JUDITH L. HAMILTON
Consulting Geologist and Engineer
GROUND-WATER AND ENGINEERING GEOLOGY
2220 Julian Street • Denver, Colorado • 80211 • (303) 455-4354

August 31, 1977

Mr. Al Stoick
Nuclear Dynamics, Inc.
200 S. Lowell
Casper, Wyoming 82601

Dear Al:

Enclosed is my report on the hydrogeologic conditions in the vicinity of your proposed in-situ leaching site near Oshoto, Wyoming. This report gives the information required by the Wyoming Department of Environmental Quality and describes the 72-hour pumping test.

A copy of Plate I is enclosed. You might want to check the ground surface elevation contour lines or the elevation of hole 797V as there appears to be a discrepancy. The hole is located between contour lines 4198 and 4200 but the ground surface elevation as given on the cross section is 4195.7. Plates II and III are your cross section of holes and your table of hole construction information.

If you have any questions or need additional information for this report, please let me know.

Sincerely,

Judy Hamilton

Judith L. Hamilton

cc; Tom Melrose

JUDITH L. HAMILTON
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HYDROLOGIC INFORMATION
VICINITY PROPOSED IN-SITU
URANIUM LEACHING SITE
OSHOTO, WYOMING

August 30, 1977

SUMMARY

Items 6a thru 6f of Supportive Information Handout, Wyoming DEQ, March 18, 1977:

6a. Piezometric surface (see Plate I)

Sand zone A (aquifer overlying production aquifer) - elevation 4127 to 4130 feet.

Sand zone B (production aquifer) - elev. 4082 to 4087 feet.

6b. Transmissivity - sand zone B: 126.1 to 172.1 gallons per day per foot based on 72-hour pumping test.

6c. Hydraulic conductivity (permeability) - 1.06 to 1.39 gallons per day per square foot based on 72-hour pumping test.

6d. Porosity of production zone - 19.6% to 37.8% in production zone aquifer (sand zone B); 19.6% to 28.6% in mineralized zone, based on core analyses for hole 477V (see Table 1).

6e. Water level conditions of aquifers

Sand zone A (below depth of 240-250 feet) - head approximately 160 to 185 feet above top of aquifer A (static water level 58 to 77 feet below ground surface).

Sand zone B - head 332 to 334 feet above top of aquifer (static water level 102 to 116 feet below ground surface).

Head in sand zone A approximately 45 feet above head in sand zone B.

Upper sand zone (0 to 100 feet)- water table conditions; water levels 36 to 80 feet below ground surface.

6f. Degree of hydraulic connection between aquifers - no leakage between sand zone A and sand zone B.

DESCRIPTION OF FIELD TESTS

Aquifer parameters for the vicinity of the proposed in-situ uranium leaching test site were determined from a 72-hour pumping test on a well constructed in the production zone aquifer (sand zone B) and from water level measurements in three observation holes in the same aquifer, located at distances of 53.7 to 94.0 feet from the pumped well. In addition, water level measurements were made before, during and after pumping tests, in four holes terminating above the production zone aquifer and separated from it by a clay-shale layer about ten feet thick. Water levels in a third set of 4 holes, 100 feet deep each, were also observed before, during and after pumping of the well.

Construction details of the well (hole 789V) and the observation holes are shown on Plates II and III.

The 72-hour pumping tests was begun at 11:45 A.M. Monday, August 1, 1977. A 7½ HP Flint and Walling 3-phase, 460-volt pump, type 75FF18 was used, with an intake depth of 404 feet. Static water level in the well as measured with electrical-type water level probe was 112.8 feet below ground surface and as measured with the air line was 111.9 feet below surface.

The well was pumped at an average rate of 10.04 gallons per minute (gpm), with a general range in rate from 9.9 to 10.1 gpm. Occasional short-term decreases or increases occurred. Rate of water flow was determined periodically by observation of the water flow meter rate and readings. A valve permitted adjustment to maintain the rate as close to 10 gpm as possible. Water levels in the well were measured

with both the electrical probe and the air line for 300 minutes, at which time the probe caught in the pump cable and could no longer be used. Water levels in the observation holes were measured with electrical probes.

Data on the test for the well and holes 788V, 791V and 797V are given in Appendix A-1. Water level observations for holes 3V, 5V and 9V (perforated about 250 to 450 feet and cemented above), hole 1067 (cemented to 241 feet, open hole 241 to 451 feet) and for 100-foot holes 790V, 797V, 795V, and 796V are given in Appendix A-2.

DETERMINATION OF AQUIFER PARAMETERS

Piezometric surface of production area aquifers. Water level elevations were determined by subtracting the depth of water below ground surface from the elevation of the ground at that point as determined by surveying. Contours for sand zone A (aquifer above the production zone) and sand zone B (production zone aquifer) are shown on Plate I. Since the points used in drawing the contours are close together and the differences in water level elevations are small, these contour lines may not be completely representative of regional water flow.

Transmissivity and storage coefficient. Results of the 72-hour test were analysed by the Jacob method for the well and by both the Jacob method and the Theis non-equilibrium method for the observation holes, to obtain transmissivities and storage coefficients. Plots for the well (787V) are shown on Figure 1, and for observation holes 788V on Figures 2 and 3, 791V on Figures 4 and 5 and 797V on Figures 6 and 7. A distance-drawdown curve is shown

on Figure 8. Results obtained for the different holes and methods are given below:

				Well 789V	Observation holes 788V	791V	797V	Distance-DD curve
T gpd/ft	Jacob Method	Pumping	probe	125.0*	172.1	162.6	140.2	169.9
			air line	121.6				
		Recovery		138.1	160.6	164.6	132.5	
	Theis Method				143.8	158.9	125.9	
S	Jacob Method	Pumping			.000062	.000096	.00020	.000078
		Recovery			.000058	.00010	.00019	
	Theis Method				.000085	.000099	.00024	

* 300 minutes only

Parameters derived by the Theis formula were obtained by matching to the standard W(u) vs. u curve for a non-leaky aquifer with a fully penetrating well and constant discharge (see Appendix A-3 for copies of these standard curves from Walton, Figure 4.2 and Table 3.1 and Todd, Figure 4.9). Graphs were plotted by Todd's methood (s vs. r^2/t) rather than Walton's (s vs. t) for comparison to a W(u) vs. u rather than 1/u standard curve.

Hydraulic conductivity (permeability). Permeabilities were obtained by dividing the transmissivity obtained in each hole by the aquifer thickness for that hole. Aquifer thickness was taken as the distance between the bottom of the shale layer above which the hole was cemented and the top of the Pierre shale. Results are shown below:

Hole No.	Transmissivity gpd/ft.	Aquifer thickness ft.	Permeability gpd/ft^2
788V	143.8[a]	121	1.19
789V (well)	138.1[b]	118	1.17
791V	158.9[a]	114[c]	1.39
797V	125.9[a]	119	1.06

[a]based on 72-hour test, using Theis method
[b]based on 72-hour test, using Jacob method (recovery)
[c]bottom 10 ft. above top of Pierre shale

Porosity of the production zone. Porosity analyses were made by Core Laboratories, Inc. on cores from the production aquifer from hole 477V. This hole is located 162 feet east of the well 789V (see Plate III for location). Results of the analyses are shown on Table 1.

Artesian or non-artesian conditions of aquifers. Water level measurements indicate that water in sand zones A and B are well above the top of the aquifer, indicating artesian conditions. It is probable that water levels in the 100-foot deep holes represent local perched water tables because of the variations in depth.

Head in sand zones A and B was determined by subtracting the depth to water from the depth to the top of the aquifer. For zone B, the top of the aquifer was taken as the bottom of the shale zone above which the hole is cemented. For zone A, the top of the aquifer is taken as the bottom of the upper cement.

Degree of hydraulic connection between aquifers. The time-drawdown curves for observation holes 788V, 791V and 797V compare well in shape with the standard W(u) vs. u curve for a non-leaky artesian aquifer (see Appendix A-3). It was therefore determined that the aquifer was non-leaky. Had leakage occurred, curves corresponding to those shown in Walton, Figure 4.8 or 4.11, would have beeen obtained (see Appendix A-3 for copies of these curves). The lack of drawdown in holes 5V and 9V, which are separated from the tested aquifer by only a ten-foot layer of clay-shale, confirm the lack of leakage. The small amount of drawdown which occurred in hole 3V

is believed to be due to downward leakage around the cement seal when the pressure from zone B was reduced, rather than leakage thru the clay layer itself.

The water levels for sand zone A are probably a composite head for various sand layers in that zone since several thick clay-shale layers exist within the perforated zone. Since zone A is not hydrologically connected to the production zone, variations in head among the different layers would not be significant to the leaching program. The piezometric surface in sand zone A is considerably higher than in sand zone B (production aquifer), on the order of 45 feet. In the unlikely event that any leakage would occur, direction of flow under natural conditions would be downward from zone A to zone B.

Respectfullly submitted,

Judith L. Hamilton

Judith L. Hamilton, P.E.
Ground-water geologist

REFERENCES

Todd, David Keith, 1959. Ground Water Hydrology. John Wiley and Sons, 336 pages.

Walton, William C., 1970. Groundwater Resource Evaluation. McGraw-Hill, Inc. 664 pages

CL-611-B

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

DALLAS, TEXAS

Company NUCLEAR DYNAMICS Formation UNKNOWN Page 1 of 1

Well 477Y Cores UNKNOWN File RP-4-3943

Field UNKNOWN Drilling Fluid UNKNOWN Date Report 2-7-77

County UNKNOWN State UNKNOWN Elevation UNKNOWN Analysts KEN BOWEN

Location UNKNOWN Remarks

CORE ANALYSIS RESULTS

(Figures in parentheses refer to footnote remarks)

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS		POROSITY PERCENT	RESIDUAL SATURATION		PROBABLE PRODUCTION	REMARKS
		HORIZONTAL	VERTICAL		OIL % VOLUME % PORE	TOTAL WATER % PORE		
1.	482.5	1.5	.01	24.1				
2.	490.6	38	5.0	27.8				
3.	500.0	1934	1915	34.0				
4.	506.5	2253	1239	37.8				
5.	507.0	1971	184	35.6				
6.	508.0	317	161	32.8				
7.	511.0	3380	2160	36.2				
8.	517.0	3944	2892	28.6				Mineralized zone
9.	524.0	51	34	19.6				
10.	531.0	254	223	27.6				
11.	543.0	2629	2291	36.4				
12.	544.0	14	.90	29.8				
13.	557.0	1606	403	32.2				
14.	573.0	8.8	.01	25.9				

TABLE 1

NOTE:

(*) REFER TO ATTACHED LETTER.

(1) INCOMPLETE CORE RECOVERY—INTERPRETATION RESERVED.

(2) OFF LOCATION ANALYSES—NO INTERPRETATION OF RESULTS.

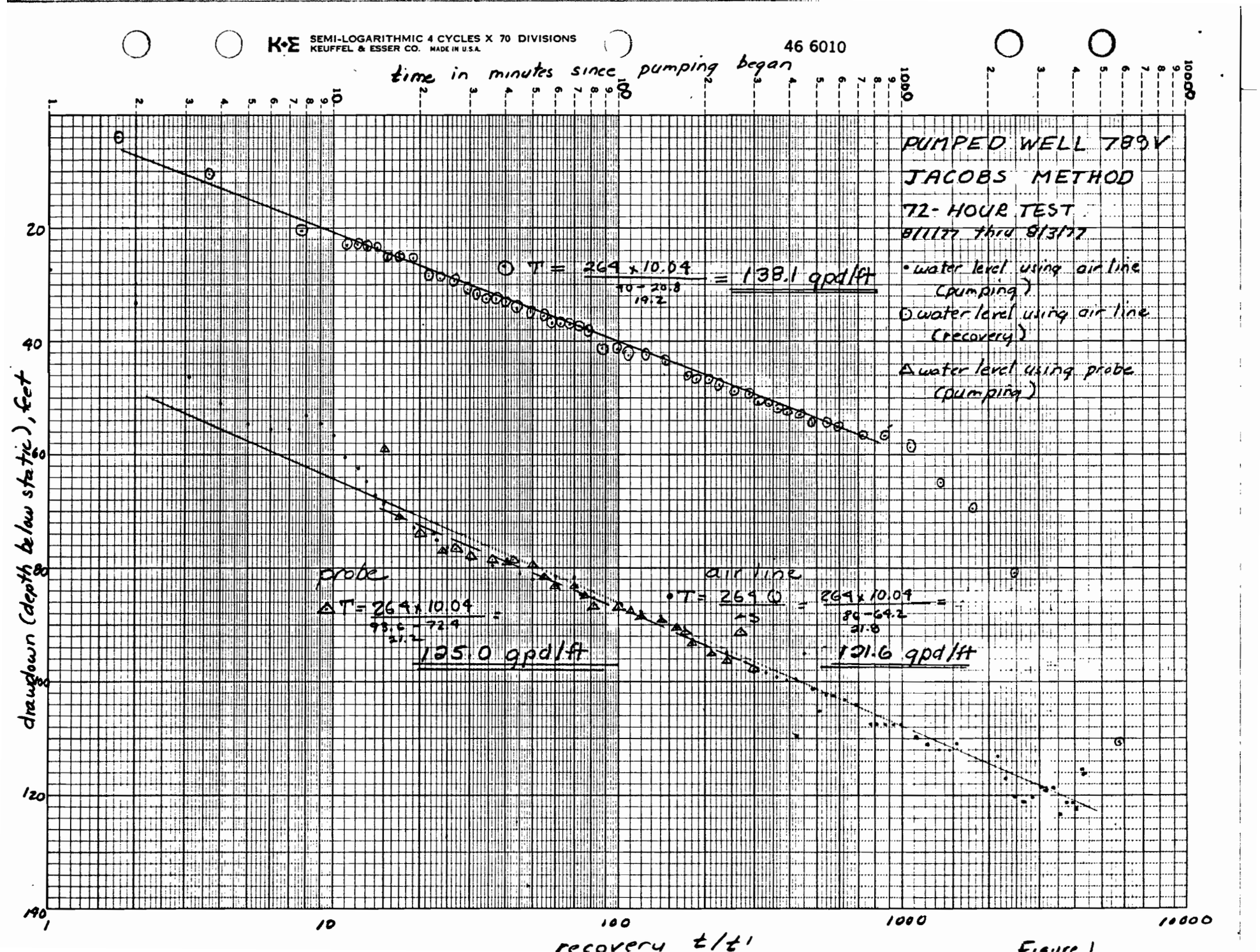

K•Σ SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010
time in minutes since pumping began
drawdown (depth below static), feet
recovery t/t'
PUMPED WELL 789V
JACOBS METHOD
72-HOUR TEST
8/11/77 thru 8/13/77
• water level using air line (pumping)
⊙ water level using air line (recovery)
Δ water level using probe (pumping)
⊙ T = 264 x 10.04 / 40 - 20.8 / 19.2 = 138.1 gpd/ft
probe
ΔT = 264 x 10.04 / 93.6 - 72.9 / 21.2 = 125.0 gpd/ft
air line
•T = 264 Q / s = 264 x 10.04 / 80 - 64.2 / 21.8 = 121.6 gpd/ft

Figure 1

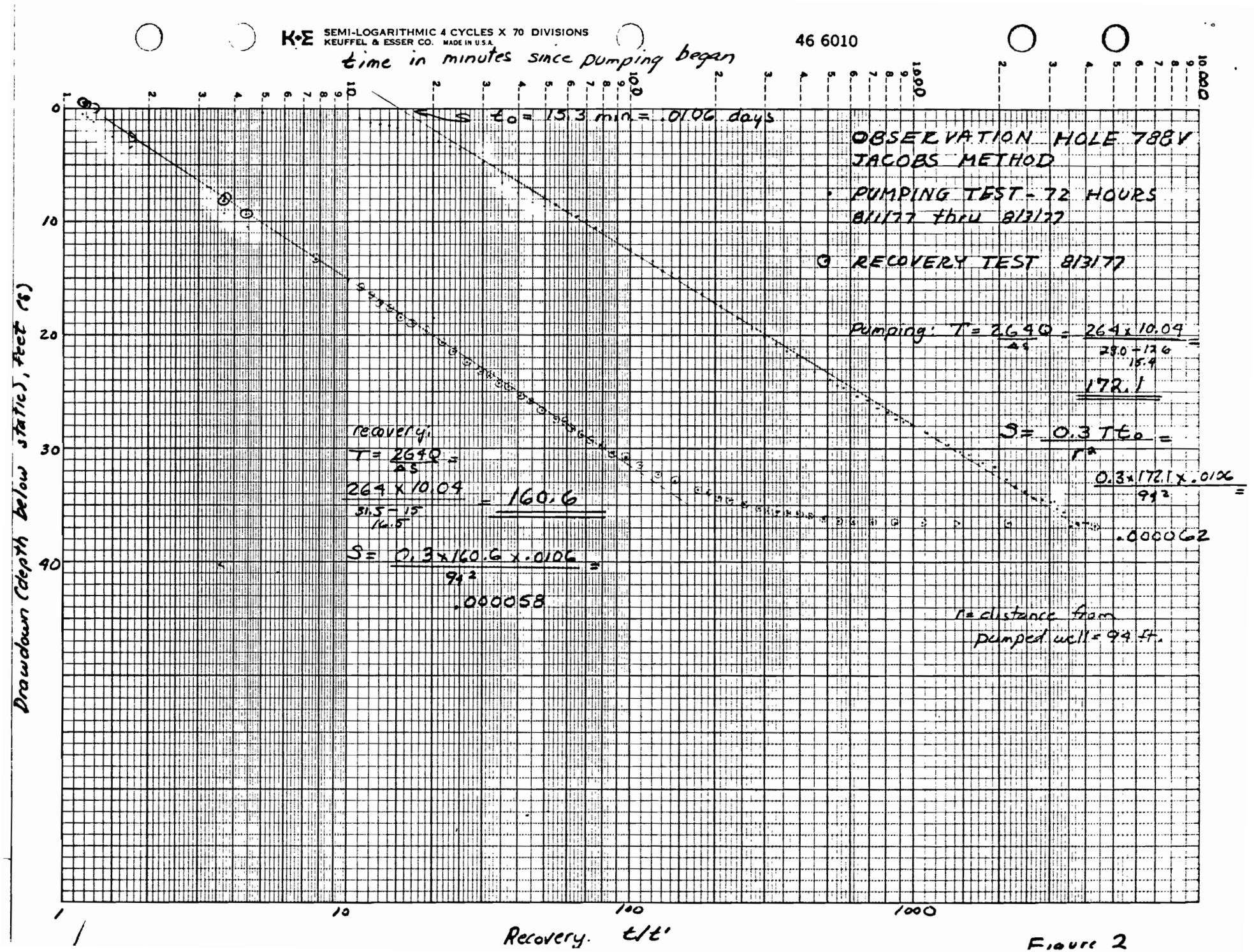
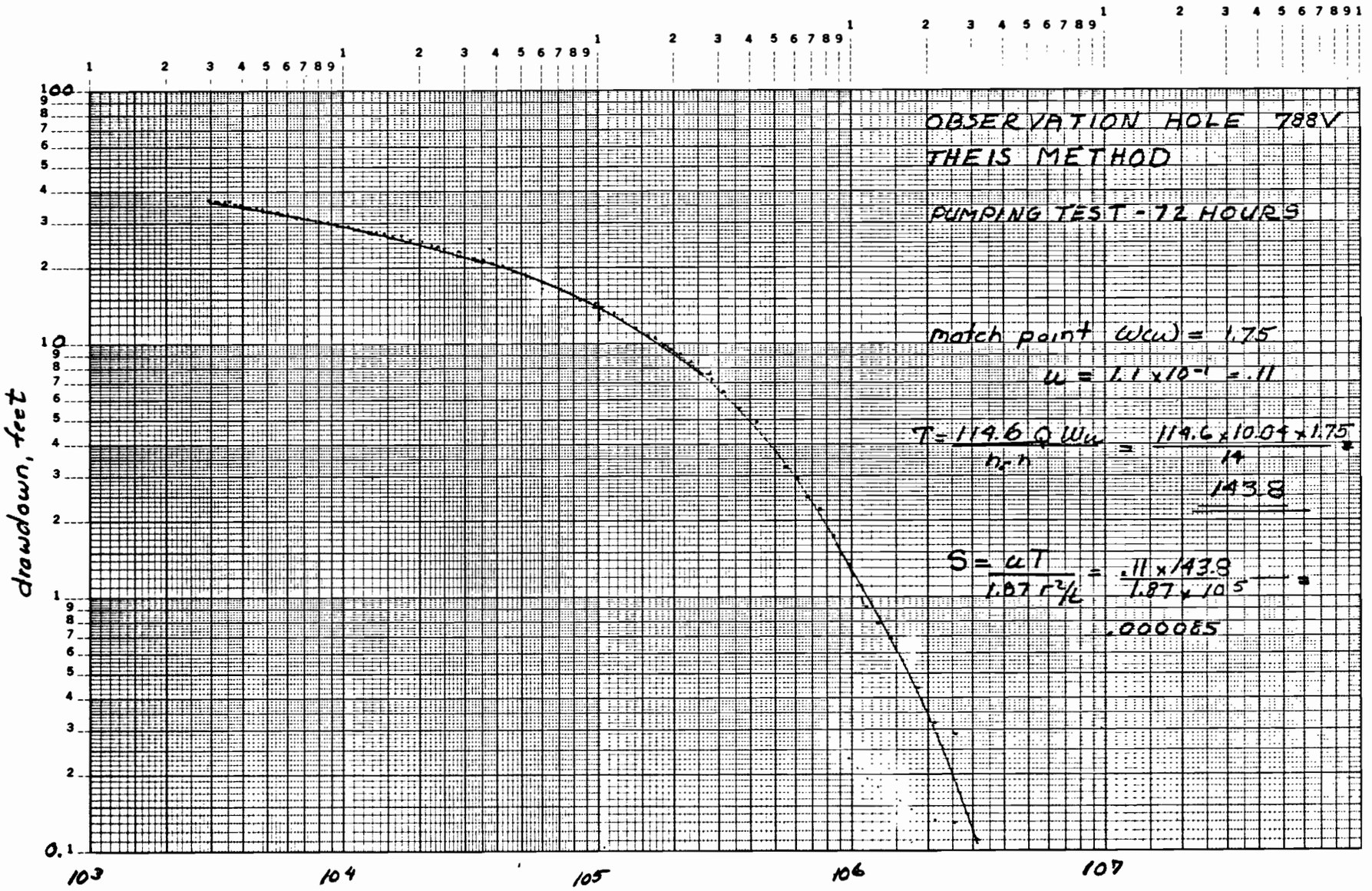

K•E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010
time in minutes since pumping began
Drawdown (depth below static), feet (s)
Recovery. t/t'
t_o = 153 min = .0106 days
OBSERVATION HOLE 788V
JACOBS METHOD
PUMPING TEST - 72 HOURS
8/1/77 thru 8/3/77
RECOVERY TEST 8/3/77
Pumping: $T = \frac{264Q}{\Delta s} = \frac{264 \times 10.09}{28.0 - 13.6} = \frac{264 \times 10.09}{15.4} =$
172.1
$S = \frac{0.3 T t_o}{r^2} = \frac{0.3 \times 172.1 \times .0106}{94^2} =$
.000062
r = distance from pumped well = 94 ft.
recovery:
$T = \frac{264Q}{\Delta s}$
$\frac{264 \times 10.09}{31.5 - 15} = \frac{264 \times 10.09}{16.5} = 160.6$
$S = \frac{0.3 \times 160.6 \times .0106}{94^2} =$
.000058

Figure 2



r = distance from pumped well; t = time in days since pumping began

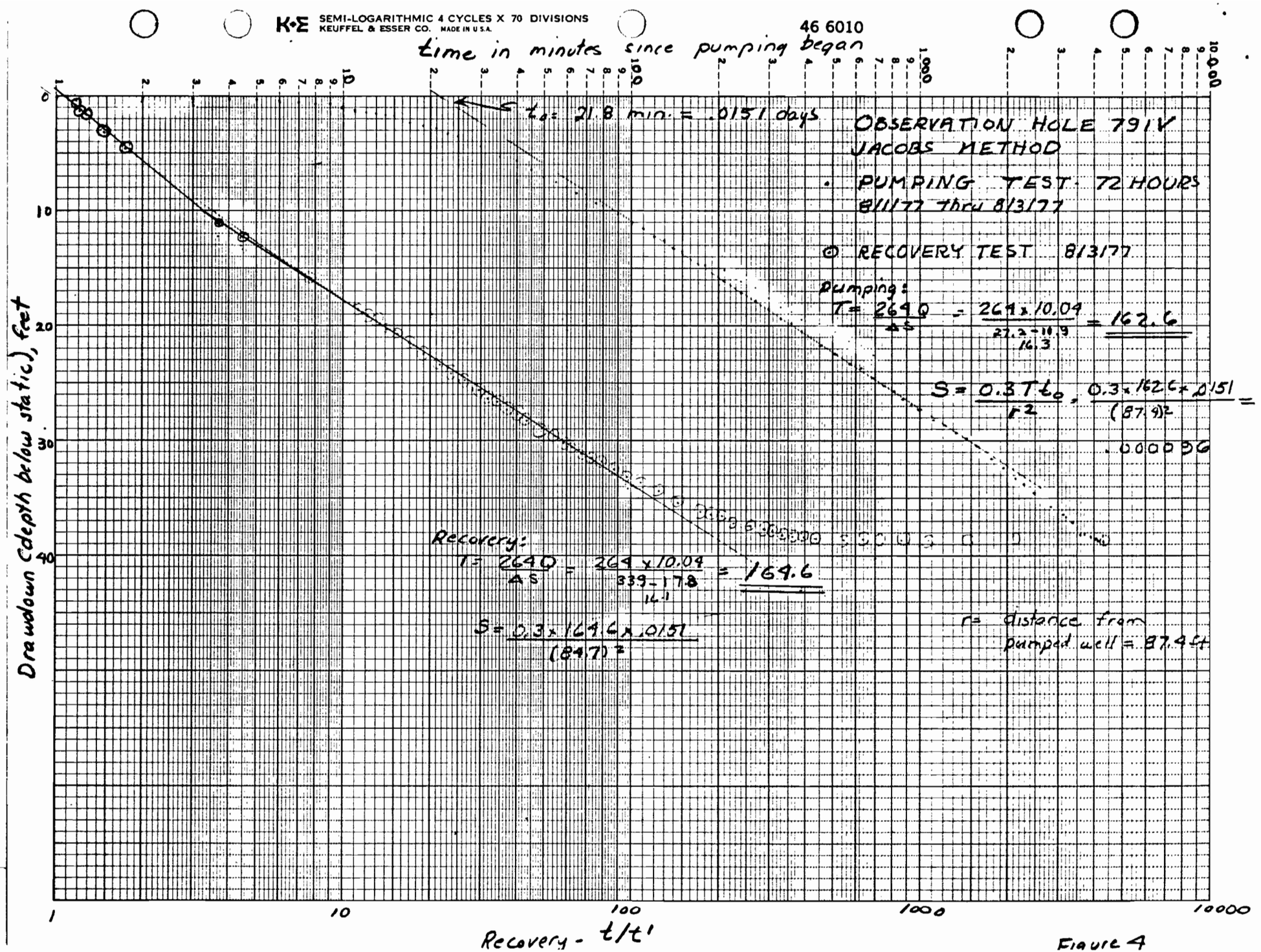

K•Σ SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010
time in minutes since pumping began
t_o = 21.8 min. = .0151 days
OBSERVATION HOLE 791V
JACOBS METHOD
PUMPING TEST 72 HOURS
8/1/77 thru 8/3/77
RECOVERY TEST 8/3/77
Pumping:
$T = \frac{264Q}{\Delta s} = \frac{264 \times 10.04}{\frac{27.2-10.9}{16.3}} = 162.6$
$S = \frac{0.3Tt_o}{r^2} = \frac{0.3 \times 162.6 \times .0151}{(87.4)^2} = .000056$
Recovery:
$T = \frac{264Q}{\Delta s} = \frac{264 \times 10.04}{\frac{339-178}{16.1}} = 164.6$
$S = \frac{0.3 \times 164.6 \times .0151}{(84.7)^2}$
r = distance from pumped well = 87.4 ft
Drawdown (depth below static), feet
Recovery - t/t'
1
10
100
1000
10000

Figure 4

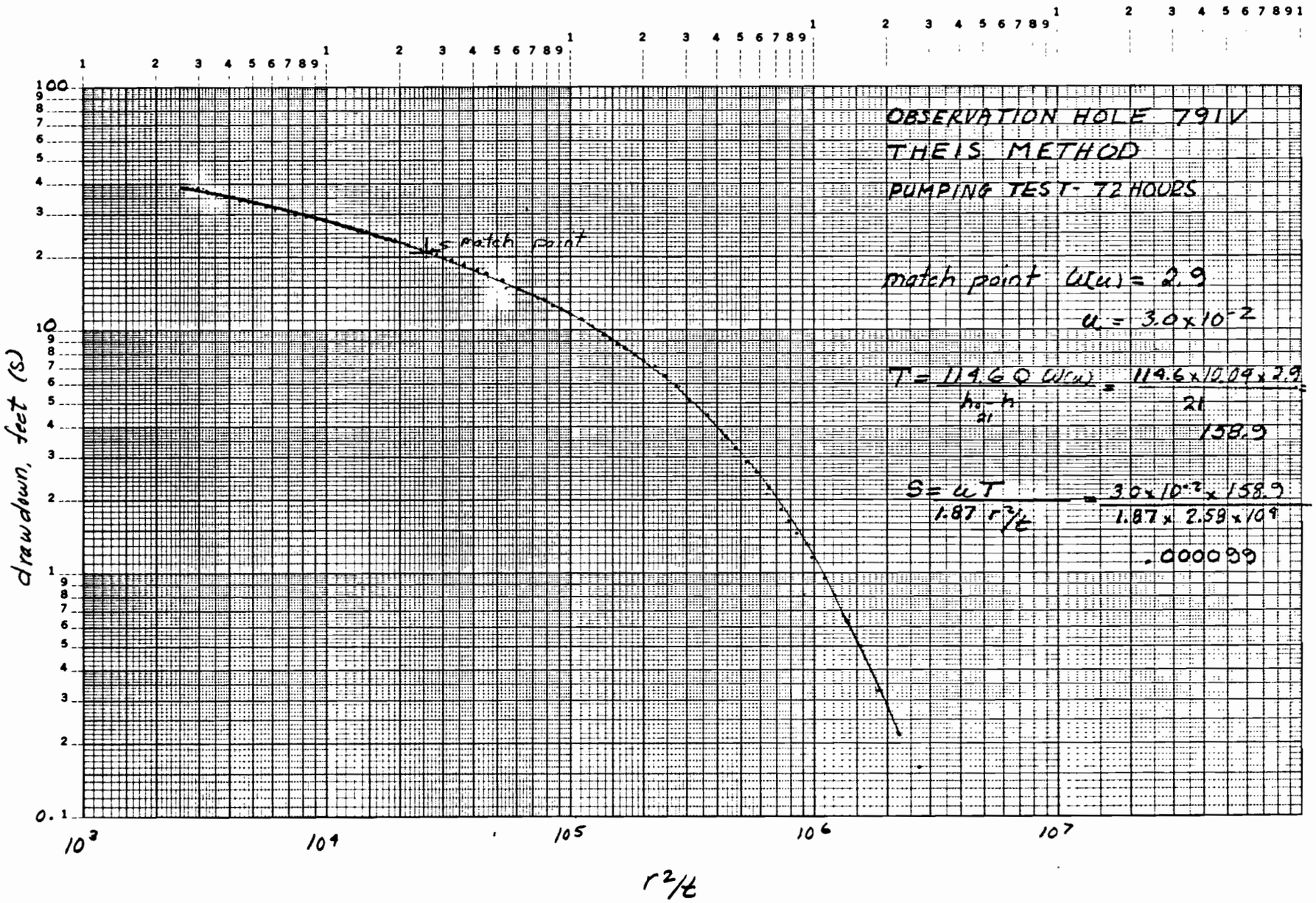
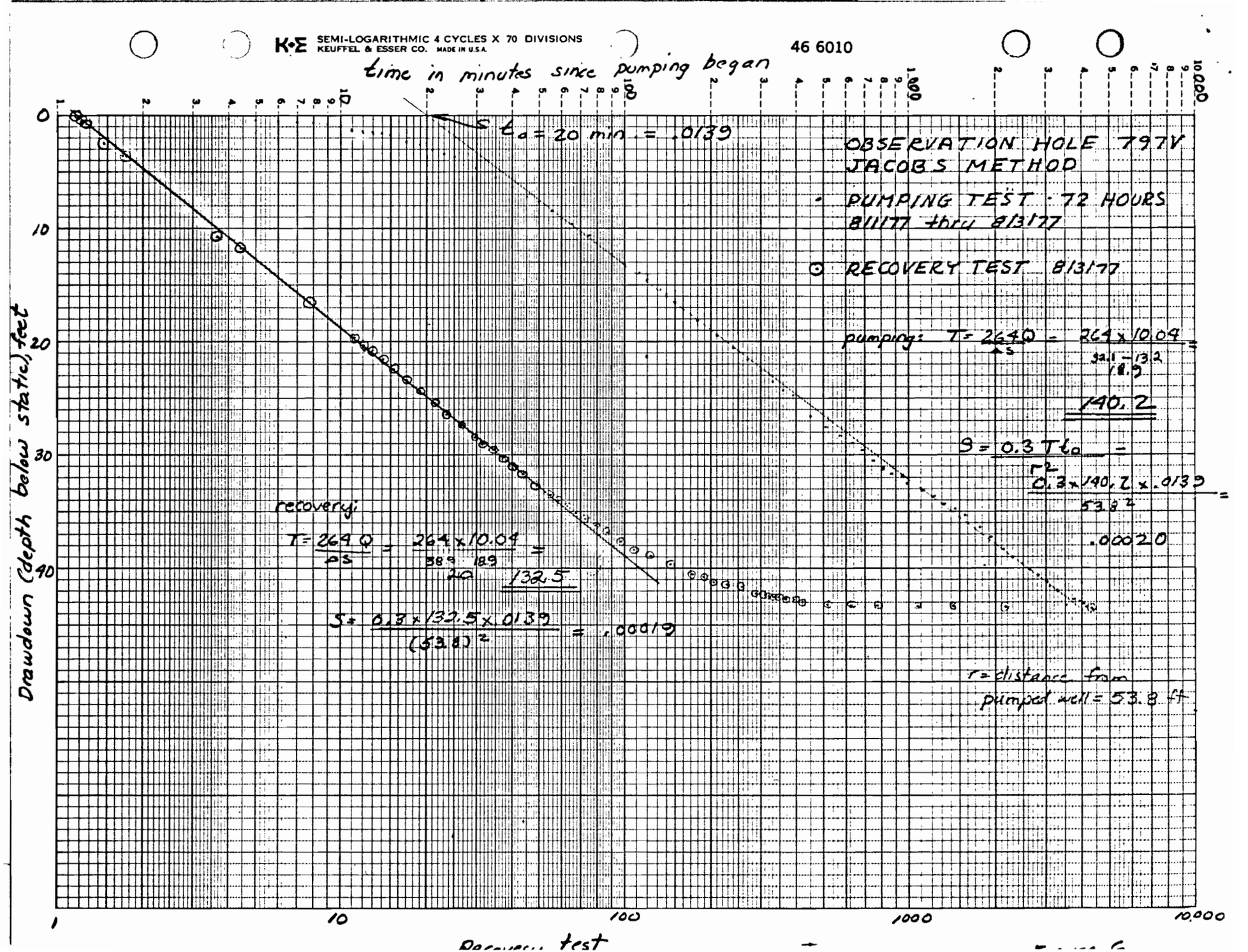

OBSERVATION HOLE 791V
THEIS METHOD
PUMPING TEST - 72 HOURS
match point W(u) = 2.9
u = 3.0 x 10⁻²
T = 114.6 Q W(u) / (h_a - h_b) = 114.6 x 10.04 x 2.9 / 21 = 158.9
S = uT / 1.87 r²/t = 3.0 x 10⁻² x 158.9 / 1.87 x 2.58 x 10⁹ = .000099
drawdown, feet (s)
r²/t
10³
10⁴
10⁵
10⁶
10⁷

Figure 5


K·E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010
time in minutes since pumping began
Drawdown (depth below static), feet
0
10
20
30
40
1
10
100
1000
10,000
S t_o = 20 min. = .0139
OBSERVATION HOLE 797V
JACOBS METHOD
PUMPING TEST - 72 HOURS
8/11/77 thru 8/13/77
RECOVERY TEST 8/13/77
pumping: T = 264 Q/s = 264 x 10.04 / 18.9 = 140.2
S = 0.3 T t_o / r^2 = 0.3 x 140.2 x .0139 / 53.8^2 = .00020
recovery:
T = 264 Q/s = 264 x 10.04 / 20 = 132.5
S = 0.3 x 132.5 x .0139 / (53.8)^2 = .00019
r = distance from pumped well = 53.8 ft.
Recovery test

Full Logarithmic, 3 x 5

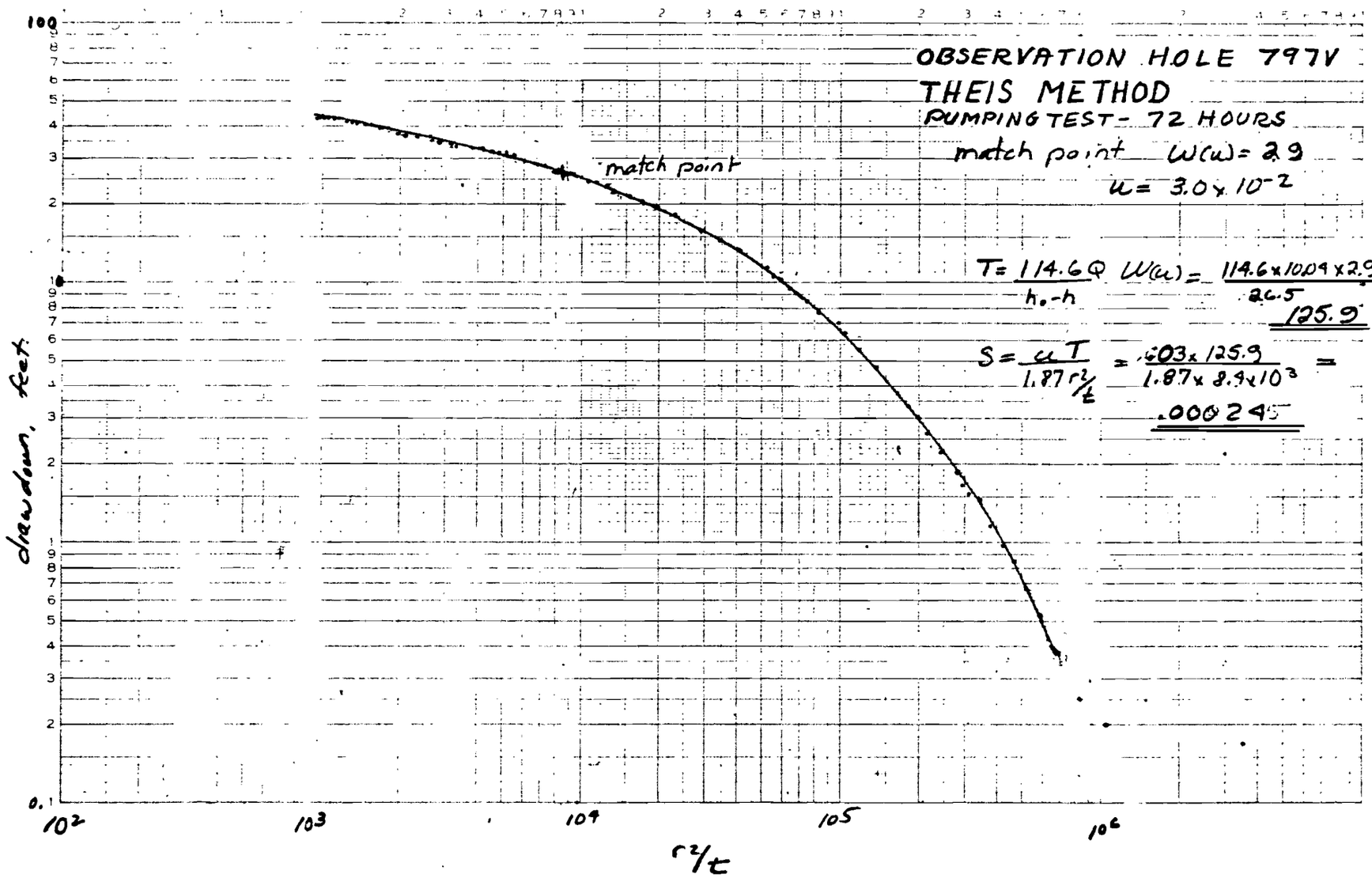
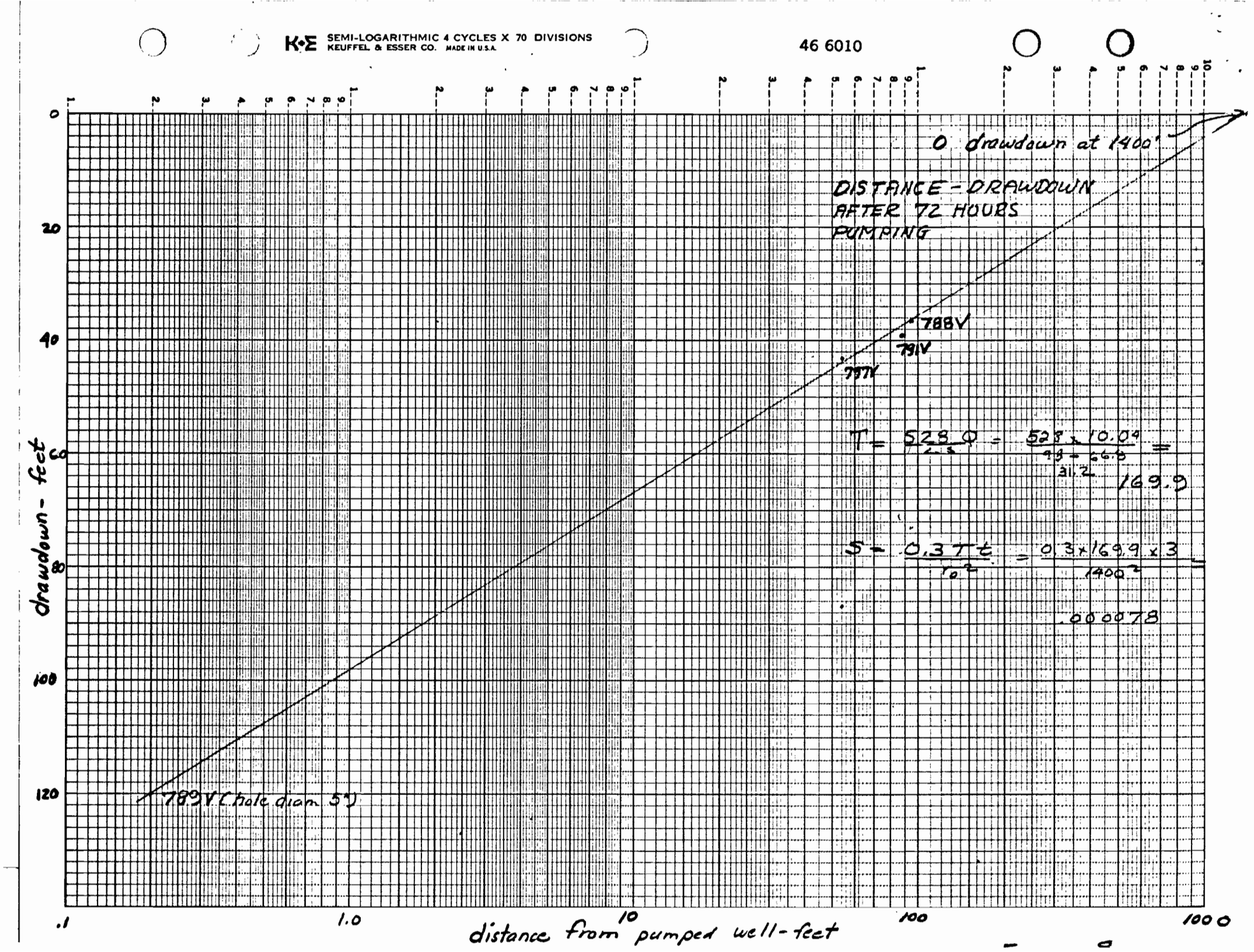


Figure 7


K•E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010
0 drawdown at 1400'
DISTANCE-DRAWDOWN
AFTER 72 HOURS
PUMPING
788V
791V
797V
T = 528 Q / Δs = 528 x 10.0 / 95 - 66.8 = 169.9
31.2
S = 0.3 T t / r0² = 0.3 x 169.9 x 3 / 1400²
.00078
789V (hole diam 5")
drawdown - feet
distance from pumped well - feet
0
20
40
60
80
100
120
.1
1.0
10
100
1000

APPENDIX A-1

PUMPING TEST 8/1/77
72 hours
10 gpm

789 V

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS

Client: NuBeth Location: Oshoto, Wyo. Date: 8/1/77

Job No.: Hole No.: 789V T.D.: Ground elev.: ft
Pump data: 5 h.p. 460 volt 3 phase; Make: Burks Depth Set:
Static water level: 112.8 ft. below G.S./M.P. Meas. point: 1.0 ft. above G.S
Start of Test: 11:49:45 AM/PM Pumping/Recovery Air Line Depth: 399.5

time	time in min. from start of pumping t	t/t'	water depth (ft) below meas pt.	water depth (ft) below static	Air Line gage pressure lbs	Air Line = feet	Air Line depth below meas pt.	Air Line depth below static (ft)	pumping rate sec/ gal.	pumping rate gpm timed	Comments
11:17			113.8		129	256.9	113.1				6550 ± meter
11 93					129.5	287.6	111.9				
11:49:45											
	1	6.99x10^{-4}			112.5	259.9	139.6	27.7			
	2	1.39x10^{-3}			110.0	254.1	145.4	33.5			
	3.0	2.15x10^{-3}			104.5	241.4	158.1	46.2			
	4	2.98x10^{-3}	128'4"		102.5	236.8	162.7	50.8		10.5	
	5	3.97x10^{-3}			101	233.3	166.2	54.3			
	6	4.97x10^{-3}	132'4"		100.5	232.2	167.3	55.4			
	7	4.86			100.5	232.2	167.3	55.4			
	8	5.56			101.5	234.5	165.0	53.1		<10	
	9	6.25			101	233.3	166.2	54.3			
	10	6.99	~~172'2"~~	~~58.4~~	100	231.0	168.5	56.6			
	11	7.69			98.5	227.5	172.0	60.1			
	12.0	8.40			97.5	225.2	174.3	62.4			
	13	9.03			96.5	222.9	176.6	64.7		10.1	
	14	9.72			95.5	220.6	178.9	67.0			
	15	1.09x10^{-2}	173'4"	59.5	95	219.5	180.0	68.1			
	17	1.18	174'5"	70.9							
	19	1.32			93.0	214.8	184.7	72.8			
	20	1.39	187'10"	74.0							
	22½	1.56			92.5	213.7	185.8	73.9			
	23	1.60			92.0	212.5	187.0	75.1			
	24	1.67	190'0"	77.0						10.2	
	25	1.74			91.5	211.4	188.1	76.2			
	26½	1.84	190'1½	76.3							
	30	2.08	191'9"	77.9	90.5	209.1	190.4	78.5		10.2	
	36	2.50	192'1½	78.3	90.0	207.9	191.6	79.7		10.2	
	40¼	2.83	192'9½	79.0	90.5	209.1	190.4	78.5		9.4	40 6940 meter
	95	3.13	192'2¾	78.4	92.5	206.7	192.8	80.9			
	97½	3.30								10.1	
	50.	3.47	193'6"	79.7	89.0	205.6	193.9	82.0		10.0	
	55	3.82	195'3½	81.5	89.5	206.7	192.8	80.9		10	7120 58 min.
	60	4.17	197'9"	83.5	89.25	206.2	193.3	81.4			
	66	4.58			89.25	206.2	193.3	81.4			

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS

Client: NuBeth Location: Oshoto, Wyo. Date:

Job No.: Hole No.: 789✓ T.D.: Ground elev.: f
Pump data: 5 h.p. 460 volt 3 phase; Make: Burks Depth Set:
Static water level: ft. below G.S./M.P. Meas. point: ft. above G.
Start of Test: AM/PM Pumping/Recovery Air Line Depth:

time	time in min. from start of pumping t	time in min. from stopping pump (t')	t/t'	water depth (ft) below meas. pt.	water depth (ft) below static	Air Line gage pressure lbs	Air Line = feet	Air Line depth below meas. pt.	Air Line depth below static (ft)	pumping rate sec/ gal.	pumping rate gpm (timed)	Comments
	70	4.86	10^{-2}	197 7¾	83.8							
	73	5.07				88	203.3	196.2	84.3		9.9	
	75	5.21				88	203.3	196.2	84.3			
	76	5.28		198'9"	84.5							
	82	5.69		200' ½"	86.3	87.5	202.1	197.4	85.5			
	102	7.08		200'8¾"	86.9	87¼	201.5	198.0	86.1		10	meter 7600 107 min
	110	7.64		201' ½"	87.3	86¾	200.4	199.1	87.2		10	
	120	8.33		202.0	83.2	86½	199.8	199.7	87.8			
	142	9.72		202.75	88.9	86¼	199.2	200.3	88.4	62/10		783 135 min
	160	1.11×10^{-1}		204'4¼"	90.5	85½	197.5	202.0	90.1		10	
	170	1.18		205'2⅝"	91.4	85½	197.5	202.0	90.1		10	"8363 @ 183 Force
	180	1.25		207'5"	93.6	89	194.0	205.5	93.6			
	210	1.46		208'8"	94.9	83¾	193.5	206.0	94.1		10	
	241	1.67		210'10"	96.2	83½	192.9	206.6	94.7			
	270	1.88		205'1½"	(91.3)	82¾	191.2	208.3	96.4		10	
	300	2.08		211'9"	98.0	82	189.4	210.1	98.2		10	9531.2 @ 300 min
	330	2.29				82	189.4	210.1	98.2			
	360	2.50				81½	188.3	211.2	99.3		10	10155.0 @ 363 min
	390	2.71				81¼	187.7	211.8	99.9			10933.0 @ 393
	420	2.92				77	177.9	221.6	109.7			trying to adjust flow up to 15 gpm pressure dropped to 76, pressure
	428	2.97				81½	188.3	211.2	99.3		9.1	lower 9
7:15P	450	3.13				83½	192.9	206.6	94.7		9	
	456	3.17									10	
	490	3.33				80½	186.0	213.5	101.6		9.8-10.1	11355.5
7:50											10	
	510	3.54				79	182.5	217.0	105.1	61/10	10.9	11666.0 @ 3
	540	3.75				80¼	185.9	214.1	102.2			11969.5
	570	3.96				80¼	185.9	214.1	102.2		9.8-10	12261.8
	600	4.17				-					10	
	630	4.38				79¾	184.2	215.3	103.4		9.95	12861.5
11:15	690	4.79				79½	183.6	215.9	104.0		10	13461.1
12:37	777	5.36				78	180.1	219.3	107.4		10	14330.0
	810	5.63				78	180.1	219.3	↓		10	14683.0
	870	6.04×10^{-1}				78	180.1	219.3	↓		9.85	15211.5

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS

Client: Location: Date: 8-2-77

Job No.: Hole No.: 789 V T.D.: Ground elev.: ft.
Pump data: ____ h.p. ____ volt ______ phase: Make: Depth Set:
Static water level: ft. below G.S./M.P. Meas. point: ft. above G.S.
Start of Test: AM/PM Pumping/Recovery Air Line Depth:

8D

time	time in min. start of pumping t	days	t/t'	water depth (ft) below meas. pt.	water depth (ft) below static	Air Line gage pressure lbs	Air Line X 2.31 = feet	Air Line depth below MP G.S	Air Line depth below static (ft)	pumping rate sec/— gal.	pumping rate gpm timed	Comments
	[illegible]	6.96	10^-1			78	180.2	219.3	107.4		7.[illegible]	[illegible]
	990	6.88				78	180.2	219.3	107.4		10	645:[illegible]
	1110	7.71				77	177.9	221.6	109.7		9.5	1700 9.5
	1215	8.44				76½	176.7	222.8	110.9		9.9	
	1335	9.27				76	175.6	223.9	112.0		9.9	
	1455	1.01	x10^0			76	175.6	223.9	112.0		9.9	
	1575	1.09				76½	176.7	222.8	110.9		9.9	
	1720	1.19				77	177.9	221.6	109.7		10.2, 10	4:15 pH ≈ 9.3, SO4 2200
	1755	1.23				77	177.9	221.6	109.7		9.8	25 < NaCl < 375 hardness
	1935	1.34				76½	176.7	222.8	110.9		9.8, 10	35 ppm H2S 0
11:00	2115	1.47				75½	174.4	225.1	113.2	27590	10	Fe 1.9 T [illegible]
2:00	2295	1.59				74	170.9	228.6	116.7	29400		15:45 22201.5
5:00	2475	1.72				72½	167.5	232.0	120.1	31200		10.2 SO4 [illegible]
8:00	2655	1.84				72	166.3	233.2	121.3		10.1	Av. 1665 [illegible]
1100	2835	1.97				72½	167.5	232.0	120.1		10.1	17:07 24062
2:00	3015	2.09				73¼	169.2	230.3	118.4	36740	10.0	8:13 AM 25700 [illegible]
5:00	3195	2.22				73	168.6	230.9	119.0	38490	9.9	3:45 pm 813 pH ≈ 9.3
8:00	3375	2.34				73¼	169.2	230.3	118.4	40350	9.6	hardness 37 ppm T. 48°F
11:00	3555	2.47				71	164.0	235.5	123.6		10.1	6:04 P 39167
2:00	3735	2.59				72	166.3	233.2	121.3		10.0	7 P.M. very strong
5:00	3915	2.72				72	166.3	233.2	121.3		10.[illegible]	wind [illegible]
08:00	4095	2.84				71½	165.2	234.3	122.4		10.0	decreased by 7:45 but
1105	4280	2.90				74½	172.1	227.4	115.5	[illegible]	9.9	still windy [illegible]
11:45	4320	3				[illegible]	171.5	228.0	116.1	49930		[illegible]
	4320¾	3/4	5761			81	187.1	212.4	100.5			[illegible] pH 9.2-9.3
	4321¼	1¼	3457			86	198.7	200.8	88.9			hardness 38 mg/l
	4321¾	1¾	2469.6			89½	206.7	192.8	80.9			[illegible] 375
	4322½	2½	1769			94½	[illegible]	181.2	69.3			
	4323¼	3¼	1361			96½	[illegible]	176.6	64.7			49930
	4324	4	1081			99	228.7	170.8	58.9			6550
	4325	5	865			100	231.0	168.5	56.6			43380 gal = 10.04 gpm
	4326	6	721			100	231.0	168.5	56.6			4320 min av.
	4327¼	7¼	596.9			100½	232.2	167.3	55.4			
	4328	8	541			101	233.3	166.2	54.3			
	4329	9	481			101	233.3	166.2	54.3			

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS

Client: Location: Date:

Job No.: Hole No.: T.D.: Ground elev.: ft
Pump data: ____ h.p. ____ volt ____ phase; Make: Depth Set:
Static water level: ft. below G.S./M.P. Meas. point: ft. above G.S
Start of Test: AM/PM Pumping/Recovery Air Line Depth:

time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth (ft) below meas. pt.	water depth (ft) below static	Air Line gage pressure lbs	Air Line X 2.31 = feet	Air Line depth below M.P.	Air Line depth below static (ft)	pumping rate sec/ gal.	pumping rate gpm (Thied)	Comments
	4330	10	433			101	234.5	165.0	53.1			
	4331	11	393.7			101 3/4	235.0	169.5	53.6			
	4332	12	361			102	235.6	163.9	52.0			
	4333	13	333.3			102	236.8	162.7	50.5			
	4334	14	309.6			102	236.8	162.7	50.8			
	4335	15	289			102.3	237.9	161.6	49.7			
	4337	17	255.1			102	238.1	161.0	49.1			
	4339	19	228.4			103 1/4	239.7	159.8	47.9			
	4341	21	206.7			104 1/4	240.8	158.7	46.8			
	4343	23	188.8			104	240.8	158.7	46.8			
	4345	25	173.8			104	241.4	158.1	46.2			
	4350	30	145			104 1/2	242.1	155.8	43.9			
	4355	35	124.4			105 1/4	243.4	154.1	42.2			
	4360	40	109			105 1/4	243.4	154.1	42.2			
	4365	45	97			105	243.0	153.5	41.6			
	4370	50	87.4			105 1/2	243.0	153.5	41.6			
	4375	55	79.5			105	243.5	150.0	38.1			
	4380	60	73			105 1/2	243.1	149.4	37.5			
	4385	65	67.5			105 1/2	243.1	149.4	37.5			
	4390	70	62.7			105 1/2	243.6	148.9	37.0			
	4395	75	58.6			105 1/2	243.6	148.9	37.0			
1:05	4400	80	55			106	244.8	147.7	35.8			
1:15	4410	90	49			106 1/2	245.9	146.6	34.7			
1:25	4420	100	44.2			106 3/4	246.5	146.0	34.1			
1:35	4430	110	40.3			107 1/4	247.7	144.8	32.9			
1:45	4440	120	37			107 1/2	248.3	144.2	32.3			
1:55	4450	130	34.2			107 1/2	248.3	144.2	32.3			
2:05	4460	140	31.9			107 3/4	248.8	143.7	31.8			
2:15	4470	150	29.8			108 1/4	250.0	142.5	30.6			
2:35	4490	170	26.4			108 3/4	251.1	141.4	29.5			
2:55	1510	190	23.7			109	251.7	140.8	28.9			
3:15	4530	210	21.6			109 1/4	252.3	140.2	28.3			
3:45	4560	240	19			109 1/2	252.2	137.3	25.4			
4:15	4590	270	17			109 1/2	252.2	137.3	25.4			
4:45	4620	300	15.4			109 1/2	252.2	137.3	25.4			

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS

Client: Location: Date:

Job No.: Hole No.: 789V T.D.: Ground elev.: f
Pump data: ____ h.p. ____ volt ____ phase; Make: Depth Set:
Static water level: ft. below G.S./M.P. Meas. point: ft. above G.
Start of Test: AM/PM Pumping/Recovery Air Line Depth:

	time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth (ft) below meas pt.	water depth (ft) below static	Air Line gage pressure lbs	Air Line ΔP = feet	Air Line depth below meas pt GS	Air Line depth below static (ft)	pumping rate sec/ gal.	pumping rate gpm	Comments
8/4	5:15	4650	330	14.1			114 1/4	263.9	135.6	23.7			
	5:45	4680	360	13			114 1/4	263.9	135.6	23.7			
	6:15	4710	390	12.1			114 1/2	264.5	135.0	23.1			
	6:45	4740	420	11.2			114 1/2	264.5	135.0	23.1			
	10:25p	4960	640	7.75			115 3/4	267.4	132.1	26.2			
8/5	8:30 AM						105*						
	2:30 P	5925	1605	3.69	124.3								
8/8	1:30 P	10185	5865	1.74	117.77								
8/10	5:00 P				116.45								
8/15	10 A				114.95								
8/18	3:30 P				114.54								
8/22	3:15 P				114.10								

* measured with M.P. probe.

788V

Sheet 1 of 2

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: Nubeth Location: Oshoto, Wyo. Date: 8/1/77

Job No.: Obs. Hole No.: 788V T.D.: 570 G.S.: 4189.4

Pumped Hole No.: 789V T.D. Pumped hole: 566 Meas. pt. above G.S.: 2.8

Distance from pumped hole: 84 ft. 3836 pumping rate: 10 gpm

time	time in min. from start of pumping t	t in days	r^2/t	water depth, ft. below meas. pt.	water depth, ft. below M.P.	water depth below static	Calculated recovery (s-s')/s ft.
7/31						below static	
7/31				105.42	102.63		
8/1 1114				105.21			
	0			105 3¼"	105.06	102.26	
	1	694×10⁻⁶	1.27×10⁶	105 3¼	105.06	0	
	2	139×10⁻³	6.36	105' 1"	105.08	.02	
	3	2.08	4.25	105' 1¼	105.08	.02	
	4	2.78	3.18	105' 0	00' .17	.11	
	5	3.47	2.55	105 4.	25 .35	29	
	6	4.17	2.12	105 4.5"	.38	.32	
	7	4.86	1.82	105'6"	.50	.44	
	8	5.56	1.59	105'7½"	.63	.57	
	9	6.25	1.41	105'9"	.75	.69	
	10	6.94	1.27	105'10½"	105.85	.79	
	11	7.64	1.16	105'11¾"	.98	.92	
	12	8.33	1.06	106'2"	106.17	1.11	
	13	9.03	9.79×10⁵	106'4¾	.40	1.34	
	14	9.72	9.09	106'6½	106.54	1.48	
	15	1.09×10⁻²	8.50	106'9¼	.81	1.75	
	17	1.18	7.99	107'3½"	107.27	2.21	
	19	1.32	6.69	107'6¾"	107.56	2.50	
	21	1.46×10⁻²	6.05	108' ¼	108.02	2.96	
	23	1.60	5.56	108 4½"	108.35	3.29	
	25	1.74	5.08	108 9½	108.77	3.71	
	30	2.08	4.25	110 00	"110.00	4.94	
	35	2.43	3.64	110' 8½"	110.71	5.65	
	40	2.78	3.18	111'6½	111.52	6.96	
	45	3.13	2.82	112'3½	"112.29	7.23	
	50	3.47	2.55	112'10½	"112.88	7.82	
	55	3.82	2.31	113'6¾	113.56	8.50	
	60	4.17	2.12	114'1¾	"114.10	9.09	
	65	4.51	1.96	114'7½	"114.63	9.57	
	70	4.86	1.82	115'00"	115.00	9.94	
	75	5.21	1.70	115'6¾"	.56	10.50	
	80	5.56	1.59	115' 11"	115.82	10.82	

time	time in min. from start of pumping t	t in days	r^2/t	water depth (Ft.) below meas. pt.	water depth (Ft.) below M.P.	below static	Calculated recovery (s-s')/s ft.
	90	6.25	1.41	116' 8"	116.67	11.61	
	100	6.94	1.27	117'5"	117.92	12.36	
	110	7.64	1.16	118'1½"	118.13	13.07	
	120	8.33	1.06	118'6"	118.54	13.48	
	130	9.03	9.79×10⁵	119'4"	119.38	14.32	
	140	9.72	9.09	119'5⅝"	119.48	14.42	
	150	1.04×10⁻¹	8.50	120'00	120.00	14.96	
	180	1.25	7.07	120'5"	121.33	16.27	
	210	1.46	6.05	122 5¼	122.44	17.38	
	240	1.67	5.29	123 7¾	123.65	18.59	
	270	1.88	4.70	124'6"	124.50	19.44	
	300	2.08	4.25	125'1½	125.15	20.09	
	330	2.29	3.86	125'11"	125.92	20.86	
	360	2.50	3.53	126'4½"	126.35	21.29	
	390	2.71	3.26	126'11"	126.96	21.90	
	450	3.13	2.82	128' 3½"	.26	23.20	
	510	3.54	2.50	129' ¼	129.04	23.98	
	540	3.75	2.36	129'6"	129.50	24.44	
	570	3.96	2.23	129'8"	129.67	24.61	
	630	4.38	2.02	130'4"	130.33	25.27	
11:15	690	4.79	1.84	130'11"	130.92	25.86	
	750	5.21	1.70	131'5"	131.42	26.36	
	810	5.63	1.57	131'10½"	131.88	26.82	
	870	6.04	1.46	132'5"	132.42	27.36	
	930	6.45	1.37	132'7½"	.63	27.57	
	990	6.88	1.28	133'	133.00	27.94	
	1050	7.71	1.15	133'2½"	.63	28.57	
	1215	8.84	1.05	134'2½"	134.21	29.15	
	1335	9.27	9.53×10³	134'9"	134.75	29.69	
	1455	1.01×10⁻¹	8.75	135'2½"	135.21	30.15	
	1575	1.09	8.11	135'7"	135.58	30.52	
5:00pm	1755	1.22	7.24	136'2½"	136.21	31.15	
8:10	1945	1.35	6.55	136'10"	136.83	31.77	
11 00	2115	1.47	6.01	137'9¾"	.81	32.75	
2:00pm	2295	1.59	5.56	138' 5"	33.34		

788V cont.

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: NuBeth Location: Oshoto, Wyoming Date: 8/3/77

Job No.: Obs. Hole No.: 788V T.D.: G.S.:
Pumped Hole No.: T.D. Pumped hole: Meas. pt. above G.S.:
Distance from pumped hole: ft. pumping rate: gpm

	time	time in min from start of pumping t	time in min from stopping pump t'	r^2/t'	water depth, ft. below meas. pt.	water depth, ft. Below M.P.	WL below static	Calculated recovery (S-S')ft
1/3	5:00 Am	2475	1.72	5.14	138'11"	138.92	33.86	
	8:00	2655	1.84	4.80	139'4½	139.38	34.32	
	11:	2835	1.97	4.49	139'6½	139.54	34.48	
	2:00	3015	2.09	4.23	139'10¾	139.90	34.84	
	5:00	3195	2.22	3.98	140.33	140.33	35.27	
	8:00	3375	2.34	3.78	140.72	140.72	35.66	
	11:00	[illegible]	2.47	3.58	142.0	142.00	36.94	calm
	[illegible]	[illegible]	2.59	3.41	[illegible]	141.50	36.44	windy
	[illegible]	[illegible]	2.72	3.25	[illegible]	141.50	36.44	
	[illegible]	4095	2.84	3.11	141.5[illegible]	191.56	36.50	
	11:00	4275	2.97	2.98	141'6½	141.54	36.48	
1145			0	t/t'	141'7	" .65	36.59	
			1	4321	[illegible]	" .67	36.61	
			2	2161	141'8	141.67	36.61	
			3	1441	141'7½	" .63	36.57	
			4	1081	141'7½	" .63	36.57	
			[illegible]	865	141'7½	.63	36.57	
			[illegible]	721	[illegible] 6"	.50	36.49	
			[illegible]	618.1	141'4½	" .38	36.32	
			[illegible]	541	141'4	" .33	36.27	
			[illegible]	481	141'2	" .17	36.11	
			10	433	141'	.0	35.94	
			11	393.7	140'	[illegible] .88	35.82	
			12	361	140'9"	140.75	35.69	
			13	333.3	140'7½	.63	35.57	
			14	309.6	140'5½	.46	35.40	
			[illegible]	289	140'4½	" .38	35.32	
			17	255.1	140'00"	140.00	34.99	
			[illegible]	228.4	39'8	139.67	34.61	
			21	206.7	139'4"	139.33	34.27	
			[illegible]	188.8	139'[illegible]	.00	33.94	
			[illegible]	173.8	138'8½"	138.71	33.65	
			30	145	138'00"	" .00	32.94	
			35	124.4	137'2½"	.21	32.15	
			40	[illegible]	13[illegible]	[illegible]	31.[illegible]	

time	time in min from start of pumping t	time in min from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) Below M.P.	WL below static	Calculated recovery (S-S') ft.
		[illegible]	97	135'4"	135.33	30.77	
		[illegible]	87.4	135'4¼	.34	30.29	
		[illegible]	79.5	134'10"	134.83	29.77	
		[illegible]	73	134'4	134.33	29.27	
		[illegible]	67.5	133'11¼	.94	28.88	
		[illegible]	62.7	133'3"	133.25	28.19	
		75	58.6	132'9	132.75	27.69	
		80	55	132'4½"	.38	27.32	
		90	49	131'8½"	.71	26.65	
		100	44.2	130'11½"	.96	25.90	
		110	40.3	130'4"	.33	25.27	
		120	37	129'8½"	.71	24.65	
		130	34.2	129'2"	.17	24.11	
		140	31.9	128'7½"	.63	23.57	
		150	29.8	128'1½"	.13	23.07	
		170	26.4	127' 4"	.33	22.27	
		190	23.7	126' 6¼"		21.46	126.52
		210	21.6	125' 9½"		20.73	125.79
		240	19	124' 10½"		19.82	124.88
		270	17	124' ¾"		19.00	124.06
		300	15.9	123' 4"		18.27	123.33
		330	14.1	122' 8"		17.61	122.67
		360	13	122' 1"		17.02	122.08
		390	12.1	121' 6½		16.48	121.54
		420	11.2	121' ½"		15.98	121.04
	4960	640	7.75	[illegible]	[illegible]	[illegible]	[illegible]
8/5 8:30	5565	1245	4.47	115.47	10.41-1.1*	9.31	
2:30	5925	1605	3.69	114.24	9.18-1.1*	8.08	
8/8 1:30P	10185	5865	1.74	108.65	3.59-1.1*	2.49	
8/10 5:00P	13275	8955	1.48	107.65	2.59-1.1*	1.49	
8/15 10A	20055	15735	1.27	106.17	1.11-1.11*	0	
8/18 3:30P	24705	20385	1.21	105.95	.89-1.11*	+.22	
8/22 3:15	30450	26130	1.17	105.55	.49-1.11*	+.62	
	* [illegible]	[illegible]	*	[illegible]	[illegible]		

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: NuBeth Location: Oshoto, Wyo Date: 8/1/77

Job No.: Obs. Hole No.: 791V T.D.: 570 G.S.: 4200.5

Pumped Hole No.: 792V T.D. Pumped hole: 566 Meas. pt. above G.S.: 2.4

Distance from pumped hole: 97.1 ft. pumping rate: 10 gpm

time	time in min. from start of pumping	time in min. from stopping pump	r^2/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	below M.P. ft.	Calculated recovery (s-s') ft.
7/31 1000				119.30			
7/31 1700				119.20			
8/1 1104				119.00			
11:45	0			118 3⅞	115.92	118.32	
11:46	1		1.10 × 10¹¹	118 4"	.01		
11:47	2		5.50 × 10⁶	118 4¼	.03	118.35	
11:48	3		3.67	118 4⅜	.08	118.40	
11:49	4		2.75	118 5⅜	.16	.48	
11:50	5		2.20	118 6½	.22	.54	
11:51	6		1.83	118 7⅜	.33	.65	
11:52	7		1.57	118 9⅝	.50	.82	
11:53	8		1.37	118 11½	.64	.96	
11:54	9		1.22	119 1½	.81	119.13	
11:55	10		1.10	119 3⅝	.96	119.28	
11:56	11		1.00	119 5⅞	1.15	.97	
11:57	12		9.17 × 10⁵	119 7½	1.31	.63	
11:58	13		8.46	119 9⅝	1.46	.78	
11:59	14		7.86	119 11¼	1.62	.94	
12:00	15		7.35	120 1½	1.81	120.13	
12:02	17		6.47	120 6⅝	2.23	.55	
12:04	19		5.79	120' 11"	2.60	120.92	
12:06	21		5.23	121' 2½	2.89	121.21	
12:08	23		4.77	121' 7"	3.26	121.58	
12:10	25		4.39	121' 11	3.60	121.92	
12:15	30		3.67	122' 7"	4.43	122.75	
12:20	35		3.14	123' 5½	5.14	123.46	
12:25	40		2.75	124' 2"	5.85	124.17	
12:30	45		2.44	124' 9½	6.44	124.76	
12:35	50		2.20	125' 4"	7.01	125.33	
12:40	55		2.00	125' 10	7.51	125.83	
12:45	60		1.83	126' 3¾	7.99	126.31	
12:50	65		1.69	126' 9"	8.43	126.75	
12:55	70		1.57	127' 2½	8.89	127.21	
1:00	75		1.47	127' 6⅞	9.25	127.57	
1:05	80		1.37	127' 11¾	9.63	127.95	

time	time in min. from start of pumping	time in min. from stopping pump	r^2/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	below M.P. ft.	Calculated recovery (s-s') ft.
1:15	90		1.22 × 10⁵	28' 8½	10.36	128.68	
1:25	100		1.10	29' 4"	11.01	129.33	
1:35	110		1.00	29' 11½	11.61	129.93	
1:45	120		9.17 × 10⁴	30' 6½	12.20	130.52	
1:55	130		8.46	131'	12.68	131.00	
2:05	140		7.85	131' 6"	13.18	131.50	
2:15	150		7.34	131' 11⅝	13.65	131.97	
2:45	180		6.11	133' 3½"	14.97	133.29	
3:15	210		5.23	34' 4⅝	16.06	134.38	
3:45	240		4.57	135' 4⅝	17.06	135.38	
4:15	270		9.06	136' 2⅝	17.91	136.23	
4:45	300		3.67	36' 11⅝	18.65	136.97	
5:15	330		3.33	137' 7½	19.31	137.63	
5:45	360		3.06	38' 2¾"	19.91	138.23	
6:15	390		2.82	38' 9"	20.93	138.75	
7:15	450		2.44	40' 2½	21.88	140.23	
8:15	510		2.16	40' 4⅞	22.50	140.82	
9:15	570		1.93	141' 7	23.26	141.58	
10:15	630		1.74	142' 2	23.85	142.17	
11:15	690		1.60	142' 10⅝	24.56	142.88	
12:15	750		1.47	143' 5⅝	25.14	143.46	
1:15	810		1.36	144' 3"	25.85	144.19	
2:15	870		1.27	144' 9"	26.35	144.67	
3:15	930		1.18	145' 3"	26.93	145.25	
4:15	990		1.11	145' 7"	27.35	145.67	
6:15	1110		9.91 × 10³	146' 4"	28.06	146.38	
8:00	1215		9.05	147'	28.68	147.00	
10:00	1335		8.24		29.18	147.50	
12:00			7.56	145.11'	29.79		
2:00	5		7.01	145.53	30.21		
5:00	1755		6.26	147' 8½	31.56		
8:00	1935		5.70	148'	32.15		
11:00	2115		5.20	151.49	33.17		
2:00	2295		4.80	152.20	33.88		
5:00					34.53		

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS OBSERVATION HOLE

Client: Nu Beth | Location: Oshoto, Wyoming | Date: 8/3/77

Job No.: | Obs. Hole No.: 791V | T.D.: [illegible] | G.S.: [illegible]

Pumped Hole No.: 789V | T.D. Pumped hole: [illegible] | Meas. pt. above G.S.: 2.4

Distance from pumped hole: 87.4 ft. | pumping rate: 10 gpm

	time	time in min from start of pumping t	time in min from stopping pump t'	r^2/t'	water depth, ft. below meas. pt.	water depth, ft. below static (s')	dd(s) from pumping curve, ft	Calculated recovery (s-s') ft
8/3	8:00	2655		×10³ 9.15	153.4	35.08		
	11:00	2835		3.88	154.17	35.85		
	2:00	3015		3.66	15[illegible]	36.37		
	5:00	3195		3.44	154.9	36.58		
	8:00	3375		3.26	155.4	37.08		
	11:00	3555		3.09	156.55	38.26	calm	
	2:00	3735		2.95		38.13	windy	
	5:00	3915		2.81	[illegible]	38.23		
	8:00	4095		2.69	[illegible]	38.48		
	11:00	4275		2.57	157	38.72		
	1143	4318		2.55	157.14	38.82		
	1145	4320	0	t/t'				
		4321	1	4321	157.0	38.68		
		4322	2	2161	157.0	38.68		
		4323	3	1441	157.10	38.78		
		4324	4	1081	157.06	38.74		
		4325	5	865	157.01	38.69		
		4326	6	721	157.03	38.71		
		4327	7	618.1	156.98	38.66		
		4328	8	541	156.98	38.66		
		4329	9	481				
		4330	10	433	156.79	38.47		
		4331	11	393.7	156.68	38.36		
		4332	12	361	156.50	38.28		
		4333	13	333.3	156.40	38.08		
		4334	14	309.6	156.24	37.92		
		4335	15	289	156.05	37.73		
		4337	17	255.1	155.7[illegible]	37.40		
		4339	19	228.4	155.4[illegible]	38.10		
		4341	21	206.7	155.0[illegible]	36.70		
		4343	23	188.8	154.71	36.39		
		4345	25	173.8	154.[illegible]	36.06		
		4350	30	145	153.5[illegible]	35.27		
		4355	35	124.9	152.76	34.44		
		4360	40	109	152.13	33.81		

time	time in min from start of pumping t	time in min from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft.	Calculated recovery (s-s') ft.
1230	4365	45	97	151.42	33.10		
	4370	50	87.4	150.8[illegible]	32.54		
	4375	55	79.5	150.25	31.93		
	4380	60	73	149.8	31.48		
	4385	65	67.5	149.35	31.03		
	4390	70	62.7	148.89	30.57		
	4395	75	58.6	148.42	30.10		
	4400	80	55	14[illegible]	29.68		
1315	4410	90	49	[illegible]	28.99		
	4421	101	43.8	[illegible]	28.20		
	4430	110	40.3	14[illegible].12	27.80		
	4440	120	37	145.5[illegible]	27.24		
	4450	130	34.2	144.9[illegible]	26.66		
	4460	140	31.9	144.4[illegible]	26.17		
	4470	150	29.8	144.05	25.73		
	4490	170	26.4	143.11	24.79		
	4510	190	23.7	142.35	24.03		
	4530	210	21.6	141.67	23.35		
	4560	240	19	140.72	22.40		
1515	4590	270	17	139.9[illegible]	21.58		
	4620	300	15.4	139.14	20.82		
	4650	330	14.1	138.5	20.18		
	4680	360	13	137.8[illegible]	19.53		
	4710	390	12.1	137.4	19.05		
1545	4740	420	11.3	136.9[illegible]	18.65		
2225	4960	640	7.75	[illegible]	15.91		
8/5 8:30A	5565	1245	4.47	131.70	13.38 -	1.1* =	12.2[illegible]
2:30P	5925	1605	3.69	130.45	12.13	-1.1* =	11.03
8/8 1:30P	10185	5865	1.74	123.9	5.58 -	1.1* =	4.58
8/10 5P			1.98	122.47	4.15 -	1.1*	3.05
8/15 10			1.27	120.95	2.63 -	1.1*	1.53
8/18 3:30P			1.21	120.60	2.28 -	1.1*	1.18
8/22 3:15P			1.17	120.23	1.91 -	1.1*	.81
* adjust [illegible]	+.6	[illegible]	[illegible]				

797V

Sheet 1 of 2

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: Nu Beth Location: Oshoto, Wyo. Date: 8/1/77 -

Job No.: Obs. Hole No.: 797V T.D.: 520 G.S.: 4195.7

Pumped Hole No.: 797V T.D. Pumped hole: 516 Meas. pt. above G.S.: 3.5

Distance from pumped hole: 68.2 ft. r^2 = 28944 pumping rate: 1[illegible] gpm

time	time in min from start of pumping t	time in min from stopping pump t'	r^2/t	water depth, ft. below meas. pt.	water depth, ft. below static	dd(s) from pumping curve, ft	Calculated recovery (s - s') ft
7/31 1000				117.70			
7/31 1700				117.51	113.96		
8/1 1118				117.20	113.65		
1145	0						
	2.40						
	4		1.09×10^{4}	117.40	.2		
	5		8.34×10^{3}	117.45	.25		
	6		6.94	117.58	.38		
	7		5.96	117.73	.53		
	8		5.20	117.88	.68		
	9		4.63	118.05	.85		
	10		4.17	118.18	.98		
	11		3.79	118.35	1.15		
	12		3.45	118.68	1.48		
	13		3.21	118.72	1.52		
	14		2.97	118.87	1.67		
	15		2.78	119.06	1.86		
	17		2.45	119.43	2.23		
	19		2.19	119.81	2.61		
	21		2.00	120.20	3.0		
	23		1.81	120.57	3.37		
	25		1.66	120.96	3.76		
	30		1.39	121.92	4.72		
	35		1.19	122.75	5.55		
	40		1.09	123.56	6.36		
	45		9.24×10^{3}	124.30	7.10		
	50		8.34	124.98	7.78		
	55		7.58	125.68	8.48		
	60		6.94	126.30	9.10		
	65		6.42	126.84	9.64		
	70		5.96	127.33	10.13		
	75		5.56	127.80	10.60		
8/3	80		5.20	128.40	11.20		
	90		4.63	129.31	12.11		
	100		4.17	130.25	13.05		

time	time in min. from start of pumping t	days	r^2/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft.	Calculated recovery (s - s') ft.
	112	7.77×10^{-2}	3.73	131.16	13.96		
	120		3.45	131.73	14.53		
	133	9.24×10^{-2}	3.13	132.58	15.33		
	140		2.97	133.00	15.80		
	150		2.78	133.60	16.40		
	180		2.32	135.22	18.02		
	210		1.98	136.[illegible]	19.40		
	240		1.73	137.85	20.65		
	270		1.54	139.00	21.80		
	300		1.39	139.87	22.67		
	330		1.26	140.[illegible]	23.50		
	360		1.16	141.37	24.19		
	[illegible]		1.07×10^{3}	142.15	24.85		
	450		9.26×10^{3}	143.81	26.61		
	510		8.17	144.62	27.42		
	570		7.31	[illegible]	28.20		
	630		6.62	145.[illegible]	28.90		
	[illegible]		6.04	[illegible]	29.65		
	[illegible]		5.56	142.[illegible]	30.4		
	[illegible]		5.15	[illegible]	31.05		
	[illegible]		4.79	[illegible]	31.7		
	[illegible]		4.46	149.[illegible]	31.9		
	[illegible]		4.21	149.[illegible]	32.4		
9[illegible]	[illegible]		3.76	[illegible]	33.1		
8:00	1285		3.27	150.8[illegible]	33.65		
	1335		3.12	151.43	34.23		
	1455		2.86	152.[illegible]	34.8		
	1575		2.65	152.45	35.25		
5:00	1755		2.37	153.65	36.45		
[illegible]:00	1935	1.34	2.15	154.35	37.15		
11:00	2115		1.97	155.[illegible]	38.30		
2:00	2295		1.82	154.[illegible]	39.00		
5:00	2475		1.68	156.7	39.55		
8:00	[illegible]		1.57	157.3	40.10		
11:00	[illegible]		1.47	[illegible]	[illegible]		

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: NuBeth Location: Oshoto, Wyo Date: 8/3/77

Job No.: Obs. Hole No.: 797V T.D.: 580 G.S.: 4195.7

Pumped Hole No.: 797W T.D. Pumped hole: Meas. pt. above G.S.:

Distance from pumped hole: 53.8 ft. pumping rate: 11 gpm

time	time in min from start of pumping t	time in min from stopping pump t'	t/t'	water depth, A. below meas. pt.	water depth, A. below static	s'	Calculated recovery (s-s') ft.
8/3 2:00 P	3015		1.38	158.31	41.11		
	3195		1.30	158.76	41.56		
8:00 P	3375		1.24	159.19	41.99		
11:00	3555		1.17	160.35	43.15	cdm	
[illegible]	[illegible]		1.12	160.05	42.85	1½ WIND	
5:00	3915		1.06	160.15	42.95		
8:00	4095		1.02 (1.03)	160.3	43.10		
11:00	4275		9.74 (1.02)	160.5	43.35		
11:43	4318		9.65 (1.02)	160.5	43.36		
			t/t'			below static	
11:45	4321	1	4321	160.5	43.36		
11:46		2	2161	160.5	43.35		
11:47		3	1441	160.5	43.33		
11:48		4	1081	160.5	43.32		
11:49		5	865	160.4	43.22		
11:50		6	721	160.4	43.20		
		7	618.1	160.[illegible]	43.09		
		8	541	160.[illegible]	42.99		
		9	481	160.[illegible]	42.87		
		10	433	159.[illegible]	42.77		
		[illegible]	393.7	159.85	42.65		
		12	361	159.70	42.50		
		13	333.3	159.55	42.35		
		14	309.6	159.40	42.20		
		15	289	159.35	42.03		
		16	235.1	159.30	41.80		
		18	228.4	159.70	41.50		
		21	206.7	159.[illegible]	41.10		
		25	188.8	157.95	40.75		
		25	173.8	157.75	40.55		
		30	145	156.90	39.70		
		35	124.4	156.15	38.95		
		40	109	155.35	38.15		
		45	97	154.78	37.58		
		50	87.4	154.[illegible]	36.90		

time	time in min from start of pumping t	time in min from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	s'	Calculated recovery (s-s') ft.
		55	79.5	152.4[illegible]	0	36.20	
		60	73	152.8[illegible]	5	35.65	
		65	67.5	152.2[illegible]	5	35.05	
		70	62.7	151.70	0	34.50	
		75	58.6	151.20	0	34.0	
		80	55	150.[illegible]2		33.52	
1:15 P.M.		90	49	149.[illegible]0		32.70	
1:25 P.M.		100	93.8	149.00		31.80	
1:35 P.M.		110	40.3	148.[illegible]2		31.02	
1:45 P.M.		120	37	147.55		30.35	
1:55 P.M.		130	34.2	147.[illegible]85		29.65	
2:05		140	31.9	147.[illegible]0		29.00	
2:15		150	29.8	145.60		28.40	
2:35		170	26.4	144.[illegible]50		27.30	
2:55		190	23.7	143.55		26.35	
3:15		210	21.6	142.65		25.45	
3:45		240	19	141.53		24.33	
4:15		270	17	140.50		23.35	
4:45		300	15.4	139.65		22.45	
5:15		330	14.1	138.82		21.62	
5:45		360	13	138.10		20.90	
6:15		390	12.1	137.50		20.3	
6:45		420	11.2	137.[illegible]85		19.65	
10 25		640	7.75	133.7		16.5	
8/5 8:30	5565	1245	4.47	130.25	13.05 - 1.1*		11.95
2:30	5725	1605	3.69	129.05	11.85 - 1.1*		10.75
8/8 1:30	10185	5865	1.74	122.05	4.85 - 1.1		3.75
8/10 500P			1.48	120.73	3.53 - 1.1*		2.43
8/15 10A			1.27	119.15	1.95 - 1.1		.85
8/18 5:30P			1.21	118.68	1.48 - 1.1		.38
8/22 2:15			1.17	118.35	1.15 - 1.1		.05
	*adjustment for NO[illegible] prod[illegible]						

APPENDIX A-2

WATER LEVEL DATA

HOLES 3V, 5V, 9V, 1067V
790V, 794V, 795V, 796V

7/31/77-
8/22/77

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: NuBeth   Location: Oshoto, Wyoming   Date: 8/1/77

Job No.:   Obs. Hole No.: [illegible]   T.D.: [illegible]   G.S.: [illegible]
Pumped Hole No.: [illegible]   T.D. Pumped hole: [illegible]   Meas. pt. above G.S.: [illegible]
Distance from pumped hole: [illegible] ft.   pumping rate: [illegible] gpm

date	time	time in min from start of pumping t	time in min from stopping pump t'	t/t'	water depth, ft. below meas. pt.	water depth, ft. below static (s)	dd(s) from pumping curve ft	Calculated recovery (s-s') ft
7/31	1000				—			
7/31	1700				[illegible]	77.30		
8/1	[illegible]	A.M.			79.22			
	12:15				79'–	11½"	ND	[illegible]
	[illegible]				79'–	11½"	7	[illegible]
	1:20				80'			
	1:55				80'	½"		
	2:15				79'	11½"		
	3:30				79'	11½"		
	[illegible]				79'	11½"		
	[illegible]				79	11"		
	6:30				79	11"		
	7:30				80'	00"		
	[illegible]				79'	11"		
	[illegible]				80'	00"		
	[illegible]				[illegible]	11½"		
	[illegible]				79	11½"		
8/2	12:30				80'	½"		
	1:30				79	11½"		
	[illegible]				80'00"			
	2:30				80'1½"			
	[illegible]				[illegible]			
	4:30				80'			
	[illegible]				80'			
	1000				80'½"			
	4:20				80'1"			
	7:55				80'2½"			
	10:38				80'4½"			
8/3	2:00 AM				80'6"			
8/3	5:00 AM				80'5½"			
	[illegible] a				80'[illegible]			
	1105				80'9¼			
	2:15				80'10¾			
	3:15				80'11"			
	[illegible]				80'11¼"			

time	time in min from start of pumping t	time in min from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft.	Calculated recovery (s-s') ft.
11:15				[illegible]11½"			
[illegible]				[illegible]			
[illegible]				[illegible]1½			
[illegible]				[illegible]			
11:00	[illegible]			[illegible]		[illegible]	OFF
1203		12:03		[illegible]3		AT	11:[illegible]
12:13		12:13		81'3½"			
12:37		12:37		[illegible]3"			
		1:44		81'3"			
		2:46		81'3"			
		3:23		81'3¼"			
		4:30		81'3½			
		5:30		81'4"			
		6:30		81'4"			
[illegible]				81'5"			
8/5 3:52P				81'7¾"			
8/5 2:30P				81'8½"			
8/8 1:30P				81'10½"			
8/10 5P				81'9 3/8			
8/15 10A				81'2¼"			
8/18 3:30P				80'10¾			
8/22 3:15P				80'8"			

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: Nu Beth   Location: Oshoto, Wyoming   Date: 8/1/77

Job No.:   Obs. Hole No.: 5V   T.D.: 415   G.S.: 4197.4

Pumped Hole No.: 487V   T.D. Pumped hole: 566   Meas. pt. above G.S.: 1.88

Distance from pumped hole: [illegible] ft.   pumping rate: 10 gpm

	time	time in min from start of pumping t	time in min from stopping pump t'	t/t'	water depth, ft. below meas. pt.	water depth, ft. below static (s')	dd(s) from pumping curve ft	Calculated recovery (s-s') ft	time	time in min from start of pumping t	time in min from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft.	Calculated recovery (s-s') ft.
7/31	1000				69.90											
7/31	1700				69.83	67.95			[illegible]				[illegible] 1½			
8/1	1109				67.61	= 67.79	below g.s.		[illegible]				[illegible]			
	12:20				70'-	4"	[illegible]		11:00	AM			[illegible]	½"		
	12:50				70'-	3½"	[illegible]		~~~~	~~~~	~~~~	~~~~	~~~~	~~~~	~~~~	~~~~
	1:25				70'-	2½"				Pump off at 11:45 pm						
	1:50				70'	3½"										
	2:20				70'	3"					12:40	P.M.	69'	11"		
	3:30				70'	2½"			3:34 P				69'11"			
	4:30				70'	1½"			6:38				70'0"			
	5:30				70'	1 3/4"										
	6:30				70'	1"			8/5 8:48	A			70'1"			
	7:30				70'	1½"			8/5 2:30	P			70'1"			
	8:30				70	1½"			8/8 1:30	P			70'1¾			
	9:30				70'	1"			8/10 5	P			70'2½			
	10:30				70'	½"	PM		8/15 10	A			69'11½			
	11:30				70	½"			8/18 3:30	P			69'10¾			
	12:30				70	½"			8/22 3:15	P			69'9½"			
	1:30				70'1"											
	2:15				70'											
	330				70½"											
	4:15				70¼"											
	6:35				70'1½"											
	1000				69'11½"											
	4:20				70'1½"											
	8:49				69'11¾											
	12:32				69'11½"											
8/3	2:00 AM				69 11½"											
	5:00				69 11½"											
	800				69'11"											
	11:00				69'10 6"											
	2:10				69'10¾											
	5:12				69'11											
	8:17				69'10½"											
	11:18				69'10½											

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: NuBeth Location: Osheta, Wyoming Date: 8/11/77

Job No.: Obs. Hole No.: 9V T.D.: 412 G.S.: 4188.9

Pumped Hole No.: 789V T.D. Pumped hole: 556 Meas. pt. above G.S.: 1.6

Distance from pumped hole: 99.7 ft. pumping rate: 10 gpm

	time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth, ft. below meas. pt.	water depth, ft. below static (s)	dd(s) from pumping curve, ft	calculated recovery (s-s') ft.
7/31	1000				60.28			
7/31	1700				60.18	58.58		
8/1	1112				60.09	(58.47	below G.S.	
	12:25				60'- 8" - MM - STATIC?			
	12:55				60'- 8"			
	1:30				60'- 7"			
	1:55				60' 8"			
	2:25				60' 7"			
	3:30				60' 7½"			
	4:30				60' 6"			
	5:30				60' 5½"			
	6:30				60' 6"			
	7:30				60' 6½"			
	8:30				60' 6"			
	9:30				60' 5½"			
	10:30				60' 5½"			
	11:30				60' 5½"			
8/2	12:30				60' 5½"			
	1:30				60' 6½"			
	2:30				60' 5½"			
	3:15				60' 5½"			
	4:15				60' 6"			
	6:25				60' 5"			
	10:25				60' 3½"			
	4:20				60' 3"			
	7:45P				60' 4½"			
	10:44				60' 5"			
8/3	2:00 AM				60' 4"			
	5:00				60' 4"			
	8:10				60' 4½"			
	11:15				60' 4"			
	2:00P				60' 4"			
	5:25				60' 4"			
	8:12				60' 4½"			
	11:20				60' 4"			

time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft.	Calculated recovery (s-s') ft.
[illegible]				[illegible]			
[illegible]				[illegible]			
[illegible]				[illegible]			
8/1 [illegible]				60' 11"			
[illegible]				[illegible]			
	Pump [illegible]			[illegible]	11'4/5	[illegible]	
		12:40		60' 4"			
3 3'7p				60'4"			
6:38				60'5½"			
8/5 8:46	A			60'7"			
2:30	P			60'9¼"			
8/2 1:30	P			60'8"			
8/10 5P				60'7¾"			
8/15 10	A			60'6"			
8/18 3:30	P			60'6½"			
8/22 3:15	P			60'5¾"			

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

WATER LEVEL MEASUREMENTS

Client: Job No:

Hole Number:	1067V											
Location:												
Date of drilling												
Water during drill.												
Ground elev, ft.												
Meas. pt. above g.s.	0.5											
Date:	Depth to H_2O	W.L. elev.	Depth to H_2O	W.L. elev.	Depth to H_2O	W.L. elev.	Depth to H_2O	W.L. elev.	Depth to H_2O	W.L. elev.	Depth to H_2O	W.L. elev.
July 12, 1977	79'9"											
July 29 10:35	80.49											
Aug 3 2:15 P	80'1"											
" 5:15 P	80'1"											
Aug 3 8:30 P	80'1¼"											
Aug 10 5:00 P	80'3"											
Aug 15 10 A	80'1"											
Aug 18 3:30 P	79'11"											
Aug 22 3:15 P	79'10¾"											

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Sheet 1 of ____

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: Location: Oshoto, Wyoming Date: 8/11/77

Job No.: Obs. Hole No.: 790V T.D.: 100 G.S.: 4198.3

Pumped Hole No.: 789V T.D. Pumped hole: 566 Meas. pt. above G.S.: 0.7

Distance from pumped hole: 22.0 ft. pumping rate: 10 gpm

	time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth, ft. below meas. pt.	water depth, ft. below static (s)	dd(s) from pumping curve, ft	Calculated recovery (s-s') ft.
	7-29-77 1100				37.13	36.38		
7/31	1000				37.45			
7/31	1700				37.29	36.54		
8/1	1107				37.10			
8/2	1000				37'2½"			
	9:30				37'5"			
	7:52				37'5"			
	10:35				37'5½"			
8/3	5:00				37'5"			
8/3	11:30A				37'5"			
	2:15P				37'3½"			
	5:15				37'2½"			
	8:18P				37'3½"			
	11:22				37'3½"			
8/4	[illegible]				[illegible]			
	[illegible]				[illegible]			
	332	9M			37'7½"			
	6:38				37'6"			
8/5	2:50A				37'8"			
	2:30P				37'7"			
8/8	1:20P				36'6"	(?)		
8/10	5P				37'10½"			
8/15	10A				37'9½"			
8/18	3:30P				37'10"			
8/22	3:15P				37'8½"			

time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft	Calculated recovery (s-s') ft.

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Sheet 1 of ____

JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: **Location:** **Date:**

Job No.: **Obs. Hole No.:** 794V **T.D.:** 100 **G.S.:** 4189.5

Pumped Hole No.: 789V **T.D. Pumped hole:** **Meas. pt. above G.S.:** 1.04

Distance from pumped hole: 1105 ft. **pumping rate:** 10 gpm

	time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth, ft. below meas. pt.	water depth, ft. below static (s)	dd(s) from pumping curve, ft	Calculated recovery (s - s') ft
	7-29-77 11:00a				49.9	48.86		
7/31	1000				50.05			
7/31	1900				50.00	48.96		
8/1	1116				49.93			
8/2	1020				~~51'3"~~	50'4"		
	4:26				50'3½"		soil first NOT.	
	7:47				50'3"			
	10:45				50'3¼"			
8/3	5:00 AM				50'4"			
	11:[illegible]				50'3"			
	2:00P				50'3"			
	5:27				50'0"			
	5:15				50'1"	Very windy		
	11:30				50'1½			
8/4	5:46				50'2½			
	7:20				50'1"			
	338				50'4½			
	6:40				50'4"			
8/5	8:45A				50'5¼"			
	2:30P				50'4¼"			
8/8	1:30P				50'3"			
8/10	5:20P				50'6"			
8/15	10:00A				50'3"			
8/18	3:30P				50'3½"			
8/22	3:15P				50'3"			

time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft.	Calculated recovery (s - s') ft.

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JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

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PUMPING TEST RESULTS
OBSERVATION HOLE

Client: Location: Date:

Job No.: Obs. Hole No.: 795V T.D.: 101 G.S.: 4217.7
Pumped Hole No.: 789V T.D. Pumped hole: 566 Meas. pt. above G.S.: 0.75
Distance from pumped hole: 325.0 ft. pumping rate: 10 gpm

	time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth, ft. below meas. pt.	water depth, ft. below static (s)	dd(s) from pumping curve, ft	Calculated recovery (s-s') ft.
	7-29-77 1100				80.41	79.66		
7/31	1000				80.69			
7/31	1700				80.65	79.90		
8/1	1055				80.45			
8/2	1015				82' 3½			
	4:40				81' 2¾			
	8:00				81' 3½"			
8/3	5:00	AM			81' 3"			
	11:45	AM			81' 3⅓"			
	2:20	P			81' 2"			
	5:20				81' 2"			
	8:25				81' 4¼	very windy		
	11:20				81' 2½			
8/4	2:30				81' 2½			
	9:20				81' 4"			
	328	pm			81' 3"			
	6:33				81' 3½"			
8/5	8:56	A			81' 4½"			
	2:30	P			81' 4¼"			
8/8	1:30	P			81' 3½"			
8/10	5:00	P			81' 6"			
8/15	10:00	A			81' 4"			
8/18	3:30	P			81' 4¾"			
8/22	3:15	P			81' 3½"			

time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft	Calculated recovery (s-s') ft.

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JUDITH L. HAMILTON
Consulting Geologist and Engineer
2220 Julian St. Denver, Colo. 80211

PUMPING TEST RESULTS
OBSERVATION HOLE

Client: Location: Date: 8/1/77

Job No.: Obs. Hole No.: 796V T.D.: 100 G.S.: 4211.8.
Pumped Hole No.: 789V T.D. Pumped hole: 566 Meas. pt. above G.S.: 1.13:
Distance from pumped hole: [illegible] ft. pumping rate: 10 gpm

time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth, ft. below meas. pt.	water depth, ft. below static (s)	dd(s) from pumping curve, ft	Calculated recovery (s-s')/ft
7-29-77 1100				74.48	73.35		
7/31 1000				74.82			
7/31 1700				74.74	73.61		
8/1 1057				74.65			
8/2 1000				74.5			
4:35				75'2"			
7:58				25'9			
10:40				75'3½			
8/3 [illegible]	[illegible]			[illegible]	3"		
8/3 11:30	AM			25' 2"			
2:17				75'2"			
5:46				75'1"			
8:23P				75'1½	very sl.	sl.	
11:25				75'2½			
8/4 [illegible]				[illegible]			
[illegible]				[illegible]			
3:26	PM			75'2½			
6:31				75'2½			
8/5 8:54A				75'4½"			
2:30P				75'3½"			
8/8 1:30P				75'4"			
8/10 5:00P				75'6 5/8"			
8/15 10:00A				75'4½"			
8/18 3:30P				75'4¾"			
8/22 3:15P				75'3"			

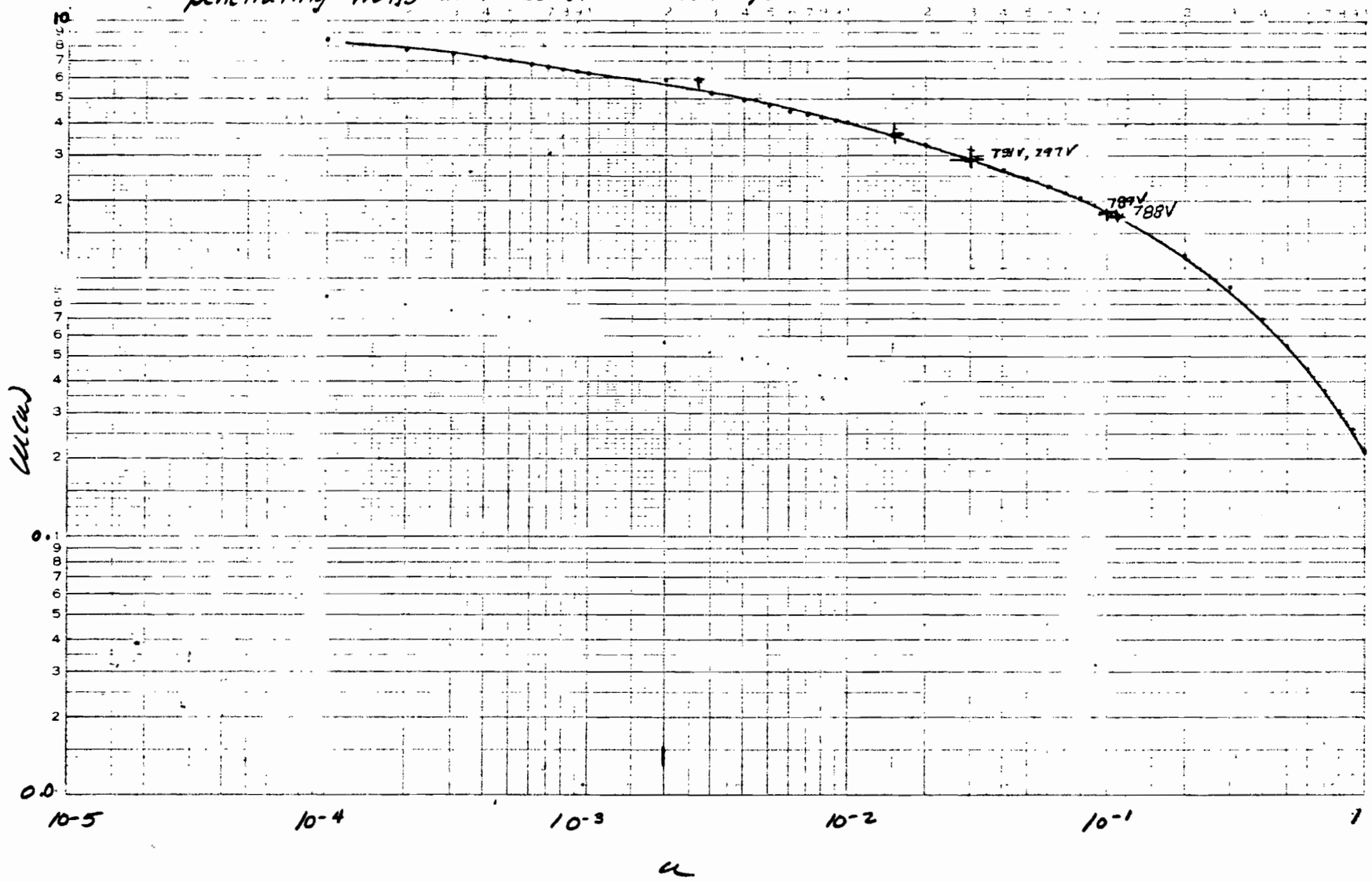
time	time in min. from start of pumping t	time in min. from stopping pump t'	t/t'	water depth (ft.) below meas. pt.	water depth (ft.) below static	dd(s) from pumping curve, ft.	Calculated recovery (s-s')/t ft.

APPENDIX A-3

STANDARD CURVES

Full Logarithmic, 3 x 5

Standard Curve for Anisotropic Non leaky Artesian Aquifer with fully penetrating wells and constant discharge conditions



From: Walton, 1970 Groundwater Resource Evaluation

TABLE 3.1 VALUES OF $W(u)$ OR $W(u_{xy})$. (*After Wenzel, 1942.*)

N \ u or u_{xy}	$N\times10^{-15}$	$N\times10^{-14}$	$N\times10^{-13}$	$N\times10^{-12}$	$N\times10^{-11}$	$N\times10^{-10}$	$N\times10^{-9}$	$N\times10^{-8}$	$N\times10^{-7}$	$N\times10^{-6}$	$N\times10^{-5}$	$N\times10^{-4}$	$N\times10^{-3}$	$N\times10^{-2}$	$N\times10^{-1}$	N
1.0	33.9616	31.6590	29.3564	27.0538	24.7512	22.4486	20.1460	17.8435	15.5409	13.2383	10.9357	8.6332	6.3315	4.0379	1.8229	0.2194
1.5	33.5561	31.2535	28.9509	26.6483	24.3458	22.0432	19.7406	17.4380	15.1354	12.8328	10.5303	8.2278	5.9266	3.6374	1.4845	0.1600
2.0	33.2684	30.9658	28.6632	26.3607	24.0581	21.7555	19.4529	17.1503	14.8477	12.5451	10.2426	7.9402	5.6394	3.3547	1.2227	0.04890
2.5	33.0453	30.7427	28.4401	26.1375	23.8349	21.5323	19.2298	16.9272	14.6246	12.3220	10.0194	7.7172	5.4167	3.1365	1.0443	0.02431
3.0	32.8629	30.5604	28.2578	25.9552	23.6526	21.3500	19.0474	16.7449	14.4423	12.1397	9.8371	7.5348	5.2349	2.9591	0.9057	0.01305
3.5	32.7088	30.4062	28.1036	25.8010	23.4985	21.1959	18.8933	16.5907	14.2881	11.9855	9.6830	7.3807	5.0813	2.8089	0.7942	0.00970
4.0	32.5753	30.2727	27.9701	25.6675	23.3649	21.0623	18.7598	16.4572	14.1546	11.8520	9.5495	7.2472	4.9482	2.6813	0.7024	0.00779
4.5	32.4575	30.1549	27.8523	25.5497	23.2471	20.9446	18.6420	16.3394	14.0368	11.7342	9.4317	7.1295	4.8310	2.5684	0.6253	0.00673
5.0	32.3521	30.0495	27.7470	25.4444	23.1418	20.8392	18.5366	16.2340	13.9314	11.6290	9.3263	7.0242	4.7261	2.4679	0.5595	0.00585
5.5	32.2568	29.9542	27.6516	25.3491	23.0465	20.7439	18.4413	16.1387	13.8361	11.5330	9.2310	6.9289	4.6313	2.3775	0.5034	0.00509
6.0	32.1698	29.8672	27.5646	25.2620	22.9595	20.6569	18.3543	16.0517	13.7491	11.4465	9.1440	6.8420	4.5448	2.2953	0.4544	0.00443
6.5	32.0898	29.7872	27.4846	25.1820	22.8794	20.5768	18.2742	15.9717	13.6691	11.3665	9.0640	6.7620	4.4652	2.2201	0.4115	0.00388
7.0	32.0156	29.7131	27.4105	25.1079	22.8053	20.5027	18.2001	15.8976	13.5950	11.2924	8.9899	6.6879	4.3916	2.1508	0.3738	0.00341
7.5	31.9467	29.6441	27.3415	25.0389	22.7363	20.4337	18.1311	15.8280	13.5260	11.2234	8.9209	6.6190	4.3231	2.0867	0.3403	0.00305
8.0	31.8821	29.5795	27.2769	24.9744	22.6718	20.3692	18.0666	15.7640	13.4614	11.1589	8.8563	6.5545	4.2591	2.0269	0.3106	0.00276
8.5	31.8215	29.5189	27.2163	24.9137	22.6112	20.3086	18.0060	15.7034	13.4008	11.0982	8.7957	6.4939	4.1960	1.9711	0.2849	0.00250
9.0	31.7643	29.4618	27.1592	24.8566	22.5540	20.2514	17.9488	15.6462	13.3437	11.0411	8.7386	6.4368	4.1423	1.9187	0.2602	0.00228
9.5	31.7103	29.4077	27.1051	24.8025	22.4999	20.1973	17.8948	15.5922	13.2896	10.9870	8.6845	6.3828	4.0887	1.8695	0.2387	0.00207

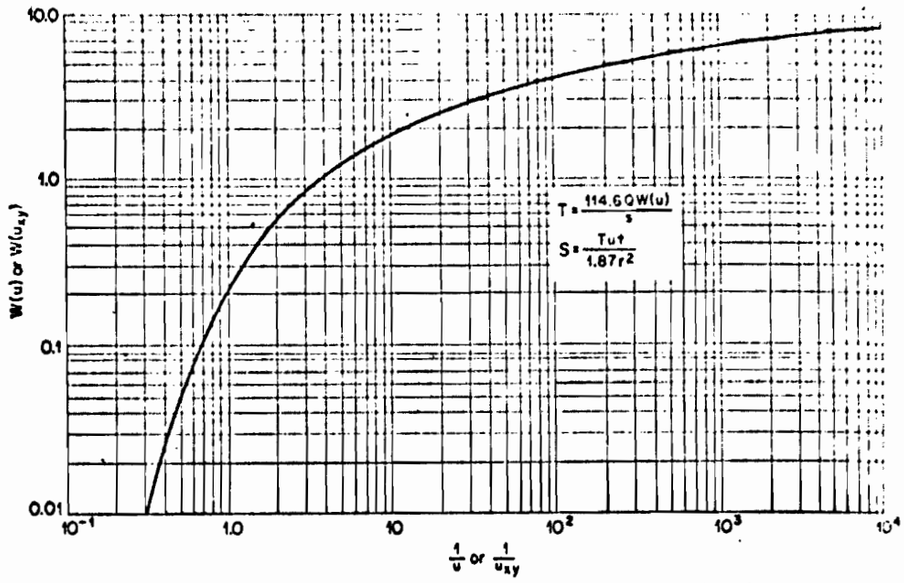
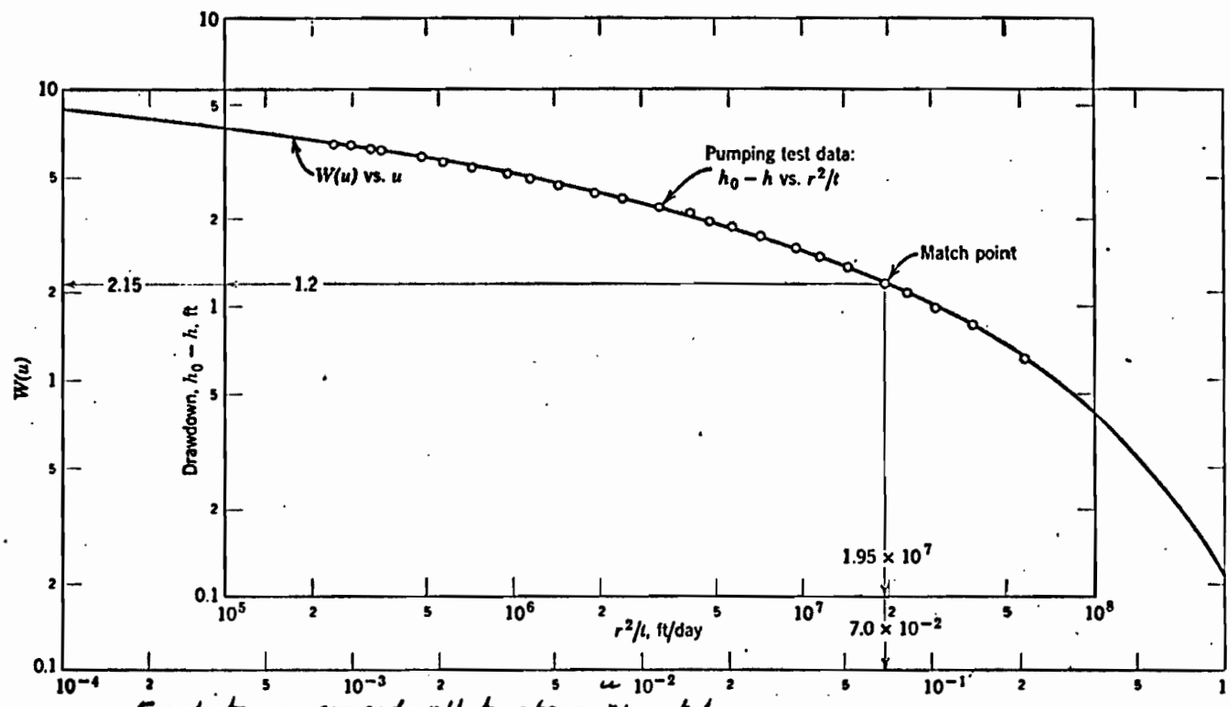


Fig. 4.2 Nonleaky artesian, fully penetrating, constant-discharge, time-drawdown type curve. (*Drawn by W. C. Walton.*)

From: Walton, 1970, Groundwater Resource Evaluation



r = distance pumped well to observation hole
t = time in days since pumping began

Fig. 4.9. Theis method of superposition for solution of the nonequilibrium equation.

From: Todd, 1959, Ground Water Hydrology

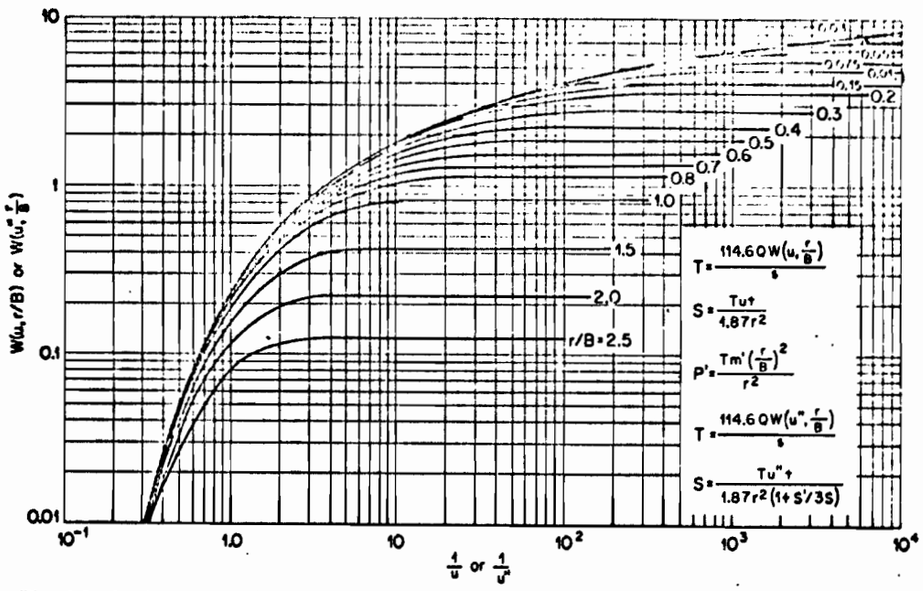


Fig. 4.8 Leaky artesian, fully penetrating, without water released from storage in aquitard, constant-discharge, time-drawdown type curves. (*After Walton, 1962a.*)

r = distance pumped well to observation hole
$B = \sqrt{T/(P'/m')}$
P' = coef. of permeability of aquitard, gpd/ft²
m' = saturated thickness of aquitard, in feet.

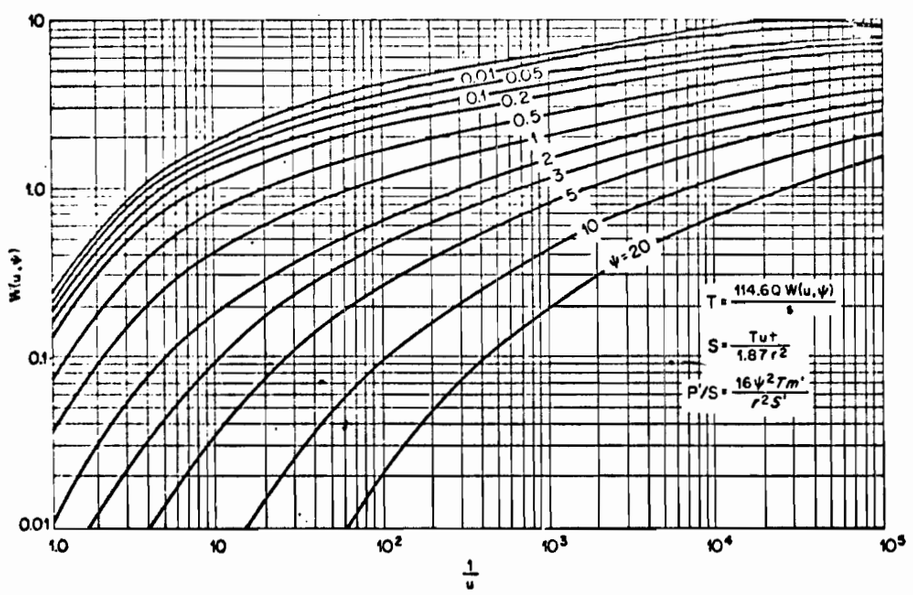
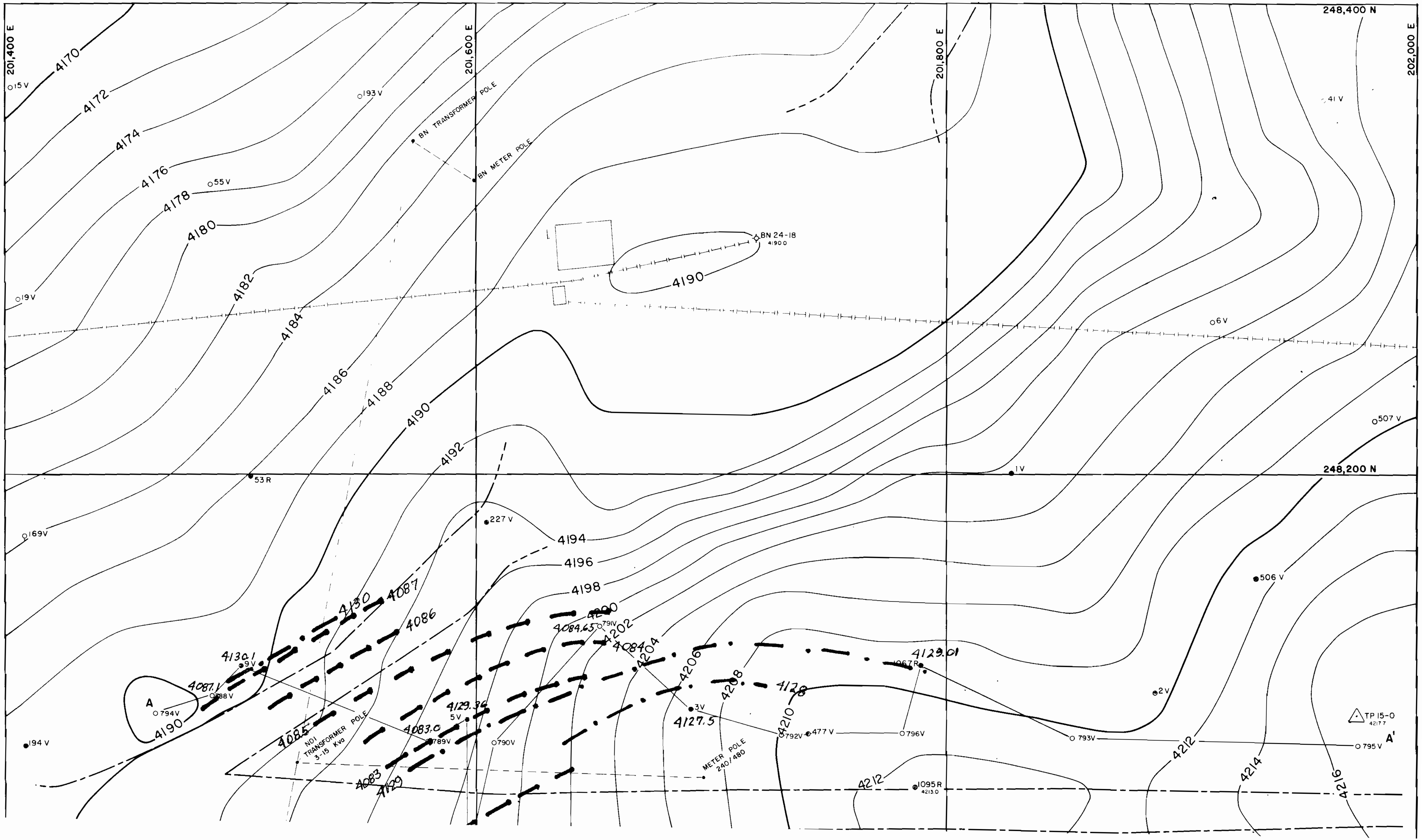


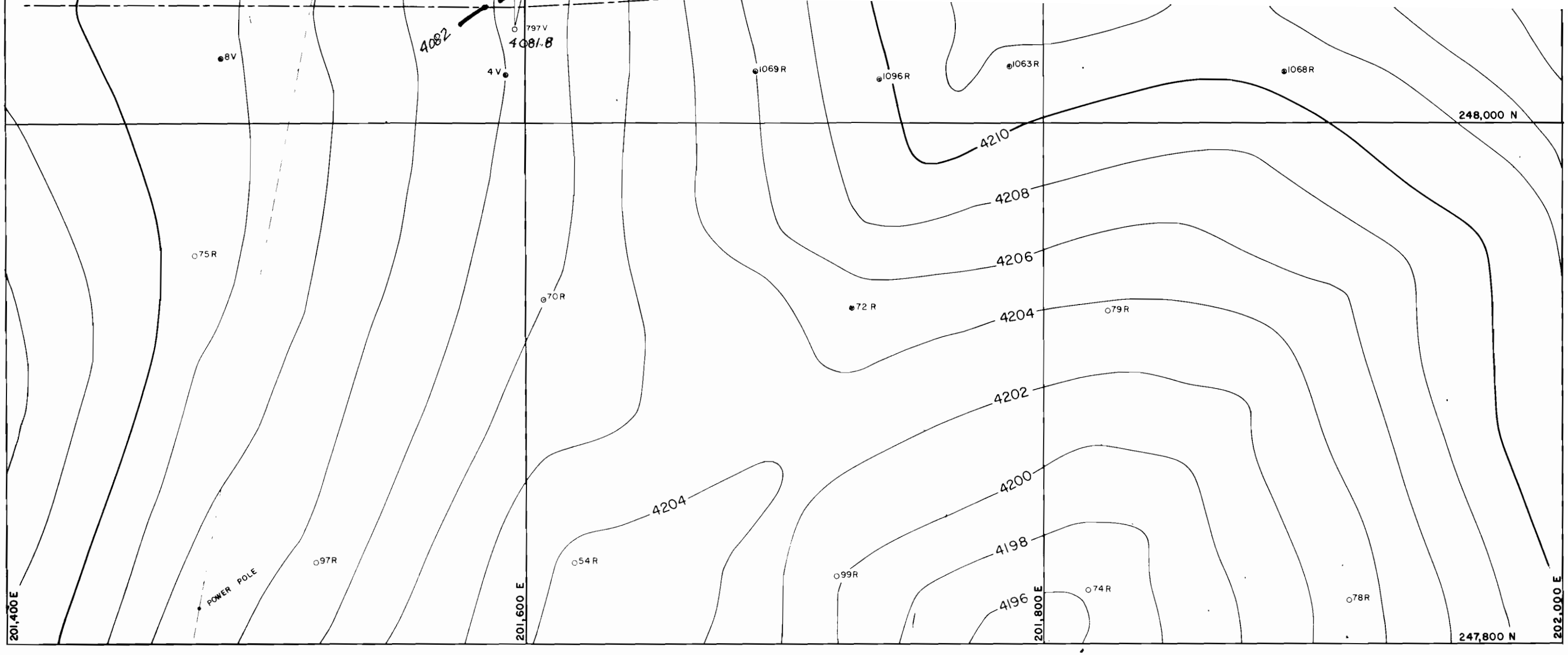
Fig. 4.11 Leaky artesian, fully penetrating, with water released from storage in aquitard, $t \leq m'S/74.8\,P'$, constant-discharge, time-drawdown type curves. (*Drawn by W. C. Walton.*)

$\psi = (\frac{r}{4}\sqrt{\frac{S'P'}{Tm'}}$ S' = coef. of storage of aquitard

From: Walton, 1970. Groundwater Resource Evaluation



248,400 N
248,200 N
201,400 E
201,600 E
201,800 E
202,000 E
BN TRANSFORMER POLE
BN METER POLE
BN 24-18
4190.0
NO1 TRANSFORMER POLE
3-15 Kva
METER POLE
240/480
TP 15-O
4217.7
A'
A
4170
4172
4174
4176
4178
4180
4182
4184
4186
4188
4190
4192
4194
4196
4198
4200
4202
4204
4206
4208
4210
4212
4214
4216
4128
4127.5
4129.01
4129.36
4129
4130
4130.1
4084.0
4084.65
4083.0
4083
4085
4086
4087
4087.1
1095 R
4213.0
1067 R
15 V
193 V
55 V
19 V
169 V
194 V
53 R
227 V
1 V
6 V
41 V
507 V
506 V
2 V
9 V
788 V
794 V
789 V
790 V
5 V
791 V
3 V
792 V
477 V
796 V
793 V
795 V



HYDROLOGIC TEST SITE

NUCLEAR DYNAMICS

AUGUST, 1977

0' 10' 20'

LEGEND

- 3V-NDI DRILL HOLE
- 4V-NDI DRILL HOLE - CEMENTED TO SURFACE
- 1V-NDI DRILL HOLE - CEMENTED IN ZONE "B"
- BN 24-18 OIL WELL
- POWER LINE
- A —— —— A' LINE OF SECTION
- BURIED PIPE LINE
- TP 15-0 TRIANGULATION STATION
- BUILDING
- ROAD
- 4200 SURFACE CONTOUR- C.I. = 2'

4082 Piezometric surface in Sand zone B

4129 Piezometric surface in sand zone A

4129.01 water level elevation in hole, feet

PLATE I