6 L's Farm   Short test

T 42
R 28

TELEGRAPH SWAMP SE, FLA.

110'   50'   90'   120'

5   4   3   2
15   1   750'

8

6   110'

40

Pumped
well

O65
well #12

195 20'P

8   NOT
OWNED

7
165'

6000'

12   200' deep

13

Roland
Walker

RESIDENTIAL

1500'

200' deep
9

10

18   11
820

24

O65
well #9

NOT

OWNED

17

14

40

16

OBS2
OBS3

21
22
OBS1
OBS4
23

15

16

17

18

30

20

SCALE

1000   0   1000   2000

Oaks Creek

1

2

Well # 9

Distance from pumped well 1500' GPM 52¼ GPM

Resumed 2 min → 130 min's into test   Static WL 40"

Time	Water Level	Draw-Down	Time	Water Level	Draw-Down
~~0 sec~~	40"	0	30 min	5'+11¼" 71.0	2.60
30 sec	40"	0	35 min	5'+16" 76.0	3.00
~~45 sec~~	40¼"	.02	40 min	5'+20½" 80.5	3.38
60 sec 2 min	~~40⅛~~	.02	45 min	5'+23½"	
~~45 sec~~			50 min	5'+27½" 87.5	
30 min	40¼	.02	55 min	5'+29½" 89¼	4.13
~~45 sec~~			60 min	10'-2.8" 92	
3 min	40½	.04	70 min	10'-23½" 96½	4.71
~~4 min~~	41	.08	80 min	10'-19" 101	5.08
5 min	41½	.12	90 min	10'-14" 106	5.50
min 30 sec	~~40½~~		100 min	10'-11½"	5.71
4 min			110 min	10'-8½" 111.5	
min 30 sec			120 min	10'-6" 114	6.17
5 min			150 min	10'+4" 124"	7.00
6 min	42½	.20	180 min	10'+9½" 129.5	7.46
7 min	44"	.32	210 min	10'+13½" 133.5	7.96
8 min	5'-17¼"	X	240 min	10'+19" 139.0	8.25
9 min	5'-15½" 44½	.36	300 min	10'+25"	8.75
min	5'-14" 46"	.50	580 min	4" 166.0	10.5
11 min	5'-13"	.58	1505 min	15'+7" 187.0	12.25
12 min	5'-11¾" 48¼	.69			
13 min	5'-10¼" 49¾	.81			
14 min	5'-9¼"	.90			
15 min	5'-8" 52	1.00			
20 min	5'-½" 59.5 1000	1.63			
25 min	5'+5¾"	2.15			

Well # 9 Recovery

Distance from pumped well __150'__ GPM _____

Static WL

Time	Water Level	Draw-Down	Time	Water Level	Draw-Down
0 0/5 sec	15'+7"		30 min	15'-24"	
30 sec	15'+7"		35 min	15'-27½"	
45 sec	15'+6"		40 min	15'-31"	
60 sec	15'+5 ¾"		45 min	15'-33½"	
min 15 sec	15'+5½"		50 min	15'-35½"	
min 30 sec	15'+5"		55 min	10'+22½"	
min 45 sec	15'+4½"		60 min	10'+20"	
2 min	15'+4⅛"		70 min	10'+16"	
min 30 sec	15'+3¾"		80 min	10'+12½"	
3 min	15'+3"		90 min	10'+9"	
min 30 sec	15'+2¾"		100 min	10'+6"	
4 min	15'+1½"		110 min	10'+3"	
min 30 sec	15'+1¼"		120 min	10'+¼"	
5 min	15'+½"		150 min	Pumped	
6 min	15'-½"		180 min	Well shut off at 1:00-1 PM	
7 min	15'-1½"		210 min	9762900 gal.	
8 min	15'-3"		240 min		
9 min	15'-4½"			10'+25"	
10 min	15'-5½"			8:20	
11 min	15'-6½"			15'-14"	
12 min	15'-8½"			11:45	
13 min	15'-9½"			15+7"	
14 min	15'-10¼"				
15 min	15'-11½"				
20 min	15'-15½"				
25 min	15'-20"				

524 GPM

East of jack Cabin

Well # 12

Distance from pumped well ___ GPM 52.4
r ~ 6000 ft   Static WL 1.8' BLTOC

Time	Water Level	Draw-Down	Time	Water Level	Draw-Down
0 sec	21 1/4 in.		30 min	21 1/4	
30 sec	11 11		35 min	11 11	
			40 min	11 11	
60 sec	11 11		45 min	11 11	
min 15 sec	11 11		50 min	11 11	
min 30 sec	11 11		55 min	11 11	
min 45 sec	11 11		60 min	11 11	
2 min	11 11		70 min	11 11	
min 30 sec	11 11		80 min	11 11	
3 min	11 11		90 min	11 11	
min 30 sec	11 11		100 min	21 in.	
4 min	11 11		110 min	11 11	
min 30 sec	11 11		120 min	20 3/4	
5 min	11 11		150 min	11 11	
? min	11 11		180 min	11 11	
? min	11 11		210 min	11 11	
? min	11 11		240 min	20 3/4	
? min	11 11		270 min	11 11	
? min	11 11		300 min	20 3/4 in.	3:20
1 min	11 11		600 min	20 3/4 in	
2 min	11 11		1320 min	21 1/2 in	
3 min	11 11		1520 min	21 3/4 in	
4 min	11 11				
5 min	11 11				
20 min	11 11				

$Q = 524 \ GPM$

$r = 1500'$

$$T = \frac{114.6 \ Q}{s} w(u, r/B)$$

$$= \frac{(114.6)(524)}{4.4}(1)$$

$$= 13,047 \ GPD/FT$$

$$S = \frac{Tt}{2700 \, r^2} u$$

$$= \frac{13047}{(2700 \times 1500^2)}\left(\frac{1}{10}\right)$$

$$= 3.16 \times 10^{-5}$$

$$\frac{r}{B} = \frac{r}{\sqrt{T/(P'/m')}} \Rightarrow \frac{P'}{m'} = \frac{T(r/b)^2}{r^2}$$

$$L = \frac{P'}{m'} = \frac{(13047)(.3)^2}{1500^2}$$

$$= 5.46 \times 10^{-4}$$

$$GPD/FT^3$$

$\frac{1}{u} = 10$

$w(u, r/B) = 10$

$s = 4.4$

$t = 141$

0.2

$r/b = 0.3$

0.4

10

$t \quad min$

10

100

1000

TELEGRAPH SWAMP SE, FLA.

FIGURE 3   WELL LOCATIONS

SCALE

FEET

.8 WELL SITE
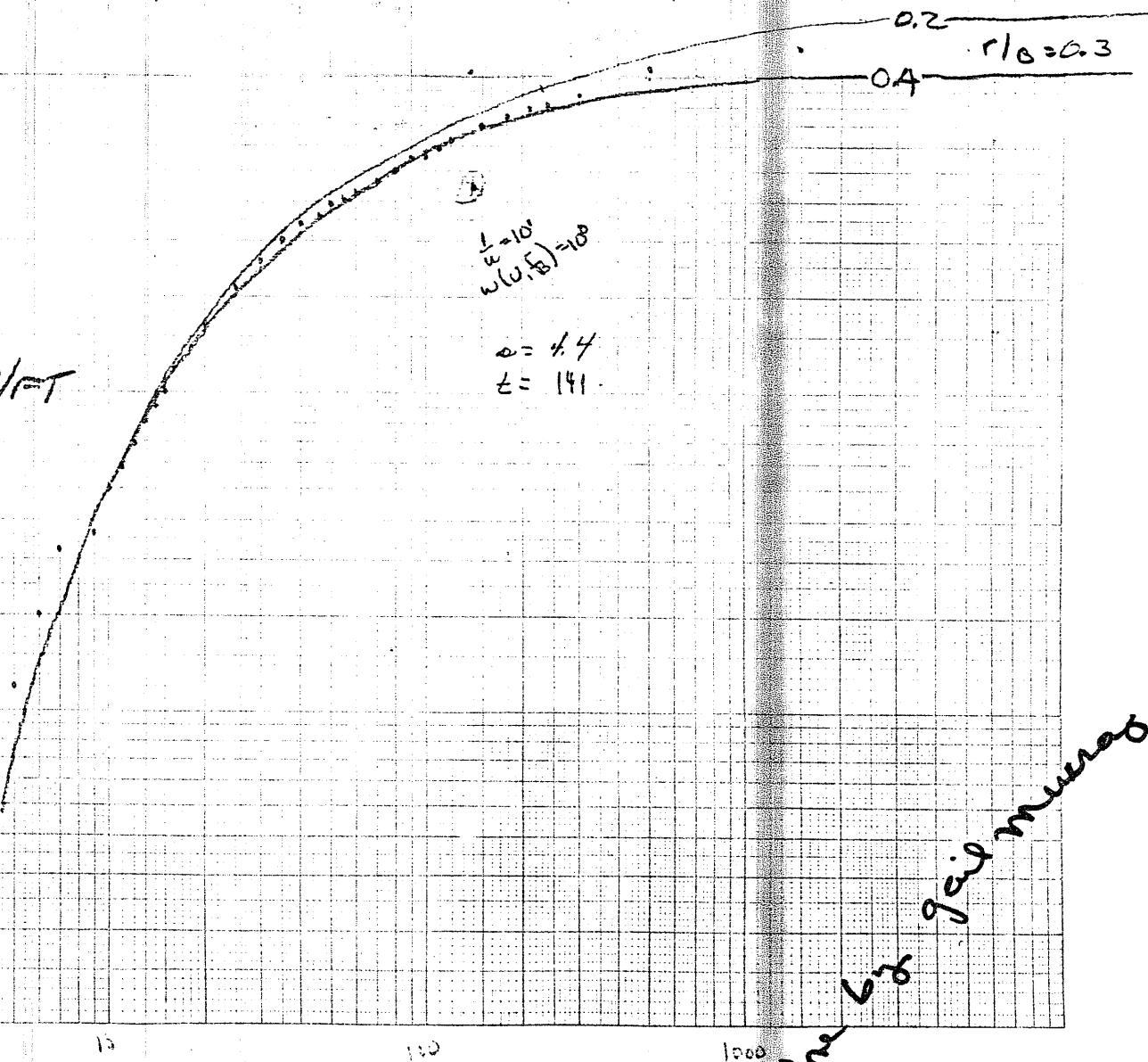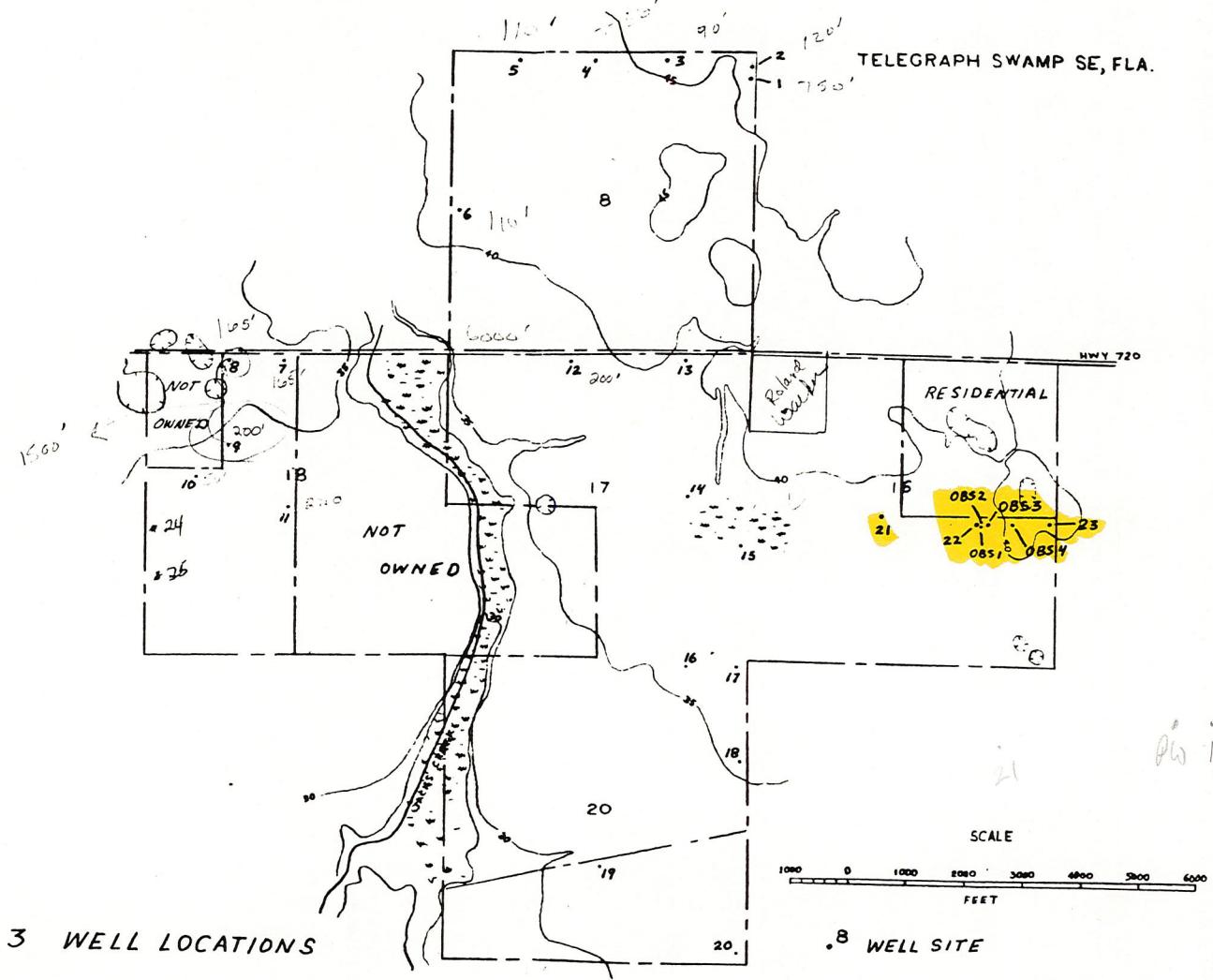
TEST PROCEDURES

Observation Wells and Core Sampling

Production well no. 22 was chosen to be used as the test production
well after step drawdown tests and nos. 21 and 23 as observation
wells. Four two inch observation wells were drilled between wells
22 and 23. A shallow and production zone well were placed at 50
feet from well no. 22 and two others at 200 and 600 feet. See
Figure 3 for their location. Table 3 lists their drilled and cased
depths.

The two inch observation wells were constructed by cable tool
and hydraulically bored out. The production zone wells had simple
open hole entrances but the shallow well was installed with ten
feet of screen by lowering a slotted 1 1/4 inch PVC pipe into the
steel casing and extending it below the casing bottom.

Core samples were collected at approximately ten foot intervals by
collecting material washed up out of the casing as it was drilled
out. As highly consolidated limestone was encountered at 15 feet,
the first 20 feet of casing was drilled out before additional
sections were driven. This tended to alleviate the problem of
losing samples through packing of the casing as it was driven
through the limestone layer. This technique, while the only one
readily available, tended to wash out fine clay fractions, possi-
bly changing marginal sandy clays to claye sands.

WELL NO.	DIAMETER, in.	DRILL DEPTH, ft.	CASING DEPTH, ft.
21	9 5/8	165	80
22	9 5/8	180	74
23	9 5/8	165	80
OBS 1	2	120	70
OBS 2	2	50	40 - 10 screen
OBS 3	2	120	70
OBS 4	2	120	79

WELL NO.	RADIAL DIST., ft.
21	2000
23	1700
OBS 1	50
OBS 2	50
OBS 3	200
OBS 4	600

TABLE 3   TEST WELL DATA

Level Measurement

Battery powered volt and ammeters with graduated wires, which were lowered into the casings, were used on all wells except for the test production well in which an air pressure tube with a 0 - 30 psi gauge was employed. Levels were measured according to the schedule supplied by the S.F.W.M.D. This schedule may be found in the appendix along with the data collected.

Flow Measurement

A four inch impellor type flowmeter was installed on the discharge of the test pump, a six inch, five stage turbine, which was equipped with an instantaneous rate indicator and totalizer. Pump rates were set with the rate indicator but tabulated rates were determined by dividing the total pumpage by the elapsed time.

Discharge Routing

Pumped water was carried from the test site by a ditch system that ran down-grade to a retention site 4000 feet away. No artificial recharge was detected as predicted from the core sampling program.

Step Drawdown Tests

The three existing production wells, nos. 21, 22, 23, were tested to determine if good hydraulic connection existed with the aquifer and which one had the lowest specific drawdown. The best producing was then to be used in the constant rate discharge test. In each test the well was pumped for thirty minutes and drawdown measured. This was done at several flow rates from the highest first to the lowest, as the maximum production of each well was not known before hand. It was attemped to allow the aquifer to fully recover between each pump test but it soon became apparent that this would have required too much time in consideration of the objectives of this phase of the over-all testing program. The aquifer was then allowed to recover for twenty minutes and the water level was recorded.

Constant Rate Discharge Test

Pumping began on production well no. 22 at 11:20 AM on August 9, 1982. Discharge rate was set at 450 GPM and totalizer reading recorded. This well was pumped for 72 hours and measurements were taken as per the following schedule:

TIME PERIOD, min.	FREQUENCY OF MEASUREMENT, min.
0 - 5	every 0.5
5 - 20	every 1.0
20 - 60	every 5
60 - 100	every 10

Constant Rate, cont.

TIME PERIOD, min.	FREQUENCY OF MEASUREMENT, min.
100 - 120	every 20
120 - 240	every 30
240 - 720	every 60
720 - 1920	every 120
1920 - 4320	every 240

At 11:20 on August 12, 1982 the pump was shut down and totalizer reading recorded.

Recovery Test

Immediately following pump shut down recovery measurements were started. The frequency of these was the same as for the constant rate up to 720 minutes and three more measurements were taken at 1200, 2640 and 4080 minutes.

ANALYSIS OF DATA

Hydrogeologic Cross-section

From the well logs of the test production well and the observation
wells a representative cross-section was developed, Figure 4.
In the test area the aquiclude seems to begin at 75 feet below
ground level and is roughly 45 feet thick. It is estimated from
the driller's log of no. 22 that the aquifer is 60 to 70 feet
thick. See the appendix for a detailed description of the core
samples collected.

Specific Capacity

Plots of the drawdown vs pumping rate, Q, GPM, were drawn from the
step drawdown data for wells 21, 22, and 23, Figures 5 and 6.
A straight line was fitted to the data points with its slope giving
an average specific capacity, rate, Q/ drawdown, s. The following
summarizes this:

WELL NO.	SPECIFIC CAPACITY, GPM/FT
21	4.4
22	33.3
23	1.4

A plot of specific drawdown vs pumping rate, Q, CFS, was prepared
for well no. 22, Figure 6, and the coefficients determined for
the theoretical relationship of drawdown, s vs discharge, Q;
$s = BQ + CQ^2$. The efficiency was also calculated by ;
$E = 1 / 1 + (C/B)Q$. Suspicion of the data arose on the calculation
of the well loss, C/Q^2. If level measurements made on the pro-
duction well during the constant rate test were corrected for this
loss an impossible physical phenomenon would have to occured, ie
the water surface would actually rise in elevation from the closest
observation well to the production well, water would be flowing
up-hill. It is for this reason that the observed drawdowns will
not be adjusted for well loss.

It is postulated that not enough data points were collected with
sufficient accuracy to support this analysis.

Theis Non-Equilibrium Analysis

It was suspected that the aquifer in this region is leaky so the
Theis analysis was done for that case. Log - log plots of draw-
down vs time, Figures 7 and 8, were prepared and compaired with
nonsteady-state leaky artesian aquifer type curves,(1), Figure 9.
Match points were found resulting in numerical values for use
in solving the Theis equations. The following is a list of the
variables involved and their units:

WEST — EAST

LATERAL DISTANCE, FT

0   50   100   150   200   250   300   350   400   450   500   550   600   650   700

NO. 22   OBS 1   OBS 3   OBS 4

(37' NGVD) 0

DEPTH, FT.

20

40

60

80

100

120

140

160

180

47 0702

SAND, ORANGE TO BROWN, FINE TO MED. GRAIN

SANDY LIMESTONE, LT. ORANGE TO WHITE

SANDY CLAY TO CLAYE SAND, GREY

SAND, GREY; TRACE PHOSPHATES

SANDY PHOSPHATIC CLAY, OLIVE GREEN

CLASTICS; QUARTZ, CLEAR; QUARTZITE, GREY

SANDY CLAY, WHITE; TRACE PHOSPHATE, BLACK

SAND, GREY; CLAY, WHITE

SAND, GREY; LIMESTONE, WHITE

SANDY LIMESTONE, WHITE

LIMESTONE TO SANDY LIMESTONE, WHITE; FOSSILS

AQUICLUDE
AQUIFER

FIGURE 4   HYDROGEOLOGIC CROSS-SECTION FOR TEST SITE
SEE APPENDIX FOR MORE DETAILED CLASSIFICATION

DRAWDOWN, S, FT

SLOPE = 0.23 FT/GPM

SPECIFIC CAPACITY = 4.4 GPM/FT

PUMPING RATE, Q, GPM

PRODUCTION WELL NO. 21

DRAWDOWN, S, FT.

SLOPE = 0.71 FT/GPM

SPECIFIC CAPACITY = 1.4 GPM/FT

PUMPING RATE, Q, GPM

PRODUCTION WELL NO. 23
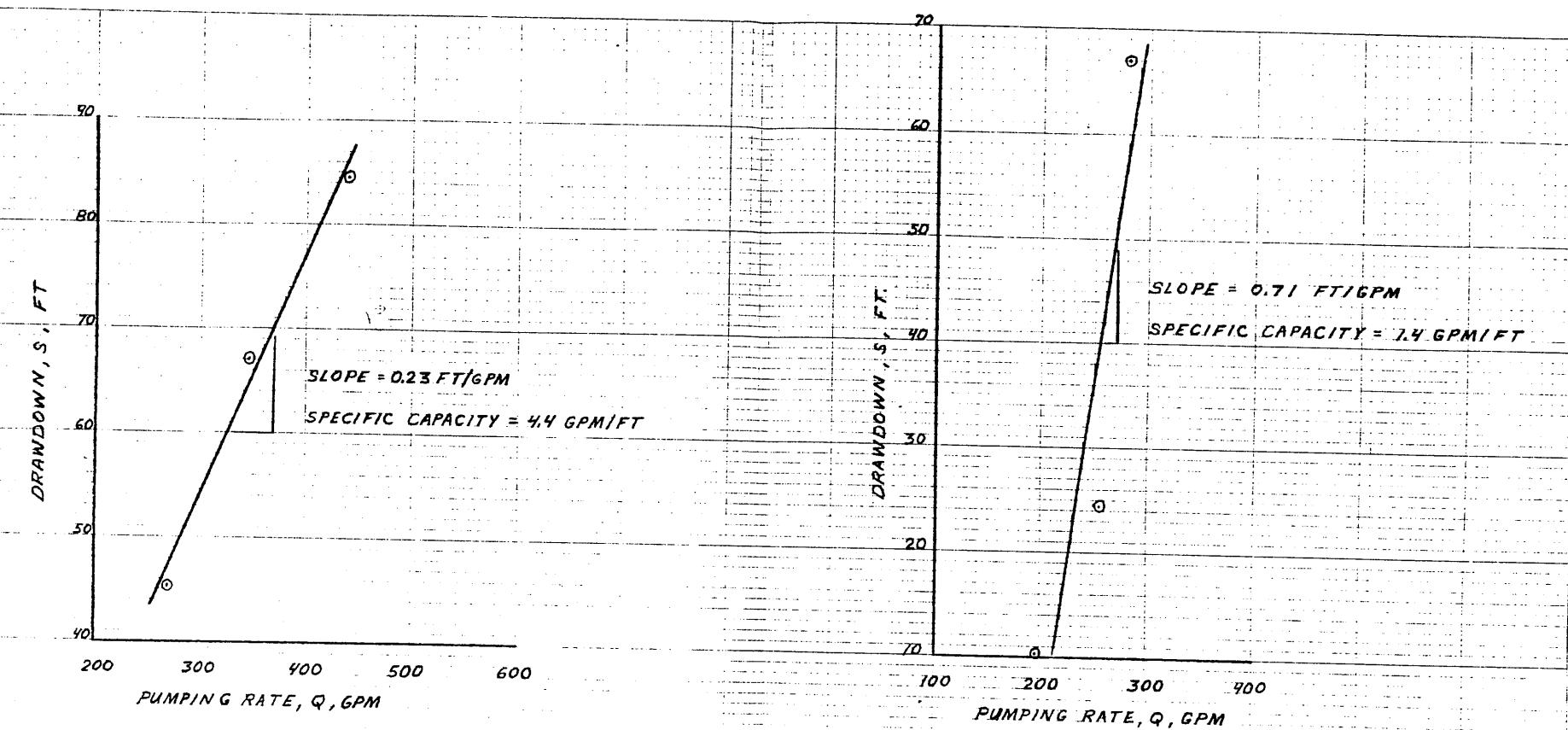
FIGURE 5 SPECIFIC CAPACITY TEST RESULTS
FOR PRODUCTION WELLS, NO. 21 AND 23

SLOPE = 0.03 FT/GPM

SPECIFIC CAPACITY = 33.3 GPM/FT

DRAWDOWN, S, FT

14

12

10

8

6

INCONSISTANT DATA POINT

PUMPING RATE, Q, GPM

200   300   400   500   600

S/Q, 1/FT²·SEC

10

9

8

INCONSISTANT DATA POINT

BY LEAST-SQUARES

$\frac{S}{Q} = 4.94 + 3.86 Q$

$B = 4.94$

$C = 3.86$

PUMPING RATE, Q, CFS

.6   .8   1.0   1.2   1.4

Q, CFS

.6   .8   1.0   1.2   1.4

4

6

8

10

12

14

S, FT

$S = 4.94 Q + 3.86 Q^2$

4.94 Q

FORMATION LOSS

$3.86 Q^2$

WELL LOSS

EFFICIENCY

70 %

60 %

50 %

WELL EFFICIENCY
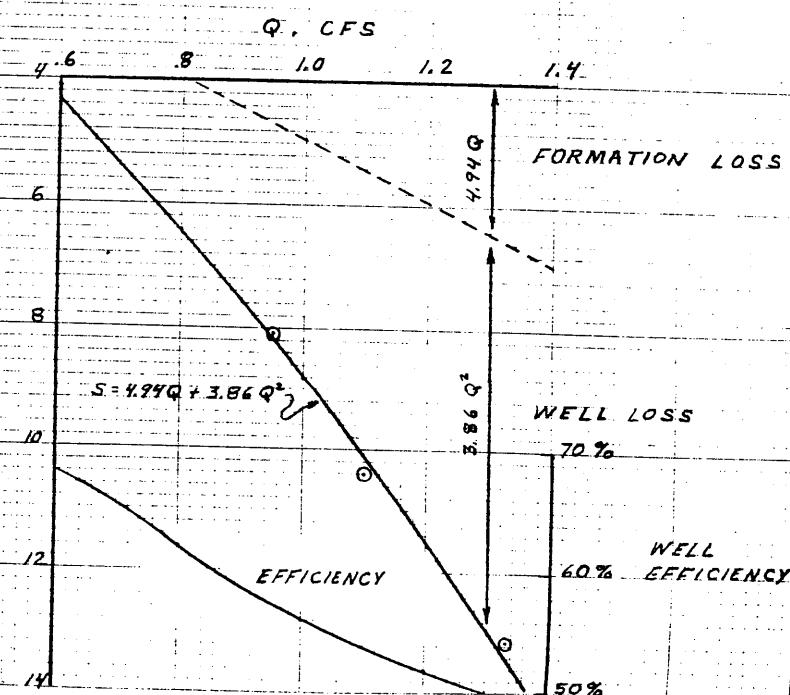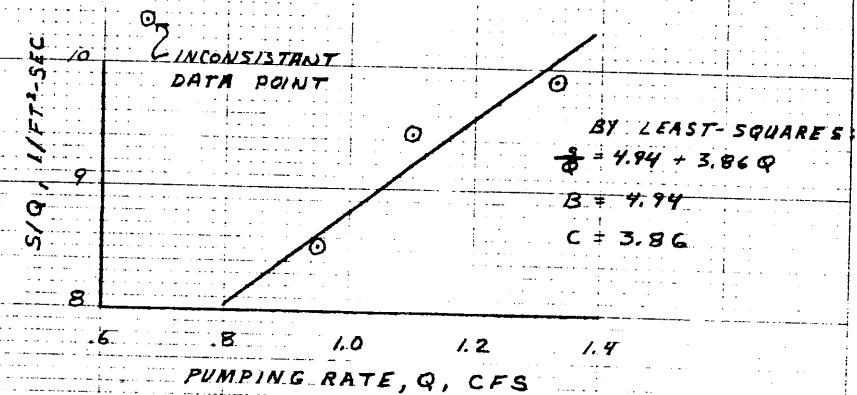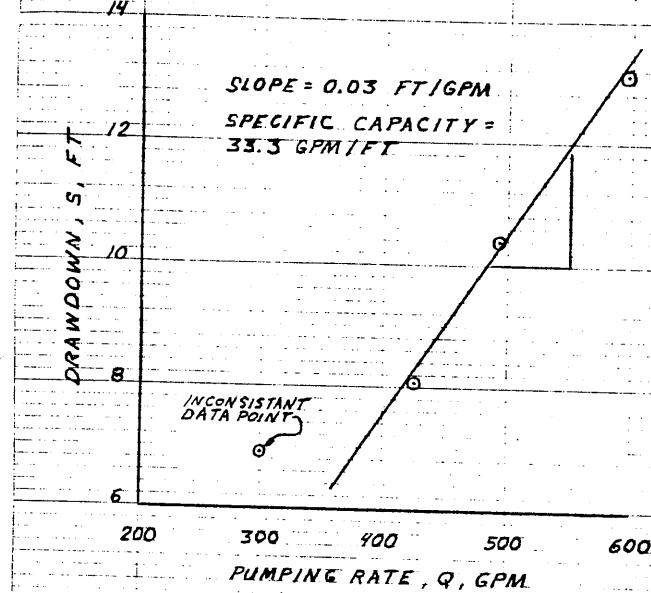
FIGURE 6. SPECIFIC CAPACITY DIAGRAM FOR PRODUCTION WELL NO. 22, WHICH WAS USED FOR THE CONSTANT DISCHARGE TEST.
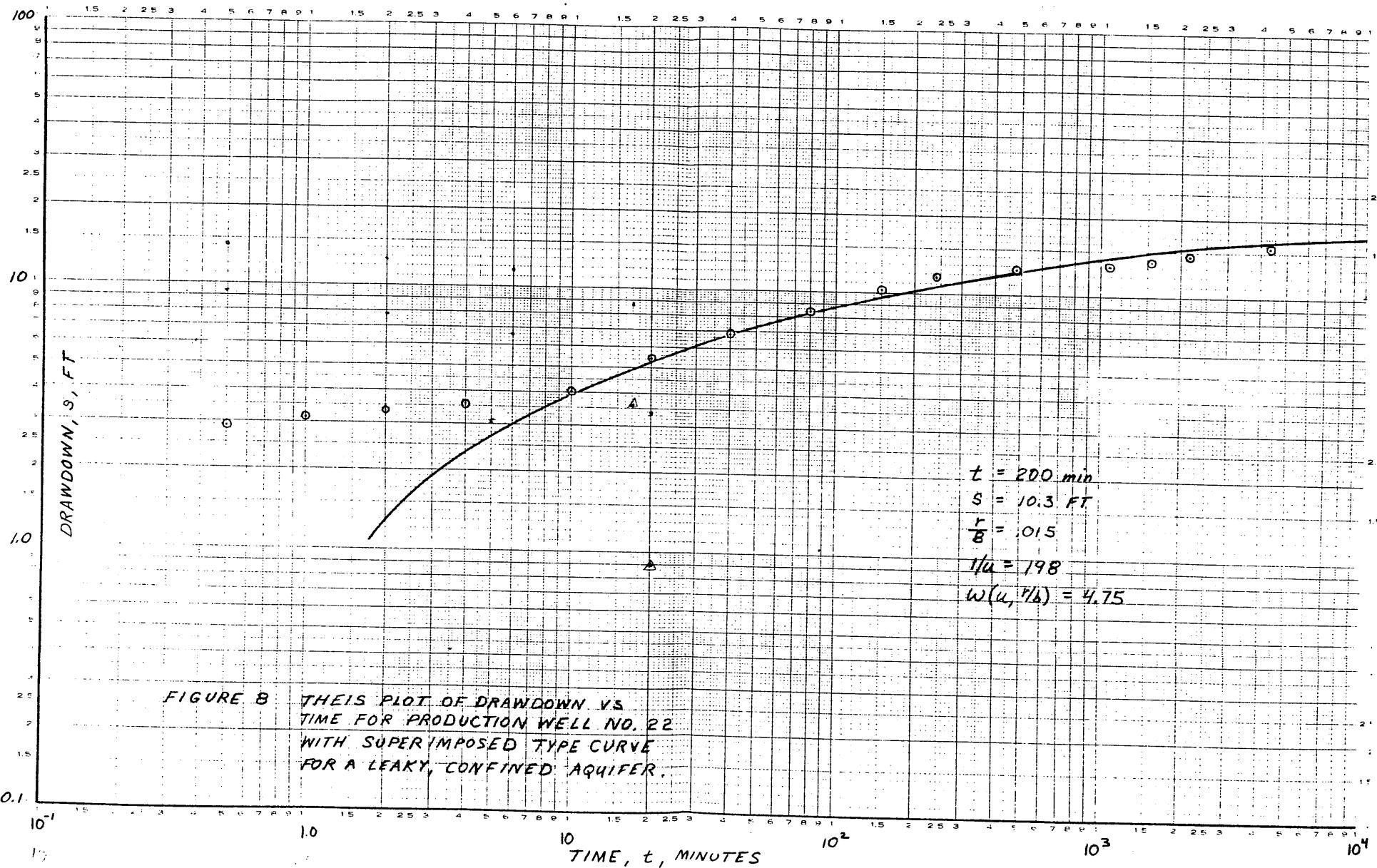
FIGURE 8   THEIS PLOT OF DRAWDOWN VS
TIME FOR PRODUCTION WELL NO. 22
WITH SUPERIMPOSED TYPE CURVE
FOR A LEAKY, CONFINED AQUIFER.

$t = 200 \, min$

$S = 10.3 \, FT$

$\frac{r}{B} = .015$

$1/u = 198$

$W(u, r/b) = 4.75$

DRAWDOWN, S, FT

TIME, t, MINUTES

WELL	t	r/B	s	$1/u$	$\omega(u, r/b)$
O.B.S. NO. 1	200	.052	10.1	146	4.44
O.B.S. NO. 3	150	.062	8.6	64	3.60
O.B.S. NO. 4	300	.090	9.2	62	3.55
PROD. NO. 23	400	0.30	7.0	13.2	2.01
PROD. NO. 21	600	0.15	2.7	14	2.12

⊕ OBSERVATION NO. 1
△ OBSERVATION NO. 3
⊡ OBSERVATION NO. 4
◇ PRODUCTION NO. 23
▽ PRODUCTION NO. 21
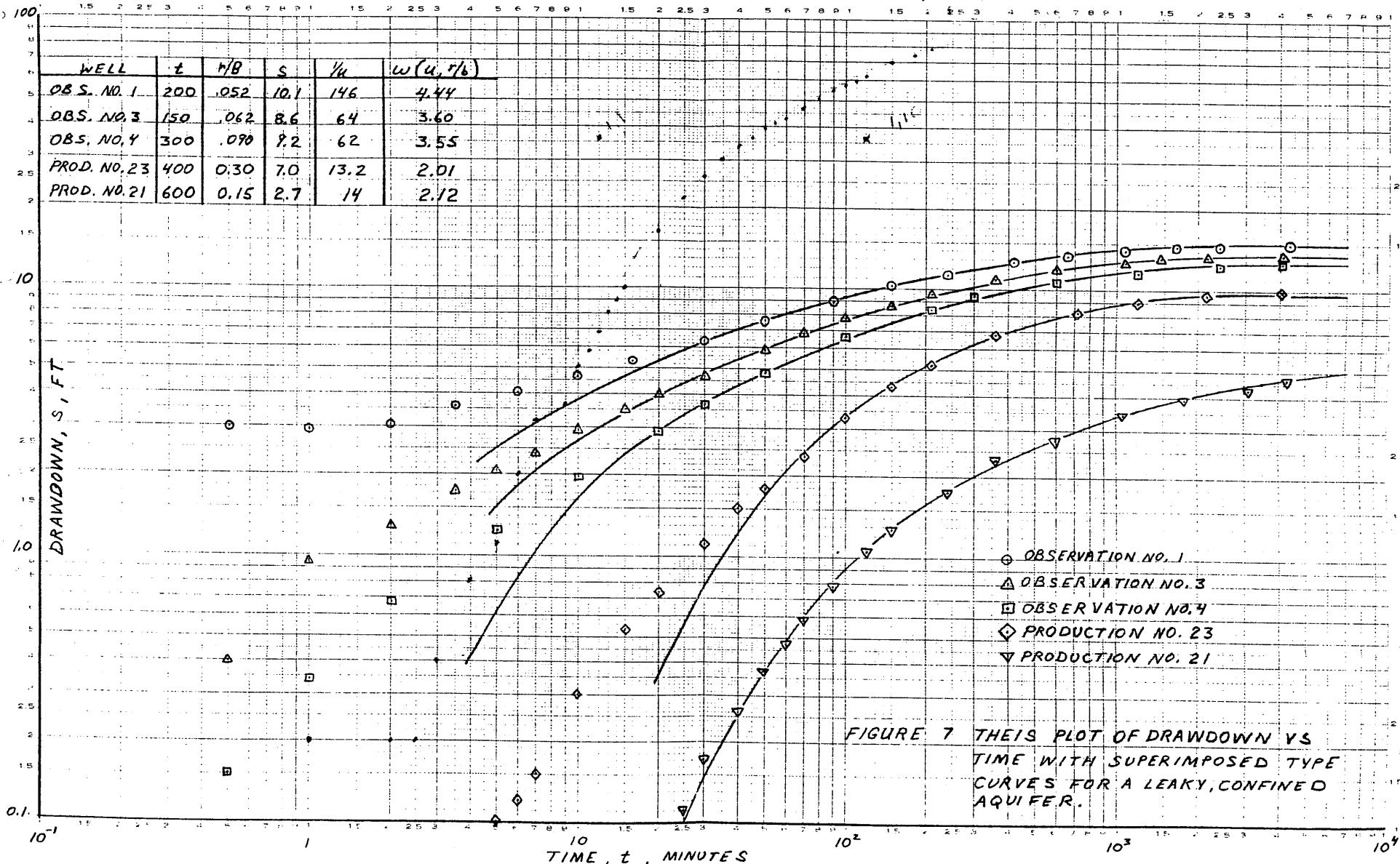
FIGURE 7 THEIS PLOT OF DRAWDOWN VS TIME WITH SUPERIMPOSED TYPE CURVES FOR A LEAKY, CONFINED AQUIFER.

DRAWDOWN, S, FT

TIME, t, MINUTES

$W(u, r/B)$ — vertical axis

$1/u$ — horizontal axis

NO LEAKAGE
$B \rightarrow \infty$

0.015
0.03
0.05
0.075
0.1
0.15
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1.0
1.5
2.0
$r/B = 2.5$

$$S = \frac{114.6 \, Q \, W(r/B, u)}{T}$$

$$u = \frac{2700 \, r^2 \, S_c}{T \, t}$$

$$r/B = \frac{r}{\sqrt{T/(K'/b')}}$$

FIGURE 9 NON STEADY-STATE LEAKY ARTESIAN
TYPE CURVES (1)
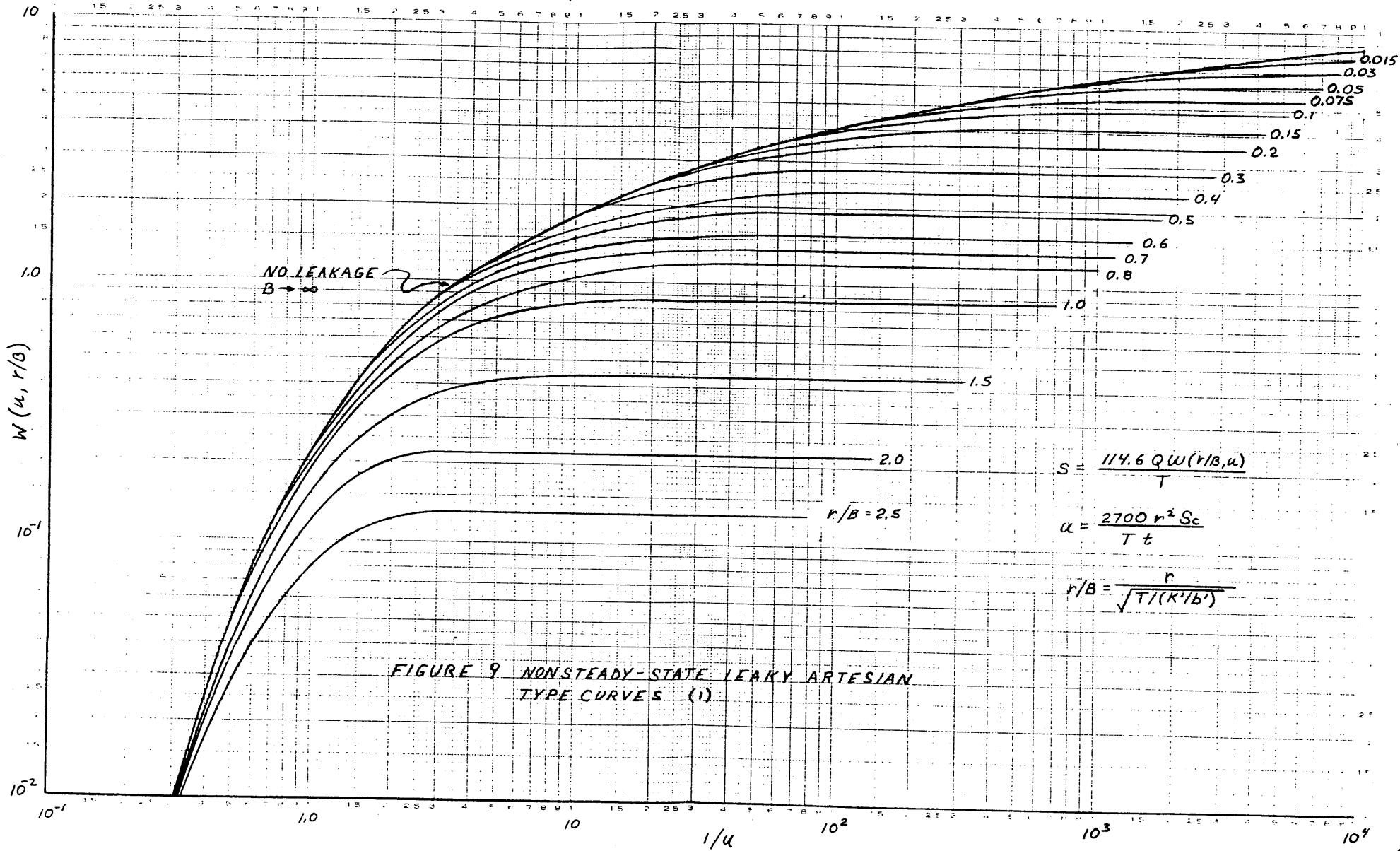
Theis Non-Equilibrium, cont.

s   measured drawdown, feet
Q   pumping rate, gpm
t   time, minutes
T   transmissivity , gpd/ft
S   storage coefficient, dimensionless
r   radial distance from production well, feet
B   leakage factor, feet
K   hydraulic conductivity of aquifer, gpd/ft^2
K'   hydraulic conductivity of semi-confining stratum, gpd/ft^2
b   thickness of aquifer, feet
b'   thickness of aquiclude, feet
$W(u,r/B)$ well function for leaky artesian aquifers
$1/u = Tt/2700r^2 S$

Values of s, t, 1/u, and $W(u,r/B)$ were determined by fitting the plotted data points to the type curves for values of r/B. These were substituted into the following equations for calculation of the aquifer constants:

$$T = 114.6 \ Q \ W(u,r/B) / \ s \qquad\qquad S = u \ T \ t / \ 2700 \ r^2$$

$$K = T / \ b \qquad\qquad\qquad\qquad K' = T \ b' \ (r/B)^2 / \ r^2$$

Table 4 summarizes the graphical and calculated values derived through this analysis. The most striking differences in the formation constants are the transmissivity calculated from the data derived from well no. 21 and the hydraulic conductivity of the aquiclude from production well no. 22. As there were no intermediate observation wells between no. 21 and 22 no concrete reason can be given for the higher transmissibility but it is strongly suspected that in light of the low specific discharge for well 21 that there exists a natural barrier to flow from west to east causing an apparent high T value.

The high value of K' calculated from production well 22 is in direct contradiction with the value of r/B determined. The small value of r/B would predict a small value for K'. It would be a good guess, as can be seen clearly in the Jacob analysis, that the problem relates back to the measured drawdowns in the production well. The drawdown measured seems to be much smaller than theory predicts, making the T and K' values appear higher.

For the above mentioned reasons, it was decided to neglect the constants determined from wells 21 and 22 and average the values from the other wells to determine constants for use in the predictive drawdown analysis. The following values will then be used:

TRANSMISSIVITY , T :   20970 GPD/FT,   STORAGE COEF., S: $1.39 \ 10^{-3}$
HYDRAULIC COND., K: 300 GPD/FT^2,   HYDRAULIC COND., K':   0.38 GPD/FT^2

WELL NO.	RADIUS, FT	DRAWDOWN, FT	TIME, MIN	r/B	1/u	W(u,r/B)	T, GPD/FT	S		K, GPD/FT^2	K', GPD/FT^2
OBS I	50	10.1	200	.052	146	4.44	24081	4.89	-3	344	1.17
OBS 3	200	8.6	150	.062	64	3.60	22931	4.98	-4	328	0.10
OBS 4	600	9.2	300	.090	62	3.55	21137	1.05	-4	302	0.21
23	1700	7.0	400	.30	13.2	2.01	15729	6.11	-5	225	0.02
21	2000	2.7	600	.15	14	2.12	43012	1.71	-4	614	0.01
22	0.4	10.3	200	.015	198	4.75	25262	5.91	+1	361	1.60 +3

VALUES USED FOR COMPUTATION: Thickness of aquifer, b 70 ft
Thickness of aquiclude, b' 45 ft
Pumping Rate, Q 478 gpm

TABLE 4   GRAPHICAL AND CALCULATED VALUES BY THEIS NON-EQUILIBRIUM MODEL FOR A LEAKY ARTESIAN AQUIFER.

Jacob Non-Equilibrium Analysis

Plots of the collected drawdown data were prepared vs radial distance, holding the time constant, Figure10, and drawdown vs t/r^2, Figures 11, 12 and 13, on semi-log paper. Straight lines were fitted to the linear portions of these plots and their slopes determined. Rearranging Jacob's basic equation for the two cases results in the following relationships:

Plot of s vs r   slope, $m = -2.3\ Q\ /\ 2\pi T$
                                  $S = 2.25\ T\ t\ /\ \text{antilog}(2\ s\ /\ m + 2\ \log r)$

Plot of s vs t/r^2 slope, $m = 2.3\ Q\ /\ 4\pi T$
                                  $S = 2.25\ T\ /\ \text{antilog}\ (\ s/m - \log t/r^2)$

where: m = slope, ft
                    Q = pumping rate, cfs
                    T = transmissivity, ft^2/sec
                    s = drawdown, ft
                    r = radial distance, ft
                    t = time, sec

Tabulated values of the transmissivities have been converted to units of gpd/ft for comparison with the Theis analysis. Table 5 summarizes the formation constants determined from the plot of drawdown, s vs radial distance, r and Table 6 for the plot of drawdown, s vs t/r^2.

It should be noted that data collected from the test production well was not used in the plot of drawdown vs distance as visual inspection showed no correlation of that data with the others. This supports an earlier observation that the measurements taken indicated a smaller drawdown than that predicted. It can be attributed to faulty data collection or more likely to the strong effect of leakage near the pump site.

As can be seen in Table 5, the values of the transmissivity cal-culated are on the order of five times greater in magnitude than those from the Theis analysis and the plot of s vs t/r^2, Table 6. The transmissivity is calculated from the slope of the plot which would indicate that leakage which appeared to be greatest near the the production well and decreasing with increasing radial distance, see Table 4, has strongly influenced the data to the point of making this type of analysis inappropriate.

The formation constants determined from the semi-log plot of drawdown vs t/r^2 , Table 6, are quite close to those from the Theis analysis, Table 4. Here the effect of leakage is not quite so dramatic as comparisons are not directly being made between each of the wells.

TIME, min	TRANSMISSIVITY, gpd/ft	STORAGE COEF.	
10	88478	4.32	-5
20	93741	9.21	-6
50	102923	3.58	-7
100	100865	3.47	-8
210	106398	1.05	-9
540	110114	2.20	-11
1080	114100	2.50	-12
4320	118397	3.97	-13

TABLE 4   FORMATION CONSTANTS DETERMINED BY JACOB ANALYSIS FROM
A PLOT OF DRAWDOWN VS RADIAL DISTANCE ON SEMI-LOG PAPER.

WELL NO.	TRANSMISSIVITY, gpd/ft	STORAGE COEF.	
OBS 1	22495	7.21	-5
OBS 3	20318	9.87	-6
OBS 4	20487	1.69	-6
21	51002	1.34	
22	35995	0.19	
23	22495	6.51	-7

TABLE 5   FORMATION CONSTANTS DETERMINED BY JACOB METHOD FROM
A PLOT OF DRAWDOWN VS t/r^2.

47 6210

$$SLOPE = \left(-\frac{2.30\,Q}{2\pi T}\right)$$

WITH Q ≡ GPM

⊙ PRODUCTION WELL # 21
◇ PRODUCTION WELL # 23
□ OBSERVATION # 1
△ OBSERVATION # 3
▽ OBSERVATION # 4

-2.13
-2.21
-2.29
-2.37
-2.50
-2.45
-2.69
-2.85

t = 4320 MIN
t = 1080 MIN.
t = 540 MIN.
t = 210 MIN.
t = 100 MIN.
t = 50 MIN
t = 20 MIN
t = 10 MIN

18
16
14
12
10
8
6
4
2
0

DRAWDOWN, S, FT

10   100   1000   10,000
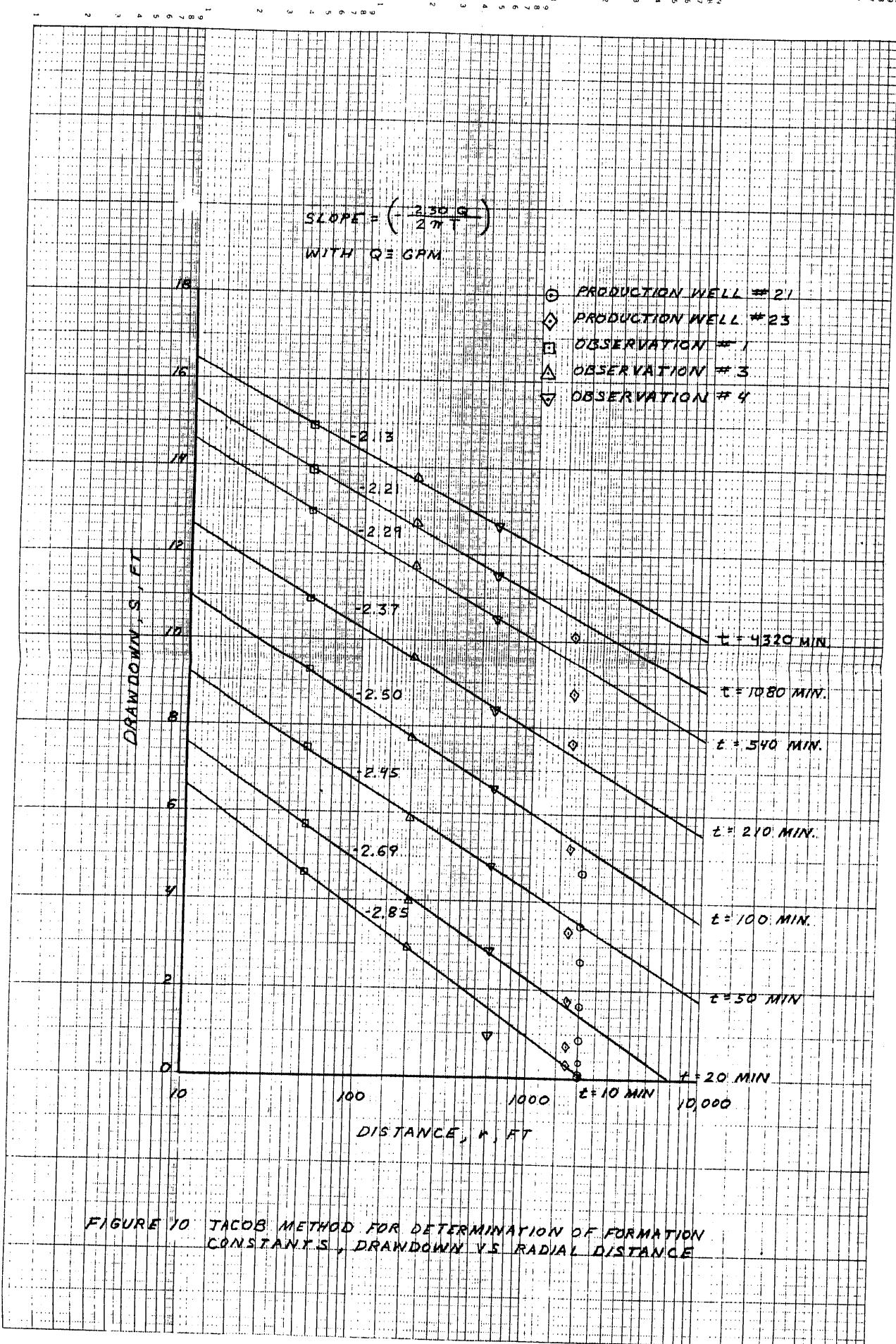
DISTANCE, r, FT

FIGURE 10 JACOB METHOD FOR DETERMINATION OF FORMATION
CONSTANTS, DRAWDOWN VS RADIAL DISTANCE
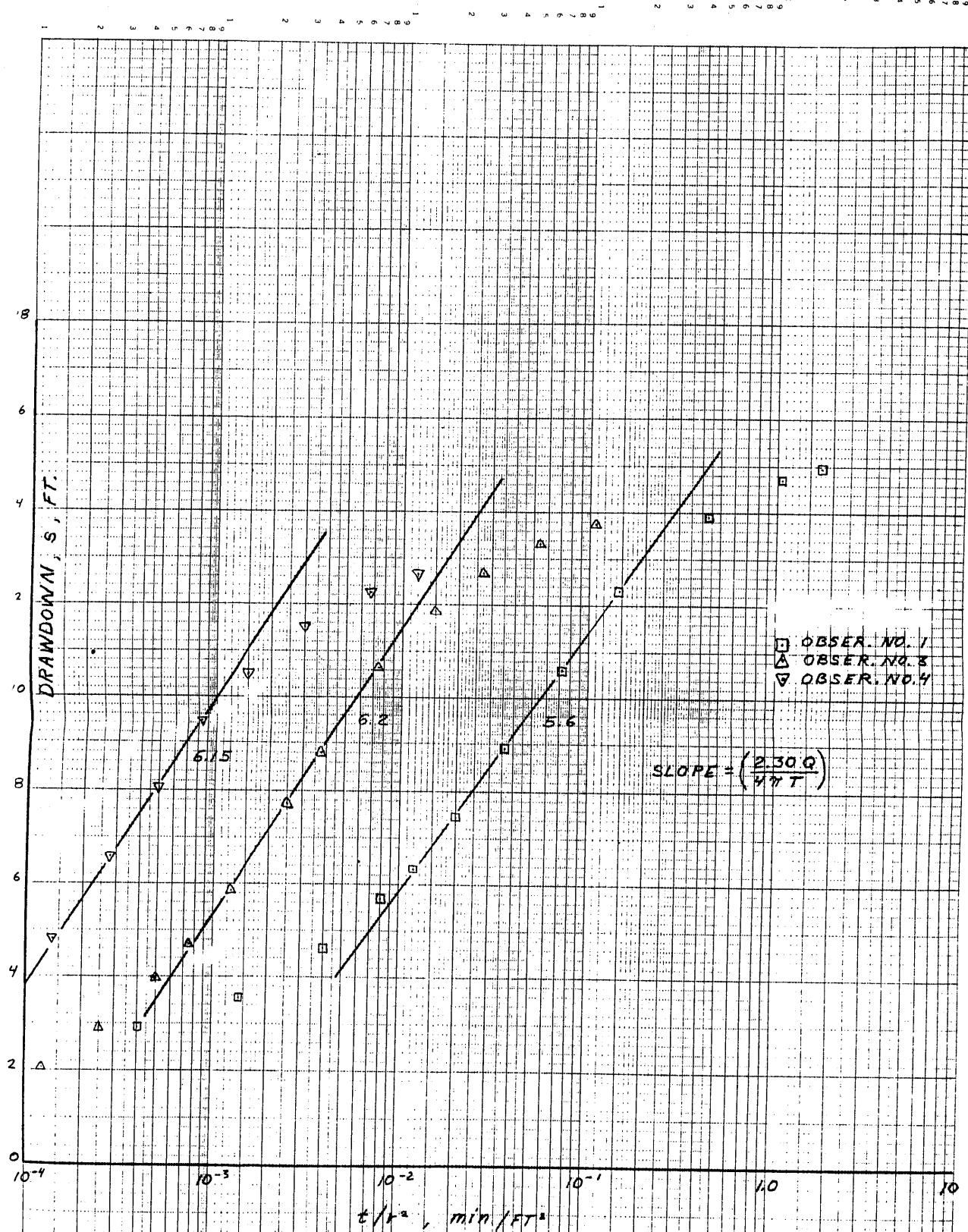
FIGURE 11 JACOB METHOD FOR DETERMINATION OF FORMATION CONSTANTS
FROM DRAWDOWN, s VS t/r²

FIGURE 12 JACOB METHOD FOR DETERMINATION OF FORMATION CONSTANTS FROM DRAWDOWN, s VS t/r² FOR TEST PRODUCTION WELL NO. 22

K•E SEMI-LOGARITHMIC 5 CYCLES X 150 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

47 6210
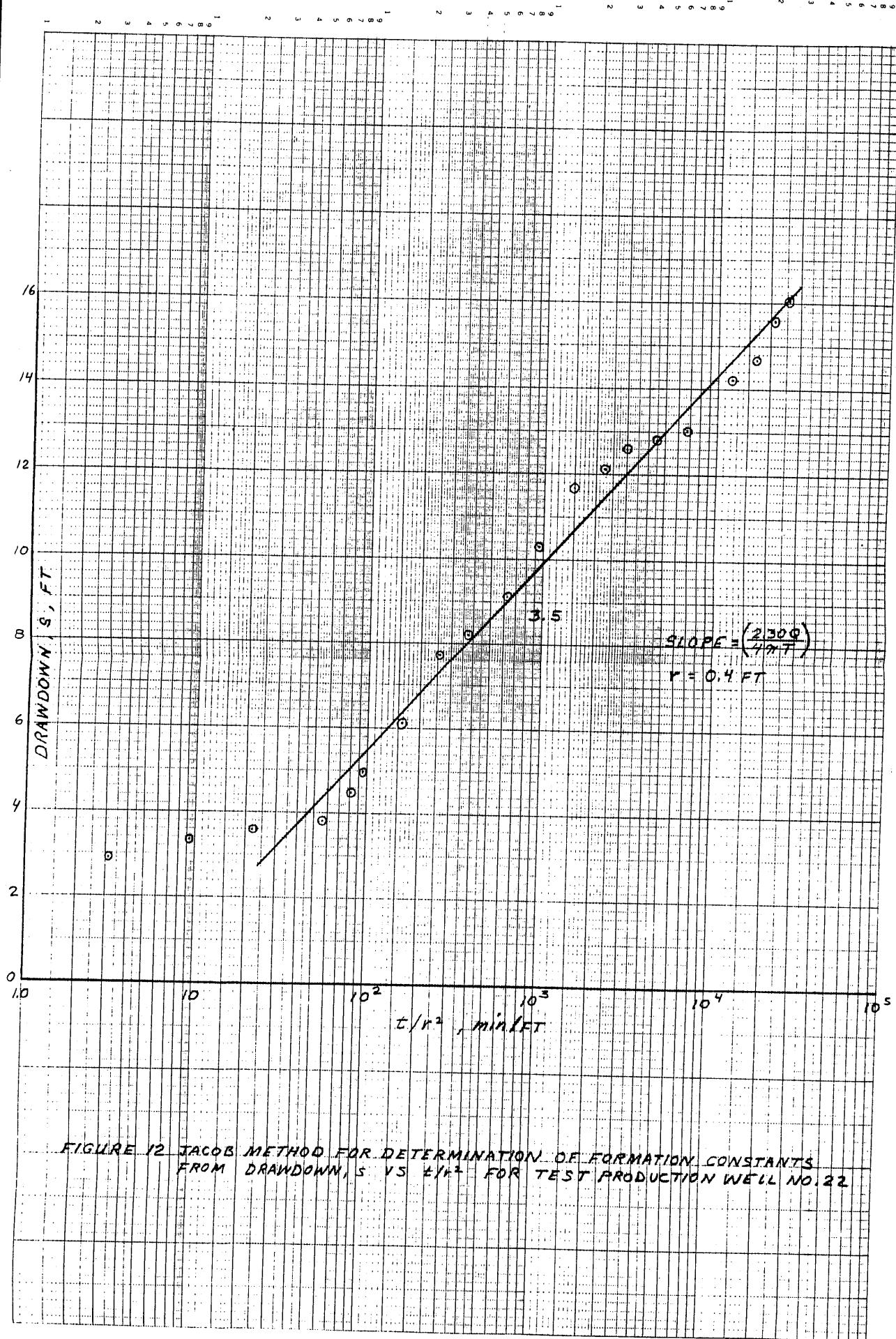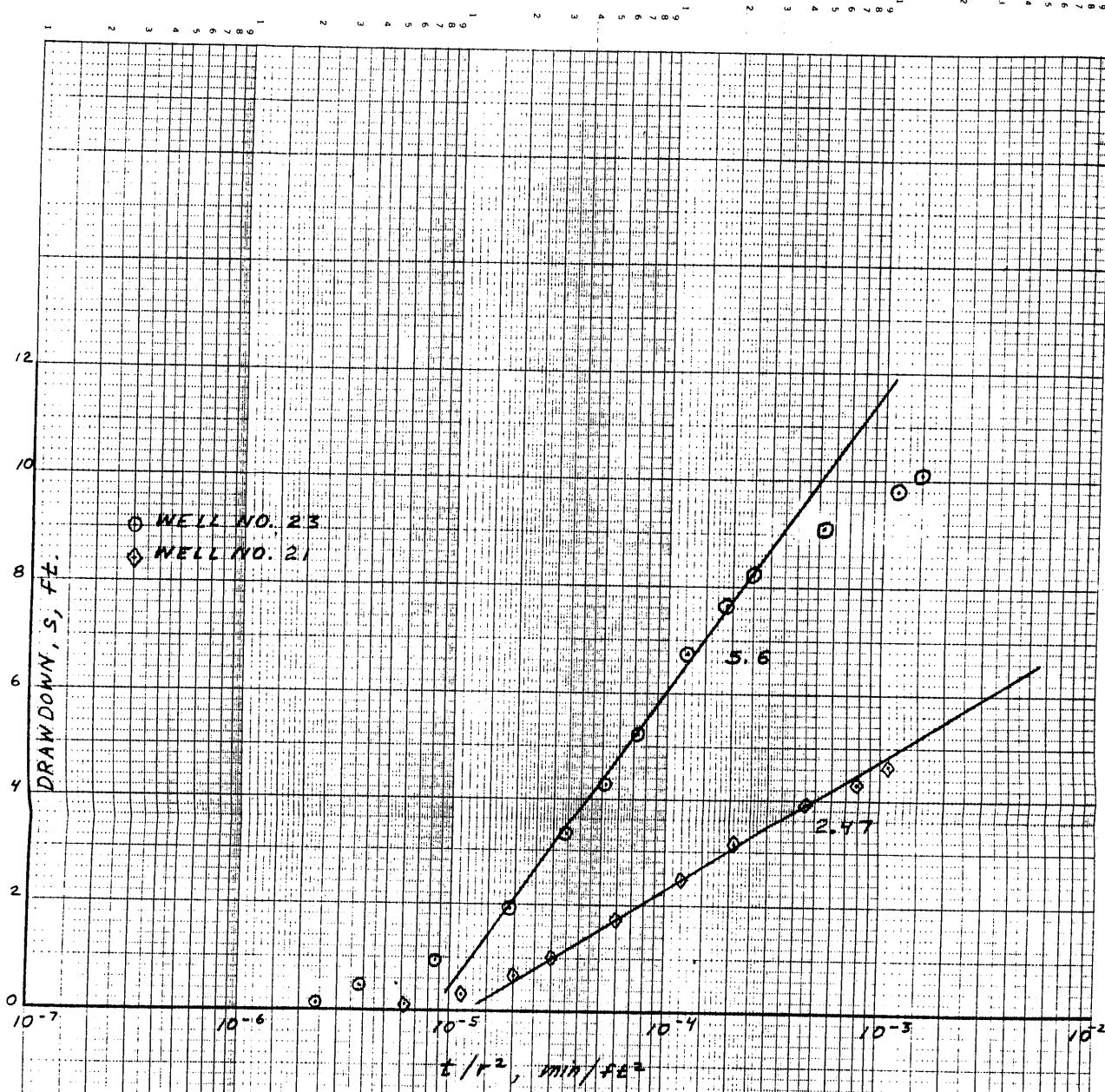
FIGURE 13 JACOB METHOD FOR DETERMINATION OF FORMATION CONSTANTS FROM S vs t/r^2.

Jacob Non-Equilibrium, cont.

An average transmissivity was found by dropping values obtained from well 21 and 22 and averaging the rest. The same procedure was used in determining the storage coefficient. The values are as follows:

TRANSMISSIVITY, T: 21449 GPD/FT
STORAGE COEFFICIENT, S: 2.11 -05

Recovery Analysis

A plot of the recovery drawdown vs t/t' was prepared on semi-log paper and the linear portion fitted with a straight line described by the modified Theis equation: (Figure 14)

$$s' = 2.3 \ Q \ /4\pi T \ (\ \log t/t' - \log S/S')$$

where: s' = recovery drawdown, ft
          Q   = pumping rate before recovery, gpd
          T   = transmissivity, gpd/ft
          t   = total time from pump start to recovery pt., min
          t' = time from pump shut-down to recovery pt., min
          S   = storage coefficient during pumping
          S' = storage coefficient during recovery

The above equation is linear only if the storage coefficient during recovery remains constant. The data seems to support this as can be seen in Figure 14. A value of S/S' which is greater than one indicates that the aquifer has undergone an inelastic compression.

Data points for all wells except no. 21 fell on almost exactly the same line indicating no pronounced effect of leakage which might be predicted as the piezometric head increases during recovery. This analysis high-lighted two points, 1. leakage into the aquifer is quite pronounced in this region and, 2. a barrier to confined flow exists near well 21 thus decreasing the transmissivity there. The following is a summary of the formation constants determined:

WELL NO.	SLOPE,m, ft	S/S'	T, gpd/ft
OBS 1	5.2	4.0	23244
OBS 3	5.2	4.0	23244
OBS 4	5.2	4.0	23244
22	5.2	4.0	23244
23	5.65	3.7	22298

$$T = \frac{2.3 \, Q}{4 \pi \, m}$$

WHERE m = SLOPE
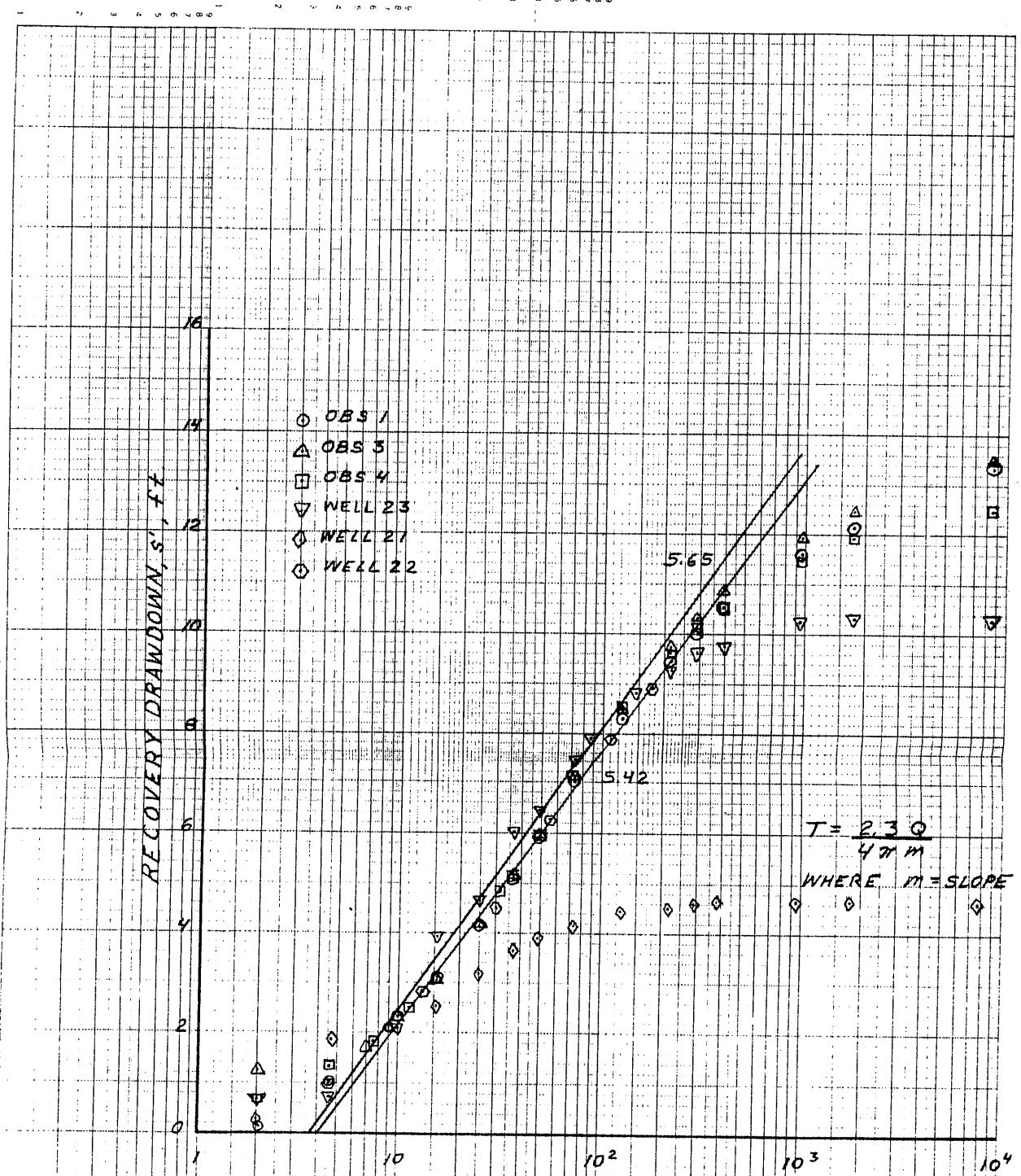
FIGURE 14 RECOVERY ANALYSIS FOR DETERMINATION
OF AQUIFER TRANSMISSIVITY, T.

PREDICTED EFFECT OF WITHDRAWALS

Drawdown Diagrams

Using representative formation constants, which were substituted back into Theis's equation for leaky artesian aquifers, predicted drawdowns were calculated for one well pumping for periods of thirty and sixty days. It became apparent from the results and the shape of the type curve that equilibrium conditions were achieved in thirty days therefore drawdowns were not calculated for one hundred days and equilibrium as the results would have been the same.

Due to the linearity of Laplace's equation, the results for a single well pumping were superimposed to find the effect of two wells pumping. See Figures 15 and 16 for the calculated cones of depression. The data from which these were plotted is listed in Table 6. For the sake of plotting the effect of two wells pumping, a lateral distance of 1000 ft between them was assumed.

Effect On Current Legal Users

Located in section 16 and east of section 8 are about eight legal residential wells. The names and addresses of their owners are listed in the appendix. Until recently all of the wells were equipped with simple centrifugal pumps installed at an average of three feet above ground level. It is estimated that for the particular pumps involved, their maximum suction lift would be 15 feet. This, coupled with the droughty conditions that prevailed in 1980, 81 and early 82, led to the problem experienced by several of the legal users.

In July and August of 1982, Six L's Farms purchased and installed deep well jet pump assemblies for the residential users listed in the appendix. This should completely eliminate any problems they might experience as a jet-type pump can withdraw water from levels of 40 to 50 feet with a 1/3 Hp motor.

Traditionally, safe yield is defined as that which can be economically achieved. The cost difference between a shallow well pump and deep well jet pump runs in the neighborhood of $30.00 or 10% of the pump cost. As the state of Florida is experiencing an unavoidable increase in population, its residents must resign themselves to increased costs of mining this resource. In this particular instance, a 10% increase in capital layout seems to be a small enough price to pay.

RADIUS, r, ft	DRAWDOWN, ft		COMPOSITE D.D., ft	
	t = 30 days	t = 60 days	TOWARD	AWAY
5	24.8	25.2	27.9	27.9
50	14.5	14.9	17.8	17.5
75	13.2	13.2	16.7	16.1
100	12.4	12.2	16.0	15.3
150	10.4	10.4	14.2	13.2
200	8.3	9.1	12.4	11.0
400	6.6	6.6	11.6	8.8
500	5.5	5.5	11.0	7.5
800	4.1	4.1		5.7
1000	3.1	3.3		4.5
1500	2.0	2.1		2.8
2000	1.3	1.2		1.9
2500	0.8	0.9		1.7
3000	0.6	0.6		0.9
3500	0.5	0.4		0.7
4000	0.4	0.4		0.4
4500	0.2	0.2		0.2

PUMP RATE, Q_1 = 400 gpm Q_2 = 400 gpm
TRANSMISSIVITY, T = 22107 gpd/ft
LEAKAGE FACTOR, B = 1618 ft
STORAGE COEFFICIENT, S = 1.39 -3
LEAKANCE, K'/b' = 8.44 -3 gpd/ft^3
DISTANCE BETWEEN MULTIPLE WELLS = 1000 ft

TABLE 6   PREDICTED DRAWDOWN LEVELS FOR A LEAKY ARTESIAN AQUIFER
FOR SINGLE AND MULTIPLE WELLS.

APPENDIX

WELL CORE SAMPLE CLASSIFICATIONS

WELL NO. 22

DEPTH, FT	DESCRIPTION
5	SAND,BROWN, FINE TO MED,SUB ROUNDED.
7 - 15	SAND,LT GREY, MED GRAIN, SUB ANGULAR TO SUB ROUNDED; TRACE LIMESTONE.
20	SAND, GREY, FINE GRAIN, SUB ROUNDED; TRACE ROUNDED.
25	CLAYE SAND, LT GREY, FINE TO MED GRAIN, SUB ANGULAR; TRACE PHOSPHATE.
30	SAME AS 25
50	SAND, GREY, FINE GRAIN, SUB ANGULAR; CLAY, OLIVE GREEN.
60	SANDY CLAY, OLIVE GREEN.
70	CLAYE SAND, GREY, MED TO COURSE GRAIN, SUB ROUNDED; TRACE LIMESTONE; TRACE PHOSPHATE.
75	SAME AS 70
102	SAME AS 70
120	SANDY LIMESTONE, WHITE; TRACE PHOSPHATE.
130	SAME AS 120
170	SAME AS 120

OBS WELL 1

5 - 10	SAND, CLEAR AND LT ORANGE, MED GRAIN, SUB ANGULAR TO ANGULAR.
10	SAND, TAN, FINE GRAIN, SUB ANGULAR TO ANGULAR.
10 - 20	SAND, LT ORANGE, MED GRAIN, SUB ANGULAR TO SUB ROUNDED; TRACE LIMESTONE, TAN AND LT ORANGE.
20	SLIGHTLY SANDY LIMESTONE, WHITE; TRACE FOSSIL FRAGS.
20 - 30	LIMESTONE, TAN TO LT ORANGE; TRACE FOSSIL FRAGMENTS.
30 - 40	SANDY CLAY, GREY; TRACE FOSSILE FRAGMENTS.
40 - 50	SAND, GREY, MED GRAIN, SUB ANGULAR TO SUB ROUNDED; TRACE PHOSPHATE.
50 - 60	SAND, GREY, MED GRAIN, SUB ANGULAR TO ANGULAR; TRACE PHOSPHATE.
60 - 65	SANDY PHOSPHATIC CLAY, OLIVE GREEN.
65 - 70	CLASTICS; QUARTZ, CLEAR, VERY COURSE TO COURSE GRAIN, ANGULAR TO SUB ANGULAR; QUARTZITE, GREY, ROUNDED; PHOSPHATE, BLACK.
70 - 80	SANDY CLAY, WHITE; TRACE PHOSPHATE.
85	SAME AS 70-80
90	SAND, GREY, COURSE TO VERY COURSE GRAIN, SUB ROUNDED; CLAY, WHITE; TRACE PHOSPHATE AND QUARTZITE.
90 -100	SAND, CLEAR AND GREY, MED TO VERY COURSE GRAIN, SUB ROUNDED TO ROUNDED; CLAY, WHITE; TRACE PHOSPHATE AND QUARTZITE.
100-110	SANDY LIMESTONE, WHITE.
110-120	SANDY LIMESTONE, WHITE; TRACE PHOSPHATE.
120	LIMESTONE, WHITE; TRACE FOSSIL FRAGMENTS.

CLASSIFICATION, CONT.

OBS WELL 3

DEPTH, FT	DESCRIPTION
10	SAND, LT ORANGE, FINE GRAIN, SUB ANGULAR TO SUB ROUNDED.
15 - 20	SANDY LIMESTONE, GREY AND LT ORANGE.
25 - 35	SAND, GREY, VERY FINE TO FINE GRAIN, SUB ANGULAR; LIMESTONE, TAN AND WHITE; SHELL FRAGMENTS.
40 - 50	SAND, GREY, FINE TO MED GRAIN, SUB ANGULAR TO SUB ROUNDED; TRACE PHOSPHATE.
50 - 60	SAND, LT GREY, MED TO COURSE GRAIN, SUB ANGULAR; TRACE PHOSPHATE.
60 - 70	SANDY PHOSPHATIC CLAY, OLIVE GREEN.
75	CLASTICS; QUARTZ, CLEAR AND GREY, COURSE GRAIN, SUB ROUNDED; QUARTZITE, GREY AND WHITE, COURSE GRAIN, ROUNDED; PHOSPHATE, BLACK.
78	SANDY CLAY, OFF WHITE; TRACE LIMESTONE, WHITE; TRACE PHOSPHATE.
80 - 90	SANDY CLAY, OFF WHITE; TRACE PHOSPHATE.
90-100	LIMESTONE, OFF WHITE; TRACE PHOSPHATE.
100-110	SAME AS 90-100.
115	LIMESTONE, TAN AND WHITE; TRACE PHOSPHATE; TRACE FOSSILS.
120	SAME AS 115

OBS WELL 4

DEPTH, FT	DESCRIPTION
10	SAND, LT BROWN, FINE GRAIN, SUB ANGULAR TO ROUNDED.
15	LIMESTONE, LT ORANGE AND GREY.
20	SANDY LIMESTONE, LT ORANGE AND WHITE.
20 - 30	CLAYE SAND, GREY; TRACE FOSSIL FRAGMENTS.
30 - 40	SAND, GREY, FINE GRAIN, ANGULAR TO SUB ANGULAR; TRACE LIMESTONE; TRACE PHOSPHATE.
40 - 50	SAND, GREY, VERY FINE TO FINE GRAIN, SUB ANGULAR TO SUB ROUNDED; TRACE LIMESTONE; TRACE PHOSPHATE.
50 - 60	SAME AS 40-50.
60 - 70	SANDY PHOSPHATIC CLAY, OLIVE GREEN.
75	CLASTICS; QUARTZ, CLEAR AND GREY, COURSE TO VERY COURSE, SUB ROUNDED; QUARTZITE, GREY, ROUNDED; PHOSPHATE, BLACK.
78	SAME AS 75 EXCEPT OF GRAVEL SIZE.
80	SAME AS 75 EXCEPT MED TO COURSE GRAIN.
85	SANDY CLAY, WHITE; PHOSPHATE, BLACK.
95	SAME AS 85.
100	CLAYE SAND, LT GREY, FINE TO COURSE, SUB ROUNDED; TRACE LIMESTONE, WHITE; PHOSPHATE.
105	SAND, DARK GREY, FINE GRAIN, SUB ROUNDED; SHELL FRAGS; TRACE PHOSPHATE.
110	LIMESTONE, WHITE; TRACE CLAY, OLIVE GREEN.
115	SAND, GREY, FINE GRAIN, SUB ANGULAR; LIMESTONE, WHITE; TRACE PHOSPHATE.
120	SANDY LIMESTONE; TRACE PHOSPHATE; TRACE FOSSILS.

BACKGROUND STATIC WATER LEVEL ELEVATIONS

Water Elevations For Existing Wells Taken July 12, 1982.

WELL NO.	ELEV.,FT	WELL NO.	ELEV.,FT	WELL NO.	ELEV.,FT
1	44.45	9	28.92	17	33.34
2	44.17	10	30.94	18	33.07
3	37.22	11	27.89	19	31.08
4	43.45	12	36.28	20	30.20
5	36.19	13	36.22	21	35.34
6	36.60	14	36.35	22	36.23
7	32.35	15	34.37	23	35.53
8	31.76	16	33.18		

Background Data For APT Program

WELL NO.	8/3	8/4	8/5	DATE 8/6	8/7	8/8	8/9
21	34.94	34.94	34.90	34.84	34.84	34.86	34.92
22	37.08	37.08	37.00	37.08	37.08	37.08	37.04
23	32.93	32.95	32.89	32.87	32.83	32.91	32.87
13	36.38	36.36	36.36	36.32	36.34	36.32	36.32
OBS 1				37.01	36.86	37.05	36.99
OBS 2				37.21	37.12	37.14	36.06
OBS 3				36.92	36.82	36.94	36.94
OBS 4				36.99	36.89	37.20	37.01

NOTE: ELEVATIONS REFERENCED TO USGS VERTICAL DATUM

STEP DRAWDOWN TEST DATA

WELL NO. __21__ , DATE __July 28, 1982__ , STATIC LEVEL __3.35__ FT

BELOW TOC, TOC ELEVATION __37.09__ FT

TIME START	STOP	DURATION, MIN	TOTALIZER START	STOP	PUMPAGE, GAL	RATE, GPM	D.D.
2:20	2:50	30	00000	13200	13200	440	82.85
2:53	3:13	20	14100	14100	-	-	0.45
3:13	3:43	30	14100	24500	10400	346	66.99
3:45	4:05	20	25050	25050	-	-	0.31
4:05	4:35	30	25050	33125	8075	269	45.39

WELL NO. __22__ , DATE __August 2, 1982__ , STATIC LEVEL __0.5__ FT

BELOW TOC, TOC ELEVATION __37.58__ FT

TIME START	STOP	DURATION, MIN	TOTALIZER START	STOP	PUMPAGE, GAL	RATE, GPM	D.D.
12:40	1:10	30	74200	87000	12800	427	8.09
1:10	1:30	20	87000	87000	-	-	1.15
1:30	2:00	30	87000	101800	14800	493	10.40
2:00	2:20	20	101800	101800	-	-	2.77
2:20	2:50	30	101800	119700	17900	597	13.17
2:50	3:10	20	119700	119700	-	-	2.31
3:15	3:45	30	119700	128700	9000	300	6.93

STEP DRAWDOWN TEST DATA, CONT.

WELL NO. __23__ ,   DATE __July 30, 1982__ , STATIC LEVEL __2.25__ FT

BELOW TOC,   TOC ELEVATION __35.37__ FT

| TIME | | | TOTALIZER | | | | |
START	STOP	DURATION, MIN	START	STOP	PUMPAGE, GAL	RATE, GPM	D.D.
10:52	11:22	30	40500	48890	8390	280	67.0
11:24	12:20	56	49300	49300	-	-	2.0
12:25	12:55	30	49300	57000	7700	257	24.4
1:00	1:40	40	58350	58350	-	-	3.8
1:40	2:10	30	58350	64220	5870	196	10.0
2:12	3:10	58	64700	64700	-	-	3.1

PROJECT NAME   ROWLAND WALKER   ,   DATE OF APT AUGUST 9, 1982

WELL NO. ___21___ , TOTAL DEPTH ___165___ FT., CASED DEPTH __80__ FT.

T.O.C. (NGVD) __37.09__ FT., DISTANCE TO PROD. WELL _2000_ FT.,

RATE OF DISCHARGE __478__ GPM   r = 2000'

TIME, min.	t/r^2	D.D., ft.	TIME, min.	t/r^2	D.D., ft.	TIME, min.	t/r^2	D.D., ft.
0.0	0	0	19	9.5 -3	0.07	600	.3	2.75
0.5	2.5 E-4	0	20	1 -2	0.08	660	.33	2.88
1.0	5 E-4	0	25	1.25 -2	0.11	720	.36	2.96
1.5	7.5 E4	0	30	1.5 -2	0.17	840	.42	3.15
2.0	1 E-3	0	35	1.75 -2	0.21	960	.48	3.31
2.5	1.25 -3	0	40	2 -2	0.26	1080	.54	3.44
3.0	1.5 -3	0	45	2.25 -2	0.31	1200	.6	3.54
3.5	1.75 -3	0	50	2.5 -2	0.37	1320	.66	3.60
4.0	2 E-3	0.01	55	2.75 -2	0.42	1440	.72	3.69
4.5	2.25 -3	0.01	60	3 -2	0.47	1560	.78	3.75
5.0	2.5 -3	0.01	70	3.5 -2	0.58	1680	.84	3.88
6.0	3 -3	0.01	80	4 -2	0.67	1800	.9	3.90
7.0	3.5 -3	0.01	90	4.5 -2	0.77	1920	.96	3.92
8.0	4 -3	0.01	100	5 -2	0.86	2160	1.08	4.06
9.0	4.5 -3	0.01	120	6 -2	1.04	2400	1.2	4.15
10	5 -3	0.02	150	7.5 -2	1.26	2640	1.32	4.21
11	5.5 -3	0.02	180	9 -2	1.45	2880	1.44	4.25
12	6. -3	0.02	210	1.05 -1	1.63	3120	1.56	4.29
13	6.5 -3	0.03	240	.12	1.74	3360	1.68	4 33
14	7.0 -3	0.03	300	.15	2.00	3600	1.8	4.48
15	7.5 -3	0.04	360	.18	2.31	3840	1.92	4.50
16	8 -3	0.05	420	.21	2.38	4080	2.04	4.58
17	8.5 -3	0.06	480	.24	2.46	4320	2.16	4.63
18	9 -3	0.06	540	.27	2.63			

PROJECT NAME   ROWLAND WALKER   ,   DATE OF RECOVERY AUGUST12, 1982

WELL NO. ____21____

RECOVERY DATA

TIME, min.	D.D., ft.	4.63-dd. ↓	TIME, min.	D.D., ft.	4.63-dd ↓	TIME, min.	D.D., ft.	4.63-(↓
0.0	4.63	O	12	4.63	O	120	3.63	1.0
0.5	4.63		13	4.63	O	150	3.40	1.23
1.0	4.63		14	4.63	O	180	3.19	1.44
1.5	4.63		15	4.61	.02	210	3.00	1.63
2.0	4.63		20	4.56	.07	240	2.83	1.8
2.5	4.63		25	4.52	.11	300	2.54	2.09
3.0	4.63		30	4.50	.13	360	2.40	2.22
3.5	4.63		35	4.44	.19	420	2.21	2.42
4.0	4.63		40	4.40	.23	480	2.06	2.57
4.5	4.63		45	4.35	.28	540	1.92	2.71
5.0	4.63		50	4.31	.32	600	1.77	2.86
6.0	4.63		55	4.25	.38	660	1.65	2.98
7.0	4.63		60	4.19	.44	720	1.52	3.11
8.0	4.63		70	4.09	.54	1200	0.83	3.8
9.0	4.63		80	4.00	.63	2640	0.48	4.15
10	4.63		90	3.92	.71	4080	0.17	4.46
11	4.63	O	100	3.83	.8			

D

PROJECT NAME   ROWLAND WALKER   ,   DATE OF APT   AUGUST 9, 1982
WELL NO.   22   , TOTAL DEPTH   180   FT., CASED DEPTH   74   FT.
T.O.C. (NGVD)   37.58   FT.,   DISTANCE TO PROD. WELL   0   FT.,
RATE OF DISCHARGE   478   GPM

TIME, min.	D.D., ft.	TIME, min.	D.D., ft.	TIME, min.	D.D., ft.
0.0	0	19	5.43	600	12.59
0.5	2.89	20	5.43	660	12.59
1.0	3.12	25	6.12	720	12.82
1.5	3.35	30	6.12	840	12.82
2.0	3.35	35	6.81	960	12.82
2.5	3.58	40	6.81	1080	13.05
3.0	3.58	45	7.51	1200	13.28
3.5	3.58	50	7.74	1320	13.28
4.0	3.58	55	7.97	1440	13.51
4.5	3.58	60	8.20	1560	13.74
5.0	3.58	70	8.20	1680	13.74
6.0	3.81	80	8.43	1800	13.98
7.0	3.81	90	8.89	1920	14.21
8.0	3.81	100	9.12	2160	14.44
9.0	3.81	120	9.82	2400	14.44
10	4.04	150	10.28	2640	14.67
11	4.27	180	10.74	2880	14.67
12	4.50	210	11.43	3120	14.90
13	4.50	240	11.67	3360	15.59
14	4.97	300	11.90	3600	15.59
15	4.97	360	12.13	3840	15.82
16	5.20	420	12.59	4080	16.05
17	5.20	480	12.59	4320	15.59
18	5.20	540	12.59		

PROJECT NAME   ROWLAND WALKER   ,   DATE OF RECOVERY   AUGUST12, 1982

WELL NO.   22

RECOVERY DATA

TIME, min.	D.D., ft.	TIME, min.	D.D., ft.	TIME, min.	D.D., ft.
0.0	15.59	12	7.97	120	5.09
0.5	8.66	13	7.74	150	4.56
1.0	6.35	14	7.74	180	4.14
1.5	4.74	15	7.51	210	3.80
2.0	7.51	20	7.51	240	3.54
2.5	5.66	25	8.96	300	3.04
3.0	5.66	30	8.55	360	2.81
3.5	5.66	35	8.23	420	2.54
4.0	7.51	40	7.87	480	2.35
4.5	8.89	45	7.62	540	2.15
5.0	7.74	50	7.35	600	2.02
6.0	8.66	55	7.11	660	1.88
7.0	8.66	60	6.91	720	1.77
8.0	8.43	70	6.50	1200	1.00
9.0	8.20	80	6.25	2640	0.58
10	8.20	90	5.84	4080	0.25
11	7.97	100	5.59		

PROJECT NAME ___ROWLAND WALKER___ , DATE OF APT ___AUGUST 9, 1982___

WELL NO. ___OBS 1___ , TOTAL DEPTH ___120___ FT., CASED DEPTH ___70___ FT.

T.O.C. (NGVD) ___38.86___ FT., DISTANCE TO PROD. WELL ___50___ FT.,

RATE OF DISCHARGE ___478___ GPM

TIME, min.	t/r^2	D.D., ft.	TIME, min.	t/r^2	D.D., ft.	TIME, min.	t/r^2	D.D., ft.
0.0	0	0	19	.38	-	600	12	13.15
0.5	.01	2.97	20	.4	5.69	660	13.2	13.34
1.0	.02	2.93	25	.5	6.10	720	14.4	13.44
1.5	.03	2.93	30	.6	6.34	840	16.8	13.65
2.0	.04	3.05	35	.7	6.66	960	19.2	13.80
2.5	.05	3.20	40	.8	6.96	1080	21.6	13.92
3.0	.06	3.35	45	.9	7.20	1200	24	14.05
3.5	.07	3.56	50	1.0	7.47	1320	26.4	14.09
4.0	.08	3.60	55	1.1	7.73	1440	28.8	14.15
4.5	.09	3.71	60	1.2	7.93	1560	31.2	14.23
5.0	.1	3.81	70	1.4	8.30	1680	33.6	14.40
6.0	.12	4.03	80	1.6	8.59	1800	36	14.40
7.0	.14	4.21	90	1.8	8.90	1920	38.4	14.44
8.0	.16	4.38	100	2.0	9.23	2160	43.2	14.57
9.0	.18	4.50	120	2.4	9.64	2400	48	14.65
10	.2	4.61	150	3	10.18	2640	52.8	14.69
11	.22	4.75	180	3.6	10.61	2880	57.6	14.69
12	.24	4.87	210	4.2	10.95	3120	62.4	14.71
13	.26	4.97	240	4.8	11.24	3360	67.2	14.78
14	.28	5.11	300	6	12.03	3600	72	14.86
15	.3	5.21	360	7.2	12.32	3840	76.8	14.90
16	.32	5.30	420	8.4	12.57	4080	81.5	14.96
17	.34	5.40	480	9.6	12.82	4320	86.4	14.96
18	.36	-	540	10.8	12.98			

PROJECT NAME   ROWLAND WALKER   ,   DATE OF RECOVERY AUGUST12, 1982

WELL NO.   OBS 1

RECOVERY DATA

TIME, min.	D.D., ft.	14.90-d.d. ↓	TIME, min.	D.D., ft.	14.90 d.d ↓	TIME, min.	D.D., ft.	14.90
0.0	14.90	.00	12	10.43	4.47	120	5.10	9.8
0.5	13.36	1.54	13	10.30	4.6	150	4.56	10.34
1.0	12.65	2.25	14	10.15	4.75	180	4.15	10.7
1.5	12.42	2.48	15	10.00	4.9	210	3.81	11.0
2.0	12.25	2.65	20	9.45	5.45	240	3.53	11.3
2.5	12.15	2.75	25	9.05	5.85	300	3.13	11.7
3.0	11.97	2.93	30	8.65	6.25	360	2.88	12.0
3.5	11.80	3.10	35	8.32	6.58	420	2.63	12.2
4.0	11.72	3.18	40	8.00	6.9	480	2.36	12.5
4.5	11.60	3.3	45	7.73	7.17	540	2.17	12.7
5.0	11.52	3.38	50	7.50	7.4	600	2.00	12
6.0	11.35	3.55	55	7.25	7.65	660	1.90	12
7.0	11.15	3.75	60	7.00	7.9	720	1.78	13.
8.0	11.00	3.9	70	6.63	8.27	1200	1.03	13.
9.0	10.85	4.05	80	6.35	8.55	2640	0.55	14.
10	10.65	4.3	90	5.93	8.97	4080	0.15	14.
11	10.55	4.35	100	5.64	9.26			

PROJECT NAME ROWLAND WALKER   ,   DATE OF APT AUGUST 9, 1982

WELL NO. ___OBS 2___ , TOTAL DEPTH ___50___ FT., CASED DEPTH 40/10 FT.

T.O.C. (NGVD) _39.31_ FT., DISTANCE TO PROD. WELL ___50___ FT.,

RATE OF DISCHARGE _478_ GPM

TIME, min.	D.D., ft.	TIME, min.	D.D., ft.	TIME, min.	D.D., ft.
0.0	0	19	0	600	0.23
0.5	0	20	0	660	0.21
1.0	0	25	0	720	0.21
1.5	0	30	0	840	0.21
2.0	0	35	0	960	0.21
2.5	0	40	0	1080	0.21
3.0	0	45	0	1200	0.21
3.5	0	50	0	1320	0.21
4.0	0	55	0	1440	0.21
4.5	0	60	0	1560	0.21
5.0	0	70	0	1680	0.29
6.0	0	80	0	1800	0.29
7.0	0	90	0.04	1920	0.21
8.0	0	100	0.04	2160	0.08
9.0	0	120	0.01	2400	0.02
10	0	150	0	2640	0
11	0	180	0.01	2880	0.02
12	0	210	0.01	3120	0.06
13	0	240	0.01	3360	0.08
14	0	300	0.12	3600	0.14
15	0	360	0.12	3840	0.14
16	0	420	0.17	4080	0.17
17	0	480	0.14	4320	0.21
18	0	540	0.21		

PROJECT NAME   ROWLAND WALKER   ,   DATE OF RECOVERY AUGUST 12, 1982

WELL NO.   ___OBS 2___

RECOVERY DATA

TIME, min.	D.D., ft.	TIME, min.	D.D., ft.	TIME, min.	D.D., ft.
0.0	0.21	12	0.22	120	0.06
0.5	0.23	13	0.22	150	0.08
1.0	0.21	14	0.22	180	0.08
1.5	0.21	15	0.22	210	0.12
2.0	0.21	20	0.23	240	0.19
2.5	0.19	25	0.12	300	0.25
3.0	0.19	30	0.11	360	0.27
3.5	0.21	35	0.12	420	0.27
4.0	0.21	40	0.12	480	0.27
4.5	0.20	45	0.08	540	0.27
5.0	0.21	50	0.08	600	0.27
6.0	0.21	55	0.08	660	0.27
7.0	0.21	60	0.08	720	0.27
8.0	0.20	70	0.08	1200	1.29
9.0	0.20	80	0.10	2640	1.79
10	0.21	90	0.08	4080	2.13
11	0.21	100	0.06		

D

PROJECT NAME   ROWLAND WALKER   ,   DATE OF APT   AUGUST 9, 1982

WELL NO.   OBS 3   , TOTAL DEPTH   120   FT., CASED DEPTH   70   FT.

T.O.C. (NGVD)   37.86   FT.,   DISTANCE TO PROD. WELL   200   FT.,

RATE OF DISCHARGE   478   GPM

TIME, min.	D.D., ft.	TIME, min.	D.D., ft.	TIME, min.	D.D., ft.
0.0	0	19	-	600	11.88
0.5	0.4	20	3.99	660	12.15
1.0	0.95	25	4.33	720	12.22
1.5	1.1	30	4.69	840	12.40
2.0	1.29	35	5.04	960	12.55
2.5	1.47	40	5.36	1080	12.68
3.0	1.59	45	5.60	1200	12.80
3.5	1.72	50	5.87	1320	12.92
4.0	1.85	55	6.12	1440	13.03
4.5	1.97	60	6.33	1560	13.05
5.0	2.07	70	6.75	1680	13.13
6.0	2.23	80	7.08	1800	13.22
7.0	2.48	90	7.45	1920	13.24
8.0	2.6	100	7.75	2160	13.34
9.0	2.75	120	8.30	2400	13.40
10	2.92	150	8.80	2640	13.47
11	3.05	180	9.19	2880	13.51
12	3.15	210	9.58	3120	13.53
13	3.26	240	9.86	3360	13.59
14	3.38	300	10.63	3600	13.68
15	3.5	360	10.99	3840	13.70
16	3.62	420	11.26	4080	13.76
17	-	480	11.47	4320	13.76
18	-	540	11.72		

PROJECT NAME   ROWLAND WALKER   ,   DATE OF RECOVERY   AUGUST12, 1982

WELL NO.   OBS 3

RECOVERY DATA

TIME, min.	D.D., ft. ↓ 13.70-d.d.
0.0	13.70 0
0.5	13.45 .25
1.0	13.00 .70
1.5	12.74 0.96
2.0	12.59 1.11
2.5	12.44 1.26
3.0	12.30 1.4
3.5	12.21 1.49
4.0	12.05 1.65
4.5	11.93 1.77
5.0	11.81 1.89
6.0	11.64 2.06
7.0	11.44 2.26
8.0	11.29 2.41
9.0	11.15 2.55
10	11.01 2.69
11	10.85 2.85

TIME, min.	D.D., ft. ↓ 13.70-d.d.
12	10.73 2.97
13	10.59 3.11
14	10.45 3.25
15	10.33 3.37
20	9.75 3.95
25	9.34 4.36
30	8.84 4.86
35	8.47 5.23
40	8.13 5.57
45	7.90 5.8
50	7.53 6.17
55	7.30 6.4
60	7.06 6.64
70	6.63 7.07
80	6.26 7.44
90	5.95 7.75
100	5.64 8.06

TIME, min.	D.D., ft. ↓ 13.70
120	5.16 8.5
150	4.61 9.0
180	4.14 9.5
210	3.86 9.8
240	3.51 10.1
300	3.05 10.6
360	2.80 10.
420	2.53 11.1
480	2.34 11.?
540	2.15 11.5
600	1.95 11.7
660	1.84 11.8
720	1.72 11.9
1200	2.05 11.6
2640	1.59 12.1
4080	1.22 12.44

PROJECT NAME ___ROWLAND WALKER___ , DATE OF APT ___AUGUST 9, 1982___

WELL NO. ___OBS 4___, TOTAL DEPTH ___120___FT., CASED DEPTH ___79__FT.

T.O.C. (NGVD) ___39.01___FT., DISTANCE TO PROD. WELL ___600___FT.,

RATE OF DISCHARGE ___478___GPM

TIME, min.	D.D., ft.	TIME, min.	D.D., ft.	TIME, min.	D.D., ft.
0.0	0	19	2.84	600	10.79
0.5	0.15	20	2.90	660	10.92
1.0	0.34	25	3.29	720	11.02
1.5	0.36	30	3.61	840	11.21
2.0	0.67	35	3.94	960	11.40
2.5	0.75	40	4.23	1080	11.52
3.0	0.88	45	4.48	1200	11.63
3.5	0.96	50	4.81	1320	11.75
4.0	1.06	55	4.98	1440	11.86
4.5	1.19	60	5.27	1560	11.90
5.0	1.23	70	5.58	1680	11.96
6.0	1.33	80	5.71	1800	12.00
7.0	1.48	90	6.25	1920	12.06
8.0	1.69	100	6.59	2160	12.17
9.0	1.81	120	7.02	2400	12.25
10	1.96	150	7.50	2640	12.29
11	2.04	180	8.06	2880	12.38
12	2.19	210	8.40	3120	12.42
13	2.25	240	8.75	3360	12.46
14	2.42	300	9.46	3600	12.50
15	2.46	360	9.81	3840	12.54
16	2.56	420	10.06	4080	12.61
17	2.67	480	10.33	4320	12.65
18	2.75	540	10.52		

PROJECT NAME   ROWLAND WALKER   ,   DATE OF RECOVERY AUGUST12, 1982

WELL NO. _____OBS 4_____

RECOVERY DATA

TIME, min.	D.D., ft. (12.63-dd)	TIME, min.	D.D., ft. (12.63-dd)	TIME, min.	D.D., ft. (12.63)
0.0	12.63 0	12	10.44 2.19	120	5.17 7.46
0.5	12.48 .15	13	10.33 2.3	150	4.63 8.0
1.0	12.29 .34	14	10.21 2.42	180	4.13 8.5
1.5	12.13 .5	15	10.09 2.54	210	3.84 8.79
2.0	12.00 .63	20	9.61 3.02	240	3.25 9.38
2.5	11.94 .69	25	9.17 3.46	300	2.96 9.67
3.0	11.79 .84	30	8.73 3.9	360	2.77 9.80
3.5	11.71 .92	35	8.50 4.13	420	2.50 10.1
4.0	11.59 1.04	40	8.17 4.46	480	2.31 10.3
4.5	11.50 1.13	45	7.88 4.75	540	2.13 10.5
5.0	11.44 1.19	50	7.61 5.02	600	1.94 10.6
6.0	11.25 1.38	55	7.34 5.29	660	1.81 10.8
7.0	11.11 1.52	60	7.04 5.59	720	1.71 10.92
8.0	10.96 1.69	70	6.63 6.0	1200	1.34 11.29
9.0	10.81 1.82	80	6.23 6.4	2640	0.92 11.71
10	10.67 1.96	90	5.92 6.71	4080	0.67 11.91
11	10.54 2.09	100	5.67 6.96		

PROJECT NAME <u>ROWLAND WALKER</u> , DATE OF APT <u>AUGUST 9, 1982</u>

WELL NO. <u>23</u> , TOTAL DEPTH <u>165</u> FT., CASED DEPTH <u>80</u> FT.

T.O.C. (NGVD) <u>35.37</u> FT., DISTANCE TO PROD. WELL <u>1700</u> FT.,

RATE OF DISCHARGE <u>478</u> GPM

TIME, min.	D.D., ft.	TIME, min.	D.D., ft.	TIME, min.	D.D., ft.
0.0	0	19	-	600	7.91
0.5	+0.02	20	0.74	660	8.06
1.0	+0.01	25	0.97	720	8.24
1.5	0	30	1.11	840	8.47
2.0	0	35	1.25	960	8.62
2.5	+0.01	40	1.51	1080	8.78
3.0	0.02	45	1.67	1200	8.89
3.5	0.05	50	1.78	1320	8.97
4.0	0.07	55	1.94	1440	9.08
4.5	0.07	60	2.13	1560	9.14
5.0	0.09	70	2.36	1680	9.32
6.0	0.12	80	2.63	1800	9.35
7.0	0.15	90	2.98	1920	9.39
8.0	0.21	100	3.30	2160	9.51
9.0	0.24	120	3.65	2400	9.60
10	0.30	150	4.28	2640	9.66
11	0.45	180	4.78	2880	9.68
12	0.46	210	5.22	3120	9.72
13	0.47	240	5.55	3360	9.80
14	0.47	300	5.51	3600	9.87
15	0.53	360	6.78	3840	9.89
16	-	420	7.08	4080	9.91
17	-	480	7.43	4320	10.11
18	-	540	7.64		

PROJECT NAME   ROWLAND WALKER_____,   DATE OF RECOVERY   AUGUST12, 1982

WELL NO. ____23_____

RECOVERY DATA   10.38-dd

10.36-dd   10.38-dd   10.38-

TIME, min.	D.D., ft.		TIME, min.	D.D., ft.	TIME, min.	D.D., ft.
0.0	10.08	.3	12	9.75 .63	120	6.03 4.35
0.5	10.23	.15	13	9.71 .67	150	5.08 5.3
1.0	10.23	.15	14	9.68 .70	180	4.63 5.75
1.5	10.23	.15	15	9.61 .77	210	4.20 6.18
2.0	10.38	0	20	9.26 1.12	240	3.80 6.58
2.5	10.34	.04	25	9.18 1.2	300	2.97 7.41
3.0	10.26	.12	30	8.81 1.57	360	2.72 7.66
3.5	10.24	.14	35	8.48 1.9	420	2.41 7.97
4.0	10.27	.11	40	8.27 2.11	480	2.16 8.2
4.5	10.24	.14	45	8.10 2.28	540	1.95 8.42
5.0	10.16	.22	50	7.94 2.44	600	1.74 8.64
6.0	10.16	.22	55	7.65 2.73	660	1.62 8.71
7.0	9.92	.46	60	7.43 2.95	720	1.49 8.8
8.0	9.86	.52	70	7.26 3.12	1200	0.74 9.6
9.0	9.77	.61	80	6.82 3.56	2640	0.64 9.74
10	9.78	.60	90	6.45 3.93	4080	0.64 9.7
11	9.78	.60	100	6.21 4.17		

NAMES AND ADDRESSES OF RESIDENTIAL USERS FURNISHED WITH DEEP WELL

JET ASSEMBLIES

Gerald R. Freiberg
Star Rt. Box 580
Labell, Fl 33935

William D. McCardel
Star Rt. Box 580-A
Labell, Fl 33935

William J. McCardel
Star Rt. Box 580-A
Labell, Fl 33935

Patricia Harvey
Rt 1 Box 580-AA
Labell, Fl 33935

Tony Orsini
Star Rt Box 58-B
Labell, Fl 33935

Diaz
Star Rt 1 Box 590
Labell, Fl 33935

Phillips
Star Rt. Box 579-AA
Labell, Fl 33935

L. King
Star Rt Box 579-K
Labell, Fl 33935

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1. Davis and Dewiest, 1966. HYDROGEOLOGY. John Wiley and
    Sons Inc.

2. Butler, Stanley S., 1957. ENGINEERING HYDROLOGY. Prentice
    Hall Inc.

3. Murray, Gail. Personal communication.

4. Massey-Norton, John. Personal communication.

PROJECT NAME ROWLAND WALKER   DATE OF AAT

LOCATION HWY 720, MUSE, FL.   AUG. 9, 1982

OBSERVATION WELL NO. WEST PROD   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
						STATIC W.L.
11:20	0	27 INCHES				STATIC W.L.
	0.5	27				
	1.0	27				
	1.5	27				
	2.0	27				
	2.5	27				
	3.0	~~27~~ 27				
	3.5	27				
	4.0	27 $1/16$				
	4.5	27 $1/16$				
	5.0	27 $1/16$				
	6.0	27 $1/16$				
	7.0	27 $1/16$				
	8.0	27 $1/16$				
	9.0	27 $1/8$				
	10.0	27 $3/16$				
	11.0	27 $1/4$				
	12.0	27 $1/4$				

	TIME (MIN)	DEPTH W.L.	OBS. DD	TREND CORR.	ADJUST DD	OBSERVATION WELL NO. WEST PROD. WELL COMMENTS
	14.0	27 3/8				
	15.0	27 1/2				
16	20.0	27 9/16				
17	25	27 11/16				
18	30	27 3/4				
19	35	27 7/8				
20 5 min	40	27 13/16				
25	45	28 3/8				
30	50	29				
35	55	29 1/2				
40 5min	60	30 1/8				
45	70	30 3/4				
50	80	31 7/16				
55	90	32				
60	100	32 11/16				
70	120	~~33 1/4~~ 34				
80 10 min	150	35 1/8				
90	180	36 1/4				
100 20 min	210	37 3/8				
120	240	~~39~~ 39 7/16				
150 30 min		42 1/8				
180		44 3/8				
210		46 1/2				
240		47 7/8				
300		5'-9"				
360		5'-5 1/4"				
420		5'-4 1/2"				
480		5'-3 1/2"				

WEST PROD. WELL

	MIN.	LEVEL
	600	5'
	660	5' + 1½"
	720	5' + 2½"
	840	5' + 4¾"
	960	5' + 6¾"
	1080	5' + 8¼"
AM 7:20	1200	5' + 9½"
9:20	1320	5' + 10¼"
← 11:20	1440	5' + 11¼"
1:20	1560	5' + 1'
3:20	1680	5' + 1' 1½"
5:20	1800	5' + 1' 3¾"
7:20	1920	5' + 1' 2"
PM 11:20	2160	5' + 1' 3¾"
3:20	2400	5' + 1' 4¾"
7:20	2640	5' + 1' 5½"
11:20	2880	5' + 1' 6"
PM 3:20	3120	5' + 1' 6½"
PM 7:20	3360	5' + 1' 7"
11:20	3600	5' + 1' 8¾"
AM 3:20	3840	5' + 1' 9"
7:20	4080	5' + 1' 10"
11:20	4320	

PROJECT NAME ROWLAND WALKER   DATE OF AAT

LOCATION HWY 720, MUSE, FL.   Aug. 9, 1982

CENTER

CRM   OBSERVATION WELL NO. PROD. WELL   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW

RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
						STATIC W.L.
		6" BELOW CASNG	129800 (VOL.)			
11:20	0	25.25 PSI				STATIC W.L.
	0.5	24.0				
	1.0	23.9				
	1.5	23.8				
	2.0	23.8				
	2.5	23.7				
	3.0	23.7				
	3.5	23.7				
	4.0	23.7				
	4.5	23.7				
	5.0	23.7				
	6.0	23.6				
	7.0	23.6				
	8.0	23.6				
	9.0	23.6				
	10.0	23.5				
	11.0	23.4				
	12.0	23.3				

TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORR.	ADJUST DD	OBSERVATION WELL NO. __PROD WELL__ CENTER COMMENTS
14.0	23.1				
15.0	23.1				
EXTRA 1 MIN READS → EXTRA 16 {23.8 / 17 23.8 / 1 MIN/8 23.0}					
20.0	22.9				
25	22.6				
30	22.6				
35	22.3				
40	22.3				
45	22.0				
50	21.9				
55	21.8				
60	21.7				
70	21.7				
80	21.6				
90	21.4				
100	21.3				
120	21.0				
150	20.8				
180	20.6				
210	20.3				
240	20.2				
300	20.1				
360	20.0				
420	19.8				
480	19.8				
540	19.8				

PROD. WELL CENTER

MIN.	LEVEL
600	19.8 PSI
660	19.8
720	19.7
840	19.7
960	19.7
1080	19.6
1200	19.5
1320	19.5
1440	19.4
1560	19.3
1680	19.3
1800	19.2
1920	19.1
2160	19.0
2400	19.0
2640	18.9
2880	18.9
3120	18.8
3360	18.5
3600	18.5
3840	18.4
4080	18.3
4320	

PROJECT NAME ROWLAND WALKER   DATE OF ART

LOCATION HWY 720 MUSE, FL.   AUG. 9, 1982

JTM-N

John

OBSERVATION WELL NO. PZ-1   SPEC. CAP.   GAM/Fi

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD	COMMENTS
						STATIC W.L.
	0	1.85 FROM TOC				STATIC W.L.
	0.5	4.82				
	1.0	4.78				
	1.5	4.78				
	2.0	4.90				
	2.5	5.05				
	3.0	5.20				
	3.5	5.41				
	4.0	5.45				
	4.5	5.56				
	5.0	5.66				
	6.0	5.88				
	7.0	6.06				
	8.0	6.23				
	9.0	6.35				
	10.0	6.46				
	11.0	6.60				
	12.0	6.72				

TIME (MIN)	DEPTH W.L.	OBS. DD	TREND CORR.	ADJUST DD	OBSERVATION WELL NO. PZ-1 COMMENTS
14.0	6.96				
15.0	7.06				
16 17 20.0	7.15				
	7.25				
25	(7.54)				
30	7.95 8.19				
35	8.51				
40	8.81				
45	9.05				
50	9.32				
55	9.58				
60	9.78				
70	10.15				
80	10.44				
90	10.75				
100	11.08				
120	11.49				
150	12.03				
180	12.46				
210	12.80				
240	13.09				
300	15'-13½"				
360	15'-10"				
420	15'-7"				
480	15'-4"				
540	15'-2"				

MIN	LEVEL
600	15'
660	15' + 2¼"
720	15' + 3½"
840	15' + 6"
960	15' + 7¾"
1080	15' + 9¼"
1200	15' + 10¾"
1320	15' + 11¼"
1120 1440	15' + 12"
1560	15' + 1'1"
1680	15' + 1'3"
1800	15' + 1'3"
1920	15' + 1'3½"
2160	15' + 1'5"
2400	15' + 1'6"
2640	15' + 1'6½"
2880	15' + 1'6¼"
3120	15' + 1'6¾"
3360	15' + 1'7½"
3600	15' + 1'8½"
3840	15' + 1'9"
4080	15' + 1'9¾"
4320	

10

PROJECT NAME ROWLAND WALKER   DATE OF AAT
LOCATION HWY 720 MUSE, FL.   AUG. 9, 1982

OBSERVATION WELL NO. SW-1   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD	COMMENTS
						STATIC W.L.
11:20	0	38½"				STATIC W.L.
	0.5	38½				
	1.0	38½				
	1.5	38½				
	2.0	38½				
	2.5	38½				
	3.0	38½				
	3.5	38½				
	4.0	38½				
	4.5	38½				
	5.0	38½				
	6.0	38½				
	7.0	38½				
	8.0	38½				
	9.0	38½				
	10.0	38½				
	11.0	38½				
	12.0	38½				

TIME (MIN)	DEPTH W.L.	OBS. DD	TREND CORR.	ADJUST DD	COMMENTS
14.0	38 ½				
~~15~~ 15.0	38 ½				
16 ~~20.0~~	38 ½				
17 ~~25~~	38 ½				
18 ~~30~~	38 ½				
19 ~~35~~	38 ½				
20 ~~40~~	38 ½				
25 ~~45~~	38 ½				
30 ~~50~~	38 ½				
35 ~~55~~	38 ½				
40 ~~60~~	38 ½				
45 ~~70~~	38 ½				
50 ~~80~~	38 ½				
55 ~~90~~	38 ½				
60 ~~100~~	38 ½				
70 ~~120~~	38 ½				
80 ~~150~~	38 ½				
90 ~~180~~	38 ¾				
100 ~~210~~	38 ¾				
120 ~~240~~	38 5/8				
150	38 ½				
180	38 5/8				
210	38 5/8				
240	38 5/8				
GRM 300	5'-1'8"				
360	5'-1'8"				
420	5'-1'7½"				
480	5'-1'7¾"				

SHALLOW SW-1

	min.	level
	600	5'- 1'6¾"
	660	5'- 1'7"
11:20 PM	720	5'- 1'7"
AM 1:20	840	5'- 1'7"
AM 3:20	960	5'- 1'7"
AM 5:20	1080	5'- 1'7"
AM 7:20	1200	5'- 1'7"
	1320	5'- 1'7"
AM 11:20	1440	5'- 1'7"
1:20	1560	5'- 1'7"
3:20	1680	5'- 1'6"
5:20	1800	5'- 1'6"
7:20	1920	5'- 1'7"
	2160	5'- 1'8½"
	2400	5'- 1'9¼"
	2640	5'- 1'9½"
	2880	5'- 1'9¼"
	3360	5'- 1'8½"
	3600	5'- 1'7¾"
	3840	5'- 1'7¾"
	4080	5'- 1'7½"
	4320	

LIGHT RAIN DURING THIS TIME

RAIN?

PROJECT NAME ROWLAND WALKER   DATE OF AAT

LOCATION HWY 720   MUSE, FL.   AUG. 9, 1982

GAIL

OBSERVATION WELL NO. PZ2 D.   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
						STATIC W.L.
	0	.95				STATIC W.L.
	0.5	1.35				
	1.0	1.9				
	1.5	2.05				
	2.0	2.24				
	2.5	2.42				
	3.0	2.54				
	3.5	2.67				
	4.0	2.80				
	4.5	2.92				
	5.0	3.02				
	6.0	5 - 1.82 = 3.18				
	7.0	5 - 1.57 = 3.43				
	8.0	5 - 1.45 = 3.55				
	9.0	5 - 1.30 = 3.70				
	10.0	5 - 1.13 = 3.87				
	11.0	5 - 1.0 = 4.0				
	12.0	5 - 0.9 = 4.1				

TIME- (MIN)	DEPTH W.L.	OBS. DD	TREND CORR.	ADJUST DD	OBSERVATION WELL NO. PZ2 DEEP COMMENTS
14.0	5-.6=4.33				
15.0	5-.55=4.45				
16.0	.457				
20.0	5-.06=4.94				
25	5.28				
30	5.64				
35	5.97				
40	6.31				
45	6.55				
50	6.82				
55	7.07				
60	7.28				
70	7.7				
80	8.03				
90	8.40				
100	8.70				
120	9.25				
150	9.75				
180	10.14				
210	10.53				
240	10.81'				
300	10'+1'7"				
360	10'+1'11¼"				
420	10'+2',2½"				
480	10'+29"				
540	15'-2'4"				

PZ - 2 DEEP

MIN	LEVEL
600	15' - 2'2"
660	15' - 1'10¾"
720	15' - 1'10"
840	15' - 1'7¾"
960	15' - 1'6"
1080	15' - 1'4½"
1200	15' - 1'3"
1320	15' - 1'1½"
11:20 1440	15' - 1'¼"
1560	15' - 1'
1680	15' - 11"
1800	15' - 10"
1920	15' - 9¾"
2160	15' - 8½"
2400	15' - 7¾"
2640	15' - 7"
2880	15' - 6½"
3120	15' - 6¼"
3360	15' - 5½"
3600	15' - 4½"
3840	15' - 4¼"
4080	15' - 3½"
4320	

PROJECT NAME ROWLAND WALKER   DATE OF AAT

LOCATION HWY 720 MUSE, FL.   AUG. 9, 1982

OBSERVATION WELL NO. PZ-3   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD	COMMENTS
						STATIC W.L.
	0	5 - 2' 11½"				STATIC W.L.
	0.5	5 - 2' 9¾"				
	1.0	5 - 2' 7½"				
	1.5	5 - 2' 7¼"?				
	2.0	5 - 2' 3½				
	2.5	5 - 2' 2½				
	3.0	5 - 2' 1"				
	3.5	5 - 2' 0"				
	4.0	5 - 1' 10¾"				
	4.5	5 - 1' 9¼"				
	5.0	5 - 1' 8¾				
	6.0	5 - 1' 7½				
	7.0	5 - 1' 5¾"				
	8.0	5 - 1' 3¼"				
	9.0	5 - 1' 1¾"				
	10.0	5 - 1' 0"				
	11.0	5 - 0 11"				
	12.0	5 - 9½"				

TIME- (MIN)	DEPTH W.L.	OBS. DD	TREND CORR.	ADJUST DD	COMMENTS
14.0	5-0' 6½"				
15.0	5- 6.0"				
20.0	5- ¾"				
25	5+ 4.0"				
30	5+ ¾"				
35	5+ 11 ¾"				
40	5+1' 3¼"				
45	5+1' 6¼"				
50	5+1' 10¼"				
55	5+2' ¼"				
60	5+2' 3¾"				
70	5+2' 7½"				
80	5+2' 9.0"				
90	5+3' 3½"				
100	5+3' 7½"				
120	5+4' ¾"				
150	5+4' 6½"				
180	10+ 1¼"				
210	10+5¼"				
240	10+9½"				
300	10'+1'6"				
360	10'+1'10¼"				
420	10'+2'1¼"				
480	10'+28½"				
540	10'+2'6¾"				

Left margin notes:

1st W.L

0 | 5- 4¾
0 | 5- 3½
0 | 5- 2½
0 | 5- 1½

PZ 3

min.	level
600	15'-2'2"
660	15'-2' 1/2"
720	15'- 1' 11 1/4"
840	15'- 1' 9"
960	15'- 1' 6 3/4"
1080	15'- 1' 5 1/4"
1200	15'- 1' 4"
1320	15'- 1' 2 1/2"
11:20 1440	15'- 1' 1 1/4"
1560	15'- 1' 3/4"
1680	15'- 1'
1800	15'- 11 1/2"
1920	15'- 10 3/4"
2160	15'- 9 1/2"
2400	15'- 8 1/2"
2640	15'- 8"
2880	15'- 7"
3120	15'- 6 1/2"
3360	15'- 6"
3600	15'-5 1/2"
3840	15'-5"
4080	15'- 4 1/4"
4320	

PAA PROJECT NAME ROWLAND WALKER   DATE OF AAT

LOCATION HWY 720', MUSE, FL   AUG 9, 1982

Volmeter 22-052

                                        EAST
        OBSERVATION WELL NO. 4 Deep   SPEC. CAP.   GAM/FT

        TOTAL DEPTH   CASED DEPTH

        TOC (TOP OF CASING) NGVD

    * PROBE TO ZERO MARK = 3.0'   DISTANCE TO PW
                                          RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
						STATIC W.L.
11:50						
	0	0 - .43				STATIC W.L.
	0.5	0 - .45				
	1.0	0 - .44				
	1.5	0 - .43				
	2.0	0 - .43				
	2.5	0 - .44				
	3.0	0 - .41				
	3.5	0 - .50				
	4.0	0 - .36				
	4.5	0 - .34				
	5.0	0 - .34				
	6.0	0 - .31				
	7.0	0 - .28				
	8.0	0 - .22				
	9.0	0 - .19				
	10.0	0 - .13				
	11.0	0 + .02				
	12.0	0 + .03				

TIME (MIN)	DEPTH to W.L.	OBS. DD	TREND CORR.	ADJUST DD	COMMENTS
14.0	0+.04				
15.0	0+.10				
20.0	0+.31				
25	0+.54				
30	0+.				
35	1-.18				
40	1+.08				
45	1+.24				
50	1+.35				
55	1+.51				
60	1+.				
70	2-.07				
80	2+.20				
90	3-.45				
100	3-.13				
120	3+.22				
150	4-.15				
180	4+.35				
210	5-.21				
240	5+.12				
300	10'-1¾"				
360	10'-7¾"				
420	10'-4¼"				
480	10'				
540	10'+2½"				

OBSERVATION WELL NO. PZ 4

Z - 4

MIN	LEVEL
600	10' + 5¾"
660	10' + 7½"
720	10' + 9¾"
840	10' + 1' ½"
960	10' + 1' 2¼"
1080	10' + 1' 4¼"
1200	10' + 1' 5½"
1320	10' + 1' 6½"
11:20 1440	10' + 1' 7¾"
1560	10' + 1' 8½"
1680	10' + 1' 10¾"
1800	10' + 1' 11"
1920	10' + 1' 11½"
2160	10' + 2' 1"
2400	10' + 2' 2"
2640	10' + 2' 2¾"
2880	10' + 2' 3"
3120	10' + 2' 3½"
3360	10' + 2' 4½"
3600	10' + 2' 5¼"
3840	10' + 2' 5½"
4080	10' + 2' 5¾"
4320	

Recovery

PROJECT NAME ROWLAND WALKER DATE OF AAT

LOCATION HWY 720 MUSE, FL. Aug. 9, 1982

OBSERVATION WELL NO. most PW   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
						STATIC W.L.
11:15		5'+1'10½"				
11:20	0	5'+1'10½"				STATIC W.L.
11:20.5	0.5	5'+1'10½"				
11:21	1.0	5'+1'10½"				
11:21.5	1.5	5'+1'10½"				
11:22	2.0	5'+1'10½"				
11:22.5	2.5	5'+1'10½"				
11:23	3.0	5'+1'10½"				
11:23.5	3.5	5'+1'10½"				
11:24	4.0	5'+1'10½"				
11:24.5	4.5	5'±1'10½"				
11:25	5.0	5'+1'10½"				
11:26	6.0	5'+1'10½"				
11:27	7.0	5'+1'10½"				
11:28	8.0	5'+1'10½"				
11:29	9.0	5'+1'10½"				
11:30	10.0	5'+1'10½"				
11:31	11.0	5'+1'10½"				
11:32	12.0	5'+1'10½"				
13.0		5'+1'10½"				

OBSERVATION WELL NO. P.W.(West)

COMMENTS
STATIC 27" = 2'3"

TIME (MIN)	DEPTH to W.L.	OBS. DD	TREND CORR.	ADJUST DD	COMMENTS
14.0	11:34	5'+1'10½"			
15.0	11:35	5'+1'10⅞"			
20.0	11:40	5'+1'9"/16			
25	11:45	5'+1'9¼"			
30	11:50	5'+1'9"			
35	11:55	5'+1'8⅞"			
40	12:00	5'+1'7¹³/₁₆"			
45	12:05	5'+1'7½"			
50	12:10	5'+1'6¾"			
55	12:15	5'+1'6"			
60	12:20	5'+1'5¾"			
70	12:30	5'+1'4⅛"			
80	12:40	5'+1'3"			
90	12:50	5'+1'2"			
100	1:00	5'+1'1"			
120	1:20	5'+10½"			
150	1:50	5'+7¾"			
180	2:20	5'+5½"			
210	2:50	5'+3" =	5'3"		
240	3:20	5'+1" =	5'1"		
300	4:20	5'-2½" =	4'9½"		
360	5:20	5'-4¼" =	4'7¾"		
420	6:20	5'-6½" =	4'5½"		
480	7:20	5'-8¼" =	4'3¾"		
540	8:20	5'-10" =	4'2"		
600	9:20	5'-11¾"			
660	10:20	5'-1'1¼"			
720	11:20	5'-1'2¾"			

Recovery

PROJECT NAME ROWLAND WALKER   DATE OF AAT
LOCATION   2194170   AUG. 9, 198:

OBSERVATION WELL NO. Pumped ...   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
	STATIC	0.5'				STATIC .W.L.
11:15		18.5				
11:20	0	18.5				STATIC W.L.
	0.5	21.5				
	1.0	22.5				
	1.5	23.2				
	2.0	22.0				DISCH. PIPE EMPTY
	2.5	22.8				
	3.0	22.8				
	3.5	22.8				
	4.0	22.0				
	4.5	21.4				
	5.0	21.9				
	6.0	21.5				
	7.0	21.5				
	8.0	21.6				
	9.0	21.7				
	10.0	21.7				
	11.0	21.8				
	12.0	21.8				

TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORR.	ADJUS. DD	COMMENTS
					STATIC = 0.5'
14.0	21.9				
15.0	22.0				
20.0	22.0				
25	10'-.54'				
30	10'-.95'				
35	10'-1.27'				
40	10'-1.63'				
45	10'-1.88'				
50	10'-25¾"				
55	10'-2.39'				
60	10'-2.59'				
70	10'-3'				
80	5'+1.75'				
90	6.34'				
100	6.09'				
120	5.59'				
150	5.06'				
180	4.64'				
210	4.30'				
240	5'-11½" = 4'4½"				
300	5'-1'5⅝" = 3'6½"				
360	5'-1'8¼" = 3'3¾"				
420	5'-1'11½ = 3'½"				
480	5'-2'1¾" = 2'10¼"				
540	5'-2'4¼" 2'7¾"				
600	5'-2'5¾"				
660	5'-2'7½" = 2'4½"				
720	5'-2'8¾"				

4:20 (at 300 min)

Recovery

PROJECT NAME RONLAND WALKER   DATE OF AAT
LOCATION HWY 720, MUSE, FL.   8/12/82
    AUG. 9, 198?

OBSERVATION WELL NO. Deep P2-1   SPEC. CAP.   GAM/FT
TOTAL DEPTH   CASED DEPTH
TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
						STATIC W.L. 1.85
11:15		15 + 1.75 = 16.75				
	0	15 + 1.75 = 16.75				STATIC W.L.
	0.5	15 + .21 = 15.21				
	1.0	15 - .5 = 14.5				
	1.5	15 - .73 = 14.27				
	2.0	15 - .10 = 14.10				
	2.5	15 - 1.0 = 14.0				
	3.0	15 - 1.18 = 13.82				
	3.5	15 - 1.35 = 13.65				
	4.0	15 - 1.43 = 13.57				
	4.5	15 - 1.55 = 13.45				
	5.0	15 - 1.63 = 13.37				
	6.0	15 - 1.8 = 13.20				
	7.0	15 - 2.0 = 13.0				
	8.0	15 - 2.15 = 12.85				
	9.0	15 - 2.3 = 12.70				
	10.0	15 - 2.5 = 12.5				
	11.0	15 - 2.6 = 12.4				
	12.0	15 - 2.72 = 12.28				

TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORR.	ADJ DD	COMMENTS
					STATIC 1.85'
14.0	15-3.0=12.0				
15.0	10+1.85=11.85				
20.0	11.3				
25	10.9				
30	10.5				
35	10.17				
40	10-.15=9.85				
45	10-.42=9.58				
50	10-.65=9.35				
55	10-.9=9.10				
60	10-1.15=8.85				
70	10-1.52=8.48				
80	10-1.9=8.2				
90	10-2.22=7.78				
100	10-2.51=7.49				
120	6.95				
150	6.41				
180	6.00				
210	5.66				
240	5.38				
300	5'-1⅛" = 4'11¾"				
360	5'-4¼"=4'8¾"				
420	5'-7¼" = 4'5¾"				
480	5'-9½ = 4'2½"				
540	5'-11¾"= 4'¼"				
600	5'-1'1¾"				
660	5'-1'3"				
720	5'-1'4½"				

6AIL

4:20

Recovery

PROJECT NAME *ROWLAND WAKER*   DATE OF APT
LOCATION *HWY 720 MUSE, FL.*   *Aug. 9, 1982*

OBSERVATION WELL NO. P21 S...   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
11:15		5' 19"				STATIC W.L. $38\frac{1}{2}"$
	0	5' - 19				STATIC W.L.
	0.5	5' - 18 3/4"				
	1.0	5' - 19"				
	1.5	5' - 19"				
	2.0	5' - 19"				
	2.5	5' - 19 1/4"				
	3.0	5' - 19 1/4"				
	3.5	5' - 19"				
	4.0	5' - 19'				
	4.5	5' - 19 1/8"				
	5.0	5' - 19"				
	6.0	5' - 19				
	7.0	5' - 19				
	8.0	5' - 19"				
	9.0	5' - 19 1/2"				
	10.0	- 19				
	11.0	5' - 19"				
	12.0	5' - 18 7/8"				

TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORR.	ADJ DD	COMMENTS
					STATIC 38½" = 3' 2½"
14.0	5-18"				
15.0	5'-17"				
20.0	5'-18"				
25	40"				
30	39"				
35	40"				
40	40				
45	39"				
50	39"				
55	39"				
60	39 ½				
70	39				
80	39 ¾"				
90	39 ½"				
100	39 ¾"				
120	39 ¼"				
150	39 ½"				
180	39 ½				
HN 210	40"				
GM 240	3.4'				
300	5'-1'6½"	3' 5½"			
360	5'-1'6¼"	3' 5¾"			
420	5'-1'6¼"	3' 5¾"			
480	5'-1'6¼"	3' 5¾"			
540	5'-1'6¼"	3' 5¾"			
600	5'-1'6¼"	3' 5¾"			
660	5'-1'6¼"				
720	5'-1'6¼"				

Recovery

PROJECT NAME ROWLAND WALKER   DATE OF AAT

LOCATION HWY 720, MUSE, FL.   Aug. 9, 1982

OBSERVATION WELL NO. P̅t̅ - ꞓoꞏp   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
11.15		15 — 0.29 14.71				STATIC W.L. .95
11.??	0	15 - 0.35 14.65				STATIC W.L.
	0.5	15 - 0.60 14.40				
	1.0	15 - 1.05 13.95				
	1.5	15 - 1.31 13.61				
	2.0	15 - 1.46 13.54				
	2.5	15 - 1.61 13.31				
	3.0	15 - 1.75 13.25				
	3.5	15 - 1.84 13.16				
	4.0	15 - 2.0 13.00				
	4.5	15 - 2.12 12.88				
	5.0	15 - 2.24 12.76				
	6.0	15 - 2.41 12.59				
	7.0	15 - 2.61 12.39				
	8.0	15 - 2.76 12.24				
	9.0	15 - 2.90 12.10				
	10.0	15 - 3.04 11.96				
	11.0	15 - 3.20 11.80				
	12.0	15 - 3.32 11.68				
	13.0					

TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORR.	ADJ DD	Well No. _I 4 8_ n.f
					COMMENTS
					STATIC = .95'
14.0	15-3.60=11.40				
15.0	15-3.72=11.28				
20.0	15-4.30=10.70				
25	15-4.71=10.29				
30	10-0.21=9.79				
35	10-0.58=9.42				
40	10-0.92=9.08				
45	10-1.15=8.85				
50	10-1.52=8.48				
55	10-1.75=8.25				
60	10-1.99=8.01				
70	10-2.42=7.58				
80	10-2.79=7.21				
90	10-3.10=6.90				
100	10-3.41=6.59				
120	10-3.89=6.11				
150	10-4.44=5.56				
180	10-4.91=5.09				
210	5-0.19=4.81				
240	5-0.54=4.46				
420 300	5'-1' = 4'				
360	5'-1'3" = 3'9"				
420	5'-1'6¼"=3'5¾"				
480	5'-1'8½"=3'3½"				
540	5'-1"10¾"				
600	5'-2'1¼"				
660	5'-2'2½"				
720	5'-2'4"				

Recovery

PROJECT NAME ROWLAND WALKER   DATE OF AAT

LOCATION HWY 720, MUSE, FL.   AUG 9, 1982

OBSERVATION WELL NO. PZ 3 Deep   SPEC. CAP.   GAM/FT

TOTAL DEPTH   CASED DEPTH

TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
11:15		15' – 0' 3¾				STATIC W.L.
	0	15' – 4"				STATIC W.L.
	0.5	15' – 0 3¾				
	1.0	15' – 0 7'				
	1.5	15' – 0 10"				
	2.0	15' –				
	2.5	15' – 1				
	3.0	15' – 1 2"				
	3.5	15' – 1 3				
	4.0	15' –				
	4.5	15' – 1 5½"				
	5.0	15' – 1 6¼				
	6.0	15 – 1 8⅝				
	7.0	05' – 1 10				
	8.0	15' – 2' 0"				
	9.0	15 – 2' 1¾				
	10.0	15' – 2' 3½				
	11.0	15 – 2' 5"				
	12.0	15 – 2' 6½"				
	13.0					

TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORR.	ADJ DD	COMMENTS
					STATIC = 2.05'
14.0	10 - 2' 9"				
15.0	10 - 2' 10½"				
20.0	10 - '				
25					
30	10 - '				
35	10 + 6'				
40	+ 2'				
45	10 - 0' 1"				
50	10 - 4'				
55					
60	10 -				
70	10 - 1'				
80	10 1' 8½				
90	10 - 2' 3				
100	10 - 2 - 3½				
120	10 - 2 - 9½				
150	5' + 1 + 8"				
180	5' + 1+2"				
210	5' + 0 10½"				
240	5' + 0 3½"				
4:20 300	5'				
360	5' - 2¼" = 4' 9¾"				
420	5' - 5½" = 4' 6½"				
480	5' - 7¾" = 4' 4¼"				
540	5' - 10" = 4' 2"				
600	5' - 1'¼" = 3' 11¾"				
660	5' - 1'1¾"				
720	5' - 1'3"				

Recovery

PROJECT NAME ROWLAND WALKER   DATE OF AAT
LOCATION HWY 720, MUSE, FL.   AUG, 9, 198?

OBSERVATION WELL NO. FZ4 Deep SPEC. CAP.   GAM/FT
TOTAL DEPTH   CASED DEPTH
TOC (TOP OF CASING) NGVD

DISTANCE TO PW
RATE OF DISCHARGE

3 ft. from omach by Me

TIME (MILITARY)	TIME (MIN)	DEPTH TO W.L.	OBS. DD	TREND CORRECT.	ADJUST. DD.	COMMENTS
						STATIC W.L.
						2.57
11:18		10-.32 - 12.6?				
11:20	0	9+.65-12.65	?			STATIC W.L.
	0.5	10-.2-1?.?				
	1.0	10-.2=1?.8				
	1.5	10-.2-?.?				
	2.0	10-.0?-?.??				
	2.5	10-.09-???				
	3.0	10-.17-?.??				
	3.5	10-.19-?.?1				
	4.0	10-.1?-12.84				
	4.5	10-.19-12.?1				
	5.0	10-.27-12.73				
	6.0	10-.27-12.73				
	7.0	10-.51-12.49				
	8.0	10-.57-12.43				
	9.0	10-.66-12.34				
	10.0	10-.65-12.35				
	11.0	10-.65-12.35				
	12.0	10-.6?-12.3?				
	13.0	-.7?-12.??				