115021

ORIGINAL (Red)

NUS CORPORATION
A Halliburton Company

D-31-9-4-5
DRAFT
MI-4-RI/FS-D(3)-III

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY REPORT

VOLUME III

APPENDICES

MILLCREEK SITE
ERIE COUNTY, PENNSYLVANIA

EPA WORK ASSIGNMENT
NUMBER 60-3L60
CONTRACT NUMBER 68-01-6699

NUS PROJECT NUMBER S778

AUGUST 1985

AR000394

NUS CORPORATION

Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

D-31-9-4-5
DRAFT
MI-4-RI/FS-D(3)-III

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY REPORT

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AUGUST 1985

SUBMITTED FOR NUS BY:

CATHERINE D. CHAMBERS
PROJECT MANAGER

APPROVED:

AR000395

DAVID E. MacINTYRE
REGIONAL MANAGER
REGION III

DRAFT

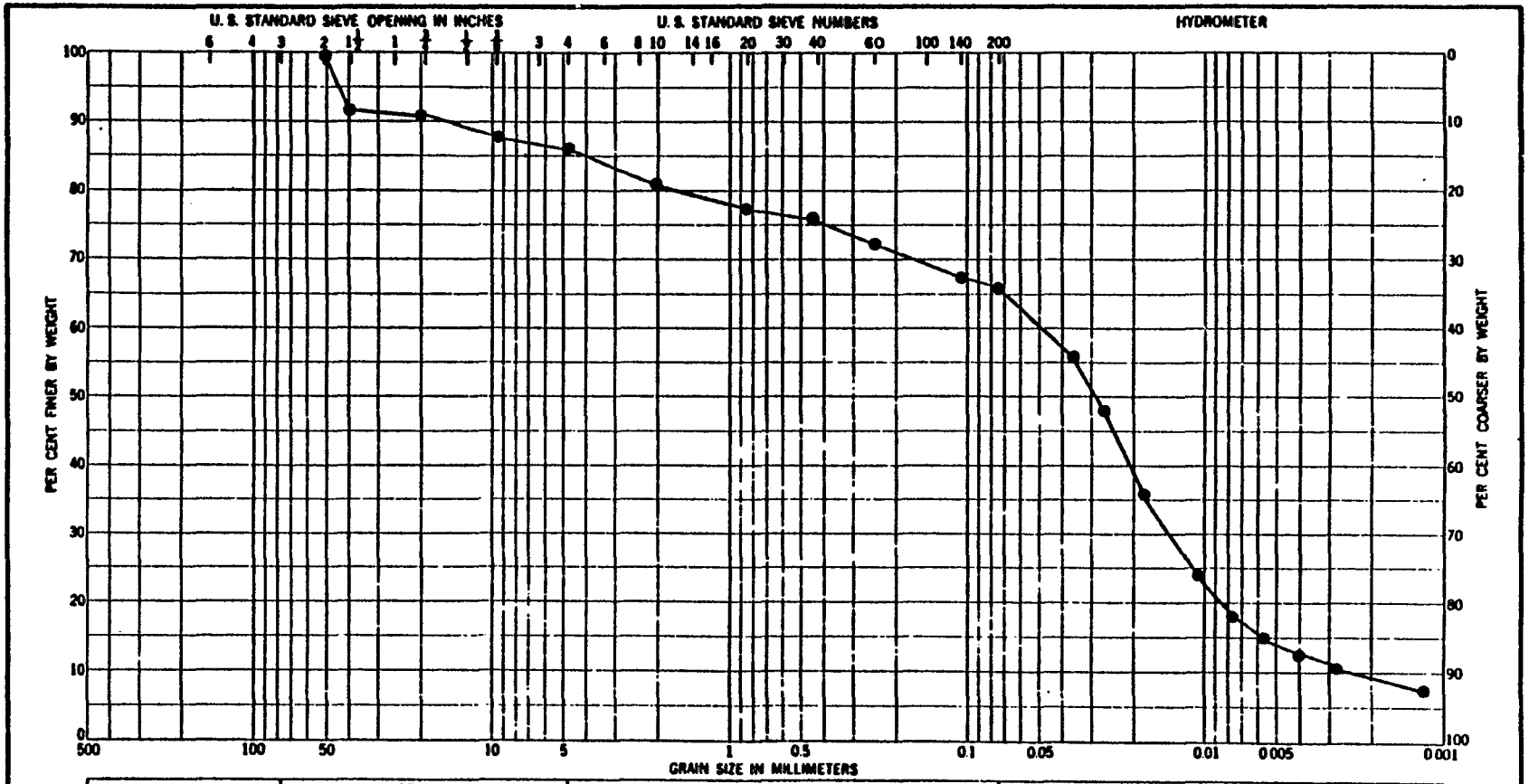
CONTENTS

DRAFT

APPENDIX A

PHYSICAL PROPERTIES OF THE TILL

GRAIN SIZE DISTRIBUTION ANALYSIS



HOLE NO.	SAMPLE NO.	ELEV. OR DEPTH	CLASSIFICATION	NAT W %	LL	PL	PI
[illegible] B	DT 1	23.5'- 25.5	ML	15.4	18.3	16.7	1.6

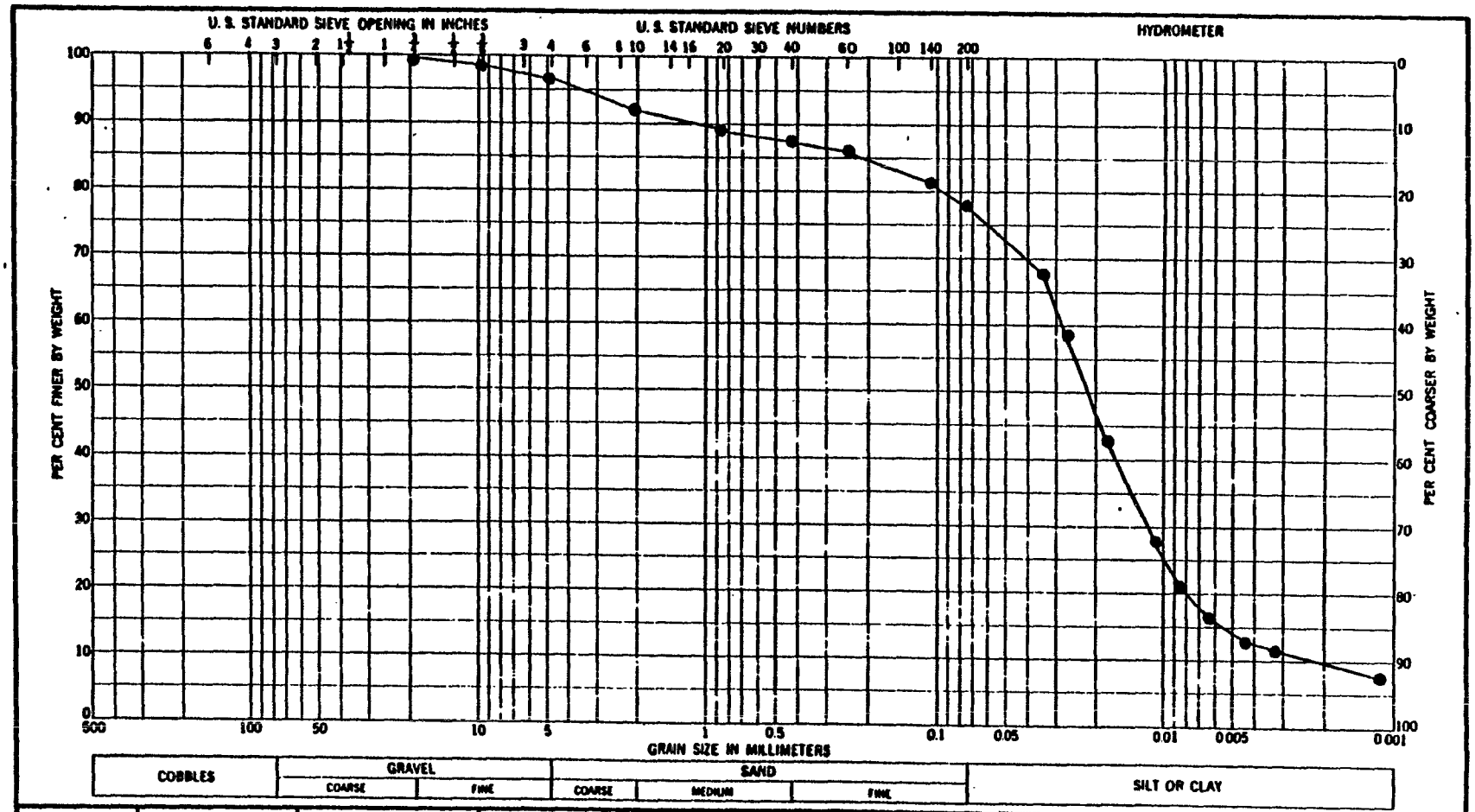
DESCRIPTION : Silt with Sand

PROJECT: NUS Corporation
Mill Creek Testing

SRW ASSOCIATES INC.

DWG. NO.: 84254

GRAIN SIZE DISTRIBUTION ANALYSIS



HOLE NO.	SAMPLE NO.	ELEV. OR DEPTH	CLASSIFICATION	NAT W %	LL	PL	PI
23A & B	1 & 8	21.0'-22.5'	MI.		19.8	17.5	2.3

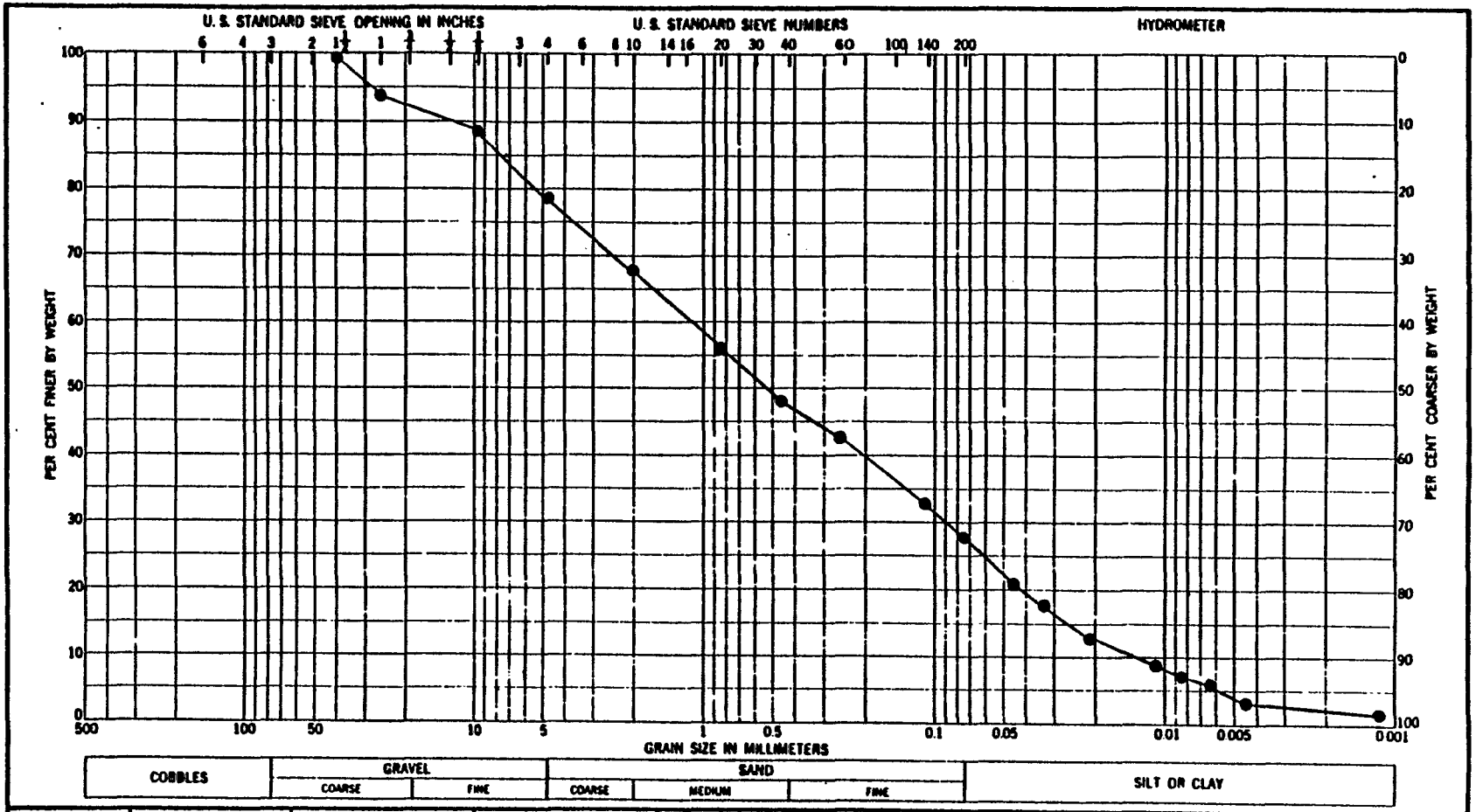
DESCRIPTION : Silt with Sand

PROJECT: NUS Corporation
Mill Creek Testing

SRW ASSOCIATES INC.

DWG. NO.: 84254

GRAIN SIZE DISTRIBUTION ANALYSIS



HOLE NO.	SAMPLE NO.	ELEV. OR DEPTH	CLASSIFICATION	NAT W %	LL	PL	PI
23A	14 & 15	48.0'- 52.0'	SM		NL	NP	--

DESCRIPTION : Silty Sand with Gravel

PROJECT: NUS Corporation
Mill Creek Testing

SRW ASSOCIATES INC.

DWG. NO.: 84254

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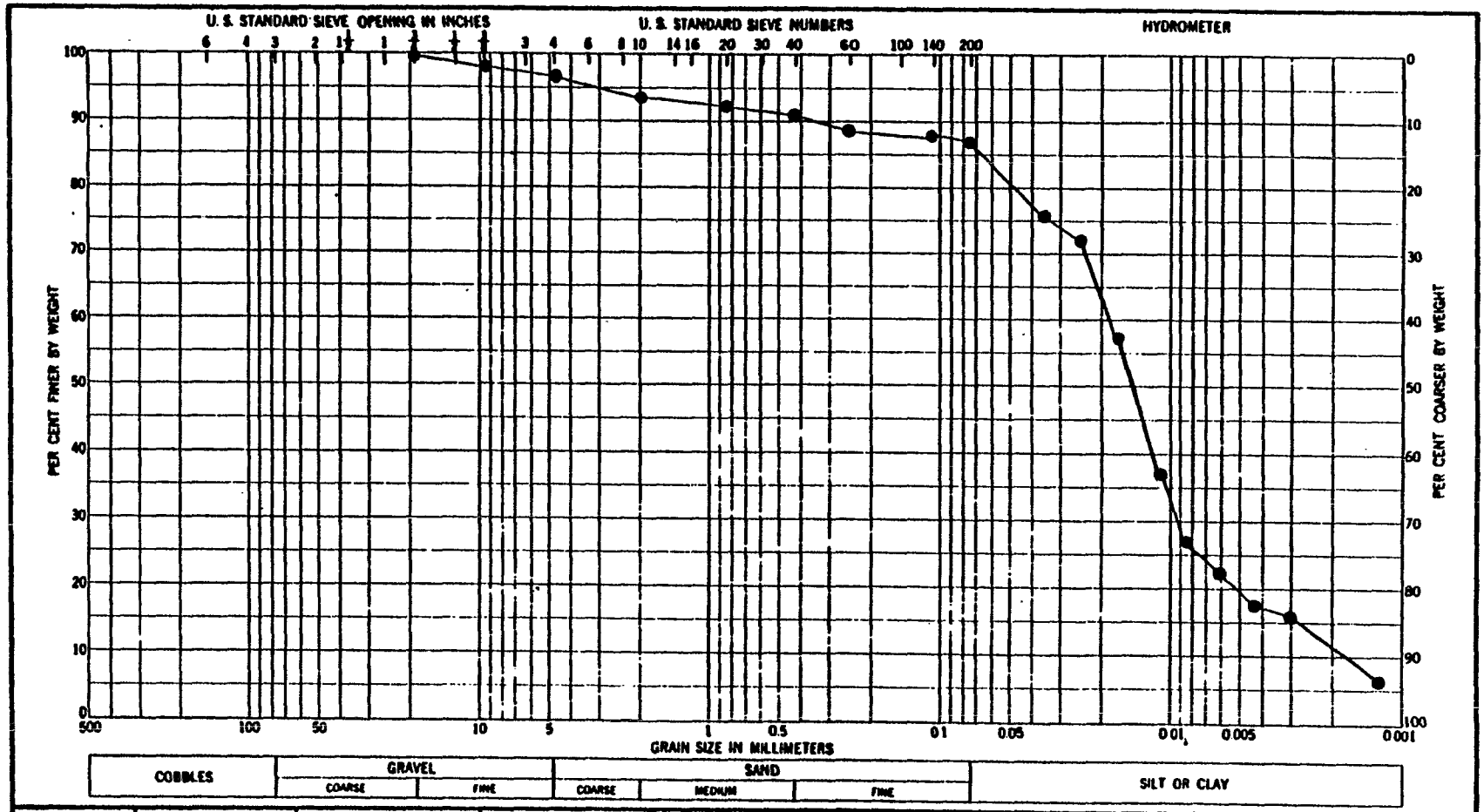
GRAIN SIZE DISTRIBUTION ANALYSIS



HOLE NO.	SAMPLE NO.	ELEV. OR DEPTH	CLASSIFICATION	NAT W %	LL	PL	PI
~~23-A & B~~	DT 3	32.5' - 34.5'	ML-CL	19.9	24.6	19.7	4.9

DESCRIPTION : Lean Clay and Silt

PROJECT: NUS Corporation
Mill Creek Testing

SRW ASSOCIATES INC.

DWG. NO.: 84254

24

10+000

ORIGINAL (Red)

NUS CORPORATION
MILL CREEK TESTING
SRW PROJECT 84254

PERMEABILITY TEST RESULTS

Boring	Depth (ft.)	Coefficient of Permeability (cm/sec)
23B	23.5 - 25.5	7.7×10^{-7}
~~23A~~ 24A	32.5 - 34.5	4.6×10^{-7}

SHELBY TUBE DENSITY

Boring	Depth (ft.)	Dry Unit Wt. (pcf)	Water Content (%)	Wet Unit Wt. (pcf)
23B	23.5 - 25.5	94.6	15.4	109.1
~~23A~~ 24A	32.5 - 34.5	100.0	19.9	119.9

DRAFT

APPENDIX B

MONITORING WELL BORING LOGS

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 15A
ELEVATION 725.59' DATE 6/21-6/22/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO., TYPE & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION*			USCS OR ROCK BROKENNESS	REMARKS
				SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
S-1 0.0'- 1.5'	3-14-22	1.5/1.5	DRY	DENSE	BROWN & BLACK	SILTY SAND, SOME ROOTS, FILL	SM	FOUNDRY SAND
				↓		2.0' ↓ ↓ 2.0'		OVM @ BKGRD
			MOIST		BROWN	FINE SAND, TRACE GRAVEL, FILL		
S-2 5.0'- 6.5'	2-3-9	.4/1.5	MOIST	MED. DENSE	BROWN TO BLACK	FINE SAND, SOME GRAVEL, TRACE SILT, FILL	SP	
S-3 10.0'- 11.5'	1-5-6	.75/1.5	WET	MED. DENSE	BLACK TO BROWN	FINE SAND, TRACE SILT, FILL	SM	
			▽ 12.2' 6/22/84			14.0' ↓ ↓ 14.0'		
S-4 15.0'- 16.5'	2-2-8	1.0/1.5	SATURATED	LOOSE	BROWN	FINE TO MED. SAND, TRACE SILT	SM	END 6/21/84
S-5 20.0'- 21.5'	5-10-10	1.5/1.5	WET	VERY STIFF	GRAY	SILT, TRACE SAND	ML	

REMARKS NO OVM READINGS ABOVE BACKGROUND

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 . BORING 15A
ELEVATION 725.59' DATE 6/22/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH (ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
S-6 20.0'- 26.5'	5-8-9	1.3/1.5	WET	VERY STIFF	GRAY	CLAYEY SILT, w/.5' SILTY CLAY @ 25.5'	ML	
S-7 30.0'- 31.5'	15-18-14	1.5/1.5	WET	DENSE	GRAY	SILTY CLAY 30.0 - 30.4' SAND, TRACE GRAVEL	SP	GRAVEL ANGULAR TO SUBANGULAR ROCK FRAGMENTS
S-8 35.0'- 36.5'	13-22-27	1.5/1.5	MOIST (SLIGHTLY)	HARD	GRAY	32.0' 32.0' SANDY SILT, TRACE GRAVEL, (TILL)	ML-SW	
S-9 0.0'- 1.4'	20-40-50/.4	1.4/1.4				SILT, TRACE SAND, TRACE GRAVEL (TILL)	ML	
S-10 5.0'- 16.0'	24-55	1.0/1.0						

REMARKS No OVM READINGS ABOVE BACKGROUND

*SEE LEGEND ON BACK

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 15A
ELEVATION 725.59' DATE 6/22/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* — SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
-6 25.0'- 26.5'	5-8-9	1.2/1.5	WET	VERY STIFF	GRAY	CLAYEY SILT, w/.5' SILTY CLAY @ 25.5'	ML	
-7 30.0'- 31.5'	15-18-14	1.5/1.5	WET	DENSE	GRAY	SILTY CLAY 30.0 - 30.4' SAND, TRACE GRAVEL	SP	GRAVEL ANGULAR TO SUBANGULAR ROCK FRAGMENTS
S-8 35.0'- .5	13-22-27	1.5/1.5	MOIST (SLIGHTLY)	HARD	GRAY	SANDY SILT, TRACE GRAVEL, (TILL)	ML-SW	
S-9 .0'- .4'	20-40-50/.4	1.4/1.4				SILT, TRACE SAND, TRACE GRAVEL (TILL)	ML	
10 .0'- 6.0'	24-55	1.0/1.0						

32.0' 32.0'

REMARKS NO OVM READINGS ABOVE BACKGROUND

BORING 15A

*SEE LEGEND ON BACK

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AR000406

AR000406

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 15A
ELEVATION 735.59' DATE 6/22 - 6/23/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH (ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH(ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
11 50.0-50.3'	6-44-50/.3	1.3/1.3	MOIST (SLIGHTLY)	HARD	GRAY	FINE SAND, TRACE GRAVEL 50.0'-50.4' ← SILT, TRACE SAND, TRACE GRAVEL (GRAVEL ANGULAR TO SUBANGULAR)	ML	DRILLING SPEED INCREASED @ 49.5', SAND MAY HAVE BEGUN THERE
						TILL		
						55.0' 55.0'		
12 55.0-55.3'	50/.3	.3/.3	DRY	MED. SOFT	GRAY	SHALE, WEATHERED, VERY BROKEN	V. BR.	END 6/22/84
				MED. SOFT	GRAY	SHALE, WEATHERED, BROKEN, BREAKS ALONG BEDDING PLANES (HORIZONTAL)	BR.	
RE RUN#1								
1	42%	5.1/5.1						
						60.4' 60.4'		
			T.D. 60.4'					

REMARKS WELL 15A INSTALLED IN BORING

BORING 15A

SEE LEGEND ON BACK

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 16A
ELEVATION 717.55' DATE 6/26/84
FIELD GEOLOGIST JEFF ORIENT

SA NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
-1 1.5'	7-11-8	1.1/1.5	DRY	MED. DENSE	BROWN TO BLACK	SILTY SAND, FILL W/ YELLOW & ORANGE	SP	FOUNDRY SAND?
S-2 1.5'-3.0'	1-4-5	1.5/1.5	DRY	LOOSE	BLACK	FINE SAND, FILL	SP	
S-3 3.0'-4.5'	3-2-2	.4/1.5	DRY	VERY LOOSE	BROWN TO BLACK	FINE TO COARSE SAND, TRACE GRAVEL, FILL	SW	
4 5'-6.0'	10-10-6	.5/1.5	WET ▽5.5' 6/26/84	MED. DENSE		GRAVEL, SOME SAND, TRACE SILT, FILL	GW	
S-5 6.0'-7.5'	3-3-4	1.05/1.5	MOIST	STIFF	GRAY TO GREEN	CLAY, TRACE SILT, TRACE ORGANICS (ROOTS) TRACE SAND - NATURAL SOIL	CH	TAKEN FOR ANALYSIS
S-6 7.5'-9.0'	3-3-7	1.5/1.5	MOIST	STIFF	GRAY TO BROWN	CLAY, TRACE SILT, TRACE SAND	CH	MC-SS-01
7 9.0'-10.5'	7-9-11	1.5/1.5	SATUR.	MED. DENSE	BROWN TO GRAY	FINE TO COARSE SAND, TRACE SILT	SP	
S-8 10.5'-12.0'	5-8-9	1.1/1.5	SATUR.	MED. DENSE		SILTY FINE TO COARSE SAND - (SAND & SILT LAYERS INTERBEDDED)	SP-ML	
S-9 12.0'-13.5'	7-8-10	1.1/1.5	WET					
10 13.5'-15.0'	3-7-10	1.5/1.5	WET		GRAY			
S-11 15.0'-16.5'	5-9-7	1.5/1.5	WET					
S-12 16.5'-18.0'	4-8-12	1.3/1.5	MOIST	VERY STIFF	GRAY	SILT, TRACE SAND 17.0' 17.0'	ML	
13 18.0'-19.5'	5-8-10	1.5/1.5						
S-14 19.5'-21.0'	6-8-7							
S-15 21.0'-22.5'	2-3-5	1.5/1.5	WET	STIFF	GRAY	SILT, SOME SAND, TRACE GRAVEL (SILTY & SANDY LAYERS INTERBEDDED)	ML-SW	
-16 22.5'-24.0'	22-31-38	1.5/1.5	MOIST	HARD				
S-17 24.0'-25.5'	65-36-44	.8/1.5	MOIST	VERY DENSE	GRAY	FINE TO MED. SAND, TRACE GRAVEL, TRACE SILT	SP	

REMARKS

AR000408

BORING 16A

SEE LEGEND ON BACK

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 16A
ELEVATION 717.55' DATE 6/26-6/27/84
FIELD GEOLOGIST JEFF ORIENT

S. ENO. & DEPTH (ft.)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
5.5'								
-18	13-13-							
25.5'- 27.0'	17	1.5/1.5	WET	DENSE	GRAY	FINE TO COARSE SAND, TRACE GRAVEL, TRACE SILT	SW	
19 .0'.	10-16-19	1.5/1.5	WET	↓	↓	28.3' ↓ ↓ 28.3'	↓	
5'					GRAY	SILT, SOME SAND, TRACE GRAVEL	ML	
S-20			MOIST					
28.5'- 1.3'	35-50/.3	.8/.8	(SLIGHTLY)	HARD	GRAY	SILT, SOME SAND, TRACE GRAVEL (TILL)	ML	GRAVEL ANGULAR
21 30.0'-	60/.5	.5/.5						TO SUBANGULAR,
30.5'								
-22 .5'- 1.0'	90/.5	.5/.5						ROCK FRAGMENTS
								END 6/26
S-23 33.0'-	58/.5	.5/.5						
	35-41-							
36.0'	54	1.5/1.5						
25 .0'-	38-41-	1.25/1.5						
7.5'	53							
S-26	26-34-							
37.5'- 2.0'	23	1.5/1.5						
27 .0'-	20-23- 29	1.3/1.5	MOIST	VERY DENSE	GRAY	MED. TO COARSE SAND, SOME GRAVEL, SOME SILT	SW	GRAVEL ANGULAR
40.5'								
28	22-25-							TO SURROUNDED
.5'- 2.0'	27	1.2/1.5	SATURATED					
S-29 42.0'-	32-33- 32	1.5/1.5						
1.5'								
30	35-50-							
45.5'- 45.0'	32	1.5/1.5						
31 .0'-	34-30- 37	1.5/1.5	WET	VERY DENSE	GRAY	SILT, TRACE GRAVEL, TRACE SAND .3' VERY FINE SAND, TRACE SILT 1.2'	SP	
6.5'								
S-32								
46.5'- .4'	25-50/.4	.9/.9	WET	VERY DENSE	GRAY	VERY FINE SAND, SOME SILT	SP	
33 .0'-	75/.3	.3/.3	WET	VERY DENSE	GRAY	SAND, SOME SILT, TRACE GRAVEL	SP	GRAVEL ANGULAR
8.3'								
.0.5'- .9'	75/.4	.4/.4	WET	VERY DENSE	GRAY	FINE TO COARSE SAND, SOME GRAVEL	SW	TO SURROUNDED

MARKS

BORING 16A

SEE LEGEND ON BACK

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 16A
ELEVATION 717.55' DATE 6/27/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* — SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
S-35 51.0'-	32-50/3	.8/.8	MOIST (SLIGHTLY)	HARD	GRAY	SILT, TRACE SAND, TRACE GRAVEL (TILL)	ML	GRAVEL ANGULAR
:8'								
:36	29-36-							TO SUBANGULAR
52.5'- 54.0'	60	1.5/1.5						ROCK FRAGMENTS
37 1.0'-	20-53- 57	1.0/1.5						
:5'								
S-38								
55.5'- :9'	50/.4	.4/.4				W/ FEW INTERBEDDED ANGULAR		NX CORE
						BOULDERS (UP TO .45' ϕ)		
CORE RUN #1	(55.9'- 61.0')							
				↓	↓	59.55' ↓ 59.55'		
	0%	5.1/5.1		SOFT	GRAY	SHALE, BROKEN, WEATHERED	BR	
				MED. SOFT	GRAY	SHALE, W/ SANDY STREAKS, BROKEN	BR	
						WEATHERED, BREAKS ALONG		
CORE RUN #2	(61.0'- 66.0')					BEDDING PLANES (HORIZONTAL)		
	39%	5.0/5.0		↓	↓	66.0' ↓ 66.0'	↓	↓
			T.D. 66.0'					

REMARKS WELL 16A INSTALLED IN BORING

BORING AR000440

SEE LEGEND ON BACK

PAGE 3 OF 3

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 16B
ELEVATION 717.66' DATE 6/28/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
						SEE BORING LOG 16A FOR DETAILED LITHOLOGY ↓ ↓		
S-1 1.0'	6-4-2	1.5/1.5	WET ▽ 5.9' 6/28/84	LOOSE	BLACK TO BROWN	FINE TO COARSE SAND, TRACE CLAY (AT BOTTOM), FILL (TO CLAY LAYER)	SP	TAKEN FOR ANALYSIS- MC-SS-02
						SEE BORING LOG 16A FOR DETAILED LITHOLOGY ↓ ↓		

REMARKS

AR000411

BORING 16B

SEE LEGEND ON BACK

PAGE 1 OF 2

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 16B
ELEVATION 717.66' DATE 6/28/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
2 30.0'-31.1'	70-100-50/.1	1.1/1.1	MOIST (SLIGHTLY)	HARD	GRAY	SILT, TRACE SAND, TRACE GRAVEL	ML	TAKEN FOR EXAMINATION
			T.D. 31.1'					

REMARKS WELL 16B INSTALLED IN BORING

AR000412

SEE LEGEND ON BACK

PAGE 2 OF 2

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 17A
ELEVATION 719.90' DATE 7/5/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NUMBER & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
S-1 0.0'-1.5'	4-6-7	1.5/1.5	DRY	MED. DENSE	BLACK & ORANGE	FINE SAND, TRACE SILT, FEW ROOTS, FILL	SP	FOUNDRY SAND
S-2 3.0'-4.5'	8-5-7	.9/1.5	MOIST	MED DENSE	BLACK & BROWN	FINE SAND, TRACE SILT, FILL	SP	TAKEN FOR ANALYSIS (MC-CC-23)
S-3 5.0'-6.5'	2-4-6	.2/1.5	WET	LOOSE	BLACK TO GRAY	8.0' 8.0'	SP	
S-4 10.0'-11.5'	4-8-10	1.5/1.5	SATURATED ▽ 10.1' 7/10	MED. DENSE	GRAY	VERY FINE SAND, TRACE SILT (UNIFORM SAND)	SP	NATURAL SOIL
S-5 12.0'-13.5'	7-9-11	1.3/1.5				15.0' 15.0'		
S-6 15.0'-16.5'	1/0'-1	.5/1.5	MOIST	VERY SOFT	BLACK	CLAYEY SILT	ML	
S-7 20.0'-21.5'	10-3-7	1.5/1.5	SATURATED	LOOSE	GRAY	VERY FINE TO COARSE SAND, TRACE SILT (FINE SAND W/ LAYERS (1-2") OF COARSE SAND	SW	SOME BEDDING APPARENT
S-8 21.5'-23.0'	6-14-14	1.5/1.5		MED. DENSE	GRAY	FINE TO COARSE SAND, TRACE GRAVEL, TRACE SILT (MOSTLY COARSE SAND)	SW	GRAVEL ANGULAR SUBROUNDED
S-9 24.0'-	7-?-?							

REMARKS OVM NOT WORKING PROPERLY

BORING 17A

SEE LEGEND ON BACK

PAGE 1 OF 3

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 17A
ELEVATION 719.90' DATE 7/5-7/10/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
(CONTINUED)						(.62' SILT, .25' FINE TO COARSE SAND IN BOTTOM OF SAMPLE)		
10	7-12-14	1.5/1.5	SATURATED	MED. DENSE	GRAY	VERY FINE SAND, TRACE SILT, UNIFORM SAND	SP	
11 30.0-31.5'	19-31-32	1.5/1.5		VERY DENSE		(.2' HARD GRAY SILT AT BOTTOM OF SAMPLE)		
12 33.0-34.5'	0-1-9	1.1/1.5		LOOSE		FINE SAND, TRACE SILT		
13 36.0-37.0	35-60/5"	1.0/1.0	MOIST (SLIGHTLY	HARD	GRAY	36.3' SILT, SOME SAND, TRACE GRAVEL, TILL 36.3'	ML	TILL DEPOSIT
								GRAVEL ANGULAR TO SURROUNDED
14 40.0-41.5'	65/5"	.5/.5						HARD DRILLING
								END 7/5
15 43.0-43.9'	36-50/4"	.9/.9				SILT, TRACE SAND, TRACE GRAVEL, TILL		(PRESERVED FOR POSSIBLE TESTING)
16 45.0-46.5'	34-41-42	1.5/1.5						
CORE RUN #1 46.5'- 50.0'	0%	2.3/3.5		SOFT	GRAY	48.25' SHALE 48.25'	V. BR	DRILLING EXTREMELY HARD - TRIED CORING

REMARKS CORE LOSS IN RUN #1 WAS JUDGED TO BE TILL

BORING R0004A14

SEE LEGEND ON BACK

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 17A
ELEVATION 719.90' DATE 7/10/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO., TYPE & DEPTH (ft.)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION*			USCS OR ROCK BROKENNESS	REMARKS
				SOFT	GRAY	SHALE, W/ SOME SANDY STREAKS	V. BR.	
CORE RUN 2						VERY BROKEN - BREAKS ALONG BEDDING		
50.0'- 55.0'						PLANES (HORIZONTAL)		
	7%	5.0/5.0				55.0' ↓ ↓ 55.0'		
			T.D. 55.0'					

REMARKS WELL 17A INSTALLED IN BORING

AR000415

BORING 17A

*SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 17B
ELEVATION 719.88' DATE 7/11/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH(ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH(ft)	MATERIAL MOISTURE & WATER DEPTH(ft)	MATERIAL DESCRIPTION*			USCS OR ROCK BROKENNESS	REMARKS
				SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
						SEE BORING LOG 17A FOR DETAILED LITHOLOGY		
			▽ 9.2' 7/11/84					
						14.0'		
			T.D. 14.0'					

REMARKS WELL 17B INSTALLED IN BORING

BORING 17B
AR000416

SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 18 A
ELEVATION 717.14 DATE 7/12/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
S-1 0.0-1.5'	2-5-17	1.5/1.5	DRY	MED. DENSE	BLACK	FINE SAND, SOME ROOTS & WOOD FRAGMENTS PRESENT, FILL	SP	OVA @ 220 PPM INJ. 4-6.5' NO READING AT SAMP
S-2 3.0-4.5'	1-1-2	1.5/1.5	WET ▽5.5 7/12/84	VERY LOOSE	BLACK (GREEN)	SILTY FINE SAND, W/ FEW WOOD FRAGS. FILL 5.5' 5.5'	SM	FOUNDRY SAND S-2 TAKEN FOR ANALYSIS
S-3 10.0-11.5'	2-4-5	.85/1.5	WET	STIFF	BROWN & GRAY	CLAYEY SILT - W/ LARGE WOOD FRAGMENT NATURAL SOIL	ML	ML-SS-04
	6-8-9	1.5/1.5	SATURATED	MED. DENSE	BROWN	FINE TO COARSE SAND, TRACE SILT 1.0' FINE SILTY SAND .5'	SW	
S-5 12.0-13.5'	2-3-2	1.1/1.5	SATURATED	LOOSE	BROWN TO GRAY	VERY FINE TO FINE SAND, TRACE SILT (.1' SILT IN BOTTOM OF SAMPLE)	SP	
S-6 15.0-16.5'	0-1-1	1.3/1.5		VERY LOOSE		18.0' 18.0'		
S-7 20.0-21.5'	15-22-32	1.5/1.5	MOIST	HARD	GRAY	SILT, TRACE SAND	ML	
S-8 21.0-22.5'	12-20-22	1.5/1.5						
S-9 24.0-25.5'	12-18-20	1.0/1.5	SATURATED	DENSE	GRAY	MED. TO COARSE SAND, TRACE GRAVEL	SW	GRAVEL SUB-ANGULAR TO ROUNDED

REMARKS

ARCO 0417

SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 18A
ELEVATION 717.14' DATE 7/12-7/13/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO., TYPE & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION*			USCS OR ROCK BROKENNESS	REMARKS
				SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
-9 (CONTINUED)						27.3' 27.2'		
-10 27.0- 28.5'	17-22-29	1.5/1.5	MOIST	HARD	GRAY	SILT, .8'. FINE TO MED SAND, .5'	ML-SP	
-11 30.0- 31.5	17-43-56	1.5/1.5	MOIST	HARD	GRAY	FINE TO COARSE SAND, SOME GRAVEL, .7' SILT, TRACE GRAVEL, .8'	ML-SW	GRAVEL ANGULAR TO ROUNDED
S-12 33.0- 34.5'	15-28-39	1.2/1.5	SATURATED	VERY DENSE	GRAY	33.6' 33.6' FINE TO COARSE SAND, SOME GRAVEL, TRACE SILT	SW	
-13 36.0- 37.5'	28-23-20	1.5/1.5	MOIST	HARD	GRAY	36.5' 36.5' SILT, SOME SAND, TRACE GRAVEL W/.3' LENS OF SAND, TRACE GRAVEL, TILL	ML	TILL - GRAVEL ANGULAR TO SUBROUNDED
-14 39.0- 40.5	12-16-26	1.2/1.5	MOIST (SLIGHTLY)	HARD	GRAY	SANDY SILT, TRACE GRAVEL		END 7/12/84
S-15 42.0- 42.9'	30-50/.4	.9/.9		HARD	GRAY	SILT, TRACE GRAVEL, TRACE SAND		
-16 45.0- 45.5	79/.5	.5/.5		HARD	GRAY	SILT, SOME SAND, TRACE GRAVEL		

REMARKS

BORING: 18A
AR 000418

*SEE LEGEND ON BACK

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 18A
ELEVATION 717.14' DATE 7/13/84
FIELD GEOLOGIST JEFF ORIENT

S...E NO. & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* — SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
-18 0.0-50.5'	89/.5	5/.5	MOIST (SLIGHTLY)	HARD	GRAY	SILT, SOME SAND, TRACE GRAVEL TILL	ML	GRAVEL ANGULAR TO SUBANGULAR VERY HARD DRILLING ~40 MINUTES TO AUGER 5 FEET
						55.2' 55.2'		
-19 50.5-55.2'	2%/.2	3/.2		SOFT	GRAY	SHALE, WEATHERED, BROKEN, BREAKS ALONG BEDDING PLANES (HORIZONTAL)	V. BR.	
CORE RUN #1								
	0%	5.0/5.0				60.2'		
			TD 60.2'					

REMARKS WELL 18A INSTALLED IN BORING

BORING 18A

SEE LEGEND ON BACK

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AR000419

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 18B
ELEVATION 717.17' DATE 7/16/84
FIELD GEOLOGIST JEFF ORIENT

S. E NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH(ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
						SEE BORING LOG 18A FOR DETAILED LITHOLOGY		
5.0'-6.0'	1-1-3	1.5/1.5	▽5.0' WET	SOFT	YELLOW	SILT, SOME CLAY, TRACE SAND	ML	RETAINED FOR ANALYSIS (MC-SS-05)
						18.0' 18.0'		
			T.D. 18.0					

REMARKS WELL 18B INSTALLED IN BORING

BORING 18B
ATT0000420

SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 19A
ELEVATION 715.76' DATE 7-16-84
FIELD GEOLOGIST DANIEL R HAMEL

SAMPLE NO. & DEPTH (ft.)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft.)	MATERIAL MOISTURE & WATER DEPTH (ft.)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
1 0-1.5	28-10-12	1.5/1.5	DRY	MEDIUM DENSE	BRN	FINE AND V. FINE SAND, TRACE SILT, ROOTS, WOOD (FILL)	(SP)	PID-BACKGROUND
2 3.0-4.5	3-9-11	1.5/1.5	MOIST	MEDIUM DENSE	BLK	V. FINE TO MEDIUM SAND, TRACE TO SOME SILT, TRACE SLAG FRAGMENTS	(SM)	PID-BACKGROUND
						5.5 FILL 5.5		
3 7.0-8.5	4-4-4	1.5/1.5	WET ▼6.5 7-16-84	MEDIUM STIFF	BRN TO DARK GRY	SILT, SOME V. FINE TO FINE SAND 8.0 8.0	(ML)	PID - BACKGROUND
4 10.0-11.5	12-14-15	1.5/1.5	WET	MEDIUM DENSE	GRY	V. FINE SAND, TRACE TO SOME SILT	(SP)	PID - BACKGROUND
						11.0 11.0		
5 12.0-13.5	14-14-19	1.5/1.5	MOIST	V. STIFF	GRY	SILT, SOME V. FINE SAND	(ML)	PID-BACKGROUND
						14.5 14.5		
6 15.0-16.5	1-5-7	1.5/1.5	MOIST	MEDIUM DENSE	GRY TO BRN	V. FINE TO FINE SAND, TRACE SILT	(SP)	PID-BACKGROUND
7 17.0-18.5	5-9-13	1.5/1.5	MOIST			SOME SUBANGULAR TO ROUNDED GRAVEL	(SP)	
8 21.0-22.5	1-2-7	1.5/1.5	WET			23.2 23.2	(SP)	
9 23.0-24.5	9-18-22	1.5/1.5	WET	DENSE	GRY	ANGULAR TO ROUND V. COARSE TO FINE GRAVEL, SOME SAND, TRACE SILT	(GW-GP)	PID-BACKGROUND

REMARKS PID BACKGROUND 0-0.3 ppm
7-16-84 WATER LEVEL 6.5 FT (OPEN BOREHOLE)

BORING 19A
AR000421

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NUS CORPORATION
A Halliburton Company

PROJECT MILL CREEK
PROJECT NO. 0778.17 BORING 19A
ELEVATION 715.76' DATE 7-16-84
FIELD GEOLOGIST DANIEL R HAMEL

SAMPLE NO. & DEPTH (ft.)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
10 0-0.5	12-19-23	1.5/1.5	MOIST	DENSE	DARK GRY	V. FINE TO FINE SAND, TRACE SUBANGULAR TO ROUNDED FINE TO MEDIUM GRAVEL	(SP)	
11 30.0-31.0	29-50/.5	1.0/1.0	MOIST	V. DENSE	DARK GRY	SILT, SOME TO TRACE V. FINE SAND TRACE GRAVEL (TILL)	(ML-SM)	
S-12 35.0-35.5	27-50/.5	1.0/1.0	MOIST	V. DENSE	DARK GRY	V. FINE SAND, SOME SILT, TRACE GRAVEL 35.5 (TILL) 35.5	(SM)	
13 37.5-38.0	3-5-19	1.5/1.5	WET	MEDIUM DENSE	DARK GRY	V. FINE TO FINE SAND, SOME SILT, TRACE ROUNDED FINE GRAVEL (TILL)	(SM)	
14 37.0-40.5	21-41-52	1.5/1.5	MOIST	V. DENSE	DARK GRY	V. FINE TO FINE SAND, SOME SILT, TRACE SUBANGULAR TO ROUNDED GRAVEL (TILL)	(SM-SP)	
S-15 42.0-42.5	26-31-39	1.5/1.5	MOIST				(SM-SP)	
16 47.0-47.0	48-76/.5	1.0/1.0	MOIST			47.2 47.2	(SM-SP)	
17 48.0-49.0	51-71/.5	1.0/1.0	MOIST	V. STIFF TO HARD		SILT, TRACE V. FINE SAND, TRACE GRAVEL (TILL)	(ML)	

REMARKS

BORING 19A
AR000422
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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 19A
ELEVATION 715.76' DATE 7-17-84
FIELD GEOLOGIST DANIEL R HAMEL

SAMPLE ENC & DEPTH(ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH(ft)	MATERIAL MOISTURE & WATER DEPTH(ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
S-18 0.0-	55-81/.5	1.0/1.0	MOIST	V. STIFF TO HARD	GRY	SILT, TRACE V. FINE SAND, TRACE SUBANGULAR GRAVEL, TRACE SHALE ROCK FRAGMENTS (TILL)	(ML)	
S-19 20.0-	48-64/.5	1.0/1.0	MOIST	HARD	GRY	WEATHERED SHALE ROCK FRAGMENTS, SOME SILT, TRACE V. FINE SAND (TILL)	(GM)	
57.2						57.2		
57.0- 57.2	71/.2	.2/.2		MEDIUM SOFT	GRY	SHALE, WEATHERED, V. BROKEN	V. BR	
2 1 2- 2	49%	6.5/7.0		MEDIUM HARD	GRY	SHALE, BROKEN	BR	
						64.2 64.2		
			TD 64.2					

REMARKS

AR000423
BORING 19A

SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 20A
ELEVATION 719.13' DATE 7/17/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO & DEPTH (ft)	BLOWS/SIX INCHES OR ROD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
1 0-1.5	2-9-9	1.1/1.5	DRY	MED. DENSE	BLACK, BROWN, YELLOW	FINE SAND, TRACE GRAVEL, FILL	SP	
2 3.0-5'	3-6-20	1.5/1.5	▽ 3.0' 7/19 WET					TAKEN FOR ANALYSIS MC-55-06
3 5-7	2-3-4	1.5/1.5	MOIST	LOOSE	GRAY TO BROWN	6.0' VERY FINE SAND, SOME SILT, TRACE CLAY- NATURAL SOIL 6.5'	SP- ML	TAKEN FOR ANALYSIS MC-55-07
4 8.0-10.5'	1-3-4	1.5/1.5	SATURATED	LOOSE	GRAY	FINE TO MED. SAND	SP	
5 13.0-15'	4-8-14	1.5/1.5		MED DENSE	BROWN	VERY FINE SAND, TRACE SILT, UNIFORM SAND 15.0' 15.0'	SP	
6 15.0-17'	2-6-12	1.5/1.5	MOIST	VERY STIFF	GRAY	SILT, SOME V. FINE SAND, TRACE CLAY 18.0' 18.0'	MH-ML	
7 18.0-19.5	4-6-11	1.5/1.5	SATURATED	MED. DENSE	GRAY	VERY FINE SAND, TRACE SILT, UNIFORM SAND	SP	
8 21.0-22.5	1-1-4	1.2/1.5		LOOSE				
9 24.0-25.5'	1-3-11	1.3/1.5		MED. DENSE		25.0' 25.0'		

REMARKS NO OVM READINGS ABOVE BACKGROUND

BORING 20A, 21

AR000421

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 20A
ELEVATION 719.13' DATE 7/17-7/19/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* — SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
27)						.3' MED. TO COARSE SAND, .2' HARD SILT		
-10 7.0-7.3	17-40-50/3	1.0/1.5	SATURATED MOIST	VERY DENSE	GRAY	FINE TO COARSE SAND, SOME GRAVEL .4' HARD GRAY SILT	SW	
-11 30.0-30.9	43-50/4	.9/.9	MOIST (SLIGHTLY)	HARD	GRAY	SANDY SILT, TRACE GRAVEL	ML	TILL GRAVEL ANGULAR TO SUBROUNDED
-12 33.0-	30-45-50/4	1.4/1.4		HARD	GRAY	SILT	ML	END 7/17
-13 40.0-7.5	51-50/.2	.7/.7	MOIST	VERY DENSE	GRAY	SILTY VERY FINE SAND	SP-ML	
14 47.0-49.41	50/.4	.4/.4	MOIST (SLIGHTLY)	HARD	GRAY	SILT, SOME SAND, TRACE GRAVEL, TILL	ML	GRAVEL ANGULAR TO SUBROUNDED, TILL
S-15 52.0-2.7	53-50/.2	.7/.7		HARD	GRAY	SILT AND SAND, TRACE GRAVEL	ML-SP	
-16 55.0-55.9	38-50/4	.9/.9		HARD	GRAY	SILT, SOME SAND, TRACE GRAVEL	ML	END 7/18

MARKS

AR 000425
BORING 20A

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 20A
ELEVATION 719.13' DATE 7/19/84
FIELD GEOLOGIST JEFF ORIENT

S...E NO., & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
...7 1.0- ...7	48-5%	.7/.7	MOIST SLIGHTLY	HARD	GRAY	SILT, SOME SAND, TRACE GRAVEL	ML	TILL - GRAVEL, ANGULAR TO SUBROUNDED
				52.0'		52.0'		
...18 55.0- 55.2	50/.2	.2/.2		SOFT	GRAY	SHALE, VERY WEATHERED, BROKEN	V. BR	
RE ...N #1 55.2'- 60.2'						BREAKS ALONG BEDDING PLANES (HORIZ.)		
	0%	5.0/5.0		60.2'		60.2'		
			T.D. 60.2'					

REMARKS WELL 20A INSTALLED IN BORING

BORING 20A26
AR 000426

*SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 20B
ELEVATION 718.99' DATE 7/20/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION*			USCS OR ROCK BROKENNESS	REMARKS
				SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
						SEE BORING LOG 20A FOR DETAILED LITHOLOGY		
			▽ 5'					
-1 3.5-5.0	3-5-6	1.2/1.5	SATURATED	MED DENSE	GRAY	FINE TO MED. SAND, TRACE SILT	SP	
			T.D. 15.0'					

REMARKS WELL 20B INSTALLED IN BORING

BORING 20B

AR000427

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 21A
ELEVATION 717.06' DATE 7-19-84
FIELD GEOLOGIST DANIEL R. HAMEL

SAMPLE NO., TYPE & DEPTH (ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
						26.5 26.5		
-10 1.0- 8.0	39-52/.5	1.0/1.0	MOIST	V. STIFF TO HARD	GRY	FINE SANDY SILT (TILL)	(ML-SM)	
						29.0 29.0		
-11 30.0- 31.0	50-76/.5	1.0/1.0	MOIST	HARD	GRY	SILT, TRACE FINE SAND TRACE SUBANGULAR TO ANGULAR FINE GRAVEL AND ROCK FRAGS	(ML)	
S-12 33.0-	30-58/.5	1.0/1.0				(TILL)	(ML)	
-13 .0- .5	34-68/.5	1.0/1.0					(ML)	
						38.5 38.5		
14 3.0- 40.5	7-9-21	1.5/1.5	MOIST	MEDIUM DENSE	GRY	V. FINE TO FINE SAND, TRACE SILT, TRACE SUBANGULAR TO ANGULAR FINE GRAVEL AND ROCK FRAGS, TILL	(SP)	
S-15 42.0- .5	52-88/.5	1.0/1.0		V. DENSE	GRY	FINE SAND, SOME SILT, TRACE SUBANGULAR TO ANGULAR FINE GRAVEL AND ROCK FRAGS, TILL	(SP-SM)	
						45.0 45.0		
-16 .0- .5	78/.5	0.5/0.5	MOIST			SILT, SOME SUBANGULAR TO ANGULAR FINE GRAVEL AND ROCK FRAGS, TRACE FINE SAND, TILL	(ML)	
-1 75.5- 51.0	0%	5.5/5.5	TD 51.0	SOFT	GRY	SHALE, WEATHERED, V. BROKEN	V. BR	

REMARKS

BORING 21A
AR0080429

*SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 22A
ELEVATION 716.98' DATE 7/23/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH (ft.)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* — SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
-1 0- .5	10-11-7	1.1/1.5	DRY	MED. DENSE	BROWN	SILTY SAND, SOME GRAVEL, FILL	SW	
2 3.0'- 4.5'	4-7-7	1.3/1.5	▽23' SATURATED	MED. DENSE	GRAY	3.4' 3.4' FINE TO COARSE SAND, TRACE SILT (NATURAL SOIL)	SW	TAKEN FOR ANALYSIS - MC-55-09 (2 JAR
S-3 3.0- 5'	2-4-7	1.4/1.5		MED. DENSE	GRAY	VERY FINE SAND (UNIFORM)	SP	
	1-2-4	1.5/1.5		LOOSE				
5 2.0- 3.5'	2-7-10	1.5/1.5		MED DENSE		13.0' 13.0' .5' GRAVEL, SOME SAND	GW	GRAVEL ROUNDED, UP TO 1" Ø
S-6 6.0- 7.5'	6-8-10	1.2/1.5		MED. DENSE	GRAY	15.5' SAND/GRAVEL 15.5' VERY FINE SAND	SP	
S-7 8.0- 9.5'	1-6-19	.8/1.5		MED DENSE	GRAY	VERY FINE TO COARSE SAND, TRACE GRAVEL	SW	
8 20.0'- 22.5'	5-25-49	1.5/1.5		VERY DENSE		22.3' 22.3' .2Ø' SILT, SOME VERY FINE SAND		
S-9 24.8- .2'	37-35-50/2	.5/1.2		VERY DENSE	GRAY	FINE TO COARSE SAND & GRAVEL	SW-GW	GRAVEL > 1.2" Ø, ROUNDED

REMARKS NO OVM READINGS ABOVE BACKGROUND

BORING 22A
AR000431

SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 22A
ELEVATION 716.98' DATE 7/24/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* — SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
17 2.0-50.8	17-50/3	.6/.8	MOIST	VERY DENSE	GRAY	SAND, SOME GRAVEL, SOME SILT (TILL)	SM	GRAVEL ANGULAR TO SUBROUNDED, SHALE LIMESTONE GRANITIC ROCK FRAGMENTS
						52.55' 52.55'		
50.8'-55.0'				SOFT	GRAY	CLAYEY SHALE, SOME SILTY AND SANDY STREAKS, WEATHERED, VERY BROKEN, BREAKS ARE ALONG BEDDING PLANES (HORIZONTAL)	V. BR	
	0%	3.1/4.2						
								PACKER TEST RUN ON INTERVAL FROM 56.0-61.0'
	0%	6.0/6.0	T.D. 61.0'			61.0' 61.0'		

REMARKS WELL 22A INSTALLED IN BORING

BORING 22A
AR000433

SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 22B
ELEVATION 716.85' DATE 7/30/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. TYPE & DEPTH(ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH(ft)	MATERIAL MOISTURE & WATER DEPTH(ft)	MATERIAL DESCRIPTION*			USCS OR ROCK BROKENNESS	REMARKS
				SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
						33.0' ↓ ↓ 33.0'		
						T.D. 33.0'		

REMARKS WELL 22B INSTALLED IN BORING

AR000435
BORING 22B

SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 23A
ELEVATION 714.02' DATE 7-23-84
FIELD GEOLOGIST DANIEL R HAMEL

SAMPLE NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
S-1 0.0-1.5	14-22-17	1.5/1.5	MOIST	MEDIUM DENSE	BLK	FINE SAND, SOME SILT, TRACE GREEN SLAG (FILL)	(SM)	
S-2 3.0-4.5	3-4-4	1.5/1.5	MOIST	LOOSE	BRN	FINE SAND, TRACE SILT, TRACE SLAG (FILL)	(SP-SM)	
						6.0 6.0		
S-3 5.0-6.5	4-5-7	1.5/1.5	WET	MEDIUM DENSE	BRN	FINE TO COARSE SAND SOME SUBANGULAR TO ROUNDED FINE TO MEDIUM GRAVEL, TRACE SILT	(SW)	
	8-11-11	1.5/1.5	SATURATED				(SW)	SAMPLE TAKEN FOR ANALYSIS MC-SS-10
						11.5 11.5		
S-4 12.0-13.5	14-17-23	1.5/1.5	MOIST	DENSE	GRY	FINE SAND, TRACE SILT	(SP)	SAMPLE TAKEN FOR ANALYSIS MC-SS-11
S-5 13.5-15.0	14-17-21	1.5/1.5				ROUNDED FINE GRAVEL	(SP)	
						18.0 18.0		
S-6 15.0-16.5	16-19-17	1.5/1.5				V. FINE TO FINE SAND, SOME SUBANGULAR TO ROUNDED FINE TO MEDIUM GRAVEL, TRACE SILT.	(SP)	
S-7 21.0-22.5	12-24-26	1.5/1.5	MOIST	V. STIFF	GRY	SILT, TRACE SUBANGULAR TO ROUNDED FINE GRAVEL AND ROCK FRAGMENTS, TRACE V. FINE SAND (TILL)	(ML)	
S-8 24.0-25.0	44-68/5	1.0/1.0		HARD			(ML)	

REMARKS

BORING 23A

SEE LEGEND ON BACK

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AR000437

AR000437

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 23A
ELEVATION 714.02' DATE 7-23-84
FIELD GEOLOGIST DANIEL R HAMEL

LEN & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
15 51.0- .0	27-38/.5	1.0/1.0	MOIST	V. DENSE	GRY	FINE SAND, SOME SUBANGULAR TO ROUNDED GRAVEL, TRACE TO SOME SILT (TILL)	(SP-SM)	
.16 .0- .0	36-47/.5	1.0/1.0					(SP-SM)	
17 .0- 58.0	29-62/.5	1.0/1.0	MOIST				(SP-SM)	
						59.0 ↓ 59.0		
61.0	36-37/.5	1.0/1.0	MOIST	V. STIFF	GRY	V. FINE SANDY SILT, SOME SUBANGULAR TO ROUNDED GRAVEL	(ML-SM)	
.2 .5- 65.0	0%	0.7/3.5			GRY	COARSE GRAVEL (TILL)	(GP)	
R-3 65.0- .0	48%	3.0/3.0		MEDIUM SOFT TO MEDIUM HARD	GRY	SHALE, WITH SILTSTONE SEAMS BROKEN	BR	
R-4 .0- .0	43%	6.5/7.0		SOFT TO MEDIUM HARD	GRY			PACKER TEST 67.7-75.0FT

75.0 TOTAL DEPTH

REMARKS

BORING 23A
AR000439

SEE LEGEND ON BACK

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NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 23B
ELEVATION 713.57' DATE 7-26-84
FIELD GEOLOGIST DANIEL R HAMEL

LEN & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* — SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
								PACKER TEST
								29.0-31.0FT
-2 31.0- 5	13-22-25	1.5/1.5	MOIST	V. STIFF	GRY	SILT, SOME FINE SAND, TRACE SUBANGULAR TO ROUNDED GRAVEL	(ML)	
-3 36.5- 7.5	1-3-7	1.5/1.5		STIFF	GRY		ML	
						TD 37.5 FT		

REMARKS

SEE LEGEND ON BACK

AR000441

PAGE 2 OF 2

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 24A
ELEVATION 720.40' DATE 7-30-84
FIELD GEOLOGIST DANIEL R HAMEL

SAMPLE TYPE & DEPTH (ft)	BLOWS/SIX INCHES OR RQD(%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
-2		*2.0/2.0				** BOTTOM SILT, SOME ROCK FRAGMENTS (TILL)	(ML)	(DENNISON TUBE)
S						TOP SAND, TRACE SILT	(SP)	SAMPLE
R-1 0- 2.0	0%	1.0/3.0			GRY	SILT, SOME COARSE TO FINE SUBANGULAR TO ROUNDED GRAVEL AND ROCK FRAGMENTS (TILL)	(ML)	PACKER TEST 30.0 - 32.0 FT
S-3 35.0		* 0.8/2.0	MOIST		GRY	SILT, SOME FINE SUBANGULAR TO ROUNDED GRAVEL AND ROCK FRAGMENTS (TILL)	(ML)	(DENNISON TUBE) SAMPLE
36.5	7-28-36	1.5/1.5	MOIST	STIFF TO V. STIFF	GRY	SILT, SOME FINE SAND, TRACE SUBANGULAR TO ROUNDED GRAVEL AND ROCK FRAGMENTS (TILL)	(ML)	
S-11 38.0- 38.5	105/.5	*.2/.5	MOIST	V. STIFF	GRY	38.5 SOME ROCK FRAGMENTS	(ML)	
RD-2 38.5- 41.0	30%	10.5/10.5		SOFT TO MEDIUM HARD	GRY	SHALE WITH SILTSTONE INTERBEDS, BROKEN	BR	PACKER TEST 40.0 - 49.0 FT
			49.0'					

REMARKS * REC IS REC IN SAMPLE TUBE - TOTAL REC INCLUDING SHOE WAS 2.5/2.5 FOR DS-2 AND 1.4/2.5 FOR DS-3
** BELIEVE MOST MATERIAL IN TUBE IS CAVE MATERIAL FROM CLEANING 10" OD HOLLOW STEMS TO 25.0FT.

BORING 24A
AR000443

SEE LEGEND ON BACK

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 0778.17 BORING 25A
ELEVATION 714.49' DATE 8/2/84
FIELD GEOLOGIST JEFF ORIENT

SAMPLE NO. & DEPTH (ft.)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION*			USCS OR ROCK BROKENNESS	REMARKS
				SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION		
11 (CONTINUED)								GRAVEL IN S-11 IN LAYERS AT ABOUT 8" INTERVALS
S-12 8.0-8.5'	7-4-11	1.5/1.5		MED. DENSE	GRAY	VERY FINE SAND, TRACE SILT, TRACE COARSE SAND & GRAVEL	SP-SM	SILT IN .1' LAYERS
S-13 30.0-31.5	16-13-17	1.3/1.5	WET	VERY STIFF	GRAY	SILT, SOME VERY FINE SAND	ML	
S-14 32.0-	4-6-8	.6/1.5		STIFF				
S-15 40.0-41.5	10-9-10	1.0/1.5	MOIST	VERY STIFF	GRAY	SILT	ML	
S-16 39.0-40.5	7-10-14	1.5/1.5						
S-17 42.0-	6-24-42	1.5/1.5		HARD		42.9' .6' VERY DENSE FINE SAND	ML-SP	
S-18								
S-18 5.0-6.5	7-13-20	1.1/1.5	WET	DENSE	GRAY	.6' GRAY SILT FINE SAND, TRACE SILT	SP	
S-19 48.0-49.5'	9-20-29	1.5/1.5		VERY DENSE	GRAY	VERY FINE SAND, TRACE SILT	SP	UNIFORM SAND

REMARKS

BORING 25A
ARU00445

*SEE LEGEND ON BACK

NUS CORPORATION
A Halliburton Company

PROJECT MILLCREEK
PROJECT NO. 2772.17 BORING 25A
ELEVATION 714.49' DATE 8/2-8/3/84
FIELD GEOLOGIST JEFF ORIENT

S E NO & DEPTH (ft)	BLOWS/SIX INCHES OR RQD (%)	SAMPLE RECOVERY/ SAMPLE LENGTH (ft)	MATERIAL MOISTURE & WATER DEPTH (ft)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	USCS OR ROCK BROKENNESS	REMARKS
S-28 .0-2.0	37-54/.4	.9/1.9	MOIST (SLIGHTLY)	HARD	GRAY	SANDY SILT, TRACE GRAVEL (TILL)	ML-SM	2 JARS KEPT
								GRAVEL ANGULA
								TO SUBROUNDED
S-29 2.0-3.5	38-43-39	1.5/1.5	WET	VERY DENSE	GRAY	FINE TO COARSE SAND, SOME GRAVEL, TRACE SILT (TILL)	SM-SW	END 8/2
S-30 .0-.5'	33-35-38	1.5/1.5						
S-31 5.0-7.0'	22-39-50/.2	1.2/1.2	MOIST	VERY DENSE	GRAY	VERY FINE SAND, TRACE MED. TO COARSE SAND, TRACE SILT, TRACE GRAVEL (TILL)	SP-SM	2 JARS KEPT
						87.0' 87.0'		
S-32 27.0-27.1	63/.1	.1/.1			GRAY	SHALE		BEDROCK NOT
			T.D. 27.1'					CORES DUE TO
								LOCATION IN
								RESIDENTIAL
								YARDS TO AVOID
								POTENTIAL MES

MARKS WELL 25A INSTALLED IN BORING

BORING 025A7
AR000447

SEE LEGEND ON BACK

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APPENDIX C

MONITORING WELL CONSTRUCTION LOGS

VELL LOG SHEET

Nº. 16A	PROJECT Nº. 0778.17	PROJECT NAME MILLCREEK
ATION NW SITE		GEOLOGIST JEFF ORIENT
RILLING DATE 6/26-6/27/84	DRILLING CONTRACTOR PA. DRILLING CO.	
.LING METHOD HOLLOW STEM AUGER	DRILLER R. WADDELL	INSTALLATION DATE 7/3/84
/ATER LEVEL BEFORE INSTALLATION 10.5' BLS		WATER LEVEL AFTER INSTALLATION 7.6' BLS
E.ELOPMENT METHOD PUMPING & BAILING		GROUND ELEVATION 717.55'

LITHOLOGY DESCRIPTION — SEE BORING LOG 16A FOR DETAILED LITHOLOGY

SYMBOL

BLACK SAND, w/ SILT & GRAVEL (FILL) 0.0'-6.0'

CLAY 6.0'-9.0'

SAND, w/ SILT 9.0'-17.0'

SILT, w/ SAND 17.0'-24.0'

SAND, w/ SILT & GRAVEL 24.0'-28.3'

SILT, w/ SAND & GRAVEL (TILL) 28.3'-39.0'

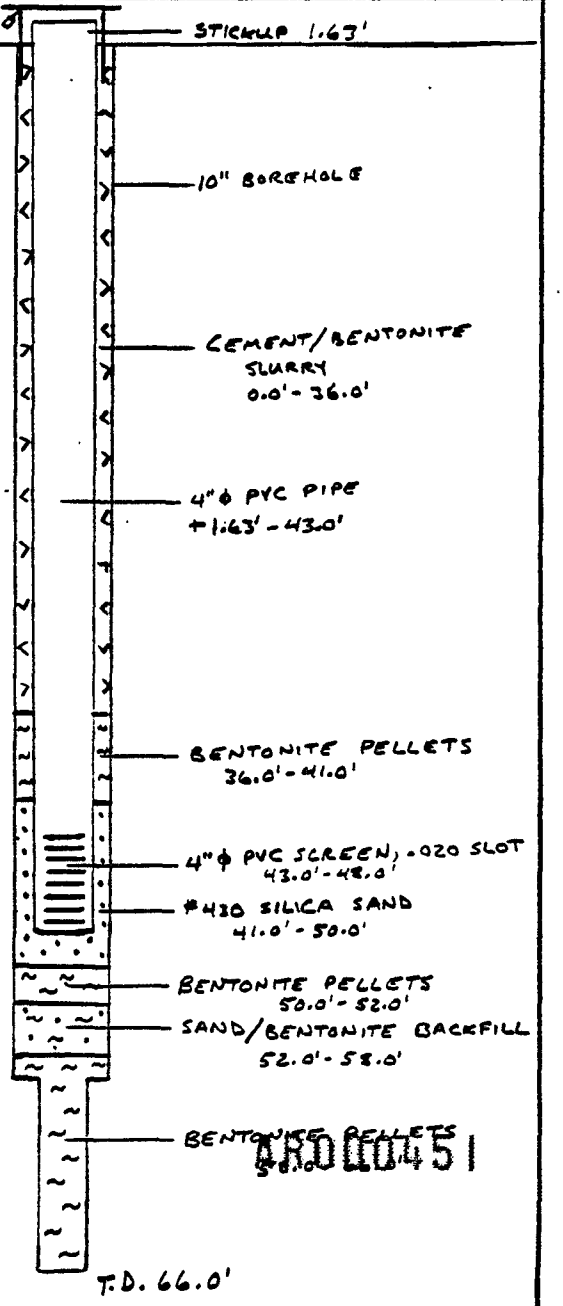
SAND, w/ SILT & GRAVEL 39.0'-50.0'

SILT, w/ SAND & GRAVEL (TILL) 50.0'-59.55'

SHALE 59.55'-66.0'

CONSTRUCTION DETAILS

DESCRIPTION — DEPTH



ARD 000451

WELL LOG SHEET

. Nº. 17A	PROJECT Nº. 0778.17	PROJECT NAME MILLCREEK	
.C ATION S SITE		GEOLOGIST JEFF ORIENT	
)RILLING DATE 7/5 - 7/10/84	DRILLING CONTRACTOR PA. DRILLING CO.		
)F .LING METHOD HOLLOW STEM AUGERS	DRILLER R. WADDELL	INSTALLATION DATE 7/10/84	
VATER LEVEL BEFORE INSTALLATION 10.1' BLS		WATER LEVEL AFTER INSTALLATION 9.2' BLS	
)L.ELOPMENT METHOD DUMPING & BAILING		GROUND ELEVATION 719.90'	

LITHOLOGY DESCRIPTION — SEE BORING LOG 17A FOR DETAILED LITHOLOGY

SYMBOL

SAND, w/ SILT (FILL) 0.0' - 8.0'

SAND, w/ SILT (NATURAL SOIL) 8.0' - 15.0'

CLAYEY SILT 15.0' - 18.0'

SAND, w/ SILT 18.0' - 36.3'

SILT, w/ SAND & GRAVEL (TILL) 36.3' - 48.25'

SHALE 48.25' - 55.0'

CONSTRUCTION DETAILS

DESCRIPTION	DEPTH
STICKUP	1.75'
10" ϕ BORE HOLE	
CEMENT/BENTONITE SLURRY	0.0' - 14.0'
4" ϕ, SCH 80 PVC PIPE	+1.75' - 24.0'
BENTONITE PELLETS	14.0' - 18.0'
4" ϕ, .020 SLOT, PVC WELL SCREEN	24.0' - 34.0'
#430 SILICA SAND	18.0' - 36.0'
BENTONITE PELLETS	36.0' - 38.5'
SAND/BENTONITE MIX	38.5' - 46.0'
BENTONITE PELLETS	46.0' - 55.0'
T.D.	55.0'

AR000453

5/1/84

WELL LOG SHEET

Nº. 18A	PROJECT Nº. 0778.17	PROJECT NAME MILLCREEK	
LOCATION SW SITE		GEOLOGIST JEFF ORIENT	
DRILLING DATE 7/12-7/13/84	DRILLING CONTRACTOR PA. DRILLING CO.		
DRILLING METHOD 6¼" ID HOLLOW STEM AUGER	DRILLER R. WADDELL	INSTALLATION DATE 7/16/84	
WATER LEVEL BEFORE INSTALLATION 4.4' BLS		WATER LEVEL AFTER INSTALLATION 5.7' BLS	
DEVELOPMENT METHOD PUMPING		GROUND ELEVATION 717.14'	

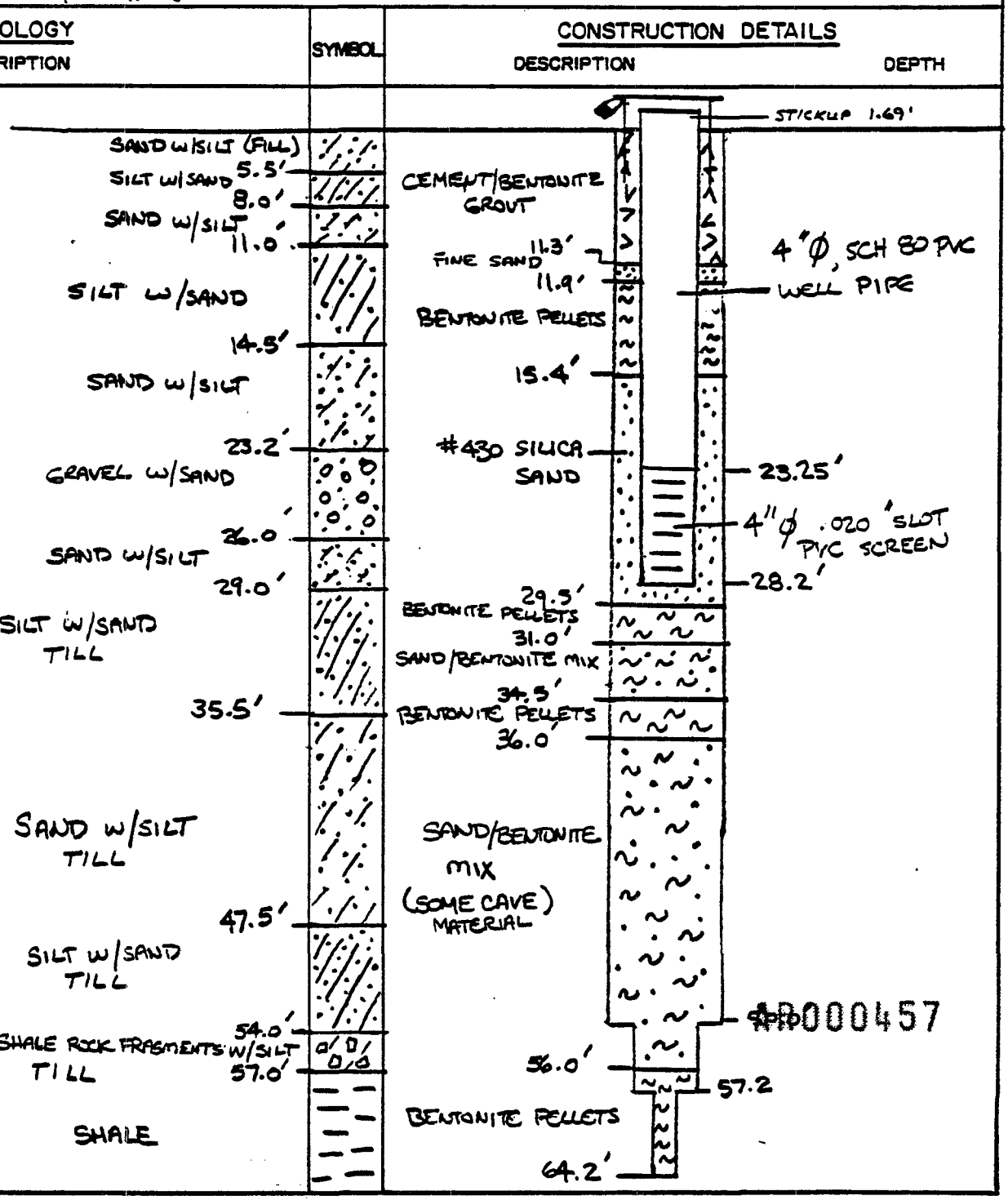
LITHOLOGY DESCRIPTION (SEE BORING LOG 18A FOR DETAILED LITHOLOGY)	SYMBOL	CONSTRUCTION DETAILS DESCRIPTION	DEPTH
SAND, w/ SILT, FILL		STICKUP	1.73'
0.0'-5.5'			
CLAYEY SILT		CEMENT/BENTONITE SLURRY	0.0'-20.0'
5.5'-8.0'			
SAND, w/ SILT		4"ϕ, SCH. 80 PVC PIPE	+1.73'-31.0'
8.0'-18.0'			
SILT, w/ SAND		BENTONITE PELLETS	20.0'-22.0'
18.0'-24.0'			
SAND, w/ GRAVEL		SAND/BENTONITE MIX	22.0'-27.0'
24.0'-27.2'			
SILT		BENTONITE PELLETS	27.0'-29.0'
27.2'-28.0'			
SAND, SILT, & GRAVEL		#430 SILICA SAND	29.0'-36.5'
28.0'-36.5'			
		4"ϕ, .020 SLOT, PVC WELL SCREEN	31.0'-36.0'
SILT, w/ SAND & GRAVEL (TILL)		BENTONITE PELLETS	36.5'-39.0'
36.5'-55.2'			
		SAND/BENTONITE MIX	39.0'-54.0'
SHALE		BENTONITE PELLETS	54.0'-60.2'
55.2'-60.2'			
T.D. 60.2'		T.D.	

AR000455

5/1/84

WELL LOG SHEET

L Nº. 19A	PROJECT Nº. 0778.17	PROJECT NAME MILLCREEK	
LOCATION		GEOLOGIST DANIEL R HAMEL	
DRILLING DATE 7-16-84	DRILLING CONTRACTOR PA DRILLING CO.		
DRILLING METHOD 10"ϕ HOLLOW STEM AUGER	DRILLER BERNIE GOLLIHUE	INSTALLATION DATE 7-17-84	
WATER LEVEL BEFORE INSTALLATION 6.5 FT (BGL)		WATER LEVEL AFTER INSTALLATION	
DEVELOPMENT METHOD PUMPING		GROUND ELEVATION 715.76'	



'ELL LOG SHEET

Nº. 20B	PROJECT Nº. 0778.17	PROJECT NAME MILLCREEK	
C TION CENTER OF SITE		GEOLOGIST JEFF ORIENT	
ILLING DATE 7/20/84	DRILLING CONTRACTOR PA. DRILLING CO.		
I ING METHOD 6 ¼" ID HOLLOW STEM AUGER	DRILLER RUSS WADDELL	INSTALLATION DATE 7/20/84	
ATER LEVEL BEFORE INSTALLATION 6.5' BLS		WATER LEVEL AFTER INSTALLATION 7.1' BLS	
LOPMENT METHOD PUMPING		GROUND ELEVATION 718.99'	

LITHOLOGY DESCRIPTION (SEE BORING LOG 20A FOR DETAILED LITHOLOGY)	SYMBOL	CONSTRUCTION DETAILS DESCRIPTION	DEPTH
SAND, w/ GRAVEL, FILL 0.0'-6.6'		STICKUP 1.19'	
		4" ϕ, SCH 80 PVC PIPE	+1.19'-9.0'
		CEMENT/BENTONITE SLURRY	0.0'-6.0'
		BENTONITE PELLETS	6.0'-8.0'
SAND, w/ SILT 6.6'-15.0'		#430 SILICA SAND	8.0'-15.0'
		4" ϕ, .010 SLOT, WELL SCREEN	9.0'-15.0'
		T.D. 15.0'	

AR000459

VELL LOG SHEET

Nº. 21B	PROJECT Nº. 0778.17	PROJECT NAME MILLCREEK	
..ATION		GEOLOGIST DANIEL R. HAMEL	
RILLING DATE 7-20-84	DRILLING CONTRACTOR PA DRILLING CO.		
..LING METHOD 10"ϕ HOLLOWSTEM AUGER	DRILLER BERNIE GOLLIHUE	INSTALLATION DATE 7-20-84	
..TER LEVEL BEFORE INSTALLATION 7.0'		WATER LEVEL AFTER INSTALLATION 7.0'	
..LOPMENT METHOD PUMPING		GROUND ELEVATION 717.32'	

LITHOLOGY DESCRIPTION	SYMBOL	CONSTRUCTION DETAILS DESCRIPTION	DEPTH
SAND W/SILT (FILL)		STICKUP 1.65'	
		CEMENT/BENTONITE GROUT	10"ϕ BOREHOLE
		FINE SAND	5.0'
5.5'			5.5'
		BENTONITE PELLETS	4"ϕ PVC SCH 80 PIPE
SAND W/SILT			
			8.8'
9.0'		#430 SILICA SAND	11.25'
GRAVEL, W/SAND			4"ϕ, .010 SLOT PVC WELL SCREEN
			15.5'
16.5'			

AR000461

/ELL LOG SHEET

Nº. 22 B PROJECT Nº. 0778.17 PROJECT NAME MILLCREEK

)C TION TOWNSHIP BALLPARK PARKING LOT GEOLOGIST JEFF ORIENT

RILLING DATE 7/30/84 DRILLING CONTRACTOR PA. DRILLING CO.

RI LING METHOD HOLLOW STEM AUGER DRILLER JIM ADAMS INSTALLATION DATE 7/31/84

ATER LEVEL BEFORE INSTALLATION 3.3' BLS WATER LEVEL AFTER INSTALLATION 3.3' BLS

E' LOPMENT METHOD PUMPING GROUND ELEVATION 716.85'

LITHOLOGY DESCRIPTION	SYMBOL	CONSTRUCTION DETAILS DESCRIPTION	DEPTH
SILTY SAND W/ GRAVEL (FILL)		STICKUP	1.93'
0.0' - 3.4'		10"ϕ BOREHOLE	
SAND, W/ SILT		4"ϕ, SCH 80 PVC PIPE	+1.93' - 27.0'
3.4' - 13.0'			
SAND & GRAVEL		CEMENT/BENTONITE SLURRY	0.0' - 21.5'
13.0' - 15.5'			
SAND, W/ GRAVEL		BENTONITE PELLETS	21.5' - 23.5'
15.5' - 22.3'		#430 SILICA SAND	23.5' - 33.0'
SILT, W/ SAND		4"ϕ, .010 SLOT, PVC WELL SCREEN	27.0' - 32.0'
22.3' - 24.0'		T.D.	33.0'
SAND, W/ GRAVEL & SILT			
24.0' - 33.0'			

AR000463

WELL LOG SHEET

L Nº. 23A PROJECT Nº. 0778.17 PROJECT NAME MILLCREEK

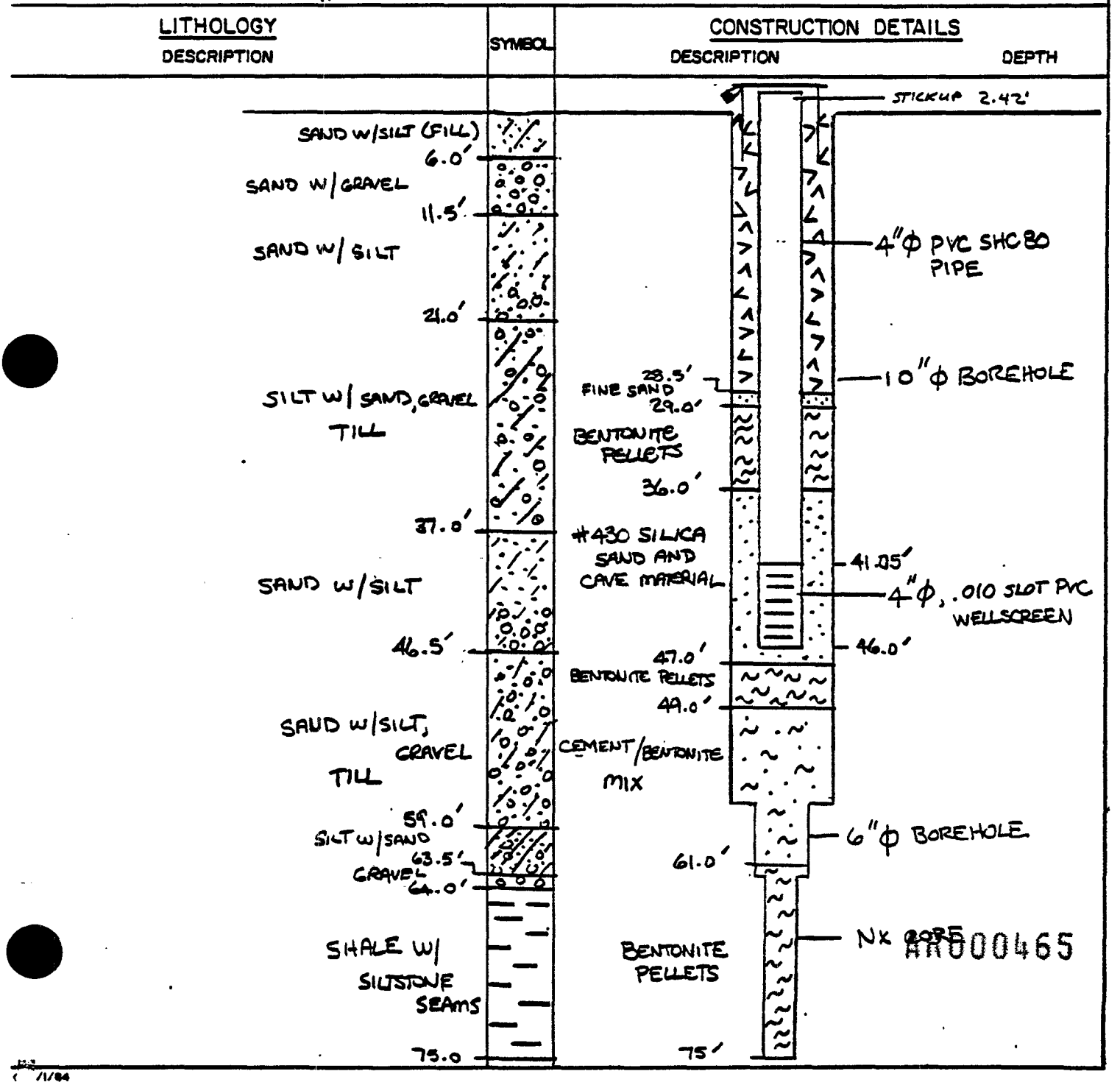
L :ATION GEOLOGIST DANIEL R HAMEL

DRILLING DATE 7-24-84 DRILLING CONTRACTOR PA DRILLING CO

D LLING METHOD 10"ϕ HOLLOW STEM AUGERS DRILLER BERNIE GOLLIHUE INSTALLATION DATE 7-26-84

WATER LEVEL BEFORE INSTALLATION 8.0 FT WATER LEVEL AFTER INSTALLATION 8.0 FT

D_/ELOPMENT METHOD PUMPING GROUND ELEVATION 714.02



AR000465

1/84

WELL LOG SHEET

NO. 24A PROJECT NO. 0778.17 PROJECT NAME MILLCREEK

LOCATION GEOLOGIST DANIEL R HAMEL

DRILLING DATE 7-30-84 DRILLING CONTRACTOR DA DRILLING CO.

DRILLING METHOD HOLLOW STEM AUGER DRILLER B. GOLLIHUE INSTALLATION DATE 7-31-84

WATER LEVEL BEFORE INSTALLATION 3.3 FT WATER LEVEL AFTER INSTALLATION 3.3 FT

DEVELOPMENT METHOD PUMPING GROUND ELEVATION 720.40'

LITHOLOGY DESCRIPTION	SYMBOL	CONSTRUCTION DETAILS DESCRIPTION	DEPTH
SAND W/SILT (FILL)		STICKUP	1.74'
			1.5'
SAND W/SILT		CEMENT/BENTONITE GROUT (SOME CAVE)	
		10 Ø BOREHOLE	
		4" Ø SCH. 80 PVC WELL PIPE	
		FINE SAND	14.5'
SAND W/GRAVEL			14.5'
			15.0'
		BENTONITE PELLETS	
			16.0'
			18.0'
SAND W/SILT			
		#430 SILICA SAND	
			18.85'
		4" Ø PVC SCREEN .010 SLOT	
			23.8
			24.0'
		BENTONITE PELLETS	
			25.0'
			26.0'
SILT W/ SAND, GRAVEL AND ROCK FRAGMENTS		SAND/BENTONITE MIX	
TILL		6" Ø BOREHOLE	
			37.0'
			38.5'
SHALE W/ SILTSTONE INTERBEDS		BENTONITE PELLETS	
		NX CORE	
			49.0'

AR000467

5/1/84

VELL LOG SHEET

Nº. 25 B PROJECT Nº. 0778.17 PROJECT NAME MILLCREEK

...TION DANIELS' RESIDENCE SIDE YARD GEOLOGIST JEFF ORIENT

RILLING DATE 8/8/84 DRILLING CONTRACTOR P.A. DRILLING CO.

...LING METHOD HOLLOW STEM AUGER DRILLER RUSS WADDELL INSTALLATION DATE 8/8/84

...ATER LEVEL BEFORE INSTALLATION 13.0' BLS WATER LEVEL AFTER INSTALLATION 12.48' BLS

E ...ELOPMENT METHOD PUMPING GROUND ELEVATION 714.53'

LITHOLOGY DESCRIPTION (SEE BORING LOG 25 A FOR DETAILED LITHOLOGY)	SYMBOL	CONSTRUCTION DETAILS DESCRIPTION	DEPTH
SAND, W/ SILT & GRAVEL (FILL)		STICKUP	1.81'
		10"ϕ BOREHOLE	
		CEMENT/BENTONITE SLURRY	0.0' - 6.0'
		4"ϕ, PVC SCH 80 WELL PIPE	+1.81' - 9.75'
		BENTONITE PELLETS	6.0' - 8.0'
SAND, W/ SILT & GRAVEL		#430 SILICA SAND	8.0' - 20.0'
		4"ϕ, .020 SLOT, PVC WELL SCREEN	9.75' - 19.75'
		T.D.	20.0'

AR000469

/84

DRAFT

APPENDIX D

HYDRAULIC CONDUCTIVITY TEST RESULTS

PRESSURE TEST REPORT

SHT 1 OF 1

PROJECT 0778.17 SITE MILLCREEK DATE 7/24/84 BORING No. 22A, TEST 1 OF 2

LOCATION ERIE, PA GROUND ELEV. ~716' TOTAL DEPTH 50' TOP OF ROCK; DEPTH —

CONTRACTOR PA. DRILLING CO. DRILLER RUSS WADDELL INSPECTOR JEFF ORIENT CHEK'D BY

WATER LEVEL; DEPTH 3.5' ELEV. 712.5' WATER PIPE LENGTH 51.3' (packer 2.7') WATER PIPE I.D. 1.0"

FLOW METER No. RECORDALL MODEL 40 PRESSURE GAUGE No. AMATEK(USG) P-500 005506 TEST INTERVAL; DEPTH 46.5'-50.0' ELEV.

GAUGE PRESS. 10 psi
PACKER INFL'T'N PRESS. 100psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	1.5	
0.5	1.5	
1.0	1.5	
1.5	1.5	
2.0	1.7	
2.5	1.7	
3.0	1.7	
3.5	1.7	
4.0	1.7	
4.5	1.7	
5.0	1.7	
5.5	1.7	
6.0	1.7	
6.5	1.7	
7.0	1.7	

REMARKS:
FLOW METER READINGS
BEGIN 25381.5
HOLDING TEST PERFORMED FOR 5 MIN. AT CONCLUSION OF TEST - NO DROP IN WATER PRESSURE

GAUGE PRESS. 20 PSI
PACKER INFL'T'N PRESS. 100PSI

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	2.2	
0.5	2.2	
1.0	2.3	
1.5	2.4	
2.0	2.5	
2.5	2.5	
3.0	2.6	
3.5	2.6	
4.0	2.7	
4.5	2.7	
5.0	2.8	
5.5	2.8	
6.0	2.8	
6.5	2.9	
7.0	2.9	
7.5	2.9	
8.0	2.9	
9.0	2.9	
10.0	2.9	

REMARKS:
STOPPED FOR LUNCH AFTER INITIAL TEST; FLOW READING INCREASES IN 20 PSI TEST MAY BE DUE TO WATER IN HOLE SOFTENING UP TILL OVER TIME.

GAUGE PRESS. 30 psi
PACKER INFL'T'N PRESS. 100psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	3.4	
0.5	3.4	
1.0	3.4	
1.5	3.5	
2.0	3.5	
2.5	3.5	
3.0	3.5	
3.5	3.6	
4.0	3.6	
4.5	3.7	
5.0	3.7	
5.5	3.7	
6.0	3.7	
6.5	3.7	
7.0	3.7	
7.5	3.7	
8.0	3.7	
9.0	3.7	

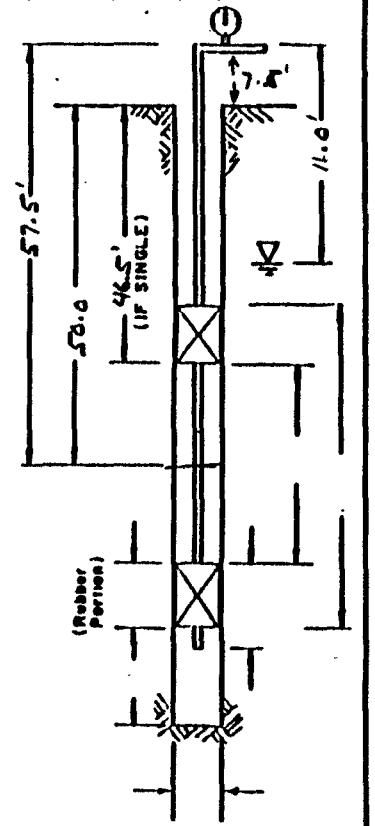
REMARKS:

GAUGE PRESS. 35 psi
PACKER INFL'T'N PRESS. 117psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	4.4	
0.5	4.4	
1.0	4.4	
1.5	4.4	
2.0	4.4	
2.5	4.4	
3.0	4.4	
3.5	4.4	
4.0	4.4	
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		

REMARKS:
READINGS BEGAN ABOUT 2 MINUTES AFTER PRESSURE WAS INCREASED - HAD TROUBLE AT FIRST W/ PACKER SLIPPING UP THE CASING 2 FEET.

TEST CONFIGURATION



DID HOLDING TEST AT CONCLUSION OF 35 PSI TEST - NO PRESSURE WAS LOST IN 5 MINUTES, TEST STOPPED

SINGLE ☒
DOUBLE ☐
TAPE/RULE

FLOW METER READING AT END OF TEST 25384.4

Figure 1 Pressure Test Report Form

AR000471

PRESSURE TEST REPORT

SHT 1 OF 1

PROJECT 0778.17 SITE MILLCREEK DATE 7/24/84 BORING No. B-22A, TEST 2 OF 2

LOCATION ERIE, PA GROUND ELEV. ~717' TOTAL DEPTH 61.0' TOP OF ROCK; DEPTH 52.55'

CONTRACTOR PENNSYLVANIA DRILLING CO. DRILLER RUSS WADDELL INSPECTOR JEFF ORIENT CHEK'D BY

WATER LEVEL; DEPTH 3.5' ELEV. 713.5' WATER PIPE LENGTH 61.1' WATER PIPE I.D. 1.0"

FLOW METER No. RECORDALL MODEL 40 PRESSURE GAUGE No. AMTEK(USG) P-500 005506 TEST INTERVAL; DEPTH 56.0'-61.0' ELEV.

GAUGE PRESS. 10 psi
PACKER INFL'T'N PRESS. 105 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	5.0	
0.5	5.1	
1.0	5.1	
1.5	5.1	
2.0	5.1	
2.5	5.1	
3.0	5.1	
3.5	5.1	
4.0	5.1	
4.5	5.1	
5.0	5.1	
5.5		
6.0		
6.5		
7.0		

REMARKS:
FLOWMETER READING TO BEGIN 25385.0 (gal.)

GAUGE PRESS. 20 psi
PACKER INFL'T'N PRESS. 105 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	5.7	
0.5	5.7	
1.0	5.7	
1.5	5.7	
2.0	5.7	
2.5	5.7	
3.0	5.7	
3.5	5.7	
4.0	5.7	
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		

REMARKS:

GAUGE PRESS. 30 psi
PACKER INFL'T'N PRESS. 105 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	6.0	
0.5	6.0	
1.0	6.0	
1.5	6.0	
2.0	6.0	
2.5	6.0	
3.0	6.0	
3.5	6.0	
4.0	6.0	
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		

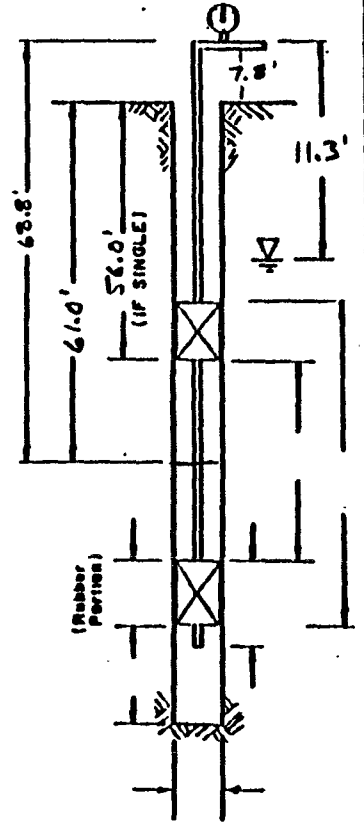
REMARKS:

GAUGE PRESS. 45 psi
PACKER INFL'T'N PRESS. 120 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	6.4	
0.5	6.4	
1.0	6.4	
1.5	6.4	
2.0	6.4	
2.5	6.4	
3.0	6.4	
3.5	6.4	
4.0	6.4	
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		

REMARKS:
FLOW METER READING AT CONCLUSION 25396.4 (gal)

TEST CONFIGURATION



SINGLE ☐
DOUBLE ☐
TAPE/RULE No.

Figure 1 Pressure Test Report Form

PRESSURE TEST REPORT

SHT 1 OF 1

PROJECT 0778.17 SITE MILLCREEK DATE 7-25-84 BORING No. B-23A

LOCATION B-23A GROUND ELEV. _____ TOTAL DEPTH _____ TOP OF ROCK; DEPTH 65.0FT

CONTRACTOR PA DRILLING CO. DRILLER BERNIE GOLLIHUE INSPECTOR DANIEL R HAMEL CHEK'D BY _____

WATER LEVEL; DEPTH 8.0FT ELEV. _____ WATER PIPE LENGTH 69.3FT WATER PIPE I.D. 1"

FLOW METER No. _____ PRESSURE GAUGE No. _____ TEST INTERVAL; DEPTH 67.7-75.0 ELEV. _____

GAUGE PRESS. 10psi
PACKER INFL'T'N PRESS. 120 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	3.5	
0.5	3.5	
1.0	3.5	
1.5	3.5	
2.0	3.5	
2.5	3.5	
3.0	3.5	
3.5	3.5	
4.0	3.5	
4.5		
5.0		

REMARKS:
GAUGE ZERO READING
0025403.5

GAUGE PRESS. 20psi
PACKER INFL'T'N PRESS. 120psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	3.5	
0.5	3.5	
1.0	3.5	
1.5	3.5	
2.0	3.5	
2.5	3.5	
3.0	3.5	
3.5	3.5	
4.0	3.5	
4.5		
5.0		

REMARKS:
GAUGE ZERO READING
0025403.5

GAUGE PRESS. 35psi
PACKER INFL'T'N PRESS. 140psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	3.5	
0.5	3.6	
1.0	3.7	
1.5	3.7	
2.0	3.7	
2.5	3.7	
3.0	3.7	
3.5	3.7	
4.0	3.7	
4.5		
5.0		

REMARKS:
GUAGE ZERO READING
0025403.5

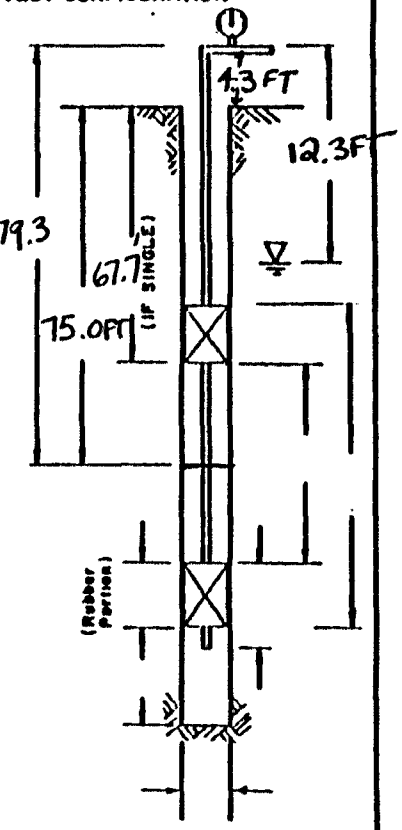
GAUGE PRESS. 50 psi
PACKER INFL'T'N PRESS. 140psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	3.7	
0.5	3.9	
1.0	3.9	
1.5	3.9	
2.0	3.9	
2.5	3.9	
3.0	3.9	
3.5	3.9	
4.0	3.9	
4.5		
5.0		

REMARKS:
GUAGE ZERO READ
0025403.7

HOLDING TEST
PRESSURE DROPPED FROM 50psi TO 40psi IN 4.0 HELD STEADY AT 40psi FOR 2.0min.
TOTAL HOLDING TEST 6min.
FLOW METER END TEST
0025403.9

TEST CONFIGURATION



SINGLE ☑
DOUBLE ☐
TAPE/RULE

Figure 1 Pressure Test Report Form

PRESSURE TEST REPORT

SHT 1 OF 1

PROJECT 0778.17 SITE MILLCREEK DATE 7/26/84 BORING No. 23 B

LOCATION ERIE, PA. GROUND ELEV. _____ TOTAL DEPTH 31.0' TOP OF ROCK; DEPTH –

CONTRACTOR PA. DRILLING CO. DRILLER B. GOLLIHUE INSPECTOR JPO/DRH CHEK'D BY _____

WATER LEVEL; DEPTH 8.0' ELEV. _____ WATER PIPE LENGTH 31.2' WATER PIPE I.D. 1.0"

FLOW METER No. RECORDALL MODEL 40 PRESSURE GAUGE No. AMATEK(4.5G) P-500 005506 TEST INTERVAL; DEPTH 29.0'-31.0' ELEV. _____

GAUGE PRESS. 10 psi
PACKER INFL'T'N PRESS. 110 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	2.05	
0.5	2.05	
1.0	2.05	
1.5	2.05	
2.0	2.05	
2.5	2.05	
3.0	2.05	
3.5	2.05	
4.0	2.05	
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		

REMARKS: ZERO GUAGE READING
0025402.05

GAUGE PRESS. 15 psi
PACKER INFL'T'N PRESS. 110 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	2.05	
0.5	2.05	
1.0	2.05	
1.5	2.05	
2.0	2.05	
2.5	2.05	
3.0	2.05	
3.5	2.05	
4.0	2.05	
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		

REMARKS: ZERO GUAGE READING
0025402.05

GAUGE PRESS. 20 psi
PACKER INFL'T'N PRESS. 110 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	2.10	
0.5	2.10	
1.0	2.10	
1.5	2.10	
2.0	2.10	
2.5	2.10	
3.0	2.10	
3.5	2.10	
4.0	2.10	
4.5		
5.0		
5.5		
6.0		
6.5		
7.0		

REMARKS: ZERO GUAGE READING
0025402.1

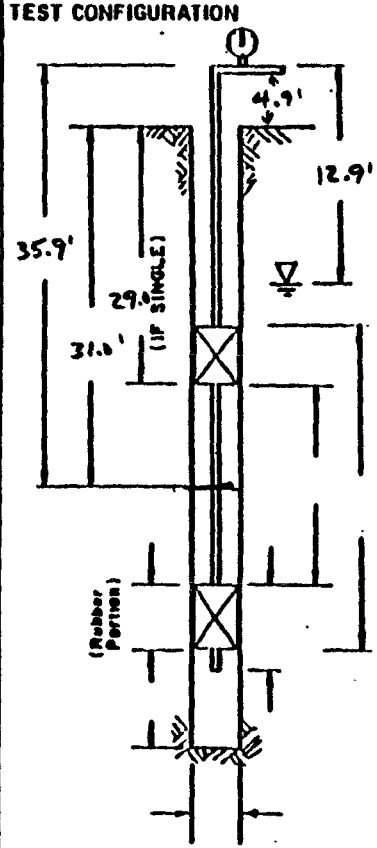
GAUGE PRESS. 25 psi
PACKER INFL'T'N PRESS. 120 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	2.2	
0.5	2.25	
1.0	2.25	
1.5	2.25	
2.0	2.25	
2.5	2.25	
3.0	2.25	
3.5	2.25	
4.0	2.25	
4.5		
5.0		
5.5		
6.0		
6.1		
7.0		

REMARKS: ZERO GUAGE READING
002542.2

HOLDING TEST - VALVES WRONG DIRECTION TO RUN TEST

TEST CONFIGURATION



SINGLE ☐
DOUBLE ☐
TAPE/RULE No. _____

Figure 1 Pressure Test Report Form

PRESSURE TEST REPORT

SHT 1 OF 1

PROJECT 0778.17 SITE MILLCREEK DATE 7-30-84 BORING No. 24A

LOCATION _____ GROUND ELEV. _____ TOTAL DEPTH 32' TOP OF ROCK, DEPTH -

CONTRACTOR PA DRILLING CO DRILLER BERNIE GOLLIHUE INSPECTOR D.R. HAMEL CHEK'D BY _____

WATER LEVEL, DEPTH 3.3FT (BGL) ELEV. _____ WATER PIPE LENGTH 31.1' WATER PIPE I.D. 1.0"

FLOW METER No. 81528418 BADGER METER PRESSURE GAUGE No. _____ TEST INTERVAL, DEPTH 30.0'-32.0 ELEV. _____

GAUGE PRESS. 10psi
PACKER INFL'T'N PRESS. 110psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	499.6	
0.5	499.6	
1.0	499.6	
1.5	499.6	
2.0	499.7	
2.5	499.7	
3.0	499.7	
3.5	499.7	
4.0	499.7	
5.0	499.7	
6.0	499.7	
7.0	499.7	
8.0	499.7	
9.0	499.7	
10.0	499.7	

REMARKS:
0025499.6
CASING AT 29.0 FT

GAUGE PRESS. 15psi
PACKER INFL'T'N PRESS. 120psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	499.9	
0.5	490.0	
1.0	490.0	
1.5	490.0	
2.0	490.0	
2.5	490.0	
3.0	490.0	
3.5	490.0	
4.0	490.0	
5.0	490.0	
6.0	490.0	
7.0	490.0	
8.0	490.0	
9.0	490.0	
10.0	490.0	

REMARKS:
0025499.9

GAUGE PRESS. 20psi
PACKER INFL'T'N PRESS. 120 psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	490.4	
0.5	490.4	
1.0	490.4	
1.5	490.4	
2.0	490.4	
2.5	490.4	
3.0	490.45	
3.5	490.5	
4.0	490.5	
5.0	490.5	
6.0	490.5	
7.0	490.5	
8.0	490.5	
9.0	490.5	
10.0	490.5	

REMARKS:
0025490.4

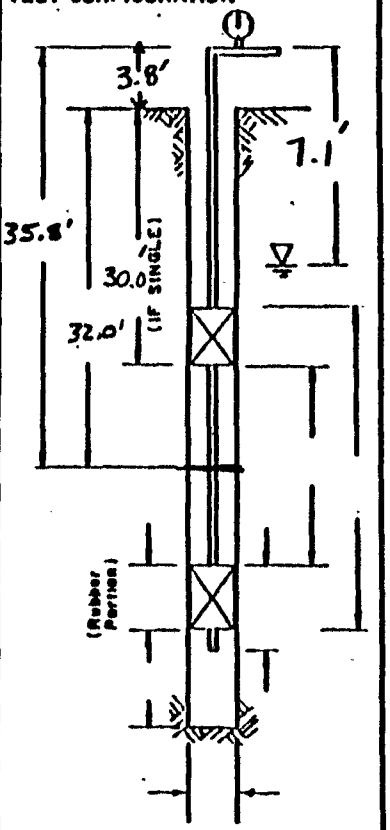
GAUGE PRESS. 25psi
PACKER INFL'T'N PRESS. 130psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	490.70	
0.5	490.75	
1.0	490.75	
1.5	490.75	
2.0	490.75	
2.5	490.75	
3.0	490.75	
3.5	490.75	
4.0	490.75	
5.0	490.75	
6.0	490.75	
7.0	490.75	
8.0	490.75	
9.0	490.75	
10.0	490.75	

REMARKS:
002590.70

HOLDING TEST
10min - No PRESSURE DROP

TEST CONFIGURATION



SINGLE ☑
DOUBLE ☐
TAPE/RULE No. _____

Figure 1 Pressure Test Report Form

AR000475

V-19

PRESSURE TEST REPORT

SHT 1 OF 1

PROJECT 0778.17 SITE MILLCREEK DATE 7-31-89 BORING No. 24A

LOCATION _____ GROUND ELEV. _____ TOTAL DEPTH 49.0FT TOP OF ROCK; DEPTH 38.5 FT

CONTRACTOR PA DRILLING CO. DRILLER B. GOLLIHUE INSPECTOR D.R. HAMEL CHEK'D BY _____

WATER LEVEL; DEPTH 3.3FT ELEV. _____ WATER PIPE LENGTH 40.1FT (WITHOUT PACKER) WATER PIPE I.D. 1"

FLOW METER No. _____ PRESSURE GAUGE No. _____ TEST INTERVAL; DEPTH 10.0-49.0 ELEV. _____

GAUGE PRESS. 20psi
PACKER INFL'T'N PRESS. 120psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	491.65	
0.5	491.65	
1.0	491.65	
1.5	491.70	
2.0	491.70	
2.5	491.70	
3.0	491.70	
3.5	491.70	
4.0	491.70	
5.0	491.70	
6.0	491.70	
7.0	491.70	
8.0	491.70	
9.0	491.70	
10.0	491.70	

REMARKS:
0025491.65

GAUGE PRESS. 25 psi
PACKER INFL'T'N PRESS. 120psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	491.70	
0.5	491.70	
1.0	491.80	
1.5	491.85	
2.0	491.85	
2.5	491.85	
3.0	491.85	
3.5	491.85	
4.0	491.85	
5.0	491.85	
6.0	491.85	
7.0	491.85	
8.0	491.85	
9.0	491.85	
10.0	491.85	

REMARKS:
0025491.70

GAUGE PRESS. 30psi
PACKER INFL'T'N PRESS. 120psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	491.85	
0.5	491.85	
1.0	491.85	
1.5	491.85	
2.0	491.85	
2.5	491.85	
3.0	491.85	
3.5	491.85	
4.0	491.90	
5.0	491.95	
6.0	492.00	
7.0	492.00	
8.0	492.00	
9.0	492.00	
10.0	492.00	

REMARKS:
0025491.85

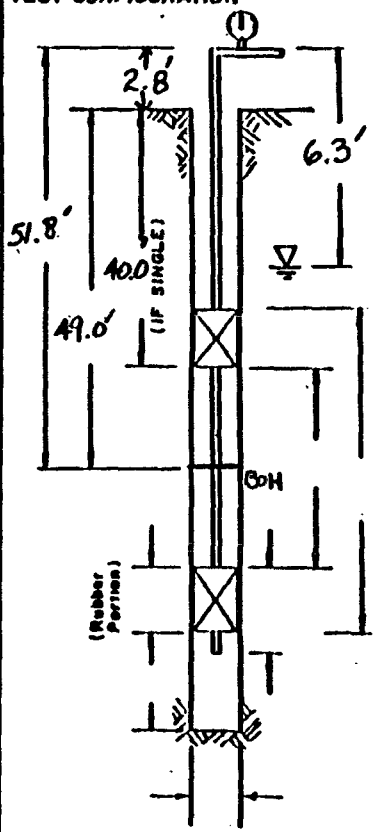
GAUGE PRESS. 35 psi
PACKER INFL'T'N PRESS. 130psi

ELAPSED TIME Min.	FLOW READING Gal.	Δ FLOW
0.0	492.00	
0.5	492.00	
1.0	492.00	
1.5	492.00	
2.0	492.00	
2.5	492.00	
3.0	492.00	
3.5	492.00	
4.0	492.00	
5.0	492.00	
6.0	492.00	
7.0	492.00	
8.0	492.00	
9.0	492.00	
10.0	491.00	

REMARKS:
0025492.0

HOLDING TEST
10min - NO PRESSURE DROP

TEST CONFIGURATION



SINGLE ☑
DOUBLE ☐

TAPE/RULE No. _____

Figure 1 Pressure Test Report Form

15A

$H = 13.26 \quad L_w = 12.26 \quad r_c = .156 \quad r_w = .417 \quad L_e = 6.24$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

$$= \frac{.156^2(2.10)}{12.48} \frac{1}{10} \ln \frac{2.6}{.68}$$

$$= (.00404)(.134)$$

$$= .000542 \text{ ft/min}$$

$$= .000009 \text{ ft/sec}$$

$$= .0000027 \text{ m/sec}$$

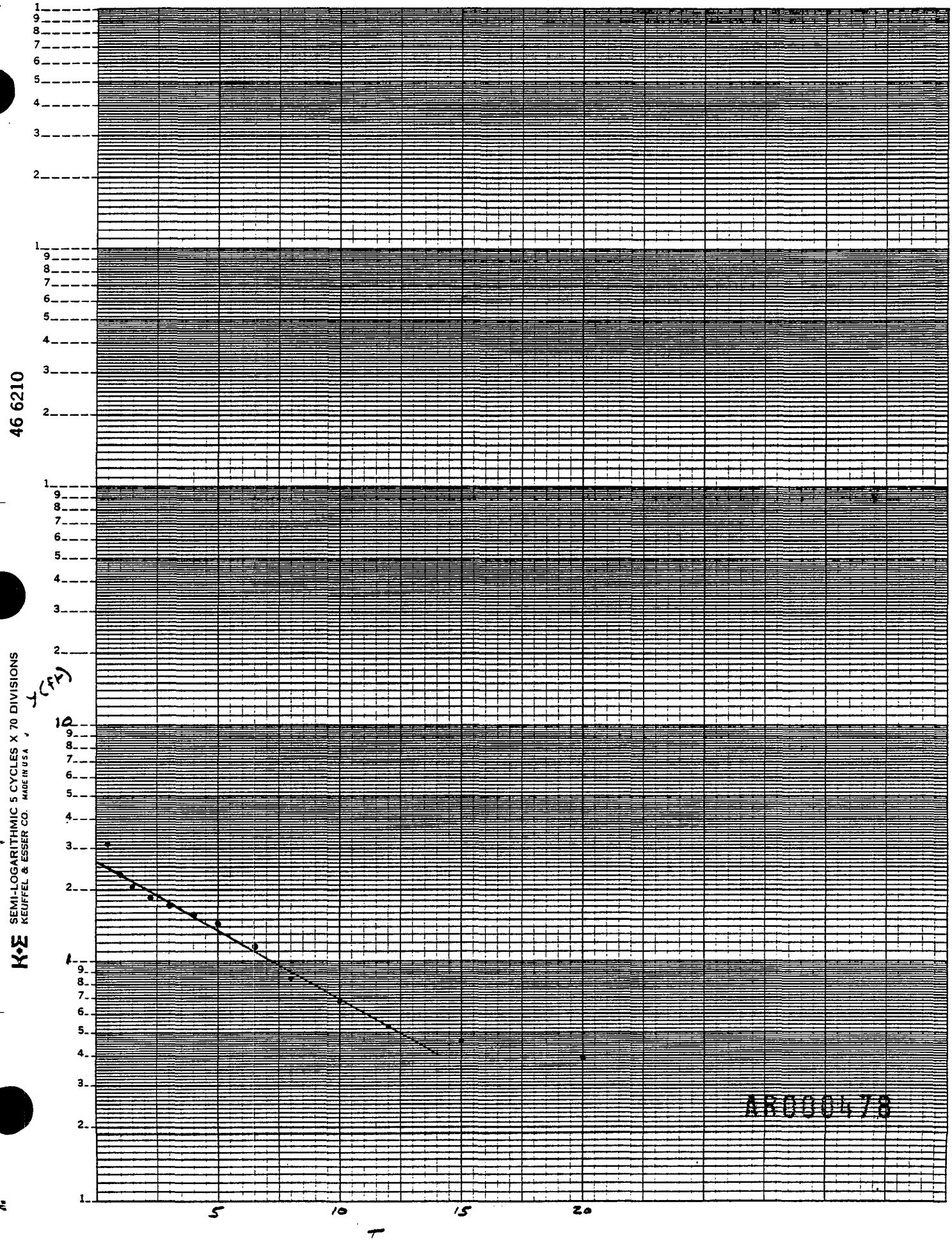
$$= 2.7 \times 10^{-4} \text{ cm/sec} \quad \bigstar$$

$$\ln R_e/r_w = \frac{1}{\frac{1.1}{\ln L_w/r_w} + \frac{A + B \ln[(H-L_w)/r_w]}{L_e/r_w}} =$$

$$= \frac{1}{\frac{1.1}{3.38} + \frac{A + B(.875)}{14.96}}$$

$$= \frac{1}{.325 + \frac{2 + 0.3(.875)}{14.96}}$$

$$= \frac{1}{.476} = 2.10$$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K•E SEMI-LOGARITHMIC 5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
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NUS CORPORATION

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SUBJECT ____ Checked By ____

WELL NO. 15A

TEST METHOD - RISING HEAD, USING A pump and a "popper" water level indicator

STATIC WATER LEVEL - 12.76'

TIME (MIN)	ADJUSTED READING	Y
.5	15.89	3.13
1.0	15.09	2.33
1.5	14.84	2.08
2.25	14.69	1.93
3.0	14.47	1.71
4.0	14.32	1.56
5.0	14.19	1.43
6.5	13.92	1.16
8.0	13.60	.84
10.0	13.44	.68
12.0	13.29	.53
15.0	13.22	.46
20.0	13.15	.39

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WELL 16A

$R = .156$ $t_1 = 2.0$ $t_2 = 8.0$ $h_1 = 3.27$ $h_2 = .50$ $L_e = 9.0'$

$$K = \frac{R^2 \ln(R_e/R)}{2(L_e)(t_2 - t_1)} \ln\left(\frac{h_1}{h_2}\right)$$

$$= \frac{.156^2 (5.3)}{2(9)(6)} (1.88)$$

$$= .00224 \text{ ft/min}$$

$$= 1.1 \times 10^{-3} \text{ cm/sec.}$$

AR000480

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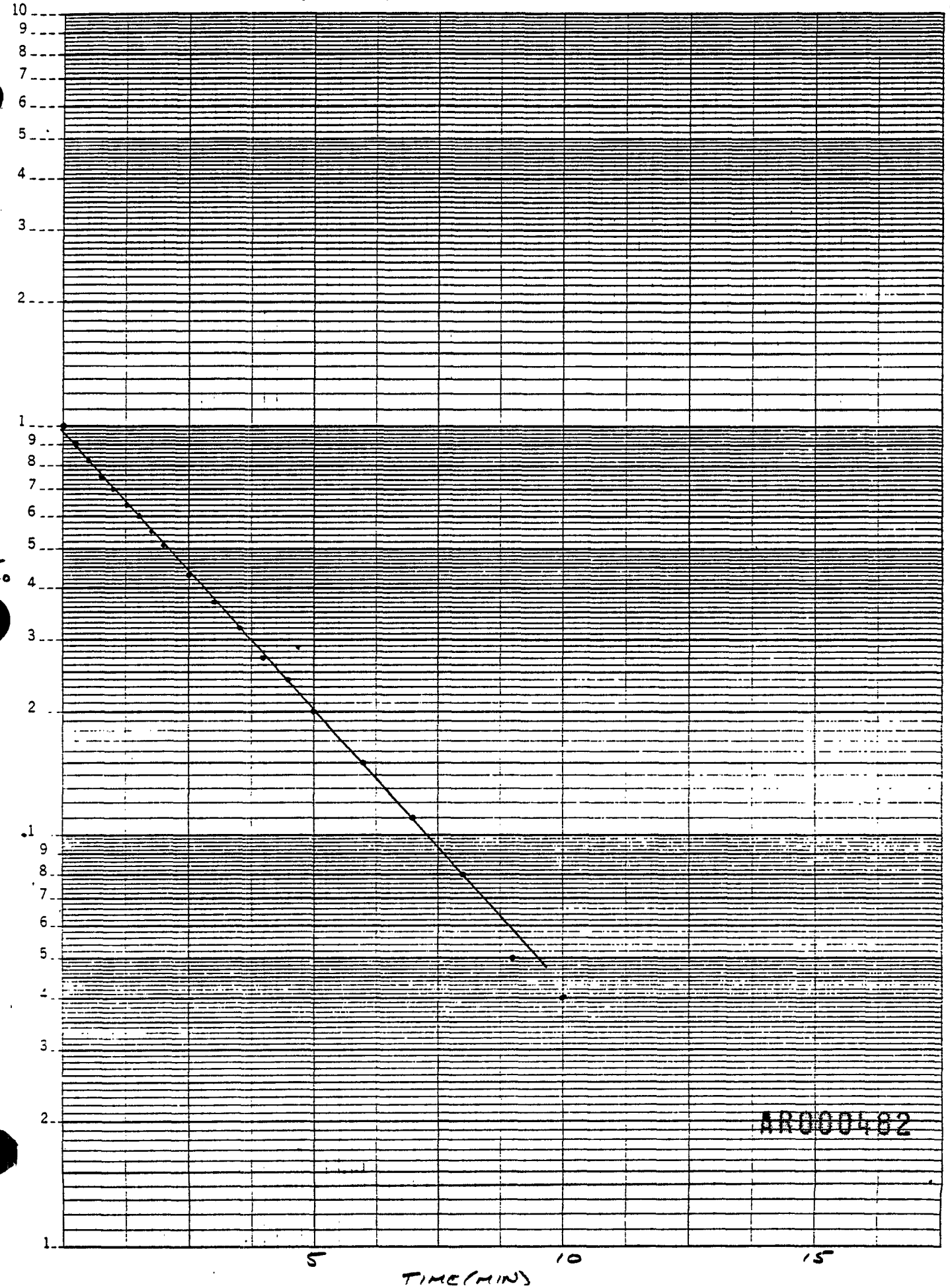
WELL NO 16A TEST 2 OF 2 TEST METHOD - FALLING HEAD, USING PRESSURE TRANSDUCER + SLUG OF H_2O (~4 GAL.)

INITIAL WATER LEVEL - 10.38'

TIME	ADJUSTED READING	$d-h_1$ (ft)	$H-H_o$	$\frac{H-h}{H-H_o}$
0	3.94	6.44	6.44	1
.25	4.61	5.77		.9
.50	5.10	5.28		.82
.75	5.53	4.85		.75
1.0	5.89	4.49		.70
1.25	6.24	4.14		.64
1.5	6.55	3.83		.60
1.75	6.84	3.54		.55
2.0	7.11	3.27		.51
2.5	7.58	2.8		.43
3.0	7.97	2.41		.37
3.5	8.32	2.06		.32
4.0	8.61	1.77		.27
4.5	8.85	1.53		.24
5.0	9.06	1.32		.20
6.0	9.41	.97		.15
7.0	9.67	.71		.11
8.0	9.88	.50		.08
9.0	10.03	.35		.05
10.0	10.10	.28		.04
12.0	10.22	.16		.02
14.0	10.28	.10		.02
16.0	10.31	.07		.01
18.0	10.34	.04		.01
20.0	10.41			
24.0	10.44			
30.0	10.44			

AR000481

WELL 16A



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WELL NO. 16 B INITIAL WATER LEVEL 8.62'

$r = .156$ $R = .417$ $L = 16.1$ $T_0 = .225$

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

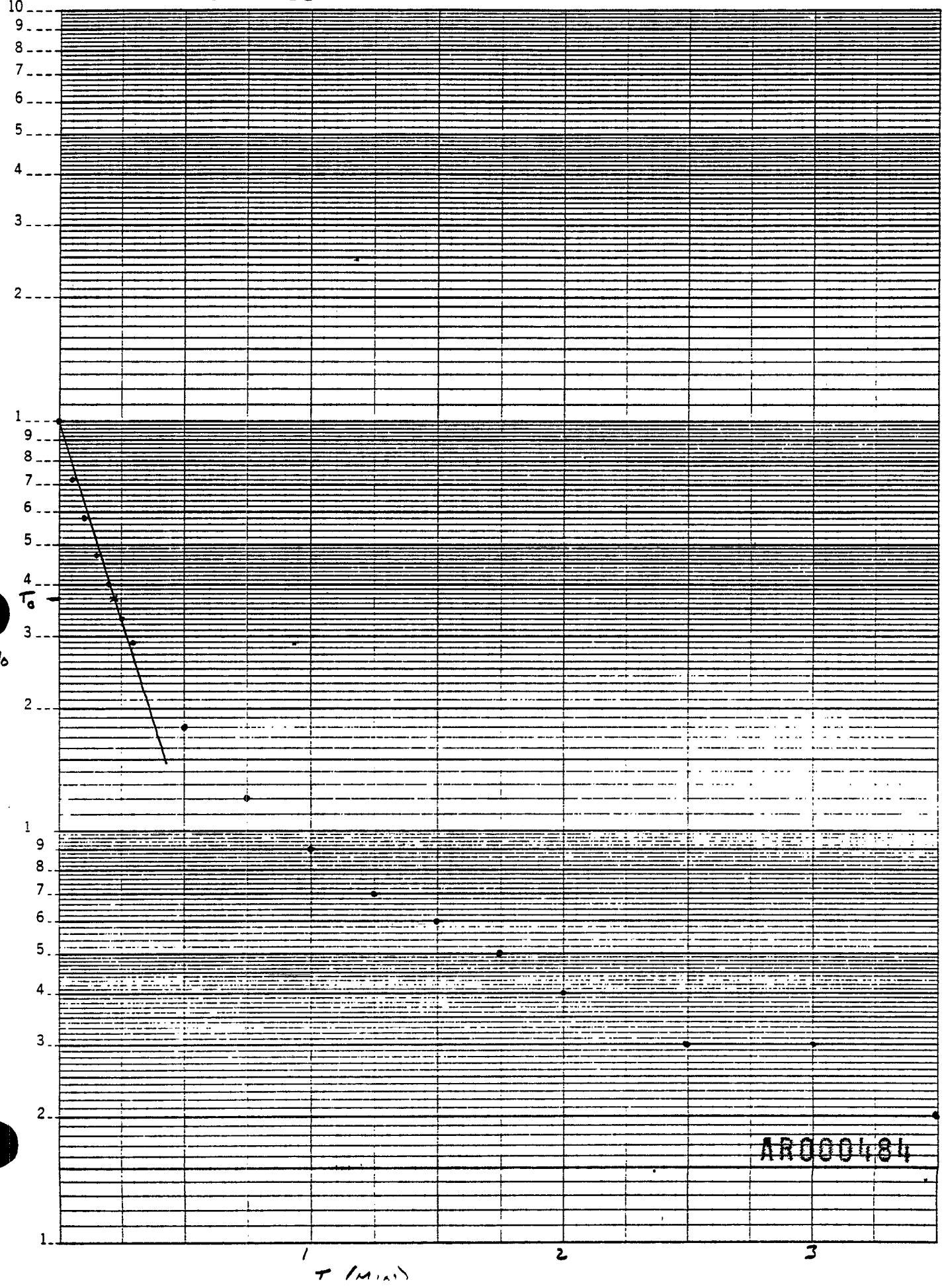
$$= \frac{.156^2 \ln(16.1/.417)}{2(16.1)(.225)}$$

$$= \frac{.0888}{7.245}$$

$$= .0123 \text{ ft/min}$$

$$= 6.2 \times 10^{-3} \text{ cm/sec.}$$

WELL NO. 16B



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WELL 16B

TEST METHOD - FALLING HEAD, USING A PRESSURE TRANSDUCER - A SLUG OF WATER (~4 GAL)

INITIAL WATER LEVEL - 8.62'

TIME(MM)	READING	H-h	H-H_o	$\frac{H-h}{H-H_o}$
0	4.27	4.35	4.35	1
.05	5.50	3.12		.72
.10	6.11	2.51		.58
.15	6.56	2.06		.47
.20	6.89	1.73		.40
.25	7.17	1.45		.33
.30	7.38	1.24		.29
.50	7.83	.79		.18
.75	8.10	.52		.12
1.0	8.24	.38		.09
1.25	8.31	.31		.07
1.5	8.37	.25		.06
1.75	8.42	.20		.05
2.0	8.45	.17		.04
2.5	8.48	.14		.03
3.0	8.51	.11		.03
3.5	8.52	.1		.02

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WELL 17A

TEST METHOD - FALLING HEAD, USING A PRESSURE TRANSDUCER AND A SLUG OF WATER (~ 4 GAL)

INITIAL WATER LEVEL - 7.71'

$r = .156 \quad R = .417 \quad L = 18 \quad T_o = .32$

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

$$= \frac{.156^2 \ln(18/.417)}{2(18)(.32)}$$

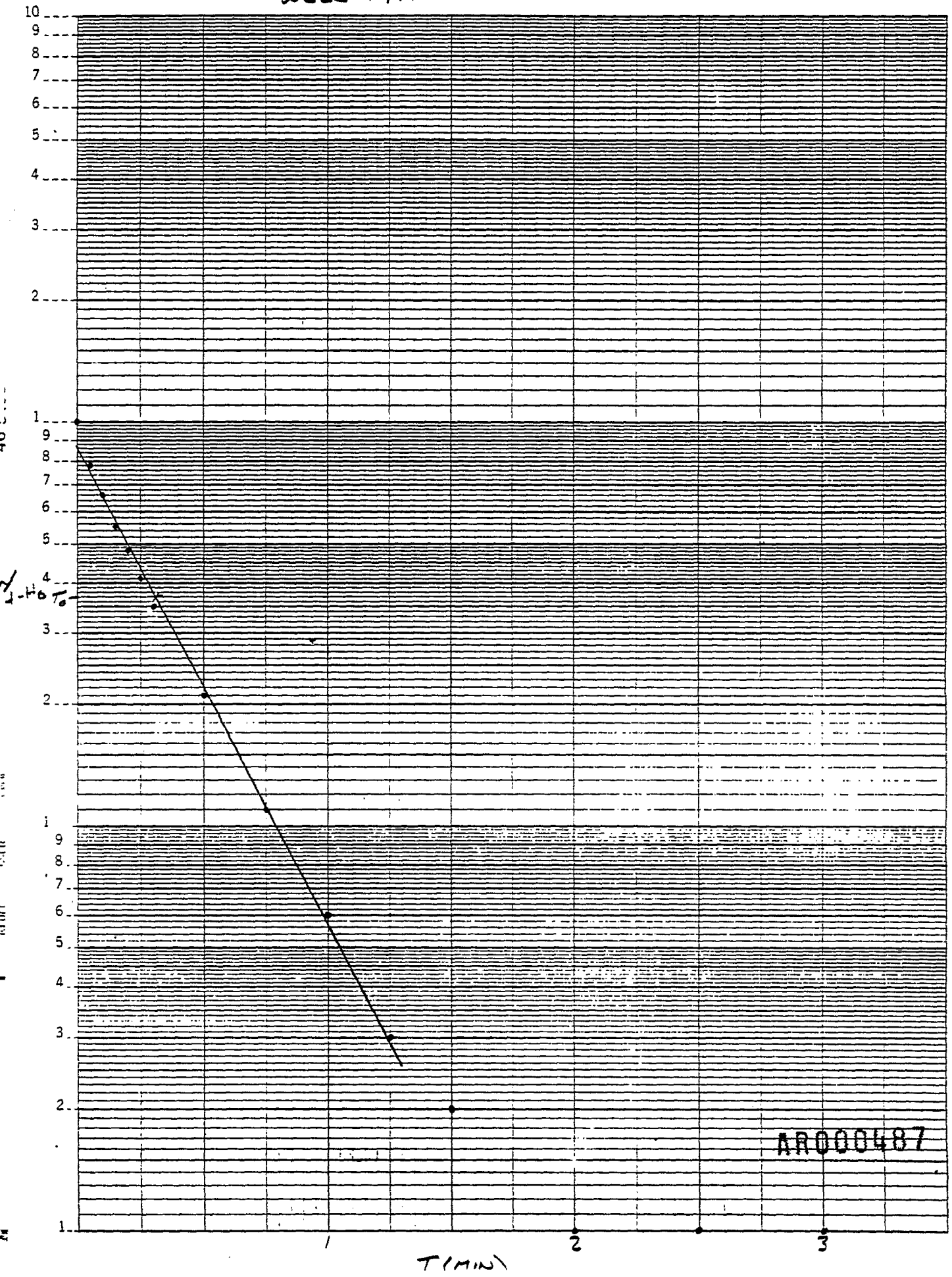
$$= \frac{.0915}{11.52}$$

$$= .00794 \text{ ft/min}$$

$$= 4.0 \times 10^{-3} \text{ cm/sec.}$$

AR000486

WELL 17A



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WELL 17A

STATIC WATER LEVEL - 7.71'

TEST METHOD - FALLING HEAD, USING A PRESSURE TRANSDUCER + A SLUG OF WATER (~ 4 GAL)

TIME	READING	H - h	H - H_o	$\frac{H-h}{H-H_o}$
0	3.79	3.92	3.92	1
.05	4.64	3.07		.78
.10	5.11	2.6		.66
.15	5.56	2.15		.55
.20	5.82	1.89		.48
.25	6.09	1.62		.41
.30	6.32	1.39		.35
.50	6.89	.82		.21
.75	7.27	.44		.11
1.0	7.48	.23		.06
1.25	7.58	.13		.03
1.5	7.64	.07		.02
2.0	7.67	.04		.01
2.5	7.67	.04		.01
3.0	7.69	.02		.01

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WELL 17B

$r_c = .156'$ $r_w = .417'$ $H = 9.5'$ $L_w = 8.5'$ $L_e = 7.5'$ $t = .25$ $y_0 = 3.31$ $y_t = 1.89$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y_t}$$

$$= \frac{.156^2(2.02)}{2(7.5)} \frac{1}{.25} \ln\left(\frac{3.31}{1.89}\right)$$

$$= .00323(2.24)$$

$$= .00723 \text{ ft/min}$$

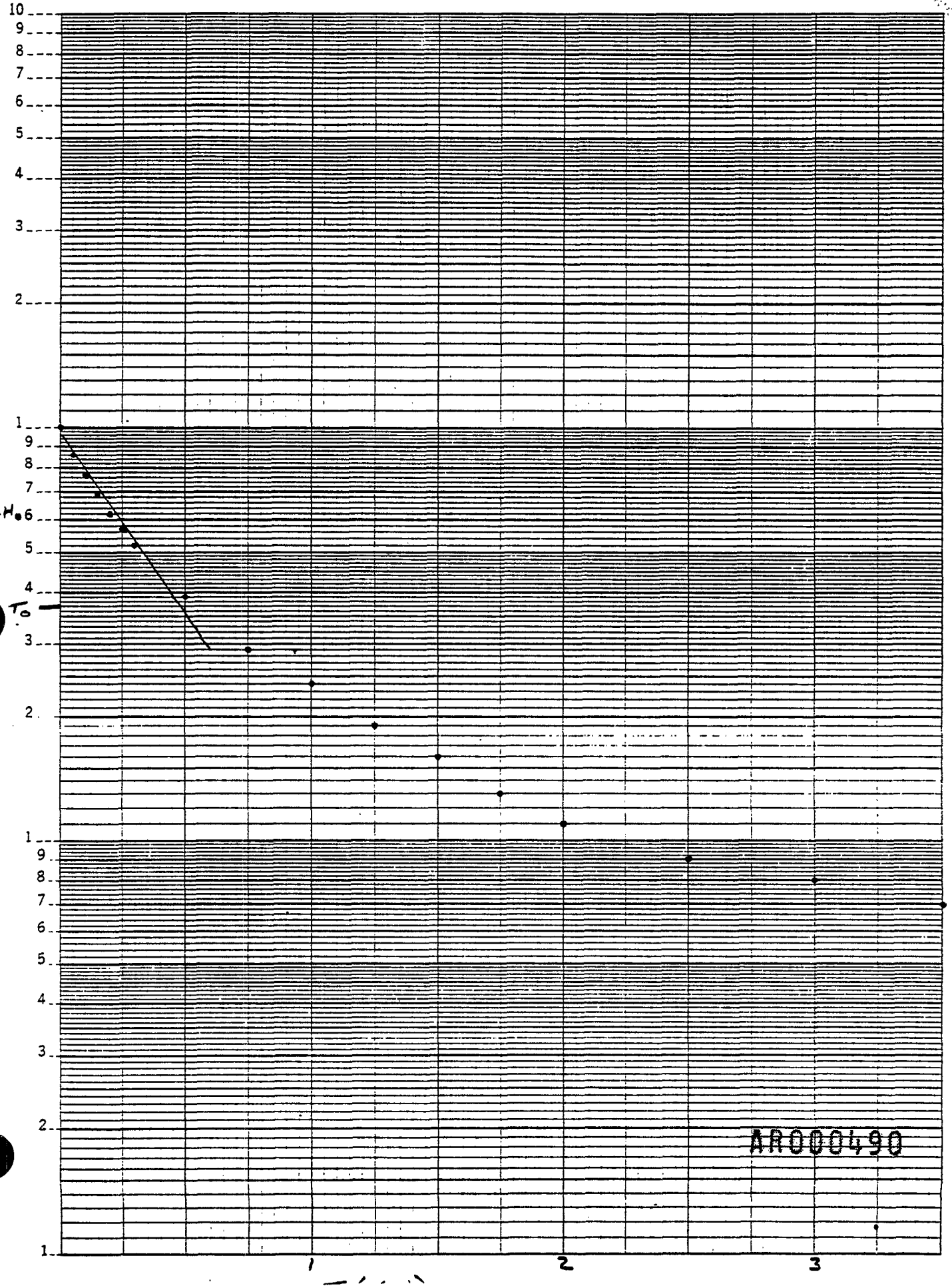
$$= 3.7 \times 10^{-3} \text{ cm/sec.}$$

$$\ln(R_e/r_w) = \frac{1}{\frac{1.1}{\ln(L_w/r_w)} + \frac{A + B\ln[(H-L_w)/r_w]}{(L_e/r_w)}}$$

$$= \frac{1}{\frac{1.1}{3.015} + \frac{2.1 + .3(.875)}{17.99}}$$

$$= \frac{1}{.365 + .131}$$

$$= 2.02$$



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WELL 17B

TEST METHOD - FALLING HEAD, USING A PRESSURE TRANSDUCER + A SLUG OF WATER (~4 GAL)

INITIAL WATER LEVEL - 6.08'

TIME	READING	$H-h$ (Y)	$H-H_o$	$\frac{H-h}{H-H_o}$
0	2.77	3.31	3.31	1
.05	3.22	2.86	↓	.86
.10	3.52	2.56		.77
.15	3.78	2.30		.69
.20	4.01	2.07		.62
.25	4.19	1.89		.57
.30	4.35	1.73		.52
.50	4.78	1.30		.39
.75	5.11	.97		.29
1.0	5.30	.78		.24
1.25	5.46	.62		.19
1.5	5.56	.52		.16
1.75	5.64	.44		.13
2.0	5.70	.38		.11
2.5	5.77	.31		.09
3.0	5.83	.25		.08
3.5	5.86	.22		.07

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WELL 18 B

TEST METHOD - RISING HEAD, USING A POPPER, AND A PUMP TO LOWER WATER LEVEL

INITIAL WATER LEVEL - 3.26'

TIME	ADJUSTED READING	h
.5	10.21	6.95
1.0	7.29	4.03
1.5	5.71	2.45
2.25	4.62	1.36
3.0	4.29	1.03
4.0	4.12	.86
5.0	3.83	.54
6.5	3.71	.45
8.0	3.62	.36
10.0	3.58	.32
12.0	3.52	.26
15.0	3.46	.20
20.0	3.46	.20

$R = .156$ $L_3 = 10.0$

$t_1 = .5$ $t_2 = 2.25$

$h_1 = 6.95$ $h_2 = 1.36$

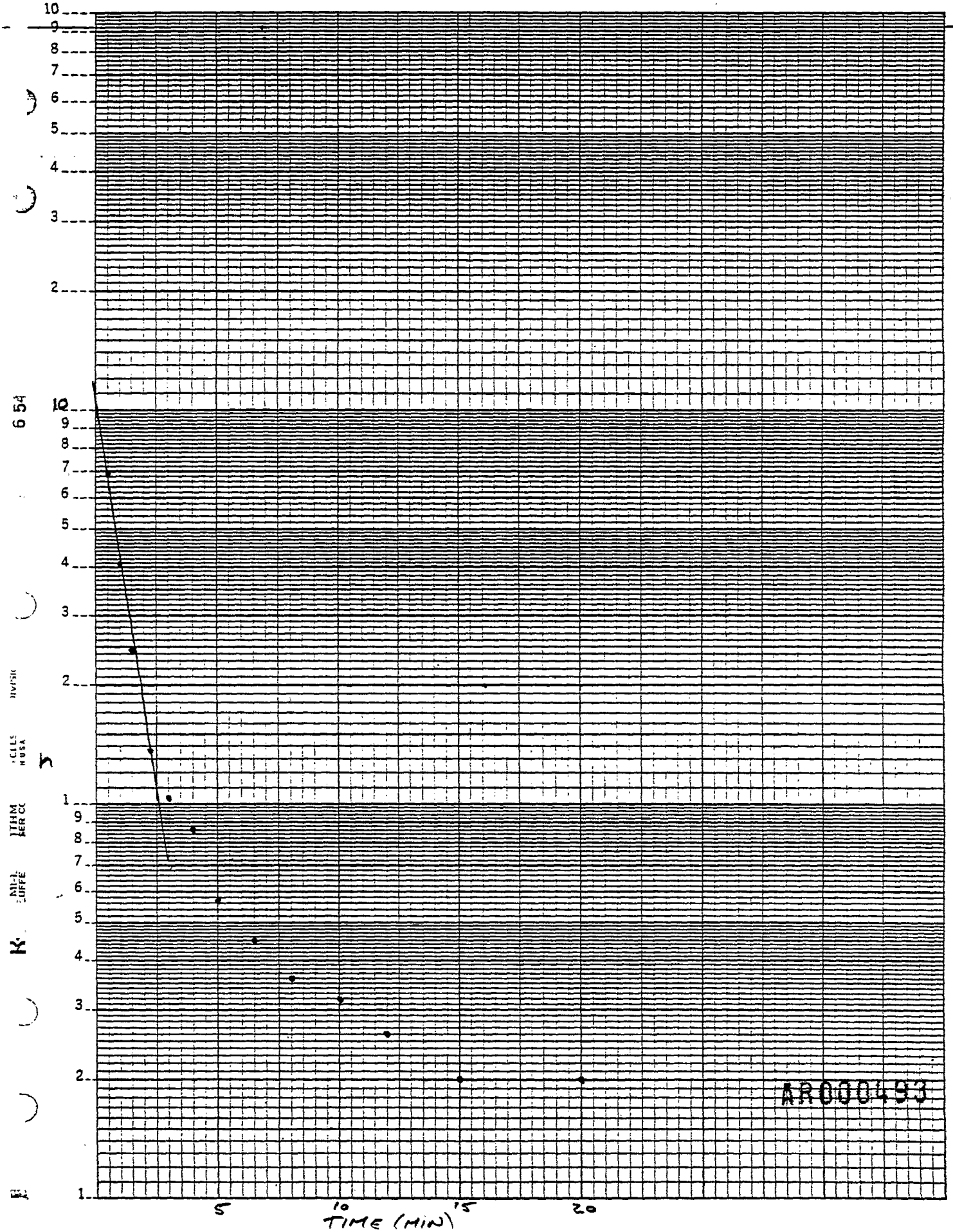
$$K = \frac{R^2 \ln(R_e/R) \ln\left(\frac{h_1}{h_2}\right)}{2L_3(t_2 - t_1)}$$

$$= \frac{.156^2 (5.30)}{35} (1.63)$$

$= .0056$ ft/min

$= 3.1 \times 10^{-3}$ cm/sec.

AR000492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TIME (MIN)
AR000493

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WELL NO. 18A

INITIAL WATER LEVEL - 5.09'

TEST METHOD - RISING HEAD, WITH POPPER, AND A PUMP TO LOWER WATER LEVEL

TIME	ADJUSTED READING	H (Y)
.5	17.42	12.33
1.0	13.92	8.83
1.5	11.8	6.71
2.25	9.92	4.83
3.0	8.92	3.83
4.0	8.0	2.91
5.0	7.5	2.41
6.5	7.09	2.0
8.0	6.92	1.83
10.0	6.75	1.66
12.0	6.42	1.33
15.0	6.17	1.08
20.0	5.84	.75
25.0	5.78	.69
30.0	5.59	.50
45.0	5.42	.33

$R = .156$ $t_1 = .5$ $t_2 = 1.5$

$L = 7.5$ $h_1 = 12.33$ $h_2 = 6.71$

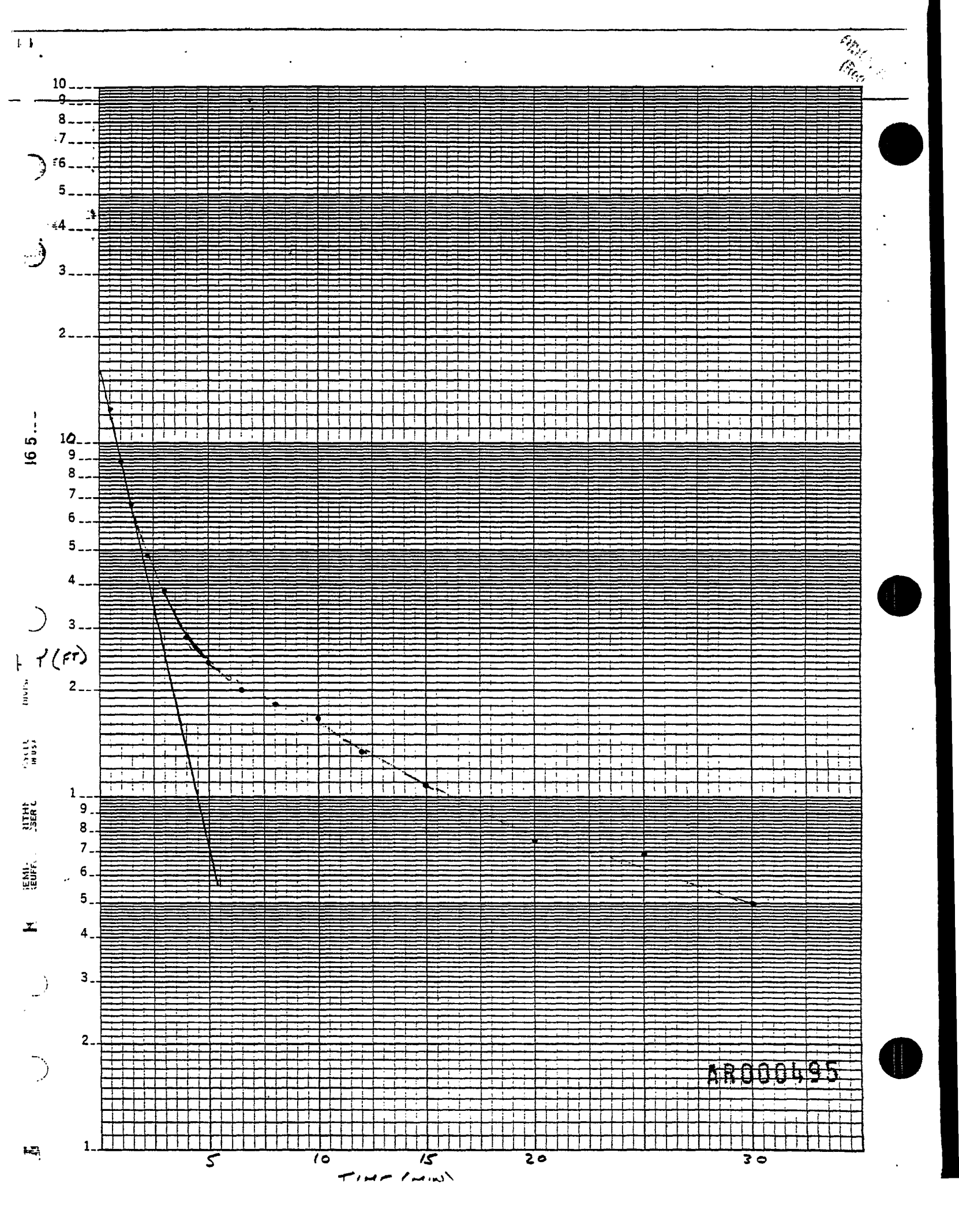
$$K = \frac{R^2 \ln(R_e/R) \ln\left(\frac{h_1}{h_2}\right)}{2L_e(t_2 - t_1)}$$

$$= \frac{.156^2 (5.30)}{15} (.61)$$

$= .00524$ ft/min

$= 2.7 \times 10^{-3}$ cm/sec.

AR000494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TIME (MIN)
AR000495

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WELL NO. 19A

INITIAL WATER LEVEL - 7.5'

TEST METHOD - RISING HEAD, USING A POPPER, AND A PUMP TO LOWER WATER LEVEL

TIME	ADJUSTED READING	h, Y
.5	26.96	19.46
1.0	26.67	19.17
1.5	26.42	18.92
2.25	26.29	18.79
3.0	25.96	18.46
4.0	25.79	18.29
5.0	24.92	17.42
6.5	24.17	16.67
8.0	23.25	15.75
10.0	22.0	14.50
12.0	20.87	13.37
15.0	19.25	11.75
20.0	17.87	10.37

$R = .156 \quad L_3 = 13.6 \quad t_1 = 1 \quad t_2 = 8$

$h_1 = 19.17 \quad h_2 = 15.75$

$$K = \frac{R^2 \ln(R_0 - R)}{2L_3(t_2 - t_1)} \ln\left(\frac{h_1}{h_2}\right)$$

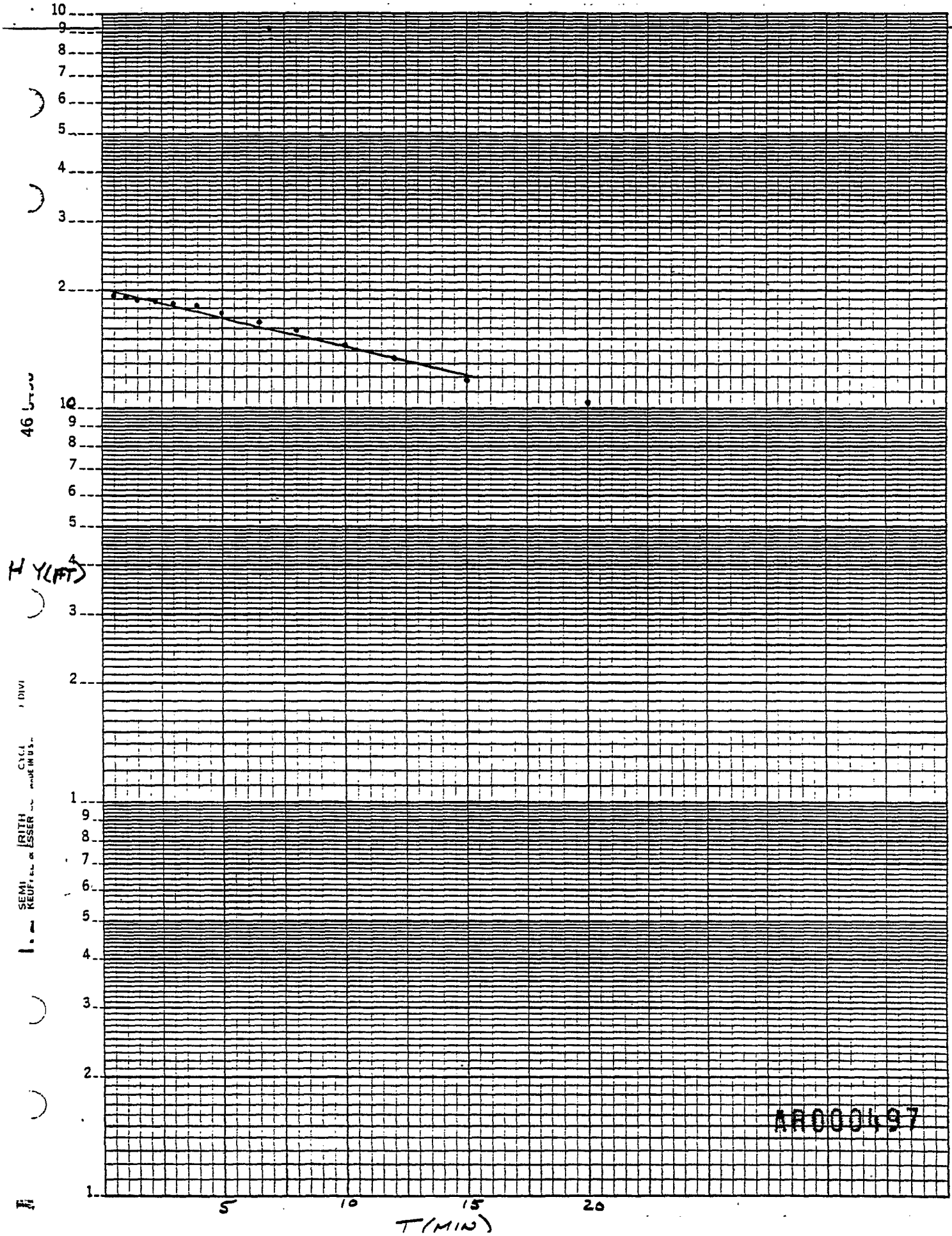
$$= \frac{.156^2 (5.30)}{2(13.6)(7)} \ln\left(\frac{19.17}{15.75}\right)$$

$$= \frac{.129}{190.4} (.1965)$$

$$= .000133 \text{ ft/min}$$

$$= 7.0 \times 10^{-5} \text{ cm/sec.}$$

AR000496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WELL NO. 20A

INITIAL WATER LEVEL - 9.12'

TIME (min)	ADJUSTED READING	h
.25	—	—
.5	4.84'	4.28
.75	5.25'	3.87
1.0	5.62'	3.50
1.25	6.02'	3.10
1.50	6.35'	2.77
1.75	6.62'	2.5
2.0	6.92'	2.2
2.5	7.33'	1.79
3.0	7.73'	1.39
3.5	8.03'	1.09
4.0	8.27'	.85
4.5	8.49'	.63
5.0	8.60'	.52
6.0	8.81'	.31
7.0	8.95'	.17
8.0	9.04'	.08
10.0	9.06'	.06
12.0	9.08'	.04
15.0		
20.0		

TEST METHOD - FALLING HEAD, USING 4 GAL H_2O & A POPPER

$R = .156'$ $L_2 = 7$ $t_1 = 1$ $h_1 = 3.50$ $t_2 = 4$ $h_2 = .85$

$$K = \frac{R^2 \ln(L_2/R) \ln\left(\frac{h_1}{h_2}\right)}{2L_2(t_2 - t_1)}$$

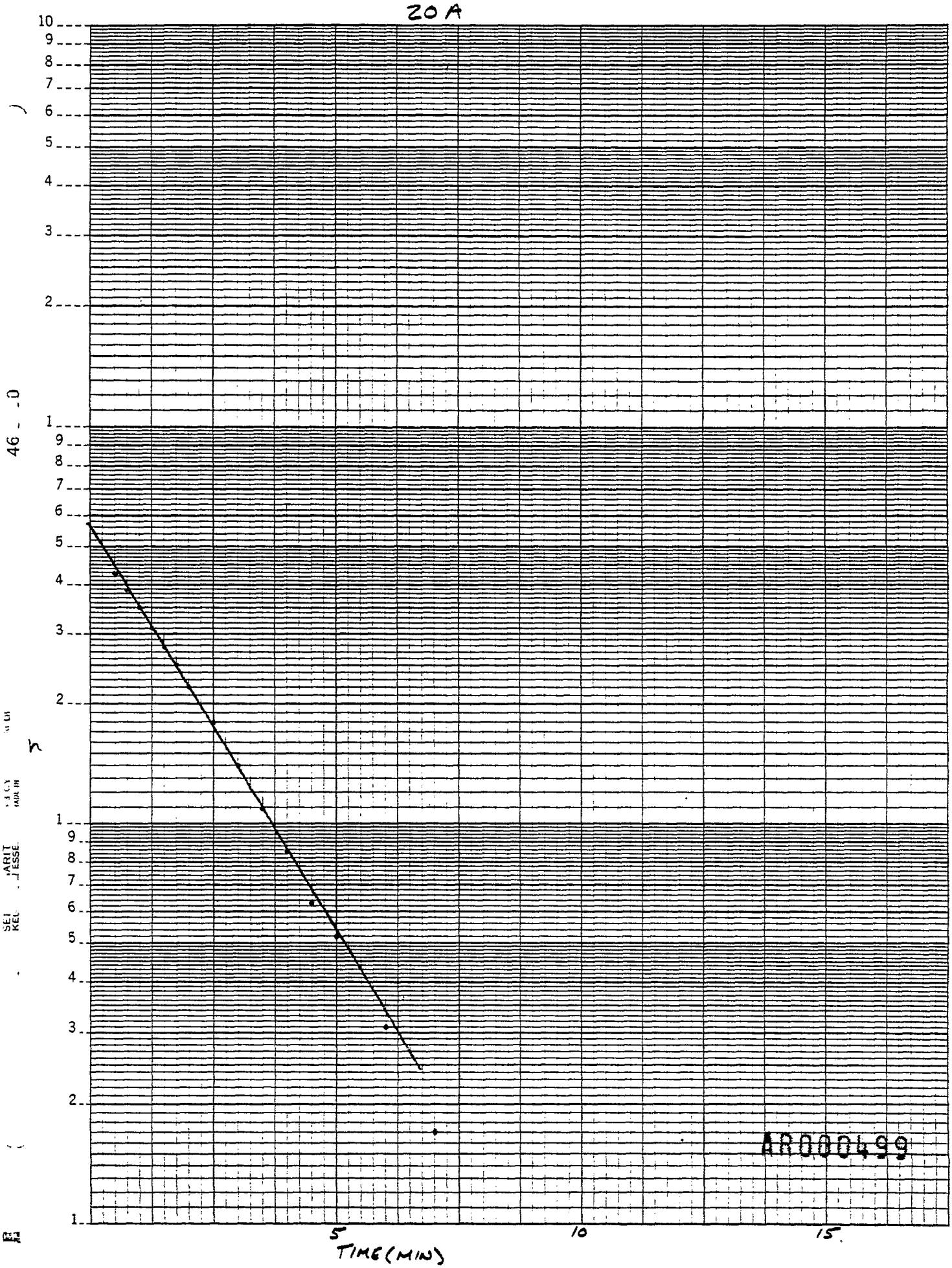
$$= \frac{.156^2 (3.80)}{42} (1.42)$$

$$= (.00217)(1.42)$$

$$= .00308 \text{ ft/min}$$

$$= 1.6 \times 10^{-3} \text{ cm/sec.}$$

AR000498


20A
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15
TIME (MIN)
AR000499

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WELL NO. 20 B TEST METHOD - FALLING HEAD, USING 4 GAL H_2O & A POPPER

INITIAL WATER LEVEL - 7.96'

$H = 8.1$ $L_w = 8.1$ $r_c = .156$ $r_w = .417$

$L_e = 7.0'$ $Y_o = 5.6$ $T = 7$ $Y_t = 1.82$

TIME(min)	ADJUSTED READING(FT)	Y(FT)
.25	2.46'	5.5
.50	2.84'	5.12
.75	3.0'	4.96
1.0	3.19'	4.77
1.25	3.39'	4.57
1.50	3.61'	4.35
1.75	3.80'	4.16
2.0	3.96'	4.0
2.5	4.29'	3.67
3.0	4.54'	3.42
3.5	4.84'	3.12
4.0	5.08'	2.88
4.5	5.29'	2.67
5.0	5.5'	2.46
6.0	5.84'	2.12
7.0	6.14'	1.82
8.0	6.33'	1.63
10.0	6.79'	1.17
12.0	7.08'	.88
15.0	7.35'	.61
20.0	7.62'	.34
25.0	7.77'	.19

$$K = r_c^2 \frac{\ln(Re/r_w)}{2L_e} \frac{1}{t} \ln \frac{Y_o}{Y_t}$$

$$= \frac{.024(1.09)}{14}\left(\frac{1}{7}\right)(1.12)$$

$$= (.0019)(.16)$$

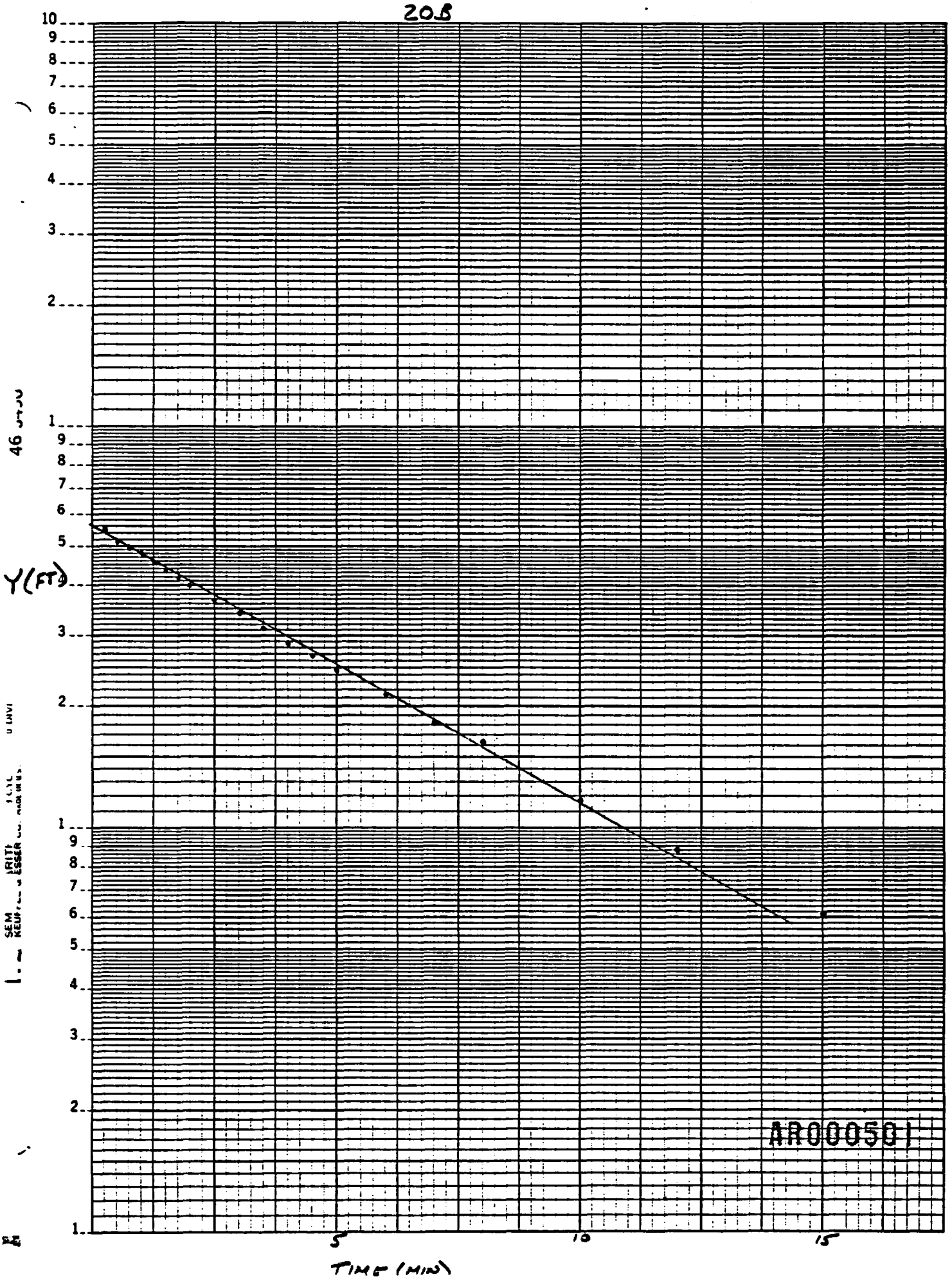
$$= .000304 \text{ ft/min}$$

$$= 1.5 \times 10^{-4} \text{ cm/sec}$$

$$\ln Re/r_w = \frac{1}{\frac{1.1}{\ln L_w/r_w} + \frac{C}{L_e r_w}}$$

$$= \frac{1}{\frac{1.1}{2.99} + \frac{1.6}{2.92}}$$

$$= \frac{1}{.37 + .55} = 1.09$$


208
Y(FT)
TIME (MIN)
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AR000501

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SUBJECT ____ Checked By ____

WELL NO. 21A

TEST METHOD - RISING HEAD TEST USING A POPPER, AND A PUMP TO LOWER THE WATER LEVEL

INITIAL WATER LEVEL - 7.26' (TOC)
5.63' (BLS)

$r_c = .156$ $R_w = .417$ $L_e = 6.3$ $y_o = 21.8$ $y_t = 3.34$
$L_w = 19.24'$ $H = 19.24$ $t = 4.0$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

$$= \frac{.156^2 (1.17)}{12.6} \frac{1}{4} (1.876)$$

$$= .00106 \text{ ft/min}$$

$$= 5.4 \times 10^{-4} \text{ cm/sec.} \star$$

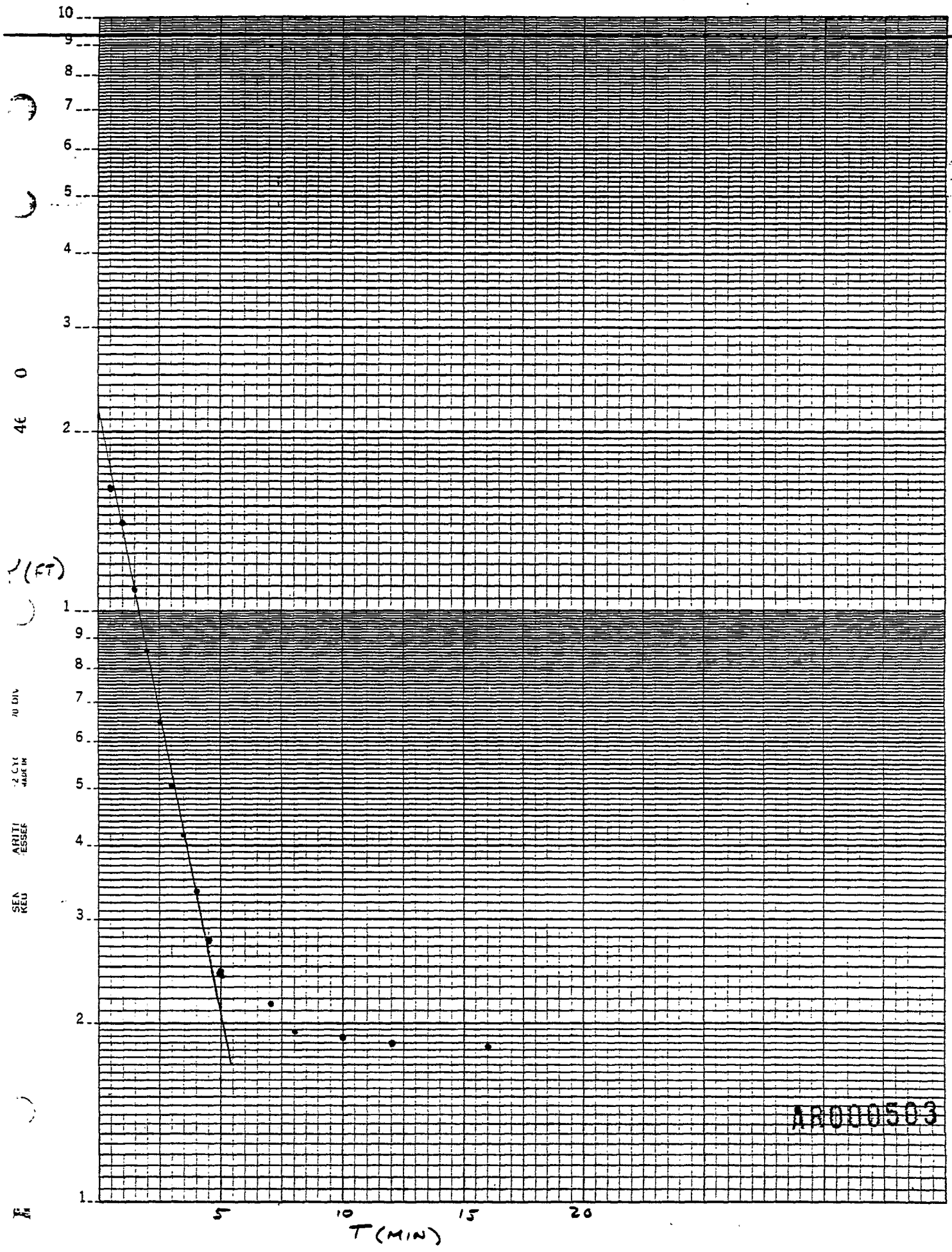
$$\ln(R_e/r_w) = \frac{1}{\frac{1.1}{\ln L_w/r_w} + \frac{C}{(L_e/r_w)}}$$

$$= \frac{1}{\frac{1.1}{3.83} + \frac{1.5}{2.63}}$$

$$= \frac{1}{.287 + .57}$$

$$= 1.17$$

AR000502



NUS CORPORATION

Page 1 of 1

DATE 7-23-84

CLIENT EPA FILE NO. 0778.17 BY DRH

SUBJECT RISING HEAD TEST Checked By

TIME START OF TEST - 9:20AM

B-21A

TIME	READING	Y
30sec	23.42 FT	16.16
1.0min	21.38 FT	14.12
1.5 min	18.13 FT	10.87
2.0 min	15.82 FT	8.56
2.5 min	13.75 FT	6.49
3.0 min	12.30 FT	5.04
3.5 min	11.43 FT	4.17
4.0 min	10.60 FT	3.34
4.5 min	10.02 FT	2.76
5.0 min	9.69 FT	2.43
6.0 min	—	—
7.0 min	9.45 FT	2.19
8.0 min	9.14 FT	1.88
10.0 min	9.03 FT	1.77
12.0 min	8.93 FT	1.67
14.0 min	8.93 FT	1.67
16.0 min	8.90 FT	1.64
18.0 min	8.90 FT	
20.0 min	8.90 FT	

NUS CORPORATION

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CLIENT ____ FILE NO. ____ BY ____

SUBJECT ____ Checked By ____

WELL NO. 21B TEST METHOD - RISING HEAD USING A BOOSTER AND A PUMP TO LOWER THE WATER LEVEL

INITIAL WATER LEVEL - 9.16'

$H = 17.34$ $r_c = .156$ $L_e = 6.34'$ $r_w = .417$ $y_o = 8.0$

$L_w = 6.34$ $r_w = .417$ $r_c = .156$ $t_1 = 4.0$ $y_t = 3.0$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

$$= \frac{.024(1.67)}{12.68} \frac{1}{4} (.981)$$

$$= .00077 \text{ ft/min}$$

$$= 3.9 \times 10^{-4} \text{ cm/sec.}$$

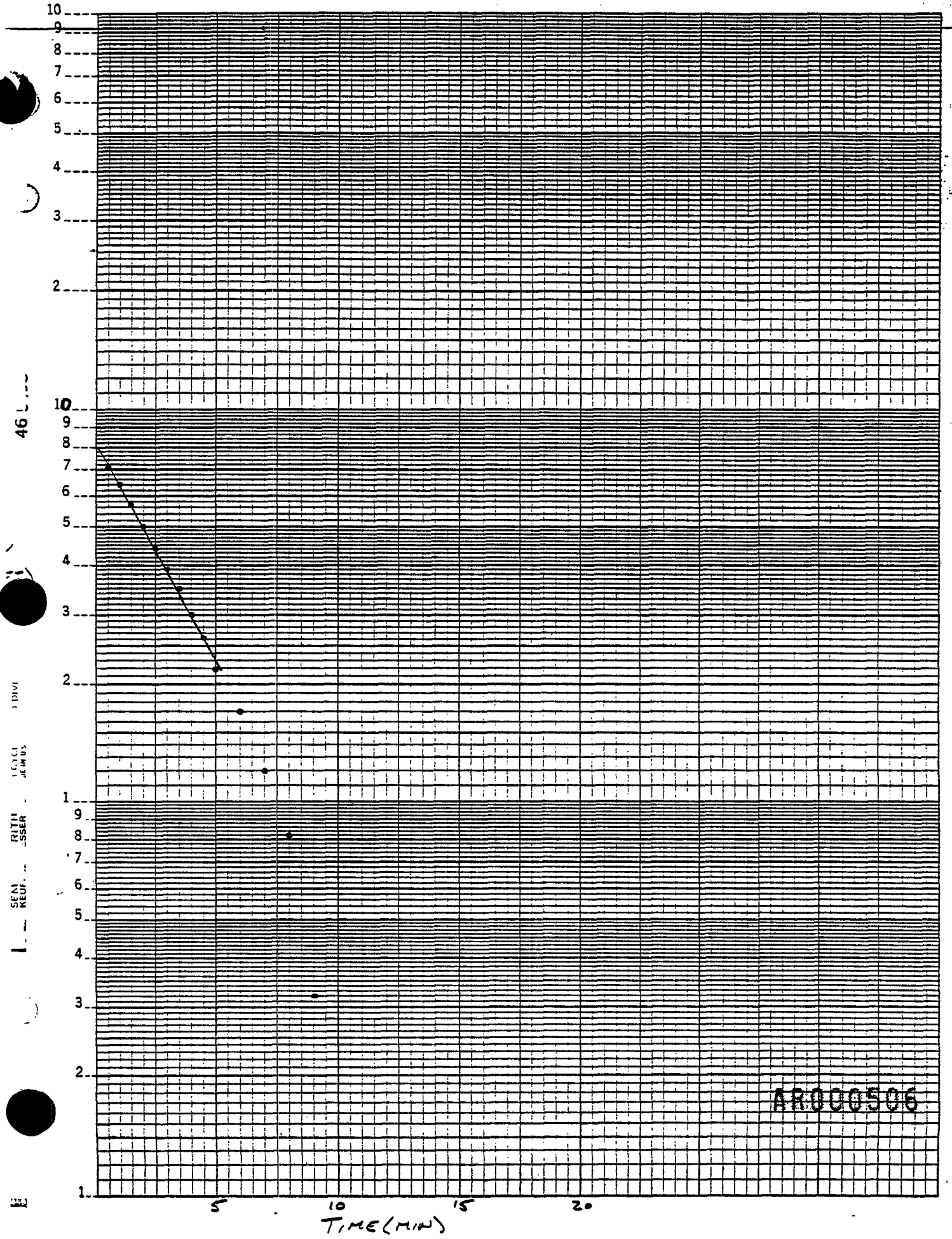
$$\ln(R_e/r_w) = \frac{1}{\frac{1.1}{\ln(L_w/r_w)} + \frac{A + B \ln[(H-L_w)/r_w]}{L_e/r_w}}$$

$$= \frac{1}{\frac{1.1}{2.72} + \frac{2.0+.3(3.27)}{15.20}}$$

$$= \frac{1}{.404 + .196}$$

$$= 1.67$$

AR000505



NUS CORPORATION

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DATE 7-23-84

CLIENT EPA FILE NO. 0778.17 BY DRH

SUBJECT RISING HEAD TEST Checked By _____

TIME START OF TEST - 8:43 AM
B-21B

PUMPING 5.5 gpm

STATIC ▽ = 9.16 FT

TIME	READING		▽ Y
30sec	16.20	FT	7.04
1min	15.55	FT	6.39
1.5min	14.85	FT	5.69
2.0min	14.15	FT	4.99
2.5min	13.55	FT	4.39
3.0min	13.05	FT	3.89
3.5min	12.64	FT	3.48
4.0min	12.16	FT	3.0
4.5min	11.78	FT	2.62
5.0min	11:34	FT	2.18
6.0min	10.86	FT	1.7
7.0min	10.37	FT	1.2
8.0min	9.98	FT	.82
10min	9.48	FT	.32
12min	9.22	FT	.06
14min	9.17	FT	.01
16min	9.16	FT	0
18min	9.15	FT	0
20min	9.15	FT	0

AR000507

NUS CORPORATION

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SUBJECT ____ Checked By ____

WELL 22A

$r = .085 \quad R = .25 \quad L = 7.5 \quad T_o = .25$

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

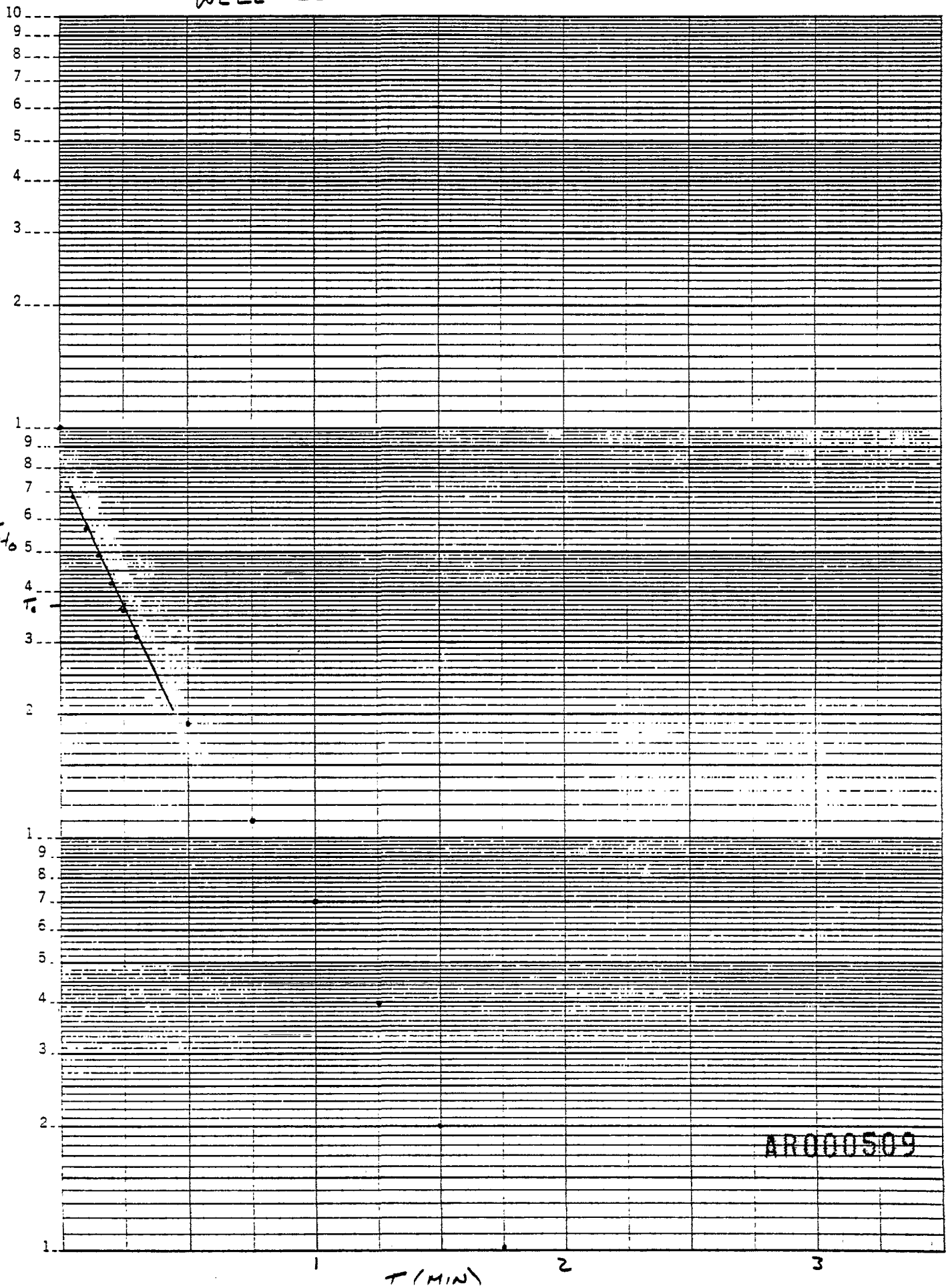
$$= \frac{.085^2 \ln(7.5/.25)}{2(7.5)(.25)}$$

$$= \frac{.0246}{3.75}$$

$= .00656$ ft/min

$= 3.3 \times 10^{-3}$ cm/sec.

WELL 22A



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SUBJECT ____ Checked By ____

WELL 22A

TEST METHOD - FALLING HEAD, USING A PRESSURE TRANSDUCER, AND A VACCUM PUMP TO RAISE WATER LEVEL

INITIAL WATER LEVEL - 4.85'

TIME	READING	$H-h$	$H-H_o$	$\frac{H-h}{H-H_o}$
0	1.07	3.78	3.78	1
.05	2.29	2.56		.68
.10	2.69	2.16		.57
.15	3.0	1.85		.49
.20	3.26	1.59		.42
.25	3.49	1.36		.36
.30	3.67	1.18		.31
.50	4.12	.73		.19
.75	4.44	.41		.11
1.00	4.60	.25		.07
1.25	4.71	.14		.04
1.50	4.79	.06		.02
1.75	4.80	.05		.01
2.0	4.81	.04		.01
2.5	4.85	0		0
3.0	4.85	0		0
3.5	4.85	0		0

AR000510

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WELL 22B TEST 3

$R = .156 \quad T_1 = 5 \quad T_2 = 10 \quad h_1 = 2.45 \quad h_2 = 1.32 \quad L_3 = 9.5$

$$K = \frac{R^2 \ln(R_e/R)}{2 L_e (t_2 - t_1)} \ln\left(\frac{h_1}{h_2}\right)$$

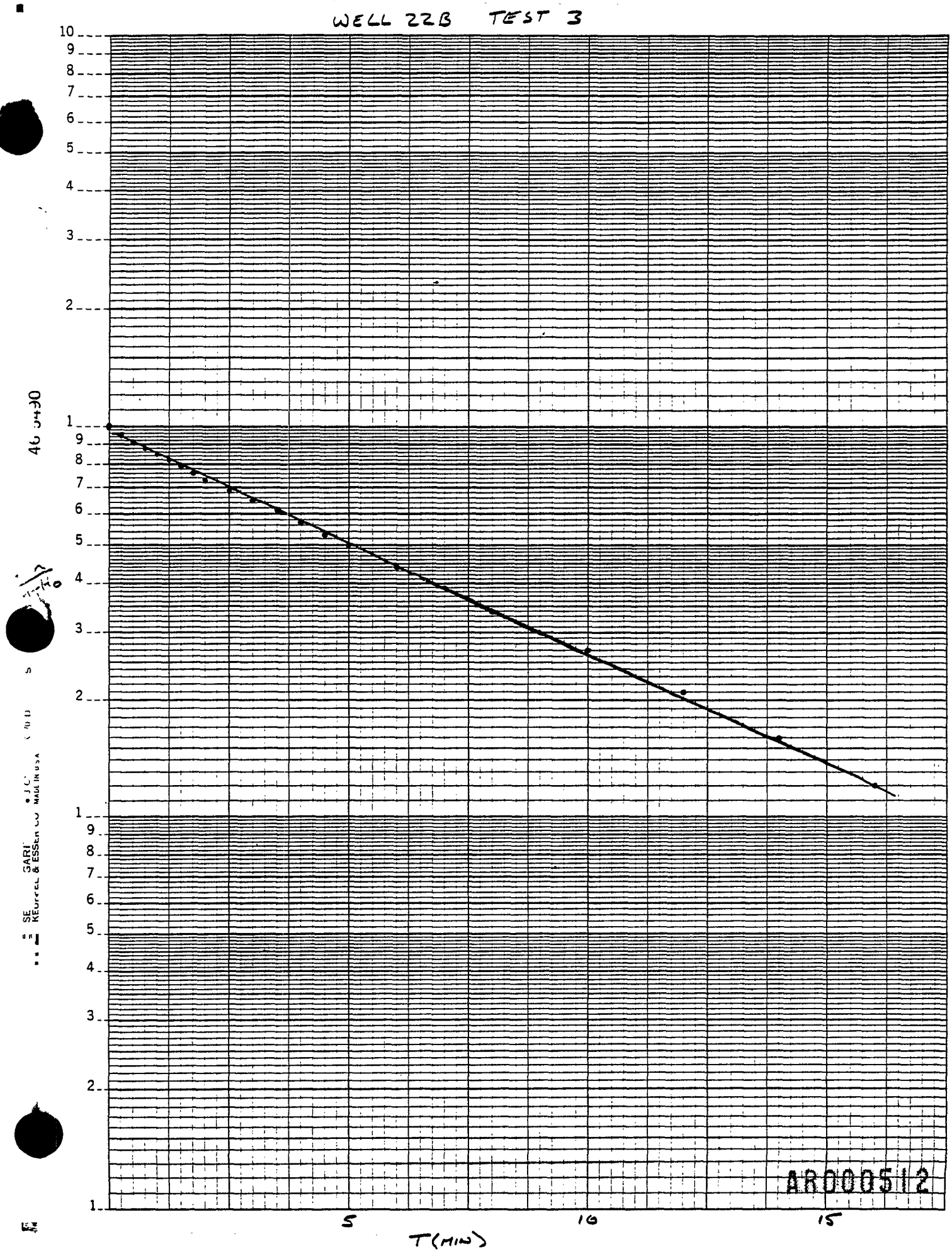
$$= \frac{.0243(5.30)}{2(9.5)(5)} (.62)$$

$= .00084$ ft/min

$= .0000043$ m/s

$= 4.3 \times 10^{-4}$ cm/sec.

AR000511


WELL 22B TEST 3
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T(MIN)

NUS CORPORATION

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CLIENT ____ FILE NO. ____ BY ____

SUBJECT ____ Checked By ____

Well 22B TEST 3
INITIAL WATER LEVEL - 5.00'

TEST METHOD - FALLING HEAD TEST, USING A PRESSURE TRANSDUCER AND RAISING THE WATER LEVEL BY ADDING H_2O TO THE WELL

TIME	READING	H-h, (h)	H-Ho	$\frac{H-h}{H-H_o}$
0	.09	4.91	4.91	1
.25	.36	4.64	↓	.95
.50	.52	4.48		.91
.75	.69	4.31		.88
1.00	.84	4.16		.85
1.25	.99	4.01		.82
1.50	1.13	3.87		.79
1.75	1.25	3.75		.76
2.0	1.39	3.61		.73
2.5	1.61	3.39		.69
3.0	1.81	3.19		.65
3.5	2.02	2.98		.61
4.0	2.20	2.8		.57
4.5	2.38	2.62		.53
5.0	2.55	2.45		.50
6.0	2.84	2.16		.44
7.0	3.09	1.91		.39
8.0	3.32	1.68		.34
9.0	3.51	1.49		.30
10.0	3.68	1.32		.27
12.0	3.97	1.03		.21
14.0	4.21	.79		.16
16.0	4.39	.61		.12
18.0	4.53	.47		.09
20.0	4.63	.37		.07
22.0	4.71	.29		.06

AR000513

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CLIENT ____ FILE NO. ____ BY ____

SUBJECT ____ Checked By ____

WELL 22C

$r_c = .156'$ $r_w = .417'$ $L_e = 10.5'$ $L_w = 11.65'$ $H = 18.95'$ $t = 3$ $y_o = 2.77$ $y_t = .52$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

$$= \frac{.156^2 (2.14)}{21} \frac{1}{3} (1.67)$$

$$= (.00245)(.557)$$

$$= .00136 \text{ ft/min}$$

$$= 6.9 \times 10^{-4} \text{ cm/sec}$$

$$\ln(R_e/r_w) = \frac{1}{\frac{1.1}{\ln(L_w/r_w)} + \frac{A + B \ln[(H-L_w)/r_w]}{L_e/r_w}}$$

$$= \frac{1}{\frac{1.1}{3.33} + \frac{2.3 + .4(2.86)}{25.18}}$$

$$= \frac{1}{.33 + .136}$$

$$= \frac{1}{.467}$$

$$= 2.14$$

AR000514

NUS CORPORATION

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DATE ____

CLIENT ____ FILE NO. ____ BY ____

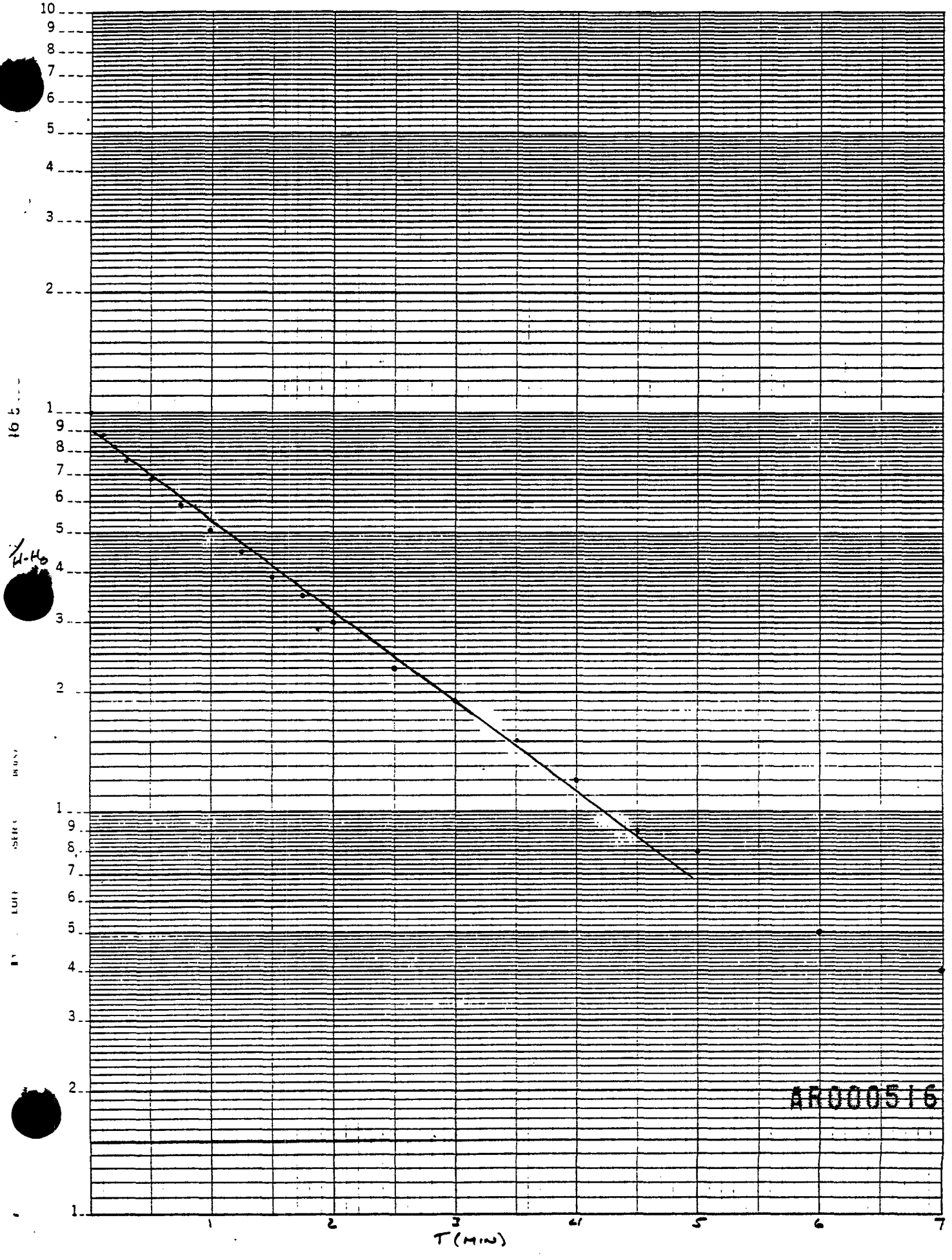
SUBJECT ____ Checked By ____

WELL 22C

TEST METHOD - FALLING HEAD, USING A PRESSURE TRANSDUCER AND A VACCUM PUMP TO RAISE WATER LEVEL

INITIAL WATER LEVEL - 5.12'

TIME	READING	$H-h_t(Y)$	$H-H_o$	$\frac{H-h}{H-H_o}$
0	2.35	2.77	2.77	1
.10	2.68	2.44		.88
.20	2.86	2.26		.82
.30	3.02	2.10		.76
.50	3.24	1.88		.68
.75	3.48	1.64		.59
1.00	3.70	1.42		.51
1.25	3.88	1.24		.45
1.50	4.04	1.08		.39
1.75	4.16	.96		.35
2.0	4.28	.84		.30
2.5	4.47	.65		.23
3.0	4.60	.52		.19
3.5	4.71	.41		.15
4.0	4.78	.34		.12
4.5	4.86	.26		.09
5.0	4.90	.22		.08
6.0	4.98	.14		.05
7.0	5.01	.11		.04



B-23A

$R = .156 \quad L_3 = 9.5 \quad T_1 = 1 \quad T_2 = 5 \quad h_1 = 8.12 \quad h_2 = 1.79$

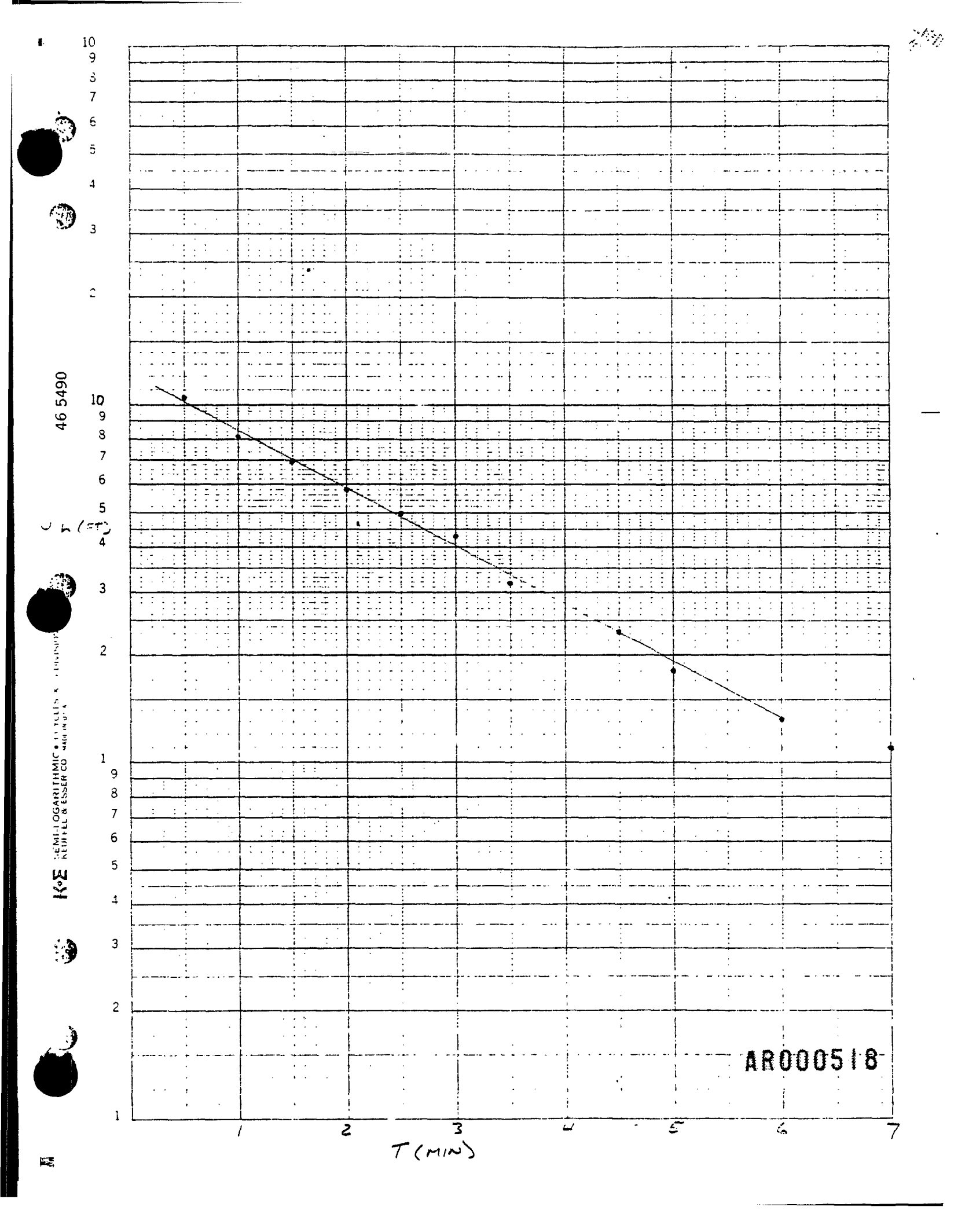
$$K = \frac{R^2 \ln(R_0/R)}{2L_3(T_2 - T_1)} \ln\left(\frac{h_1}{h_2}\right)$$

$$= \frac{.156^2(5.298)}{2(9.5)(4)} (1.51)$$

$$= .00256 \text{ ft/min.}$$

$$= .000013 \text{ m/sec.}$$

$$= 1.3 \times 10^{-3} \text{ cm/sec.} \star$$


46 5490
KEUFFEL & ESSER CO
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AR000518

NUS CORPORATION

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DATE 7-27-84

CLIENT EPA FILE NO. 0778-17 BY DRH

SUBJECT _____ Checked By _____

RISING HEAD TEST B-23A

TIME (min)	READING (FT BELOW PVC)	Y, h
0.5	19.4	10.42
1.0	17.1	8.12
1.5	15.95	6.97
2.0	14.87	5.89
2.5	13.95	4.97
3.0	13.26	4.28
3.5	12.14	3.16
4.5	11.30	2.32
5.0	10.77	1.79
6.0	10.30	1.32
7.0	10.08	1.10
8.0	9.79	.81
10.0	9.58	.60
12.0	9.40	.42
14.0	9.30	.32
16.0	9.22	.24
18.0	9.17	.19
20.0	9.11	.13

STATIC WATER LEVEL
8.98 FT

AR000519

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CLIENT ____ FILE NO. ____ BY ____

SUBJECT ____ Checked By ____

B-23A

TEST METHOD - RISING HEAD TEST USING A POPPER, AND A PUMP TO LOWER THE WATER LEVEL

INITIAL WATER LEVEL - 8.98'

TIME	ADJUSTED READING	h
.5	19.4	10.42
1.0	17.1	8.12
1.5	15.95	6.97
2.0	14.87	5.89
2.5	13.95	4.97
3.0	13.26	4.28
3.5	12.14	3.16
4.5	11.30	2.32
5.0	10.77	1.79
6.0	10.30	1.32
7.0	10.08	1.1
8.0	9.79	.81
10.0	9.58	.6
12.0	9.40	.42
14.0	9.30	.32
16.0	9.22	.24
18.0	9.17	.19
20.0	9.11	.13

$R = .156 \quad L_3 = 9.5 \quad T_1 = 1 \quad T_2 = 5$

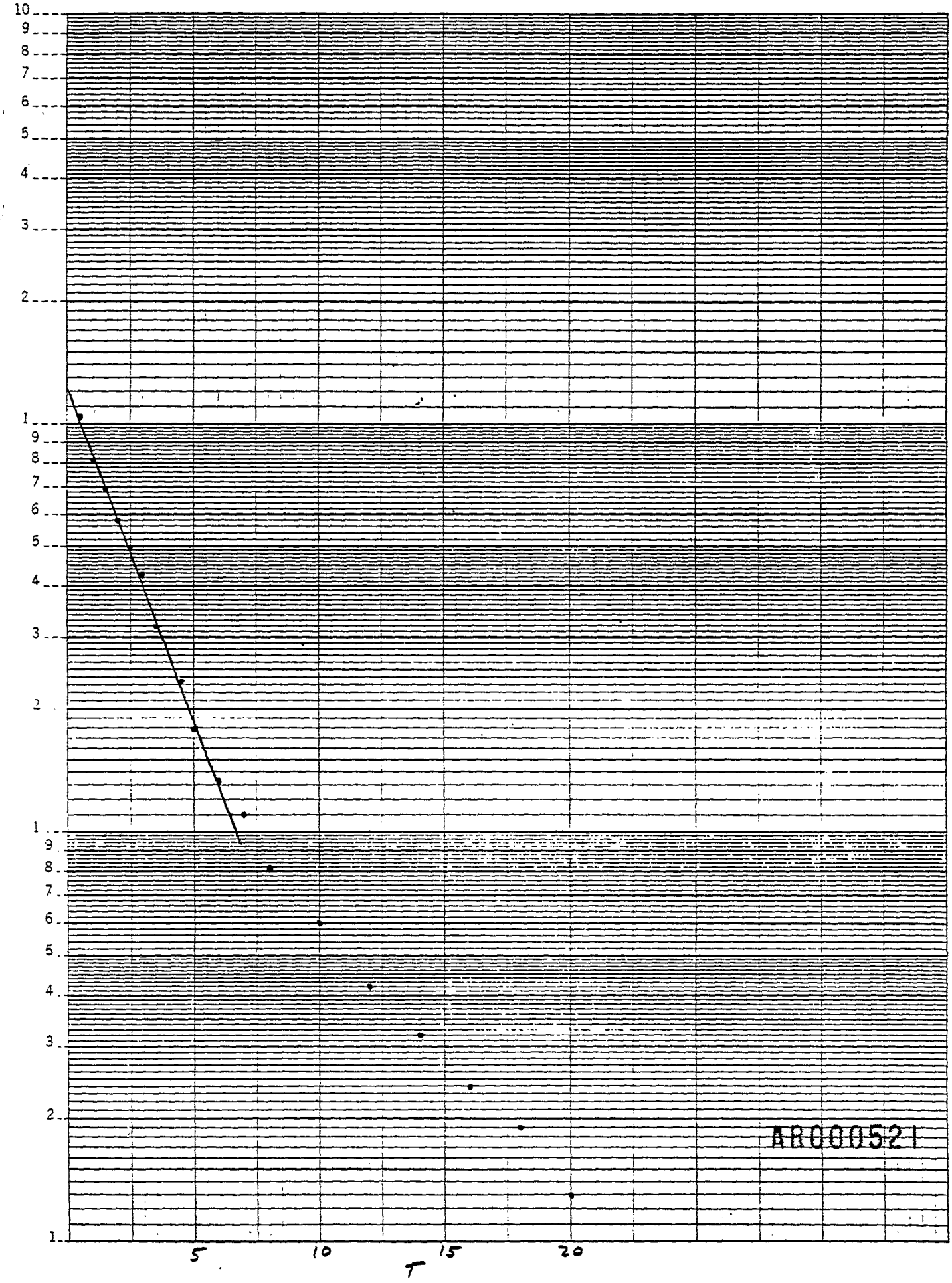
$h_1 = 8.12 \quad h_2 = 1.79$

$$K = \frac{R^2 \ln(R_0/R)}{2L_3(T_2 - T_1)} \ln\left(\frac{h_1}{h_2}\right)$$

$$= \frac{.156^2(5.298)}{2(9.5)(4)}(1.51)$$

$= .00256$ ft/min.

$= 1.3 \times 10^{-3}$ cm/sec.



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SUBJECT ____ Checked By ____

WELL NO. 23B

INITIAL WATER LEVEL - 8.40

TEST METHOD - RISING HEAD USING A POPPER, AND A PUMP TO LOWER WATER LEVEL

TIME	ADJUSTED READING	Y
.5	19.40	11.0
1.0	18.41	10.01
2.0	17.97	9.57
2.5	17.30	8.9
3.0	17.08	8.68
3.5	16.60	8.2
4.0	16.27	7.87
4.5	15.85	7.45
5.0	15.49	7.09
6.0	14.95	6.55
7.0	14.20	5.8
8.0	13.55	5.15
10.0	13.05	4.65
12.0	12.12	3.72
14.0	11.19	2.79
16.0	10.46	2.06
18.0	9.97	1.57
20.0	9.56	1.16

$r_c = .156$ $r_w = .417$ $L_e = 13.5$

$L_w = 14.11$ $H = 14.11$ $t = 5$ $y_t = 7.09$ $y_o = 12.0$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

$$= \frac{.0243(1.40)}{27} \frac{1}{5} (.526)$$

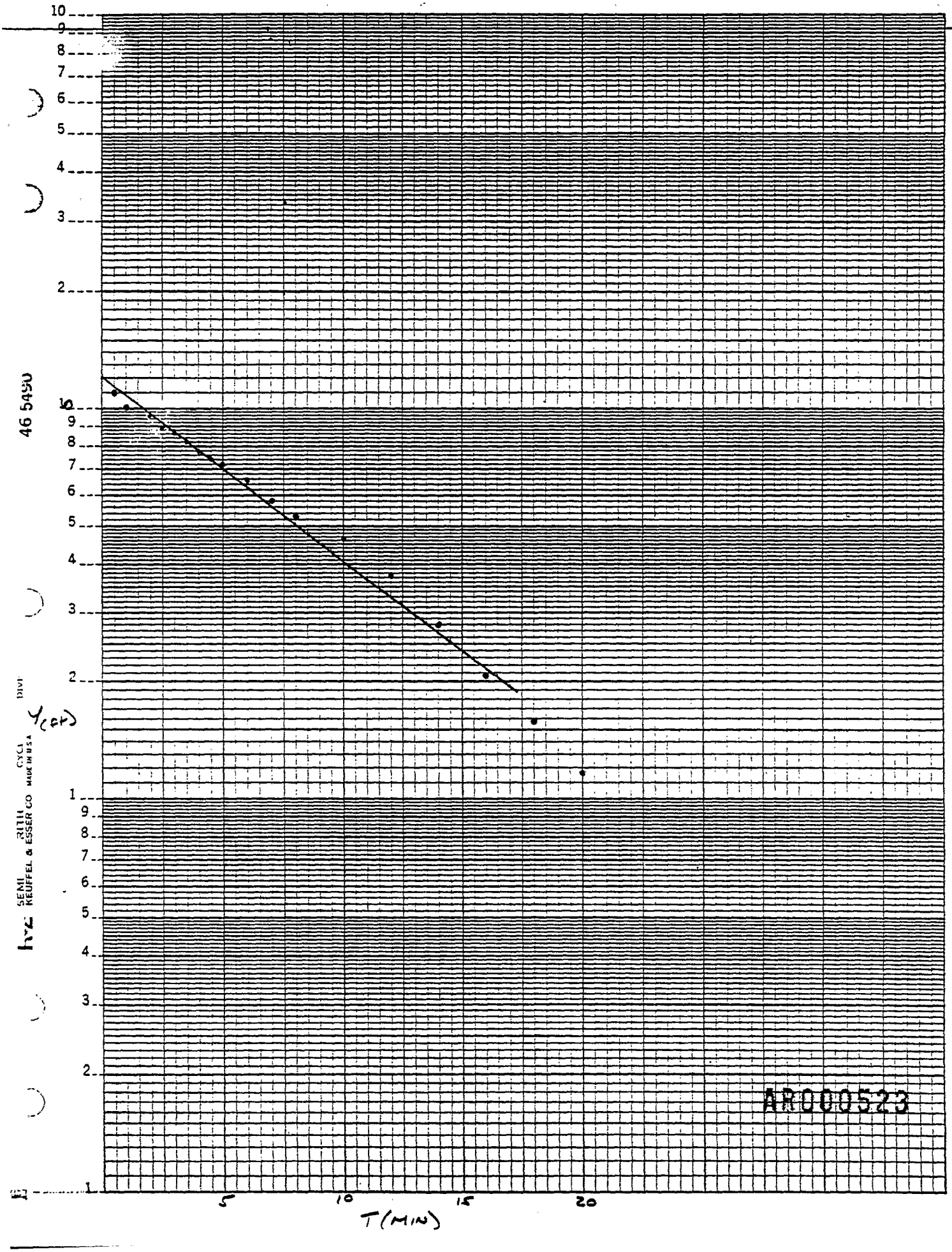
$= .00013$ ft/min.

$= 7.0 \times 10^{-5}$ cm/sec.

$$\ln(R_e/r_w) = \frac{1}{\frac{1.1}{\ln(L_w/r_w)} + \frac{C}{L_e r_w}} = \frac{1}{\frac{1.1}{3.52} + \frac{2.25}{5.63}} =$$

$$\frac{1}{.313 + .40} = 1.40$$

AR000522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KEUFFEL & ESSER CO
AR000523

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CLIENT ____ FILE NO. ____ BY ____

SUBJECT ____ Checked By ____

WELL NO. 24A TEST METHOD - RISING HEAD TEST- PUMP + POPPER

INITIAL WATER LEVEL -5.4'

TIME	ADJUSTED READING	Y
.5	19.35	13.95
1.0	18.52	13.12
1.5	17.75	12.35
2.0	17.03	11.63
2.5	16.40	11.0
3.0	15.77	10.37
3.5	15.16	9.76
4.0	14.57	9.17
4.5	14.00	8.6
5.0	13.44	8.04
6.0	12.53	7.13
7.0	11.64	6.24
8.0	10.76	5.36
10.0	10.06	4.66
12.0	8.88	3.48
14.0	7.94	2.54
16.0	7.24	1.84
18.0	6.54	1.14
20.0	6.18	.78

$r_c = .156$ $r_w = .417$ $L_w = 20.44$

$H = 20.44$ $L_e = 6.0$ $y_o = 15.0$

$t = 8$ $y_t = 5.36$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln\left(\frac{y_o}{y_t}\right)$$

$$= \frac{.0243(1.13)}{12} \frac{1}{8} (1.03)$$

$= .000295$ ft/min

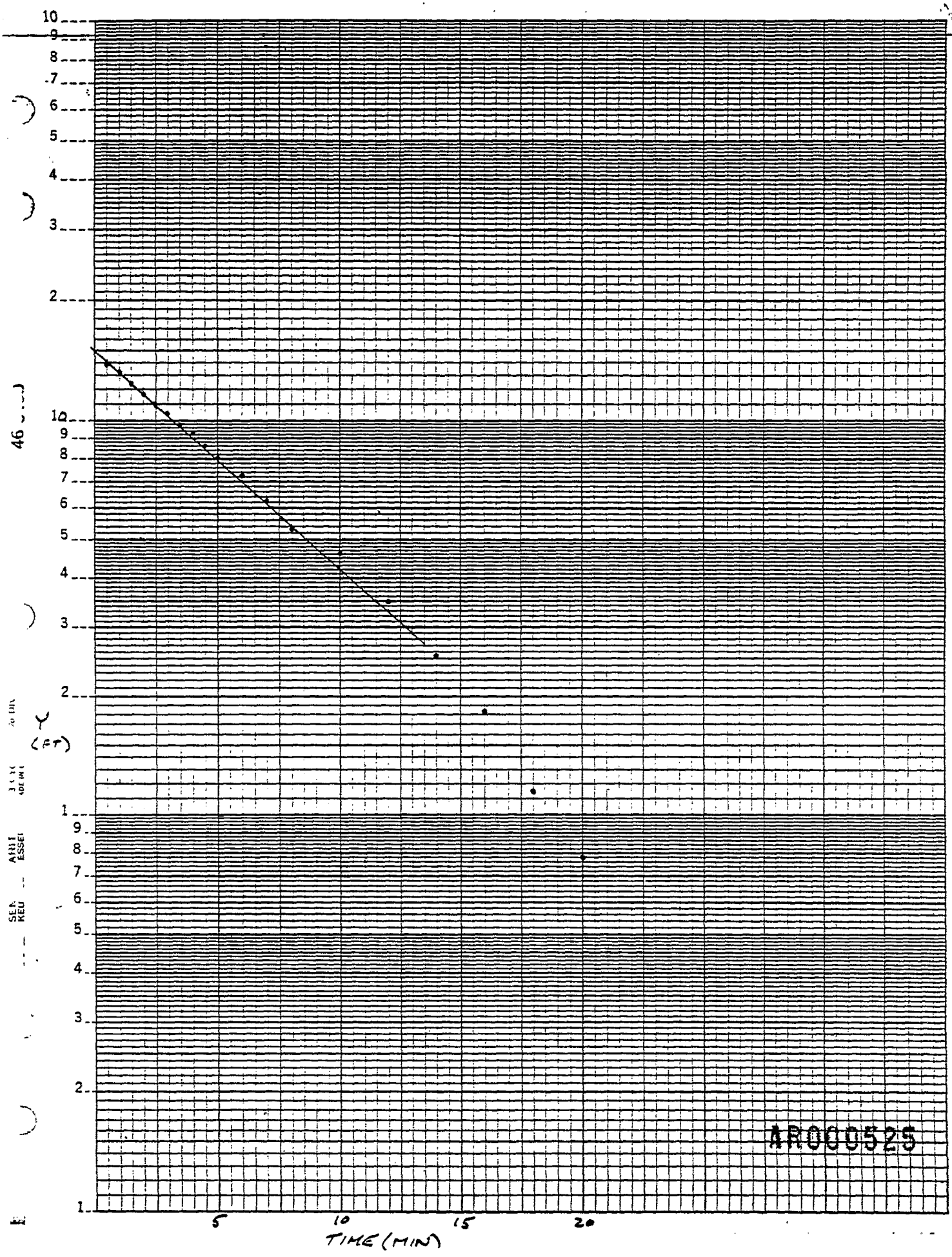
$= 1.5 \times 10^{-4}$ cm/sec.

$$\ln(R_e/r_w) = \frac{1}{\frac{1.1}{\ln(L_w/r_w)} + \frac{C}{(L_e r_w)}} = \frac{1}{\frac{1.1}{3.89} + \frac{1.5}{2.5}} =$$

$$= \frac{1}{.283 + .6}$$

$= 1.13$

AR000524



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CLIENT ____ FILE NO. ____ BY ____

SUBJECT ____ Checked By ____

WELL NO. 25A

TEST METHOD - RISING HEAD
PUMP + POPPER

INITIAL WATER LEVEL - 12.59

TIME	ADJUSTED READING	h
.5	21.78	9.19
1.0	20.11	7.52
1.5	19.07	6.48
2.25	18.20	5.61
3.0	17.70	5.11
4.0	17.28	4.69
5.0	17.05	4.46
6.5	16.8	4.21
8.0	16.7	4.11
10.0	16.53	3.94
12.0	16.39	3.8
15.0	16.34	3.75
20.0	16.20	3.61

$R = .156$ $L = 7.5$ $t_1 = .5$ $t_2 = 1.5$

$h_1 = 9.19$ $h_2 = 6.48$

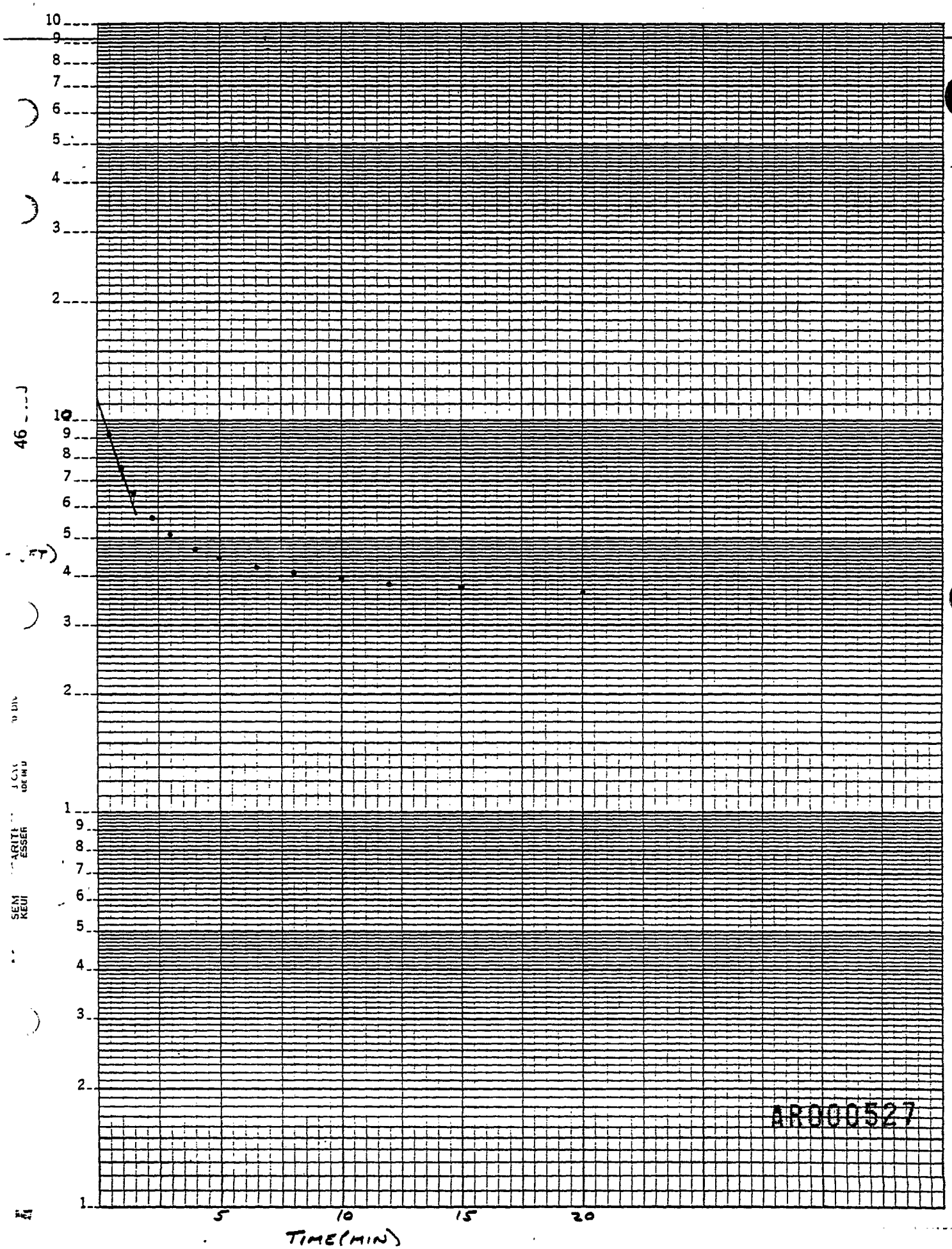
$$K = \frac{R^2}{2L(t_2 - t_1)} \ln\left(\frac{L}{R}\right) \ln\left(\frac{h_1}{h_2}\right)$$

$$= \frac{.0243}{15} (3.87)(.35)$$

$= .00219$ ft/min

$= 1.1 \times 10^{-3}$ cm/sec.

AR000526



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SUBJECT ____ Checked By ____

WELL NO. 25B — TEST METHOD - RISING HEAD

INITIAL WATER LEVEL - 12.48' — POPPER + PUMP

TIME	ADJUSTED READINGS	Y
.5	12.8	.32
1.0	12.63	.15
1.5	12.55	.07
2.25	12.5	.02
3.0	12.5	.02

$L_w = 7.27'$ $L_e = 7.27'$ $H = 16.52'$

$r_c = .156'$ $r_w = .417'$ $Y_o = .64$

$t = 1.5$ $Y_t = .07$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{Y_o}{Y_t}$$

$$= \frac{.156^2(1.63)}{14.54} \frac{1}{1.5} \ln\left(\frac{.64}{.07}\right)$$

$$= .00403 \text{ ft/min.}$$

$$= 2.1 \times 10^{-3} \text{ cm/sec.}$$

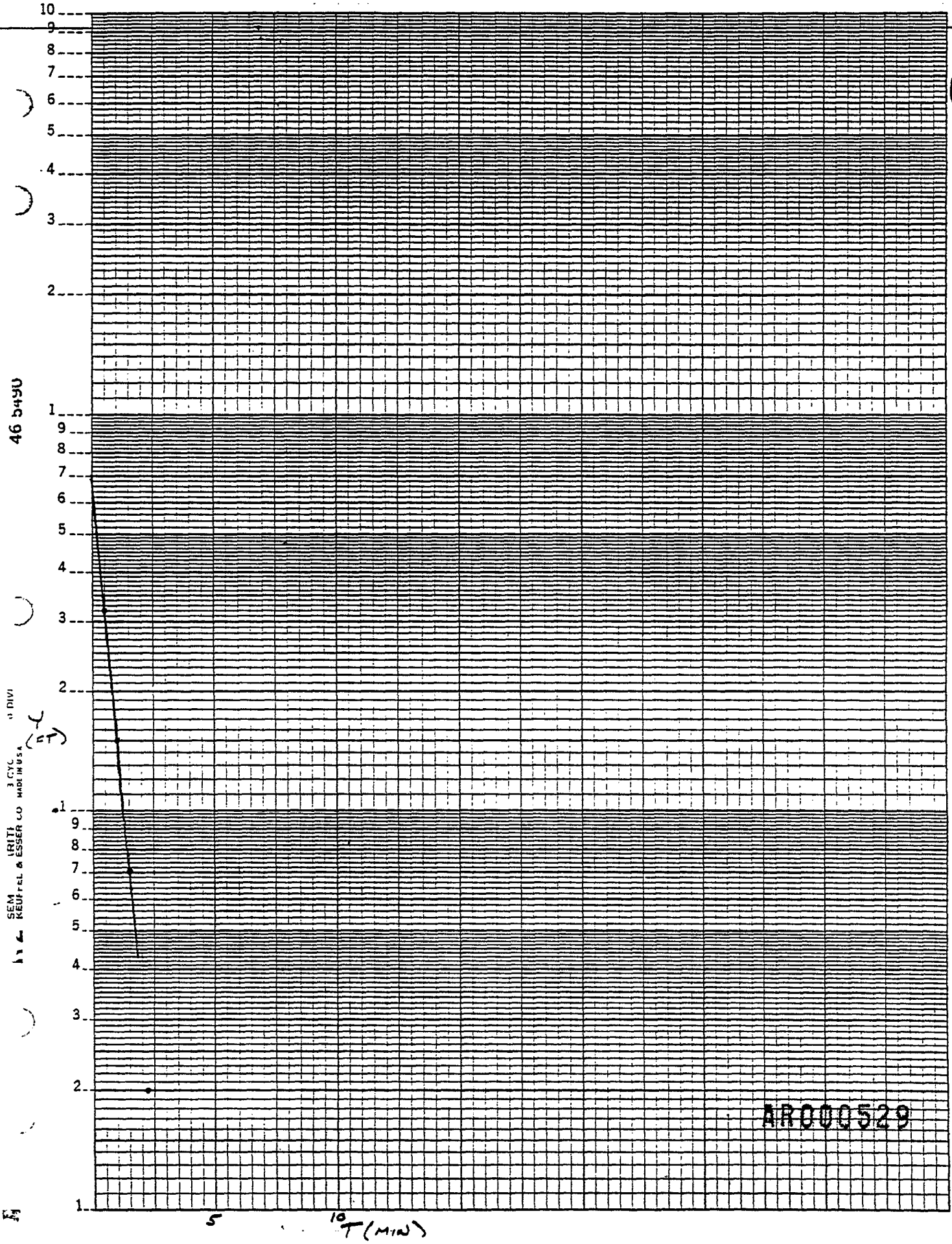
$$\ln(R_e/r_w) = \frac{1.1}{\ln(L_w/r_w)} + \frac{A + B \ln((H-L_w)/r_w)}{L_e/r_w}$$

$$= \frac{1}{\frac{1.1}{2.96} + \frac{2.1 + .6(3.099)}{17.43}}$$

$$= \frac{1}{.612}$$

$$= 1.63$$

AR000528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APPENDIX E

TEST PIT LOGS

APPENDIX E
TEST PIT LOGS
MILLCREEK SITE

TEST PIT #1 9/18/84

0.9'-8.0'-

- Black sand, gravel, and cobbles-Foundry Sand, with few metal scraps
- Drums filled with foundry waste found @ 3.0, 3.25, 6.0
- Sample taken @ 7.0, MC-TP-001, 3 jars
- OVA Readings to 40 ppm

8.0'-9.5'

- Gray sandy silt, trace clay-natural soil

TD 10.5'

TEST PIT #2 9/18/84

0.0'-3.0'

- Black silty sand, trace gravel, trace cobbles, with construction debris
- Mixture of foundry sand, natural fill, & debris (metal bands, timbers)
- OVA Reading @ 3.0' - 20 ppm

3.0'-10.5'

- Black silty sand, with construction debris - foundry sand and debris
- Drum with foundry waste found at 3.5'

- Oily odor common
- Sample taken @ 8.0, MC-TP-002, 3 jars

TD 10.5'

- Stopped excavation due to elevated OVA readings in the breathing zone - did not reach natural ground

TEST PIT #3 9/18/84

0.0'-10.0

- Brown and black sand, gravel, and cobbles - foundry sand
- Pit contained few light brown chunks of sand (molds) up to 10" in diameter, and some debris (metal bands, garbage), especially @ 8.5'
- Drum with foundry waste found @ 9.0', with OVA reading of 50 ppm
- Sample taken at 9.0', MC-TP-003, 3 jars

TD.10.0'

- Pit discontinued due to elevated OVA readings in the breathing zone, without reaching natural ground.

TEST PIT #4 9/18/84

0.0'-14.5'

- Brown and black sand, some gravel and cobbles and construction debris-foundry sand
- High OVA readings @ 2.0' (100 ppm)
- Garbage zone from 2.5'-3.5'
- Sample taken @ 3.0', MC-TP-004, 3 Jars
- Natural soil (fill) from 3.5'-6.5'
- Wood scraps common from 6.5' down
- Noticeable organic odor throughout digging, low OVA readings at greater depths

14.5'-15.0'

- Gray silty clay, some sand, trace gravel-natural soil

TD 15.0

TEST PIT #4A 9/18/84

0.0'-4.5'

- Brown and black sand, some gravel-foundry sand.
- OVA readings up to 400 ppm in the depth range of 2.5'-4.5'

TD. 4.5'

- Stopped pit after finding shallow zone of high organic readings

TEST PIT #5 9/18/84

0.0'-5.0'

- Brown and black sand, some gravel-foundry sand
- Some garbage and construction debris mixed in
- OVA readings over 1000 ppm at 3.25'
- Sample taken at 3.25;, MC-TP-005, 3 jars

T.D.5.0'

- Stopped pit below zone of high organic readings

TEST PIT #6 9/18/84

0.0'-11.5'

- Black sand, some gravel, trace cobbles-foundry sand
- Lumber fragments mixed in with fill
- OVA readings to about 100 ppm, hydrocarbon odor

11.5'-12.0'

- Gray mottled clay, some silt-natural soil
- Sample taken at 11.5; MC-TP-006, 3 jars

T.D. 12.0'

TEST PIT #7 9/18/84

0.0'-1.0'

- Brown sand - foundry sand

1.0'-3.4'

- Black oily sludge, strong odor, sample taken at 2.5', MC-TP-007, 3 jars

3.4'-4.0'

- Gray silty very fine sand-natural soil

T.D. 4.0'

TEST PIT #8 9/19/84

0.0'-4.5'

- Black sand, some gravel-Foundry sand
- Construction debris and garbage mixed throughout the fill
- High OVA readings, >1000 ppm
- Sample taken at 1.3', MC-TP-008, 3 jars

T.D. 4.5'

- Pit discontinued due to high OVA readings

TEST PIT #8A 9/19/84

0.0'-3.0'

- Black sand, some gravel-Foundry sand, with construction debris mixed in
- Drum filled with foundry wastes found at 2.0'

T.D. 3.0'

- Pit discontinued due to high (>1000 ppm) OVA readings

TEST PIT #9 9/19/84

0.0'-11.0'

- Black silty sand, some gravel-Foundry sand
- Construction debris and gravel mixed in
- Pocket of blue slag at 2.0'
- Occasional slag drums found throughout the fill from 2.5' down
- Sample taken at 2.5, MC-TP-009, 3 jars

11.0'-11.5'

- Gray mottled silt, some clay, some sand-natural soil
- Groundwater at 11.0'

T.D. 11.5'

TEST PIT #10 9/19/84

0.0'-4.5'

- Black sand, some gravel-foundry sand, with some construction debris mixed in (wood, steel bars, etc.)
- High OVA readings, especially between 1.0'-2.0' (>1000 ppm)
- Sample taken from 1.0-2.0' interval, MC-TP-010, 3 jars

T.D.4.5'

- Pit discontinued as nearby pit (T.P. #9) reached natural ground

TEST PIT # 10A 9/19/84

0.0'-9.0'

- Black sand, some gravel-foundry sand, with construction debris and a few slag drums mixed in.
- Hydrocarbon odor common
- Water at 7.3'

9.0'-9.75'

- Gray mottled silty sand, trace clay-natural soil

T.D.9.75'

TEST PIT #11 9/19/84

0.0--6.5'

- Brown and black sand, some gravel-foundry sand, with some construction debris (bricks, wood, pipe, metal bands)
- Sample taken at 2.0; MC-TP-011, 3 jars (Duplicate also taken, MC-TP-011A)
- Few slag drums found within fill

T.D.6.5'

- Pit discontinued due to difficult digging conditions

TEST PIT #12 9/19/84

0.0'-7.5'

- Black sand, some gravel-foundry sand, with a few slag drums and construction debris mixed in.
- OVA readings up to 200 ppm
- Sample taken at 2.5'; MC-TP-12, 3 jars
- Groundwater encountered at 6.25'

7.5'-8.0'

- Gray mottled sandy silt, trace clay-natural soil

T.D.8.0'

TEST PIT #13 9/19/84

0.0'-5.0'

- Black and brown sand, trace gravel-foundry sand, with buried brush and garbage; OVA readings up to 200 ppm near surface.
- Sample taken at 1.0', MC-TP-013, 3 jars
- Patch of white powdery material at 2.5'
- Groundwater at 4.5'

5.0'-6.0'

- Gray and yellow-green mottled silty clay, trace sand-natural soil

T.D. 6.0'

TEST PIT #14 9/19/84

0.0'-5.5'

- Black silty sand, some gravel-foundry sand, with a few slag barrels mixed in.
- OVA readings up to >1000 ppm, typically 50 ppm - hydrocarbon odor.
- Sample taken at 1.5', MC-TP-015, 3 jars

5.5'-6.0'

- Gray mottled sandy silt, trace clay-natural soil

T.D.6.0'

TEST PIT #15 9/19/84

0.0'-5.0'

- Bricks, slag chunks, foundry sand-demolition debris
- Very hard digging
- Groundwater at 4.2'

5.0'-5.7'

- Gray sandy silt, some clay-natural ground
- Sample taken at 5.0', MC-TP-015, 3 jars

T.D.5.7'

TEST PIT #16 9/20/84

0.0'–6.0'

- Brown and black sand, some gravel and cobbles–foundry sand
- Sample taken at 5.5', MC–TP–016, 3 jars

6.0'–6.5'

- Gray mottled silt, some clay, trace sand–natural soil

T.D.6.5'

TEST PIT #17 9/20/84

0.0'–5.5'

- Brown and black sand, some gravel and cobbles
- foundry sand, with a few wood scraps and slag barrels mixed in
- Samples taken at 4.5; MC–TP–017, 3 jars

5.5'–6.0'

- Gray mottled silt, trace clay, trace sand–natural soil

T.D.6.0'

TEST PIT #18 9/20/84

0.0'–4.6'

- Brown and black sand, some gravel–foundry sand
- Small pockets (1–2' diameter) of orange–red soil

- No OVA readings above background
- Sample taken at 4.3', MC-TP-018, 3 jars

4.6'-5.0'

- Stiff gray clay, natural soil

T.D.5.0'