

**HYDROLOGIC ASSOCIATES U.S.A., INC.
ENVIRONMENTAL CONSULTANTS**

MIAMI

8925 S. W. 148th Street, Suite 212,
Miami, Florida 33176
Phone: (305) 252-7118 • Fax: (305) 254-0874

ORLANDO

109 Bayberry Road
Altamonte Springs, Florida 32714
Phone: (407) 788-1355 • Fax: (407) 788-1135

April 29, 1994

**Mr. Gene McLoughlin, P.E.
MDWASA
P.O. Box 330316
Miami, Florida 33233-0316**

Dear Mr. McLoughlin,

The purpose of this letter report is to describe the procedures used and the results obtained from quantitative hydraulic analysis of two potential monitoring zones within the Floridan Aquifer system penetrated by Injection well I-15. The straddle packer test and subsequent hydraulic analysis were conducted in the zones of the aquifer between 2040 to 2070 feet and 2190 to 2220 feet below land surface.

METHOD

A straddle packer was used to isolate the test zones for drawdown and recovery tests. Stress was imposed on the hydraulic system with a 4 inch submersible pump and water level changes were measured in the drill stem with a pressure transducer and recorded on a Hermit 1000-C data logger. Prior to testing, the wells were developed by pumping the formation fluid until the specific conductance stabilized (Appendix 1). The well was then allowed to recover from development before performing the test.

BACKGROUND

A 12 1/4 inch pilot hole was drilled below casing to a depth of 2500 feet below land surface. A suite of geophysical logs were run and, together with the borehole cutting samples, two test zones were selected by the WASA project hydrogeologist. An upper zone was selected between 2040-2070 feet below land surface and a lower zone was selected from 2190-2220 feet below land surface. Each zone was isolated with inflatable straddle packers. The packer is made up of 2, 15 foot packers separated by a 30 foot length of drill stem. The 10 feet of perforated drill stem is open to the formation between the two packer elements.

The packer assembly was lowered on the drill stem into the original pilot hole to the tested interval of 2190-2220 feet B.L.S. The packer elements were then inflated. A submersible pump was installed in the drill stem to develop the formation fluids between the packer elements. After nine hours and fifteen minutes of pumping, a constant specific conductance of 47,500 umhos was reached. The well was then allowed to recover to its initial antecedent conditions. The well was then pumped while drawdown data was recorded. After the pumping was discontinued recovery data were recorded until formation water level had again reached antecedent conditions. Background, drawdown and recovery water level data is graphed on Figure 1. Raw data are presented in Appendix II.

The packer assembly was then raised to the 2040-2070 feet below land surface zone. The same procedure as above was then followed. The specific conductance for the upper zone stabilized at 45,500 umhos after ten hours of pumping. Background, drawdown and recovery water level data is graphed on Figure 2.

AQUIFER TEST I-15 ZONE 2190-2220

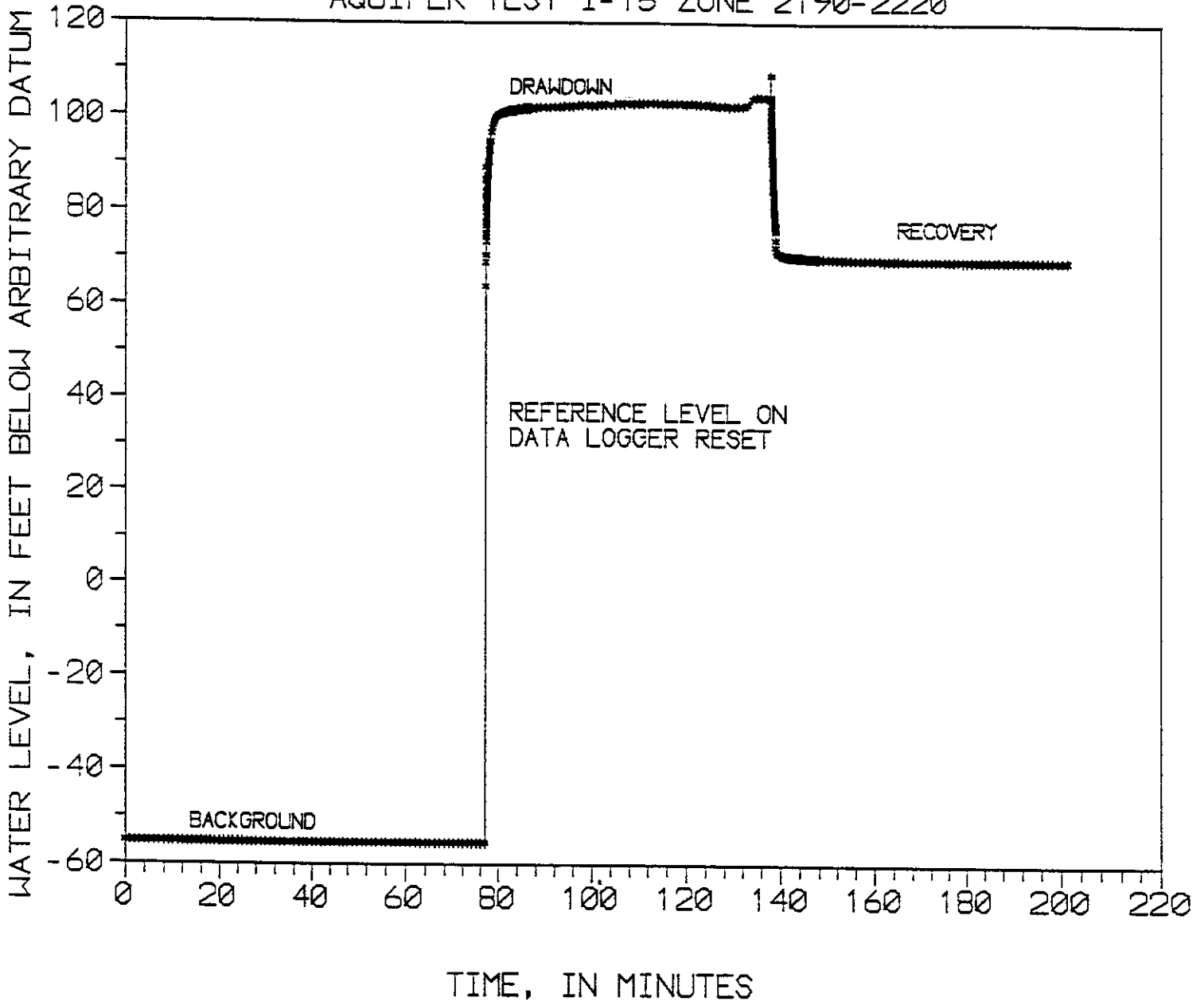


Figure 1.-- Background, drawdown and recovery data I-15, from 2190 to 2220 zone, arbitrary datum.

AQUIFER TEST I-15 ZONE 2040-2070

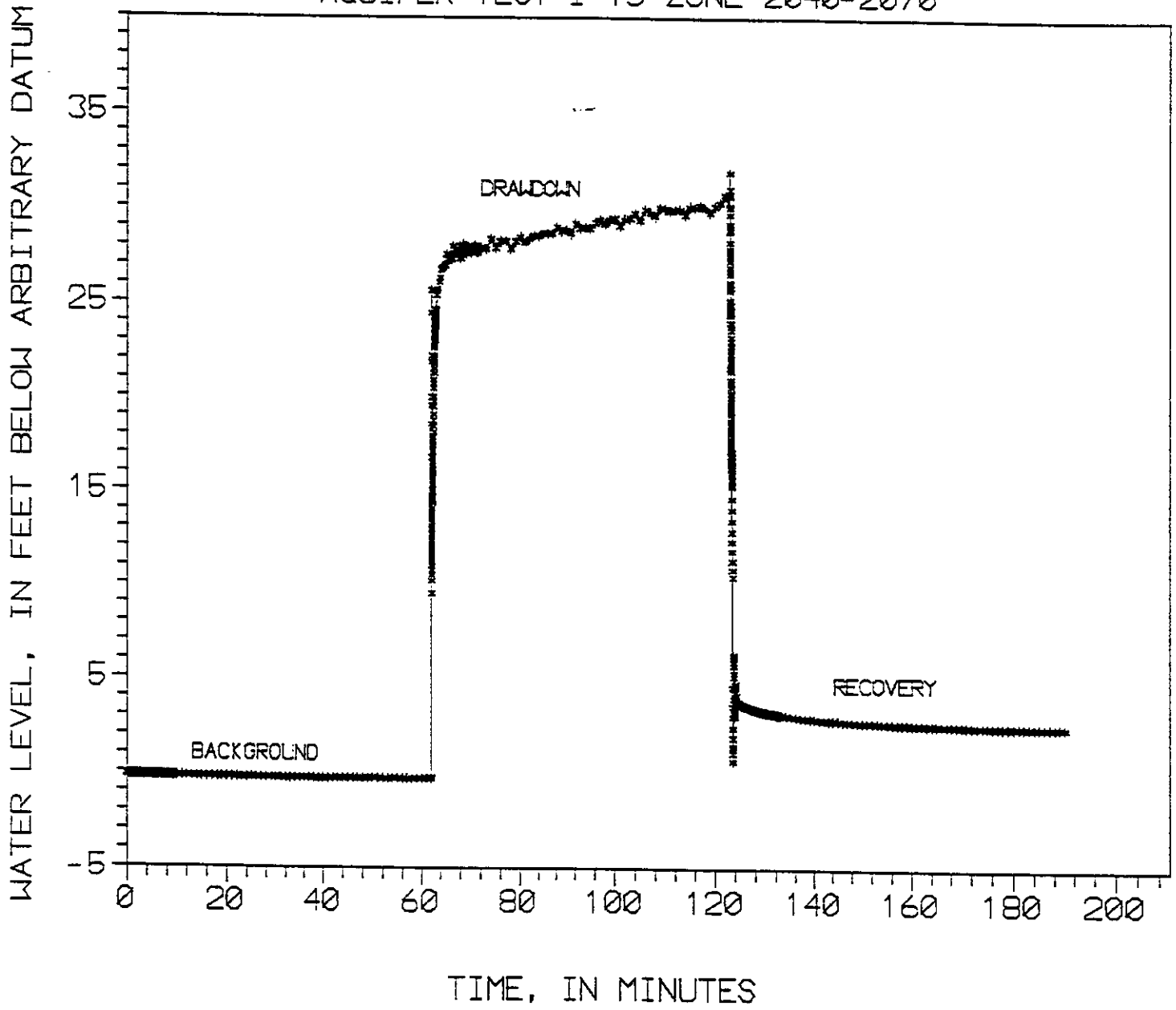


Figure 2.-- Background, drawdown and recovery data I-15, from 2040 to 2070 zone, arbitrary datum.

DATA ANALYSIS, UPPER AND LOWER ZONE

Three methods of data analysis are used to calculate the transmissivity for the upper packer setting between 2040 and 2070 feet below land surface and at the lower packer setting, between 2190 and 2220 feet below land surface, and are as follows:

1. Cooper-Jacob Analysis
2. Theis Analysis (Leaky)
3. Theis Recovery Analysis

1. Cooper-Jacob Analysis

The Cooper-Jacob method (figure 3 and 4) (Todd, 1980 p. 129) was used to compute a transmissivity value. The equation is as follows:

$$T = \frac{(2.3) (Q)}{(4) (\pi) (\Delta s_t)} \quad \text{where} \quad \begin{array}{l} Q = \text{discharge in cubic feet per day} \\ s_t = \text{drawdown over one log cycle of time} \end{array}$$

The data were plotted on semi-log paper (s versus log t) and a straight line is fitted to the data (Figure 3).

Using the observed drawdown over a single log cycle, (s), the transmissivity can be determined from the equation given by Todd (1980, p. 130) as:

UPPER UNIT

$$T = \frac{(2.30) (15399) \text{ ft}^3/\text{day}}{(4) (3.1416) (11.8 \text{ ft})}$$

$$T = 185 \text{ ft}^2/\text{day}$$

LOWER UNIT

$$T = \frac{(2.3) (14437) \text{ ft}^3/\text{day}}{(4) (3.1416) (17.8 \text{ ft})}$$

$$T = 128 \text{ ft}^2/\text{day}$$

Using a unit thickness of 30 ft., the horizontal hydraulic conductivity is:

UPPER UNIT

$$\begin{array}{l} K = 6.2 \text{ ft./day} \\ K = 1.7 \times 10^{-4} \text{ cm/sec.} \end{array}$$

LOWER UNIT

$$\begin{array}{l} K = 4.3 \text{ ft./day} \\ K = 1.2 \times 10^{-4} \text{ cm/sec} \end{array}$$

COOPER-JACOB DRAWDOWN ANALYSIS I-15 ZONE 2040-2070

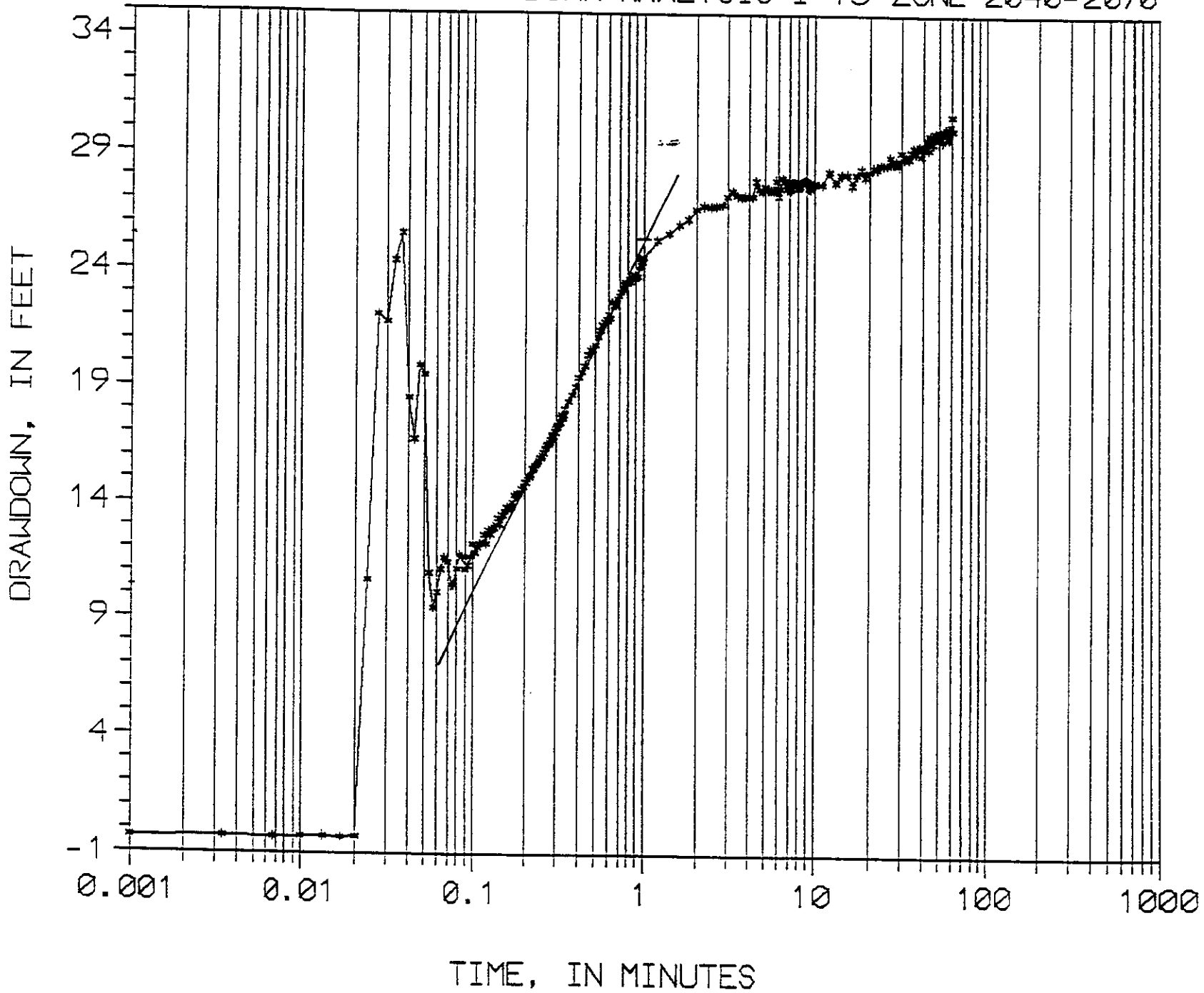


Figure 3.-- Cooper-Jacob Drawdown Analysis I-15, zone 2040-2070

COOPER-JACOB DRAWDOWN ANALYSIS I-15 ZONE 2190-2220

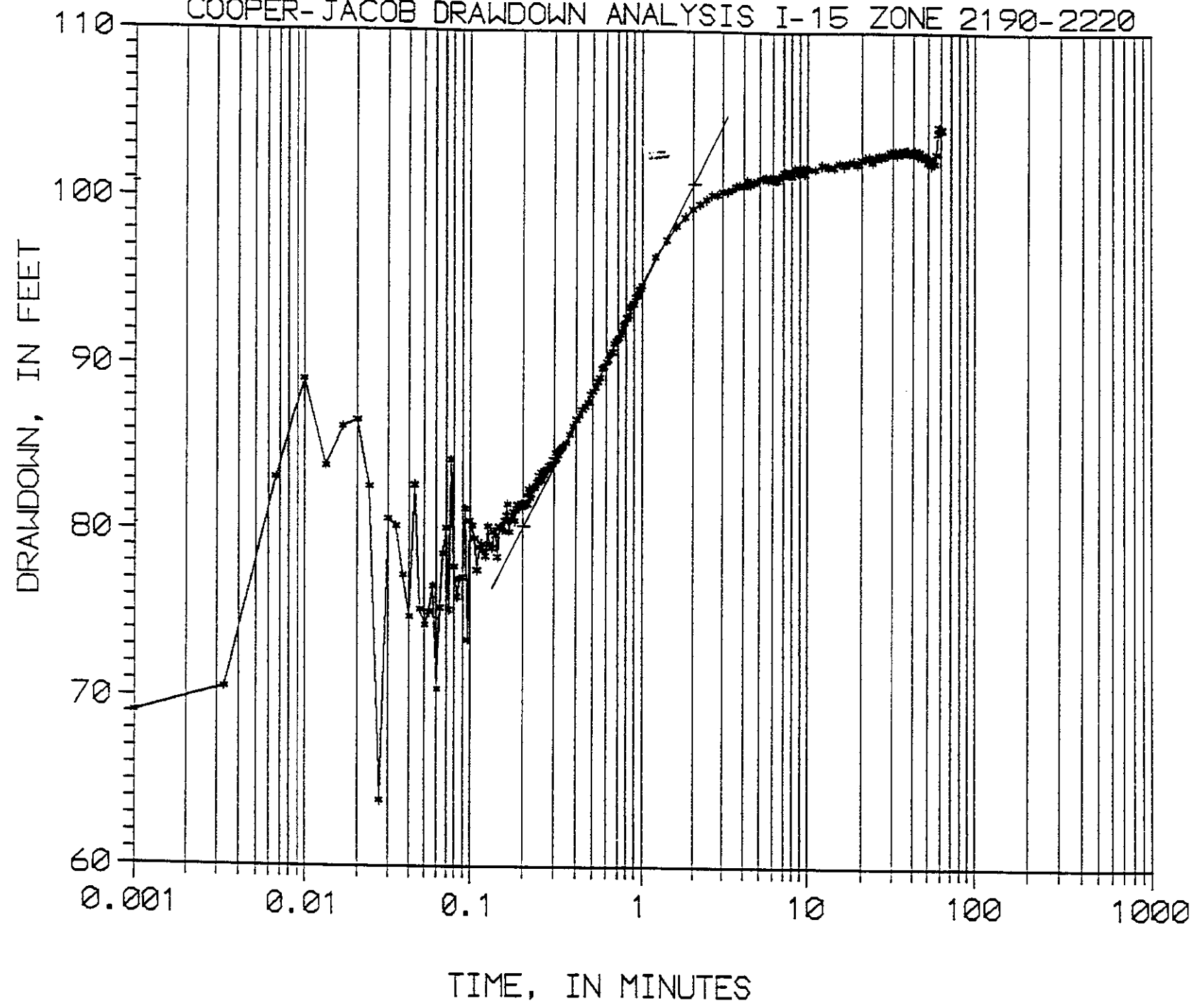


Figure 4.-- Cooper-Jacob Drawdown Analysis I-15, zone 2190-2220

2. Theis Analysis

The time-drawdown data for the packer test was analyzed using the Theis nonequilibrium equation given by (Todd, 1980, 123) as:

$$s = \frac{(Q) (W(u))}{(4) (\pi) (T)}$$

Where s is the drawdown, Q is the pumping rate and T is the transmissivity.

$W(u)$ is the well function and (u is the exponential integral function) where

$$u = \frac{(r^2) \cdot (S)}{(4) (\pi) (T) (t)}$$

Where r is the distance to the observation well (r = well radius for a single well test).

S = Storage coefficient

t = Time since the start of pumping

Transmissivity and storage coefficient values were determined from the drawdown data by type - curve matching techniques as described in Todd (P125-128) by using the computer package GWAP (Graphical Well Analysis Package). Figures 5 and 6 show the type curve superimposed on the drawdown data plot and the resulting computed values for transmissivity, hydraulic conductivity and storativity (Storage coefficient divided by unit thickness). Values for horizontal hydraulic conductivity expressed in standard units are:

UPPER UNIT

$K = 62.4$ gal/day/sq.ft.
 $K = 2.9 \times 10^{-5}$ cm/sec

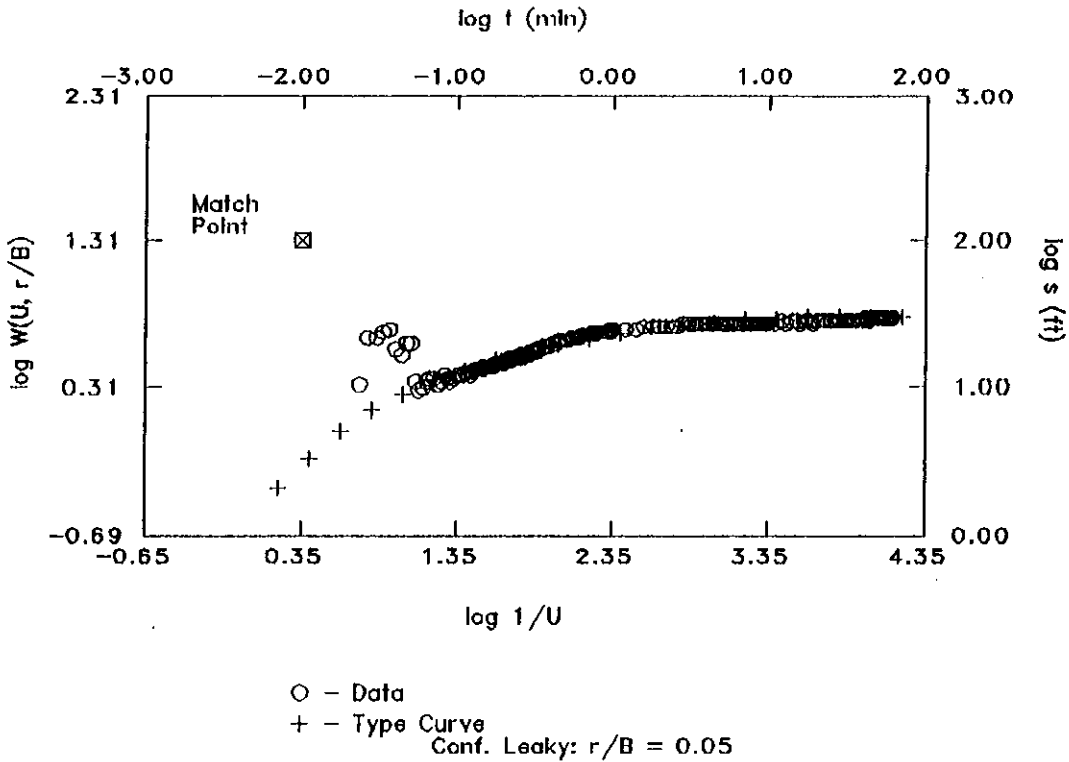
8.4 ft/day

LOWER UNIT

$K = 23.3$ gal/day/sq.ft.
 $K = 1.1 \times 10^{-5}$ cm/sec

3.1 ft/d

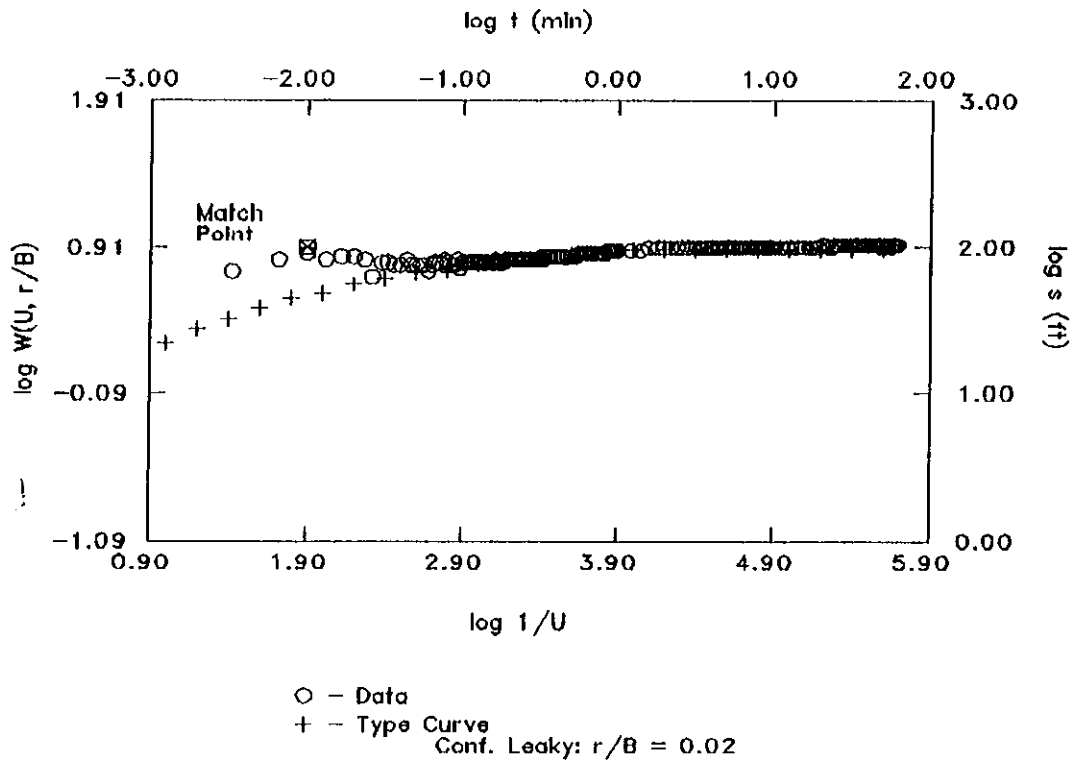
I-15 ZONE 2040-2070



MATCH POINT		SOLUTION	
t	= 1.000E-0002	Transmissivity (T)	= 1.871E+0003 gpd/ft
s	= 1.000E+0002	Hydraulic Conductivity (K)	= 6.238E+0001 gpd/sq ft
1/U	= 2.239E+0000	Storativity (S)	= 1.242E-0002
W(U, r/B)	= 2.042E+0001	Leakage Factor (B)	= 1.000E+0001 ft
WELL INFORMATION			
WELL IDENTIFICATION			: 115 2040
DATE OF AQUIFER TEST			: 4/22/94
AQUIFER THICKNESS (b)			: 3.000E+0001 ft
DISCHARGE RATE (Q)			: 8.000E+0001 gpm
PUMPING WELL RADIUS (r)			: 1.025E+0001 ft
DISTANCE OF OBSERVATION WELL FROM PUMPING WELL (d)			: 5.000E-0001 ft

Figure 5.--Theis Leaky Curve Analysis I-15, zone 2040-2070

I-15 ZONE 2190-2220



MATCH POINT		SOLUTION	
t	= 1.000E-0002	Transmissivity (T)	= 8.984E+0002 gpd/ft
s	= 1.000E+0002	Hydraulic Conductivity (K)	= 2.328E+0001 gpd/sq ft
1/U	= 7.943E+0001	Storativity (S)	= 1.306E-0004
W(U, r/B)	= 8.128E+0000	Leakage Factor (B)	= 2.500E+0001 ft
WELL INFORMATION			
WELL IDENTIFICATION	: I15 2190		
DATE OF AQUIFER TEST	: 4/21/94		
AQUIFER THICKNESS (b)	: 3.000E+0001 ft		
DISCHARGE RATE (Q)	: 7.500E+0001 gpm		
PUMPING WELL RADIUS (r)	: 8.500E-0002 ft		
DISTANCE OF OBSERVATION WELL FROM PUMPING WELL (d)	: 5.000E-0001 ft		

Figure 6.--Theis Leaky Curve Analysis I-15, zone 2190-2220

3. Theis Recovery Analysis

The Theis Method was used to analyze recovery in the well after the pump was shut down, using the method as described in Todd (1980 p. 133). Residual drawdown, s' , was plotted against the log of the ratio of time from the start of pumping to the time of shut down (t/t') (see figure 7 and 8).

A straight line was fitted to the early time data and the change in residual drawdown over a single log cycle (s') was calculated. Transmissivity was then determined from the equation: Todd (1980, p. 134):

UPPER UNIT

$$T = \frac{(2.30) (15399) \text{ ft}^3/\text{day}}{(4) (3.1416) (19.5 \text{ ft})}$$

$$T = 145 \text{ ft}^2/\text{day}$$

LOWER UNIT

$$T = \frac{(2.3) (14437) \text{ ft}^3/\text{day}}{(4) (3.1416) (32.5 \text{ ft})}$$

$$T = 81 \text{ ft}^2/\text{day}$$

Horizontal hydraulic conductivity is calculated by dividing T by the unit thickness of 30.0 ft.

UPPER UNIT

$$\begin{aligned} K &= 4.8 \text{ ft/day} \\ K &= 1.4 \times 10^{-4} \text{ cm/sec} \end{aligned}$$

LOWER UNIT

$$\begin{aligned} &= 2.7 \text{ ft/day} \\ &= 7.6 \times 10^{-3} \text{ cm/sec} \end{aligned}$$

Analytical results of the tests are summarized as follows:

Hydraulic Conductivity

UPPER UNIT

LOWER UNIT

Cooper-Jacob	= $1.7 \times 10^{-4} \text{ cm/sec}$	= $1.2 \times 10^{-4} \text{ cm/sec}$
Theis	= $2.9 \times 10^{-5} \text{ cm/sec}$	= $1.1 \times 10^{-5} \text{ cm/sec}$
Theis Recovery	= $1.4 \times 10^{-4} \text{ cm/sec}$	= $7.6 \times 10^{-3} \text{ cm/sec}$

THEIS RECOVERY ANALYSIS I-15 ZONE 2040-2070

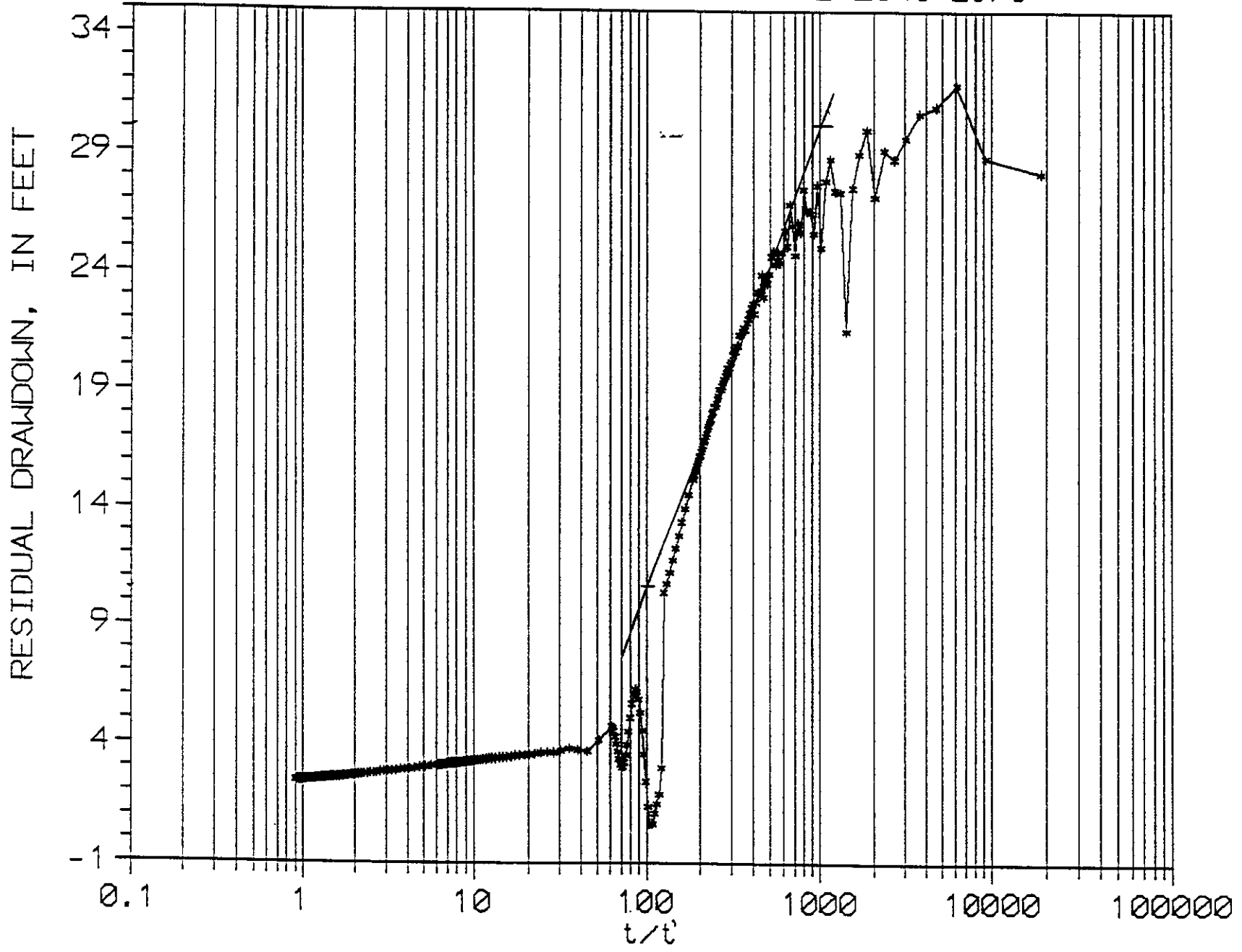


Figure 7.-- Theis Recovery Analysis I-15, zone 2040-2070

THEIS RECOVERY ANALYSIS I-15 ZONE 2190-2220

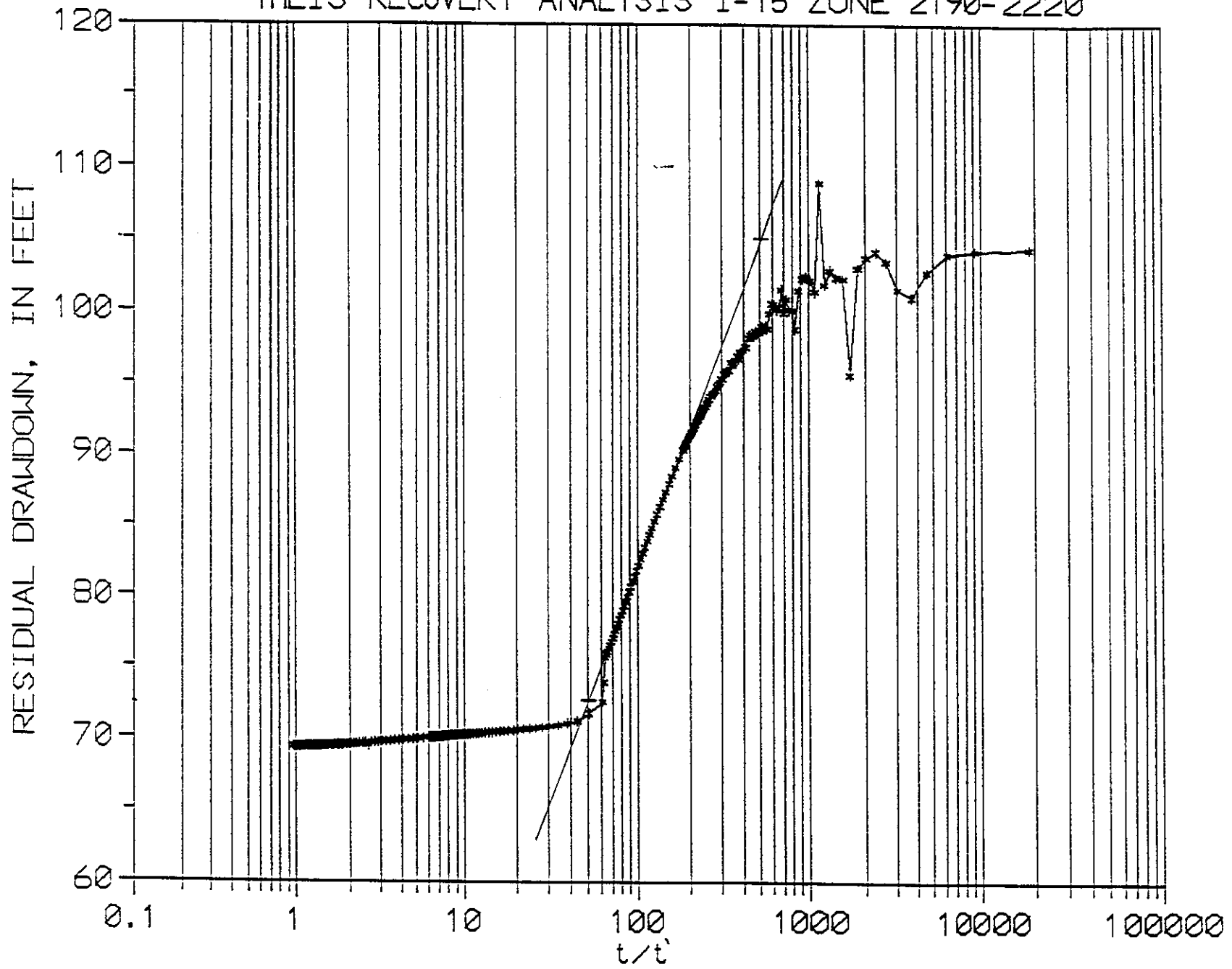


Figure 8.-- Theis Recovery Analysis I-15, zone 2190-2220

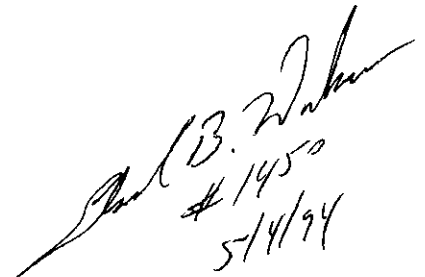
If you have any questions or comments please feel free to contact me or Leo Swayze.

Sincerely,



Edmand B. Workman, P.G.

EBW/na



#1450
5/4/94

Appendix I
Specific Conductance Stabilization Data

I-15
Zone 2040 - 2070

<u>TIME</u>	<u>TEMP</u>	<u>CONDUCTIVITY</u>
2400	27	46,000
0015	27	46,000
0030	26.5	45,500
0045	27	42,000
0100	26.5	47,500
0115	26.5	47,000
0130	26.5	46,500
0145	26.5	47,000
0200	26	46,500
0215	26	45,500
0230	26.5	45,500
0245	26.5	45,000
0300	26	44,000
0315	26	42,000
0330	26.5	44,500
0345	26	44,000
0400	26	45,000
0415	26	45,500
0430	26	45,500
0445	26	45,500
0500	26	45,000
0515	26	45,500
0530	26	45,500
0545	26	45,000
0600	26	45,000
0615	26	45,500
0630	26	45,500
0645	26	45,000
0700	26	45,500
0715	26	45,500
0730	26	45,500
0745	26	45,500
0800	26	45,500
0815	26	45,500
0830	26	45,500
0845	26	45,500
0900	26	45,500
0915	26	45,500
0930	26	45,500
0945	26	45,500
1000	26	45,500

Packer Test
Zone 2190 - 2220

<u>TIME</u>	<u>TEMP</u>	<u>CONDUCTIVITY</u>
0630	29	35,750
0645	28	42,000
0700	28	38,500
0715	28	38,500
0730	28	39,000
0745	28	38,750
0800	28	38,900
0815	28	47,000
0830	28	46,900
0845	28	47,500
0900	28	48,000
0915	28	47,500
0930	28	47,000
0945	28	48,000
1000	28	48,000
1015	28	48,000
1030	28	47,500
1045	28	47,500
1100	28	47,500
1115	28	47,500
1130	28	48,000
1145	28	48,500
1200	28	48,500
1215	28	48,500
1230	28	48,500
1245	28	48,000
0100	28	48,000
0115	28	47,500
0130	28	47,500
0145	28	47,500
0200	28	47,500
0215	28	47,500
0230	28	47,500
0245	28	47,500
0300	28	47,500
0315	28	47,500
0330	28	47,500
0345	28	47,500

Appendix II
Raw Aquifer Test Data

!

SE1000C
Environmental Logger
04/22 14:17

Unit# 01513 Test 1

Setups: INPUT 1

Type Level (F)
Mode TOC
I.D. 00000

Reference 0.000
Linearity 0.280
Scale factor 29.990
Offset 0.120
Delay mSEC 50.000

Step 0 04/21 16:48:44

Elapsed Time INPUT 1

0.0000 -55.156
1.0000 -55.166
2.0000 -55.175
3.0000 -55.185
4.0000 -55.185
5.0000 -55.204
6.0000 -55.204
7.0000 -55.214
8.0000 -55.223
9.0000 -55.233
10.0000 -55.233
11.0000 -55.243
12.0000 -55.252
13.0000 -55.252
14.0000 -55.262
15.0000 -55.252
16.0000 -55.252
17.0000 -55.272
18.0000 -55.281
19.0000 -55.281
20.0000 -55.281
21.0000 -55.291
22.0000 -55.291
23.0000 -55.291
24.0000 -55.300
25.0000 -55.300
26.0000 -55.310
27.0000 -55.310
28.0000 -55.291
29.0000 -55.320
30.0000 -55.320
31.0000 -55.320
32.0000 -55.329
33.0000 -55.329
34.0000 -55.339
35.0000 -55.339
36.0000 -55.348

37.0000	-55.348
38.0000	-55.348
39.0000	-55.358
40.0000	-55.358
41.0000	-55.358
42.0000	-55.368
43.0000	-55.358
44.0000	-55.368
45.0000	-55.368
46.0000	-55.358
47.0000	-55.368
48.0000	-55.368
49.0000	-55.378
50.0000	-55.378
51.0000	-55.378
52.0000	-55.378
53.0000	-55.378
54.0000	-55.387
55.0000	-55.387
56.0000	-55.387
57.0000	-55.387
58.0000	-55.387
59.0000	-55.387
60.0000	-55.387
61.0000	-55.387
62.0000	-55.397
63.0000	-55.397
64.0000	-55.397
65.0000	-55.407
66.0000	-55.407
67.0000	-55.397
68.0000	-55.397
69.0000	-55.407
70.0000	-55.407
71.0000	-55.407
72.0000	-55.407
73.0000	-55.407
74.0000	-55.407
75.0000	-55.407
76.0000	-55.416
77.0000	-55.407

SE1000C
Environmental Logger
04/22 14:19

Unit# 01513 Test 2

Setups: INPUT 1

Type Level (F)
Mode TOC
I.D. 00000

Reference 69.060
Linearity 0.280
Scale factor 29.990
Offset 0.120
Delay mSEC 50.000

Step 0 04/21 18:11:44

Elapsed Time INPUT 1

0.0000 69.060
0.0033 70.582
0.0066 83.208
0.0100 89.147
0.0133 83.909
0.0166 86.308
0.0200 86.682
0.0233 82.700
0.0266 63.882
0.0300 80.740
0.0333 80.298
0.0366 77.367
0.0400 74.856
0.0433 82.786
0.0466 75.299
0.0500 74.375
0.0533 75.116
0.0566 76.674
0.0600 70.505
0.0633 75.395
0.0666 78.646
0.0700 80.192
0.0733 75.270
0.0766 84.303
0.0800 77.867
0.0833 76.059
0.0866 77.136
0.0900 77.213
0.0933 81.355
0.0966 73.481
0.1000 80.625
0.1033 80.375
0.1066 79.568
0.1100 77.665
0.1133 79.040
0.1166 79.241
0.1200 78.838

0.1233	78.501
0.1266	80.298
0.1300	79.222
0.1333	78.992
0.1366	79.981
0.1400	79.741
0.1433	78.453
0.1466	80.318
0.1500	80.241
0.1533	80.078
0.1566	80.625
0.1600	80.942
0.1633	81.624
0.1666	79.981
0.1700	80.750
0.1733	80.692
0.1766	81.211
0.1800	80.625
0.1833	81.250
0.1866	81.614
0.1900	81.480
0.1933	81.538
0.1966	81.681
0.2000	81.576
0.2033	81.614
0.2066	81.576
0.2100	82.191
0.2133	81.672
0.2166	82.603
0.2200	82.027
0.2233	82.277
0.2266	82.623
0.2300	82.661
0.2333	82.623
0.2366	82.815
0.2400	82.988
0.2433	83.045
0.2466	83.352
0.2500	83.084
0.2533	83.583
0.2566	83.103
0.2600	83.458
0.2633	83.429
0.2666	83.564
0.2700	83.737
0.2733	83.775
0.2766	83.727
0.2800	83.977
0.2833	83.909
0.2866	84.015
0.2900	84.082
0.2933	84.091
0.2966	84.341
0.3000	84.341
0.3033	84.322
0.3066	84.735
0.3100	84.399
0.3133	84.792
0.3166	84.668
0.3200	84.859

0.3233	84.917
0.3266	85.022
0.3300	85.022
0.3333	85.128
0.3500	85.349
0.3666	85.867
0.3833	86.346
0.4000	86.778
0.4166	87.037
0.4333	87.354
0.4500	87.555
0.4666	87.804
0.4833	88.284
0.5000	88.476
0.5166	88.715
0.5333	89.070
0.5500	89.300
0.5666	89.885
0.5833	89.981
0.6000	90.239
0.6166	90.393
0.6333	90.766
0.6500	90.843
0.6666	91.370
0.6833	91.552
0.7000	91.628
0.7166	91.724
0.7333	91.954
0.7500	92.079
0.7666	92.481
0.7833	92.606
0.8000	92.902
0.8166	92.893
0.8333	93.065
0.8500	93.525
0.8666	93.659
0.8833	93.764
0.9000	93.707
0.9166	94.147
0.9333	94.195
0.9500	94.291
0.9666	94.597
0.9833	94.664
1.0000	94.808
1.2000	96.539
1.4000	97.563
1.6000	98.395
1.8000	98.950
2.0000	99.428
2.2000	99.705
2.4000	99.972
2.6000	100.240
2.8000	100.269
3.0000	100.470
3.2000	100.479
3.4000	100.613
3.6000	100.795
3.8000	100.881
4.0000	100.804
4.2000	101.158

4.4000	100.909
4.6000	101.015
4.8000	101.100
5.0000	101.253
5.2000	101.272
5.4000	101.320
5.6000	101.158
5.8000	101.311
6.0000	101.368
6.2000	101.167
6.4000	101.186
6.6000	101.320
6.8000	101.464
7.0000	101.664
7.2000	101.655
7.4000	101.559
7.6000	101.550
7.8000	101.578
8.0000	101.359
8.2000	101.703
8.4000	101.875
8.6000	101.750
8.8000	101.607
9.0000	101.645
9.2000	101.722
9.4000	101.855
9.6000	101.531
9.8000	101.922
10.0000	101.836
11.0000	101.827
12.0000	102.075
13.0000	101.960
14.0000	101.970
15.0000	102.218
16.0000	102.037
17.0000	102.247
18.0000	102.285
19.0000	102.123
20.0000	102.409
21.0000	102.514
22.0000	102.572
23.0000	102.266
24.0000	102.524
25.0000	102.715
26.0000	102.572
27.0000	102.706
28.0000	102.725
29.0000	102.906
30.0000	102.725
31.0000	102.925
32.0000	102.715
33.0000	102.897
34.0000	102.830
35.0000	102.963
36.0000	102.963
37.0000	102.954
38.0000	102.763
39.0000	102.887
40.0000	102.801
41.0000	102.982

42.0000	102.763
43.0000	102.696
44.0000	102.925
45.0000	102.639
46.0000	102.686
47.0000	102.534
48.0000	102.648
49.0000	102.266
50.0000	102.400
51.0000	102.467
52.0000	102.113
53.0000	102.257
54.0000	102.352
55.0000	102.218
56.0000	102.782
57.0000	104.014
58.0000	104.386
59.0000	104.272
60.0000	104.186
61.0000	104.243

SE1000C
Environmental Logger
04/22 14:24

Unit# 01513 Test 3

Setups: INPUT 1

Type Level (F)
Mode TOC
I.D. 00000

Reference 69.060
Linearity 0.280
Scale factor 29.990
Offset 0.120
Delay mSEC 50.000

Step 0 04/21 19:14:13

Elapsed Time INPUT 1

0.0000 104.157
0.0033 104.386
0.0066 104.243
0.0100 104.014
0.0133 102.782
0.0166 101.024
0.0200 101.578
0.0233 103.517
0.0266 104.205
0.0300 103.804
0.0333 103.030
0.0366 95.611
0.0400 102.304
0.0433 102.419
0.0466 102.935
0.0500 101.903
0.0533 108.976
0.0566 101.425
0.0600 102.237
0.0633 102.505
0.0666 102.352
0.0700 101.492
0.0733 98.825
0.0766 100.097
0.0800 100.164
0.0833 100.900
0.0866 99.944
0.0900 101.597
0.0933 100.336
0.0966 100.202
0.1000 100.546
0.1033 100.623
0.1066 99.886
0.1100 98.854
0.1133 99.074
0.1166 98.720
0.1200 99.045

0.1233	98.625
0.1266	98.529
0.1300	98.691
0.1333	98.328
0.1366	98.357
0.1400	98.433
0.1433	98.223
0.1466	97.544
0.1500	97.611
0.1533	97.362
0.1566	97.257
0.1600	97.237
0.1633	96.712
0.1666	96.941
0.1700	96.625
0.1733	96.482
0.1766	96.329
0.1800	96.501
0.1833	95.946
0.1866	95.908
0.1900	95.879
0.1933	95.697
0.1966	95.668
0.2000	95.333
0.2033	95.372
0.2066	95.094
0.2100	94.989
0.2133	94.702
0.2166	94.826
0.2200	94.501
0.2233	94.386
0.2266	94.319
0.2300	94.204
0.2333	94.099
0.2366	93.917
0.2400	93.869
0.2433	93.678
0.2466	93.553
0.2500	93.352
0.2533	93.247
0.2566	93.132
0.2600	92.998
0.2633	92.854
0.2666	92.740
0.2700	92.663
0.2733	92.481
0.2766	92.395
0.2800	92.289
0.2833	92.127
0.2866	92.021
0.2900	91.868
0.2933	91.782
0.2966	91.648
0.3000	91.533
0.3033	91.379
0.3066	91.303
0.3100	91.150
0.3133	91.044
0.3166	90.910
0.3200	90.814

0.3233	90.680
0.3266	90.565
0.3300	90.459
0.3333	90.335
0.3500	89.712
0.3666	89.108
0.3833	88.514
0.4000	87.939
0.4166	87.392
0.4333	86.845
0.4500	86.328
0.4666	85.809
0.4833	85.311
0.5000	84.831
0.5166	84.370
0.5333	83.919
0.5500	83.468
0.5666	83.035
0.5833	82.603
0.6000	82.181
0.6166	81.787
0.6333	81.403
0.6500	81.028
0.6666	80.664
0.6833	80.327
0.7000	79.981
0.7166	79.645
0.7333	79.318
0.7500	79.001
0.7666	78.693
0.7833	78.396
0.8000	78.107
0.8166	77.828
0.8333	77.579
0.8500	77.319
0.8666	77.059
0.8833	76.800
0.9000	76.540
0.9166	76.290
0.9333	76.078
0.9500	75.924
0.9666	75.703
0.9833	73.923
1.0000	72.566
1.2000	71.728
1.4000	71.179
1.6000	71.035
1.8000	70.900
2.0000	70.823
2.2000	70.755
2.4000	70.698
2.6000	70.649
2.8000	70.611
3.0000	70.572
3.2000	70.544
3.4000	70.505
3.6000	70.476
3.8000	70.447
4.0000	70.428
4.2000	70.399

4.4000	70.390
4.6000	70.370
4.8000	70.351
5.0000	70.331
5.2000	70.313
5.4000	70.293
5.6000	70.274
5.8000	70.274
6.0000	70.254
6.2000	70.245
6.4000	70.226
6.6000	70.216
6.8000	70.206
7.0000	70.197
7.2000	70.177
7.4000	70.168
7.6000	70.158
7.8000	70.148
8.0000	70.129
8.2000	70.129
8.4000	70.120
8.6000	70.100
8.8000	70.100
9.0000	70.100
9.2000	70.071
9.4000	70.071
9.6000	70.062
9.8000	70.052
10.0000	70.043
11.0000	70.004
12.0000	69.956
13.0000	69.927
14.0000	69.898
15.0000	69.869
16.0000	69.840
17.0000	69.811
18.0000	69.783
19.0000	69.763
20.0000	69.744
21.0000	69.725
22.0000	69.706
23.0000	69.686
24.0000	69.475
25.0000	69.657
26.0000	69.638
27.0000	69.619
28.0000	69.590
29.0000	69.571
30.0000	69.580
31.0000	69.542
32.0000	69.561
33.0000	69.532
34.0000	69.532
35.0000	69.532
36.0000	69.513
37.0000	69.513
38.0000	69.465
39.0000	69.484
40.0000	69.503
41.0000	69.484

SE1000C
Environmental Logger
04/22 14:27

Unit# 01513 Test 4

Setups: INPUT 1

Type Level (F)
Mode TOC
U.D. 00000

Reference 0.000
Linearity 0.280
Scale factor 29.990
Offset 0.120
Delay mSEC 50.000

Step 0 04/22 10:11:42

Elapsed Time INPUT 1

0.0000 -0.144
0.0033 -0.202
0.0066 -0.163
0.0100 -0.173
0.0133 -0.163
0.0166 -0.144
0.0200 -0.163
0.0233 -0.163
0.0266 -0.173
0.0300 -0.182
0.0333 -0.153
0.0366 -0.173
0.0400 -0.153
0.0433 -0.153
0.0466 -0.163
0.0500 -0.163
0.0533 -0.163
0.0566 -0.182
0.0600 -0.173
0.0633 -0.173
0.0666 -0.173
0.0700 -0.134
0.0733 -0.134
0.0766 -0.153
0.0800 -0.173
0.0833 -0.173
0.0866 -0.192
0.0900 -0.163
0.0933 -0.173
0.0966 -0.134
0.1000 -0.212
0.1033 -0.144
0.1066 -0.163
0.1100 -0.182
0.1133 -0.192
0.1166 -0.153
0.1200 -0.173

0.1233	-0.153
0.1266	-0.144
0.1300	-0.173
0.1333	-0.173
0.1366	-0.173
0.1400	-0.192
0.1433	-0.173
0.1466	-0.163
0.1500	-0.173
0.1533	-0.153
0.1566	-0.173
0.1600	-0.163
0.1633	-0.182
0.1666	-0.163
0.1700	-0.163
0.1733	-0.163
0.1766	-0.173
0.1800	-0.163
0.1833	-0.182
0.1866	-0.182
0.1900	-0.173
0.1933	-0.173
0.1966	-0.173
0.2000	-0.163
0.2033	-0.163
0.2066	-0.182
0.2100	-0.163
0.2133	-0.173
0.2166	-0.192
0.2200	-0.173
0.2233	-0.163
0.2266	-0.182
0.2300	-0.173
0.2333	-0.173
0.2366	-0.182
0.2400	-0.182
0.2433	-0.173
0.2466	-0.173
0.2500	-0.163
0.2533	-0.163
0.2566	-0.163
0.2600	-0.153
0.2633	-0.173
0.2666	-0.173
0.2700	-0.153
0.2733	-0.192
0.2766	-0.173
0.2800	-0.173
0.2833	-0.173
0.2866	-0.173
0.2900	-0.163
0.2933	-0.173
0.2966	-0.173
0.3000	-0.182
0.3033	-0.173
0.3066	-0.163
0.3100	-0.182
0.3133	-0.163
0.3166	-0.182
0.3200	-0.173

0.3233	-0.163
0.3266	-0.173
0.3300	-0.173
0.3333	-0.163
0.3500	-0.173
0.3666	-0.182
0.3833	-0.173
0.4000	-0.173
0.4166	-0.163
0.4333	-0.163
0.4500	-0.192
0.4666	-0.182
0.4833	-0.173
0.5000	-0.182
0.5166	-0.182
0.5333	-0.182
0.5500	-0.163
0.5666	-0.163
0.5833	-0.163
0.6000	-0.182
0.6166	-0.192
0.6333	-0.182
0.6500	-0.173
0.6666	-0.182
0.6833	-0.182
0.7000	-0.192
0.7166	-0.182
0.7333	-0.182
0.7500	-0.202
0.7666	-0.202
0.7833	-0.182
0.8000	-0.182
0.8166	-0.182
0.8333	-0.173
0.8500	-0.182
0.8666	-0.182
0.8833	-0.173
0.9000	-0.134
0.9166	-0.153
0.9333	-0.173
0.9500	-0.173
0.9666	-0.182
0.9833	-0.182
1.0000	-0.182
1.2000	-0.192
1.4000	-0.163
1.6000	-0.173
1.8000	-0.192
2.0000	-0.192
2.2000	-0.173
2.4000	-0.182
2.6000	-0.163
2.8000	-0.173
3.0000	-0.202
3.2000	-0.192
3.4000	-0.192
3.6000	-0.202
3.8000	-0.192
4.0000	-0.192
4.2000	-0.192

4.4000	-0.182
4.6000	-0.173
4.8000	-0.192
5.0000	-0.192
5.2000	-0.212
5.4000	-0.202
5.6000	-0.212
5.8000	-0.212
6.0000	-0.182
6.2000	-0.202
6.4000	-0.202
6.6000	-0.192
6.8000	-0.192
7.0000	-0.212
7.2000	-0.212
7.4000	-0.202
7.6000	-0.212
7.8000	-0.192
8.0000	-0.212
8.2000	-0.212
8.4000	-0.202
8.6000	-0.240
8.8000	-0.212
9.0000	-0.202
9.2000	-0.221
9.4000	-0.240
9.6000	-0.221
9.8000	-0.221
10.0000	-0.221
11.0000	-0.221
12.0000	-0.230
13.0000	-0.240
14.0000	-0.259
15.0000	-0.250
16.0000	-0.250
17.0000	-0.250
18.0000	-0.269
19.0000	-0.259
20.0000	-0.250
21.0000	-0.250
22.0000	-0.269
23.0000	-0.288
24.0000	-0.269
25.0000	-0.240
26.0000	-0.288
27.0000	-0.279
28.0000	-0.288
29.0000	-0.288
30.0000	-0.269
31.0000	-0.298
32.0000	-0.308
33.0000	-0.308
34.0000	-0.288
35.0000	-0.279
36.0000	-0.288
37.0000	-0.298
38.0000	-0.308
39.0000	-0.317
40.0000	-0.308
41.0000	-0.317

42.0000	-0.298
43.0000	-0.288
44.0000	-0.308
45.0000	-0.298
46.0000	-0.298
47.0000	-0.317
48.0000	-0.288
49.0000	-0.308
50.0000	-0.298
51.0000	-0.288
52.0000	-0.317
53.0000	-0.317
54.0000	-0.298
55.0000	-0.298
56.0000	-0.317
57.0000	-0.317
58.0000	-0.327
59.0000	-0.288
60.0000	-0.317
61.0000	-0.279
62.0000	-0.327

SE1000C
Environmental Logger
04/22 14:30

Unit# 01513 Test 5

Setups: INPUT 1

Type Level (F)
Mode TOC
I.D. 00000

Reference 0.000
Linearity 0.280
Scale factor 29.990
Offset 0.120
Delay mSEC 50.000

Step 0 04/22 11:17:27

Elapsed Time INPUT 1

0.0000 -0.298
0.0033 -0.279
0.0066 -0.308
0.0100 -0.279
0.0133 -0.259
0.0166 -0.308
0.0200 -0.259
0.0233 10.702
0.0266 22.150
0.0300 21.824
0.0333 24.445
0.0366 25.610
0.0400 18.532
0.0433 16.761
0.0466 19.949
0.0500 19.537
0.0533 11.000
0.0566 9.493
0.0600 10.155
0.0633 11.163
0.0666 11.652
0.0700 11.469
0.0733 10.482
0.0766 10.482
0.0800 11.172
0.0833 11.786
0.0866 11.690
0.0900 11.134
0.0933 11.316
0.0966 11.709
0.1000 12.247
0.1033 11.844
0.1066 12.112
0.1100 12.275
0.1133 12.352
0.1166 12.649
0.1200 12.275

0.1233	12.841
0.1266	12.678
0.1300	12.889
0.1333	12.956
0.1366	13.090
0.1400	13.378
0.1433	13.119
0.1466	13.522
0.1500	13.493
0.1533	13.666
0.1566	13.857
0.1600	13.771
0.1633	13.857
0.1666	13.848
0.1700	14.039
0.1733	14.365
0.1766	14.346
0.1800	14.337
0.1833	14.413
0.1866	14.490
0.1900	14.672
0.1933	14.605
0.1966	14.730
0.2000	14.931
0.2033	14.921
0.2066	15.075
0.2100	15.170
0.2133	15.161
0.2166	15.266
0.2200	15.525
0.2233	15.458
0.2266	15.534
0.2300	15.669
0.2333	15.736
0.2366	15.812
0.2400	15.851
0.2433	15.985
0.2466	16.004
0.2500	16.081
0.2533	16.224
0.2566	16.186
0.2600	16.377
0.2633	16.435
0.2666	16.540
0.2700	16.588
0.2733	16.569
0.2766	16.675
0.2800	16.789
0.2833	16.904
0.2866	16.971
0.2900	16.924
0.2933	17.125
0.2966	17.077
0.3000	17.278
0.3033	17.316
0.3066	17.432
0.3100	17.412
0.3133	17.498
0.3166	17.518
0.3200	17.728

0.3233	17.853
0.3266	17.699
0.3300	17.833
0.3333	18.082
0.3500	18.408
0.3666	18.705
0.3833	19.040
0.4000	19.461
0.4166	19.719
0.4333	19.968
0.4500	20.446
0.4666	20.648
0.4833	20.676
0.5000	20.868
0.5166	21.222
0.5333	21.499
0.5500	21.748
0.5666	21.843
0.5833	21.977
0.6000	22.178
0.6166	22.015
0.6333	22.695
0.6500	22.589
0.6666	22.589
0.6833	22.876
0.7000	22.982
0.7166	23.144
0.7333	23.489
0.7500	23.278
0.7666	23.402
0.7833	23.536
0.8000	23.498
0.8166	23.689
0.8333	23.584
0.8500	23.737
0.8666	23.785
0.8833	23.909
0.9000	23.747
0.9166	23.823
0.9333	24.196
0.9500	24.578
0.9666	24.292
0.9833	24.435
1.0000	24.626
1.2000	25.362
1.4000	25.668
1.6000	26.040
1.8000	26.289
2.0000	26.709
2.2000	26.853
2.4000	26.814
2.6000	26.853
2.8000	26.919
3.0000	27.263
3.2000	27.521
3.4000	27.302
3.6000	27.235
3.8000	27.292
4.0000	27.254
4.2000	27.263

4.4000	27.932
4.6000	27.579
4.8000	27.464
5.0000	27.712
5.2000	27.579
5.4000	27.550
5.6000	27.531
5.8000	27.961
6.0000	27.292
6.2000	27.607
6.4000	28.056
6.6000	27.961
6.8000	27.617
7.0000	27.951
7.2000	27.560
7.4000	27.913
7.6000	27.894
7.8000	27.798
8.0000	27.617
8.2000	27.712
8.4000	27.875
8.6000	27.951
8.8000	27.999
9.0000	27.951
9.2000	27.645
9.4000	27.607
9.6000	27.750
9.8000	27.808
10.0000	27.856
11.0000	27.798
12.0000	28.343
13.0000	27.865
14.0000	28.218
15.0000	28.247
16.0000	27.779
17.0000	28.218
18.0000	28.448
19.0000	28.133
20.0000	28.352
21.0000	28.534
22.0000	28.486
23.0000	28.667
24.0000	28.629
25.0000	28.639
26.0000	28.982
27.0000	28.725
28.0000	28.839
29.0000	28.620
30.0000	29.192
31.0000	28.906
32.0000	28.992
33.0000	28.906
34.0000	29.211
35.0000	29.383
36.0000	29.154
37.0000	29.364
38.0000	29.469
39.0000	29.040
40.0000	29.402
41.0000	29.460

42.0000	29.746
43.0000	29.326
44.0000	29.918
45.0000	29.756
46.0000	29.574
47.0000	30.023
48.0000	29.975
49.0000	29.851
50.0000	29.937
51.0000	29.947
52.0000	29.660
53.0000	30.099
54.0000	30.032
55.0000	30.176
56.0000	29.985
57.0000	29.775
58.0000	30.109
59.0000	30.300
60.0000	30.720
61.0000	30.118

SE1000C
Environmental Logger
04/22 14:34

Unit# 01513 Test 6

Setups: INPUT 1

Type Level (F)
Mode TOC
I.D. 00000

Reference 0.000
Linearity 0.280
Scale factor 29.990
Offset 0.120
Delay mSEC 50.000

Step 0 04/22 12:19:50

Elapsed Time INPUT 1

0.0000 30.624
0.0033 28.247
0.0066 28.877
0.0100 31.903
0.0133 31.006
0.0166 30.729
0.0200 29.679
0.0233 28.810
0.0266 29.192
0.0300 27.235
0.0333 30.032
0.0366 29.040
0.0400 27.607
0.0433 21.594
0.0466 27.435
0.0500 27.493
0.0533 28.820
0.0566 27.903
0.0600 25.104
0.0633 27.722
0.0666 25.706
0.0700 26.547
0.0733 26.690
0.0766 27.550
0.0800 25.744
0.0833 26.145
0.0866 24.798
0.0900 26.031
0.0933 26.919
0.0966 25.171
0.1000 25.830
0.1033 24.903
0.1066 24.473
0.1100 24.922
0.1133 24.387
0.1166 24.941
0.1200 24.731

0.1233	24.005
0.1266	23.613
0.1300	23.794
0.1333	23.039
0.1366	23.957
0.1400	23.230
0.1433	23.221
0.1466	22.800
0.1500	22.331
0.1533	22.743
0.1566	22.580
0.1600	22.350
0.1633	22.101
0.1666	21.939
0.1700	21.652
0.1733	21.738
0.1766	21.576
0.1800	21.423
0.1833	21.423
0.1866	20.954
0.1900	20.963
0.1933	20.714
0.1966	20.839
0.2000	20.571
0.2033	20.284
0.2066	20.188
0.2100	20.015
0.2133	20.025
0.2166	19.805
0.2200	19.681
0.2233	19.557
0.2266	19.375
0.2300	19.250
0.2333	19.106
0.2366	19.097
0.2400	18.810
0.2433	18.714
0.2466	18.494
0.2500	18.379
0.2533	18.360
0.2566	18.159
0.2600	18.082
0.2633	17.843
0.2666	17.747
0.2700	17.661
0.2733	17.536
0.2766	17.412
0.2800	17.230
0.2833	17.115
0.2866	16.952
0.2900	16.856
0.2933	16.722
0.2966	16.588
0.3000	16.454
0.3033	16.301
0.3066	16.243
0.3100	16.090
0.3133	15.985
0.3166	15.851
0.3200	15.697

0.3233	15.611
0.3266	15.467
0.3300	15.391
0.3333	15.276
0.3500	14.624
0.3666	14.030
0.3833	13.436
0.4000	12.851
0.4166	12.333
0.4333	11.815
0.4500	11.307
0.4666	10.817
0.4833	10.443
0.5000	3.010
0.5166	1.894
0.5333	1.481
0.5500	1.086
0.5666	0.663
0.5833	0.673
0.6000	1.356
0.6166	2.433
0.6333	3.577
0.6500	4.567
0.6666	5.326
0.6833	5.902
0.7000	6.219
0.7166	6.315
0.7333	6.152
0.7500	5.710
0.7666	5.114
0.7833	4.528
0.8000	3.971
0.8166	3.538
0.8333	3.231
0.8500	3.048
0.8666	3.028
0.8833	3.135
0.9000	3.375
0.9166	3.692
0.9333	4.009
0.9500	4.317
0.9666	4.557
0.9833	4.701
1.0000	4.769
1.2000	4.163
1.4000	3.692
1.6000	3.750
1.8000	3.807
2.0000	3.711
2.2000	3.634
2.4000	3.654
2.6000	3.625
2.8000	3.577
3.0000	3.557
3.2000	3.529
3.4000	3.510
3.6000	3.500
3.8000	3.481
4.0000	3.423
4.2000	3.433

4.4000	3.423
4.6000	3.394
4.8000	3.385
5.0000	3.385
5.2000	3.356
5.4000	3.346
5.6000	3.336
5.8000	3.317
6.0000	3.298
6.2000	3.298
6.4000	3.269
6.6000	3.269
6.8000	3.250
7.0000	3.231
7.2000	3.240
7.4000	3.211
7.6000	3.221
7.8000	3.202
8.0000	3.193
8.2000	3.193
8.4000	3.193
8.6000	3.183
8.8000	3.154
9.0000	3.144
9.2000	3.135
9.4000	3.135
9.6000	3.125
9.8000	3.106
10.0000	3.125
11.0000	3.087
12.0000	3.028
13.0000	3.019
14.0000	2.971
15.0000	2.943
16.0000	2.933
17.0000	2.923
18.0000	2.875
19.0000	2.846
20.0000	2.846
21.0000	2.856
22.0000	2.827
23.0000	2.769
24.0000	2.769
25.0000	2.769
26.0000	2.721
27.0000	2.731
28.0000	2.721
29.0000	2.712
30.0000	2.692
31.0000	2.664
32.0000	2.683
33.0000	2.644
34.0000	2.644
35.0000	2.634
36.0000	2.634
37.0000	2.596
38.0000	2.615
39.0000	2.596
40.0000	2.587
41.0000	2.587

42.0000	2.596
43.0000	2.567
44.0000	2.567
45.0000	2.558
46.0000	2.548
47.0000	2.548
48.0000	2.538
49.0000	2.520
50.0000	2.520
51.0000	2.510
52.0000	2.520
53.0000	2.491
54.0000	2.491
55.0000	2.500
56.0000	2.491
57.0000	2.491
58.0000	2.500
59.0000	2.481
60.0000	2.491
61.0000	2.471
62.0000	2.481
63.0000	2.462
64.0000	2.481
65.0000	2.471
66.0000	2.481
67.0000	2.452