TURNER CORPORATION

APPL. #08272-A

SUBMITTAL OF GEOHYDROLOGIC DATA

Prepared by:

Missimer and Associates, Inc.

Cape Coral, Florida

May, 1983

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I. GENERAL INFORMATION

Figures 1 and 2 show the location of wells that received various levels of investigation. The distances shown were measured and used for aquifer test analysis. The construction features of each well are summarized in Table 1 according to the aquifer, which they penetrate. Table 2 is a summary of background water level measurements. Reference or measuring point elevations were determined on each well by Agricultural Management Services. Their report is enclosed.

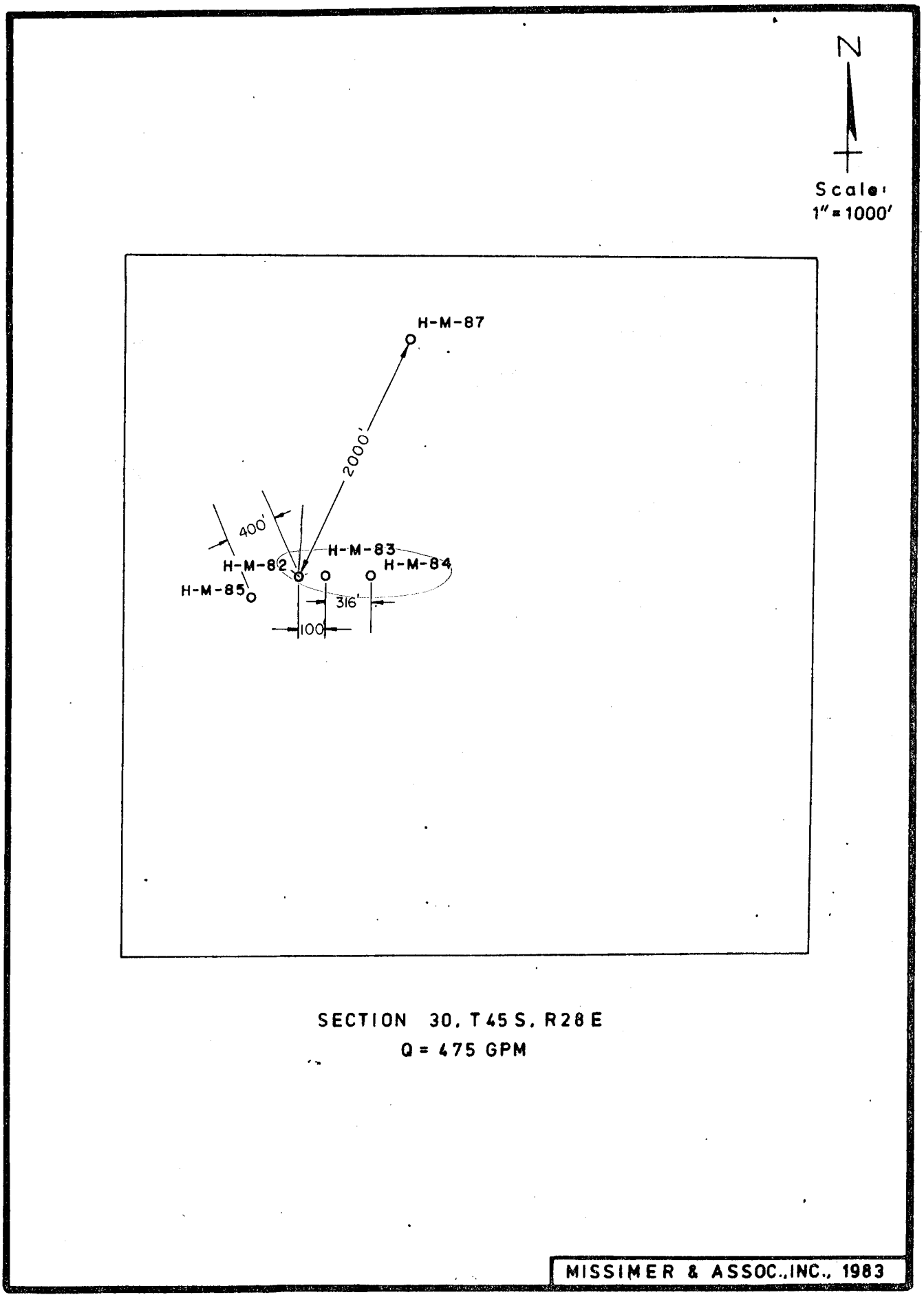


FIGURE 1. LOCATION OF WELLS USED IN SOUTH SITE AQUIFER TEST, TURNER CORPORATION, -83 - 2-18-8

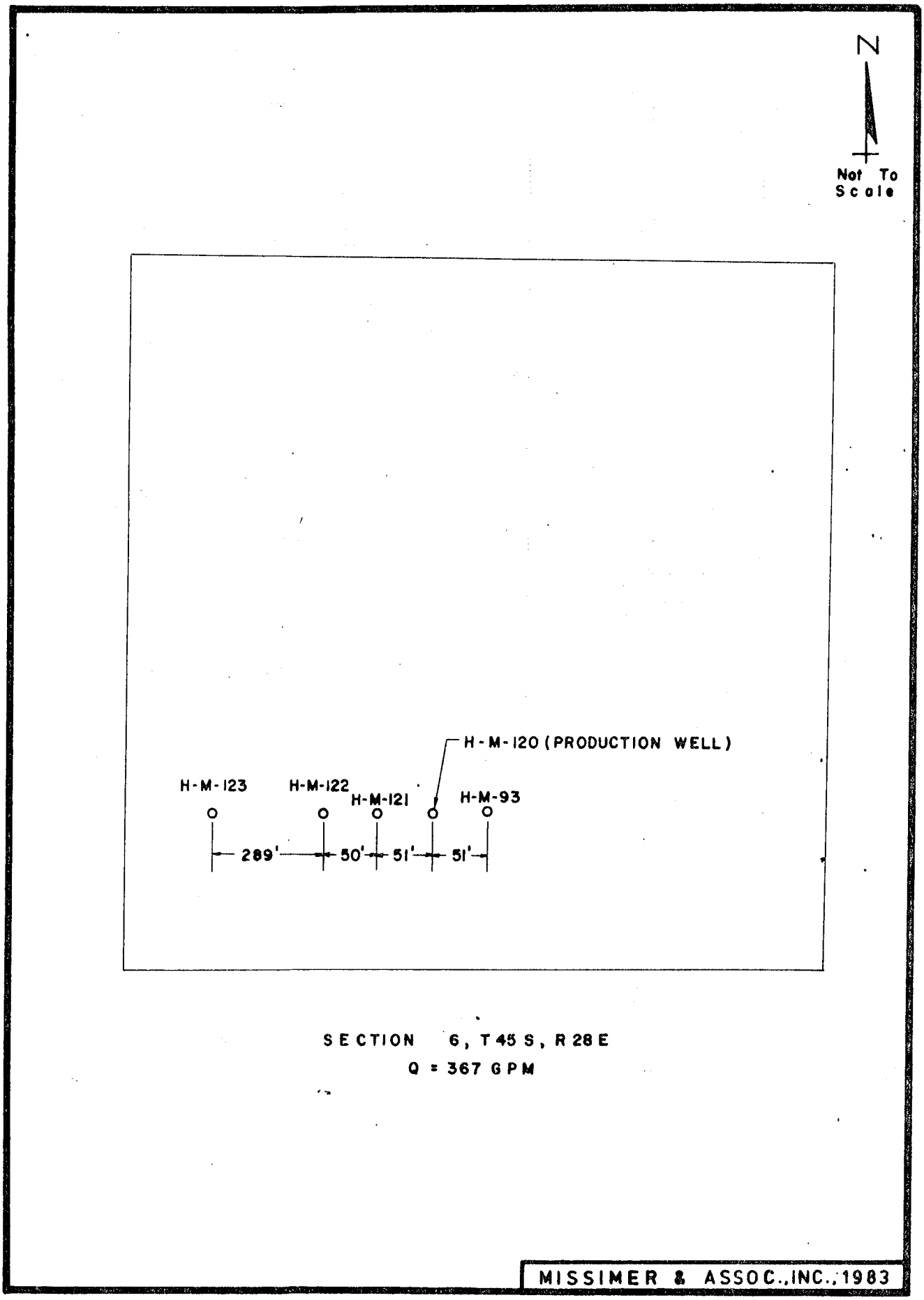


FIGURE 2. LOCATION OF WELLS USED IN NORTH SITE AQUIFER TEST, TURNER CORPO[illegible]TION, 3/12/83 — 3/15/8[illegible]

TABLE 1. CONSTRUCTION DETAILS OF OBSERVATION WELLS
TURNER CORPORATION

Tamiami Aquifer System-Deep Zone

Well Number	Total Depth (feet)	Casing Diameter (inches)	Screened Interval (feet)	Open-Hole Section (feet)
H-M-82	240	8	155-175	189-240
H-M-83	240	4	155-175	189-240
H-M-84	240	4	---	155-240
H-M-120	250	10	---	162-250
H-M-121	250	4	---	162-250
H-M-122	250	4	---	160-250
H-M-123	250	4	---	160-250
Sandstone Aquifer				
H-M-87	66	6	---	---
H-M-93	81	8	---	---
Water-Table Aquifer				
H-M-85	21	8	---	---

TABLE 2. WATER LEVEL DATA
TURNER CORPORATION
OBSERVATION WELLS

Tamiami Aquifer System-Deep Zone

Well Number	Date	Water Level in Feet Above NGVD
H-M-82	4/20/83	26.53
	5/5/83	23.53
H-M-83	4/20/83	26.44
	5/5/83	23.25
H-M-84	4/20/83	26.42
	5/5/83	22.88
H-M-120	5/5/83	23.06
H-M-121	5/5/83	23.02
H-M-122	5/5/83	22.96
H-M-123	5/5/85	22.81

Sandstone Aquifer

H-M-87	4/20/83	26.31
	5/5/83	22.15
H-M-93	5/5/83	22.72

Water-Table Aquifer

H-M-85	4/20/83	25.69

AGRICULTURAL MANAGEMENT SERVICES

May 2, 1983

Mr. T. H. O'Donnell
Missimer & Associates Inc.
Route 8, Box 625-D
Cape Coral, Florida 33909

Dear Mr. O'Donnell:

Re: Hydrologic Investigation - Turner Corporation

I enclose herewith a map depicting the approximate locations of the wells used in your recent hydrologic investigation, and list below the mean sea level elevations as determined from USGS bench mark #53EEB, located near the corners of Sections 7, 8, 17 and 18.

Except where noted otherwise, elevations were taken on the top of casings where these were marked with an arrow and/or the letters M.P.

Well #	Elevation (ft. m.s.l.)	Comments
82	32.47	
83	33.93	
84	32.83	
85	31.78	
87	34.38	
93	30.24	Top of casing - west side
120	30.81	
121	29.43	Casing scored at point measured
122	30.90	
123	30.33	Top of cap on casing

This information will allow you to proceed with your analysis. If I can be of further assistance, please call me.

Sincerely,

Nigel E. Morris
For the Company

jlf

Encls.

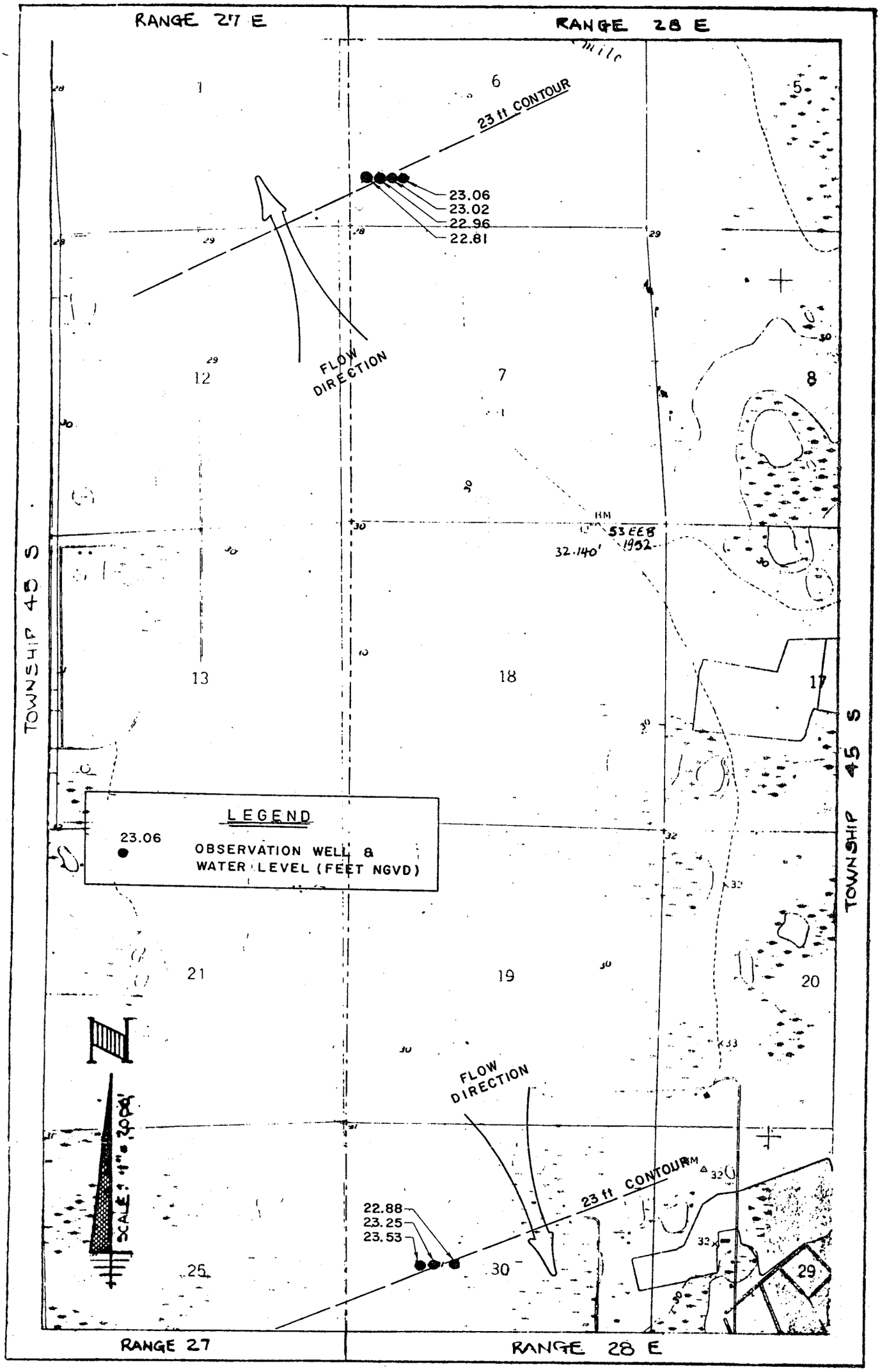
cc: Ed English

4830 Airport Road, Pu rda, Florida 33950 (813) -2410

II. POTENTIOMETRIC SURFACE MAP OF THE PROPOSED ZONE OF WITHDRAWAL

Exhibit I presents water level measurements from appropriate wells made on May 5, 1983. Our interpretative placement of the 23 foot contour lines results in predicting an on-site "mound". Support for this is available in SFWMD Technical Publication Number 82-1.

EXHIBIT I



POTENTIOMETRIC SURFACE: TAMIAMI AQUIFER SYSTEM-DEEP ZONE ON 5/5/83 BENEATH TURNER CORPORATION TEST SITE. (REFERENCE SFWMD TECH PUB 82-1).

III. STEP-DRAWDOWN TESTS

Measurements were made on both test production wells, H-M-82 and H-M-120. Pertinent data is presented in Table 3. Graphical plots for efficiency ratings have also been provided in Figures 3 and 4.

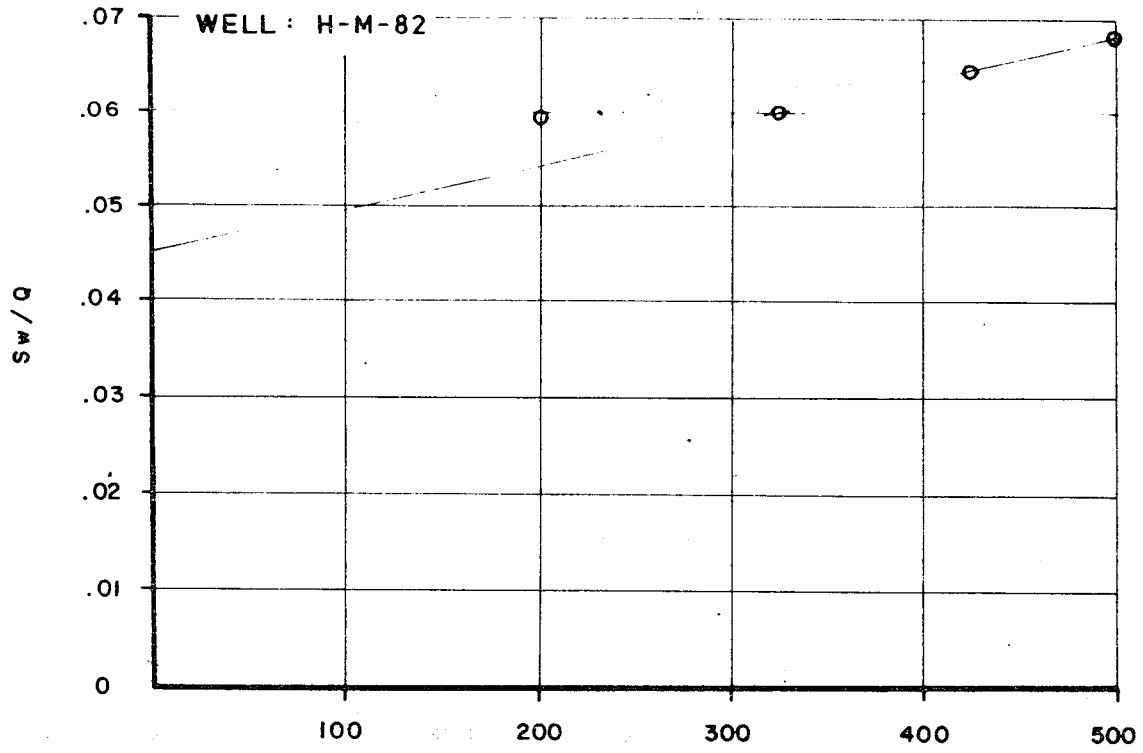
Note that although H-M-120 had a considerably higher efficiency, its specific capacity is much lower than H-M-82. The ultimate yield of wells in this portion of the Turner property will be substantially limited by the factor.

TABLE 3. STEP-DRAWDOWN TEST RESULTS FOR WELL H-M-82 (1-20-83)

Pumping Rate (gpm)	60 min. Drawdown (feet)	Specific Capacity (gpm/ft)	Percent Efficiency
200	11.88	16.8	76.6
325	19.59	16.6	75.5
425	27.29	15.6	70.8
500	33.88	14.7	67.1

STEP DRAWDOWN TEST RESULTS FOR WELL H-M-120 (4-8-83)

Pumping Rate (gpm)	60 Min. Drawdown (feet)	Specific Capacity (gpm/ft)	Percent Efficiency
227	20.85	10.89	89.8
287	26.42	10.86	89.6
337	31.55	10.68	88.1
394	37.95	10.38	85.6

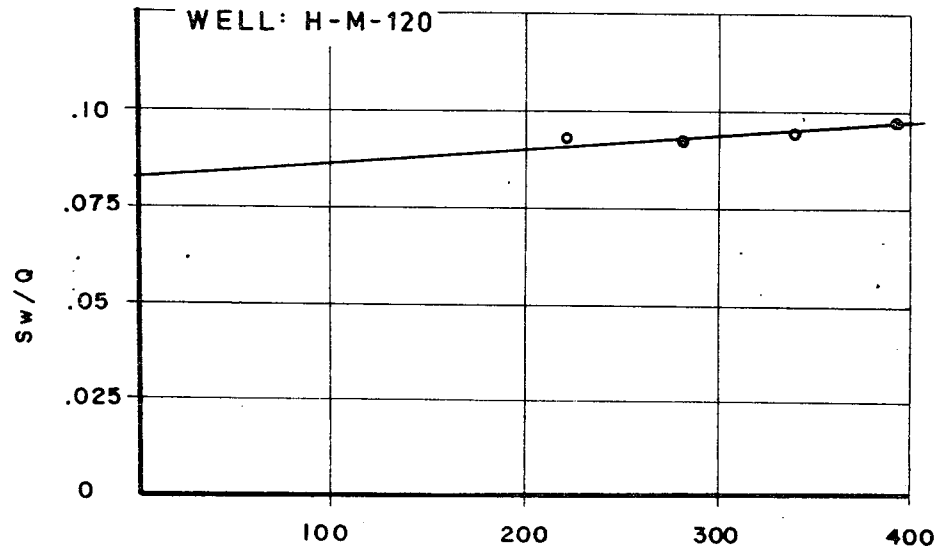


LEGEND

Q = PUMPING RATE (GPM)
Sw = DRAWDOWN (FEET)

MISSIMER & ASSOC., INC., 1983

FIGURE 3. EFFICIENCY CHARACTERISTICS OF WELL H-M-82.



LEGEND

Q = PUMPING RATE (GPM)

Sw = DRAWDOWN (FEET)

MISSIMER & ASSOC., INC., 1983

FIGURE 4. EFFICIENCY CHARACTERISTICS OF WELL H-M-120.

IV. TWO AQUIFER PERFORMANCE TESTS

The location of wells used in the south site test are shown in Figure 1. Time and drawdown data for each well are provided in Table 4. Time and recovery data are provided in Table 5. Equivalent information from wells used in the north site aquifer test appear in Figure 2 and Tables 6 and 7.

Both tests were run for $72^{\pm}$ hours. Background water level data were collected continuously for at least 24 hours. Selected wells were fitted with water level recorders during drawdown and recovery periods; others were measured periodically with a tape.

The discharge was monitored during pumping with an orifice apparatus. Flow rate was controlled by using either a gate valve or throttle. Barometric pressure was monitored during both tests. These last data are available upon request.

TABLE 4. TIME AND DRAWDOWN DATA FROM WELLS H-M-82, 83, 84, 85, and 87 USED IN THE SOUTH SITE AQUIFER TEST.

WELL H-M-82 PRODUCTION WELL

TIME AND DRAWDOWN DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME(minutes)	DRAWDOWN(feet)
1	23.35
2	29.55
3.33	30.1
4	30.23
5	30.6
6	30.72
7	30.77
8	30.85
9	31
10	31.1
13.5	31.29
15	31.37
20	31.6
25	31.85
30	32.15
40	32.5
50	32.6
60	32.85
75	33.1
90	33.25
105	33.3
120	33.55
150	33.8
180	33.93
246	34.43
306	34.75
366	34.92
428	34.84
540	34.94
1280	35.62
1580	36.22
2750	36.7
4370/ 78+ hrs.	37.7

WELL H-M-83

TIME AND DRAWDOWN DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	DRAWDOWN (feet)
.25	.76
.5	1.29
.75	1.52
1	1.78
1.5	2.03
2	2.23
3	2.51
4	2.71
5	2.86
6	2.96
7	3.08
8	3.17
9	3.26
10	3.34
12.5	3.5
15	3.64
20	3.87
25	4.05
32	4.27
40	4.47
50	4.67
60	4.85
75	5.08
90	5.25
105	5.43
120	5.6
150	5.86
180	6.07
242	6.45
302	6.70
362	6.9
423	7.12
480	7.23
540	7.37
600	7.48
660	7.61
720	7.73
780	7.74
840	7.77
900	7.83
960	7.87
1020	7.95
1080	7.96

WELL H-M-83 - Continued:
TIME AND DRAWDOWN DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME(minutes)	DRAWDOWN(feet)
1140	8.02
1200	8.03
1515	8.16
1560	8.25
1680	8.3
1800	8.36
1920	8.43
2040	8.43
2160	8.43
2280	8.47
2400	8.50
2520	8.51
2640	8.51
2718	8.55
2880	8.63
3510	8.71

WELL H-M-84

TIME AND DRAWDOWN DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME(minutes)	DRAWDOWN(feet)
.25	.02
.5	.08
.75	.15
1	.22
1.5	.32
2	.4
3	.52
4	.61
5	.69
6	.76
7	.82
8	.87
9	.92
10	.97
12.5	1.07
15	1.15
20	1.28
25	1.38
30	1.48
40	1.63
50	1.74
60	1.85
75	1.99
90	2.08
105	2.182
120	2.27
150	2.41
180	2.53
240	2.71
300	2.85
360	2.98
420	3.07
480	3.14
540	3.21
600	3.27
660	3.35
720	3.40
780	3.42
840	3.44
900	3.47
960	3.49
1020	3.50
1080	3.51
1140	3.53

WELL H-M-84 - Continued

TIME AND DRAWDOWN DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME(minutes)	DRAWDOWN(feet)
1200	3.55
1250	3.57
1320	3.57
1380	3.57
1440	3.57
1680	3.58
1800	3.59
1920	3.60
2040	3.60
2160	3.61
2280	3.62
2400	3.62
2880	3.64
3600	3.67
4305	3.63

WATER TABLE WELL H-M-85

TIME AND DRAWDOWN DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME(minutes)	DRAWDOWN(feet)
17	0
33	0
102	0
150	0
200	0
258	0
318	0
381	0
420	0
1285	.11
2755	.74

WELL H-M-87

TIME AND DRAWDOWN, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	DRAWDOWN (feet)
12.5	0
23	0
43	0
64	0
95	.02
165	.07
231	.12
253	.14
314	.18
375	.21
439	.24
686	.62
1315	.47
1585	.45
2755	.41

TABLE 5. TIME AND RECOVERY DATA FROM WELLS H-M-82, 83, AND 84 USED IN THE SOUTH SITE AQUIFER TEST

WELL H-M-82 PRODUCTION WELL

TIME AND RECOVERY DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME(minutes)	RECOVERY(feet)
0	0
.58	26.22
1.08	26.78
1.75	27.14
2	27.31
2.5	27.46
3	27.61
4	27.87
5	28.03
6	28.18
7	28.32
8	28.41
9	28.52
10	28.62
12.5	28.79
15	28.96
20	29.24
25	29.46
40	29.97
50	30.20
60	30.44
75	30.74

WELL H-M-83

TIME AND RECOVERY DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	RECOVERY (feet)
0	0
.17	.57
.25	.86
.5	1.2
.75	1.4
1	1.55
1.5	1.77
2	1.93
2.5	2.06
3	2.16
4	2.32
5	2.44
6	2.54
7	2.63
8	2.71
9	2.77
10	2.83
12.5	2.98
20	3.29
25	3.445
30	3.58
40	3.79
50	3.97
60	4.13
75	4.33
90	4.51
105	4.65
120	4.78
150	5.0
180	5.2
240	5.51
360	5.75
420	5.95
480	6.13
540	6.29
600	6.42
660	6.55
720	6.65
780	6.74
840	6.86
900	6.95
960	7.03
1020	7.11
1080	7.19
1140	7.25
1200	7.31
1260	7.37

WELL H-M-84

TIME AND RECOVERY DATA, SOUTH SITE AQUIFER TEST
TURNER CORPORATION

TIME(minutes)	RECOVERY(feet)
0	0
.17	.01
.25	.02
.5	.07
.75	.12
1	.17
1.5	.24
2	.3
3	.4
4	.47
5	.53
6	.58
7	.63
8	.67
9	.7
10	.74
15	.88
20	.98
25	1.06
30	1.13
40	1.27
50	1.34
60	1.42
75	1.53
90	1.62
105	1.68
120	1.74
150	1.84
180	1.93
240	2.08

TABLE 6. TIME AND DRAWDOWN DATA FROM WELLS H-M-93, 120, 121, 122, and 123 USED IN THE NORTH SITE AQUIFER TEST.

WELL H-M-93 SANDSTONE WELL

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	DRAWDOWN (feet)
0	0
.25	-.019
.50	-.03
.75	-.035
1.0	-.037
1.5	-.045
2	-.05
3	-.05
4	-.054
5	-.056
6	-.056
7	-.056
8	-.06
9	-.06
10	-.06
12.5	-.06
15	-.058
20	-.05
25	-.037
30	-.019
40	.003
50	.077
60	.13
75	.202
90	.28
105	.35
120	.41
150	.53
184	.655
249	.84
308	.98
380	1.11
431	1.2
492	1.31
547	1.39
606	1.48
653	1.54
733	1.62
783	1.68
845	1.72

WELL H-M-93 SANDSTONE WELL

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION CONT'd

TIME (Minutes)	DRAWDOWN (feet)
893	1.76
1025	1.85
1250	2.00
1732	2.22
2125	2.33
2700	2.50
3385	2.64
4165	2.73

WELL H-M-120 PRODUCTION WELL

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	DRAWDOWN (feet)
1	24.97
5	29.55
8	30.55
12	31.15
18	32.35
24	32.88
30	33.17
40	33.70
50	33.77
60	33.65
65	33.70
68	34.17
75	34.49
80	34.55
90	34.42
105	34.77
120	34.97
150	35.25
188	35.55
247	35.45
305	35.85
380	34.80
429	35.25
540	37.00
559	36.90
660	37.23
725	37.10
780	37.00
842	36.95
900	37.28
1205	37.05
1688	37.90
1730	37.45
2680	37.65
4290	38.00

WELL H-M-121

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	DRAWDOWN (feet)
.08	.70
.25	2.02
.5	3.97
.75	4.78
1.0	5.29
1.5	6.28
2	7.04
3	7.84
4	8.33
5	8.69
6	8.96
7	9.22
8	9.39
9	9.57
10	9.72
20	10.87
25	11.19
30	11.45
40	11.85
50	12.09
60	12.21
65	12.30
75	12.44
90	12.715
105	12.935
120	13.09
150	13.285
180	13.29
200	13.46
238	13.62
305	13.8
361	13.94
385	14.03
424	14.06
477	14.41
545	14.46
600	14.50
658	14.60
779	14.67
840	14.78
901	14.815
1020	14.78
1205	15.11

WELL H-M-121

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION - CONT'D

TIME (minutes)	DRAWDOWN (feet)
1400	15.40
1660	15.55
2320	15.42
2690	15.54
3025	15.71
3565	15.71
4113	15.71

WELL H-M-122

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	DRAWDOWN (feet)
.08	.12
.25	.77
.5	1.01
.75	2.6
1.0	3.13
1.5	3.88
2	4.58
3	5.36
4	5.85
5	6.22
6	6.51
7	6.76
8	6.96
9	7.13
10	7.29
11	7.42
12.5	7.6
15	7.82
20	8.35
25	8.68
30	8.92
40	9.32
50	9.6
60	9.71
65	9.8
75	9.96
90	10.19
105	10.41
120	10.55
150	10.75
182	10.79
240	11.09
300	11.23
360	11.37
387	11.44
422	11.47
480	11.79
537	11.87
592	11.89
662	12.01
838	12.18
903	12.21
1212	12.34
1260	12.5

WELL H-M-122

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION - CONT'D

TIME (minutes)	DRAWDOWN (feet)
1560	12.75
1700	12.62
2040	12.42
2500	12.75
2700	12.87
3030	13.01
3390	13.08
3810	13.06
4110	13.08

WELL H-M-123

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	DRAWDOWN (feet)
.25	.01
.5	.06
.75	.19
1	.31
1.5	.60
2	.88
3	1.33
4	1.69
5	1.98
6	2.20
7	2.40
8	2.49
9	2.63
10	2.76
12.5	3.10
15	3.29
20	3.62
25	3.94
30	4.09
40	4.38
50	4.59
60	4.74
75	4.92
90	5.08
105	5.22
120	5.32
150	5.485
193	5.66
240	5.79
300	5.94
364	6.155
420	6.24
480	6.33
554	6.43
600	6.50
650	6.56
730	6.63
786	6.67
845	6.72
900	6.76

WELL H-M-123

TIME AND DRAWDOWN DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION CONT'D

TIME (minutes)	DRAWDOWN (feet)
1228	6.92
1405	7.14
1735	7.13
1920	7.06
2280	7.23
2700	7.37
2880	7.50
3150	7.51
3385	7.54
3745	7.57
4105	7.59

TABLE 7. TIME AND RECOVERY DATA FROM WELLS H-M-93, 120, 121, 122, and 123 USED IN THE NORTH SITE AQUIFER TEST.

H-M-93 SANDSTONE WELL

TIME AND RECOVERY DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	RECOVERY (feet)
1.5	-.02
4.0	-.05
8.0	-.05
25	-.03
30	-.02
40	.02
50	.06
60	.11(5)
79	.21
105	.34
122	.40
151	.51
182	.61
240	.82
360	1.05
480	1.24
600	1.36

WELL H-M-120 PRODUCTION WELL

TIME AND RECOVERY DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	RECOVERY (feet)
0	0
.25	22.77
1	27.74
1.5	28.82
2	29.60
3	30.30
4	30.51
5	30.95
6	31.25
7	31.5
8	31.71
9	31.89
10	32.03
12.5	32.31
15	32.55
20	32.95
25	33.29
30	33.53
40	33.87
50	34.15
60	34.33
75	34.63
90	34.79
110	35.05
121	35.09
152	35.27
180	35.47

WELL H-M-121

TIME AND RECOVERY DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	RECOVERY (feet)
0	0
.08	.34
.25	3.83
.5	4.43
.75	5.23
1	5.88
1.5	6.7
2	7.24
3	7.94
4	8.46
5	8.8
6	9.1
7	9.34
8	9.54
9	9.71
10	9.86
12.5	10.18
15	10.42
20	10.81
25	11.09
30	11.33
40	11.69
50	11.94
60	12.18
75	12.41
90	12.6
105	12.75
120	12.87
150	13.07
180	13.24

WELL H-M-122

TIME AND RECOVERY DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	RECOVERY (feet)
0	0
.08	.067
.25	1.622
.5	2.18
.75	2.92
1	3.46
1.5	4.23
2	4.73
3	5.43
4	5.91
5	6.26
6	6.55
7	6.77
8	6.99
9	--
10	7.31
12.5	7.62
15	7.87
20	8.24
25	8.54
30	8.76
40	9.13
50	9.37
60	9.57
80	9.88
90	9.98
105	10.13
120	10.26
150	10.46
180	10.62
270	11.0
390	11.263
510	11.444
630	11.585
750	11.712
870	11.832
990	11.93
1130	12.061
1370	12.151
1610	12.25
1850	12.322
2090	12.357
2570	12.44

WELL H-M-122

TIME AND RECOVERY DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION - CONT'D

TIME (minutes)	RECOVERY (feet)
3050	12.515
3530	12.562
4010	12.602
4490	12.638
4970	12.69
5450	12.71

WELL H-M-123

TIME AND RECOVERY DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION

TIME (minutes)	RECOVERY (feet)
0	0
.08	0
.25	.01
.41	.05
.58	.13
.75	.22
1	.37
1.25	.52
1.5	.67
2	.93
2.5	1.13
3	1.35
3.5	1.53
4	1.69
4.5	1.83
5	1.96
6	2.15
7	2.35
8	2.51
9	2.65
10	2.775
12.5	2.99
15	3.19
17.5	3.36
20	3.49
25	3.73
30	3.9
40	4.18
50	4.385
60	4.54
80	4.79
95	4.925
105	4.997
124	5.12
155	5.274
185	5.43
240	5.61
360	5.88
420	5.97
480	6.07
540	6.15
600	6.22
660	6.29

WELL H-M-123

TIME AND RECOVERY DATA, NORTH SITE AQUIFER TEST
TURNER CORPORATION CONT'D

TIME (minutes)	RECOVERY (feet)
720	6.34
780	6.39
840	6.45
900	6.49
960	6.54
1020	6.58
1080	6.61
1140	6.64
1200	6.67
1260	6.69
1320	6.72
1380	6.73
1440	6.75
1560	6.77

V. ANALYSIS OF THE AQUIFER PERFORMANCE TEST

Drawdown and recovery data have been evaluated primarily by using the Jacob Straight Line method and the Hantush-Jacob type curves for leaky artesian aquifers. In addition, the type curves developed by Ferris and others were used on the south site data to estimate the distances to an apparent discharge image. These curves and associated analysis methodologies are discussed in U.S.G.S. Professional Paper 708 - Ground Water Hydraulics. Walton's text, Groundwater Resource Evaluation was also referenced in analyzing the leaky aquifer data. The following equations apply:

Straight-Line:

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

T = Transmissivity, gpd/ft

Q = Discharge, gpm

Δs = Drawdown difference per log cycle, feet

Hantush-Jacob:

$$T = \frac{114.6\ Q\ H(u,\ B)}{s}$$

$$S = \frac{T u\ t}{1.87\ r^2}$$

$$k'/b' = \frac{T\ (r/B)^2}{r^2}$$

where,

T = Transmissivity (gpd/ft)

Q = Discharge (gpm)

s = Drawdown (ft)

S = Storage coefficient

H(u, B) = Hantush-Jacob curve function

t = Time

r = Distance from pumped well to observation well (ft)

k' = Permeability of confining layer (gpd/ft^2)

b' = Thickness of confining layer (ft)

r/B = Hantush-Jacob curve function

Table 8 summarizes the hydraulic coefficients computed from the aquifer test data bases. Specific features of the data are discussed below.

South Site Test

Time-drawdown graphs for wells H-M-83 and 84 are shown in Figures 5 and 6 respectively. Also shown are the Theis curve and curves generated by the image theory proportionality constants, K=25 and K=35. Deflections of drawdown data above the Theis curve are interpreted as reflecting the presence of a discharge effect within the cone-of-influence of the pumped well. The computed distance to the "image well" ranges from 3,300 to 3,500 feet. It's

TABLE 8. AQUIFER COEFFICIENTS CALCULATED FOR THE PUMPED ZONE AT THE NORTH AND SOUTH SITES

North Site

Analysis Method	T(gpd/ft)	S	k'/b' (gpd/ft^3)
Well H-M-121			
Straight Line	26,000	--	--
Curve matching	17,600	1.5×10^{-4}	1.1×10^{-2} @ $r/B = .04$
Well H-M-122			
Straight Line	28,000	--	--
Curve matching	19,500	1.0×10^{-4}	3.1×10^{-3} @ $r/B = .04$
Well H-M-123			
Straight Line	37,000	--	--
Curve matching	26,800	6.5×10^{-5}	1.8×10^{-3} @ $r/B = .1$

South Site

Well H-M-83			
Straight Line	79,000	--	--
Curve matching	72,000	1.4×10^{-4}	7.2×10^{-6}
Well H-M-84			
Straight Line	114,000	--	--
Curve matching	140,000	1.5×10^{-4}	8.1×10^{-5}

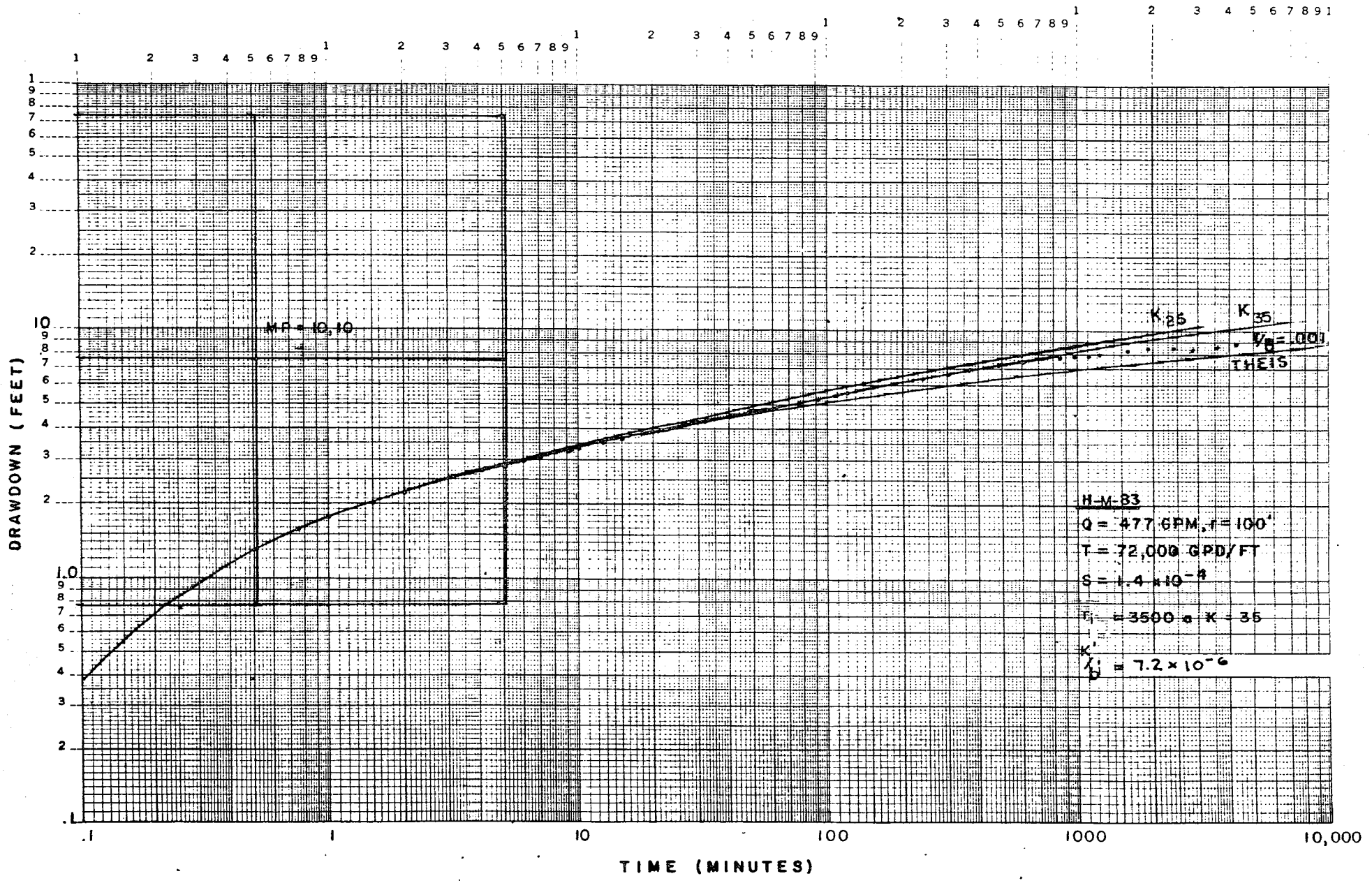


FIGURE 5. LOG-LOG PLOT OF TIME AND DRAWDOWN DATA FOR H-M-83 DURING SOUTH SITE TEST.

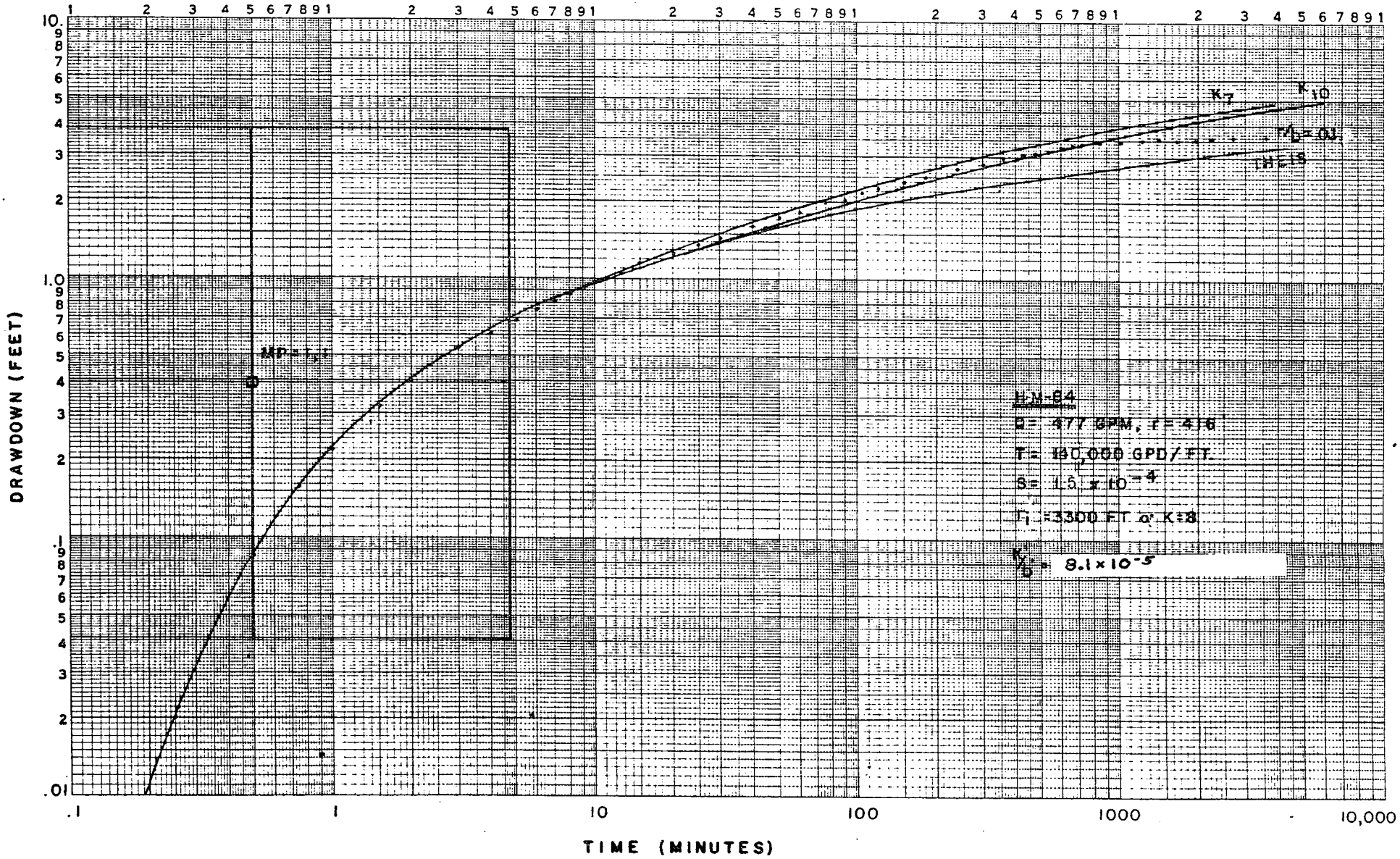


FIGURE 6. LOG - LOG PLOT OF TIME AND DRAWDOWN DATA FOR H-M-84 DURING SOUTH SITE TEST.

origin was not resolved although may reflect geologic conditions. Leakance effects became apparent after about 24 hours of pumping. Although originating from a discharge image curve, maintenance of a constant transmissivity resulted in leakance value estimates of 8×10^{-5} to 7×10^{-6} gpd/ft^3. These are considered unrealistically low.

Monitoring of the water table in the general vicinity of the pumped well did not reveal any effects of withdrawal. A Sandstone Aquifer well, H-M-87, began to drawdown after about 95 minutes of pumpage. This factor lead to a decision to monitor the effects of pumpage on this aquifer more closely in time and space during the north site test.

North Site Test

Time-drawdown graphs for wells H-M-121, 122 and 123 are shown in Figures 7 and 9, respectively. Figure 10 is an equivalent plot of data from the Sandstone Aquifer well, H-M-93. Each of the production zone wells showed the effects of leakance shortly after pumpage began. The water level declines did not follow typical trends. Drawdown continued throughout the duration of the test. The early release of water stored in confining beds may have accounted for the flattening of the drawdown curve at a time before leakage actually occurred. In any case, leakance values estimated from the data ranged from approximately .002 to .01. Note that the transmissivity of the aquifer

beneath the north site is lower than present to the south.

The Sandstone Aquifer responded to the test with a drawdown of nearly 3 feet. Pumpage effects between this zone and underlying parts of the Tamiami Aquifer System were clearly demonstrated. This is supportive of the relatively high leakance values computed from the test data.

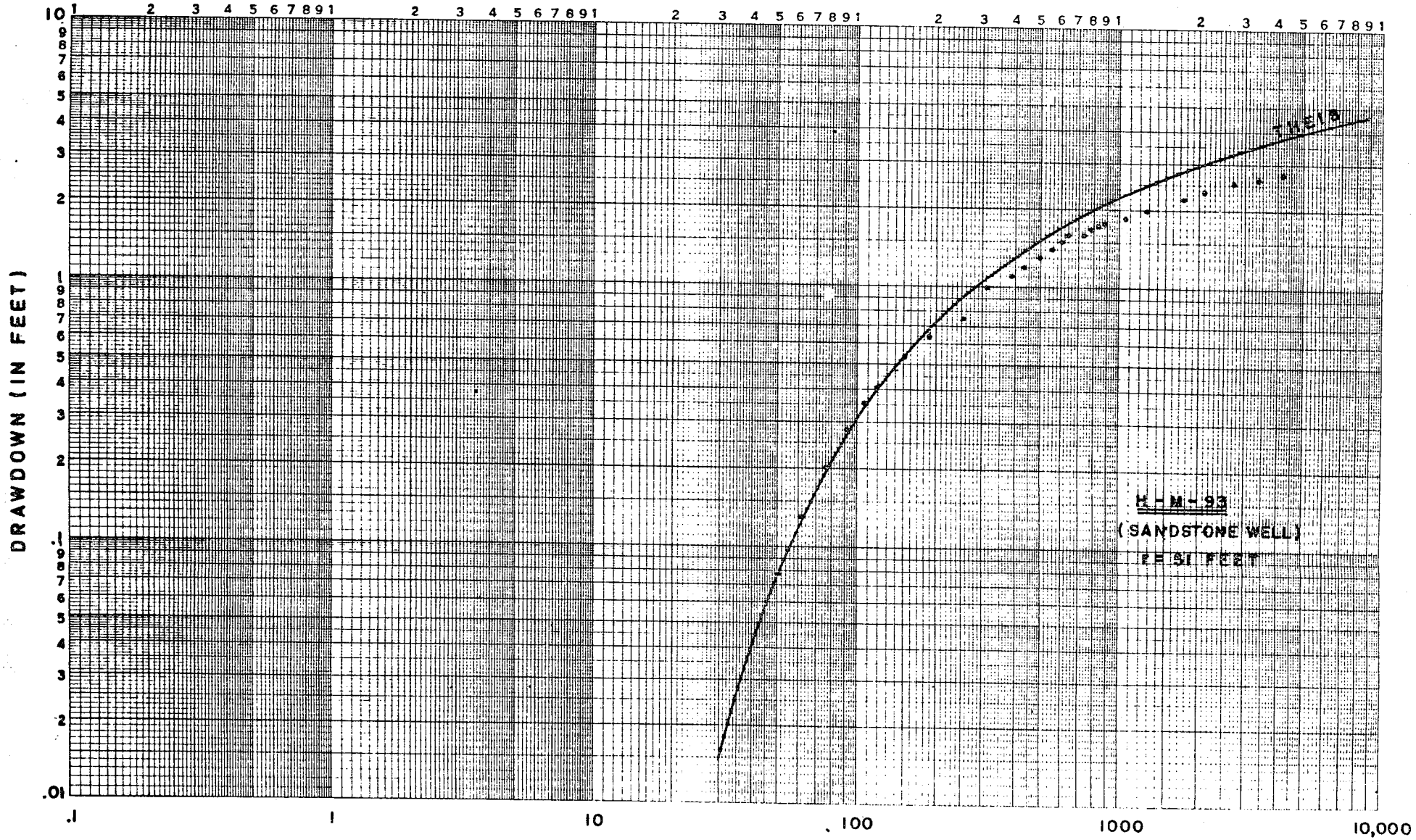


FIGURE 10. LOG-LOG PLOT OF TIME AND DRAWDOWN DATA FOR H-M-93 (SANDSTONE WELL), DURING THE NORTH SITE AQUIFER TEST.

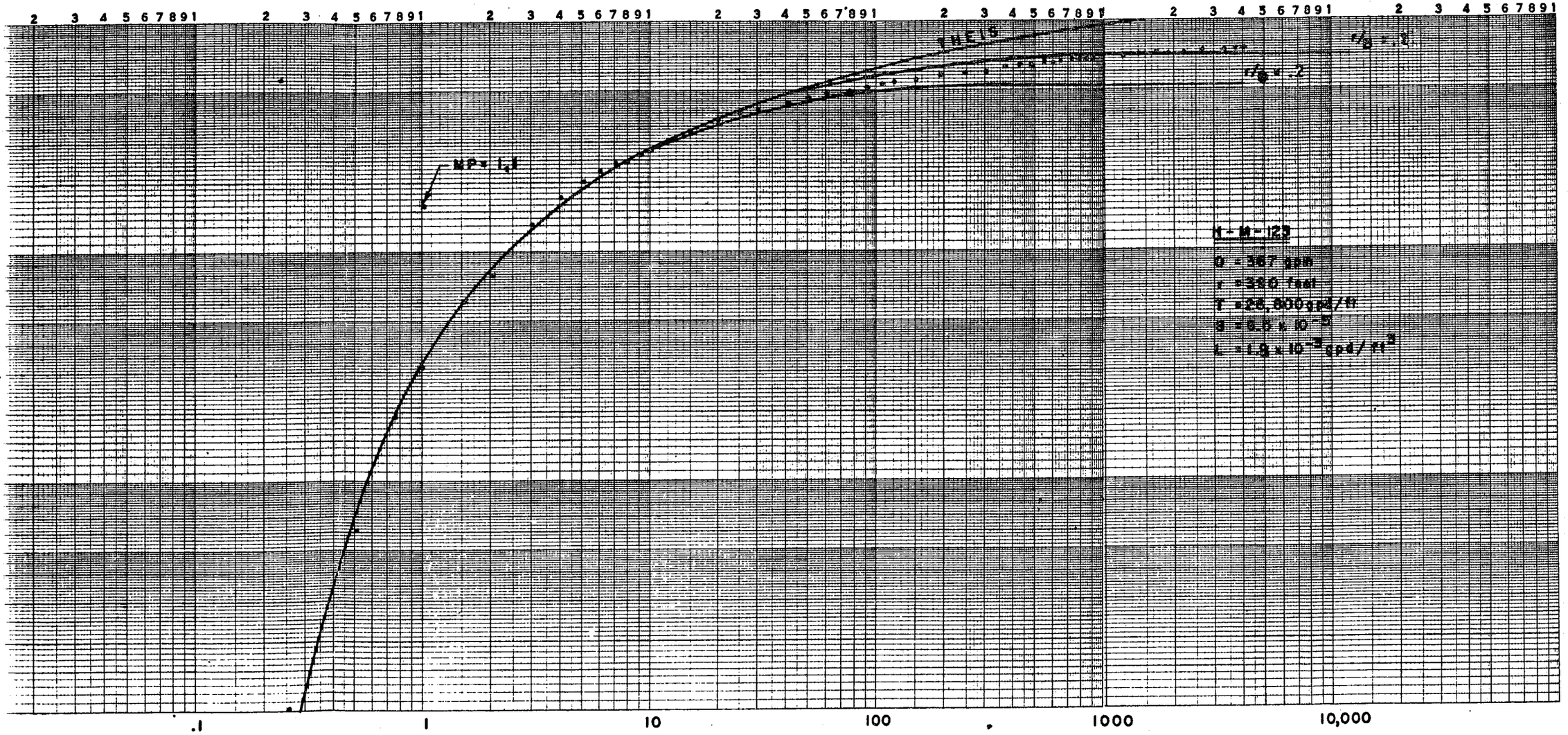


FIGURE 9. LOG-LOG PLOT OF TIME AND DRAWDOWN DATA FOR H-M-123 DURING THE NORTH SITE AQUIFER TEST.

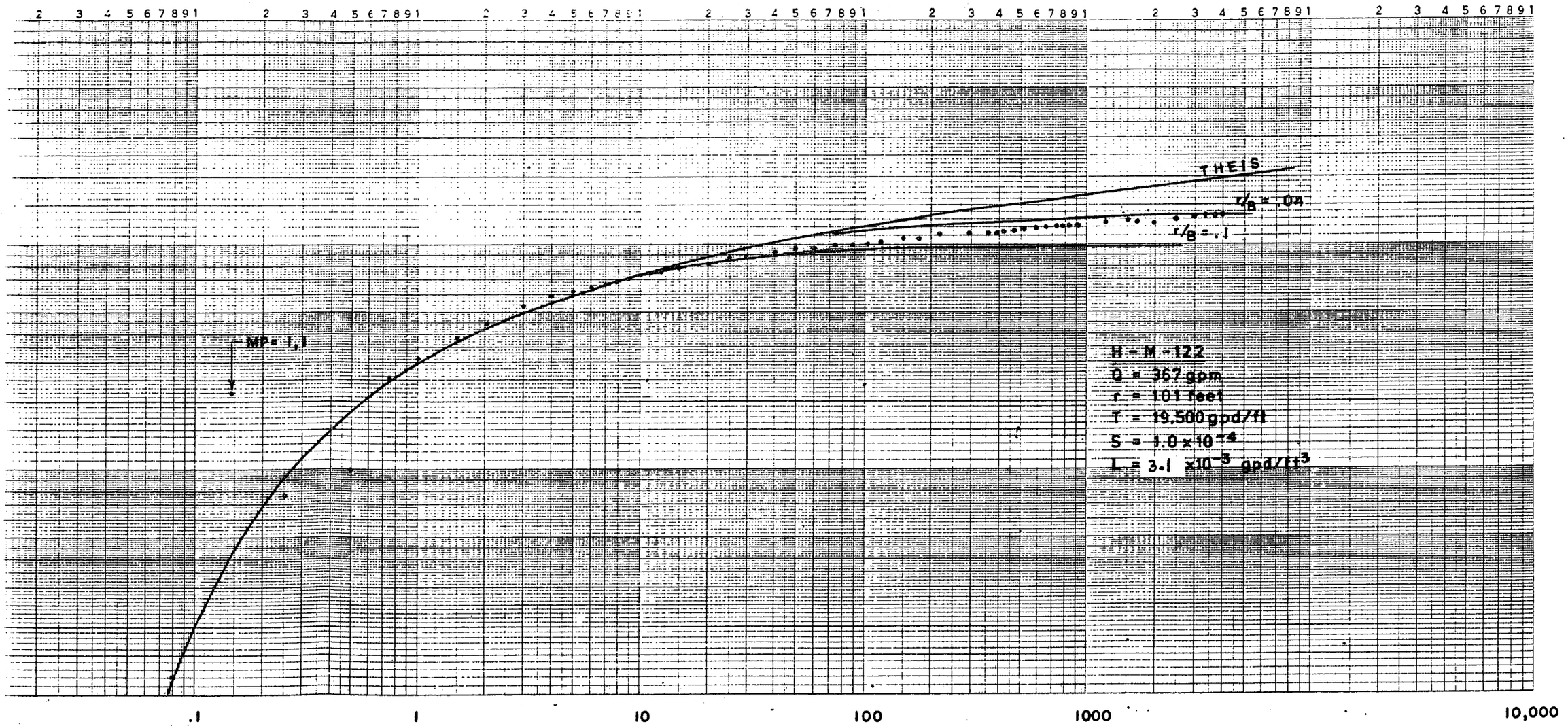


FIGURE 8. LOG-LOG PLOT OF TIME AND DRAWDOWN DATA FOR H-M-122 DURING THE NORTH SITE AQUIFER TEST.

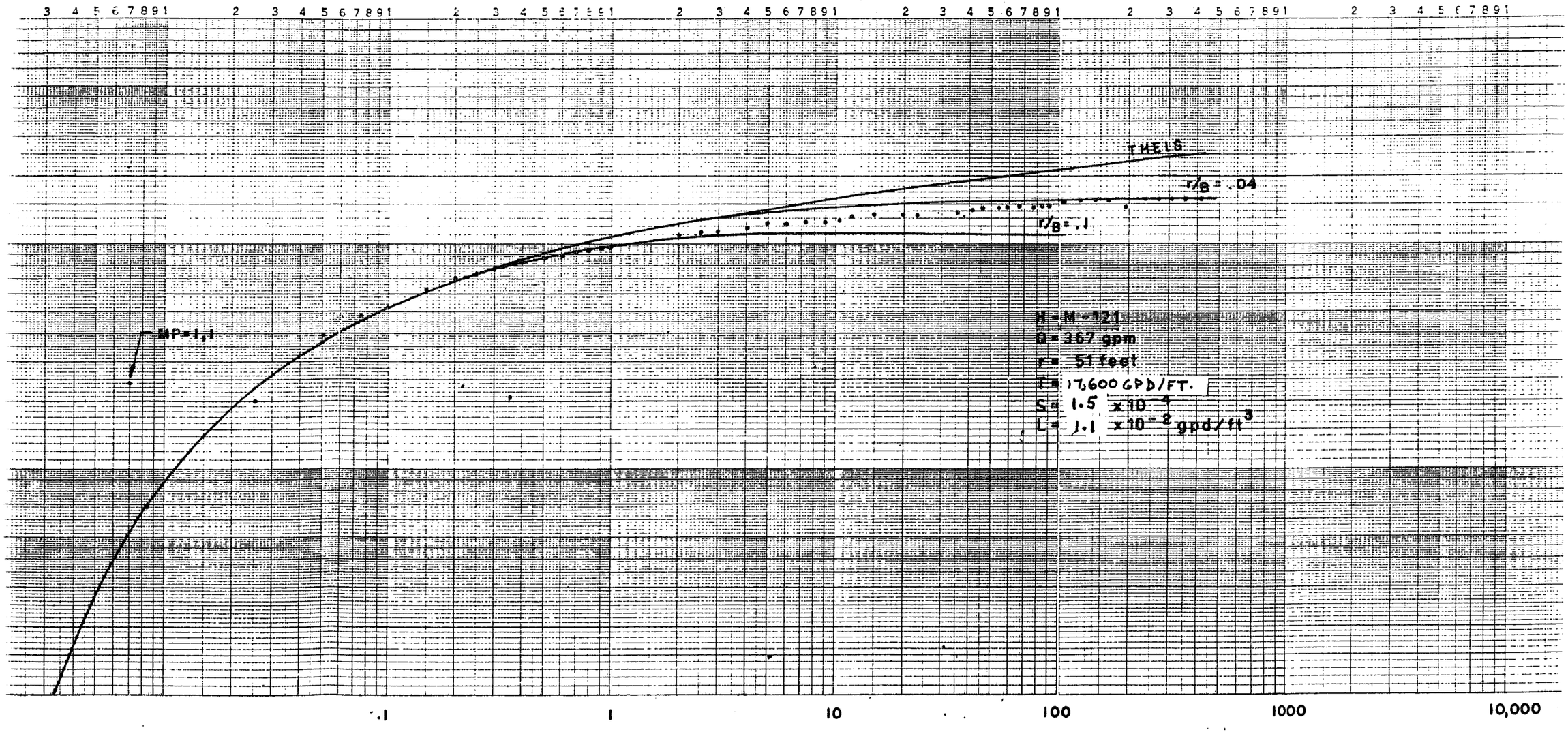


FIGURE 7. LOG-LOG PLOT OF TIME AND DRAWDOWN DATA FOR H-M-121 DURING THE NORTH SITE AQUIFER TEST.

VI. WATER QUALITY ANALYSIS BEFORE, DURING AND AFTER TESTS

The specific conductivity and concentration of dissolved chloride in each test/production well were measured periodically during the aquifer tests. These data are summarized in Table 9. The quality of water at each site is different but consistent. The values of chloride at the north site averaged about 300 mg/l. This is very similar to the chloride value of 310 mg/l reported by the U.S.G.S. in their well L-1965, which is just west of Turner's property. The low average chloride value of 47 mg/l at the south site may result from the higher permeability of the aquifer in this area.

TABLE 9. WATER QUALITY DATA COLLECTED DURING NORTH SITE AQUIFER TEST TURNER CORPORATION

WELL H-M-120
(Q = 367GPM, 4/12 - 4/15/83)

Time Since Pumping Began (minutes)	Chloride (mg/l)	Specific Conductivity (umhos/cm)
10	300	1390
30	260	1240
300	300	1390
1205 (20.1 hours)	300	1430
2680 (44.7 hours)	300	1430
4320 (72 hours)	320	1440

WATER QUALITY DATA COLLECTED
DURING SOUTH SITE AQUIFER TEST
TURNER CORPORATION

WELL H-M-120
(Q = 480 gpm, 2/15-2/18/83)

Time Since Pumping Began (minutes)	Chloride (mg/l)	Specific Conductivity (umhos/cm)
10	46	650
75	46	650
250	50	680
430	46	650
1260 (21 hours)	48	650
2760 (46 hours)	48	650
4320 (72 hours)	48	650

VII. LITHOLOGIC LOGS OF TEST WELLS

GEOLOGIST'S LOG: H-83

Depth(feet)	Lithology
0-15	Sand, brown and light gray, fine-grained, subangular; minor organic debris, silt, clay and phosphorite.
15-20	Limestone, white to light gray, sandy; minor shell.
20-40	Limestone, white to light gray; sand; marl, increasing with depth; thin hard bed at 28 feet.
40-60	Clay, green, minor phosphorite; shell, sand and limestone fragments; sandy between 50-55.
60-85	Limestone, sandy, gray; abundant shell fragments; phosphorite.
85-100	Sand, medium to very coarse; pebbles well rounded; phosphorite; shell; limestone fragments.
100-120	Sand, very fine, clayey, gray; minor phosphorite and shell fragments.
120-135	Clay, gray, very sandy; minor shell and phosphorite.
135-150	Sand, very fine, clayey, gray; minor phosphorite and shell fragments.
150-170	Limestone, tan, numerous casts and molds.
170-180	Limestone, light gray, marly; minor shell and phosphorite.
180-210	Marl, gray; limestone, marly, sandy; clay, gray.
210-215	Clay, gray; marl, light gray; limestone fragments.
215-230	Limestone, light gray, sandy in places; shell fragments.
230-235	Limestone, light gray, sandy; marl; shell fragments.
235-240	Marl, gray; limestone; shell fragments; minor sand and phosphorite.

GEOLOGIST'S LOG OF WELL H-120

Depth(feet)	Lithology
0-5	Sand, brown, fine grained; minor organic debris.
5-15	Sandstone, white to yellowish brown, calcareous matrix, well indurated; minor shell.
15-20	Limestone, white to light gray; sandy.
20-25	Limestone, gray, marly; clay, green; shell fragments, sand, phosphorite. Clay increasing with depth.
25-90	Clay, green, minor phosphorite, shell, quartz sand and limestone fragments.
90-125	Quartz pebbles, light gray, medium to coarse-grained (2 mm - 8 mm), pebbles well rounded; clay, green (increasing from 95-105); phosphorite; minor limestone.
125-159	Clay, green, calcareous, phosphatic; quartz pebbles, light gray, well rounded; minor limestone, white.
159-189	Limestone, light gray and tan, numerous microscopic vugs, shell casts and molds; minor phosphorite; trace amounts of sphalerite and chalcopyrite from 177-183.
189-217	Marl, light gray; limestone; minor phosphorite and minor shell.
217-242	Limestone, light gray, marly in places, sandy; shell fragments.
242-260	Marl, light gray; limestone; minor phosphorite.

VIII. ASSESSMENT OF ADVERSE IMPACTS ON LEGAL EXISTING USERS

Both on-site and off-site pumpage impacts have been evaluated using the Hantush-Jacob, semi-confined aquifer model. The model run utilized the following input:

Transmissivity	= 21,000 gpd/ft
Leakance	= .002 gpd/ft^3
Pumpage	= 30 wells at 720,000 gpd/ea
Well Spacing	= See Figure

Predicted drawdowns are shown in reference to the Turner property and Lehigh Acres in Figure 11. Our analysis, utilizing conservative coefficients, does not predict serious off-site drawdowns. Turner's pumpage will ultimately be controlled by drawdown impacts on their property, i.e., self-regulating. At the 21.6 MGD withdrawal rate, the maximum drawdown values, 1-foot from a pumping well, is about 65 feet. Restraints posed by dry season water levels, well efficiencies, pump requirements, etc. will not safely allow additional drawdowns.

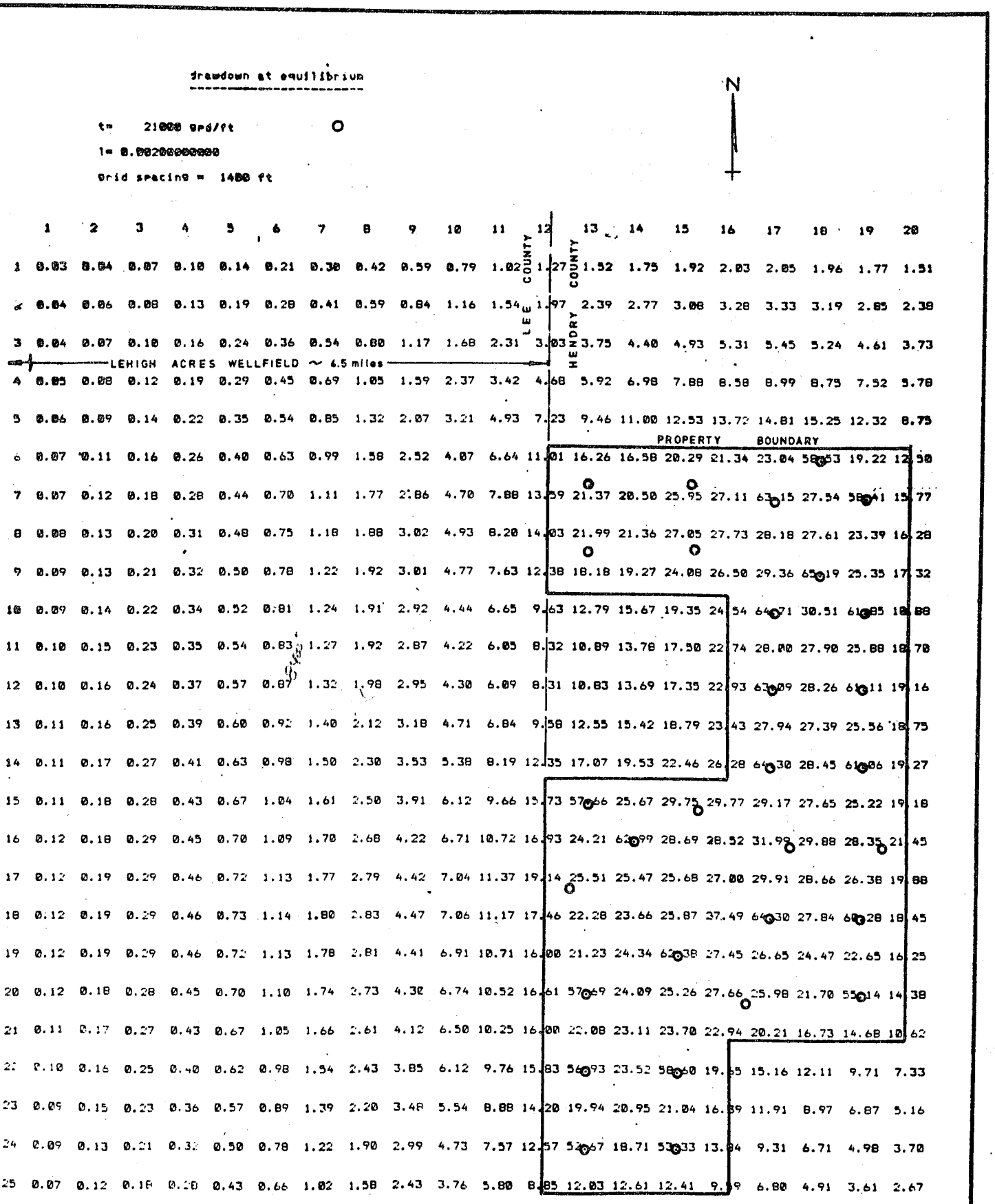


FIGURE 11. EQUILIBRIUM DRAWDOWN IN TAMIAMI AQUIFER SYSTEM-DEEP ZONE, FROM TURNER CORP. PUMPAGE, 21.6 MGD.

MISSIMER & ASSOC., INC., 1983

IX. ASSESSMENT OF ADVERSE IMPACTS ON THE WETLANDS

Both surface and shallow groundwater levels beneath the Turner property are controlled to a first order by the Lehigh Acres Canal. Pumpage impacts will not have an adverse impact on the water table. Irrigation will be designed for plant requirements; hence, recharge of the water table will be minimal.