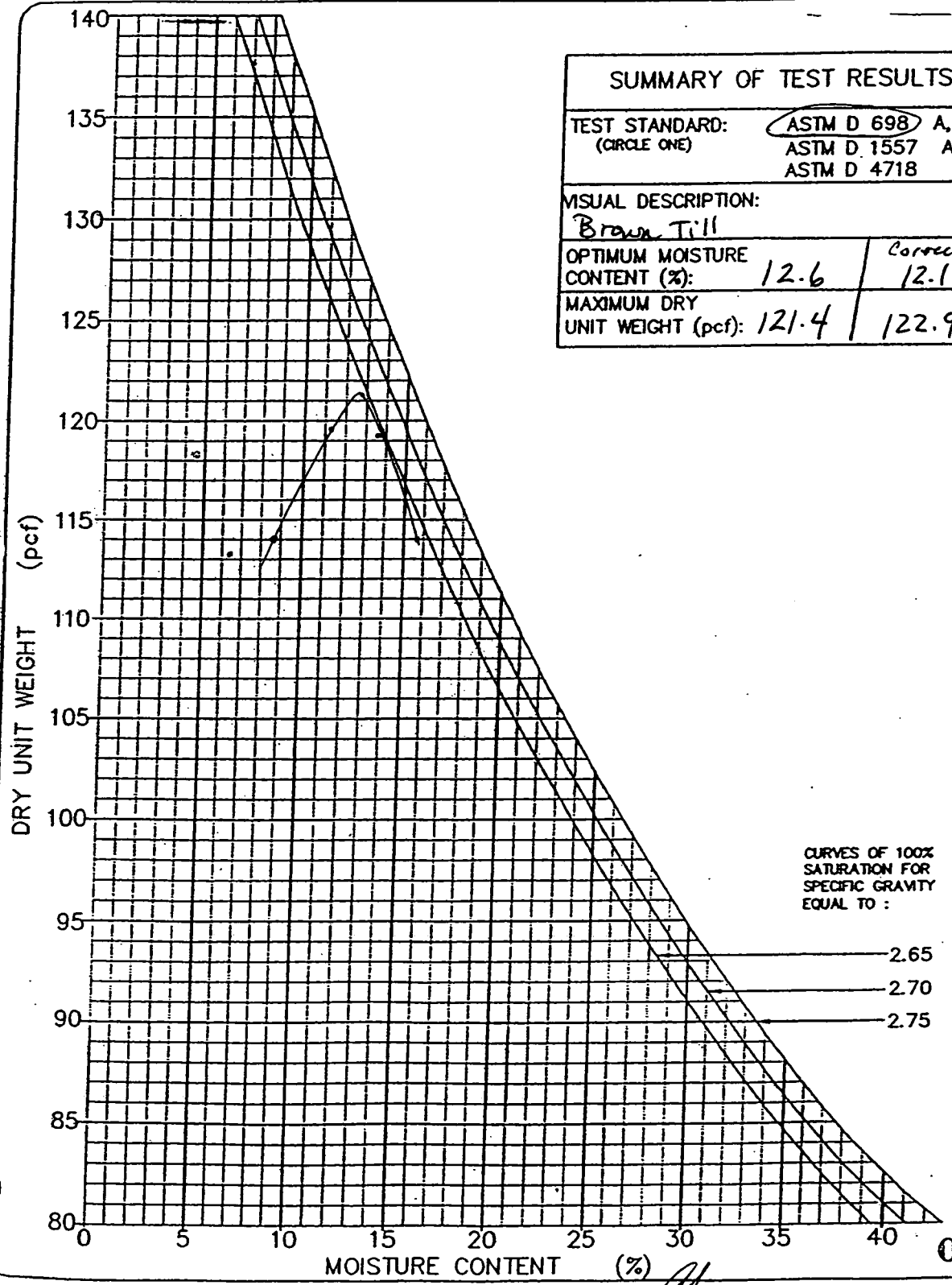
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase III DATE: 23 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-3 SAMPLE NO.: LP02-16

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.6	Corrected 12.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	121.4	122.9	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 23 day July month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LP01-16

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 13.74	4% 13.99	6% 14.0	8% 13.50	
	WATER ADDED	(ml)	50 mL	100 mL	150 mL	0 mL	
A	WT. OF SOIL & MOLD	(grams)	6232.5	6345.9	6350.4	6123.6	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2028.0	2141.4	2145.9	1919.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.8	141.3	141.6	126.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	126.1	130.0	126.8	121.5	

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: KS

	TARE NO.		605	49	615	65	
F	WT. OF TARE	(grams)	8.3	8.2	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	293.0	279.4	276.0	331.8	
H	WT. OF DRY SOIL & TARE	(grams)	276.5	257.7	248.0	318.6	5368
I	WT. OF WATER = G − H	(grams)	16.5	21.7	28.0	13.2	
J	WT. DRY SOIL = H − F	(grams)	268.2	249.5	239.8	310.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.2	8.7	11.7	4.3	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 23 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-16 MOD

Weight of Total Sample	=	38076.0
Weight of Oversize Fraction	=	1676.2
Weight of Finer Fraction (- 3/8)	=	36399.8
Percentage of Oversize Fraction	= (P_C)	4.4
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.095
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	131.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 9.1\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 132.4$ pcf

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000665

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

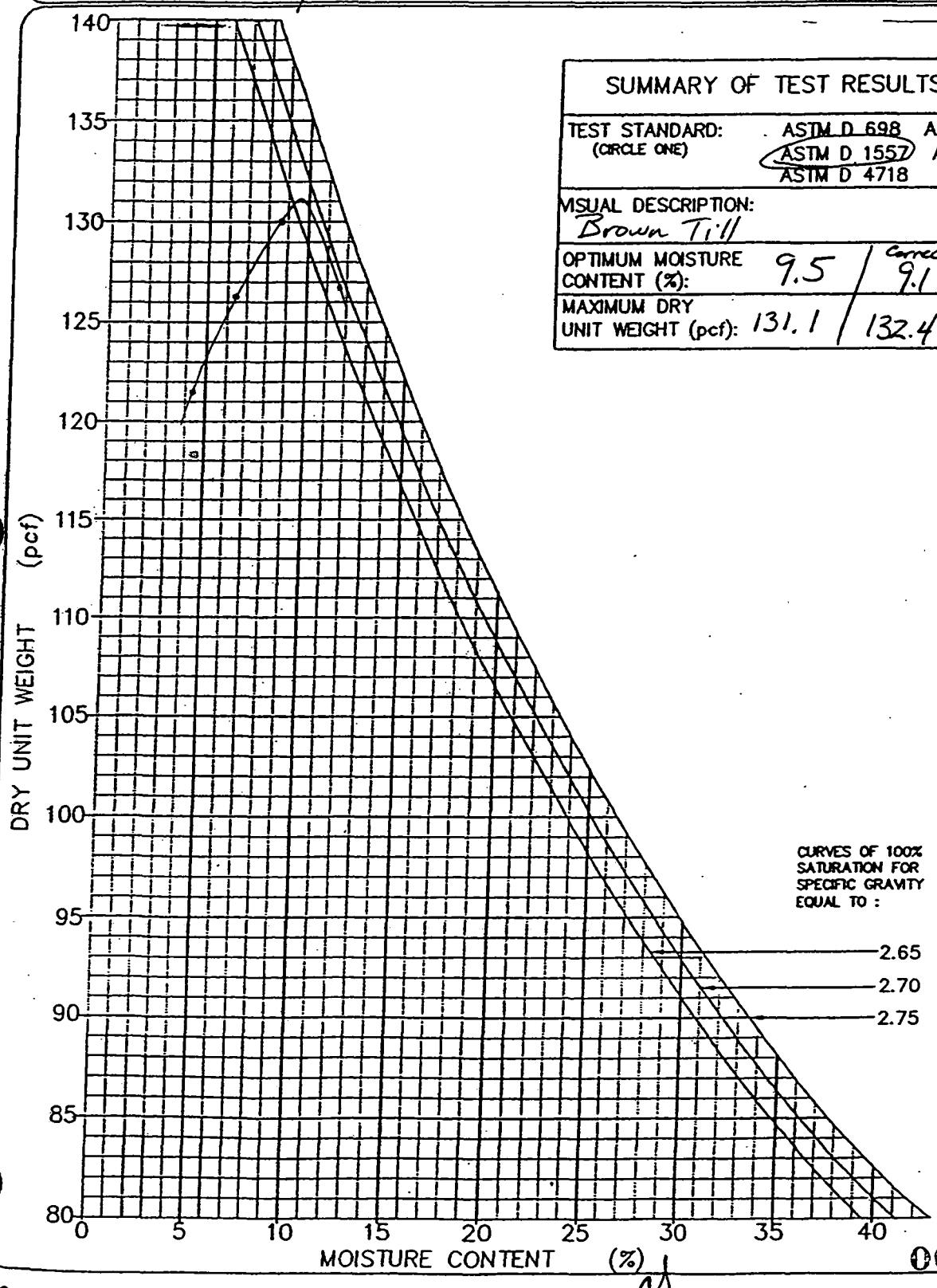
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 23 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-3 SAMPLE NO.: LP02-16

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.5	Corrected 9.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	131.1	132.4	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 23 day July month 2002 year

SAMPLE NO.: LP02-17

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.60	6% 13.84	8% 13.79	2% 13.35	
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6169.0	6277.8	6255.1	6055.6	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1964.5	2073.3	2050.6	1851.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	136.8	135.3	122.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.2	~~122.8~~ 122.1	119.4	117.7	

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: KS

	TARE NO.		230	679	630	12	
F	WT. OF TARE	(grams)	8.4	8.2	8.1	8.3	
G	WT. OF WET SOIL & TARE	(grams)	388.1	331.2	371.7	314.4	
H	WT. OF DRY SOIL & TARE	(grams)	354.6	296.3	329.0	293.1	
I	WT. OF WATER = G - H	(grams)	33.5	34.9	42.7	21.3	
J	WT. DRY SOIL = H - F	(grams)	346.2	288.1	320.9	284.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.7	12.1	13.3	7.5	

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO **PROJECT NO.** GQ1341 **TASK NO.** 04.1

DESCRIPTION: Phase IV **DATE:** 23 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-17

Weight of Total Sample	=	24587.7
Weight of Oversize Fraction	=	795.1
Weight of Finer Fraction (- 3/8)	=	23792.6
Percentage of Oversize Fraction	= (P_C)	3.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.120
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	122.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 11.7\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 123.5\ pcf$$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

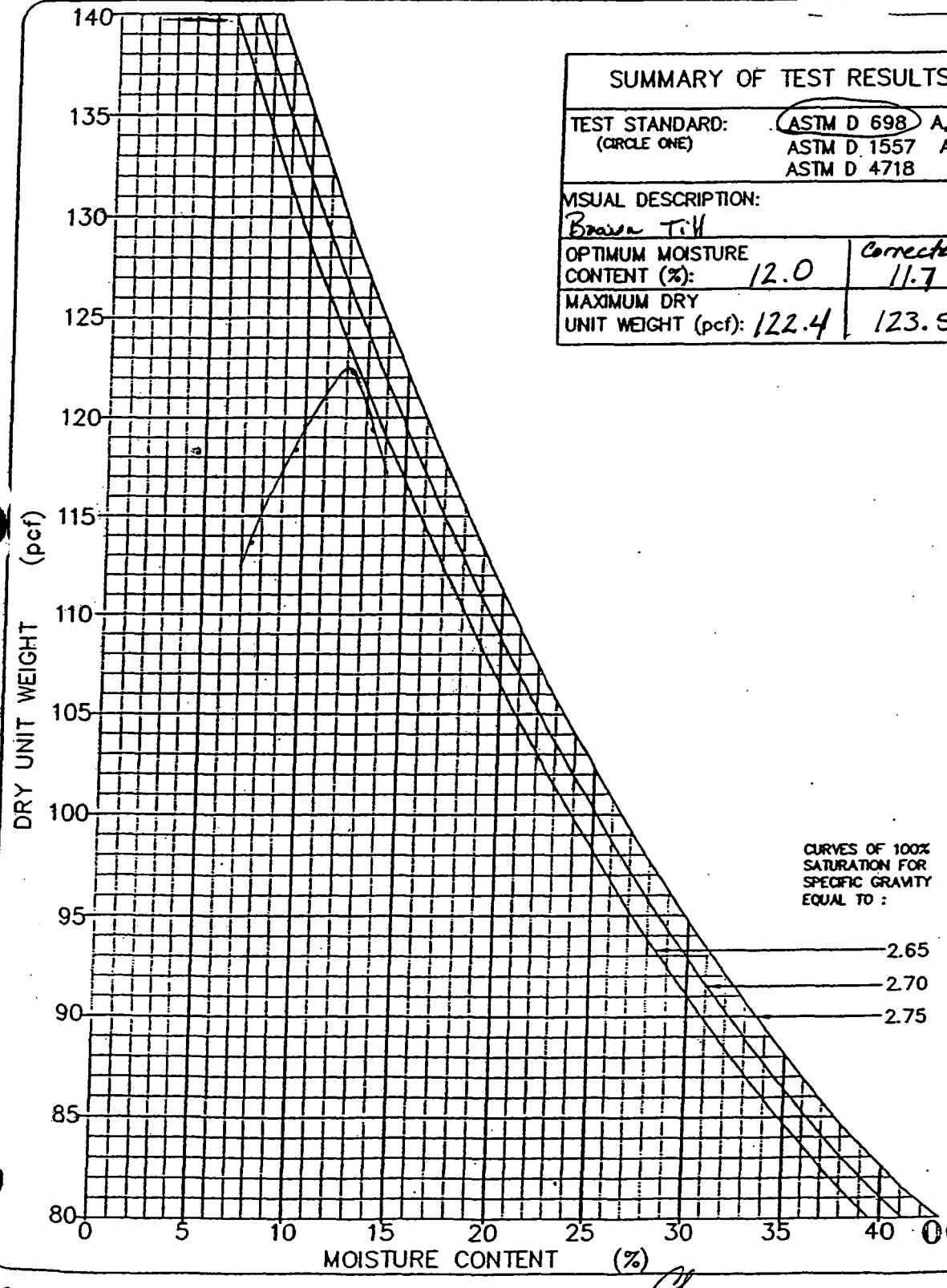
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GO1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 23 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE Ø2-3 SAMPLE NO.: LPØ2-17

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 12.0	Corrected 11.7	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): 122.4	123.5	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 2 day Aug month ~~2002~~ year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LA02-19

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: [illegible]

			13.20	13.32	13.61	13.68	~~13.55~~
	WATER ADDED	(ml)	4%	6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)	5987.5	6042.0	6173.5	6205.2	6146.3
B	WT. OF MOLD	(grams)	4205.5	4205.5	4205.5	4205.5	4205.5
C	WT. OF SOIL = A − B	(grams)	1783.0	1837.5	1969.0	2000.7	1941.8
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.7	121.3	130.0	132.0	128.2
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	108.2	110.1	115.0	114.4	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: [illegible]

	TARE NO.		#14	636	604	#18	#605
F	WT. OF TARE	(grams)	8.2	8.3	8.3	8.3	8.3
G	WT. OF WET SOIL & TARE	(grams)	352.0	184.4	239.3	~~253.3~~ 253.7	321.5
H	WT. OF DRY SOIL & TARE	(grams)	324.1	168.2	212.7	220.9	275.4
I	WT. OF WATER = G − H	(grams)	27.9	16.2	26.6	32.8	46.1
J	WT. DRY SOIL = H − F	(grams)	315.9	159.9	240.4	212.6	267.1
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.8	10.1	13.0	15.4	17.3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. C2134 TASK NO. 041

DESCRIPTION: Cta Phase IV DATE: 2 day Aug month 2002 year

MATERIAL TYPE: Clay Liner 4002-19 STD

Weight of Total Sample	=	40005.3
Weight of Oversize Fraction	=	929.4
Weight of Finer Fraction (-3/8)	=	39075.9
Percentage of Oversize Fraction	= (P_C)	2.3
Percentage of Finer Fraction (-3/8)	= (P_F)	97.7
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.141
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	116.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 13.8\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 117.3$ pcf

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FLUOR FERNALD

5368

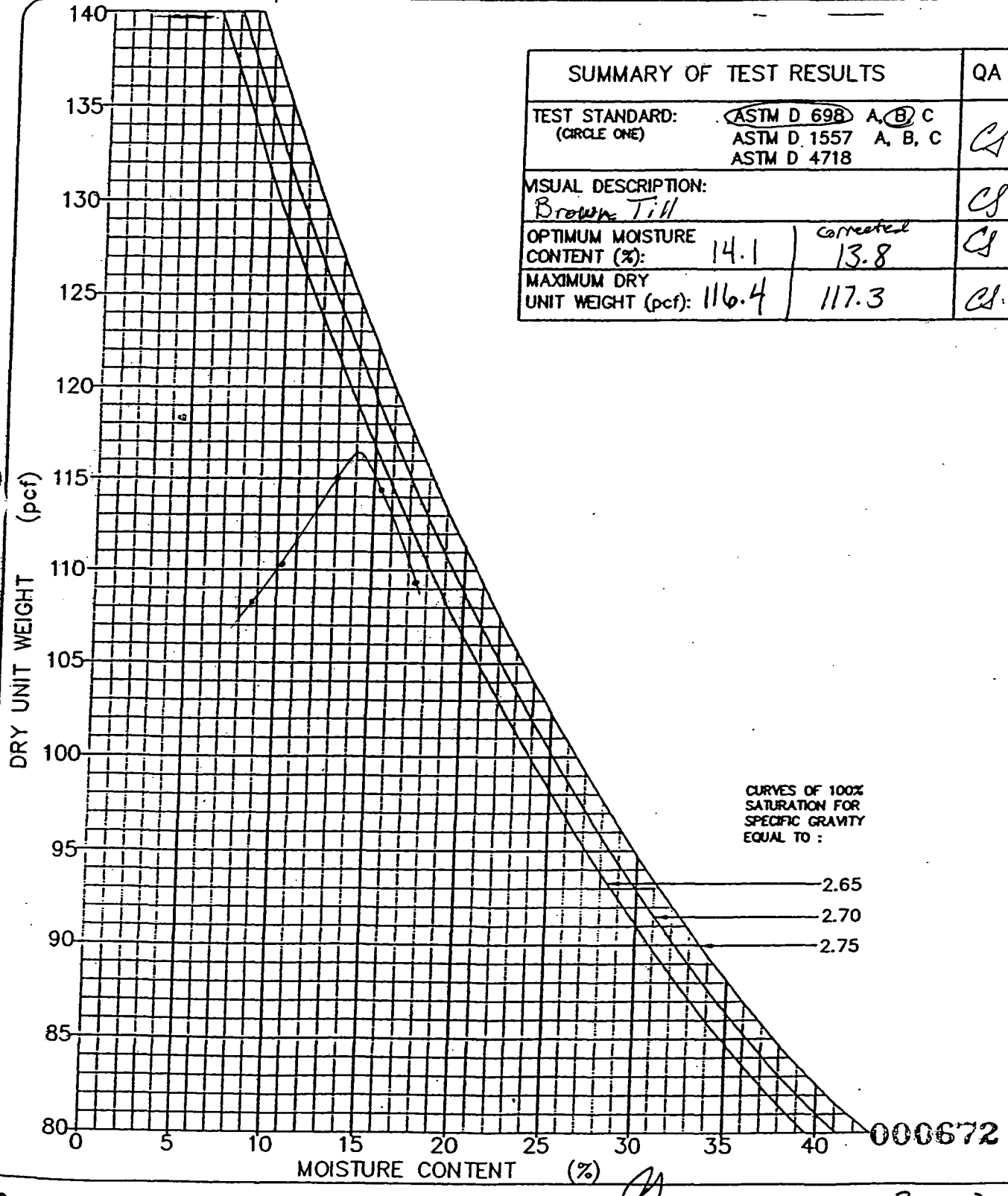
MOISTURE–DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Fluor Fernald DATE: 2 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LP02-19



SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	14.1	Corrected 13.8	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	116.4	117.3	CS

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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 64.1

DESCRIPTION: Phase IV

DATE: 26 day July month 2002 year

MATERIAL TYPE: Low Plan Clay MATERIAL SOURCE: Stockpile 02-3 SAMPLE NO.: LP02-19

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: JW

			13.13 omit	13.58	13.91	13.90	13.8
	WATER ADDED	(ml)	2%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	5955.8	6159.9	6309.5	6305.6	6259.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1751.3	1955.4	2105.1	2100.5	2055.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	115.9	129.1	138.9	138.6	135.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.0	120.7	126.2	124.4	~~128.7~~ 119.6

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: DLE

			STD POINT RUN omit				
	TARE NO.		#608	# 607	# 97	# 63	# 606
F	WT. OF TARE	(grams)	8.2	8.28	8.20	8.17	8.16
G	WT. OF WET SOIL & TARE	(grams)	476.0	264.15	253.55	205.15	189.04
H	WT. OF DRY SOIL & TARE	(grams)	451.9	247.4	231.1	185.0	167.6
I	WT. OF WATER = G − H	(grams)	24.1	16.75	22.45	20.15	~~18.56~~ 21.4
J	WT. DRY SOIL = H − F	(grams)	443.7	239.12	222.9	176.83	159.44
K	MOISTURE CONTENT = (I/J) X 100	(%)	5.4	7.00	10.1	11.4	~~5.4~~ 13.4
			1.07	1.101	1.114	1.054	

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SHEET NO. 1 OF 4

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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 661341 TASK NO.: 4.1

DESCRIPTION: PHASE IV

DATE: 30 day JULY month 02 year

MATERIAL TYPE: LOW PLASTIC CLAY MATERIAL SOURCE: STOCKPILE 02-3 SAMPLE NO.: LP02-19

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: DLE

	WATER ADDED	(ml)	13.49 2%				
A	WT. OF SOIL & MOLD	(grams)	6119.1				
B	WT. OF MOLD	(grams)	4204.5				
C	WT. OF SOIL = A − B	(grams)	1914.6				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.4				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	120.2				

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: DLE/RS

	TARE NO.		# 107				
F	WT. OF TARE	(grams)	7.97				
G	WT. OF WET SOIL & TARE	(grams)	236.29				
H	WT. OF DRY SOIL & TARE	(grams)	225.20				
I	WT. OF WATER = G − H	(grams)	11.1				
J	WT. DRY SOIL = H − F	(grams)	217.2				
K	MOISTURE CONTENT = (I/J) X 100	(%)	5.1				

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 041

DESCRIPTION: Phase ~~IV~~ DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-19 Mod

Weight of Total Sample	=	40005.3
Weight of Oversize Fraction	=	929.4
Weight of Finer Fraction (-3/8)	=	39075.9
Percentage of Oversize Fraction	= (P_C)	2.3
Percentage of Finer Fraction (-3/8)	= (P_F)	97.7
Specific Gravity (Assumed)	= (G_M)	62.4

(W_F)	=	Water Content -3/8, as decimal	=	0.106
(W_C)	=	Water Content +3/8, as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	125.6
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = ~~9.3%~~ 10.4%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = ~~130.3 pcf~~ 126.4 pcf

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MOISTURE-DENSITY RELATIONSHIP

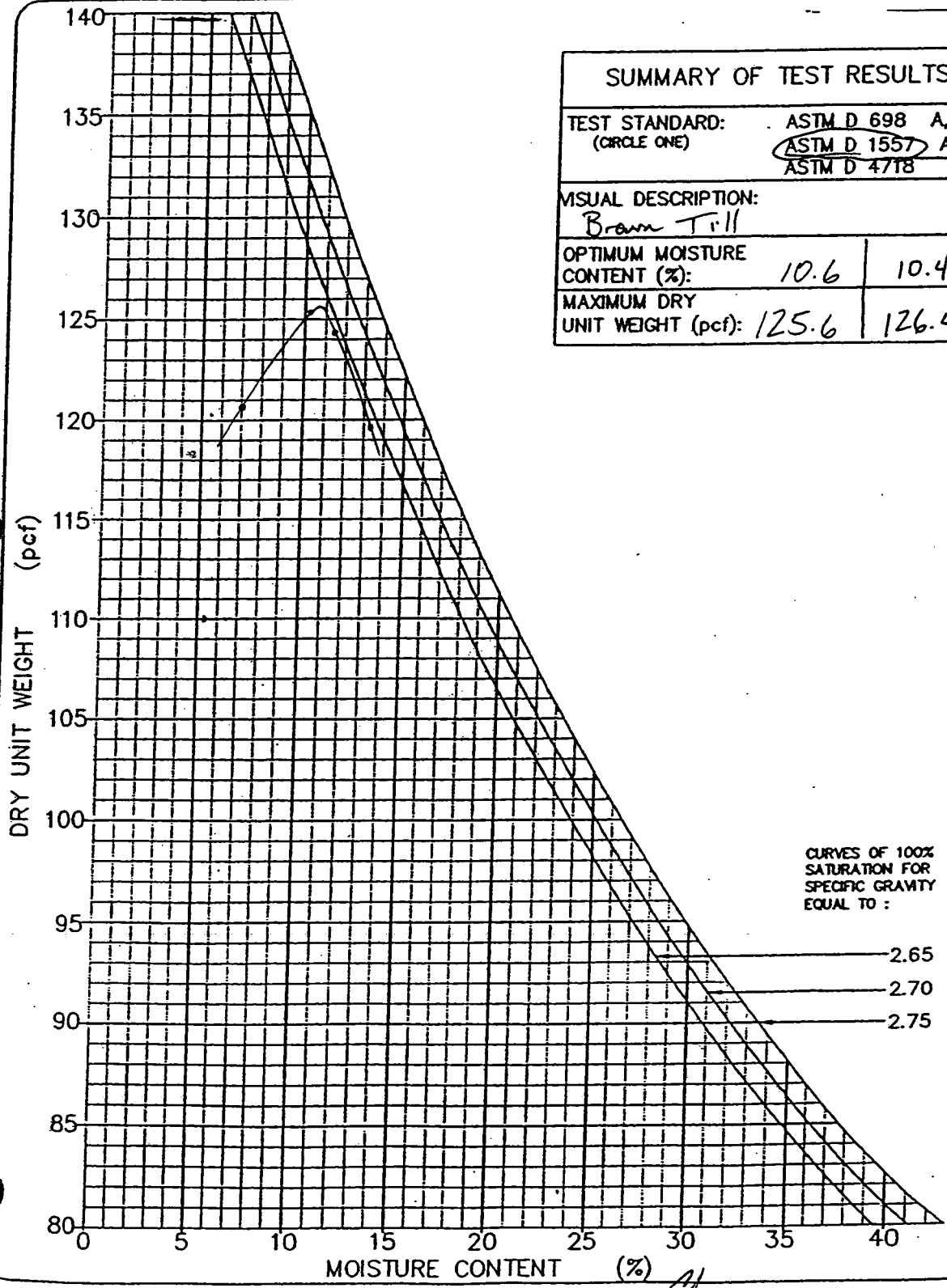
5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 641

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-4 SAMPLE NO.: LP02-19



SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	10.6	10.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	125.6	126.4	CJ

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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: PHASE IV

MATERIAL TYPE: Clay Liner

PROJECT NO. 69134 TASK NO.: 04.1

DATE: 26 day July month 02 year

SAMPLE NO.: LP02-21

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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.

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COMPACTION OF SOIL

QA ID: JW

			13.62	13.29	13.43	13.59	
	WATER ADDED	(ml)	12%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6178.0	6028.3	6091.8	6164.4	6218.9
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1973.5	1823.8	1887.3	1959.9	2014.4
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.3	120.4	124.6	129.3	133.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.2	111.9	113.1	115.9	117.3

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.		#679	#52	#601	#616	#97
F	WT. OF TARE	(grams)	8.1	8.1	8.2	8.2	8.2
G	WT. OF WET SOIL & TARE	(grams)	256.80	396.8	461.5	505.2	479.8
H	WT. OF DRY SOIL & TARE	(grams)	222.25	369.4	419.9	453.5	424.2
I	WT. OF WATER = G − H	(grams)	34.5	27.4	~~31.6~~ 41.6	51.7	55.6
J	WT. DRY SOIL = H − F	(grams)	214.2	~~7.6~~ 361.3	~~411.7~~ 411.7	445.3	416.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	16.1	7.6	~~7.7~~ 10.1	11.6	13.4

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 041

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-21 STD

Weight of Total Sample	=	21065.0
Weight of Oversize Fraction	=	1269.5
Weight of Finer Fraction (- 3/8)	=	19795.5
Percentage of Oversize Fraction	= (P_C)	6.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.131
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	118.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 12.4\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 120.2$ pcf

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FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

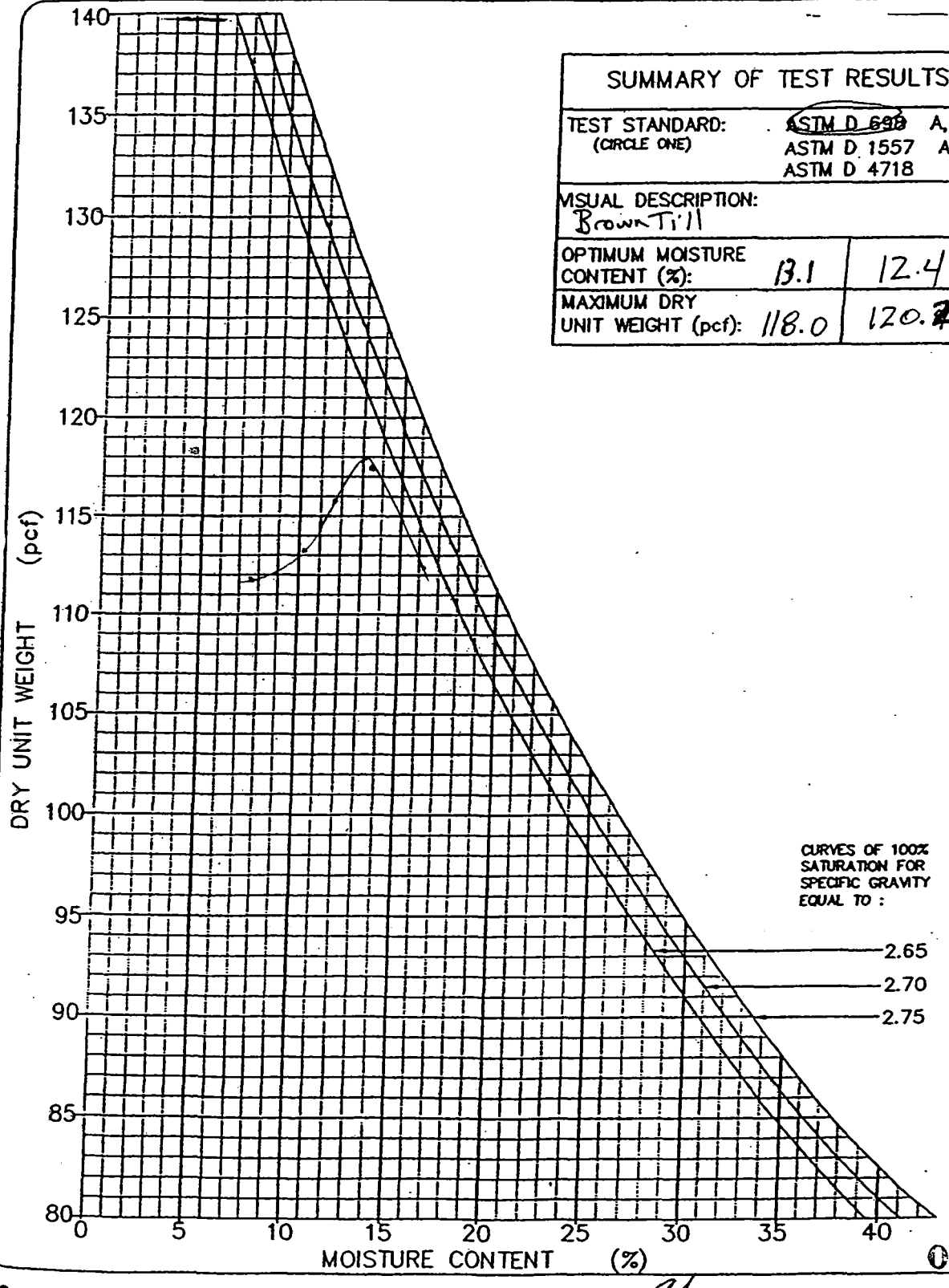
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 01-3 SAMPLE NO.: LP02-21

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.1	12.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	118.0	120.7	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 691341 TASK NO.: 04.1

DESCRIPTION: PHASE IV

DATE: 30 day JULY month 02 year

MATERIAL TYPE: LOW PERM CLAY

SAMPLE NO.: LP02-22

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			13.5	13.57	13.73	13.63	QA ID: JW 13.29
	WATER ADDED	(ml)	4%	6%	8%	10%	6%
A	WT. OF SOIL & MOLD	(grams)	6123.6	6155.3	6227.9	6182.6	6209.8
B	WT. OF MOLD	(grams)	4204.5	4204.5 OMIT	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1919.1	1950.9	2023.4	1978.1	2005.3
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.7	128.8	133.5	130.6	132.3
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.4	114.4	117.1	111.9	118.0

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.		#12	#65	#63	#97	#97
F	WT. OF TARE	(grams)	8.3	8.4	8.2	8.2	8.2
G	WT. OF WET SOIL & TARE	(grams)	291.3	229.98	207.1	269.0	281.7
H	WT. OF DRY SOIL & TARE	(grams)	263.7	205.21	182.7	231.9	252.2
I	WT. OF WATER = G - H	(grams)	27.6	24.8	24.4	37.1	29.5
J	WT. DRY SOIL = H - F	(grams)	255.4	197.0	174.5	223.7	244.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.8	12.6	14.0	~~16.7~~ 16.6	12.1

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase II DATE: 2 day Aug month 2002 year

MATERIAL TYPE: Clay Liner

Weight of Total Sample	=	46817.5
Weight of Oversize Fraction	=	2021.4
Weight of Finer Fraction (- 3/8)	=	44796.1
Percentage of Oversize Fraction	= (P_C)	4.3
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.7
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.130
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 12.5\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C\delta_D = 120.6$ pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

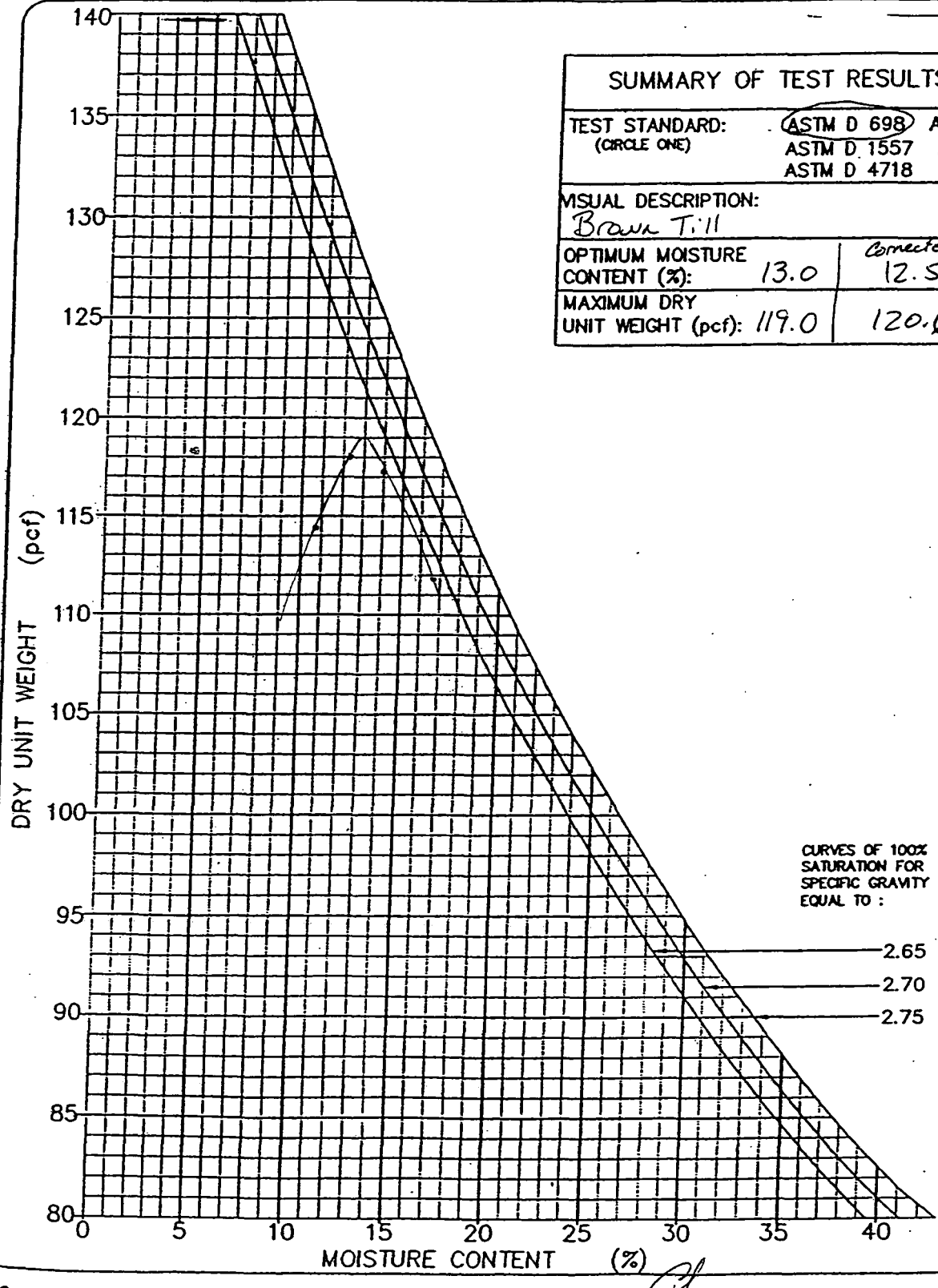
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G21341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 2 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-3 SAMPLE NO.: LP02-22

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.0	Corrected 12.5	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	119.0	120.6	CJ



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 30 day JULY month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-2 SAMPLE NO.: LP02-22

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: CHW

			14.06	13.89	13.78	13.88	13.61
	WATER ADDED	(ml)	4%	6%	8%	2%	0%
A	WT. OF SOIL & MOLD	(grams)	6377.6	6300.5	6250.6	6296.0	6173.5
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	2173.1	2096.0	2046.1	2091.5	1969.0
D	WET UNIT WT.(1) = C X 0.066	(pcf)	143.4	138.3	135.0	138.0	130.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	130.0	122.7	118.0	127.7	~~130.0~~ 122.5

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: CHD/DLE

	TARE NO.		# 230	#615	#608	# 14	#49
F	WT. OF TARE	(grams)	8.3	8.2	8.2	8.3	8.2
G	WT. OF WET SOIL & TARE	(grams)	237.0	546.9	185.3	470.9	402.4
H	WT. OF DRY SOIL & TARE	(grams)	215.6	486.1	163.0	436.2	379.8
I	WT. OF WATER = G - H	(grams)	21.4	60.8	22.3	34.7	22.6
J	WT. DRY SOIL = H - F	(grams)	207.3	477.9	154.8	427.9	371.6
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.3	12.7	14.4	8.1	6.1

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 04.1

DESCRIPTION: Phase II DATE: 2 day Aug month 2002 year

MATERIAL TYPE: Clay Liner 2P02-22 MOD

Weight of Total Sample	=	46817.5
Weight of Oversize Fraction	=	2021.4
Weight of Finer Fraction (- 3/8)	=	44796.1
Percentage of Oversize Fraction	= (P_C)	4.3
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.7
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.097
(W_C) =	Water Content + 3/8 , as decimal	=	~~0.097~~ 0.015
(δ_F) =	Dry Density of finer fraction	=	130.3
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 9.3$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 131.6$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

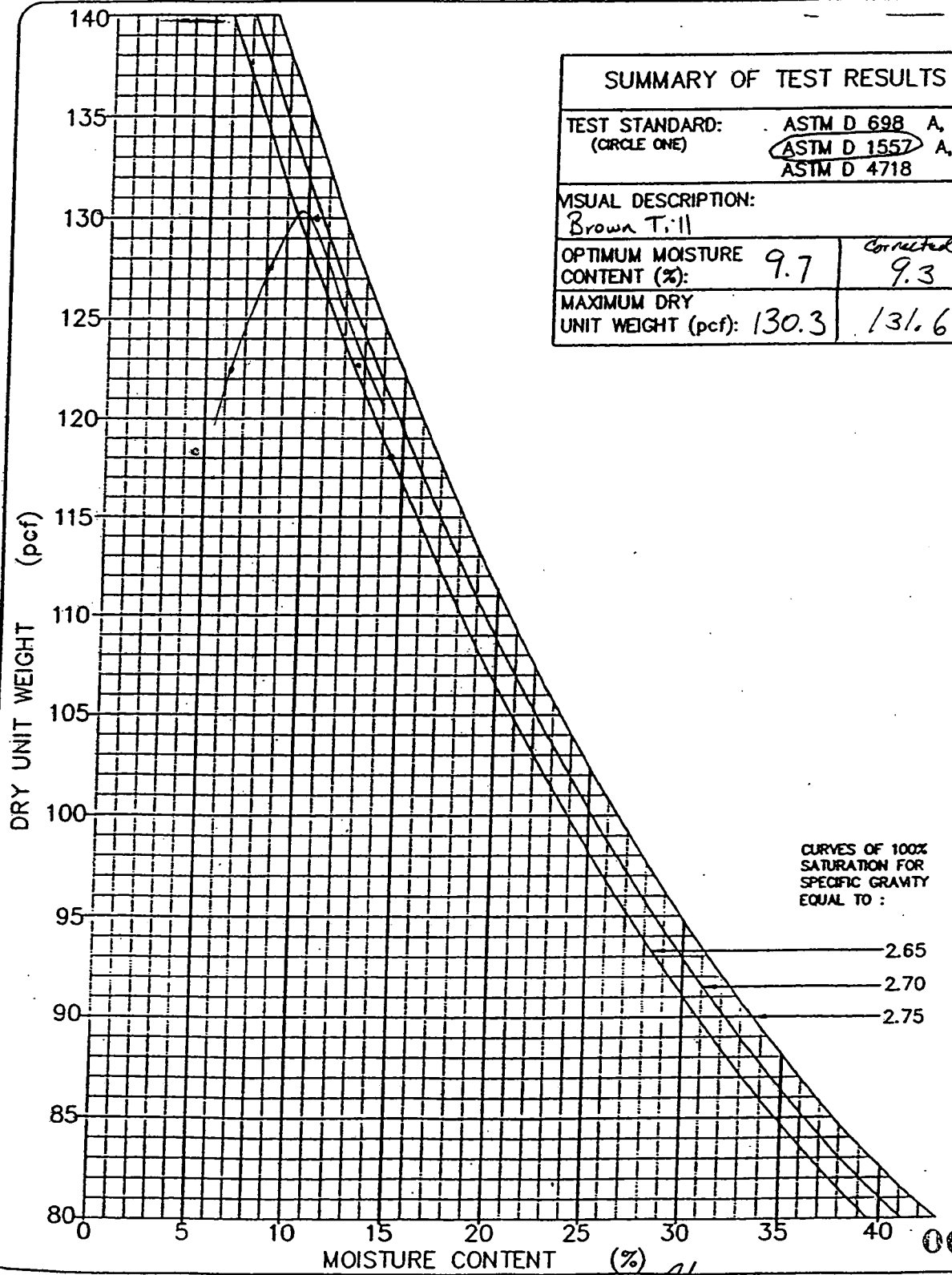
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GG1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 2 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-3 SAMPLE NO.: LP02-22

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, (B) C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.7	Corrected 9.3	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	130.3	131.6	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO. 69341 TASK NO.: 04.1

DATE: 28 day July month 2002 year

SAMPLE NO.: 4P02-23

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 1353	6% 1374	8% 1365	2% 1332	
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6137.2	6232.5	6191.6	6042.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1932.7	2028.0	1987.1	1837.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.6	133.8	131.2	121.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.5	117.4	112.5	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: KS

	TARE NO.		95	98	93	630	
F	WT. OF TARE	(grams)	8.0	8.2	8.2	8.1	
G	WT. OF WET SOIL & TARE	(grams)	355.0	389.5	339.5	340.7	
H	WT. OF DRY SOIL & TARE	(grams)	319.5	342.8	292.3	313.0	
I	WT. OF WATER = G − H	(grams)	35.5	46.7	~~284.1~~ 47.2	27.7	
J	WT. DRY SOIL = H − F	(grams)	311.5	334.6	284.1	304.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.4	14.0	16.6	9.1	

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 29 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-23

STD

Weight of Total Sample	=	46,779.7
Weight of Oversize Fraction	=	2095.4
Weight of Finer Fraction (- 3/8)	=	44684.3
Percentage of Oversize Fraction	= (P_C)	4.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.140
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	117.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 13.4\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 119.0$ pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

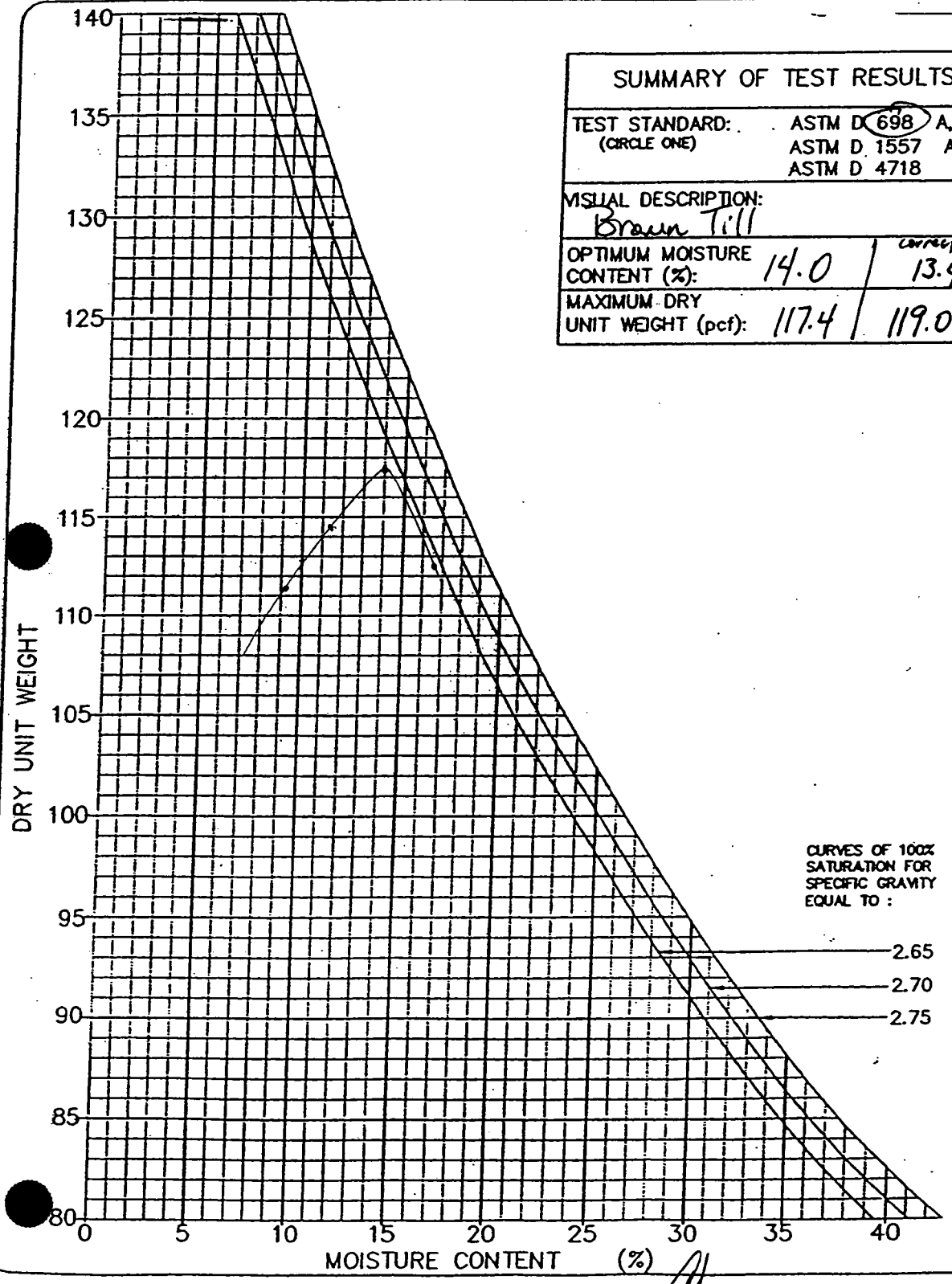
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ 1341 TASK NO.: 4.1

DESCRIPTION: PHASE IV DATE: 28 day JULY month 02 year

MATERIAL TYPE: Low Plasm Clay MATERIAL SOURCE: STOCKPILE 02-04 SAMPLE NO.: LA02-23

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		JW
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	14.0	corrected 13.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	117.4	119.0	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase IV

DATE: 28 day July month 2ØØ2 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Ø2-4 SAMPLE NO.: LPØ2-23

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 13.94	4% 13.99	6% 13.84	Ø% 13.72	
	WATER ADDED	(ml)	5ØmL	1ØØmL	15ØmL	ØmL	
A	WT. OF SOIL & MOLD	(grams)	6323.2	6345.9	6277.8	6223.4	
B	WT. OF MOLD	(grams)	42Ø4.5	42Ø4.5	42Ø4.5	42Ø4.5	
C	WT. OF SOIL = A − B	(grams)	2118.7	2141.4	2Ø73.3	2Ø18.9	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	139.8	141.3	136.8	133.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	128.0	127.1	120.2	124.3	

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: KS

	TARE NO.		6Ø5	1Ø7	6Ø2	18	
F	WT. OF TARE	(grams)	8.3	8.Ø	8.3	8.4	
G	WT. OF WET SOIL & TARE	(grams)	3Ø4.4	294.4	342.1	318.Ø	
H	WT. OF DRY SOIL & TARE	(grams)	279.5	265.5	301.6	297.2	
I	WT. OF WATER = G − H	(grams)	24.9	28.9	40.5	20.8	
J	WT. DRY SOIL = H − F	(grams)	271.2	257.5	293.3	288.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.2	11.2	13.8	7.2	

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FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 29 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-23 Mod

Weight of Total Sample	=	46,779.7
Weight of Oversize Fraction	=	2095.4
Weight of Finer Fraction (- 3/8)	=	44684.3
Percentage of Oversize Fraction	= (P_C)	4.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.102
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	129.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 9.8\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 130.6 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

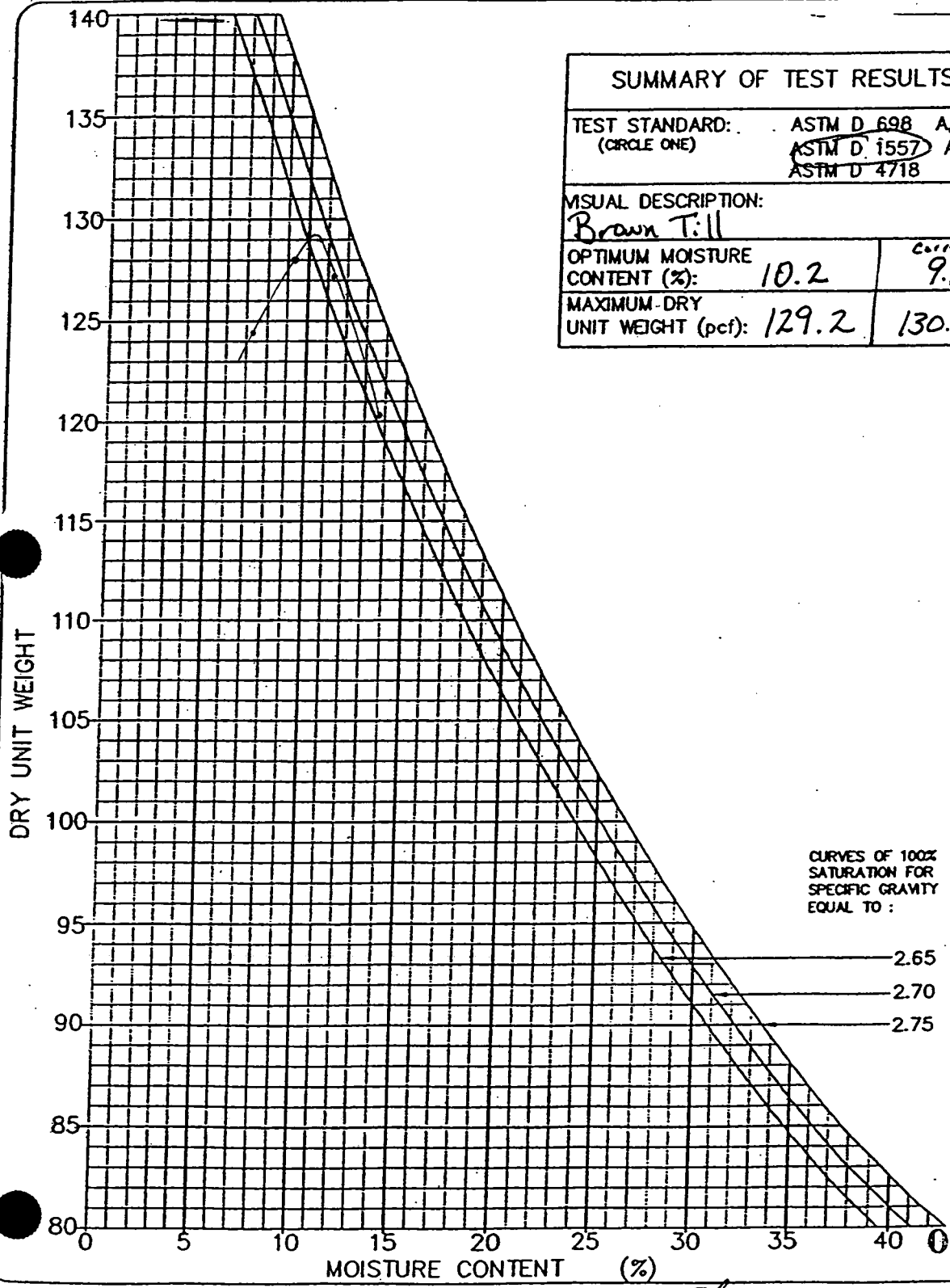
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 661341 TASK NO.: 4.1

DESCRIPTION: PHASE IV DATE: 28 day JULY month 02 year

MATERIAL TYPE: LOW PERM CLAY MATERIAL SOURCE: STOCKPILE 02-4 SAMPLE NO.: 4P02-23

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	10.2	corrected 9.8	CA
MAXIMUM-DRY UNIT WEIGHT (pcf):	129.2	130.6	CA



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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 6 day Aug month 2002 year

MATERIAL TYPE: Clay Liner

Weight of Total Sample	=	19064.9
Weight of Oversize Fraction	=	502.1
Weight of Finer Fraction (- 3/8)	=	18562.8
Percentage of Oversize Fraction	= (P_C)	2.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.148
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 14.4 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 116.6 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

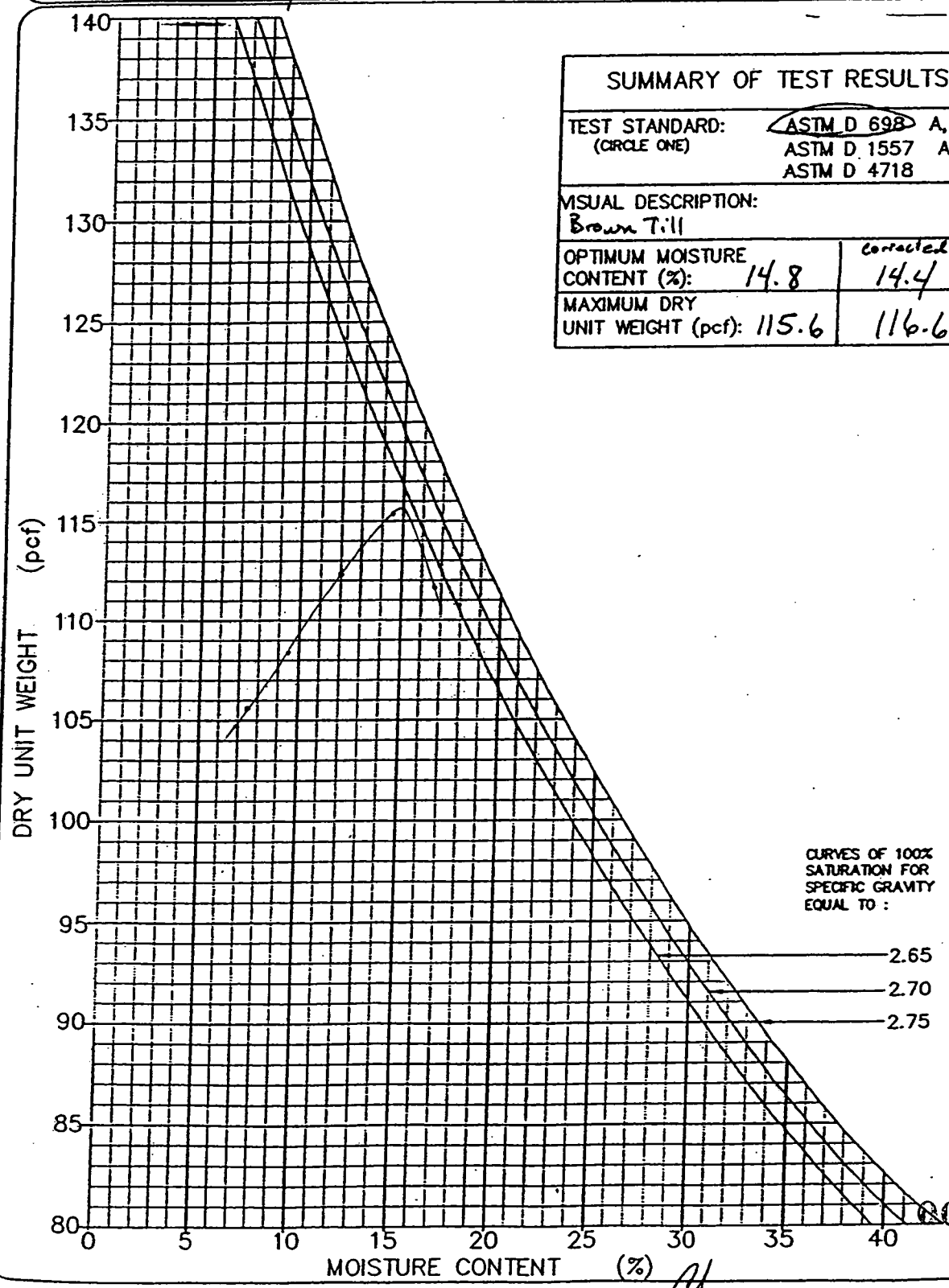
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-4 SAMPLE NO.: LP02-29

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 14.8	corrected 14.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): 115.6	116.6	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-4 SAMPLE NO.: LPØ2-25

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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/CHW

			13.25	13.51	13.66	13.66	
	WATER ADDED	(ml)	4%	6%	8%	10%	
A	WT. OF SOIL & MOLD	(grams)	6ØØ1.2	6128.1	6196.2	6196.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1805.7	1923.6	1991.7	1991.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	119.2	127.0	131.5	131.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.3	114.6	116.6	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/CHW

	TARE NO.		#97	#630	#93	#114	
F	WT. OF TARE	(grams)	8.2	8.1	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	5Ø9.9	299.6	275.9	246.2	
H	WT. OF DRY SOIL & TARE	(grams)	472.6	271.3	245.5	214.2	
I	WT. OF WATER = G − H	(grams)	37.3	28.3	30.3	32.0	
J	WT. DRY SOIL = H − F	(grams)	464.4	263.2	237.3	206.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.0	10.8	12.8	15.5	

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FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G2134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-25 STD

Weight of Total Sample	=	44384.7
Weight of Oversize Fraction	=	1715.6
Weight of Finer Fraction (-3/8)	=	42669.1
Percentage of Oversize Fraction	= (P_C)	3.9
Percentage of Finer Fraction (-3/8)	= (P_F)	96.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content -3/8, as decimal	=	0.139
(W_C) =	Water Content +3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	117.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 13.4\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 118.8\ pcf$$

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FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

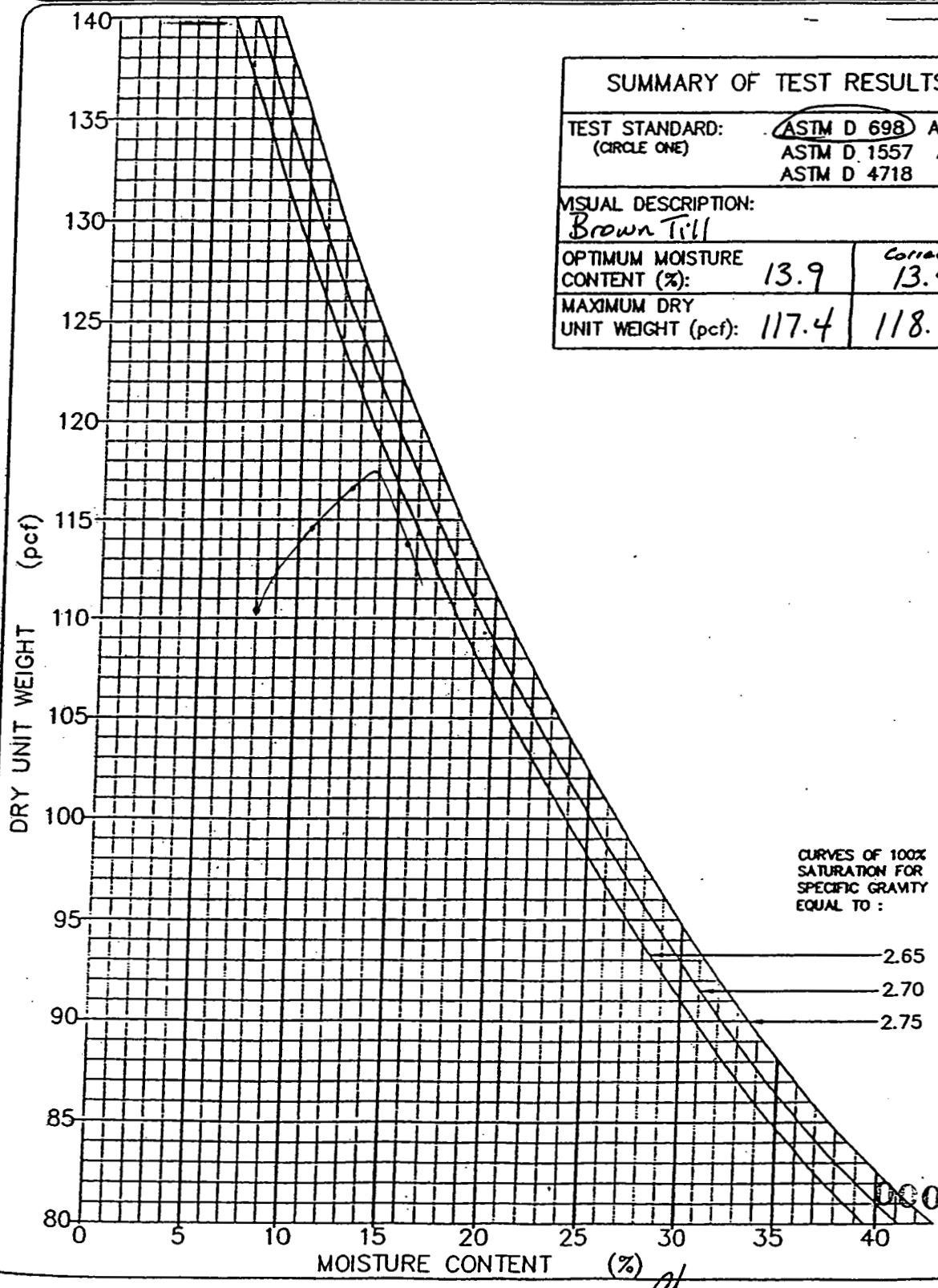
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile #2 - 4 SAMPLE NO.: LP#2-25

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.9	Corrected 13.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	117.4	118.8	CJ



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase IV

DATE: 3Ø day JULY month 2ØØ2 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Ø2-4 SAMPLE NO.: LRØ2-25

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL — QA ID: CHW

			~~[illegible]~~ 13.91	13.99	13.93	13.73	
	WATER ADDED	(ml)	4%	6%	8%	~~10%~~ 2%	
A	WT. OF SOIL & MOLD	(grams)	6309.6	6345.9	6319.Ø	6228.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2105.1	2141.4	2114.5	2023.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	138.9	141.3	139.6	133.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	128.4	127.8	124.7	125.6	

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: CHW

	TARE NO.		98	95	6Ø2	18	
F	WT. OF TARE	(grams)	8.2	8.1	8.2	8.4	
G	WT. OF WET SOIL & TARE	(grams)	486.6	511.9	456.8	433.1	
H	WT. OF DRY SOIL & TARE	(grams)	45Ø.4	463.5	409.2	4Ø7.8	
I	WT. OF WATER = G − H	(grams)	36.2	48.4	47.6	25.3	
J	WT. DRY SOIL = H − F	(grams)	442.2	455.4	401.0	399.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.2	10.6	11.9	6.3	

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FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner LP02-25 MOD

Weight of Total Sample	=	44384.7
Weight of Oversize Fraction	=	1715.6
Weight of Finer Fraction (-3/8)	=	42669.1
Percentage of Oversize Fraction	= (P_C)	3.9
Percentage of Finer Fraction (-3/8)	= (P_F)	96.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.095
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	129.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 9.2\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 130.8 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

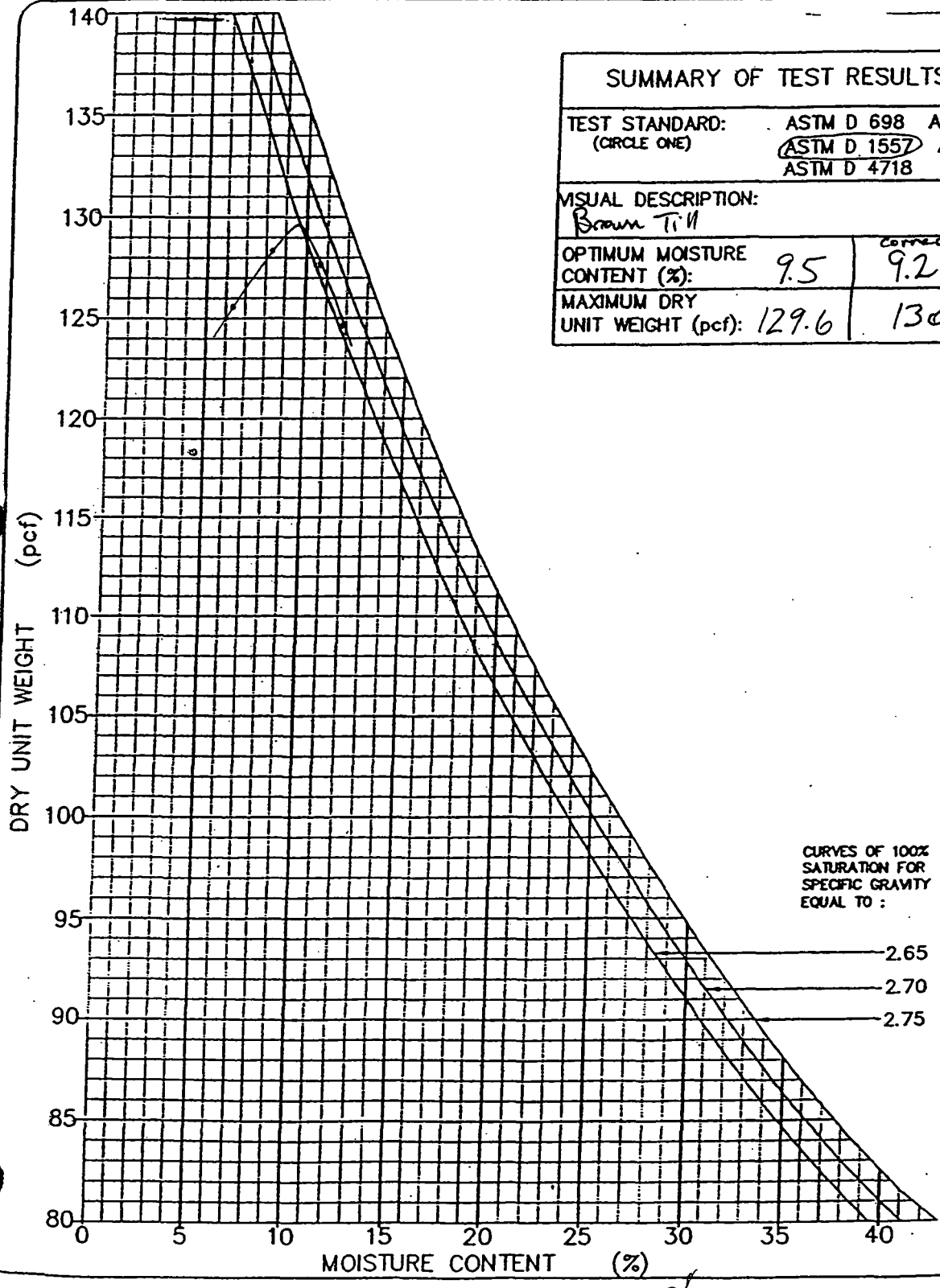
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04,1

DESCRIPTION: Phase II DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-4 SAMPLE NO.: LP02-25

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	9.5	corrected 9.2	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	129.6	130.8	CA



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay Stockpile Ø2-4

PROJECT NO.: 69134 TASK NO.: 04.1

DATE: 30 day JULY month 2002 year

SAMPLE NO.: ELPØ2-26

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: CHW

			13.30	13.63	13.77	13.76	13.66
	WATER ADDED	(ml)	4%	6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)	6032.9	6182.6	6246.1	6241.5	6196.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1828.4	1978.1	2041.6	2037.0	1991.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.7	130.6	134.7	134.4	131.4
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.2	118.0	120.3	117.9	113.5

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: RLB

	TARE NO.		#110	#91	#227	#48	#308
F	WT. OF TARE	(grams)	8.0	8.2	8.3	8.3	8.0
G	WT. OF WET SOIL & TARE	(grams)	474.8	551.8	470.0	549.5	536.5
H	WT. OF DRY SOIL & TARE	(grams)	441.9	499.6	420.6	482.9	464.5
I	WT. OF WATER = G - H	(grams)	32.9	52.2	49.4	66.6	72.0
J	WT. DRY SOIL = H - F	(grams)	433.9	491.4	412.3	474.6	456.5
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.6	10.6	12.0	14.0	15.8

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5368

GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

CHECKED BY: CB

SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay liner LP02-26 STD

Weight of Total Sample	=	21940.9
Weight of Oversize Fraction	=	630.1
Weight of Finer Fraction (- 3/8)	=	21310.8
Percentage of Oversize Fraction	= (P_C)	2.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.123
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.8
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 12.0\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 121.8\ pcf$$

000701

2 of 3

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

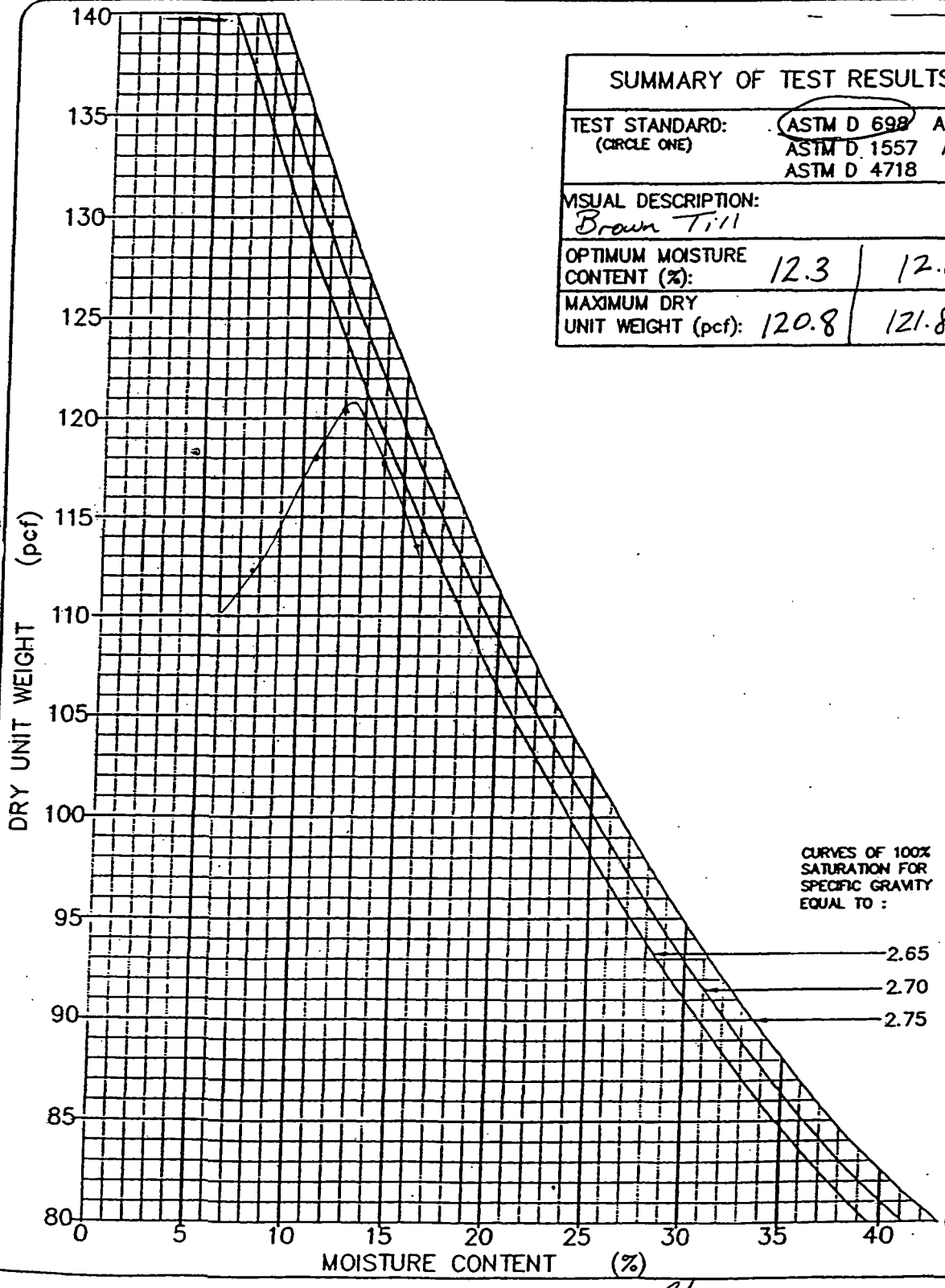
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 31 day July month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-4 SAMPLE NO.: LP02-26

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	12.3	12.0	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	120.8	121.8	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: PHASE IV

MATERIAL TYPE: LOW PERM CLAY

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 1 day AUG month 02 year

SAMPLE NO.: LP02-27

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS/JW 13.54

			13.73	13.10	13.05 19	13.32	
	WATER ADDED	(ml)	12%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6227.9	5942.2	5983.0	6042.0	6141.7
B	WT. OF MOLD	(grams)	4272.2	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1955.7	1737.7	1778.5	1837.5	1937.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.1	114.7	117.4	121.3	127.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.5	105.7	106.4	108.0	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: KS/JW

	TARE NO.		647	#12	#65	#103	#679
F	WT. OF TARE	(grams)	8.1	8.3	8.2	8.0	8.1
G	WT. OF WET SOIL & TARE	(grams)	343.1	361.3	423.6	372.8	326.3
H	WT. OF DRY SOIL & TARE	(grams)	295.0	333.6	384.9	332.8	285.1
I	WT. OF WATER = G - H	(grams)	48.1	27.7	38.7	40.0	41.2
J	WT. DRY SOIL = H - F	(grams)	286.9	325.3	376.7	324.8	277.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	16.8	8.5	10.3	12.3	14.9

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 6 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-27 STD

Weight of Total Sample	=	37887.1
Weight of Oversize Fraction	=	1827.7
Weight of Finer Fraction (- 3/8)	=	36059.4
Percentage of Oversize Fraction	= (P_C)	4.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.156
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	112.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_\omega = 14.9\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 114.1 \text{ pcf}$$

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000704

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

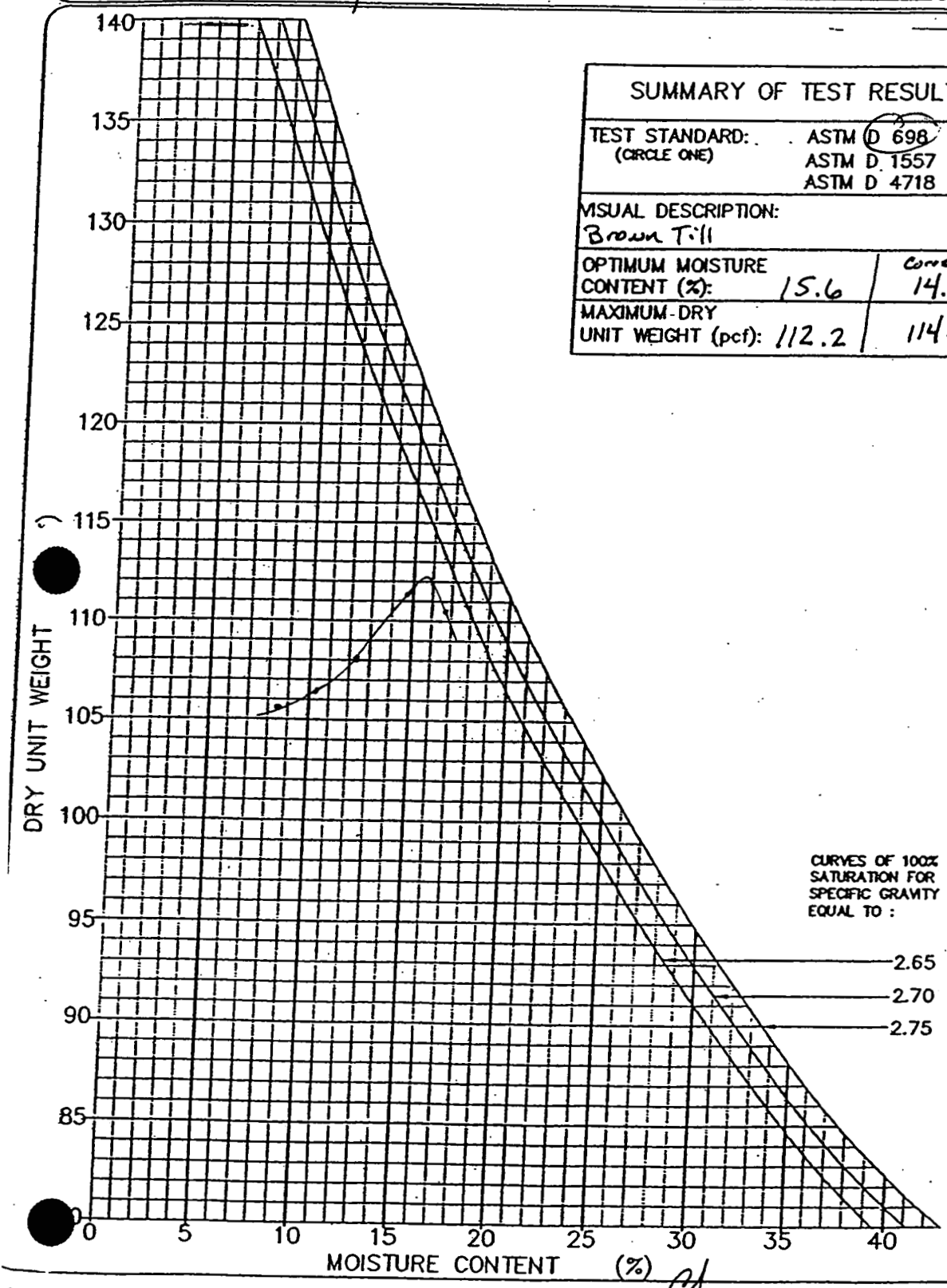
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE #2-4 SAMPLE NO.: LP02-27

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	15.6	Corrected 14.9	CJ
MAXIMUM-DRY UNIT WEIGHT (pcf):	112.2	114.1	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 4.1

DESCRIPTION: PHASE IV

DATE: 31 day JULY month 02 year

MATERIAL TYPE: LOW PERM CLAY MATERIAL SOURCE: STOCK PILE 02-4 SAMPLE NO.: LP02-27

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS/JW

			13.47	13.59	13.83	13.55	13.91
	WATER ADDED	(ml)	2%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6110.0	6164.4	6273.3	6282.4	6309.6
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4272.2
C	WT. OF SOIL = A − B	(grams)	1905.5	1959.9	2068.8	2077.9	2037.4
D	WET UNIT WT.(1) = C X 0.066	(pcf)	125.8	129.4	136.5	137.1	134.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.1	119.7	123.4	121.8	117.1

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: KS/JW

	TARE NO.		#93	#636	#114	#48	16
F	WT. OF TARE	(grams)	8.2	8.2	8.4	8.3	8.4
G	WT. OF WET SOIL & TARE	(grams)	454.2	347.0	351.6	366.8	330.4
H	WT. OF DRY SOIL & TARE	(grams)	427.0	321.5	318.8	326.4	288.7
I	WT. OF WATER = G − H	(grams)	27.2	25.5	32.8	40.1	41.7
J	WT. DRY SOIL = H − F	(grams)	418.8	313.3	310.4	318.1	280.3
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.5	8.1	10.6	12.6	14.9

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GeoSyntec Consultants

FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 6 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-27 mod

Weight of Total Sample	=	37887.1
Weight of Oversize Fraction	=	1827.7
Weight of Finer Fraction (- 3/8)	=	36059.4
Percentage of Oversize Fraction	= (P_C)	~~8.4~~ 4.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.113
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	124.1
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 10.8\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 125.7 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

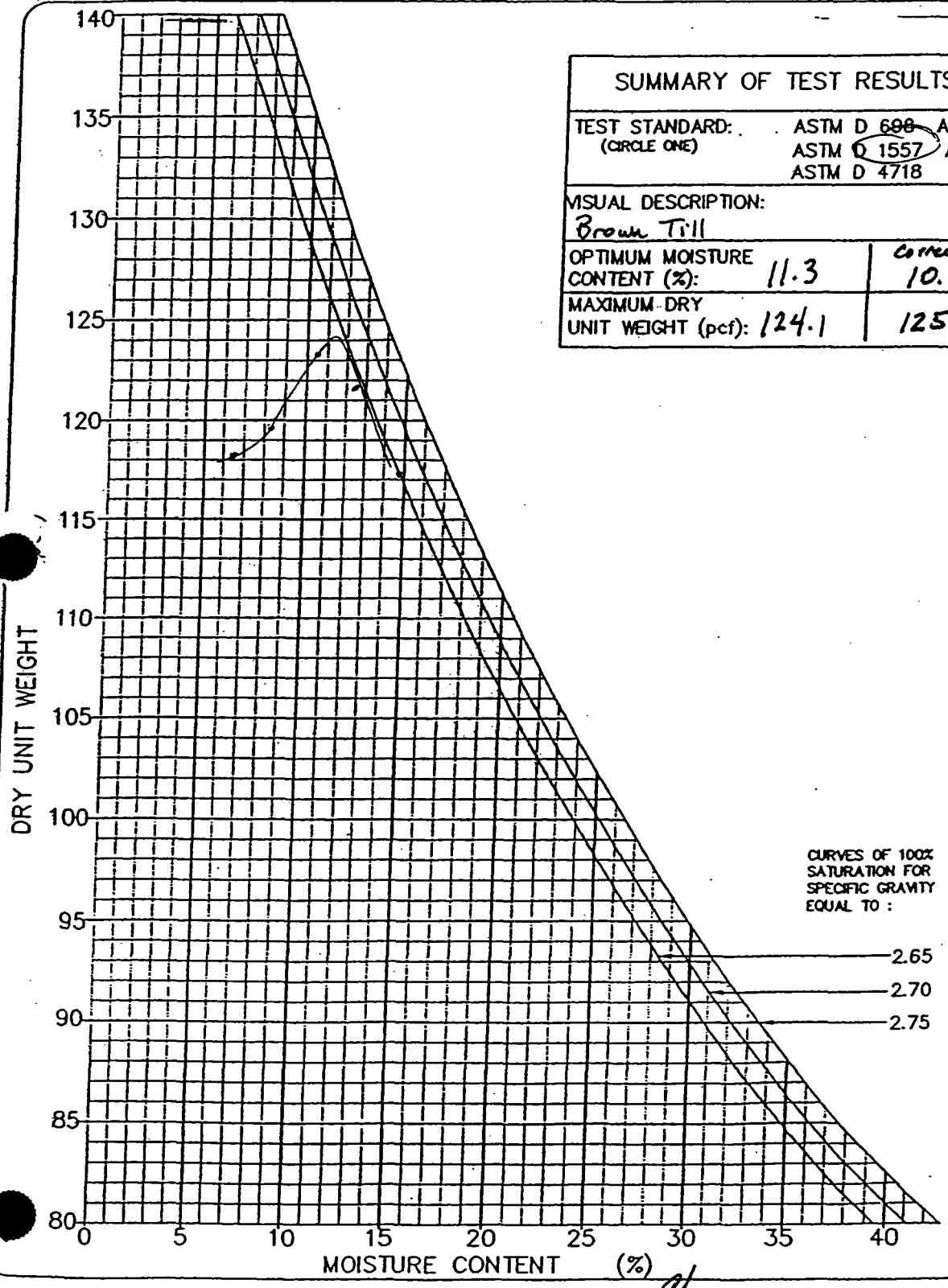
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: 1341 TASK NO.: 4.1

DESCRIPTION: PHASE IV DATE: 31 day JULY month 02 year

MATERIAL TYPE: LOW PLASTIC CLAY MATERIAL SOURCE: STOCKPILE 02-4 SAMPLE NO.: LP02-27

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 11.3	Corrected 10.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): 124.1	125.7	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: PHASE IE

MATERIAL TYPE: LOW PERM CLAY

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 1 day AUG month 02 year

SAMPLE NO.: LP02-28

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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 1355

	WATER ADDED	(ml)	13.58 12%	13.07 4%	13.18 6%	13.33 8%	10%
A	WT. OF SOIL & MOLD	(grams)	6159.9	5928.6	5978.4	6046.5	6146.3
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1955.4	1724.1	1773.9	1842.0	1941.8
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.1	113.8	117.1	121.6	128.2
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.8	105.6	106.5	109.5	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: JW

	TARE NO.		#310	#110	#602	#227	#308
F	WT. OF TARE	(grams)	8.0	8.0	8.3	8.3	8.0
G	WT. OF WET SOIL & TARE	(grams)	262.4	345.0	339.5	362.9	311.0
H	WT. OF DRY SOIL & TARE	(grams)	228.3	320.7	309.3	327.5	272.4
I	WT. OF WATER = G - H	(grams)	34.1	24.3	30.2	35.4	38.6
J	WT. DRY SOIL = H - F	(grams)	220.3	312.7	301.0	319.2	264.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.5	7.8	10.0	11.1	14.6

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC CHECKED BY: SH SHEET NO. 1 OF 4

GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 691341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 3 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-28

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			149, 13.65				
	WATER ADDED	(ml)	350mL				
A	WT. OF SOIL & MOLD	(grams)	6191.6				
B	WT. OF MOLD	(grams)	4272.2				
C	WT. OF SOIL = A - B	(grams)	1919.4				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.7				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	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: 15

	TARE NO.		103				
F	WT. OF TARE	(grams)	8.3				
G	WT. OF WET SOIL & TARE	(grams)	275.1				
H	WT. OF DRY SOIL & TARE	(grams)	233.79				
I	WT. OF WATER = G - H	(grams)	41.3				
J	WT. DRY SOIL = H - F	(grams)	225.5				
K	MOISTURE CONTENT = (I/J) X 100	(%)	18.3				

5368

GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC CHECKED BY: [illegible]

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-28 STD

Weight of Total Sample	=	26167.2
Weight of Oversize Fraction	=	1024.5
Weight of Finer Fraction (- 3/8)	=	25142.7
Percentage of Oversize Fraction	= (P_C)	3.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.151
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	112.0
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 14.6\ \%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 113.5\ pcf$$

3 of 4

000711

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

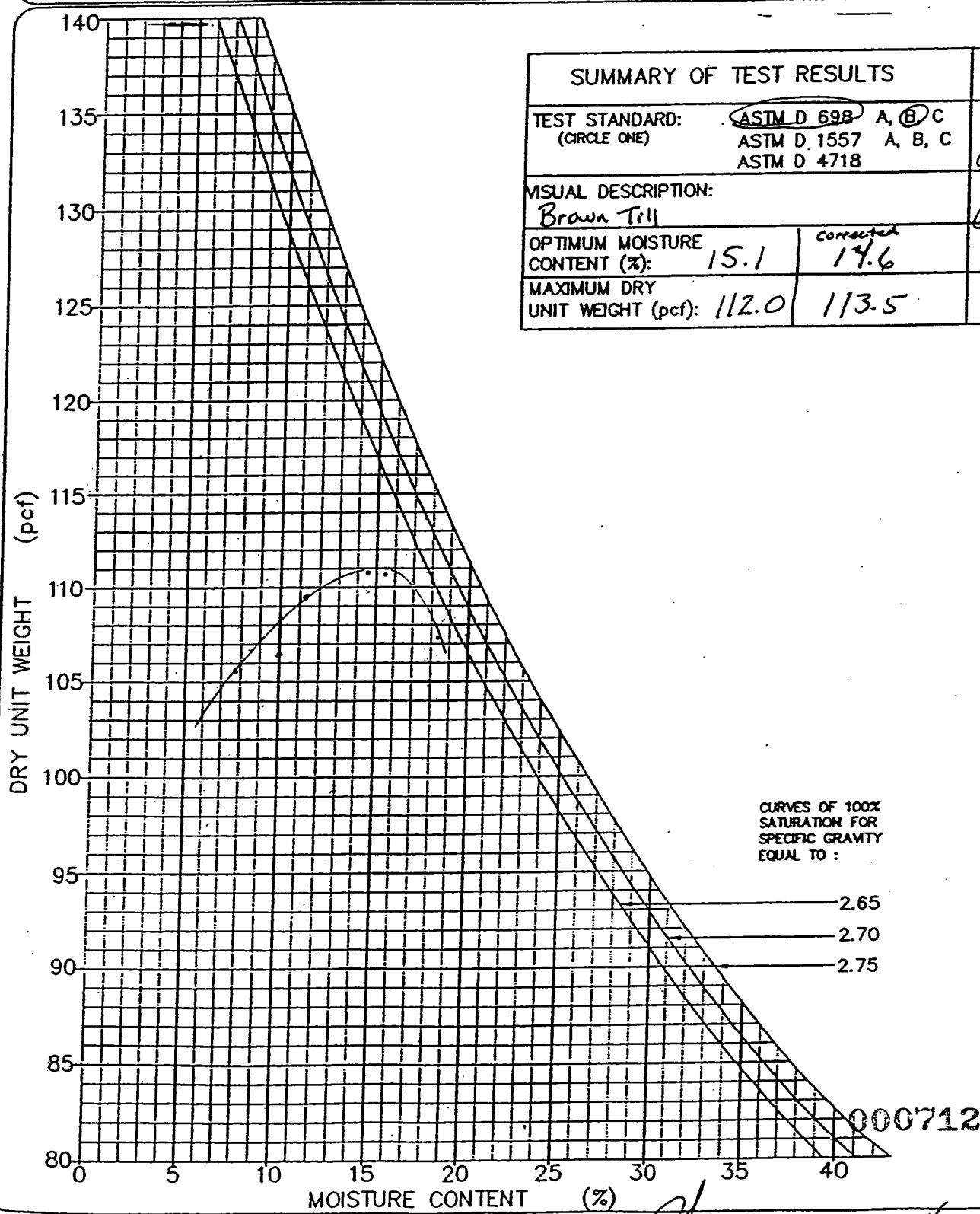
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE Ø2-4 SAMPLE NO.: LP02-28

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	15.1	corrected 14.6	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	112.0	113.5	CS



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: LP Clay

PROJECT NO. 69141 TASK NO.: 04.1

DATE: 3 day Aug month 2002 year

SAMPLE NO.: LP02-29

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: CHW

	WATER ADDED	(ml)	13.57 / 12%	13.28 / 4%	13.48 / 6%	13.58 / 8%	13.66 / 10%
A	WT. OF SOIL & MOLD	(grams)	6155.4	5987.5	6114.5	6159.9	6196.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1950.9	1783.0	1910.0	1955.4	1991.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	128.8	117.7	126.1	129.1	131.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.7	108.3	113.7	114.1	114.4

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: CHW

	TARE NO.		#613	#600	#645	#99	#67
F	WT. OF TARE	(grams)	8.2	8.2	8.1	8.3	8.1
G	WT. OF WET SOIL & TARE	(grams)	455.1	445.0	511.9	515.5	482.1
H	WT. OF DRY SOIL & TARE	(grams)	388.9	409.9	462.2	CHW ~~466~~ 456.9	420.5
I	WT. OF WATER = G - H	(grams)	66.2	35.1	49.7	58.6	61.6
J	WT. DRY SOIL = H - F	(grams)	380.7	401.7	454.1	448.6	412.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	17.4	8.7	10.9	13.1	14.9

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SHEET NO. 1 OF 4

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: SAMPLE NO.: LP02-29

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

8% 13.73

QA ID: KS

	WATER ADDED	(ml)	200 mL				
A	WT. OF SOIL & MOLD	(grams)	6227.5				
B	WT. OF MOLD	(grams)	4204.5				
C	WT. OF SOIL = A − B	(grams)	2023.4				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.5				
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: KS

	TARE NO.		110				
F	WT. OF TARE	(grams)	8.0				
G	WT. OF WET SOIL & TARE	(grams)	389.7				
H	WT. OF DRY SOIL & TARE	(grams)	345.5				
I	WT. OF WATER = G − H	(grams)	44.2				
J	WT. DRY SOIL = H − F	(grams)	337.5				
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.1				

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1344 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 6 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-29 STD

Weight of Total Sample	=	34616.3
Weight of Oversize Fraction	=	1104.8
Weight of Finer Fraction (- 3/8)	=	33511.5
Percentage of Oversize Fraction	= (P_C)	3.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.131
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	118.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 12.7%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 119.3 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

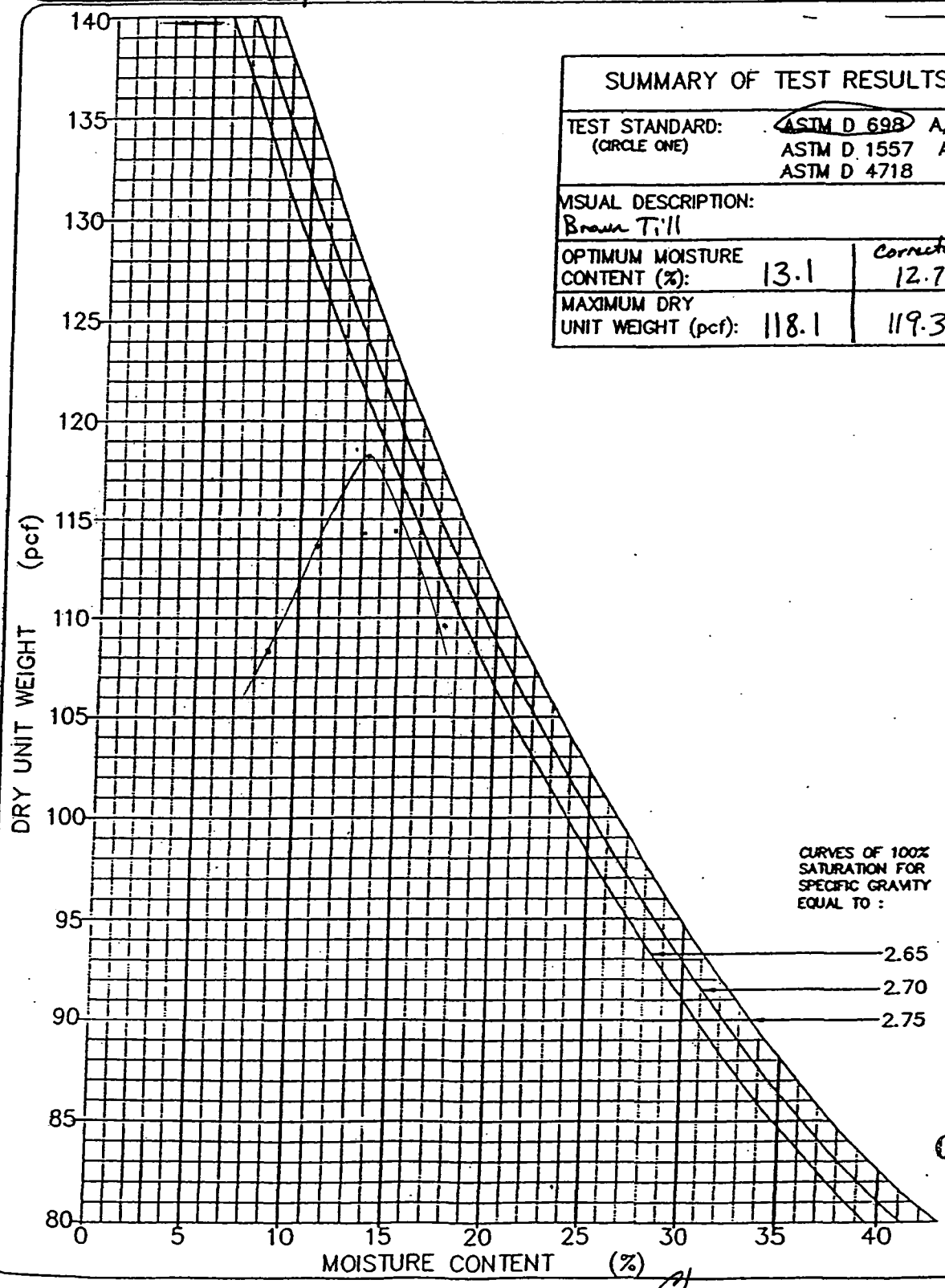
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-29

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.1	Corrected 12.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	118.1	119.3	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 3 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-29

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

13.66

COMPACTION OF SOIL — QA ID: Cthw

			13.59	13.86	13.95	13.86	
	WATER ADDED	(ml)	2%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6164.4	6286.9	6327.7	6286.9	6196.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1959.9	2082.4	2123.2	2082.4	1991.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.4	137.4	140.1	137.4	131.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	120.8	126.5	126.4	121.8	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: Cthw

	TARE NO.		#202	#675	#309	#96	#616
F	WT. OF TARE	(grams)	8.2	8.3	8.0	8.1	8.2
G	WT. OF WET SOIL & TARE	(grams)	401.7	574.9	373.5	465.5	365.6
H	WT. OF DRY SOIL & TARE	(grams)	375.5	529.9	337.8	413.6	320.8
I	WT. OF WATER = G − H	(grams)	26.2	45.0	35.7	51.9	44.8
J	WT. DRY SOIL = H − F	(grams)	367.3	521.6	329.8	405.5	312.6
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.1	8.6	10.8	12.8	14.3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 601341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 6 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-29 BMOD

Weight of Total Sample	=	34616.3
Weight of Oversize Fraction	=	1104.8
Weight of Finer Fraction (-3/8)	=	33511.5
Percentage of Oversize Fraction	= (P_C)	3.2
Percentage of Finer Fraction (-3/8)	= (P_F)	96.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	~~0.135~~ 0.097
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	~~117.3~~ 129.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 9.4\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 130.0 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

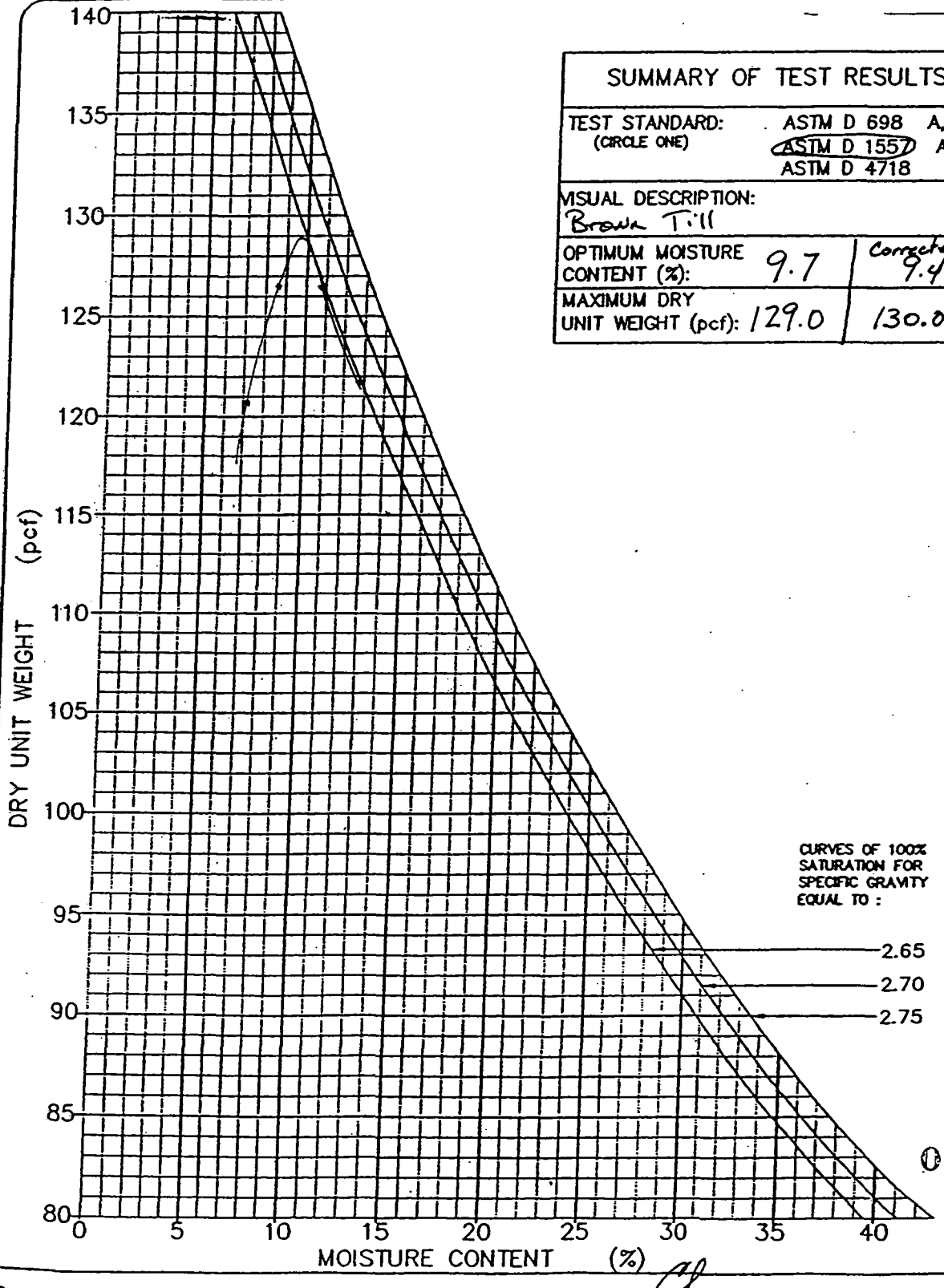
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-29

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	9.7	Corrected 9.4	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	129.0	130.0	CS



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 3 day AUGUST month 2002 year

MATERIAL TYPE: LP Clay

SAMPLE NO.: LP02-30

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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.

13.31

COMPACTION OF SOIL

QA ID: CHW

			13.48	13.72	13.84	13.79	
	WATER ADDED	(ml)	4%	6%	8%	10%	2%
A	WT. OF SOIL & MOLD	(grams)	6114.5	6223.4	6277.8	6255.1	6037.4
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1910.0	2018.9	2073.3	2050.6	1832.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.1	133.2	136.8	135.3	121.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.9	119.8	120.7	116.7	112.7

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: CHW

	TARE NO.		#230	#676	#14	#614	310
F	WT. OF TARE	(grams)	8.4	8.3	8.3	8.2	8.0
G	WT. OF WET SOIL & TARE	(grams)	572.0	525.8	452.7	501.6	538.5
H	WT. OF DRY SOIL & TARE	(grams)	522.0	473.7	400.4	433.8	502.0
I	WT. OF WATER = G - H	(grams)	50.0	52.1	52.3	67.8	36.5
J	WT. DRY SOIL = H - F	(grams)	513.6	465.4	392.1	425.6	494.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.7	11.2	13.3	15.9	7.4

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 6 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LPØ2.30 STD

Weight of Total Sample	=	22389.9
Weight of Oversize Fraction	=	747.2
Weight of Finer Fraction (- 3/8)	=	21642.7
Percentage of Oversize Fraction	= (P_C)	3.3
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.7
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.126
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	122.3
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 12.2$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 123.5$$

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FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

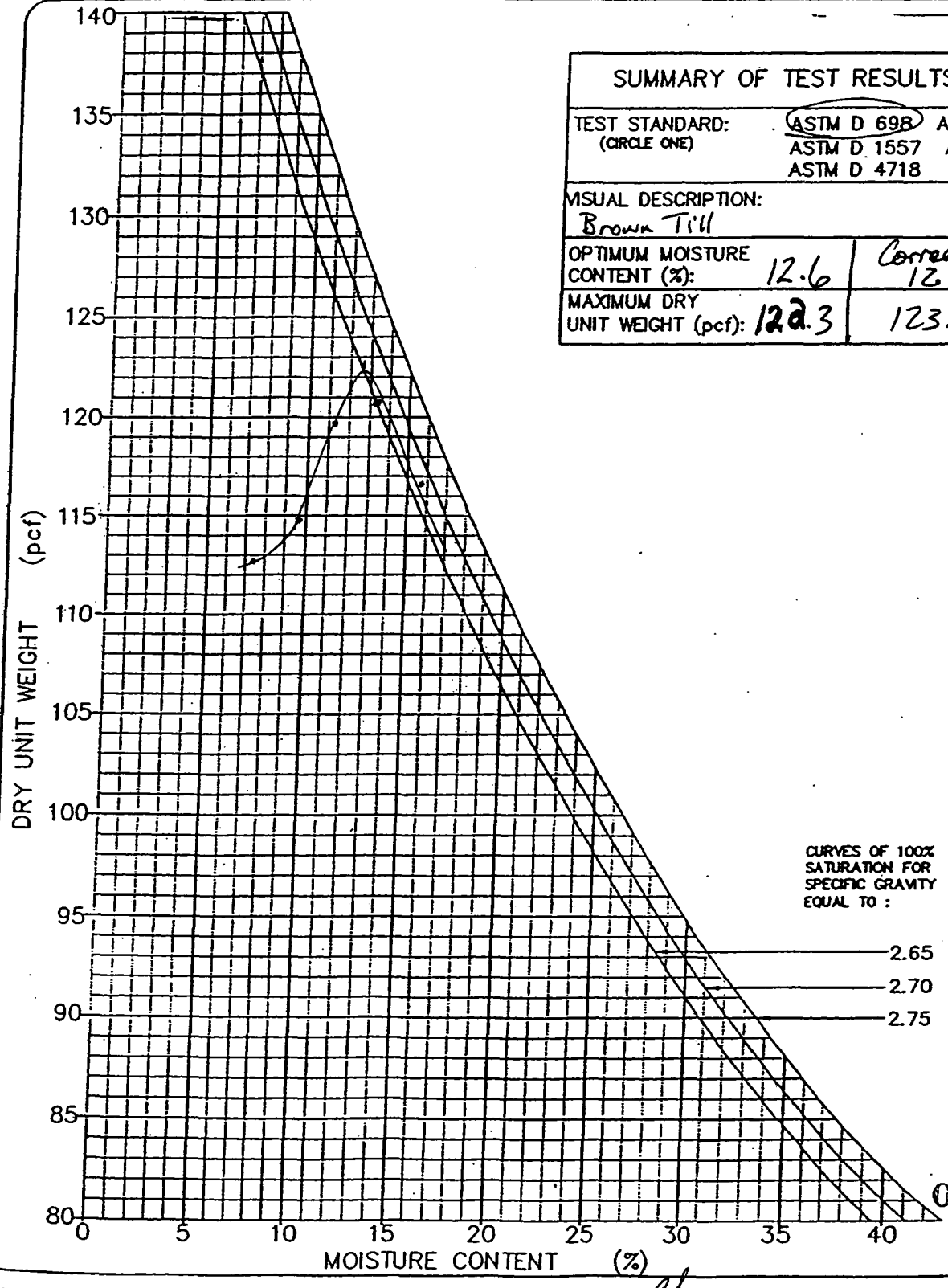
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GR1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: CP02-30

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till		CA
OPTIMUM MOISTURE CONTENT (%): 12.6	Corrected 12.2	CA
MAXIMUM DRY UNIT WEIGHT (pcf): 122.3	123.5	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 69341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 3 day August month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: # LP02-31

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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.

???!*!?

13.26

COMPACTION OF SOIL

QA ID: [illegible]

			13.82	13.48	13.66	13.65	
	WATER ADDED	(ml)	4%	6%	8%	10%	2%
A	WT. OF SOIL & MOLD	(grams)	6268.8	6114.5	6196.2	6191.6	6014.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	2064.3	1910.0	1991.7	1987.1	1810.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	136.2	126.1	131.4	131.1	119.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	124.5	113.5	116.4	113.1	110.9

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: [illegible]

	TARE NO.		#49	#636	#114	#48	#308
F	WT. OF TARE	(grams)	8.2	8.2	8.4	8.3	8.1
G	WT. OF WET SOIL & TARE	(grams)	538.2	555.5	502.5	513.5	602.9
H	WT. OF DRY SOIL & TARE	(grams)	492.6	500.7	446.0	444.3	562.2
I	WT. OF WATER = G − H	(grams)	45.6	54.8	56.5	69.2	40.7
J	WT. DRY SOIL = H − F	(grams)	484.4	492.5	437.6	436.0	~~521.5~~ 554.1
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.4	11.1	12.9	15.9	~~7.8~~ 7.3

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 69134.1 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 3 day AUGUST month 2002 year

MATERIAL TYPE: Low Perm Clay

SAMPLE NO.: LP02-31

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: CHW

	WATER ADDED	(ml)	13.17 ~~0~~ %				
A	WT. OF SOIL & MOLD	(grams)	CHW ~~5973.9~~	5994.0			
B	WT. OF MOLD	(grams)	4204.5				
C	WT. OF SOIL = A - B	(grams)	1768.5				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	116.8				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	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: CHW

	TARE NO.		#603				
	WT. OF TARE	(grams)	8.2				
	WT. OF WET SOIL & TARE	(grams)	534.2				
	WT. OF DRY SOIL & TARE	(grams)	509.5				
	WT. OF WATER = G - H	(grams)	24.7				
J	WT. DRY SOIL = H - F	(grams)	501.3				
K	MOISTURE CONTENT = (I/J) X 100	(%)	4.9				

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 2 OF 4

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 6 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-31 STD

Weight of Total Sample	=	47252.0
Weight of Oversize Fraction	=	3425.9
Weight of Finer Fraction (- 3/8)	=	43826.1
Percentage of Oversize Fraction	= (P_C)	7.3
Percentage of Finer Fraction (- 3/8)	= (P_F)	92.7
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.135
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	117.3
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 12.6\ \%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 120.0\ pcf$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

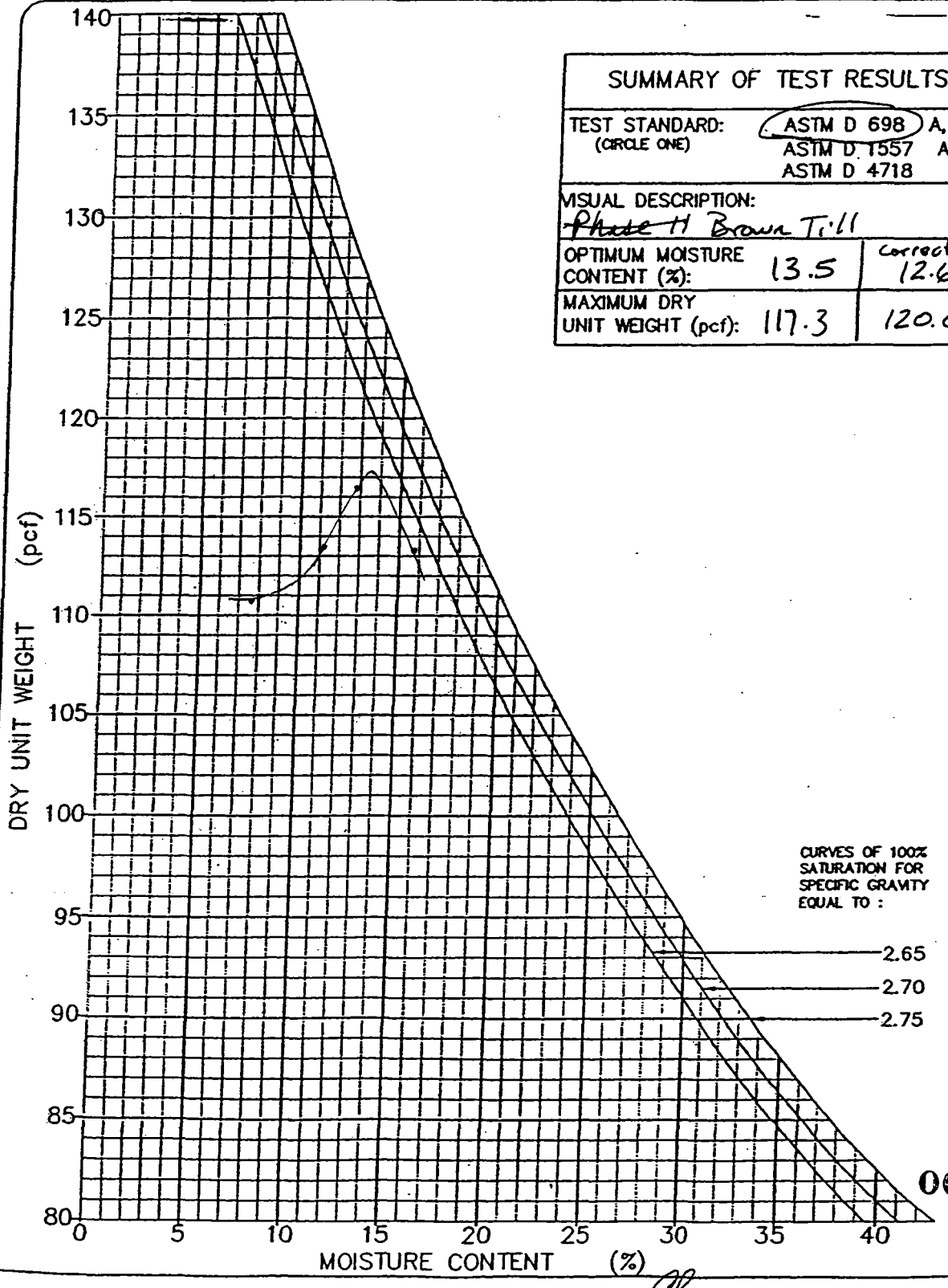
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-5 SAMPLE NO.: LPØ2-31

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: ~~Phase II~~ Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.5	corrected 12.6	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	117.3	120.0	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 3 day AUGUST month 2002 year

MATERIAL TYPE: LP Clay

MATERIAL SOURCE: Stockpile - 02-5

SAMPLE NO.: LP02-31

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: 13.857

	WATER ADDED	(ml)	13.89 2%	13.93 4%	13.99 6%	13.82 8%	0%
A	WT. OF SOIL & MOLD	(grams)	6300.5	6318.6	6345.9	6268.8	6155.4
B	WT. OF MOLD	(grams)	4204.5	* 4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	2096.0	2114.1	2141.4	2064.3	1950.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	138.3	139.5	141.3	136.2	128.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	129.3	128.0	126.8	120.0	122.6

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: 13.857

	TARE NO.		#18	#98	#110	#605	#92
F	WT. OF TARE	(grams)	8.4	8.2	8.0	8.3	8.2
G	WT. OF WET SOIL & TARE	(grams)	460.7	463.3	407.9	434.2	428.0
H	WT. OF DRY SOIL & TARE	(grams)	431.0	425.9	366.9	383.5	408.0
I	WT. OF WATER = G - H	(grams)	29.7	37.4	41.0	50.7	20.0
J	WT. DRY SOIL = H - F	(grams)	422.6	417.7	358.9	375.2	399.8
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.0	9.0	11.4	13.5	5.0

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 6 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-31 MOD

Weight of Total Sample	=	47252.0
Weight of Oversize Fraction	=	3425.9
Weight of Finer Fraction (- 3/8)	=	43826.1
Percentage of Oversize Fraction	= (P_C)	7.3
Percentage of Finer Fraction (- 3/8)	= (P_F)	92.7
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.082
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	132.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 7.7\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 134.2$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

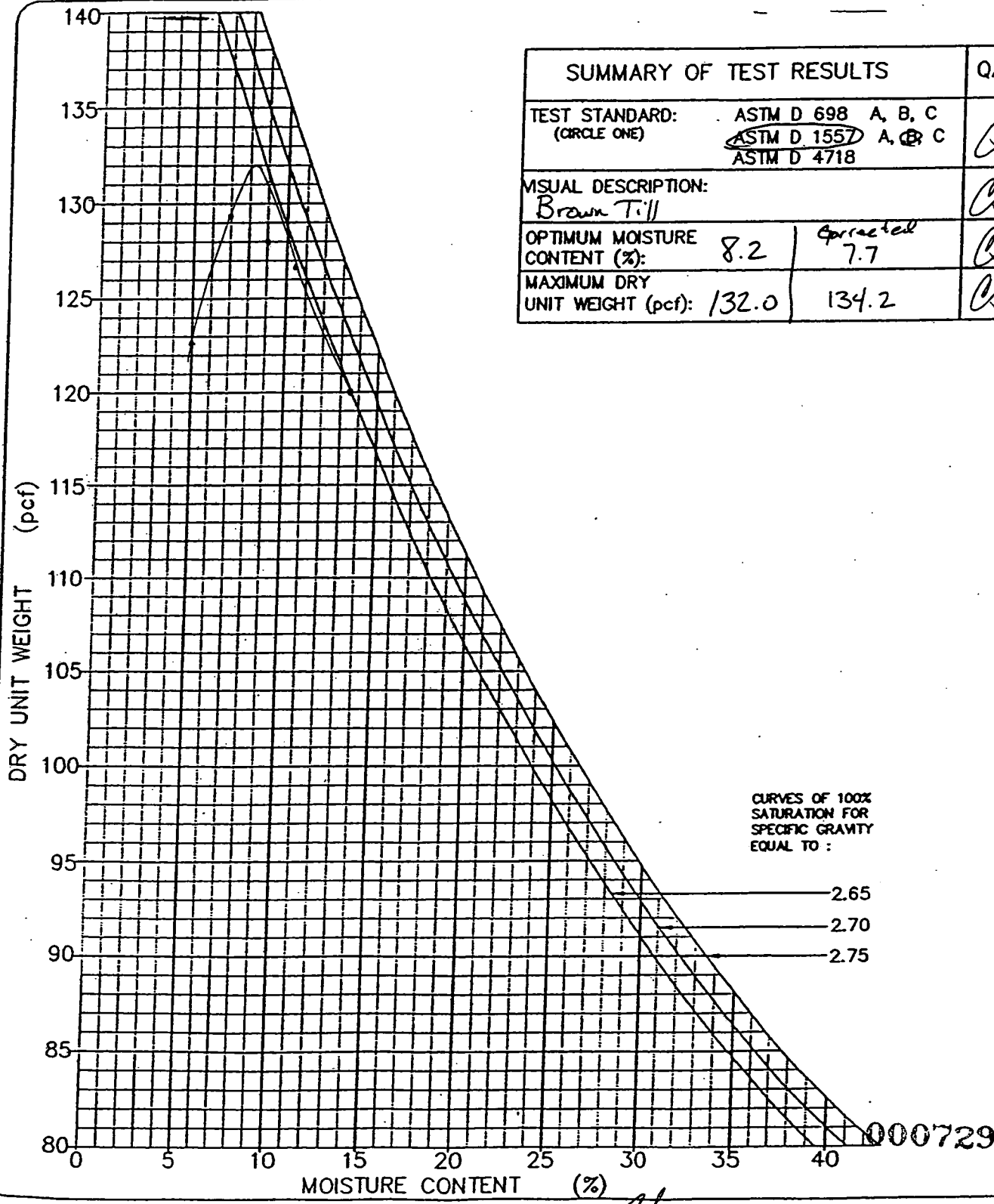
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 5 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-5 SAMPLE NO.: LPØ2-31

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	8.2	Corrected 7.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	132.0	134.2	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 7 day August month 2002 year

SAMPLE NO.: L802-34

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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. 13.82

COMPACTION OF SOIL

QA ID: CHW

			13.30	13.44	13.50	13.83	
	WATER ADDED	(ml)	2%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6032.9	6096.4	6123.6	6273.3	6268.8
B	WT. OF MOLD	(grams)	4272.2	4272.2	4272.2	4272.2	4272.2
C	WT. OF SOIL = A - B	(grams)	1760.7	1824.2	1851.4	2001.1	1996.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)	116.2	120.4	122.2	132.1	131.8
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.6	112.7	~~112.4~~ 112.6	118.5	116.4

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: CHW

	TARE NO.		#92	#63	#110	#647	#614
	WT. OF TARE	(grams)	8.2	8.1	7.9	8.1	8.2
	WT. OF WET SOIL & TARE	(grams)	571.1	498.8	528.8	550.9	470.4
	WT. OF DRY SOIL & TARE	(grams)	543.7	467.4	489.2	494.8	416.6
	WT. OF WATER = G - H	(grams)	27.4	31.4	41.6	56.1	53.8
J	WT. DRY SOIL = H - F	(grams)	535.5	459.3	479.3	486.7	408.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	5.1	6.8	8.6 ~~8.7~~	11.5	13.2

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 10 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-34

Weight of Total Sample	=	24257.3
Weight of Oversize Fraction	=	13705
Weight of Finer Fraction (- 3/8)	=	22886.8
Percentage of Oversize Fraction	= (P_C)	5.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.12
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	118.8
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_\omega = 11.4\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 120.8$ pcf

2 of 3

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

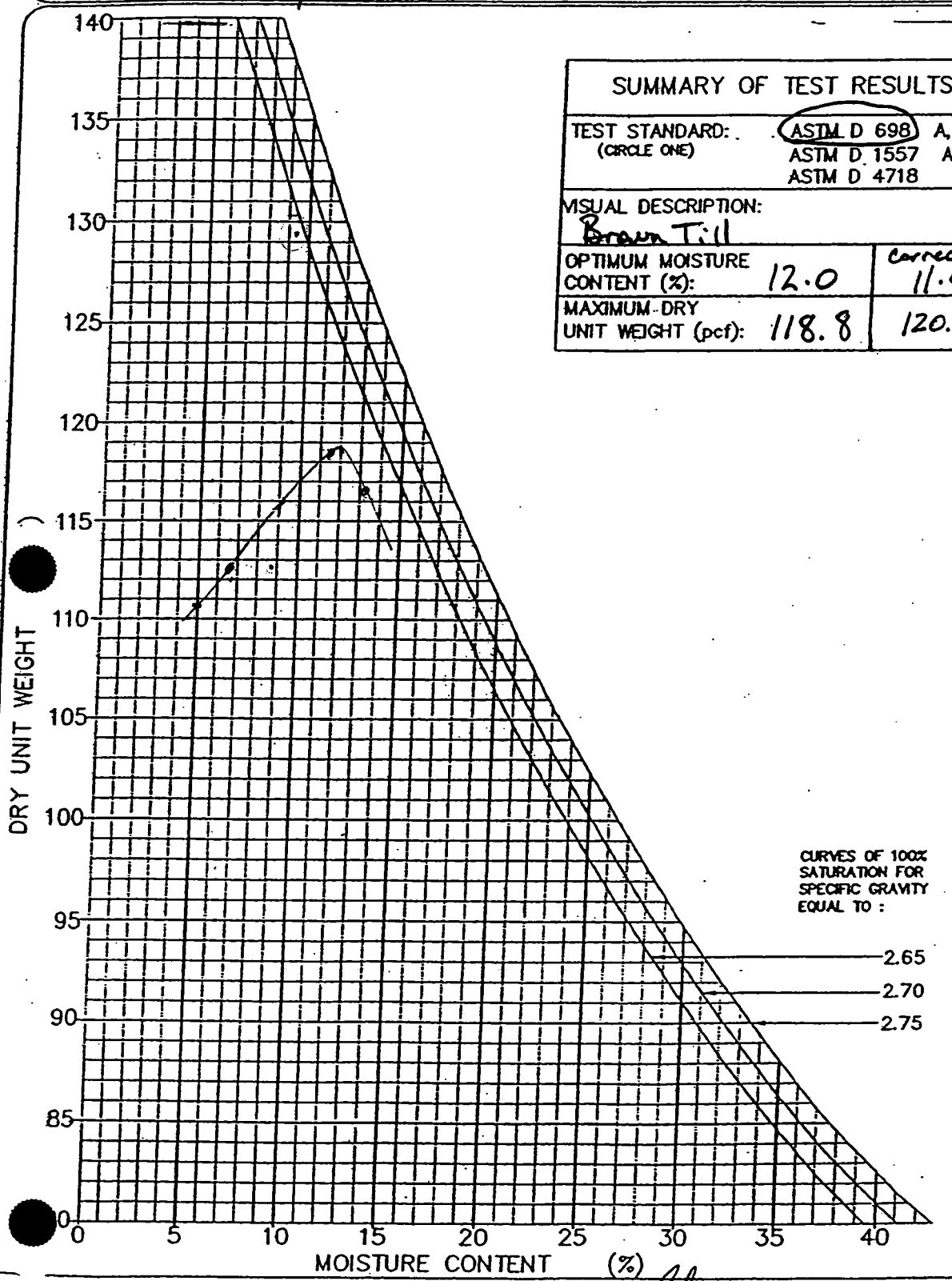
LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 5268

DESCRIPTION: Phase IV DATE: 10 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-34

STO

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		GS
VISUAL DESCRIPTION: Brown Till			GS
OPTIMUM MOISTURE CONTENT (%):	12.0	Corrected 11.4	GS
MAXIMUM DRY UNIT WEIGHT (pcf):	118.8	120.8	GS



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 49134 TASK NO.: 04.1

MATERIAL TYPE: LP Clay

DATE: 8 day August month 2002 year

SAMPLE NO.: LP 02-35

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			13.43	13.61	13.88	13.93	13.80
	WATER ADDED	(ml)	4%	6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)	6091.8	6173.5	6296.0	6318.6	6259.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1887.3	1969.0	2091.5	2114.1	2055.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.6	130.0	138.0	139.5	135.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	116.6	119.3	123.4	123.0	117.7

QA ID: CHW

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

	TARE NO.		#630	#14	#107	#614	#647
F	WT. OF TARE	(grams)	8.1	8.3	8.0	8.2	8.1
G	WT. OF WET SOIL & TARE	(grams)	355.2	414.8	375.5	343.0	360.3
H	WT. OF DRY SOIL & TARE	(grams)	332.7	381.3	336.6	303.4	313.8
I	WT. OF WATER = G − H	(grams)	22.5	33.5	38.9	39.6	46.5
J	WT. DRY SOIL = H − F	(grams)	324.6	373.0	328.6	295.2	305.7
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.9	9.0	11.8	13.4	15.2

QA ID: CHW

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134 TASK NO. 04.1

DESCRIPTION: Phase II DATE: 9 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-35 STD

Weight of Total Sample	=	44147.8
Weight of Oversize Fraction	=	1665.2
Weight of Finer Fraction (- 3/8)	=	42482.6
Percentage of Oversize Fraction	= (P_C)	3.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.124
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	124.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 12.0\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 125.4 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

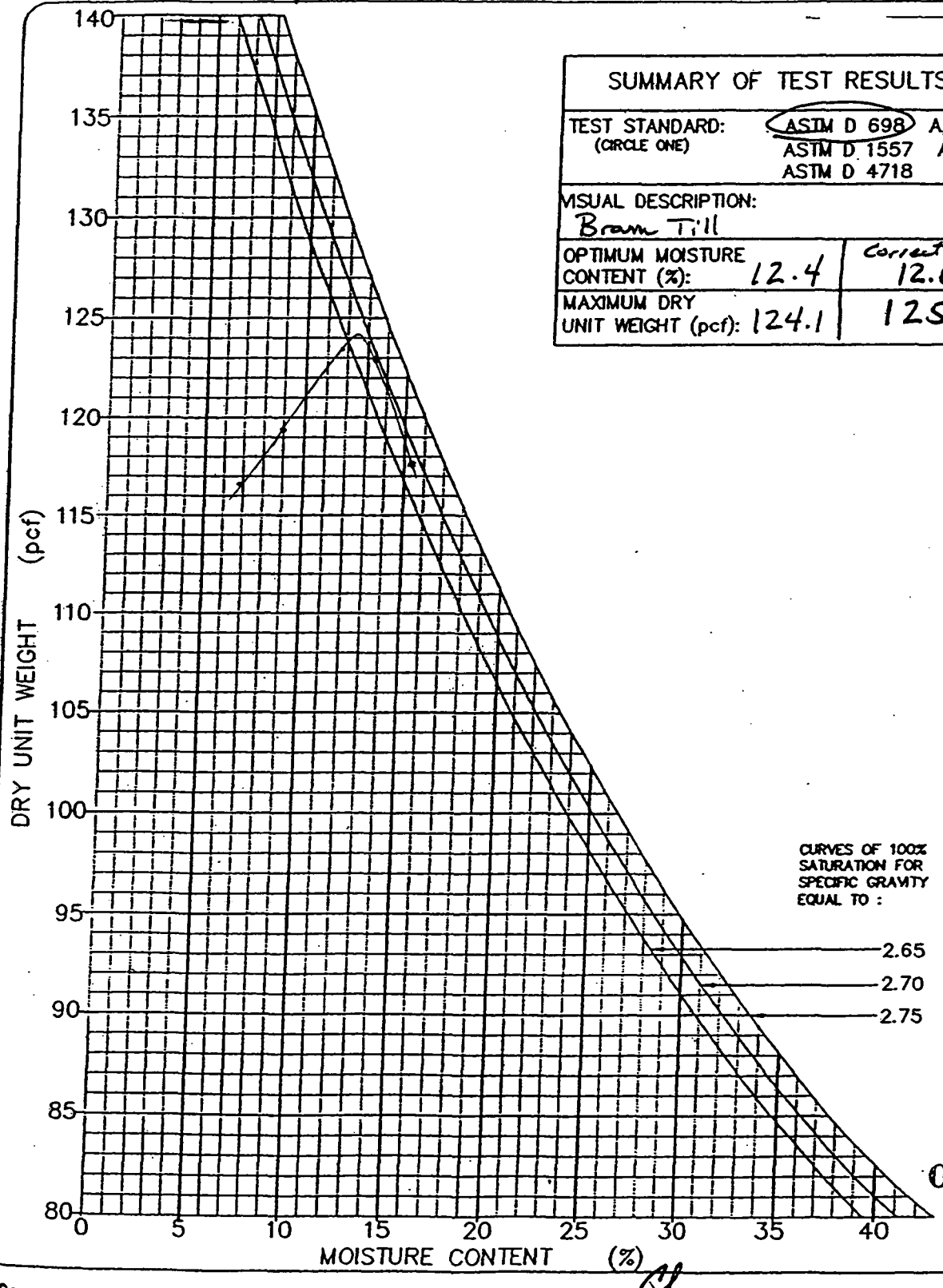
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase II DATE: 9 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-35

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, (B) C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 12.4	Corrected 12.0	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): 124.1	125.4	CJ



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 8 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-35

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: CHW

	WATER ADDED	(ml)	13.76 2%	13.88 4%	14.15 6%	14.07 8%	13.91 10%
A	WT. OF SOIL & MOLD	(grams)	6241.5	6296.0	6418.4	6382.2	6309.6
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	2037.0	2091.5	2213.9	2177.7	2105.1
D	WET UNIT WT.(1) = C X 0.066	(pcf)	134.4	138.0	146.1	143.7	138.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	127.4	129.6	133.8	128.9	122.4

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: CHW

	TARE NO.		#103	#608	#9994	#67	#99
F	WT. OF TARE	(grams)	8.3	8.2	8.4	8.1	8.1
G	WT. OF WET SOIL & TARE	(grams)	465.4	483.0	465.6	384.9	392.4
H	WT. OF DRY SOIL & TARE	(grams)	441.5	454.2	~~346.7~~ 427.2	346.1	~~427.2~~ 346.7
I	WT. OF WATER = G − H	(grams)	23.9	28.8	~~11.8~~ 38.4	38.8	45.7
J	WT. DRY SOIL = H − F	(grams)	433.2	446.0	418.8	338.0	338.6
K	MOISTURE CONTENT = (I/J) X 100	(%)	5.5	6.5	9.2	11.5	13.5

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-35 Mod

Weight of Total Sample	=	44147.8
Weight of Oversize Fraction	=	1665.2
Weight of Finer Fraction (- 3/8)	=	42482.6
Percentage of Oversize Fraction	= (P_C)	3.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.09
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	133.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 8.7\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 135.0$ pcf

2 of 3

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

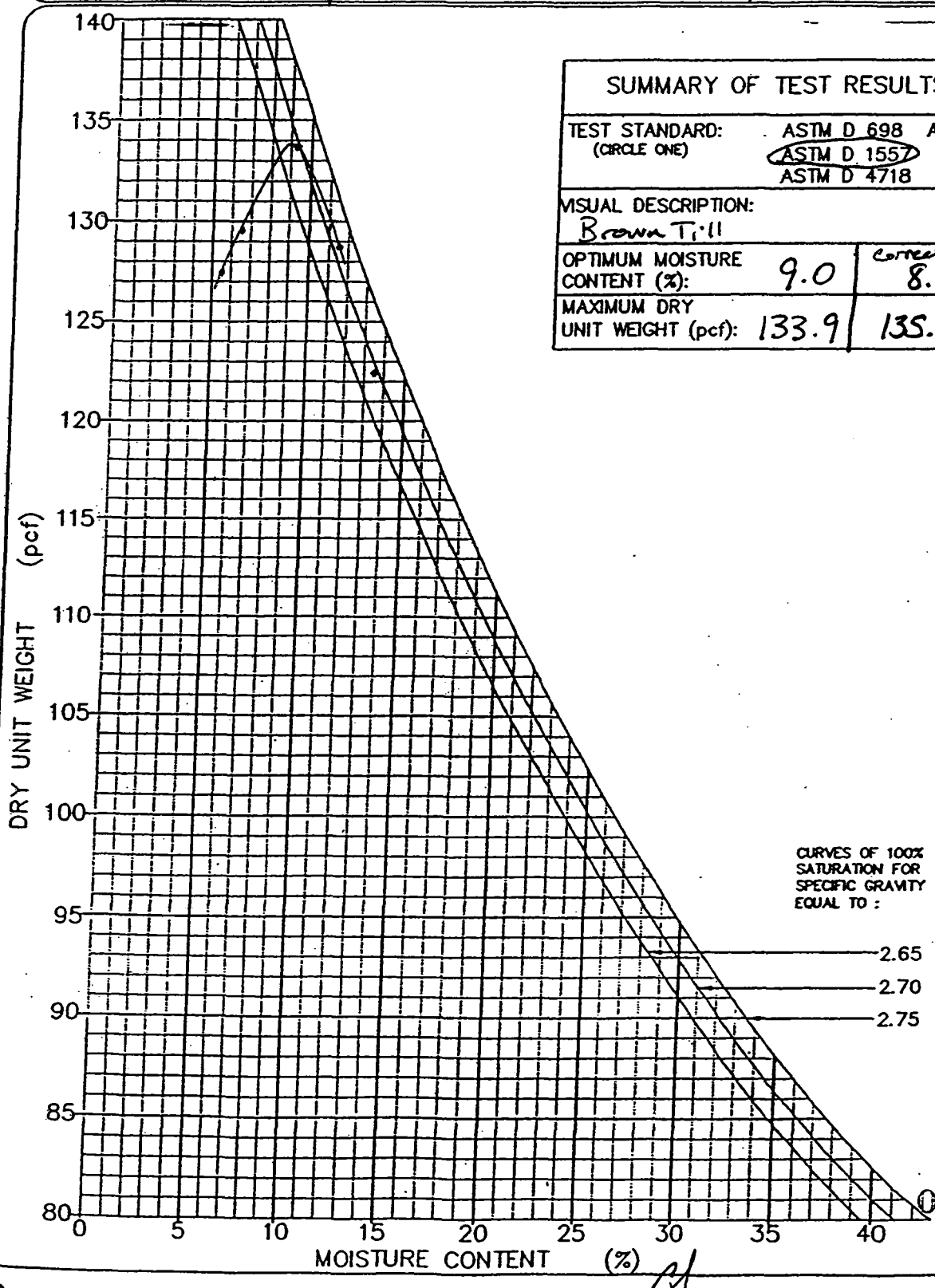
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ 1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-35

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	9.0	corrected 8.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	133.9	135.0	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: LP Clay

PROJECT NO. 69141 TASK NO.: 04.1

DATE: 8 day August month 2002 year

SAMPLE NO.: LP02-36

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: CAW

			13.40	13.53	13.71	13.91	13.84
	WATER ADDED	(ml)	4%	6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)	6078.2	6137.2	6218.9	6309.6	6277.8
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1873.7	1932.7	2014.4	2105.1	2073.3
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.7	127.6	133.0	138.9	136.8
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	116.0	117.5	120.5	123.6	119.7

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: CAW

	TARE NO.		#63	#114	#613	#92	#90
F	WT. OF TARE	(grams)	8.2	8.4	8.2	8.0	8.3
G	WT. OF WET SOIL & TARE	(grams)	343.2	451.0	424.5	350.4	332.7
H	WT. OF DRY SOIL & TARE	(grams)	322.5	415.9	385.2	312.6	292.2
I	WT. OF WATER = G - H	(grams)	20.7	35.1	39.3	37.8	40.5
J	WT. DRY SOIL = H - F	(grams)	314.3	407.5	377.0	304.6	283.9
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.6	8.6	10.4	12.4	14.3

5368

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 041

DESCRIPTION: Phase IV DATE: 9 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-36 STD

Weight of Total Sample	=	19882.3
Weight of Oversize Fraction	=	445.9
Weight of Finer Fraction (- 3/8)	=	19436.4
Percentage of Oversize Fraction	= (P_C)	2.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.124
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	123.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 12.2\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 124.4$ pcf

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000740

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

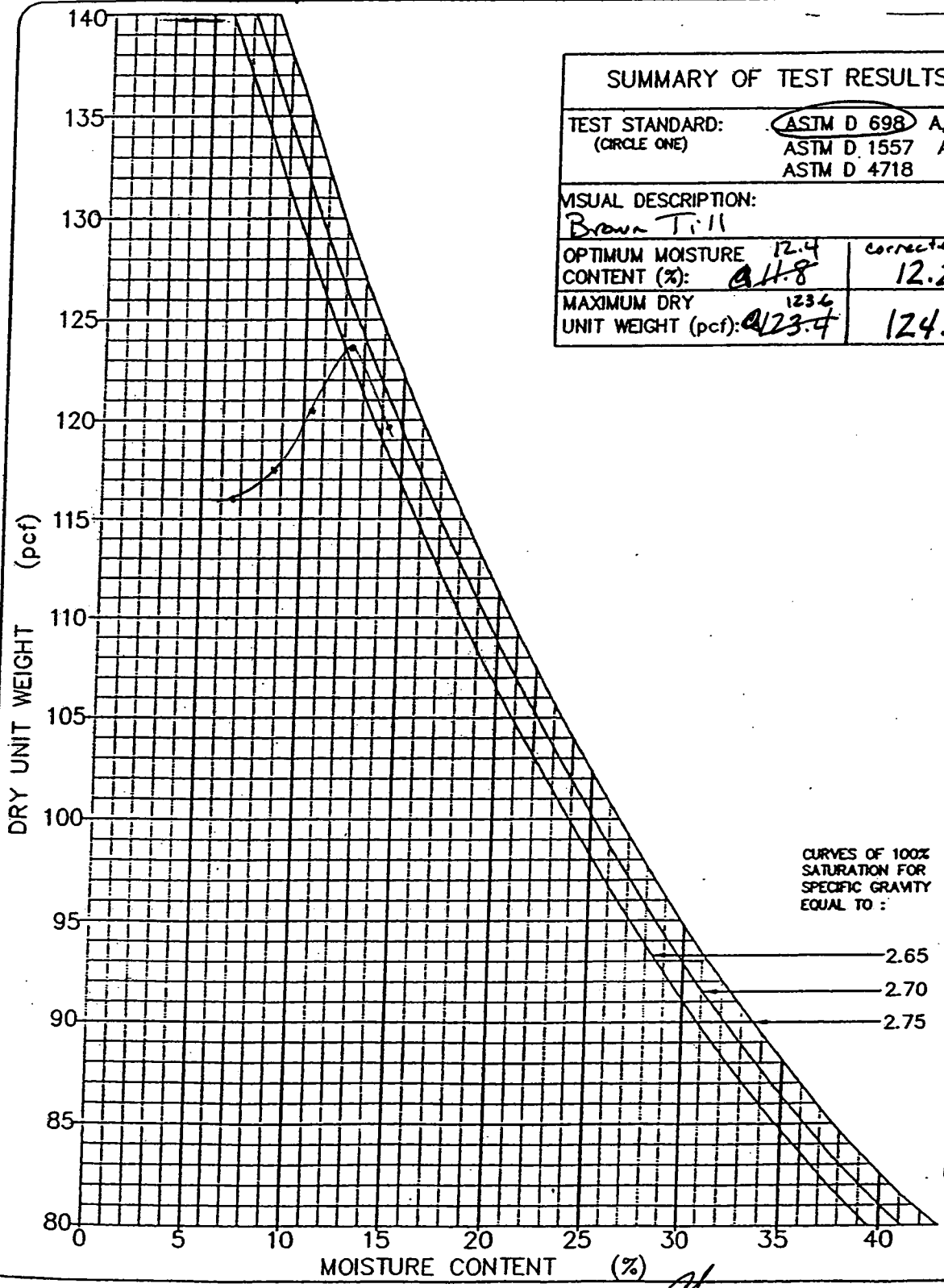
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-5 SAMPLE NO.: LP02-36

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): ~~11.8~~ 12.4	corrected 12.2	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): ~~123.4~~ 123.6	124.4	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: LP Clay

PROJECT NO.: 69341 TASK NO.: 04.1

DATE: 9 day August month 2002 year

SAMPLE NO.: LP02-38

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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.

13.87

COMPACTION OF SOIL

QA ID: CHW

			13.32	13.49	13.60	13.90	
	WATER ADDED	(ml)	4%	6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)	6042.0	6119.1	6169.0	6305	6291.4
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1837.5	1914.6	1964.5	2100.5	2086.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	121.3	126.4	129.7	138.6	137.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.0	117.5	118.6	124.4	121.6

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: CHW

	TARE NO.		#67	#95	#647	#614	#14
	WT. OF TARE	(grams)	8.1	8.1	8.1	8.2	8.3
	WT. OF WET SOIL & TARE	(grams)	464.0	423.0	368.1	366.7	302.5
	WT. OF DRY SOIL & TARE	(grams)	440.6	393.8	337.3	329.8	268.0
I	WT. OF WATER = G − H	(grams)	23.4	29.2	30.8	36.9	34.5
J	WT. DRY SOIL = H − F	(grams)	432.5	385.7	329.2	321.6	259.7
K	MOISTURE CONTENT = (I/J) X 100	(%)	5.4	7.6	9.4	11.5	13.3

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 14 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-38 STD

Weight of Total Sample	=	40627.3
Weight of Oversize Fraction	=	957.9
Weight of Finer Fraction (- 3/8)	=	39669.4
Percentage of Oversize Fraction	= (P_C)	2.4
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.117
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	124.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$C_w = 11.5\%$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$C_{\delta D} = 125.3$ pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

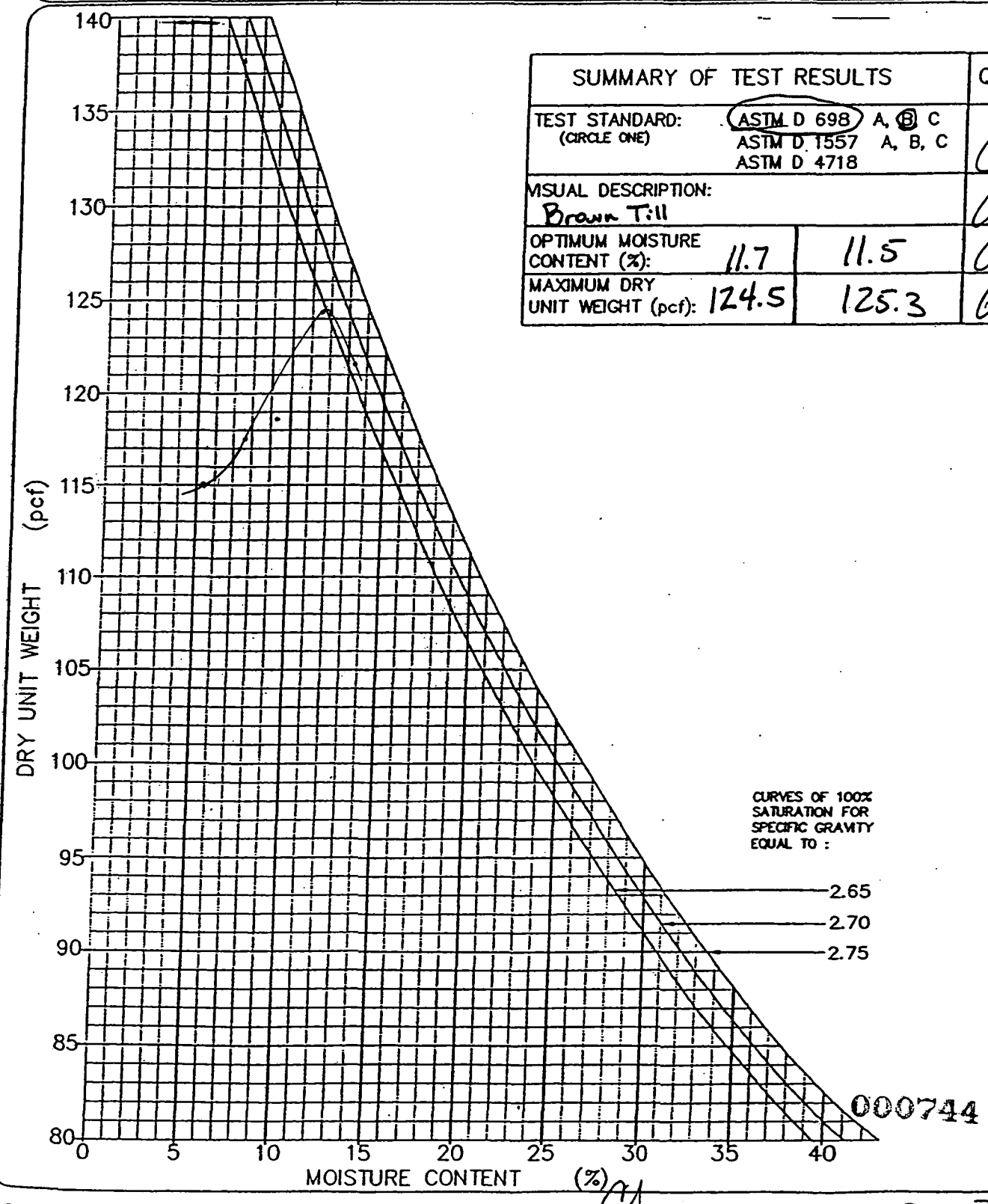
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 681341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 10 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-6 SAMPLE NO.: LP02-38

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	11.7	11.5	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	124.5	125.3	CA



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase IV

DATE: 10 day August month 2ØØ2 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile Ø2-6 SAMPLE NO.: LPØ2-38

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

13.8Ø

COMPACTION OF SOIL

QA ID: CHW

			13.78	13.99	14.14	14.13	
	WATER ADDED	(ml)	4%	6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)	625Ø.6	6345.9	6413.9	6409.4	6259.7
B	WT. OF MOLD	(grams)	42Ø4.5	4204.5	4204.5	4204.5	42Ø4.5
C	WT. OF SOIL = A − B	(grams)	2946.1	2141.4	2209.4	2204.9	2Ø55.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	135.Ø	141.3	145.8	145.5	135.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	129.8	131.6	133.8	132.2	118.5

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: CHW

	TARE NO.		#2Ø2	#6Ø3	#16	#608	#14
F	WT. OF TARE	(grams)	8.19	8.2	8.4	8.2	8.3
G	WT. OF WET SOIL & TARE	(grams)	~~346.68~~ 346.7	~~308.24~~ 308.2	~~259.31~~ 259.3	~~374.05~~ 374.1	~~384.97~~ 384.9
H	WT. OF DRY SOIL & TARE	(grams)	328.6	287.5	238.5	340.5	339.2
I	WT. OF WATER = G − H	(grams)	18.1	20.7	20.8	33.6	47.7
J	WT. DRY SOIL = H − F	(grams)	320.4	279.3	230.1	332.3	328.9
K	MOISTURE CONTENT = (I/J) X 100	(%)	~~5.7~~ 5.6	7.4	9.Ø	10.1	14.5
			1.057	1.074	1.09	1.101	1.140

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 14 day Aug month 2000 year

MATERIAL TYPE: Clay Liner LP02-38 Mod

Weight of Total Sample	=	40627.3
Weight of Oversize Fraction	=	957.9
Weight of Finer Fraction (- 3/8)	=	39669.4
Percentage of Oversize Fraction	= (P_C)	2.4
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.091
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	133.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 8.9\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 134.6 \text{ pcf}$$

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

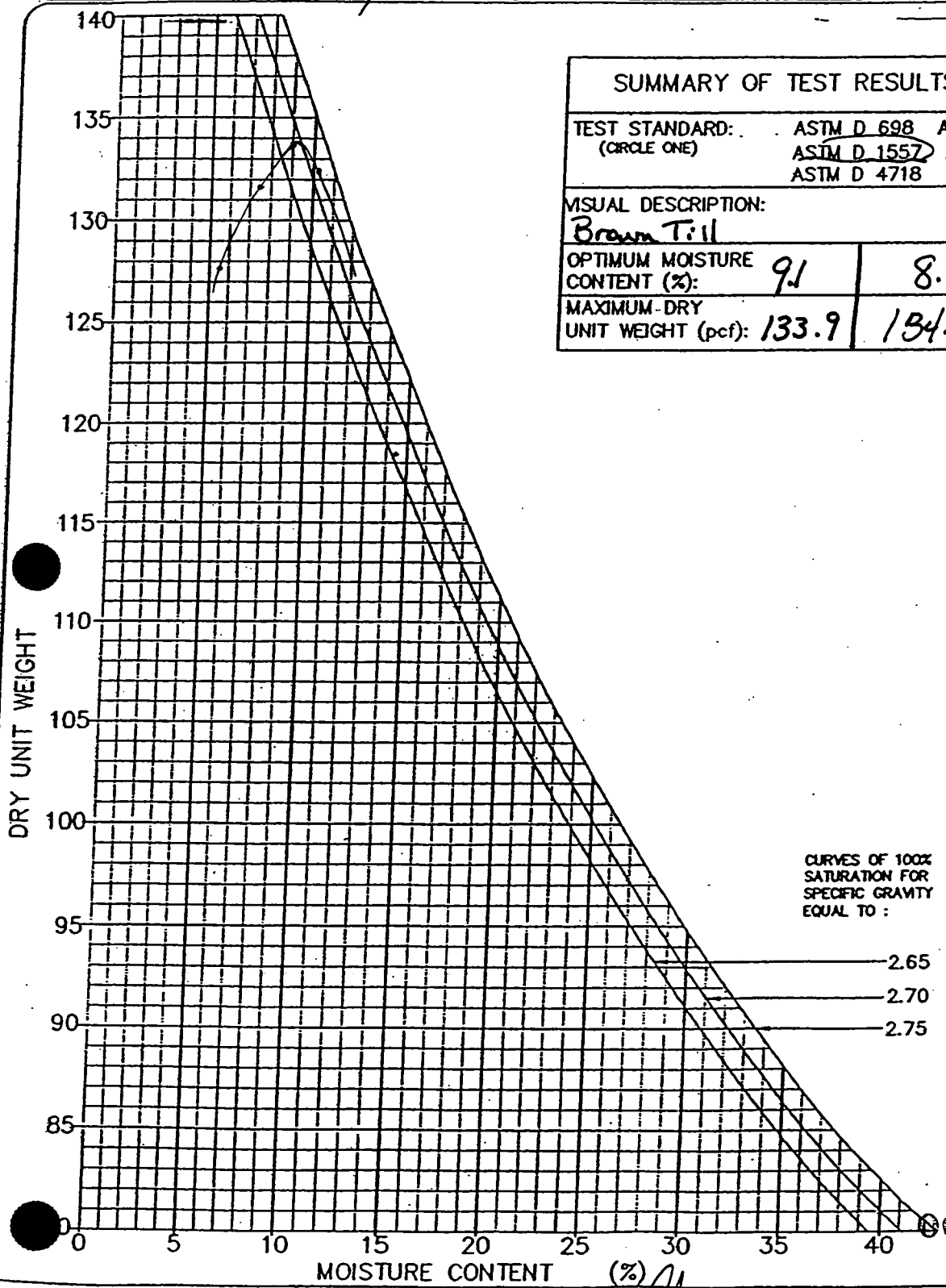
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO.: 641

DESCRIPTION: Phase IV DATE: 12 day Aug month 2002 year

MATERIAL TYPE: L.P. Clay MATERIAL SOURCE Stockpile 06 SAMPLE NO. LP02-38

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, (B) C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	9.1	8.9	CS
MAXIMUM-DRY UNIT WEIGHT (pcf):	133.9	134.6	CS



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 691341 TASK NO.: 04.1

MATERIAL TYPE: LP Clay — DATE: 12 day August month 2002 year

SAMPLE NO.: LP02-39

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

13.84

							QA ID: CHW
			13.33	13.42	13.65	13.78	
	WATER ADDED	(ml)	4%	6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)	6046.5	6087.3	6191.6	6250.6	6277.8
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1842.0	1882.8	1987.1	2046.1	2073.3
D	WET UNIT WT.(1) = C X 0.066	(pcf)	121.6	124.3	131.1	135.0	136.8
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.0	115.6	119.4	121.2	120.3

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: CHW
	TARE NO.		#602	#613	#63	#630	#202
F	WT. OF TARE	(grams)	8.2	8.2	8.2	8.1	8.2
G	WT. OF WET SOIL & TARE	(grams)	483.2	483.0	387.7	324.9	356.72
H	WT. OF DRY SOIL & TARE	(grams)	457.7	450.0	353.7	292.4	314.70
I	WT. OF WATER = G - H	(grams)	25.5	33.0	34.0	32.5	42.0
J	WT. DRY SOIL = H - F	(grams)	449.5	441.8	345.5	284.3	306.5
K	MOISTURE CONTENT = (I/J) X 100	(%)	5.7	7.5	9.8	11.4	13.7

*GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO 1 OF 3

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 14 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-39

Weight of Total Sample	=	26590.9
Weight of Oversize Fraction	=	1510.3
Weight of Finer Fraction (-3/8)	=	25080.6
Percentage of Oversize Fraction	= (P_C)	5.7
Percentage of Finer Fraction (-3/8)	= (P_F)	94.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content -3/8, as decimal	=	0.12
(W_C) =	Water Content +3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.3
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 11.4\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C\delta_D = 123.3$ pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

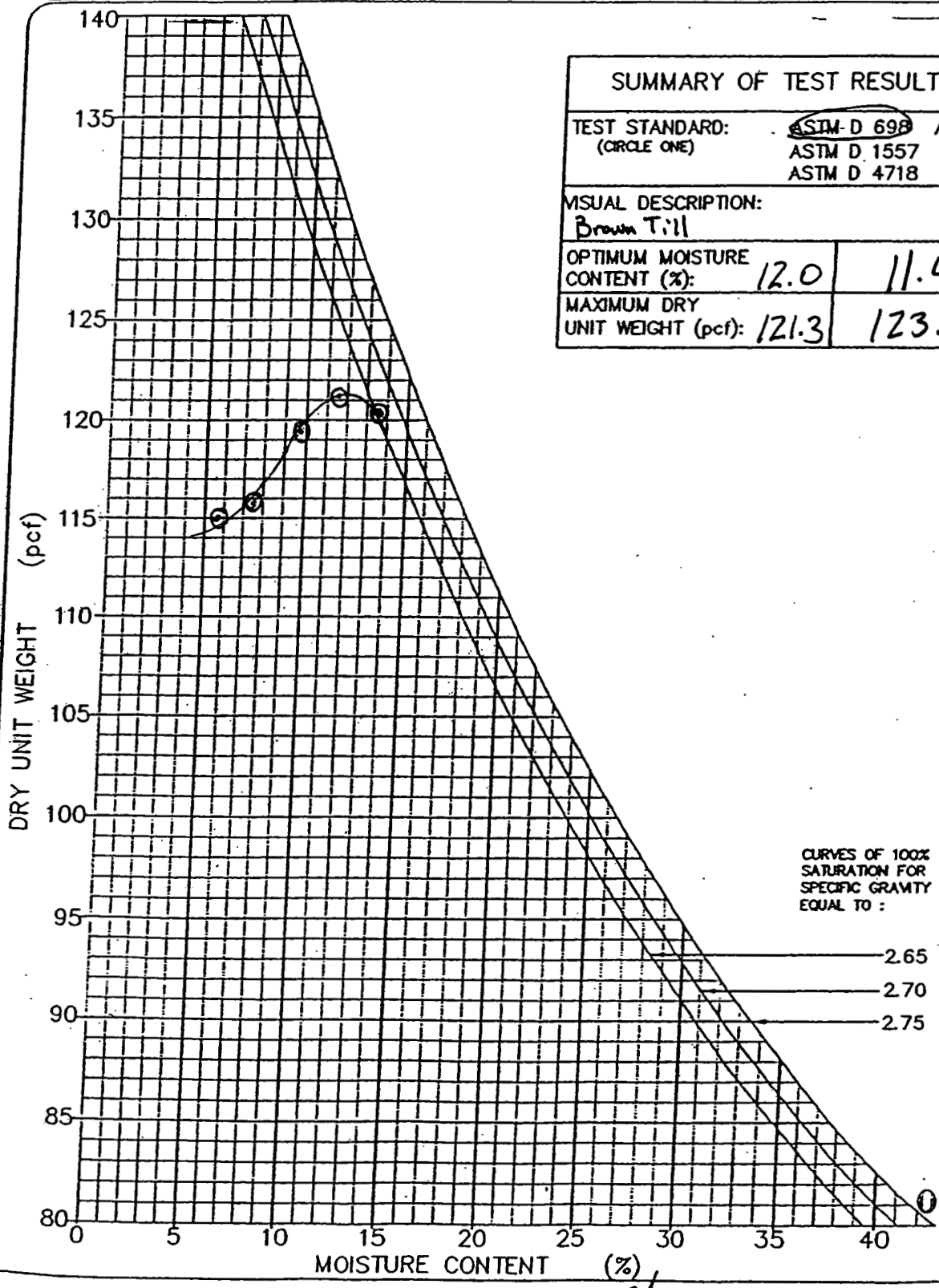
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day August month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-6 SAMPLE NO.: LP02-39

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	12.0	11.4	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	121.3	123.3	CS



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 69134 — TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 15 day Aug month 2002 year

SAMPLE NO.: LP02-40

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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% 13.42	6% 13.68	8% 13.89	10% 13.81	QA ID: KS
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6087.3	6205.2	6300.5	6264.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1882.8	2000.7	2096.0	2059.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.3	132.0	138.3	135.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.6	120.5	123.9	119.6	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

							QA ID: KS
	TARE NO.		107	610	92	90	
F	WT. OF TARE	(grams)	8.1	8.2	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	361.1	342.2	394.6	315.4	
H	WT. OF DRY SOIL & TARE	(grams)	336.4	313.2	354.3	278.7	
I	WT. OF WATER = G − H	(grams)	24.7	29.0	40.3	36.7	
J	WT. DRY SOIL = H − F	(grams)	328.3	305.0	346.1	270.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.5	9.5	11.6	13.6	
			1.075	1.095	1.116	1.136	

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SHEET NO. 6 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134/ TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-40 STD

Weight of Total Sample	=	22570.6
Weight of Oversize Fraction	=	408.7
Weight of Finer Fraction (- 3/8)	=	22161.9
Percentage of Oversize Fraction	= (P_C)	1.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.119
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	123.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 11.7\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 124.5$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

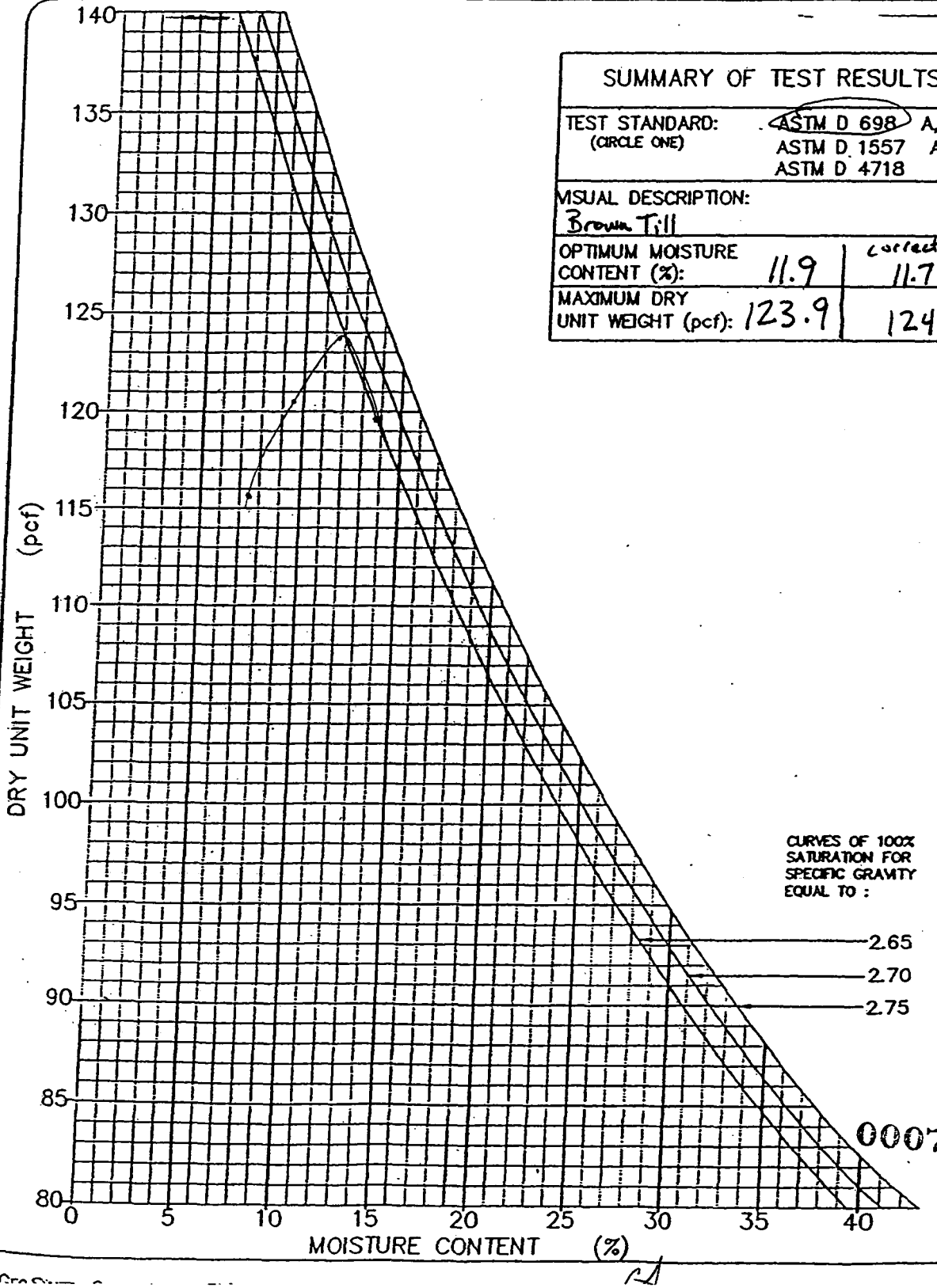
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-06 SAMPLE NO.: 02-40

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	11.9	corrected 11.7	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	123.9	124.5	CS



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO. 69134 TASK NO.: 04.1

MATERIAL TYPE: LP Clay

DATE: 12 day August month 2002 year

SAMPLE NO.: LP02-41

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED	(ml)	13.33	13.47	13.68	13.87	13.89
A	WT. OF SOIL & MOLD	(grams)	4%	6%	8%	10%	12%
B	WT. OF MOLD	(grams)	6046.5	6110.0	6205.2	6291.4	6300.5
C	WT. OF SOIL = A - B	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
D	WET UNIT WT.(1) = C X 0.066	(pcf)	1842.0	1905.5	2000.7	2086.9	2096.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	121.6	125.8	132.0	137.7	138.3
			115.8	117.7	121.3	124.5	123.2

QA ID: CMW

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

	TARE NO.		#603	#202	#14	#608	#114
F	WT. OF TARE	(grams)	8.2	8.3	8.3	8.3	8.4
G	WT. OF WET SOIL & TARE	(grams)	505.8	497.4	375.5	432.6	426.6
H	WT. OF DRY SOIL & TARE	(grams)	482.3	466.0	345.9	391.9	380.7
I	WT. OF WATER = G - H	(grams)	23.5	31.4	29.6	40.7	45.9
J	WT. DRY SOIL = H - F	(grams)	474.1	457.7	337.6	383.6	372.3
K	MOISTURE CONTENT = (I/J) X 100	(%)	4.96	6.86	8.77	10.61	12.33
			5.0	6.9	8.8	10.6	12.3

QA ID: CMW

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 12 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1241 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 14 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-41

Weight of Total Sample	=	22570.6
Weight of Oversize Fraction	=	408.7
Weight of Finer Fraction (- 3/8)	=	22161.9
Percentage of Oversize Fraction	= (P_C)	1.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.113
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	125.3
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 11.1\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 125.9 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

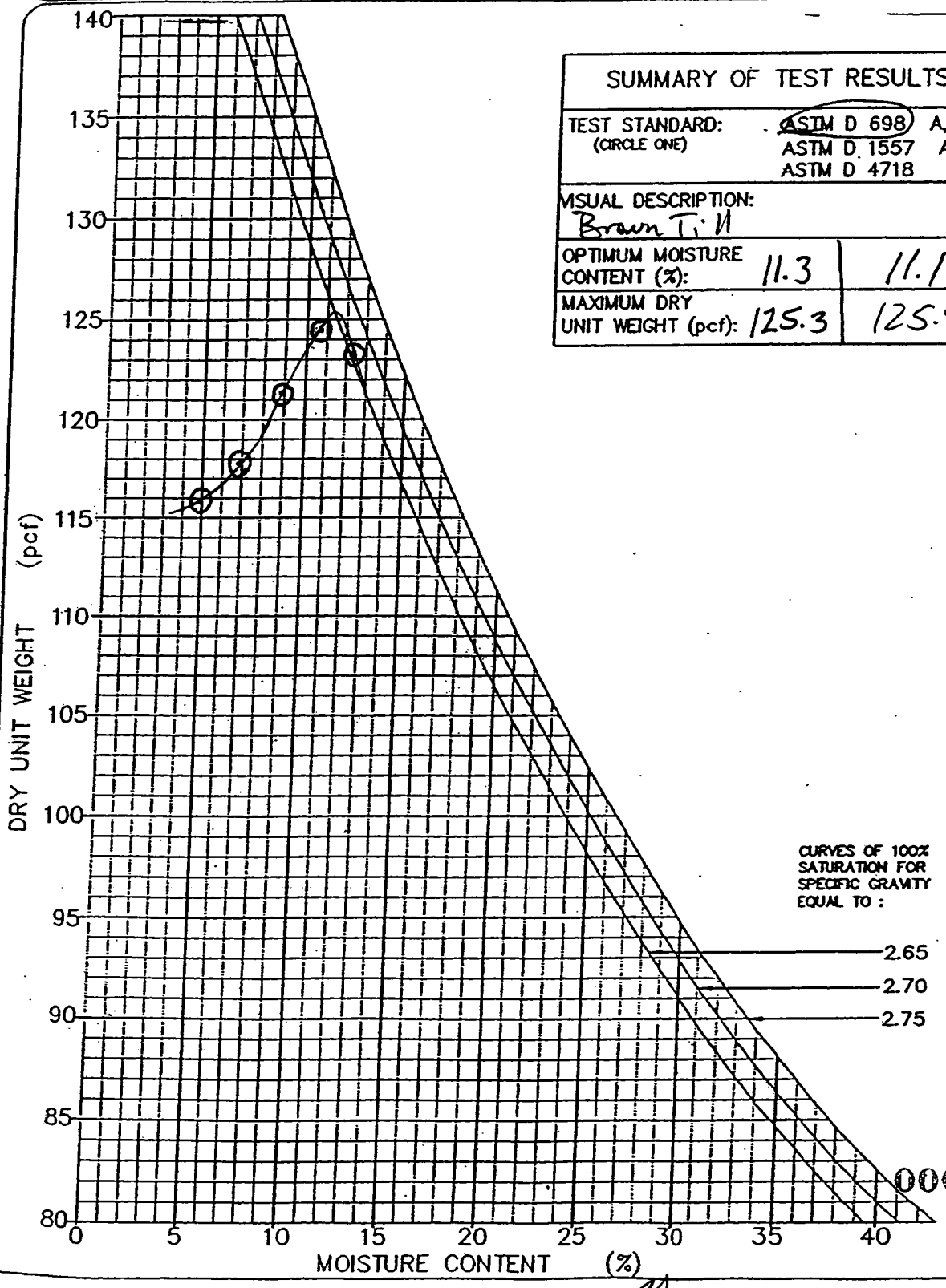
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day August month 2002 year

MATERIAL TYPE: MATERIAL SOURCE: Stockpile 02-6 SAMPLE NO.: LP02-41

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		QA
VISUAL DESCRIPTION: Brown Till			QA
OPTIMUM MOISTURE CONTENT (%):	11.3	11.1	QA
MAXIMUM DRY UNIT WEIGHT (pcf):	125.3	125.9	QA



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 15 day Aug month 2002 year

SAMPLE NO.: LP02-42

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DLE

			13.74	13.35	13.56	13.70	13.81
	WATER ADDED	(ml)	12%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6232.5	6055.6	6150.8	6214.3	6264.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	2028.0	1851.1	1946.3	2009.8	2059.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.8	122.2	128.5	132.6	135.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.9	114.1	118.5	120.8	120.8

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: DLE

	TARE NO.		#95	#67	#52	#103	#614
F	WT. OF TARE	(grams)	8.1	8.1	8.1	8.3	8.2
G	WT. OF WET SOIL & TARE	(grams)	512.5	469.0	499.7	551.3	536.1
H	WT. OF DRY SOIL & TARE	(grams)	445.0	438.6	461.5	502.9	477.6
I	WT. OF WATER = G − H	(grams)	67.5	30.4	38.2	48.4	58.5
J	WT. DRY SOIL = H − F	(grams)	436.9	430.5	453.4	494.6	469.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.4	7.1	8.4	9.8	12.5

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SHEET NO. 1 OF 2

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP82-42 STD

Weight of Total Sample	=	54178.1
Weight of Oversize Fraction	=	1585.7
Weight of Finer Fraction (- 3/8)	=	52592.4
Percentage of Oversize Fraction	= (P_C)	2.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	~~0.0~~ 0.11
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_\omega = 10.7\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 122.1 \text{ pcf}$$

2 of 3

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

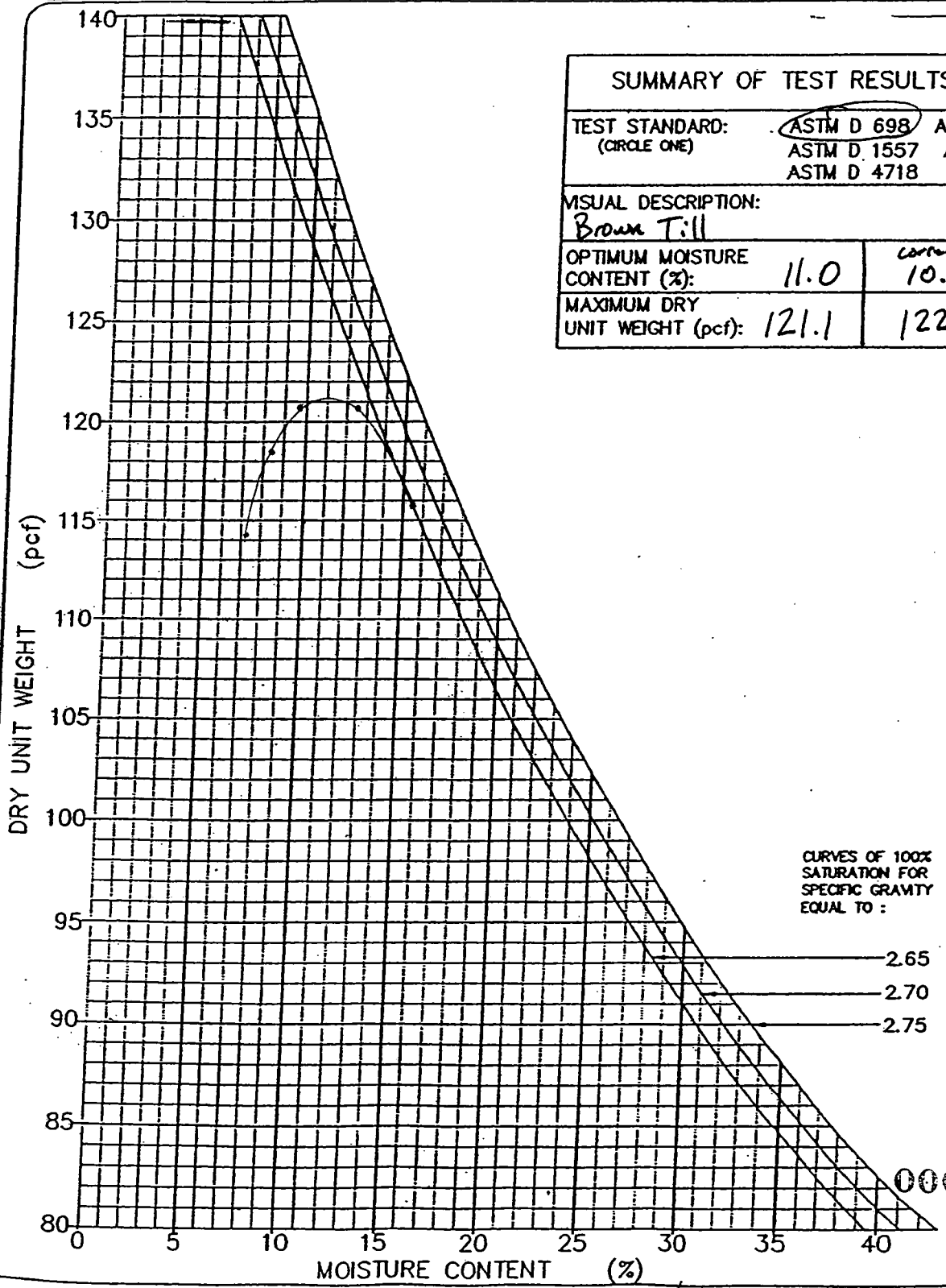
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 16 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-07 SAMPLE NO.: LP02.42

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	11.0	corrected 10.7	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	121.1	122.1	CS



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 15 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: SAMPLE NO.: CL02-42

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

13.95

COMPACTION OF SOIL — QA ID: CHW

			13.65	13.82	14.05	14.11	
	WATER ADDED	(ml)	2%	4%	6%	8%	10%
A	WT. OF SOIL & MOLD	(grams)	6191.6	6268.8	6373.1	6400.3	6327.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1987.1	2064.3	2168.6	2195.8	2123.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.1	136.2	143.1	144.9	140.1
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	125.7	128.4	132.4	131.3	124.4

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: CHW

	TARE NO.		#630	#603	#601	#14	#608
F	WT. OF TARE	(grams)	8.1	8.2	8.2	8.3	8.2
G	WT. OF WET SOIL & TARE	(grams)	388.1	394.3	327.9	330.6	363.8
H	WT. OF DRY SOIL & TARE	(grams)	372.3	372.1	304.0	300.3	323.9
I	WT. OF WATER = G − H	(grams)	15.8	22.2	23.9	30.3	39.9
J	WT. DRY SOIL = H − F	(grams)	364.2	363.9	295.8	292.0	315.7
K	MOISTURE CONTENT = (I/J) X 100	(%)	4.3	6.1	8.1	10.4	12.6

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-42 MOD

Weight of Total Sample	=	54178.1
Weight of Oversize Fraction	=	~~1736.2~~ 1585.7
Weight of Finer Fraction (- 3/8)	=	52592.4
Percentage of Oversize Fraction	= (P_C)	2.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.092
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	133.8
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

~~$C_w = 8.9\%$~~ $C_w = 9.0\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 134.6$ pcf

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GEOSYNTEC CONSULTANTS

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MOISTURE-DENSITY RELATIONSHIP

5368

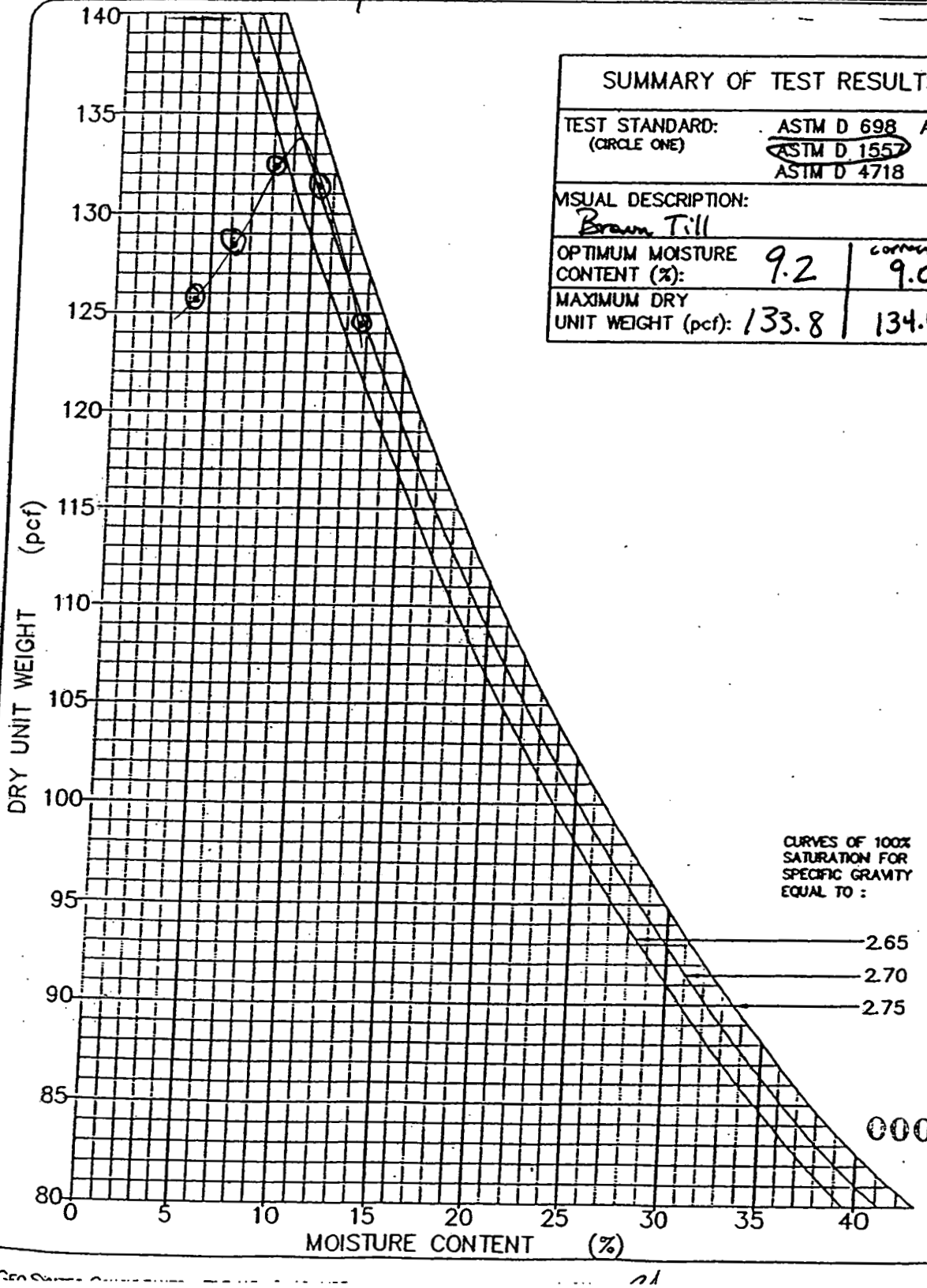
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 16 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-7A 42

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CL
VISUAL DESCRIPTION: Brown Till			CL
OPTIMUM MOISTURE CONTENT (%):	9.2	corrected 9.0	CL
MAXIMUM DRY UNIT WEIGHT (pcf):	133.8	134.6	CL



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 15 day Aug month 2002 year

SAMPLE NO.: LPB02-44

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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. 13.68

COMPACTION OF SOIL

QA ID: DCE

				13.22	13.51	13.72	
	WATER ADDED	(ml)		6%	8%	10%	12%
A	WT. OF SOIL & MOLD	(grams)		5996.6	6128.1	6223.4	6205.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)		1792.1	1923.6	2018.9	2000.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)		118.3	127.0	133.2	132.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		107.9	113.8	116.6	~~110.7~~ 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: DCE

	TARE NO.			#91	#602	#94	#613
F	WT. OF TARE	(grams)		8.2	8.2	8.1	8.2
G	WT. OF WET SOIL & TARE	(grams)		496.8	500.9	511.1	558.3
H	WT. OF DRY SOIL & TARE	(grams)		454.2	449.6	448.5	479.3
I	WT. OF WATER = G − H	(grams)		42.6	51.3	62.6	79.0
J	WT. DRY SOIL = H − F	(grams)		446.0	441.4	440.4	~~441.1~~ 471.1
K	MOISTURE CONTENT = (I/J) X 100	(%)		9.6	11.6	14.2	~~19.2~~ 16.8

5368

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 602131 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-44 STD

Weight of Total Sample	=	21343.1
Weight of Oversize Fraction	=	378.5
Weight of Finer Fraction (- 3/8)	=	20964.6
Percentage of Oversize Fraction	= (P_C)	1.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.144
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	116.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 14.2\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 117.3 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

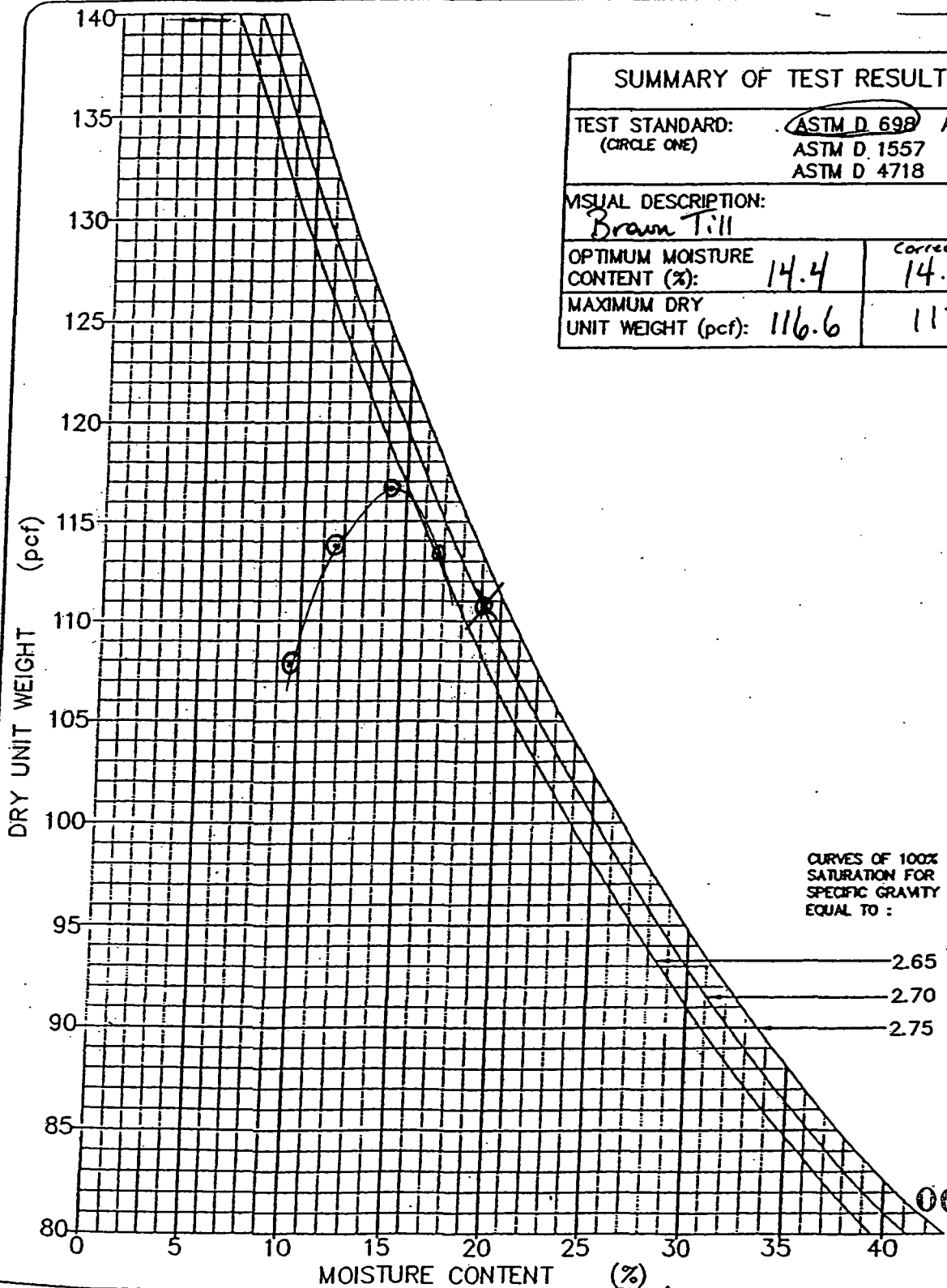
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 16 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-44

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	14.4	Corrected 14.2	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	116.6	117.3	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 69134 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 17 day Aug month 2002 year

SAMPLE NO.: LP02-45

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.38	6% 13.63	8% 13.80	10% 13.70	
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	6069.2	6182.6	6259.7	6214.3	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1864.7	1978.1	2055.2	2009.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.1	130.6	135.6	132.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.6	117.0	119.6	115.3	

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: KS

	TARE NO.		202	604	65	676	
F	WT. OF TARE	(grams)	8.2	8.3	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	312.2	266.0	369.3	365.7	
H	WT. OF DRY SOIL & TARE	(grams)	286.3	239.2	326.7	319.1	
I	WT. OF WATER = G - H	(grams)	25.9	26.8	42.6	46.6	
J	WT. DRY SOIL = H - F	(grams)	278.1	230.9	318.5	310.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.3	11.6	13.4	15.0	

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134/TASK NO. 04.1

DESCRIPTION: Phase II DATE: 19 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-45 STD

Weight of Total Sample	=	45831.8
Weight of Oversize Fraction	=	956.9
Weight of Finer Fraction (-3/8)	=	44874.9
Percentage of Oversize Fraction	= (P_C)	2.1
Percentage of Finer Fraction (-3/8)	= (P_F)	97.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.134
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 13.2 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 120.3 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

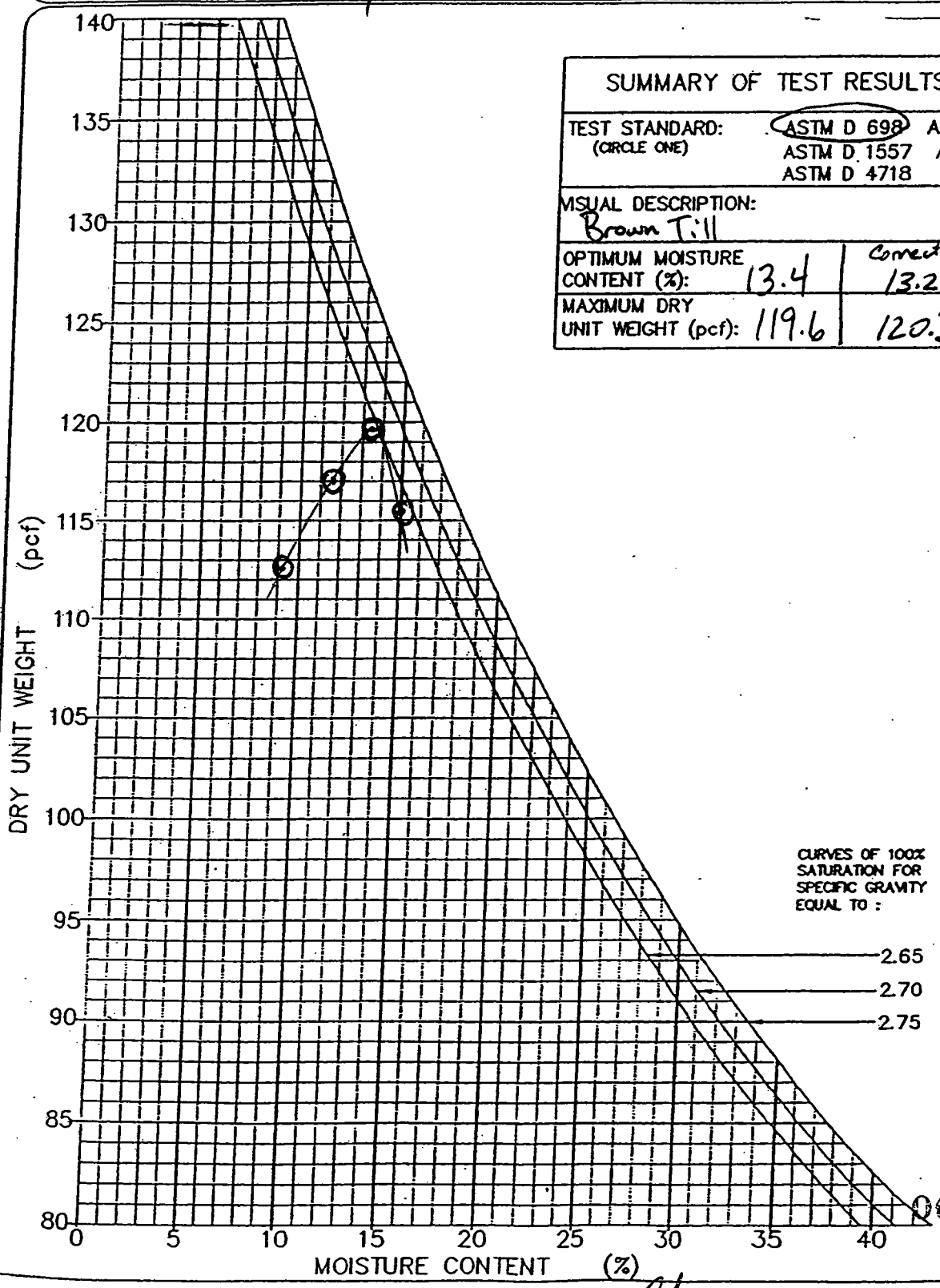
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 60134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: 280245

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CL
VISUAL DESCRIPTION: Brown Till			CL
OPTIMUM MOISTURE CONTENT (%):	13.4	Corrected 13.2	CL
MAXIMUM DRY UNIT WEIGHT (pcf):	119.6	120.3	CL



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase III

DATE: 17 day August month ~~2002~~ year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LPØ2-45

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL — QA ID: CAH

			13.72	14.Ø4	13.97	13.83	
	WATER ADDED	(ml)	2%	4%	6%	8%	
A	WT. OF SOIL & MOLD	(grams)	6223.4	6368.5	6336.8	6273.3	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2018.9	2164.Ø	2132.3	2068.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.2	142.8	14Ø.7	136.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	124.5	13Ø.2	125.7	119.5	

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: CAH

	TARE NO.		#49	#12	#227	#97	
F	WT. OF TARE	(grams)	8.2	8.3	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	345.1	296.5	345.8	307.3	
H	WT. OF DRY SOIL & TARE	(grams)	323.1	271.0	309.9	270.2	
I	WT. OF WATER = G − H	(grams)	22.Ø	25.5	35.9	37.1	
J	WT. DRY SOIL = H − F	(grams)	314.8	262.7	301.6	262.Ø	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.Ø	9.7	11.9	14.2	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 19 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-45 mod

Weight of Total Sample	=	45831.8
Weight of Oversize Fraction	=	956.9
Weight of Finer Fraction (- 3/8)	=	44784.9
Percentage of Oversize Fraction	= (P_C)	2.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.1
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	130.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 9.8\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 131.2 \text{ pcf}$$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

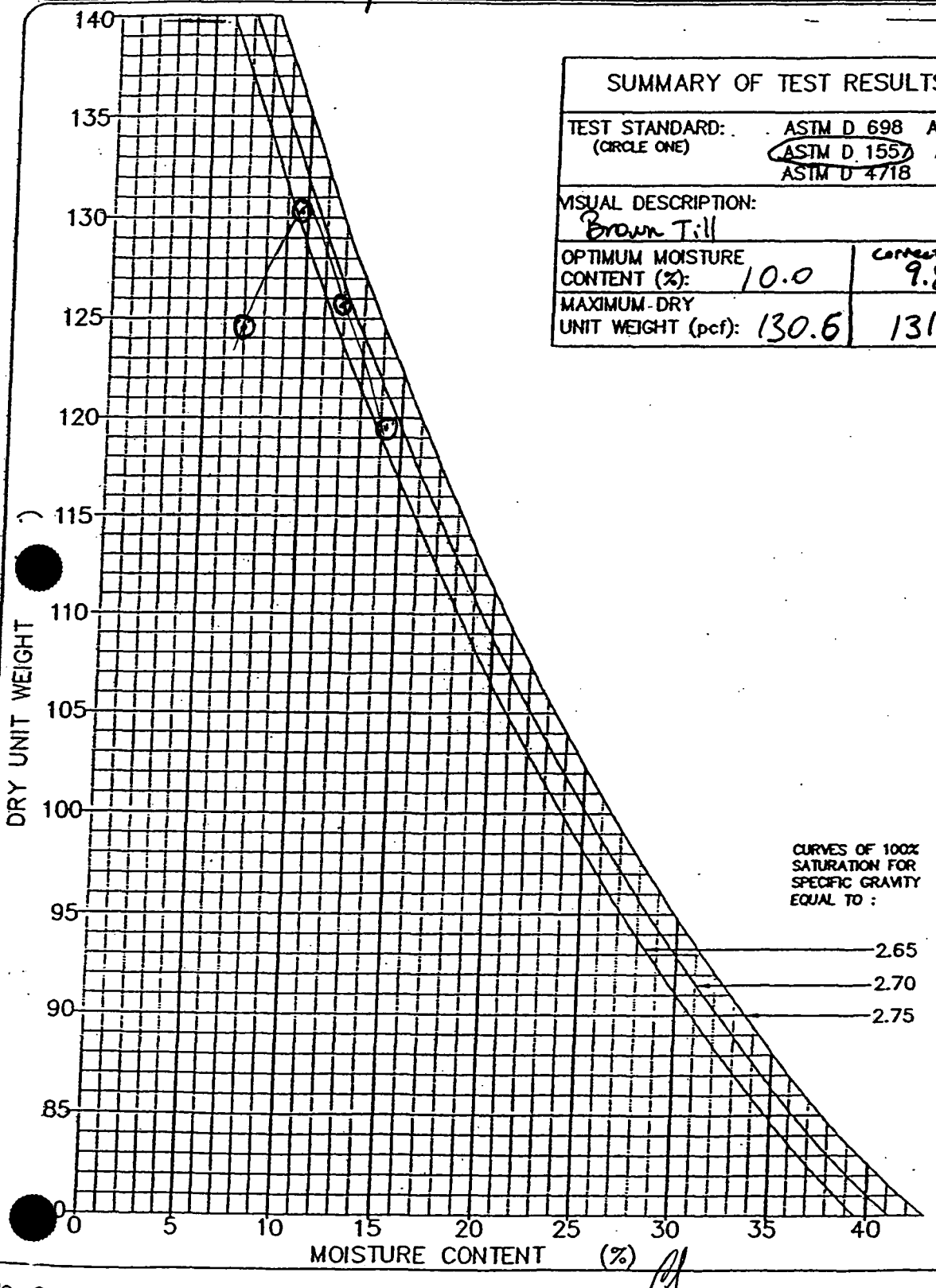
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GG1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day August month 02 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-45

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	10.0	corrected 9.8	CJ
MAXIMUM-DRY UNIT WEIGHT (pcf):	130.6	131.2	CJ



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

ASTM D698 ~~(ASTM D 1557 METHOD B)~~

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 16 day August month 2002 year

MATERIAL TYPE: LPC Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: CL02-46

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

13.39

COMPACTION OF SOIL QA ID: CHW

			13.62	13.81	13.78	13.64	
	WATER ADDED	(ml)	4%	6%	8%	10%	2%
A	WT. OF SOIL & MOLD	(grams)	6178.0	6264.2	6250.6	6187.1	6073.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1973.5	2059.7	2046.1	1982.6	1869.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.3	135.9	135.0	130.9	123.4
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.0	120.6	117.9	112.3 ~~123.4~~	114.2

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: CHW

	TARE NO.		#604	#676	#202	#647	#65
F	WT. OF TARE	(grams)	8.3	8.4	8.3	8.2	8.2
G	WT. OF WET SOIL & TARE	(grams)	378.0	379.3	339.1	340.1	434.4
H	WT. OF DRY SOIL & TARE	(grams)	343.3	337.6	297.2	292.7	402.3
I	WT. OF WATER = G − H	(grams)	34.7	41.7	41.9	47.4	32.1
J	WT. DRY SOIL = H − F	(grams)	335.0	329.2	288.9	284.5	394.1
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.4	12.7	14.5	16.6	8.1

1.104 1.127 1.145 1.165 1.081

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G21341 TASK NO. 041

DESCRIPTION: Phase IV DATE: 17 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-46 @ ~~MOD~~ STD

Weight of Total Sample	=	24015.0
Weight of Oversize Fraction	=	1454.3
Weight of Finer Fraction (- 3/8)	=	22560.7
Percentage of Oversize Fraction	= (P_C)	6.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.9
Specific Gravity (Assumed)	= (G_M)	~~6~~ 2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.130
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.8
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 12.3\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 122.9 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

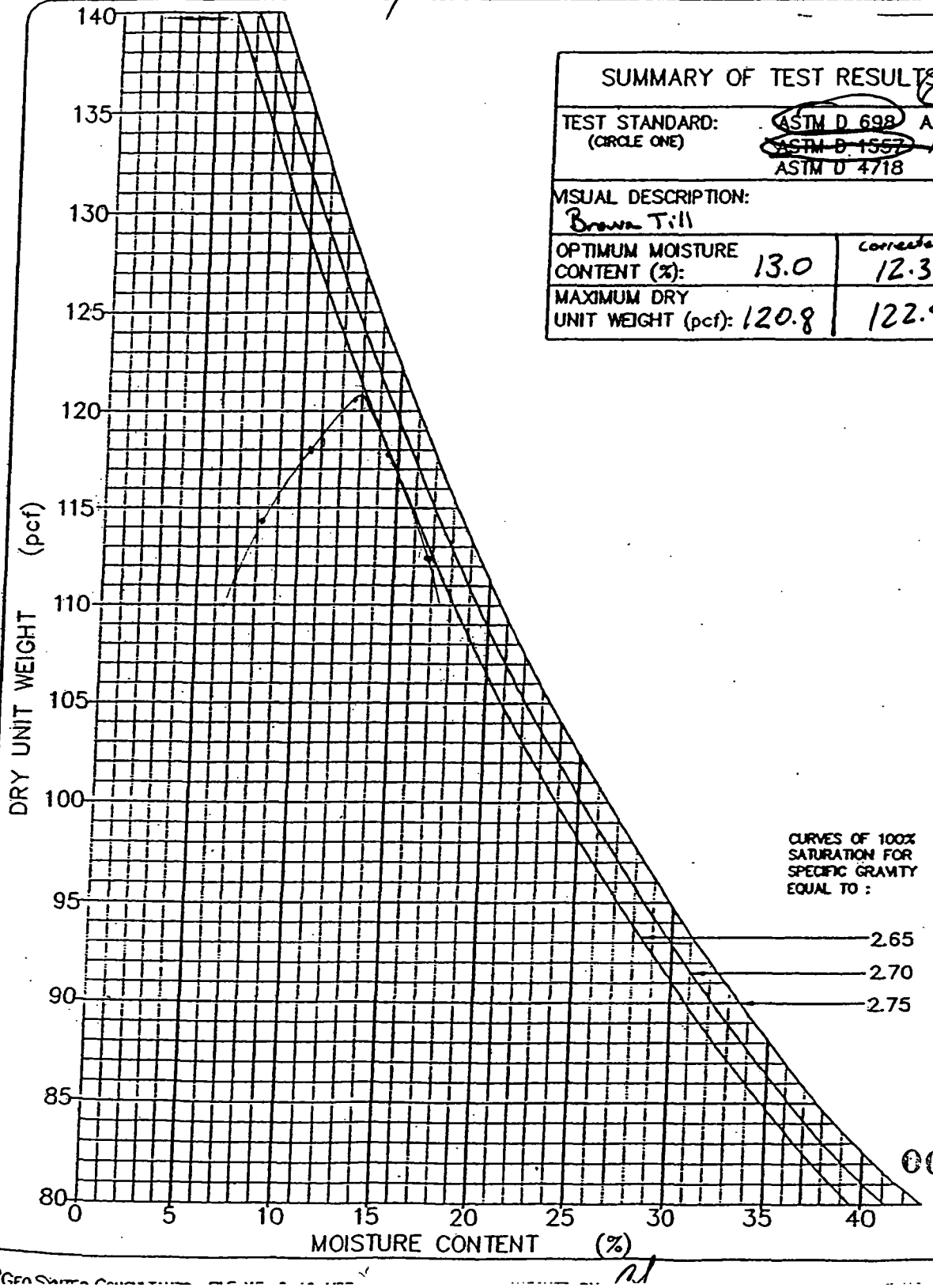
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GR1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 17 day Aug month 2002 year

MATERIAL TYPE: L P Clay MATERIAL SOURCE: Stockpile 02-07 SAMPLE NO. LP02-46

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ~~ASTM D 1557 A, B, C~~ ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	13.0	corrected 12.3	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	120.8	122.9	CS



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 69134 TASK NO.: 04.1

DATE: 17 day Aug month 2002 year

MATERIAL TYPE: Low Perm. Clay

SAMPLE NO.: LP02-47

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.37	6% 13.59	8% 13.77	10% 13.72	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6064.6	6164.4	6246.1	6223.4	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1860.1	1959.9	2041.6	2018.9	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	122.8	129.4	134.7	133.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.4	117.3	119.7	117.0	

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: KS

	TARE NO.		110	309	605	615	
F	WT. OF TARE	(grams)	8.0	8.1	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	310.7	324.2	334.1	397.6	
H	WT. OF DRY SOIL & TARE	(grams)	287.7	294.7	298.0	350.3	
I	WT. OF WATER = G − H	(grams)	23.0	29.5	36.1	47.3	
J	WT. DRY SOIL = H − F	(grams)	279.7	286.6	289.7	342.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.2	10.3	12.5	13.8	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 19 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-47 STD

Weight of Total Sample	=	45558.0
Weight of Oversize Fraction	=	1733.8
Weight of Finer Fraction (- 3/8)	=	43824.2
Percentage of Oversize Fraction	= (P_C)	3.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.123
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 11.9\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 121.3$ pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

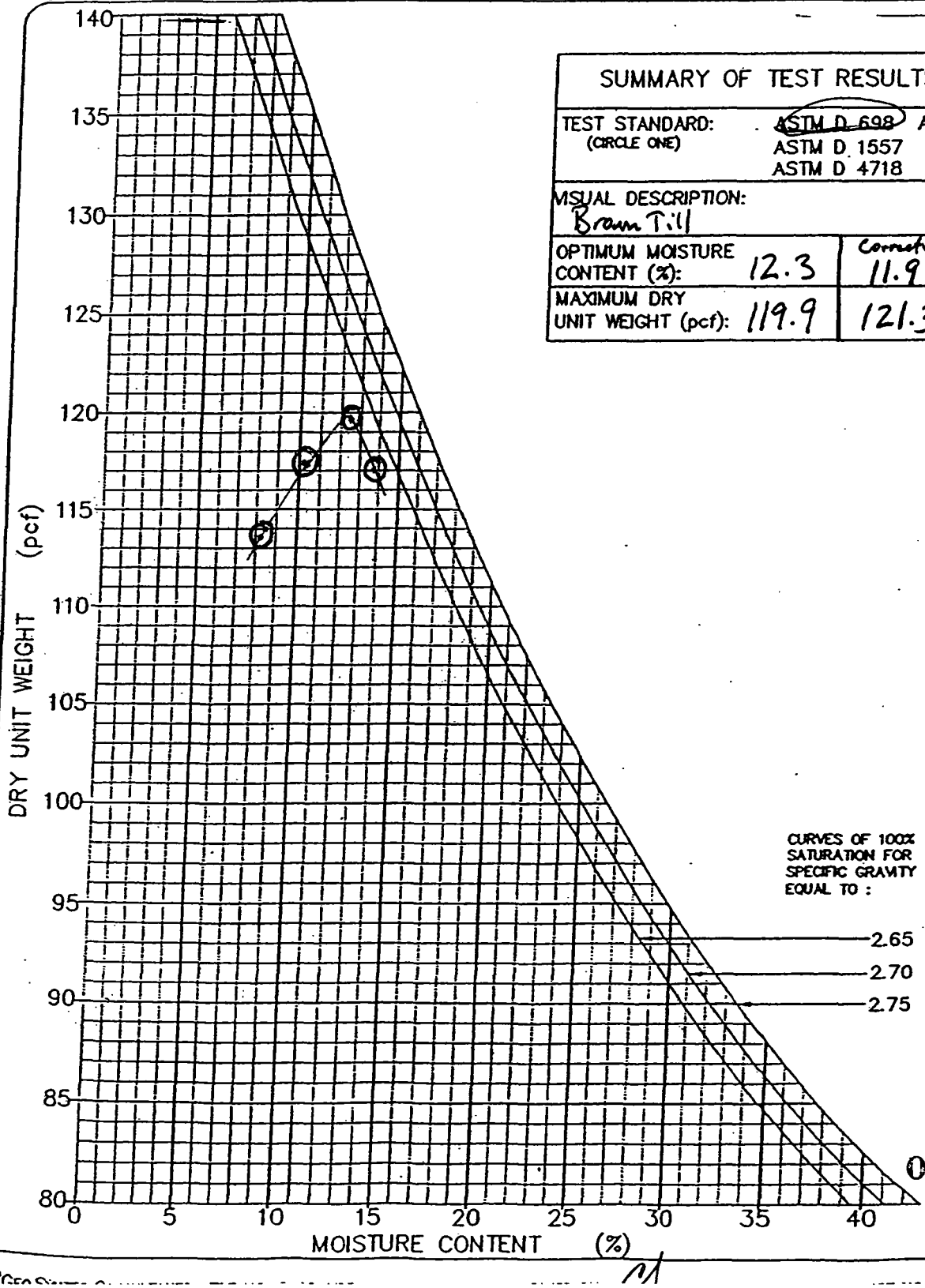
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GG1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP0247

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	12.3	Corrected 11.9	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	119.9	121.3	CA



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ134 TASK NO.: 04.1

DATE: 17 day August month 2002 year

MATERIAL TYPE: LP Clay

MATERIAL SOURCE: Stockpile 02-7

SAMPLE NO.: LP02-47

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%,
AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL — QA ID: [illegible]

			13.82	13.98	14.07	13.90	
	WATER ADDED	(ml)	2%	4%	6%	8%	
A	WT. OF SOIL & MOLD	(grams)	6268.8	6341.3	6382.2	6305.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2064.3	2136.8	2177.7	2100.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	136.2	141.0	143.7	138.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	127.9	130.7	130.3	122.5	

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: [illegible]

	TARE NO.		#679	#645	#230	#48	
F	WT. OF TARE	(grams)	8.1	8.1	8.4	8.3	
G	WT. OF WET SOIL & TARE	(grams)	341.4	353.6	377.9	336.9	
H	WT. OF DRY SOIL & TARE	(grams)	321.0	328.4	343.5	298.8	
I	WT. OF WATER = G − H	(grams)	20.4	25.2	34.4	38.1	
J	WT. DRY SOIL = H − F	(grams)	312.9	320.3	335.1	290.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.5	7.9	10.3	13.1	

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ 1301 TASK NO. 041

DESCRIPTION: Phase II DATE: 19 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-47 Mod

Weight of Total Sample	=	45558.0
Weight of Oversize Fraction	=	1733.8
Weight of Finer Fraction (- 3/8)	=	43824.2
Percentage of Oversize Fraction	= (P_C)	3.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.2
Specific Gravity (Assumed)	= (G_M)	

(W_F) =	Water Content - 3/8 , as decimal	=	0.09
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	132.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 8.7 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 133.6 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

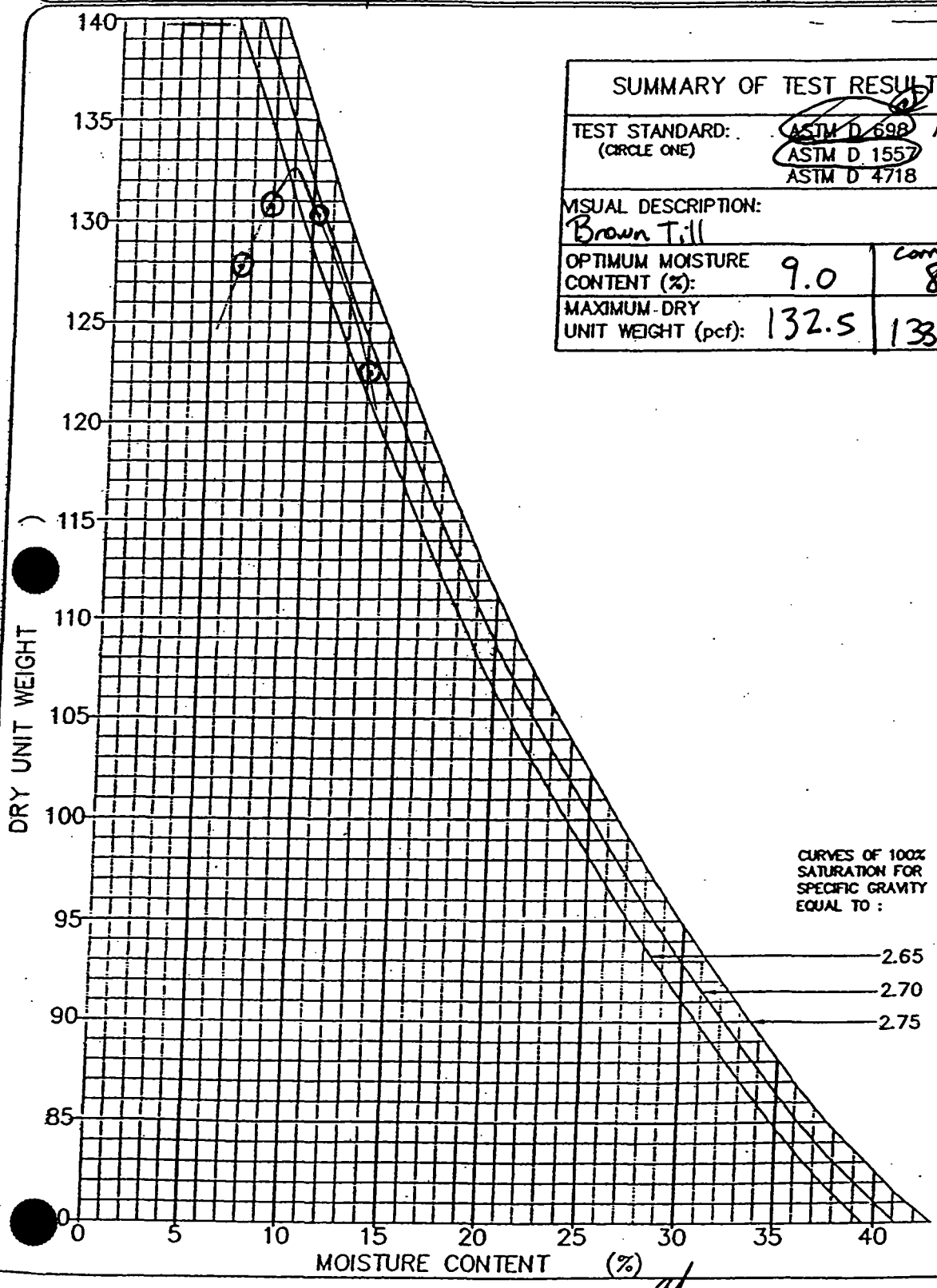
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day August month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP-02-47

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	9.0	corrected 8.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	132.5	133.6	CA



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 69141 TASK NO.: 04.1

DATE: 20 day Aug month 2002 year

SAMPLE NO.: LP02.48

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DZE

			13.44	13.61	13.86	13.83	13.72
	WATER ADDED	(ml)	4%	6%	8%	10%	12
A	WT. OF SOIL & MOLD	(grams)	6096.4	6173.5	6286.9	6273.3	6223.4
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1891.9	1969.0	2082.4	2068.7	2018.9
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.9	130.0	137.4	136.5	133.2
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.6	117.6	122.0	119.7	114.6

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: DZE

	TARE NO.		#97	#645	#97	#230	#679
F	WT. OF TARE	(grams)	8.2	8.1	8.2	8.3	8.1
G	WT. OF WET SOIL & TARE	(grams)	484.2	506.9	509.2	551.0	607.7
H	WT. OF DRY SOIL & TARE	(grams)	448.8	459.6	453.1	484.1	524.2
I	WT. OF WATER = G − H	(grams)	35.4	47.3	56.1	66.9	83.5
J	WT. DRY SOIL = H − F	(grams)	440.6	451.5	444.9	475.8	516.1
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.0	10.5	12.6	14.06	16.2

1.08 1.105 1.126 1.1406 1.162

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-48 STD

Weight of Total Sample	=	22846.1
Weight of Oversize Fraction	=	935.2
Weight of Finer Fraction (-3/8)	=	21910.9
Percentage of Oversize Fraction	= (P_C)	4.1
Percentage of Finer Fraction (-3/8)	= (P_F)	95.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	12.9
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	122.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 12.4\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 123.5 \text{ pcf}$$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

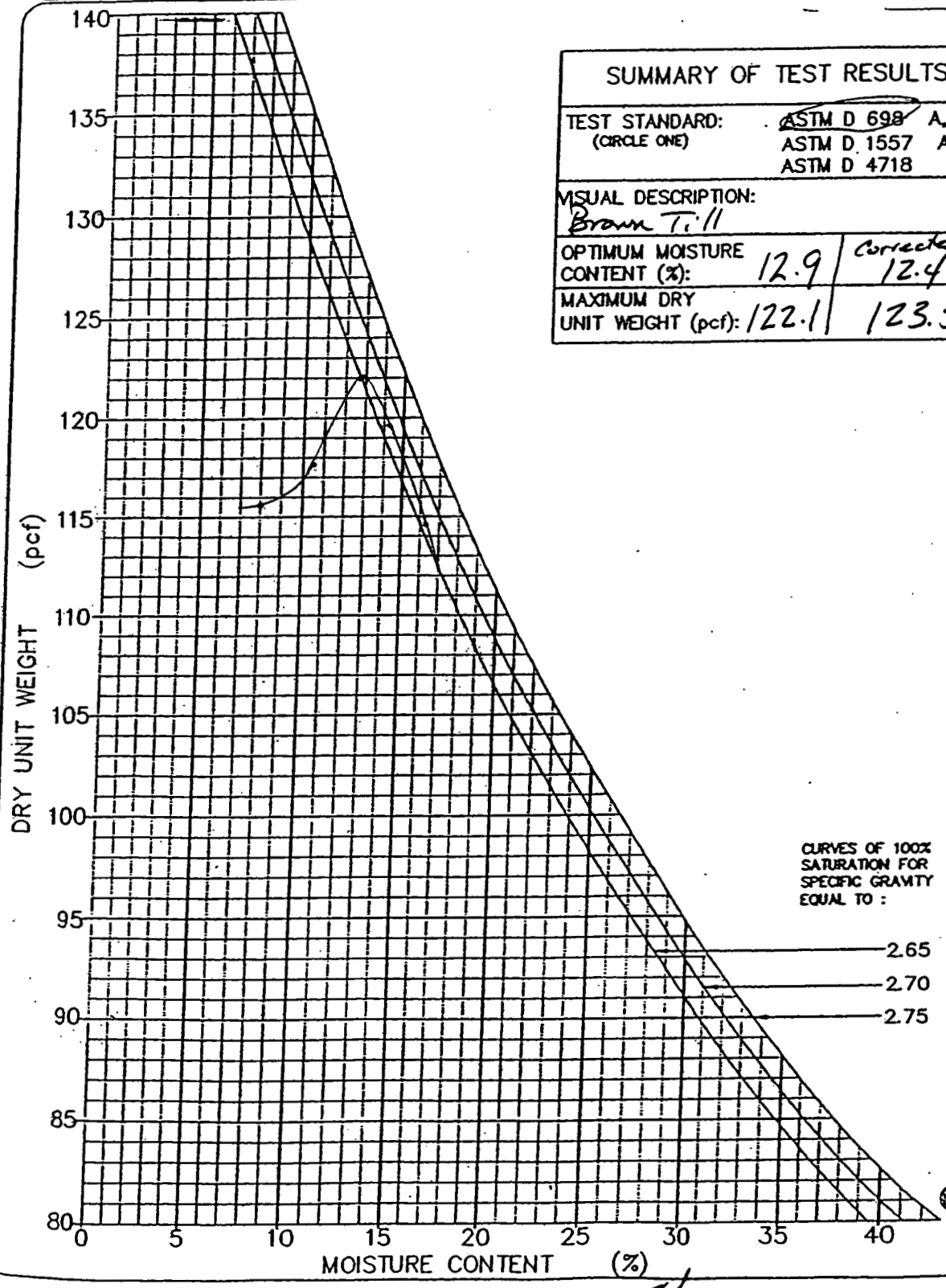
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-07 SAMPLE NO.: LP02-48

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.9	Corrected 12.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	122.1	123.5	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase III

PROJECT NO. 69134 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 22 day Aug month 2002 year

SAMPLE NO.: LP02.49

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.43	6% 13.68	8% 13.86	10% 13.78	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6091.8	6205.2	6286.9	6250.6	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1887.3	2000.7	2082.4	2046.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.6	132.0	137.4	135.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.3	119.5	121.7	117.6	

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: KS

	TARE NO.		96	308	600	98	
	WT. OF TARE	(grams)	8.1	8.1	8.2	8.2	
	WT. OF WET SOIL & TARE	(grams)	329.0	364.1	333.2	347.6	
	WT. OF DRY SOIL & TARE	(grams)	304.9	330.4	296.0	303.8	
	WT. OF WATER = G - H	(grams)	24.1	33.7	37.2	43.8	
J	WT. DRY SOIL = H - F	(grams)	296.8	322.3	287.8	295.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.1	10.5	12.9	14.8	

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SHEET NO. 1 OF 3

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 23 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-49 STD

Weight of Total Sample	=	35707.6
Weight of Oversize Fraction	=	1697.2
Weight of Finer Fraction (- 3/8)	=	34010.4
Percentage of Oversize Fraction	= (P_C)	4.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.123
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	122.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 11.8\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 123.7$ pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

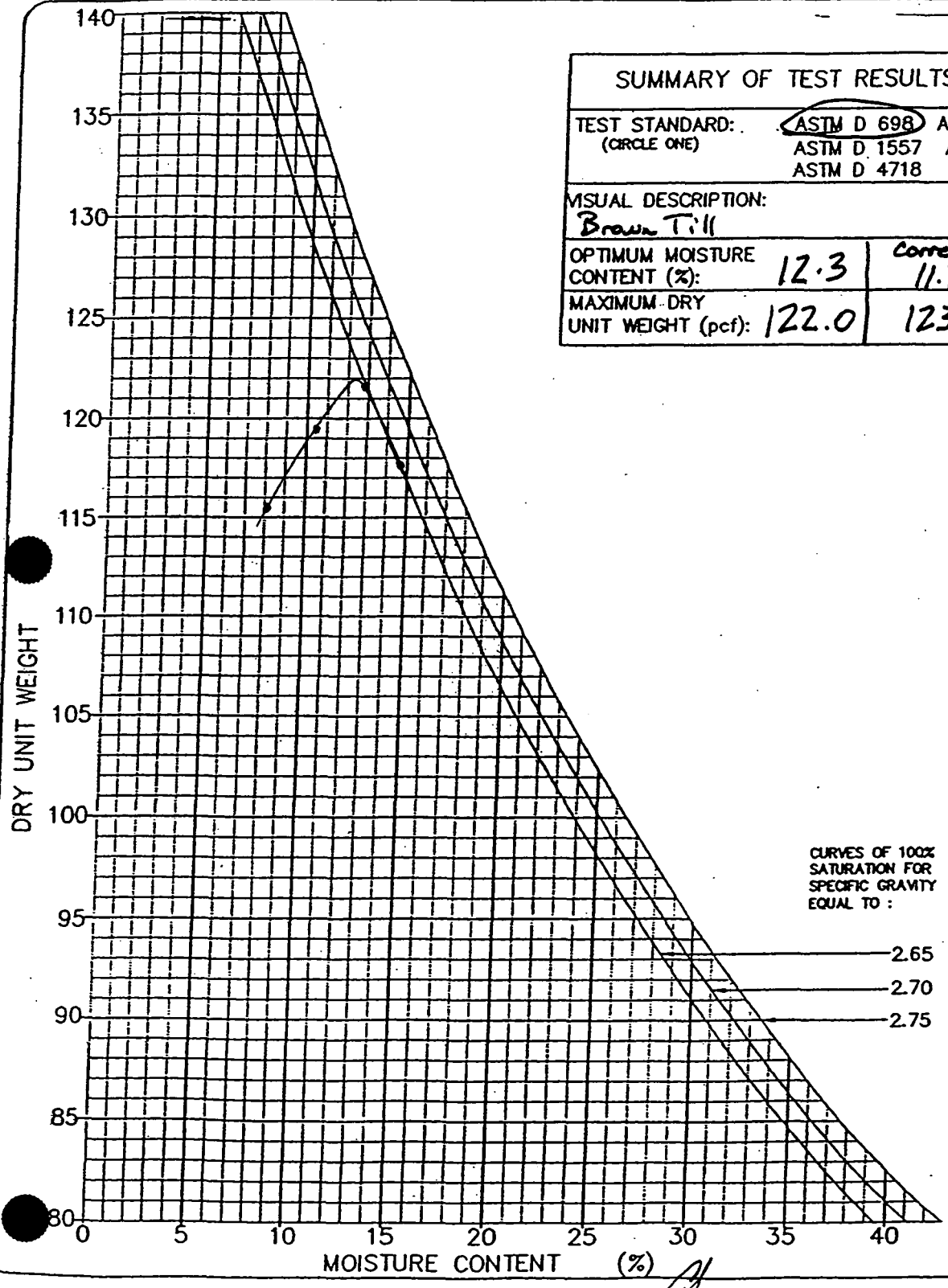
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 23 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LA02-49

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.3	Corrected 11.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	122.0	123.7	CJ



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FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 601341 TASK NO.: 04.1

DESCRIPTION: Phase II

DATE: 21 day Aug. month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02.49

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 13.98	4% 14.21	6% 14.26	8% 14.10	
	WATER ADDED	(ml)					
A	WT. OF SOIL & MOLD	(grams)	6341.3	6445.7	6468.3	6395.8	
B	WT. OF MOLD	(grams)	4272.2	4272.2	4272.2	4272.2	4272.2
C	WT. OF SOIL = A − B	(grams)	2069.1	2173.5	2196.1	2123.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	136.6	143.5	144.9	140.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	128.0	132.6	131.5	124.7	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: KS

	TARE NO.		#49	307	605	616	
F	WT. OF TARE	(grams)	8.2	8.0	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	345.8	296.5	294.6	279.1	
H	WT. OF DRY SOIL & TARE	(grams)	324.7	274.6	268.2	244.7	
I	WT. OF WATER = G − H	(grams)	21.1	21.9	26.4	29.4	
J	WT. DRY SOIL = H − F	(grams)	316.5	266.6	259.9	236.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.7	8.2	10.2	12.4	

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FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-49 MOD

Weight of Total Sample	=	35707.6
Weight of Oversize Fraction	=	1697.2
Weight of Finer Fraction (- 3/8)	=	34010.4
Percentage of Oversize Fraction	= (P_C)	4.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.091
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	133.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 8.7\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 135.3 \text{ pcf}$$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

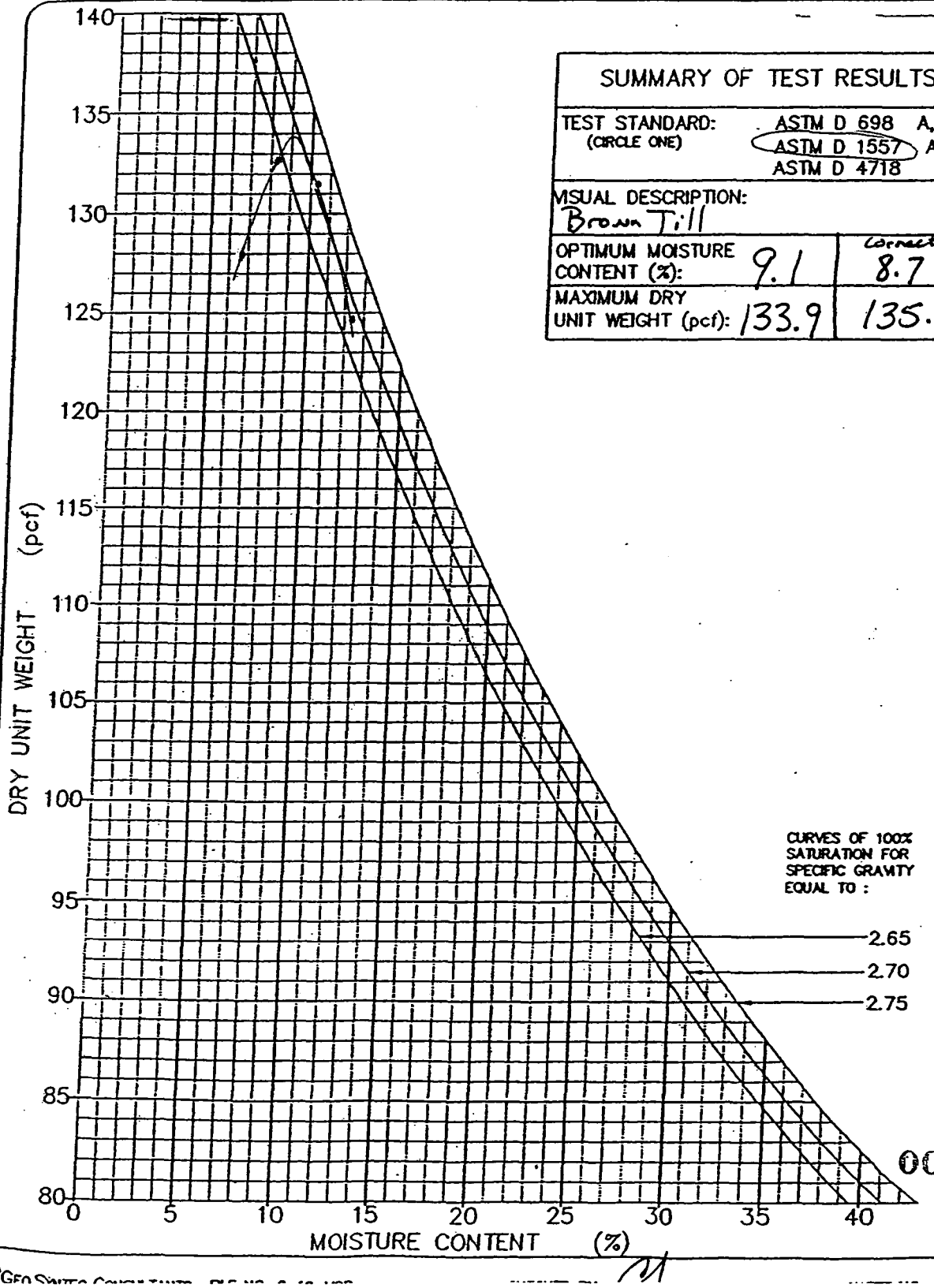
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02-49

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.1	Corrected 8.7	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	133.9	135.3	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 69134 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 22 day Aug month 2002 year

SAMPLE NO.: LP02-50

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: DLE

	WATER ADDED	(ml)		13.42	13.69	13.84	13.79
A	WT. OF SOIL & MOLD	(grams)		4%	6%	8%	10%
B	WT. OF MOLD	(grams)	4204.5	6087.3	6209.8	6277.8	6255.1
C	WT. OF SOIL = A − B	(grams)		4204.5	4204.5	4204.5	4204.5
D	WET UNIT WT.(1) = C X 0.066	(pcf)		1882.8	2005.3	2073.3	2050.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)		124.3	132.3	136.8	135.3
				114.4	119.1	121.1	117.4

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: DLE

	TARE NO.			#645	#230	#615	#97
F	WT. OF TARE	(grams)		8.1	8.3	8.2	8.1
G	WT. OF WET SOIL & TARE	(grams)		482.2	513.4	515.0	475.2
H	WT. OF DRY SOIL & TARE	(grams)		444.2	463.1	456.5	413.5
I	WT. OF WATER = G − H	(grams)		38.0	50.3	58.5	61.7
J	WT. DRY SOIL = H − F	(grams)		436.1	454.8	448.3	405.4
K	MOISTURE CONTENT = (I/J) X 100	(%)		8.7	11.1	13.0	15.2

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*GEO SYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 23 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-50 STD

Weight of Total Sample	=	20064.0
Weight of Oversize Fraction	=	668.7
Weight of Finer Fraction (- 3/8)	=	19395.3
Percentage of Oversize Fraction	= (P_C)	3.3
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.7
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.139
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$C_W = 13.5\%$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$C_{\delta D} = 122.6$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

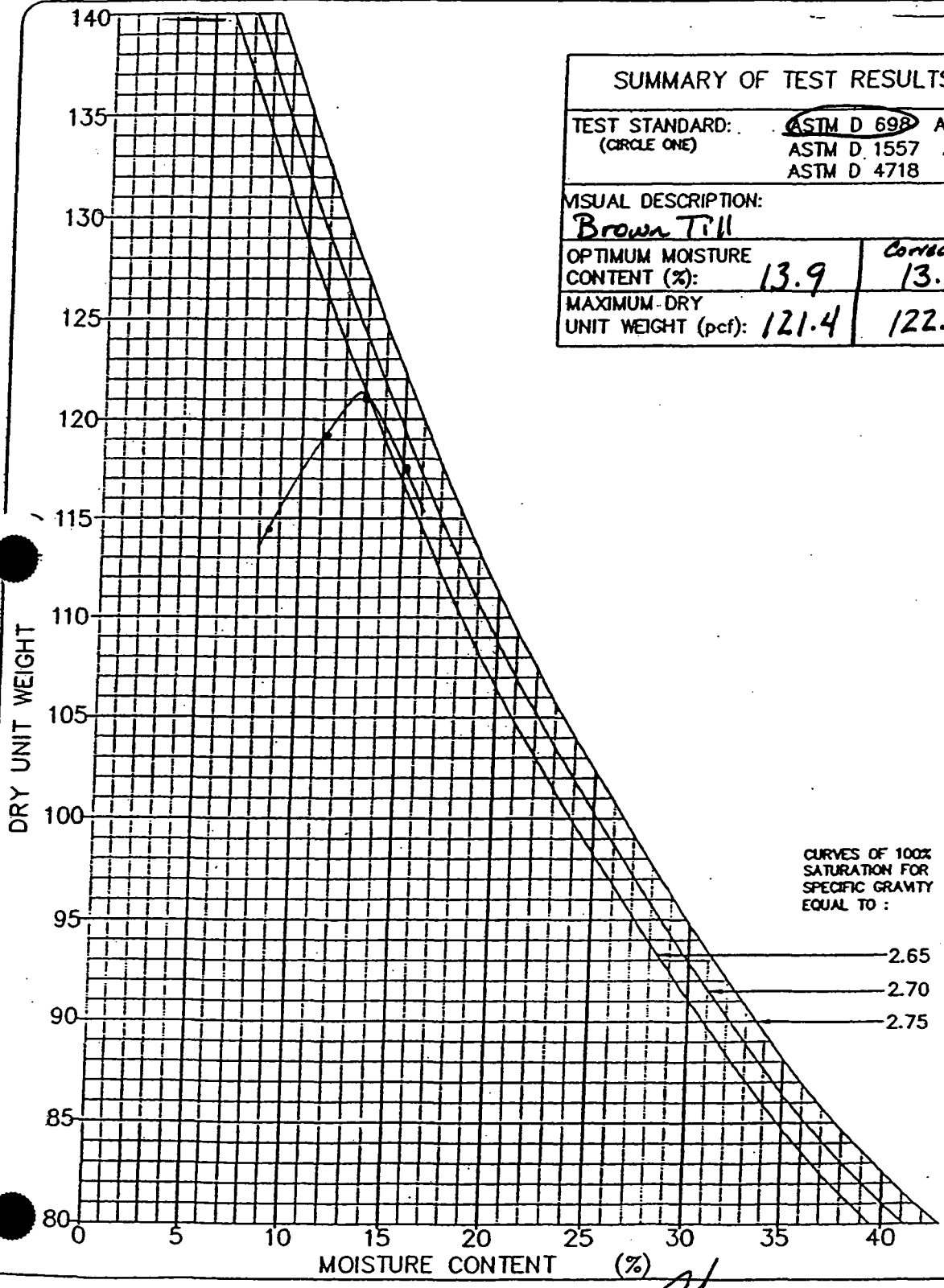
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 23 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02-S0

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.9	Corrected 13.5	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	121.4	122.6	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 21 day Aug month 2002 year

SAMPLE NO.: LP02-51

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

13.80

QA ID: DLE

			13.71	13.54	13.68	13.89	
	WATER ADDED	(ml)	0%	2%	4%	6%	8%
A	WT. OF SOIL & MOLD	(grams)	6218.9	6141.7	6205.2	6300.5	6259.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	2014.4	1937.2	2000.7	2096.0	2055.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.0	127.9	132.0	138.3	135.6
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.3	117.4	119.7	122.3	117.4

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: DLE/KS

	TARE NO.		#676	#230	#645	#90	#12
F	WT. OF TARE	(grams)	8.3	8.3	8.1	8.2	8.3
G	WT. OF WET SOIL & TARE	(grams)	549.9	522.9	542.7	587.4	533.8
H	WT. OF DRY SOIL & TARE	(grams)	473.6	481.0	492.8	520.4	463.1
I	WT. OF WATER = G - H	(grams)	76.3	41.9	49.9	67.0	70.7
J	WT. DRY SOIL = H - F	(grams)	465.3	472.7	484.7	512.2	454.8
K	MOISTURE CONTENT = (I/J) X 100	(%)	16.4	8.9	10.3	13.1	15.5

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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GeoSyntec Consultants

FLUOR FERNALD 5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134/TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-51 STD

Weight of Total Sample	=	46013.9
Weight of Oversize Fraction	=	2746.6
Weight of Finer Fraction (- 3/8)	=	43267.3
Percentage of Oversize Fraction	= (P_C)	6.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.13
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	122.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 12.3\ \%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 124.7\ pcf$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

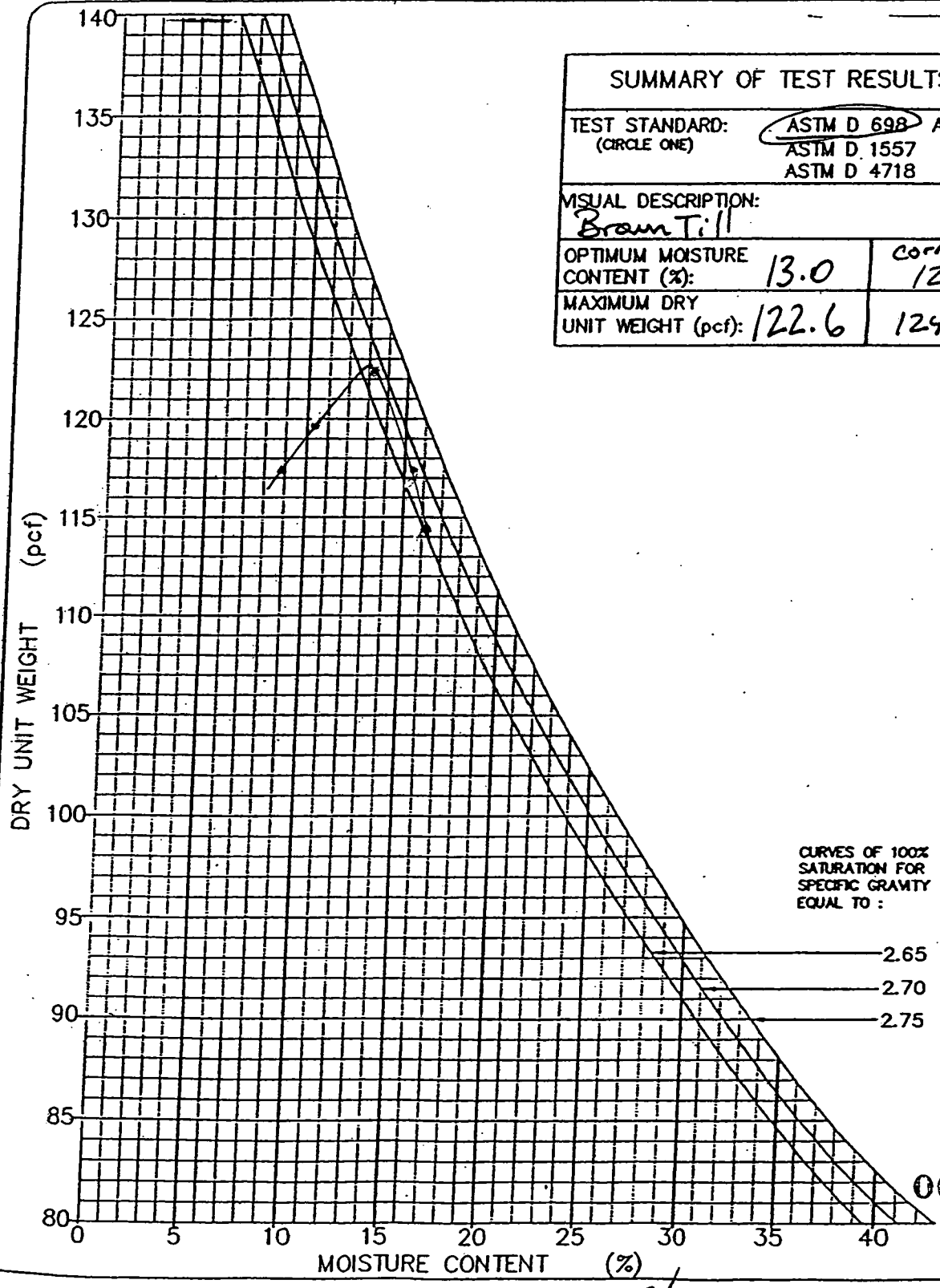
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LA02-51

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.0	corrected 12.3	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	122.6	124.7	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. GQ341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 21 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02-51

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 14.18	4% 14.25	6% 14.04	13.88 0%	
	WATER ADDED	(ml)	50 mL	100 mL	150 mL	200 mL	
A	WT. OF SOIL & MOLD	(grams)	6432.0	6463.8	6368.5	6296.0	
B	WT. OF MOLD	(grams)	4272.2	4272.2	4272.2	4272.2	
C	WT. OF SOIL = A - B	(grams)	2159.8	2191.6	2096.3	2023.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	142.5	144.6	138.4	133.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	131.2	131.5	122.5	126.3	

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: DLE/KS

	TARE NO.		#48	#202	#227	#615	
F	WT. OF TARE	(grams)	8.3	8.2	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	342.1	375.1	347.7	355.1	
H	WT. OF DRY SOIL & TARE	(grams)	315.6	341.8	308.7	336.0	
I	WT. OF WATER = G - H	(grams)	26.5	33.3	39.0	19.1	
J	WT. DRY SOIL = H - F	(grams)	307.3	333.6	300.4	327.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.62	9.98	13.0	5.8	

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1.0862 1.0998 1.130 1.058

GeoSyntec Consultants

FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-51 mod

Weight of Total Sample	=	46013.9
Weight of Oversize Fraction	=	2746.6
Weight of Finer Fraction (- 3/8)	=	43267.3
Percentage of Oversize Fraction	= (P_C)	6.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.094
(W_C) =	Water Content + 3/8 , as decimal	=	~~0.089~~ 0.015
(δ_F) =	Dry Density of finer fraction	=	132.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 0.089 = \underline{8.9\%}$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = \underline{134.2} \text{ pcf}$$

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

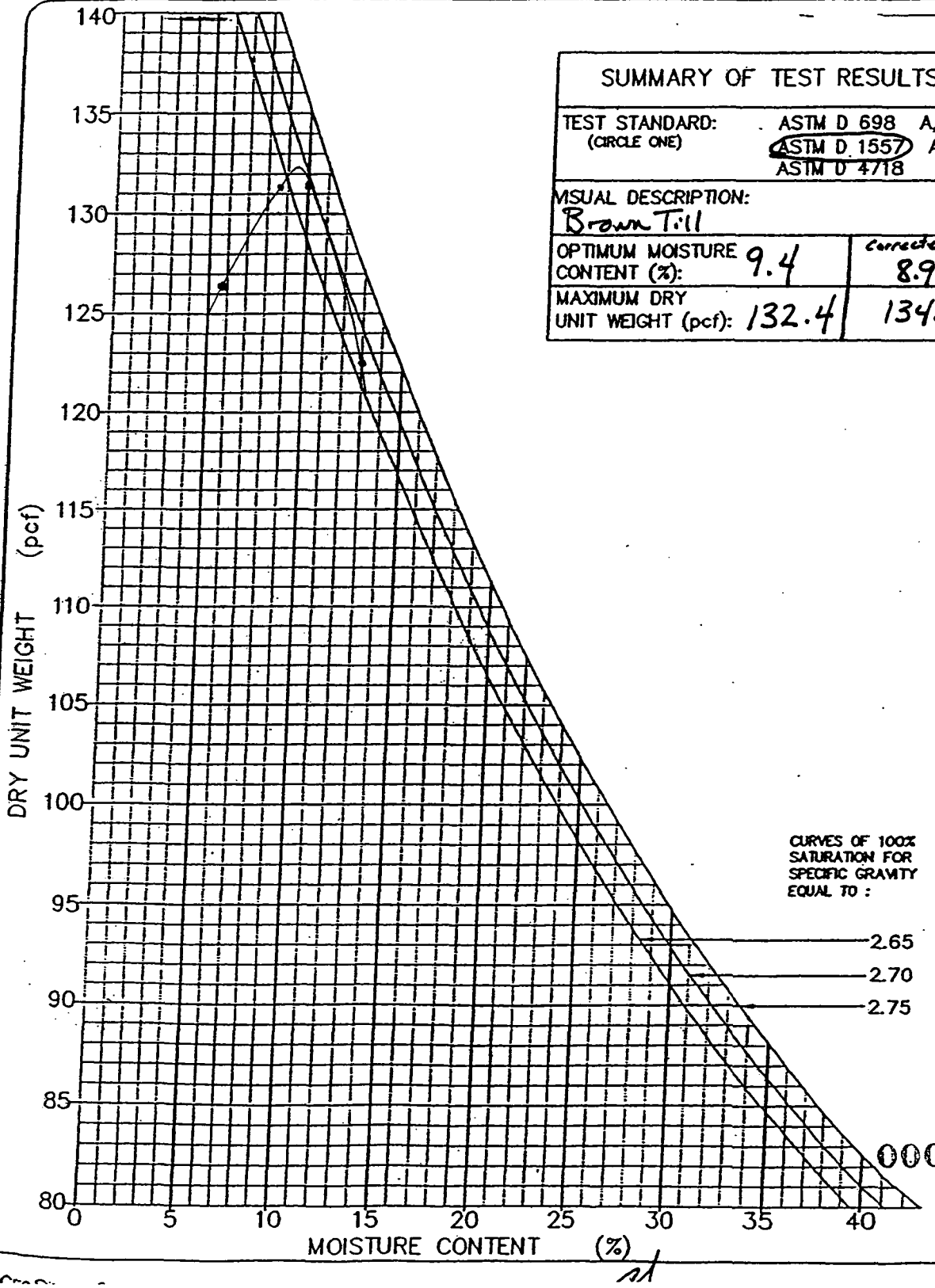
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 22 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP-02-51

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.4	corrected 8.9	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	132.4	134.2	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO. 69134 TASK NO.: 04.1

DATE: 23 day Aug month 2002 year

SAMPLE NO.: LP02-53

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.21	6% 13.45	8% 13.76	10% 13.72	
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	5992.1	6100.9	6241.5	6223.4	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1787.6	1896.4	2037.0	2018.9	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	118.0	125.2	134.4	133.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.1	114.2	120.3	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: KS

	TARE NO.		48	202	676	90	
F	WT. OF TARE	(grams)	8.3	8.2	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	309.5	310.3	393.3	310.2	
H	WT. OF DRY SOIL & TARE	(grams)	289.3	283.8	353.0	275.3	
I	WT. OF WATER = G - H	(grams)	20.2	26.5	40.3	34.9	
J	WT. DRY SOIL = H - F	(grams)	281.0	275.6	344.7	267.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.2	9.6	11.7	13.1	

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-53 STD

Weight of Total Sample	=	23025.2
Weight of Oversize Fraction	=	679.2
Weight of Finer Fraction (- 3/8)	=	22346.0
Percentage of Oversize Fraction	= (P_C)	2.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.118
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 11.5\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 121.4 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

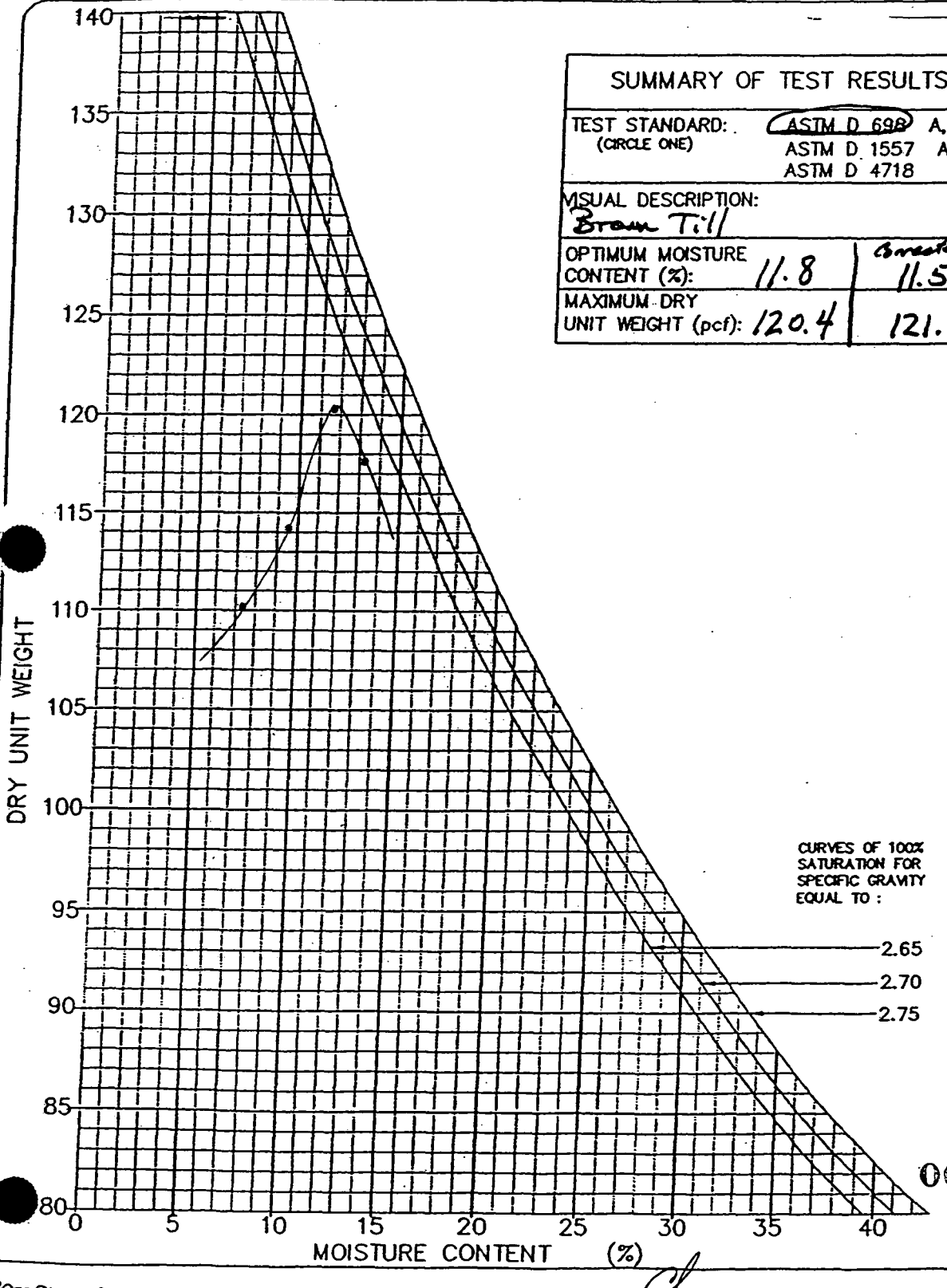
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 24 day Aug month 2ΦΦ2 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-8 SAMPLE NO.: LAΦ2-53

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CL
VISUAL DESCRIPTION: Brown Till			CL
OPTIMUM MOISTURE CONTENT (%):	11.8	Corrected 11.5	CL
MAXIMUM DRY UNIT WEIGHT (pcf):	120.4	121.4	CL



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase III

PROJECT NO.: 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 24 day Aug month 2002 year

SAMPLE NO.: LP02-54

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.46	6% 13.68	8% 13.82	10% 13.70	
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	6105.5	6205.2	6268.8	6214.3	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1901.0	2000.7	2064.3	2009.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	125.5	132.0	136.2	132.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.7	118.6	120.1	114.2	

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: KS

	TARE NO.		605	97	615	98	
F	WT. OF TARE	(grams)	8.4	8.2	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	360.8	295.1	377.3	344.2	
H	WT. OF DRY SOIL & TARE	(grams)	330.5	265.9	333.5	297.5	
I	WT. OF WATER = G - H	(grams)	30.3	29.2	43.8	46.7	
J	WT. DRY SOIL = H - F	(grams)	322.1	257.7	325.3	289.3	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.4	11.3	13.5	16.1	

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-54 STD

Weight of Total Sample	=	45429.3
Weight of Oversize Fraction	=	2117.9
Weight of Finer Fraction (-3/8)	=	43311.4
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (-3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.13
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 11.3\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 122.1 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

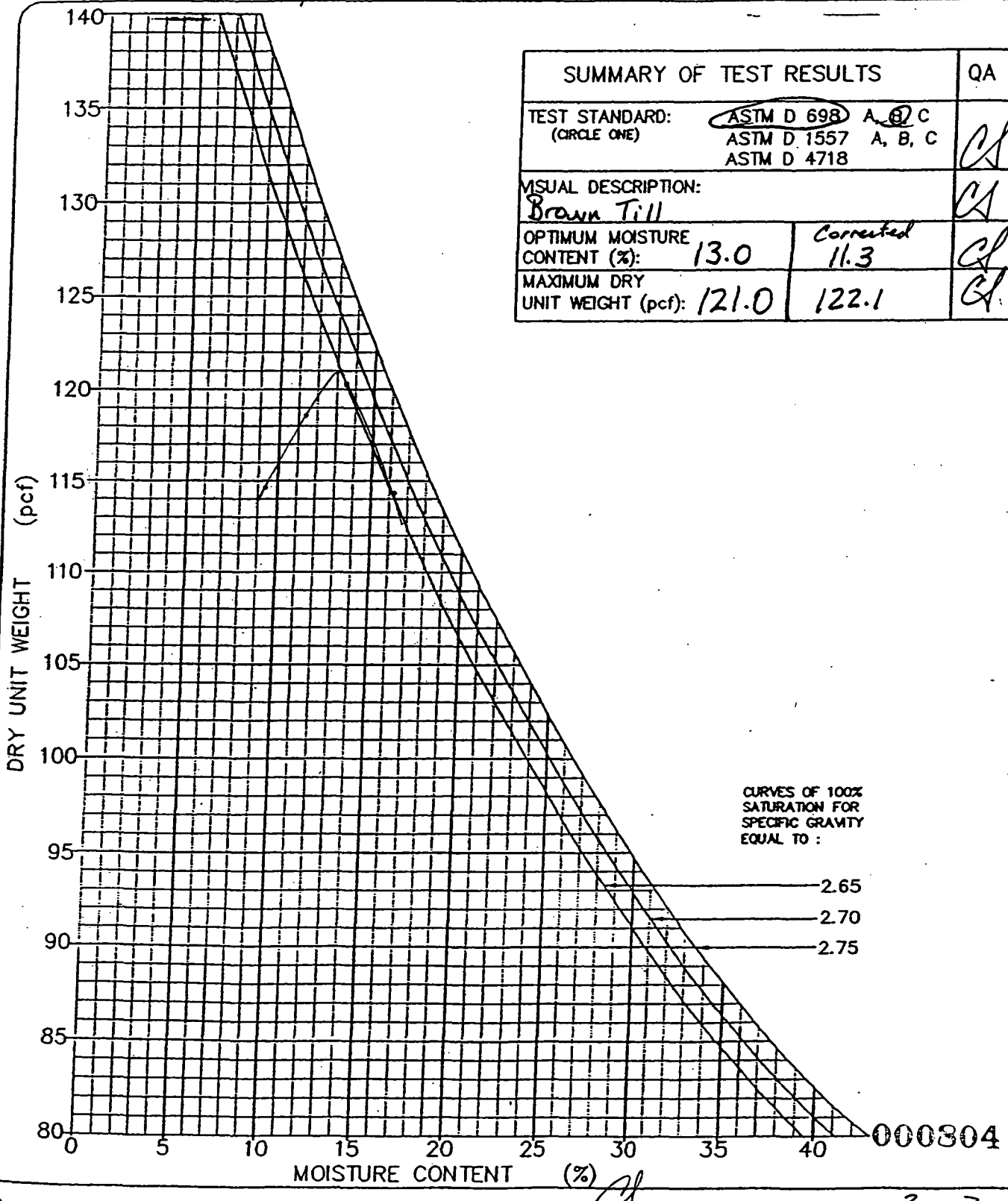
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-8 SAMPLE NO.: LP02-54

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	13.0	Corrected 11.3	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	121.0	122.1	CS



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 24 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02-54

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL QA ID: KS

			2% 13.81	4% 14.06	6% 14.01	0% 13.53	
	WATER ADDED	(ml)	50mL	100mL	150mL	0mL	
A	WT. OF SOIL & MOLD	(grams)	6264.2	6377.6	6354.9	6137.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2059.7	2173.1	2150.4	1932.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	135.9	143.4	141.9	127.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	127.4	130.8	127.2	121.9	

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: KS

	TARE NO.		12	48	90	202	
F	WT. OF TARE	(grams)	8.3	8.3	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	346.1	287.8	297.6	301.0	
H	WT. OF DRY SOIL & TARE	(grams)	324.9	263.2	267.5	288.1	
I	WT. OF WATER = G − H	(grams)	21.2	24.6	30.1	12.9	
J	WT. DRY SOIL = H − F	(grams)	316.6	254.9	259.3	279.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.7	9.7	11.6	4.6	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Clay Liner LP02-54 mod

Weight of Total Sample	=	45429.3
Weight of Oversize Fraction	=	2117.9
Weight of Finer Fraction (- 3/8)	=	43311.4
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	~~0.09~~ 0.09
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	130.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_ω = 8.7 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

C_{SD} = 131.9 pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

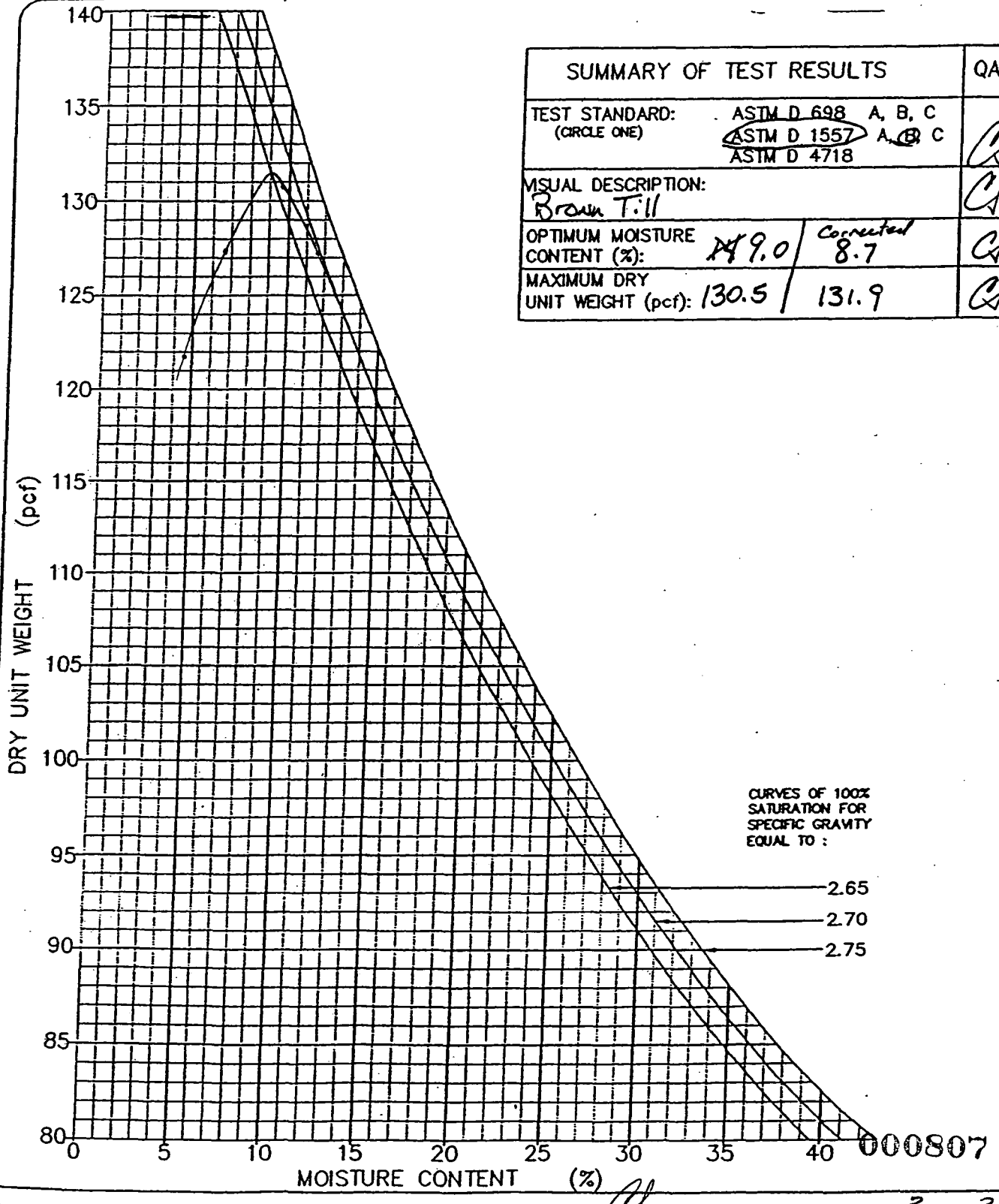
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LP02-54

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.0	Corrected 8.7	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	130.5	131.9	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 27 day Aug month 2002 year

SAMPLE NO.: LP02-55

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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% 13.20	6% 13.56	~~8% 13.68~~	10% 13.78	QA ID: KS 12% 13.64
	WATER ADDED	(ml)	100mL	150mL	~~200mL~~	250mL	300mL
A	WT. OF SOIL & MOLD	(grams)	5987.5	6150.8	~~6205.2~~	6250.6	6187.1
B	WT. OF MOLD	(grams)	4204.5	4204.5	~~4204.5~~	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1783.0	1946.3	~~2000.7~~	2046.1	1982.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.7	128.5	~~132.0~~ omit	135.0	130.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.9	116.5	~~117.9~~ omit	118.9	112.3

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: KS 12%
	TARE NO.		227	230	~~636~~	645	67
F	WT. OF TARE	(grams)	8.3	8.4	~~8.3~~	8.1	8.1
G	WT. OF WET SOIL & TARE	(grams)	362.8	352.8	~~307.1~~	342.9	351.8
H	WT. OF DRY SOIL & TARE	(grams)	339.3	320.7	~~275.0~~	303.1	302.8
I	WT. OF WATER = G − H	(grams)	23.5	32.1	~~32.1~~ omit	39.8	49.0
J	WT. DRY SOIL = H − F	(grams)	331.0	312.3	~~266.7~~	295.0	294.7
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.1	10.3	~~12.0~~	13.5	16.6

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1.071 1.120 1.135 1.166

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO **PROJECT NO.** G01341 **TASK NO.** 04.1

DESCRIPTION: Phase IV **DATE:** 4 **day** Sept **month** 2002 **year**

MATERIAL TYPE: Clay Liner LP02-55 STD

Weight of Total Sample	=	52977.4
Weight of Oversize Fraction	=	3236.9
Weight of Finer Fraction (- 3/8)	=	49740.5
Percentage of Oversize Fraction	= (P_C)	6.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.127
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	120.0
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_\omega = 12.0\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 122.2 \text{ pcf}$$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

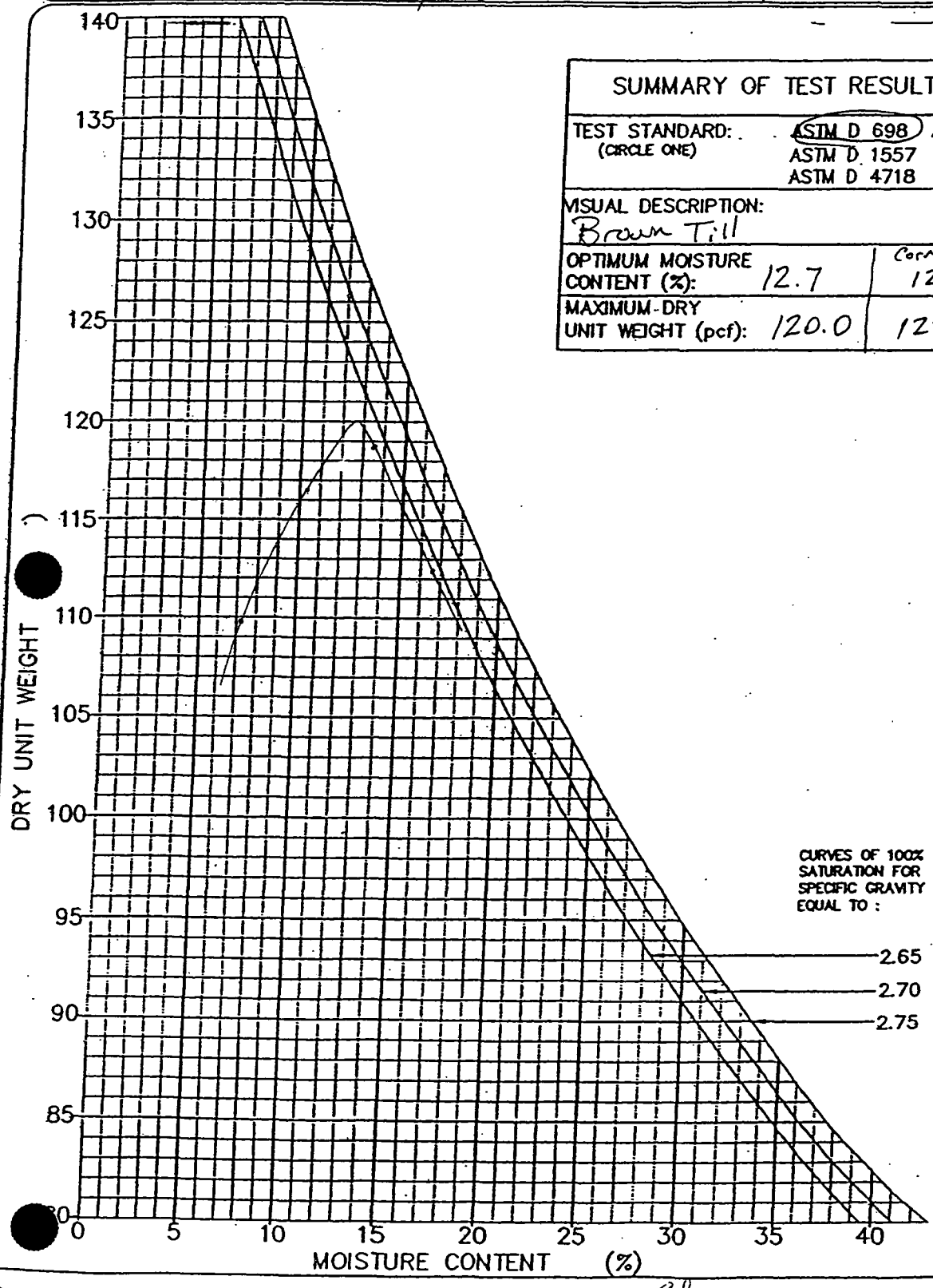
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GR1341 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 29 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: P02-55

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CL
VISUAL DESCRIPTION: Brown Till			CL
OPTIMUM MOISTURE CONTENT (%):	12.7	Corrected 12.0	CL
MAXIMUM-DRY UNIT WEIGHT (pcf):	120.0	122.2	CL



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 24 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-7 SAMPLE NO.: LP02-55

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: CS

			2% 13.73	4% 13.91	6% 14.08	8% 13.99	
	WATER ADDED	(ml)	50mL	100mL	150mL	200mL	
A	WT. OF SOIL & MOLD	(grams)	6227.9	6309.6	6386.7	6345.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2023.4	2105.1	2182.2	2141.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.5	138.9	144.0	141.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	125.6	129.4	131.3	126.3	

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: CS

	TARE NO.		309	676	616	49	
F	WT. OF TARE	(grams)	8.0	8.3	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	367.5	318.1	397.2	344.1	
H	WT. OF DRY SOIL & TARE	(grams)	346.2	296.9	362.9	308.3	
I	WT. OF WATER = G − H	(grams)	21.3	21.2	34.3	35.8	
J	WT. DRY SOIL = H − F	(grams)	338.2	288.6	354.7	300.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.3	7.3	9.7	11.9	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134/TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Clay Liner 2P02-55 mod

Weight of Total Sample	=	52977.4
Weight of Oversize Fraction	=	3236.9
Weight of Finer Fraction (- 3/8)	=	49740.5
Percentage of Oversize Fraction	= (P_C)	6.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	~~0.135~~ 0.085
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	132.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = ~~12.8~~ 8.1%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 134.3

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

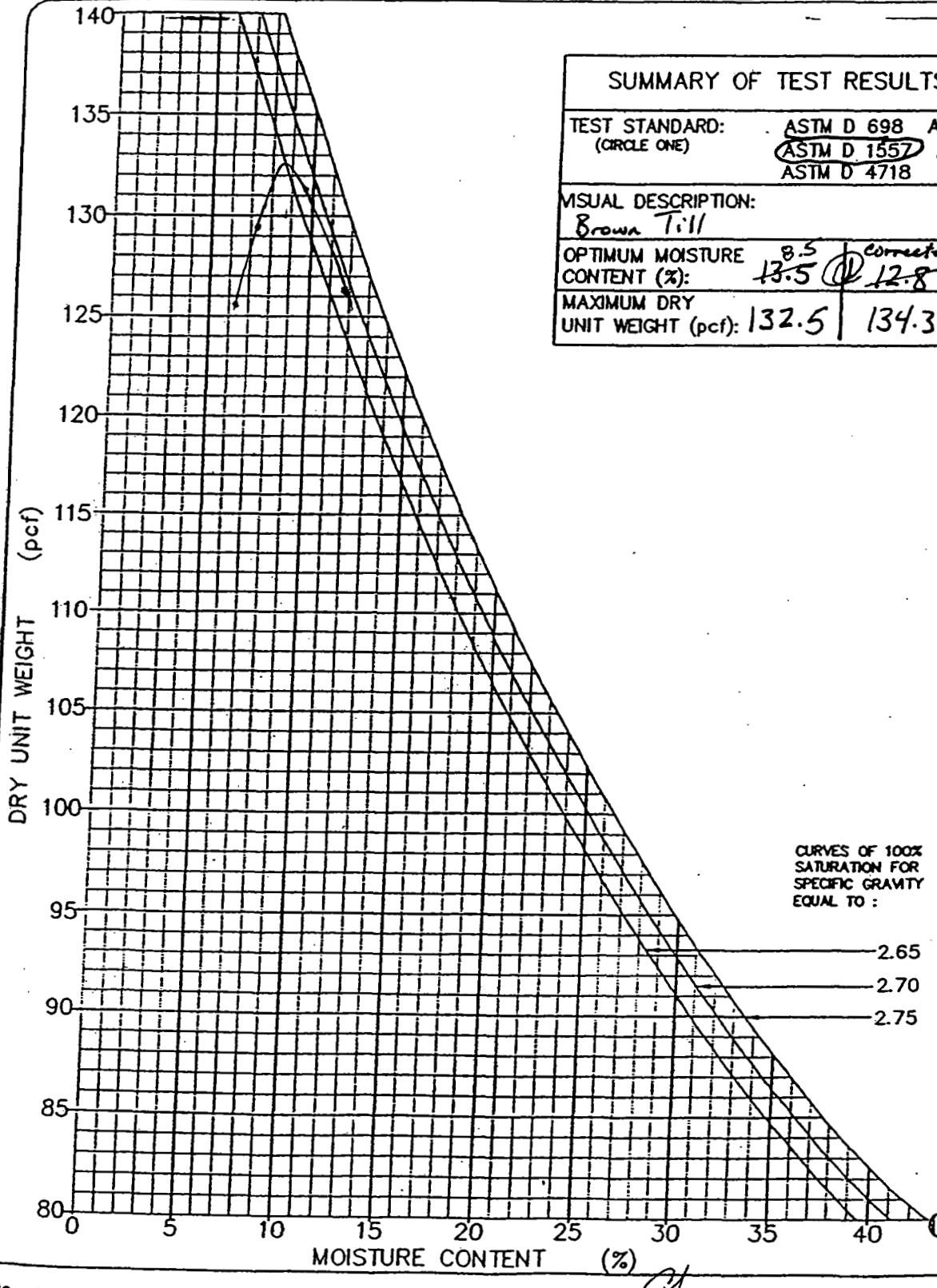
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 26 day Aug month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO.: LA02-55

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	~~13.5~~ 8.5	~~12.8~~ corrected 8.1%	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	132.5	134.3	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 69134 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 28 day Aug month 2002 year

SAMPLE NO.: LP02-56

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: LS

			6% 13.67	8% 13.86	10% 13.83	4% 13.41	
	WATER ADDED	(ml)	150mL	200mL	250 mL	100mL	
A	WT. OF SOIL & MOLD	(grams)	6200.7	6286.9	6273.3	6002.8	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1996.2	2082.4	2068.8	1798.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.7	137.4	136.5	118.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	120.6	123.7	120.9	115.7	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: LS/DTE

	TARE NO.		230	227	98	645	
F	WT. OF TARE	(grams)	8.4	8.4	8.2	8.1	
G	WT. OF WET SOIL & TARE	(grams)	345.1	370.1	312.3	269.2	
H	WT. OF DRY SOIL & TARE	(grams)	316.6	334.0	297.5	251.6	
I	WT. OF WATER = G − H	(grams)	28.5	36.1	34.8	17.6	
J	WT. DRY SOIL = H − F	(grams)	308.2	325.6	269.3	243.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.2	11.1	12.9	7.2	

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1.092 CHECKED BY: CA 1.111 1.129 1.077 SHEET NO. 1 OF 3

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FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 4 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-56

STD

Weight of Total Sample	=	24829.7
Weight of Oversize Fraction	=	887.3
Weight of Finer Fraction (- 3/8)	=	23942.4
Percentage of Oversize Fraction	= (P_C)	3.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.111
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	123.9
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 10.8%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 125.1 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

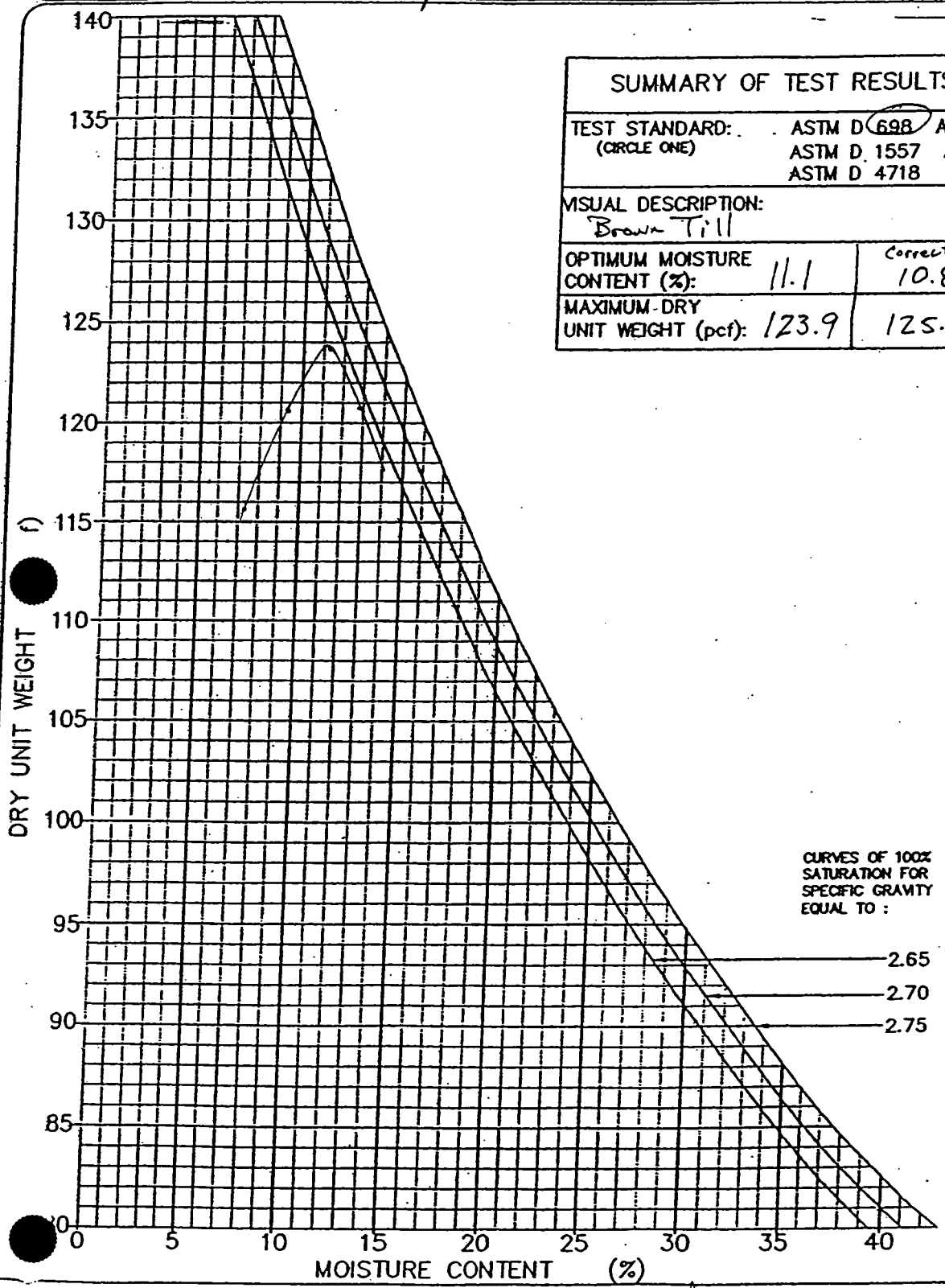
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 691341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 29 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO.: LP02-56

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	11.1	Corrected 10.8	CA
MAXIMUM-DRY UNIT WEIGHT (pcf):	123.9	125.1	CA



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 69.341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 29 day Aug month 2002 year

SAMPLE NO.: LP02-57

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED	(ml)	6% 13.49 / 150mL	8% 13.77 / 200mL	10% 13.86 / 250mL	12% 13.67 / 300mL	QA ID: KS
A	WT. OF SOIL & MOLD	(grams)	6119.1	6246.1	6286.9	6200.7	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1914.6	2041.6	2082.4	1996.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.4	134.7	137.4	131.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.9	121.1	121.7	113.8	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

	TARE NO.		679	604	310	KS ~~647~~ 14	QA ID: KS
F	WT. OF TARE	(grams)	8.2	8.3	8.1	KS ~~8.1~~ 8.3	
G	WT. OF WET SOIL & TARE	(grams)	344.0	384.1	365.2	305.1	
H	WT. OF DRY SOIL & TARE	(grams)	316.2	346.2	324.3	264.8	
I	WT. OF WATER = G − H	(grams)	27.8	37.9	40.9	40.3	
J	WT. DRY SOIL = H − F	(grams)	308.0	337.9	316.2	256.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.02	11.21	12.93	15.7	

5368

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 4 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-57 STD

Weight of Total Sample	=	44805.5
Weight of Oversize Fraction	=	2793.7
Weight of Finer Fraction (-3/8)	=	42011.8
Percentage of Oversize Fraction	= (P_C)	6.2
Percentage of Finer Fraction (-3/8)	= (P_F)	93.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.121
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	122.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 11.4 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 124.7 pcf

2 of 3

000818

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

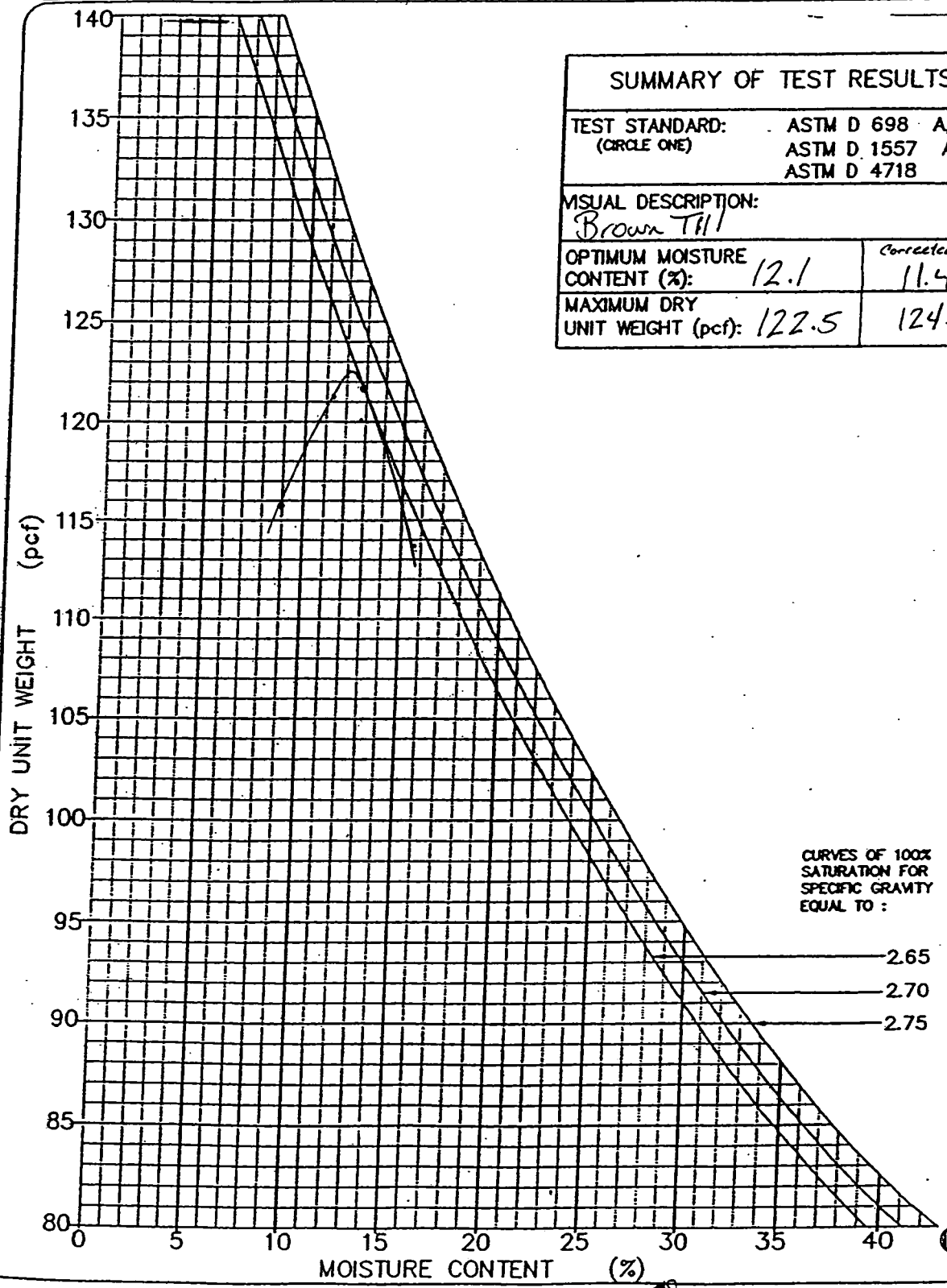
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 30 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO. LP02-57

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		
VISUAL DESCRIPTION: Brown Till		
OPTIMUM MOISTURE CONTENT (%): 12.1	Corrected 11.4	
MAXIMUM DRY UNIT WEIGHT (pcf): 122.5	124.7	



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6-0134/ TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 27 day Aug month 2002 year

MATERIAL TYPE: LP. Clay

MATERIAL SOURCE: Stockpile 02-9

SAMPLE NO.: LP02-57

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% · 13.56	4% 13.94	14.06 6%	8% 14.05	
	WATER ADDED	(ml)	50 mL	100 mL	150 mL	200 mL	
A	WT. OF SOIL & MOLD	(grams)	6159.9	6323.2	6377.6	6373.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1955.4	2118.7	2173.1	2168.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.1	139.8	143.4	143.1	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	123.7	130.6	131.5	129.2	

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: KS/DLE

	TARE NO.		#98	308	600	96	
F	WT. OF TARE	(grams)	8.2	8.1	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	284.6	282.9	350.0	291.7	
H	WT. OF DRY SOIL & TARE	(grams)	273.0	264.8	321.6	264.0	
I	WT. OF WATER = G − H	(grams)	11.6	18.1	28.4	27.7	
J	WT. DRY SOIL = H − F	(grams)	264.8	256.7	313.4	255.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	4.4	7.05	9.06	10.8	
			1.044	1.0705	1.0906	1.108	

0.0060

5368

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO **PROJECT NO.** G01341 **TASK NO.** 04.1

DESCRIPTION: Phase IV **DATE:** 4 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LAØ2-57 MOD

Weight of Total Sample	=	44805.5
Weight of Oversize Fraction	=	2793.7
Weight of Finer Fraction (- 3/8)	=	42011.8
Percentage of Oversize Fraction	= (P_C)	6.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.085
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	132.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 8.1 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 134.3 pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

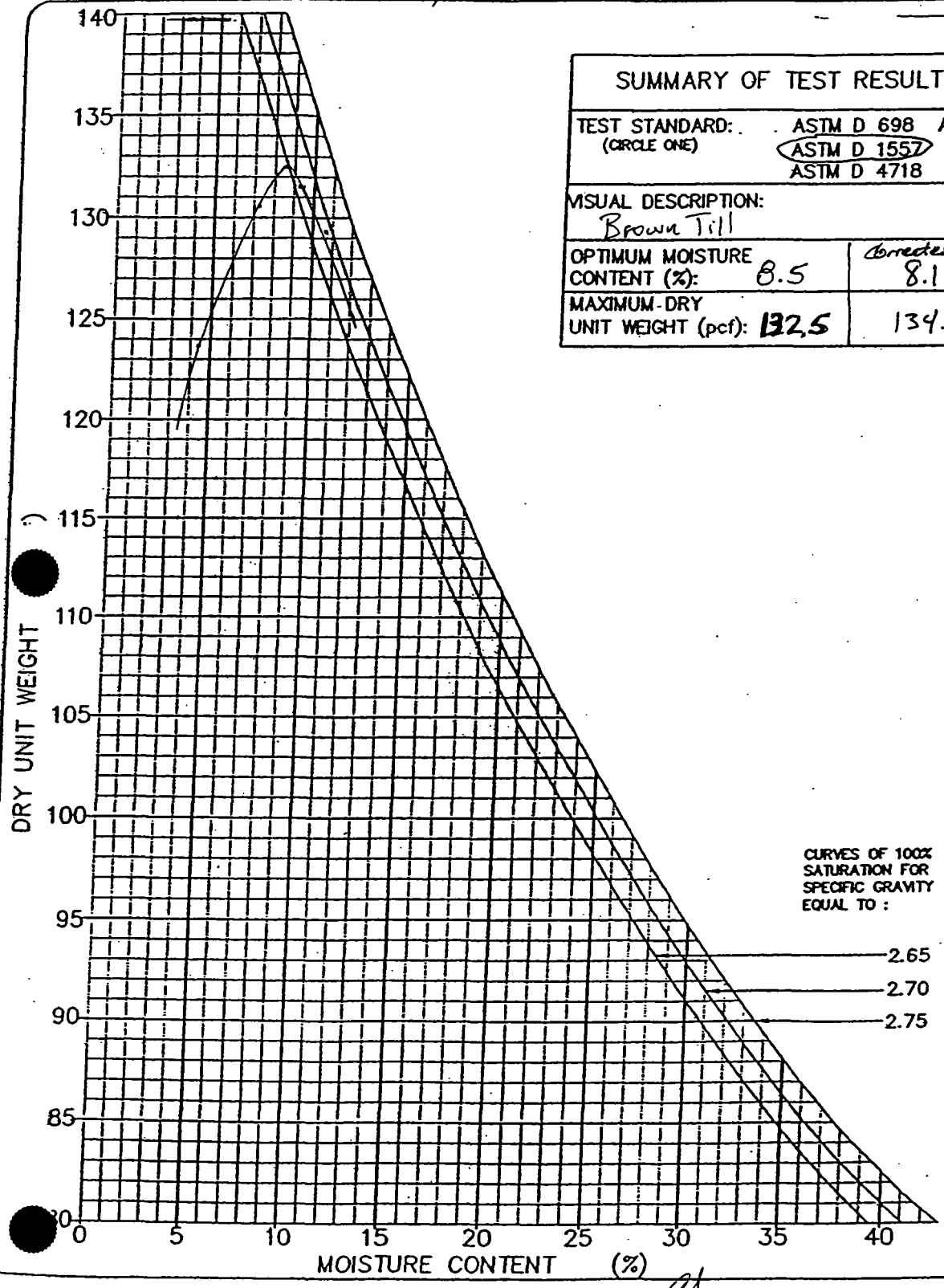
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO.: 041

DESCRIPTION: Phase II DATE: 29 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO. LP02-57

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 8.5	corrected 8.1	CJ
MAXIMUM-DRY UNIT WEIGHT (pcf): 132.5	134.3	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV

DATE: 6 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO.: CP02-58

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.55	8% 13.76	10% 13.92	12% 13.80	
	WATER ADDED	(ml)	150 ML	200 ML	250 ML	300 ML	
A	WT. OF SOIL & MOLD	(grams)	6146.3	6241.5	6314.1	6259.7	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1941.8	2037.0	2109.6	2055.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	128.2	134.4	139.2	135.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.0	122.1	124.4	119.0	

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: KS

	TARE NO.		603	107	63	613	
F	WT. OF TARE	(grams)	8.1	8.0	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	380.6	~~385.~~ 358.5	366.4	394.4	
H	WT. OF DRY SOIL & TARE	(grams)	350.9	326.3	328.4	347.0	
I	WT. OF WATER = G − H	(grams)	29.7	32.2	38.0	47.4	
J	WT. DRY SOIL = H − F	(grams)	342.8	318.3	320.2	338.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.7	10.1	11.9	14.0	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 041

DESCRIPTION: Phase IV DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-58 STD

Weight of Total Sample	=	43702.7
Weight of Oversize Fraction	=	1948.8
Weight of Finer Fraction (- 3/8)	=	41753.9
Percentage of Oversize Fraction	= (P_C)	4.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.115
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	124.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 11.1%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 126.1 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

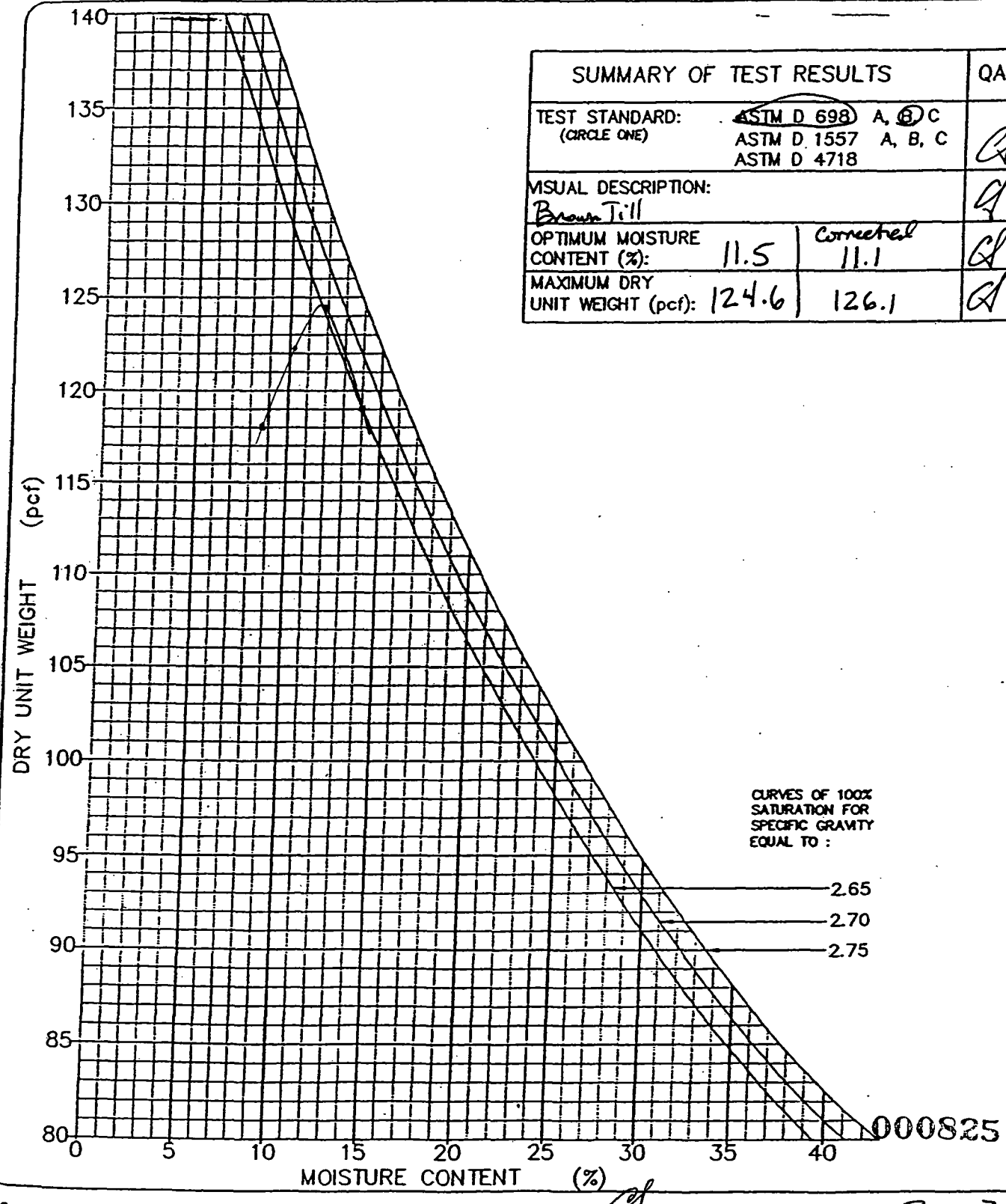
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-9 SAMPLE NO.: LPP-58

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	11.5	Corrected 11.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	124.6	126.1	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 29 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO.: LP02-58

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			4% 13.88	6% 14.08	8% 14.07	2% 13.62	
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6296.0	6386.7	6382.2	6178.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2091.5	2182.2	2177.7	1973.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	138.0	144.0	143.7	130.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	130.0	132.7	130.4 ~~134.9~~	125.0	

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: KS

	TARE NO.		95	614	103	52	
F	WT. OF TARE	(grams)	8.1	8.3	8.3	8.1	
G	WT. OF WET SOIL & TARE	(grams)	310.7	281.1	303.3	295.0	
H	WT. OF DRY SOIL & TARE	(grams)	293.1	259.6	275.9	283.2	
I	WT. OF WATER = G − H	(grams)	17.6	21.5	27.4 ~~19.9~~	11.8	5368
J	WT. DRY SOIL = H − F	(grams)	285.0	251.3	267.6	275.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.17	8.55	10.2 ~~6.50~~	4.28	

1.0617 1.0855 1.0650 1.0428

GEO SYNTEC CONSULTANTS FILE NO. 2-09-FLC CHECKED BY: CA

SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G21341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 4 day Sep month 2002 year

MATERIAL TYPE: Clay Liner LAB2-58 mod

Weight of Total Sample	=	43702.7
Weight of Oversize Fraction	=	1948.8
Weight of Finer Fraction (- 3/8)	=	41753.9
Percentage of Oversize Fraction	= (P_C)	4.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.082
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	133.3
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 7.9 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 134.6 pcf

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000827

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

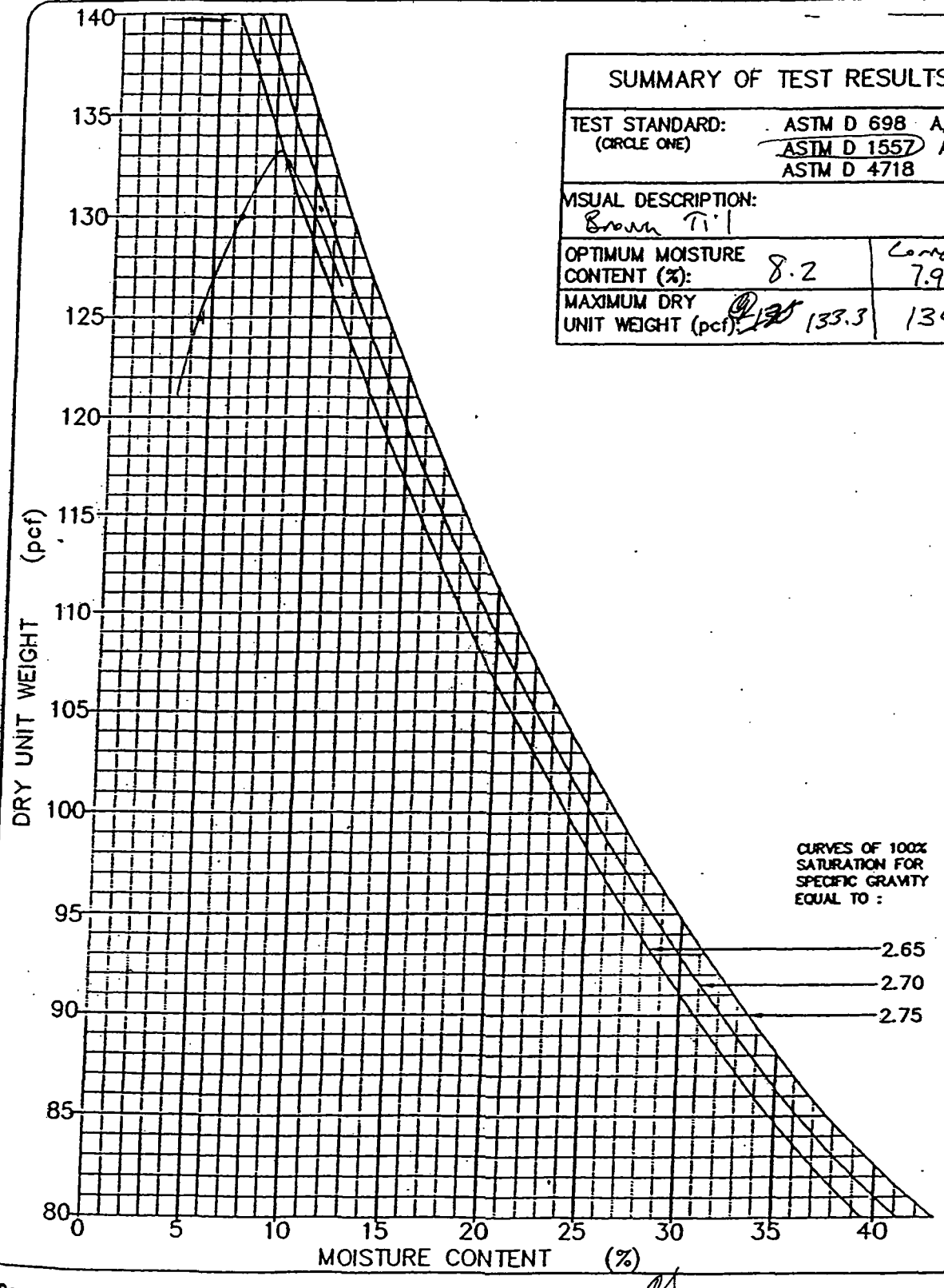
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 30 day Aug month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO. LP02.58

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	8.2	Corrected 7.9	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	~~135~~ 133.3	134.6	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 11 day Sept month 2002 year

SAMPLE NO.: LP02-59

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			8% 13.77	10% 13.75	12% 13.65	6% 13.39	
	WATER ADDED	(ml)	200 mL	250 mL	300 mL	150 mL	
A	WT. OF SOIL & MOLD	(grams)	6246.1	6237.0	6191.6	6073.7	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2041.6	2032.5	1987.1	1869.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	134.7	134.1	131.2	123.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	120.1	117.3	112.8	113.0	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: KS/DLE

	TARE NO.		#95	#98	#230	#600	
F	WT. OF TARE	(grams)	8.0	8.2	8.4	8.2	
G	WT. OF WET SOIL & TARE	(grams)	380.9	343.6	411.2	293.1	
H	WT. OF DRY SOIL & TARE	(grams)	340.5	301.6	354.7	269.2	
I	WT. OF WATER = G − H	(grams)	40.4	42.0	56.5	23.9	
J	WT. DRY SOIL = H − F	(grams)	332.5	293.4	346.3	261.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.2	14.3	16.3	9.2	

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-59

STD

Weight of Total Sample	=	20213.2
Weight of Oversize Fraction	=	1236.8
Weight of Finer Fraction (- 3/8)	=	18976.4
Percentage of Oversize Fraction	= (P_C)	6.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.126
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	120.9
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 11.9\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 123.1 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

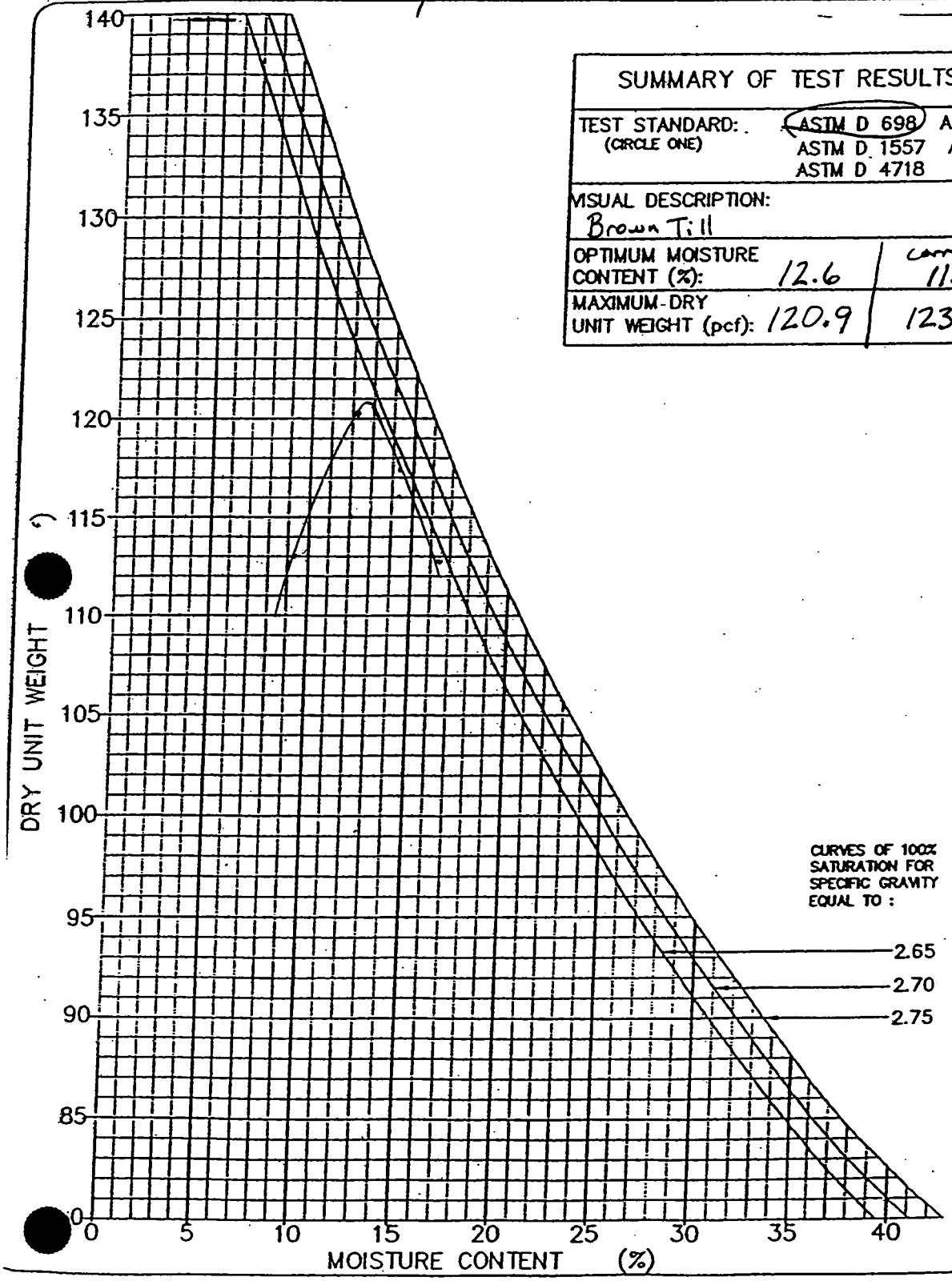
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO. G-Q1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 04 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO. LP02-59

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	12.6	corrected 11.9	CA
MAXIMUM-DRY UNIT WEIGHT (pcf):	120.9	123.1	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO.: LP02-60

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.39	6% 13.85	7% 13.87	9% 13.82	
	WATER ADDED	(ml)	100mL	150mL	175 mL	225 mL	
A	WT. OF SOIL & MOLD	(grams)	6073.7	6282.4	6291.4	6268.8	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1869.2	2077.9	2086.9	2064.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.4	137.1	137.7	136.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.7	122.6	121.8	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: KS

	TARE NO.		636	679	14	613	
F	WT. OF TARE	(grams)	8.3	8.1	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	317.6	375.3	315.2	335.2	
H	WT. OF DRY SOIL & TARE	(grams)	293.3	336.6	279.7	291.1	
	WT. OF WATER = G - H	(grams)	24.3	38.7	35.5	44.1	
J	WT. DRY SOIL = H - F	(grams)	285.0	328.5	271.4	282.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.5	11.8	13.1	15.6	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. Ga1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-60 STD

Weight of Total Sample	=	47826.9
Weight of Oversize Fraction	=	2155.7
Weight of Finer Fraction (- 3/8)	=	45671.2
Percentage of Oversize Fraction	= (P_C)	4.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.122
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	123.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 11.7\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 124.7 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

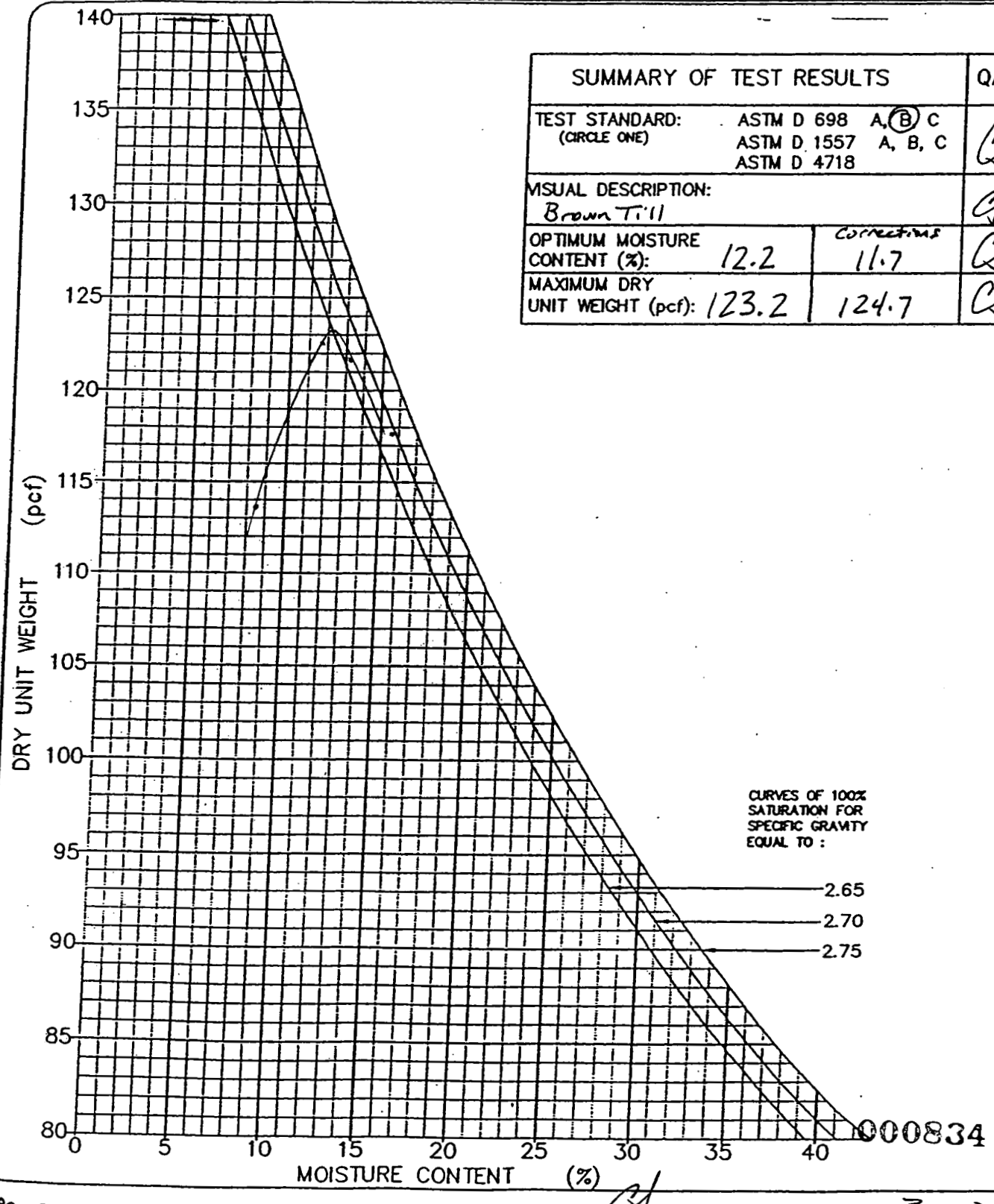
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE Ø2-9 SAMPLE NO.: LAØ2-60

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, (B) C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 12.2	Corrections 11.7	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): 123.2	124.7	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: Ø4.1

DESCRIPTION: Phase III

DATE: 3 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Ø2-9 SAMPLE NO.: LPØ2-6Ø

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL — QA ID: KS

			4% 14Ø1	6% 13.98	Ø% 13.61	2% 13.85	
	WATER ADDED	(ml)	1ØØmL	15Ømi	2ØØmL	5ØmL	
A	WT. OF SOIL & MOLD	(grams)	6354.9	6341.3	6173.5	6282.4	
B	WT. OF MOLD	(grams)	42Ø4.5	42Ø4.5	42Ø4.5	42Ø4.5	
C	WT. OF SOIL = A − B	(grams)	215Ø.4	2136.8	1969.Ø	2Ø77.9	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	141.9	141.Ø	13Ø.Ø	137.1	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	13Ø.2	126.7	122.9	127.7	

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: KS

	TARE NO.		679	1Ø3	6Ø4	52	
F	WT. OF TARE	(grams)	8.1	8.3	8.3	8.1	
G	WT. OF WET SOIL & TARE	(grams)	3Ø1.8	336.7	361.2	347.1	
H	WT. OF DRY SOIL & TARE	(grams)	277.5	303.4	342.0	323.8	
I	WT. OF WATER = G − H	(grams)	24.3	33.3	19.2	23.3	
J	WT. DRY SOIL = H − F	(grams)	269.4	295.1	333.7	315.7	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.02	11.28	5.75	7.38	
			1.0902	1.1128	1.0575	1.0738	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 4 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-60 MOD

Weight of Total Sample	=	~~20213.7~~ 47826.9
Weight of Oversize Fraction	=	~~1236.8~~ 2155.7
Weight of Finer Fraction (- 3/8)	=	45671.2
Percentage of Oversize Fraction	= (P_C)	4.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.095
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	130.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 9.1\ \%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 132.3$ pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

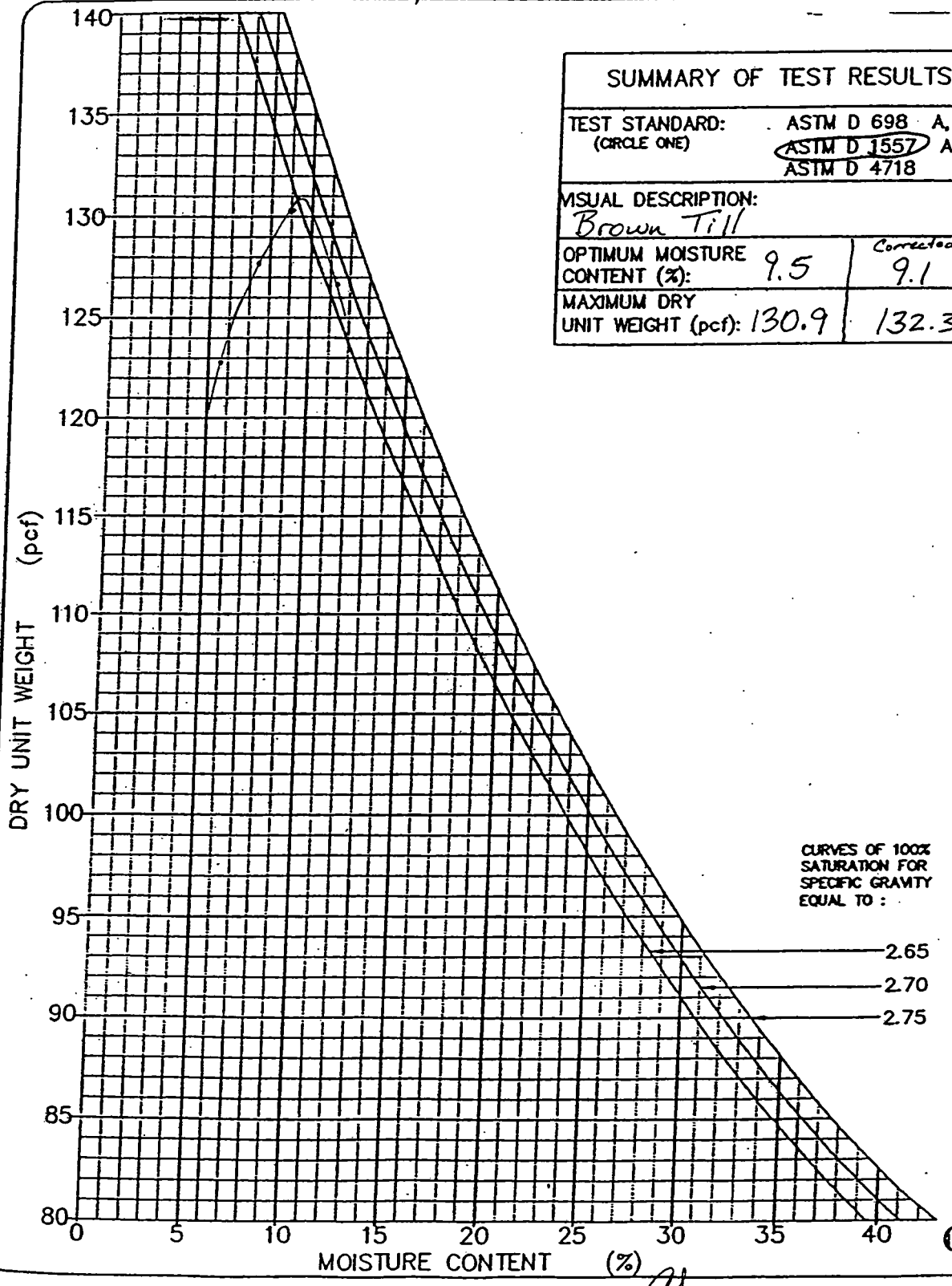
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 04 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO.: LP02-66

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	9.5	Corrected 9.1	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	130.9	132.3	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 69134 — TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 4 day Sept month 2002 year

SAMPLE NO.: LP02-61

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			6% 13.38	8% 13.62	10% 13.75	12% 13.71	QA ID: KS
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	
A	WT. OF SOIL & MOLD	(grams)	6069.2	6178.0	6237.0	6218.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1864.7	1973.5	2032.5	2014.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.1	130.3	134.1	132.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.7	116.8 ~~112.6~~	116.9	114.4	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

							QA ID: KS
	TARE NO.		14	645	600	98	
F	WT. OF TARE	(grams)	8.3	8.1	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	340.5	368.6	302.3	376.8	
H	WT. OF DRY SOIL & TARE	(grams)	312.3	331.2	264.5	325.5	
	WT. OF WATER = G − H	(grams)	28.2	37.4	37.8	51.3	
J	WT. DRY SOIL = H − F	(grams)	304.0	323.1	256.3	317.3	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.3	11.6	14.7	16.2	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LPM-61 STD

Weight of Total Sample	=	23987.3
Weight of Oversize Fraction	=	1652.7
Weight of Finer Fraction (- 3/8)	=	22334.6
Percentage of Oversize Fraction	= (P_C)	~~93.1~~ 6.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	93.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.148
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 13.9 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 122.0 pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

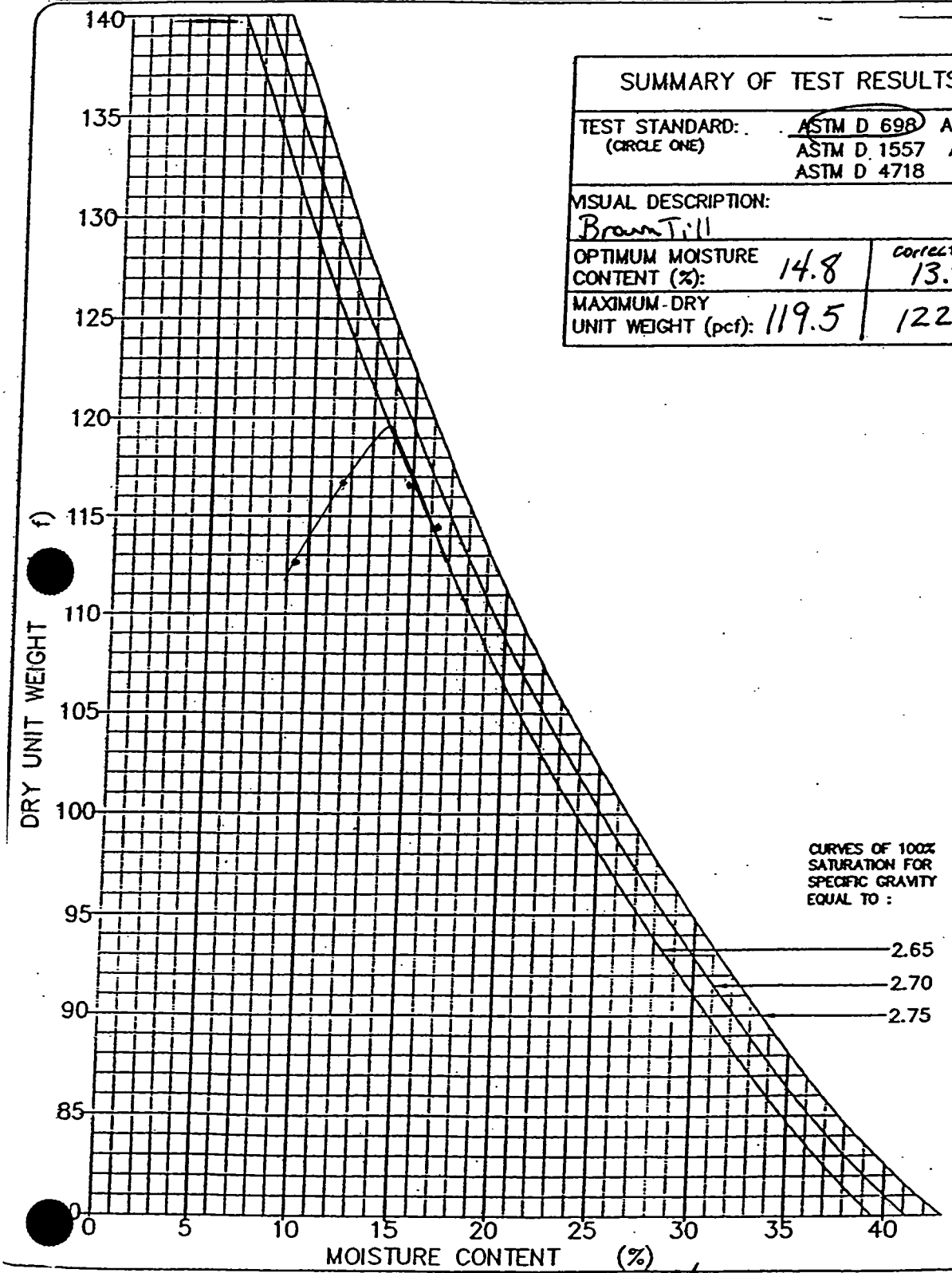
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: 641341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 06 day Sept. month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-9 SAMPLE NO. LP02-61

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	14.8	Corrected 13.9	CA
MAXIMUM-DRY UNIT WEIGHT (pcf):	119.5	122.0	CA



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 4 day Sept month 2002 year

SAMPLE NO.: LP02-62

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.49	8% 13.65	10% 13.74	12% 13.73	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6119.1	6191.6	6232.5	6227.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1914.6	1987.1	2028.0	2023.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.4	131.2	133.8	133.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.5	117.5	116.6	115.3	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: KS/DLE

	TARE NO.		67	614	310	KS95 52	
F	WT. OF TARE	(grams)	8.1	8.3	8.1	KS8 8.1	
G	WT. OF WET SOIL & TARE	(grams)	417.8	327.3	409.2	360.9	
H	WT. OF DRY SOIL & TARE	(grams)	379.2	294.0	357.5	312.7	
I	WT. OF WATER = G − H	(grams)	38.6	33.3	51.7	48.2	
J	WT. DRY SOIL = H − F	(grams)	371.1	285.7	349.4	304.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.4	11.7	14.8	15.8	

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1.104 1.117 1.148 1.158

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-62 STD

Weight of Total Sample	=	21151.9
Weight of Oversize Fraction	=	687.4
Weight of Finer Fraction (- 3/8)	=	20464.5
Percentage of Oversize Fraction	= (P_C)	3.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.133
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$C_W = 12.9\%$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$C_{\delta D} = 121.5$ pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

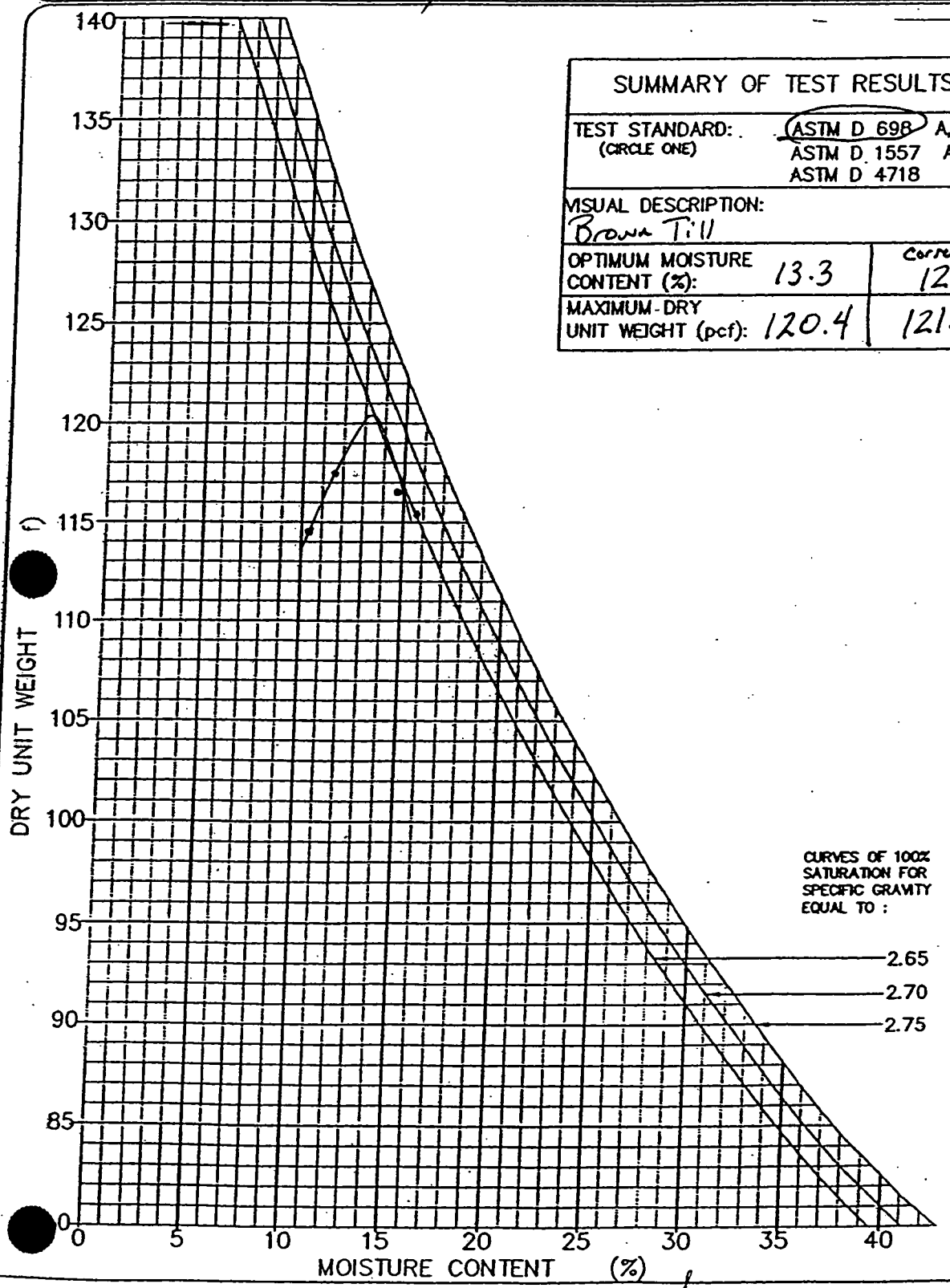
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 06 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-8 SAMPLE NO. LP02-62

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	(ASTM D 698) A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.3	Corrected 12.9	CJ
MAXIMUM-DRY UNIT WEIGHT (pcf):	120.4	121.5	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 7 day Sept month 2002 year

MATERIAL SOURCE: Stockpile 02-10 — SAMPLE NO.: LP02-63

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			6% 13.49	8% 13.83	10% 13.86	12% 13.70	QA ID: KS
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6119.1	6273.3	6286.9	6214.3	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1914.6	2068.8	2082.4	2009.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	126.4	136.5	137.4	132.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.8	122.8	120.1	~~114.6~~ 114.2	

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: KS/DLE
	TARE NO.		630	610	607	99	
F	WT. OF TARE	(grams)	8.1	8.2	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	335.8	346.0	339.6	289.7	
H	WT. OF DRY SOIL & TARE	(grams)	308.1	312.0	297.9	250.6	
I	WT. OF WATER = G − H	(grams)	27.7	34.0	41.7	~~38.1~~ 39.1	
J	WT. DRY SOIL = H − F	(grams)	300.0	303.8	289.7	242.3	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.2	11.2	14.4	~~15.7~~ 16.1	
			1.092	1.112	1.144	1.157	

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ 1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-63 STP

Weight of Total Sample	=	43906.1
Weight of Oversize Fraction	=	1748.3
Weight of Finer Fraction (- 3/8)	=	42158.4
Percentage of Oversize Fraction	= (P_C)	4.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.120
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	127.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

C_w = ~~12.1%~~ 11.6%

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

C_{SD} = ~~125.8 pcf~~ 124.9

2 of 3

000845

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

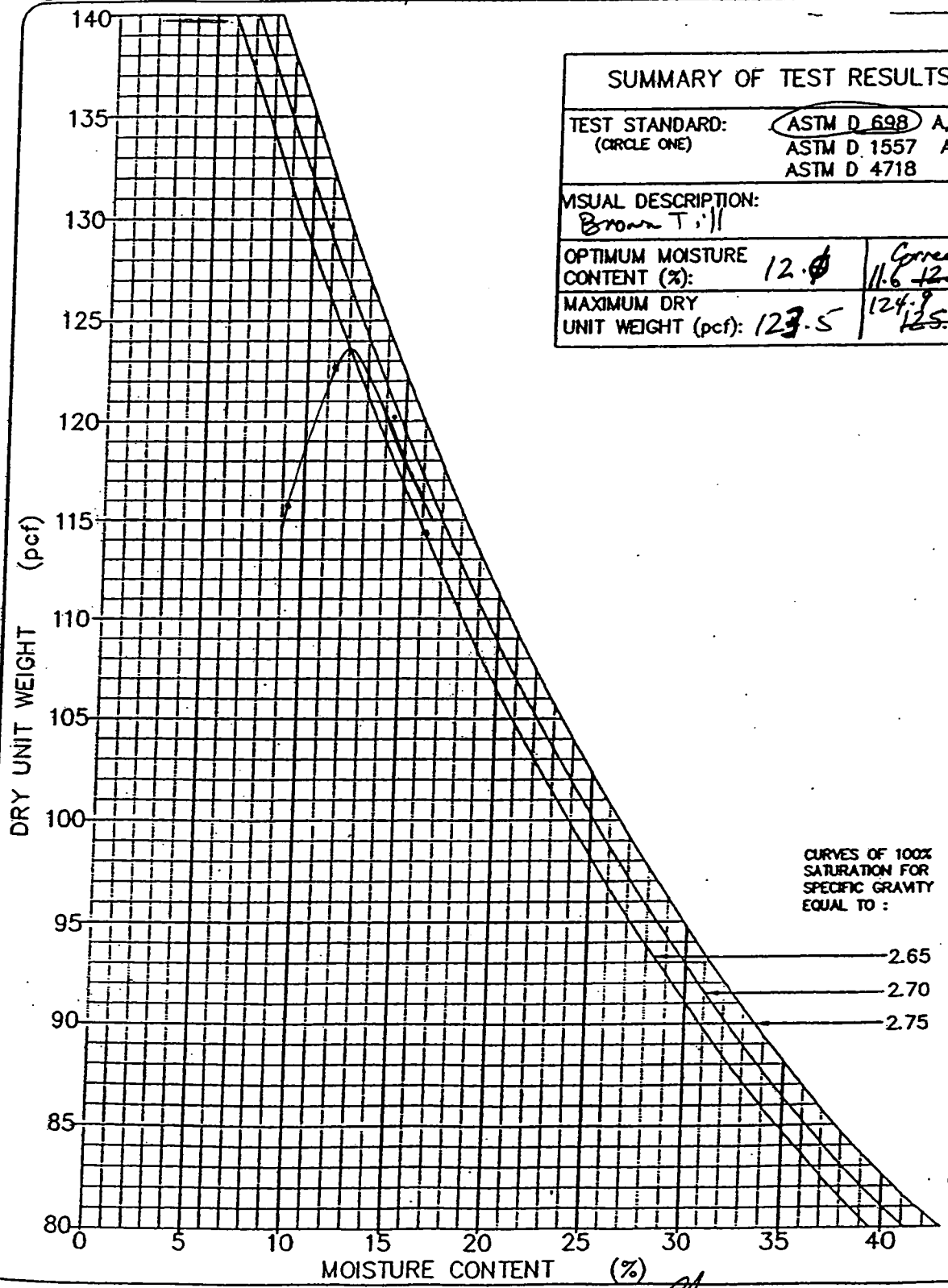
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134/ TASK NO.: 041

DESCRIPTION: Phase IV DATE: 09 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02.10 SAMPLE NO. LP 02-63

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		
VISUAL DESCRIPTION: Brown Till			
OPTIMUM MOISTURE CONTENT (%):	12.0	Corrected 11.6 ~~12.1~~	
MAXIMUM DRY UNIT WEIGHT (pcf):	123.5	124.9 ~~125.8~~	



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 7 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-63

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 13.69	4% 13.88	6% 14.09	8% 13.98	
	WATER ADDED	(ml)	50mL	100mL	150mL	200mL	
A	WT. OF SOIL & MOLD	(grams)	6209.8	6296.0	6391.2	6341.3	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2005.3	2091.5	2186.7	2136.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	132.3	138.0	144.3	141.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	125.8	129.5 ~~130.2~~	132.5	125.0	

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: KS/MC

	TARE NO.		230	310	103	679	
F	WT. OF TARE	(grams)	8.3	8.0	8.3	8.1	
G	WT. OF WET SOIL & TARE	(grams)	353.6	331.2	375.2	337.7	
H	WT. OF DRY SOIL & TARE	(grams)	336.5	311.2	345.2	300.2	
I	WT. OF WATER = G − H	(grams)	17.1	20.0	30.0	37.5	
J	WT. DRY SOIL = H − F	(grams)	328.2	303.2	336.9	292.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	5.2	6.6	8.9	12.8	

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1.052 1.060 1.069 1.128

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G9341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-63 MAD

Weight of Total Sample	=	43906.1
Weight of Oversize Fraction	=	1748.3
Weight of Finer Fraction (- 3/8)	=	42158.4
Percentage of Oversize Fraction	= (P_C)	4.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.082
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	134.0
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 7.9\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 135.1$$

2 of 3

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

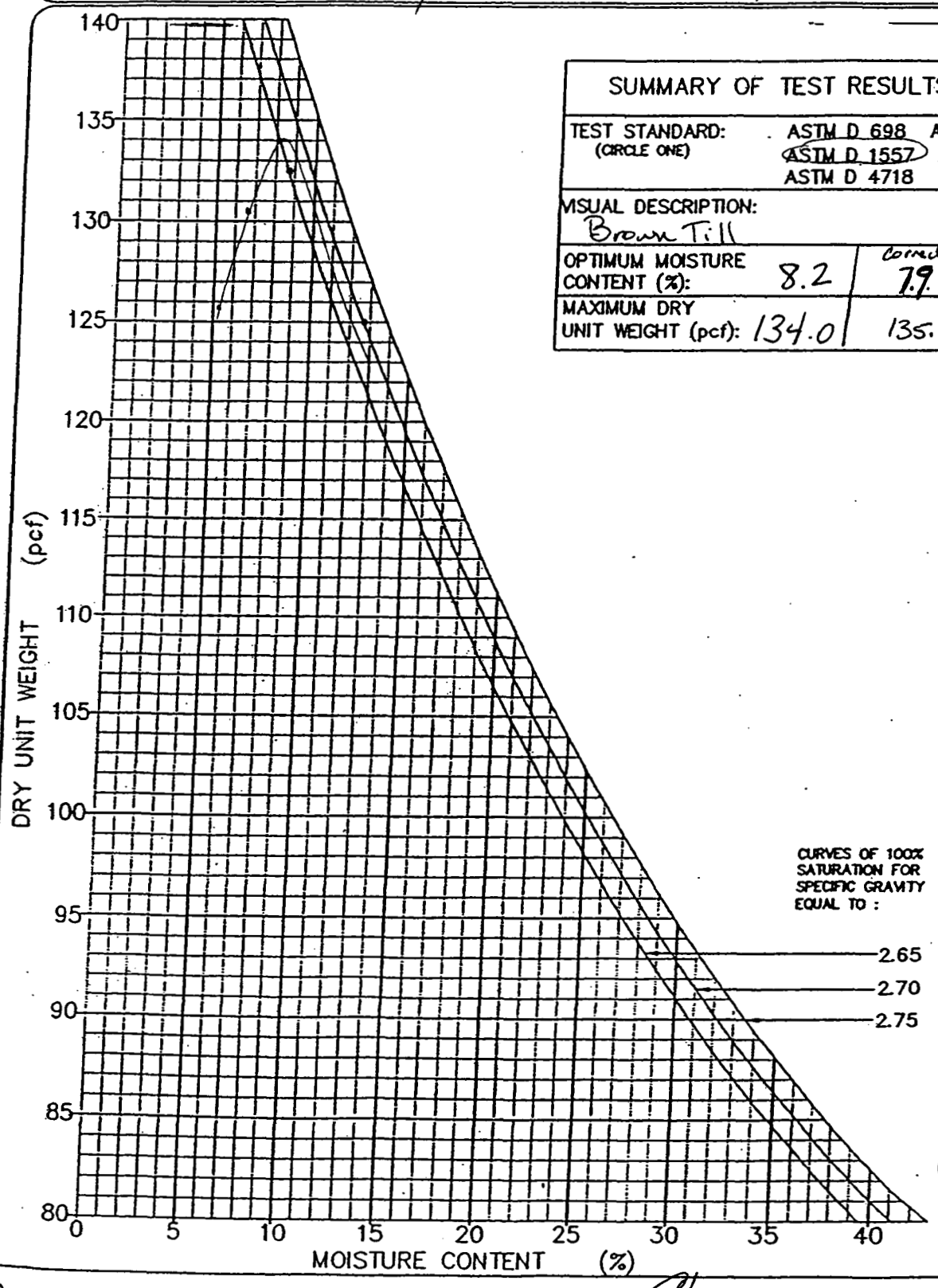
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 09 day Sept. month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO. 41-02-63

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	8.2	Correction 7.9	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	134.0	135.1	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 7 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-64

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.40	8% 13.66	10% 13.91	12% 13.86	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6078.2	6196.2	6309.6	6286.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1873.7	1991.7	2105.1	2082.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.7	131.5	138.9	137.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	114.4	119.2	123.7	120.0	

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: KS/DLF

	TARE NO.		675	18	200	114	
F	WT. OF TARE	(grams)	8.3	8.5	8.2	8.4	
G	WT. OF WET SOIL & TARE	(grams)	344.8	254.8	339.9	328.5	
H	WT. OF DRY SOIL & TARE	(grams)	319.7	231.8	303.6	288.0	
I	WT. OF WATER = G − H	(grams)	25.1	23.0	36.3	40.5	
J	WT. DRY SOIL = H − F	(grams)	311.4	223.3	295.4	279.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.1	10.3	12.3	14.5	

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1.081 1.103 1.123 1.115

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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 11 day Sept month 2002 year

SAMPLE NO.: LP02-66

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.31	8% 13.68	10% 13.73	12% 13.83	14% 13.66
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	350mL
A	WT. OF SOIL & MOLD	(grams)	6037.4	6205.2	6227.9	6273.3	6196.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1832.9	2000.7	2023.4	2068.8	1991.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	121.0	132.0	133.5	136.5	131.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.6	119.6	118.6	118.7	112.4

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: KS

	TARE NO.		98	645	67	636	97
F	WT. OF TARE	(grams)	8.2	8.1	8.1	8.3	8.2
G	WT. OF WET SOIL & TARE	(grams)	274.3	355.7	334.6	295.8	353.3
H	WT. OF DRY SOIL & TARE	(grams)	253.7	322.9	298.1	258.4	303.3
I	WT. OF WATER = G − H	(grams)	20.6	32.8	36.5	37.4	50.0
J	WT. DRY SOIL = H − F	(grams)	245.5	314.8	290.0	250.1	295.1
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.4	10.4	12.6	15.0	16.9

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SHEET NO. 1 OF 6

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GeoSyntec Consultants

FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G02134/TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-64 STD

Weight of Total Sample	=	~~23987.3~~	22155.0
Weight of Oversize Fraction	=	~~1652.7~~	880.2
Weight of Finer Fraction (- 3/8)	=	~~22334.6~~	21274.8
Percentage of Oversize Fraction	= (P_C)	~~6.9~~	4.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	~~93.1~~	96.4
Specific Gravity (Assumed)	= (G_M)	2.72	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.125
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	123.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = ~~11.7%~~ 12.1 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = ~~126.2 pcf~~ 125.2 pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

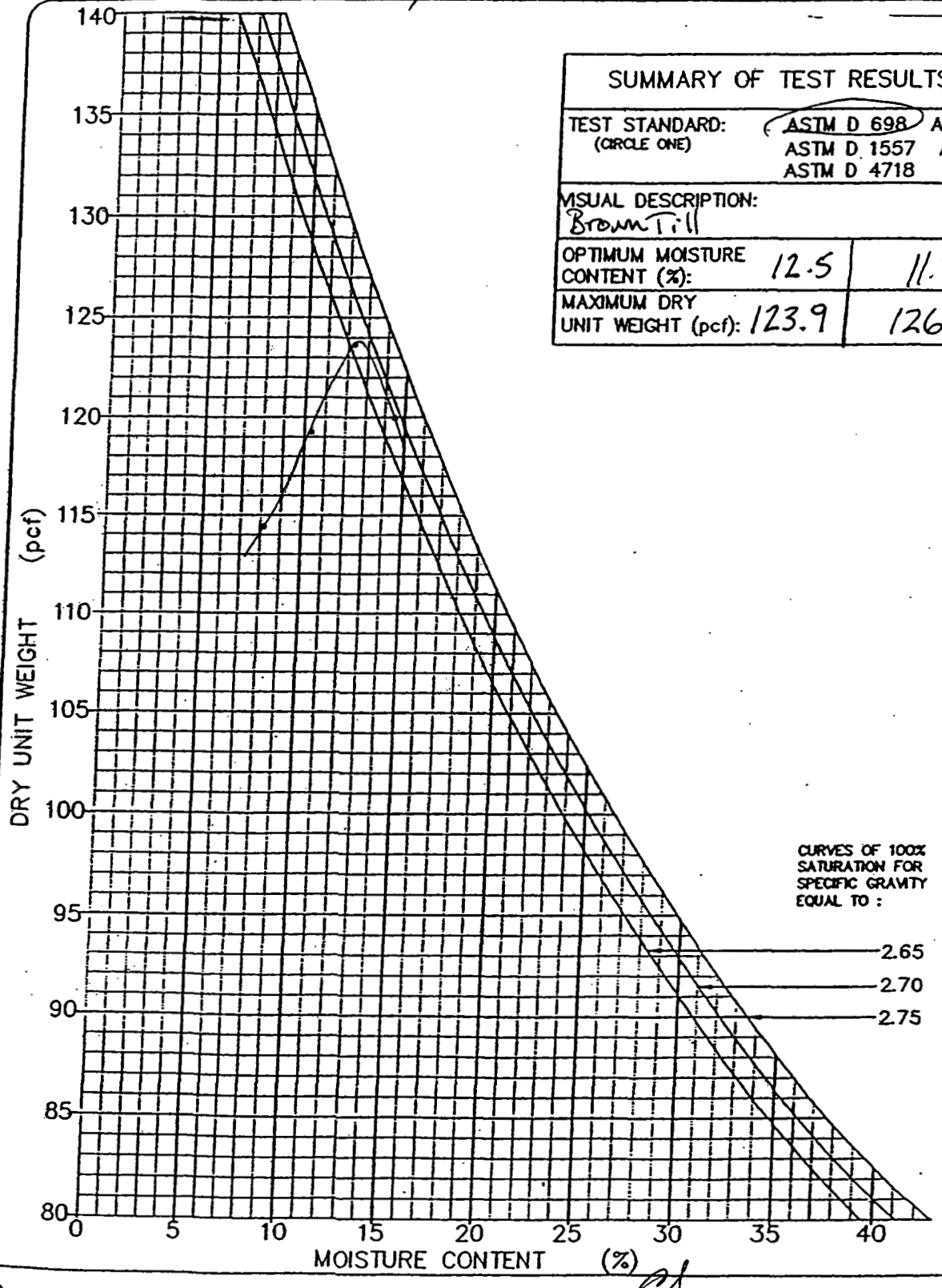
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 09 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: SAMPLE NO.: LP02-64

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.5	11.7	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	123.9	126.2	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO. 691341 TASK NO.: 04.1

DATE: 11 day Sept month 2002 year

SAMPLE NO.: LP02-65

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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. 13.41

COMPACTION OF SOIL

QA ID: 15

			6% 13.65	8% 13.91	10% 13.81	4%	
	WATER ADDED	(ml)	150mL	200mL	250mL	200mL	
A	WT. OF SOIL & MOLD	(grams)	6191.6	6309.6	6264.2	6082.8	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1987.1	KS ~~6309.2~~ 6.1	2059.7	1878.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.2	138.9	135.9	124.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	119.6	123.6	118.6	114.8	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: 15

	TARE NO.		90	647	94	614	
F	WT. OF TARE	(grams)	8.2	8.1	8.1	8.2	
G	WT. OF WET SOIL & TARE	(grams)	308.3	359.1 KS	350.5	294.3	
H	WT. OF DRY SOIL & TARE	(grams)	281.7	320.5	306.8	273.1	
I	WT. OF WATER = G - H	(grams)	26.6	38.6	43.7	21.2	
J	WT. DRY SOIL = H - F	(grams)	273.5	312.4	298.7	264.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.7	12.4	14.6	8.0	

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*GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: R Clay Liner LP02-65 STD

Weight of Total Sample	=	42337.7
Weight of Oversize Fraction	=	641.7
Weight of Finer Fraction (-3/8)	=	41696.0
Percentage of Oversize Fraction	= (P_C)	1.5
Percentage of Finer Fraction (-3/8)	= (P_F)	98.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.12
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	124.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 11.8\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 124.5 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

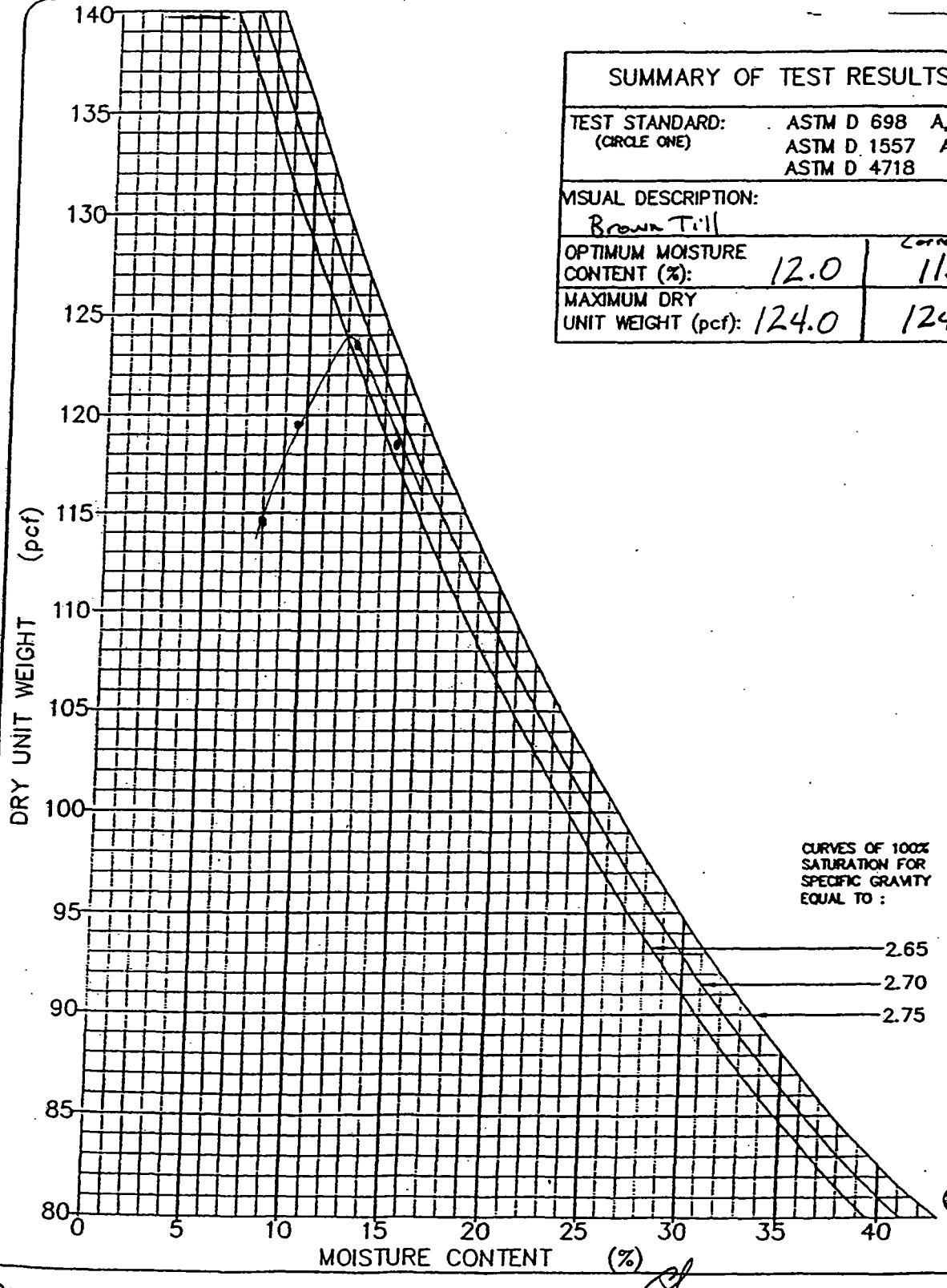
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-65

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.0	Corrected 11.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	124.0	124.5	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 7 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-65

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 13.84	4% 14.05	6% 14.11	8% 13.97	
	WATER ADDED	(ml)	50mL	100mL	150mL	200mL	
A	WT. OF SOIL & MOLD	(grams)	6277.8	6373.1	6400.3	6336.8	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2073.3	2168.6	2195.8	2132.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	136.8	143.1	144.9	140.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	129.0	132.7	131.4	125.2	

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: KS/DLE

	TARE NO.		602	608	92	91	
F	WT. OF TARE	(grams)	8.2	8.2	8.1	8.2	
G	WT. OF WET SOIL & TARE	(grams)	323.1	302.6	361.8	347.1	
H	WT. OF DRY SOIL & TARE	(grams)	305.4	281.2	328.8	309.6	
I	WT. OF WATER = G − H	(grams)	17.7	21.4	33.0	37.5	
J	WT. DRY SOIL = H − F	(grams)	297.2	273.0	320.7	301.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.0	7.8	10.3	12.4	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-65 MOD

Weight of Total Sample	=	42 337.7
Weight of Oversize Fraction	=	641.7
Weight of Finer Fraction (- 3/8)	=	41696.0
Percentage of Oversize Fraction	= (P_C)	1.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.09
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	134.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 8.9\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 134.9$ pcf

2 of 3

GEOSYNTEC CONSULTANTS

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5368

MOISTURE-DENSITY RELATIONSHIP

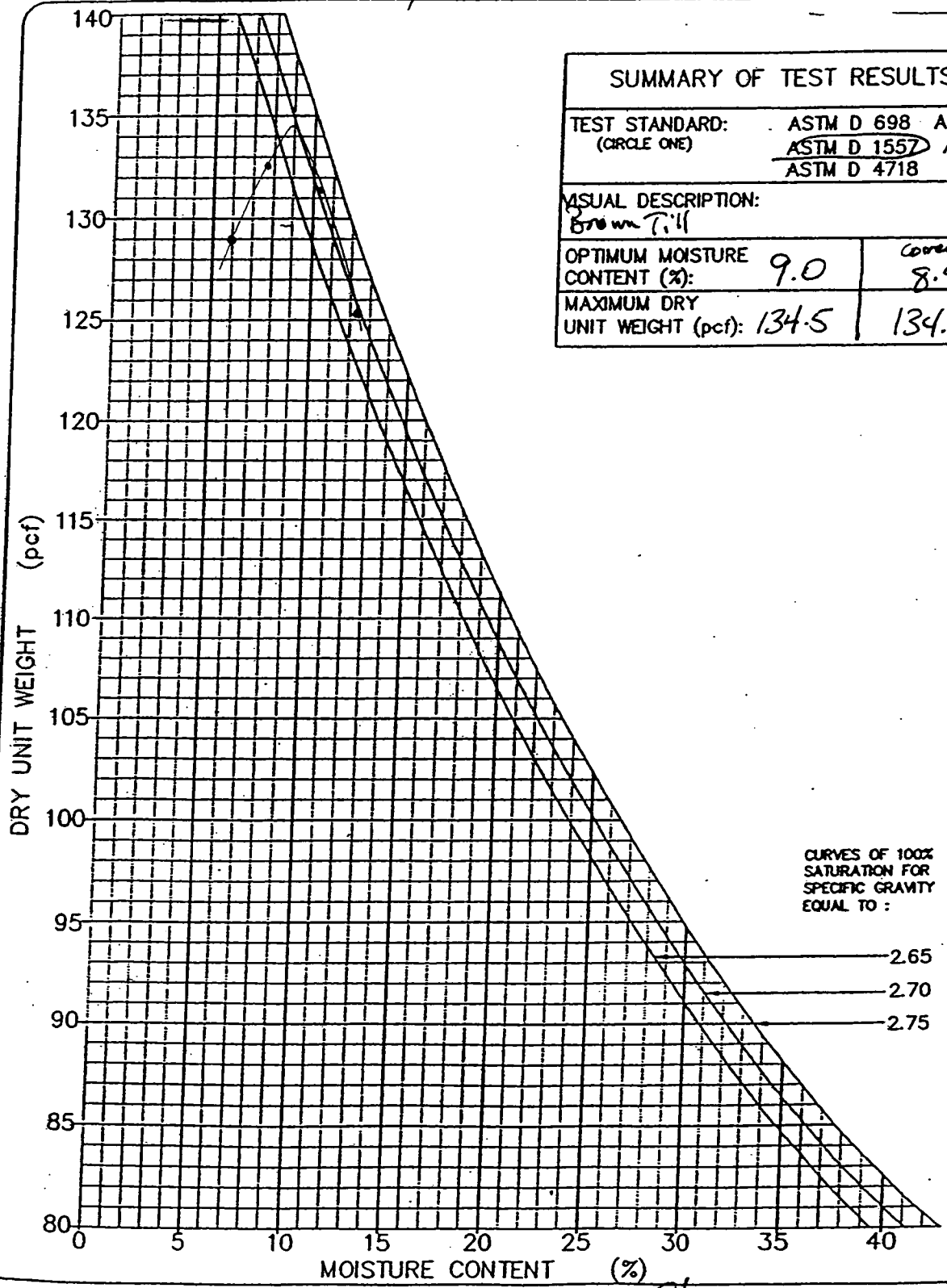
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 09 day Sept. month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO. LP02-65

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, (B), C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.0	corrected 8.9	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	134.5	134.9	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO. 69341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 13 day Sept month 2002 year

SAMPLE NO.: LP02-66

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: PLE

			10% 13.88				
	WATER ADDED	(ml)	250 ml				
A	WT. OF SOIL & MOLD	(grams)	6296.0				
B	WT. OF MOLD	(grams)	4204.5				
C	WT. OF SOIL = A - B	(grams)	2091.5				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	138.0				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	123.2				

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: _____

	TARE NO.		#107				
F	WT. OF TARE	(grams)	8.0				
G	WT. OF WET SOIL & TARE	(grams)	519.9				
H	WT. OF DRY SOIL & TARE	(grams)	464.7				
I	WT. OF WATER = G - H	(grams)	55.2				
J	WT. DRY SOIL = H - F	(grams)	456.7				
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.1				

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SHEET NO. 2 OF 6

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 14 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-66 STD

Weight of Total Sample	=	22816.1
Weight of Oversize Fraction	=	851.1
Weight of Finer Fraction (- 3/8)	=	21965
Percentage of Oversize Fraction	= (P_C)	3.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.121
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	123.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 11.7\ \%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 124.5\ pcf$$

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MOISTURE-DENSITY RELATIONSHIP

5368

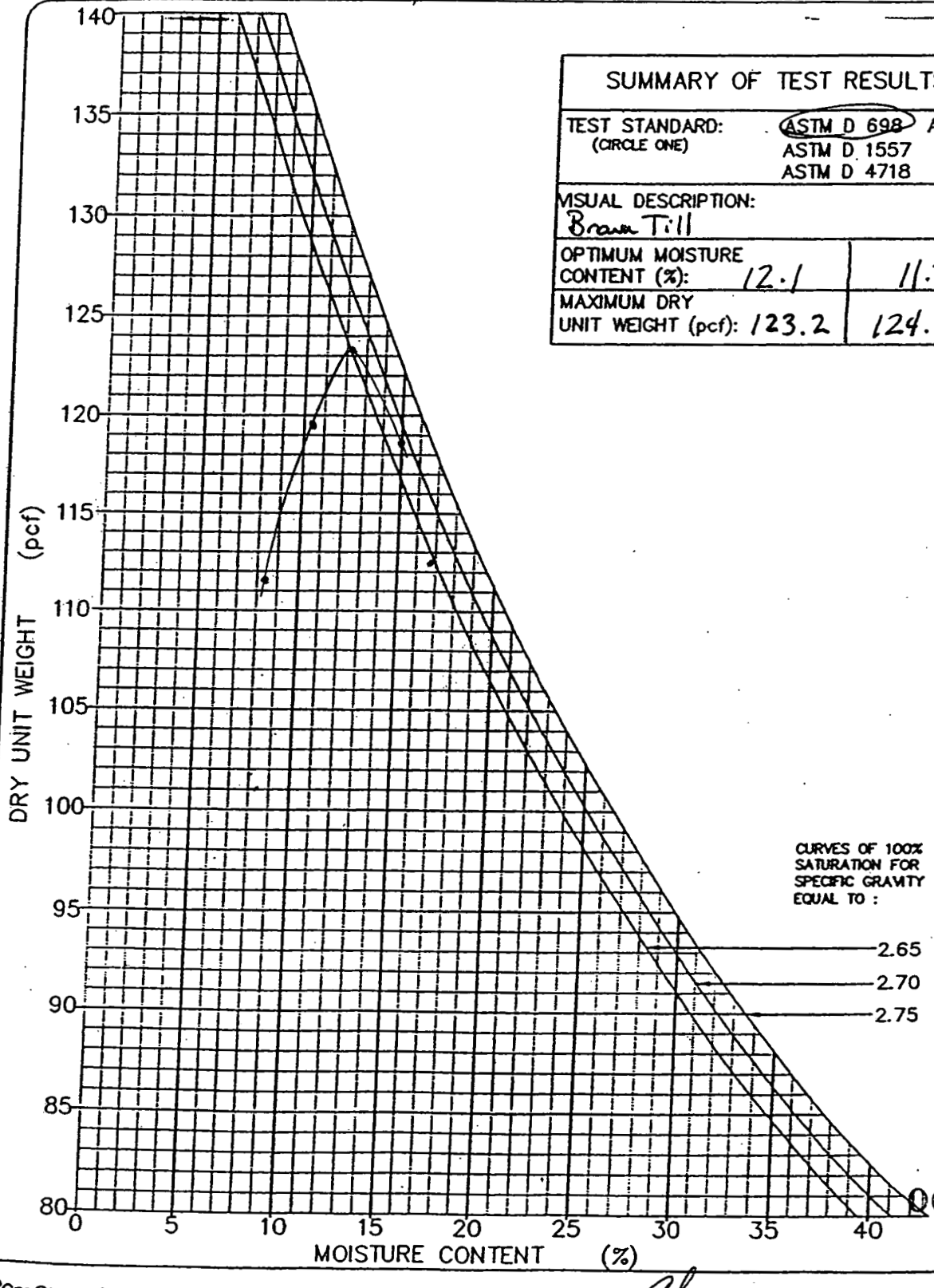
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-66

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.1	11.7	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	123.2	124.5	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 601341 TASK NO.: 04.1

DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-7167

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.37	8% 13.57	10% 13.78	12% 13.76	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6064.6	6155.4	6250.6	6241.5	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1860.1	1950.9	2046.1	2037.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	122.8	128.8	135.0	134.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	~~108.4~~ 112.8	~~112.2~~ 116.3	119.1	116.7	

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: KS

	TARE NO.		601	308	604	603	
F	WT. OF TARE	(grams)	8.3	8.1	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	321.0	324.4	339.0	328.8	
H	WT. OF DRY SOIL & TARE	(grams)	295.6	293.8	300.0	286.6	
I	WT. OF WATER = G - H	(grams)	25.4	30.6	39.0	42.2	
J	WT. DRY SOIL = H - F	(grams)	287.3	285.7	291.7	278.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.8	10.7	13.4	15.2	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 13 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-67 STD

Weight of Total Sample	=	44680.2
Weight of Oversize Fraction	=	1097.4
Weight of Finer Fraction (- 3/8)	=	43582.8
Percentage of Oversize Fraction	= (P_C)	2.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	~~0.0~~ 0.138
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 13.5\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 120.4\ pcf$$

2.53

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5368

MOISTURE-DENSITY RELATIONSHIP

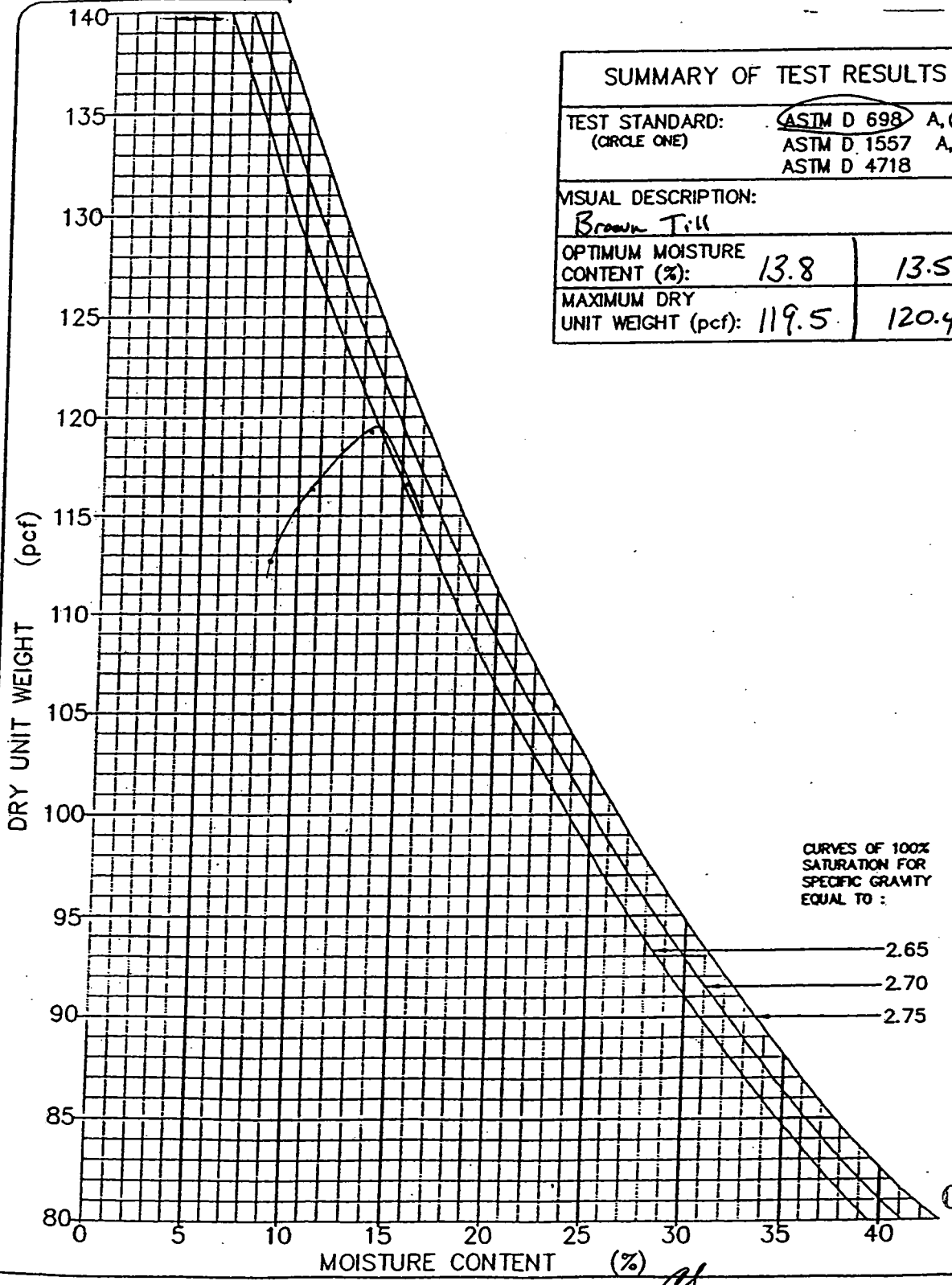
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-67

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.8	13.5	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	119.5	120.4	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 16 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-67

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 13.56	4% 13.76	6% 13.96	8% 14.05	10% 13.95
	WATER ADDED	(ml)	50 mL	100 mL	150 mL	200 mL	250 mL
A	WT. OF SOIL & MOLD	(grams)	6150.0	6241.5	6332.3	6373.1	6327.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1946.3	2037.0	2127.8	2168.6	2123.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	128.5	134.4	140.4	143.1	140.1
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	122.6	126.0	130.1	129.4	124.8

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: KS

	TARE NO.		110	107	607	48	645
F	WT. OF TARE	(grams)	8.1	8.0	8.2	8.3	8.1
G	WT. OF WET SOIL & TARE	(grams)	330.0	315.2	317.0	301.4	307.1
H	WT. OF DRY SOIL & TARE	(grams)	315.4	296.6	294.2	273.2	274.3
I	WT. OF WATER = G − H	(grams)	14.6	19.2	22.8	28.2	32.8
J	WT. DRY SOIL = H − F	(grams)	307.3	288.0	286.0	264.9	266.2
K	MOISTURE CONTENT = (I/J) X 100	(%)	4.8	6.7	8.0	10.6	12.3

5368

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 17 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-67 MOD

Weight of Total Sample	=	44680.2
Weight of Oversize Fraction	=	1097.4
Weight of Finer Fraction (- 3/8)	=	43582.8
Percentage of Oversize Fraction	= (P_C)	2.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.092
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	132.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 9.0\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 133.1$ pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

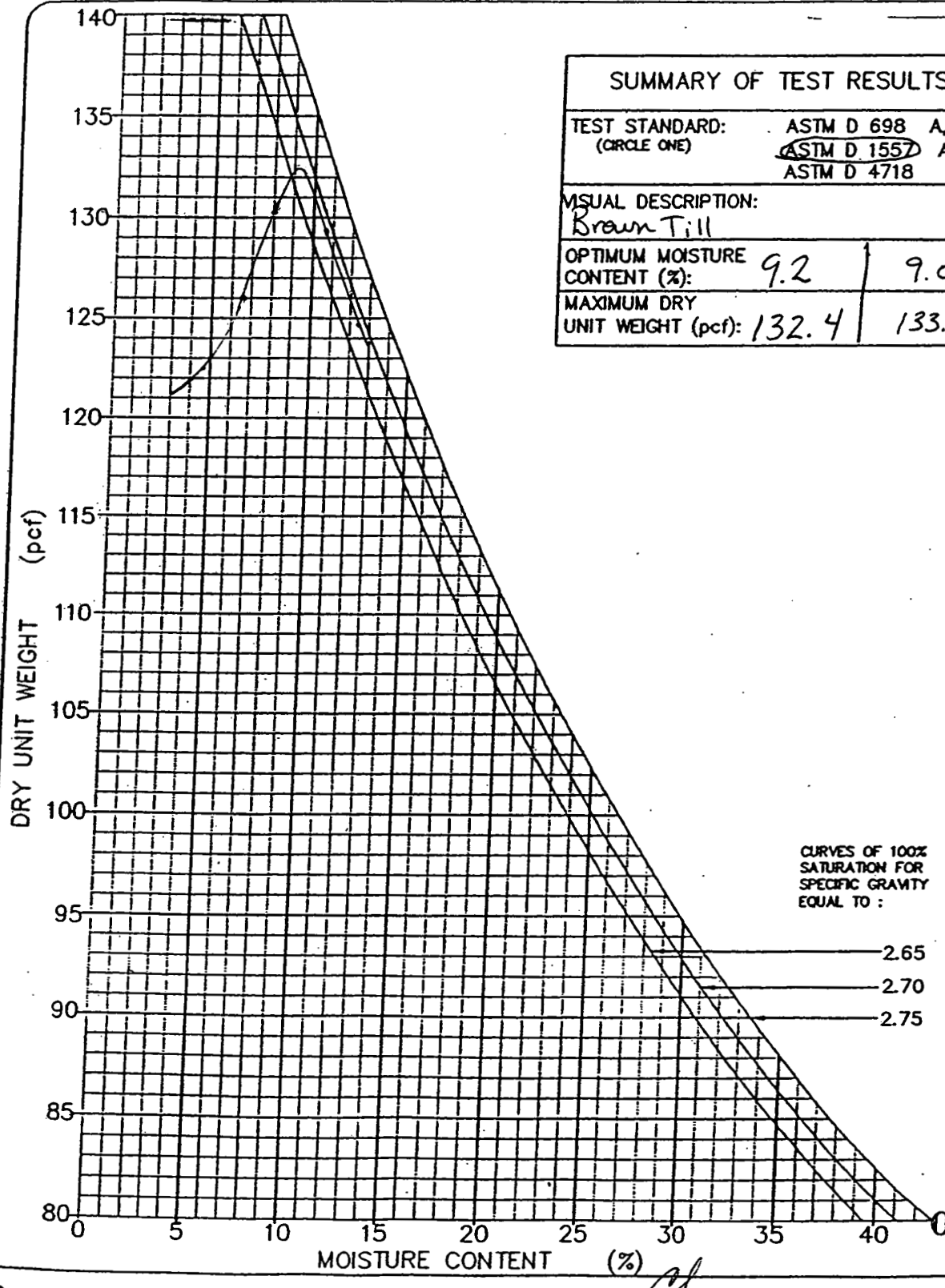
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile #2-10 SAMPLE NO.: LP#2-67

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.2	9.0	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	132.4	133.1	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

PROJECT NO.: 69341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 11 day Sept month 2002 year

SAMPLE NO.: LP02-69

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			6% 13.31	8% 13.65	10% 13.82	12% 13.80	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6037.4	6191.6	6268.8	6259.7	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1832.9	1987.1	2064.3	2055.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	121.0	131.2	136.2	135.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.9	118.6	119.6	117.0	

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: 15

	TARE NO.		48	615	309	12	
F	WT. OF TARE	(grams)	8.3	8.2	8.1	8.3	
G	WT. OF WET SOIL & TARE	(grams)	319.7	335.7	334.2	338.4	
H	WT. OF DRY SOIL & TARE	(grams)	296.4	304.3	294.3	293.0	
I	WT. OF WATER = G − H	(grams)	23.3	31.4	39.9	45.4	
J	WT. DRY SOIL = H − F	(grams)	288.1	296.1	286.2	284.7	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.1	10.6	13.9	15.9	

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 601341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-69 STD

Weight of Total Sample	=	~~47826.9~~ 47122.3
Weight of Oversize Fraction	=	~~2155.7~~ 1392.2
Weight of Finer Fraction (- 3/8)	=	45730.1
Percentage of Oversize Fraction	= (P_C)	3.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.125
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	121.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = ~~0.12~~ 12.2%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 122.9 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

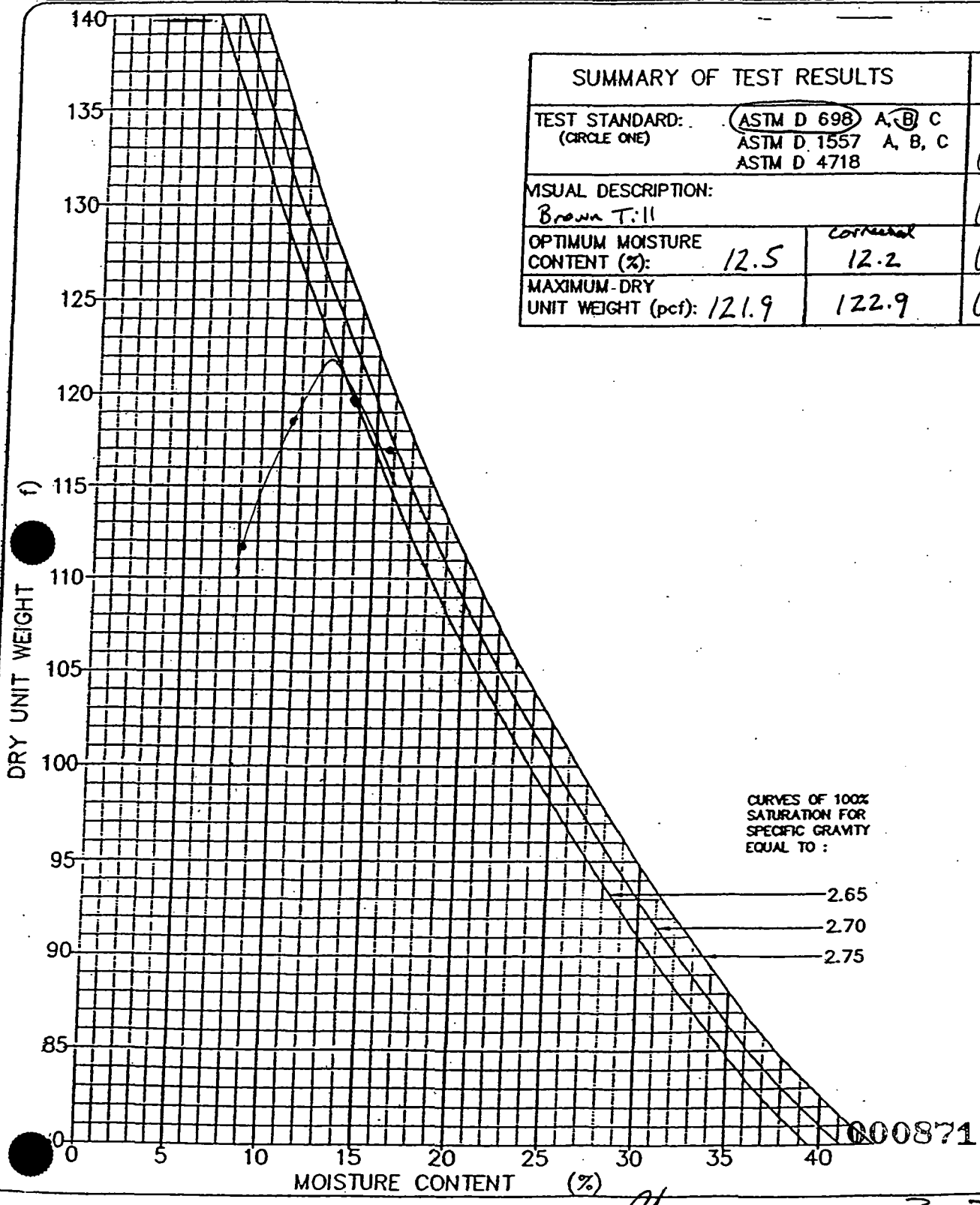
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LP02-69

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	12.5	corrected 12.2	CA
MAXIMUM-DRY UNIT WEIGHT (pcf):	121.9	122.9	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 16 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LP02-69

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			4% 13.74	6% 13.97	8% 14.08	10% 13.92	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6232.5	6336.8	6386.7	6314.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2028.0	2132.3	2182.2	2109.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.8	140.7	144.0	139.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	125.9	130.4	130.2	122.5	

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: KS

	TARE NO.		647	90	63	95	
F	WT. OF TARE	(grams)	8.1	8.2	8.2	8.1	
G	WT. OF WET SOIL & TARE	(grams)	297.2	247.7	284.6	260.3	
H	WT. OF DRY SOIL & TARE	(grams)	280.0	230.2	258.1	229.9	
I	WT. OF WATER = G − H	(grams)	17.2	17.5	26.5	30.4	
J	WT. DRY SOIL = H − F	(grams)	271.9	222.0	249.9	221.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.3	7.9	10.6	13.7	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0641 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 17 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LA02-69 MOD

Weight of Total Sample	=	47122.3
Weight of Oversize Fraction	=	1392.2
Weight of Finer Fraction (-3/8)	=	45730.1
Percentage of Oversize Fraction	= (P_C)	3.0
Percentage of Finer Fraction (-3/8)	= (P_F)	97.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content -3/8, as decimal	=	0.092
(W_C) =	Water Content +3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	133.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_\omega = 9.0\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 134.3 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

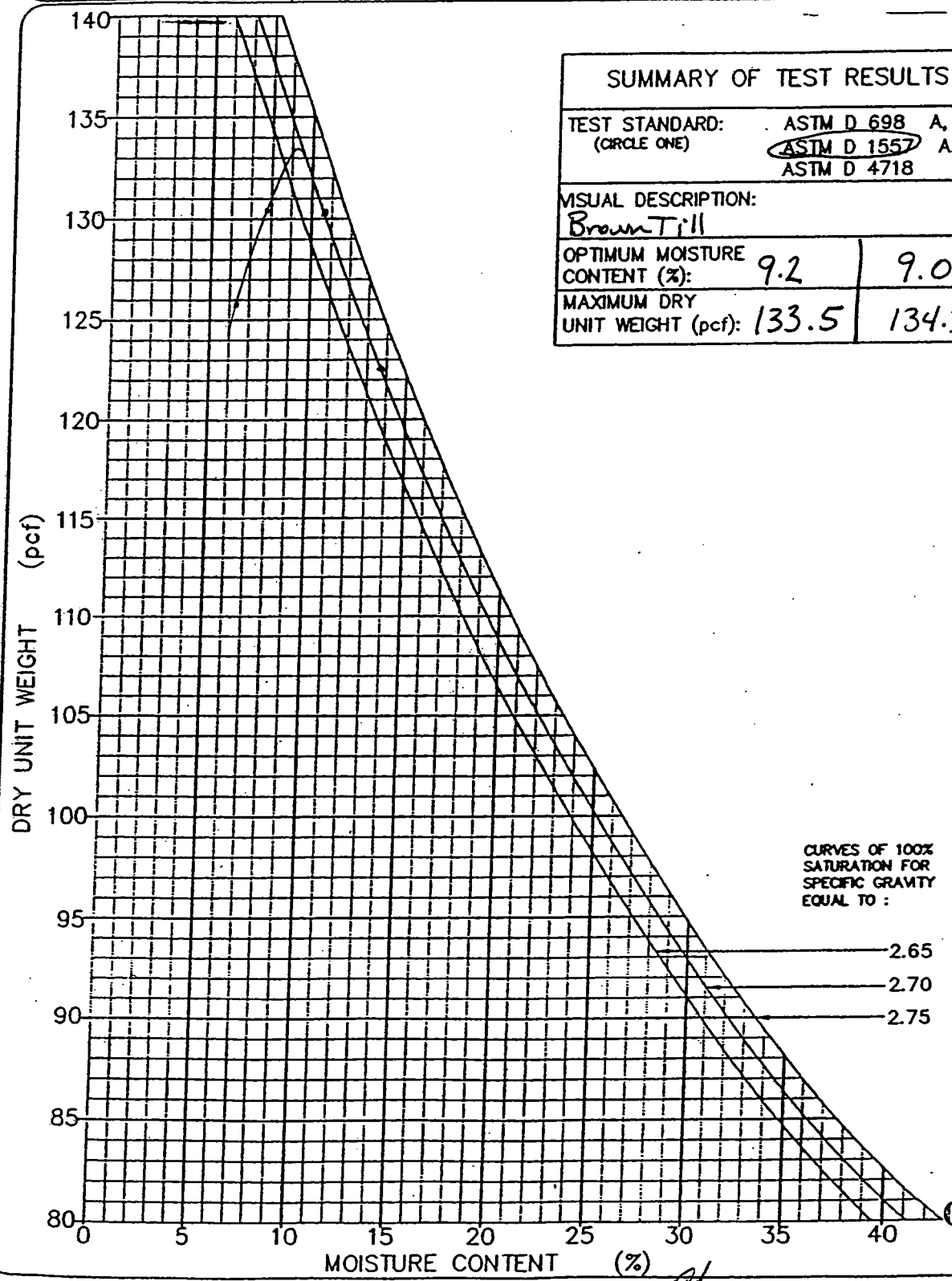
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 17 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-11 SAMPLE NO.: LPØ2-69

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	9.2	9.0	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	133.5	134.3	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-11 — DATE: 12 day Sept month 2002 year — SAMPLE NO.: LP02-70

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.21	8% 13.42	10% 13.67	12% 13.82	
	WATER ADDED	(ml)	150ml	200ml	250ml	300ml	
A	WT. OF SOIL & MOLD	(grams)	5992.1	6087.3	6200.7	6268.8	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1787.6	1882.8	1996.2	2064.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	118.0	124.3	131.7	136.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.6	113.1	117.6	119.0	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL. THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: KS

	TARE NO.		202	676	65	96	
F	WT. OF TARE	(grams)	8.2	8.3	8.2	8.1	
G	WT. OF WET SOIL & TARE	(grams)	277.3	313.7	361.6	327.9	
H	WT. OF DRY SOIL & TARE	(grams)	258.3	286.3	323.6	287.5	
I	WT. OF WATER = G − H	(grams)	19.0	27.4	38.0	40.4	
J	WT. DRY SOIL = H − F	(grams)	250.1	278.0	315.4	279.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.6	9.9	12.0	14.6	

5368

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 13 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-70 STD

Weight of Total Sample	=	20033.5
Weight of Oversize Fraction	=	774.8
Weight of Finer Fraction (- 3/8)	=	19258.7
Percentage of Oversize Fraction	= (P_C)	3.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.14
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 13.5\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 121.5 \text{ pcf}$$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

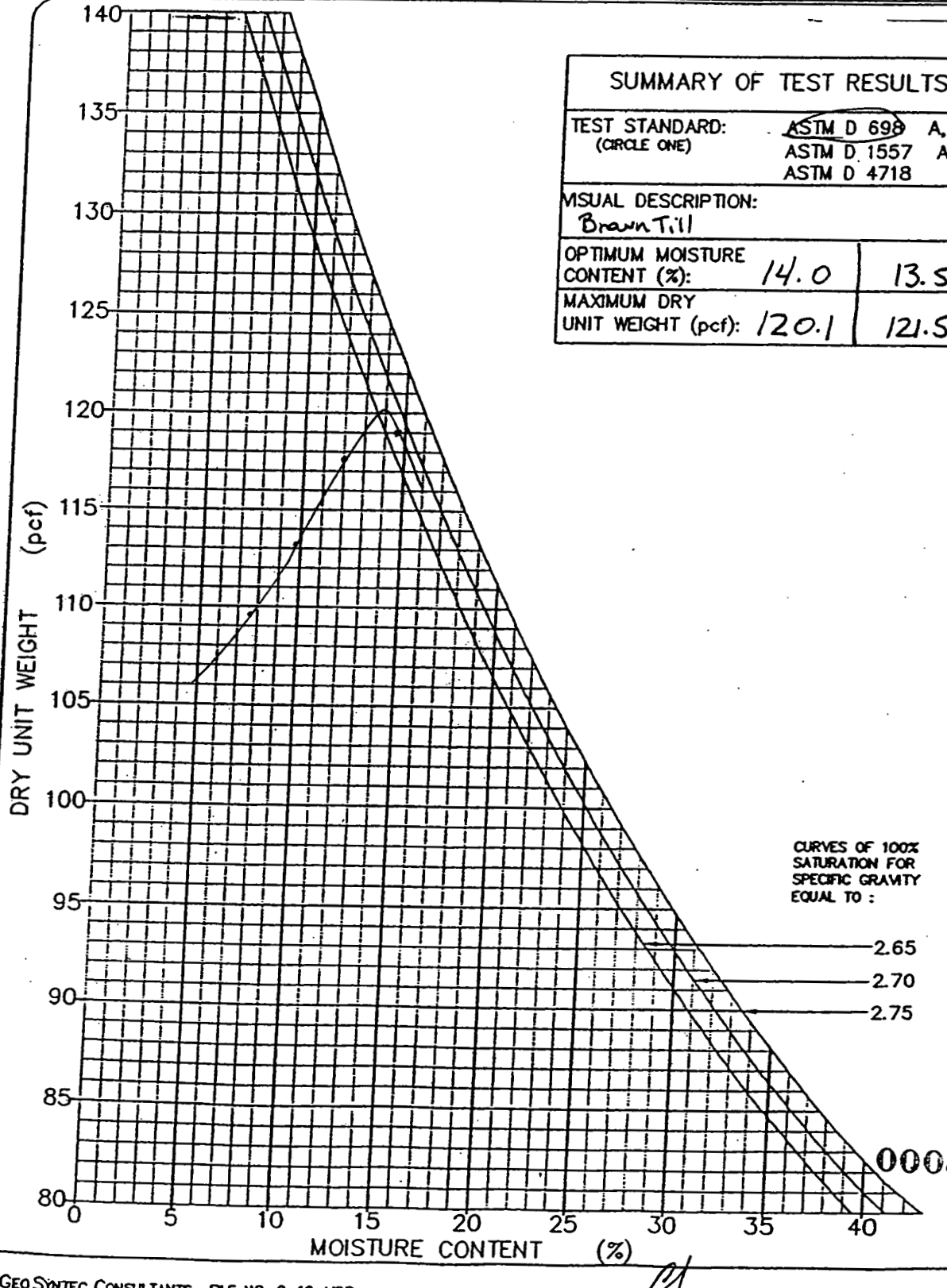
5368

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G21341 TASK NO.: 041

DESCRIPTION: Phase IV DATE: 13 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LR02-70



SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	14.0	13.5	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	120.1	121.5	CS

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LP02-71

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.51	8% 13.76	10% 13.86	12% 13.74	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6128.1	6241.5	6286.9	6232.5	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1923.6	2037.0	2082.4	2028.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.0	134.4	137.4	133.8	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	116.3	120.6	120.8	~~116.0~~ 116.1	

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: KS

	TARE NO.		230	310	103	679	
F	WT. OF TARE	(grams)	8.3	8.1	8.3	8.1	
G	WT. OF WET SOIL & TARE	(grams)	288.3	344.7	326.4	343.6	
H	WT. OF DRY SOIL & TARE	(grams)	264.7	310.0	287.8	299.0	
I	WT. OF WATER = G - H	(grams)	23.6	34.7	38.6	44.6	
J	WT. DRY SOIL = H - F	(grams)	256.4	301.9	279.5	290.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.2	11.5	13.8	15.3	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 13 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-71 STD

Weight of Total Sample	=	43507.0
Weight of Oversize Fraction	=	2148.5
Weight of Finer Fraction (- 3/8)	=	41358.5
Percentage of Oversize Fraction	= (P_C)	4.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.126
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	122.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 12.1$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 123.8$

000879

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MOISTURE-DENSITY RELATIONSHIP

5368

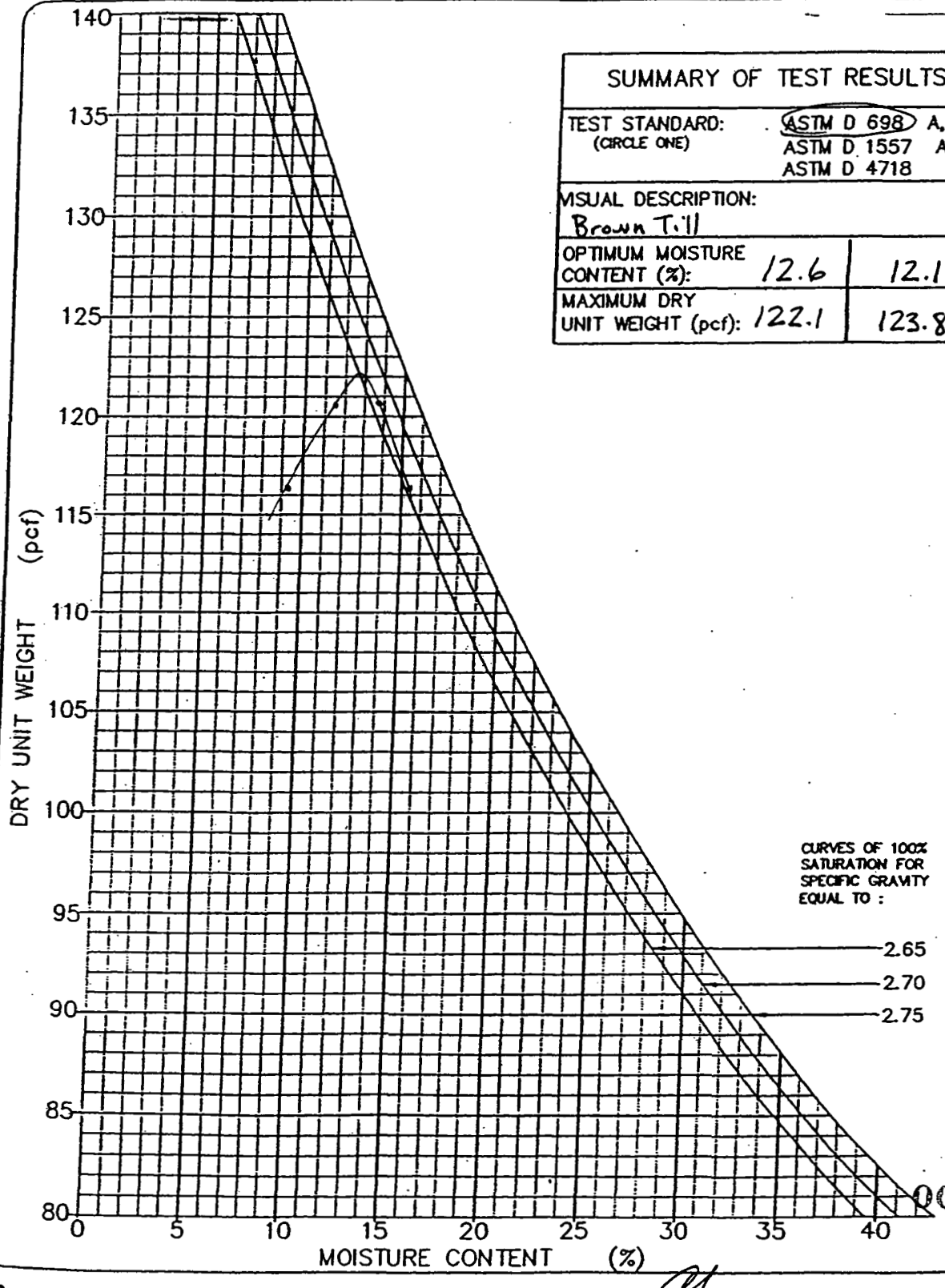
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 13 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LP02-71

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	12.6	12.1	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	122.1	123.8	CS



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 17 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LP02-71

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			49 o 13.83	69 o 14.11	89 o 14.06	29 o 13.71	
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6273.3	6400.3	6377.6	6218.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2068.8	2195.8	2173.1	2014.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	136.5	144.9	143.4	132.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	128.2	132.9	129.0	126.7	

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: KS

	TARE NO.		52	14	613	309	
F	WT. OF TARE	(grams)	8.1	8.3	8.2	8.1	
G	WT. OF WET SOIL & TARE	(grams)	324.7	346.7	325.4	295.5	
H	WT. OF DRY SOIL & TARE	(grams)	305.3	318.9	293.5	282.1	
I	WT. OF WATER = G − H	(grams)	19.4	27.8	31.9	13.4	
J	WT. DRY SOIL = H − F	(grams)	297.2	310.6	285.3	274.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.5	9.0	11.2	4.9	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6034 TASK NO. 041

DESCRIPTION: Phase II DATE: 18 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-71 MOD

Weight of Total Sample	=	43507.0
Weight of Oversize Fraction	=	2148.5
Weight of Finer Fraction (-3/8)	=	41358.5
Percentage of Oversize Fraction	= (P_C)	4.9
Percentage of Finer Fraction (-3/8)	= (P_F)	95.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	~~9.5~~ 0.095
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	133.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 9.1\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 134.8 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

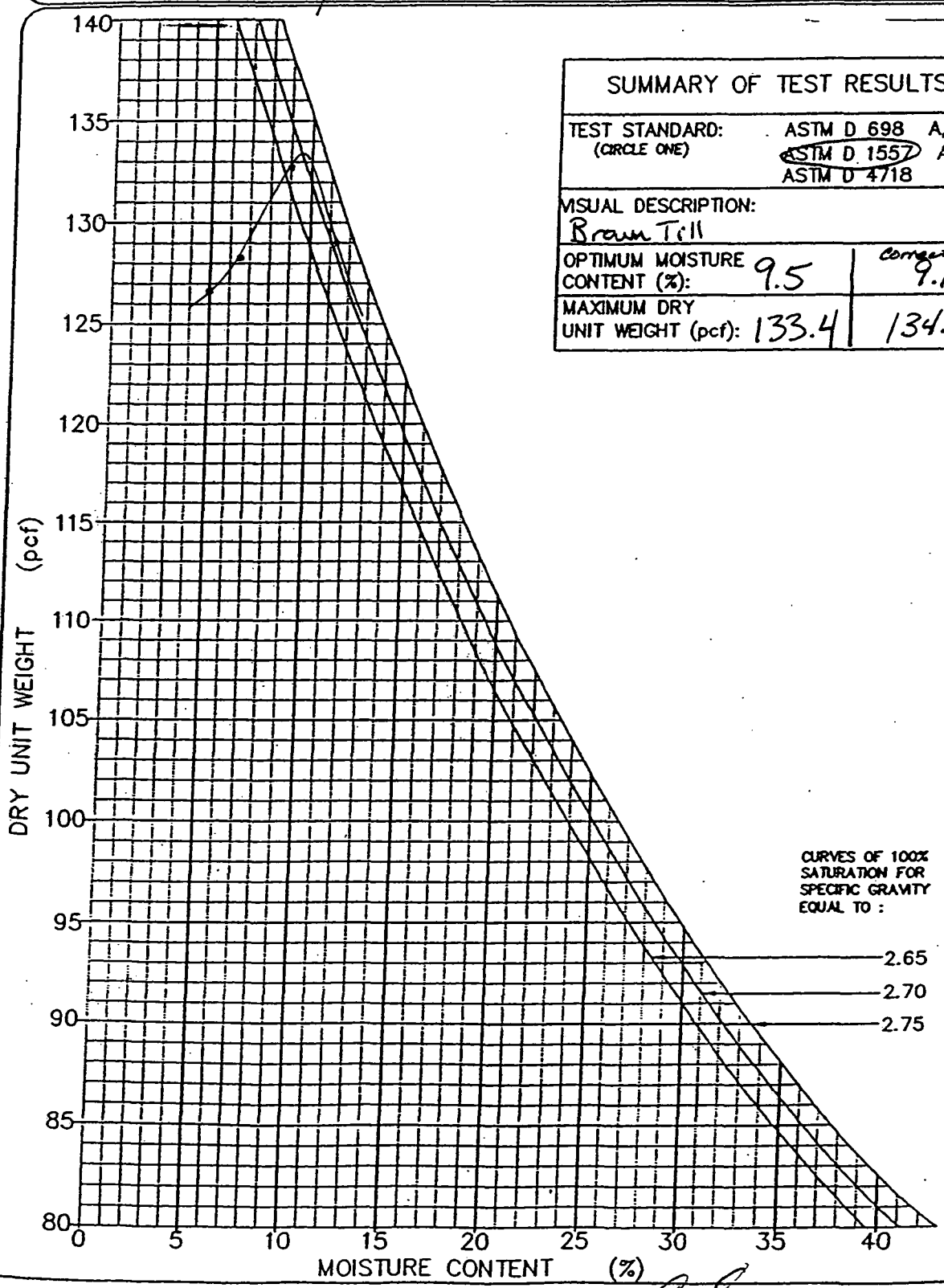
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G0B41 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 18 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: STOCKPILE 02-11 SAMPLE NO.: LA02-71

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	9.5	corrected 9.1	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	133.4	134.8	CS



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LP02-72

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.64	8% 13.77	10% 13.80	12% 13.66	
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	
A	WT. OF SOIL & MOLD	(grams)	6187.1	6246.1	6259.7	6196.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1982.6	2041.6	2055.2	1991.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.9	134.7	135.6	131.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	117.2	119.5	118.7	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: KS

	TARE NO.		602	91	675	200	
F	WT. OF TARE	(grams)	8.2	8.2	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	310.6	378.6	377.3	319.4	
H	WT. OF DRY SOIL & TARE	(grams)	279.0	336.8	331.1	273.8	
I	WT. OF WATER = G − H	(grams)	31.6	41.8	46.2	45.6	
J	WT. DRY SOIL = H − F	(grams)	270.8	328.6	322.8	265.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.7	12.7	14.3	17.2	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 12 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-72 STD

Weight of Total Sample	=	22816.1
Weight of Oversize Fraction	=	851.1
Weight of Finer Fraction (- 3/8)	=	21965.0
Percentage of Oversize Fraction	= (P_C)	3.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.132
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	120.2
(δ_W)	=	Unit Weight of Water	=	~~123.4~~ 62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = ~~12.2%~~ 12.8%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = ~~123.4 pcf~~ 121.5 pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

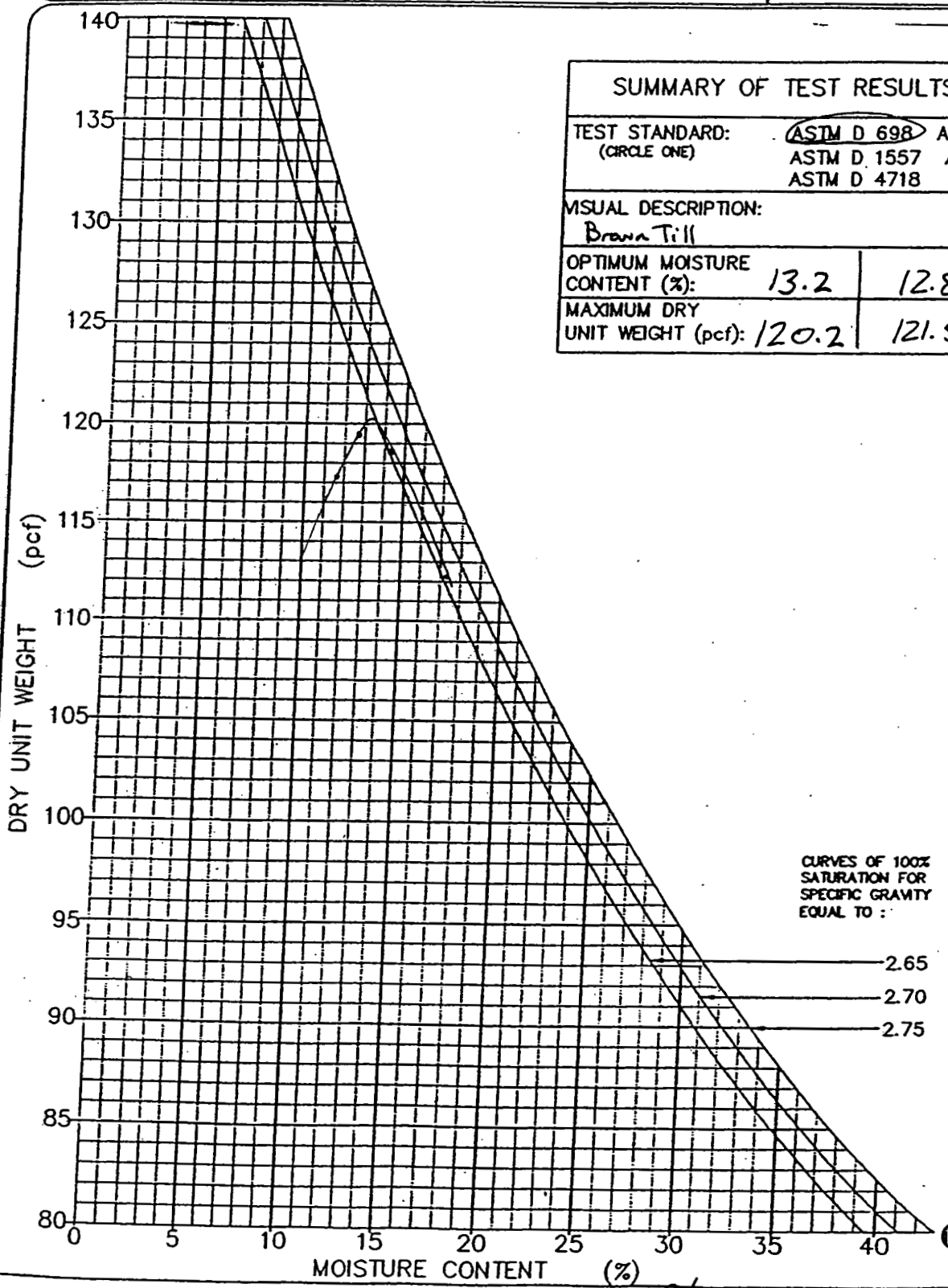
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G21341 TASK NO.: 041

DESCRIPTION: Phase III DATE: 13 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-11 SAMPLE NO.: LØØ2-72

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.2	12.8	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	120.2	121.5	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 18 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LP02-73

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.18	8% 13.28	10% 13.51	12% 13.64	14%
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	350mL
A	WT. OF SOIL & MOLD	(grams)	5978.4	6023.8	6128.1	6187.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1773.9	1819.3	1923.6	1982.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.1	120.1	127.0	130.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	105.5	107.0	110.6	111.1	

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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: KS

	TARE NO.		107	645	48	110	
F	WT. OF TARE	(grams)	8.0	8.1	8.3	8.1	
G	WT. OF WET SOIL & TARE	(grams)	250.3	309.2	291.2	241.2	
H	WT. OF DRY SOIL & TARE	(grams)	226.4	276.3	254.8	206.0	
I	WT. OF WATER = G − H	(grams)	23.9	32.9	36.4	35.2	
J	WT. DRY SOIL = H − F	(grams)	218.4	268.2	246.5	197.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.9	12.3	14.8	17.8	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134/TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Clay Liner CP42-73 STD

Weight of Total Sample	=	36930.9
Weight of Oversize Fraction	=	1510.2
Weight of Finer Fraction (- 3/8)	=	34520.7
Percentage of Oversize Fraction	= (P_C)	4.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.165
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	112.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 15.9\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 114.2 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

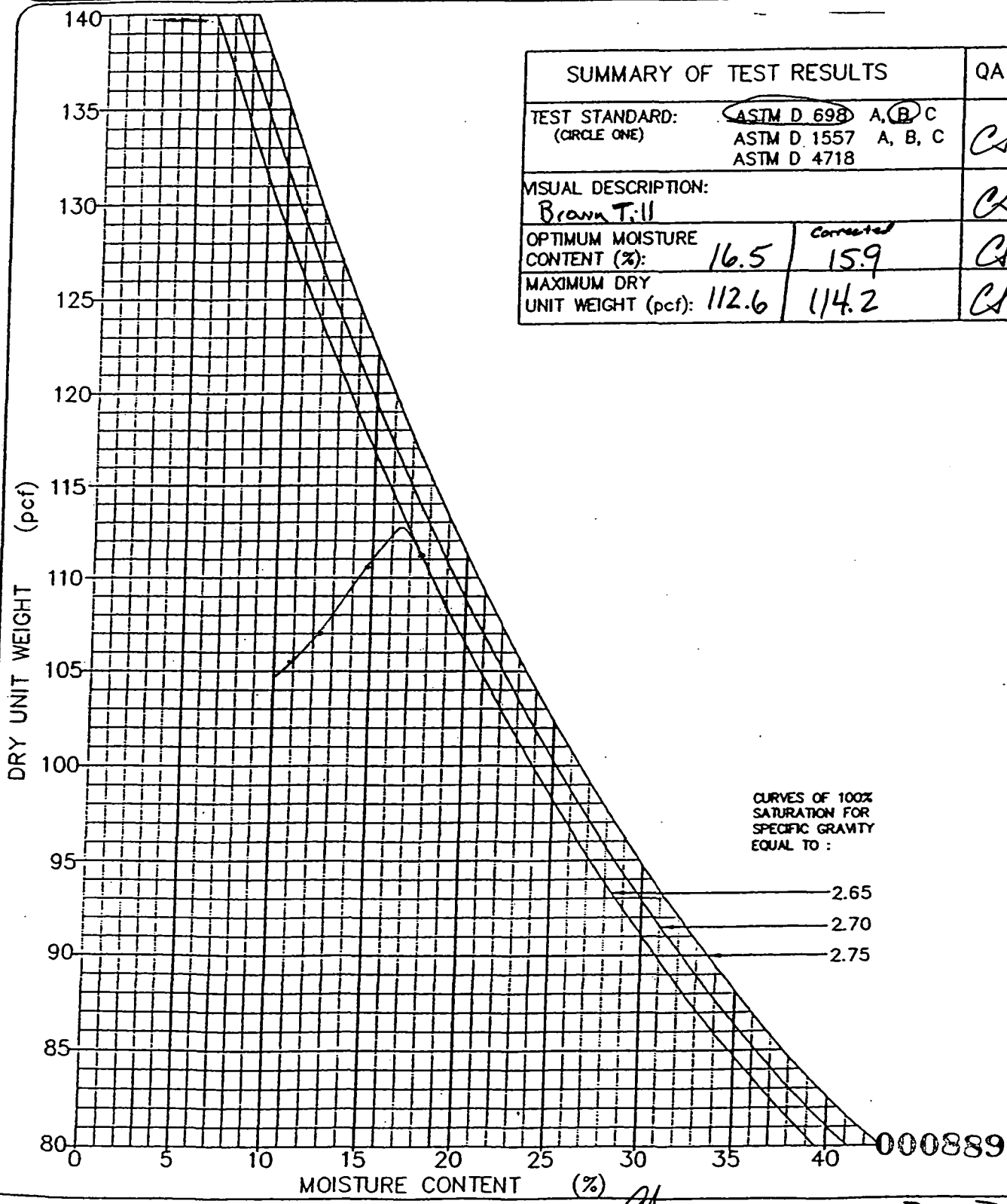
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 041

DESCRIPTION: Phase II DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: SA02-23

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	16.5	Corrected 15.9	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	112.6	114.2	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1349 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-11 — DATE: 18 day Sept month 2002 year — SAMPLE NO.: LP02-73

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: 15

			4% 13.64	6% 13.87	8% 13.92	10% 13.86	
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	6169.0	6291.4	6314.1	6286.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1964.5	2086.9	2109.6	2082.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	137.7	139.2	137.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	119.4	123.9	123.6	120.6	

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: 15

	TARE NO.		603	97	310	601	
F	WT. OF TARE	(grams)	8.2	8.2	8.1	8.3	
G	WT. OF WET SOIL & TARE	(grams)	262.8	241.6	253.5	260.3	
H	WT. OF DRY SOIL & TARE	(grams)	242.7	218.2	226.0	229.4	
I	WT. OF WATER = G − H	(grams)	20.1	23.4	27.5	30.9	
J	WT. DRY SOIL = H − F	(grams)	234.5	210.0	217.9	221.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.6	11.1	12.6	14.0	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase II DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-73 mod

Weight of Total Sample	=	36930.9
Weight of Oversize Fraction	=	1510.2
Weight of Finer Fraction (-3/8)	=	34520.7
Percentage of Oversize Fraction	= (P_C)	4.2
Percentage of Finer Fraction (-3/8)	= (P_F)	95.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.12
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	124.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 11.6\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 126.0$ pcf

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5368

MOISTURE-DENSITY RELATIONSHIP

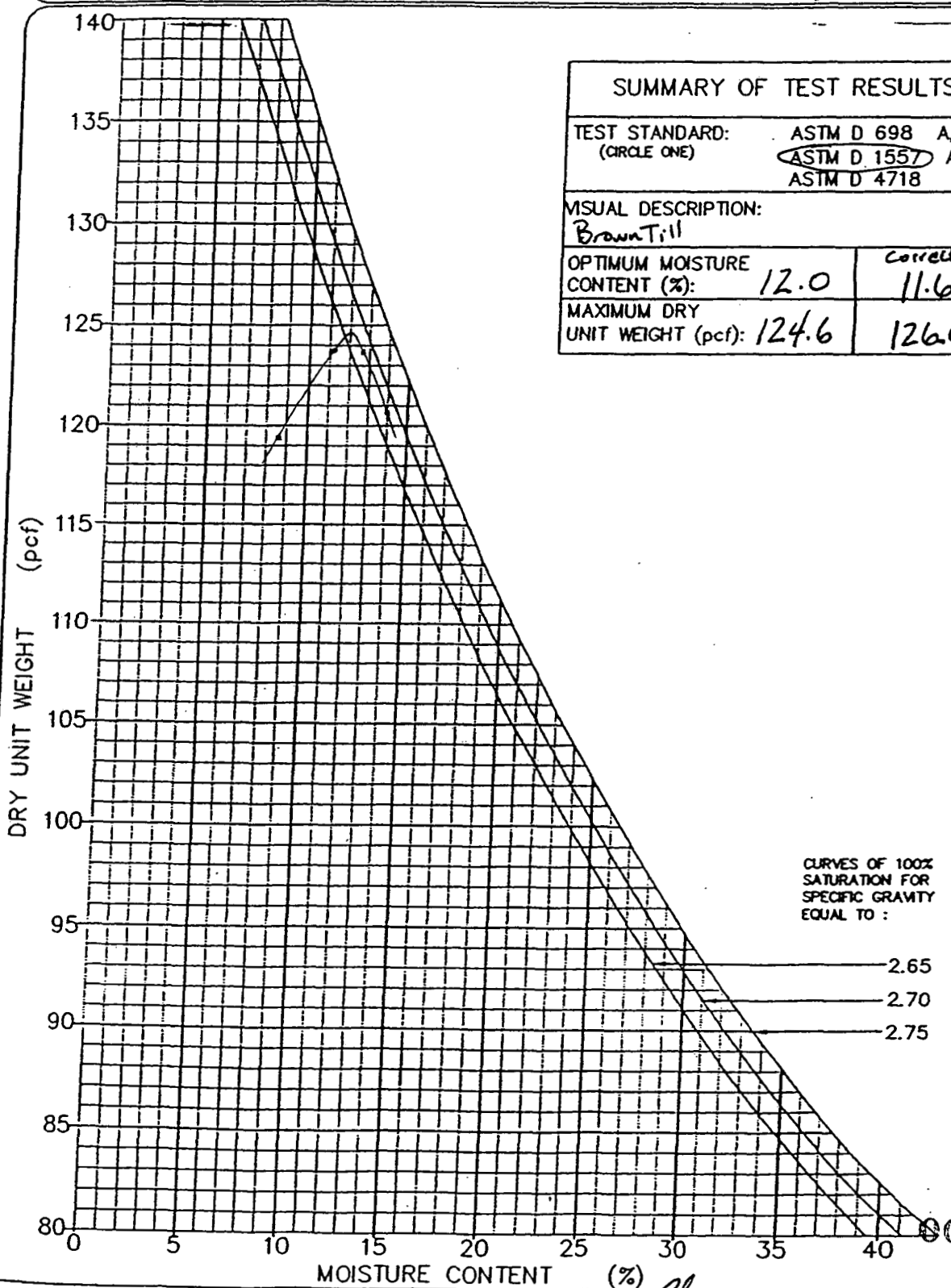
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-11 SAMPLE NO.: CPØ2-73

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.0	Corrected 11.6	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	124.6	126.0	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: 04.1

DATE: 18 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-12 SAMPLE NO.: LP02-74

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.27	8% 13.46	10% 13.66	12% 13.58	8% 13.46
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6019.3	6105.5	6196.2	6159.9	6105.5
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1814.8	1901.0	1991.7	1955.4	1901.0
D	WET UNIT WT.(1) = C X 0.066	(pcf)	119.8	125.5	131.5	129.1	125.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.5	109.5	113.5	109.6	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: KS

	TARE NO.		647	90	607	63	636
F	WT. OF TARE	(grams)	8.1	8.2	8.2	8.2	8.3
G	WT. OF WET SOIL & TARE	(grams)	285.2	288.3	371.3	285.0	414.3
H	WT. OF DRY SOIL & TARE	(grams)	256.7	252.7	321.8	243.2	365.3
I	WT. OF WATER = G − H	(grams)	28.5	35.6	49.5	41.8	49.0
J	WT. DRY SOIL = H − F	(grams)	248.6	244.5	313.6	235.0	357.0
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.5	14.6	15.8	17.8	13.7

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FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-74 STD

Weight of Total Sample	=	40799.6
Weight of Oversize Fraction	=	700.9
Weight of Finer Fraction (- 3/8)	=	40098.7
Percentage of Oversize Fraction	= (P_C)	1.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.159
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	113.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 15.7\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 114.2 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

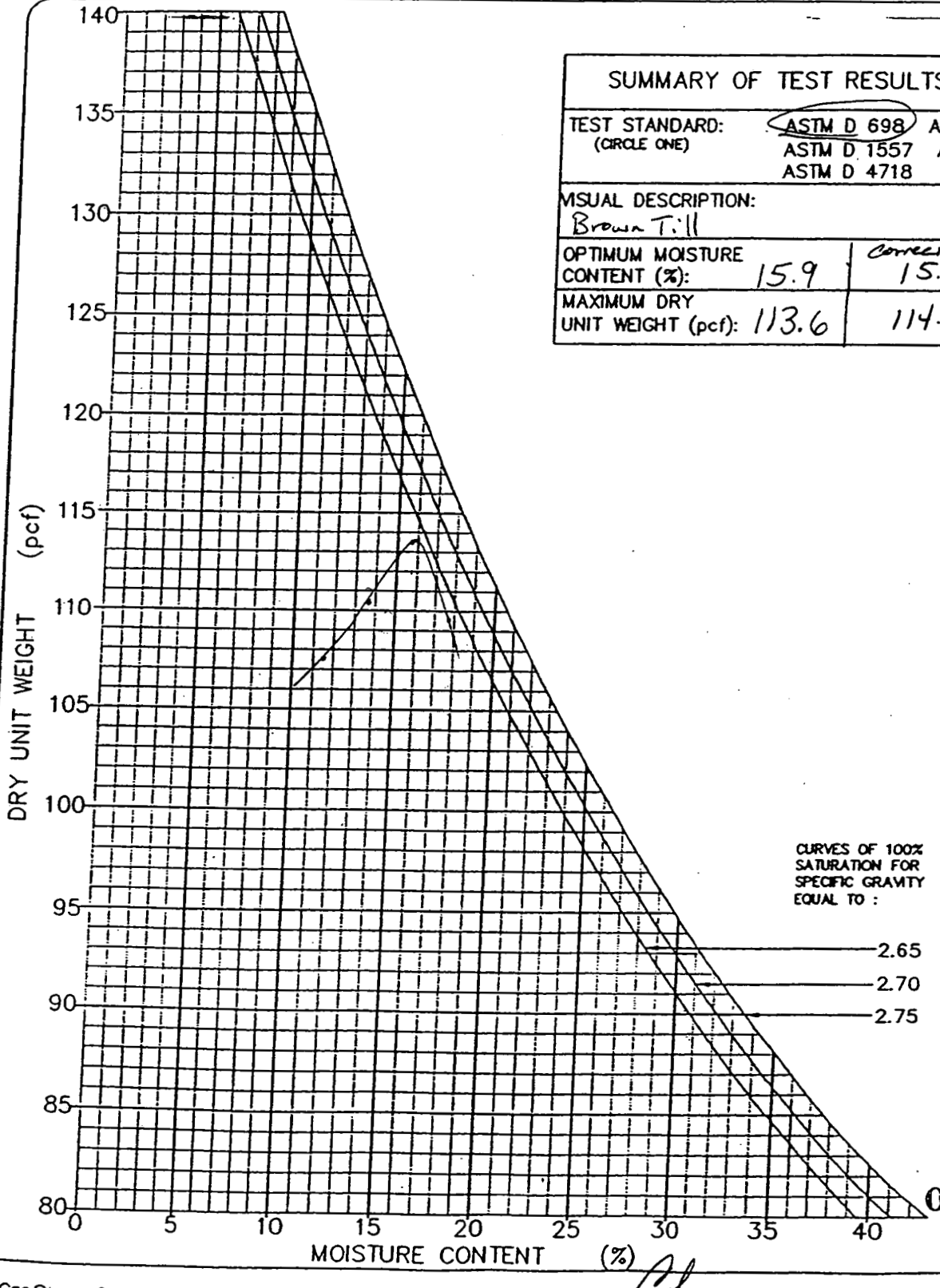
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G21341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-12 SAMPLE NO.: LPØ2-24

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	15.9	Corrected 15.7	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	113.6	114.2	CS



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 18 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-12 SAMPLE NO.: LA02-74

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL QA ID: KS

			4% @ 13.65	6% @ 13.83	8% @ 13.87	10% @ 13.77	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6191.6	6273.3	6291.4	6246.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1987.1	2068.8	2086.9	2041.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.2	136.5	137.7	134.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	120.7	123.6	120.5	116.7	

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: KS

	TARE NO.		230	604	200	675	
F	WT. OF TARE	(grams)	8.3	8.3	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	274.9	317.3	278.9	300.2	
H	WT. OF DRY SOIL & TARE	(grams)	253.7	288.0	245.1	261.2	
I	WT. OF WATER = G − H	(grams)	21.2	29.3	33.8	39.0	
J	WT. DRY SOIL = H − F	(grams)	245.4	279.7	236.9	252.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.6	10.5	14.3	15.4	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-74 MOD

Weight of Total Sample	=	40799.6
Weight of Oversize Fraction	=	700.9
Weight of Finer Fraction (-3/8)	=	40098.7
Percentage of Oversize Fraction	= (P_C)	1.7
Percentage of Finer Fraction (-3/8)	= (P_F)	98.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content -3/8, as decimal	=	0.119
(W_C) =	Water Content +3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	125.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 11.7 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 125.7 pcf

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MOISTURE-DENSITY RELATIONSHIP

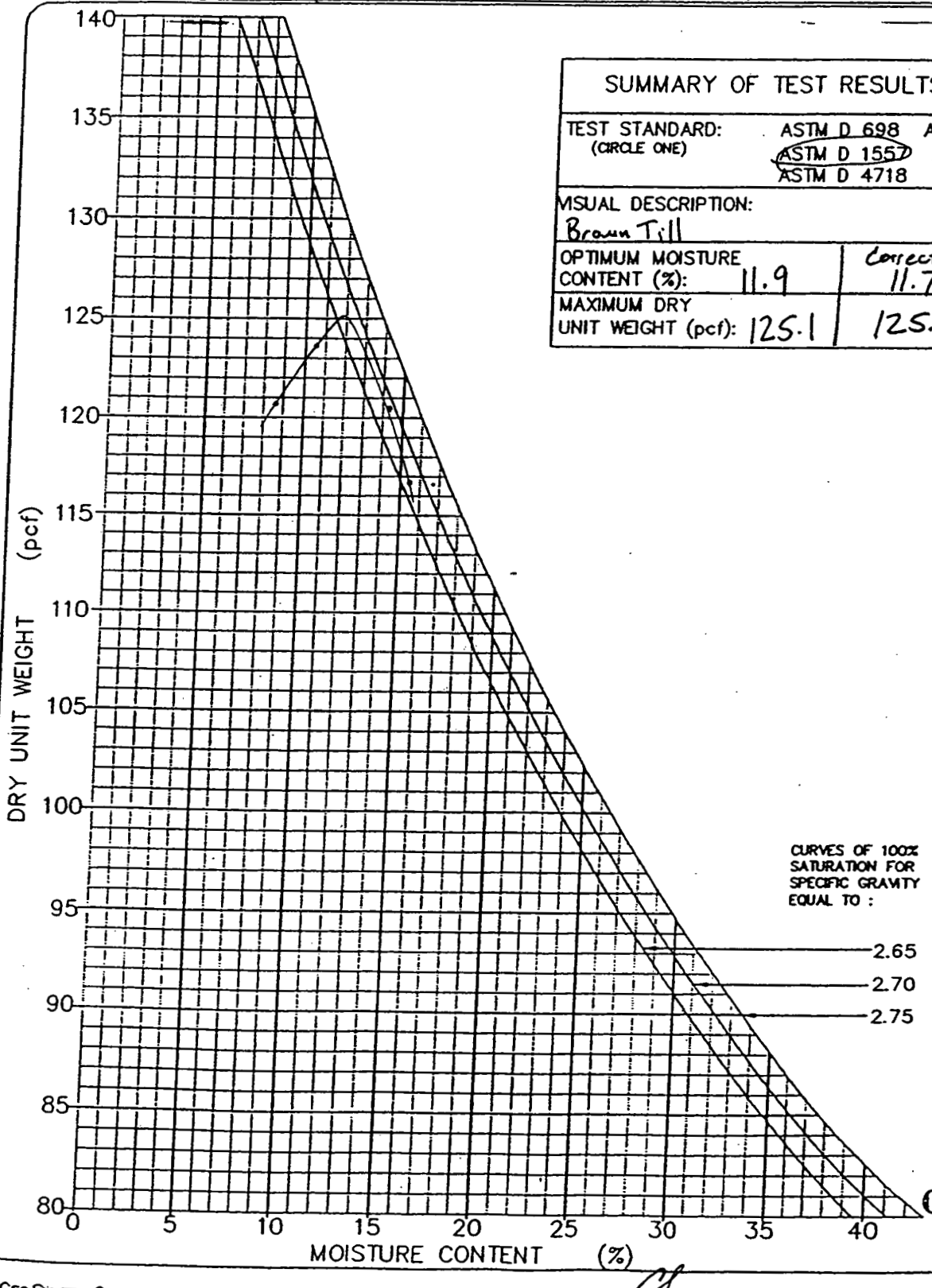
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day Sept month 2000 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-12 SAMPLE NO.: LP02-74

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	11.9	Corrected 11.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	125.1	125.7	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 17 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-10 SAMPLE NO.: LP02-75

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			6% 13.65	8% 13.76	10% 13.80	4% 13.33	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	100 mL	
A	WT. OF SOIL & MOLD	(grams)	6191.6	6241.5	6259.7	6046.5	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1987.1	2037.0	2055.2	1842.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.2	134.4	135.6	121.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.2	119.6	118.8	112.0	

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: 15

	TARE NO.		614	610	18	114	
F	WT. OF TARE	(grams)	8.2	8.2	8.4	8.4	
G	WT. OF WET SOIL & TARE	(grams)	282.1	291.5	323.4	305.5	
H	WT. OF DRY SOIL & TARE	(grams)	254.9	260.2	284.2	282.0	
I	WT. OF WATER = G − H	(grams)	27.2	31.3	~~23.5~~ 39.2	23.5	
J	WT. DRY SOIL = H − F	(grams)	246.7	252.0	275.8	273.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.0	12.4	~~8.6~~ 14.2	8.6	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 18 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-75 STD

Weight of Total Sample	=	22135.1
Weight of Oversize Fraction	=	660.4
Weight of Finer Fraction (- 3/8)	=	21474.7
Percentage of Oversize Fraction	= (P_C)	3.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	12.8
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 12.5%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 121.1 pcf

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MOISTURE-DENSITY RELATIONSHIP

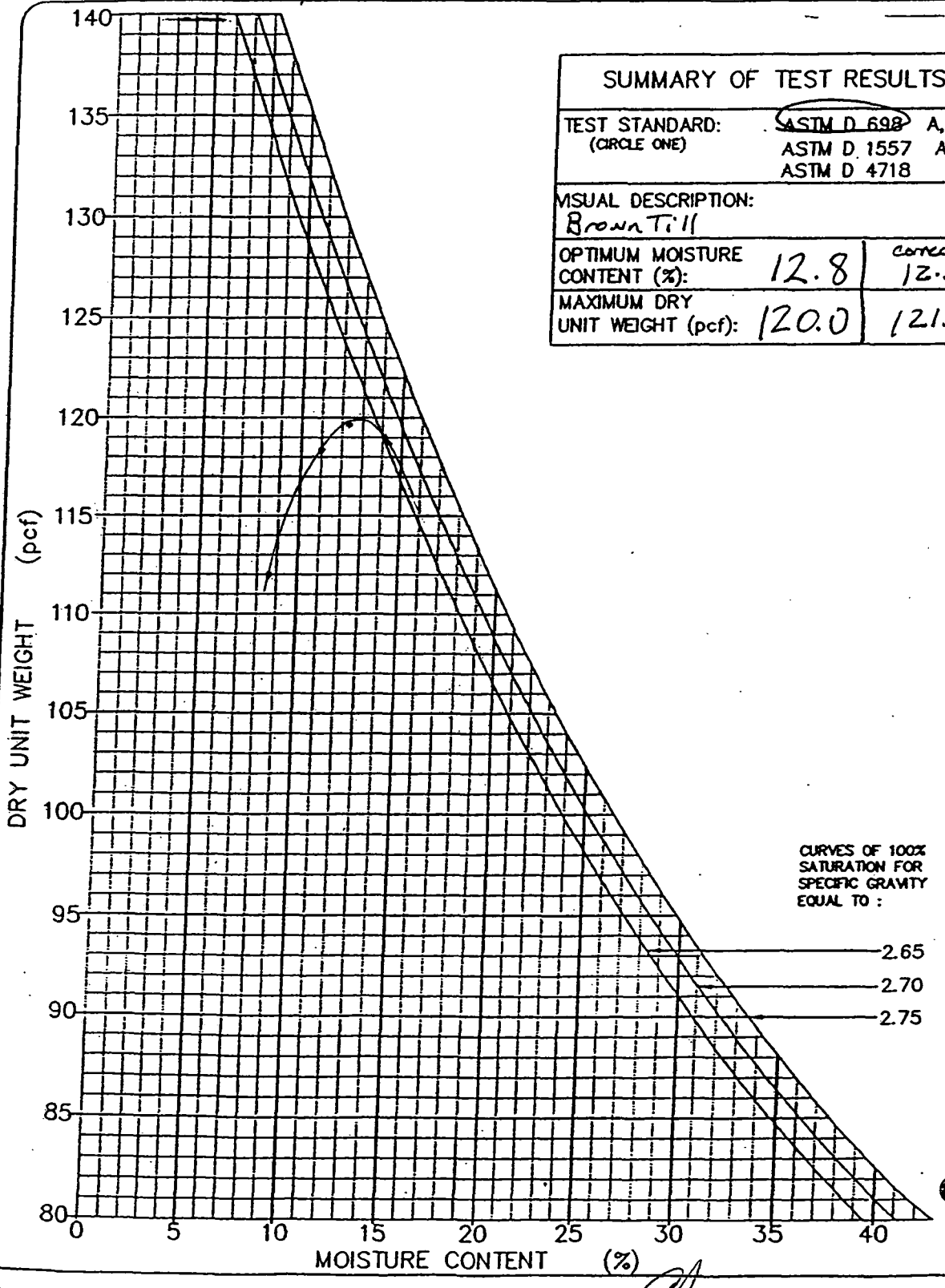
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ 341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 18 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-10 SAMPLE NO.: LP02-75

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	12.8	corrected 12.5	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	120.0	121.1	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: GG1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-11 — DATE: 19 day Sept month 2002 year — SAMPLE NO.: LP02-76

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: CS

			6% 13.29	8% 13.57	10% 13.63	12% 13.57	9% 13.64
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	225 mL
A	WT. OF SOIL & MOLD	(grams)	6028.3	6155.4	6182.6	6155.4	6187.1
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1823.8	1950.9	1978.1	1950.9	1982.6
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.4	128.8 omit	130.6	128.8	130.9
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	108.2	112.3	113.9	108.9	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: CS

	TARE NO.		602	16	12	613	103
F	WT. OF TARE	(grams)	8.2	8.4	8.3	8.2	8.3
G	WT. OF WET SOIL & TARE	(grams)	367.2	377.8	383.9	419.3	410.5
H	WT. OF DRY SOIL & TARE	(grams)	330.7	330.5	335.7	355.8	354.1
I	WT. OF WATER = G − H	(grams)	36.5	47.3 omit	48.2	63.5	56.4
J	WT. DRY SOIL = H − F	(grams)	322.5	322.1	~~287.5~~ 327.4	347.6	345.8
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.3	14.7	14.7	18.3	16.3

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ341 TASK NO. 041

DESCRIPTION: Phase IV DATE: 23 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-76 STD

Weight of Total Sample	=	20439.6
Weight of Oversize Fraction	=	217.9
Weight of Finer Fraction (- 3/8)	=	20221.7
Percentage of Oversize Fraction	= (P_C)	1.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.152
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	114.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 15.1\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta d} = 115.0$ pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

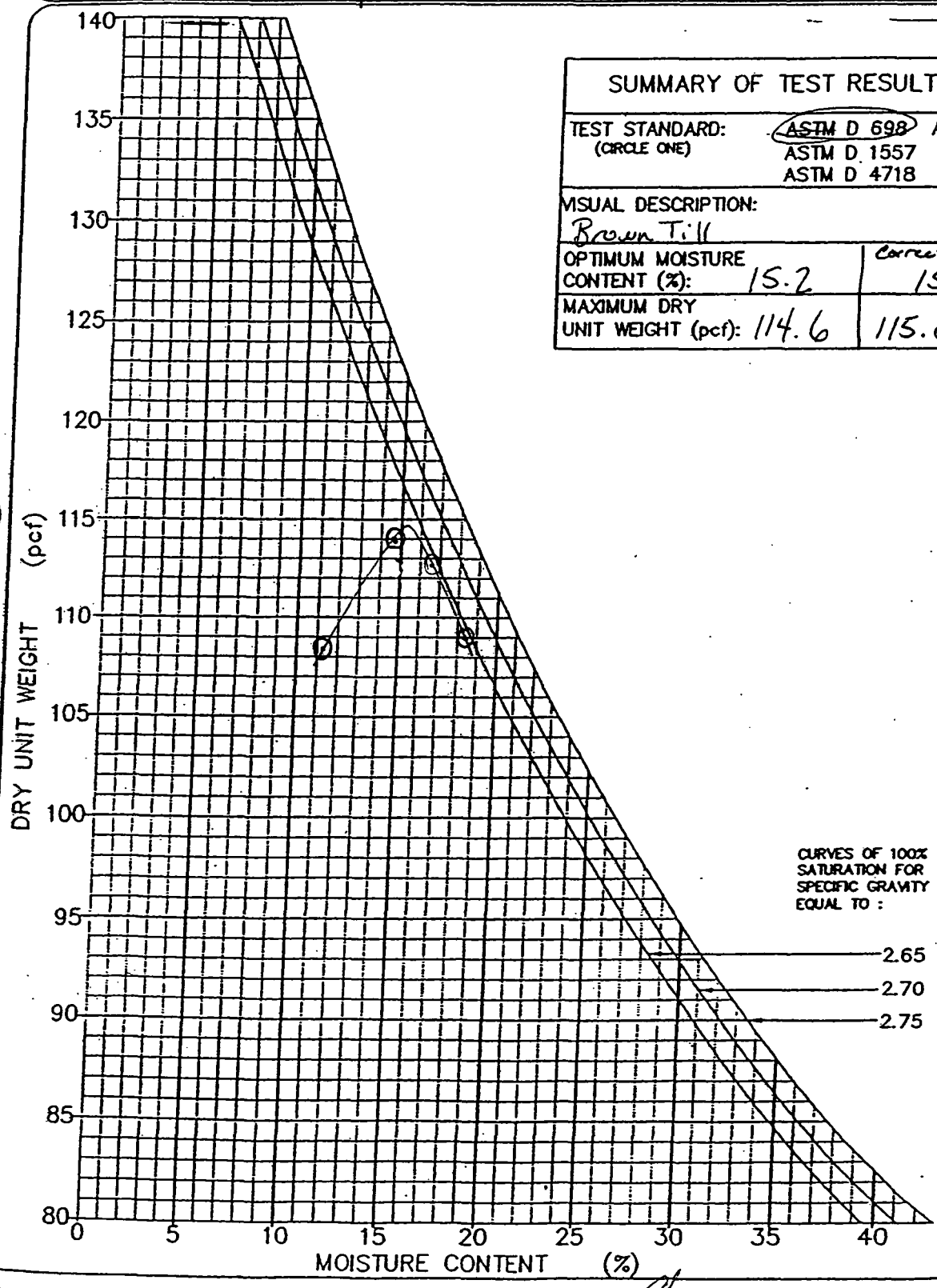
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-11 SAMPLE NO.: LP02-76

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	15.2	Corrected 15.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	114.6	115.0	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1341 TASK NO.: Ø4.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile Ø2-12 — DATE: 2Ø day Sept month 2ØØ2 year — SAMPLE NO.: LPØ2-77

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.25	6% 13.57	8% 13.68	10% 13.68	
	WATER ADDED	(ml)	1ØØ mL	15Ø mL	2ØØ mL	25Ø mL	
A	WT. OF SOIL & MOLD	(grams)	6Ø1Ø.2	6155.4	62Ø5.2	62Ø5.2	
B	WT. OF MOLD	(grams)	42Ø4.5	42Ø4.5	42Ø4.5	42Ø4.5	
C	WT. OF SOIL = A − B	(grams)	18Ø5.7	195Ø.9	2ØØØ.7	2ØØØ.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	119.2	128.8	132.Ø	132.Ø	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	1Ø8.4	113.8	115.3	113.1 ~~115.3~~ KS	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: KS

	TARE NO.		3Ø8	6Ø7	92	91	
F	WT. OF TARE	(grams)	8.1	8.2	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	243.1	41Ø.3	37Ø.1	282.1	
H	WT. OF DRY SOIL & TARE	(grams)	221.8	364.5	324.1	242.8	
I	WT. OF WATER = G − H	(grams)	21.3	45.8	46.Ø	39.3	
J	WT. DRY SOIL = H − F	(grams)	213.7	356.3	315.9	234.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	1Ø.Ø	12.9	14.6	16.8	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 041

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-77

STD

Weight of Total Sample	=	21867.2
Weight of Oversize Fraction	=	474.3
Weight of Finer Fraction (- 3/8)	=	21392.9
Percentage of Oversize Fraction	= (P_C)	2.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.149
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 14.6%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 116.2 pcf

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MOISTURE–DENSITY RELATIONSHIP

PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

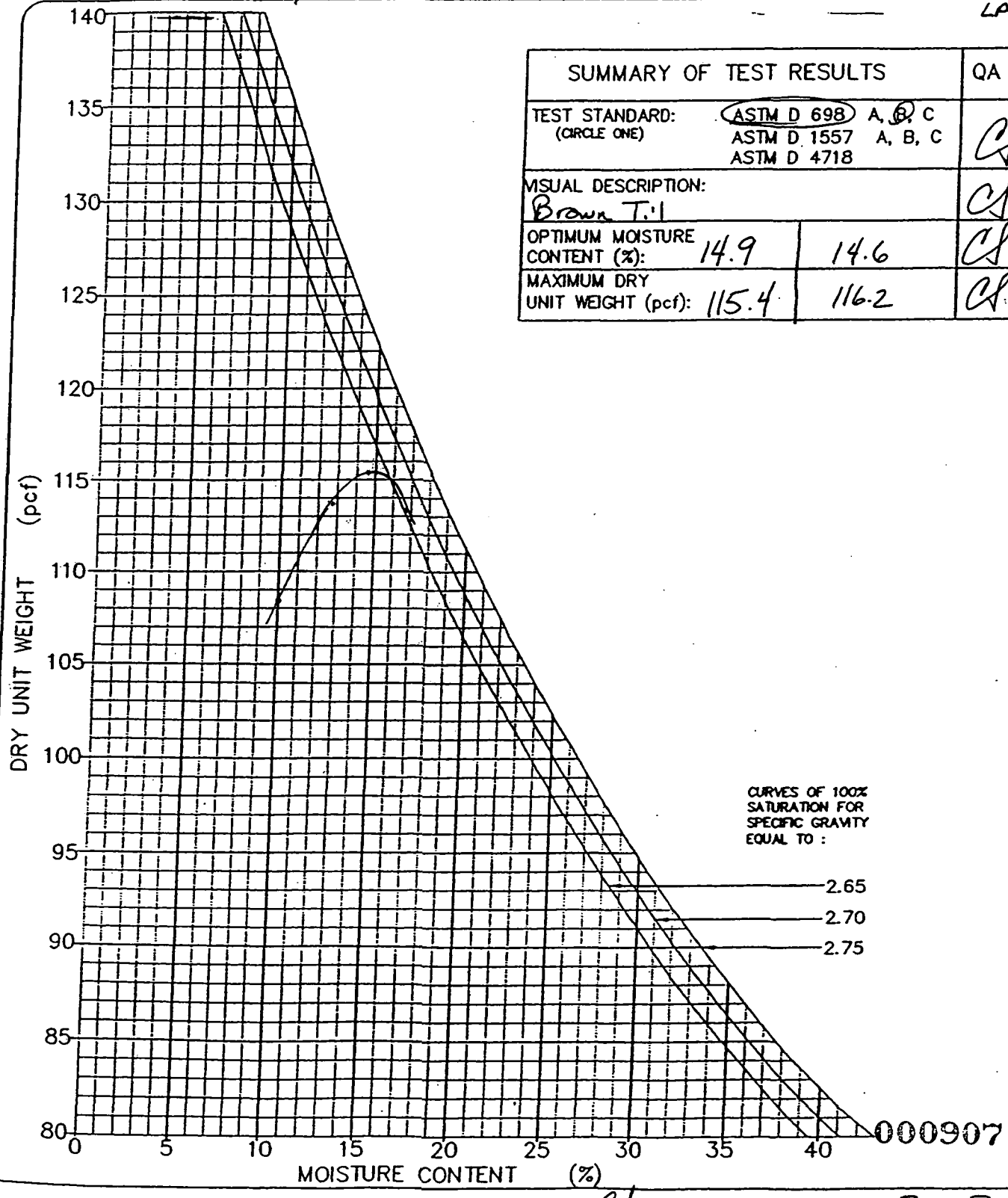
LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase III DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-12 SAMPLE NO.: 04.1

LP02-77

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown T.'l			CS
OPTIMUM MOISTURE CONTENT (%):	14.9	14.6	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	115.4	116.2	CS



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: low Perm Clay — MATERIAL SOURCE: Stockpile 02-12 — DATE: 19 day Sept month 2002 year — SAMPLE NO.: LP02-78

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			69 @ 13.54	89 @ 13.74	109 @ 13.74	129 @ 13.71	
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	
A	WT. OF SOIL & MOLD	(grams)	6141.7	6232.5	6255.1	6218.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1937.2	2028.0	2050.6	2014.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.9	133.8	135.3	132.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.5	118.9	~~119.5~~ 118.2	114.5	

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: KS

	TARE NO.		309	614	14	52	
F	WT. OF TARE	(grams)	8.1	8.2	8.3	8.1	
G	WT. OF WET SOIL & TARE	(grams)	363.1	395.0	382.3	377.8	
H	WT. OF DRY SOIL & TARE	(grams)	328.8	351.9	~~338.4~~ 334.8	326.4	
I	WT. OF WATER = G − H	(grams)	34.3	43.1	~~43.9~~ 47.5	51.4	
J	WT. DRY SOIL = H − F	(grams)	320.7	343.7	~~330.1~~ 326.5	318.3	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.7	12.5	~~13.3~~ 14.5	16.1	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-78 STD

Weight of Total Sample	=	43647.3
Weight of Oversize Fraction	=	1914.9
Weight of Finer Fraction (- 3/8)	=	41732.4
Percentage of Oversize Fraction	= (P_C)	4.4
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.135
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 13.0\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 121.6 \text{ pcf}$$

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

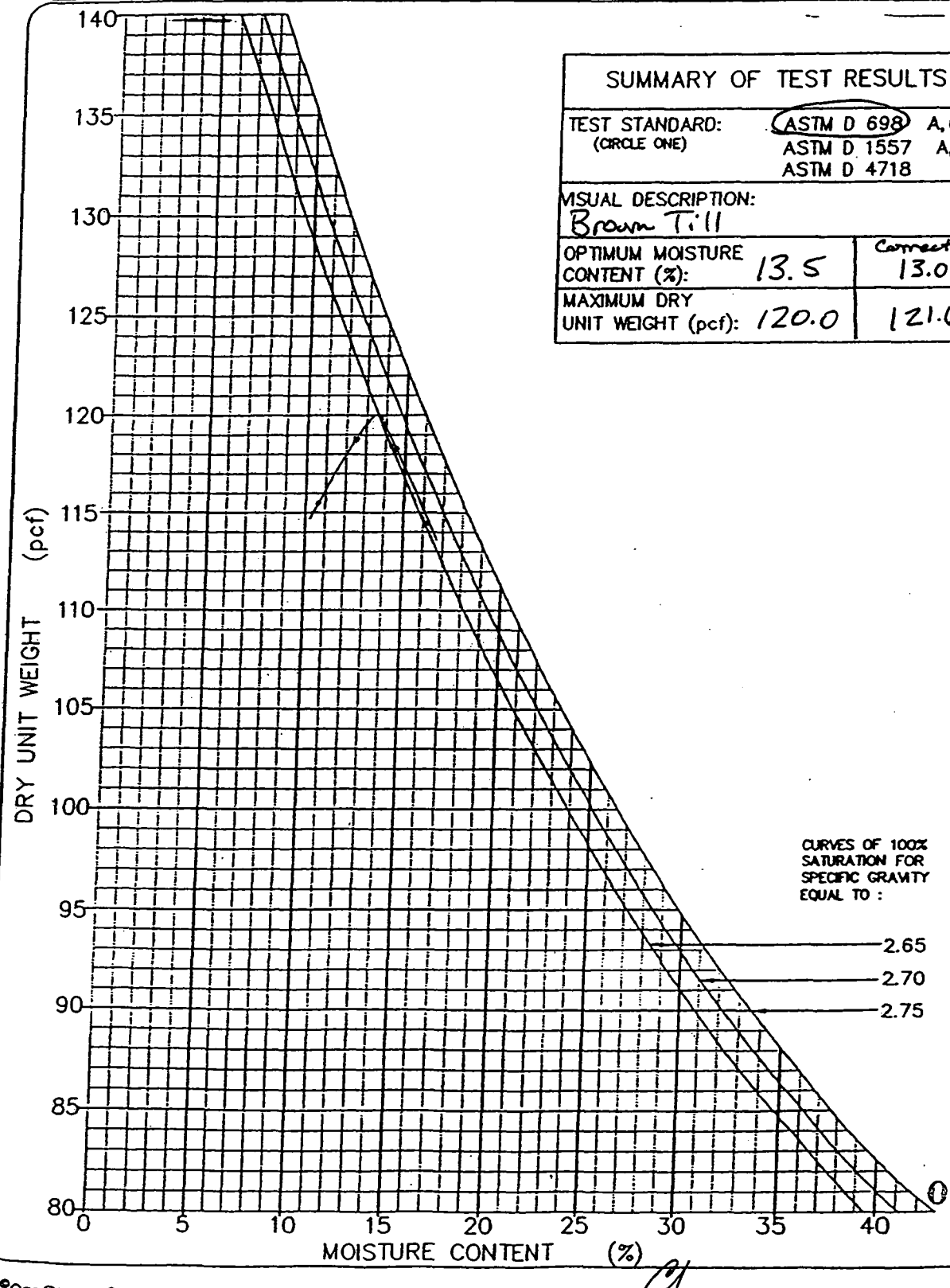
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-12 SAMPLE NO.: LPØ2-78

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.5	Corrected 13.0	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	120.0	121.6	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: GQ1341 TASK NO.: Ø41

DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay

MATERIAL SOURCE: Stockpile Ø2-12

SAMPLE NO.: LPØ2-78

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			6% 14.08	8% 14.03	4% 13.92	2% 13.65	
	WATER ADDED	(ml)	150mL	200mL	100mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6386.7	6364.0	6314.1	6191.6	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2182.2	2159.5	2109.6	1987.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	144.0	142.5	139.2	131.2	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	130.5	127.3	129.1	124.0	

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: KS

	TARE NO.		608	98	615	99	
F	WT. OF TARE	(grams)	8.2	8.2	8.2	8.4	
G	WT. OF WET SOIL & TARE	(grams)	251.9	288.1	416.0	488.2	
H	WT. OF DRY SOIL & TARE	(grams)	229.1	258.2	386.2	461.9	
I	WT. OF WATER = G − H	(grams)	22.8	29.9	29.8	26.3	
J	WT. DRY SOIL = H − F	(grams)	220.9	250.0	378.0	453.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.3	12.0	7.9	5.8	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6012341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-78 MOD

Weight of Total Sample	=	43647.3
Weight of Oversize Fraction	=	1914.9
Weight of Finer Fraction (- 3/8)	=	41732.4
Percentage of Oversize Fraction	= (P_C)	4.4
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.095
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	132.6
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 9.1\ \%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 133.9$$

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MOISTURE-DENSITY RELATIONSHIP

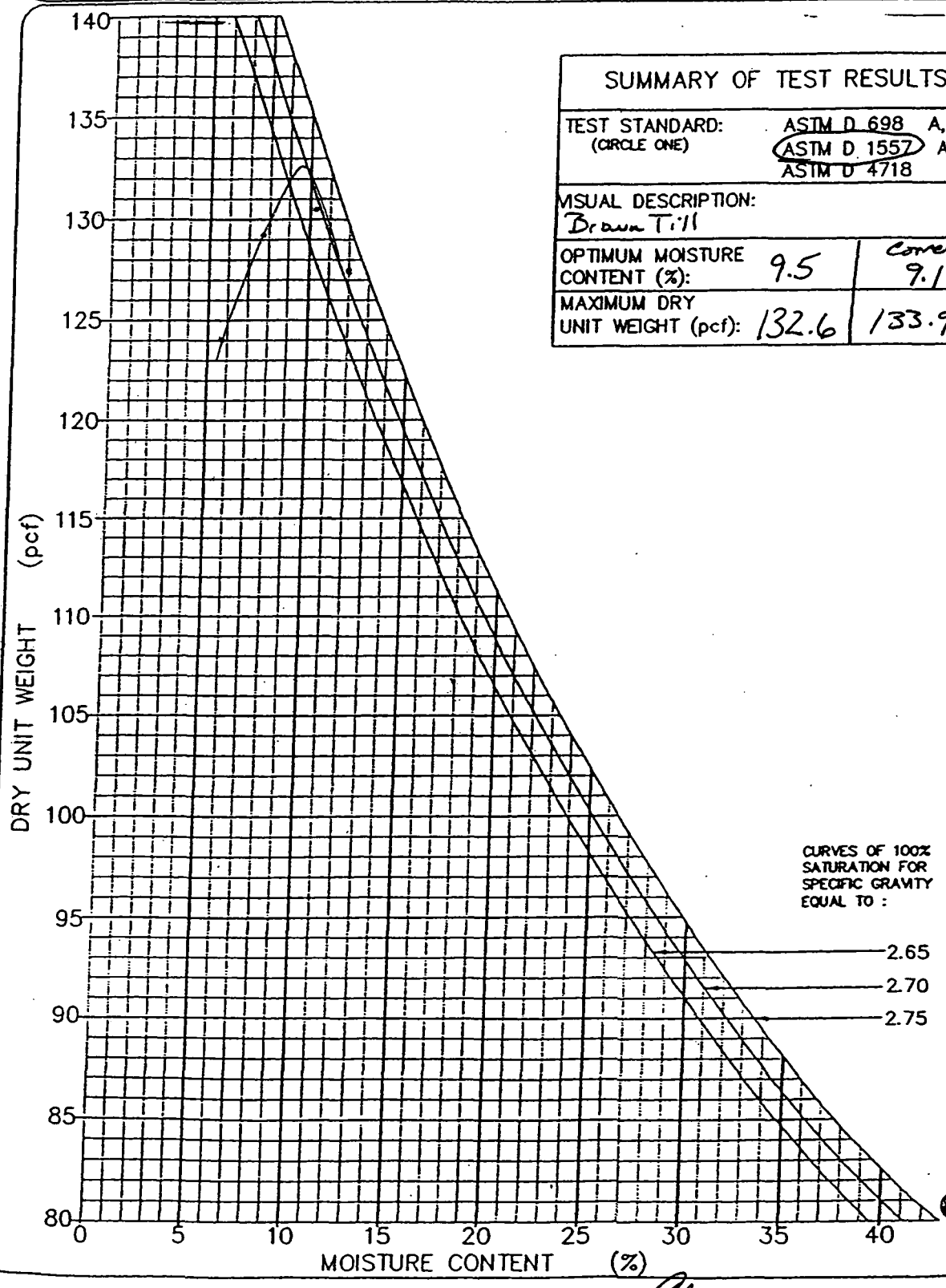
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-12 SAMPLE NO.: LP02-78

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.5	Corrected 9.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	132.6	133.9	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 19 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-12 SAMPLE NO.: LP02-79

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			69 @ 13.73	89 @ 13.79	109 @ 13.71	49 @ 13.60	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	100 mL	
A	WT. OF SOIL & MOLD	(grams)	6227.9	6255.1	6218.9	6169.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2023.4	2050.6	2014.4	1964.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.5	135.3	132.9	129.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	119.1	118.4	115.5	116.9	

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: KS

	TARE NO.		610	114	18	95	
F	WT. OF TARE	(grams)	8.2	8.4	8.4	8.1	
G	WT. OF WET SOIL & TARE	(grams)	364.2	401.6	441.6	367.1	
H	WT. OF DRY SOIL & TARE	(grams)	325.6	352.5	384.8	331.7	
I	WT. OF WATER = G − H	(grams)	38.6	49.1	56.8	35.4	
J	WT. DRY SOIL = H − F	(grams)	317.4	344.1	376.4	323.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.2	14.3	15.1	10.9	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 041

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LA02-79 STD

Weight of Total Sample	=	23713.2
Weight of Oversize Fraction	=	1152.9
Weight of Finer Fraction (- 3/8)	=	~~4.9~~ 22560.3
Percentage of Oversize Fraction	= (P_C)	~~95.1~~ 4.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	~~4.9~~ 95.1
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.132
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 12.6%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 121.9 pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

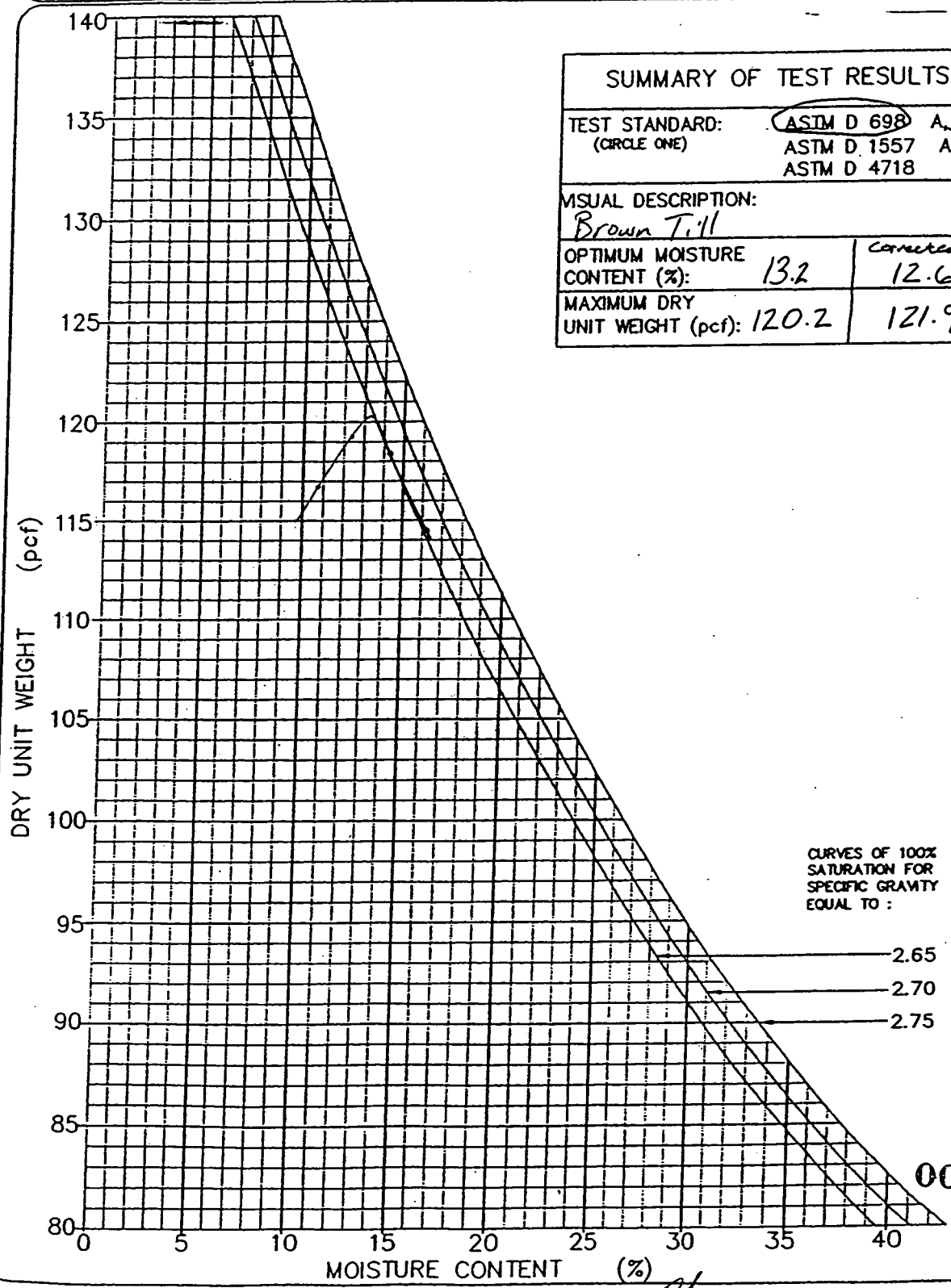
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-12 SAMPLE NO.: LP02-79

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 13.2	Corrected 12.6	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): 120.2	121.9	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 60134 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-12 — DATE: 19 day Sept month 2002 year — SAMPLE NO.: LP02-81

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.71	8% 13.80	10% 13.68	4% 13.42	
	WATER ADDED	(ml)	150mL	200mL	250mL	100mL	
A	WT. OF SOIL & MOLD	(grams)	6218.9	6259.7	6205.2	6087.3	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2014.4	2055.2	2000.7	1882.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	132.9	135.6	132.0	124.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	118.4	118.0	113.3	113.5	

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: KS

	TARE NO.		679	202	676	96	
F	WT. OF TARE	(grams)	8.1	8.2	8.3	8.1	
G	WT. OF WET SOIL & TARE	(grams)	435.7	353.5	384.1	371.5	
H	WT. OF DRY SOIL & TARE	(grams)	389.0	308.6	330.7	339.9	
I	WT. OF WATER = G − H	(grams)	46.7	44.9	53.4	31.6	
J	WT. DRY SOIL = H − F	(grams)	380.9	300.4	322.4	331.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.3	14.9	16.6	9.5	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ341 TASK NO. 04.1

DESCRIPTION: Phase II DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP42-81 STD

Weight of Total Sample	=	42756.5
Weight of Oversize Fraction	=	1698.9
Weight of Finer Fraction (- 3/8)	=	41057.6
Percentage of Oversize Fraction	= (P_C)	4.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.135
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 13.0 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 121.3 pcf

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MOISTURE–DENSITY RELATIONSHIP

5368

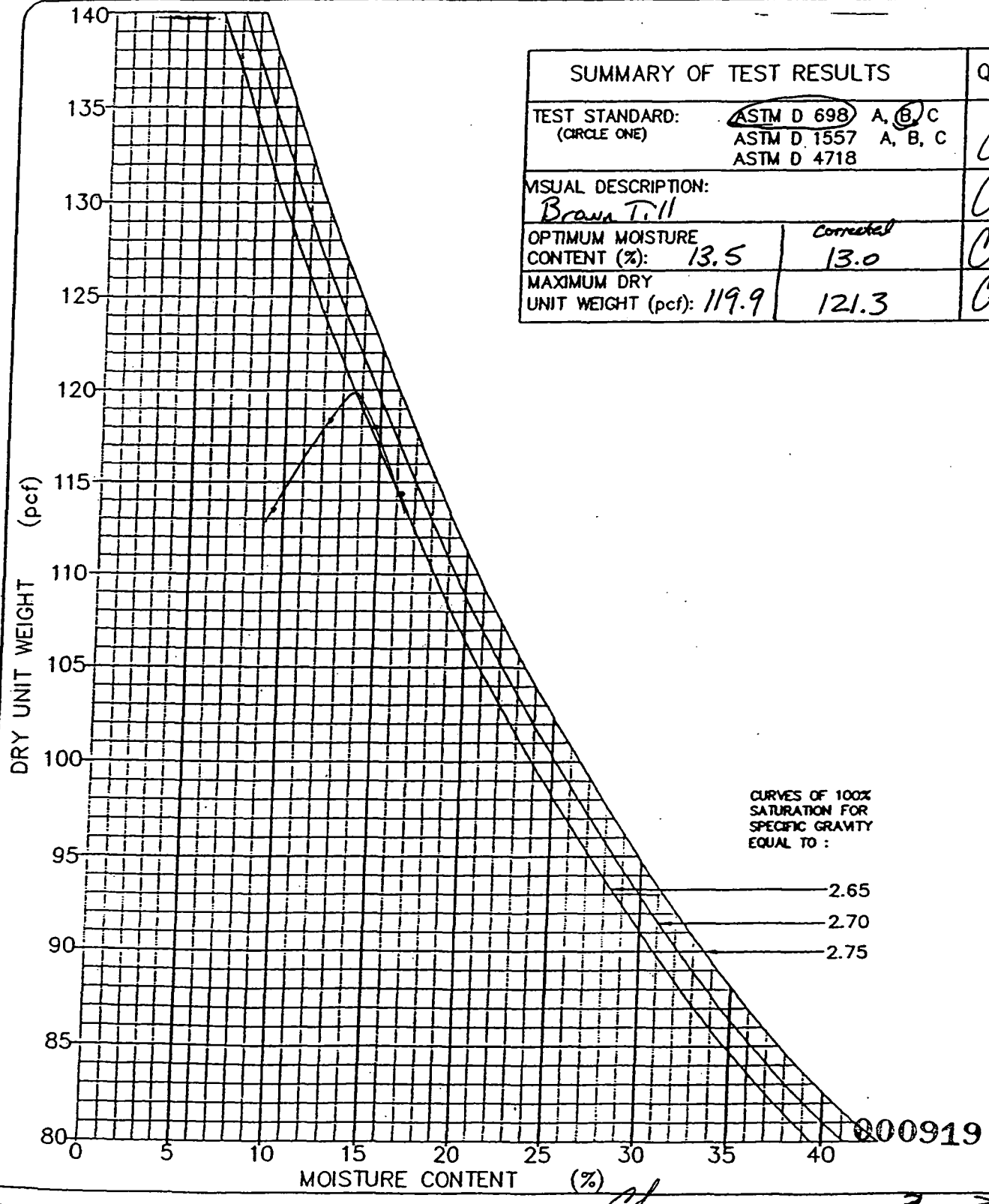
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-81 SAMPLE NO.: LP02-81

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till		CA
OPTIMUM MOISTURE CONTENT (%): 13.5	Corrected 13.0	CA
MAXIMUM DRY UNIT WEIGHT (pcf): 119.9	121.3	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 661341 TASK NO.: 04 1

DESCRIPTION: Phase IV

DATE: 18 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-12 SAMPLE NO.: LP02-81

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			49 @ 14.05	69 @ 14.00	89 @ 13.67	29 @ 13.88	
	WATER ADDED	(ml)	100mL	150mL	~~200mL~~	50mL	
A	WT. OF SOIL & MOLD	(grams)	6373.1	6350.4	6200.7	6296.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2168.6	2145.9	1996.2	2091.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	143.1	141.6	131.7	138.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	129.6	126.3	124.8	127.5	

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: KS

	TARE NO.		605	616	600	94	
F	WT. OF TARE	(grams)	8.4	8.3	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	460.9	410.6	484.5	440.2	
H	WT. OF DRY SOIL & TARE	(grams)	418.0	367.0	~~407~~ 459.2	~~459.2~~ 407.3	
I	WT. OF WATER = G − H	(grams)	42.9	43.6	25.3	32.9	
J	WT. DRY SOIL = H − F	(grams)	409.6	358.7	450.9	399.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.5	12.2	5.6	8.2	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 601341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-81 mod

Weight of Total Sample	=	42756.5
Weight of Oversize Fraction	=	1698.9
Weight of Finer Fraction (- 3/8)	=	41057.6
Percentage of Oversize Fraction	= (P_C)	4.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.109
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	129.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 10.5%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 130.8 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

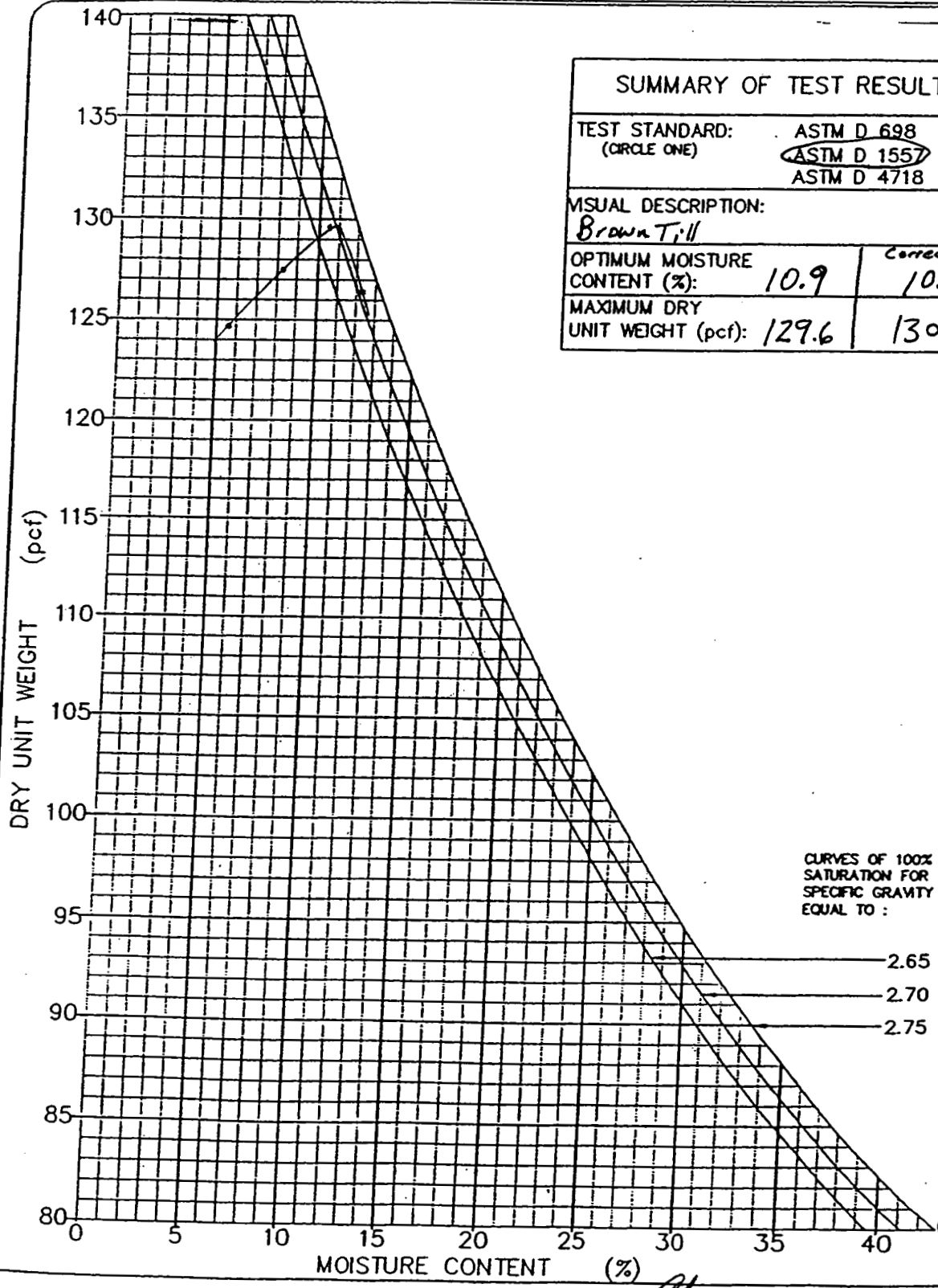
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-12 SAMPLE NO.: LPØ2-81

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	10.9	Corrected 10.5	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	129.6	130.8	CJ



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FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 20 day Sept month 2002 year

SAMPLE NO.: LP02-82

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: LS

			6% 13.51	8% 13.76	10% 13.74	4% 13.34	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	100 mL	
A	WT. OF SOIL & MOLD	(grams)	6128.1	6241.5	6232.5	6051.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1923.6	2037.0	2028.0	1846.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	127.0	134.4	133.8	121.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.4	117.0	114.9	110.2	

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: LS

	TARE NO.		230	675	308	604	
F	WT. OF TARE	(grams)	8.4	8.3	8.0	8.3	
G	WT. OF WET SOIL & TARE	(grams)	392.5	405.8	362.1	432.3	
H	WT. OF DRY SOIL & TARE	(grams)	351.3	354.1	312.2	391.5	
	WT. OF WATER = G - H	(grams)	41.2	~~51.4~~ 51.7	49.9	40.8	
	WT. DRY SOIL = H - F	(grams)	342.9	345.8	304.2	383.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.0	~~14.9~~ 15.0	16.4	10.6	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04-1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LPØZ-82 STD

Weight of Total Sample	=	23930.9
Weight of Oversize Fraction	=	1252.6
Weight of Finer Fraction (-3/8)	=	22678.3
Percentage of Oversize Fraction	= (P_C)	5.2
Percentage of Finer Fraction (-3/8)	= (P_F)	94.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.15
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	117.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 14.3 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 119.0 pcf

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MOISTURE–DENSITY RELATIONSHIP

5368

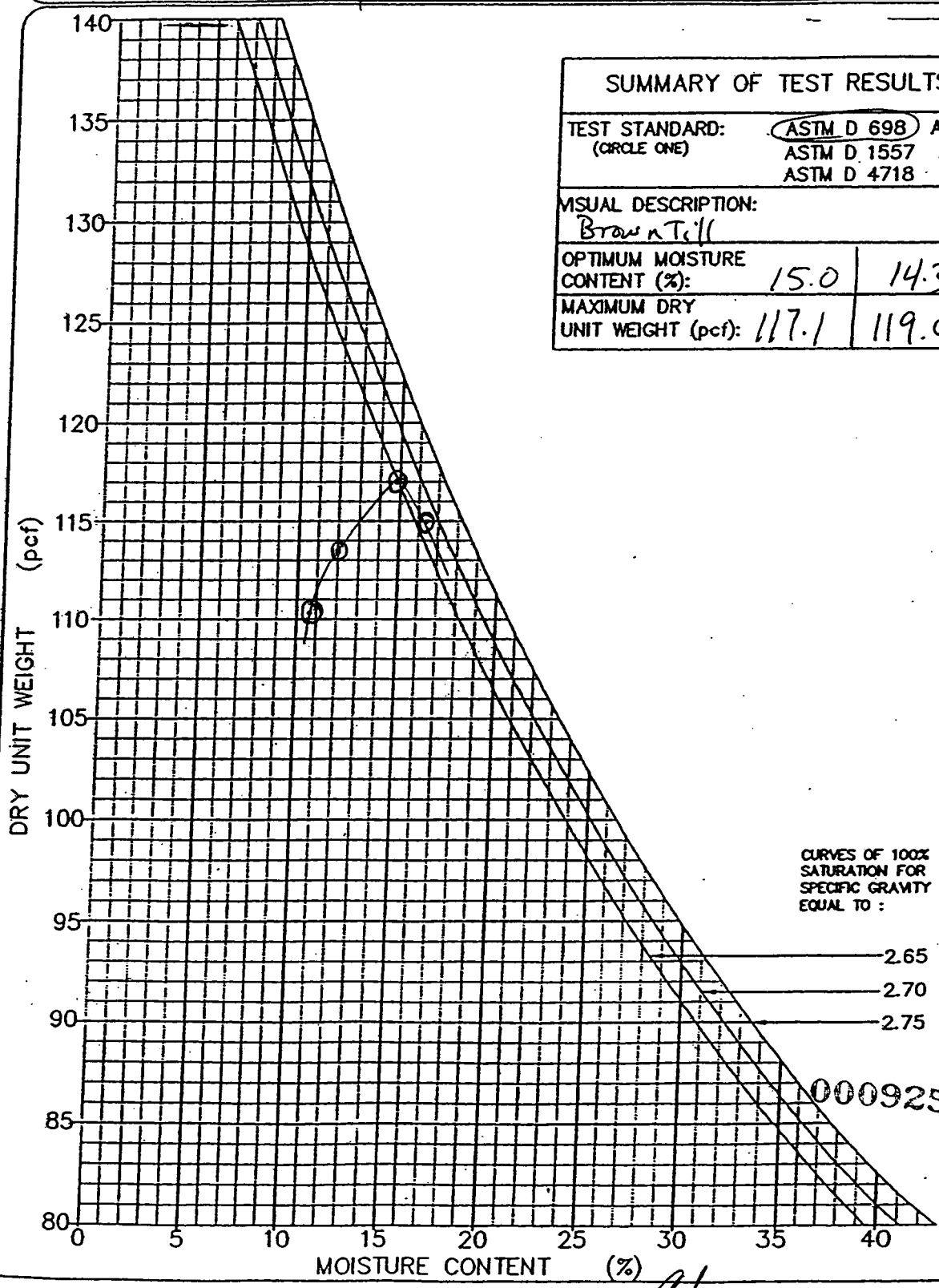
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK

DESCRIPTION: Phase IV DATE: 21 day Sept mont

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-12 SAMPLE

SUMMARY OF TEST RESULTS		
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, ASTM D 4718	
VISUAL DESCRIPTION: Brown Till		
OPTIMUM MOISTURE CONTENT (%):	15.0	14.3
MAXIMUM DRY UNIT WEIGHT (pcf):	117.1	119.0



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FLUOR DANIEL FERNALD

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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 69134 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 5 day Oct month 2002 year

SAMPLE NO.: LP02-83

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.14	6% 13.43	8% 13.59	10% 13.66	12% 13.58
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	300mL
A	WT. OF SOIL & MOLD	(grams)	5960.3	6091.8	6164.4	6196.2	6159.9
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	1755.8	1887.3	1959.9	1991.7	1955.4
D	WET UNIT WT.(1) = C X 0.066	(pcf)	115.9	124.6	129.4	131.5	129.1
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	105.5	111.2	113.3	112.9	109.1

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: KS

	TARE NO.		29	662	28	663	39
F	WT. OF TARE	(grams)	8.3	8.3	8.3	8.4	8.2
G	WT. OF WET SOIL & TARE	(grams)	403.1	356.9	401.0	401.0	481.8
H	WT. OF DRY SOIL & TARE	(grams)	367.6	319.4	352.2	345.3	408.7
I	WT. OF WATER = G - H	(grams)	35.5	37.5	48.8	55.7	73.1
J	WT. DRY SOIL = H - F	(grams)	359.3	311.1	343.9	336.9	400.5
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.9	12.1	14.2	16.5	18.3

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-83 STD

Weight of Total Sample	=	41085.0
Weight of Oversize Fraction	=	815.1
Weight of Finer Fraction (- 3/8)	=	40269.9
Percentage of Oversize Fraction	= (P_C)	2.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	15.0
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	113.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 14.7\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 114.4\ pcf$$

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MOISTURE-DENSITY RELATIONSHIP

5368

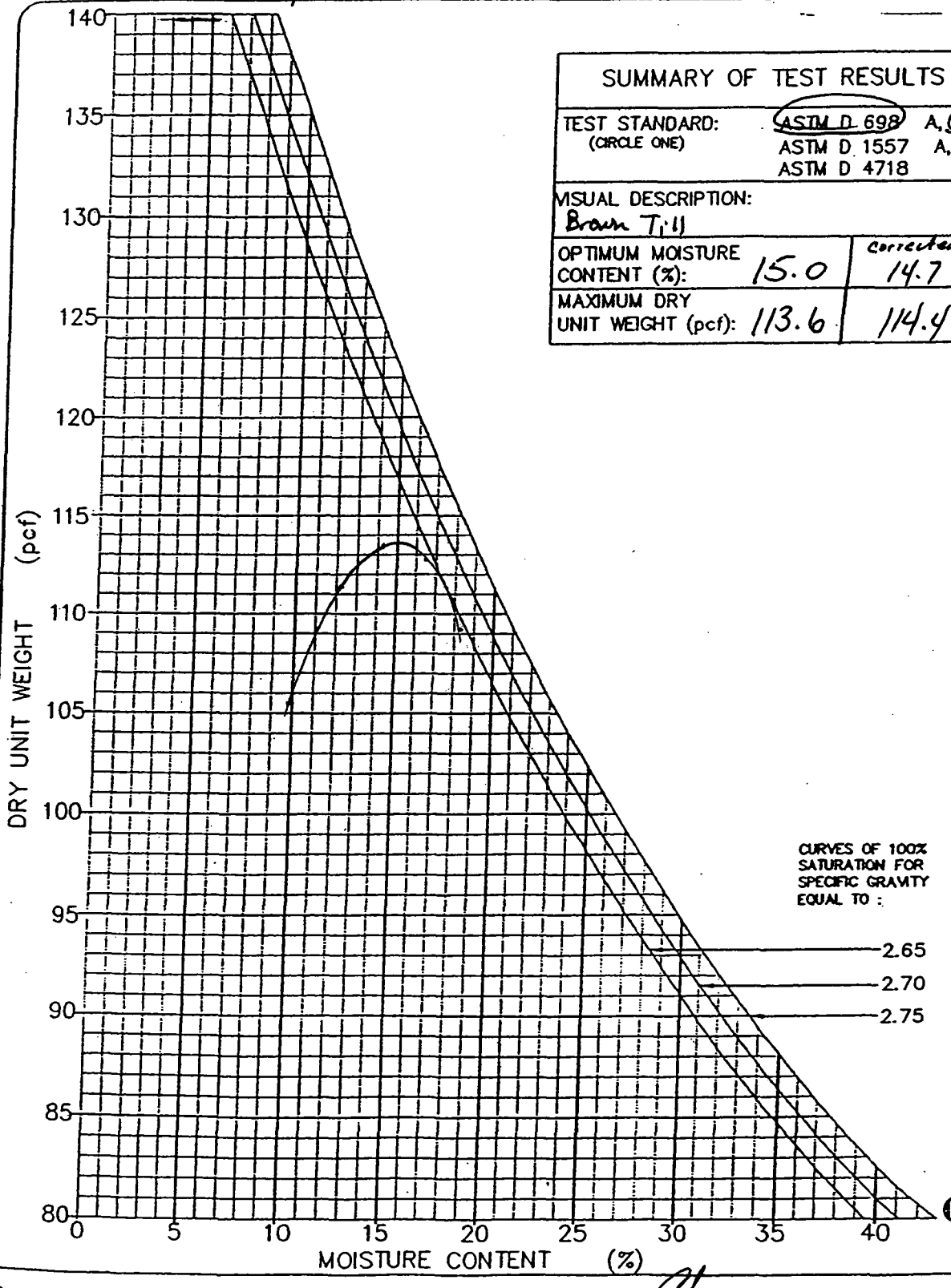
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile Ø2-13 SAMPLE NO.: LPØ2-83

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	15.0	corrected 14.7	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	113.6	114.4	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO. 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 20 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: CP02-83

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL QA ID: KS

			4% 13.92	6% 13.84	2% 13.67	0% 13.45	
	WATER ADDED	(ml)	100mL	150mL	50mL	0mL	
A	WT. OF SOIL & MOLD	(grams)	6314.1	6277.8	6200.7	6119.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2109.6	2073.3	1996.2	1914.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	139.2	136.8	131.7	126.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	124.8	119.0	120.4	117.6	

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: KS

	TARE NO.		65	90	103	49	
F	WT. OF TARE	(grams)	8.1	8.2	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	369.5	388.8	390.6	383.6	
H	WT. OF DRY SOIL & TARE	(grams)	332.2	339.3	357.9	357.3	
I	WT. OF WATER = G − H	(grams)	37.3	49.5	32.7	26.3	
J	WT. DRY SOIL = H − F	(grams)	324.1	331.1	349.6	349.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.5	15.0	9.4	7.5	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G013/ TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-83 MOD

Weight of Total Sample	=	41085.0
Weight of Oversize Fraction	=	815.1
Weight of Finer Fraction (- 3/8)	=	40269.9
Percentage of Oversize Fraction	= (P_C)	2.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	98.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.121
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	125.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 11.9 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 126.1 pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

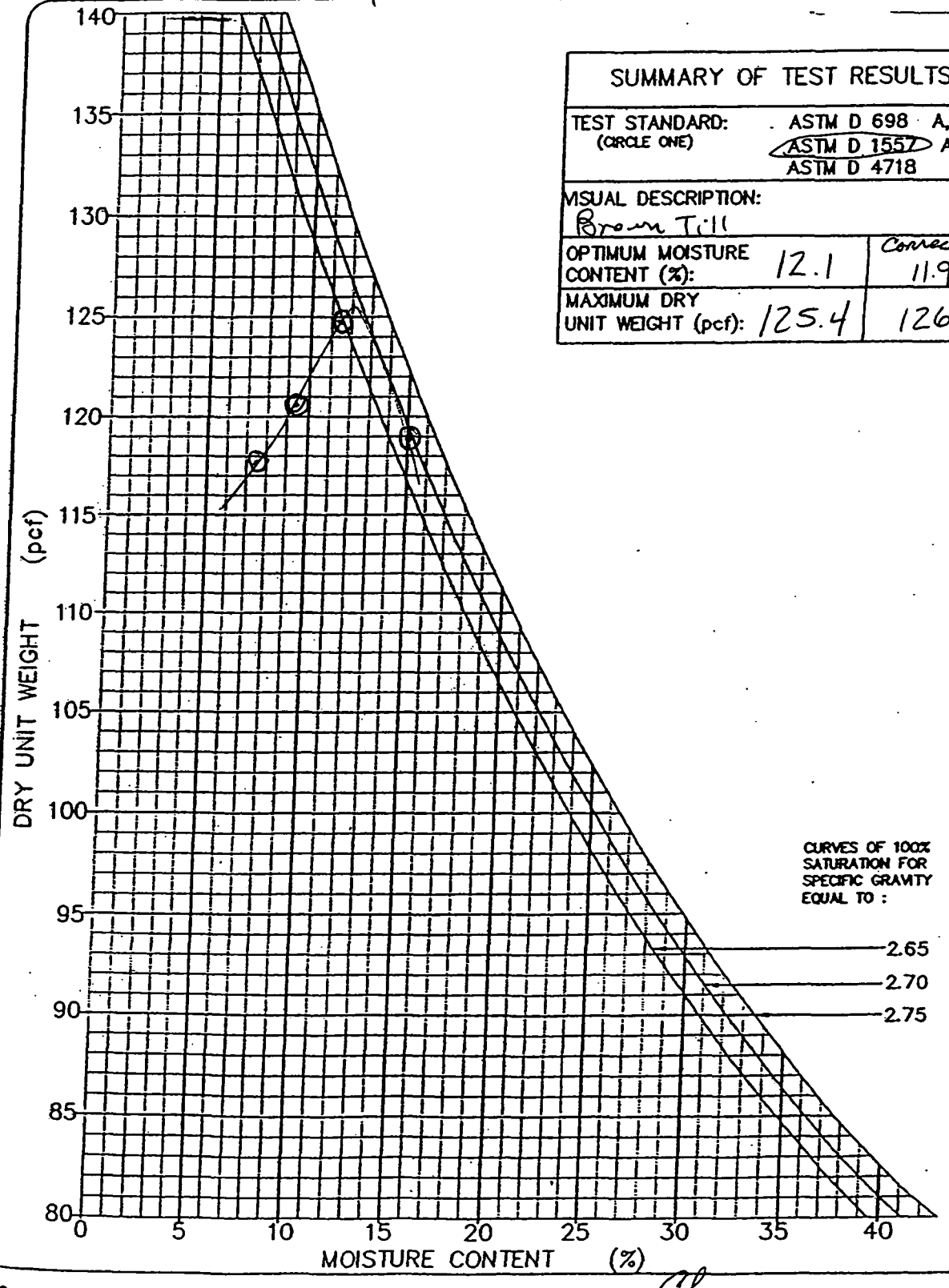
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 21 day Sept month 2002 year

MATERIAL TYPE: LP Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-83

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.1	Corrected 11.9	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	125.4	126.1	CJ



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FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 69341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 26 day Sept month 2002 year

SAMPLE NO.: LP02-84

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			6% 13.46	8% 13.43	10% 13.73	12% 13.75	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	5969.4	6091.8	6227.9	6237.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1764.9	1887.3	2023.4	2032.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	116.5	124.6	133.5	134.1	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.2	~~112.6~~ 112.5	118.1	116.9	

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: 15

	TARE NO.		90	65	49	607	
F	WT. OF TARE	(grams)	8.3	8.2	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	440.5	326.8	412.6	366.3	
H	WT. OF DRY SOIL & TARE	(grams)	405.8	295.9	366.2	320.3	
I	WT. OF WATER = G − H	(grams)	34.7	30.9	46.4	46.0	
J	WT. DRY SOIL = H − F	(grams)	397.5	287.7	358.0	312.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.7	10.7	13.0	14.7	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 601341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-84 STD

Weight of Total Sample	=	21415.0
Weight of Oversize Fraction	=	~~585.2~~ 935.7
Weight of Finer Fraction (-3/8)	=	20479.3
Percentage of Oversize Fraction	= (P_C)	4.4
Percentage of Finer Fraction (-3/8)	= (P_F)	95.6
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.135
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 13\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 120.6$ pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

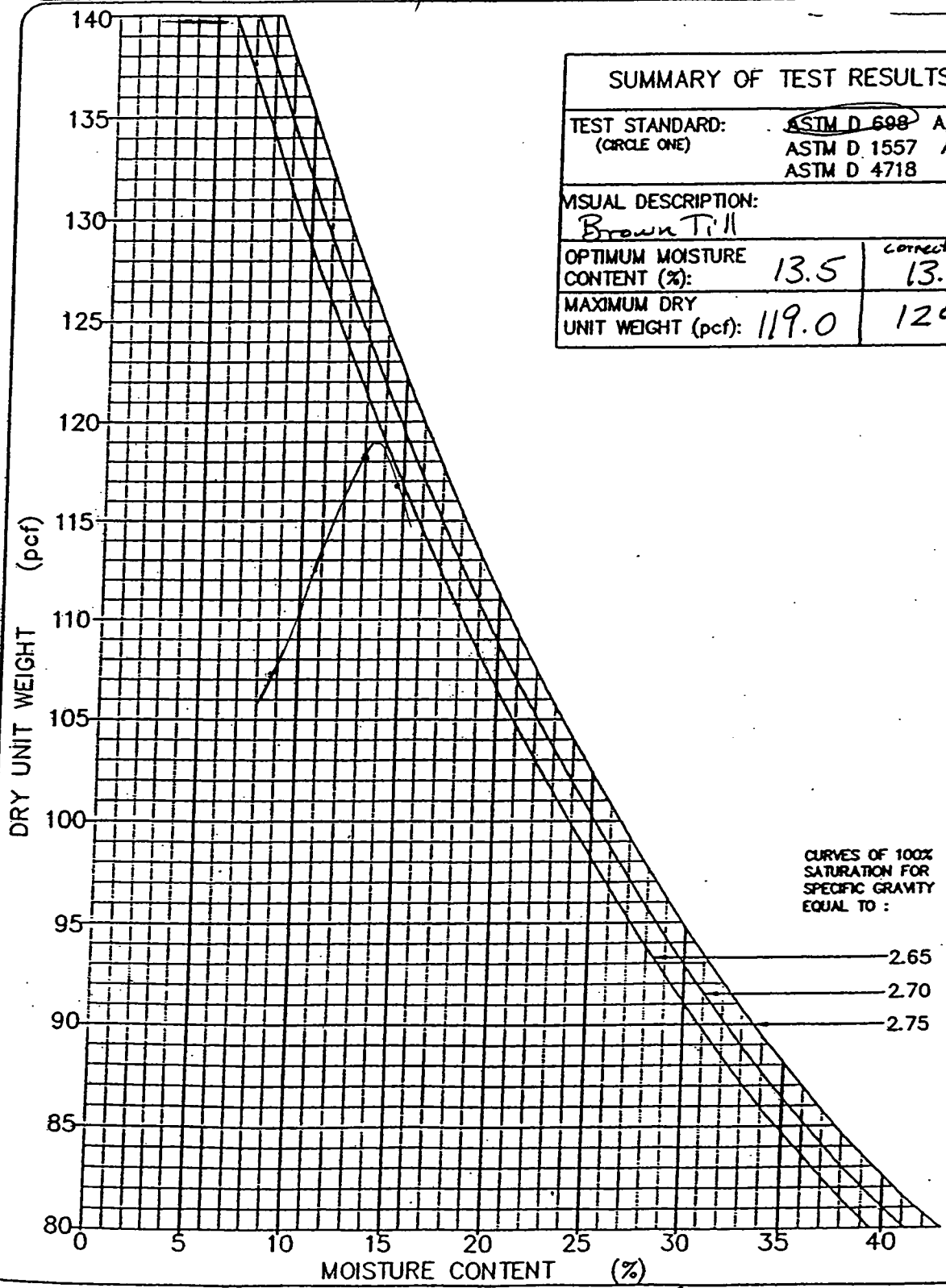
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 27 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-84

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.5	correction 13.0	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	119.0	120.6	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IIc

PROJECT NO.: 69.341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 28 day Sept month 2002 year

SAMPLE NO.: LP02-85

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			49 @ 13.18	69 @ 13.56	89 @ 13.77	109 @ 13.83	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	5978.4	6150.8	6246.1	6273.3	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1773.9	1946.3	2041.6	2068.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	117.1	128.5	134.7	136.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.0	116.2	119.9	119.9	

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: KS

	TARE NO.		308	310	98	230	
F	WT. OF TARE	(grams)	8.1	8.1	8.2	8.4	
G	WT. OF WET SOIL & TARE	(grams)	332.7	414.4	402.8	427.2	
H	WT. OF DRY SOIL & TARE	(grams)	310.2	375.3	359.5	376.5	
I	WT. OF WATER = G - H	(grams)	22.5	39.1	43.3	50.7	
J	WT. DRY SOIL = H - F	(grams)	302.1	367.2	351.3	368.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.4	10.6	12.3	13.8	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G21341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-85 STD

Weight of Total Sample	=	45076.6
Weight of Oversize Fraction	=	1186.2
Weight of Finer Fraction (- 3/8)	=	43890.4
Percentage of Oversize Fraction	= (P_C)	2.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.131
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	120.5
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 12.8\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\gamma D} = 121.4$

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MOISTURE-DENSITY RELATIONSHIP

5368

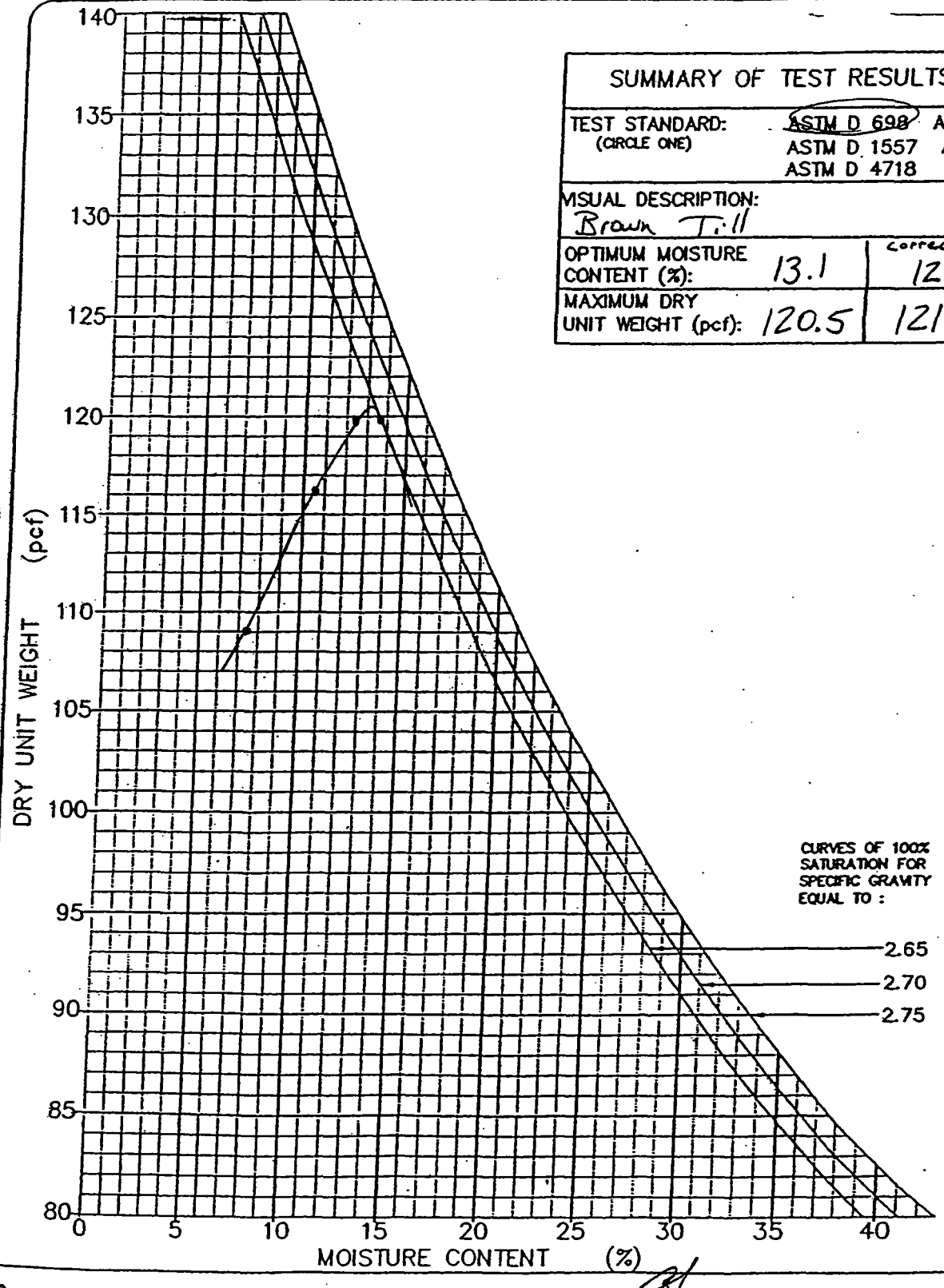
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 30 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-85

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		GS
VISUAL DESCRIPTION: Brown Till			GS
OPTIMUM MOISTURE CONTENT (%):	13.1	corrected 12.8	GS
MAXIMUM DRY UNIT WEIGHT (pcf):	120.5	121.4	GS



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FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase III

DATE: 1 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-85

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 13.64	4% 13.87	6% 14.05	8% 13.98	~~8% 13.53~~
	WATER ADDED	(ml)	50 mL	100 mL	150 mL	200 mL	~~125 mL~~
A	WT. OF SOIL & MOLD	(grams)	6187.1	6291.4	6373.1	6341.3	~~6137.2~~
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	~~4204.5~~
C	WT. OF SOIL = A − B	(grams)	1982.6	2086.9	2168.6	2136.8	~~1932.7~~
D	WET UNIT WT.(1) = C X 0.066	(pcf)	130.9	137.7	143.1	141.0	~~127.6~~
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	124.5	128.9	128.9	~~126.1~~ 126.3	~~116.5~~

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: KS

	TARE NO.		675	230	604	98	~~32~~
F	WT. OF TARE	(grams)	8.3	8.4	8.3	8.2	~~8.4~~
G	WT. OF WET SOIL & TARE	(grams)	582.0	478.2	462.2	406.6	~~402.4~~
H	WT. OF DRY SOIL & TARE	(grams)	554.4	448.2	417.3	364.9	~~364.2~~
I	WT. OF WATER = G − H	(grams)	27.6	30.0	44.9	42.0	~~34.2~~
J	WT. DRY SOIL = H − F	(grams)	546.1	439.8	409.0	356.7	~~359.8~~
K	MOISTURE CONTENT = (I/J) X 100	(%)	5.1	6.8	11.0	~~11.8~~ 11.7	~~9.5~~

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase III

DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Low perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-85

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

5% 14.02

QA ID: KS

	WATER ADDED	(ml)	125 mL				
A	WT. OF SOIL & MOLD	(grams)	6359.5				
B	WT. OF MOLD	(grams)	4204.5				
C	WT. OF SOIL = A − B	(grams)	2155.0				
D	WET UNIT WT.(1) = C X 0.066	(pcf)	142.2				
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	130.3				

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: KS

	TARE NO.		662				
F	WT. OF TARE	(grams)	8.3				
G	WT. OF WET SOIL & TARE	(grams)	431.7				
H	WT. OF DRY SOIL & TARE	(grams)	396.5				
I	WT. OF WATER = G − H	(grams)	35.2				
J	WT. DRY SOIL = H − F	(grams)	388.2				
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.1				

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FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase II DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-85 MOD

Weight of Total Sample	=	45076.6
Weight of Oversize Fraction	=	1186.2
Weight of Finer Fraction (- 3/8)	=	43890.4
Percentage of Oversize Fraction	= (P_C)	2.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.091
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	130.3
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 8.9\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 131.1 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

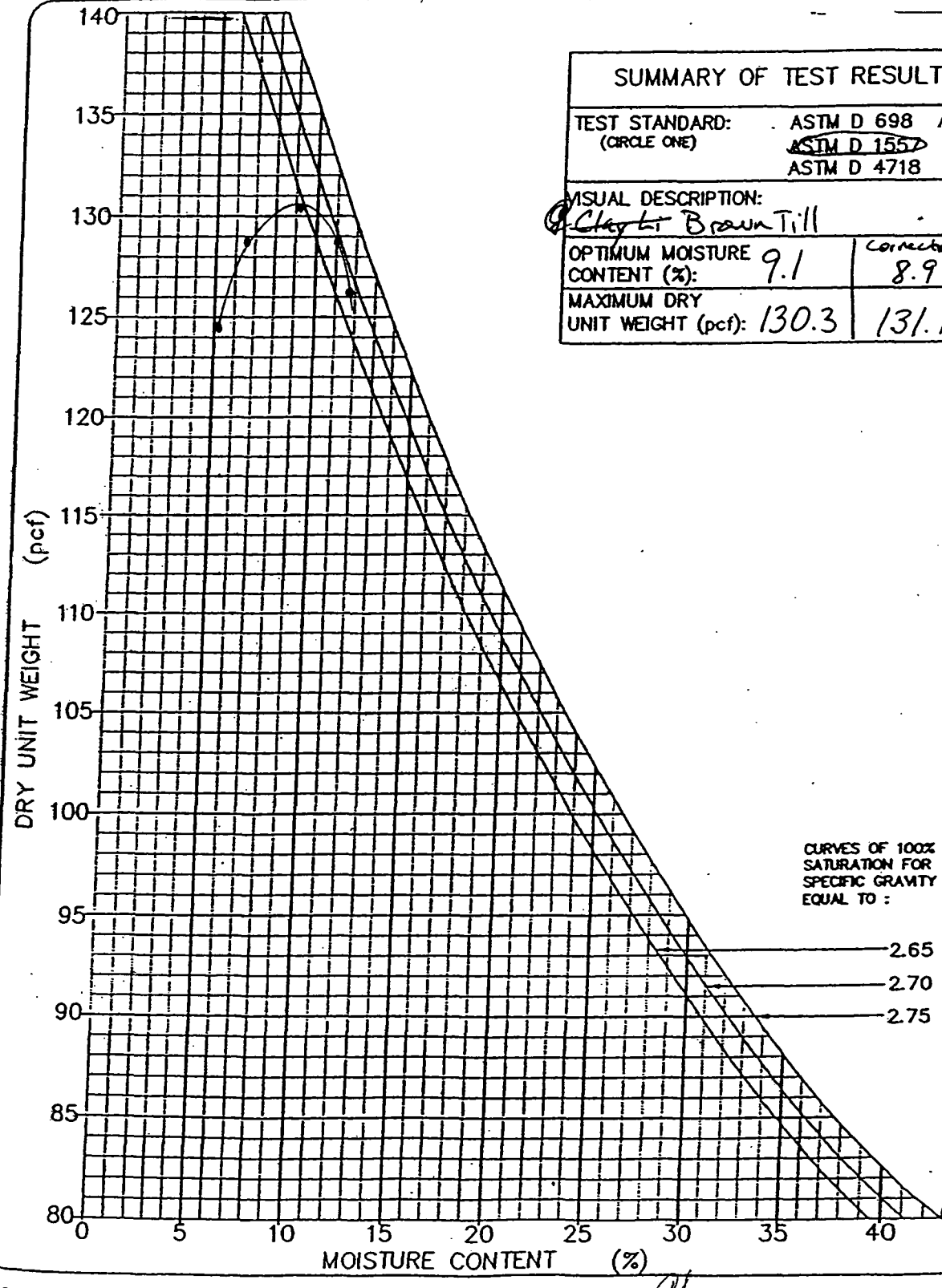
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: Ø4.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Ø2-13 SAMPLE NO.: LPØ2-85

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Clay Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	9.1	corrected 8.9	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	130.3	131.1	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 28 day Sept month 2002 year

SAMPLE NO.: LP02-86

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			6% 13.42	8% 13.70	10% 13.78	12% 13.75	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	300 mL	
A	WT. OF SOIL & MOLD	(grams)	6087.3	6214.3	6250.6	6237.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1882.8	2009.8	2046.1	2032.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.3	132.6	135.0	134.1	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.8	118.7	119.0	116.4	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: 15

	TARE NO.		65	90	49	607	
F	WT. OF TARE	(grams)	8.2	8.2	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	339.1	395.3	433.9	381.5	
H	WT. OF DRY SOIL & TARE	(grams)	311.1	354.7	383.7	332.2	
I	WT. OF WATER = G − H	(grams)	28.0	40.6	50.2	49.3	
J	WT. DRY SOIL = H − F	(grams)	302.9	346.5	375.5	324.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.2	11.7	13.4	15.2	

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SHEET NO. 1 OF 3

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134/TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-86 STD

Weight of Total Sample	=	20633.1
Weight of Oversize Fraction	=	376.9
Weight of Finer Fraction (-3/8)	=	20256.2
Percentage of Oversize Fraction	= (P_C)	1.8
Percentage of Finer Fraction (-3/8)	= (P_F)	98.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.126
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 12.4\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 120.6 \text{ pcf}$$

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FLUOR FERNALD

5368

MOISTURE-DENSITY RELATIONSHIP

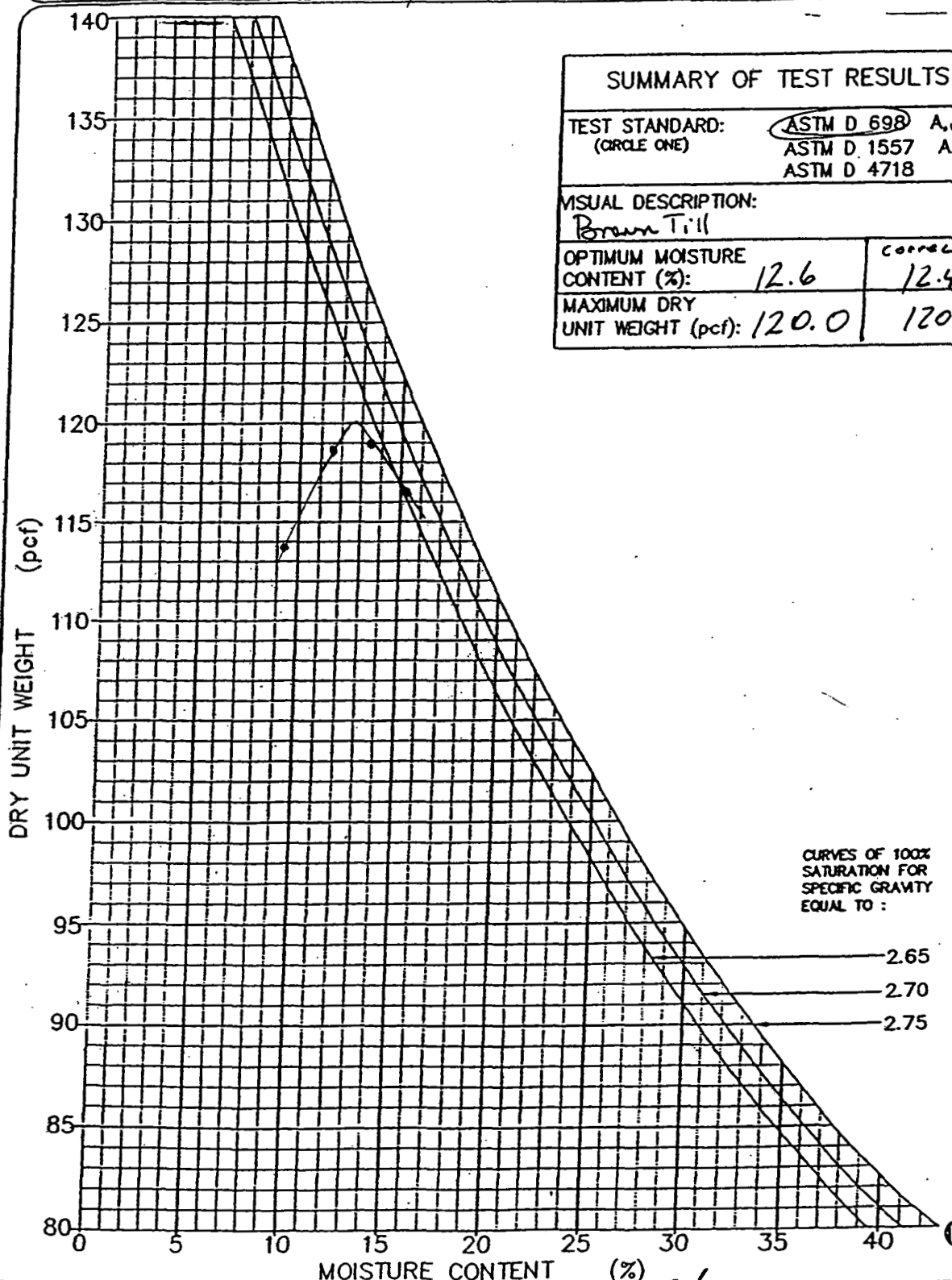
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 30 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Low Stockpile 02-13 SAMPLE NO.: LP02-86

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	12.6	corrected 12.4	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	120.0	120.6	CS



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 28 day Sept month 2002 year

SAMPLE NO.: LP02-87

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			4% 1315	6% 1353	8% 1372	10% 1376	
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	5964.8	6137.2	6223.4	6241.5	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1760.3	1932.7	2018.9	2037.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	116.2	127.6	133.2	134.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	107.7	114.3	117.5	116.2	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: 15

	TARE NO.		200	604	675	91	
F	WT. OF TARE	(grams)	8.2	8.3	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	322.2	391.3	401.2	444.8	
H	WT. OF DRY SOIL & TARE	(grams)	299.3	351.6	354.7	385.7	
I	WT. OF WATER = G − H	(grams)	22.9	39.7	46.5	59.1	
J	WT. DRY SOIL = H − F	(grams)	291.1	343.3	346.4	377.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	15.29 7.9	11.6	13.4	15.7	

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. LQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day Sept month 2002 year

MATERIAL TYPE: Clay Liner LP02-87 STD

Weight of Total Sample	=	40546.7
Weight of Oversize Fraction	=	1247.4
Weight of Finer Fraction (- 3/8)	=	39299.3
Percentage of Oversize Fraction	= (P_C)	3.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.144
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	118.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 14.0\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 119.6 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

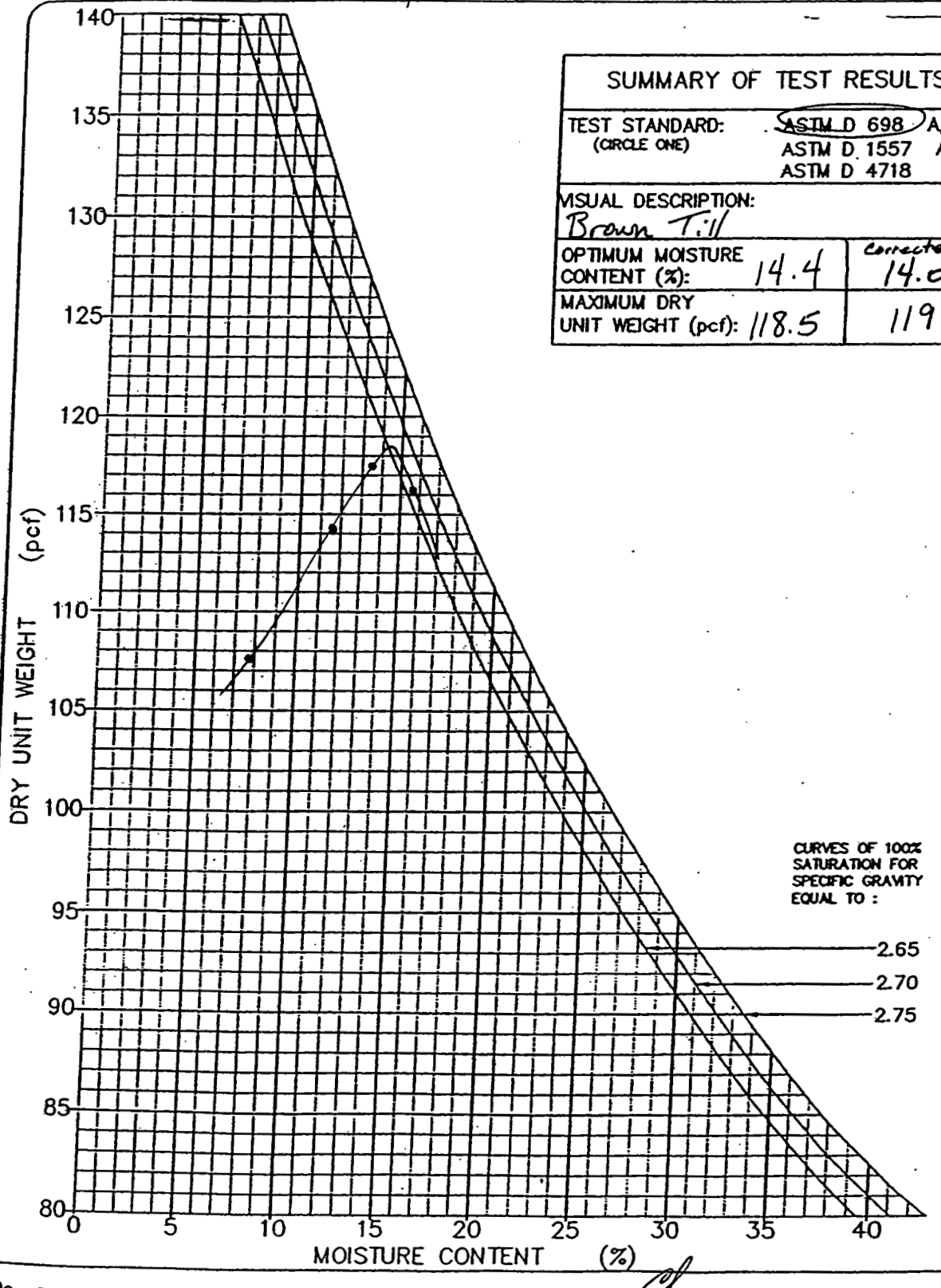
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 30 day Sept month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-87

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	14.4	corrected 14.0	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	118.5	119.6	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 621341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 1 day Oct month 2002 year

MATERIAL TYPE: Cow Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: L802-87

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL QA ID: KS

			2% 13.67	4% 13.99	6% 14.02	8% 13.91	
	WATER ADDED	(ml)	50mL	100mL	150mL	200mL	
A	WT. OF SOIL & MOLD	(grams)	6200.7	6345.9	6359.5	6309.6	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1996.2	2141.4	2155.0	2105.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.7	141.3	142.2	138.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	123.4	129.2	129.0	122.1	

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: KS

	TARE NO.		96	202	200	310	
F	WT. OF TARE	(grams)	8.1	8.1	8.2	8.1	
G	WT. OF WET SOIL & TARE	(grams)	556.8	399.6	463.2	408.4	
H	WT. OF DRY SOIL & TARE	(grams)	522.5	365.9	421.1	359.9	
I	WT. OF WATER = G − H	(grams)	34.3	33.7	42.1	48.5	
J	WT. DRY SOIL = H − F	(grams)	514.4	357.8	412.9	351.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.7	9.4	10.2	13.8	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-87 MOD

Weight of Total Sample	=	40546.7
Weight of Oversize Fraction	=	1247.4
Weight of Finer Fraction (-3/8)	=	39299.3
Percentage of Oversize Fraction	= (P_C)	3.1
Percentage of Finer Fraction (-3/8)	= (P_F)	96.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.1
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	129.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 9.7\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 130.8 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

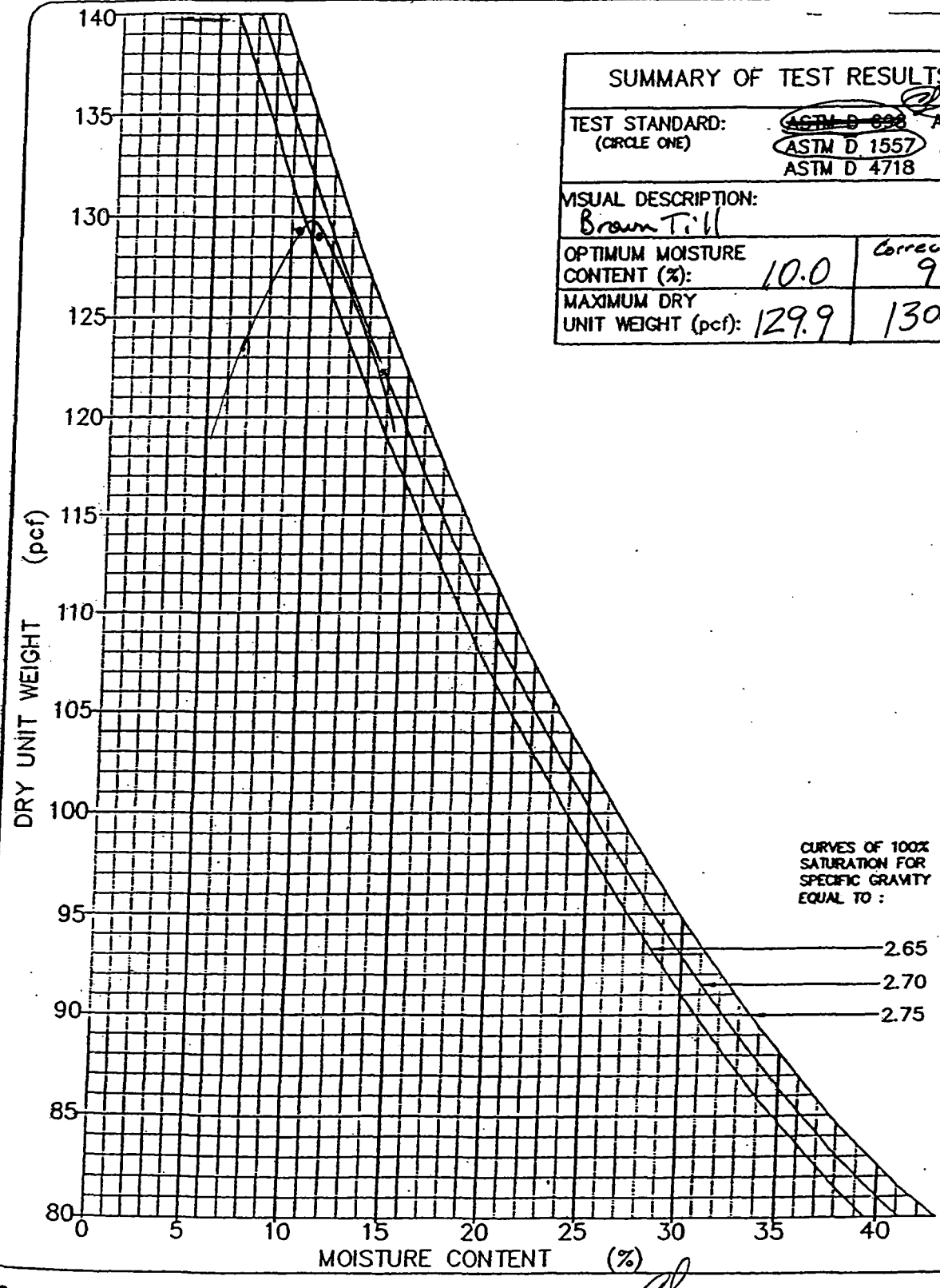
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 001341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-13 SAMPLE NO.: LP02-87

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, ~~B~~, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	10.0	Corrected 9.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	129.9	130.8	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 69134 — TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 23 day Sept month 2002 year

SAMPLE NO.: LP02-88

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			69 @ 13.45	89 @ 13.67	109 @ 13.71	49 @ 13.33	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	100 mL	
A	WT. OF SOIL & MOLD	(grams)	6100.9	6200.7	6218.9	6046.5	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1896.4	1996.2	2014.4	1842.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	125.1	131.7	132.9	121.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.7	114.9	115.0	109.8	

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: KS

	TARE NO.		603	103	608	676	
F	WT. OF TARE	(grams)	8.3	8.3	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	379.7	360.5	398.7	420.2	
H	WT. OF DRY SOIL & TARE	(grams)	339.9	315.5	346.9	380.5	
I	WT. OF WATER = G − H	(grams)	39.8	45.0	51.8	39.7	
J	WT. DRY SOIL = H − F	(grams)	331.7	307.2	338.7	372.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.0	14.6	15.3	10.7	

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SHEET NO. 3 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G2134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-88 STD

Weight of Total Sample	=	22367.4
Weight of Oversize Fraction	=	682.1
Weight of Finer Fraction (- 3/8)	=	21685.3
Percentage of Oversize Fraction	= (P_C)	3.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	~~0.01~~ 0.151
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

C_w = 14.7%

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$C_{\delta D}$ = 116.2 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

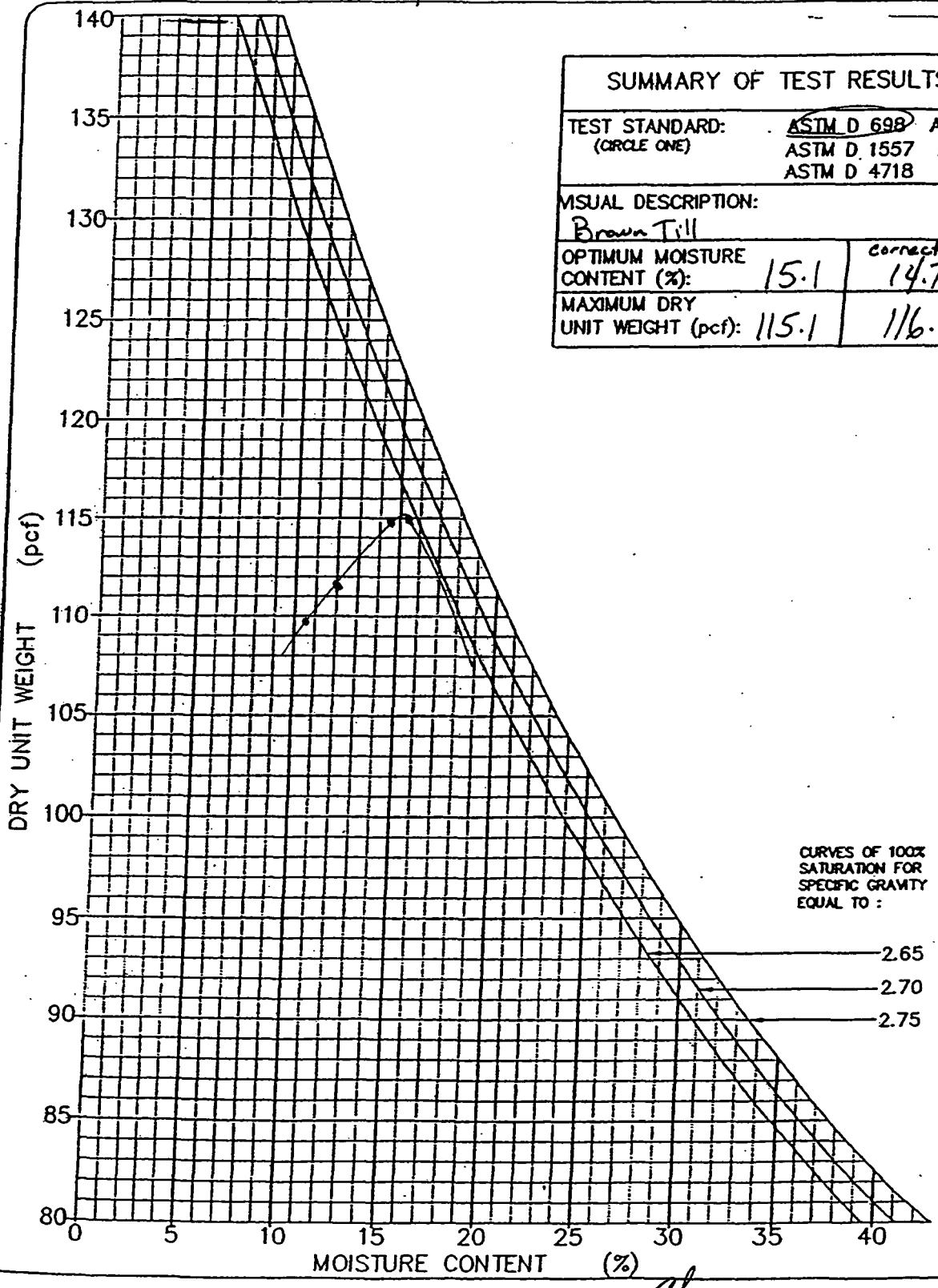
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 3Φ day Sept month 2ΦΦ2 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-13 SAMPLE NO.: LPΦ2-88

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	15.1	corrected 14.7	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	115.1	116.2	CA



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

DATE: 30 day Sept month 2002 year

SAMPLE NO.: LP02-89

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			49 @ 13.70	69 @ 13.72	89 @ 13.16	29 @ 13.26	89 @ 13.68
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	50 mL	200 mL
A	WT. OF SOIL & MOLD	(grams)	6214.3	6223.4	5969.4	6014.7	6205.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A - B	(grams)	2009.8	2018.9	1764.9	1810.2	2000.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	132.6	133.2	116.5	119.5	132.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	116.6	115.1	107.1	108.3	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: 15

	TARE NO.		607	608	49	90	659
F	WT. OF TARE	(grams)	8.2	8.2	8.2	8.3	8.1
G	WT. OF WET SOIL & TARE	(grams)	461.2	371.4	387.4	390.0	419.5
H	WT. OF DRY SOIL & TARE	(grams)	406.5	322.1	356.8	354.2	360.6
I	WT. OF WATER = G - H	(grams)	54.7	49.3	30.6	35.8	58.9
J	WT. DRY SOIL = H - F	(grams)	398.3	313.9	348.6	345.9	352.5
K	MOISTURE CONTENT = (I/J) X 100	(%)	13.7	15.7	8.8	10.3	16.7

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*GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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SHEET NO. 1 OF 3

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 041

DESCRIPTION: Phase IV DATE: 7 day Oct month 2002 year

MATERIAL TYPE: Clay liner LP02-89 STD

Weight of Total Sample	=	48219.5
Weight of Oversize Fraction	=	1827.9
Weight of Finer Fraction (- 3/8)	=	46391.6
Percentage of Oversize Fraction	= (P_C)	3.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.145
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	117.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 14.0\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 118.9 \text{ pcf}$$

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FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

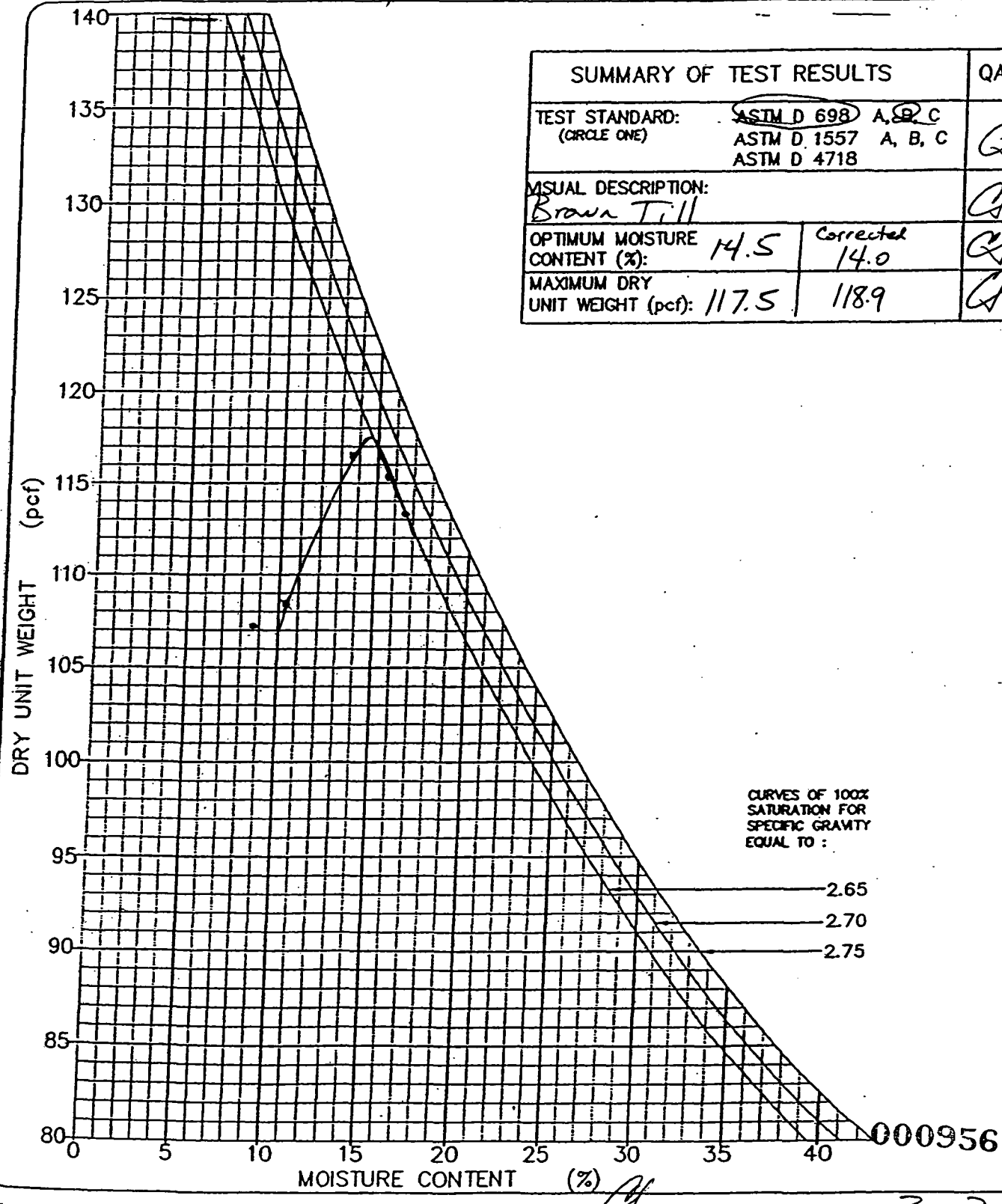
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 1 day Oct month 2ΦΦ2 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-14 SAMPLE NO.: LPΦ2-89

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	14.5	Corrected 14.0	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	117.5	118.9	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 1 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay

MATERIAL SOURCE: Stockpile 02-14

SAMPLE NO.: LP02-89

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER. 13.79

COMPACTION OF SOIL

QA ID: KS

			0% 13.60	2% 13.86	4% 13.92	6%	
	WATER ADDED	(ml)	0 mL	50 mL	100 mL	150 mL	
A	WT. OF SOIL & MOLD	(grams)	6169.0	6286.9	6314.1	6255.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1964.5	2082.4	2109.6	2050.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	137.4	139.2	135.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	121.2	125.4	122.2	116.7	

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: KS

	TARE NO.		679	97	601	63	
F	WT. OF TARE	(grams)	8.1	8.2	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	467.5	387.3	431.0	314.9	
H	WT. OF DRY SOIL & TARE	(grams)	437.6	354.1	379.4	272.8	
I	WT. OF WATER = G − H	(grams)	29.9	33.2	51.6	42.1	
J	WT. DRY SOIL = H − F	(grams)	429.5	345.9	371.1	264.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.0	9.6	13.9	15.9	

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GeoSyntec Consultants

FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G9134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-89 MOD

Weight of Total Sample	=	48219.5
Weight of Oversize Fraction	=	1827.9
Weight of Finer Fraction (- 3/8)	=	46391.6
Percentage of Oversize Fraction	= (P_C)	3.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.115
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	127.3
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 11.1\ \%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 128.5\ pcf$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

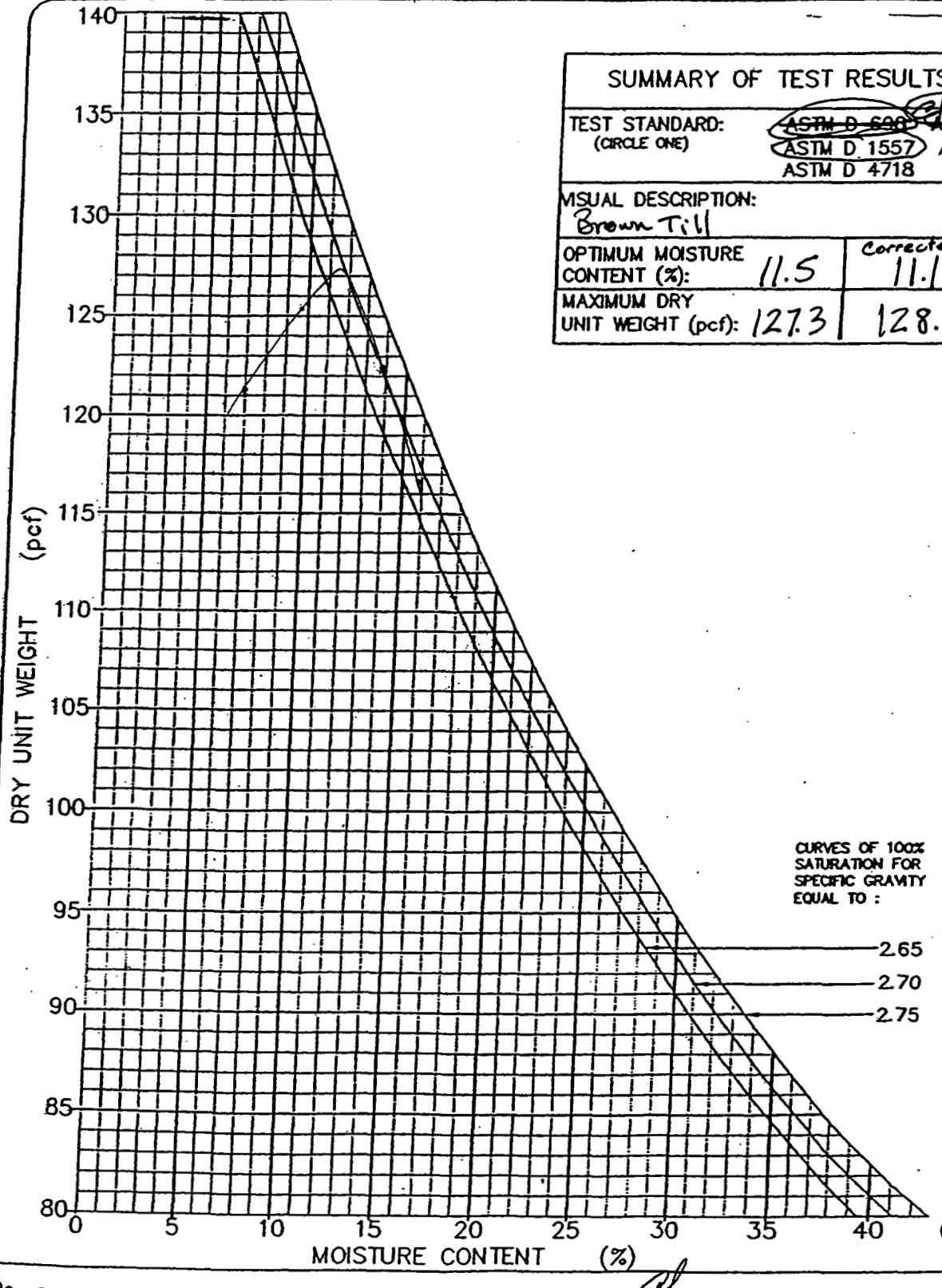
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 62134 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-14 SAMPLE NO.: LP02-89

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ ~~A, B, C~~ ASTM D 1557 A, (B) C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	11.5	Corrected 11.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	127.3	128.5	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 69134 TASK NO.: 04.1

DATE: 30 day Sept month 2002 year

SAMPLE NO.: LP02-92

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			4% 13.36	6% 13.45	8% 13.75	10% 13.75	~~12%~~ 13.61
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	175 mL
A	WT. OF SOIL & MOLD	(grams)	6060.1	6100.9	6237.0	6237.0	6173.5
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1855.6	1896.4	2032.5	2032.5	1969.0
D	WET UNIT WT.(1) = C X 0.066	(pcf)	122.5	125.2	134.1	134.1	130.0
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.2	112.3	117.4	116.5	114.9

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: 15

	TARE NO.		603	103	676	308	658
F	WT. OF TARE	(grams)	8.2	8.4	8.4	8.1	8.1
G	WT. OF WET SOIL & TARE	(grams)	412.9	379.7	400.9	393.2	407.9
H	WT. OF DRY SOIL & TARE	(grams)	375.4	341.5	352.1	342.6	361.7
I	WT. OF WATER = G − H	(grams)	37.5	38.2	48.8	50.6	46.2
J	WT. DRY SOIL = H − F	(grams)	367.2	333.1	343.7	334.5	353.6
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.2	11.5	14.2	15.1	13.1

5368

GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 601341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 7 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-92 STD

Weight of Total Sample	=	22741.1
Weight of Oversize Fraction	=	924.4
Weight of Finer Fraction (- 3/8)	=	21816.7
Percentage of Oversize Fraction	= (P_C)	4.9
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.147
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	117.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 14.2\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 119.0 \text{ pcf}$$

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000961

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

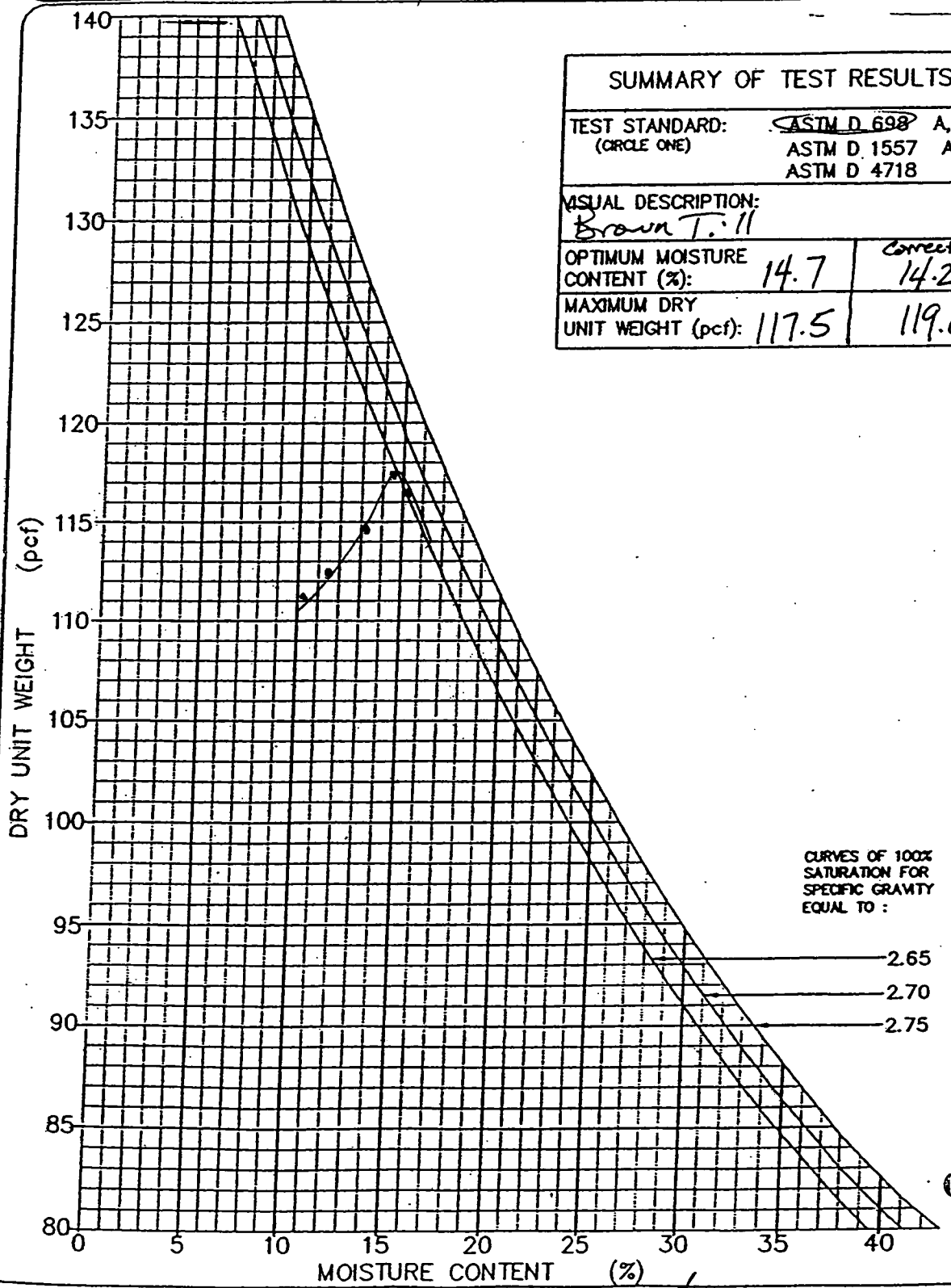
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 42-14 SAMPLE NO.: GP02-92

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	14.7	Corrected 14.2	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	117.5	119.0	CJ



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GEOSYNTEC CONSULTANTS

FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 69134 TASK NO.: 04.1

DATE: 8 day Oct month 2002 year

SAMPLE NO.: LP02-93

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.32	8% 13.58	10% 13.82	12% 13.76	
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	
A	WT. OF SOIL & MOLD	(grams)	6042.0	6159.9	6268.8	6241.5	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1837.5	1955.4	2064.3	2037.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	121.3	129.1	136.2	134.4	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.0	116.1	119.9	116.3	

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: KS

	TARE NO.		657	660	30	661	
F	WT. OF TARE	(grams)	8.1	8.4	8.6	8.3	
G	WT. OF WET SOIL & TARE	(grams)	496.2	384.1	463.8	420.4	
H	WT. OF DRY SOIL & TARE	(grams)	454.6	346.4	409.4	364.8	
I	WT. OF WATER = G - H	(grams)	41.6	37.7	54.4	55.6	
J	WT. DRY SOIL = H - F	(grams)	446.5	338.0	400.8	356.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.3	11.2	13.6	15.6	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-93 STD

Weight of Total Sample	=	39571.7
Weight of Oversize Fraction	=	2030.6
Weight of Finer Fraction (- 3/8)	=	37541.1
Percentage of Oversize Fraction	= (P_C)	5.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	13.4
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 12.8 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 121.8 pcf

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

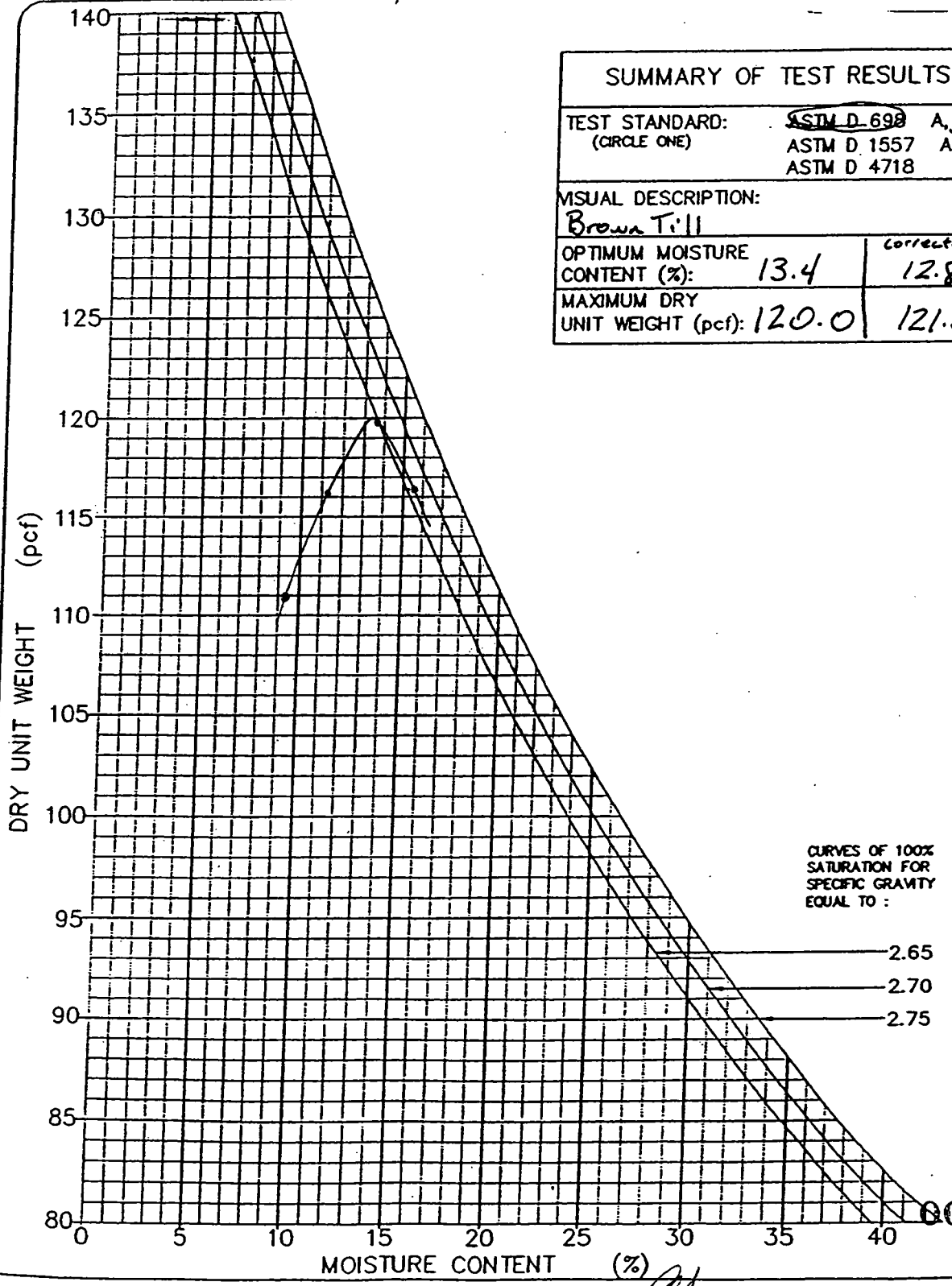
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-14 SAMPLE NO.: LP02-93

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.4	corrected 12.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	120.0	121.8	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 601341 TASK NO.: 04.1

DATE: 1 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-14 — SAMPLE NO.: LP02-9.3

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			4% 13.79	6% 13.97	8% 14.04	10% 13.89	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6255.1	6336.8	6368.5	6300.5	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2050.6	2132.3	2164.0	2096.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	135.3	140.7	142.8	138.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	125.7	128.7	128.2	121.5	

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: KS

	TARE NO.		63	110	92	48	
F	WT. OF TARE	(grams)	8.1	8.0	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	422.5	451.9	432.6	408.9	
H	WT. OF DRY SOIL & TARE	(grams)	393.3	414.3	389.2	360.2	
I	WT. OF WATER = G − H	(grams)	29.2	37.6	43.4	48.7	
J	WT. DRY SOIL = H − F	(grams)	385.2	406.3	381.0	351.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.6	9.3	11.4	13.8	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-93 MOD

Weight of Total Sample	=	39571.7
Weight of Oversize Fraction	=	2030.6
Weight of Finer Fraction (- 3/8)	=	37541.1
Percentage of Oversize Fraction	= (P_C)	5.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.105
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	130.0
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

C_w = 10.0 %

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

[1] $C_{\gamma D}$ = 131.6 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

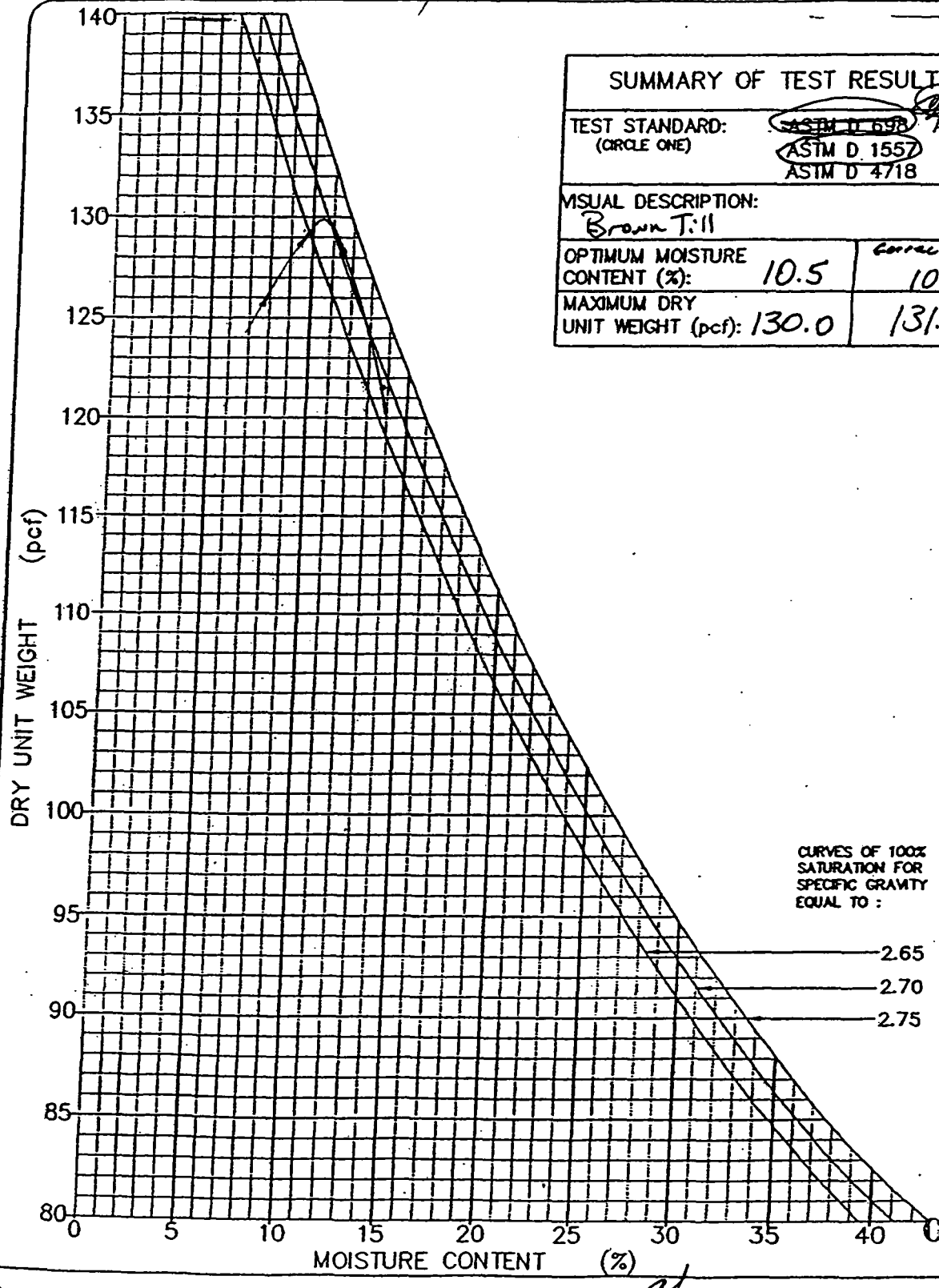
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 2 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-14 SAMPLE NO.: 4002-93

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ~~ASTM D 698~~ A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 10.5	corrected 10.0	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): 130.0	131.6	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 2 day Oct month 2002 year

SAMPLE NO.: LP02-94

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			6% 13.43	8% 13.62	10% 13.66	12% 13.62	QA ID: KS
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	
A	WT. OF SOIL & MOLD	(grams)	6091.8	6178.0	6196.2	6178.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1887.3	1973.5	1991.7	1973.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.6	130.3	131.5	130.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.7	114.4	113.5	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: KS
	TARE NO.		49	608	607	90	
F	WT. OF TARE	(grams)	8.2	8.2	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	399.7	439.0	396.9	336.3	
H	WT. OF DRY SOIL & TARE	(grams)	359.4	386.5	343.6	287.2	
I	WT. OF WATER = G - H	(grams)	40.3	52.5	53.3	49.1	
J	WT. DRY SOIL = H - F	(grams)	351.2	378.3	335.4	278.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.5	13.9	15.9	17.6	

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 3 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LA02-94

Weight of Total Sample	=	23324.9
Weight of Oversize Fraction	=	626.8
Weight of Finer Fraction (- 3/8)	=	22668.1
Percentage of Oversize Fraction	= (P_C)	2.8
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.2
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.145
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 14.1\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 116.1 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

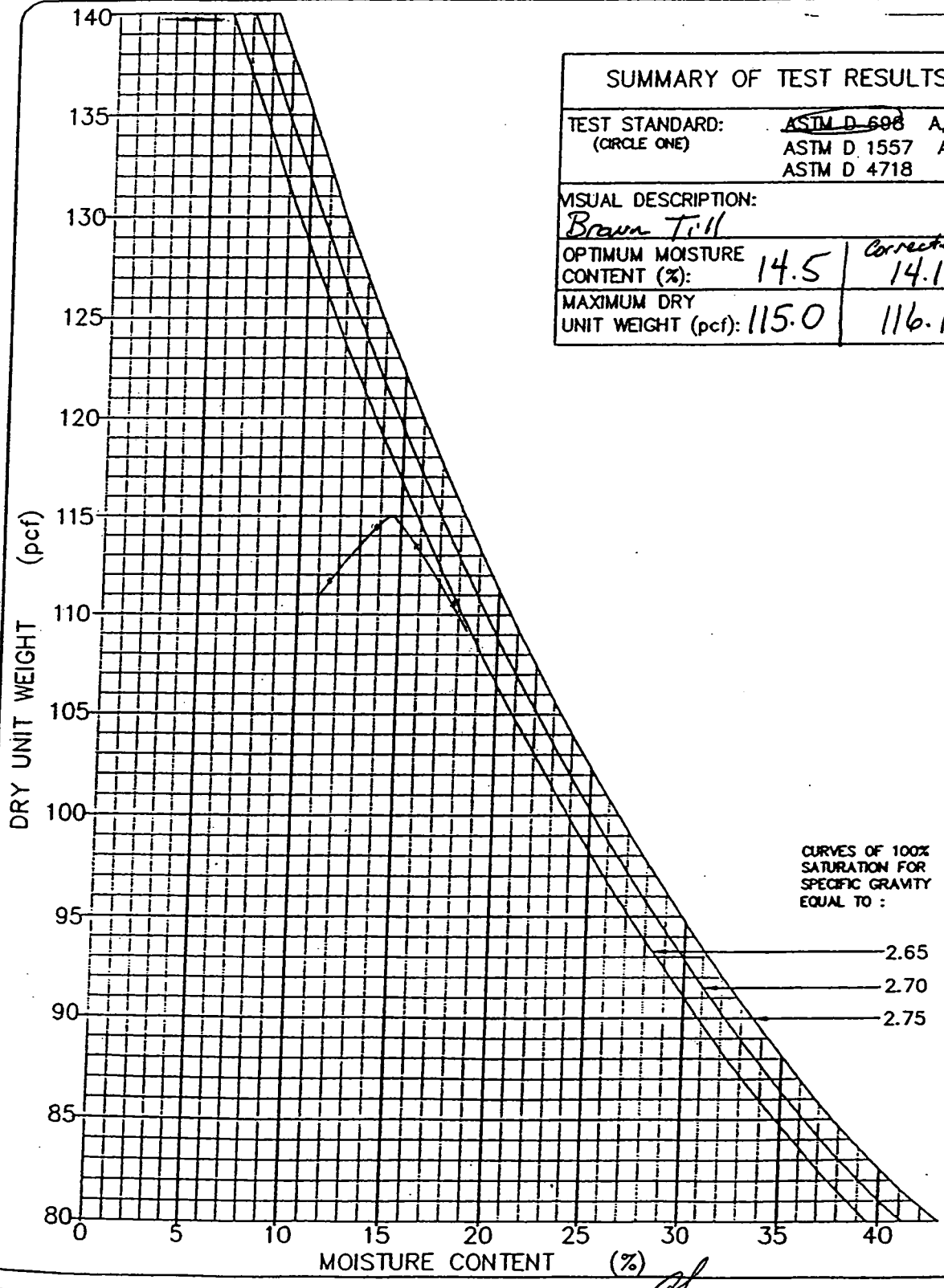
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 3 day Oct month 2ΦΦ2 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2-14 SAMPLE NO.: LPΦ294

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B), C ASTM D 1557 A, B, C ASTM D 4718		
VISUAL DESCRIPTION: Brown Till			
OPTIMUM MOISTURE CONTENT (%):	14.5	Corrected 14.1	
MAXIMUM DRY UNIT WEIGHT (pcf):	115.0	116.1	



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 69134 — TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 4 day Oct month 2002 year

SAMPLE NO.: LP02-95

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			49 @ 13.29	69 @ 13.57	89 @ 13.68	109 @ 13.64	89 @ 13.67
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6028.3	6155.3	6178.0	6187.1	6200.7
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1823.8	1950.9	1973.5	1982.6	1996.2
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.4	128.8	130.3	130.9	131.7
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	108.2	113.3	112.8	111.6	113.4

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: KS

	TARE NO.		31	660	30	661	29
F	WT. OF TARE	(grams)	8.3	8.4	8.6	8.3	8.3
G	WT. OF WET SOIL & TARE	(grams)	354.2	463.9	363.4	396.3	376.9
H	WT. OF DRY SOIL & TARE	(grams)	319.1	408.9	315.7	339.1	325.7
I	WT. OF WATER = G − H	(grams)	35.1	55.0	47.7	57.2	51.2
J	WT. DRY SOIL = H − F	(grams)	310.8	400.5	307.1	330.8	317.4
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.3	13.7	15.5	17.3	16.1

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-95 STD

Weight of Total Sample	=	46568.1
Weight of Oversize Fraction	=	1279.2
Weight of Finer Fraction (- 3/8)	=	45288.9
Percentage of Oversize Fraction	= (P_C)	2.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.149
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	115.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 14.5\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 116.0 \text{ pcf}$$

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

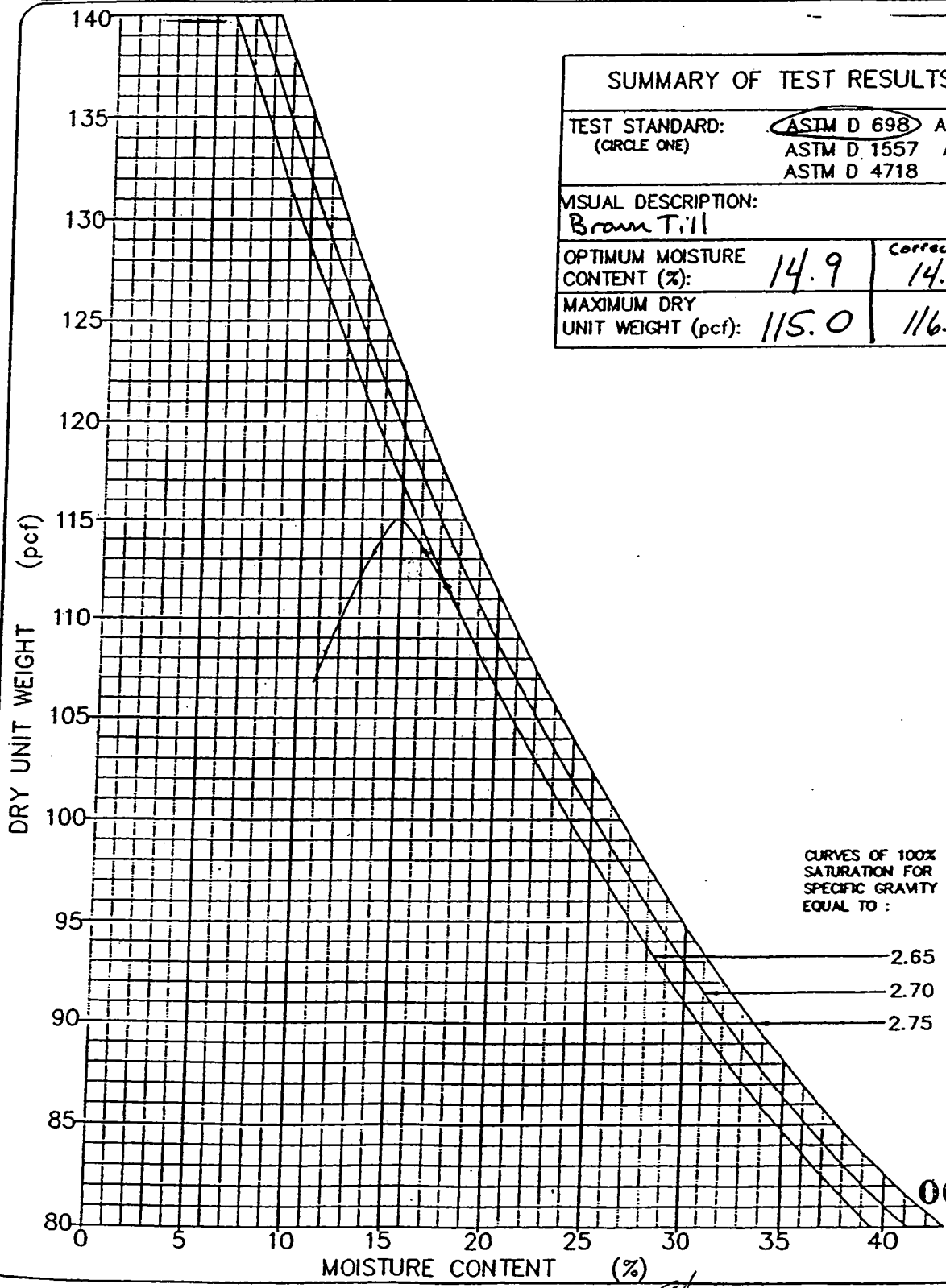
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 601341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile SAMPLE NO.: LP02-95

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	14.9	Corrected 14.5	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	115.0	116.0	CS



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

MATERIAL SOURCE:

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DATE: 7 day Oct month 2002 year

SAMPLE NO.: LP02-95

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER. 13.60

COMPACTION OF SOIL

QA ID: KS DO

			49% 13.82	69% 13.46	89% 13.83	29%	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	50 mL	
A	WT. OF SOIL & MOLD	(grams)	6268.8	6300.5	6273.3	6169.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2064.3	2096.0	2068.8	1964.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	136.2	138.3	136.5	129.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	122.5	122.2	118.0	118.6	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL. THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

QA ID: KS DO

	TARE NO.		KS8331	658	651	659	
F	WT. OF TARE	(grams)	8.3	8.1	8.2	8.1	
G	WT. OF WET SOIL & TARE	(grams)	332.6	363.6	358.9	326.4	
H	WT. OF DRY SOIL & TARE	(grams)	300.0	322.2	311.2	299.1	
I	WT. OF WATER = G − H	(grams)	32.6	41.4	47.7	27.3	
J	WT. DRY SOIL = H − F	(grams)	291.7	314.1	303.0	291.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.2	13.2	15.7	9.4	

1.112 1.132 1.157 1.091

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP92-95 MOD

Weight of Total Sample	=	46568.1
Weight of Oversize Fraction	=	1279.2
Weight of Finer Fraction (- 3/8)	=	45288.9
Percentage of Oversize Fraction	= (P_C)	2.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.126
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	124.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 12.3\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{SD} = 124.9$ pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

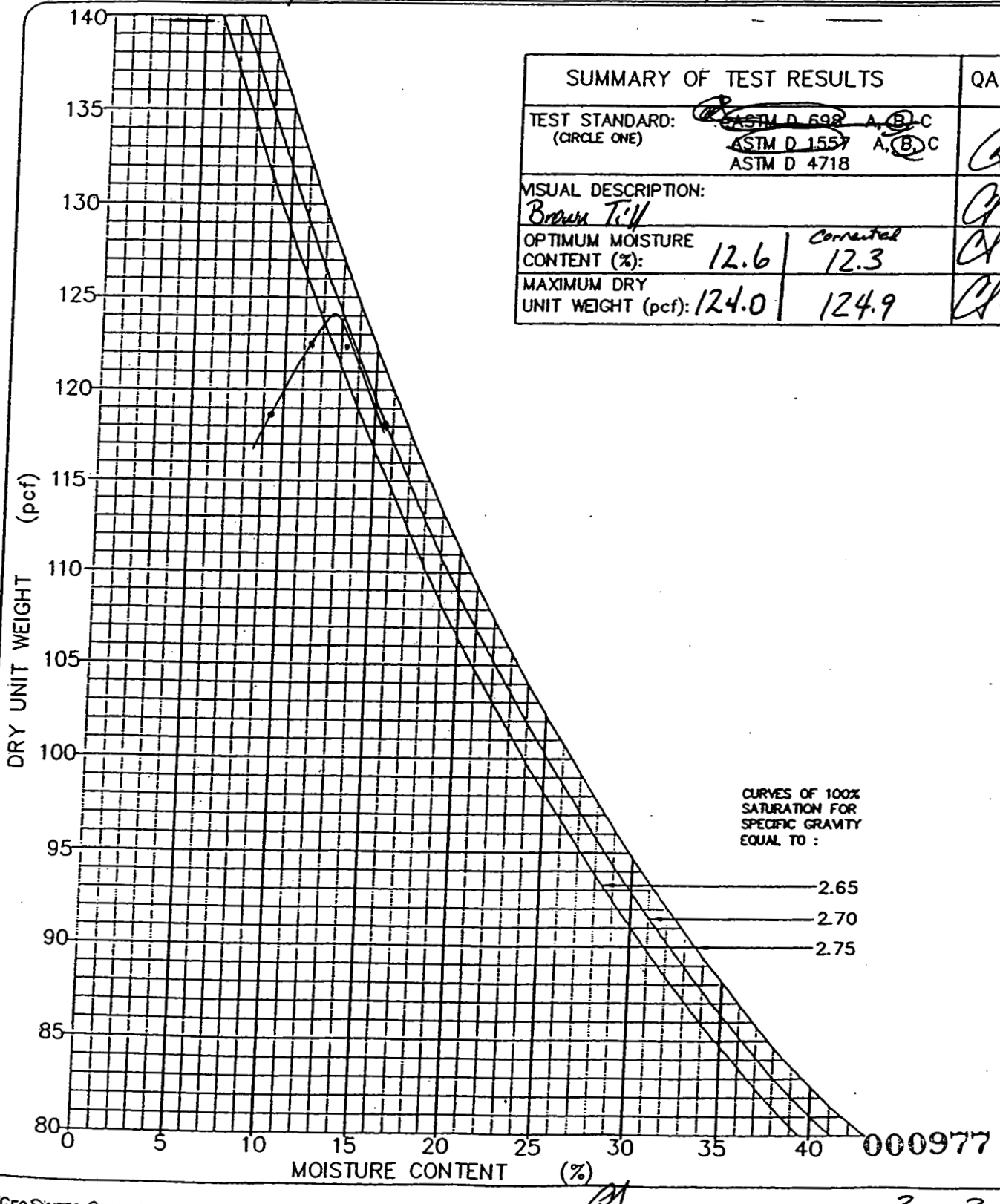
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-14 SAMPLE NO.: LP02-25

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B), C ~~ASTM D 1557~~ A, (B), C ASTM D 4718		
VISUAL DESCRIPTION: Brown Till			
OPTIMUM MOISTURE CONTENT (%):	12.6	Corrected 12.3	
MAXIMUM DRY UNIT WEIGHT (pcf):	124.0	124.9	



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FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO. 691341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 8 day Oct month 2002 year

SAMPLE NO.: LP02-98

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			69 @ 13.66	89 @ 13.79	109 @ 13.71	49 @ 13.34	
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	100 mL	
A	WT. OF SOIL & MOLD	(grams)	6196.2	6255.1	6218.9	6051.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1991.7	2050.6	2014.4	1846.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	131.5	135.3	132.9	121.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	117.3	118.7	114.3	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: KS

	TARE NO.		32	27	664	26	
F	WT. OF TARE	(grams)	8.4	8.2	8.3	8.3	
G	WT. OF WET SOIL & TARE	(grams)	473.9	397.7	425.9	427.5	
H	WT. OF DRY SOIL & TARE	(grams)	423.5	349.9	367.3	390.8	
I	WT. OF WATER = G − H	(grams)	50.4	47.8	58.6	36.7	
J	WT. DRY SOIL = H − F	(grams)	415.1	341.7	359.0	382.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.1	14.0	16.3	9.6	

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC

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FLUOR FERNALD
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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G2134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-98 STD

Weight of Total Sample	=	43894.6
Weight of Oversize Fraction	=	1556.4
Weight of Finer Fraction (- 3/8)	=	42338.2
Percentage of Oversize Fraction	= (P_C)	3.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.139
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 13.3\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 121.3\ pcf$$

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MOISTURE–DENSITY RELATIONSHIP

5368

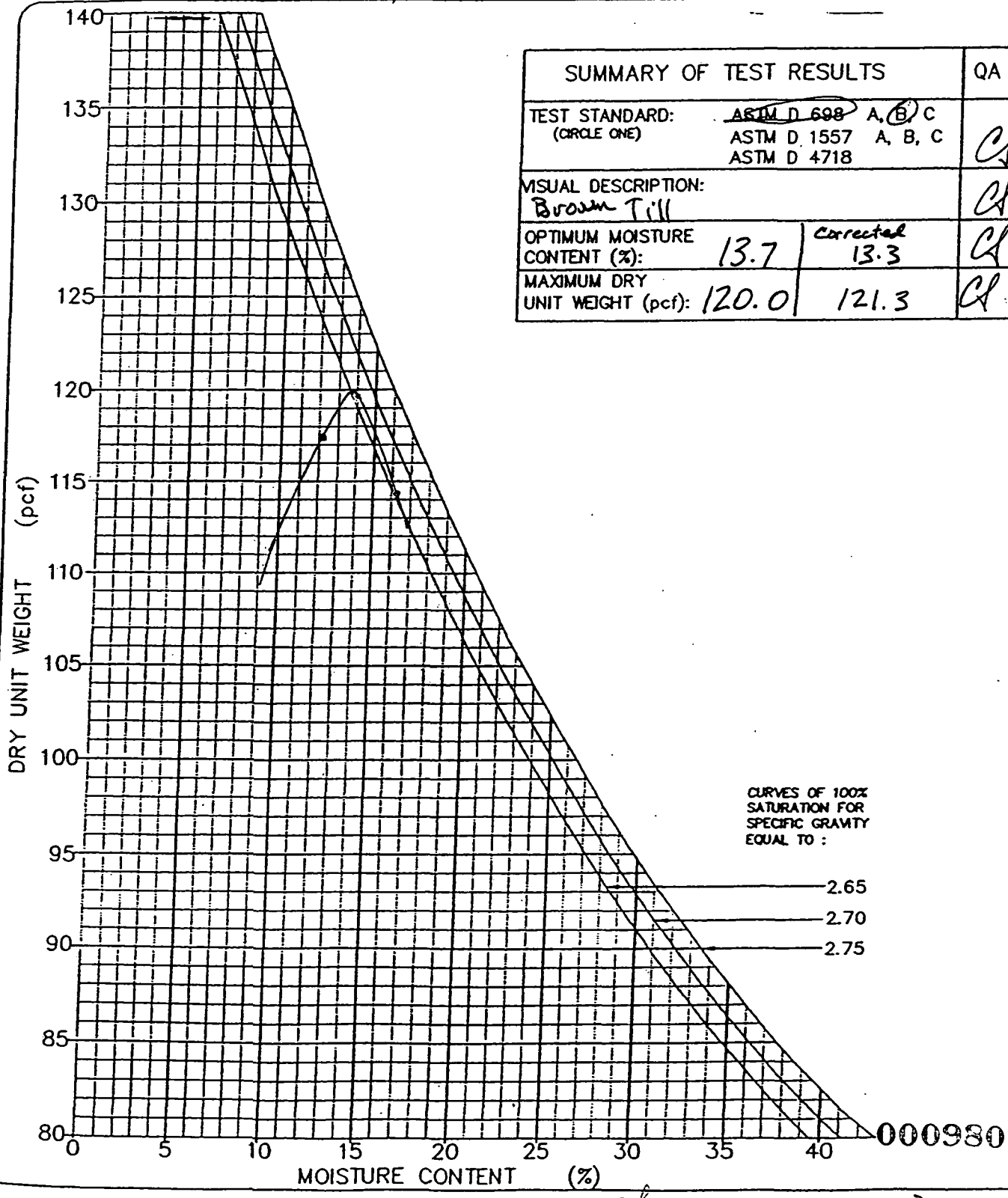
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-98

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CL
VISUAL DESCRIPTION: Brown Till			CL
OPTIMUM MOISTURE CONTENT (%):	13.7	Corrected 13.3	CL
MAXIMUM DRY UNIT WEIGHT (pcf):	120.0	121.3	CL



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-98

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL			4% 13.98	6% 14.01	8% 13.88	2% 13.77	QA ID: LCS
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6341.3	6354.9	6296.0	6246.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2136.8	2150.4	2091.5	2041.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	141.0	141.9	138.0	134.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	128.5	126.9	120.9	125.2	

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: LCS
	TARE NO.		663	36	655	35	
F	WT. OF TARE	(grams)	8.4	8.3	8.0	8.4	
G	WT. OF WET SOIL & TARE	(grams)	423.1	383.9	479.7	499.1	
H	WT. OF DRY SOIL & TARE	(grams)	386.6	344.2	421.4	464.4	
I	WT. OF WATER = G − H	(grams)	36.5	39.7	58.3	34.7	
J	WT. DRY SOIL = H − F	(grams)	378.2	335.9	413.4	456.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.7	11.8	14.1	7.6	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 601341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-98 MOD

Weight of Total Sample	=	43894.6
Weight of Oversize Fraction	=	1556.4
Weight of Finer Fraction (- 3/8)	=	42338.2
Percentage of Oversize Fraction	= (P_C)	3.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	~~0.105~~ 0.105
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	129.1
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 10.2\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 130.2$ pcf

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5368

MOISTURE-DENSITY RELATIONSHIP

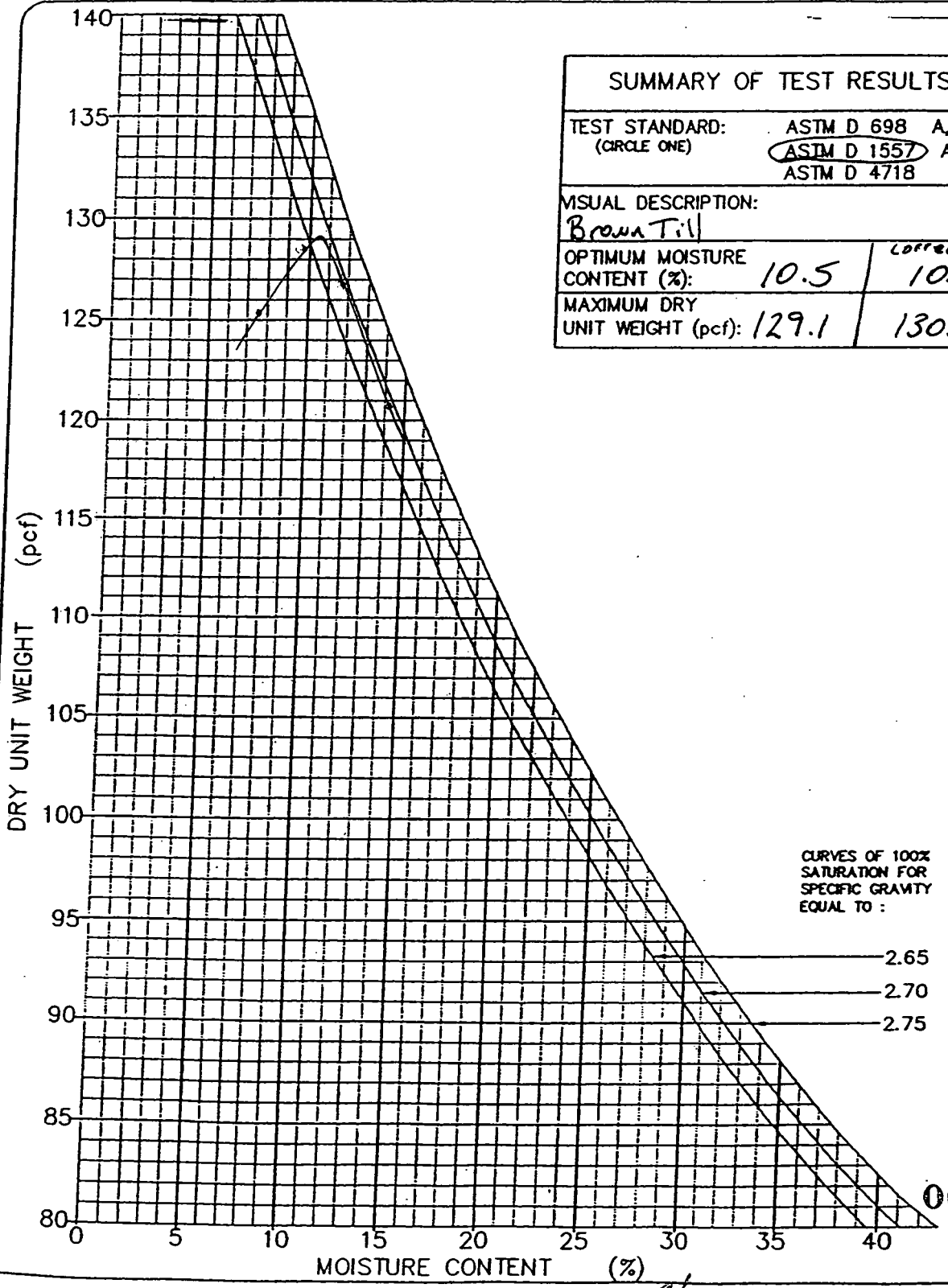
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 0245 SAMPLE NO.: LP02-98

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	10.5	corrected 10.2	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	129.1	130.2	CA



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 69134 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 7 day Oct month 2002 year

SAMPLE NO.: LP02-99

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: LS

	WATER ADDED	(ml)	6% 13.75 150 mL	8% 13.89 200 mL	10% 13.83 250 mL	4% 13.42 100 mL	
A	WT. OF SOIL & MOLD	(grams)	6237.0	6300.5	6273.3	6087.3	
B	WT. OF MOLD	(grams)	4272.2 ~~4204.5~~	4272.2 ~~4204.5~~	4272.2 ~~4204.5~~	4272.2 ~~4204.5~~	
C	WT. OF SOIL = A - B	(grams)	1964.8	2028.3	2001.1	1815.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	133.9	132.1	119.8	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	116.1	117.5	113.6	109.6	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT - ASTM D 2216

QA ID: LS

	TARE NO.		38	653	37	654	
F	WT. OF TARE	(grams)	8.1	8.2	8.2	8.3	
G	WT. OF WET SOIL & TARE	(grams)	425.2	429.5	506.8	397.8	
H	WT. OF DRY SOIL & TARE	(grams)	381.6	377.8	436.8	364.5	
I	WT. OF WATER = G - H	(grams)	43.6	51.7	70.0	33.3	
J	WT. DRY SOIL = H - F	(grams)	373.5	369.6	428.6	356.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.7	14.0	16.3	09.3	

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GEOSYNTEC CONSULTANTS FILE NO. 2-05-FLC 1.117 CHECKED BY: 1.14 1.163 .093

GeoSyntec Consultants

FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. Ga 1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-99 STD

Weight of Total Sample	=	24283.7
Weight of Oversize Fraction	=	1325.7
Weight of Finer Fraction (- 3/8)	=	22958
Percentage of Oversize Fraction	= (P_C)	5.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	94.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.13
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	118.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 12.4$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 120.9$

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MOISTURE-DENSITY RELATIONSHIP

5368

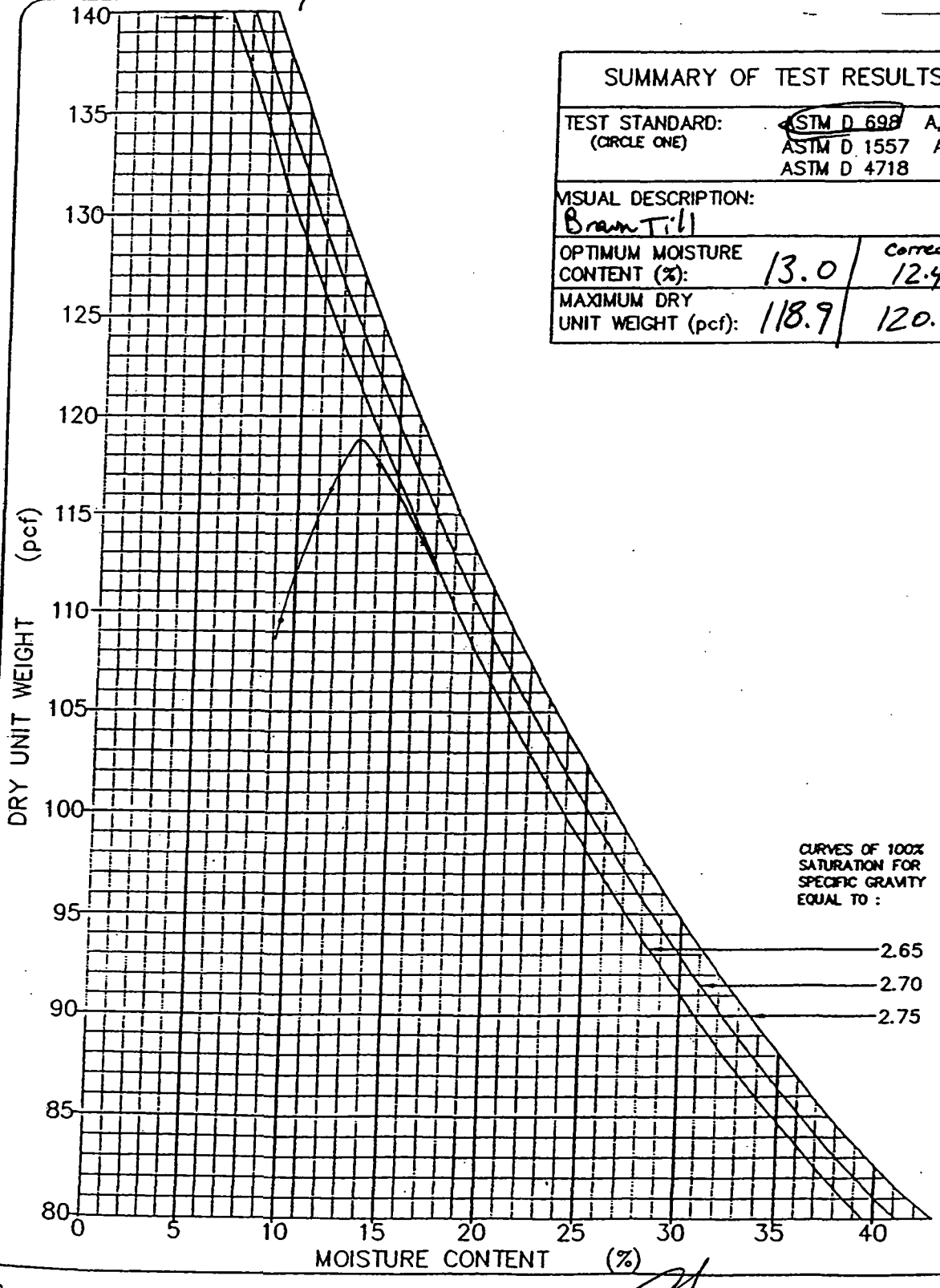
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6234 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-89

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	13.0	Corrected 12.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	118.9	120.9	CJ



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FLUOR DANIEL FERNALD

FIELD LABORATORY COMPACTION TEST (ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 691341 TASK NO.: 04.1

DATE: 9 day Oct month 2002 year

SAMPLE NO.: LP02-100

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.39	8% 13.54	10% 13.74	12% 13.68	
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	
A	WT. OF SOIL & MOLD	(grams)	6073.7	6141.7	6232.5	6205.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1869.2	1937.2	2028.0	2000.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.4	127.9	133.8	132.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.6	113.3	116.4	113.0	

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: KS

	TARE NO.		656	39	665	651	
F	WT. OF TARE	(grams)	8.2	8.2	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	406.0	405.3	381.4	418.9	
H	WT. OF DRY SOIL & TARE	(grams)	367.9	359.8	332.9	359.7	
I	WT. OF WATER = G − H	(grams)	38.1	45.5	48.5	59.2	
J	WT. DRY SOIL = H − F	(grams)	359.7	351.6	324.6	351.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.6	12.9	14.9	16.8	

1.106 1.129 1.149 1.168

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G02-341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 10 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-100 STD

Weight of Total Sample	=	41237.2
Weight of Oversize Fraction	=	1720.9
Weight of Finer Fraction (- 3/8)	=	39516.3
Percentage of Oversize Fraction	= (P_C)	4.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.15
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	116.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_W = 14.4\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 118.0$ pcf

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MOISTURE–DENSITY RELATIONSHIP

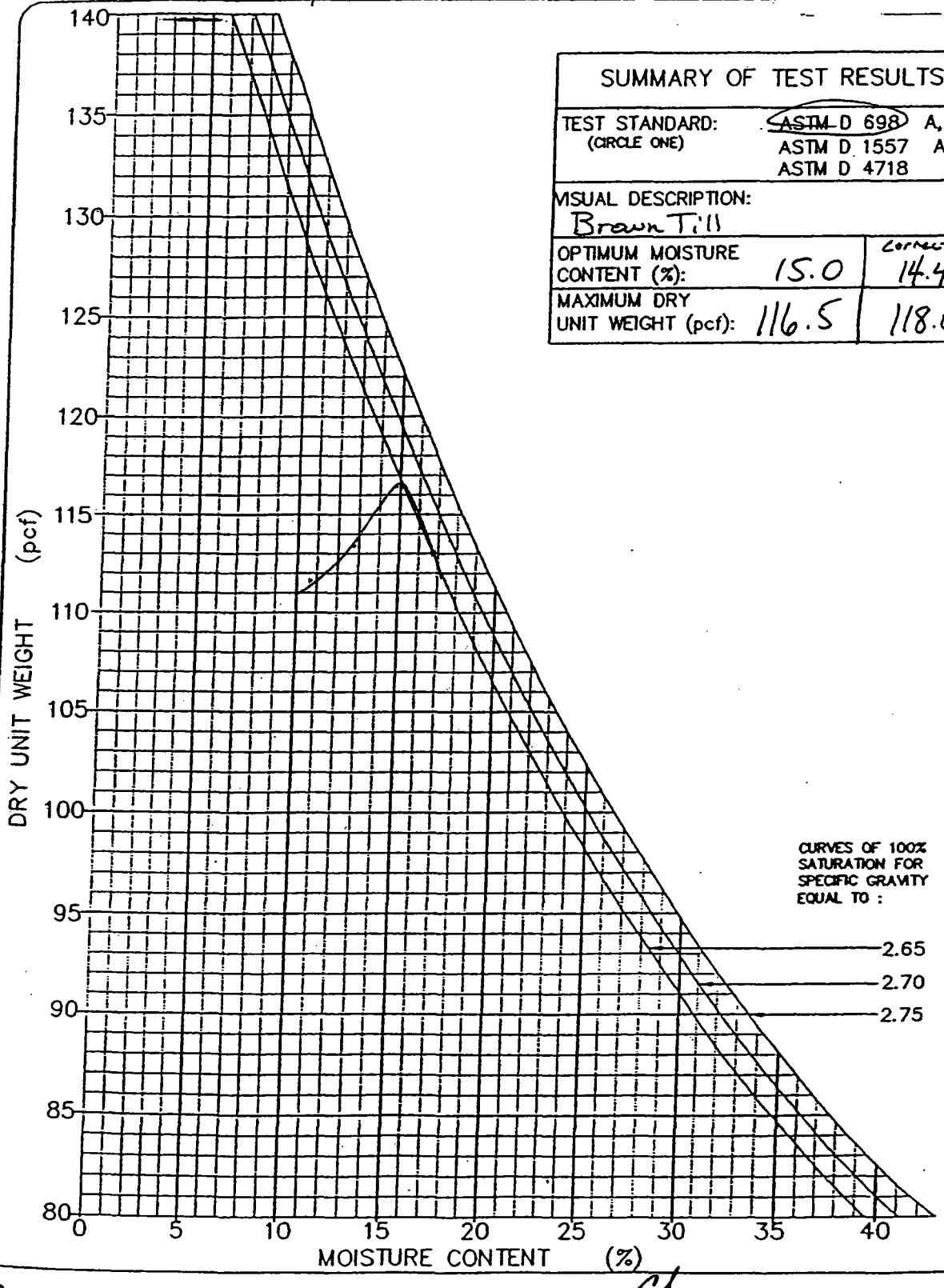
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 10 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: ~~04.1~~ LP02-108

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	15.0	corrected 14.4	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	116.5	118.0	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 60341 TASK NO.: 04.1

DESCRIPTION: Phase II

DATE: 8 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-100

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			4% 13.72	6% 13.93	8% 13.92	8% 13.52	
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6223.4	6318.6	6314.1	6132.7	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2018.9	2114.1	2109.6	1928.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	133.2	139.5	139.2	127.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	123.3	126.1	123.5	119.8	

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: KS

	TARE NO.		650	40	652	34	
F	WT. OF TARE	(grams)	8.3	8.1	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	500.5	467.3	477.7	443.9	
H	WT. OF DRY SOIL & TARE	(grams)	464.1	423.3	424.9	418.2	
I	WT. OF WATER = G − H	(grams)	36.4	44.0	53.1	25.7	
J	WT. DRY SOIL = H − F	(grams)	455.8	415.2	416.6	410.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.0	10.6	12.7	6.3	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 62134/ TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 10 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LPØ2-100 MOD

Weight of Total Sample	=	41237.2
Weight of Oversize Fraction	=	1720.9
Weight of Finer Fraction (- 3/8)	=	39516.3
Percentage of Oversize Fraction	= (P_C)	4.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.102
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	126.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 9.8\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 127.9 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

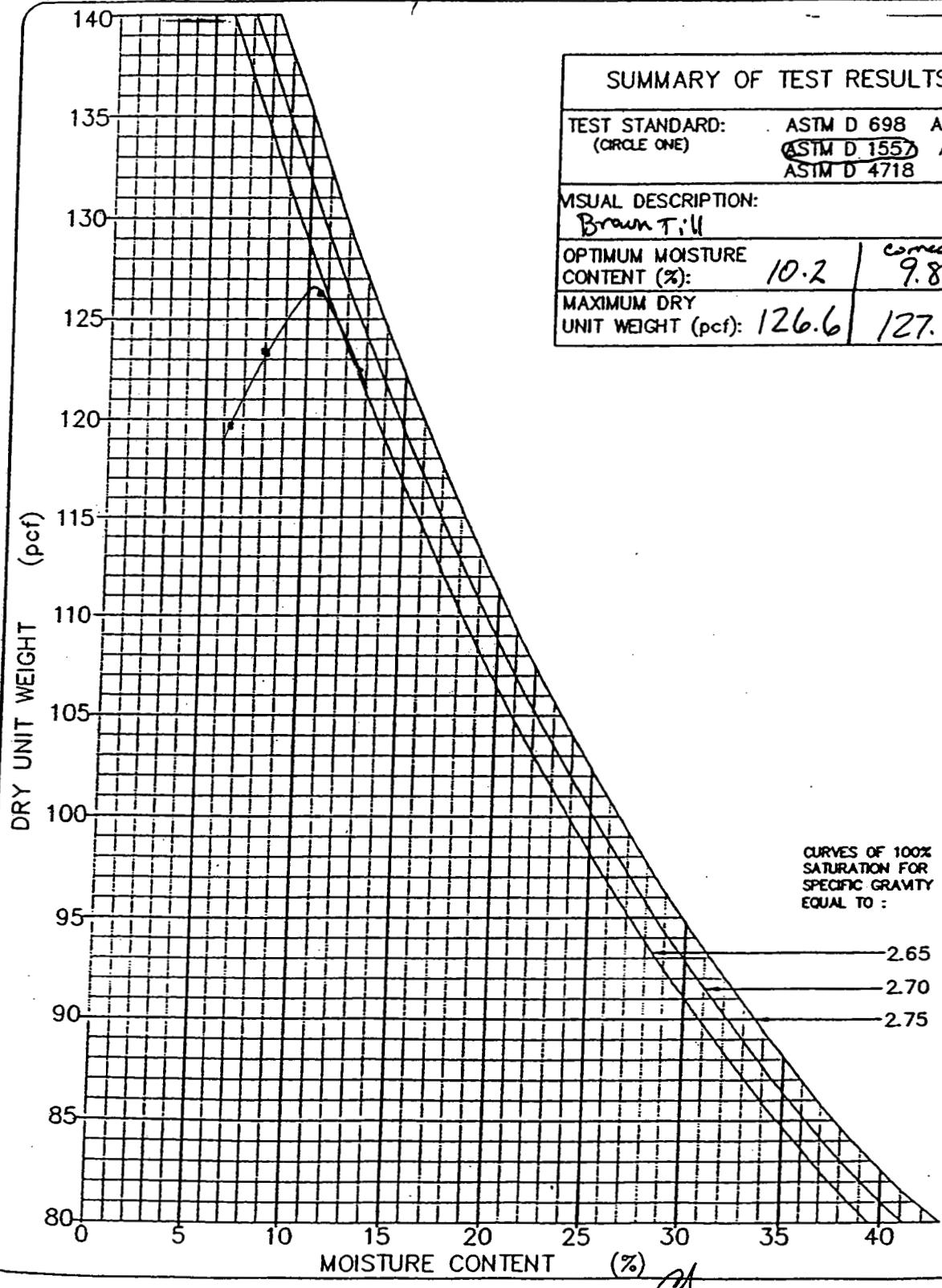
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 9 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: L2021000

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	10.2	corrected 9.8	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	126.6	127.9	CS



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 601341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — DATE: 10 day Oct month 2002 year

MATERIAL SOURCE: Stockpile 02-15 — SAMPLE NO.: LP02-101

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.29	6% 13.56	8% 13.82	10% 13.75	
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	6028.3	6150.8	6268.8	6237.0	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1823.8	1946.3	2064.3	2032.5	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.4	128.5	136.2	134.1	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	110.4	115.7	119.9	116.2	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT — ASTM D 2216

QA ID: KS

	TARE NO.		40	650	34	652	
F	WT. OF TARE	(grams)	8.1	8.3	8.3	8.3	
G	WT. OF WET SOIL & TARE	(grams)	441.7	491.4	453.4	437.3	
H	WT. OF DRY SOIL & TARE	(grams)	405.7	443.0	400.0	379.9	
I	WT. OF WATER = G − H	(grams)	36.0	48.4	53.4	57.4	
J	WT. DRY SOIL = H − F	(grams)	397.6	434.7	391.7	371.6	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.1	11.1	13.6	15.4	
			1.091	1.111	1.136	1.154	

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FLUOR FERNALD

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6A/341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 11 day Oct month 2002 year

MATERIAL TYPE: Clay liner LP02-101 STD

Weight of Total Sample	=	21694.5
Weight of Oversize Fraction	=	1014.4
Weight of Finer Fraction (- 3/8)	=	20680.1
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.136
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.9
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_w = 13.0\%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{SD} = 121.6 \text{ pcf}$$

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MOISTURE–DENSITY RELATIONSHIP

5368

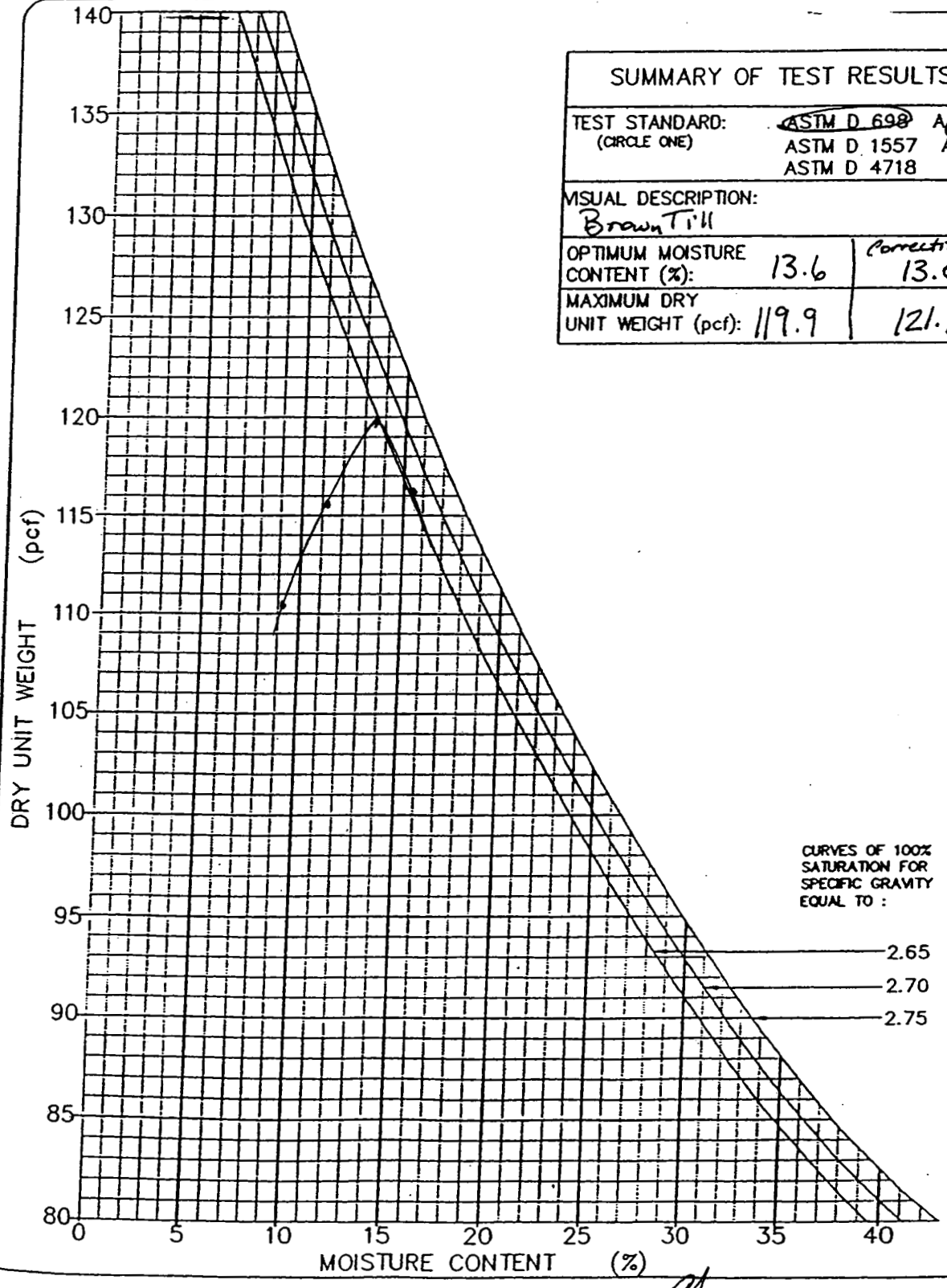
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 11 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-101

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.6	Correction 13.0	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	119.9	121.6	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase III — PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-15 — DATE: 14 day Oct month 2002 year — SAMPLE NO.: LP02-02

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			6% 13.45	8% 13.71	10% 13.73	12% 13.65	QA ID: KS
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	
A	WT. OF SOIL & MOLD	(grams)	6100.9 ✓	6218.9 ✓	6227.9 ✓	6191.6 ✓	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1896.4 ✓	2014.4 ✓	2023.4 ✓	1987.1 ✓	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	125.2 ✓	132.9 ✓	133.5 ✓	131.2 ✓	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	113.1 ✓	117.1 ✓	116.0 ✓	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: KS
	TARE NO.		15	680	622	41	
F	WT. OF TARE	(grams)	8.3	8.1	8.1	8.1	
G	WT. OF WET SOIL & TARE	(grams)	368.1	384.4	394.5	405.3	
H	WT. OF DRY SOIL & TARE	(grams)	333.4	339.6	343.7	348.5	
I	WT. OF WATER = G − H	(grams)	34.7 ✓	44.8 ✓	50.8 ✓	56.8 ✓	
J	WT. DRY SOIL = H − F	(grams)	325.1 ✓	331.5 ✓	335.6 ✓	340.4 ✓	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.7 ✓	13.5 ✓	15.1 ✓	16.7 ✓	

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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 11 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-102

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL QA ID: KS

			49 @ 13.83	69 @ 14.01	89 @ 13.94	29 @ 13.63	
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6273.3	6354.9	6323.2	6182.6	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2068.8	2150.4	2118.7	1978.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	136.5	141.9	139.8	130.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	125.5	127.8	123.8	122.1	

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: KS

	TARE NO.		656	651	665	39	
F	WT. OF TARE	(grams)	8.2	8.3	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	451.8	436.7	410.7	452.8	
H	WT. OF DRY SOIL & TARE	(grams)	415.8	394.1	364.6	423.4	
I	WT. OF WATER = G − H	(grams)	36.0	42.6	46.1	29.2	
J	WT. DRY SOIL = H − F	(grams)	407.6	385.8	356.3	415.2	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.8	11.0	12.9	7.0	

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MOISTURE–DENSITY RELATIONSHIP

5368

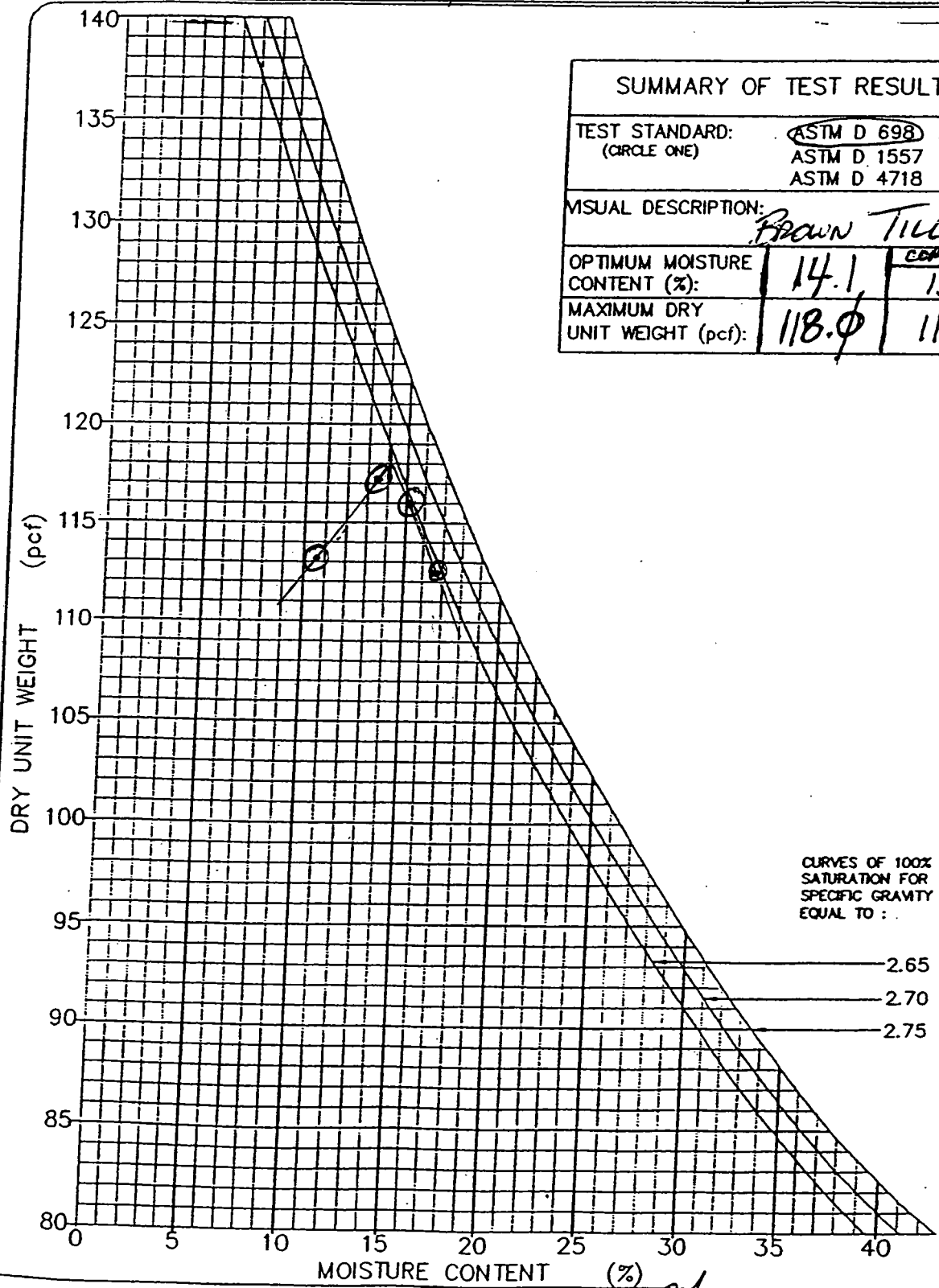
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 15 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-102

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		KS
VISUAL DESCRIPTION:	Brown Till		TBY
OPTIMUM MOISTURE CONTENT (%):	14.1	CORRECTED 13.5	TBY/CS
MAXIMUM DRY UNIT WEIGHT (pcf):	118.0	119.7	TBY/CS



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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-102 STD

Weight of Total Sample	=	40624.8
Weight of Oversize Fraction	=	1924.2
Weight of Finer Fraction (-3/8)	=	38700.6
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (-3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.141
(W_C) =	Water Content + 3/8, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	118.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 13.5\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 119.7$ pcf

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 14 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-102 MOD

Weight of Total Sample	=	40624.8
Weight of Oversize Fraction	=	1924.2
Weight of Finer Fraction (- 3/8)	=	38700.6
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.116
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	128.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 11.1\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 129.5\ pcf$$

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MOISTURE–DENSITY RELATIONSHIP

5368

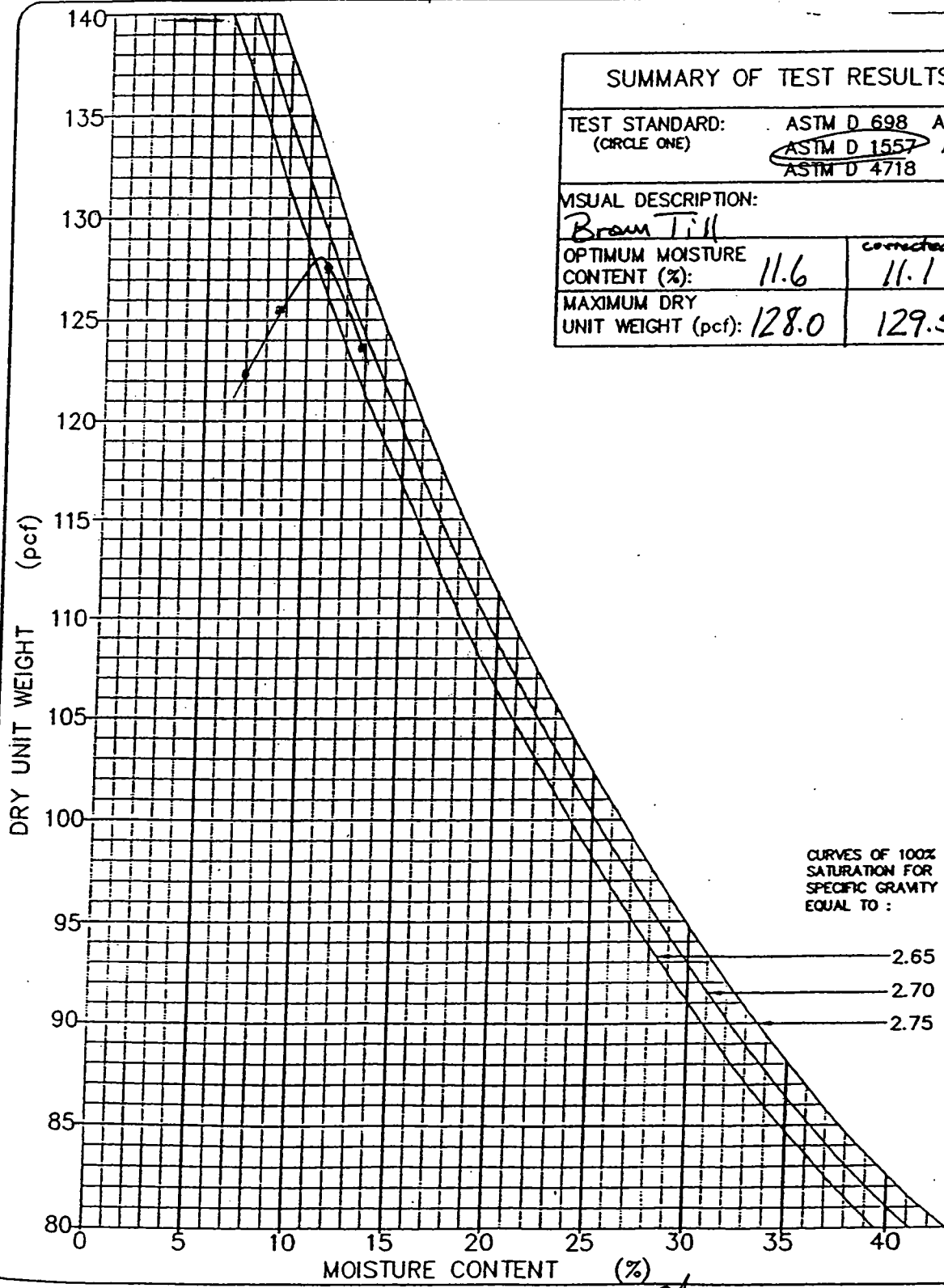
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 12 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-15 SAMPLE NO.: LP02-102

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		QA
VISUAL DESCRIPTION: Brown Till			QA
OPTIMUM MOISTURE CONTENT (%):	11.6	corrected 11.1	QA
MAXIMUM DRY UNIT WEIGHT (pcf):	128.0	129.5	QA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase II — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-15 — DATE: 22 day Oct month 2002 year — SAMPLE NO.: LP02-103

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 12.98	8% 13.18	10% 13.52	12%	~~14% 13.47~~
	WATER ADDED	(ml)	150mL	200mL	250mL	300mL	350mL
A	WT. OF SOIL & MOLD	(grams)	5887.7	5978.4	6132.7	6164.4	6110.0
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1683.2	1773.9	1928.2	1959.9	1905.5
D	WET UNIT WT.(1) = C X 0.066	(pcf)	111.1	117.1	127.3	129.4	125.8
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	99.7	103.2	109.9	108.7	103.5

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: KS

	TARE NO.		116	232	306	615	116
F	WT. OF TARE	(grams)	8.3	8.2	8.3	8.2	8.3
G	WT. OF WET SOIL & TARE	(grams)	367.7	385.0	382.5	368.3	415.3
H	WT. OF DRY SOIL & TARE	(grams)	334.9	340.2	331.4	310.7	343.6
I	WT. OF WATER = G − H	(grams)	36.8	44.8	51.1	57.6	72.2
J	WT. DRY SOIL = H − F	(grams)	322.6	332.0	323.1	302.5	334.6
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.4	13.5	15.8	19.0	21.6

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FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G01341 TASK NO. 041

DESCRIPTION: Phase IV DATE: 22 day 01 month 2002 year

MATERIAL TYPE: Brown Till/Clay Liner ~~G015~~ LP02-103

Weight of Total Sample	=	20740.6
Weight of Oversize Fraction	=	638.6
Weight of Finer Fraction (- 3/8)	=	20102.0
Percentage of Oversize Fraction	= (P_C)	3.1
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.9
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.17
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	112.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 16.5\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 113.2 \text{ pcf}$$

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MOISTURE–DENSITY RELATIONSHIP

5368

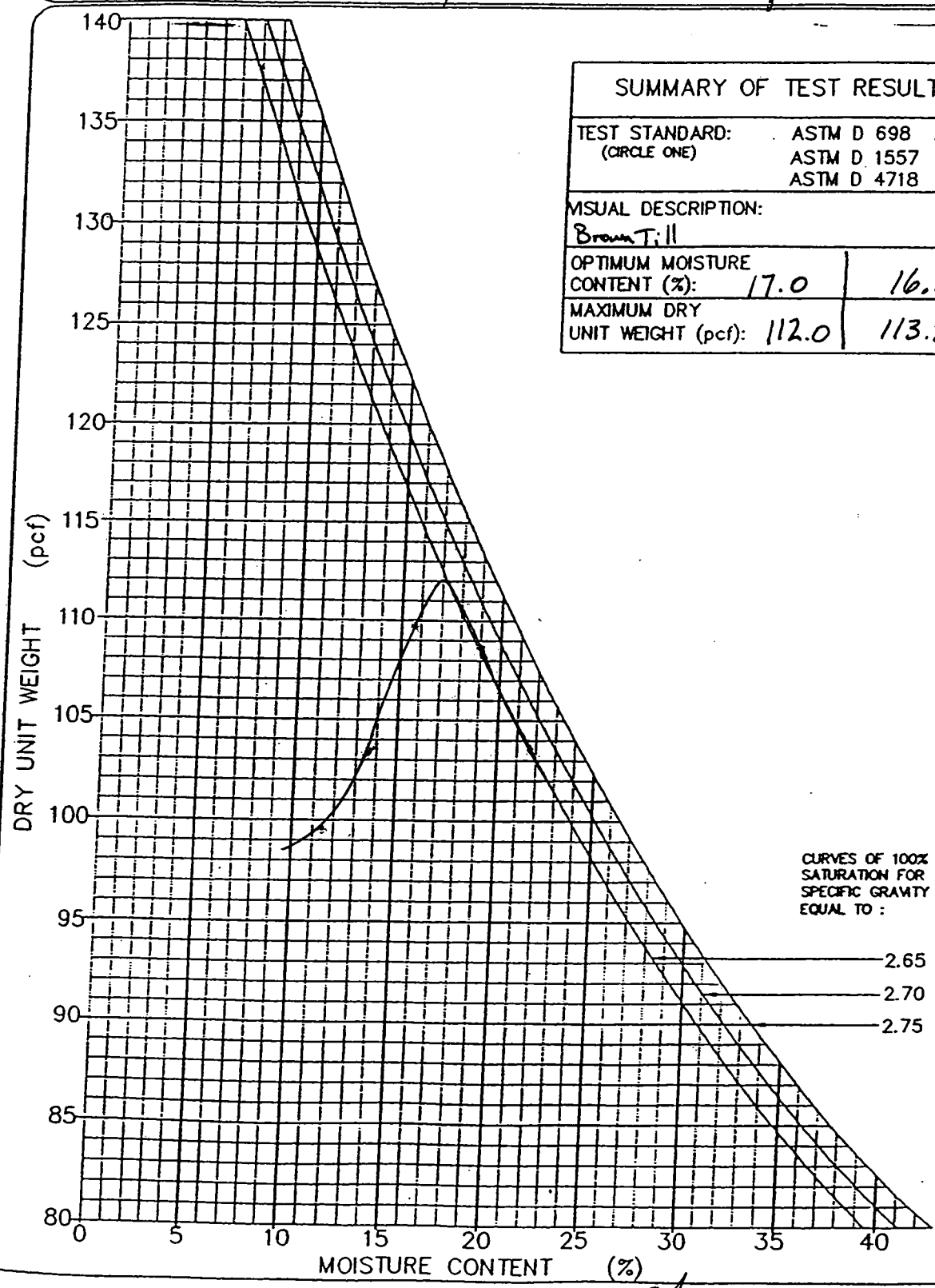
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DESCRIPTION: Phase IV DATE: 22 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile Φ2+5 SAMPLE NO.: LPΦ2-103

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	17.0	16.5	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	112.0	113.2	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

PROJECT NO.: 661341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay

MATERIAL SOURCE: Stockpile 02-16

DATE: 15 day Oct month 2002 year

SAMPLE NO.: LP02-104

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED		6% 13.49	8% 13.75	10% 13.83	12% 13.68	QA ID: KS
A	WT. OF SOIL & MOLD	(ml)	150 mL	200 mL	250 mL	300 mL	
B	WT. OF MOLD	(grams)	6119.1	6237.0	6273.3	6205.2	
C	WT. OF SOIL = A − B	(grams)	4204.5	4204.5	4204.5	4204.5	
D	WET UNIT WT.(1) = C X 0.066	(grams)	1914.6	2032.5	2068.8	2000.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	126.4	134.1	136.5	132.0	
		(pcf)	114.9	119.0	119.1	113.0	

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

	TARE NO.		43	62	62	44	QA ID: KS
F	WT. OF TARE	(grams)	8.3	8.1	8.1	8.5	
G	WT. OF WET SOIL & TARE	(grams)	462.1	460.4	445.7	501.3	
H	WT. OF DRY SOIL & TARE	(grams)	420.7	409.6	390.0	430.3	
I	WT. OF WATER = G − H	(grams)	41.4	50.8	55.7	71.0	
J	WT. DRY SOIL = H − F	(grams)	412.4	401.5	381.9	421.8	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.0	12.7	14.6	16.8	

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134/ TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-104 STD

Weight of Total Sample	=	40989.7
Weight of Oversize Fraction	=	1014.3
Weight of Finer Fraction (- 3/8)	=	39975.4
Percentage of Oversize Fraction	= (P_C)	2.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.139
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 13.6%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 121.3 pcf

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MOISTURE–DENSITY RELATIONSHIP

5368

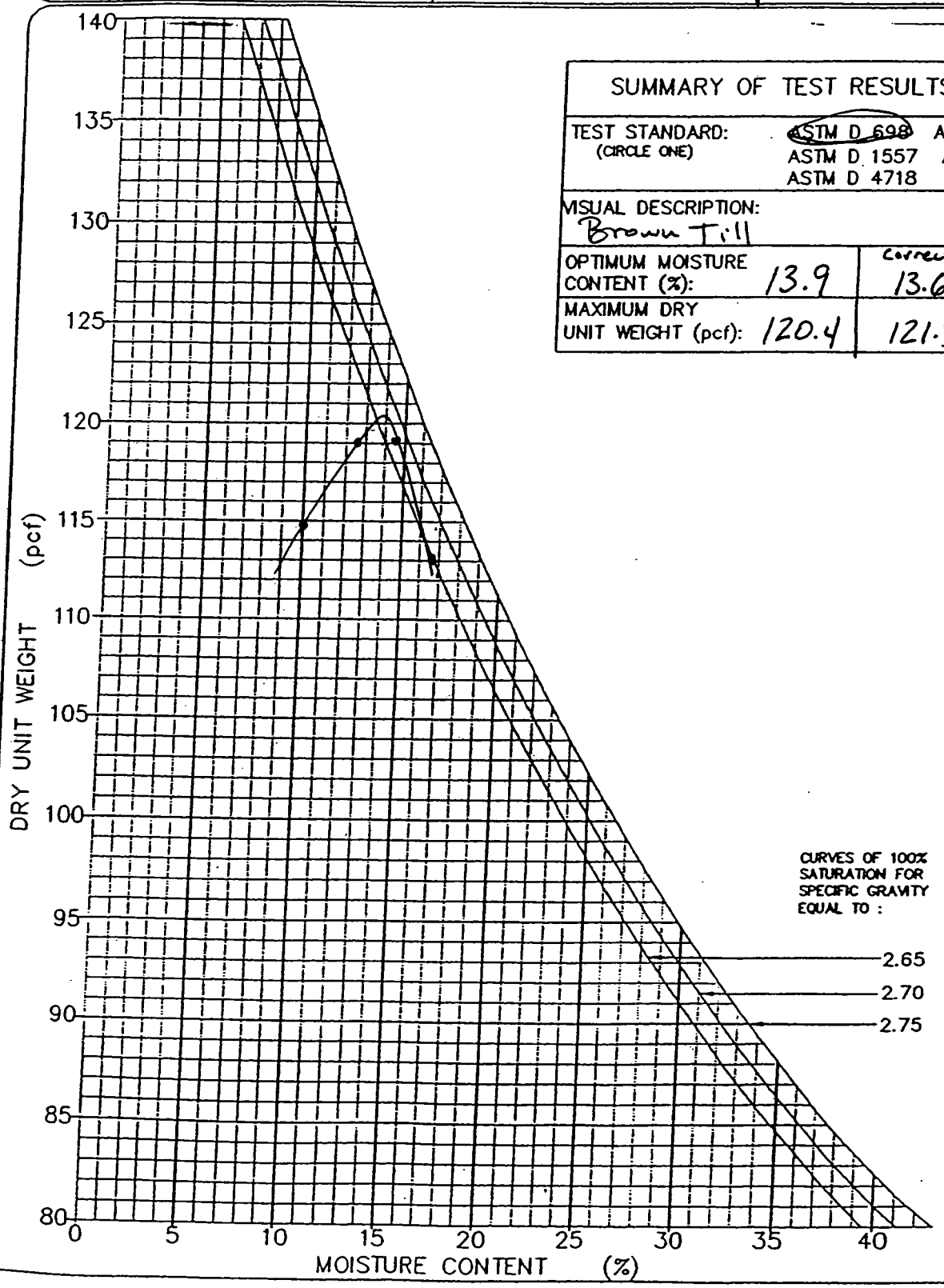
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: CQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 16 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-104

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	13.9	corrected 13.6	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	120.4	121.3	CS



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase III DATE: 17 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-104

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL QA ID: KS

			4% 13.93	6% 14.06	8% 13.97	2% 13.71	
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6318.6	6377.6	6336.8	6218.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2114.1	2173.1	2132.3	2014.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	139.5	143.4	140.7	132.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	128.6	130.1	125.3	125.0	

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: KS

	TARE NO.		41	304	625	621	
F	WT. OF TARE	(grams)	8.1	8.3	8.0	8.1	
G	WT. OF WET SOIL & TARE	(grams)	481.9	426.0	397.0	478.7	
H	WT. OF DRY SOIL & TARE	(grams)	444.6	387.4	354.3	451.0	
I	WT. OF WATER = G − H	(grams)	37.3	38.6	42.7	27.7	
J	WT. DRY SOIL = H − F	(grams)	436.5	379.1	346.3	442.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.5	10.2	12.3	6.3	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G-341 TASK NO. 041.1

DESCRIPTION: Phase IV DATE: 18 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-104 MOD

Weight of Total Sample	=	40989.7
Weight of Oversize Fraction	=	1014.3
Weight of Finer Fraction (- 3/8)	=	39975.4
Percentage of Oversize Fraction	= (P_C)	2.5
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.5
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.1
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	130.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 9.8\%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{SD} = 130.8$ pcf

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MOISTURE-DENSITY RELATIONSHIP

5368

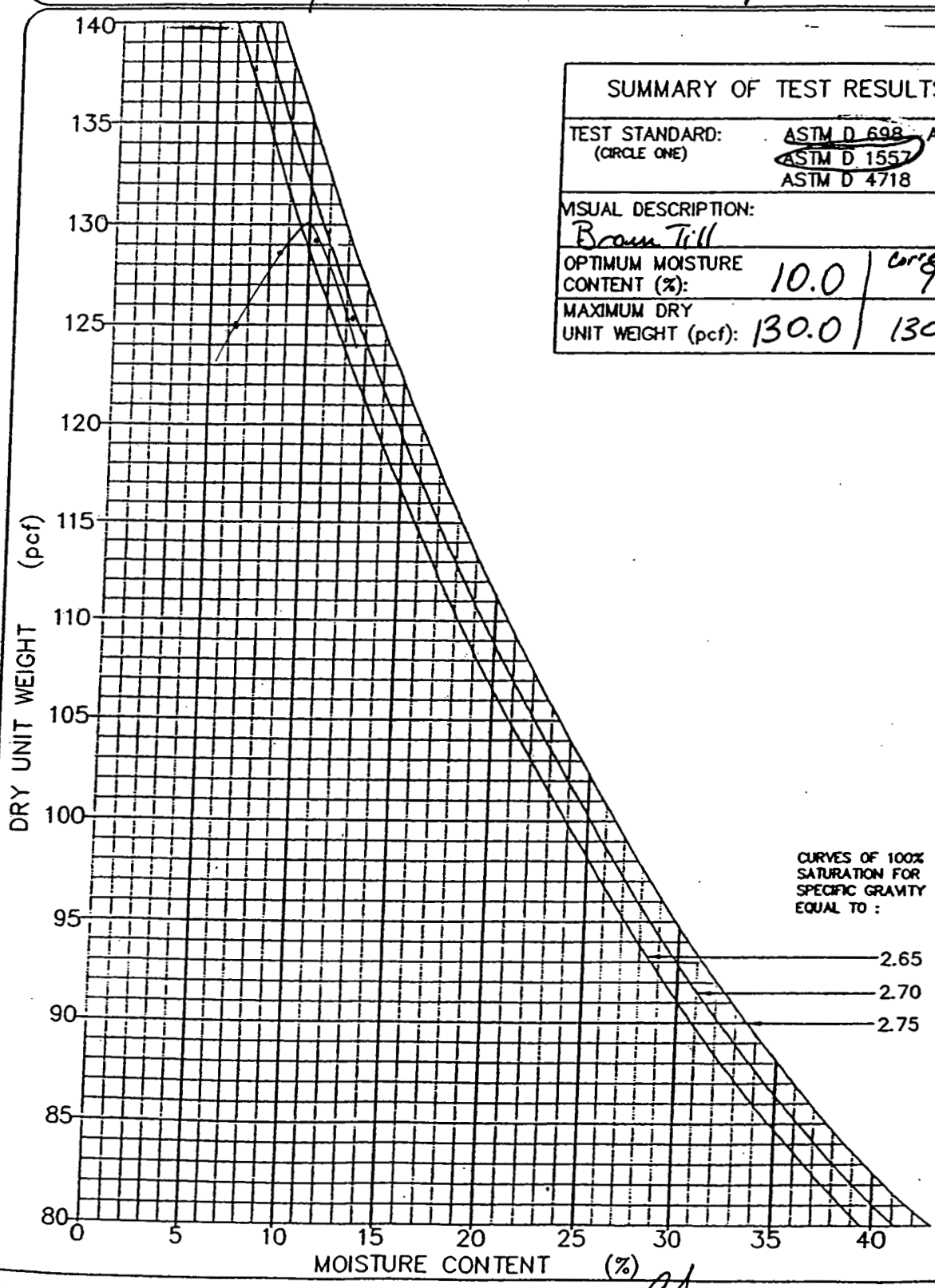
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G01341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-104

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		
VISUAL DESCRIPTION: Brown Till			
OPTIMUM MOISTURE CONTENT (%):	10.0	Corrected 9.8	
MAXIMUM DRY UNIT WEIGHT (pcf):	130.0	130.8	



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: GQ1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-16 — DATE: 15 day Oct month 2002 year — SAMPLE NO.: LP02-105

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

			69 @ 13.60	89 @ 13.77	109 @ 13.78	49 @ 13.22	QA ID: CS
	WATER ADDED	(ml)	150 mL	200 mL	250 mL	100 ~~200~~ mL	
A	WT. OF SOIL & MOLD	(grams)	6169.0	6246.1	6250.6	5996.6	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1964.5	2041.6	2046.1	1792.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	134.7	135.0	118.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	116.0	119.2	117.4	109.0	

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: CS
	TARE NO.		624	305	625	304	
F	WT. OF TARE	(grams)	8.0	8.3	8.0	8.3	
G	WT. OF WET SOIL & TARE	(grams)	407.2	452.0	478.0	422.3	
H	WT. OF DRY SOIL & TARE	(grams)	365.1	400.8	416.8	389.7	
I	WT. OF WATER = G − H	(grams)	42.1	51.2	61.2	32.6	
J	WT. DRY SOIL = H − F	(grams)	357.1	392.5	408.8	381.4	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.8	13.0	15.0	8.5	

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5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 16 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-105 STD

Weight of Total Sample	=	22597.7
Weight of Oversize Fraction	=	673.5
Weight of Finer Fraction (- 3/8)	=	21924.2
Percentage of Oversize Fraction	= (P_C)	3.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.135
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.0
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 13.1\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 121.1 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

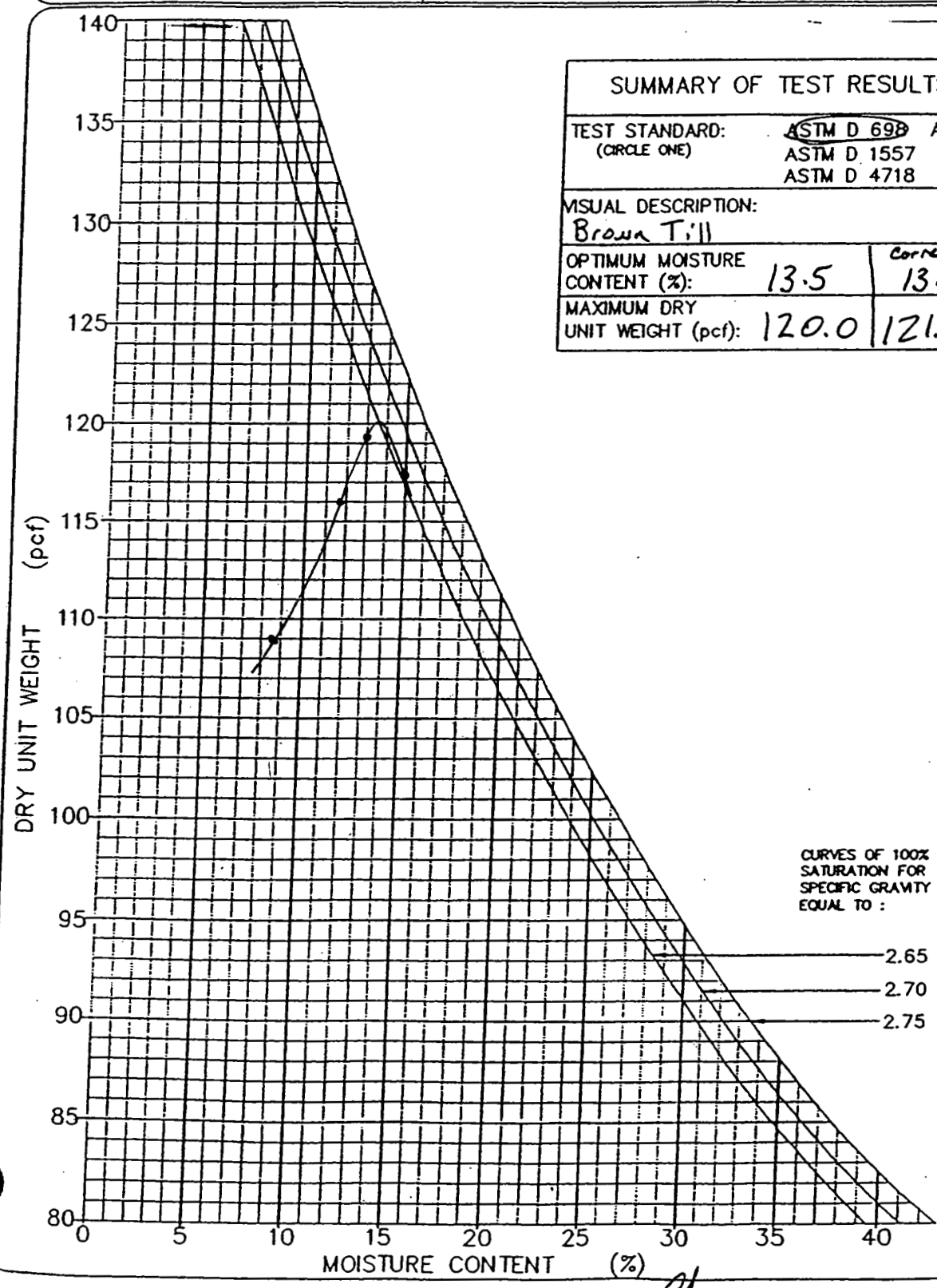
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 16 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-105

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	13.5	Corrected 13.1	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	120.0	121.1	CS



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-16 — DATE: 17 day Oct month 2002 year — SAMPLE NO.: LP02-106

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.35	6% 13.61	8% 13.73	10% 13.71	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6055.6	6173.5	6227.9	6218.9	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1851.1	1969.0	2023.4	2014.4	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	122.2	130.0	133.5	132.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.6	116.6	117.5	114.4	

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: KS

	TARE NO.		232	654	660	26	
F	WT. OF TARE	(grams)	8.2	8.3	8.4	8.3	
G	WT. OF WET SOIL & TARE	(grams)	468.6	427.6	409.4	423.2	
H	WT. OF DRY SOIL & TARE	(grams)	428.5	384.2	361.4	365.4	
I	WT. OF WATER = G − H	(grams)	40.1	43.4	48.0	57.8	
J	WT. DRY SOIL = H − F	(grams)	420.3	375.9	353.0	357.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.5	11.5	13.6	16.2	

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SHEET NO. 1 OF 3

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 19 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-106 STD

Weight of Total Sample	=	48803.0
Weight of Oversize Fraction	=	~~2310.8~~ 2301.8
Weight of Finer Fraction (- 3/8)	=	46501.2
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.128
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	118.5
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_w = 12.3%

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 120.2 pcf

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FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

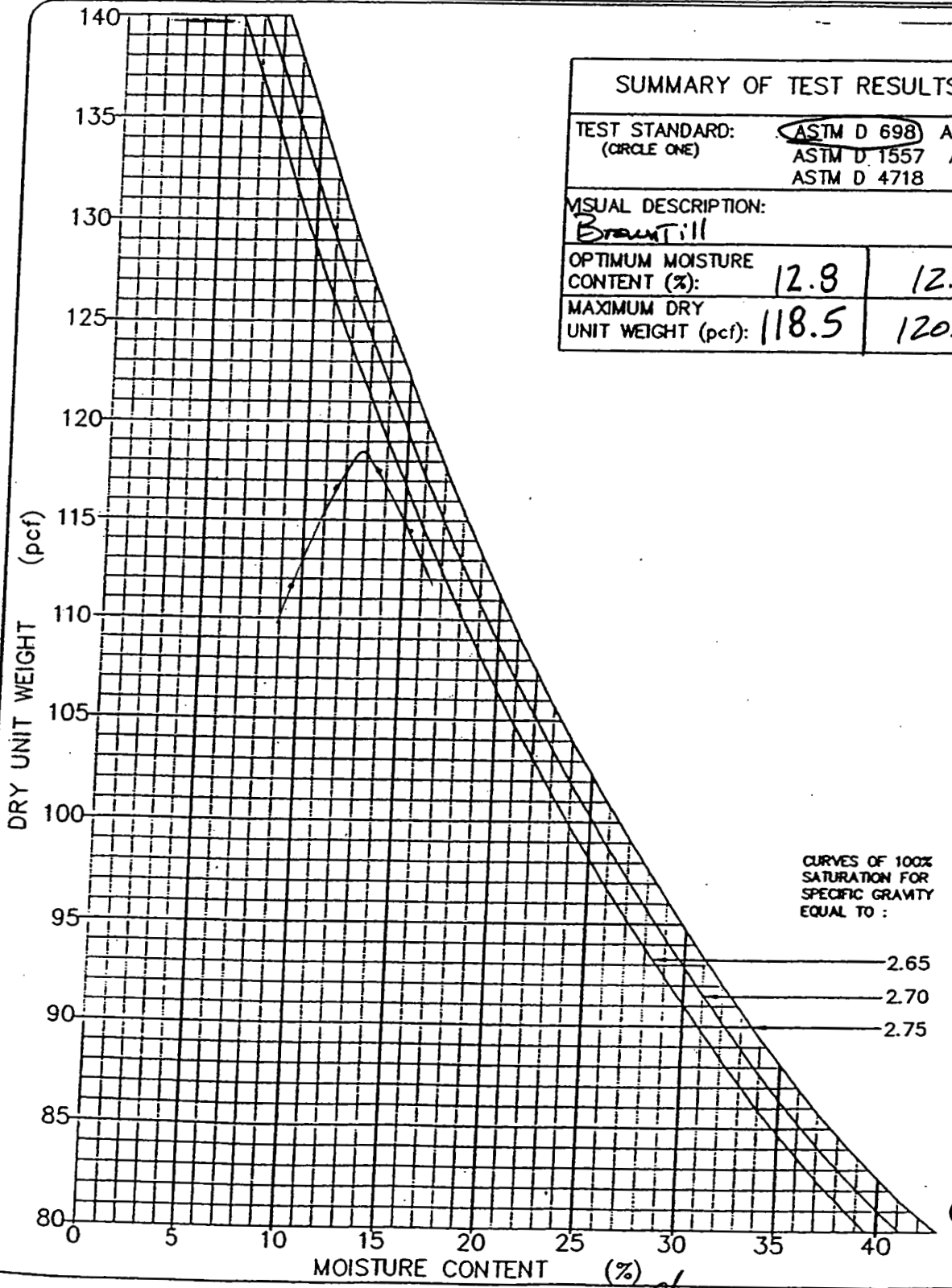
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G21341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-106

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.8	12.3	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	118.5	120.5	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase III DATE: 17 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-106

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL QA ID: KS

			29% 13.77	49% 13.98	69% 14.01	89% 13.89	
	WATER ADDED	(ml)	50 mL	100 mL	150 mL	200 mL	
A	WT. OF SOIL & MOLD	(grams)	6246.1	6341.3	6354.9	6300.5	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2041.6	2136.8	2150.4	2096.0	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	134.7	141.0	141.9	138.3	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	124.8	128.3	127.0	121.5	

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: KS

	TARE NO.		620	43	112	306	
F	WT. OF TARE	(grams)	8.1	8.2	8.0	8.3	
G	WT. OF WET SOIL & TARE	(grams)	487.8	434.6	446.1	435.3	
H	WT. OF DRY SOIL & TARE	(grams)	452.7	396.1	400.1	383.4	
I	WT. OF WATER = G − H	(grams)	35.1	38.5	46.0	51.9	
J	WT. DRY SOIL = H − F	(grams)	444.6	387.9	392.1	375.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	7.9	9.9	11.7	13.8	

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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 6Q131 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 18 day 04 month 2002 year

MATERIAL TYPE: Clay Liner LP02-108 MOD

Weight of Total Sample	=	48803.0
Weight of Oversize Fraction	=	2301.8
Weight of Finer Fraction (- 3/8)	=	46501.2
Percentage of Oversize Fraction	= (P_C)	4.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.105
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	129.3
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 10.1\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{SD} = 130.8 \text{ pcf}$$

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MOISTURE-DENSITY RELATIONSHIP

5368

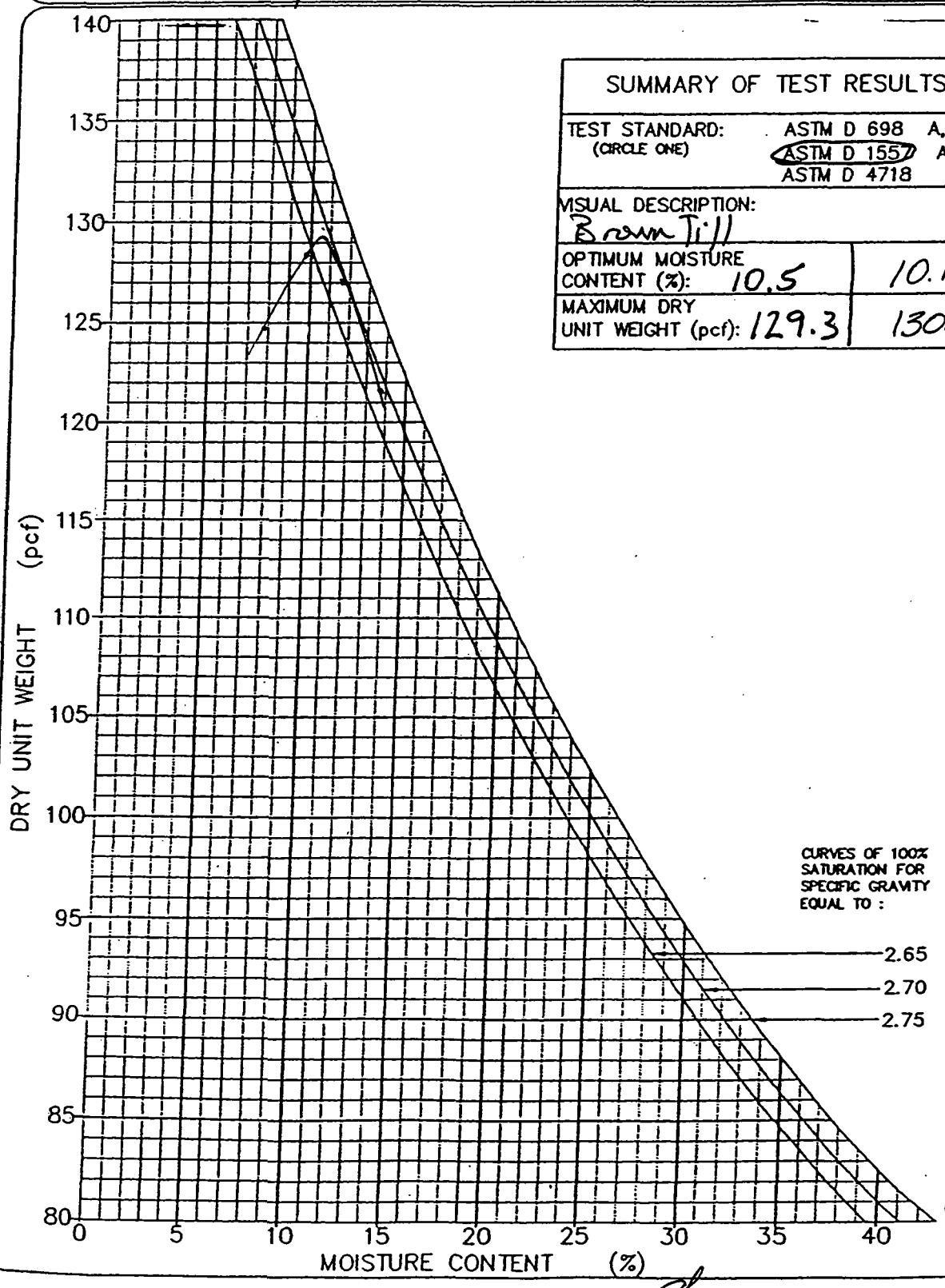
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: G21341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: CP2-1-16

SUMMARY OF TEST RESULTS		QA ID
TEST STANDARD: (CIRCLE ONE) ASTM D 698 A, B, C; ASTM D 1557 A, B, C; ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till		CJ
OPTIMUM MOISTURE CONTENT (%): 10.5	10.1	CJ
MAXIMUM DRY UNIT WEIGHT (pcf): 129.3	130.8	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Φ1341 TASK NO.: Φ4.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile Φ2-16 — DATE: 22 day Oct month 2ΦΦ2 year — SAMPLE NO.: LPΦ2-1Φ7

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: 15

			4% 13.58	6% 13.8Φ	8% 13.73	2% 13.26	
	WATER ADDED	(ml)	1ΦΦmL	15Φ mL	2ΦΦ mL	5Φ mL	
A	WT. OF SOIL & MOLD	(grams)	6159.9	6259.7	6227.9	6Φ14.7	
B	WT. OF MOLD	(grams)	42Φ4.5	42Φ4.5	42Φ4.5	42Φ4.5	
C	WT. OF SOIL = A − B	(grams)	1955.4	2Φ55.2	2Φ23.4	181Φ.2	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.1	135.6	133.5	119.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.8	119.5	115.Φ	1Φ9.6	

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: 15

	TARE NO.		3Φ9	9Φ	6Φ8	6Φ7	
F	WT. OF TARE	(grams)	8.1	8.3	8.2	8.2	
G	WT. OF WET SOIL & TARE	(grams)	358.6	419.7	4Φ4.Φ	394.1	
H	WT. OF DRY SOIL & TARE	(grams)	322.5	370.7	349.1	362.3	
I	WT. OF WATER = G − H	(grams)	36.1	49.Φ	54.9	31.8	
J	WT. DRY SOIL = H − F	(grams)	314.4	362.4	34Φ.9	354.1	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.5	13.5	16.1	9.Φ	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60341 TASK NO. 041

DESCRIPTION: Phase IV DATE: 23 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-107

Weight of Total Sample	=	24362.4
Weight of Oversize Fraction	=	1020.2
Weight of Finer Fraction (- 3/8)	=	23342.2
Percentage of Oversize Fraction	= (P_C)	4.2
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.8
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8, as decimal	=	0.139
(W_C) =	Water Content + 3/4, as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.7
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 13.4\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 121.2 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

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MOISTURE–DENSITY RELATIONSHIP

5368

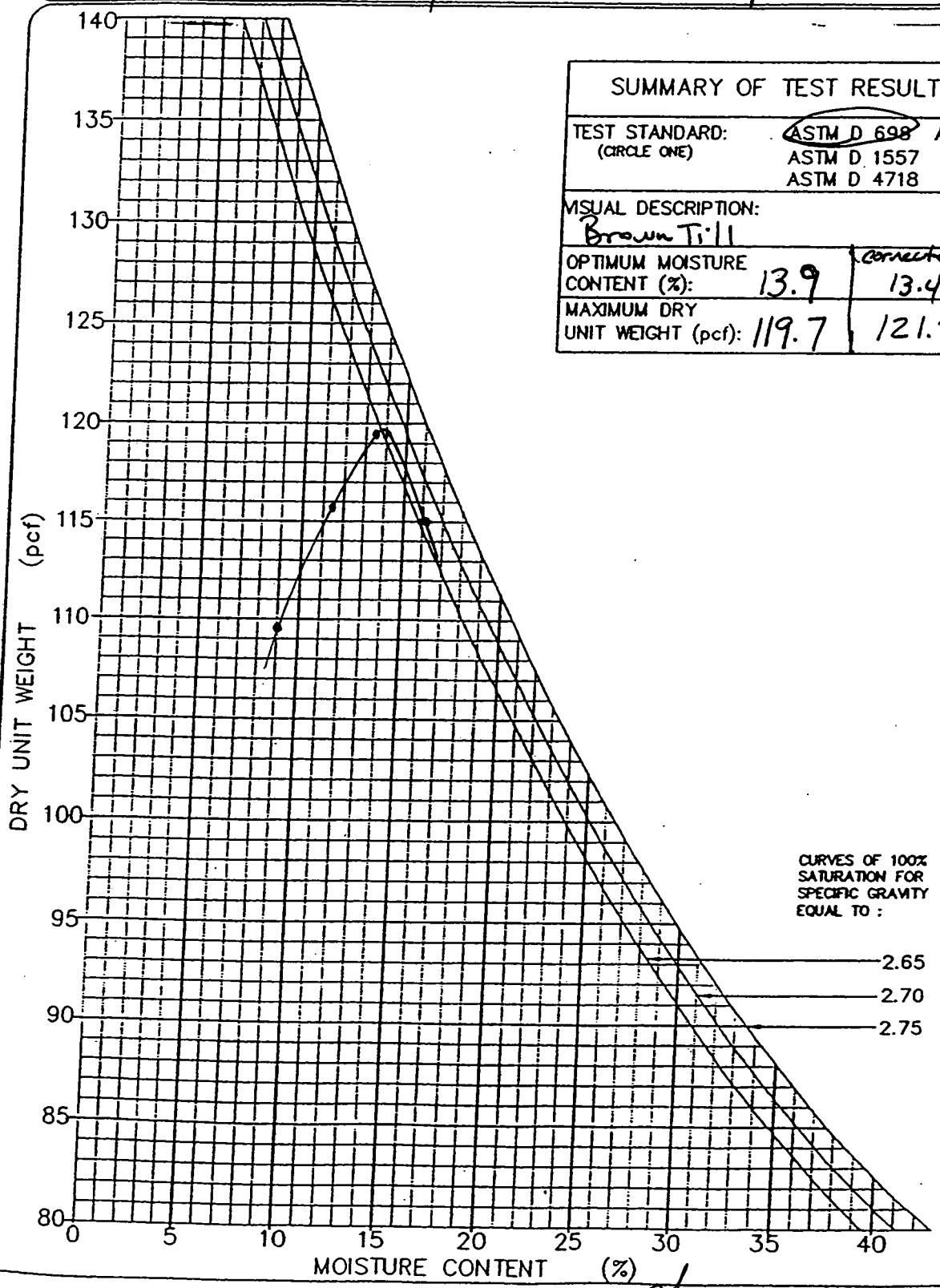
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: ~~GQ1341~~ 04.1 KS

DESCRIPTION: Phase IV DATE: 22 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-107

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B) C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	13.9	corrected 13.4	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	119.7	121.2	CA



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase III — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-16 — DATE: 22 day Oct month 2002 year — SAMPLE NO.: LP02-108

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.38	6% 13.67	8% 13.76	10% 13.70	
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	
A	WT. OF SOIL & MOLD	(grams)	6069.2	6200.7	6241.5	6214.3	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1864.7	1996.2	2037.0	2009.8	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	123.1	131.7	134.4	132.6	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	111.7	117.8	117.5	114.3	

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: KS

	TARE NO.		49	43	306	305	
F	WT. OF TARE	(grams)	8.2	8.2	8.3	8.3	
G	WT. OF WET SOIL & TARE	(grams)	352.4	435.1	386.9	433.9	
H	WT. OF DRY SOIL & TARE	(grams)	320.4	390.1	339.3	375.2	
I	WT. OF WATER = G − H	(grams)	32.0	45.0	47.6	58.7	
J	WT. DRY SOIL = H − F	(grams)	312.2	381.9	331.0	366.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.2	11.8	14.4	16.0	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ134 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 23 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-108 STD

Weight of Total Sample	=	48971.5
Weight of Oversize Fraction	=	1739.3
Weight of Finer Fraction (- 3/8)	=	47232.2
Percentage of Oversize Fraction	= (P_C)	3.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.128
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	120.8
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_W = 12.4\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 122.0\ pcf$$

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FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

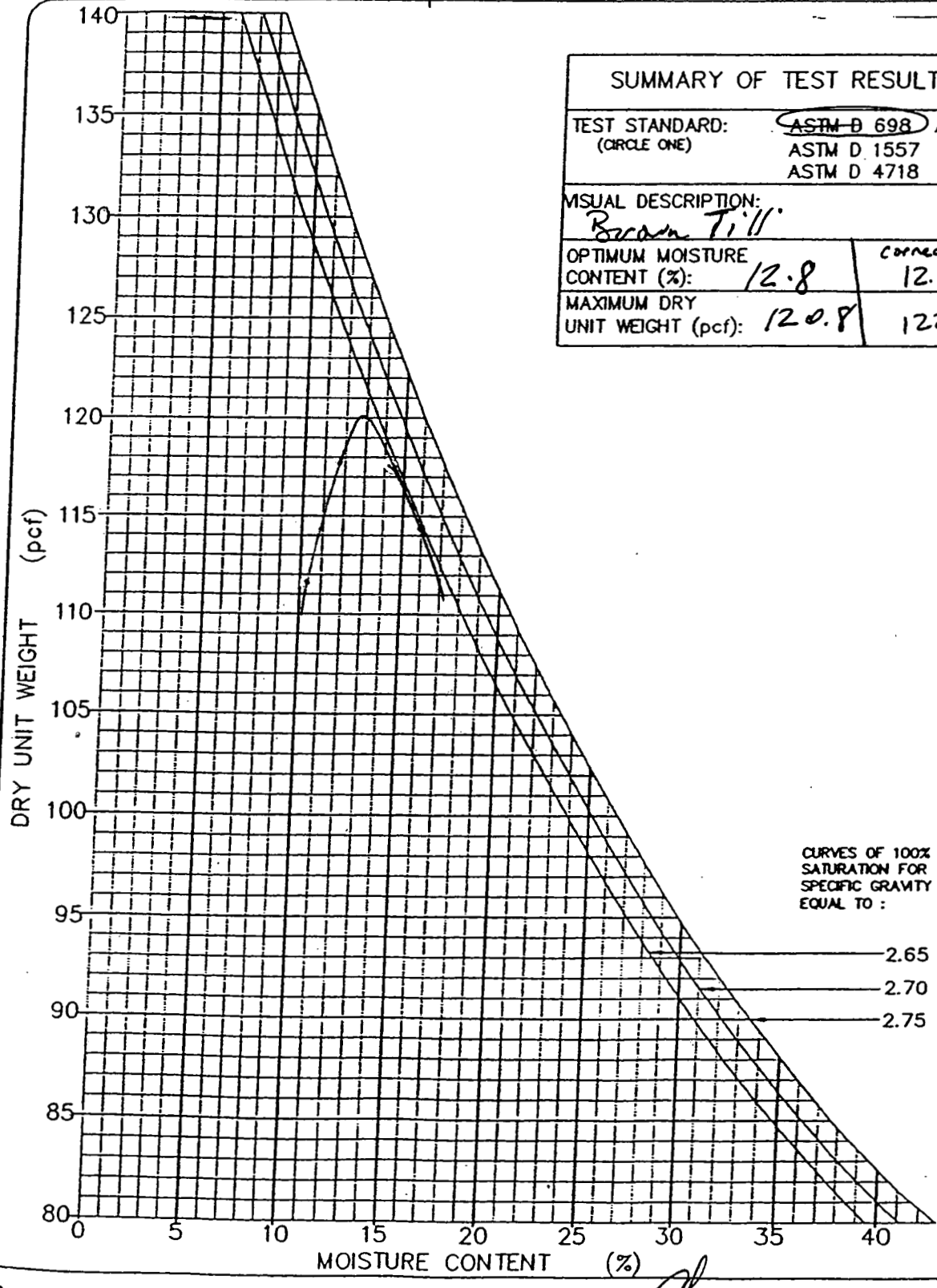
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF) 5368

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 23 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-108

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	~~ASTM D 698~~ A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	12.8	corrected 12.4	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	120.8	122.0	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase II

DATE: 17 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-108

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: KS

			2% 13.75	4% 13.99	6% 13.99	8% 13.84	
	WATER ADDED	(ml)	500 mL	100 mL	150 mL	200 mL	
A	WT. OF SOIL & MOLD	(grams)	6237.0	6345.9	6345.9	6277.8	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2032.5	2141.4	2141.4	2073.3	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	134.1	141.3	141.3	136.8	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	123.9	128.7	125.9	119.2	

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: KS

	TARE NO.		305	624	302	301	
F	WT. OF TARE	(grams)	8.3	8.0	8.3	8.5	
G	WT. OF WET SOIL & TARE	(grams)	456.7	428.7	430.9	415.8	
H	WT. OF DRY SOIL & TARE	(grams)	422.8	391.2	385.1	363.4	
I	WT. OF WATER = G − H	(grams)	33.9	37.5	45.8	52.4	
J	WT. DRY SOIL = H − F	(grams)	414.5	383.2	376.8	354.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	8.2	9.8	12.2	14.8	

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GeoSyntec Consultants

FLUOR FERNALD 5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 041

DESCRIPTION: Phase IV DATE: 18 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-108 MOD

Weight of Total Sample	=	48971.5
Weight of Oversize Fraction	=	1739.3
Weight of Finer Fraction (- 3/8)	=	47232.2
Percentage of Oversize Fraction	= (P_C)	3.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.105
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	129.8
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W = (W_F P_F) + (W_C P_C)$$

$$C_W = 10.2\ \%$$

$$C\delta_D = 100\delta_F G_M \delta_W / (\delta_F P_C) + (G_M \delta_W P_F)$$

$$C_{\delta D} = 130.9\ pcf$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

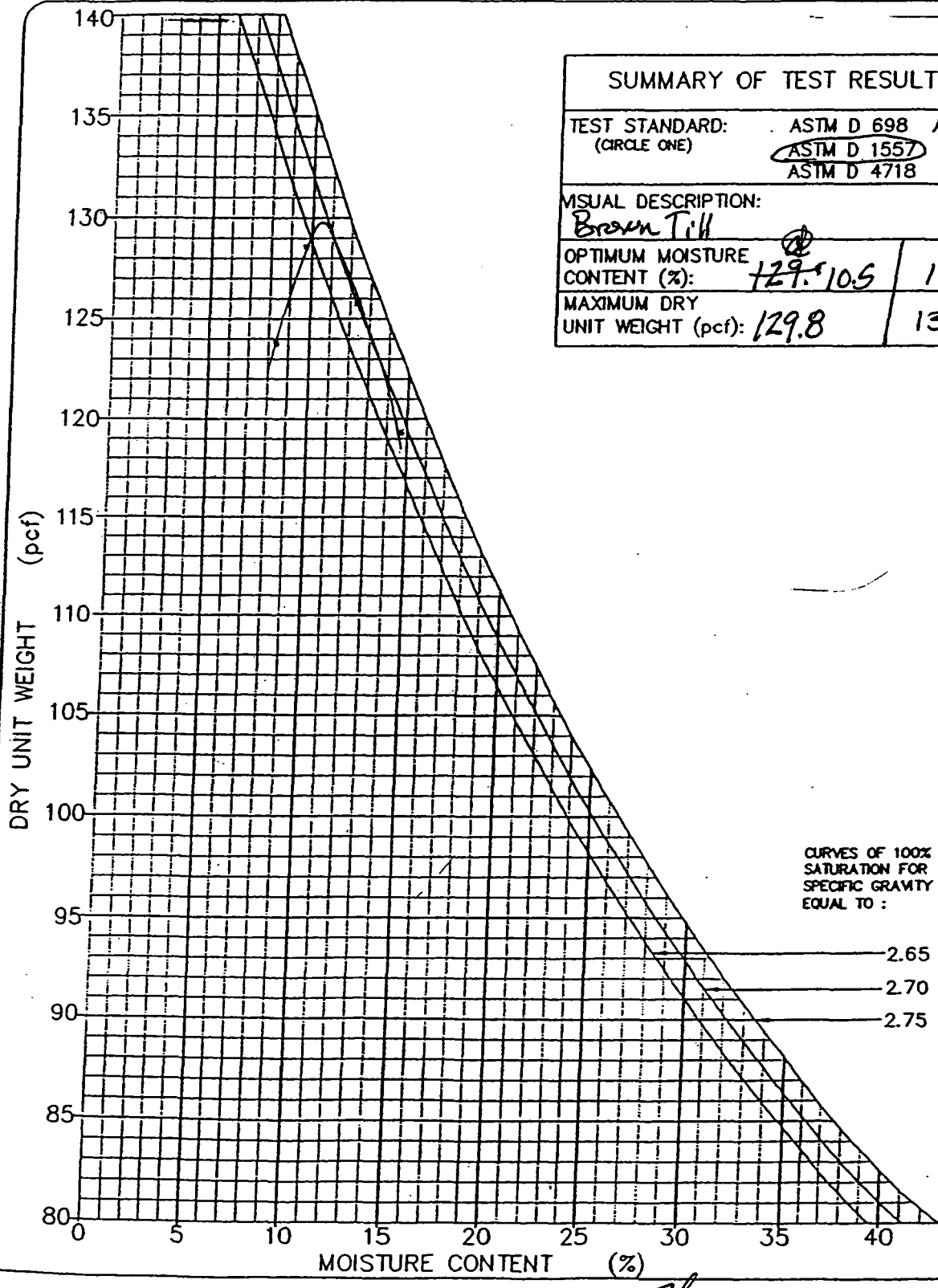
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 19 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-108

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	~~129.5~~ 10.5	10.2	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	129.8	130.9	CS



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV — PROJECT NO.: 6Q1341 TASK NO.: 04.1

MATERIAL TYPE: Low Perm Clay — MATERIAL SOURCE: Stockpile 02-16 — DATE: 23 day Oct month 2002 year — SAMPLE NO.: LP02-109

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.43	6% 13.68	8% 13.76	10% 13.66	
	WATER ADDED	(ml)	100mL	150mL	200mL	250mL	
A	WT. OF SOIL & MOLD	(grams)	6091.8	6205.2	6241.5	6196.2	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A - B	(grams)	1887.3	2000.7	~~2343~~ 2037.0	1991.7	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	124.6	132.0	134.4	131.5	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	112.9	117.5	116.8	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: KS

	TARE NO.		305	43	306	608	
F	WT. OF TARE	(grams)	8.3	8.2	8.3	8.2	
G	WT. OF WET SOIL & TARE	(grams)	514.6	396.6	456.2	408.9	
H	WT. OF DRY SOIL & TARE	(grams)	467.0	354.0	397.4	349.1	
I	WT. OF WATER = G - H	(grams)	47.6	42.6	58.8	59.8	
J	WT. DRY SOIL = H - F	(grams)	458.7	345.8	389.1	340.9	
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.4	12.3	15.1	17.5	

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GeoSyntec Consultants

FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 24 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-109 STD

Weight of Total Sample	=	24175.8
Weight of Oversize Fraction	=	897.0
Weight of Finer Fraction (- 3/8)	=	23278.8
Percentage of Oversize Fraction	= (P_C)	3.7
Percentage of Finer Fraction (- 3/8)	= (P_F)	96.3
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.137
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	119.7
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 13.2$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 121.0$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

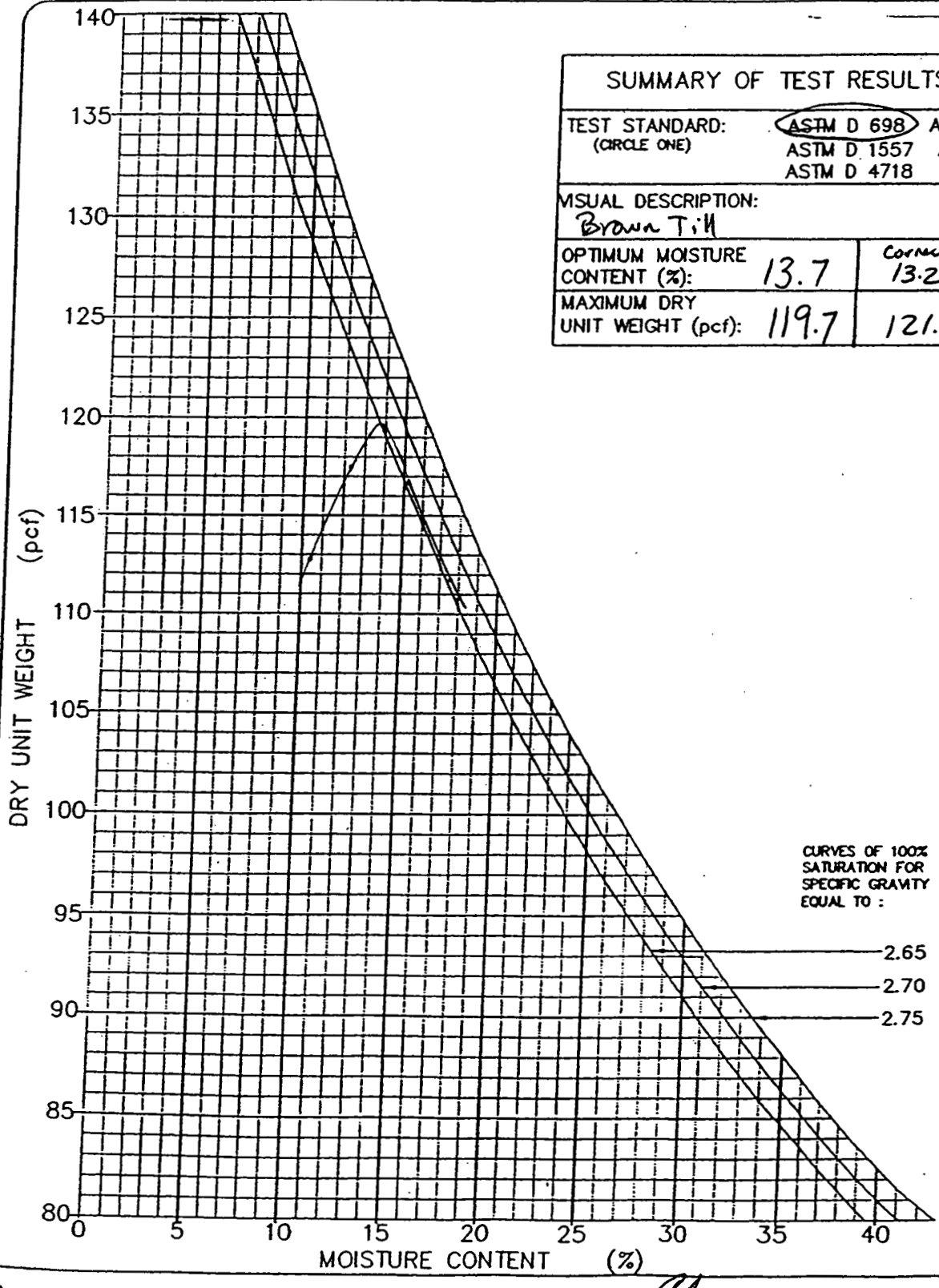
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 24 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-109

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CS
VISUAL DESCRIPTION: Brown Till			CS
OPTIMUM MOISTURE CONTENT (%):	13.7	Corrected 13.2	CS
MAXIMUM DRY UNIT WEIGHT (pcf):	119.7	121.0	CS



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

DESCRIPTION: Phase IV

MATERIAL TYPE: Low Perm Clay

PROJECT NO.: 6Q1341 TASK NO.: Φ4.1

DATE: 23 day Oct month 2ΦΦ2 year

MATERIAL SOURCE: Stockpile Φ2-17 lb SAMPLE NO.: LΦΦ2-11Φ

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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

	WATER ADDED		6% 13.52	8% 13.78	1Φ% 13.73	4% 13.2Φ	QA ID: KS
A	WT. OF SOIL & MOLD	(ml)	15ΦmL	2ΦΦmL	25ΦmL	1ΦΦmL	
B	WT. OF MOLD	(grams)	6132.7	6125Φ.6	6227.9	5987.5	
C	WT. OF SOIL = A − B	(grams)	42Φ4.5	42Φ4.5	42Φ4.5	42Φ4.5	
D	WET UNIT WT.(1) = C X 0.066	(grams)	1928.2	2Φ46.1	2Φ23.4	1783.Φ	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	127.3	135.Φ	133.5	117.7	
		(pcf)	114.3	118.1	115.4	108.3	

NOTE: IF CALIBRATED MOLD OF 1/30 FT³ IS USED, THE WET DENSITY IS CALCULATED FROM THE WEIGHT OF SOIL, THE VOLUME OF THE MOLD AND THE CONVERSION FROM GRAMS TO POUNDS (I.E., CONVERSION FACTOR = (30 / 453.6) = 0.066). THE MOLD MUST BE CALIBRATED TO VERIFY A CAPACITY OF 1/30 ± 0.0005 FT³ ON INTERVALS NOT TO EXCEED 1000 TIMES THAT THE MOLD IS FILLED.

MOISTURE CONTENT – ASTM D 2216

	TARE NO.		3Φ4	232	26	112	QA ID: KS
F	WT. OF TARE	(grams)	8.3	8.2	8.3	8.Φ	
G	WT. OF WET SOIL & TARE	(grams)	351.1	395.9	455.9	37Φ.Φ	
H	WT. OF DRY SOIL & TARE	(grams)	316.2	347.4	395.Φ	341.Φ	
I	WT. OF WATER = G − H	(grams)	34.9	48.5	60.9	29.0	
J	WT. DRY SOIL = H − F	(grams)	307.9	339.2	386.7	333.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	11.3	14.3	15.7	8.7	

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SHEET NO. 1 OF 3

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FLUOR FERNALD
5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES

(ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 62134/ TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 24 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LA02-110 STD

Weight of Total Sample	=	39638.6
Weight of Oversize Fraction	=	1035.1
Weight of Finer Fraction (- 3/8)	=	38603.5
Percentage of Oversize Fraction	= (P_C)	2.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F)	=	Water Content - 3/8 , as decimal	=	0.141
(W_C)	=	Water Content + 3/8 , as decimal	=	0.015
(δ_F)	=	Dry Density of finer fraction	=	118.5
(δ_W)	=	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

C_W = 13.8 %

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D}$ = 119.4 pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

0368

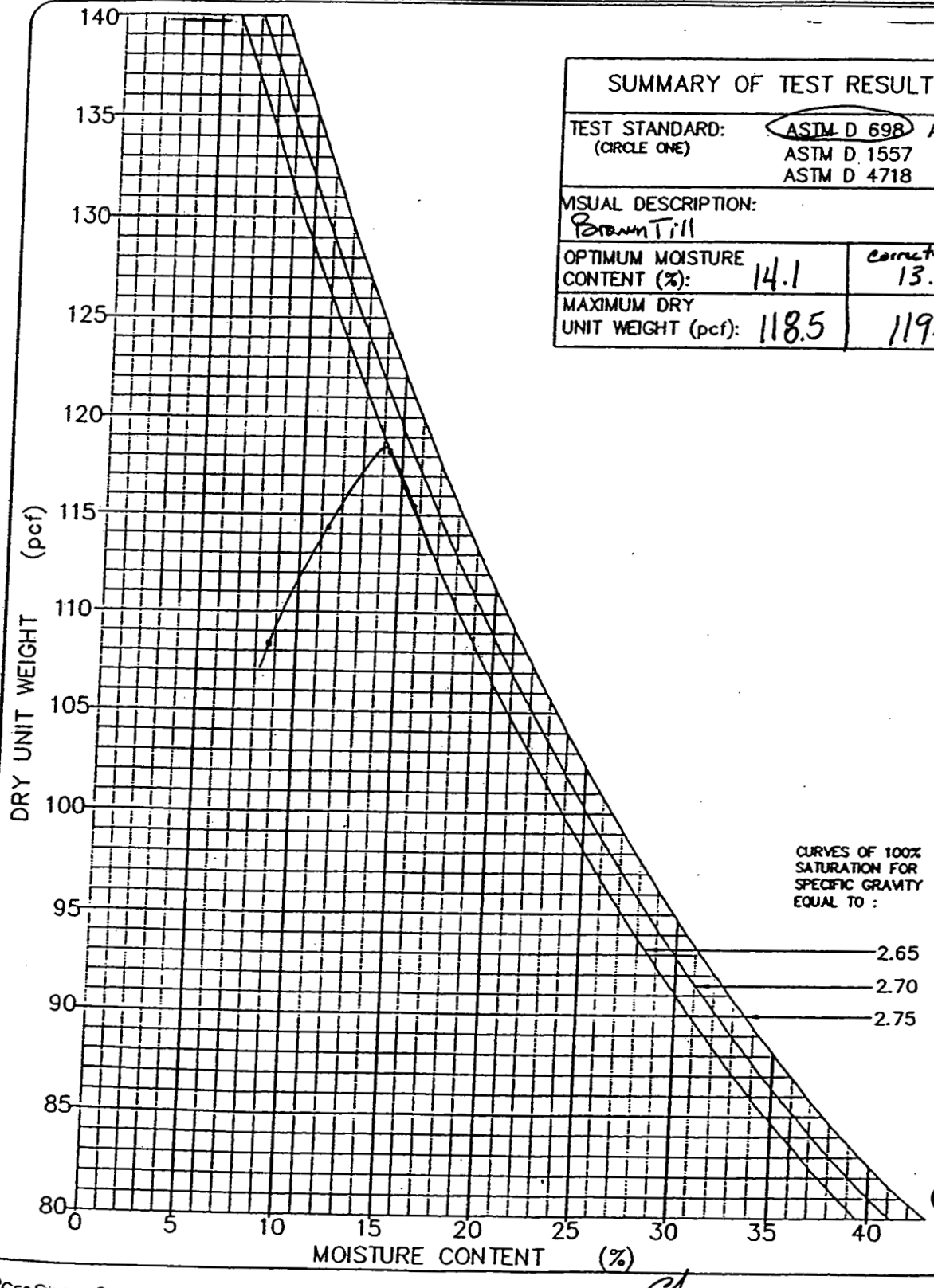
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 24 day Oct month 2002 year

MATERIAL TYPE: Clay Liner MATERIAL SOURCE: Stockpile 02-16 SAMPLE NO.: LP02-110

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CA
VISUAL DESCRIPTION: Brown Till			CA
OPTIMUM MOISTURE CONTENT (%):	14.1	corrected 13.8	CA
MAXIMUM DRY UNIT WEIGHT (pcf):	118.5	119.4	CA



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 23 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-1716 SAMPLE NO.: LP02-110

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL — QA ID: KS

			2% 13.60	4% 13.88	6% 14.05	8% 13.91	
	WATER ADDED	(ml)	50 mL	100 mL	150 mL	200 mL	
A	WT. OF SOIL & MOLD	(grams)	6169.0	6296.0	6373.1	6309.6	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1964.5	2091.5	2168.6	2105.1	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.7	138.0	143.1	138.9	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	121.8	126.3	128.3	121.6	

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: KS

	TARE NO.		309	90	607	669	
F	WT. OF TARE	(grams)	8.1	8.3	8.2	8.4	
G	WT. OF WET SOIL & TARE	(grams)	416.9	400.7	433.5	468.6	
H	WT. OF DRY SOIL & TARE	(grams)	392.1	367.2	389.7	411.4	
I	WT. OF WATER = G − H	(grams)	24.8	33.5	43.8	57.2	
J	WT. DRY SOIL = H − F	(grams)	384.0	358.9	381.5	403.0	
K	MOISTURE CONTENT = (I/J) X 100	(%)	6.5	9.3	11.5	14.2	

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FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. G0134 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 24 day Oct month 2002 year

MATERIAL TYPE: Clay Liner LP02-110 MOD

Weight of Total Sample	=	~~36~~ 39638.6
Weight of Oversize Fraction	=	1035.1
Weight of Finer Fraction (- 3/8)	=	38603.5
Percentage of Oversize Fraction	= (P_C)	2.6
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.4
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.111
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	128.6
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 10.8\ \%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 129.4 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

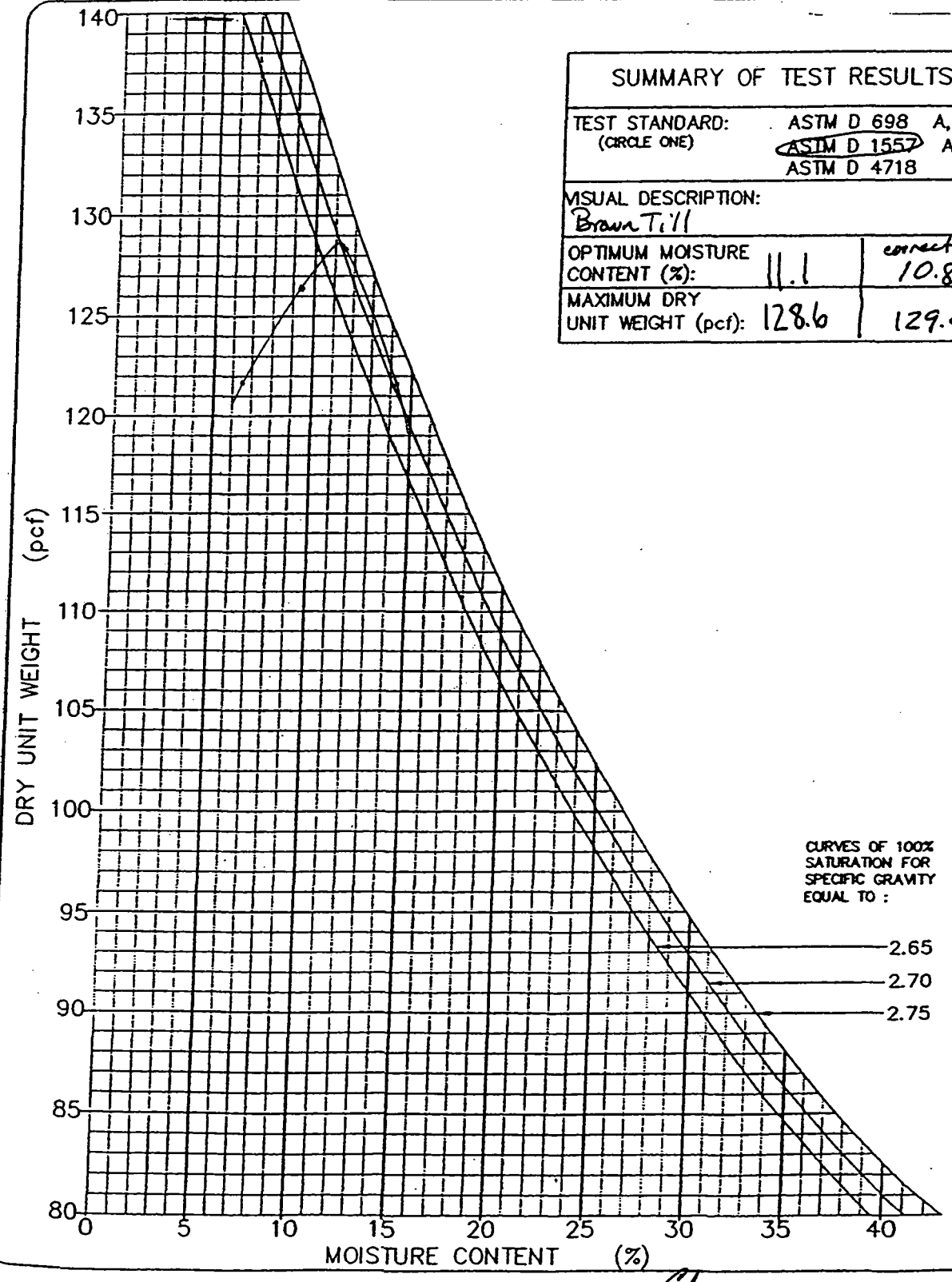
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase II DATE: 24 day Oct month 2002 year

MATERIAL TYPE: Clay liner MATERIAL SOURCE: Stockpile Ø2-16 SAMPLE NO.: LPØ2H0

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	11.1	corrected 10.8	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	128.6	129.4	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 30 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-17 SAMPLE NO.: LP02-113

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			4% 13.30	6% 13.50	8% 13.66	10% 13.77	12% 13.66
	WATER ADDED	(ml)	100 mL	150 mL	200 mL	250 mL	300 mL
A	WT. OF SOIL & MOLD	(grams)	6032.9	6123.6	6196.2	6246.1	6196.2
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	4204.5
C	WT. OF SOIL = A − B	(grams)	1828.4	1919.1	1991.7	2041.6	1991.7
D	WET UNIT WT.(1) = C X 0.066	(pcf)	120.7	126.7	131.5	134.7	131.5
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	109.7	113.4	115.8	116.4	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

QA ID: KS

	TARE NO.		47	626	303	44	626
F	WT. OF TARE	(grams)	8.1	8.0	8.3	8.5	8.0
G	WT. OF WET SOIL & TARE	(grams)	358.9	397.9	419.2	354.0	367.1
H	WT. OF DRY SOIL & TARE	(grams)	327.0	357.1	370.1	307.1	313.2
I	WT. OF WATER = G − H	(grams)	31.9	40.8	49.1	46.9	53.9
J	WT. DRY SOIL = H − F	(grams)	318.9	349.1	361.8	298.6	305.2
K	MOISTURE CONTENT = (I/J) X 100	(%)	10.0	11.7	13.6	15.7	17.7

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO **PROJECT NO.** 601341 **TASK NO.** 04.1

DESCRIPTION: Phase II **DATE:** 1 day Nov month 2002 year

MATERIAL TYPE: Clay Liner LP02-113 STD

Weight of Total Sample	=	22119.7
Weight of Oversize Fraction	=	670.4
Weight of Finer Fraction (- 3/8)	=	21449.5
Percentage of Oversize Fraction	= (P_C)	3.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	97.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.149
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	117.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 14.5\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta_D} = 118.3 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE–DENSITY RELATIONSHIP

5368

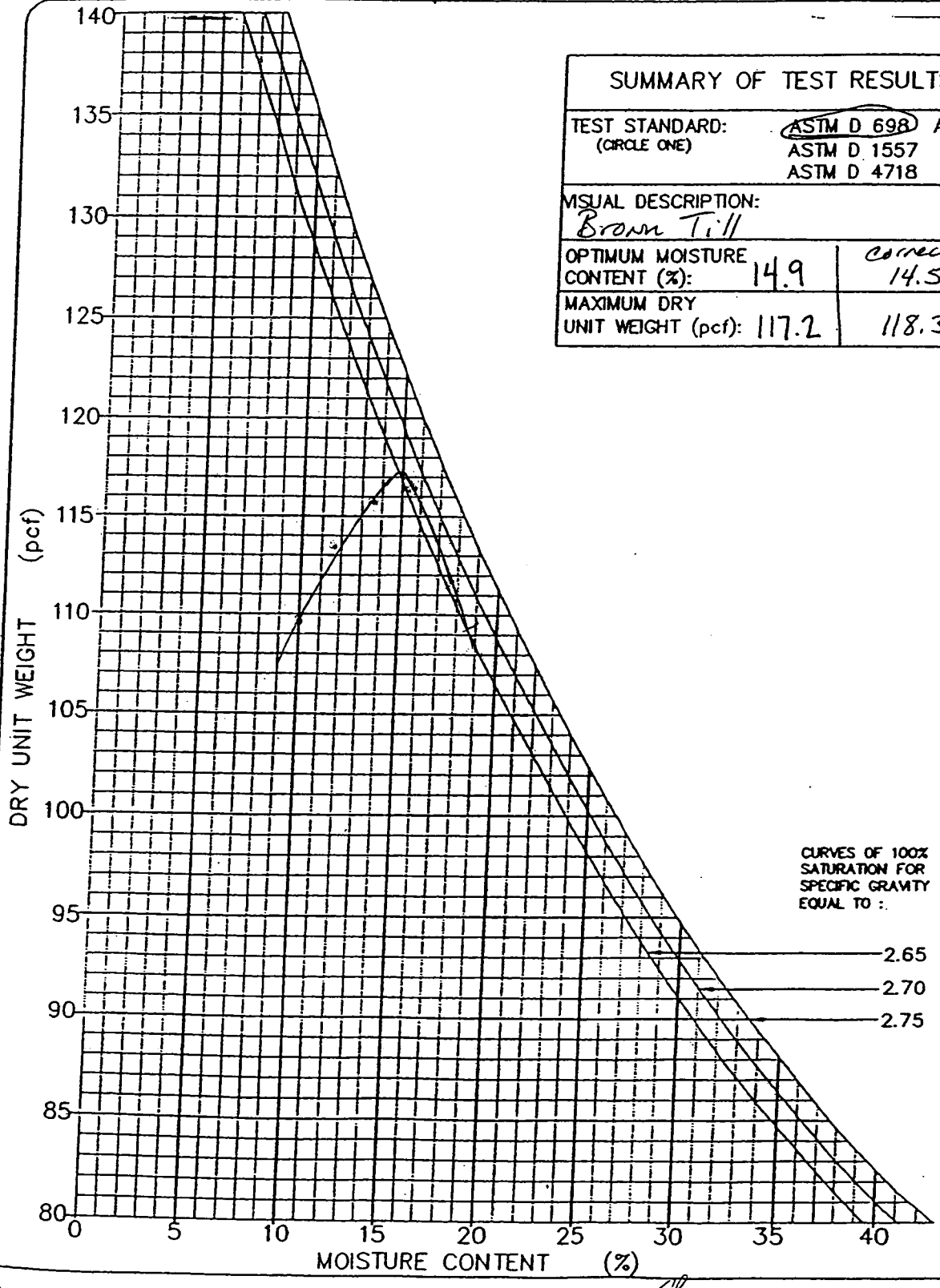
PROJECT: ON–SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 31 day Oct month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-17 SAMPLE NO.: LP02-113

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	14.9	corrected 14.5	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	117.2	118.3	CJ



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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 698 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO

PROJECT NO.: 6Q1341 TASK NO.: 04.1

DESCRIPTION: Phase IV

DATE: 2 day Nov month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-17 SAMPLE NO.: LP02-114

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 3/4-in. (19-mm) SIEVE IS LESS THAN 30%, IF THE MATERIAL RETAINED ON THE NO. 4 (4.75-mm) SIEVE IS GREATER THAN 20%, AND IF THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-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: KS

			6% 13.59	8% 13.78	10% 13.68	4% 13.31	
	WATER ADDED	(ml)	150mL	200mL	250mL	100mL	
A	WT. OF SOIL & MOLD	(grams)	6164.4	6250.6	6205.2	6037.4	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	1959.9	2046.1	2000.7	1832.9	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	129.4	135.0	132.0	121.0	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	115.1	118.1	113.3	109.6	

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: KS

	TARE NO.		658	652	663	23	
F	WT. OF TARE	(grams)	8.1	8.3	8.4	8.4	
G	WT. OF WET SOIL & TARE	(grams)	378.8	414.4	461.4	382.1	
H	WT. OF DRY SOIL & TARE	(grams)	337.8	363.5	397.1	346.9	
I	WT. OF WATER = G − H	(grams)	41.0	50.9	64.3	35.2	
J	WT. DRY SOIL = H − F	(grams)	329.7	355.2	388.7	338.5	
K	MOISTURE CONTENT = (I/J) X 100	(%)	12.4	14.3	16.5	10.4	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES *(ASTM D 4718)*

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. GQ1341 TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 4 day Nov month 2002 year

MATERIAL TYPE: Clay Liner LP02-114 STD

Weight of Total Sample	=	73269.1
Weight of Oversize Fraction	=	3666.0
Weight of Finer Fraction (- 3/8)	=	69603.1
Percentage of Oversize Fraction	= (P_C)	5.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.142
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	118.4
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$$C_w = 13.6\%$$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$$C_{\delta D} = 120.2 \text{ pcf}$$

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

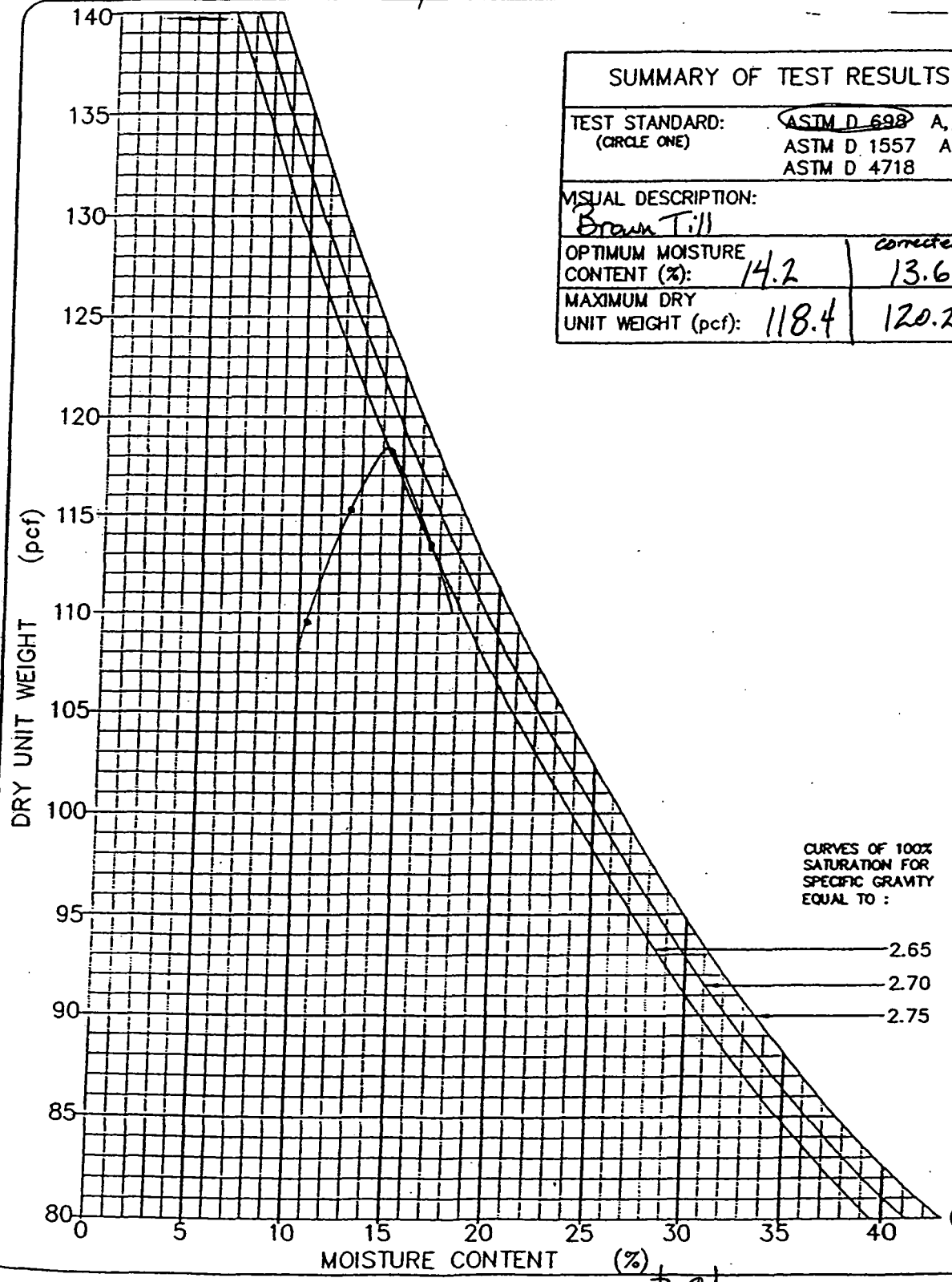
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 4 day Nov month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-17 SAMPLE NO.: LP02-114

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, (B), C ASTM D 1557 A, B, C ASTM D 4718		CJ
VISUAL DESCRIPTION: Brown Till			CJ
OPTIMUM MOISTURE CONTENT (%):	14.2	corrected 13.6	CJ
MAXIMUM DRY UNIT WEIGHT (pcf):	118.4	120.2	CJ



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FLUOR FERNALD, INC.

FIELD LABORATORY COMPACTION TEST

(ASTM D 1557 METHOD B)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 2 day NOV month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-17 SAMPLE NO.: LP02-114

THIS METHOD WILL BE USED IF THE MATERIAL RETAINED ON THE NO. 4-in. (4.75-mm) SIEVE IS GREATER THAN 20%, AND THE MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS LESS THAN 20%.
ALL MATERIAL RETAINED ON THE NO. 3/8-in. (9.5-mm) SIEVE IS DISCARDED.
USE OVERSIZE CORRECTION IF MORE THAN 5% IS DISCARDED ACCORDING TO ASTM D 4718.
USE A 4-in. DIAMETER MOLD / 10-lb RAMMER / 18-in. DROP / 5 LAYERS / 25 BLOWS PER LAYER.

COMPACTION OF SOIL

QA ID: LS

			4% 13.95	6% 14.01	8% 13.88	2% 13.77	
	WATER ADDED	(ml)	100mL	150mL	200mL	50mL	
A	WT. OF SOIL & MOLD	(grams)	6327.7	6354.9	6296.0	6246.1	
B	WT. OF MOLD	(grams)	4204.5	4204.5	4204.5	4204.5	
C	WT. OF SOIL = A − B	(grams)	2123.2	2150.4	2091.5	2041.6	
D	WET UNIT WT.(1) = C X 0.066	(pcf)	140.1	141.9	138.0	134.7	
E	DRY UNIT WT. = D / [1 + (K/100)]	(pcf)	127.5	126.5	120.6	124.5	

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: LS

	TARE NO.		680	15	35	22	
F	WT. OF TARE	(grams)	8.1	8.3	8.4	8.3	
G	WT. OF WET SOIL & TARE	(grams)	443.2	426.7	391.1	461.5	
H	WT. OF DRY SOIL & TARE	(grams)	404.1	381.1	342.8	427.0	
I	WT. OF WATER = G − H	(grams)	39.1	45.6	48.3	34.5	
J	WT. DRY SOIL = H − F	(grams)	396.0	372.8	334.4	418.7	
K	MOISTURE CONTENT = (I/J) X 100	(%)	9.9	12.2	14.4	8.2	

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GeoSyntec Consultants

FLUOR FERNALD

5368

CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES (ASTM D 4718)

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO. 60134 / TASK NO. 04.1

DESCRIPTION: Phase IV DATE: 4 day Nov month 2002 year

MATERIAL TYPE: Clay Liner LP02-114 MOD

Weight of Total Sample	=	73289.1
Weight of Oversize Fraction	=	3666.0
Weight of Finer Fraction (- 3/8)	=	69603.1
Percentage of Oversize Fraction	= (P_C)	5.0
Percentage of Finer Fraction (- 3/8)	= (P_F)	95.0
Specific Gravity (Assumed)	= (G_M)	2.72

(W_F) =	Water Content - 3/8 , as decimal	=	0.109
(W_C) =	Water Content + 3/8 , as decimal	=	0.015
(δ_F) =	Dry Density of finer fraction	=	129.2
(δ_W) =	Unit Weight of Water	=	62.4

$$C_W=(W_F P_F)+(W_C P_C)$$

$C_w = 10.4\ \%$

$$C\delta_D=100\delta_F G_M \delta_W/(\delta_F P_C)+(G_M \delta_W P_F)$$

$C_{\delta D} = 130.8$ pcf

GEOSYNTEC CONSULTANTS

FLUOR FERNALD

MOISTURE-DENSITY RELATIONSHIP

5368

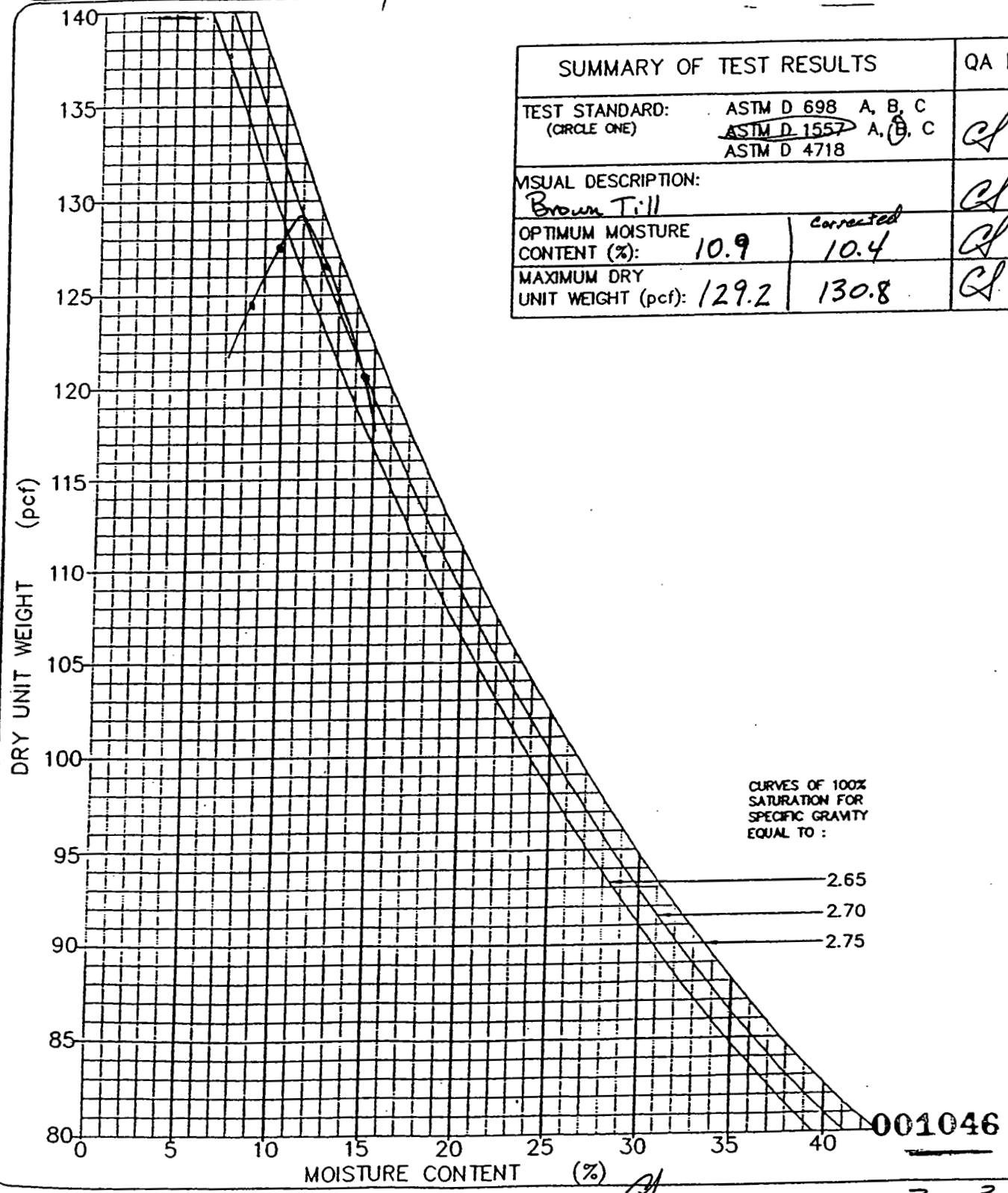
PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)

LOCATION: FERNALD, OHIO PROJECT NO.: GQ1341 TASK NO.: 04.1

DESCRIPTION: Phase IV DATE: 4 day Nov month 2002 year

MATERIAL TYPE: Low Perm Clay MATERIAL SOURCE: Stockpile 02-17 SAMPLE NO.: LP02-114

SUMMARY OF TEST RESULTS			QA ID
TEST STANDARD: (CIRCLE ONE)	ASTM D 698 A, B, C ~~ASTM D 1557~~ A, B, C ASTM D 4718		CL
VISUAL DESCRIPTION: Brown Till			CL
OPTIMUM MOISTURE CONTENT (%):	10.9	Corrected 10.4	CL
MAXIMUM DRY UNIT WEIGHT (pcf):	129.2	130.8	CL



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