102655

FINAL
REMEDIAL INVESTIGATION REPORT
VOLUME II

BERKS SAND PIT
SUPERFUND SITE
LONGSWAMP TOWNSHIP, PENNSYLVANIA

Submitted to

PENNSYLVANIA DEPARTMENT OF
ENVIRONMENTAL RESOURCES
Harrisburg, Pennsylvania

Submitted by

BAKER/TSA, INC.
Coraopolis, Pennsylvania

SEPTEMBER 1988

AR300252

A. WELL AND BORING LOGS

AR300253

APPENDIX A

WELL AND BORING LOGS

Table A-1

BERKS SAND PIT
WELL DATA SUMMARY

Well Number	Well Diameter (in.)	Total Depth (ft.)	Top of Casing Elevation (ft. MSL)	Stick -Up (ft.)	Overburden Thickness (ft.)	Zone of Weathered Bedrock (depth in ft.)	Zone of Competent Bedrock (depth in ft.)
SW-1	2	62.43	975.95	0	12.0	12.0 - 60.0	60.0 - 63.0
SW-2	2	61.	968.03	2.23	34.0	36.0 - 41.0	34.0 - 36.0 41.0 - 61.0
SW-3	2	45.	973.59	2.99	9.0	9.0 - 30.0 31.0 - 45.0	30.0 - 31.0 45.0 - 50.0
SW-4	2	62.	995.30	2.6	13.0	--	13.0 - 62.0
SW-5	2	61.	965.14	2.54	11.0	11.0 - 16.0 20.0 - 61.0	16.0 - 20.0
SW-6	2	61.	983.02	0	8.0	--	8.0 - 61.0
SW-7	2	30.	973.42	0	40.0	--	--
MW-1	6	151.	983.66	0	17.5	17.5 - 25.0 50.0 - 81.0 107.0 - 112.0	25.0 - 50.0 81.0 - 107.0 112.0 - 152.0
MW-2	6	152.	979.53	0	14.0	14.0 - 48.0 81.0 - 98.0 128.0 - 131.0	48.0 - 81.0 98.0 - 128.0 131.0 - 151.0
MW-3	6	157.18	995.33	2.13	9.4	9.4 - 14.0 34.5 - 55.0 60.0 - 116.5 126.0 - 151.0	14.0 - 34.5 55.0 - 60.0 116.5 - 126.0
MW-4	6	150.	968.51	2.21	32.0	32.0 - 57.5 83.5 - 113.0 123.0 - 131.0	57.5 - 83.5 113.0 - 123.0 131.0 - 150.0
MW-5	6	153.	973.19	2.19	27.7	27.7 - 43.0 55.0 - 65.0 96.5 - 98.0 116.0 - 118.0	43.0 - 55.0 65.0 - 96.5 98.0 - 116.0 118.0 - 153.0
MW-6	6	150.	964.66	2.46	34.5	34.5 - 50.0	50.0 - 150.0
MW-7	6	155.	1014.56	1.56	11.5	11.5 - 58.0	58.0 - 155.0
MW-8	6	151.	979.32	2.12	14.5	14.5 - 31.0	31.0 - 150.0
MW-9	6	155.	982.52	2.27	11.5	11.5 - 52.0	52.0 - 150.0

Notes:

1. Well construction details were taken from field notes and are only approximate.
2. No boring log was completed for TB-12.

Table A-2

BERKS SAND PIT
RESIDENTIAL WELL SUMMARY

Residence		Reported Well Depth[1] (ft)	Casing Diameter (in.)	Survey Designation	Top of Casing Elevation (ft. MSL)
Bowen	RW-7	112	NA	0	985.31
Bowers	RW-14	NA	5.5	Bowers	968.19
Erney	RW-11	194	6	N	975.61
Frey	RW-12	NA	NA	Frey	978.54
Gruver	RW-16	NA	NA	NA	NA
Johnson	RW-8	NA	6	Johnson	975.65
Leibensperger	RW-2	160 - 180	NA	G	1,108.69
Lieppert	RW-4	60	NA	L	985.13
Longswamp Township Well Association	RW-19	NA	5.5	LST-2	1,073.03
Merkel	RW-10	547	5.5	Merkel	975.79
Mt. Village (Mobile Home Park)	RW-17	180	6	NA	NA
Ream	RW-5	68	6	M	985.78
Ringler	RW-15	NA	NA	Well	966.51
Robb	RW-6	60	8	P	987.27
Stehman	RW-1	NA	6	F	1,029.22
Thomas	RW-9	122	6	NA	NA
Van Elsywck	RW-3	117	5.5	G - G	995.28
Yannone	RW-13	102	5.5	Yannone	988.47

(1) - Depths are approximate; information provided by owner or field measured.
NA - Not available.

TEST BORING LOG LEGEND

SOIL DESCRIPTION

GRAIN SIZE IDENTIFICATION

NAME	SIZE LIMITS
Boulder	12" OR MORE
Cobbles	3" - 12"
Coarse Gravel	3/4" - 3"
Fine Gravel	4.76 mm (#4) - 3/4"
Coarse Sand	2 mm (#10) - 4.76 mm (#4)
Medium Sand	0.42 mm (#40) - 2 mm (#10)
Fine Sand	0.074 mm (#200)-0.42 mm (#40)
Silt	0.002 mm-0.074 mm (#200)
Clay	Less than 0.002 mm

RELATIVE DENSITY

NONCOHESIVE SOIL

TERM	SPT (Blows/ft)
Very Loose	Below 4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	OVER 50

COHESIVE SOILS

TERM	SPT (Blows/ft)
Very Soft	BELOW 2
Soft	2-4
Medium Stiff	4-8
Stiff	8-15
Very Stiff	15-30
Hard	OVER 30

MOISTURE	DESCRIPTIVE TERMS	
Dry	Trace	0-10%
Damp	Little	10-20%
Moist	Some	20-35%
Wet	And	35-50%

ROCK DESCRIPTIONS

HARDNESS

Very Soft -	Easily gouged by knife, easily scratched by fingernail, easily broken by hand
Soft -	Gouged by knife, scratched by fingernail, difficult to break by hand, powders with hammer
Medium Hard -	Easily scratched by knife, easily broken with hammer
Hard -	Difficult to scratch, breaks with hammer
Very Hard -	Difficult to break, rings when struck

WEATHERING

Decomposed -	Soft to Very soft, bedding and fractures indistinct, no cementation.
Highly Weathered -	Very soft to soft, with medium hard relict rock fragments; little to moderate cementation. Vugs, openings in bedding and fractures (may be filled).
Weathered -	Soft to medium hard. Good cementation, bedding and fractures are pronounced. Uniformly stained.
Slightly Weathered -	Medium hard. Fractures pronounced, non-uniform staining, bedding distinct.
Fresh -	Medium hard to hard. No staining. Fractures may be present. Bedding may or may not be indistinct.

BEDDING AND FRACTURES:

SPACING	BEDDING	FRACTURES
	Indistinct	
LESS THAN 1/2" (1 cm)	Laminated	Fissile
1/2" to 1" (1cm-3cm)	Very Thin	Very Close
1" TO 4" (3cm-10cm)	Thin	Close
4" TO 1' (10cm-30cm)	Moderate	Moderate
1' TO 3' (30 cm-1m)	Thick	Wide
3' TO 10' (1m-3m)	Massive	Very Wide

CONTACTS:

_____ = DEFINITE

_____ _____ = INDEFINITE

. . . . . = GRADATIONAL

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash (Roller Bit)
C = Core
P = Piston
N = No Sample Taken

ABBREVIATIONS

HS = Hollow Stem
NP = Non Plastic
-PL = Below the Plastic Limit
PL = At the Plastic Limit
+PL = Above the Plastic Limit
+LL = Above the Liquid Limit
SPT = Standard Penetration Test
RQD = Rock Quality Designation

BG SOIL TEST BORINGS

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: BG-1
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		9/2/87	0.0 to 8.0	Sunny, 60°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)		Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatio
1							**SAND**, medium grained, some clay, small granitic fragments; light brown; dry, oxidized	
2								
3		A-N						
4								
5								
6	6.0							6.5'
7		S-1	2.0	8 8 9 15			**SAPROLITE**, mica and quartz rich, quartz crystals well developed; light brown; medium dense; decomposed granitic gneiss, trace of remnant foliation, dry	
8	8.0							8.0'
9							End of Boring at 8.0'	
10								

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: BG-1
SHEET 1 OF 1

AR300259

TB SOIL TEST BORINGS

TEST BORING RECORD

Baker Engineers

Michael Baker, Jr., Inc.

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-1
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		8/18/87	0.0 to 13.5	Sunny, 90°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE
S = Split Spoon, A = Auger
T = Shelby Tube, W = Wash
R = Air Rotary, C = Core
D = Denison, P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)		Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatio
1	1.5	A-N					GRANITIC GNEISS, quartz and chlorite rich, albitic, trace of mica; light brown to gray; hard; dry, decomposed, little to no structure	
2	2.5	S-1	1.0	41 45/.4				
3	3.0	A-N						
4	5.0	S-2	2.0	5 15 28 21				
5								
6	7.0	A-N						
7							7.0'	
8	9.0	S-3	2.0	26 35 39 25			GRANITIC GNEISS, chlorite and quartz rich, plagioclase is dominant feldspar, hornblende; orange to tan; hard; dry, highly weathered, friable, highly fractured, foliated	
9								
10	10.0	A-N					Match to Sheet 2	

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: TB-1
SHEET 1 OF 2

AR300261

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: TB-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
11 — 11.5	S-4	1.5	36 47 60/.2			**GRANITIC GNEISS**, chlorite rich, abundant quartz, some hornblende; green to gray; hard; dry, highly weathered and fractured, foliated	
12							
13 — 13.5	A-N					13.5'	
14						End of Boring at 13.5'	
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: TB-1

AR300262

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-2
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		8/18/87	0.0 to 10.0	Sunny, 90°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE
S = Split Spoon, A = Auger
T = Shelby Tube, W = Wash
R = Air Rotary, C = Core
D = Denison, P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)		Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevation
1	1.5	A-N					**GRANITIC GNEISS**, chlorite and quartz rich, some hornblende; orange to greenish gray; hard; dry; highly weathered to decomposed, foliated	
2	2.7	S-1	1.2	36 42 50/.2				
3								
4	5.0	A-N						
5							5.0'	
6	7.0	S-2	2.0	12 18 36 45			**GRANITIC GNEISS**, quartz-rich, some chlorite and hornblende, trace of mica; orange to gray; hard; dry, highly weathered and fractured, foliated, oxidized	
7								
8	9.0	A-N						
9	10.0	S-3	1.0	40 80/.5				
10							End of Boring at 10.0'	

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO : TB-2
SHEET 1 OF 1

AR300263

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI — BORING NO.: TB-3
COORDINATES: EAST — NORTH:
ELEVATION: SURFACE — TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		8/18/87	0.0 to 9.2	Ptly Cldy, 80°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE
S = Split Spoon; A = Auger; T = Shelby Tube; W = Wash; R = Air Rotary; C = Core; D = Denison; P = Piston; N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0 5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevation
1 — 1.5	A-N					**GRANITIC GNEISS**, quartz rich, some mica; tan to light brown; hard; decomposed, dry, no structure	
2 — 3 — 3.5	S-1	2.0	8 13 15 17				
4 — 5 — 5.0	A-N						5.0'
6 — 6.5	S-2		30 50 60/.5			**GRANITIC GNEISS**, quartz rich, abundant chlorite, some mica and hornblende, occasional quartz-rich vein; green to gray; hard; highly weathered, foliated, fractured, dry	
7 — 8 — 9 — 9.0	A-N						
9.2 — 10	S-3		65./.2			End of Boring at 9.2'	

DRILLING CO.: Pennsylvania Drilling — BAKER REP.: R. Christensen
DRILLER: B. Gallihue — BORING NO.: TB-3 — SHEET 1 OF 1

AR300264

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-4
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		8/19/87	0.0 to 11.5	Ptly Cldy, 80°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)		Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatio
1	1.5	A-N					SAND, medium grained, some clay and silt, small pebble clasts, fill material; brown; loose; oxidized, no structure, dry	
2 3	3.5	S-1	2.0	4 7 4 5				
4 5	5.0	A-N						
6 7	7.0	S-2	2.0	5 5 5 7				
8 9	9.0	A-N						
10	10.5	S-3	1.5	1 4 44		3-6	Match to Sheet 2	

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: TB-4
SHEET 1 OF 2

AR300265

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: TB-4

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
10.5	S-3					GRANITIC GNEISS, mica and quartz-rich, some hornblende, occassional quartz vein; brown to gray; hard; highly weathered, dry, foliated	
11.0	S-4		100/.5		20-30		
11						11.0'	
12						End of Boring at 11.0'	
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: TB-4 SHEET 2 OF 2

AR300266

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-5
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		8/19/87	0.0 to 10.5	Sunny, 80°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

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Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)		Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatio
1	1.5	A-N					**SAND**, medium grained, some clay, small pebbles; dark to reddish brown; loose; fill material, dry, no structure, oxidized	
2	3.5	S-1	2.0	2 4 3 4				
4	5.0	A-N					4.5'	
5							**SAPROLITE**, micaceous, occasional quartz veins; orange to gray; stiff to very stiff; decomposed, dry, no structure to trace of structure	
6	7.0	S-2	2.0	4 6 13 14		0		
8	9.0	A-N						
9							**GRANITIC GNEISS**, micaceous, abundant q orange to light brown; hard; highly weathered, foliated, dry	
10	10.5	S-3	1.5			0	10.5'	
							End of Boring at 10.5'	

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: TB-5
SHEET 1 OF 1

AR300267

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-6
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIM
SIZE (DIAM.)	3" OD		6" OD		8/19/87	0.0 to 17.0	Sunny, 80°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)		Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevati
1	1.5	A-N					SAND, some clay and silt, small pebble clasts; dark brown; loose; fill material, dry, no structure	
2–3	3.5	S-1	2.0	4 3 5 5				
4–5	5.0	A-N						
6–7	7.0	S-2	0.0	7 8 7 7				
8–9	9.0	A-N						
10		S-3	2.0	6 8 12 14		6-8	Match to Sheet 2	

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: TB-6

AR300268

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: TB-6

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevati
11.0						**GRANITIC GNEISS**, micaceous, quartz veins, abundant plagioclase; orange; hard; dry, decomposed to highly weathered, foliated	
11							
12	S-4	2.0	15 27 41 50/.5		6-8		
13.0							
13						13.5'	
14	S-5	1.5	29 37 55/.4			**GRANITIC GNEISS**, mica-rich, abundant quartz, albite is dominant feldspar; gray to orange; hard; highly weathered, dry, fractured, foliated	
14.5							
15.0	A-N						
15							
16	S-6	2.0	33 41 47 65/.4				
17.0						17.0'	
17						End of Boring at 17.0'	
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: TB-6 AR300269 SHEET 2 OF 2

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-7
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		8/19/87	0.0 to 19.5	Sunny, 80°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE
S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
1 – 1.5	A-N					SAND, some clay and silt, small pebble clasts; dark brown; loose; fill material, dry	
2 – 3.5	S-1	2.0	4 5 6 4				
4 – 5.0	A-N						
6 – 7.0	S-2	2.0	2 4 3 2				
8 – 9.0	A-N						
10 – 10.0	A-N					Boulder 10.0'	

Match to Sheet 2

DRILLING CO.: Pennsylvania Drilling
DRILLER: B. Gallihue
BAKER REP.: R. Christensen
BORING NO.: TB-7
SHEET 1 OF 2

AR300270

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: TB-7

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
10.5	S-3	0.5	50/.5		15-20	GRANITIC GNEISS, massive quartz veins, micaceous; orange to gray; hard; highly weathered, dry, foliated	
11	A-N						
12.0							
12							
13	S-4	2.0	15 18 24 25				
14.0							
14						14.5'	
15	S-5	2.0	21 24 35 49		48	GRANITIC GNEISS, highly weathered mica, abundant quartz, albite is dominant feldspar; green to gray; hard; highly weathered, dry, very fractured, saprolite zone between 16'-16.5', foliated	
16.0							
16							
17	S-6	2.0	13 15 21 35				
18.0							
18						18.5'	
19	S-7	1.5	38 47 60/.2			GRANITIC GNEISS, quartz-rich, micaceous, plagioclase; orange to brown; hard; highly weathered, dry, foliated	
19.5						19.5'	
20						End of Boring at 19.5'	
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: TB-7 AR300027 SHEET 2 OF 2

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-8
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIM
SIZE (DIAM.)	3" OD		6" OD		9/10/87	0.0 to 18.0	Sunny, 80°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE
S = Split Spoon
A = Auger
T = Shelby Tube
W = Wash
R = Air Rotary
C = Core
D = Denison
P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevati
1 – 2.0	S-1	2.0	11 9 7 8			CLAY, some sand, pebbles; dark brown; medium stiff, organic, damp — 0.5'	
3 – 4.0	S-2	2.0	8 9 10 11			SAND, some clay, small pebbles; light brown to orange; medium dense; dry, fill material, no structure, oxidized — 5.5'	
5 – 6.0	S-3	2.0	4 7 6 7			SAPROLITE, feldspar rich, trace of hornblende; orange to tan; soft to medium stiff; some foliations, decomposed, dry — 8.5'	
7 – 8.0	S-4	2.0	5 6 7 5			QUARTZ VEIN, some mica and plagioclase; orange to tan; decomposed, dry, good structure	
9 – 10.0	S-5	2.0	4 4 4 8				

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: TB-8
SHEET 1 OF 2

AR300272

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: TB-8

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatio
11 – 12.0	S-6	2.0				**SAPROLITE**, quartz-rich, abundant mica and plagioclase, trace of chlorite and hornblende, occasional small quartz seam; orange to tan; stiff to hard; well foliated, dry, decomposed, fractures filled with mica	
12 – 14.0	S-7	2.0					
13 – 16.0	S-8	2.0					
15 – 18.0	S-9	2.0					
17 – 18.0						18.0'	
18						End of Boring at 18.0'	
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: TB-8 SHEET 2 OF 2

AR300273

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-9
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		9/10/87	0.0 to 16.0	Sunny, 80°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
1 – 2 (2.0)	S-1	2.0	5 7 8 9			**CLAY**, some sand; dark brown; medium stiff; organic, damp (0.5')	
3 – 4 (4.0)	S-2	2.0	9 12 17 18			**SAND**, little clay, small granitic fragments; orange to tan; medium dense; dry, oxidized, fill material, no structure (4.0')	
5 – 6 (6.0)	S-3	2.0	11 12 12 13			**SAPROLITE**, quartz rich, abundant feldspar, some mica, trace of chlorite; orange to tan; medium stiff; dry, decomposed, well foliated, filled fractures	
7 – 8 (8.0)	S-4	2.0	5 6 8 10				
9 – 10 (10.0)	S-5	2.0	6 6 6 11				

Match to Sheet 2

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: TB-9
SHEET 1 OF 2

AR300274

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: TB-9

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevati
11	S-6	2.0	10 11 11 12			**SAPROLITE**, quartz rich, abundant feldspar, some mica, trace of chlorite; orange to tan; medium stiff; dry, decomposed, well foliated, filled fractures	
12.0							
13	S-7	2.0	15 17 26 30				
14.0						15.0'	
15	S-8	2.0	27 39 48 62/.5			**GRANITIC GNEISS**, quartz and mica rich, occasional quartz seam, abundant plagioclase; orange to tan; hard; highly weathered, dry, foliated, fractured	
16.0						16.0'	
16						End of Boring at 16.0'	
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: TB-9 SHEET 2 OF 2

AR300275

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-10
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIM
SIZE (DIAM.)	3" OD		6" OD		11/3/87	0.0 to 4.5	Cloudy, Cool		
LENGTH	2"		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
1 — 1.0	S-1	0.85	3 1 7			TOP SOIL 0.3'; roots — 0.3'	
2 — 3.0	S-2	0.6	4 6 20		4-5	CLAY with gneiss chips, trace top soil; clay grades to weathered gneiss; brown; 2 large gneiss pieces	
4 — 4.5	S-3	1.2	1 10 50			4.5'	
5						End of Boring at 4.5'	
6							
7							
8							
9							
10							

DRILLING CO.: Pennsylvania Drilling
DRILLER: B. Adams
BAKER REP.: G. Allen
BORING NO.: TB-10

AR300279

SHEET 1 OF 1

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: TB-11
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		11/3/87	0.0 to 6.0	Cloudy, Cool		
LENGTH	2"		5'						
TYPE	Std.		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE
S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevation
1 — 1.5	S-1	1.2	7 10 10			TOP SOIL 0.3'	
						Fine to medium grained gneiss chips; brown; soft; damp 1.5'	
2 — 3.0	S-2	1.5	7 19 32			Some clay with gneiss chips; brown; weathered, damp, quartz and chlorite 3.0'	
4 — 4.5	S-3	1.5	14 28 50			Weathered gneiss	
5 — 6.0	S-4	0.7	37 50/.3				
6							
7							
8							
9							
10						End of Boring at 9.8'	

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: G. Allen
DRILLER: B. Adams
BORING NO.: TB-11
SHEET 1 OF 1

AR300277

LTB SOIL TEST BORINGS

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
COORDINATES: EAST
ELEVATION: SURFACE

BORING NO.: LTB-1
NORTH:
TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2" OD		4" OD		8/29/87	0.0 to 5.0	Cloudy, 70°		
LENGTH	2'		3'		9/2/87	5.0 to 9.0	Sunny, 70°		
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS: Hand augered to 5'. Acker rig drilled from 5' to 9'.

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
1						**SAND** and clay, small pebbles; black; medium stiff; dry, organic 0.5'	
2.0	S-1	1.0				**SAPROLITE**, clay, some sand, small granite gneiss fragments; light brown to tan; stiff to hard; dry, some to no foliation, decomposed	
2							
3.5	S-2	1.5					
4							
5.0	S-3	1.4					
5							
6							
7.0	S-4	2.0	17 16 25 30				
7						7.5'	
8						**GRANITE GNEISS**, quartz rich, some hornblende, little mica; light brown to orange; hard; dry, highly weathered, hematite staining, fractured and foliated	
9.0	S-5	2.0	21 37 42 60/.5				
9							
10						End of Boring at 9.0'	

DRILLING CO.: Pennsylvania Drilling
DRILLER: B. Gallihue

BAKER REP.: R. Christensen
BORING NO.: LTB-1

SHEET 1 OF 1

AR300279

TEST BORING RECORD

Baker Engineers

Michael Baker, Jr., Inc.

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: LTB-2
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIM
SIZE (DIAM.)	2" OD		4"/6" OD		8/29/87	0.0 to 8.5	Ptly Cldy, 70°		
LENGTH	2'		3'/5'		9/2/87	9.0 to 10.7	Sunny, 70°		
TYPE	STD		S.S./H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS: Hand augered to 8.5'. Acker rig to 10.7'.

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)		Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description		Elevati
1		S-1	1.6				CLAY, some silt and sand, small pebble clasts; light brown; organic, damp, no structure		
2	2.0							2.5'	
3		S-2	1.8				SAPROLITE, quartz rich, hornblende, little mica; light brown to tan; hard; dry; decomposed, little to no structure		
4	4.0								
5		S-3	0.9						
6	6.0							6.5'	
7		S-4	1.7				SAPROLITE, micaceous, little to no quartz; bronze to brown; hard to stiff; dry, friable, decomposed		
8	8.0							8.0'	
	8.5	S-5	0.5				GRANITIC GNEISS, quartz rich, some mica, albite dominant feldspar; orange to tan; hard; highly weathered, foliated, dry, oxidized		
9	9.0	A-N							
10		S-6	1.7						

DRILLING CO.: Pennsylvania Drilling
DRILLER: B. Gallihue
BAKER REP.: R. Christensen
BORING NO.: LTB-2

AR300260

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: LTB-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
10.7	S-6					GRANITIC GNEISS, quartz rich, some mica, albite dominant feldspar; orange to tan; hard; highly weathered, foliated, dry, oxidized 10.7'	
						End of Boring at 10.7'	

11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: LTB-2 SHEET 2 OF 2

AR300281

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: LTB-3
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2" OD		4" OD		8/29/87	0.0 to 4.0	Cloudy, 70°		
LENGTH	2'		3'						
TYPE	STD		S.S.						
HAMMER WT.									
FALL									
STICK UP									

REMARKS:

SAMPLE TYPE

S = Split Spoon
A = Auger
T = Shelby Tube
W = Wash
R = Air Rotary
C = Core
D = Denison
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatio
						CLAY, little sand, pebbles; black; organic, dry — 0.5'	
1	S-1	1.7				CLAY, some sand, granitic gneiss clasts, small quartz pebbles; light brown; dry, oxidized, no structure — 2.5'	
2 — 2.0							
3	S-2	1.5			0	SAND, some clay, granitic gneiss clasts; light brown; dry, oxidized, no structure — 4.0'	
4 — 4.0							
5						End of Boring at 4.0'	
6							
7							
8							
9							
10							

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: LTB-3
SHEET 1 OF 1

AR300282

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: LTB-4
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger and Acker Rig

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2" OD		4"/6" OD		8/30/87	0.0 to 5.0	Sunny, 70°		
LENGTH	2'		3'/5'		9/2/87	5.0 to 7.0	Sunny, 70°		
TYPE	STD		S.S./H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS: Power augered to 5'. Acker Rig from 5' to 7'.

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
1 – 2.0	S-1	1.5				**CLAY**, some sand, small pebble clasts; dark to light brown; organic, dry (2.5')	
3 – 4.0	S-2	1.9				**SAND**, some clay, coarse grained, small pebble clasts; light brown to orange; oxidized, dry (4.5')	
5.0	S-3	1.0			10	**SAPROLITE**, quartz rich, some mica, resistant granitic clasts; tan; decomposed, dry, hematite staining, foliated (7.0')	
6 – 7.0	S-4	2.0	17 20 34 50		30		
7						End of Boring at 7.0'	
8							
9							
10							

DRILLING CO.: Pennsylvania Drilling
DRILLER: B. Gallihue
BAKER REP.: R. Christensen
BORING NO.: LTB-4

SHEET 1 OF 1

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: LTB-5
COORDINATES: EAST
NORTH:
ELEVATION: SURFACE
TOP OF STEEL CASING:

RIG: Power Auger	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2" OD		4" OD		8/30/87	0.0 to 3.7	Sunny, 70°		
LENGTH	2'		3'						
TYPE	STD		S.S.						
HAMMER WT.									
FALL									
STICK UP									

REMARKS:

SAMPLE TYPE
S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatio
1	S-1	1.9				**SAND**, coarse grained, some clay, pebbles; dark to light brown; organic, weathered granitic clasts, dry	
2.0						3.0'	
3	S-2	1.7				**GRANITIC GNEISS**, quartz and mica rich; orange to tan; hard; highly weathered, dry, foliated, fractured	
3.7						3.7'	
4						End of Boring at 3.7'	
5							
6							
7							
8							
9							
10							

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: LTB-5 AR300284 SHEET 1 OF 1

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI — BORING NO.: LTB-6
COORDINATES: EAST — NORTH:
ELEVATION: SURFACE — TOP OF STEEL CASING:

RIG: Acker Rig	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3" OD		6" OD		9/2/87	0.0 to 9.8	Sunny, 70°		
LENGTH	2'		5'						
TYPE	STD		H.S.						
HAMMER WT.	300#								
FALL	30"								
STICK UP									

REMARKS:

SAMPLE TYPE
S = Split Spoon, A = Auger
T = Shelby Tube, W = Wash
R = Air Rotary, C = Core
D = Denison, P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)		Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevatic
1	2.0	S-1	2.0	4 5 6 7			CLAY, some sand, pebbles; black; organic, dry (0.5')	
							SAND, some clay, pebbles; light brown; fill material, dry (1.5')	
2							CLAY and sand; black; organic, burnt wood, dry (2.0')	
3	4.0	S-2	1.3	12 19 38 39			SAPROLITE, quartz rich, micaceous; light brown to orange; stiff to hard; no to slight foliation, decomposed; dry	
4								
5	6.0	S-3	2.0	7 9 12 13		5		
6								
7	8.0	S-4	2.0	7 7 9 13				
8							(9.0')	
9	9.8	S-5	1.8	27 34 42 89/.3			GRANITIC GNEISS, quartz rich, micaceous, orthoclase dominant feldspar; light brown to gray; hard; dry; foliated, highly weathered	
10							End of Boring at 9.8'	

DRILLING CO.: Pennsylvania Drilling — BAKER REP.: R. Christensen
DRILLER: B. Gallihue — BORING NO.: LTB-6 — SHEET 1 OF 1

AR300285

SW MONITORING WELLS

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: SW-1
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 975.95
TOP OF STEEL CASING: 975.95

RIG: Simco Model 4000 TR-2

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		4-1/4"ID		11/4/87	0.0 to 63.0	Sunny, Warm		
LENGTH	2'		5'						
TYPE	Std.		H.S.						
HAMMER WT.	140#								
FALL	30"								
STICK UP		0.0							

REMARKS: Flush mounted protective hole cover (steel) cemented into place.

SAMPLE TYPE
S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	2"	Schedule 40 Threaded PVC	0.0	23.0
Well Screen	2"	0.02" Slotted PVC	23.0	

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
1						Thin layer of topsoil grading to clay in highly weathered gneiss; some large rocks	solid casing and grout	
2								
3								
4								
5	5.0					5.0'		970.95
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: G. Allen
DRILLER: B. Adams
BORING NO.: SW-1
SHEET 1 OF 4

AR300287

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11						Clay content decreasing with increase in weathered gneiss; grain size	solid casing and grout	
12	12.0					12.0'		963 95
13						Soft weathered gneiss; quartz rich; some hard rock	Bentonite Seal	
14								
15							Silica Sand Pack	960.95
16	16.0					16.0'		959.95
17						Soft weathered gneiss; quartz rich; some hard rock		
18								
19								
20								955.95
21								
22								
23							Slotted screen and sand pack	952.95
24								
25								
26								
27								
28								
29								
30						Match to Sheet 3		945.95

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-1 SHEET 2 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Same as above; water at 31.0'	slotted screen and sand pack	
31								
32						Highly weathered fine to medium grained quartz rich gneiss		
33								
34								
35								
36								
37								
38								
39								
40						Loss of cuttings 40-47'		935.95
41								
42								
43								
44								
45								
46								
47								
48								
49								
50						Match to Sheet 4		925.95

DRILLING CO.: Pennsylvania Drilling BAKER REP: G. Allen

DRILLER: B. Adams BORING NO.: SW-1

AR300289

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
51							slotted screen and sand pack	
52								
53								
54								
55								
56								
57								
58								
59								
60								915.95
61						Gneiss with trace chlorite and some large quartz crystals		
62								
63	63.0					63.0'		912.95
64						End of Boring at 63.0'		
65								
66								
67								
68								
69								
70								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-1

AR300290

SHEET 4 OF 4

TEST BORING AND WELL CONSTRUCTION RECORD

Michael Baker, Jr., Inc.

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: SW-2
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 965.8
TOP OF STEEL CASING: 968.03

RIG: Simco Model 4000 TR-2	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"	4"	4-1/4"ID		11/2/87	0.0 to 61.0	Cloudy, Cool		
LENGTH	2'	5'	5'						
TYPE	Std.	Steel	H.S.						
HAMMER WT.	140#								
FALL	30"								
STICK UP		2.23'							

REMARKS:

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	2"	Schedule 40 Threaded PVC	≈-2.0	21.0
Well Screen	2"	0.02" Slotted PVC	21.0	

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
1	1.0					**TOPSOIL**, some organics; brown; damp 1.0'	PVC casing and grout	965.80
								964.80
2						Saprolite with some quartz grains and gneiss		
3								
4								
5								
6								
7								
8								
9						Thin zone of gneiss		
10						Match to Sheet 2		

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: G. Allen
DRILLER: B. Adams
BORING NO.: SW-2
SHEET 1 OF 4

AR300291

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: SW-2

Michael Baker, Jr., Inc.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0 5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11, 12, 13, 14					0	Same as above	solid casing and grout	
15	15.0					15.0'		950.80
16						Soft zone, finer grained sand, highly weathered; brown		
17	17.0					17.0'		948.80
18						Fine grained highly weathered feldspar with little medium grained granite; tan; damp	Bentonite Seal	
19	19.0					19.0'		946.80
20						Saprolite; brown	silica sand pack	
21	21.0					21.0'		944.80
22, 23, 24						Saprolite	slotted screen and sand pack	943.80
25	25.0					25.0'		940.80
26, 27, 28, 29, 30						CLAY content increasing, weathered feldspar; light gray; dry to damp		
						Match to Sheet 3		935.80

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: B. Adams BORING NO.: SW-2 SHEET 2 OF 4

AR300292

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: SW-2

Michael Baker, Jr., Inc.

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
31							slotted screen and sand pack	
32						Same as above; producing 3-5 gpm; soft zone; finer grain-size, increase in water production 5-7 gpm		
33								
34	34.0					34.0'		931.80
35						Gneiss; hard		
36	36.0					36.0'		9[illegible]
37						Soft zone		
38								
39								
40								925.80
41	41.0					41.0'		924.80
42						Quartz, mafic, mica rich gneiss		
43								
44								
45								
46								
47								
48								
49						Producing ~ 50 gpm		
50						Match to Sheet 4		915.80

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: B. Adams BORING NO.: SW-2 SHEET 3 OF 4

AR300293

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: SW-2

Michael Baker, Jr., Inc.

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
51						Same as above	slotted screen and sand pack	
52								
53								
54								
55								
56								
57								
58								
59								
60								
61	61.0					61.0'		904.80
62						End of Boring at 61.0'		
63								
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: B. Adams BORING NO.: SW-2 SHEET 4 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: SW-3
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 970.6
TOP OF STEEL CASING: 973.59

RIG: Simco Model 4000 TR-2

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"	4"	4-1/4"ID		10/30/87	0.0 to 60.0	Cloudy, Cool		
LENGTH	2'	5'	5'						
TYPE	Std.	Steel	H.S.						
HAMMER WT.	140#								
FALL	30"								
STICK UP		2.99'							

REMARKS:

SAMPLE TYPE
S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	2"	Schedule 40 Flush Threaded PVC	≈-2.7	25.0
Well Screen	2"	0.02" Slotted PVC	25.0	

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
1						CLAY, some sand, some silt, little granite fragments; brown; stiff; dry	solid casing and grout	970.60
2								
3								
4								
5								
6								
7								
8								
9	9.0					9.0'		961.60
10						Weathered granite gneiss; light brown; medium hard; dry Match to Sheet 2		960.60

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: F. Jones
DRILLER: B. Adams
BORING NO.: SW-3
SHEET 1 OF 3

AR300295

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-3

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11							solid casing and grout	
12								
13						Weathered granite gneiss; light brown; dry		
14								
15								
16								
17	17.0					17.0'		953.60
18						Saprolite, micaceous, very sandy, significant cave-in; light brown; moist to wet, very loose		
19								
20							Bentonite Seal	950.60
21								
22								
23								947.60
24							silica sand pack	
25							slotted screen and sand pack	945.60
26								
27								
28								
29						30.0'		
30	30.0					Match to Sheet 3		940.60

DRILLING CO.: Pennsylvania Drilling BAKER REP.: F. Jones

DRILLER: B. Adams BORING NO.: SW-3

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-3

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
31.0						Granite gneiss; light brown; medium hard; moist to dry 31.0'	slotted screen with silica sand pack	939.60
31						Saprolite, very micaceous and sandy; light brown; very soft; water at 36', significant caving		
32								
33								
34								
35								
36								
37								
38								
39								
40								930 60
41								
42								
43								
44								
45.0						45.0'	bottom of casing at 45.0'	925.60
45						Granite gneiss		
46								
47								
48								
49								
50.0						End of Boring at 50.0' 50.0'		920 60
50								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: F. Jones AR300297

DRILLER: B. Adams BORING NO.: SW-3 SHEET 3 OF 3

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECOR

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: SW-4
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 992.70
TOP OF STEEL CASING: 995.30

RIG: Simco Model 4000 TR-2

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"	4"	4-1/4"ID		11/2/87	0.0 to 62.0	Cloudy, Cool		
LENGTH	2'	5'	5'						
TYPE	Std.	Steel	H.S.						
HAMMER WT.	140#								
FALL	30"								
STICK UP		2.60'							

REMARKS:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	2"	Schedule 40 Flush Threaded PVC	=-2.4	22.0
Well Screen	2"	0.02" Slotted PVC	22.0	62.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatic
						TOPSOIL; brown 0.5'	solid casing with grout	992.70
1						Highly weathered gneiss, quartz, plagioclase, little chlorite, grading to sand and clay; tan; soft		992.50
2								
3								
4								
5	5.0	A-N						
6	6.5	S-1	1.5	3 10 10				
7	8.0	S-2	0.9	17 52/.4		8.0'		984 70
8								
9	9.5	S-3	1.5	15 28 23				
10						Match to Sheet 2		982 70

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: G. Allen
DRILLER: B. Adams
BORING NO.: SW-4
SHEET 1 OF 4

AR300298

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-4

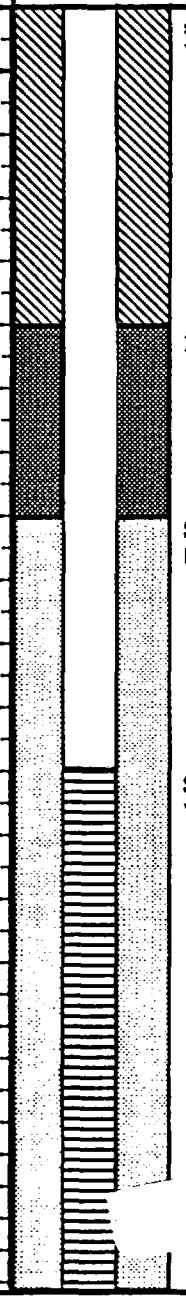
SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Elevation
13.0	S-4	1.0	15 50/.5			11.0'	981.70
						Silty sand; some saprolite, gneiss fragments	
						Gneiss, quartz, plagioclase; hard; fresh	
						Hard	
						Fine grained gneiss	
						Match to Sheet 3	962.70



DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-4 AR300299 SHEET 2 OF 4

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: SW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Same as above	slotted screen with sand pack	
31								
32								
33								
34								
35								
36						Water at 36.0', size of cuttings increases slightly, some chlorite present		
37								
38								
39								
40								952.70
41								
42								
43								
44						Water at 44.0', approximately 4 gpm, drilling rate slow		
45								
46								
47								
48								
49								
50						Match to Sheet 4		942.70

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: B. Adams BORING NO.: SW-4

AR300306

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: SW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
51						Gneiss, low water flow	slotted screen with sand pack	
52								
53								
54								
55								
56								
57								
58								
59								
60								932.70
61								
62						62.0'		930.70
63						End of Boring at 62.0'		
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: B. Adams BORING NO.: SW-4 SHEET 1 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORI

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: SW-5
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 962.60
TOP OF STEEL CASING: 965.14

RIG: Simco Model 4000 TR-2

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"	4"	4-1/4"ID		10/28/87	0.0 to 61.0	Rain, Cool		
LENGTH	2'	5'	5'						
TYPE	Std.	Steel	H.S.						
HAMMER WT.	140#								
FALL	30"								
STICK UP		2.54'							

REMARKS:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	2"	Schedule 40 Flush Threaded PVC	≈-2.3	21.0
Well Screen	2"	0.02" Slotted PVC	21.0	61.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
1						TOPSOIL; black; soft; moist	solid casing and grout	962.60
2						Saprolite with weathered grains of granitic gneiss; brown; soft; moist		
3								
4								
5								
6								
7								
8						Clay with grains of granitic gneiss; brown; soft; moist		
9								
10						Match to Sheet 2		952 60

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: G. Allen
DRILLER: B. Adams
BORING NO.: SW-5
SHEET 1 OF 4

AR300302

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-5

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11	11.0					11.0'	solid casing with grout	951.60
12						Highly weathered gneiss and sparolite; dry		
13								
14								
15	15.0					15.0'		947.60
16	16.0					Increase in gneiss cuttings 16.0'		94[illegible]
17	17.0					Granitic gneiss; hard; dry 17.0'		945.60
18						Piagioclase rich granitic gneiss	Bentonite Seal 17'-20'	
19								
20	20.0					20.0'		942.60
21						Soft zone	silica sand pack	941.60
22							Slotted screen and sand pack	
23						Water at 23.0'		
24								
25								
26								
27								
28								
29						Some gneiss fragments		
30						Match to Sheet 3		932.60

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen AR300303

DRILLER: B. Adams BORING NO.: SW-5 SHEET 2 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-5

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Same as above		
31								
32						Water and mud at 32.0'		
33								
34								
35								
36						Cuttings show no water; tan		
37						Highly weathered granitic gneiss		
38								
39								
40								922.60
41						Clean Hole 41.0'		921.60
42						Water at 44.0', approximately 25 gpm, quartz rich gneiss with glauconite, probable fracture at 45.0' (approx. 5 gpm), sample at 47.0'		
43								
44								
45								
46								
47								
48								
49								
50						Match to Sheet 4		912.60

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-5 SHEET 3 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-5

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
51						Same as above, producing water approximately 20 gpm	slotted screen and sand pack	
52								
53								
54								
55								
56								
57								
58								
59								
60								
61						61.0'		901.60
62						End of Boring at 61.0'		
63								
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-5 AR300305 SHEET 4 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: SW-6
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 983.02
TOP OF STEEL CASING: 983.02

RIG: Simco Model 4000 TR-2									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		4-1/4"ID		11/4/87	0.0 to 61.0	Sunny, Warm		
LENGTH	2'		5'						
TYPE	Std.		H.S.						
HAMMER WT.	140#								
FALL	30"								
STICK UP		0.0							

REMARKS: Flush mounted protective hole cover (steel) cemented into place.

SAMPLE TYPE

S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	2"	Schedule 40 Flush Threaded PVC	0.0	22.0
Well Screen	2"	0.02" Slotted PVC	22.0	61.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
1						Thin layer of top soil, saprolite; black; brown	solid casing and grout	983.02
2								
3								
4								
5								
6								
7								
8						Competent rock at 8.0'		
9						Quartz, plagioclase rich gneiss		
10						Match to Sheet 2		973.02

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: G. Allen
DRILLER: B. Adams
BORING NO.: SW-6
SHEET 1 OF 4

AR300306

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: SW-6

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11						Same as above	solid casing and grout	
12								
13								
14								
15						Change to finer cuttings, weathered gneiss		
16								
17							Bentonite Seal	966.02
18								
19								
20								
21						Water production after additional stem added	silica sand pack	961.92
22							slotted screen and sand pack	961.02
23								
24						Gneiss Water production less than 1 gpm		
25								
26								
27								
28						Abundant quartz and plagioclase, trace chlorite		
29								
30						Match to Sheet 3		953.02

DRILLING CO.: Pennsylvania Drilling BAKER REP: G. Allen
DRILLER: B. Adams BORING NO.: SW-6 AR300307 SHEET 2 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-6

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
31						Some quartz phenocrysts	slotted screen and sand pack	
32								
33								
34								
35								
36						Increasing chlorite content		
37								
38								
39								
40						Gneiss - drilling rate slow		
41								
42								
43								
44								
45								
46								
47								
48								
49								
50						Match to Sheet 4		933 02

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-6

AR300308

SHEET 3 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-6

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
51						Same as above	slotted screen and sand pack	
52								
53								
54								
55								
56								
57								
58								
59								
60								
61	61.0					61.0'		922.02
62						End of Boring at 61.0'		
63								
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-6 AR300309 SHEET 4 OF 4

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: SW-7
COORDINATES: EAST: NORTH:
ELEVATION: SURFACE 973.42
TOP OF STEEL CASING: 973.42

RIG: Simco Model 4000 TR-2

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	2"		4-1/4"ID		11/10/87	0.0 to 50.0	Cloudy, Cold		
LENGTH	2'		5'						
TYPE	Std.		H.S.						
HAMMER WT.	140#								
FALL	30"								
STICK UP		0.0							

REMARKS: Flush mounted protective hole cover (steel) cemented into place.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	2"	Schedule 40 Flush Threaded PVC	0.0	11.0
Well Screen	2"	0.02" Slotted PVC	11.0	30.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
1						Thin layer of topsoil, saprolite	solid casing with grout	973.42
2								
3								
4	4.0					4.0'		969.42
5						Saprolite with numerous granitic gneiss boulders		
6								
7	7.0					7.0'	Bentonite Seal	966.42
8								
9								
10						Match to Sheet 2	silica sand pack	963.42

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: G. Allen
DRILLER: B. Adams
BORING NO.: SW-7
SHEET 1 OF 3

AR300310

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-7

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0 5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11						Same as above	slotted screen and sand pack	962.42
12								
13						Saprolite gradually decreasing in clay content		
14								
15								
16								
17								
18								
19								
20								
21						First water and mud		
22								
23								
24								
25								
26								
27								
28								
29							Bottom of Well 30.0'	
30						Match to Sheet 3		943.42

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-7

AR300339

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: SW-7

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
31								
32								
33						Thick mud at 33.0' less than 1 gpm		
34								
35								
36								
37								
38								
39								
40						Competent bedrock at 40.0',		
41								
42								
43								
44	44.0					44.0'		929.42
45						End of boring due to running sands		
46								
47								
48								
49								
50								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: B. Adams BORING NO.: SW-7 SHEET 3 OF 3

AR300312

MW MONITORING WELLS

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORI

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI — BORING NO.: MW-1
COORDINATES: EAST: — NORTH:
ELEVATION: SURFACE 983.66 — TOP OF STEEL CASING: 983.66

RIG: Acker & Speedstar									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/ 6"ID	4.5"OD		8/13/87	0.0 to 17.5	Sunny		
LENGTH	2'	15.5'/50'	5'		8/27/87	17.5 to 50.0	Raining, Cold		
TYPE	Std.	Steel/ PVC	S.S.		8/28/87	50.0 to 152.0	Raining, Cold	26.0	24 hr
HAMMER WT.	300#								
FALL	30"								
STICK UP		0.0'							

REMARKS: Acker Rig completed well to 17.5'. Speedstar completed well to 152.0'.

SAMPLE TYPE
S = Split Spoon — A = Auger
T = Shelby Tube — W = Wash
R = Air Rotary — C = Core
D = Denison — P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	6"	Sch. 40 Fl. Joint Threaded PVC	0.0	50.0
Well Screen				

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
1 — 2.0	S-1	2.0	3 2 3 3			**CLAY**, some silt and sand, small granitic pebbles; dark brown to light brown; medium stiff; organic, dry (1.0')	10" diameter steel casing to 15.5'	982.66
3 — 4.0	S-2	2.0	2 3 5 8			**SAND**, trace of silt and clay, small granitic pebbles; light brown; stiff; dry, oxidized (4.5')	Borehole ≈10" diameter to 17.5'	979.16
5 — 6.0	S-3	2.0	3 5 6 8			**SAPROLITE**, well developed quartz and feldspar crystals, some mica; orange to light gray; stiff; dry, highly weathered, foliated and fractured (8.0')	Cement bentonite grout	
7 — 8.0	S-4	2.0	6 5 8 10			**SAND**, some clay, small granitic clasts; brown; medium stiff; dry, decomposed (9.0')		.66
9 — 10.0	S-5	2.0	3 5 5 4			Match to Sheet 2		.66 973.66

DRILLING CO.: Pennsylvania Drilling — BAKER REP.: R. Christensen
DRILLER: B. Gallihue/K. Baumgartner — BORING NO.: MW-1 — SHEET 1 OF 9

AR300314

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-1

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
11	S-6	2.0	5 10 8 7			**SAPROLITE**, quartz, mica, plagioclase rich; brown to pinkish white; stiff; oxidized, highly weathered, dry, fractured and foliated (12.0)		
12 (12.0)								971.66
13	S-7	2.0	10 14 25 60/.5			**SAND**, some clay, small quartz pebbles; brown; very stiff; dry, oxidized, decomposed (13.0)		970.66
14 (14.0)						**SAPROLITE**, micaceous, quartz, some hornblende; orange to brown; hard; dry, highly weathered, fractured (14.0')		969.66
15	S-8	2.0	22 25 56 60					968.66
16 (16.0)						**SAND** and **CLAY**, small quartz pebbles; brown; hard; dry, decomposed, no structure (15.0)	Borehole = 6" diameter 17.5' to 152.0'	96[illegible]
17 (17.5)	S-9	1.5	21 40 60/.5			**SAPROLITE**, micaceous, quartz, little hornblende; orange to brown; hard; dry, highly weathered, foliated and fractured (16.0)		966.16
18								
19								
20						**SAND** and **CLAY**, granitic pebbles; brown; hard; dry, no structure (16.5)		963.66
21								
22						**GRANITIC GNEISS**, quartz-rich and micaceous; orange to brown; hard; dry, highly oxidized, highly weathered (17.5)	6" diameter PVC casing to 50.0'	
23								
24						**GRANITIC GNEISS**, well developed quartz crystals; highly weathered, dry		
25								
26								
27								
28								
29								
30						Match to Sheet 3		953.66

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen/G. Allen
DRILLER: B. Gallihue/K. Baumgartner BORING NO.: MW-1 AR300315 SHEET 2 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 2		
31						Formation appears to be of consistant hardness		
32								
33								
34								
35								
36								
37								
38								
39								
40						GRANITIC GNEISS, quartz rich; coarser matrix than above		943.66
41								
42								
43						Encountered water at 43.0'		940.66
44								
45								
46								
47						Possible fracture zone		
48								
49								
50						Match to Sheet 4		933.66

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-1

AR300316

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 3	Open borehole 50.0' to 152.0'	
51						**GRANITIC GNEISS**, quartz, some hornblende, biotite, and plagioclase; weathered, foliated, oxidized		
52								
53								
54								
55								
56								
57								
58								
59								
60								923.66
61								
62								
63								
64								
65								
66								
67								
68								
69								
70						Match to Sheet 5		913.66

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-1 AR300317 SHEET 4 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-1

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 4		
71								
72								
73								
74								
75						Increase in percentage of plagioclase, decrease in percentage of quartz		
76						Increase in oxidization of granitic gneiss		
77								
78								
79								
80								903.66
81						More resistant rock		
82								
83								
84								
85								
86								
87						Same as above with decrease in quartz. Discharge rate 8-12 gal/min. Finer grained matrix.		
88								
89								
90						Match to Sheet 6		893.66

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-1

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-1

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 5		
91						GRANITIC GNEISS, abundant hornblende and biotite. Drill cuttings fine to medium with little coarsed grained cuttings.		
92								
93								
94								
95								
96								
97								
98								
99								
100								883.66
101								
102								
103								
104								
105								
106								877.66
107						Increase in discharge rate, 20-30 gal/min. Fractured zone from 107.0' to 112.0'		
108								
109								
110						Match to Sheet 7		873.66

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-1 AR300319 SHEET 6 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 6		
111						Discharge rate 20-30 gal/min		
112								
113								
114								
115						Gradational change to chlorite-rich granitic gneiss		
116								
117								
118								
119								
120						GRANITIC GNEISS, chlorite-rich, some quartz; foliated		863.66
121								
122								
123								
124								
125								
126								
127								
128						Decrease in chlorite with increase in orthoclase		
129								
130						Match to Sheet 8		853.66

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-1

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 7		
131						Decrease in percentages of plagioclase, hornblende, and biotite		
132								
133								
134								
135								
136								
137								
138								
139								
140								843 66
141								
142								
143								
144								
145								
146						Less chlorite, increase in orthoclase and quartz percentage; oxidized with hematite staining		
147								
148								
149								
150						Match to Sheet 9		833 66

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-1 AR300321 SHEET 8 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-1

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 8		
151								
152								831 66
						End of Boring at 152.0'		
153								
154								
155								
156								
157								
158								
159								
160								
161								
162								
163								
164								
165								
166								
167								
168								
169								
170								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-1 AR300322 SHEET 9 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: MW-2
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 979.53
TOP OF STEEL CASING: 979.53

RIG: Acker Rig & Speedstar Air Rig									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/ 6"ID	4.5"OD		8/11/87	0.0 to 15.0	Sunny, 80's		
LENGTH	2'	14'/50'	5'		8/25/87	15.0 to 50.0	Ptly. Cldy, 60's		
TYPE	Std.	Steel Pipe/PVC	H.S.		8/26/87	50.0 to 150.0	Ptly. Cldy, 60's		
HAMMER WT.	300#				9/8/87	150.0 to 186.0	Raining, 70's		
FALL	30"				9/9/87	186.0 to 229.0	Raining, 70's		
STICK UP		0.0'			9/10/87	229.0 to 251.0	Partly Cloudy		
					9/11/87	251.0 to 290.0	Sunny, 70's		
					9/12/87	290.0 to 300.0	Showers, 70's		

REMARKS: Acker Rig used for augering and coring; Speedstar used for 6" drill and ream.

SAMPLE TYPE

S = Split Spoon, A = Auger
T = Shelby Tube, W = Wash
R = Air Rotary, C = Core
D = Denison, P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH
Well Casing	6"	Sch. 40 Fl. Joint Threaded PVC	0.0	[illegible].0
Well Screen				

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
1, 2 (2.0)	S-1	2.0	1 1 1 2			**SAND**, trace of clay, granitic gneiss pebbles; orange to tan; loose to stiff; oxidized, medium to coarse grained, no structure	10" diameter steel casing to 14.0'	
3, 4 (4.0)	S-2	2.0	3 4 6 11				Borehole ≈10" diameter to 15.0'	
5, 6 (6.0)	S-3	2.0	4 4 7 7			5.0' **SAND**, quartz rich seams, decomposed granitic gneiss; orange to tan; medium stiff; dry, oxidized, trace of foliation, coarse grained		974.53
7, 8 (8.0)	S-4	2.0	5 4 5 3			8.0' **SAND**, trace of clay, pebble clasts; dark brown; loose	Cement bentonite grout	
9, 10 (10.0)	S-5	2.0	2 2 3 4			8.5' **SAPROLITE**, quartz rich, trace of mica; light brown to tan; medium stiff to coarse; dry, oxidized, decomposed		971.53
						Match to Sheet 2		969.53

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: MW-2

AR300323

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 1		
11	S-6	2.0	3 4 6 5			GRANITIC GNEISS, feldspar and quartz, some hornblende and mica, occasional quartz seams; orange to tan; medium stiff; dry, oxidized, foliated, fractures, highly weathered 12.0		967.53
12.0								967.03
13	S-7	2.0	1 3 10 50					
14.0						CLAY, granitic pebbles; tan; loose; dry, decomposed rock 12.5		965.53
15.0	A-N					GRANITIC GNEISS, feldspar and quartz-rich, some mica; wet, foliated, filled fractures, highly weathered 14.0		
16							Borehole = 6" diameter 15.0' to 300.0'	
17						GRANITIC GNEISS, micaceous quartz; light brown to tan; highly weathered, damp		
18								
19								
20								959.53
21							6" diameter PVC casing to 50.0'	
22								
23								
24						Soft zone at 24.0' to 26 .0'		
25								
26								
27								
28								
29								
30						Match to Sheet 3		949.53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen/G. Allen

DRILLER: B. Gallihue/K. Baumgartner BORING NO.: MW-2

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 2		
31								
32						Alternating zones of resistant and less resistant rock		
33								
34								
35								
36								
37								
38								
39								
40								939 53
41						Producing water from the hole		
42								
43								
44								
45								
46								
47						GRANITIC GNEISS; hard; weathered		
48								
49								
50						Match to Sheet 4		929 53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-2

AR300325

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 3	Open bore hole 50.0' to 300.0'	
51						GRANITIC GNEISS, quartz, hornblende and biotite		
52								
53								
54								
55								
56								
57								
58								
59								919.53
60						GRANITIC GNEISS, increase in percentage of hornblende and biotite; very resistant rock		
61								
62								
63								
64								
65						Larger rock fragments. Quartz grains increasing size.		
66								
67								
68								
69								
70						Match to Sheet 5		909 53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-2

AR300326

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 4		
71								
						Discharge rate measured at 6 gal/min		
72								
73								
74								
75								
76								
77								
78								
79								
80								899.53
						Less resistant rock		
81								
82								
83								
84								
						GRANITIC GNEISS, quartz-rich, less hornblende and biotite than above		
85								
86								
87								
88								
89								
90						Match to Sheet 6		889 53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-2 AR300327 SHEET 5 OF 16

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 5		
91								
92								
93								
94								
95								
96						Increase in percentage of hornblende and biotite; more competent rock than above. Flow rate is approximately 20 gal/min		
97								
98								
99								
100								879.53
101								
102								
103								
104								
105						micaceous cuttings		
106								
107								
108						micaceous granitic gneiss		
109								
110						Match to Sheet 7		869 53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-2 SHEET 6 OF 16

AR300328

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Engineers
Michael Baker, Jr., Inc.

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 6		
111						GRANITIC GNEISS, quartz-rich, biotite and hornblende; foliation		
112								
113								
114								
115								
116								
117								
118								
119								
120								859 53
121						Discharge rate is measured at 30 gal/min		
122								
123								
124								
125								
126								
127						Increase in quartz crystal grains; softer rock		
128								
129								
130						Match to Sheet 8		849 53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-2

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 7		
131								
						GRANITIC GNEISS, quartz-rich; more resistant rock than above		
132								
133						Discharge rate is approximately 30 gal/min		
134								
135								
136								
137								
138						GRANITIC GNEISS, decrease in percentage of orthoclase		
139						Discharge rate is 30 gal/min		
140						Decrease in hematite staining		839.53
141								
142								
143								
144						Increase amount of weathering		
145						Larger cuttings from hole		
146								
147								
148								
149						Discharge rate 30 gal/min		
150						Match to Sheet 9		829.53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen AR300330
DRILLER: K. Baumgartner BORING NO.: MW-2 SHEET 8 OF 16

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 8		
151								
152								
153								
154 (154.0)								
155	C-1	10.0'/10.0' 100%	9.0'/10.0' 90%	45°		**GRANITIC GNEISS,** hornblende and chlorite rich; green-black; good foliation, moderately broken		
156				45°				
157				45°		157.0'		822 53
158				70°		**PEGMATITE,** quartz-rich, abundant plagioclase; orange; moderately broken 158.0'		821 53
159				70°		**GRANITIC GNEISS,** hornblende and chlorite rich, chlorite filled fractures; green to black with tan sections; moderately broken, good foliation		
160								
161				45°				
162				45°		163.0'		
163						**PEGMATITE,** quartz-rich, abundant plagioclase, little hornblende, trace of chlorite; orange to white; moderately broken		816 53
164 (164.0)						164.5'		
165	C-2	1.5'/2.0' 75%	1.2'/2.0' 60%	45°				815 03
166 (166.0)								
167	C-3	10.5'/10.0' 100%	10.2'/10.5' 96%	40°		**GRANITIC GNEISS,** chlorite and hornblende rich, general increase in plagioclase down section; green to black; widely broken to moderately broken, good foliation		
168								
169								
170						Match to Sheet 10		809 53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-2

AR300331

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp.-Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
171						Continued from Sheet 9 Fractures consistant at 45°, 70°, and 30°		
172						172.5'		807.03
173						**GRANITIC GNEISS**, quartz and plagioclase rich, some hornblende and chlorite; pink to black; good foliation, fractures filled with chlorite		
174								
175								
176	176.0							8[illegible]
177				30° 30°		Moderately to closely fractured		
178								
179				37°				
180				50°				
181				27° 50°		Very closely fractured zone from 180.0' to 181.0'		
182		C-4	11.0'/11.0' 100%	6.2'/11.0' 56%				
183				32°		Fractures filled with chlorite precipitation; very closely fractured zone from 183.0' to 186.0', well foliated at an angle of 70°. Fractures near perpendicular to foliation pattern.		
184								
185				35° 28°				
186				65°		186.5'		793.03
187	187.0					**GRANITIC GNEISS**, hornblende and plagioclase rich, abundant quartz; orange to black; widely fractured		
188				35°				
189				65°				
190						Match to Sheet 11		789.53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-2 SHEET 10 OF 16

AR300332

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 10		
191						Well foliated, wide to very widely fractured, only four fractures in ten feet		
192								
193								
194	C-5	10.0'/10.0' 100%	10.0'/10.0' 100%			194.0'		785.53
195						GRANITIC GNEISS, quartz and hornblende-rich, some albite, little plagioclase; black to light gray; widely fractured		
196								
197	197.0					198.0'		
198						PEGMATITE, quartz-rich; light gray 198.5'		781.53
199						GRANITIC GNEISS, quartz and hornblende rich, some albite; black to light gray; widely to moderately fractured 201.0'		781.03
200				48°				
201				35°		Chlorite-rich zone; green; closely fractured 201.5'		778.53
202				38°		GRANITIC GNEISS, quartz and hornblende-rich, some plagioclase chlorite; purple to black; slickensides along fracture at 202.5'; very widely fractured, well foliated		778.03
203	C-6	11.0'/11.0' 100%	10.2'/11.0' 93%	38°				
204								
205								
206								
207						207.5'		
208	208.0					GRANITIC GNEISS, quartz rich, abundant hornblende and chlorite, some plagioclase; purple to orange; very widely fractured		772.03
209	C-7	2.7'/2.7' 100%	2.7'/2.7' 100%	45°				
210						Match to Sheet 12		769.53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-2 SHEET 11 OF 16

AR300333

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
210.7						Continued from Sheet 11		
211				45°		211.0'		768.53
212						GRANITIC GNEISS, hornblende and plagioclase rich, abundant quartz, chlorite along fractured surfaces, trace of mica; pink to black; moderately to widely fractured, well foliated, fractures are weathered, small fracture zone from 214.0' - 214.5'		
213								
214				45° 55°				
215	C-8	8.0'/8.0' 100%	7.4'/8.0' 92%	40°				
216				40°				
217								
218				65°				
219	219.0							
220				45°				
221	C-9	2.5'/2.5' 100%	1.9'/2.5' 76%	MECH.		221.0'		758 53
221.5						GRANITIC GNEISS, quartz rich, some hornblende and chlorite, trace of plagioclase; black to light gray; no fractures in section from 221.0' to 232.0', very widely broken, well foliated		
222				MECH				
223								
224								
225	C-10	7.5'/7.5' 100%	7.5'/7.5' 00%	MECH				
226								
227								
228								
229	229.0					Small quartz seams		
230						Match to Sheet 13		49 53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-2 AR300334 SHEET 12 OF 16

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
231	C-11	2.5'/2.5' 100%	2.5'/2.5' 100%			Continued from Sheet 12 231.0'		748.53
231.5						**PEGMATITE**, massive quartz, hornblende blebs, some plagioclase; pink to black; poor foliation. slickensides on fractured surfaces 232.5'		747.03
232				40°				
233				36°				
234	C-12	7.5'/7.5' 100%	7.3'/7.5' 97%			**GRANITIC GNEISS**, quartz rich, hornblende, some chlorite, albite, orthoclase is dominant feldspar; black to light gray; good foliation, no fractures		
235								
236								
237						238.0' Chlorite-rich zone, chlorite and hornblende blebs; green and black; poor foliation 238.7'		741.53
238								
239.0				MECH.		**GRANITIC GNEISS**, quartz rich, hornblende, albite or orthoclase is dominate feldspar, little chlorite; black to gray; moderately fractured, well foliated 241.0'		740.83
239								
240				MECH.				
241	C-13	5.9'/6.0' 98%	5.9'/6.0' 98%			Increase in plagioclase percentage; pink to dark gray 242.0'		738.53
242				50°		**GRANITIC GNEISS**, quartz rich, hornblende, albite or orthoclase is dominant feldspar, trace of chlorite along fracture surface; black to gray; well foliated, weathered fracture surfaces, moderately fractured		737.53
243				50°				
244				65°				
245.0				59°				
245				90°				
246	C-14	4.0'/4.0' 100%	3.6'/4.0' 90%			small pegmatite seam 247.5'		732.03
247						**GRANITIC GNEISS**, quartz and plagioclase rich, hornblende, trace of chlorite; pink to gray; moderately to closely fractured. poor to well foliated Match to Sheet 14		
248								
249.0								
249								
250								729.53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-2

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
251 / 251.5	C-15	2.5'/2.5' 100%	1.6'/2.5' 64%	0° 0° 55° 5°		Continued from Sheet 13 250.5'		729.03
252–259 / 259.0	C-16	7.5'/7.5' 100%	6.8'/7.5' 91%	30° MECH. 45° 45° 45° 43° 45° 42°		small quartz pegmatite seam; blue GRANITIC GNEISS, quartz and hornblende, some plagioclase, trace of mica, chlorite along fracture surfaces; black to light gray; well foliated, closely to moderately broken, fractures are oxidized 256.0' Plagioclase and quartz rich seam; orange 256.5' same as above 259.5'		7 72
259–269 / 269.0	C-17	10.0'/10.0' 100%	1.5'/10.0' 15%	50° 55° 51° 32° 45° 45° 43° 65° 53° 10° 45° 0° 0° 47° 45° 0°	0	GRANITIC GNEISS, quartz and plagioclase rich, hornblende, trace of chlorite and mica, random small quartz veins; orange to light gray; closely to very closely fractured, good foliation, sections of core are completely broken, greenish white precipitation on fracture surfaces 268.5'		720.03
269–270 / 270.0	C-18	0.9'/1.0' 90%	0.5'/1.0' 50%	0° 61° 0°		GRANITIC GNEISS, quartz, abundant plagioclase, some mica and hornblende; pink with black; well foliated, slickensides on fractured surfaces, more massive than above Match to Sheet 15		711.03 709.53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: MW-2 SHEET 14 OF 16

AR300336

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatic
				50°		Continued from Sheet 14 slickensides		
271				52°				
272				62°		Small (1 inch) micaceous lense. Chlorite increases with depth and fills fractures; good foliation, foliation decreases to poor with depth, moderately to closely fractured, primary fractures filled with chlorite and mica		
273				35°				
274				43° 40° 42°				
275								
276	C-19	11.0'/11.0' 100%	5.5'/11.0' 50%	13° 0°				
277				10°				
278				32° 50°				
279				20° 35°				
280				35° 0°		280.0'		699 53
281	281.0					**GRANITIC GNEISS,** plagioclase rich, abundant quartz, small quartz-rich veins, some chlorite and hornblende; dark orangish red to black; non distinct to moderately foliated, moderately to closely fractured, fractures have greenish-white precipitation on surfaces		
282				53° 51°				
283				60°				
284	C-20	7.5'/7.5' 100%	5.3'/7.5' 71%	57°				
285				45°				
286				0°				
287				0°				
288	288.5			55° 53°		slickensides		
289		C-21	1.2'/1.5' 80%	0.4'/1.2' 33% 45° 52°		chlorite on fracture sufaces		
290	290.0					Match to Sheet 16		689 53

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue BORING NO.: MW-2 AR300337 SHEET 15 OF 16

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-2

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 15		
291				22°		Slight decrease in plagioclase percentage, small quartz veins throughout section; pink with black; moderately fractured, well foliated		
292								
293	C-22	7.0'/7.0' 100%	1.2'/7.0' 17%	0°				
294				0°/				
295				/65°		Small chlorite blebs; foliation becomes less distinct		
296								
297	297.0			0°				
298	C-23	3.0'/3.0' 100%	1.8'/3.0' 60%	90° / 45°		GRANITIC GNEISS, quartz and plagioclase rich, some hornblende and chlorite, trace of mica, small quartz vein in section; pink with black; closely to moderately fractured		
299				30°				
300	300.0			0°		300.0'		679.53
301						End of Boring at 300.0'		
302								
303								
304								
305								
306								
307								
308								
309								
310								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-2 AR300338 SHEET 16 OF 16

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORI

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI — BORING NO.: MW-3
COORDINATES: EAST: — NORTH:
ELEVATION: SURFACE 993.20 — TOP OF STEEL CASING: 995.33

RIG: Acker Rig & Speedstar Air Rig									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/6" ID	6.0"OD		8/24/87	0.0 to 8.9	Sunny, 70's		
LENGTH	2'	10'/30'	5'		9/1/87	9.0 to 30.0	Partly Cloudy		
TYPE	Std.	Steel Pipe/PVC	S.S.		9/2/87	30.0 to 155.0	Sunny, Warm		
HAMMER WT.	300#								
FALL	30"								
STICK UP		2.13'							

REMARKS: Acker Rig drilled to 8.9'. Speedstar drilled from 8.9' to 155.0'.

SAMPLE TYPE
S = Split Spoon, A = Auger
T = Shelby Tube, W = Wash
R = Air Rotary, C = Core
D = Denison, P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	6"	Sch. 40 Fl. Joint Threaded PVC	≈-1.9	30.0
Well Screen				

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
1, 2 (2.0)	S-1	2.0	1 3 4 6			**SAPROLITE**, some sand and quartz clasts, small granitic fragments; light brown to orange; medium stiff to hard; dry, decomposed, some organic matter, oxidized	10" diameter steel casing to 10.0'	
3, 4 (4.0)	S-2	2.0	20 25 14 15			3.5' **GRANITIC GNEISS**, abundant quartz, albite, some hornblende and chlorite, trace of mica, occasional quartz vein; orange to light gray; hard; dry, little to highly foliated, highly weathered	Borehole ≈10" diameter to 10.0'	989.70
5, 6 (6.0)	S-3	2.0	19 17 18 17					
7, 8 (8.0)	S-4	2.0	18 20 21 23				Cement bentonite grout	
9 (8.9)	S-5	0.9	40 90/.4			8.9' End of Augering Granitic Gneiss; weathered — Match to Sheet 2		984.30
10								

DRILLING CO.: Pennsylvania Drilling — BAKER REP.: R. Christensen/G. Allen
DRILLER: B. Gallihue/K. Baumgartner — BORING NO.: MW-3 — SHEET 1 OF 9

AR300539

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-3

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 1		
11								
12								
13						Quartz content increasing with depth; more resistant rock		
14								
15								
16							Borehole = 6" diameter 10.0' to 155.0'	
17								
18								
19								
20								973.20
21							6" diameter PVC casing to 30.0'	
22								
23								
24						**GRANITIC GNEISS**, quartz with abundant plagioclase, little orthoclase and hornblende		
25								
26								
27								
28								
29								
30						Match to Sheet 3		963.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-3

AR300340

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-3

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 2	Open borehole 30.0' to 155.0'	
31								
32						GRANITIC GNEISS, highly stained; highly fractured from 32.0' to 35.5'		
33								
34								
35								
36								
37								
38								
39						GRANITIC GNEISS, quartz, hornblende, general increase in orthoclase; fewer returns of cuttings		
40								953.20
41						Fractures: 38.5' - 39.5'; 40.5' - 41.0'		
42								
43								
44								
45								
46								
47						Very few returns from borehole		
48								
49								
50						Match to Sheet 4		943.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-3

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-3

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 3		
51								
52								
53								
54								
						very little air circulation. No resistance from 53.0' to 55.8'		
55								
56								
57								
58								
59						soft zone		
60						No return from borehole		933.20
61								
62						soft zone 62.5' - 63.0'		
63								
64								
65								
66								
67								
68								
69								
70						Match to Sheet 5		923.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-3

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-3

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 4		
71								
72								
73								
74								
75								
76								
						Soft zone 77.0' - 79.0'		
77								
						Soft zone 79.5' - 80.0'		
78								
79								
80								913.20
						No resistance 81.0' - 82.5'		
81								
82								
83								
84								
85								
86								
87								
88								
89								
90						Match to Sheet 6		903.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-3 AR300343 SHEET 5 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-3

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 5		
91								
92								
93								
94								
95								
96								
97								
						Soft zone 97.0' - 98.0'		
98								
99								
100								893 20
						Soft zone 100.3' - 100.8'		
101								
102								
103								
104								
105								
106								
						Soft zone 106.5'		
107								
108								
109								
110						Match to Sheet 7		883 20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-3 SHEET 6 OF 9

AR300344

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Engineers
Michael Baker, Jr., Inc.

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-3

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 6		
111						More resistant rock		
112								
113								
114								
115						Soft zone 115.0' - 116.0'		
116								
117								
118								
119								
120								873.20
121								
122								
123								
124								
125								
126								
127						Soft zone 126.0' - 128.0'		
128						Less resistant rock		
129								
130						Match to Sheet 8		863 20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-3 AR300345 SHEET 7 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-3

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 7		
131								
132								
133								
134								
135								
136								
137								
138								
139								
140								853.20
141						Soft zone 141.0' - 141.5'		
142								
143								
144								
145								
146								
147								
148								
149								
150						Match to Sheet 9		843.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-3 AR300346 SHEET 8 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-3

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 8		
151								
152								
153								
154								
155						155.0'		838.20
						End of Boring at 155.0'		
156								
157								
158								
159								
160								
161								
162								
163								
164								
165								
166								
167								
168								
169								
170								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen

DRILLER: K. Baumgartner BORING NO.: MW-3

AR300347

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECOR

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
COORDINATES: EAST:
ELEVATION: SURFACE 966.30

BORING NO.: MW-4
NORTH:
TOP OF STEEL CASING: 968.51

RIG: Acker Truck Mounted									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/ 4 & 6"ID	6"OD	2.98"OD	8/14/87	0.0 to 32.0	Sunny, Warm		
LENGTH	2'	32'/60'	5'	10'	8/27/87	32.0 to 50.0	Raining, 60's		
TYPE	Std.	Steel Pipe/PVC	S.S.	NQ	8/28/87	50.0 to 100.0	Raining, 60's		
HAMMER WT.	300#				8/31/87	100.0 to 150.0	Sunny, Warm		
FALL	30"				9/1/87		Partly Cloudy		
STICK UP		2.21'							

REMARKS: Augered to 40', cored rom 40.0' to 150.0'. Screen set 60.0' to 150.0' to prevent borehole caving.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	4"/6"	Sch. 40 Fl. Joint Threaded PVC	≈-2.0	[illegible].0
Well Screen	4"	0.01" Slotted PVC	60.0	150.0

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatic
1 – 2.0	S-1	2.0	3 5 6 7		0	**SANDY**, some clay and silt, small quartz pebbles; dark to light brown; stiff; organic, dry — 2.0'	10" diameter steel casing to 32.0'	964.30
3 – 4.0	S-2	2.0	5 7 8 9		0	**SAPROLITE**, some sand and silt, small granitic clasts; orange to brown; stiff increasing to hard with depth; dry, cohesive, no structure, decomposed rock, granitic clasts are oxidized	Borehole ≈10" diameter to 32.0'	
5 – 6.0	S-3	2.0	6 8 12 15		0			
7 – 8.0	S-4	2.0	25 38 100/.4		0		Cement bentonite grout	
9 – 10.0	S-5	2.0	36 45 48 65/.5		1			

Match to Sheet 2

DRILLING CO.: Pennsylvania Drilling
DRILLER: B. Gallihue

BAKER REP.: R. Christensen
BORING NO.: MW-4 AR300348 SHEET 1 OF 8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11 12.0	S-6	2.0	26 36 41 46		1	Continued from Sheet 1 — 12.0'	4" and 6" diameter PVC casing to 60.0' (void space between)	954.30
13 14.0	S-7	2.0	8 10 15 16		6	**SAPROLITE**, sand and clay, some silt, small quartz and granite clasts; light brown; very stiff; trace of moisture, cohesive, no structure — 14.0'		952.30
15 16.0	S-8	2.0	4 5 5 6			**SAPROLITE**, micaceous, quartz, trace of hornblende; orange to tan; soft; wet, highly weathered, foliated, highly stained, friable — 16.0'		950.30
17 18.0	S-9	2.0	1 2 2 3			**SAPROLITE, CLAY**, some silt and sand, small quartz clasts; brown; soft; moist, decomposed, oxidized — 17.5'		948.80
19 20.0	S-10	2.0	1 3 3 4			**SAPROLITE**, micaceous, quartz, trace of hornblende; orange to tan; soft; wet, highly weathered to decomposed, oxidized, foliated, friable zones, filled fractures; alternating layers of highly weathered and decomposed granitic gneiss		
21 22.0	S-11	2.0	2 2 3 6					
23 24.0	S-12	2.0	1 3 7 2					
25 26.0	S-13	2.0	3 4 5 12					
27 28.0	S-14	2.0	5 8 8 12			27.5' **SAPROLITE**, micaceous, quartz, trace of hornblende; brown to tan; hard; wet, highly weathered, better cementation, fewer alternations of highly weathered		938 80
29 30.0	S-15	2.0	27 31 42 50/.5			Match to Sheet 3		936 30

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-4 AR300349 SHEET 2 OF 8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
31 — 31.5	S-16	1.5	38 39 75/.5			Continued from Sheet 2 to decomposed zones -- sharper contacts, horizontal foliation, and filled fractures (31.5)		934 80
32								
33						Split spoon refusal		
34								
35								
36	A-N							
37								
38								
39								
40 — 40.0								926 30
41				75°				
42								
43						GRANITIC GNEISS, some quartz and mica, little hornblende, plagioclase is prevalant feldspar; orange to brown; hard; weathered, staining around mica, fractures		
44								
45	C-1	0.5' / 10.0' 5%	0.0' / 10.0' 0%				Bore hole ≈ 6" diameter 32.0' to 150.0'	
46								
47								
48								
49								
50 — 50.0						Match to Sheet 4		916 30

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-4

AR300350

Baker Engineers
Michael Baker, Jr., Inc.

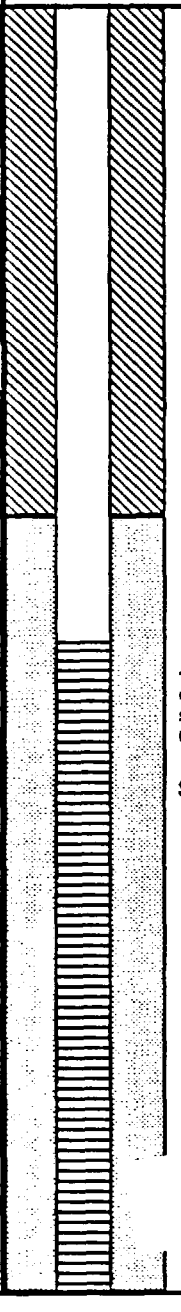
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Elevatio
						Continued from Sheet 3	
51, 52	C-2 (53.0)	0.0'/3.0' 0%	0.0'/3.0' 0%			53.0'	913.30
53, 54, 55, 56	C-3 (57.5)	4.0'/4.5' 89%	0.0'/4.5' 0%			SAND, medium grained, quartz-rich, some mica, random clasts of granitic gneiss; light brown to tan; soft; unconsolidated, no structure — 56.0'	910 30
57, 58, 59, 60, 61, 62				45°, 45°, 42°, 75°		GRANITIC GNEISS, quartz-rich, some mica and hornblende; orange-brown; very closely fractured, gradual change from overlying sand, some foliation; highly weathered; moderately fractured; Quartz-Phenocrysts in lower portion of section — 63.0'	
63, 64	C-4 (64.0)	5.0'/6.5' 77%	0.0'/6.5' 0%	76°		PEGMATITE, quartz-rich, some chlorite and hornblende, plagioclase; pink; hard; moderately fractured, weathered — 64.5'	903.30
65, 66, 67, 68, 69, 70	C-5	5.0'/8.0' 63%	0.0'/8.0' 0%			GRANITIC GNEISS, feldspar-rich, some hornblende and chlorite, little mica, small quartz veins; orange to brown; hard; very closely fractured, soft seams (highly weathered), not retrieved in core, foliated, abundant horizontal fractures	901.80
						Match to Sheet 5	896 30



DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-4

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
71						Continued from Sheet 4	Screen and sand pack	
72.0								
72						Hard; very closely fractured, well foliated		
73				69°				
74								
75								
76	C-6	4.2'/10.0' 42%	0.3'/10.0' 3%					
						76.5'		
77						Small lense of chlorite-rich granitic gneiss; green; hard; well foliated		889.10
78						77.2'		
79						GRANITIC GNEISS, quartz, hornblende, some chlorite, plagioclase is abundant feldspar; orange to tan; hard; very closely fractured, well foliated		
80								
81								
82.0								
82				41°				
83				44°		general increase in quartz content; orange to tan; hard; well foliated		
84	C-7	3.1'/6.0' 52%	0.9'/6.0' 15%	88°				
85								
86				45°				
87				45°				
88.0								
88						orange to black; hard; moderate to closely fractured, well foliated		
89	C-8	3.7'/5.0' 74%	1.3'/5.0' 26%					
90								876.30

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-4 AR300352 SHEET 5 OF 8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
91, 92, 93						Continued from Sheet 5 — 92.8'	Screen and sand pack	873.50
93–100	C-9	3.9'/7.0' 56%	1.4'/7.0' 20%	45°, 40°, 42°, 0°, 70°, 35°		GRANITIC GNEISS, quartz-rich, micaceous, trace of hornblende and chlorite; tan to orange; hard; moderately fractured, well foliated, slightly weathered; closely to very closely fractured — 100.4'		865.90
100–103.5	C-10	3.5'/3.5' 100%	0.8'/3.5' 23%	45°, 45°		GRANITIC GNEISS, micaceous, abundant plagioclase, micaceous seams; green to orange; soft; fissile, well foliated, weathered, mica is a dark green in color, very closely fractured — 103.2'		863.10
104–110	C-11	3.5'/10.0' 35%	0.4'/10.0' 4%	45°, 45°, 90°		GRANITIC GNEISS, quartz-rich, micaceous, some hornblende and chlorite. Small quartz-rich pegmatite veins throughout section; pinkish green; hard to soft; fissile, soft seams of green mica, well foliated, very closely to closely fractured — Match to Sheet 7		856.30

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-4

AR300353

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
111, 112						Continued from Sheet 6	Screen and sand pack	
113.0						112.5'		853.80
113, 114, 115	C-12	2.3'/3.0' 77%	0.4'/3.0' 13%	45°, 45°		**PEGMATITE**, quartz-rich, hornblende, some chlorite in fractures; pink; hard; closely fractured, oxidized on fracture faces		
116.0						116.5'		
116, 117, 118, 119, 120, 121, 122	C-13	5.9'/7.0' 84%	1.2'/7.0' 17%	43°, 90°, 70°		**GRANITIC GNEISS**, quartz-rich, some hornblende and chlorite, trace of mica; green to orange; hard; very closely to closely fractured, foliation dip of approximately 70°		
123.0								
123, 124, 125, 126						general increase in hornblende content; orange to gray; hard; very closely fractured, well foliated		
127, 128, 129, 130	C-14	2.5'/8.0' 31%	0.0'/8.0' 0%			3" hornblende-rich granitic gneiss; some quartz; black; hard; foliated, due to poor recovery unable to place seam		
						Match to Sheet 8		836.30

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-4

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-4

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
131.0						Continued from Sheet 7	Screen and sand pack	
131–133	C-15	2.0'/2.0' 100%	0.0'/2.0' 0%	70°, 45°, 40°, 45°		GRANITIC GNEISS, hornblende and chlorite rich, trace of galena, small pegmatite veins; purplish gray; hard; moderately to very closely fractured, foliated, lusterous		
133–136	C-16	3.0'/3.0' 100%	1.3'/3.0' 43%	0°, 45°, 45°, 45°		General increase in quartz content with decrease in hornblende and chlorite content; purplish gray; hard; moderately fractured, well foliated		
136–139	C-17	2.6'/3.0' 87%	1.1'/3.0' 37%	42°, 43°, 40°, 43°, 45°		Same as above, quartz-rich with blebs of chlorite and hornblende; green-gray; hard; moderately fractured to closely fractured, well foliated with high dip angle Slickensides Decrease in chlorite content		
139–142	C-18	3.0'/3.0' 100%	0.4'/3.0' 13%	70°, 45°, 45°, 70°, 45°				
141.0'						GRANITIC GNEISS, quartz and plagioclase rich, some hornblende and chlorite, trace of mica; pink to gray; hard; closely to very closely fractured, slickensides along a few fractures, some foliation		825.30
142–146	C-19	3.9'/4.0' 98%	1.8'/4.0' 45%	57°, 38°, 37°, 37°, 41°, 35°, 78°, 90°		moderately to closely fractured closely to very closely fractured, moderately foliated; hard		
145.9'								
146–150	C-20	2.0'/4.0' 50%	0.0'/4.0' 0%	90°, 72°, 90°		GRANITIC GNEISS, hornblende and chlorite rich, quartz and plagioclase; black and pink; hard; closely fractured, foliated		816.80 816.30

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-4

AR300355

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORI

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: MW-5
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 971.00
TOP OF STEEL CASING: 973.19

RIG: Acker Rig & Speedstar Air Rig									
	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/ 6"ID	4.5"OD		8/17/87	0.0 to 7.5	Sunny, 80's		
LENGTH	2'	30'/50'	5'		8/18/87	7.5 to 27.7	Sunny, 80's		
TYPE	Std.	Steel Pipe/PVC	S.S.		8/26/87	27.7 to 50.0	Cloudy, 60's		
HAMMER WT.	300#				8/27/87	50.0 to 153.0	Raining, 60's		
FALL	30"								
STICK UP		2.19'							

REMARKS: Acker Rig drilled to 27.7'. Speedstar drilled from 27.7' to 153.0'.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM.	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	6"	Sch. 40 Fl. Joint Threaded PVC	≈-2.0	50.0
Well Screen				

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
1	S-1	2.0	4 4 4 5			CLAY, some sand and silt, granitic clasts; dark brown; medium stiff; dry, organic 1.0'	10" diameter steel casing to 30.0'	970.00
2 (2.0)						CLAY, some sand and silt, granitic clasts; light brown; medium stiff; dry, oxidized 2.5'	Borehole ≈10" diameter to 30.0'	968.50
3	S-2	2.0	6 7 10 17			SAND, some clay and silt, granitic clasts; light brown and gray; stiff; dry, oxidized, no structure 4.0'		
4 (4.0)								966.00
5 (5.5)	S-3	1.4	38 40 100/.4			CLAY, some silt, trace of sand; light brown; soft; wet 4.2'		966.50
6 (6.0)	A-N					SAND, trace of clay, granitic fragments; light brown; hard; dry, oxidized, no structure, saprolite 7.0'	Cement bentonite grout	
7 (7.0)	S-4	0.9	24 56/.4					964.00
8 (9.0)	A-N					dark brown to light brown; hard 9.0'		
9	S-5	2.0	1 1 1 2			GRANITIC GNEISS, micaceous, quartz, some hornblende; light brown; soft; decomposed, foliation, some tree roots, dry Match to Sheet 2		962.00
10								0

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: MW-5
SHEET 1 OF 9

AR300356

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11 — 11.0	S-5					Continued from Sheet 1		
12 — 13.0	S-6	2.0	2 3 3 3			GRANITIC GNEISS, quartz rich, some mica, occasional quartz seam; light brown to gray; soft to medium stiff; decomposed rock, dry, oxidized		
14 — 15.0	S-7	2.0	5 5 6 7			15.0'		956.00
16 — 17.0	S-8	2.0	25 33 41 46			GRANITIC GNEISS, chlorite and quartz rich vein; gray to greenish tan; hard; highly weathered, dry, trace of foliation 17.0'		954.00
18 — 19.0	S-9	2.0	2 3 5 6			SAPROLITE, some quartz and mica; light brown; soft to medium stiff; decomposed, no structure, moist 19.5'		951.50
20 — 21.0	S-10	2.0	5 4 4 5			GRANITIC GNEISS, salt and pepper appearance, trace of chlorite; light gray to black; medium stiff; decomposed, highly weathered, foliated 20.5'		950.50
22 — 23.0	S-11	2.0	4 3 5 4			SAPROLITE, micaceous, occasional quartz seam; light brown; soft to medium stiff; wet, decomposed, no structure 23.5'		947.00
24 — 25.0	S-12	2.0	6 15 27 25			GRANITIC GNEISS, micaceous, quartz, some hornblende and chlorite, random veins of hornblende and chlorite, occasional quartz vein; light gray to light brown; hard; highly weathered, moist, no foliation to highly foliated, one small seam of purple quartz, moist		
26 — 26.5	S-13	1.2	38 47 70/.2					
27 — 27.0	A-N							
28 — 27.7	S-14	0.7	49 70/.2					
29						End of augering at 27.7'		
30						Match to Sheet 3		941.00

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-5 AR300357 SHEET 2 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 2	Borehole = 6" diameter 30.0' to 153.0'	
31								
32								
33								
34								
35							6" diameter PVC casing to 50.0'	
36								
37								
38						GRANITIC GNEISS, plagioclase and quartz; highly weathered		
39								
40								931.00
41						More resistant and less weathered		
42								
43								
44								
45								
46								
47						Encountered water at 47.0'		924.00
48						GRANITIC GNEISS, quartz-rich, chlorite, biotite, hornblende; hematite staining		
49								
50						Match to Sheet 4		921.00

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen AR300358
DRILLER: K. Baumgartner BORING NO.: MW-5 SHEET 3 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 3	Open borehole 50.0' to 153.0'	
51								
52								
53								
54								
55						GRANITIC GNEISS, biotite-hornblende rich, some quartz; discharge rate approximately 1 gal/min		
56								
57								
58								
59								
60								911.00
61								
62								
63								
64								
65						Discharge rate 1-2 gal/min, weathered fragments		
66								
67								
68						Chlorite rich granitic gneiss, some hornblende-biotite		
69								
70						Match to Sheet 5		901.00

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-5 AR300359 SHEET 4 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 4		
71								
72								
73								
74								
75								
76								
77								
78								
79								
80								891.00
81						GRANITIC GNEISS, increase in quartz content, some hornblende, little chlorite		
82								
83								
84								
85								
86								
87								
88								
89						Small increase in plagioclase content		
90						Match to Sheet 6		881.0

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-5 AR300360 SHEET 5 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 5		
91						GRANITIC GNEISS, hornblende-biotite rich; some hematite staining		
92								
93						Discharge rate at 5 gal/min		
94								
95								
96						Hit fractured rock		
97								
98								
99								
100								871.00
101						Hornblende-biotite rich granitic gneiss		
102								
103								
104								
105						More resistant rock at 105.0'		866.00
106								
107						Increase in quartz and plagioclase percentage		
108						Approximate discharge rate is 10 gal/min		
109								
110						Match to Sheet 7		861.00

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-5 AR300361 SHEET 6 OF 9

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Engineers

Michael Baker, Jr., Inc.

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-5

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 6		
111								
112								
113								
114								
115						116.0' - 118.0' less resistant rock. Approximate discharge rate is 20 gal/min		
116								
117								
118								
119								
120								851.00
121								
122								
123								
124								
125								
126								
127						GRANITIC GNEISS, quartz-rich, some hornblende and biotite		
128								
129						Discharge rate approximately 30 gal/min		
130						Match to Sheet 8		841.00

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-5 SHEET 7 OF 9

AR300362

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-5

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 7		
131						**GRANITIC GNEISS,** hornblende-biotite rich, abundant quartz, some orthoclase and plagioclase, trace of chlorite		
132								
133								
134								
135								
136								
137								
138								
139								
140								831.00
141								
142								
143								
144								
145								
146								
147								
148								
149								
150						General increase in chlorite percentage Match to Sheet 9		821.00

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-5 AR300363 SHEET 8 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-5

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 8		
151						Discharge rate approximately 40 gal/min		
152								
153						153.0'		818.00
						End of Boring at 153.0'		
154								
155								
156								
157								
158								
159								
160								
161								
162								
163								
164								
165								
166								
167								
168								
169								
170								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: G. Allen
DRILLER: K. Baumgartner BORING NO.: MW-5 AR300364 SHEET 9 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORI

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: MW-6
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 962.20
TOP OF STEEL CASING: 964.66

RIG: Acker Rig & Semco Air Hammer

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/ 6"ID	6"OD		8/20/87	0.0 to 14.0	Ptly. Cldy, 80's		
LENGTH	2'	22'/60'	5'		8/21/87	14.0 to 34.3	Sunny, 70's		
TYPE	Std.	Steel Pipe/PVC	S.S.		9/24/87	34.3 to 62.0	Sunny, Cold		
HAMMER WT.	300#				9/26/87	62.0 to 150.0	Sunny, Cold		
FALL	30"								
STICK UP		2.46'							

REMARKS: Acker Rig drilled to 34.5'. Semco Air Hammer drilled from 34.5' to 150.0'.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	6"	Sch. 40 Fl. Joint Threaded PVC	≈-2.2	60.0
Well Screen				

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
1 – 2 (2.0)	S-1	2.0	3 8 5 6			**SANDY LOAM**, small pebble clasts; black; soft to medium stiff; dry, organic (1.0')	10" diameter steel casing to 22.0'	961.20
3 – 4 (4.0)	S-2	2.0	6 12 14 17			**SAND**, some clay and silt, granitic clasts; light brown; medium stiff; dry, some organic matter, no structure (2.5')	Borehole ≈10" diameter to 45.0'	959.70
5 – 6 (6.0)	S-3	2.0	10 11 31 50/.5			**SAPROLITE**, clay and sand, random granitic clasts, some mica; light brown to orange; stiff to hard; trace of moisture, no structure	Cement bentonite grout	
7 – 8 (8.0)	S-4	2.0	16 24 35 41					
9 – 10 (10.0)	S-5	2.0	10 14 21 29					

Match to Sheet 2

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: MW-6
SHEET 1 OF 8

AR300365

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-6

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
11	S-6	2.0	6 8 10 10			Continued from Sheet 1		
12 (12.0)						11.0' **SAPROLITE**, micaceous, quartz-rich, small hard granitic clasts, trace of hornblende, occasional quartz vein; orange to gray; medium stiff to stiff; decomposed, damp, highly foliated		951.20
13	S-7	2.0	6 6 6 6					
14 (14.0)								
15	S-8	2.0	2 6 5 6					
16 (16.0)						16.5' **SAPROLITE**, micaceous, fractures filled with hornblende, some quartz; tan to gray; soft to stiff; decomposed, moist, highly foliated, with distinct structure		945.70
17	S-9	2.0	1 2 5 4					
18 (18.0)								
19	S-10	2.0	2 6 10 12					
20 (20.0)						20.0' **SAPROLITE**, quartz rich with occasional quartz veins, micaceous, some hornblende, occasional albite rich veins; orange to white; soft to medium stiff; wet, decomposed, some foliation	6" diameter PVC casing to 60.0'	942.20
21	S-11	2.0	1 1 6 12					
22 (22.0)								
23	S-12	2.0	3 3 6 7					
24 (24.0)						24.0' **SAPROLITE**, micaceous, hornblende, quartz; light brown to dark brown; medium stiff to stiff; wet, extremely decomposed, no structure		938.20
25	S-13	2.0	6 8 10 11					
26 (26.0)						26.5' **SAPROLITE**, mica-rich, some hornblende which delineates foliation, occasional quartz vein; light brown to black; medium stiff to very stiff; wet, decomposed, foliated with distinct structure		935.70
27	S-14	2.0	3 6 6 6					
28 (28.0)								
29	S-15	1.5	6 19 14 10					
30 (32.0)						Match to Sheet 3		932.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-6 AR300366 SHEET 2 OF 8

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-6

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatic
						Continued from Sheet 2 30.7'		
31	S-17	2.0	8 26 35 41			GRANITIC GNEISS, chlorite and hornblende rich, some quartz and mica; green to black; hard; highly weathered, very well foliated, wet 32.6'		931.50
32.0								
32.6	S-18	0.6	47 70/.1					929.60
33.5	A-N					GRANITIC GNEISS, micaceous, quartz, some hornblende; orange to brown; hard; moist, highly weathered, good foliation 34.5'		
34.5	S-19	1.0	65 81					927.70
						End of Augering at 34.5'		
						CLAY, hard granitic fragments; brown; soft to hard; wet, sample is very muddy, discharge about 2 gal/min		922.20
							Bore hole = 6" diameter 45.0' to 150.0'	
						GRANITIC GNEISS, quartz, hornblende and chlorite; hard; collapse of hole, very muddy discharge		
						Match to Sheet 4		912.20

31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Gallihue/B. Adams BORING NO.: MW-6 AR300367 SHEET 3 OF 8

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-6

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 3		
51								
52								
53								
54								
55								
56								
57								
58								
59								
60						**GRANITIC GNEISS**, quartz and albite rich, hornblende and chlorite, trace of mica; hard; discharge rate is 2 gal/min; borehole still collapsing	Open bore hole 60.0' to 150.0'	902.20
61								
62								
63								
64								
65								
66								
67						**GRANITIC GNEISS**, quartz-rich, abundant chlorite and hornblende, trace of magnetite; hard; evidence of foliation; discharge approximately 30 gal/min		
68								
69								
70						Match to Sheet 5		892 20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-6 AR300368 SHEET 4 OF 8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-6

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 4		
71								
72						Chlorite and quartz-rich seams		
73								
74								
75								
76								
77								
78								
79								
80						GRANITIC GNEISS, hornblende and chlorite-rich, seams of quartz; dark green to black; hard; foliated, discharge rate is approximately 30 gal/min		882.20
81								
82								
83								
84								
85								
86								
87								
88						MAGNETITE-rich, some weathered surfaces; black; very hard; discharge rate 30 gal/min		
89								
90						Match to Sheet 6		872.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-6

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-6

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 5		
91								
92						Quartz-rich seam, some magnetite incorporated into quartz, some albite; light gray		
93								
94								
95								
96								
97								
98								
99								
100						**GRANITIC GNEISS**, quartz and mica, some hornblende and chlorite; black to light gray; some evidence of foliation, discharge rate is about 50 gal/min		862.20
101								
102								
103								
104								
105								
106								
107						**GRANITIC GNEISS**, quartz and chlorite-rich, some hornblende; light gray to green; evidence of foliation; discharge rate about 50 gal/min		
108								
109								
110						Match to Sheet 7		852 20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-6 SHEET 6 OF 8

AR300370

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-6

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 6		
111								
112								
113								
114								
115								
116								
117								
118								
119								
120						**GRANITIC GNEISS**, very quartz rich, little chlorite and hornblende; light gray; evidence of foliation; discharge rate about 50 gal/min		842.20
121								
122								
123								
124								
125								
126								
127								
128						**GRANITIC GNEISS**, very quartz-rich, little hornblende and chlorite; black and white; salt and pepper appearance, unable to discern foliation; discharge rate is 50 gal/min		
129								
130						Match to Sheet 8		832.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-6 AR300371 SHEET 7 OF 8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-6

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 7		
131								
132								
133								
134								
135								
136								
137								
138								
139								
140						**GRANITIC GNEISS**, hornblende and chlorite rich, abundant quartz; green to black; hard; discharge rate is approximately 50 gal/min		822.20
141								
142								
143								
144								
145								
146								
147						**GRANITIC GNEISS**, hornblende and chlorite rich, abundant quartz, some plagioclase; green to black; discharge rate is 50 gal/min		
148								
149								
150						End of Boring at 150.0'		812.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-6 SHEET 8 OF 8

AR300372

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORI

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
COORDINATES: EAST:
ELEVATION: SURFACE 1013.00

BORING NO.: MW-7
NORTH:
TOP OF STEEL CASING: 1014.56

RIG: Acker Rig & Semco

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/ 6"ID	6"OD		8/20/87	0.0 to 9.5	Sunny, 80's		
LENGTH	2'	8.8'/33'	5'		9/27/87	9.5 to33.0	Sunny, Warm		
TYPE	Std.	Steel PVC	S.S.		9/28/87	33.0 to 83.0	Sunny, Warm		
HAMMER WT.	300#				9/29/87	83.0 to 153.0	Sunny, Warm		
FALL	30"								
STICK UP		1.56'							

REMARKS: Acker Rig augered to 9.5'. Semco Rig drilled to 153.0'.

SAMPLE TYPE
S = Split Spoon
T = Shelby Tube
R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	6"	Sch. 40 Fl. Joint Threaded PVC	≈-1.2	33.0
Well Screen				

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
1 – 2 (2.0)	S-1	2.0	1 4 3 10			SAND, some clay, small pebble clasts; dark brown; soft; trace of moisture, organic, no structure (1.0')	10" diameter steel casing to 8.8'	1012.00
3 – 4 (4.0)	S-2	2.0	10 18 30 33			SAND, some clay, granitic clasts; light brown to gray; medium stiff to hard; dry, decomposed, no structure (5.5')	Borehole ≈10" diameter to 9.5'	
5 – 6 (6.0)	S-3	1.9	15 40 41 59/.4			GRANITIC GNEISS, quartz rich, some hornblende and mica; light brown; hard; dry, little foliation, very highly weathered (8.0')	Cement bentonite grout	1007.50
7 – 8 (8.0)	S-4	2.0	16 24 38 45					1005.00
8.4	S-5	0.4	90/.4			GRANITIC GNEISS, quartz rich, some hornblende; orange to light gray; hard; dry, highly fractured and weathered, foliated (8.4')		1004.60
9 – 9.5	A-N							
10						Match to Sheet 2		

DRILLING CO.: Pennsylvania Drilling
DRILLER: B. Gallihue/B. Adams
BAKER REP.: R. Christensen
BORING NO.: MW-7
SHEET 1 OF 9

AR300373

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-7

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 1		
11						GRANITIC GNEISS, quartz-rich, hornblende; light gray; hard; highly weathered, foliated		
12								
13								
14								
15								
16							Borehole = 6" diameter 9.5' to 153.0'	
17								
18								
19								
20						GRANITIC GNEISS, abundant quartz and plagioclase, some mica; light brown; hard; highly weathered		993.0
21							6" diameter PVC casing to 33.0'	
22						Vadose zone at 22.0'		991.0
23								
24								
25						GRANITIC GNEISS, abundant quartz and plagioclase, some hornblende; orange to tan; hard; weathered; rock chips with fresh surface, encountered water but hole is running dry		
26								
27								
28								
29								
30						Match to Sheet 3		983.0

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-7 AR300374 SHEET 2 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-7

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 2		
31								
32								
33							Open bore hole 23.0' to 153.0'	
34								
35								
36								
37								
38								
39								
40						GRANITIC GNEISS, plagioclase-rich, quartz, hornblende, some mica; orange to black; highly weathered, very muddy discharge, 3 gal/min		973.0
41								
42								
43								
44								
45								
46						GRANITIC GNEISS, quartz rich, micaceous, some chlorite and hornblende; orange to gray; highly weathered to weathered, muddy discharge, 3-4 gal/min, foliated		
47								
48								
49								
50						Match to Sheet 4		963.0

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-7

AR300375

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-7

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 3		
51						Zones of resistant granitic gneiss, plagioclase-rich, and hornblende		
52								
53								
54								
55								
56								
57								
58								
59								
60						**GRANITIC GNEISS,** plagioclase-rich, abundant quartz, chlorite and hornblende blebs; orange to tan; discharge is approximately 3 gal/min. Aluminum cuttings from drill rods.		953.0
61								
62								
63								
64								
65								
66								
67						**GRANITIC GNEISS,** plagioclase-rich, abundant quartz and hornblende, some chlorite; orange to black; discharge is approximately 3 gal/min		
68								
69								
70						Match to Sheet 5		943.0

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-7 AR300376 SHEET 4 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-7

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 4		
71								
72								
73								
74								
75								
76								
77								
78								
79								
80								933.0
81						**GRANITIC GNEISS**, hornblende and plagioclase, some chlorite, trace of mica; green to gray; discharge approximately 4 gal/min. Hit fracture at about 80 feet.		
82								
83								
84								
85								
86								
87						**GRANITIC GNEISS**, quartz and mica, alibite feldspar-rich; purple and gray; discharge approximately 4-5 gal/min. Salt and pepper appearance for mineral assemblage.		
88								
89								
90						Match to Sheet 6		923.0

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-7

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-7

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 5		
91								
92								
93								
94								
95								
96						**GRANITIC GNEISS**, quartz rich, hornblende, trace of chlorite, little mica; gray; discharge rate 5-6 gal/min		
97								
98								
99								
100								913.0
101								
102						**GRANITIC GNEISS**, increase in plagioclase; orange to tan		
103								
104								
105								
106						Lost water momentarily		
107								
108						**PEGMATITE**, magnetite-rich, some chlorite and hornblende, quartz; black and green; discharge rate is 4-5 gal/min, fractured		
109								
110						Match to Sheet 7		903.0

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-7 SHEET 6 OF 9

AR300378

TEST BORING AND WELL CONSTRUCTION RECORD

Baker Engineers
Michael Baker, Jr., Inc.

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-7

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 6		
111								
112								
113								
114								
115						**GRANITIC GNEISS**, plagioclase and quartz-rich; orange; well developed crystal structure		
116								
117								
118								
119						**GRANITIC GNEISS**, plagioclase and quartz-rich, little hornblende and chlorite; orange to brown; discharge rate 4-5 gal/min. Well developed crystal structure.		
120								893.0
121								
122								
123								
124								
125								
126								
127								
128						**GRANITIC GNEISS**, quartz and plagioclase rich, some hornblende, trace of chlorite; brown; discharge rate 5-7 gal/min		
129								
130						Match to Sheet 8		883.0

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-7

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-7

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
131								
132								
133								
134						Discharge rate is approximately 4 gal/min		
135								
136								
137								
138						**GRANITIC GNEISS**, quartz-rich, plagioclase and hornblende, trace of mica; brown to gray; fractures. Lost water momentarily. Discharge rate is approximately 3-4 gal/min. Aluminum cuttings from rods.		
139								
140								873.0
141								
142								
143								
144						Discharge rate 5-6 gal/min		
145								
146						**GRANITIC GNEISS**, hornblende and chlorite-rich, quartz, some mica; grayish purple; foliated; calculated 8 gal/min		
147								
148								
149								
150						Match to Sheet 9		863.0

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Adams BORING NO.: MW-7 AR300380 SHEET 8 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-7

SAMPLE TYPE
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Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 8		
151								
152								
153	153.0					153.0'		860.0
						End of Boring at 153.0'		
154								
155								
156								
157								
158								
159								
160								
161								
162								
163								
164								
165								
166								
167								
168								
169								
170								

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-7 AR300381 SHEET 9 OF 9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: MW-8
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 977.20
TOP OF STEEL CASING: 979.32

RIG: Acker Rig & Semco Air Hammer

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/ 6"ID	6"OD		8/24/87	0.0 to 14.5	Sunny, 70's		
LENGTH	2'	11'/32'	5'		9/21/87	14.5 to 32.0	Cloudy, 70's		
TYPE	Std.	Steel Pipe/PVC	S.S.		9/22/87	32.0 to 150.0	Sunny, 60's		
HAMMER WT.	300#								
FALL	30"								
STICK UP		2.12'							

REMARKS: Acker Rig drilled to 14.5'. Semco Rig drilled from 14.5' to 150.0'.

SAMPLE TYPE
S = Split Spoon
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D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	6"	Sch. 40 Fl. Joint Threaded PVC	≈-1.9	32.0
Well Screen				

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)
2.0	S-1	1.0	4 5 5 7		
4.0	S-2	2.0	6 10 12 17		
6.0	S-3	2.0	4 8 9 12		
8.0	S-4	2.0	6 7 12 10		
10.0	S-5	2.0	8 11 12 7		

Visual Description

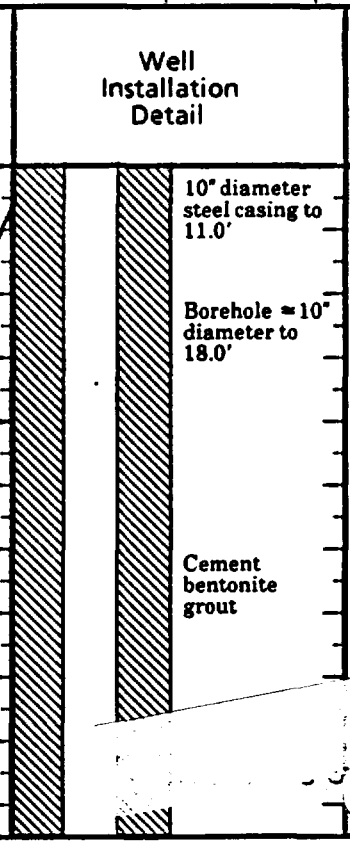
SAND, some clay; black to dark brown; medium stiff; organic, dry — 0.7'

SAND, some clay, small quartz and mica clasts, coarsed grained; light gray to light brown; medium stiff to very stiff; dry, no structure, trace of organic matter — 4.0'

SAPROLITE, some quartz and mica, random resistant granitic fragments, little albite; light brown to light gray; medium stiff to stiff; decomposed, no structure, dry, trace of laminar staining

Match to Sheet 2

Well Installation Detail



Elevation: 976.50, 973.20, 20

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: MW-8
SHEET 1 OF 8

AR300382

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-8

SAMPLE TYPE
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D = Denison P = Piston
N = No Sample

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RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 1 10.5'		966.70
11	S-6	2.0	18 21 25 26			GRANITIC GNEISS, quartz, little mica, occasional quartz veins; tan to orange; hard; dry, fractured, highly weathered, well foliated		
12 12.0								
13	S-7	2.0	25 39 48 80/.5					
14 14.0						14.5'		
14.5	S-8	0.5	86/.5					962.70
15						End of augering at 14.5'		
16								
17							Borehole = 6" diameter 18.0' to 150.0'	
18								
19								
20							6" diameter PVC casing to 32.0'	957.20
21								
22								
23								
24						MAGNETITE, quartz, some hornblende; light green to light blue; hard; dry, highly weathered, aluminum cuttings from rods		
25								
26								
27								
28								
29								
30						Match to Sheet 3		947.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-8 AR300383 SHEET 2 OF 8

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-8

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

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RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 2		
31						MAGNETITE, some quartz; black; very hard; massive, no evidence of foliation		
32							Open bore hole 32.0' to 150.0'	
33								
34								
35								
36								
37								
38								
39								
40								937.20
41								
42						Water at 42.0'		935.20
43								
44						GRANITIC GNEISS, quartz and biotite rich, trace of chlorite; gray to black; hard; evidence of foliation; moist		
45								
46								
47								
48								
49								
50						Match to Sheet 4		927 20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Adams BORING NO.: MW-8 AR300384 SHEET 3 OF 8

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit

S.O. NO.: 15438-10-SRI BORING NO.: MW-8

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 3		
51								
52								
53								
54								
55						GRANITIC GNEISS, quartz rich, some chlorite and hornblende, albite and plagioclase, trace of mica; grayish blue; evidence of foliation; discharge rate approximately 5 gal/min		
56								
57								
58								
59								
60								917.20
61								
62								
63								
64								
65						Discharge rate is approximately 10 gal/min		
66								
67								
68								
69								
70						Match to Sheet 5		907.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen

DRILLER: B. Adams BORING NO.: MW-8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-8

SAMPLE TYPE
S = Split Spoon A = Auger
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D = Denison P = Piston
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RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 4		
71								
72						GRANITIC GNEISS, quartz, mica, trace of hornblende; gray; hard; discharge rate is about 10 gal/min		
73								
74								
75								
76								
77								
78								
79								
80								897.20
81								
82								
83								
84								
85						GRANITIC GNEISS, quartz and mica rich, little chlorite and plagioclase; gray; hard; discharge rate is about 10 gal/min		
86								
87								
88								
89								
90						Match to Sheet 6		887.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-8 AR300386 SHEET 5 OF 8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-8

SAMPLE TYPE
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RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 5		
91								
92						GRANITIC GNEISS, quartz and mica rich, abundant plagioclase; pink to black; hard; slightly weathered, measured discharge is 15 gal/min		
93								
94								
95								
96								
97								
98								
99								
100								877.20
101								
102								
103								
104								
105						GRANITIC GNEISS, quartz rich, abundant hornblende and chlorite, little mica; pink to greenish black; hard; measured discharge is 15 gal/min		
106								
107								
108								
109								
110						Match to Sheet 7		867.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-8 SHEET 6 OF 8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-8

SAMPLE TYPE
S = Split Spoon A = Auger
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RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 6		
111								
112						Measured discharge 15 gal/min		
113								
114								
115								
116								
117								
118								
119								
120								857 20
121								
122								
123								
124								
125						GRANITIC GNEISS, quartz and hornblende rich, some chlorite, trace of mica; gray to pink; measured discharge 15 gal/min		
126								
127								
128								
129								
130						Match to Sheet 8		847 20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Adams BORING NO.: MW-8 AR300388 SHEET 7 OF 8

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-8

SAMPLE TYPE
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R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

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Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Pen. Rate	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 7		
131								
132						GRANITIC GNEISS, quartz rich, abundant plagioclase, some hornblende and chlorite; grayish white to pink; evidence of foliation, measured discharge 15 gal/min		
133								
134								
135								
136								
137								
138								
139								
140								837.20
141								
142								
143								
144								
145						GRANITIC GNEISS, quartz rich, abundant hornblende, little chlorite and albite; gray to pink; measured discharge 15 gal/min		
146								
147								
148								
149								
150						End of Boring at 150.0'		827.20

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen AR300389
DRILLER: B. Adams BORING NO.: MW-8 SHEET 8 OF 8

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI
BORING NO.: MW-9
COORDINATES: EAST:
NORTH:
ELEVATION: SURFACE 980.25
TOP OF STEEL CASING: 982.52

RIG: Acker Rig & Speedstar Air Rotary

	SPLIT SPOON	CASING	AUGERS	CORE BARREL	DATE	PROGRESS (FT)	WEATHER	WATER DEPTH (FT)	TIME
SIZE (DIAM.)	3"OD	10"ID/6" ID	4.5"OD	1.98"ID	8/12/87	0.0 to 13.0	Sunny, 70's		
LENGTH	2'	12'/54'	5'	10'	9/14/87	13.0 to 54.0	Sunny, 80's		
TYPE	Std.	Steel Pipe/PVC	S.S.	NX					
HAMMER WT.	300#				9/17/87	54.0 to 104.0	Raining, Cool		
FALL	30"				9/18/87	104.0 to 151.0	Cloudy, Cool		
STICK UP		2.27'							

REMARKS: Acker Rig drilled to 13.0'. Speedstar drilled to 32.0', then Acker Rig cored to 151.0'.

SAMPLE TYPE
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R = Air Rotary
D = Denison
A = Auger
W = Wash
C = Core
P = Piston
N = No Sample

WELL INFORMATION	DIAM	TYPE	TOP DEPTH (FT)	BOTTOM DEPTH (FT)
Well Casing	6"	Sch. 40 Fl. Joint Threaded PVC	≈-2.0	0
Well Screen				

Depth (Ft.)	Sample Type and No.	Samp. Rec. Ft. & %	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
1 – 2.0	S-1	2.0	1 3 4 5			**CLAY**, some sand, small granitic clasts; black to dark brown; soft to medium stiff; organic, trace of moisture (1.0')	10" diameter steel casing to 12.0'	979.25
3 – 4.0	S-2	2.0	8 4 6 7			**SAPROLITE**, sand, coarse grained, some clay, random resistant granitic clasts; light brown to gray; medium dense to dense; consolidated, dry, decomposed, no structure	Borehole ≈10" diameter to 13.0'	
5 – 6.0	S-3	2.0	5 5 10 12				Cement bentonite grout	
7 – 8.0	S-4	2.0	10 8 8 9					
9 – 10.0	S-5	2.0	6 7 6 14			(9.5') Match to Sheet 2		970.25

DRILLING CO.: Pennsylvania Drilling
BAKER REP.: R. Christensen
DRILLER: B. Gallihue
BORING NO.: MW-9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-9

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Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
						Continued from Sheet 1		
11 11.5	S-6					GRANITIC GNEISS, quartz with abundant plagioclase; pinkish white; very hard; highly weathered, dry, foliated, fractured, oxidized. Auger refusal 13.0'		
12 13.0	A-N							
13						End of Augering at 13.0'		967.25
14								
15								
16							Borehole = 6" diameter 13.0' to 151.0'	
17								
18								
19								
20								960.25
21							6" diameter PVC casing to 54.0'	
22								
23								
24								
25								
26								
27								
28								
29								
30						Match to Sheet 3		950.25

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen/G. Aiken
DRILLER: B. Gallihue/K. Baumgartner BORING NO.: MW-9 SHEET 2 OF 9

AR300391

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-9

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Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
31						Continued from Sheet 2		
32	32.0							
33								
34								
35								
36								
37		C-1	0.0' / 10.0' 0%					
38								
39								
40								940.25
41								
42	42.0							
43								
44								
45								
46		C-2	2.0' / 10.0' 20%	0.0' / 2.0' 0%		GRANITIC GNEISS, quartz rich, micaceous; brown to orange; alternating layers of resistant and less resistant rock, highly weathered, highly fractured		
47								
48								
49								
50						Match to Sheet 4		930.25

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-9 AR300392 SHEET 3 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-9

SAMPLE TYPE
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RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 3		
51								
52 (52.0)								
53								
54				72°		GRANITIC GNEISS, quartz rich, hornblende and chlorite delineate foliation; orange to pink; hard; moderately to closely fractured, steeply dipping fractures and foliation	Open bore hole 54.0' to 151.0'	
55								
56								
57	C-3	8.7'/10.0' 87%	6.5'/10.0' 65%	69°				
58								
59								
60				72°				920.25
61								
62 (62.0)								
63				75°				
64								
65						GRANITIC GNEISS, occasional quartz veins, abundant chlorite, with occasional chlorite-rich vein, plagioclase is dominant feldspar; green to orange; hard; moderately to closely fractured, foliated, slickensides along fracture at 70' depth		
66	C-4	8.9'/10.0' 89%	6.0'/10.0' 60%	61°				
67								
68								
69				44°				
70						Match to Sheet 5		910.25

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-9

SAMPLE TYPE
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T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
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RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
						Continued from Sheet 4		
71						GRANITIC GNEISS, quartz and mica rich, abundant plagioclase; orange; hard; closely fractured		
72	72.0					72.5'		
						MICA, biotite, highly fractured; black; hard; fractures follow foliation trend		907.75
73		C-5	2.0'/2.0' 100%	1.0'/2.0' 50%				907.05
74	74.0					73.2'		
						GRANITIC GNEISS, quartz rich, some hornblende and chlorite; orange to black		
75								
76						GRANITIC GNEISS, quartz rich, abundant mica. Decrease in mica content down section with general increase in percentage of hornblende and chlorite; light gray to orange; hard; foliation consistant at 70° dip, moderately fractured		
77								
78		C-6	8.0'/8.0' 100%	7.5'/8.0' 94%				
79								
80				45°		80.3'		899.95
						Quartz vein, trace of mica 80.7'		899.55
81				62°		Increase in plagioclase content; series of fractures between 80.5' - 82.0' dipping at 60° to 65°		
82	82.0							
83				45°				
84						Very fractured interval from 84.0' to 85.0'		
85								
86		C-7	8.5'/10.0' 85%	5.5'/10.0' 55%				
87						Increase in quartz percentage with decrease in mica; orange to tan; hard; very highly fractured		
88				68°				
89								
90						Match to Sheet 6		890.25

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-9 AR300394 SHEET 5 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-9

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
91						Continued from Sheet 5 last 2' of section 90' - 92'; very highly fractured		
92 (92.0)								
93				73°				
				80°		GRANITIC GNEISS, quartz rich, some hornblende, orthoclase in dominant feldspar; orange to light gray; hard; very closely fractured to closely fractured, hematite staining		
94				65°				
95				45°				
96				45°				
97	C-8	9.0'/10.0' 90%	5.0'/10.0' 50%					
98				35°				
						99.0'		
99				72°		GRANITIC GNEISS, very quartz rich, some hornblende and chlorite; light gray; hard		881.25
100								880.25
101				65°		101.5'		
102 (102.0)				68° 68°		GRANITIC GNEISS, quartz rich, some hornblende and chlorite; pink to brown; hard; conjugate fracturing along section		878.75
103				45°				
104				45°				
105	C-9	5.5'/6.0' 92%	1.5'/6.0' 25%			Decrease in quartz content and increase in hornblende; brown; extremely fractured section from 106.0' - 108.0'		
106				45°				
107				75°		108.0'		
108 (108.0)						GRANITIC GNEISS, hornblende rich, some quartz and plagioclase, little chlorite; brown to pink; hard; moderately fractured. hematite staining		25
109	C-10	4.0'/4.0' 100%	2.5'/4.0' 63%	65° 69°				
110				75°		Match to Sheet 7		870.25

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-9

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-9

SAMPLE TYPE

S = Split Spoon A = Auger
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R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
111				55°, 5°, 82°, 45°		Continued from Sheet 6 Conjugate fractures at 110.5'		
112.0						112.5'		
112								867.75
113				45°, 45°		**GRANITIC GNEISS**, quartz, micaceous, some hornblende, trace of chlorite; brown to pink; hard; moderately fractured, well foliated		
114				47°, 46°				
115				68°				
116	C-11	10.0'/10.0' 100%	5.5'/10.0' 55%	73°				
117				85°				
118				30°		Decrease in mica percentage 119.0'		
119								861.25
120						**GRANITIC GNEISS**, chlorite-rich, with chlorite filled fractures, some hornblende, small quartz rich veins; green to gray; hard; moderately fractured, highly foliated		860.25
121				45°				
122.0								
123				32°				
124								
125				34°				
126	C-12	8.7'/10.0' 87%	5.9'/10.0' 59%	47°				
127						127.0'		853.25
128						**GRANITIC GNEISS**, quartz-rich, micaceous, some chlorite and hornblende; brown to pink; good foliation		
129								
130						Match to Sheet 8		850.25

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-9 AR300396 SHEET 7 OF 9

Baker Engineers
Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-9

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D-1586) (Blows/0.5')
RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevatio
				70°		PEGMATITE, quartz and plagioclase; pink; hard; slightly fractured (130.3'–132.0')		849.75
131				70°				
132	112.0					GRANITIC GNEISS, quartz, mica, some chlorite, little hornblende; brown to green; very closely to closely fractured, friable, highly weathered		848.25
133				30°				
134				45°				
135				45°				
136		C-1	8.3'/10.0' 83%	6.9'/10.0' 69%				
137								
138								
139						(139.5')		840.75
140	112.0					PEGMATITE, quartz and plagioclase; pink; hard (140.5')		839.75
141				24°		GRANITIC GNEISS, biotite and quartz rich, abundant plagioclase, chlorite filled fractures; black and green to orange; hard; slightly weathered, moderately fractured, well foliated		
142				45°				
143				25° / 90°				
144				45°				
145		C-1	8.3'/10.0' 83%	6.9'/10.0' 69%				
146				25°				
147				54° / 45° / 50°				
148				45°				
149				45°				
150				45°		Match to Sheet 9		830.25

DRILLING CO.: Pennsylvania Drilling
DRILLER: B. Gallihue
BAKER REP.: R. Christensen
BORING NO.: MW-9

AR300397

Baker Engineers

Michael Baker, Jr., Inc.

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Berks Sand Pit
S.O. NO.: 15438-10-SRI BORING NO.: MW-9

SAMPLE TYPE

S = Split Spoon A = Auger
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R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

DEFINITIONS

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RQD = Rock Quality Designation (%)
Lab Class. = USCS (ASTM D-2487) or AASHTO (ASTM D-3282)
Lab Moist. = Moisture Content (ASTM D-2216) Dry Weight Basis

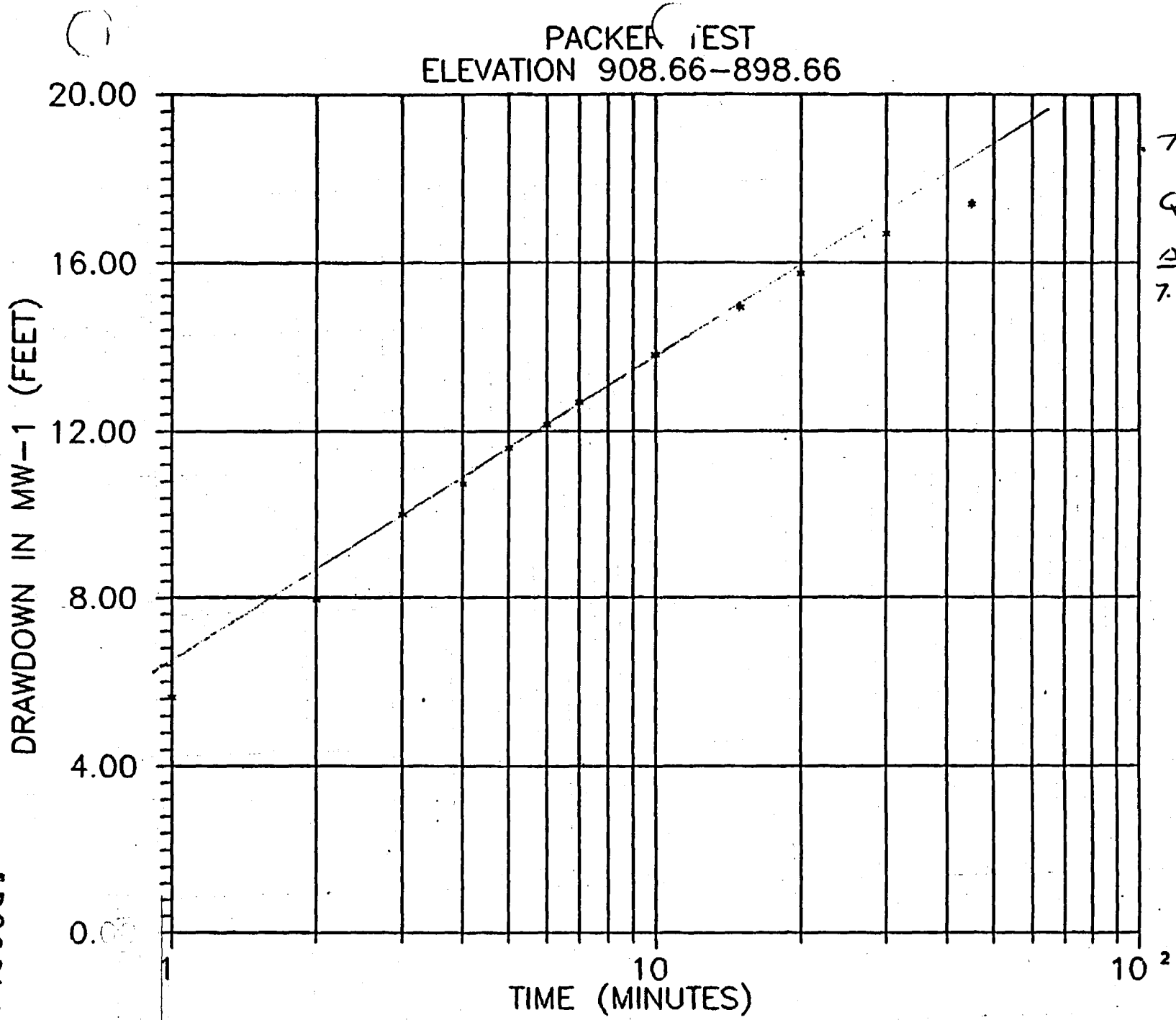
Depth (Ft.)	Sample Type and No.	Samp. Rec. (Ft. & %)	SPT or RQD	Lab. Class. or Fract. Angle	HNU/ OVA ppm (head space)	Visual Description	Well Installation Detail	Elevation
151.0						Continued from Sheet 8 151.0'		829.25
						End of Boring at 151.0'		

DRILLING CO.: Pennsylvania Drilling BAKER REP.: R. Christensen
DRILLER: B. Gallihue BORING NO.: MW-9 SHEET 9 OF 9

AR300398

B. PACKER TESTS

PACKER TEST: MW-1

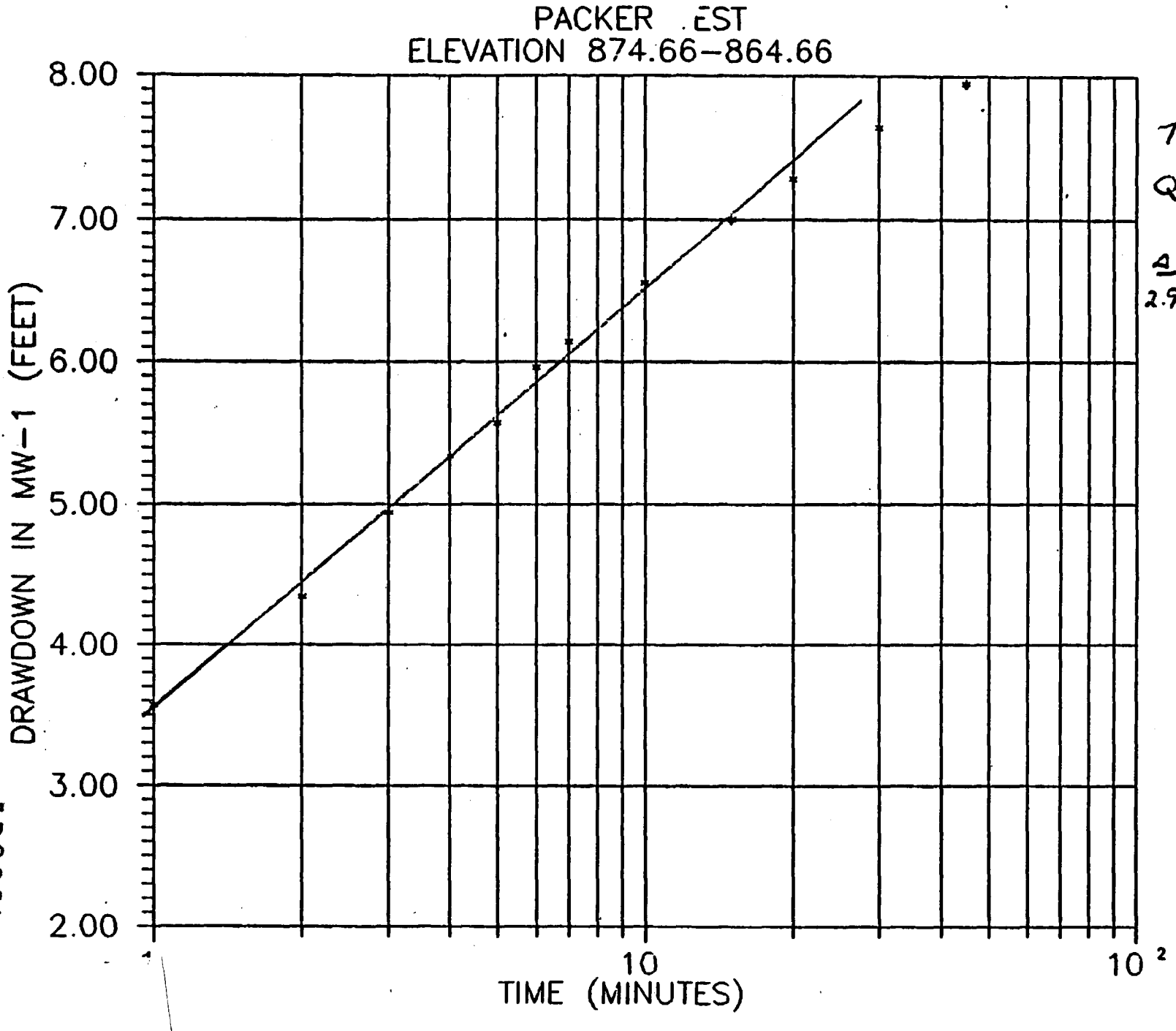


$T = \frac{264Q}{\Delta s}$

Q = 23 gpm

Δs	T (gal/ft)
7.3	830

AR300402



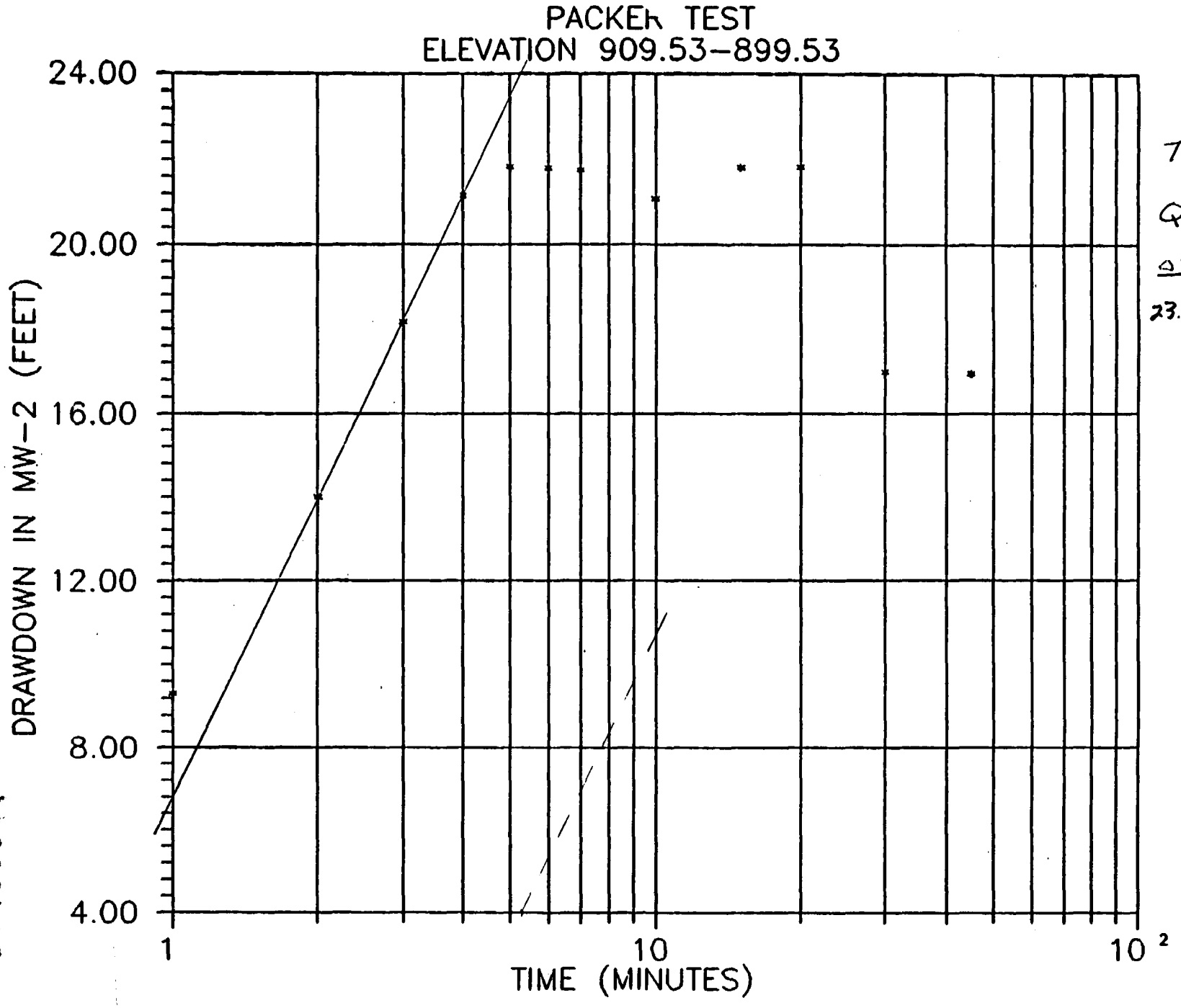
$T = \frac{264Q}{\Delta s}$

Q = 23.5 gpm

$\frac{\Delta s}{2.95}$ $\frac{T(gpd/ft)}{2100}$

AR300403

PACKER TEST: MW-2

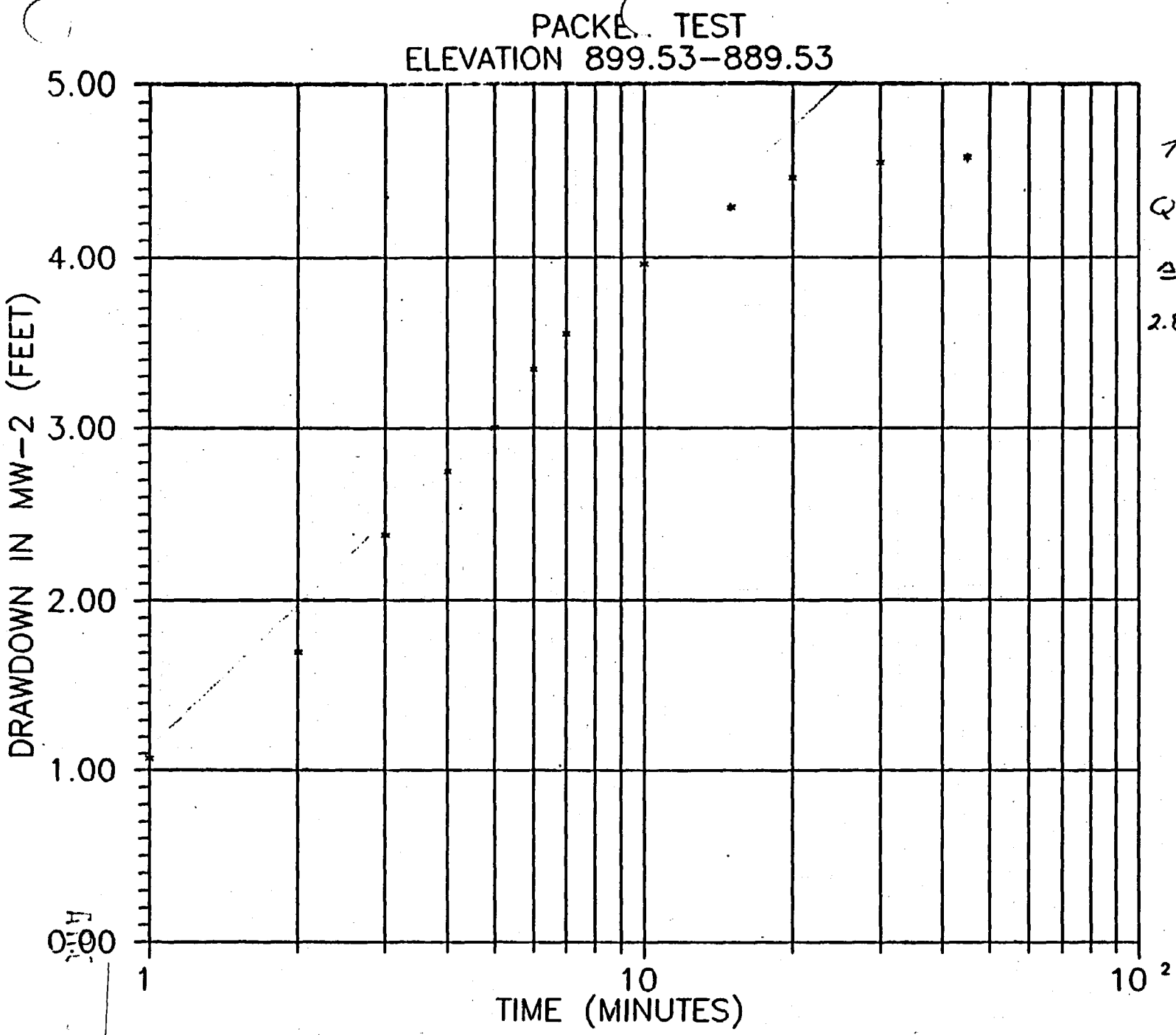


$T = \frac{264Q}{\Delta s}$

$Q \simeq 16$ gpm

Δs	T (gpd/ft)
23.8	180.

AR300405

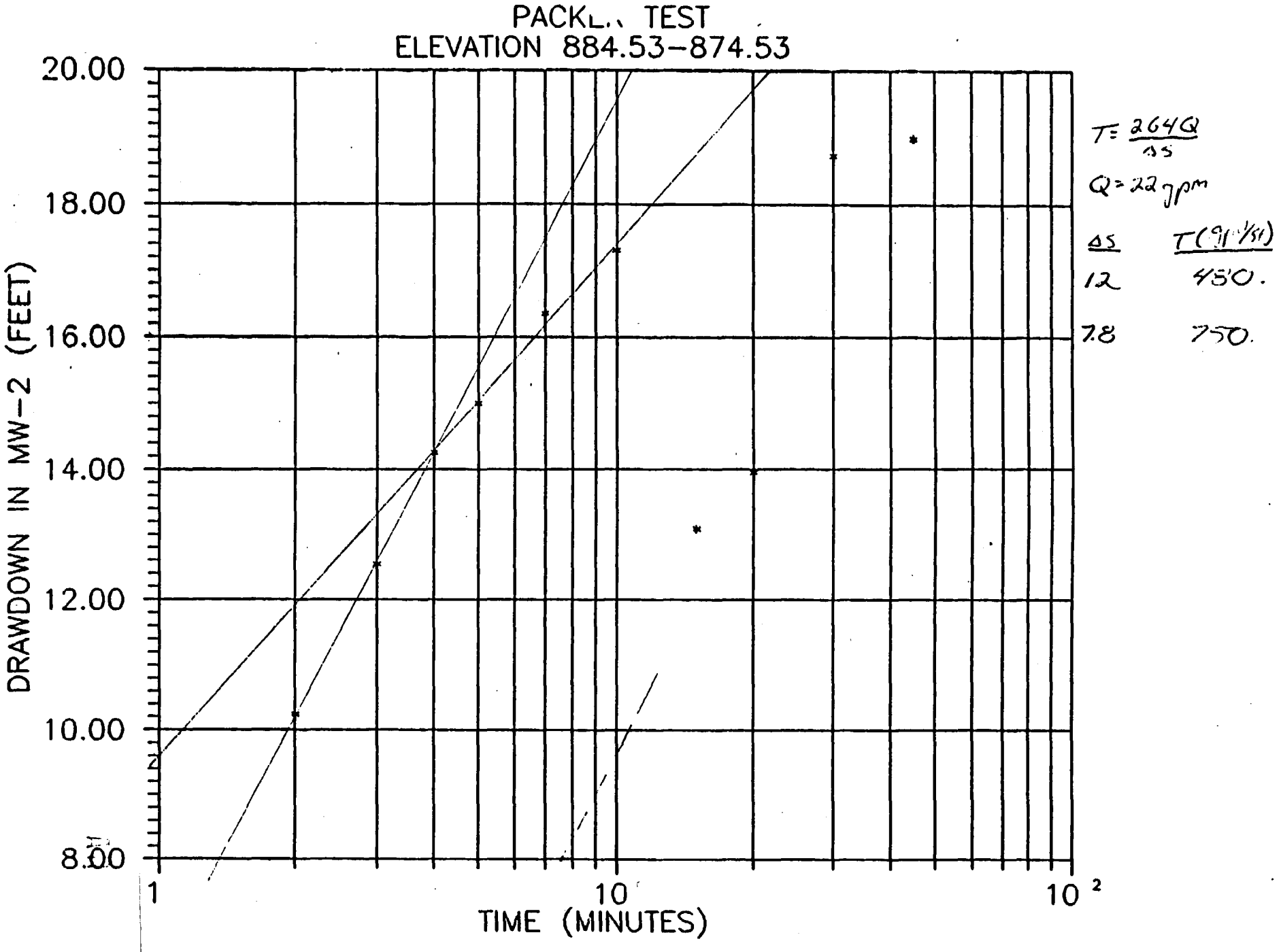


$T = \frac{264Q}{\Delta s}$

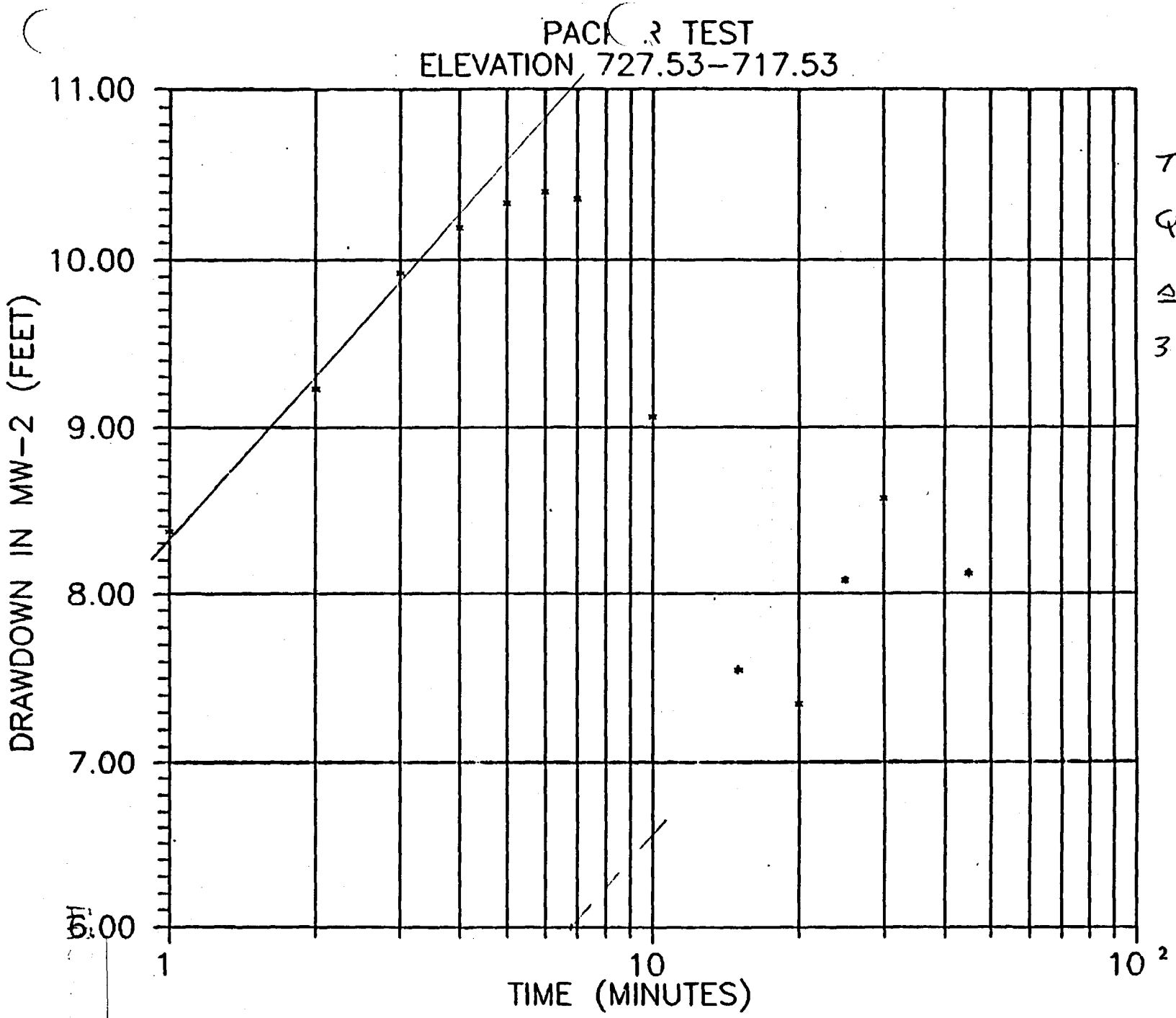
Q = 21 gpm

Δs	T (gal/ft)
2.8	1980.

AR300406


PACKER TEST
ELEVATION 884.53–874.53
DRAWDOWN IN MW-2 (FEET)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
1
10
10 2
TIME (MINUTES)
T = 264Q / ΔS
Q = 22 gpm
ΔS
T (gpd/ft)
12
450.
7.8
750.

AR300407

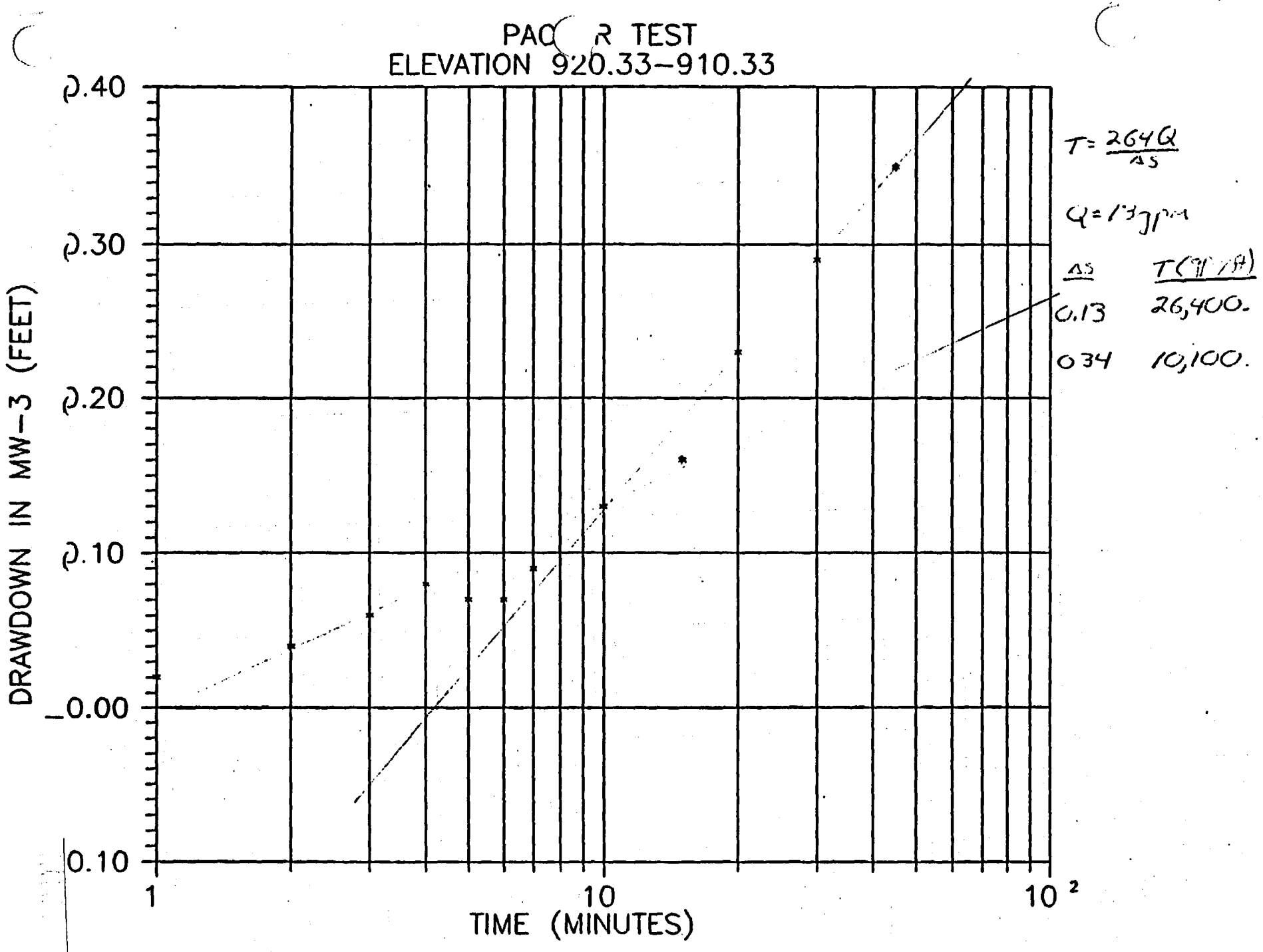


$T = \frac{264Q}{\Delta s}$

$Q \simeq 15$ gpm

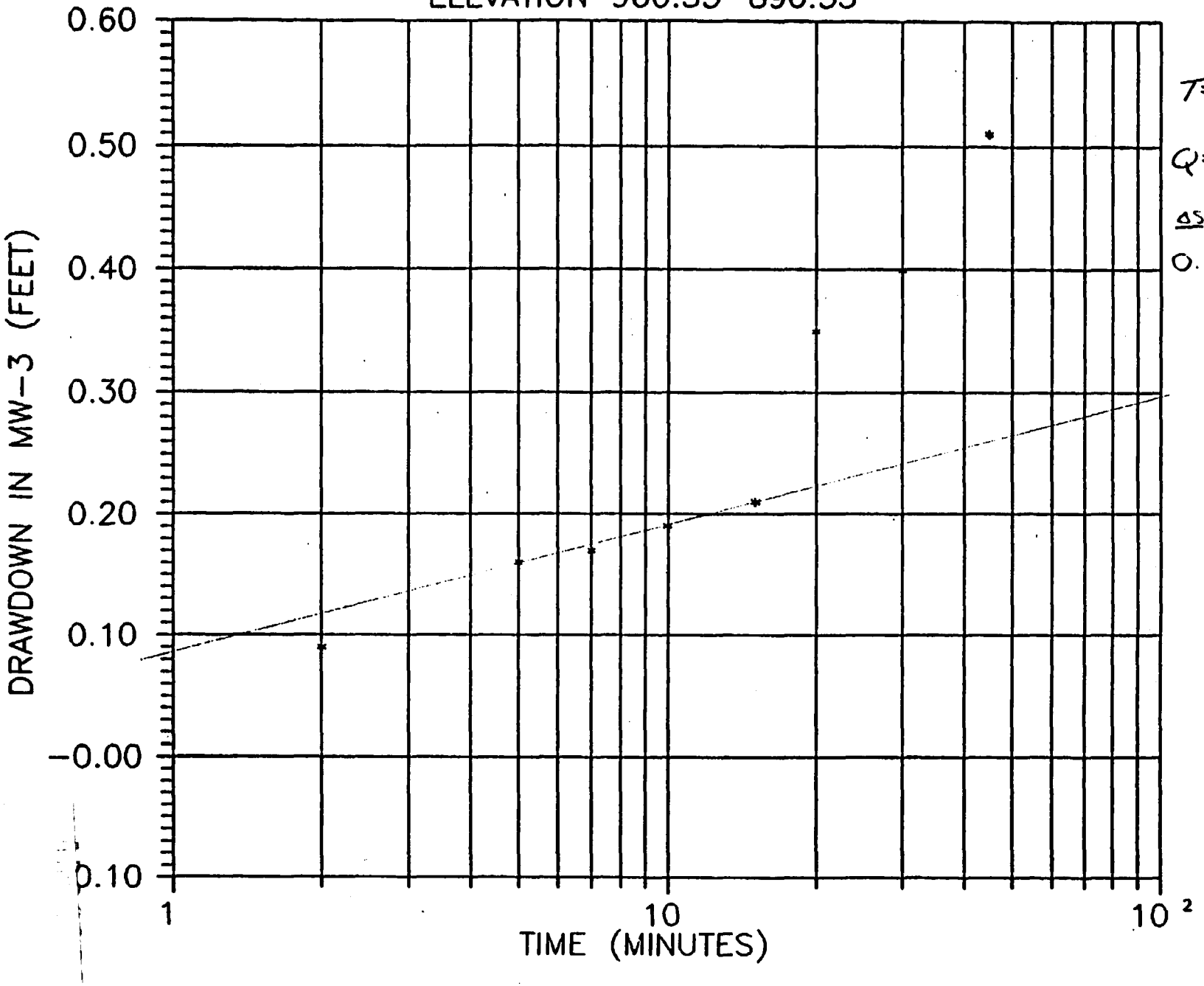
Δs	T (gpd/ft)
3.25	1220

PACKER TEST: MW-3


PAC R TEST
ELEVATION 920.33–910.33
DRAWDOWN IN MW-3 (FEET)
0.40
0.30
0.20
0.10
0.00
0.10
1
10
10 2
TIME (MINUTES)
T = 264Q / ΔS
Q = 13 gpm
ΔS
T (gpd/ft)
0.13
26,400.
0.34
10,100.

AR300410

PAC. _R TEST
ELEVATION 900.33–890.33



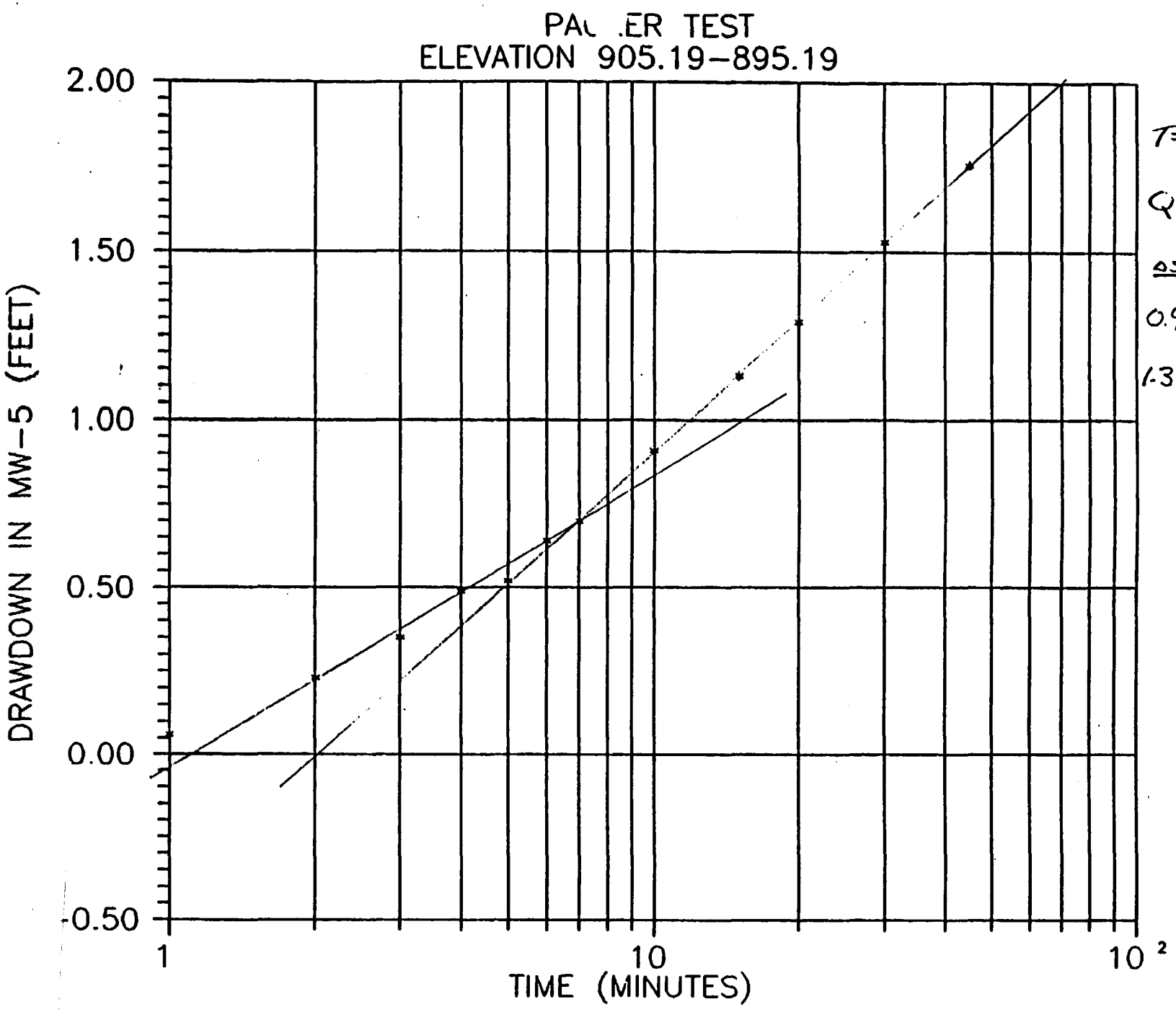
$T = \frac{264Q}{\Delta s}$

Q=10gpm

Δs	T(gpd/ft)
0.1	26,400.

AR300411

PACKER TEST: MW-5

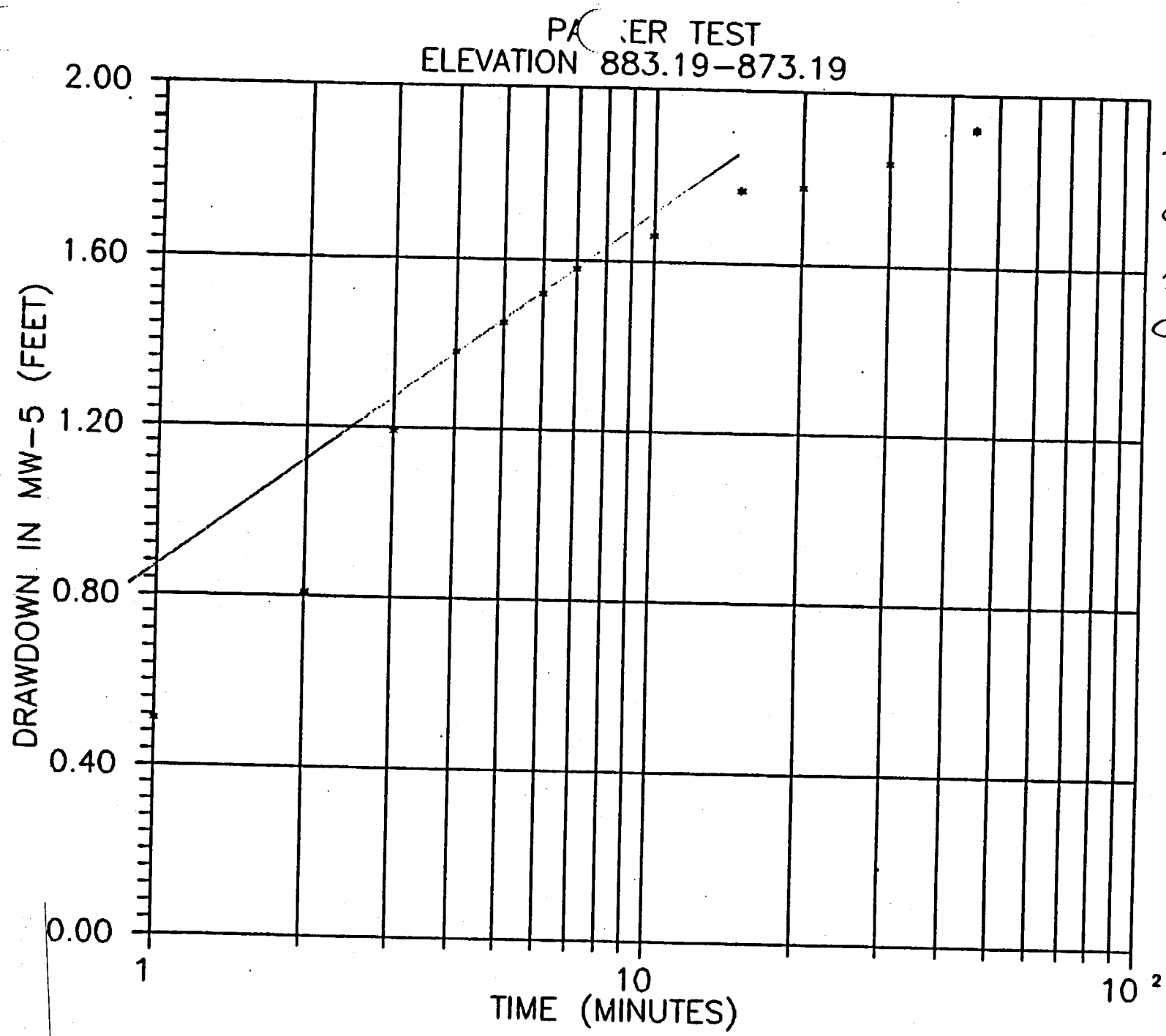


$T = \frac{264Q}{\Delta s}$

$Q \approx 23$ gpm.

Δs	T (gpd/ft)
0.9	6750.
1.3	4670

AR300413



$T = \frac{264Q}{\Delta s}$

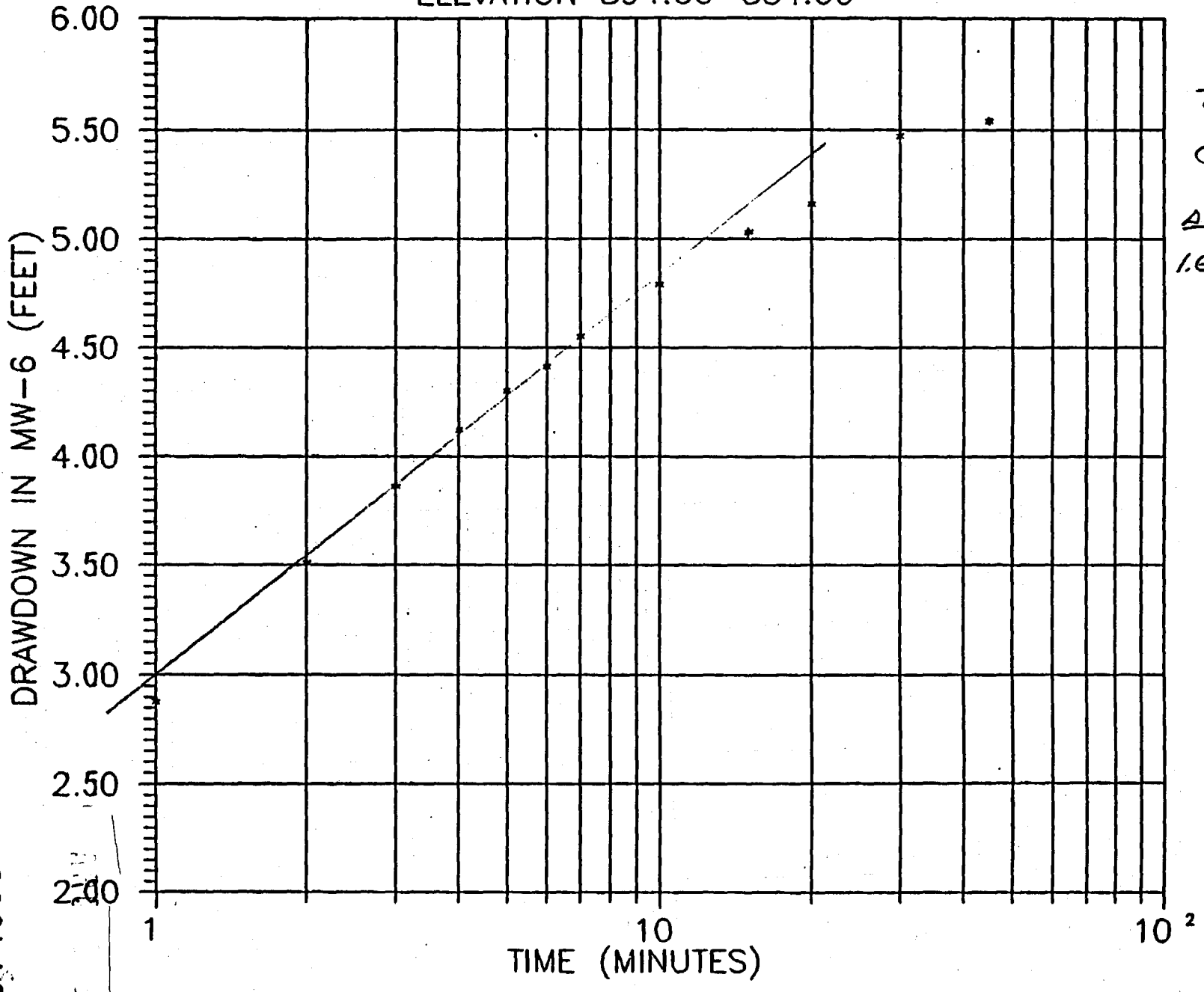
Q = 9 gpm

Δs	T (gpd/ft)
0.85	2800.

AR300414

PACKER TEST: MW-6

PACKER (.ST
ELEVATION 894.66–884.66

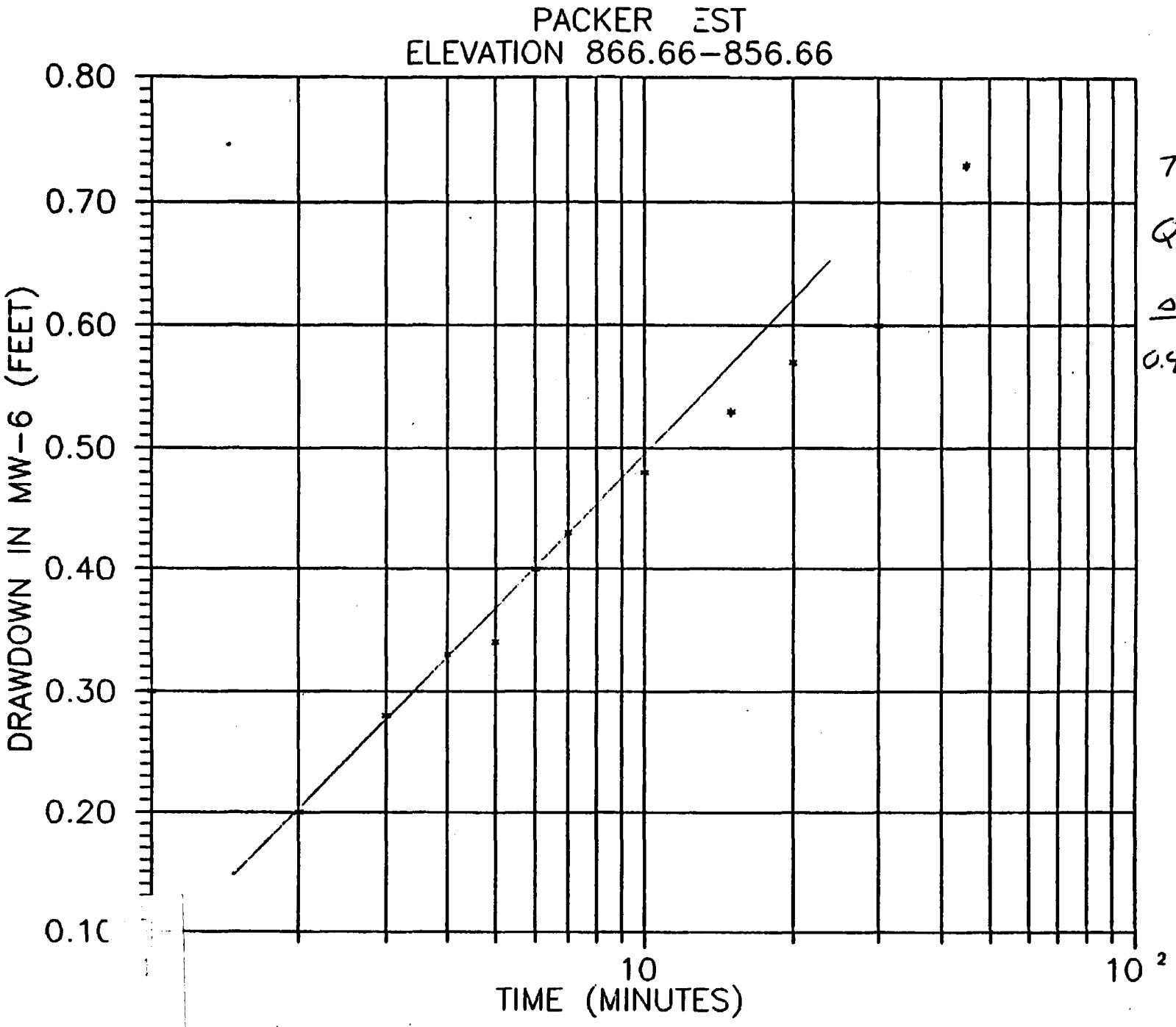


$T = \frac{264Q}{\Delta s}$

Q=21.4 gpm

Δs	$\frac{1(21.4/84)}{}$
1.6	3530.

AR300416

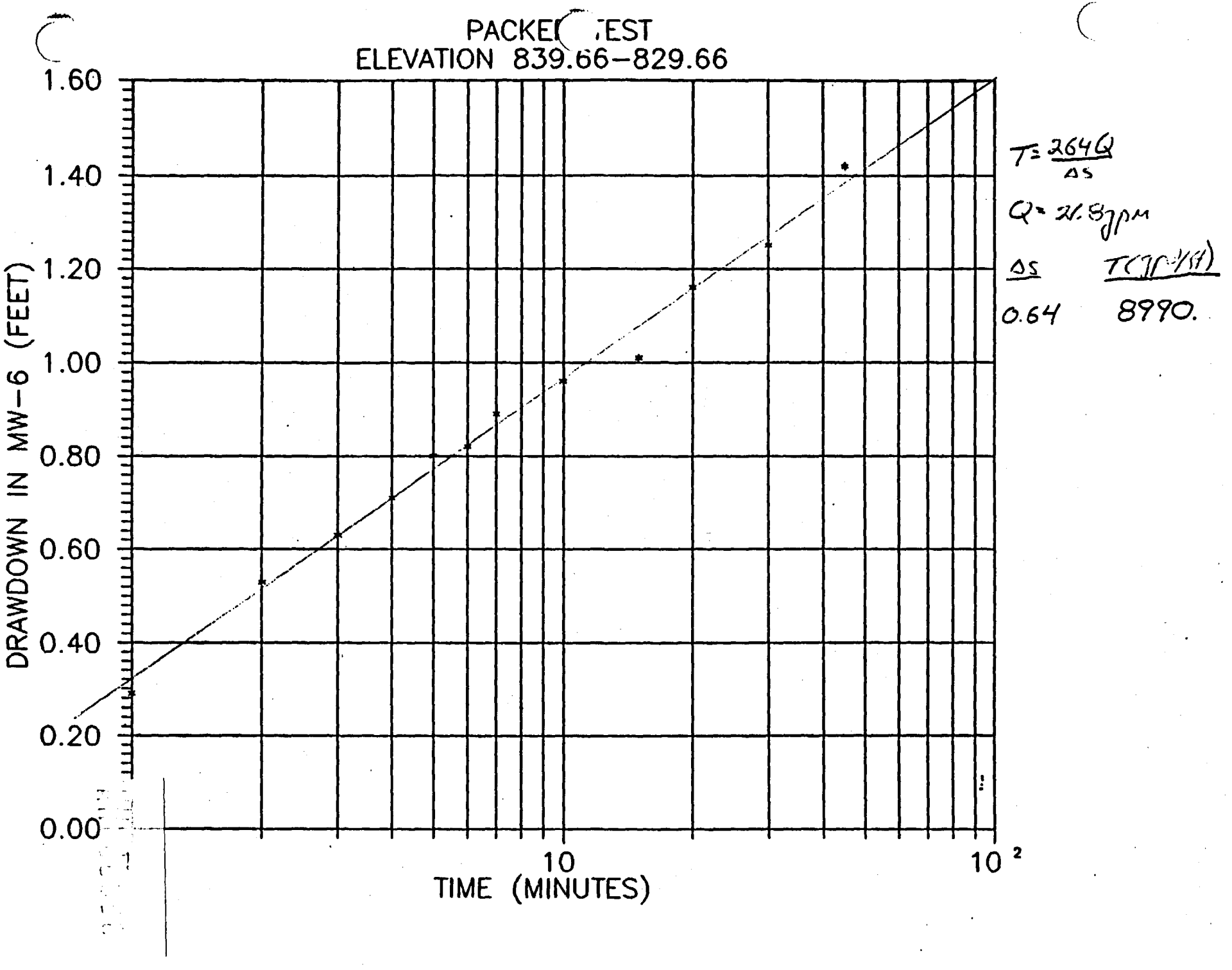


$T = \frac{264Q}{\Delta s}$

Q = 21.4 gpm

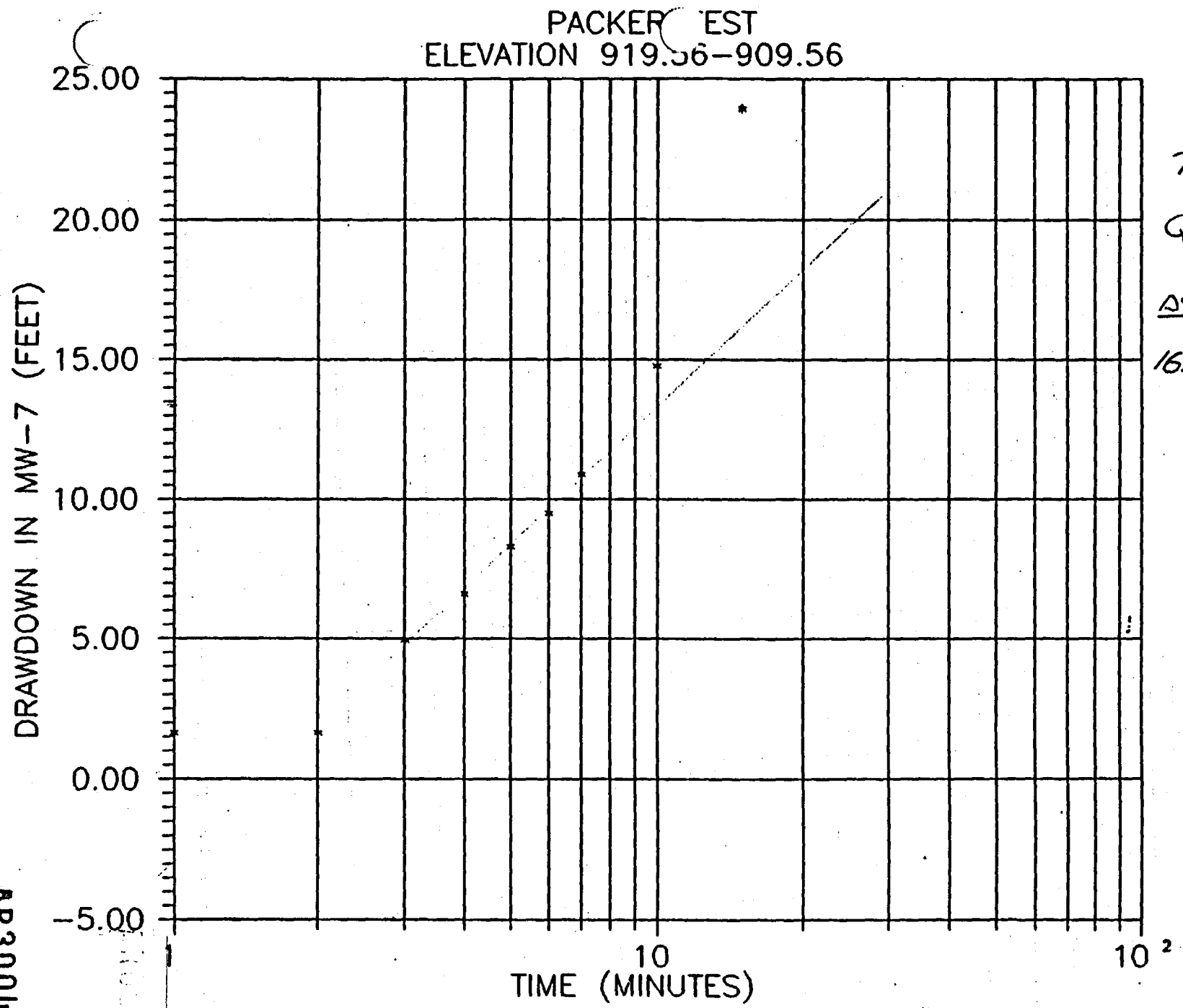
Δs	T (gal/d)
0.42	13,450.

AR300417


PACKER TEST
ELEVATION 839.66–829.66
DRAWDOWN IN MW-6 (FEET)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
10
10 2
TIME (MINUTES)
T= 264Q/Δs
Q= 21.8gpm
Δs
0.64
T(gpd/ft)
8990.

AR300418

PACKER TEST: MW-7

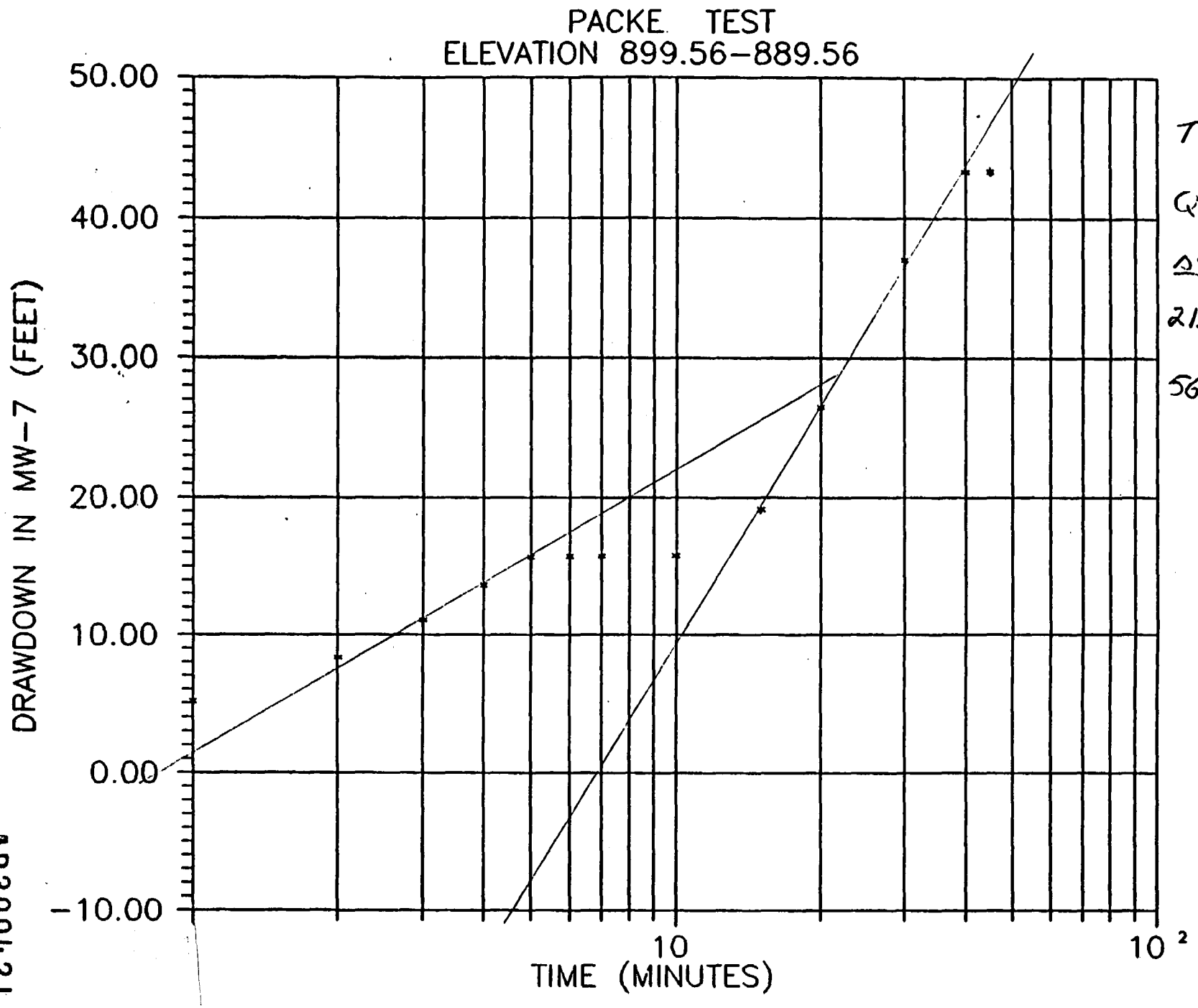


$T = \frac{264Q}{\Delta s}$

Q = 5 gpm

Δs	T (gpd/ft)
16.5	80.

AR300420



$T = \frac{264Q}{\Delta s}$

Q = 2.5 gpm

Δs	T (gpd/ft)
21.	30.
56.	12.

AR300421

C. AQUIFER PUMP TEST

AR300422

APPENDIX C

AQUIFER PUMP TEST

AR300423

APPENDIX C

AQUIFER PUMP TEST

COOPER AND JACOB METHOD FOR CALCULATION OF AQUIFER PROPERTIES FROM PUMP TEST DATA[1]

The transmissivity is calculated from the pumping rate and the slope of the time-drawdown graph by using the following equation:

$$T = \frac{2.3Q}{4\pi\Delta s/\Delta log_{10}t}$$

where:

T = transmissivity (gpd/ft)

Q = pumping rate (gpm)

$\Delta s/\Delta \log_{10} t$ = change in drawdown (feet) per change in time

Taking the change in drawdown over one log cycle and converting units to yield transmissivity in gpd/ft yields:

$$T = \frac{264Q}{\Delta s}$$

Storativity may also be calculated by the Cooper and Jacob method by the following equation:

$$S = \frac{0.3\,Tt_o}{r^2}$$

where:

t_o = time for zero drawdown (days)

S = storativity (dimensionless)

r = distance between observation well and pumping well (ft)

Converting units yields

$$S = \frac{2.08 \times 10^{-4}\,Tt_o}{r^2}$$

AR300424

where t_0 is in minutes

The following assumptions and conditions should be satisfied:[2]

- The aquifer is confined.
- The flow to the well is in a unsteady state.
- The water removed from storage is discharged instantaneously.
- The diameter of the pumping well is very small, i.e. The storage in the well can be neglected.

It should be noted that the Cooper and Jacob Method for Calculation of Aquifer Properties is somewhat restricted to "ideal" conditions, though it's simplicity and adaptability to certain situations readily constitutes it's utilization.

References:

(1) Lohman, S. W. Ground-Water Hydraulics. Geological Survey Professional Paper. 708:19-23. 1972.

(2) Kruseman, G. P. and De Rider, N. A. Analysis and Evaluation of Pumping Test Data. International Institute for Land Reclamation and Improvement. Bulletin No. 11. 1979.

AR300425

HANTUSH MODIFIED METHOD FOR CALCULATION OF AQUIFER PROPERTIES FROM PUMP TEST DATA[1]

The aquifer transmissivity is calculated from pump test data utilizing the following equation:

$$T = \frac{Q}{4\pi s} H(\mu, B)$$

where:

T = transmissivity (gpd/ft)

Q = pumping rate (gpm)

H(μ,B) = Hantush well function for leaky confined aquifers

s = drawdown in well (feet)

Conversion factors were introduced to express transmissivity in gallons per day per foot and pumping rate in gallons per minute.

$$T = \frac{360Q}{\pi s} H(\mu, \beta)$$

The following assumptions and conditions should be satisfied:[2]

- The Aquifer is semi-confined or confined.
- The flow to the well is in an unsteady state.
- The water removed from storage is discharged instantaneously.
- The well diameter is very small, so that the storage in the well can be neglected.
- The steady-state drawdown should be (approximately) known.

References:

(1) Lohman, S. W. Ground-Water Hydraulics. Geological Survey Professional Paper. 708:32-34. 1972.

(2) Kruseman, G. P. and De Rider, N. A. Analysis and Evaluation of Pumping Test Data. International Institute for Land Reclamation and Improvement. Bulletin No. 11, 1979.

AR300426

DISTANCE-DRAWDOWN METHOD FOR CALCULATION OF AQUIFER PROPERTIES FROM PUMP TEST DATA[1]

A modification of the Jacob straight-line method (Thiem's Method) may be used to estimate aquifer parameters based on distance and drawdown data from aquifer pump tests. If the drawdown is measured at the same time in several wells, it is found to vary with the distance from the pumping well in accordance with the Theis Equation. Hence, the transmissivity may be estimated by:

$$T = \frac{Q}{2\pi (S_1 - S_2)} \ln\left(\frac{r_2}{r_1}\right)$$

where:

Q = pumping rate (gpd)
S_1 = drawdown in pumping well (feet)
S_2 = drawdown in observation well (feet)
r_1 = radius of pumping well (feet)
r_2 = radial distance to observation well (feet)
T = transmissivity (gpd/ft)

and

t = time at which drawdowns are measured

The following assumptions and conditions should be satisfied:

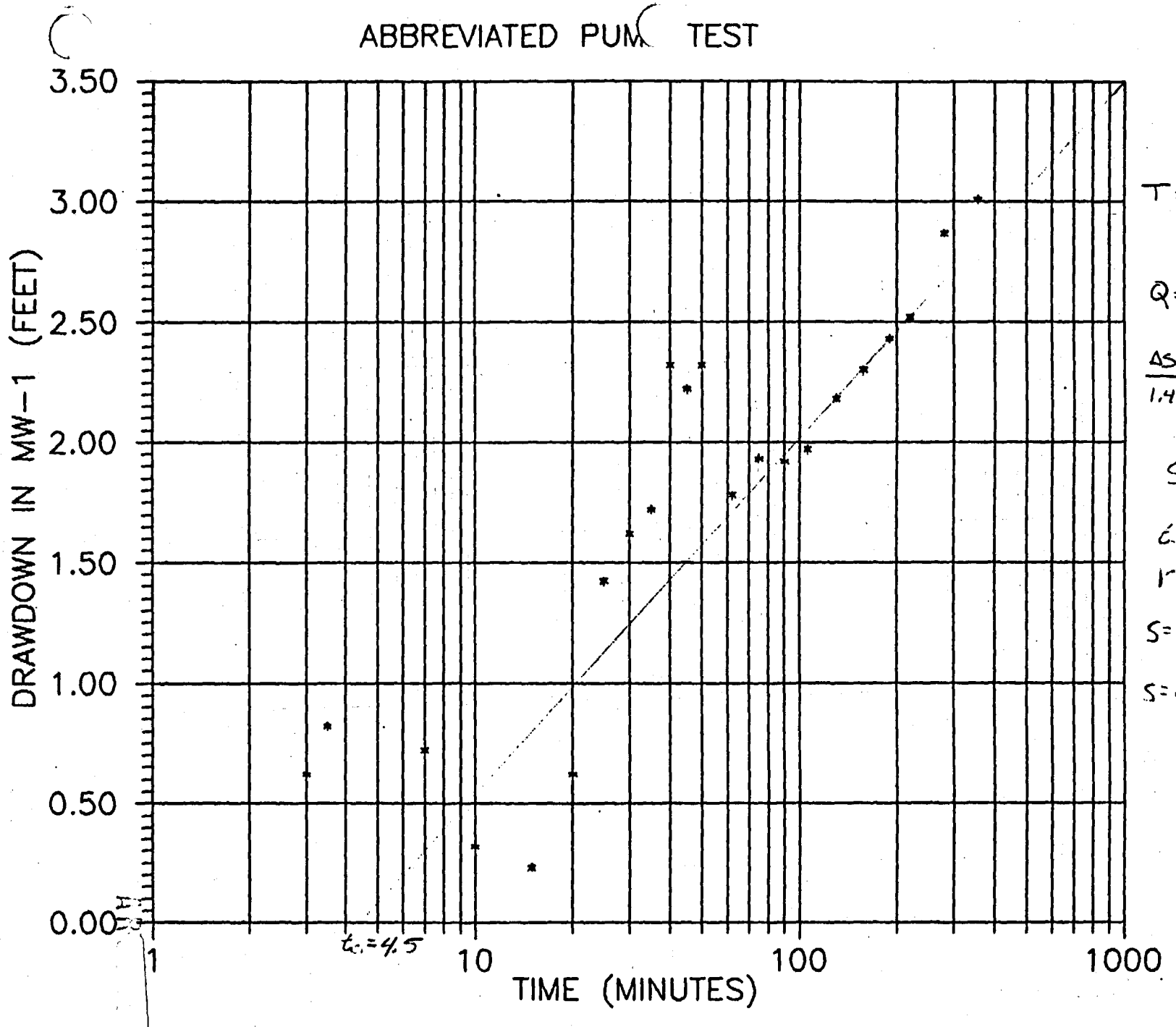
- Aquifer of infinite areal extent and confined.
- Homogeneous, isotropic and uniformly thick aquifer.
- Aquifer pumped at constant rate.
- Flow to the well is in a steady state and horizontal.
- Well penetrates the entire aquifer.

Reference:

Knuseman, G. P. and De Rider, N. A. Analysis and Evaluation of Pumping Test Data. International Institute for Land Reclamation and Improvement. Bulletin No. 11, 1979.

AR300427

ABBREVIATED PUMP TEST



$T = \frac{264Q}{\Delta S}$

$Q = 40$ gpm

$\frac{\Delta S}{1.47}$ $\frac{T}{7180}$ (gpd/ft.)

$S = \frac{2.08 \times 10^{-4} T t_0}{r^2}$

$t_0 = 4.5$ min

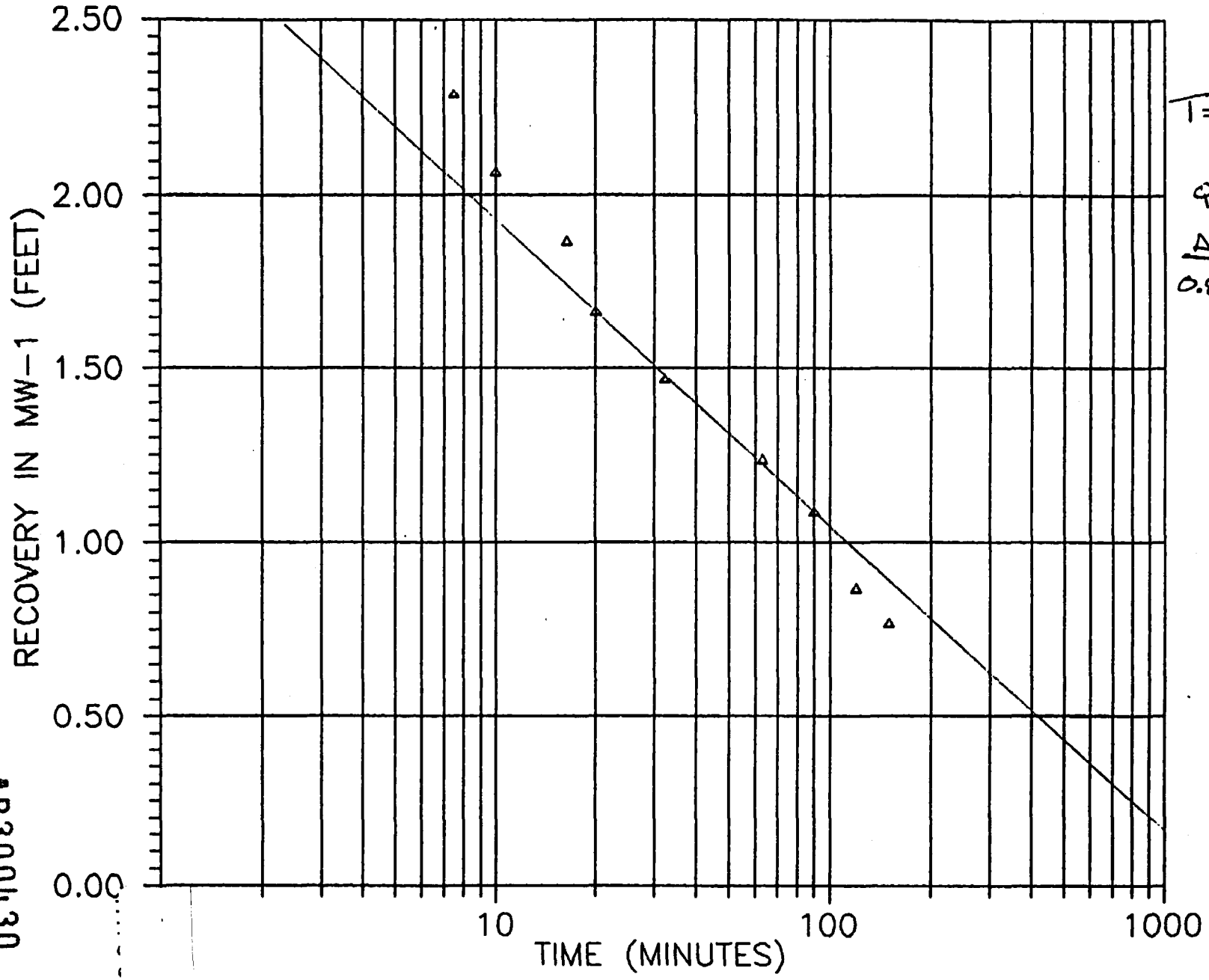
$r = 75$ ft

$S = \frac{2.08 \times 10^{-4} (7180)(4.5)}{(75)^2}$

$S = 0.0012$

AR300429

ABBREVIATED PUMP TEST



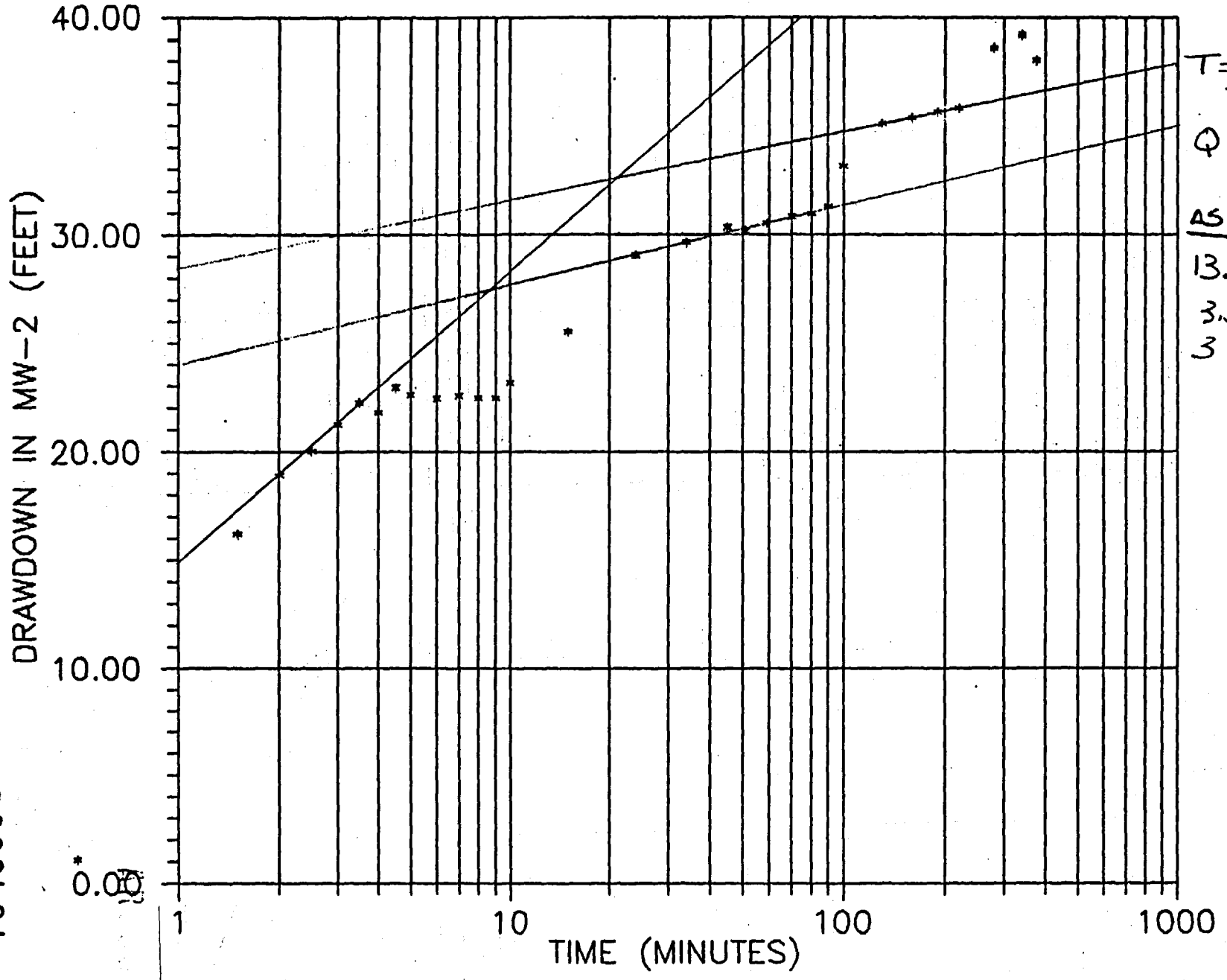
$T = \frac{264Q}{\Delta S}$

Q = 40 gpm

ΔS	T (gpd/ft)
0.875	12070

AR300430

ABBREVIATED PUMP TEST



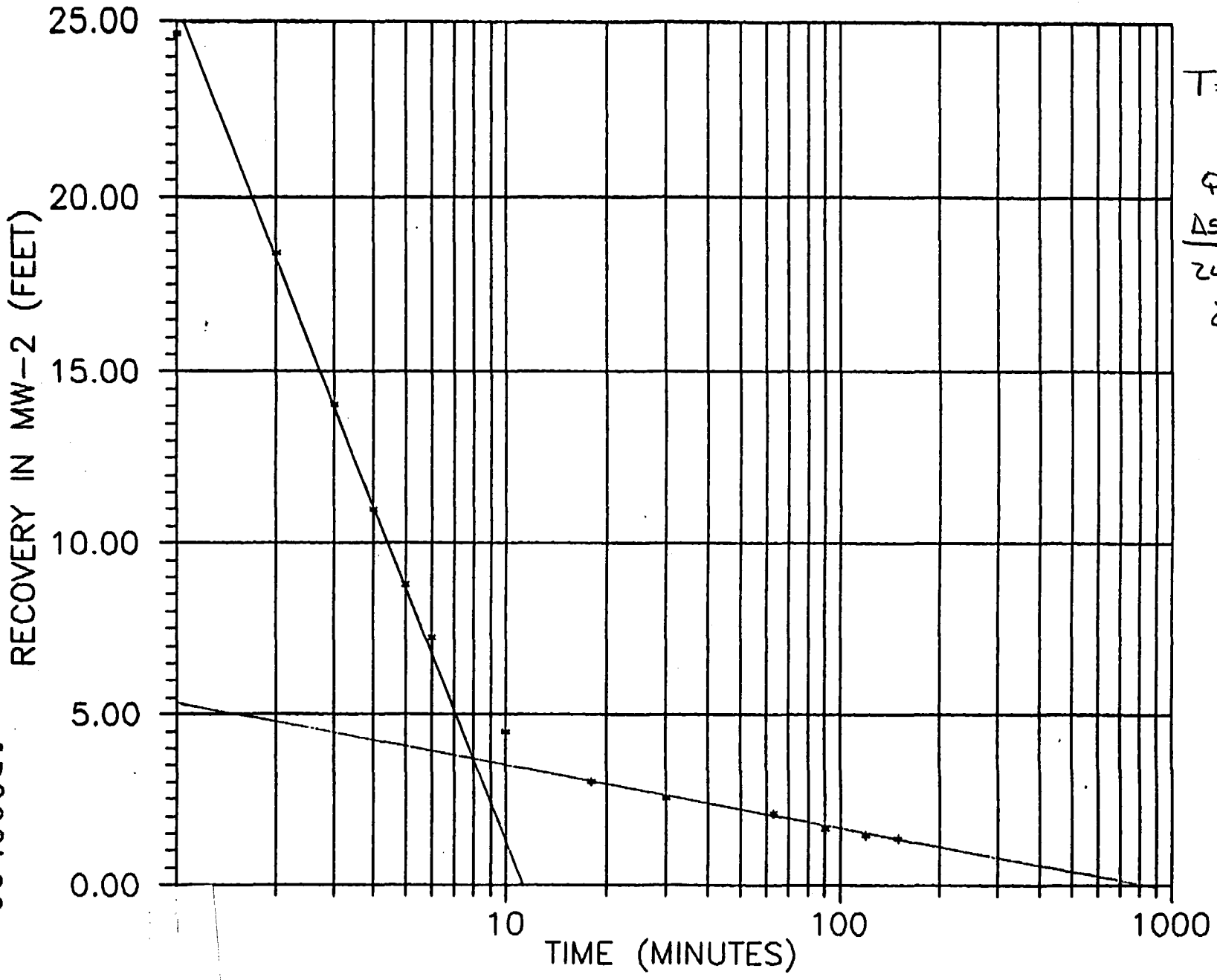
$T = \frac{264Q}{\Delta S}$

$Q = 40$ gpm

ΔS	T (gpd/ft.)
13.5	780
3.5	3020
3	3520

AR300431

ABBREVIATED PUMP TEST



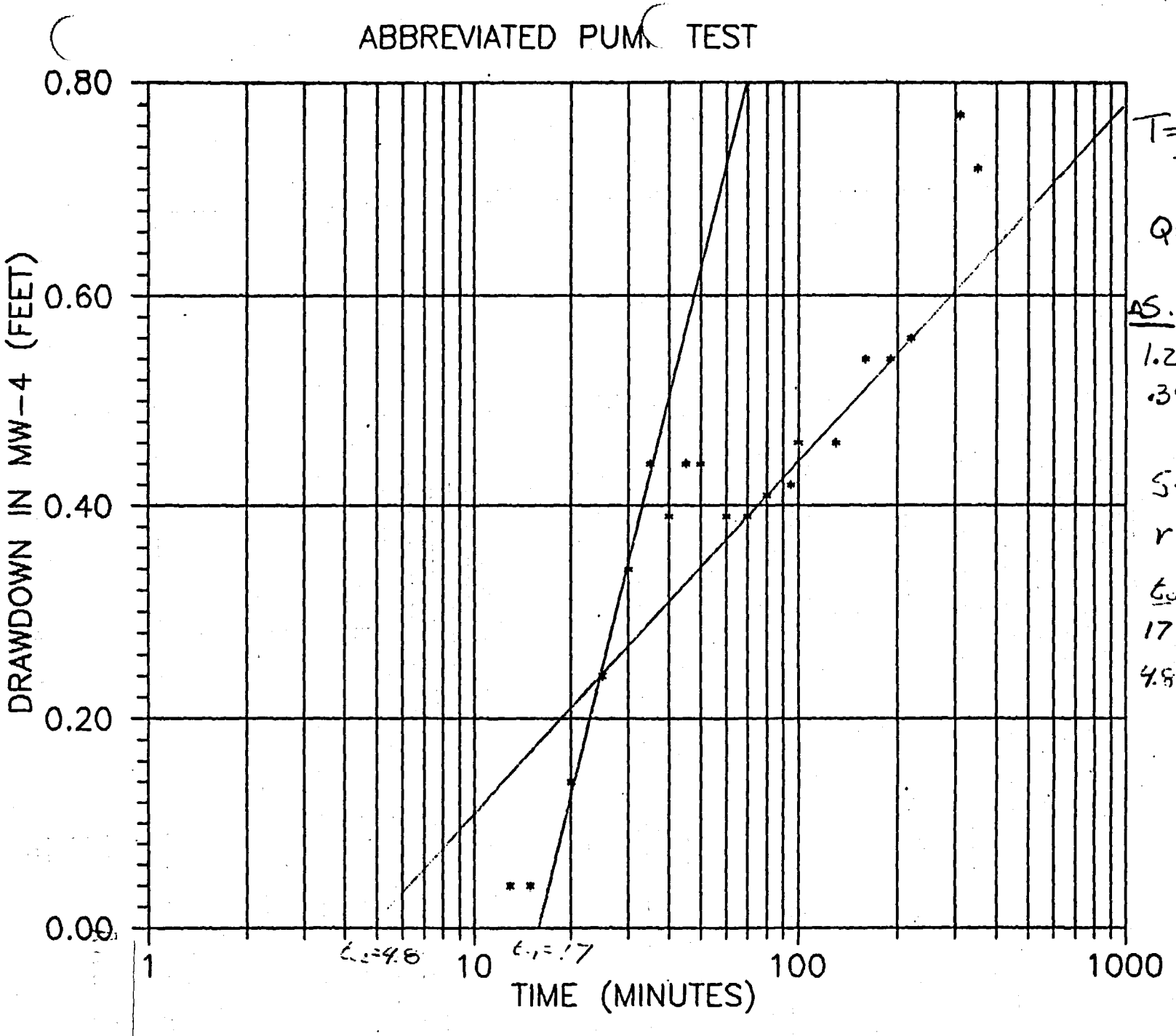
$T = \frac{264\,Q}{\Delta S}$

$Q = 40$

$\frac{\Delta S}{24}$ $\frac{T\,(gpd/ft)}{440}$

2 5280

AR300432



$T = \frac{264Q}{\Delta S}$

Q=40 gpm

ΔS:	T (gpd/ft)
1.23	8590
.34	31060

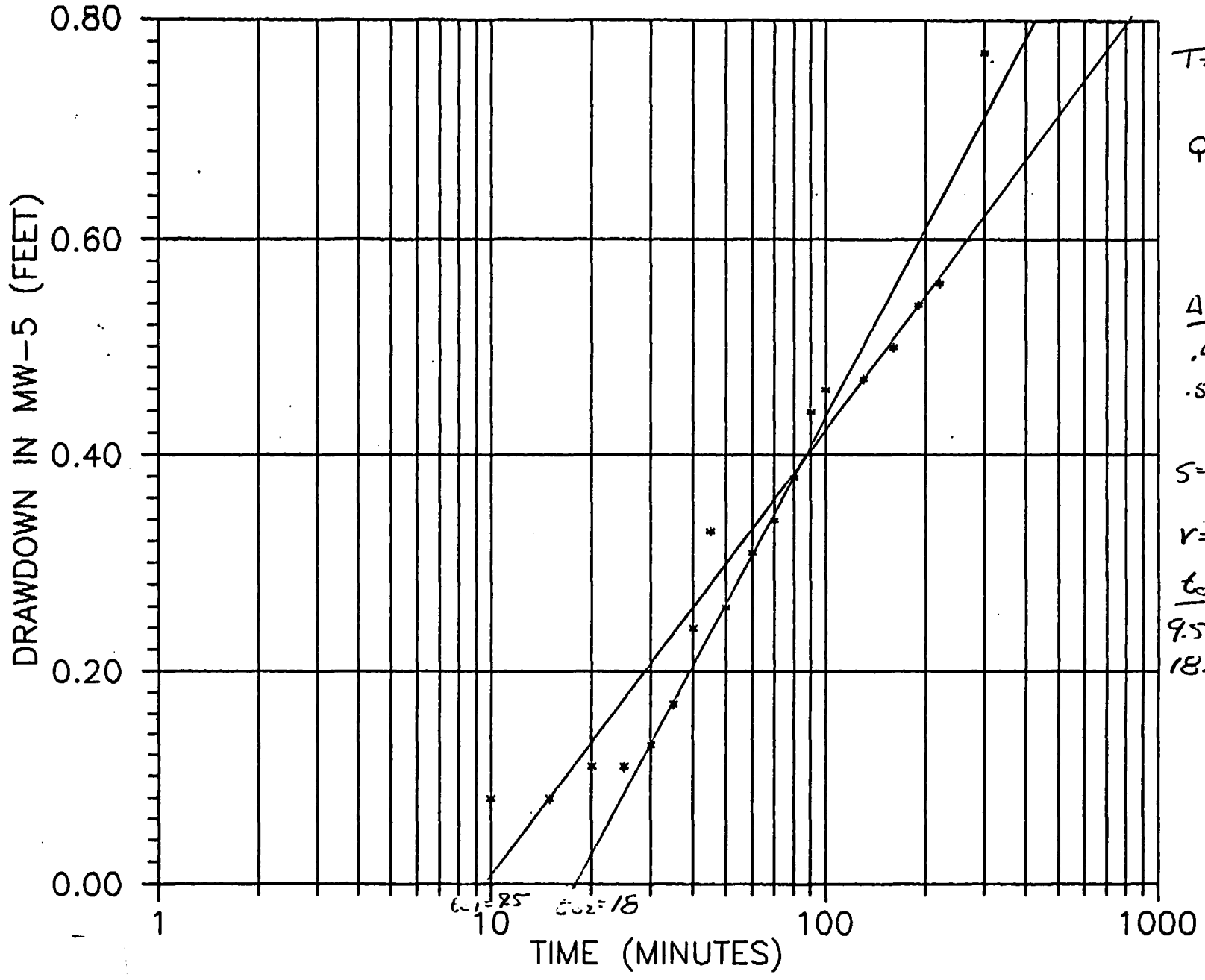
$S = \frac{2.08 \times 10^{-4}\, T t_0}{r^2}$

r=158 ft

t_0	S
17	0.0012
4.8	0.0012

AR300433

ABBREVIATED PUM.. TEST



$T = \frac{264Q}{\Delta s}$

Q = 40 gpm

Δs	T (gpd/ft)
.40	26400
.58	18210

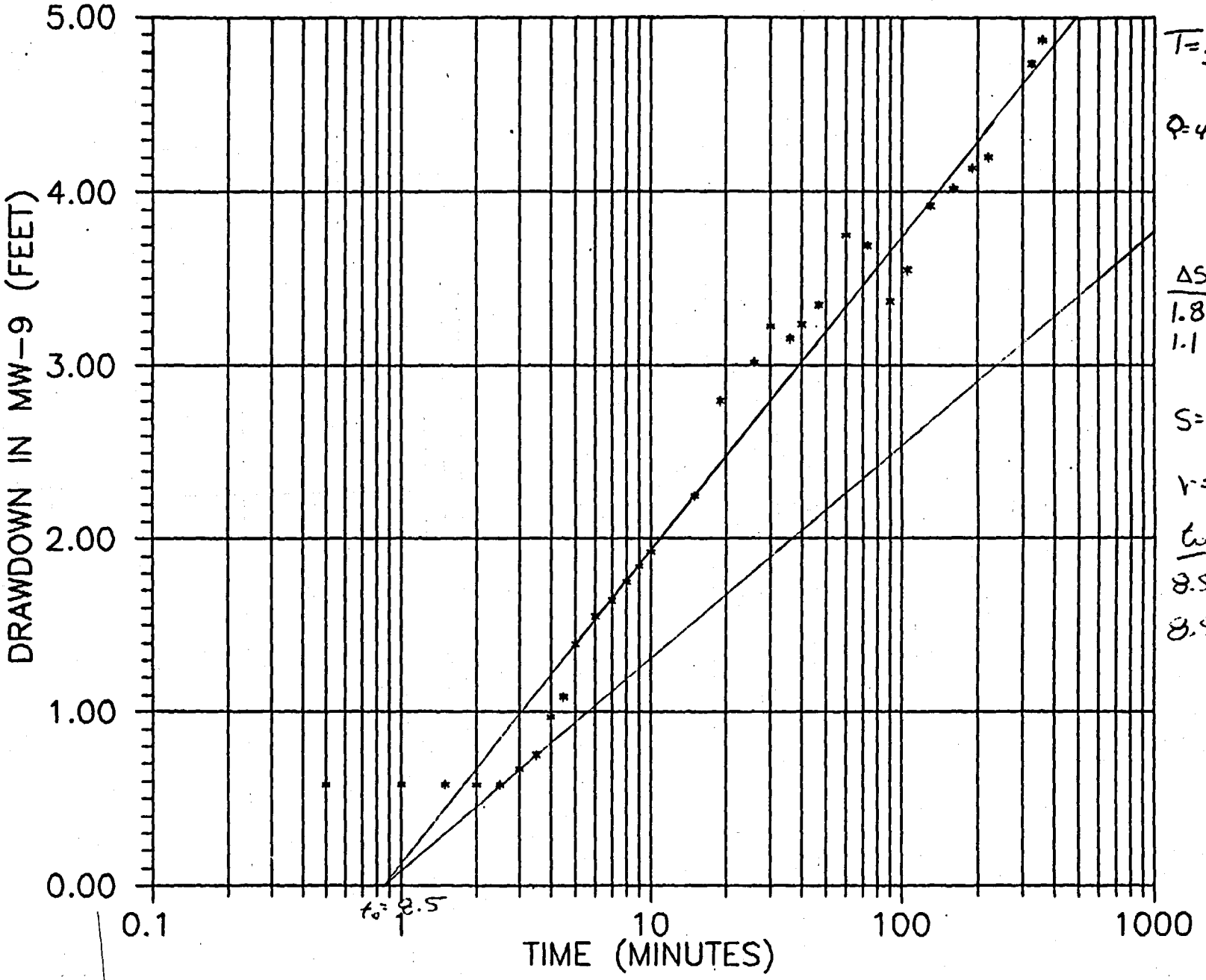
$S = \frac{2.08 \times 10^{-4} T t_o}{r^2}$

r = 350 ft

t_o	S
9.5	0.0004
18.	0.0006

AR300434

ABBREVIATED PUMP TEST



$T = \frac{264Q}{\Delta S}$

Q = 40 gpm

ΔS	T (gpd/ft)
1.8	5870
1.1	9600

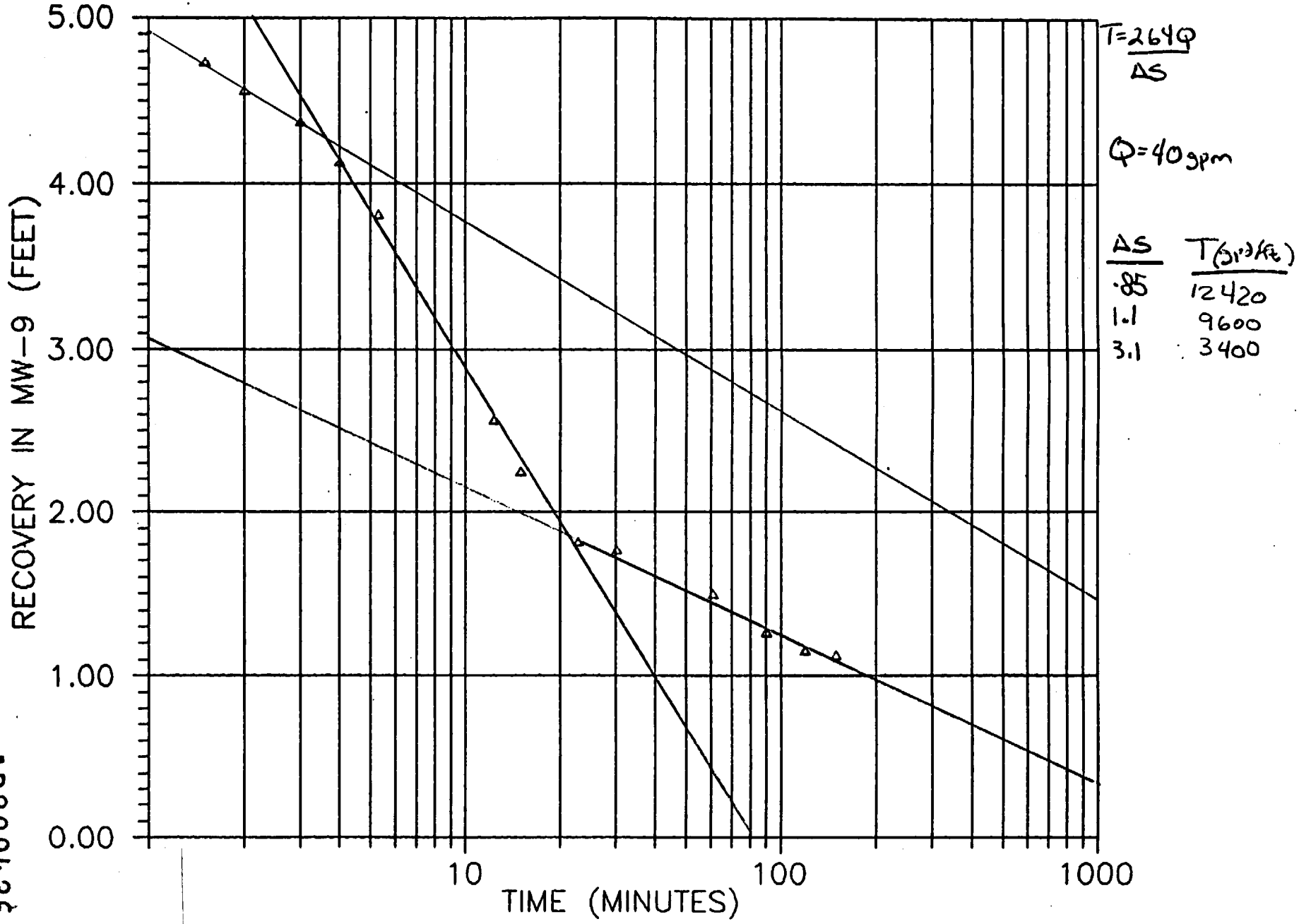
$S = \frac{2.08 \times 10^{-4} T t_o}{r^2}$

r = 33 ft

t_o	S
8.5	0.0015
8.5	0.0156

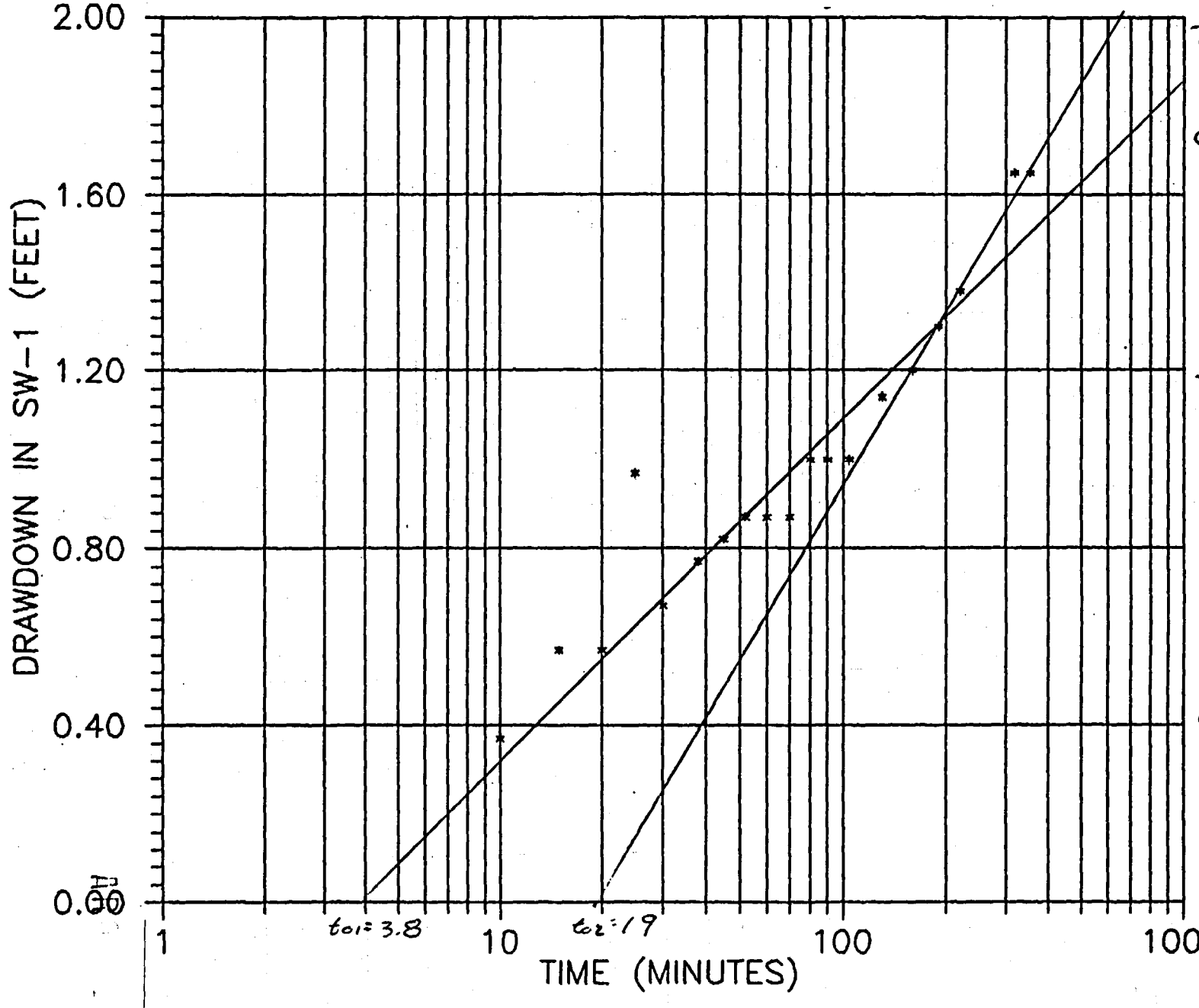
AR300435

ABBREVIATED PUMI TEST



AR300436

ABBREVIATED PUMP TEST



$T = \frac{264Q}{\Delta S}$

$Q = 40$ gpm

ΔS	T (gpd/ft.)
.76	13890
1.1	9600

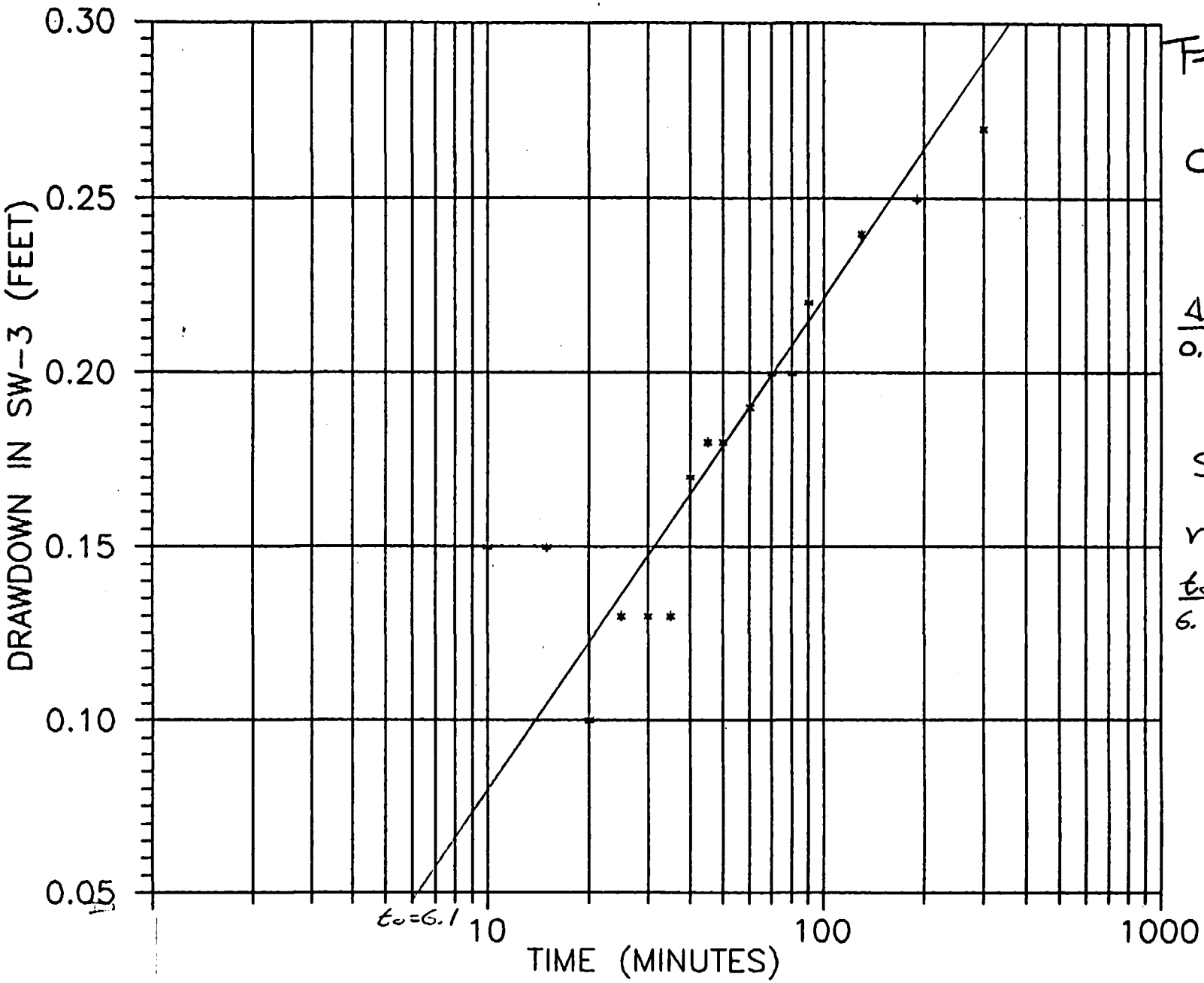
$S = \frac{2.08 \times 10^4 T t_o}{r^2}$

$r = 43$ ft.

t_o	S
3.8	0.0054
19	0.0205

AR300437

ABBREVIATED PUMI TEST



$T = \frac{264Q}{\Delta S}$

Q = 40 gpm

ΔS	T (gpd/ft)
0.14	75430

$S = \frac{2.08 \times 10^4 T t_o}{r^2}$

r = 360 ft.

t_o	S
6.1	0.0007

AR300438