Project 86-060-27
August 1991

Canonie Environmental

Volume III - Appendices

Tailings Reclamation Plan
As Approved by NRC March 1, 1991
License No. SUA - 1475

Church Rock Site
Gallup, New Mexico

Prepared For:

United Nuclear Corporation
Gallup, New Mexico

Volume III - Appendices

Tailings Reclamation Plan
As Approved by NRC March 1, 1991
License No. SUA - 1475

Canonie Environmental

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APPENDIX
A

APPENDIX A

GEOTECHNICAL INVESTIGATION DATA

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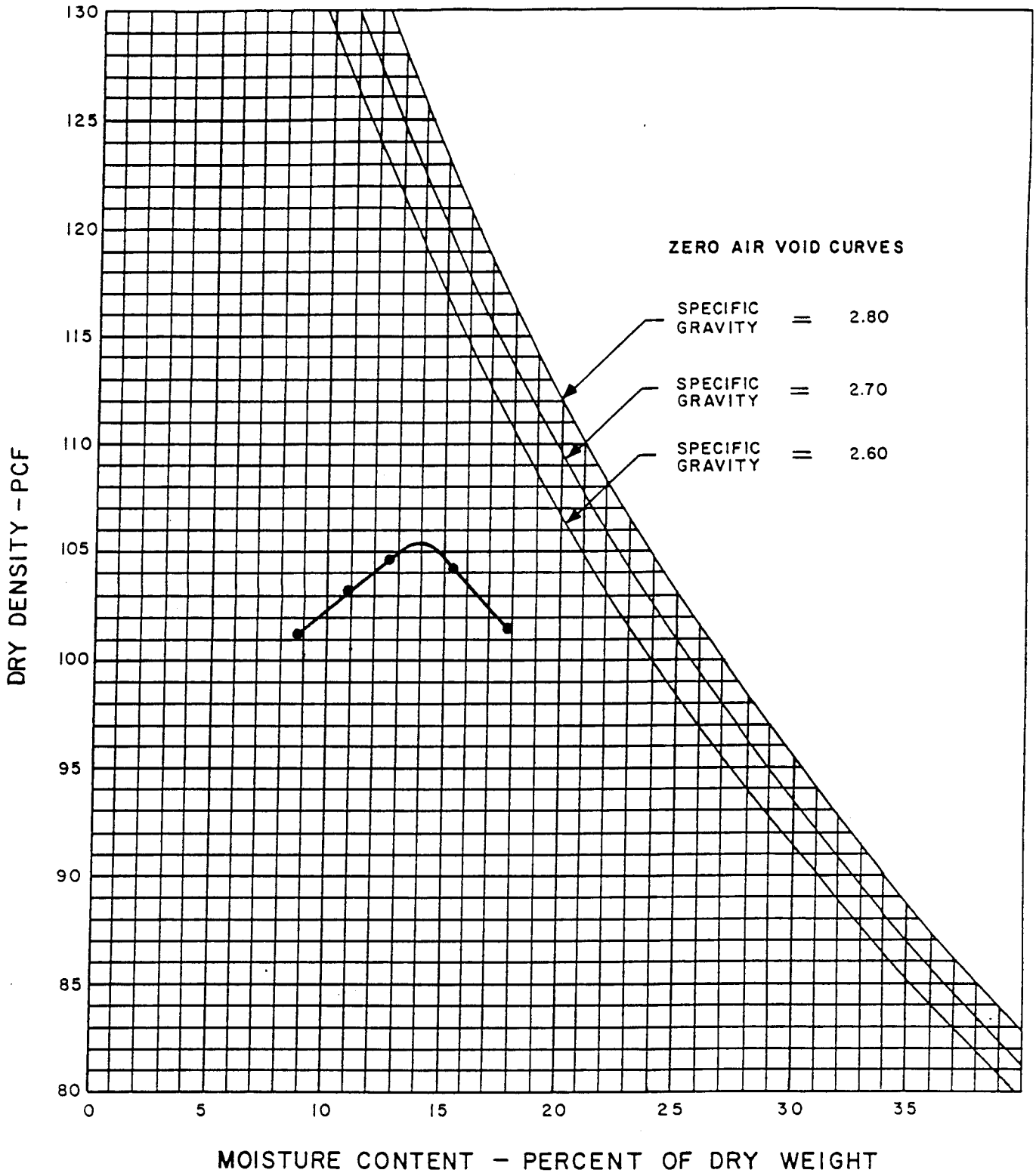
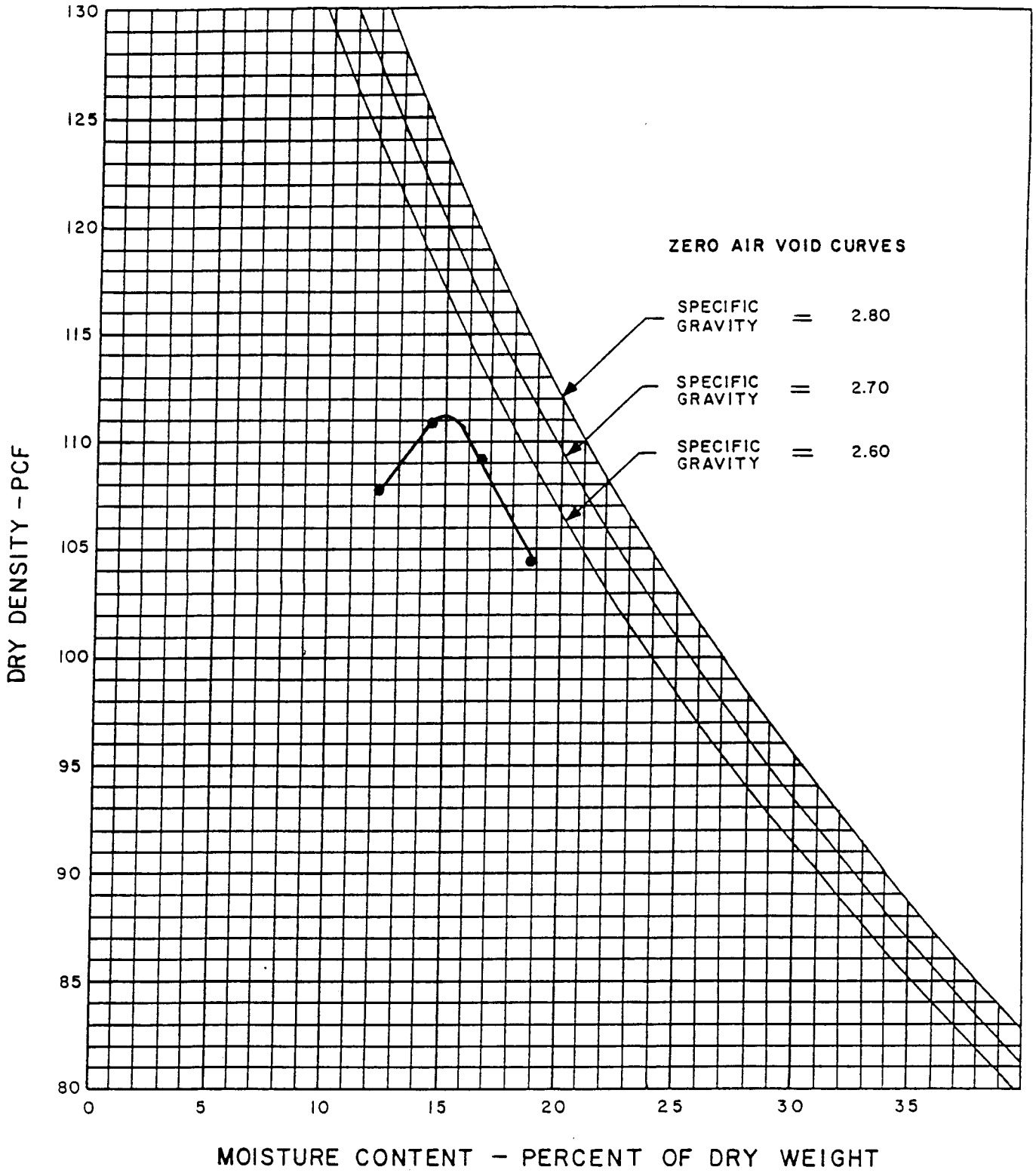
APPENDIX A-1

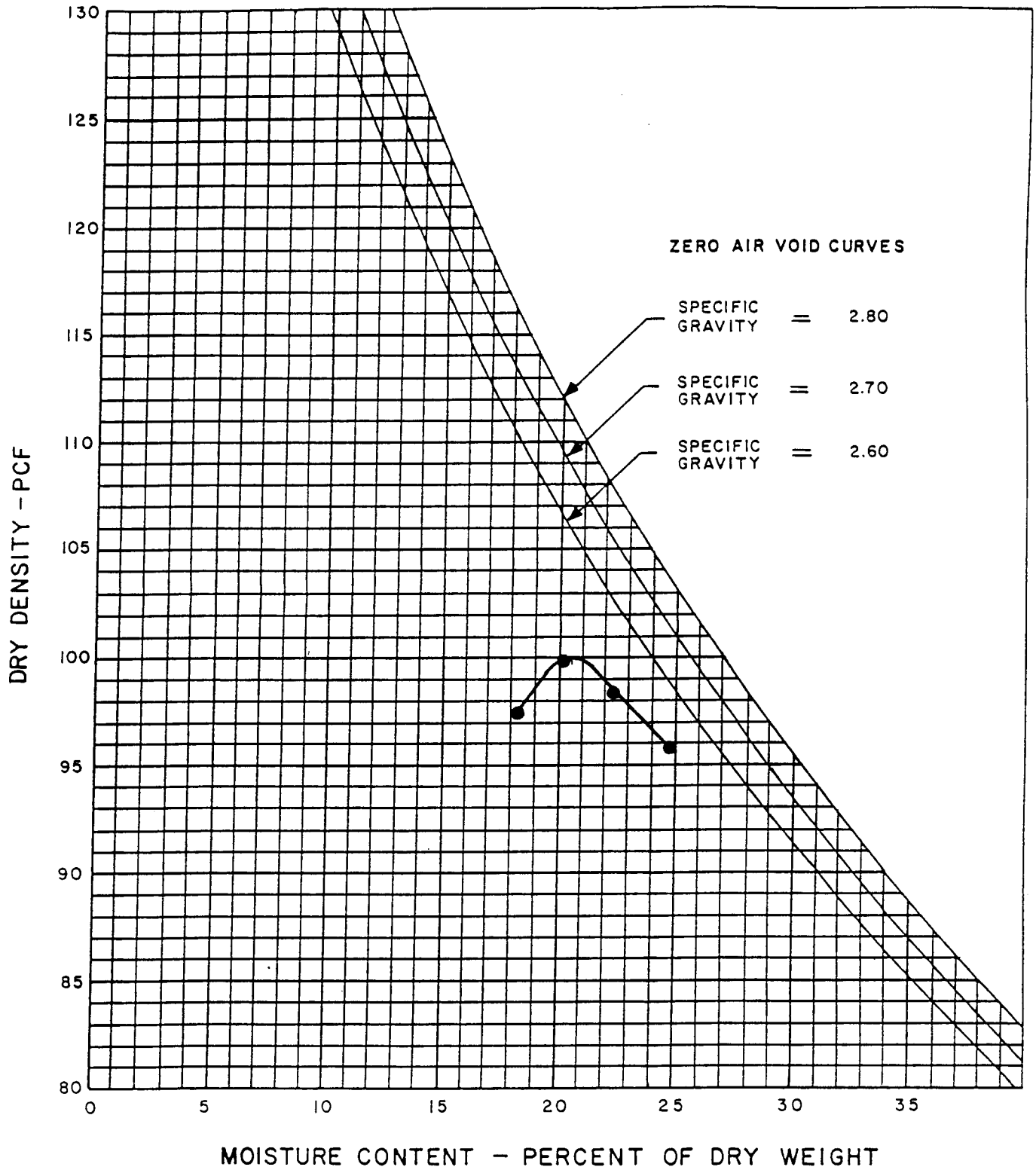
Moisture Density Relationships



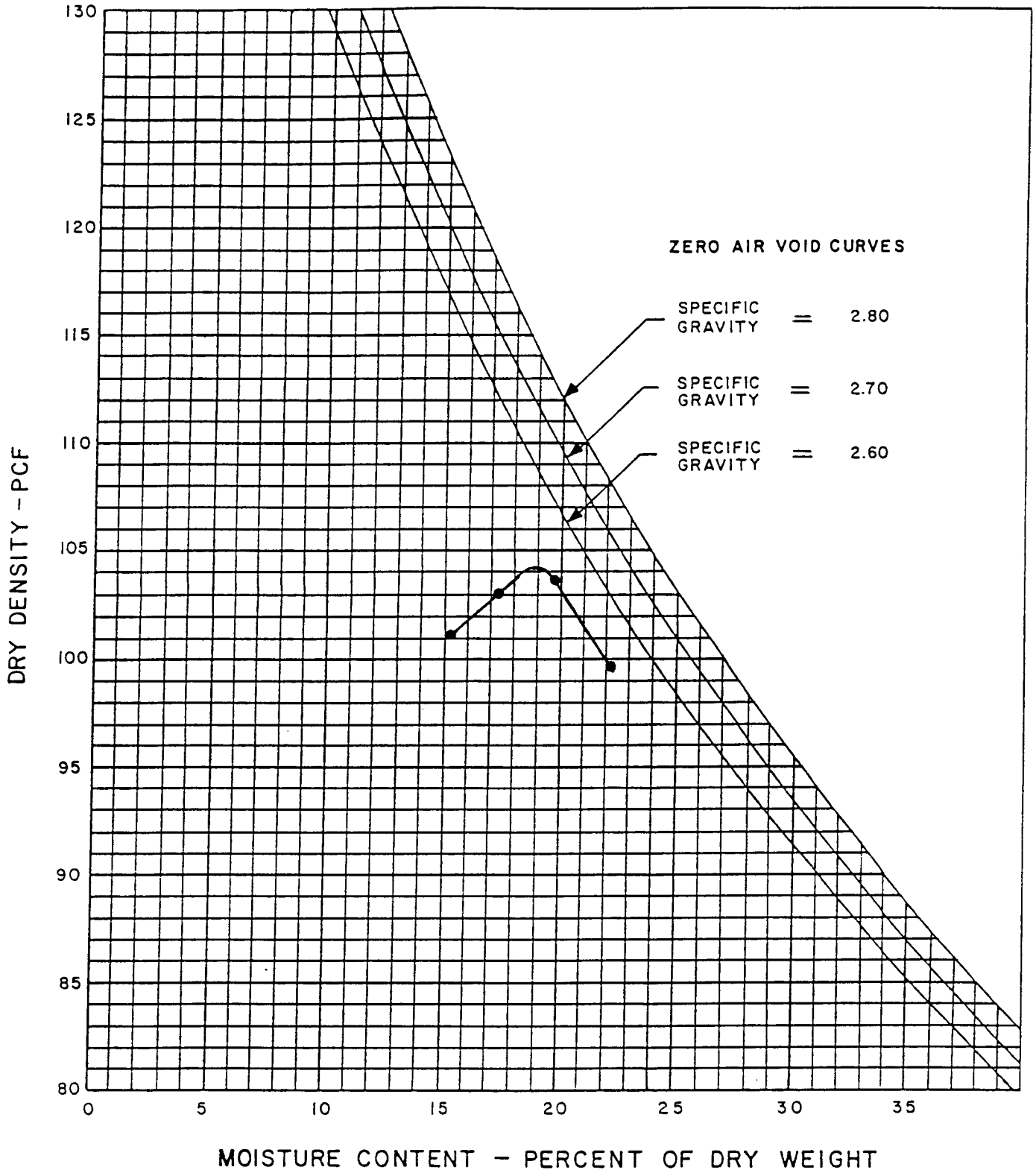
LOCATION: Canonie Environmental		MOISTURE-DENSITY RELATIONSHIPS
HOLE NO.: TP-1 DEPTH: 5-6' SAMPLE NO.:		
SOIL DESCRIPTION: Brown sand, little silt		GOODSON & ASSOC. INC.
MAX. DRY DENSITY: 105.4 PCF OPT. MOIST. CONTENT: 14.0 %	PROCEDURE: ASTM D-698 A	
LIQUID LIMIT: ____ PLASTICITY INDEX: ____	JOB NO.: 6583.01	FIG. NO.
GRAVEL: 2 % SAND: 80 % SILT AND CLAY (-200): 18 %	DATE: 12-23-86	



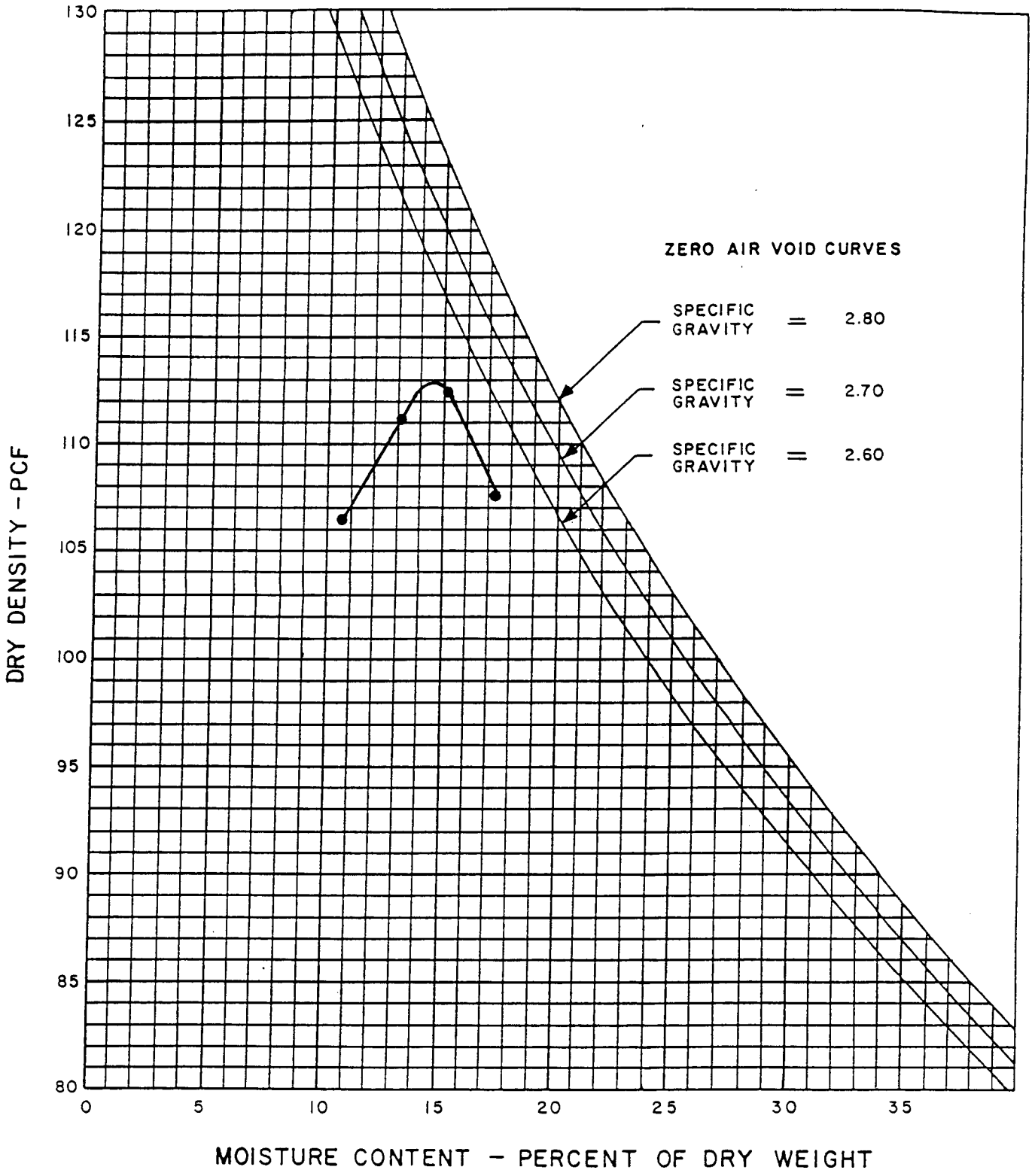
LOCATION: Canonie Environmental	MOISTURE-DENSITY RELATIONSHIPS	
HOLE NO.: TP-2 DEPTH: 6-7' SAMPLE NO.:		
SOIL DESCRIPTION: Brown silty sand	GOODSON & ASSOC. INC.	
MAX. DRY DENSITY: 111.2 PCF OPT. MOIST. CONTENT: 15.0 %	PROCEDURE: ASTM D-698 A	
LIQUID LIMIT: _____ PLASTICITY INDEX: _____	JOB NO.: 6583.01	FIG. NO.
GRAVEL: 2 % SAND: 58 % SILT AND CLAY(-200): 40 %	DATE: 12-23-86	



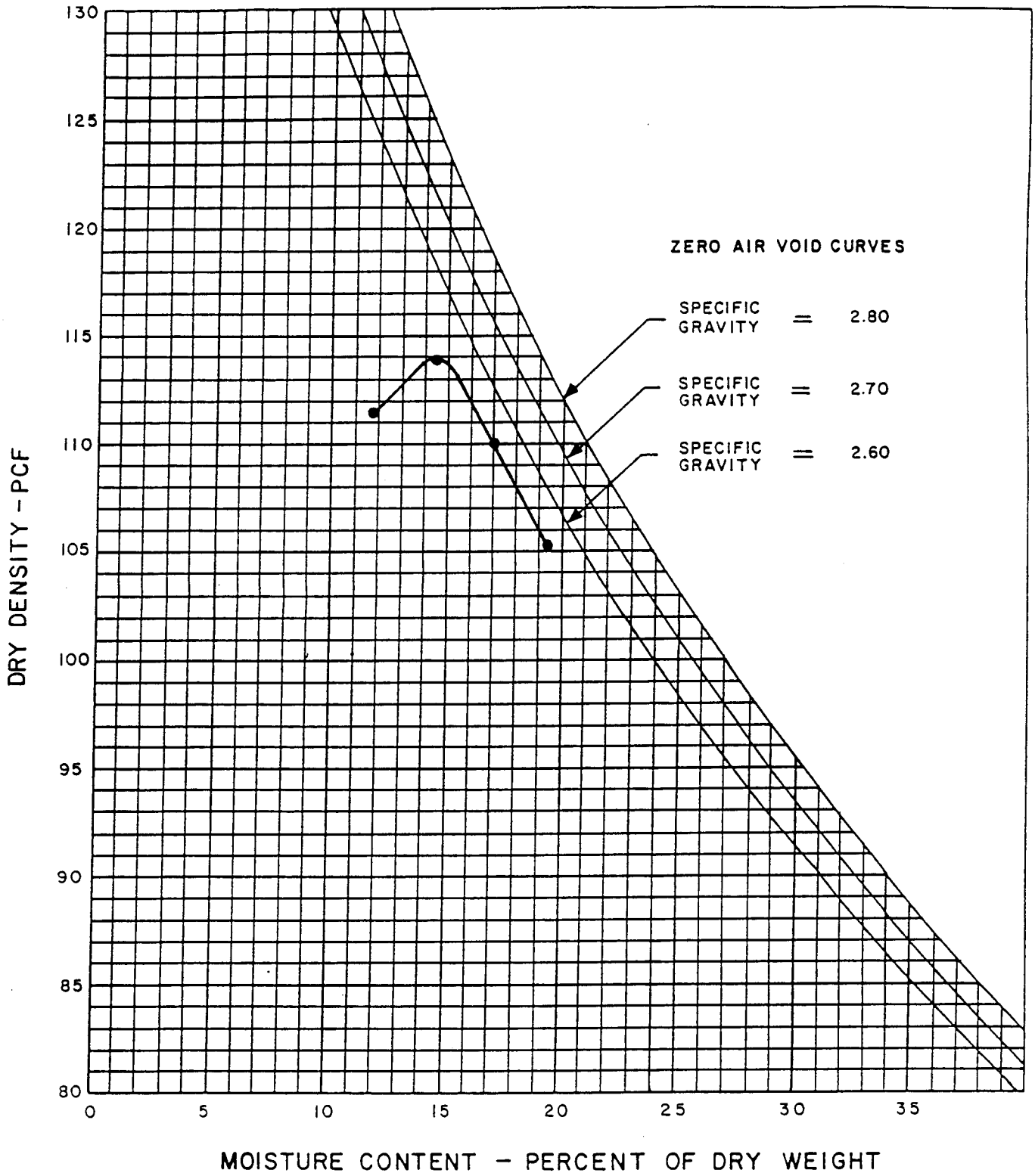
LOCATION: Canonie Environmental		MOISTURE-DENSITY RELATIONSHIPS
HOLE NO.: TP4 DEPTH: 2-3' SAMPLE NO.:		
SOIL DESCRIPTION: Brown silt, some clay, trace sand		GOODSON & ASSOC. INC.
MAX. DRY DENSITY: 100.0 PCF OPT. MOIST. CONTENT: 20.5 %		PROCEDURE: ASTM D-698 A
LIQUID LIMIT: ____ PLASTICITY INDEX: ____	JOB NO.: 6583.01	FIG. NO.
GRAVEL: 0 % SAND: 15 % SILT AND CLAY(-200): 50 %	DATE: 12-23-86	



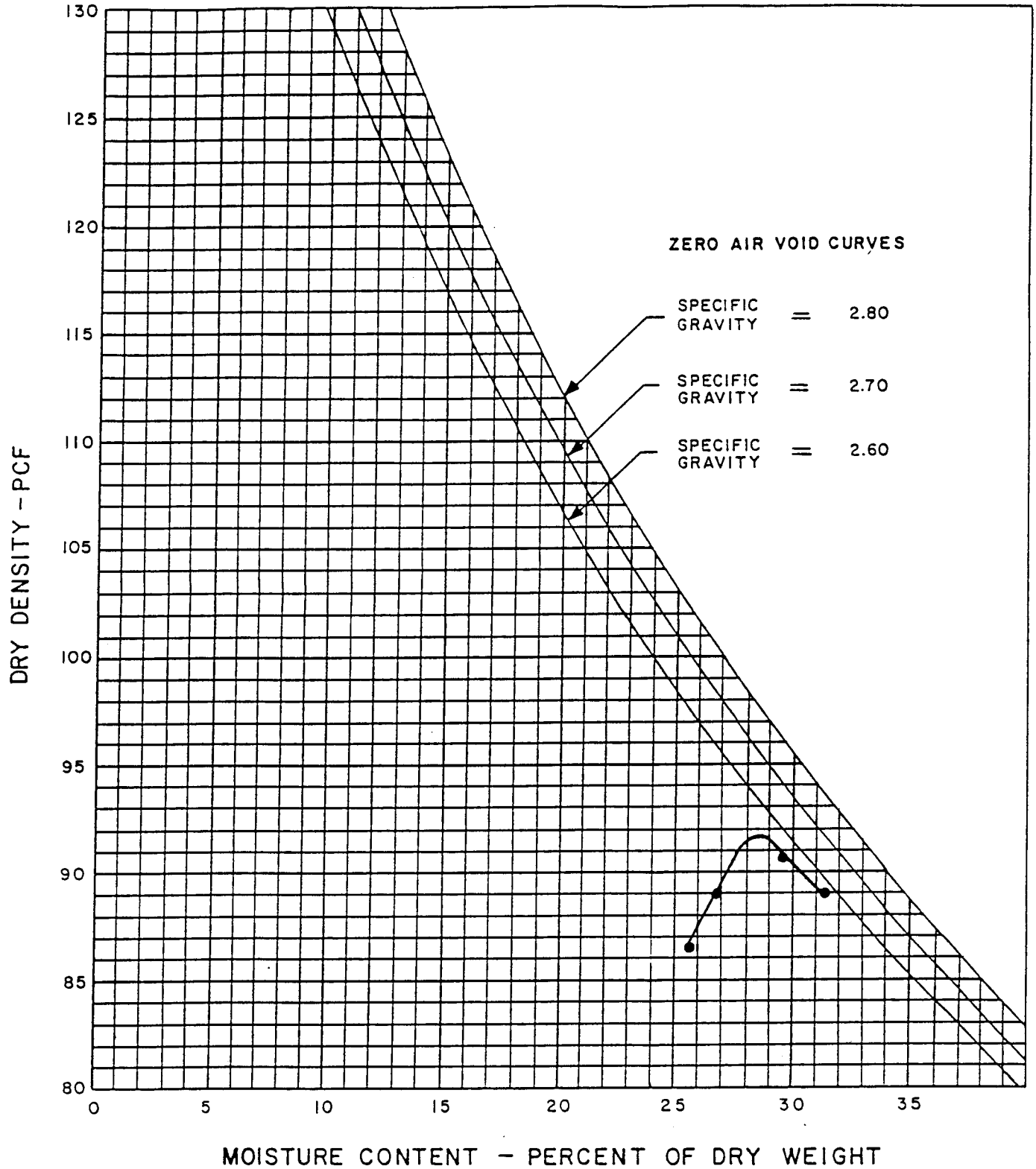
LOCATION: Canonie Environmental	MOISTURE-DENSITY RELATIONSHIPS	
HOLE NO.: TP-7 DEPTH: 4-5' SAMPLE NO.:		
SOIL DESCRIPTION: Brown sandy silt, some clay	GOODSON & ASSOC. INC.	
MAX. DRY DENSITY: 104.2 PCF OPT. MOIST. CONTENT: 18.9 %	PROCEDURE: ASTM D-698 A	
LIQUID LIMIT: _____ PLASTICITY INDEX: _____	JOB NO.: 6583.01	FIG. NO.
GRAVEL: 1 % SAND: 21 % SILT AND CLAY(-200): 78 %	DATE: 12-23-86	



LOCATION: Canonie Environmental		MOISTURE-DENSITY RELATIONSHIPS
HOLE NO.: TP-8 DEPTH: 3-5' SAMPLE NO.:		
SOIL DESCRIPTION: Brown silty sand		GOODSON & ASSOC. INC.
MAX. DRY DENSITY: 112.9 PCF	OPT. MOIST. CONTENT: 14.6 %	PROCEDURE: ASTM D-698 A
LIQUID LIMIT:	PLASTICITY INDEX:	JOB NO.: 6583.01 — FIG. NO.
GRAVEL: 0 % SAND: 65 %	SILT AND CLAY(-200): 35 %	DATE: 12-23-86



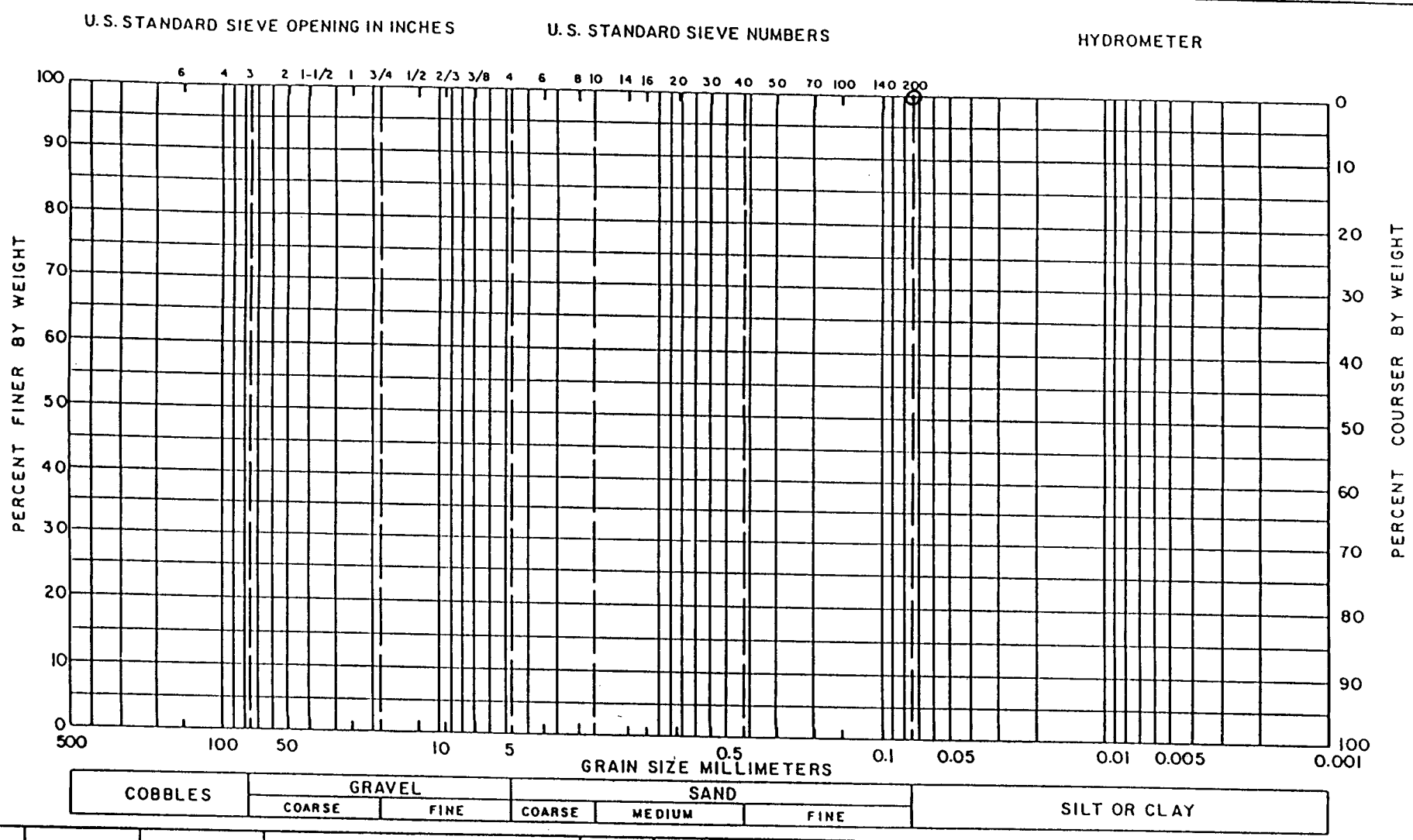
LOCATION: Canonie Environmental	MOISTURE-DENSITY RELATIONSHIPS
HOLE NO.: TP-10 DEPTH: 2-3' SAMPLE NO.:	
SOIL DESCRIPTION: Brown silty sand, little clay	GOODSON & ASSOC. INC.
MAX. DRY DENSITY: 113.9 PCF OPT. MOIST. CONTENT: 14.4 %	PROCEDURE: ASTM D-698 A
LIQUID LIMIT: _____ PLASTICITY INDEX: _____	JOB NO.: 6583.01 FIG. NO.
GRAVEL: 3 % SAND: 50 % SILT AND CLAY (-200): 47 %	DATE: 12-23-86



LOCATION: Canonie Environmental		MOISTURE-DENSITY RELATIONSHIPS
HOLE NO.: B-4 DEPTH: 6-10' SAMPLE NO.:		
SOIL DESCRIPTION: Brown siltstone, some clay, trace sand		GOODSON & ASSOC. INC.
MAX. DRY DENSITY: 91.7 PCF OPT. MOIST. CONTENT: 28.6 %	PROCEDURE: ASTM D-698 A	
LIQUID LIMIT: ____ PLASTICITY INDEX: ____	JOB NO.: 6583.01	FIG. NO.
GRAVEL: 0 % SAND: 10 % SILT AND CLAY (-200): 90 %	DATE: 12-23-86	

APPENDIX A-2

Particle Size Gradation Curves



BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
P-2		10.5-11'	Grey - Brown Clay	20.3%			

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Drawn by:	DAC	Note: 100% passing the No. 200 sieve.	
Engr.	DWE	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
Revised:		GRADATION CURVES	

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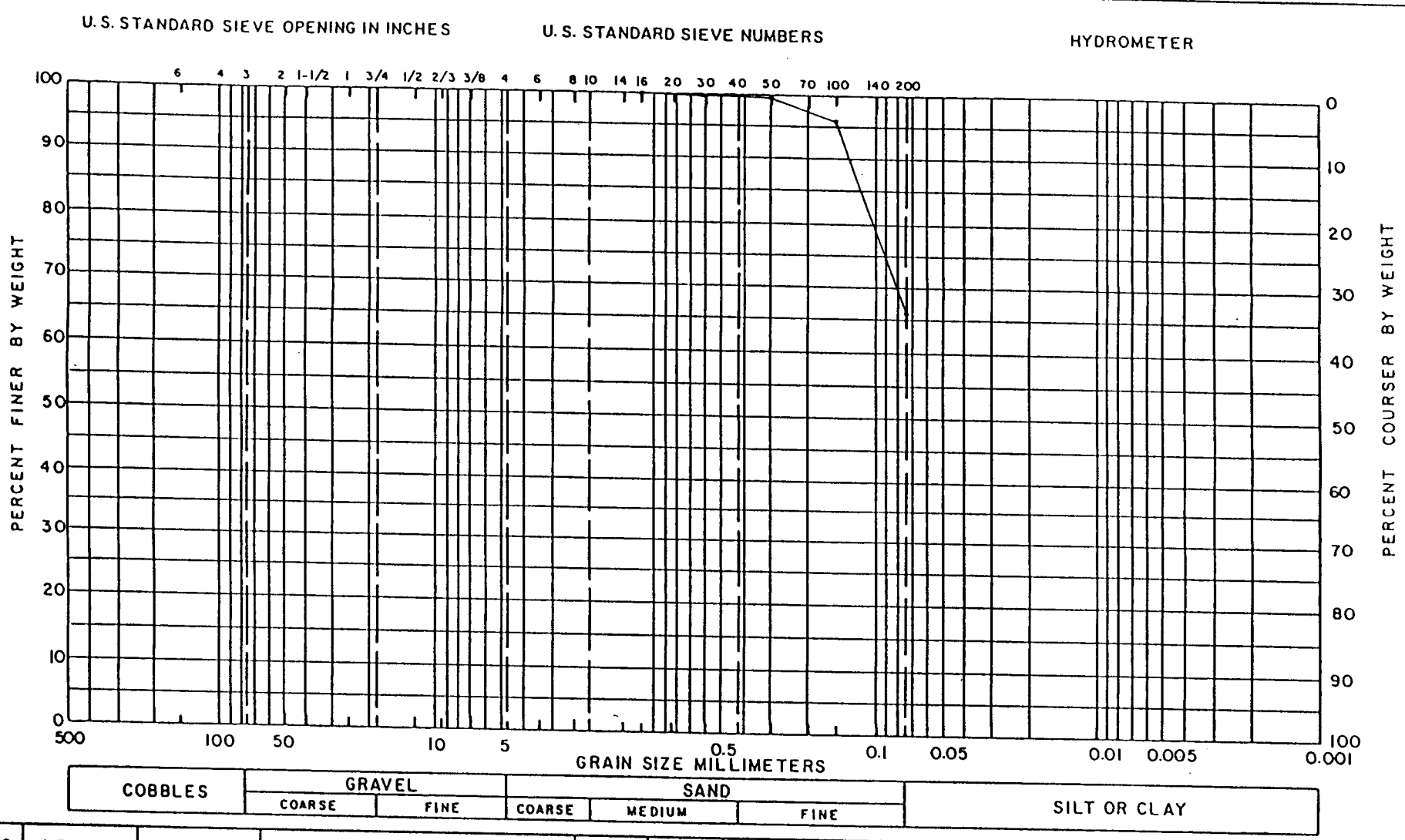
FIGURE

A-11



BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
P-3		10.5-11'	Brown sandy silt	16.2%			

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Engr.	DWE	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
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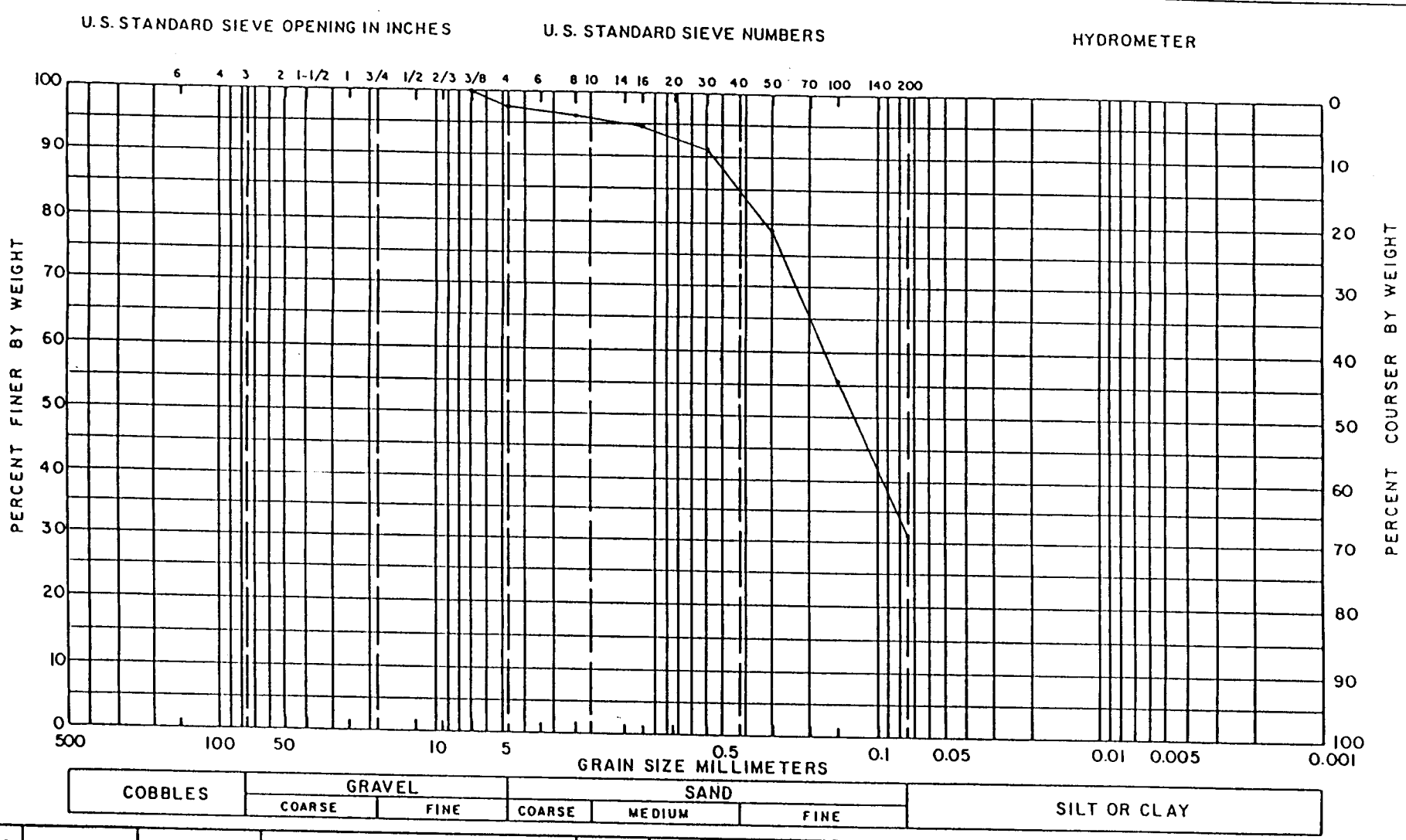

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
P-4		5.5-6'	Brown sand, some silt	10.6%			
Drawn by:	DAC						
Engr.	DWE		PROJECT NO. 6583.01	DWG. NO. RM 86-060-01			
Revised:			GRADATION CURVES				

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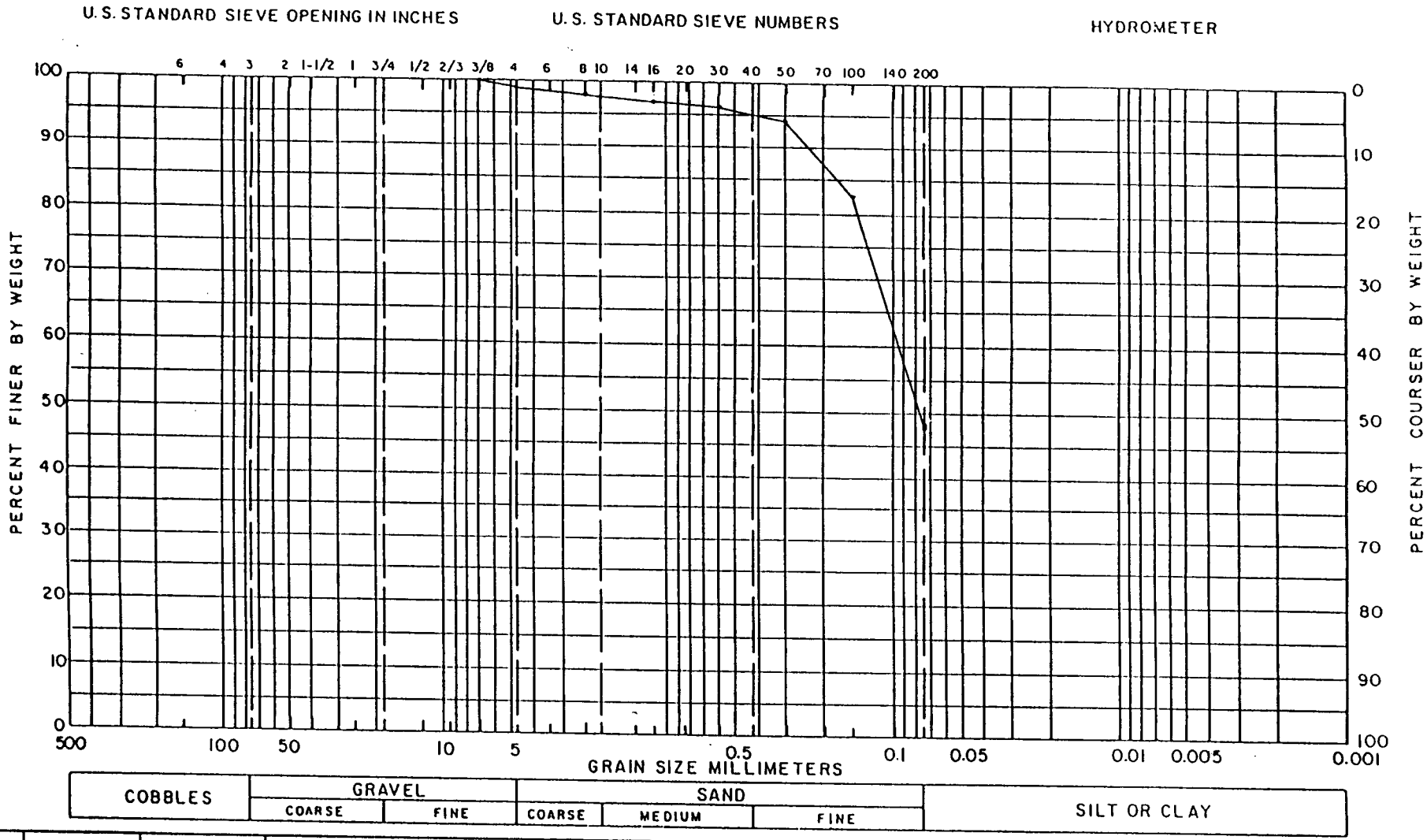
A-13



BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
P-5		6-6.5'	Brown silty sand	6.6 %			

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Drawn by:	DAC		
Engr.	DWE	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
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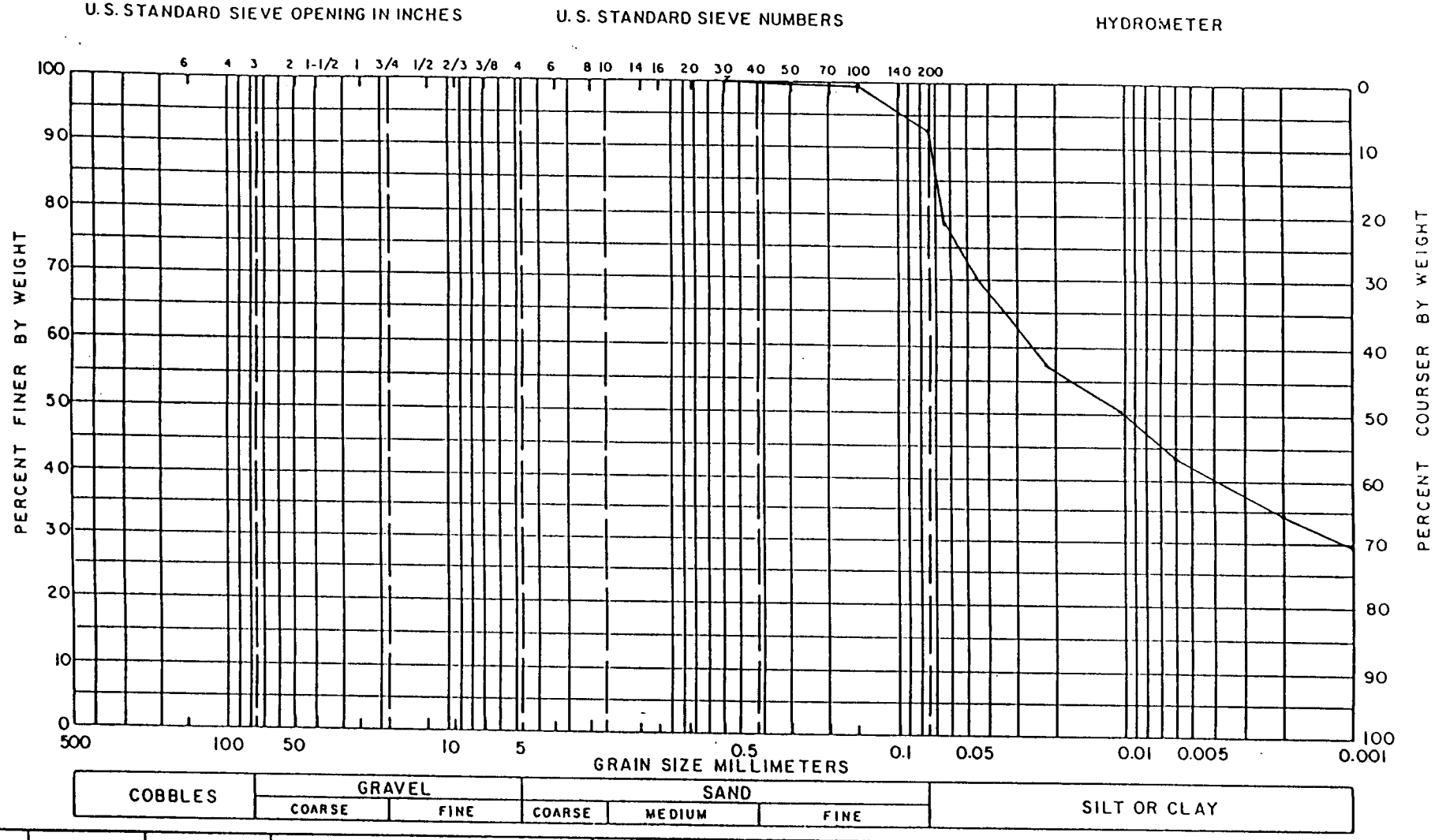
A-14



BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
P-8		11-11.5'	Brown silt; some clay trace sand	17.5 %			

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Engr.	DWE
Revised:	

PROJECT NO. 6583.01 DWG. NO. RM 86-060-01

GRADATION CURVES

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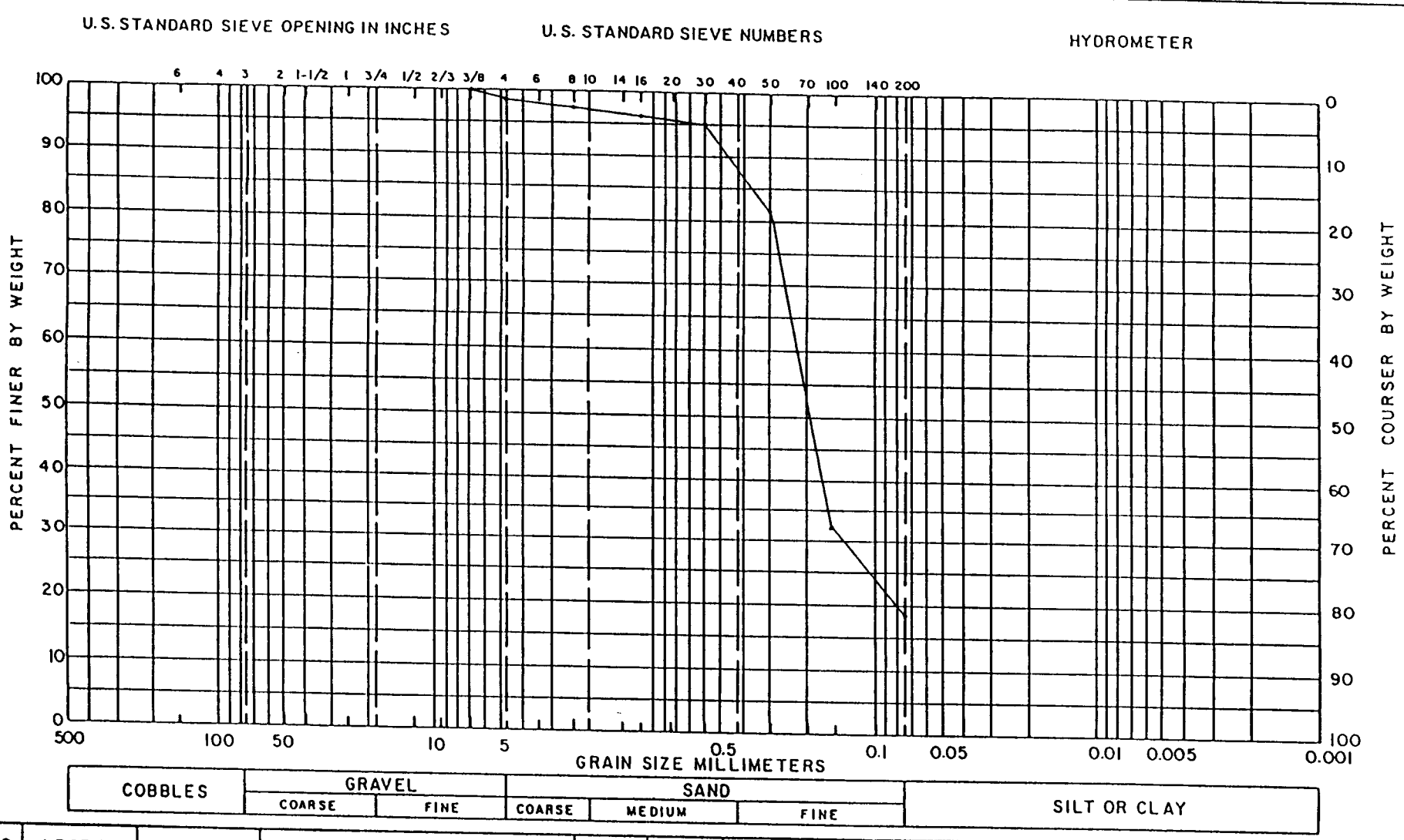

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-1		5-6'	Brown sand, little silt	7.8 %			

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Drawn by:	DAC		
Engr.	DWF	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
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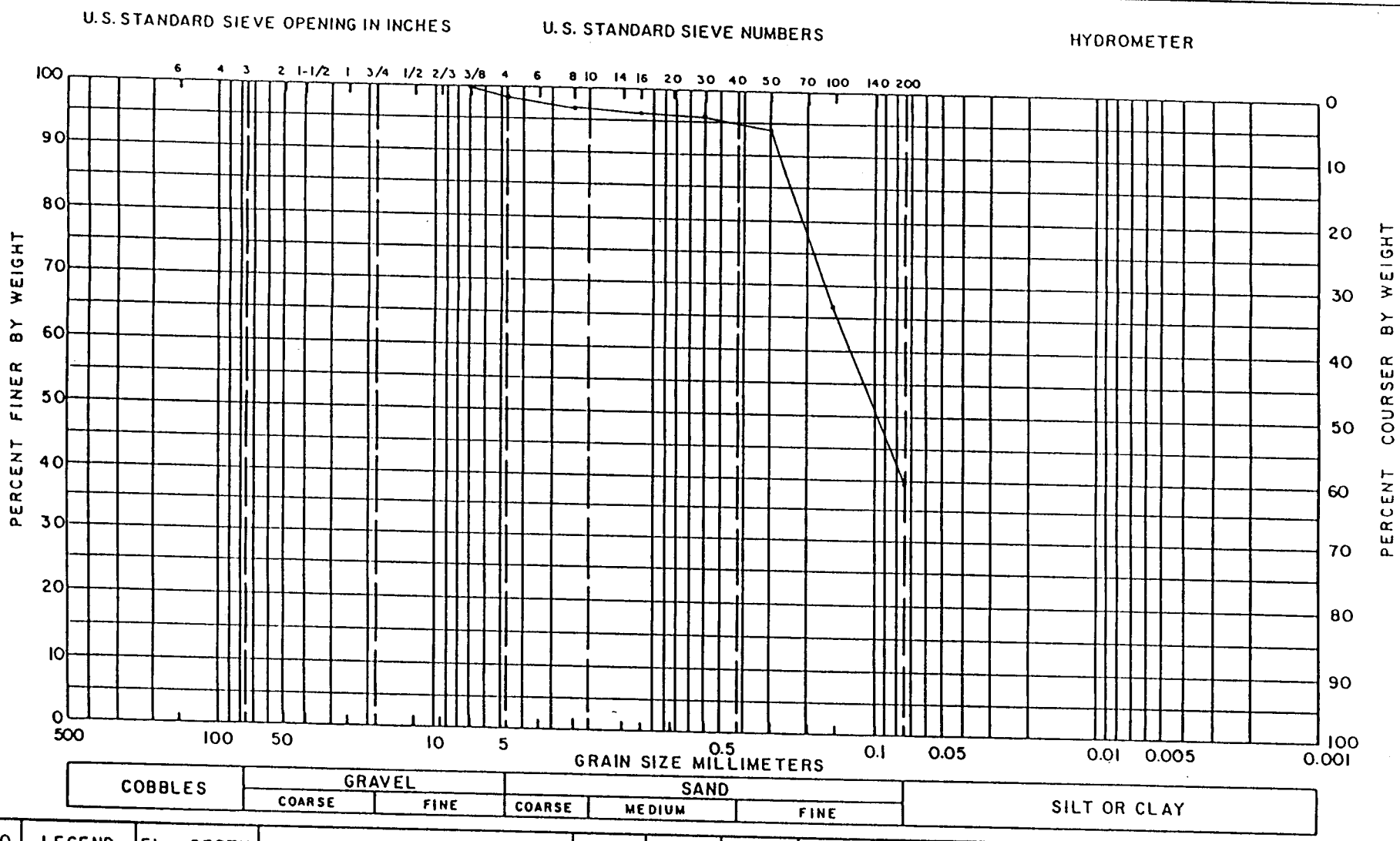

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-2		6-7'	Brown silty sand	11.9%			

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Engr.	DWE	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
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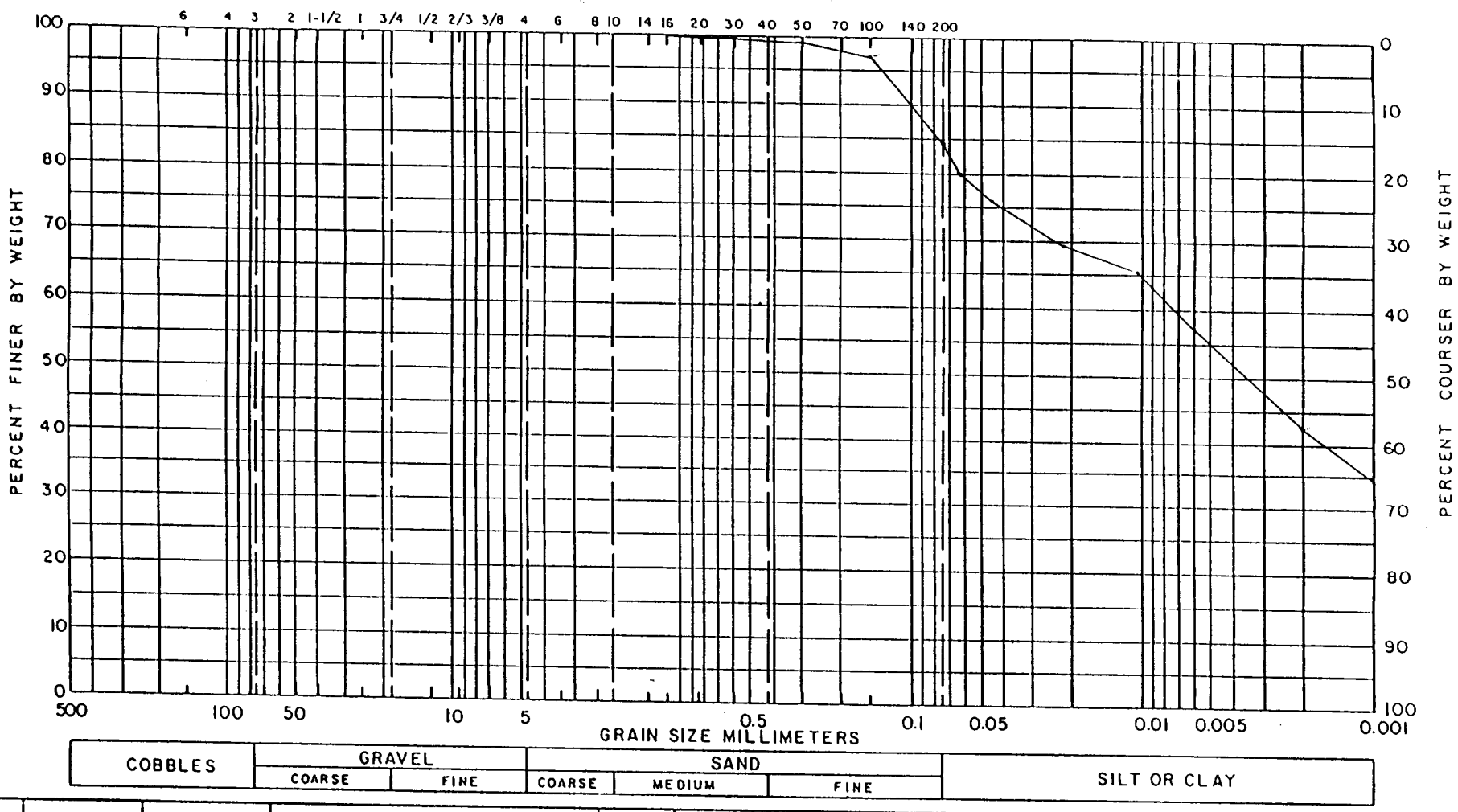

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-4		2-3'	Brown silt, some clay trace sand	13.6%			

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Engr.	DWF
Revised:	

PROJECT NO. 6583.01 DWG. NO. RM 86-060-01

GRADATION CURVES

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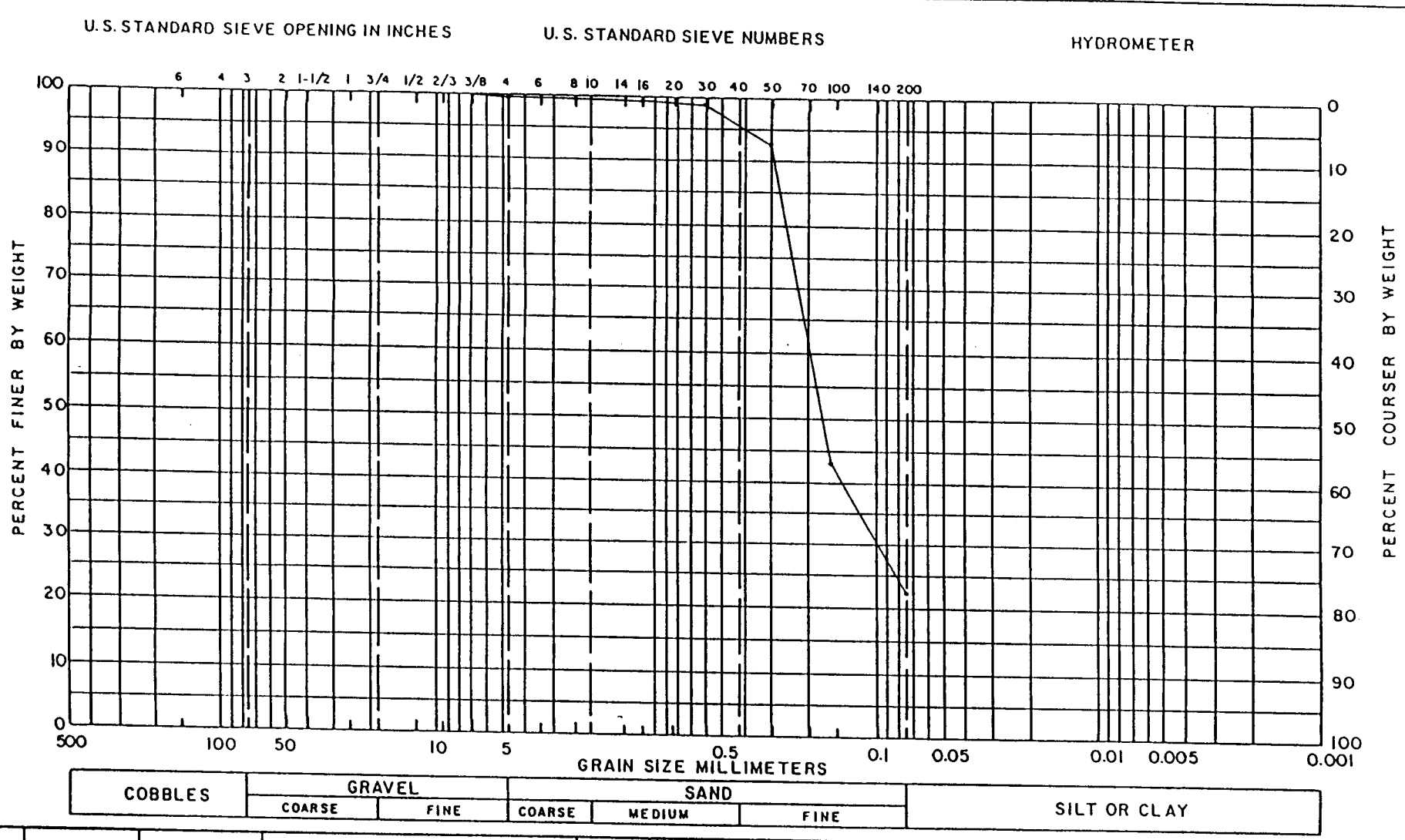

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-4		8-9'	Brown sand, some silt	6.5%			

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Engr.	DWE	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
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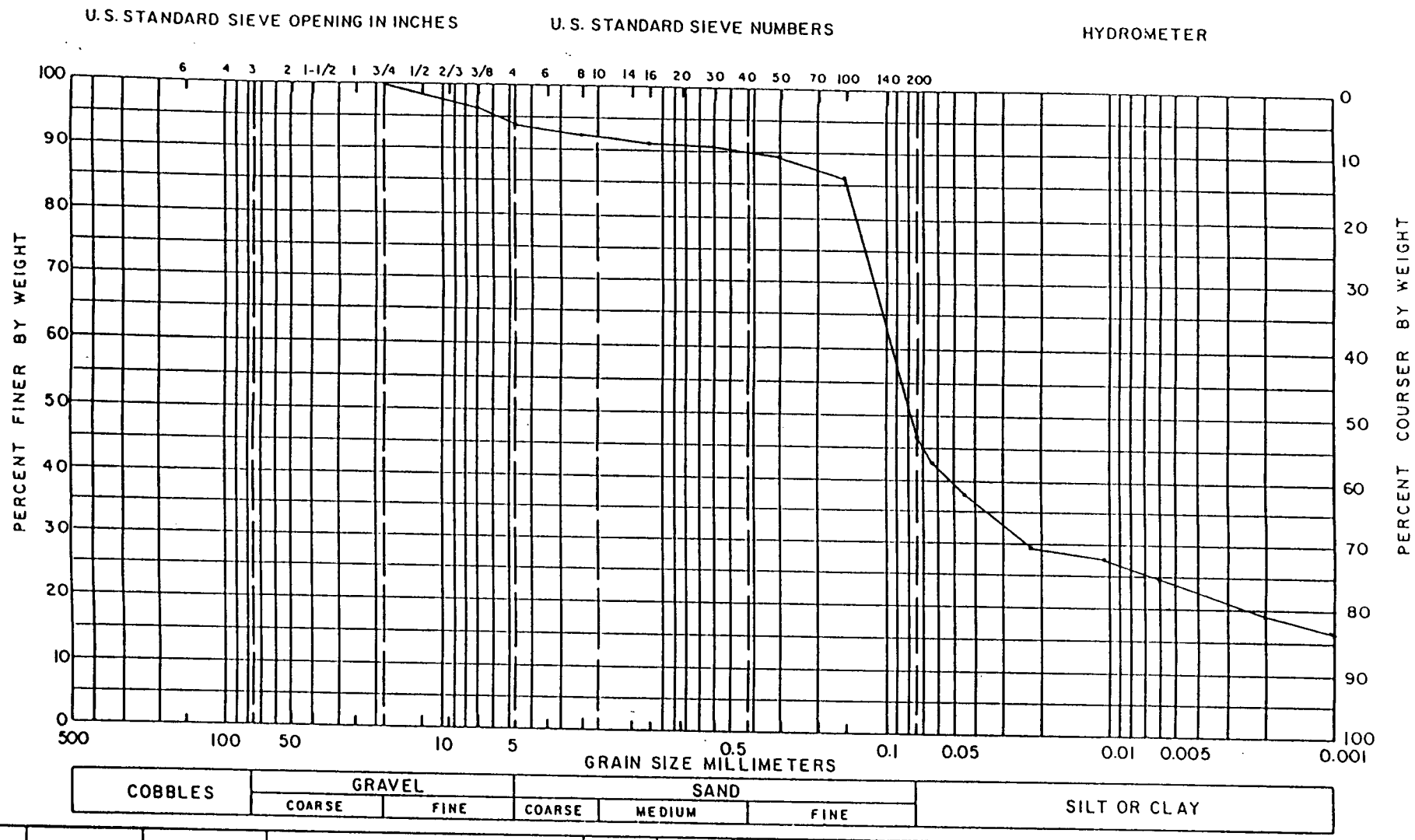

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-6		9-10'	Brown silty sand	8.5%			

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Engr.	DWE	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
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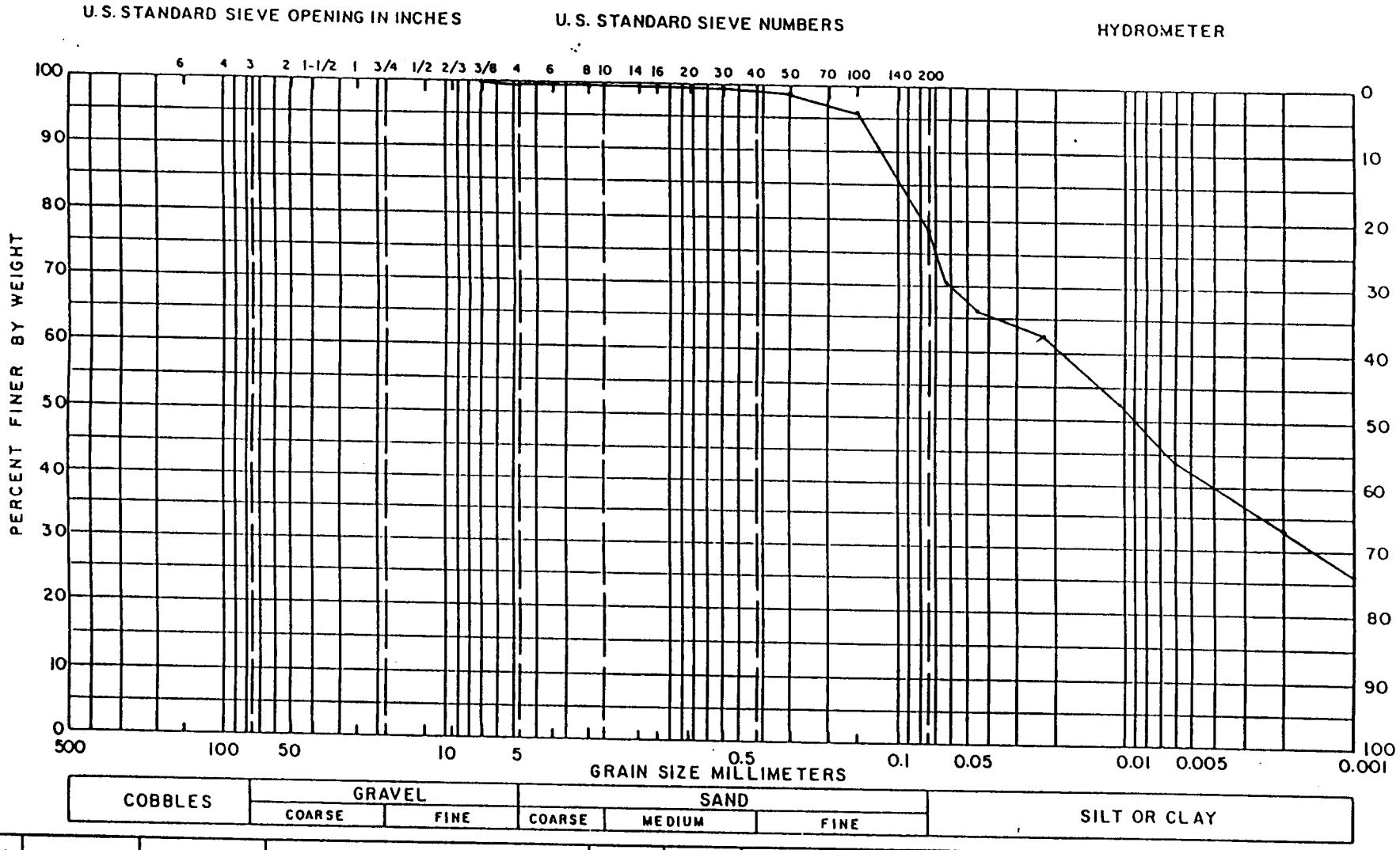

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-7		4-5'	Brown sandy silt,	9.7 %			
			some clay				

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Drawn by:	DAC		
Engr.	DWE	PROJECT NO. 6583.01	DWG. NO. RM 88-060-01
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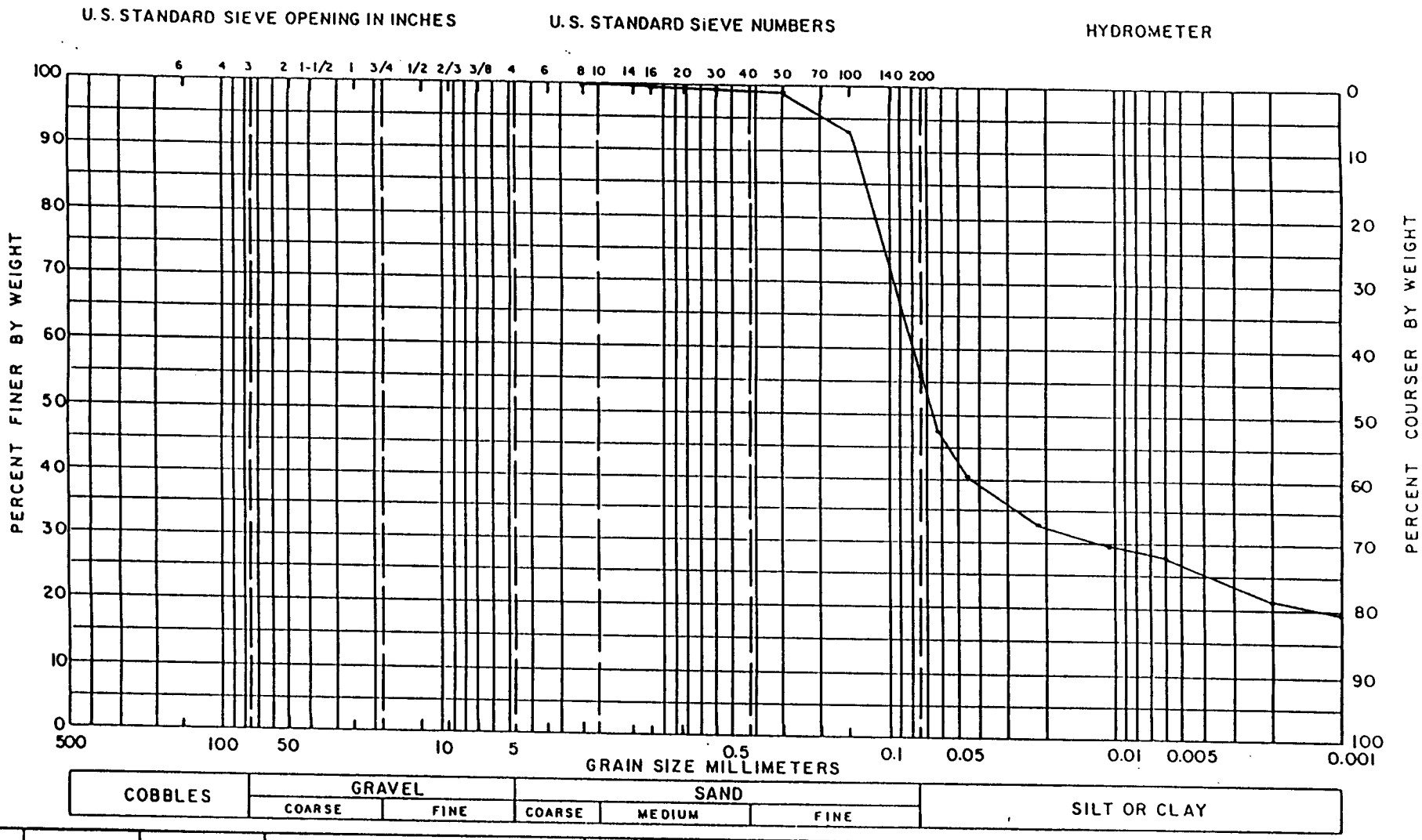

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-7		9-10'	Brown silty sand	7.4%			

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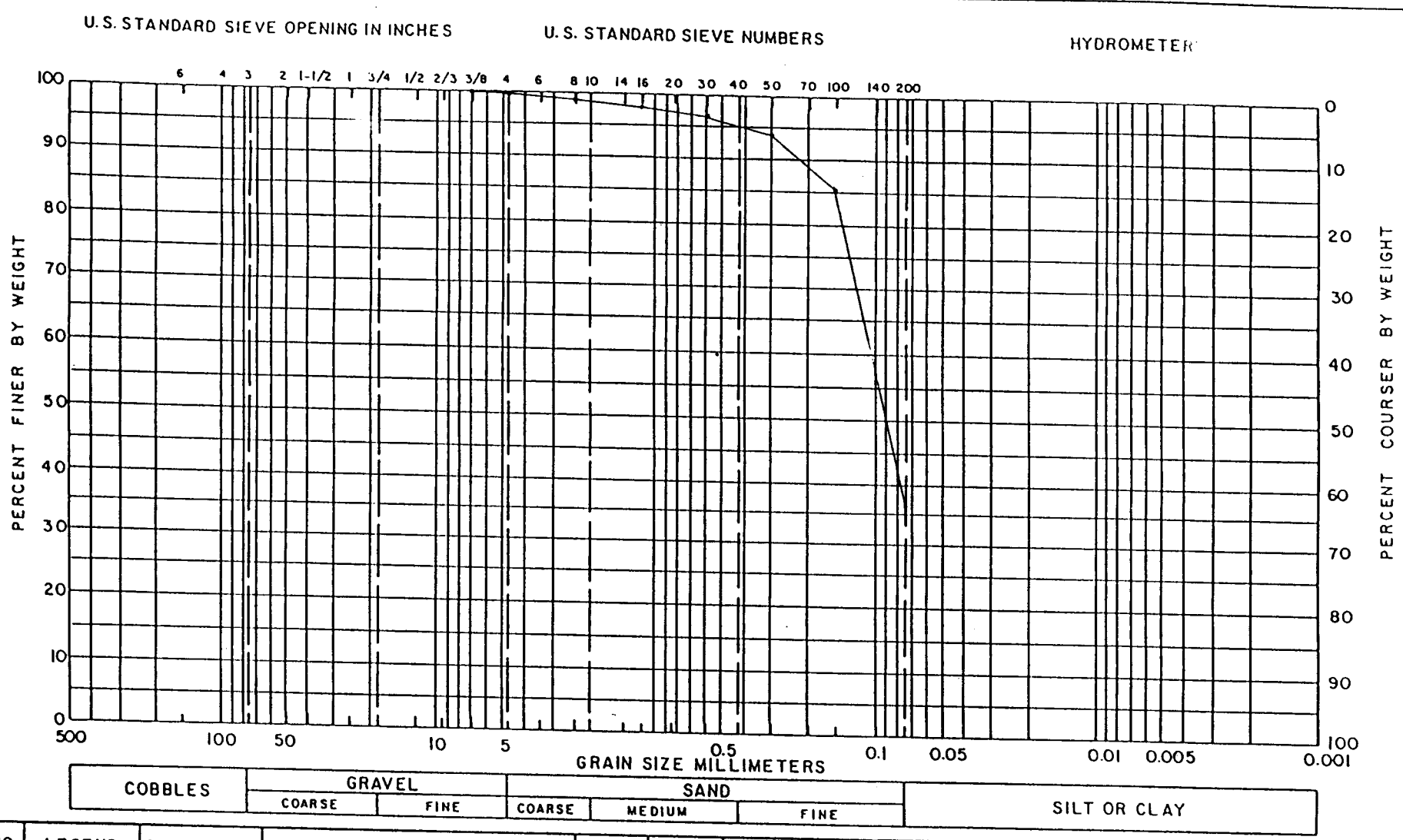
A-22



BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-8		3-5'	Brown silty sand	5.5%			

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Drawn by:	DAC		
Engr.	DWF	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
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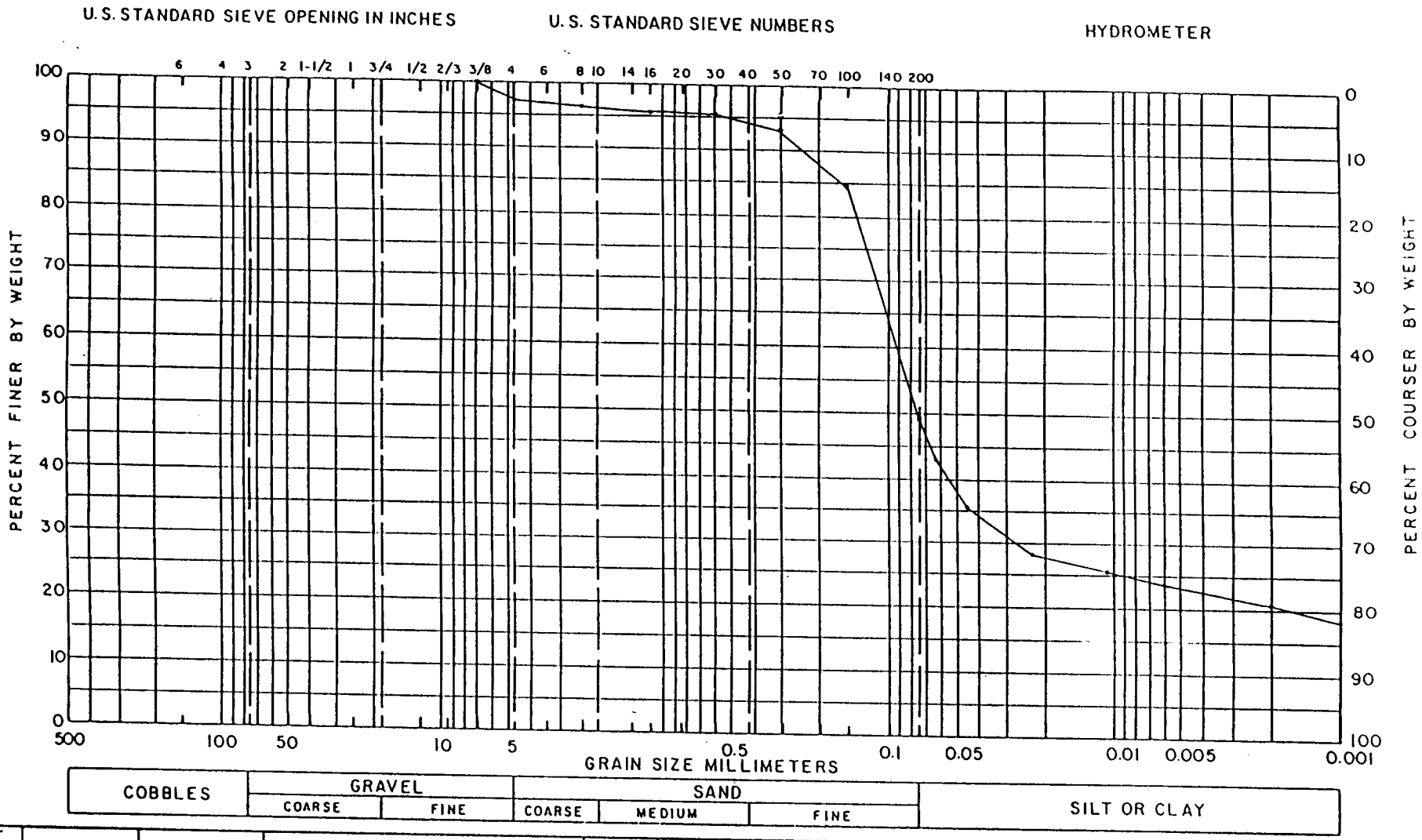
A-23



BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-10		2-3'	Brown silty sand, little clay	7.2%			
Drawn by:	DAC						
Engr.	DWE		PROJECT NO. 6583.01	DWG. NO. Rm 86-060-01			
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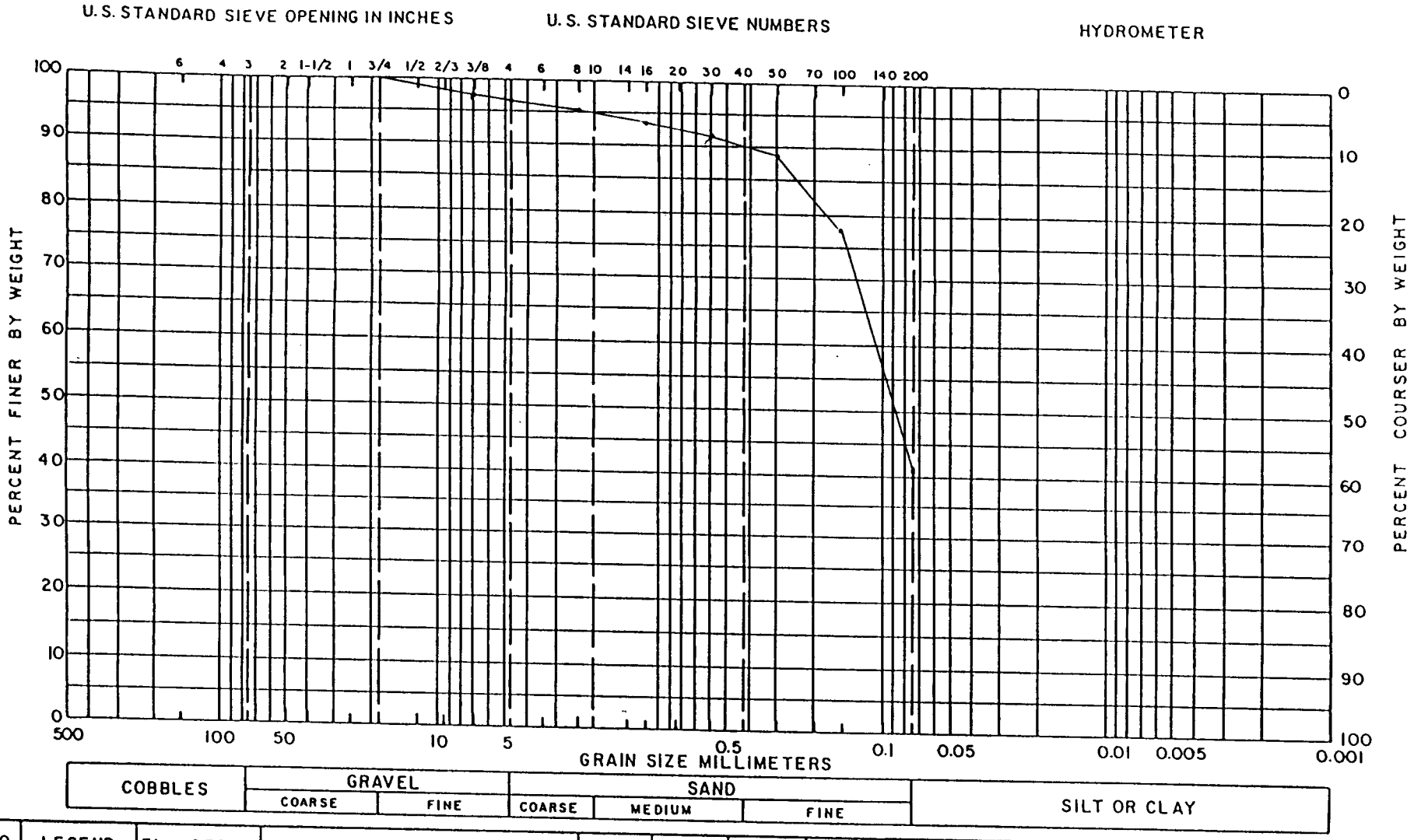

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
TP-15		6'	Brown silty sand, trace gravel	5.6%			
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Engr.	DWE		PROJECT NO. 6583.01	DWG. NO. RM 86-060-01			
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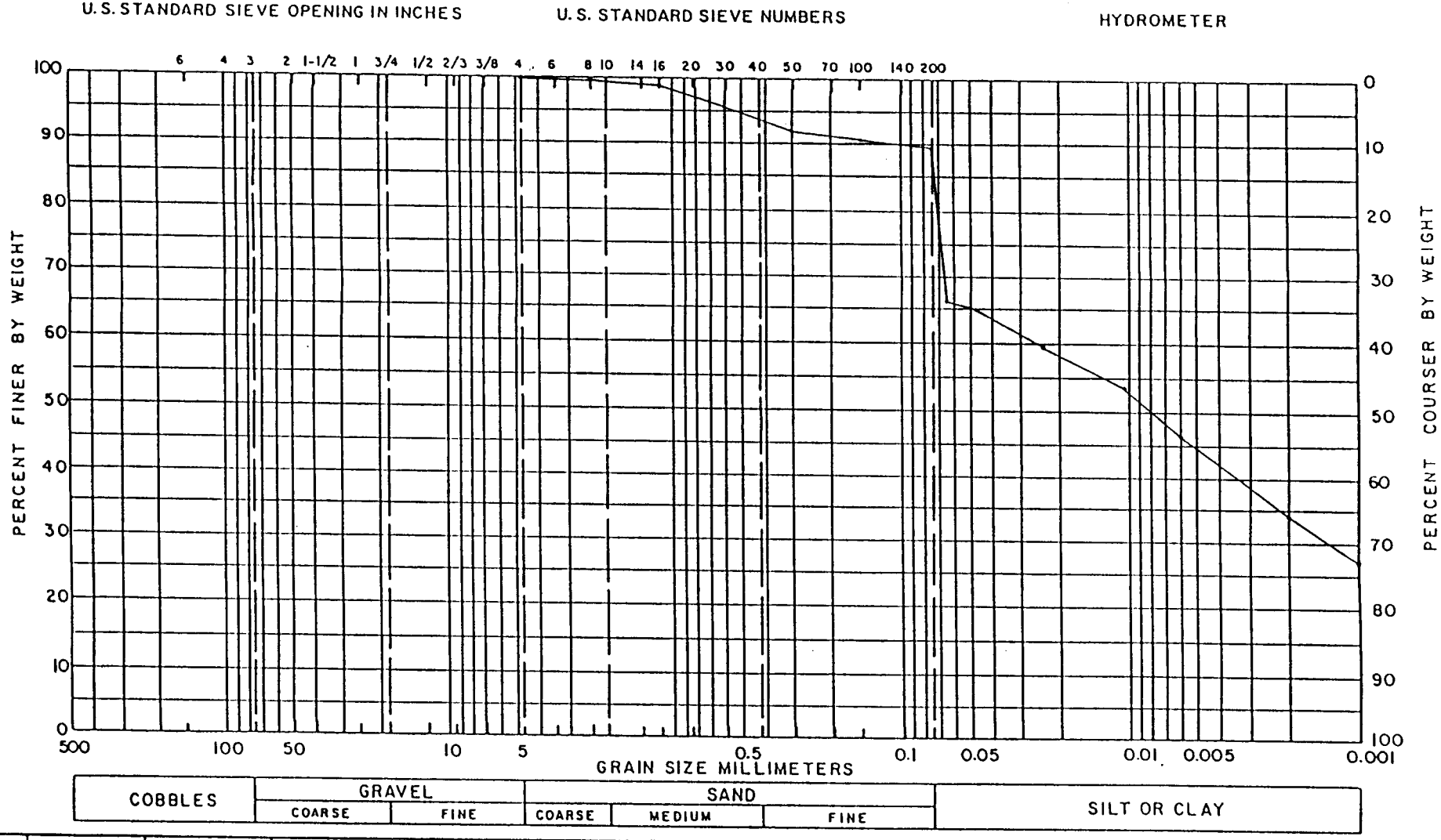

BORING NO.	LEGEND	EL. or DEPTH	CLASSIFICATION	w_n	w_L	w_p	PI
B-4		10'	Brown siltstone, some clay, trace sand	22.9 %			

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Engr.	DWE	PROJECT NO. 6583.01	DWG. NO. RM 86-060-01
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FIGURE

APPENDIX A-3

Rock Core Logs

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Rock Core Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-RR-1
PAGE 1 OF 1

PROJECT NAME UNC
BORING LOCATION N 71640.0 E 56744.3 SURFACE ELEV. 6969.7
DRILLER HEBER MINING & EXPLORATION DATE: START 11/20/86 FINISH 11/20/86

DEPTH	CORE NO.	CORE LEN.	BOX NO.	CORE DATA SIZE	PSI	FPM	% C.R.	LOSS	DISCONTINUITIES RQD	FPF	JOINT	BEDDING	HARDNESS	DESCRIPTION AND REMARKS	STRENGTH TESTS Qu TSF	Is PSI
														TAN WEATHERED FINE SANDSTONE		
														3.3		
	1	5	1	NX		1	98		84	2	H,C	TN	MH	MODERATELY HARD, TAN-LIGHT GRAY, FINE SANDSTONE, OCCASIONAL ORANGE LENSE, SOME DARK BROWN, BLACK SANDSTONE INTERNAL AT 8 FEET - 9 FEET AND AGAIN AT 12 FEET. GRAY CLAY IN FRACTURE AT 13 FEET. RETURN WATER TAN.		
5																
	2	5	1	NX		1	94		88	1.6	H,C,CL	TN	MH			
10																
	3	5	2	NX		1	84		40	3	H,C	TT	MH	ALTERNATING ORANGE AND LIGHT GRAY LENSES AT 1/8-INCH CENTERS, OCCASIONAL THICKER BED. RETURN WATER ORANGE/TAN 15 FEET TO 18 FEET. HEAVILY FRACTURED 21 TO 21.5 FEET. DARK GRAY 1/8-INCH LENSE AT 22 FEET.		
15																
	4	5	2	NX		2	66		18	4	H,V,VC	TT	MH			
20																
25																
30																

NOTES:
1) TOTAL DEPTH 23.3 FEET.
2) DRILL RETURN WATER CONSISTENT THROUGHOUT.
3) CME 55 DRILL RIG.
4) ZONE 1 OF UPPER GALLUP FORMATION.

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Rock Core Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-RR-2
PAGE 1 OF 1

PROJECT NAME UNC
BORING LOCATION N 77181.3 E 59170.4 SURFACE ELEV. 7066.7
DRILLER HEBER MINING & EXPLORATION DATE: START 11/20/86 FINISH 11/20/86

DEPTH	CORE NO.	CORE LEN.	BOX NO.	CORE DATA SIZE	PSI	FPM	% C.R.	LOSS	DISCONTINUITIES RQD	FPF	JOINT	BEDDING	HARDNESS	DESCRIPTION AND REMARKS	STRENGTH TESTS Qu TSF	Is PSI
5																
														6.0		
	1	5	1	NX		2	100		94	1.6	H,C		MH	MODERATELY HARD, TAN, FINE SANDSTONE, SOME RANDOM BLACK SAND AT 9 FEET TO 11 FEET. LENSE OF LOOSE SAND AT 9.5 FEET. RETURN WATER TAN.		
10																
	2	5	1	NX		2	92		18	5.4	H,VC		MH			
15														RETURN WATER LOST AT 15 FEET.		
	3	4	2	NX		2	100		0	9	HV,VC		MH			
20												TT		BEGINNING AT 19 FEET, ALTERNATING 1/8-INCH LENSES OF TAN, ORANGE, AND DARK BROWN SANDSTONE. CLAY COATING IN FRACTURES.		
25																

NOTES:
1) TOTAL DEPTH 20 FEET.
2) DRILL RETURN WATER CONSISTENT THROUGHOUT.
3) CME 55 DRILL RIG.
4) LOWER DALTON FORMATION.

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APPENDIX A-4

Boring Logs

Canonie

Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-P-1
LOGGED BY DAVID KURZ
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PROJECT NAME UNC
BORING LOCATION N 73692.9 E 57568.5 SURFACE ELEV. 6947.7
DRILLER HEBER MINING & EXPLORATION DATE: START 11-8-86 FINISH 11-8-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													HARD LENSE AT 1.5 AND 2.5 FEET.	
	1	SS	3	4.5	5	8	8	18	SP				MEDIUM DENSE, DARK GRAY FINE SAND, DRY, TRACE COAL, TRACE YELLOW AND WHITE FINE SAND.	
5												5	GRAY CUTTINGS AT 5 FEET.	
	2	SS	6	7.5	2	2	5	18	CL				MEDIUM STIFF, GRAY-BROWN CLAY, DAMP, TRACE SILT (ALLUVIUM).	
10												10		
	3	SS	10	10.2	50/2			0					MODERATELY HARD, LIGHT GRAY - WHITE FINE SANDSTONE (ZONE 3, GALLUP SANDSTONE).	
15														
	4	SS	15	16.5	6	8	8	18					SAME. SOME ORANGE (RUSTY) STAINED ZONES. MOIST GRAVEL-SIZE WHITE ROCK IN CUTTINGS AT 17 FEET; CUTTINGS FINE SAND AT 18 FEET.	
20														
	5	SS	20	20.2	50/2			2				22	MODERATELY HARD, LIGHT GRAY	
												23	SILTSTONE, MOIST, UNTIL APPROXIMATELY 22 FEET.	
25	6	SS	24	25	50	42	-	12					COAL IN CUTTINGS 22 - 23 FEET. HARD, LIGHT GRAY SILTSTONE, MOIST.	
30													BEGIN CORING AT 29 FEET.	
35													NOTES: 1) TOTAL DEPTH 34 FEET. 2) GROUND WATER AT -13 FEET ON 11/9/86. 3) CME 55 DRILL RIG.	

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Rock Core Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-P-1
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PROJECT NAME UNC
BORING LOCATION N 73692.9 E 57568.5 SURFACE ELEV. 6947.7
DRILLER HEBER MINING & EXPLORATION DATE: START 11/8/86 FINISH 11/8/86

DEPTH	CORE NO.	CORE LEN.	BOX NO.	CORE DATA SIZE	PSI	FPM	% C.R.	LOSS	DISCONTINUITIES RQD	FPF	JOINT	BEDDING	HARDNESS	DESCRIPTION AND REMARKS	STRENGTH TESTS Qu TSF	Is PSI
														BEGIN CORING AT 29 FEET.		
30	1	5	1	NX		1	82		25	4	H,C	TT	MH	MODERATELY HARD, GRAY, MEDIUM TO COARSE SANDSTONE, ORANGE AND BROWN LENSES, ANGULAR GRAINS.		
35														NOTES: 1) TOTAL DEPTH 34 FEET. 2) GROUND WATER -13 FEET ON 11/9/86. 3) CME 55 DRILL RIG.		

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Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-P-2
LOGGED BY DAVID KURZ
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PROJECT NAME UNC
BORING LOCATION N 73393.2 E 57548.5 SURFACE ELEV. 6941.3
DRILLER HEBER MINING & EXPLORATION DATE: START 11-8-86 FINISH 11-12-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													MEDIUM DENSE, DARK GRAY/BROWN CLAYEY FINE TO MEDIUM SAND, DRY, TRACE ORGANICS (ALLUVIUM).	
5												5.5		
	1	SS	5	6.5	14	9	14	18	SC-SP				MEDIUM DENSE, LIGHT GRAY FINE TO MEDIUM SAND BEGINNING AT 5.5 FEET. TRACE WEATHERED SANDSTONE, ROUNDED WITH ORANGE STAINING.	
10														
	2	SS	10	11.5	9	6	11	18	CL			10.3		
													BEGINNING AT 10.3 FEET, VERY STIFF, DARK GRAY-BROWN CLAY, DAMP, TRACE COAL, ORGANIC, SILT, AND WEATHERED SANDSTONE.	
15														
	3	SS	15	16.5	4	14	11	18	CL				SAME.	
20														
	4	SS	20	21.5	5	5	9	18	CL				SAME, MOIST, SOME SILT. BECOMING CLAYEY SILT, TRACE VERY FINE SAND AT 21 FEET.	
25														
													NOTES: 1) TOTAL DEPTH 30 FEET ON 11/8/86. EXTENDED TO 80 FEET ON 11/12/86. 2) GROUND WATER AT 26 FEET ON 11/9/86.	
30														
35														
40														
	5	SS	40	41.5	3	5	5	18	ML				SAME, STIFF, BROWN CLAYEY SILT, MOIST, TRACE FINE SAND.	

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Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-P-2
LOGGED BY DAVID KURZ
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PROJECT NAME UNC
BORING LOCATION N 73393.2 E 57548.5 SURFACE ELEV. 6941.3
DRILLER HEBER MINING & EXPLORATION DATE: START 11-8-86 FINISH 11-12-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
	5	SS	40	41.5	3	5	5	18	ML					
45												45		
50	6	SS	50	51.5	4	4	4	18	SM				LOOSE, LIGHT BROWN/TAN, FINE TO MEDIUM SAND, SOME SILT AND CLAY (CONTACT APPROXIMATE).	
55														
60	7	SS	60	61.5	11	22	40	18	SM				SAME, TRACE CLAY.	
65														
70	8	SS	70	70.2	50/2			2	SM				SAME, VERY DENSE.	
75														
80	9	SS	80	-	100/0			0					NOTES: 3) TOTAL DEPTH 80 FEET. 4) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-P-3
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PROJECT NAME UNC
BORING LOCATION N 73557.5 E 57738.1 SURFACE ELEV. 6944.8
DRILLER HEBER MINING & EXPLORATION DATE: START 11-8-86 FINISH 11-8-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	6-12	12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
5	1	SS	5	6.5	5	5	10	18	SC				MEDIUM DENSE, DARK GRAY-BROWN, FINE TO MEDIUM SAND, DAMP, SOME CLAY AND SILT, TRACE COAL, ORGANICS, ROOTS, AND WEATHERED ORANGE STAINED SANDSTONE (ALLUVIUM). GRAY MOIST CLAY LAYER 5.9 TO 6.4 FEET. MEDIUM DENSE, GREENISH GRAY-BROWN FINE SAND, MOIST, TRACE COAL, ORGANICS, AND CLAY.	
10	2	SS	10	11.5	5	7	7	18	SC-CL			11		
15	3	SS	15	16.5	3	2	2	18	SC			14	BEGINNING AT 11 FEET, DARK GRAY CLAY, MOIST, SOME SILT, TRACE ROOTS, ORGANICS.	
20	4	SS	20	21.5	3	3	5	18	SC				LOOSE, GREENISH-GRAY BROWN FINE SAND, TRACE CLAY, COAL, ORGANICS (CONTACT APPROXIMATE). STIFF, CLUMPY CUTTINGS AT 17 FEET SAME, INCREASING CLAY AND SILT.	
25														
30														
35														
40														

NOTES:
1) TOTAL DEPTH 35 FEET.
2) GROUND WATER AT -26.1 FEET ON 11/9/86.
3) CME 55 DRILL RIG.

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BORING No. 86-RP-P-4
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PROJECT NAME UNC
BORING LOCATION N 73728.5 E 57891.4 SURFACE ELEV. 6945.8
DRILLER HEBER MINING & EXPLORATION DATE: START 11-9-86 FINISH 11-9-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													CUTTINGS, DARK BROWN, MEDIUM SAND, SOME SILT, TRACE COARSE SAND TO 4.5 FEET. CUTTINGS LIGHT GRAY AFTER 4.5 FEET.	
5														
	1	SS	5	6.5	21	28	21	18	SM-ML			5.7	DENSE, LIGHT GRAY, MEDIUM SAND, MOIST, TRACE COAL AND WEATHERED SANDSTONE (ALLUVIUM).	
10													AT 5.7 FEET BECOMING GRAY-BROWN, CLAYEY SILT, TRACE COAL, ORGANICS, ROOTS.	
	2	SS	10	11.5	3	6	5	18	ML			11	SAME, BECOMING CLAYEY SAND AT BOTTOM.	
15														
	3	SS	15	16.5	3	4	3	18	SC				LOOSE, GREENISH GRAY-BROWN FINE SAND, MOIST, TRACE CLAY, SOME COAL POWDER.	
20													WET CLUMPY CUTTINGS AT 18 FEET.	
	4	SS	20	21.5	3	4	3	18	SC				LOOSE, GRAY-BROWN FINE SAND, MOIST, SOME CLAY, TRACE ORGANICS.	
25														
												29	CUTTINGS, LIGHTER TAN SAND FROM 28 TO 30 FEET.	
30														
	5	SS	30	31.5	7	9	9	18	CL				VERY STIFF, DARK BROWN-GRAY, SILTY CLAY, MOIST, TRACE COAL, ORGANICS, ROOTS (CONTACT APPROXIMATE).	
35														
40													NOTES: 1) TOTAL DEPTH 40 FEET. 2) GROUND WATER DATA UNAVAILABLE DUE TO CAVING. 3) CME 55 DRILL RIG.	

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BORING No. 86-RP-P-5
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PROJECT NAME UNC
BORING LOCATION N 73184.7 E 57038.7 SURFACE ELEV. 6937.4
DRILLER HEBER MINING & EXPLORATION DATE: START 11-9-86 FINISH 11-9-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
5	1	SS	5	6.5	11	15	17	18	ML				DENSE, DARK GRAY, SANDY SILT, DAMP, TRACE CLAY, COAL, ORGANICS (ALLUVIUM).	
10	2	SS	10	11.5	4	7	9	18	ML				SAME, DRY, TRACE SAND.	
15	3	SS	15	16	28	30	-	12	ML				SAME, GREENISH GRAY-BROWN, SOME CLAY, TRACE WHITE SLIVERS, AND ORGANICS.	
20	4	SS	20	21.5	7	10	12	18	ML				SAME.	
25													CLUMPY CUTTINGS AT 26 FEET.	
												27		
30	5	SS	30	31.5	6	6	5	18	CL				DARK BROWNISH-GRAY SILTY CLAY, DAMP, TRACE FINE SAND AND ORGANICS (CONTACT APPROXIMATED).	
35														
40													NOTES: 1) TOTAL DEPTH 40 FEET. 2) GROUND WATER DATA UNAVAILABLE DUE TO CAVING. 3) CME 55 DRILL RIG.	

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BORING No. 86-RP-P-6
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PROJECT NAME UNC
BORING LOCATION N 72289.3 E 56311.5 SURFACE ELEV. 6921.7
DRILLER HEBER MINING & EXPLORATION DATE: START 11-9-86 FINISH 11-9-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
												3	CUTTINGS, DARK BROWN SILTY CLAY TO 3 FEET.	
5	1	SS	5	6.5	7	11	11	18	SM				MEDIUM DENSE, TAN, SILTY FINE SAND, DRY, TRACE CLAY, ORGANICS, AND COAL (ALLUVIUM).	
10	2	SS	10	11.5	6	4	4	18	SM				SAME, NO CLAY, TRACE WEATHERED ROCK AND COAL CHIPS.	
15	3	SS	15	16.5	6	8	9	18	SM				SAME, TRACE CLAY.	
20	4	SS	20	21.5	7	9	9	18	SM				SAME. WEATHERED SANDSTONE LENSES NOTED AT 20 AND 25 FEET BY BRIEF HARD DRILLING.	
25														
30	5	SS	30	31.5	7	7	9	18	SM				SAME.	
35													NOTES: 1) TOTAL DEPTH 35 FEET. 2) GROUND WATER DATA UNAVAILABLE DUE TO CAVING. 3) CME 55 DRILLING.	
40														

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BORING No. 86-RP-P-7
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PROJECT NAME UNC
BORING LOCATION N 73635.5 E 57517.2 SURFACE ELEV. 6942.7
DRILLER HEBER MINING & EXPLORATION DATE: START 11-9-86 FINISH 11-9-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													BROWN, SILTY SAND CUTTINGS, DRY, TO 4 FEET.	
												4		
5													LIGHT GRAY WEATHERED SANDSTONE.	
													o TRICONE ROTARY WATER DRILLING 8 TO 12 FEET.	
10													o BEGIN CORING AT 12 FEET.	
15														
20													NOTES: 1) TOTAL DEPTH 22 FEET. 2) GROUND WATER DATA UNVAILABLE DUE TO CAVING. 3) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-P-7
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PROJECT NAME UNC
BORING LOCATION N 73635.5 E 57517.2 SURFACE ELEV. 6942.7
DRILLER HEBER MINING & EXPLORATION DATE: START 11/9/86 FINISH 11/9/86

DEPTH	CORE NO.	CORE LEN.	BOX NO.	CORE DATA SIZE	PSI	FPM	% C.R.	LOSS	DISCONTINUITIES RQD	FPF	JOINT	BEDDING	HARDNESS	DESCRIPTION AND REMARKS	STRENGTH TESTS Qu TSF	Is PSI
														BEGIN CORING AT 12 FEET.		
	1	3	1	NX		1	97		53	5	H,C	TT	MH	MODERATELY HARD, LIGHT GRAY SILTSTONE INTERBEDDED WITH DARK GRAY AND OCCASIONAL ORANGE LENSES. CORE BLOCKING 15 FEET TO 16.5 FEET, COAL BED.		
15	2	1.5	-	NX		1	0		0							
20														TRICONE ROTARY WATER DRILLING 16.5 FEET TO 22 FEET.		
25														SANDSTONE NOT COMPETENT ENOUGH TO CORE.		
														NOTES: 1) TOTAL DEPTH 22 FEET. 2) GROUND WATER DATA UNAVAILABLE DUE TO CAVING ABOVE BENTONITE PLUG. 3) CME 55 DRILL RIG.		

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PROJECT No. RM 86-060-01
BORING No. 86-RP-P-8
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PROJECT NAME UNC
BORING LOCATION N 73475.2 E 57467.5 SURFACE ELEV. 6938.1
DRILLER HEBER MINING & EXPLORATION DATE: START 11-12-86 FINISH 11-12-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
												1.5	FILL.	
5	1	SS	5	6.5	5	5	7	18	ML				MEDIUM DENSE, BROWN SILT, DRY, TRACE FINE SAND, ROOTS (ALLUVIUM).	
10	2	SS	10	11.5	5	5	5	18	ML-CL			10.8	STIFF, BROWN CLAYEY SILT, DRY, TRACE FINE SAND, ORANGE STAINING. BECOMING MOIST BROWN CLAY, TRACE SILT AT 10.8 FEET.	
15	3	SS	1.5	16.5	5	10	14	18	CL				SAME, TRACE WHITE SILT POCKETS.	
20	4	SS	20	21.5	10	12	14	18	CL				SAME, TRACE GRAY CLAY AND TRACE ORANGE POCKETS.	
30	5	SS	30	31.5	1	1	1	6	CL-SM			31.3	SAME, WET.	
35													BECOMING VERY LOOSE, BROWN FINE SAND AND SILT, WET, TRACE CLAY, AT 31.3 FEET. CUTTINGS WET AT 31 FEET.	
40	6	SS	40	41	50	-	-	12				40.5		

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PROJECT No. RM 86-060-01
BORING No. 86-RP-P-8
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PROJECT NAME UNC
BORING LOCATION N 73475.2 E 57467.5 SURFACE ELEV. 6938.1
DRILLER HEBER MINING & EXPLORATION DATE: START 11-12-86 FINISH 11-12-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
	6	SS	40	41	50	-	-	12					SAME. BECOMING GRAY-BROWN CLAY, MOIST, AT 40 FEET. BECOMING DARK BROWN-BLACK WEATHERED SHALE WITH ORANGE STAINING AT 40.5 FEET (ZONE 2, GALLUP SANDSTONE).	
45														
50	7	SS	50	50.3	100/4			4					HARD, BROWN AND BLACK CLAY, SOME ORGANICS. BECOMING ORANGE AND LIGHT GRAY TO WHITE FINE SANDSTONE.	
55														
60	8	SS	60	60.5	50	30/0		6					HARD, BROWN AND BLACK CLAY, DAMP, AND WEATHERED SHALE. BECOMING ORANGE, YELLOW, AND WHITE FINE SANDSTONE.	
65														
70	9	SS	70	-	50/0			0					NOTES: 1) TOTAL DEPTH 70 FEET. 2) GROUND WATER AT -25.5 FEET ON 11/12/86. 3) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-1
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PROJECT NAME UNC
BORING LOCATION N 75189.1 E 56935.9 SURFACE ELEV. 6999.2
DRILLER HEBER MINING & EXPLORATION DATE: START 11-6-86 FINISH 11-6-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	6-12	12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													4 INCHES ASPHALT.	
	1	SS	1	2.5	5	9	9	18	SM				VERY LOOSE TO MEDIUM DENSE, BROWN, DRY, FINE SAND, SOME SILT,	
	2	SS	3	4.5	2	2	2	18	SM				TRACE BLACK, RUST, AND WHITE STAINING.	
5														
	3	SS	6	7.5	2	1	2	18	SM					
10	4	SS	9	10.5	12	42	-	12	SM				SAME. BECOMING VERY DENSE, LIGHT BROWN/TAN FINE SAND. CUTTINGS, DARK GRAY/BLACK WITH	
												13	KEROSENE ODOR 11 TO 12.5 FEET.	
15	5	SS	14	14.3	100/4			3					SOFT TO MODERATELY HARD, TAN, FINE SANDSTONE, UNDERLYING DARK GRAY, ODOROUS FINE SAND (CONSIDERED SLOUGH) (CONTACT APPROXIMATE).	
20	6	SS	19	19.2	100/2			2					SAME.	
25	7	SS	24	-	50/0			0						
30													NOTES: 1) TOTAL DEPTH 24 FEET. 2) NO GROUND WATER ENCOUNTERED. 3) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-2
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PROJECT NAME UNC
BORING LOCATION N 75085.8 E 56950.7 SURFACE ELEV. 6999.0
DRILLER HEBER MINING & EXPLORATION DATE: START 11-6-86 FINISH 11-6-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													4 INCHES ASPHALT.	
	1	SS	1	2.5	9	9	12	18	SP				MEDIUM DENSE BROWN AND GRAY FINE SAND, DRY, TRACE RUST, ORANGE AND WHITE STAINING, ORGANICS, ROOTS.	
	2	SS	3	4.5	10	13	10	18	SP					
5														
	3	SS	6	7.5	2	1	2	18	SM				LOOSE, BROWN, FINE SAND, DRY, SOME SILT.	
10	4	SS	9	10.5	2	2	3	18	SM				SAME.	
15														
	5	SS	15	16.5	2	4	4	18	SC				SAME, SOME CLAY.	
20														
	6	SS	20	21.5	6	5	32	18	SP				AT 20.2 FEET, DENSE, TAN/LIGHT GRAY, FINE SAND, DRY, SLIGHTLY ODOROUS (KEROSENE).	
25														
	7	SS	25	26.5	21	41	50/4	14	SP				DENSE, BROWN, FINE SAND, DRY, (ODOROUS), BLACK AND RUST LENSES.	
30												30		
	8	SS	30	30.4	80/5			5				32	VERY DENSE, BLACK, LOW GRADE COAL.	
	9	SS	33	33.3	100/3			3					SOFT TO MODERATELY HARD, TAN, FINE SANDSTONE (CONTACT APPROXIMATE).	
35														
40														

NOTES:
1) AUGER REFUSAL AND TOTAL DEPTH 33.3 FEET.
2) NO GROUND WATER ENCOUNTERED.
3) CME 55 DRILL RIG.

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-4
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PROJECT NAME UNC
BORING LOCATION N 74936.9 E 57155.5 SURFACE ELEV. 6996.0
DRILLER HEBER MINING & EXPLORATION DATE: START 11-6-86 FINISH 11-6-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
	1	SS	0.5	2.0	4	9	9	18	SM				4 INCHES ASPHALT. MEDIUM DENSE, BROWN FINE SAND AND SILT, DRY, TRACE GRAVEL.	
5	2	SS	3	4.5	4	4	7	18	SM				TRACE DARK BROWN, ORANGE, WHITE, AND YELLOW STAINING.	
	3	SS	6	7.5	2	4	4	18	SC			7.5	MEDIUM DENSE, DARK GRAY, FINE SAND, SOME SILT AND CLAY, TRACE ORGANICS, ROOTS.	
10	4	SS	9	10.5	7	13	9	18	SC					
												14		
15	5	SS	14	15.5	5	4	5	18	SP				LOOSE, LIGHT BROWN, FINE SAND, DRY.	
20	6	SS	19	20.5	4	6	6	18	SP				SAME.	
25														
30	7	SS	29	30.5	6	6	7	18	SP				CUTTINGS, DARK BROWN CLUMPY AT 28 FEET. MEDIUM DENSE, DARK GRAY FINE SAND, MOIST, VERY ODOROUS (KEROSENE).	
	8	BR	32	33	-	11		12	SP				SAME.	
35														
40	9	BR	39	40	-	21		0	SP				ESTIMATED SAME, WET.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-4
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PROJECT NAME UNC
BORING LOCATION N 74936.9 E 57155.5 SURFACE ELEV. 6996.0
DRILLER HEBER MINING & EXPLORATION DATE: START 11-6-86 FINISH 11-6-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
												41	HARDER DRILLING 41 TO 42 FEET.	
45	10	SS	45	45.3	100/3			3					MODERATELY HARD, TAN FINE SANDSTONE.	

NOTES:
1) TOTAL DEPTH 45.3 FEET.
2) NO GROUND WATER ENCOUNTERED.
3) CME 55 DRILL RIG.

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Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-M-5
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PROJECT NAME UNC
BORING LOCATION N 74747.3 E 57312.2 SURFACE ELEV. 6991.9
DRILLER HEBER MINING & EXPLORATION DATE: START 11-5-86 FINISH 11-5-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													6 INCHES CONCRETE.	
	1	SS	1	2.5	4	5	5	16	SM				LOOSE, BROWN FINE SAND, MOIST, SOME SILT.	
	2	SS	3	4.5	5	5	9	18	SM				BLACK, DARK GRAY SAND WITH DECOMPOSED ORGANIC ODOR FROM 1.5 TO 2.5 FEET AND AGAIN AT 6 TO 7.2 FEET.	
5														
	3	SS	6	7.5	3	4	4	18	SM					
10	4	SS	9	10.5	10	3	5	18	SM				SAME, TRACE ORANGE STAINING 9.5 - 10 FEET.	
	5	BR	11	12	-			12	SM				SAME, DARK BROWN, TRACE ROOTS.	
15														
	6	BR	15	16	-	18		12	SM				SAME, TRACE ROOTS.	
20														
	7	BR	20	21	-	12		12	SP				BROWN SAND, MOIST. FROM 20 TO 24 FEET, NO FINES.	
25														
	8	BR	25	26	-	11		12	SC				STIFF, BROWN CLAYEY SAND.	
30														
35														
	9	BR	35	36	-	18		12	SM				MEDIUM DENSE, BROWN, FINE SAND, SOME SILT AND CLAY. CLEAN (NO FINES) SAND LENSE AT 35.5 FEET.	
40												40	HARDER DRILLING AT 40 FEET.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-5
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PROJECT NAME UNC
BORING LOCATION N 74747.3 E 57312.2 SURFACE ELEV. 6991.9
DRILLER HEBER MINING & EXPLORATION DATE: START 11-5-86 FINISH 11-5-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6 / 6-12 / 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
45	10	BR	45	-	50/0	0						
50	11	SS	50	50.2	100/2	2					SOFT TO MODERATELY HARD, TAN, FINE SANDSTONE.	
55											NOTES: 1) TOTAL DEPTH 55.2 FEET. 2) NO GROUND WATER ENCOUNTERED. 3) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-6
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PROJECT NAME UNC
BORING LOCATION N 74773.4 E 57456.0 SURFACE ELEV. 6991.9
DRILLER HEBER MINING & EXPLORATION DATE: START 11-5-86 FINISH 11-5-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													6 INCHES CONCRETE.	
	1	SS	1	2.5	6	11	6	14	SM				MEDIUM DENSE, BROWN SAND, MOIST, SOME SILT, TRACE COARSE SAND AND GRAVEL.	
	2	SS	3	4.5	8	6	8	18	SM					
5														
	3	SS	6	7.5	2	3	4	18	SM				SAME, LOOSE, SOME TAN AND ORANGE STRINGERS.	
10	4	BR	9	10.5	4	4	4	10	SM				SAME, SOME LENSES (1/2-TO 1-INCH THICK) MODERATELY HARD SANDSTONE.	
15	5	BR	14.5	15.5	-	8		12	SM				SAME.	
20	6	BR	19	20	-	19		12	SM				STARTING AT 19.8 FEET, MEDIUM DENSE, BROWN SAND, MOIST, SOME SILT.	
25	7	BR	24	25	-	12		10	SM				SAME.	
30	8	BR	29	30	-	38		12	SM				SAME.	
													NOTES: 1) TOTAL DEPTH 40 FEET. 2) 4-FOOT DIAMETER HOLE THROUGH CONCRETE NEARBY. 3) NO GROUND WATER ENCOUNTERED. 4) CME 55 DRILL RIG.	
35														
40	9	BR	39	40	-	45		12	SM				SAME, DRY.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-7
LOGGED BY DALE EVANS
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PROJECT NAME UNC
BORING LOCATION N 75106.4 E 57445.3 SURFACE ELEV. 6998.9
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
	1	SS	0.5	2	27	14	14	18	SM				4 INCHES ASPHALT.	
													GRAY-BROWN, SILTY, SANDY, GRAVELLY FILL. THIN LAYER OF LIMESTONE CAP-ROCK.	
	2	SS	3	4.5	7	8	13	18	SM					
5												6.5		
	3	SS	6	7.5	8	12	14	18	SM				OLIVE-GRAY SILTY SAND WITH ORGANICS, BECOMING DARK GRAY AT 7.5 FEET.	
												9		
10	4	SS	9	10.5	4	4	5	18				11	WEATHERED YELLOW-BROWN SANDSTONE, LITTLE SILT, TRACE COAL FRAGMENTS, OXIDES. BECOMING FIRM AT 11 FEET.	
	5	SS	12	12.5	100			6						
15														

NOTES:
1) TOTAL DEPTH 12.5 FEET.
2) NO GROUND WATER ENCOUNTERED.
3) CME 55 DRILL RIG.

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Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-M-8
LOGGED BY DAVID KURZ
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PROJECT NAME UNC
BORING LOCATION N 75376.4 E 57488.9 SURFACE ELEV. 6996.3
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
	1	SS	0	1.5	3	6	35		SP-SM				LOOSE, LIGHT GRAY FINE SAND, MOIST, TO 0.3 FEET.	
	2	SS	3	3.5	100/6			6					DENSE, BROWN, SILTY FINE SAND, MOIST, TO 1 FOOT.	
5													HARD, LIGHT BROWN, FINE SANDSTONE, DRY.	
	3	SS	6	7	16	50/6		12					SAME.	
10														

NOTES:
1) TOTAL DEPTH 7 FEET.
2) NO GROUND WATER ENCOUNTERED.
3) CME 55 DRILL RIG.

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Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-M-9
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PROJECT NAME UNC
BORING LOCATION N 75279.5 E 57656.3 SURFACE ELEV. 6991.6
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
	1	SS	0	1	26	50	-	12	SM				VERY DENSE, LIGHT GRAY SAND, MOIST, SOME GRAVEL, TRACE CLAY AND SILT.	
5	2	SS	3.5	5	5	6	6	18	SM				MEDIUM DENSE, LIGHT BROWN FINE SAND, TRACE SILT AND CLAY, WHITE SILT STRINGERS. BECOMING REDDISH BROWN AT 6 FEET.	
10	3	SS	7.5	9	8	9	9	18	SM				SAME.	
15	4	SS	13.5	15	4	4	5	18	SM				SAME, TRACE COAL CHIPS.	
												17	CUTTINGS BECOMING BROWN WEATHERED SANDSTONE.	
20	5	SS	18.5	19	50/5			5					SOFT TO MODERATELY HARD, BROWN-GRAY SANDSTONE, MOIST, TRACE COAL CHIPS AND IRON OXIDE STAINING (CONTACT APPROXIMATE).	

NOTES:
1) TOTAL DEPTH 19 FEET.
2) NO GROUND WATER ENCOUNTERED.
3) CME 55 DRILL RIG

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Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-M-10
LOGGED BY DAVID KURZ
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PROJECT NAME UNC
BORING LOCATION N 75266.2 E 57861.6 SURFACE ELEV. 6990.2
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	6-12	12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
	1	SS	0	1.2	8	19	50/2	14	SP			1	MEDIUM DENSE, LIGHT GRAY FINE SAND, MOIST, BROWN SAND STRINGERS.	
5	2	SS	3	3.4	100/5			5					SOFT TO MODERATELY HARD, LIGHT BROWN SANDSTONE, DRY, TRACE SILT.	
	3	SS	6	6.9	11	50/5		11					SAME.	
10													NOTES: 1) TOTAL DEPTH OF 6.9 FEET. 2) NO GROUND WATER ENCOUNTERED. 3) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-11
LOGGED BY DALE EVANS
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PROJECT NAME UNC
BORING LOCATION N 75373.2 E 57633.9 SURFACE ELEV. 6994.5
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
												0.5	BROWN SILTY SAND.	
													BROWN SANDY SILTSTONE.	
5														
													NOTES: 1) TOTAL DEPTH 4 FEET. 2) NO GROUND WATER ENCOUNTERED. 3) 4-INCH SOLID STEM AUGER. 4) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-12
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PROJECT NAME UNC
BORING LOCATION N 75392.0 E 57778.8 SURFACE ELEV. 6994.6
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
												0.5	BROWN SILTY SAND.	
													BROWN SANDY SILTSTONE.	
5														
													NOTES: 1) TOTAL DEPTH 4 FEET. 2) NO GROUND WATER ENCOUNTERED. 3) 4-INCH SOLID STEM AUGER. 4) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-13
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PROJECT NAME UNC
BORING LOCATION N 75048.2 E 57844.3 SURFACE ELEV. 6985.1
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	6-12	12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													BROWN SANDY SILTSTONE.	
5														

NOTES:
1) TOTAL DEPTH 4 FEET.
2) NO GROUND WATER ENCOUNTERED.
3) 4-INCH SOLID STEM AUGER.
4) CME 55 DRILL RIG.

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-14
LOGGED BY DALE EVANS
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PROJECT NAME UNC
BORING LOCATION N 74958.9 E 57729.7 SURFACE ELEV. 6988.5
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
												0.5	GRAY SILTY SAND.	
													BROWN SANDY SILTSTONE.	
5														
													NOTES: 1) TOTAL DEPTH 4 FEET. 2) NO GROUND WATER ENCOUNTERED. 3) 4-INCH SOLID STEM AUGER. 4) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-M-15
LOGGED BY DALE EVANS
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PROJECT NAME UNC
BORING LOCATION N 74971.8 E 57593.8 SURFACE ELEV. 6992.8
DRILLER HEBER MINING & EXPLORATION DATE: START 11-4-86 FINISH 11-4-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													BROWN SANDY SILTSTONE.	
5														
													NOTES: 1) TOTAL DEPTH 4 FEET. 2) NO GROUND WATER ENCOUNTERED. 3) 4-INCH SOLID STEM AUGER. 4) CME 55 DRILL RIG.	

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PROJECT No. RM 86-060-01
BORING No. 86-RP-B-1
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PROJECT NAME UNC
BORING LOCATION N 78021.8 E 61445.6 SURFACE ELEV. 6975.1
DRILLER HEBER MINING & EXPLORATION DATE: START 11-6-86 FINISH 11-6-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
5	1	SS	5	6.5	5	8	14	18	SM				MEDIUM DENSE, BROWN SILTY SAND, DRY (ALLUVIUM).	
10	2	SS	10	11.5	7	15	16	18	SM				SAME. CUTTINGS DAMP AT 12 FEET.	
15	3	SS	15	16.5	4	3	3	18	SM				SAME, MOIST.	
20														
25	4	SS	25	26.5	12	8	9	18	SC				SAME, SOME CLAY, DAMP.	

NOTES:
1) TOTAL DEPTH 26.5 FEET.
2) NO GROUND WATER ENCOUNTERED.
3) CME 55 DRILL RIG.

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Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-B-2
LOGGED BY DAVID KURZ
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PROJECT NAME UNC
BORING LOCATION N 76833.1 E 61535.4 SURFACE ELEV. 6994.3
DRILLER HEBER MINING & EXPLORATION DATE: START 11-6-86 FINISH 11-6-86

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
5													BROWN SILTY SAND, DRY. ALTERNATING ZONES OF HIGHLY WEATHERED SANDSTONE AND HARD LENSES.	
													HARD, BUT RIPPABLE LENSES AT 7, 12, AND 17 FEET.	
10														
15														
20														
													NOTES: 1) TOTAL DEPTH 20 FEET. 2) NO GROUND WATER ENCOUNTERED. 3) 4-INCH SOLID STEM AUGER. 4) CME 55 DRILL RIG.	

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Boring Log

PROJECT No. RM 86-060-01
BORING No. 86-RP-B-3
LOGGED BY DAVID KURZ
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PROJECT NAME UNC
BORING LOCATION N 76631.5 E 61199.1 SURFACE ELEV. 6965.9
DRILLER HEBER MINING & EXPLORATION DATE: START 11-6-86 FINISH 11-6-86

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0-6	BLOW COUNT 6-12	BLOW COUNT 12-18	RECOVERY IN INCHES	U.S.C.S. SOIL TYPE	PERCENT MOISTURE	qu TSF	CONTACT DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO.
													CUTTINGS, TAN SILTY SAND, DRY.	
5														
	1	SS	5	6.5	7	11	11	18	SM				MEDIUM DENSE, BROWN SILTY SAND, SOME ROOTS, TRACE ORANGE AND WHITE STAINING (ALLUVIUM).	
10														
	2	SS	10	11.5	8	12	20	18	SM				DENSE, BROWN, VERY FINE SAND AND SILT, SOME ORANGE, YELLOW, AND WHITE MOTTLING.	
												14		
15														
	3	SS	15	15.9	17	50/5		11					MODERATELY HARD, DARK BROWN SHALE (CONTACT APPROXIMATED).	
20													CUTTINGS, VERY DARK BROWN AT 22 FEET.	
25														
	4	SS	25	25.2	50/2			2					SAME, ORANGE IRON OXIDES PREVALENT.	

NOTES:
1) TOTAL DEPTH 25.2 FEET.
2) NO GROUND WATER ENCOUNTERED.
3) CME 55 DRILL RIG.

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APPENDIX A-5

Test Pit Logs

DATE BEGAN: 11/5/86
DATE FINISHED: 11/5/86
GROUND SURFACE EL.: 6957.2

TEST PIT NO. 86RP-TP-1
N 75782.9 E 59844.1

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
			LIGHT BROWN SAND, LITTLE SILT, TRACE GRAVEL	PIT APPROXIMATELY 133 FEET EAST OF RADIAL AT C+400
	5			1-GALLON BAG SAMPLE AT 5-6 FEET
			GRAVELLY LENSE AT 6-7 FEET	3.5-GALLON SAMPLE AT 5-6 FEET
	10			
	11			
	12		STIFF DARK BROWN SILT, LITTLE SAND	
			BOTTOM OF PIT AT 12 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/5/86
DATE FINISHED: 11/5/86
GROUND SURFACE EL.: 6962.0

TEST PIT NO. 86RP-TP-2
N 76339.2 E 60379.2

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	0.5		BROWN SILT, CLAYEY, LITTLE SAND, MOIST	PIT APPROXIMATELY 115 FEET WEST OF RADIAL AT C+175
	5			1-GALLON BAG SAMPLE AT 4-5 FEET
	5.5			3.5-GALLON SAMPLE AT 6-7 FEET
	6		DARK BROWN SILT, CLAYEY, MOIST	
			BROWN SAND, LITTLE SILT, MOIST	
			OCCASIONAL CLAYEY SILT STRINGERS	
	10			
	12		BOTTOM OF PIT AT 12 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/5/86
DATE FINISHED: 11/5/86
GROUND SURFACE EL.: 6966.9

TEST PIT NO. 86RP-TP-3
N 75907.1 E 60607.5

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
			LIGHT BROWN SILTY SAND, MOIST	PIT APPROXIMATELY 125 FEET EAST OF RADIAL AT C+600
				1-GALLON BAG SAMPLE AT 7-8 FEET
	5		BECOMING CLEAN, MOIST	1-GALLON BAG SAMPLE AT 11-12 FEET
	10			
	11		DARK BROWN SANDY SILT, MOIST	
	12		BOTTOM OF PIT AT 12 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/5/86
DATE FINISHED: 11/5/86
GROUND SURFACE EL.: 6958.3

TEST PIT NO. 86RP-TP-4
N 75751.3 E 60715.0

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	5		HARD, BROWN SILT, SOME CLAY, ORGANICS, MOIST BECOMING DRY	PIT APPROXIMATELY 115 FEET EAST OF RADIAL D 1-GALLON BAG SAMPLE AT 2-3 FEET 1-GALLON SAMPLE AT 2-3 FEET 3.5-GALLON SAMPLE AT 2-3 FEET 1-GALLON BAG SAMPLE AT 8-9 FEET
	9		YELLOWISH LIGHT BROWN FINE SAND, TRACE SILT	
	10		BOTTOM OF PIT AT 9 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 6975.4

TEST PIT NO. 86RP-TP-5
N 77965.7 E 60521.2

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	5 10 11		SILTY SAND, TRACE GRAVEL, ORGANICS, MOIST BECOMING CLEAN, DRY, SOME GRAVEL OCCASIONALLY THIN GRAVEL ZONES WITH COBBLES UP TO 4 INCHES IN DIAMETER	1-GALLON BAG SAMPLE AT 1-2 FEET 1-GALLON BAG SAMPLE AT 6 FEET
	15 20 25		BOTTOM OF PIT AT 11 FEET	

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 6980.2

TEST PIT NO. 86RP-TP-6
N 78086.6 E 61903.8

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	5		DARK BROWN CLAYEY SILT, ORGANICS, MOIST BECOMING DRY	1-GALLON BAG SAMPLE AT 1 FOOT 1-GALLON BAG SAMPLE AT 9-10 FEET
	10		LIGHT BROWN SAND, LITTLE SILT	
	11		BOTTOM OF PIT AT 11 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 6984.2

TEST PIT NO. 86RP-TP-7
N 77410.3 E 61945.6

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
			DARK BROWN CLAYEY SILT, ORGANICS, MOIST, HIGH DRY STRENGTH	
			BECOMING DRY	HARD DIGGING
				3.5-GALLON SAMPLE AT 4.5 FEET 1 GALLON SAMPLE AT 4-5 FEET 1 GALLON BAG SAMPLE AT 4-5 FEET 1 GALLON BAG SAMPLE AT 9-10 FEET
	5		BECOMING SANDY	
			LIGHT BROWN FINE SAND, LITTLE SILT	
	10			
	11		BOTTOM OF PIT AT 11 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 6984.3

TEST PIT NO. 86RP-TP-8
N 77252.8 E 61551.8

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	1		DARK BROWN SILT, LITTLE SAND, MOIST	
			LIGHT BROWN FINE SAND, LITTLE SILT, TRACE GRAVEL	3.5-GALLON SAMPLE AT 3-5 FEET
	5		OCCASIONAL THIN GRAVELLY STRINGERS	
	10			
	11		BOTTOM OF PIT AT 11 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 6963.1

TEST PIT NO. 86RP-TP-9
N 76290.5 E 60906.4

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
			LIGHT BROWN SILTY SAND, MOIST	PIT ADJACENT TO RADIAL AT C+400
	2		BECOMING DRY	
			DARK BROWN SILT, LITTLE CLAY AND SAND	1 GALLON BAG SAMPLE AT 5 FEET
	5			
			FINE SAND, LITTLE SILT, TRACE TO LITTLE GRAVEL	
	10		THIN GRAVELLY LAYERS	
	11		BOTTOM OF PIT AT 11 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 7023.7

TEST PIT NO. 86RP-TP-10
N 75887.6 E 61421.8

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	2 4		REDDISH BROWN SILT, LITTLE CLAY, TRACE SAND, MOIST, BECOMING DRY DARK BROWN SILT, LITTLE CLAY AND SAND	PIT 68 FEET WEST OF RADIAL E+500 (494.547)
	5		MEDIUM SOFT GRAY SHALELY SILTSTONE, SOME THIN SANDY LAYERS, BROKEN TO VERY BROKEN	SILTSTONE WAS RELATIVELY EASY TO EXCAVATE 3.5-GALLON SAMPLE AT 2-3 FEET 1-GALLON BAG SAMPLE AT 7 FEET 1-GALLON BAG SAMPLE AT 9 FEET
	9.5 10		MEDIUM HARD LIGHT GRAY SANDSTONE	
			BOTTOM OF PIT AT 9.5 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 7017.4

TEST PIT NO. 86RP-TP-11
N 76192.3 E 61643.9

FIELD ENGINEER: D. Evans
CHECKED BY: D. Kurz

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	4		Reddish Brown Silt, Little Clay, Trace Sand, Moist Becoming Dry	
	5 6		Medium Hard to Hard Gray-White Mottled Sandstone, Broken to Blocky	
			Bottom of Pit at 6 Feet	
	10			
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 7976.8

TEST PIT NO. 86RP-TP-12
N 76806.9 E 59972.9

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
			BROWN SILT, SOME SAND, LITTLE GRAVEL BECOMING DRY	
	5			1-GALLON BAG SAMPLE AT 6 FEET
	10			
	12		BOTTOM OF PIT AT 12 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 6973.0

TEST PIT NO. 86RP-TP-13
N 77601.0 E 60129.6

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	1		BROWN SILT, WET	
	2.5		MEDIUM HARD GRAY-BROWN SHALELY SILTSTONE	
			BOTTOM OF PIT AT 2.5 FEET	1-GALLON BAG SAMPLE AT 1.5 FEET
	5			
	10			
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 6967.4

TEST PIT NO. 86RP-TP-14
N 77040.9 E 60049.3

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
	4		MEDIUM SOFT, DARK GRAY TO BLACK SILTSTONE, BROKEN TO VERY BROKEN	TEST PIT WAS EXCAVATED INTO SIDE OF EXPOSED ROCK OUTCROP
	5		MEDIUM HARD TO HARD, GRAY-WHITE SANDSTONE, BROKEN TO BLOCKY	
	10		BOTTOM OF PIT AT 5 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

DATE BEGAN: 11/7/86
DATE FINISHED: 11/7/86
GROUND SURFACE EL.: 6961.9

TEST PIT NO. 86RP-TP-15
N 76390.4 E 59464.4

FIELD ENGINEER: D. EVANS
CHECKED BY: D. KURZ

EL. (FT.)	DEPTH (FT.)	PROFILE	DESCRIPTION	REMARKS
			LIGHT BROWN SILTY SAND, MOIST	
	5			1-GALLON BAG SAMPLE AT 6 FEET
	10			
	11		BROWN SANDSTONE	
			BOTTOM OF PIT AT 11 FEET	
	15			
	20			
	25			

PROJECT NO.: RM 86-060-01
PROJECT NAME: UNC

APPENDIX A-6

Existing Soil Stockpile - Geotechnical Data

TABULATIO.. OF TEST RESULTS

Job No. E78-1096

Project Embankment Volumes - Borrow Quantities

Church Rock, New Mexico

Material

Source

HOLE NO.	LOCATION	DEPTH	UNIFIED CLASS.	LL	PI	SIEVE ANALYSIS – ACCUM % PASSING											% Moist	LAB NO
						200	100	40	16	10	4	¼	⅜	¾	1	1½		
1	See Site Plan	4½'	ML	26	NP	54	85	94		98	100						6	96-1
2	See Site Plan	9½'	CL	25	10	53	72	84		90	95		98	100			7	96-2
3	See Site Plan	14½'	SM	NV	NP	48	91	99		100							5	96-3
4	See Site Plan	4½'	CL	34	16	79	95	99		100							8	96-4
5	See Site Plan	4½'	CL	32	15	76	91	98		100							7	96-5
5	See Site Plan	14½'	CL	30	13	62	80	93		100							8	96-6
6	See Site Plan	4½'	CL-ML	24	5	61	84	96		98	99		100				5	96-7
7	See Site Plan	9½'	SM	23	NP	44	85	97		99	100						5	96-8
8	See Site Plan	24½'	CL	33	14	94	99	100									13	96-9
9	See Site Plan	9½'	CL	42	18	93	94	96		98	99		100				11	96-10
10	See Site Plan	9½'	SM	NV	NP	22	43	57		69	79		87	96		100	4	96-11
11	See Site Plan	4½'	CL	31	11	64	86	95		97	99		100				5	96-12
12	See Site Plan	½'	CL	30	8	56	84	91		94	96		99	100			6	96-13
16	See Site Plan	4½'	CH	54	29	93	95	97		99	100						13	96-14
* 18	See Site Plan	4½'	CL	26	11	52	79	90		95	99		100				4	96-15

SERGENT, HAUSKINS & BECKWITH

TABULATIC OF TEST RESULTS

Job No. E78-1096

Project Embankment Volumes - Borrow Quantities

Church Rock, New Mexico

Material

Source

	HOLE NO	LOCATION	DEPTH	UNIFIED CLASS.	LL	PI	SIEVE ANALYSIS – ACCUM % PASSING 200	100	40	16	10	4	¼	⅜	¾	1	1½	% Moist	LAB NO
*	18	See Site Plan	14½'	CL	32	11	92	98	99		100							38	96-16
*	19	See Site Plan	4½'	SM	22	NP	41	64	82		88	94		98	100			5	96-17
	21	See Site Plan	4½'	SM	NV	NP	21	58	85		90	95		99	100			3	96-18
	22	See Site Plan	4½'	CL	28	9	51	74	84		90	95		99	100			5	96-19
	23	See Site Plan	4½'	CL	30	9	56	80	92		94	96		96	98		100	7	96-20
	24	See Site Plan	9½'	CL	43	18	96	97	98		100							10	96-21
	25	See Site Plan	9½'	CL-ML	25	5	52	80	93		98	99		100				20	96-22
	26	See Site Plan	14½'	SM	NV	NP	22	42	52		63	77		91	100			2	96-23
	29	See Site Plan	4½'	CL	49	22	97	98	98		100							10	96-24
	30	See Site Plan	4½'	CL	27	11	55	73	80		86	92		96	100			8	96-25
*	31	See Site Plan	9½'	CL	26	11	52	83	98		99	100						5	96-26
*	32	See Site Plan	4½'	SM	NV	NP	29	70	96		100							5	96-27
	32	See Site Plan	24½'	CL-ML	25	6	61	92	99		100							6	96-28
*	33	See Site Plan	4½'	CL	27	9	51	77	98		100							7	96-29
*	33	See Site Plan	14½'	SM	21	NP	47	86	99		100							5	96-30

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April 26, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Plant
Church Rock Uranium Mill

89-551

Lab No. 1219: Sandy silt, predominantly fine, nonplastic, medium brown, sampled from borrow area, N 72+40, E 60+60 by SHB on April 12, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 4	100
No. 10	99
No. 40	97
No. 100	80
No. 200	55

LIQUID LIMIT NV

PLASTICITY INDEX NP

U.S. CLASSIFICATION ML

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 116.9 pcf

Optimum Moisture 12.8%

Copies: Addressee (2)

REPLY TO: 4700 LINCOLN ROAD, N.E. ALBUQUERQUE, NEW MEXICO 87109

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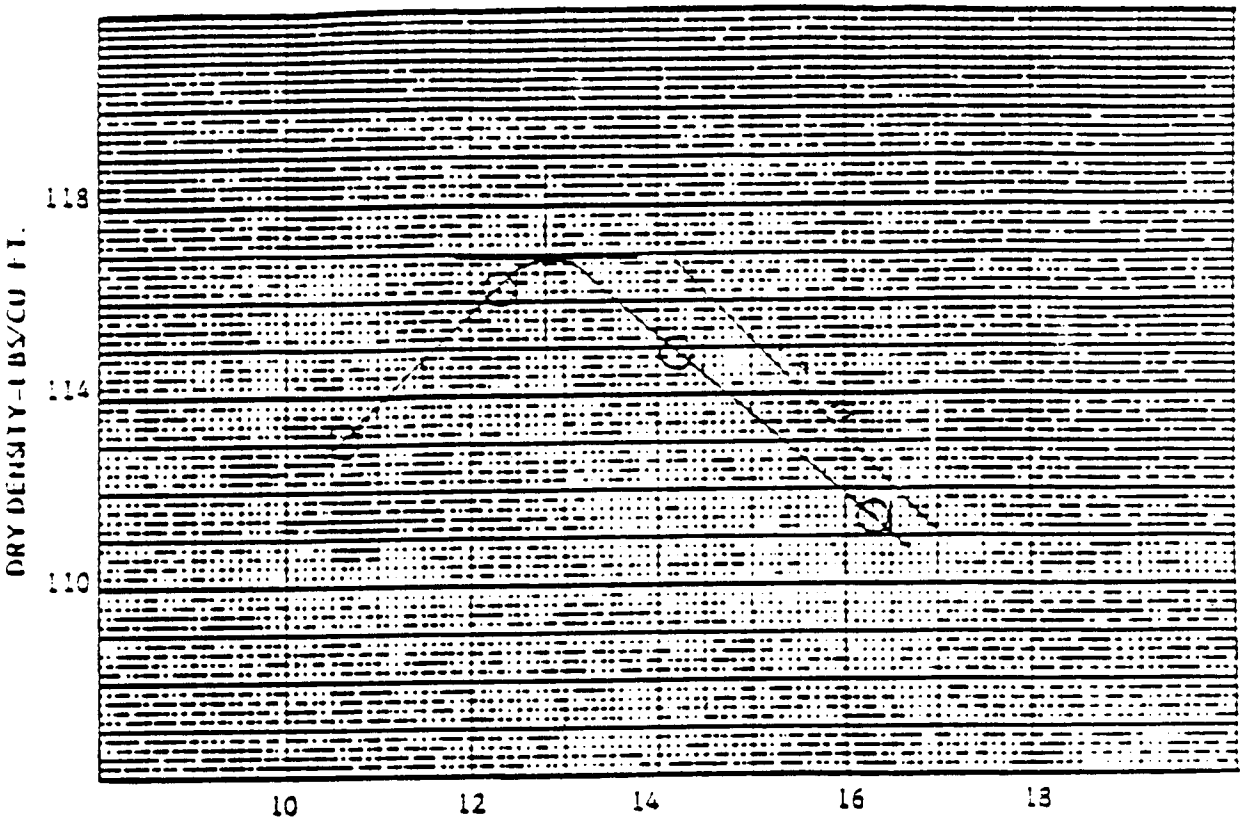
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work - Church Rock JOB NO. C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Borrow area N 72+40,	12.8	116.9	ASTM D698	A	1219
	E 60+80					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	56,944
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	56,944
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	56,944

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX · ALBUQUERQUE · SANTA FE · SALT LAKE CITY

Material: Soil Cover Material — Job No. 314(235

Source of Material: Borrow Areas

Test Procedure: — Tested/Calc. By: H Kuebler — Date:

Reviewed By: — Date:

Sample Pt.	Location	Depth	Classification AASHTO	Classification Unified	LL	PI	Sieve Analysis - Accum % Passing 200	100	50	40	30	16	10	8	4	3/8	1/2	3/4	1	Lab No./Ml
P-16	73100N 5960E	Surface		CL	26	8	59.4	85	94	95	96	96	97	97	98	99	100	-	-	
9055-1 —	Sta 1400 stockpile	Surface		SM-SC	23	3	49.9	79	91	92	92	93	94	95	96	98	100	-	-	
9055-2 —	Borrow Pit #2 stockpile	10'-12.5'		ML-CL	26	7	54.1	84	93	94	95	96	97	97	98	100	-	-	-	
A-13	74260'N 5814E	Surface		CL	27	9	60.1	83	93	94	94	95	96	96	97	99	99	100	-	
L-5	74180N 5222E	6977.4		CL	31	11	65.6	87	95	96	96	97	98	98	99	100	-	-	-	
J-12	73730N 5935E	6980.8		CL	30	15	67.6	86	95	96	97	97	98	98	99	100	-	-	-	
O-16	73800N 6085E	6981.0		SC	25	9	45.4	77	91	93	93	94	95	96	98	99	100	-	-	
D-15	73330N 5833E	6974.9		CL	32	16	61.3	84	94	96	97	98	99	99	100	-	-	-	-	
M-15	73350N 5943E	6992.[illegible]		SC	26	12	48.1	56	84	90	91	92	93	93	94	96	97	98	99	
G-17	73410N 5868E	6967.4		[illegible]	35	15	65.4	86	94	96	96	97	98	98	99	100	100	100	-	

TABULATION OF TEST RESULTS

APPENDIX A-7

North and Central Cell - Geotechnical Data

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April 26, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89 NC-1

Lab No. 1217: Sandy clay, trace of gravel, low plasticity, dark brown sampled from borrow area, N 76+00, E 61+00 by SHB on April 12, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	99
3/8 inch	97
No. 4	96
No. 10	96
No. 40	94
No. 100	80
No. 200	61

LIQUID LIMIT 26

PLASTICITY INDEX 10

U.S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 109.2 pcf

Optimum Moisture 16.0%

Copies: Addressee (2)

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PAUL KAPLAN, P.E.

April 26, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89NC-2

Lab No. 1218: Silty sand, trace of gravel, nonplastic, medium brown, sampled from borrow area, N 75+30, E 59+80, by SHB on April 12, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/8 inch	100
No. 4	99
No. 10	98
No. 40	92
No. 100	70
No. 200	47

LIQUID LIMIT NV

PLASTICITY INDEX NP

U.S. CLASSIFICATION SM

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 119.1 pcf

Opitmum Moisture 11.8%

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June 15, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89 NC-3

Lab No. 1366: Sandy clay, predominantly fine, low plasticity, dark brown, sampled from N 75140, E 59350, FSG -5.0' by SHB on May 26, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 4	100
No. 10	98
No. 40	95
No. 100	84
No. 200	61

LIQUID LIMIT 27

PLASTICITY INDEX 10

U.S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 113.7 pcf

Optimum Moisture 14.0%

Copies: Addressee (2)

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109
PHOENIX (602) [illegible] TUCSON (602) 792-2779 ALBUQUERQUE (505) 864-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 268-0720 EL PASO (915) 564-1017 RENO/SPARKS (702) 331-2373

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MATERIALS ENGINEERING • MATERIALS TESTING • ENVIRONMENTAL SERVICES

June 15, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89 NC-4

Lab No. 1367: Sandy clay, predominantly fine, medium plasticity, dark brown sampled from N 74890, E 59130, FSG -4.0' by SHB on May 26, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 4	100
No. 10	99
No. 40	97
No. 100	89
No. 200	70

LIQUID LIMIT 33

PLASTICITY INDEX 16

U.S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 110.1 pcf

Optimum Moisture 15.5%

Copies: Addressee (2)

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89 NC-5

Lab No. 1548: Silty sand, very fine, nonplastic, tan sampled from 59, 260 E and 74, 570 N by SHB on 7/18/89

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	99
No. 100	69
No. 200	45

LIQUID LIMIT NV

PLASTICITY INDEX NP

U. S. CLASSIFICATION SM

1959-1989 SHB 30 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD, N.E. ALBUQUERQUE, NEW MEXICO 87109

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89NC-6

Lab No. 1547: Sandy clay, trace of gravel, low plasticity, dark brown sampled from North embankment, 59, 500 E & 74, 970 N by SHB on 7/28/89

SIEVE ANALYSIS

Sieve Size	Percent Passing
1/2 inch	100
3/8 inch	100
No. 4	97
No. 10	92
No. 40	87
No. 100	76
No. 200	56

LIQUID LIMIT	25
PLASTICITY INDEX	8
U. S. CLASSIFICATION	CL

1959-1989 SHB 30 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD, N.E. ALBUQUERQUE, NEW MEXICO 87109

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June 15, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89 NC-7

Lab No. 1348: Clayey sand, considerable amount of gravel, low plasticity, dark brown sampled from Toe Dam, N 75250, E 59200 by SHB on May 22, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
2 inches	100
1 1/2 inches	95
1 inch	95
3/4 inch	93
1/2 inch	89
3/8 inch	86
No. 4	79
No. 10	74
No. 40	70
No. 100	63
No. 200	48

LIQUID LIMIT 27

PLASTICITY INDEX 8

U.S. CLASSIFICATION SC - SM

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maxmimum Dry Density 115.5 pcf

Opitmum Moisture 13.4%

Robert E. Dunn

Copies: Addressee (2)

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June 15, 1989

SHB Job No. C89-5034

United Nuclear Corporation
P.O. Drawer CQ
Gallup, New Mexico 87301

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89NC-8

Lab No. 1350: Sandy clay, trace of gravel, medium plasticity, dark brown, sampled from area between NW embankment & Toe Dam by SHB on May 22, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	99
3/8 inch	99
No. 4	98
No. 10	97
No. 40	96
No. 100	80
No. 200	63

LIQUID LIMIT 31

PLASTICITY INDEX 13

U.S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 113.2 pcf

Optimum Moisture 13.3%

Robert E. Saunders

Copies: Addressee (2)

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August 29, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Attn: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89 NC-9.

Lab No. 1509: Sandy clay, fine, medium plasticity, medium brown, sampled from North embankment, by SHB on 7/18/89.

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 4	100
No. 10	99
No. 40	98
No. 100	85
No. 200	60

LIQUID LIMIT 34

PLASTICITY INDEX 17

U. S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 109.0 pcf

Optimum Moisture 16.1%

mjd
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REPLY TO: 4700 LINCOLN ROAD, N.E. ALBUQUERQUE, NEW MEXICO 87109
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July 20, 1989

SHB Job No. C89-5034

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89 NC-10

Lab No. 1492: Silty sand, gravelly, nonplastic, tan, sampled from existing fill area at F6, N cell by SHB on July 12, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3 inches	100
2 inches	91
1 1/2 inches	83
1 inch	79
3/4 inch	73
1/2 inch	67
3/8 inch	63
No. 4	56
No. 10	48
No. 40	43
No. 100	25
No. 200	20

LIQUID LIMIT NV

PLASTICITY INDEX NP

U.S.CLASSIFICATION SM

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 118.3 pcf

Optimum Moisture 11.2%

Robert E. Dendel

Copies: Addressee (2)

REPLY TO: 4700 LINCOLN ROAD, N.E. ALBUQUERQUE, NEW MEXICO 87109

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June 15, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89 NC-11

Lab No. 1349: Clayey sand, trace of gravel, low plasticity, greyish brown sampled from NW embankment (surface) by SHB on May 22, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	99
3/8 inch	99
No. 4	99
No. 10	98
No. 40	90
No. 100	63
No. 200	43

LIQUID LIMIT 22

PLASTICITY INDEX 7

U.S. CLASSIFICATION SC - SM

MOISTURE-DENISTY RELATIONSHIP (ASTM D698)

Maximum Dry Density 121.0 pcf

Opitimum Moisture 12.0%

Copies: Addressee (2)

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

89NC-12

Lab No. 1614: Sandy clay, very fine, medium high plasticity, dark brown sampled from clay barrier @ South end of North cell by SHB on August 28, 1989

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	100
No. 100	82
No. 200	63

LIQUID LIMIT	43
PLASTICITY INDEX	21
U. S. CLASSIFICATION	CL

1959-1989 SHB 30 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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SALT LAKE CITY (801) 266-0720 FAX 266-0727
EL PASO (915) 564-1017 FAX 562-7739
RENO/SPARKS (702) 331-2373 FAX 331-4153

Material: Soil Cover Material — Job No. 314 035

Source of Material: Borrow Areas

Test Procedure: CENTRAL CELL — Tested/Calc By: H. Kuebler — Date:

Reviewed By: — Date:

CENTRAL CELL SUMMARY

	Grid Pt.	Location	Depth	Classification AASHTO	Classification Unified	LL	PI	Sieve Analysis - Accum % Passing 200	100	50	40	30	16	10	8	4	3/8	1/2	3/4	1	Lab No /11
90CC-7	P-16	73100N & 59600E	Surface		CL	26	8	59.4	85	94	95	96	96	97	97	98	99	100	-	-	
	—	Sta 6100 stockpile	Surface		SM-SC	23	3	49.9	79	91	92	92	93	94	95	96	98	100	-	-	
	—	Borrow Pit #2 Stockpile	10'-12.5'		ML-CL	26	7	54.1	84	93	94	95	96	97	97	98	100	-	-	-	
90CC-1	A-13	74260'N & 58[illegible]E	Surface		CL	27	9	60.1	83	93	94	94	95	96	96	97	99	99	100	-	
90CC-5	L-5	73180N & 59278E	6977.4		CL	31	11	65.6	87	95	96	96	97	98	98	99	100	-	-	-	
90CC-4	J-12	73730N & 59370E	6980.8		CL	30	15	67.6	86	95	96	97	97	98	98	99	100	-	-	-	
	O-16	73800N & 60850E	6981.0		SC	25	9	45.4	77	91	93	93	94	95	96	98	99	100	-	-	
90CC-2	Q-15	73330N & 58320E	6974.9		CL	32	16	61.3	84	94	96	97	98	99	99	100	-	-	-	-	
90CC-6	M-15	73350N & 59420E	6922.4		SC	26	12	48.4	56	84	90	91	92	93	93	94	96	97	98	99	
90CC-3	G-17	72410N & 58680E	6967.4		[illegible]	35	15	65.4	86	94	96	96	97	98	98	99	100	100	100	-	

TABULATION OF TEST RESULTS

APPENDIX A-8

Laboratory Permeabilities and Dispersion Testing

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. CS9-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1548: Silty sand, very fine, nonplastic, tan sampled from 59, 260 E and 74, 570 N by SHB on 7/13/89

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	99
No. 100	69
No. 200	45

LIQUID LIMIT NV

PLASTICITY INDEX NP

U. S. CLASSIFICATION SM

1959-1989 SHB 30 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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SALT LAKE CITY (801) 268-0720 FAX 268-0727
EL PASO (915) 564-1017 FAX 562-7739
RENO/SPARKS (702) 331-2375 FAX 331-4153

1989 Reclamation Work
Church Rock Uranium Mill

SHB Job No. C89-5034

REMOLDED PERMIABILITY

95% of ASTM D-698 Method "A", Field Lab #F-1004, Maximum Density 114.7 pcf @ Optimum Moisture 14.4%

Beginning Moisture	14.5%
Final Moisture	19.1%

Flow 1.38×10^{-6} CM/SEC

mjd
Copies: Addressee (2)

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Attn: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1547: Sandy clay, trace of gravel, low plasticity, dark brown sampled from North embankment, 59, 500 E & 74, 970 N by SHB on 7/28/89

SIEVE ANALYSIS

Sieve Size	Percent Passing
1/2 inch	100
3/8 inch	100
No. 4	97
No. 10	92
No. 40	87
No. 100	76
No. 200	56

LIQUID LIMIT	25
PLASTICITY INDEX	8
U. S. CLASSIFICATION	CL

1959-1989 SHB 30 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD, N.E. ALBUQUERQUE, NEW MEXICO 87109

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EL PASO (915) 564-1017 FAX 562-7739
RENO/SPARKS (702) 331-2375 FAX 331-4153

1989 Reclamation Work
Church Rock Uranium Mill

SHB Job No. C89-5034

REMOLDED PERMEABILITY

95% of ASTM D698 Method "A", Field Lab #F-1001, Maximum Density 114.2 pcf
@ Optimum Moisture 13.4%

Beginning Moisture	13.4%
Final Moisture	14.6%

Flow 3.48×10^{-8} CM/SEC

mjd
Copies: Addressee (2)

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1614: Sandy clay, very fine, medium high plasticity, dark brown sampled from clay barrier @ South end of North cell by SHB on August 28, 1989

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	100
No. 100	82
No. 200	63

LIQUID LIMIT	43
PLASTICITY INDEX	21
U. S. CLASSIFICATION	CL

1969-1989 SHB 20 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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EL PASO (915) 564-1017 FAX 562-7738
RENO/SPARKS (702) 331-2375 FAX 331-4153

1989 Reclamation Work
Church Rock Uranium Mill

SHB Job No. C89-5034

REMOLDED PERMIABILITY

95% of ASTM D-698 Method "A", Lab #1509, Maximum Density 109.0 pcf @ Optimum Moisture 16.1%

Beginning Moisture	16.1%
Final Moisture	16.7%

Flow 3.87×10^{-8} CM/SEC

mjd
Copies: Addressee (2)

CENTRAL CELL

Client: UNC

Project:

Soil Type:

Lab Inv.

Location: M-6

Tested By: J. Boyd.

Proctor Values: 112.3 @ 14.5

Proctor Type:

Specimen % Compaction & Moisture Content: 95% @ Optimum

Head Setting, psi	Time	Date

Weight of mold & material

Weight of mold

Weight of material

Moisture content

Wet weight

Dry weight

% Moisture

Material dry weight

Volume

In-place density

Difference

Reading, Q	Time	Date	Head, psi	Q, CM.	t, Sec.	Kt, cm/sec
0.6	10:19	9-6	10			
1.6	10:36	9.6	10	1	1020	3.33×10^{-7}
4.2	11:23	9-6	9	2.6	2820	3.49×10^{-7}
8.4	12:50	9-6	9	4.2	5220	3.039×10^{-7}
11.8	1:42	9-6	9	3.4	3120	4.113×10^{-7}
13.0	2:15	9-6	9.0	1.2	1980	2.290×10^{-7}
14.3	3:15	9-6	9	1.3	3600	1.36×10^{-7}
16.6	3:45	9-6	9	2.3	1800	4.827×10^{-7}

Average 2.937×10^{-7}

112.3 x .95 = 106.7

$K_t = 3.4 \times 10^{-3} \times Q/t \times psi$

Based on Mold HT = 2.999"

ID = 2.507

(K_t = QL/ALT)

106.7 x .00857 = .91

.914 x 453.6 = 414

414.9 x 1.145 = 474.

COEFFICIENT OF PERMEABILITY
CONSTANT HEAD

Rt Perm
Central Cell

'ient: UNC
:oject:
:il Type:

Lab Inv. K035
Location: I-17
Tested By:

:octor Values: 112.0 @ 14.9
Proctor Type:
:ecimen & Compaction & Moisture Content: 95% @ optimum

Head Setting, psi	Time	Date
2	4:14 P.M	8/28
7		
9	8:17 AM	8/29
15	10:07 AM	8/29
20	1:30	8/30
26	5:04	8/30
35	8:24 AM	8/31
40	8:15	8/31

Weight of mold & material: 9.150
Weight of mold
Weight of material

Moisture content
Wet weight
Dry weight
% Moisture

Material dry weight
Volume
In-place density

Difference

ading, Q	Time	Date	Head, psi	Q, CM.	t, Sec.	Kt, cm/sec
6.2	10:59	8/31	41			
6.6	11:25	8/2	41			
Start Over 5.8	11:42	"	"			
6.5	2:12	"	"			6.45×10^{-9}
6.6	2:18	"	"			2.03×10^{-8}
6.9	2:36	"	"			2.30×10^{-8}
7.5	3:15	"	"			2.13×10^{-8}
8.3	4:07	"	"			2.13×10^{-8}

112.0 x .95 = 106.4
106.4 x .00857 = .911
.9118 x 453.6 = 413.
413.6 x 1.149 = 475.3

$= 3.4 \times 10^{-3} \times Q/t \times psi$
sed on Mold HT = 2.999"

$(K_t = QL/ALT)$

3. 1.9×10^{-8} cm/sec

COEFFICIENT OF PERMEABILITY
CONSTANT HEAD

Left Perm
Central Cell

Client: UNC
Project:
Soil Type:

Lab Inv. K035
Location: G-12
Tested By:

Proctor Values: 112.3 @ 14.5
Specimen & Compaction & Moisture Content: 95% @ Optimum

Proctor Type:

Head Setting, psi	Time	Date
2	4:14 P.M	8/28
9	8:17 A.M	8/29
15	10:07 A.M	
20	1:30	8/30
26	5:04	8/30
35	8:24	8/31
40	8:31 A.M	8/31

Weight of mold & material
Weight of mold
Weight of material

Moisture content
Wet weight
Dry weight
% Moisture

Material dry weight
Volume
In-place density

Difference

Reading, Q	Time	Date	Head, psi	Q, CM.	t, Sec.	Kt, cm/sec
1.4	11:01	8-31	41			
3.6	11:25	8-31	41			1.15×10^{-7}
4.5	11:41	8-31	41			9.5×10^{-8}
16.2	2:12	"	"			1.07×10^{-7}
16.7	2:19	"	"			9.87×10^{-8}
16.8	2:35	"	"			8.64×10^{-9}
19.3	3:15	"	"			8.64×10^{-8}
22.9	4:07	"	"			9.57×10^{-8}

$K_t = 3.4 \times 10^{-3} \times Q/t \times psi$
based on Mold HT = 2.999"

$(K_t = QL/ALT)$

(4). 8.67×10^{-8} cm/sec

112.3 x .95 = 106.7
106.7 x .00857 = .91
.9144 x 453.6 = 414
414.9 x 1.145 = 474.

COEFFICIENT OF PERMEABILITY
CONSTANT HEAD

Central Cell

Client: UNC
Project:
Soil Type:

Lab Inv.
Location: SM-5
Tested By:

Proctor Values: 111.3 @ 14.6
Proctor Type:
Specimen % Compaction & Moisture Content: 95% @ Optimum

Head Setting, psi	Time	Date

Weight of mold & material
Weight of mold
Weight of material

Moisture content
Wet weight
Dry weight
% Moisture

Material dry weight
Volume
In-place density

Reading, Q	Time	Date	Head, psi	Difference Q, CM.	Difference t, Sec.	Kt, cm/sec
1.0	1:02	9-7	31			
3.9	1:51	9-7	31	2.9	2940	1.092×10^{-7}
4.8	2:07	9-7	31	.9	960	1.028×10^{-7}
7.0	2:42	9-7	31	2.2	2160	1.197×10^{-7}
9.6	3:13	9-7	31	2.6	1800	1.558×10^{-7}
11.1	3:34	9-7	31	1.5	1260	1.306×10^{-7}
13.1	4:04	9-7	31	2.0	1800	1.218×10^{-7}

Average = 1.218×10^{-7} cm/sec

111.3 X .95 = 105.7
105.7 x .00857 = .906
.9061 x 453.6 = 411.0
411.0 x 1.146 = 471.2

$K_t = 3.4 \times 10^{-3} \times Q/t \times psi$ (K_t = QL/ALT)
Based on Mold HT = 2.999"
TD = 2.507

Canonie Environmental

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By [illegible] Date 9/10/90 Subject [illegible] Sheet No. 1 of ___

Chkd. By [illegible] Date 9/12/90 [illegible] Proj. No. [illegible]

1/4" X 1/4"

CRUMB TEST

METHOD: PLACE SMALL CRUMBS OF CL SOIL FROM THE UNITED NUCLEAR SITE IN A CLEAR BEAKER FILLED WITH DISTILLED, DEMINERALIZED WATER. OBSERVE THE BEHAVIOR OF THE SOIL CRUMB WITH READINGS TAKEN AT 10 AND 30 MINUTES AFTER IMERSION.

DISPERSION IS DETECTED BY FORMATION OF A COLLOIDAL CLOUD, WHICH APPEARS AS A FINE MISTY HALO AROUND THE SOIL CRUMB. FOR EACH READING, THE SOIL CRUMB IS RATED FOR REACTION OR COLLOIDAL CLOUD FORMATION AS FOLLOWS:

1 = NO SIGN OF CLOUDY WATER CAUSED BY COLLOIDAL SUSPENSION

2 = BARE HINT OF COLLOIDAL CLOUD FORMATION AT SURFACE OF SOIL CRUMB.

3 = EASILY RECOGNIZED COLLOIDAL CLOUD COVERING 1/4 TO 1/2 OF THE BOTTOM OF THE BEAKER

4 = STRONG REACTION WITH COLLOIDAL CLOUD COVERING MOST OF THE BOTTOM OF THE BEAKER.

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By mjg Date 9/10/90 Subject UNC Sheet No. 1 of

Chkd. By CBu Date 9/12/90 CRUMB TEST Proj. No. 86-060-21

1/4" X 1/4"

TEST: SAMPLE DESCRIPTION: DK BROWN SILTY CLAY LOW PLASTICITY

SAMPLE I.D.: 86-060-P2 10.5'-11.0'

CRUMB NO.	10 MIN RATING	NOTES	30 MIN RATING	NOTES
1 (20:18)	1 (20:28)	NO VISIBLE CLOUDINESS	1 (20:49)	NO VISIBLE CLOUDINESS
2 "	1 "	"	1 "	"
3 "	1 "	"	1 "	"

SAMPLE I.D.: 86-060-P8 5'-8'

SAMPLE DESCRIPTION: DK. BROWN SILTY CLAY, SOME SAND, LOW PLASTICITY

CRUMB NO.	10 MIN. RATING	NOTES	30 MIN RATING	NOTES
1 (17:50)	1 (18:00)	NO VISIBLE CLOUDINESS	1 (18:22)	No visible cloudiness.
2 "	1 "	"	1 "	"
3 "	1 "	"	1 "	"