McCARTY RANCH AQUIFER TEST REPORT

BY: GEORGE W. HILL

I. Summary

A. Location. -- Lat. N27° 14' 40", Long. W 080° 29' 55", Township 37 South, Range 38 East, in NE¼, SE¼, NE¼ Section 23, 2.7 miles north of the Martin-St. Lucie County line and approximately 1.0 mile west of State Road 609.

B. Test Dates. -- March 28-29, 1979.

C. Length of Test. -- Pumping: 24.5 hours;
Recovery: None

D. Discharge. -- 123 GPM

E. Hydraulic Coefficients. --
Transmissivity -- 1,350 ft^2/day
Storage Coefficient -- 1.0×10^{-4}
Leakance Coefficient -- 4.2×10^{-4}/day

F. Analytical Model. -- Hantush-Jacob (leaky artesian, unsteady flow)

G. Computations. -- Ralph Wilcox and George Hill

H. Remarks. -- Results of Hantush I and DeGlee models were also evaluated.
Test design and test drilling supervision was done by Wes Miller.

II. Narrative

A. Introduction

1. Test Purpose. -- To determine aquifer properties of the best producing zone of the so-called shallow aquifer in this particular area. The test is part of a reconnaissance study of the aquifer properties of the Upper East Coast Planning Area which includes Martin and St. Lucie Counties and eastern Okeechobee County, Florida. The study is in cooperation with South Florida Water Management District.

2. Personnel. -- The test was designed and test drilling supervision was done by Wes Miller, SFSD office. Aquifer test was performed by George Hill, Ralph Wilcox, Bill Long, Wes Miller, and Jay Wendorf - all from the Jupiter Field Office except Mr. Miller.

B. Physical Aspects

1. Site Location. -- The test site is in Township 37 South, Range 38 East, in NE¼, SE¼, NE¼ Section 23, 2.7 miles north of Martin-St. Lucie County line and about 1.0 mile west of State Road 609, on the property of McCarty Ranch (Exhibit I).

2. Test Drilling and Geophysical Logs. -- There are no geophysical logs related to the test in the Jupiter Field office file. Presumably, the pumped well and observation wells were set and screened according to the lithologic log of well SL-185 (Exhibit III).

3. Aquifer Description. -- The so-called shallow aquifer is mainly composed of sand, clay, silt and shell of Pleistocene and Pliocene epochs. Sediments forming the aquifer system are components of the Fort Thompson and Anastasia Formations overlain by Pamlico Sand (W. Miller, 1979). Shell and sand lenses in the Caloosahotchee Marl are also present. Many facies changes appear. Generally the aquifer system is unconfined and under water-table conditions, but localized artesian conditions have been noted by other investigators (Parker 1955) in the vicinity of Fort Pierce and Indiantown where discontinuous clay lenses act as confining units.

Wells set in the producing zone were screened in a zone consisting of unconsolidated shells and shell fragments with a minor component of sand, overlain by fine, gray sand with some shells and clay (Exhibits II and III).

4. Well Descriptions. -- See the table below for production and observation well data.

Well No.	Radius, in Feet	Drilled Depth, in Feet (LSD)	Interval Screened, in Feet (LSD)	Diameter, in Inches
PW	0	113	103-113	4
OWD-1	72	98	88-98	2
OWD-2	107	109	99-109	2
OWD-3	1140	120	Unknown	6
OWS-1	9	11	Open Hole	2
OWS-2	142	23	Open Hole	2

Please see Exhibit II.

5. Instrumentation. -- Three Keck/Stevens water-level recorder combinations were used to collect background, drawdown and recovery data. Steel tapes were used to collect water-level data in all other wells.

6. Pump. -- The production well was pumped with a four-inch centrifugal pump.

7. Background Water-Level Data. -- Background water-level data was obtained from well OWD-2 from March 8-20 and for 12 hours just prior to the test (Exhibit VI). There was a net decline of 0.05 feet during the 12 hour period just prior to the test. The earlier background W/L data shows a diurnal fluctuation of several hundreths superimposed on an overall declining trend. No adjustments were made to the drawdown data to correct for the slight decline in W/L which could have occurred during the test (Exhibit VI).

8. Measurement of Drawdown. -- Drawdown and recovery records for wells OWD-1, OWD-2, and OWS-1 were obtained with Keck surface followers in conjunction with Stevens F-type recorders (Exhibit VI) adjustments of W/L data were required because of mechanical factors. On OWD-2 the recorder pully jammed against the housing and record was lost for 0.95 feet of drawdown. The chart trace was adjusted accordingly. Chart trace for well OWD-1 required adjustment of 0.18 ft. at 1227 minutes prorated back to zero at the beginning of the test.

No corrections were made for declining water levels or other cyclic phenomenon. These corrections would be insignificant compared to the corrections already made for mechanical problems.

Well OWD-3 was found by accident after the test was started and therefore, limited drawdown data could be obtained. See Exhibit VI for drawdown data.

9. Discharge. -- The production well was pumped at approximately 123 GPM. See Exhibit V for pumping data. During the early part of the test the rate was up to 131 GPM. After five hours of pumping the rate was 123 GPM and fluctuated between 123 and 122 GPM for the remainder of the test.

A 6-inch aluminum pipeline was used to route the discharge to a shallow ditch about 130 feet south of the production well.

10. Potential Surface Water Recharge. -- Shallow drainage ditches are located a short distance (within 130 ft.) to the south, west, and northeast. Underlying the ditches is a layer of clay and therefore, there shouldn't be a potential relationship of the ditches to the test; the C-23 land is approximately 2.7 miles south of the site and a large rock quarry is located about two miles west of the site. Here the shallow coquina strata is dewatered in large volumes and discharged into a drainage ditch running southward. No other data is available on the quarry and no computations were made to evaluate a discharging boundary (Image Well Theory).

A drawdown of only about 0.7 feet in the shallow wells is an indication that recharge from the shallow ditches was not a factor in the test.

C. Computations

1. Computations are included in Exhibit VIII. Three methods were considered - Hantush I, Thiem and Hantush-Jacob for leaky artesian, nonsteady flow. Since the drawdown in the shallow observation wells was very little compared to the pumped zone, there is an indication of semi-confined aquifer and therefore, all three methods are applicable. However, the Hantush-Jacob model is the most appropriate solution.

2. Type Curve Fitting. -- Drawdown data frames wells OWD-1 and OWD-2 were plotted against t/r^2 on log-log. A composite fit was achieved and a single match point selected. The fit is good.

Other solutions examined were semilog plots.

3. Transmissivity. -- Use 1,350 ft^2/day.

4. Storage Coefficient. -- Use 1.0×10^{-4}.

5. Leakance Coefficient. -- Use 4.2×10^{-4}/day.

Table 1
OWD-1

time	t(min)	s(ft)	s corrected (ft)	t/r^2 ($d ft^{-2}$)
1703	210	8.42	8.45	2.80×10^{-5}
1733	240	8.48	8.51	3.20×10^{-5}
1826	293	8.59	8.63	3.90×10^{-5}
1914	341	8.67	8.72	4.54×10^{-5}
2008	395	8.75	8.81	5.26×10^{-5}
2102	449	8.81	8.88	5.98×10^{-5}
2232	539	8.89	8.97	7.18×10^{-5}
(3-29-79) 0003	630	8.93	9.02	8.39×10^{-5}
0109	696	8.95	9.05	9.27×10^{-5}
0200	747	8.97	9.06	9.95×10^{-5}
0358	865	9.00	9.13	1.15×10^{-4}
0502	929	9.01	9.15	1.24×10^{-4}
0603	990	9.02	9.16	1.32×10^{-4}
0713	1060	9.04	9.19	1.41×10^{-4}
0800	1107	9.05	9.21	1.47×10^{-4}
0909	1176	9.07	9.24	1.57×10^{-4}
1000	1227	9.08	9.26	1.63×10^{-4}
1213	1360	9.30	—	1.81×10^{-4}
1302	1409	9.30	—	1.88×10^{-4}
1400	1467	9.30	—	1.95×10^{-4}

Table 1
OWD-1 r = 72.2ft

time (3-28-79)	t(min)	s(ft)	s corrected(ft)	t/r^2 (dft^{-2})
1334	1	1.95	1.95	1.33×10^{-7}
	2	2.95	2.95	2.66×10^{-7}
	3	3.47	3.47	4.00×10^{-7}
	4	3.84	3.84	5.33×10^{-7}
	5	4.12	4.12	6.66×10^{-7}
	7	4.62	4.62	9.33×10^{-7}
	10	5.07	5.07	1.33×10^{-6}
	15	5.65	5.65	2.00×10^{-6}
	20	6.05	6.05	2.66×10^{-6}
	26	6.31	6.31	3.46×10^{-6}
	30	6.70	6.70	4.00×10^{-6}
	35	6.93	6.94	4.66×10^{-6}
	40	7.10	7.11	5.33×10^{-6}
	45	7.22	7.23	5.99×10^{-6}
	50	7.33	7.34	6.66×10^{-6}
	55	7.41	7.42	7.33×10^{-6}
	60	7.49	7.50	7.99×10^{-6}
1448	75	7.68	7.69	9.99×10^{-6}
	90	7.82	7.83	1.20×10^{-5}
	105	7.95	7.97	1.40×10^{-5}
1534	121	8.05	8.07	1.61×10^{-5}
1556	143	8.16	8.18	1.91×10^{-5}
1633	180	8.32	8.35	2.40×10^{-5}

Table 2
OWD-2 r = 107 ft

time (3-28-79)	t (min)	s (ft)	s corrected (ft)	t/r^2 (dft^{-2})
1334	1	0.33	1.28	6.07×10^{-8}
	2	1.00	1.95	1.21×10^{-7}
	3	1.39	2.34	1.82×10^{-7}
	4	1.68	2.63	2.43×10^{-7}
	5	1.92	2.87	3.03×10^{-7}
	7	2.35	3.30	4.25×10^{-7}
	10	2.81	3.76	6.07×10^{-7}
	15	3.30	4.25	9.10×10^{-7}
	20	3.55	4.50	1.21×10^{-6}
	25	3.78	4.73	1.52×10^{-6}
	30	4.14	5.09	1.82×10^{-6}
	35	4.37	5.32	2.12×10^{-6}
	40	4.55	5.50	2.43×10^{-6}
	45	4.68	5.63	2.73×10^{-6}
	50	4.79	5.74	3.03×10^{-6}
	55	4.88	5.83	3.34×10^{-6}
	60	4.97	5.92	3.64×10^{-6}
1448	75	5.18	6.13	4.55×10^{-6}
	90	5.33	6.28	5.46×10^{-6}
	105	5.47	6.42	6.37×10^{-6}
1533	120	5.58	6.53	7.28×10^{-6}
1554	141	5.69	6.64	8.55×10^{-6}
1632	179	5.86	6.81	1.09×10^{-5}

Table 2
OWD-2

time	t(min)	s(ft)	s corrected (ft)	t/r^2 $(d\,ft^{-2})$
1702	209	5.96	6.91	1.27×10^{-5}
1733	240	6.05	7.00	1.46×10^{-5}
1827	294	6.18	7.13	1.78×10^{-5}
1911	338	6.24	7.19	2.05×10^{-5}
2008	395	6.32	7.27	2.40×10^{-5}
2102	449	6.40	7.35	2.72×10^{-5}
2234	541	6.48	7.43	3.28×10^{-5}
(3-29-79) 0010	637	6.53	7.48	3.86×10^{-5}
0115	702	6.55	7.50	4.26×10^{-5}
0205	752	6.57	7.52	4.56×10^{-5}
0359	866	6.60	7.55	5.25×10^{-5}
0504	931	6.62	7.57	5.65×10^{-5}
0558	985	6.64	7.59	5.97×10^{-5}
0713	1060	6.66	7.61	6.43×10^{-5}
0803	1110	6.68	7.63	6.73×10^{-5}
0908	1175	6.70	7.65	7.13×10^{-5}
1000	1227	6.71	7.66	7.44×10^{-5}
1038	1265	7.67	—	7.67×10^{-5}
1140	1327	7.68	—	8.05×10^{-5}
1213	1360	7.68	—	8.25×10^{-5}
1258	1405	7.68	—	8.52×10^{-5}
1400	1467	7.68	—	8.90×10^{-5}

CHECKED BY M. Dooley 4/16/79

Location Mcarty Ranch (pumping test) 375.38E.22.4323

Party RWW (instrument), JSW (rod) Date 3-30-79

LINE	Station	BS	Avg	HI	FS	Avg	Elev.	REMARKS
(1)		3.93						land surface elev. assumed to be 27 ft
2		3.70	3.70	33.40			29.70	above m.s.l. at production well (SL-185),
3		3.46						casing is 2.7 ft above land surface, elev.
4								at top of coupling 29.7 ft.
5					4.61			
6					4.365	4.37	29.084	OWS-1 (top of casing)
7					4.12			
8								
9					4.72			
10					4.39	4.39	29.01	OWD-1 (top of coupling)
11					4.06			
12								
13					4.25			
14					4.07	4.07	29.33	OWD-2 (top of coupling)
15					3.89			
16								
17					5.11			
18					4.975	4.98	28.42	OWS-2 (top of casing)
19					4.84			
20								
21					4.52			
22	TP-1				4.015	4.02	29.398	
23					3.51			
24								
25								

Location Mcarty Ranch

Party RWW & JSW

Date 3-30-79

LINE	Station	BS	Avg	HI	FS	Avg	Elev.	REMARKS
1					5.445			
2	TP-4			32.99	5.05	5.05	27.94	
3					4.655			
4		5.87						
5		5.435	5.44	33.38				
6		5.005						
7								
8					3.90			
9					3.66	3.66	29.72	SL-185 (top of coupling)
10					3.425			
11								29.72ft this measurement
12								29.70ft actual elevation
13								+0.02ft error
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

OWS-2

Radius = 142 ft 3-30-79 RWW

9-194
November 1949

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by GWW

Location of Project McCarty Ranch OWS-2

DATE	Minutes HOUR	WELL NO. MIN	TAPE READING AT— Meas. point	Water level	DEPTH TO WATER	WATER LEVEL Ft(MSL)	REMARKS
	1324		6.0	2.30	3.70		
	1330		8.0	4.31	3.69		
	1335 2		8.0	4.30	3.70	0	
	3		9.0	5.29	3.71	.01	
	4		9.0	5.30	3.70	.0	
	5		"	5.31	3.71	+.01	
	6		"	5.28	3.72	-.02	
	7		"	5.26	3.74	.04	
	8		"	5.26	3.74	.04	
	9		"	5.25	3.75	.05	
	10			5.25	3.75	.05	
	12			5.23	3.77	.07	
	14			5.23	3.77	.07	
	17			5.24	3.76	.06	
	22			5.20	3.80	.10	
	25			5.20	3.80	.10	
	25			5.20	3.80	.10	
	30			5.18	3.82	.12	
	35			5.16	3.84	.14	
	45			5.12	3.88	.18	
	50			5.11	3.89	.19	
	60			5.09	3.91	.21	

9-194
November 1949

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

BT

WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	Water level	DEPTH TO WATER	Ft(MSL)	Remarks
	75		9.0	5.06	3.94	.24	
	90		9.0	5.02	3.98	.28	
	105		9.0	4.99	4.01	.31	
	120		9.0	4.96	4.04	.34	
1632	182		6.0	1.91	4.09	.39	
1700	205		5.0	.88	4.12	.42	
1745	250		6.0	1.21	4.16	.46	
1822	287		5.0	.81	4.19	.49	
1917	342		5.0	.79	4.21	.51	
2014	399		5.0	.77	4.23	.53	
21	448		5.0	.74	4.26	.56	
2236	542		5.0	.71	4.29	.59	
3/29/79	0003	628	5.0	.69	4.31	.61	
	0113	698	5.0	.68	4.32	.62	
	0203	748	5.0	.66	4.34	.64	
	0401	866	5.0	.67	4.33	.63	
	0507	932	5.0	.65	4.35	.65	
	0600	986	5.0	.66	4.34	.64	
	712	1058	5.0	.65	4.35	.65	
	0805	1110	5.0	0.63	4.37	.67	
	0920	1190	5.0	.64	4.36	.66	
	1005	1230	5.0	.64	4.36	.66	
	1103	1288	5.0	.62	4.38	.68	

Discharge Measurements

McCarty Ranch

QW field parameters 3/28/79 RWW-MAD-JSW

Temp = 25°C hardness ($as\ CaCO_3$) = 435 mg/l

Iron = 1 mg/l 45 ≈ 400 mg/l

sp. cond. = 1580 µmhos SO_4 = < 50 mg/l

WMQ = 123 GPM

9-194
November 1949

UNITED STATES
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GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by W&R / RWW

Location of Project 6" pipe 3" orifice inches

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS Q (GPM)	
3/28	1330	Started @			15" in	128	
	1334			Same	15"	128	127
	1355	.42 hrs			14.5"	126	
	1402	.12 hrs			15.75	130	128
	1425	.38 hrs			15.75	130	131
	1435	.17 hrs			15.50	130	130
	1450	.25			15.00	128	129
	1505	.25			14.75	127	128
	1515			4" at 50	14.50	126	126
	1523			Down 50	14.50	126	
	1538				14.50	126	
	1555	2.67 hrs.			14.50	126	
	1632				14.40	126	126
	1700				14.50	126	
	1745	.63			14.25	125	
	1823				14.0	123	124
	1919				13 3/4	122	
	2012				13 3/4	122	
	2040				13 3/4	122	
	2103		19.36		13 3/4	122	122

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GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	Q (GPM)	
2/28	2238				14.0	123	
2/29/79	0007				13.8	122	
	0102				13.8	122	
	203				13.8	122	
	401				14	123	
	508				13 3/4	122	
	600				13 3/4		
	712				13 3/4		
	0807				13.75		
	925				13 3/4		
	1100				13 3/4		
	1215				13 3/4		
	1304				13.75		122
	1345				13 3/4	122	

Computation of weighted mean Q:

.42	X 127	= 53.34	2.67	X 126	=	336.42
.12	X 128	= 15.36	.63	X 124	=	78.12
.38	X 131	= 49.78	19.36	X 122	=	2361.92
.17	X 130	= 22.10	21.85			2981.29
.25	X 129	= 32.25				
.25	X 128	= 32.00				

WMQ = 123 GPM

Table

OWO-2 r = 107 ft

time (79)	t (min)	s (ft)	s corrected (ft)	t/r^2 ($d ft^{-2}$)
1334	1	0.33	1.28	6.07×10^{-8}
	2	1.00	1.95	1.21×10^{-7}
	3	1.39	2.34	1.82×10^{-7}
	4	1.68	2.63	2.43×10^{-7}
	5	1.92	2.87	3.03×10^{-7}
	7	2.35	3.30	4.25×10^{-7}
	10	2.81	3.76	6.07×10^{-7}
	15	3.30	4.25	9.10×10^{-7}
	20	3.55	4.50	1.21×10^{-6}
	25	3.78	4.73	1.52×10^{-6}
	30	4.14	5.09	1.82×10^{-6}
	35	4.37	5.32	2.12×10^{-6}
	40	4.55	5.50	2.43×10^{-6}
	45	4.68	5.63	2.73×10^{-6}
	50	4.79	5.74	3.03×10^{-6}
	55	4.88	5.83	3.34×10^{-6}
	60	4.97	5.92	3.64×10^{-6}
1448	75	5.18	6.13	4.55×10^{-6}
	90	5.33	6.28	5.46×10^{-6}
	105	5.47	6.42	6.37×10^{-6}
1533	120	5.58	6.53	7.28×10^{-6}
1554	141	5.69	6.64	8.55×10^{-6}
1632	179	5.86	6.81	1.09×10^{-5}

OWD-2

time	t(min)	s(ft)	s corrected (ft)	t/r^2 ($d ft^{-2}$)
1702	209	5.96	6.91	1.27×10^{-5}
1733	240	6.05	7.00	1.46×10^{-5}
1827	294	6.18	7.13	1.78×10^{-5}
1911	338	6.24	7.19	2.05×10^{-5}
2008	395	6.32	7.27	2.40×10^{-5}
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29-79) 0010	637	6.53	7.48	3.86×10^{-5}
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0205	752	6.57	7.52	4.56×10^{-5}
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0504	931	6.62	7.57	5.65×10^{-5}
0558	985	6.64	7.59	5.97×10^{-5}
0713	1060	6.66	7.61	6.43×10^{-5}
0803	1110	6.68	7.63	6.73×10^{-5}
0908	1175	6.70	7.65	7.13×10^{-5}
1000	1227	6.71	7.66	7.44×10^{-5}
1038	1265	7.67	—	7.67×10^{-5}
1140	1327	7.68	—	8.05×10^{-5}
1213	1360	7.68	—	8.25×10^{-5}
1258	1405	7.68	—	8.52×10^{-5}
1400	1467	7.68	—	8.90×10^{-5}

Table 1

OWD-1 $r = 72.2$ ft

time (29-79)	t (min)	s (ft)	s corrected (ft)	t/r^2 (dft^{-2})
1334	1	1.95	1.95	1.33×10^{-7}
	2	2.95	2.95	2.66×10^{-7}
	3	3.47	3.47	4.00×10^{-7}
	4	3.84	3.84	5.33×10^{-7}
	5	4.12	4.12	6.66×10^{-7}
	7	4.62	4.62	9.33×10^{-7}
	10	5.07	5.07	1.33×10^{-6}
	15	5.65	5.65	2.00×10^{-6}
	20	6.05	6.05	2.66×10^{-6}
	26	6.31	6.31	3.46×10^{-6}
	30	6.70	6.70	4.00×10^{-6}
	35	6.93	6.94	4.66×10^{-6}
	40	7.10	7.11	5.33×10^{-6}
	45	7.22	7.23	5.99×10^{-6}
	50	7.33	7.34	6.66×10^{-6}
	55	7.41	7.42	7.33×10^{-6}
	60	7.49	7.50	7.99×10^{-6}
1448	75	7.68	7.69	9.99×10^{-6}
	90	7.82	7.83	1.20×10^{-5}
	105	7.95	7.97	1.40×10^{-5}
1534	121	8.05	8.07	1.61×10^{-5}
1556	143	8.16	8.18	1.91×10^{-5}
1633	180	8.32	8.35	2.40×10^{-5}

OWD-1

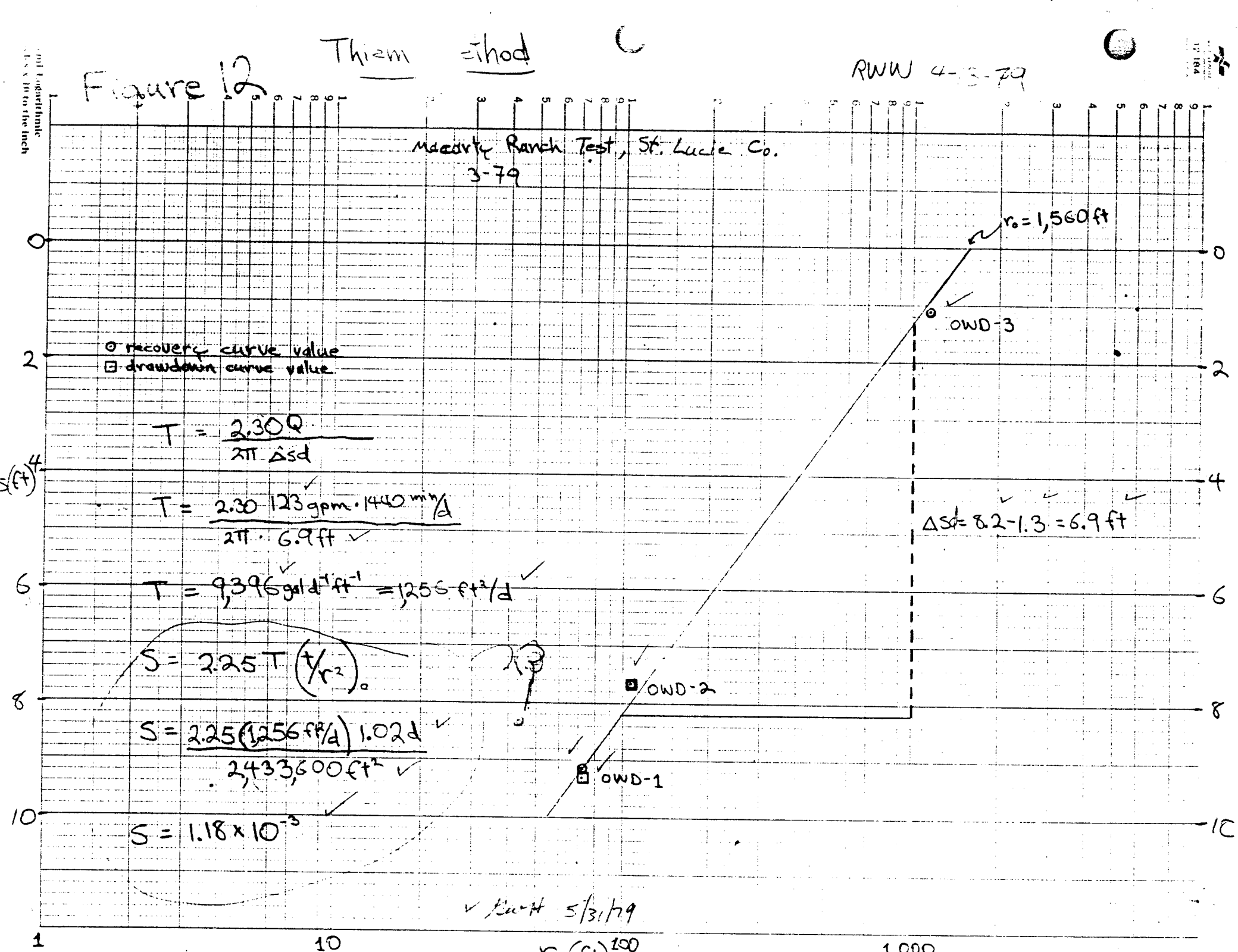
time	t(min)	s(ft)	s corrected (ft)	t/r^2 ($d\,ft^{-2}$)
1703	210	8.42	8.45	2.80×10^{-5}
1733	240	8.48	8.51	3.20×10^{-5}
1826	293	8.59	8.63	3.90×10^{-5}
1914	341	8.67	8.72	4.54×10^{-5}
2008	395	8.75	8.81	5.26×10^{-5}
2102	449	8.81	8.88	5.98×10^{-5}
2232	539	8.89	8.97	7.18×10^{-5}
1-79 0003	630	8.93	9.02	8.39×10^{-5}
0109	696	8.95	9.05	9.27×10^{-5}
0200	747	8.97	9.06	9.95×10^{-5}
0358	865	9.00	9.13	1.15×10^{-4}
0502	929	9.01	9.15	1.24×10^{-4}
0603	990	9.02	9.16	1.32×10^{-4}
0713	1060	9.04	9.19	1.41×10^{-4}
0800	1107	9.05	9.21	1.47×10^{-4}
0909	1176	9.07	9.24	1.57×10^{-4}
1000	1227	9.08	9.26	1.63×10^{-4}
1213	1360	9.30	—	1.81×10^{-4}
1302	1409	9.30	—	1.88×10^{-4}
1400	1467	9.30	—	1.95×10^{-4}

Figure 12

Thiem Method

RWW 4-3-79

Macarty Ranch Test, St. Lucie Co.
3-79



$$T = \frac{2.30Q}{2\pi \Delta s d}$$

$$T = \frac{2.30 \; 123 \text{ gpm} \cdot 1440 \text{ min/d}}{2\pi \cdot 6.9 \text{ ft}}$$

$$T = 9,396 \text{ gal d}^{-1}\text{ft}^{-1} = 1,256 \text{ ft}^2/\text{d}$$

$$S = 2.25 T \left(t/r^2\right)_o$$

$$S = \frac{2.25(1,256 \text{ ft}^2/\text{d})\, 1.02 \text{ d}}{2,433,600 \text{ ft}^2}$$

$$S = 1.18 \times 10^{-3}$$

Chart 5/31/79

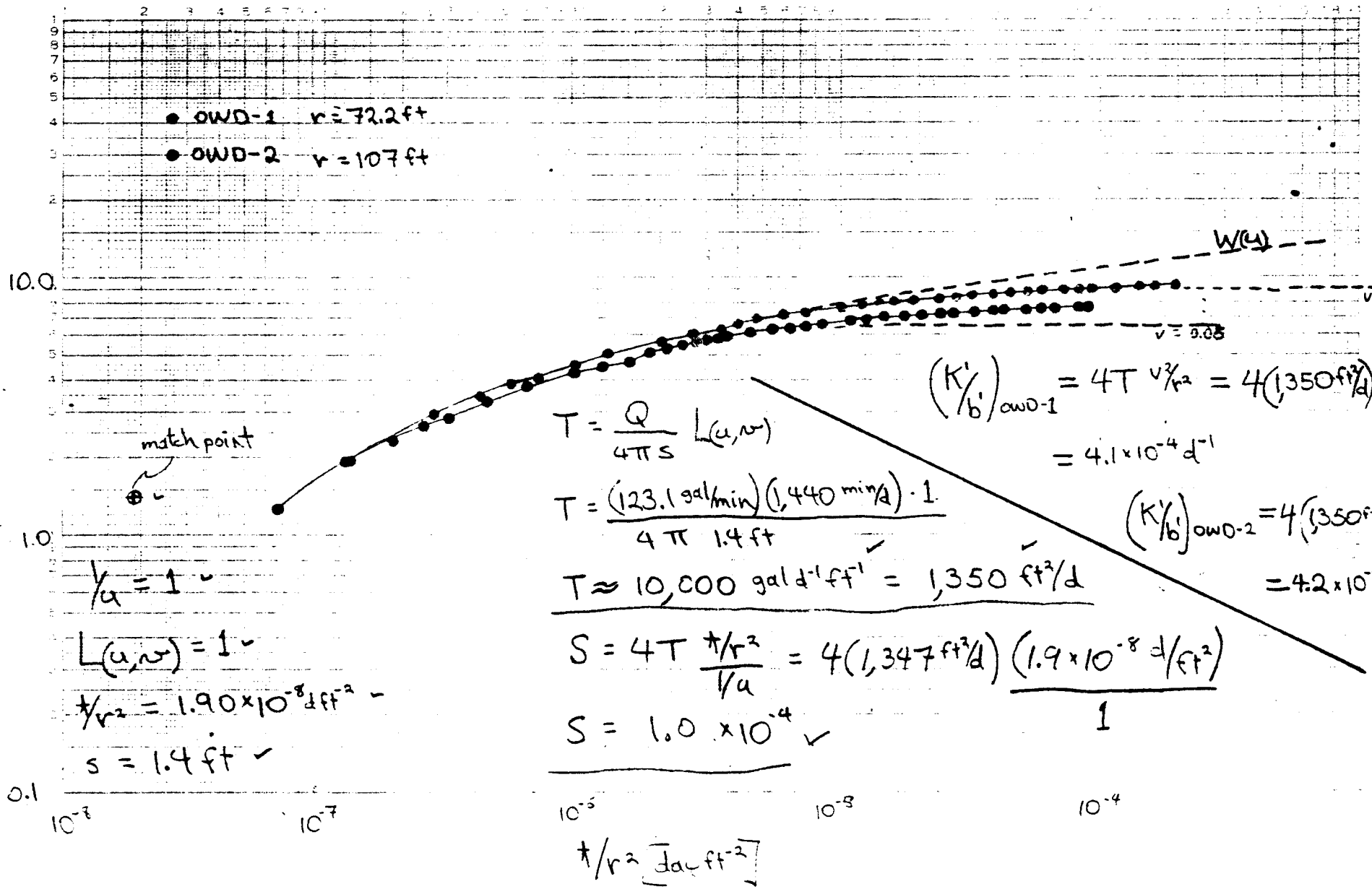
Figure 3

Logarithmic, 3 x 5

Meart [illegible] mping test, St. Lucie Co. [illegible]

RWW 4-16-79
&
4-19-79

Hantush-Jacob method from: P.P. 708 pp30-32



$1/u = 1$ ✓

$W(u,v) = 1$ ✓

$t/r^2 = 1.90 \times 10^{-8}$ d ft^{-2} ✓

$s = 1.4$ ft ✓

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

$$T = \frac{(123.1 \text{ gal/min})(1{,}440 \text{ min/d}) \cdot 1}{4\pi \ 1.4 \text{ ft}}$$

$T \approx 10{,}000$ gal d^{-1} ft^{-1} $= 1{,}350$ ft^2/d ✓

$$S = 4T \frac{t/r^2}{1/u} = 4(1{,}347 \text{ ft}^2/\text{d}) \frac{(1.9 \times 10^{-8} \text{ d/ft}^2)}{1}$$

$S = 1.0 \times 10^{-4}$ ✓

$$\left(K'/b'\right)_{OWD-1} = 4T \, v^2/r^2 = 4(1{,}350 \text{ ft}^2/\text{d}) \frac{(0.02)^2}{(72.2 \text{ ft})^2}$$

$= 4.1 \times 10^{-4}$ d^{-1}

$$\left(K'/b'\right)_{OWD-2} = 4(1{,}350 \text{ ft}^2/\text{d}) \frac{(0.030)^2}{(107 \text{ ft})^2}$$

$= 4.2 \times 10^{-4}$ d^{-1}

Hantush Method I

and evaluation of pumping test data IILRI p. 86

RWW 4-13-79
E4-13-79

Figure 1.2

Macarty Ranch Test, St. Lucie Co., 3-79

OWD-1

Q = 123.1 gal/min ✓
r = 72.2 ft ✓
s_m = 9.30 ft ✓
$s_p = \frac{1}{2} s_m$ = 4.65 ft ✓
t_p = 7.2 min ✓
Δs_p = 3.12 ft ✓

$$kD = T = \frac{2.30\,Q}{4\pi\,\Delta s_p} e^{-r/L}$$

$$T = \frac{2.30(123.1\ \text{gal/min})(1{,}440\ \text{min/d})}{4\pi\,(3.12\ \text{ft})} e^{-.042}$$

$$T = 9971\ \text{gal ft}^{-1}\text{d}^{-1} = 1{,}333\ \text{ft}^2\text{d}^{-1}$$ ✓

$$2.30\frac{s_p}{\Delta s_p} = e^{r/L} K_o(r/L)$$

$$2.30\frac{4.65\ \text{ft}}{3.12\ \text{ft}} = e^{r/L} K_o(r/L) = 3.43$$ ✓

$r/L = 0.042$ ✓

$$\frac{72.2\ \text{ft}}{0.042} = L = 1{,}719\ \text{ft}$$ ✓

$$S = \frac{2T t_p}{Lr} = \frac{2(1{,}333\ \text{ft}^2/\text{d})(7.2\ \text{min})(6.944\times10^{-4}\ \text{d/min})}{(1{,}719\ \text{ft})(72.2\ \text{ft})}$$

$$S = 1.07\times10^{-4}$$

$$c = L^2/T = \frac{(1{,}719\ \text{ft})^2}{1{,}333\ \text{ft}^2/\text{d}}$$

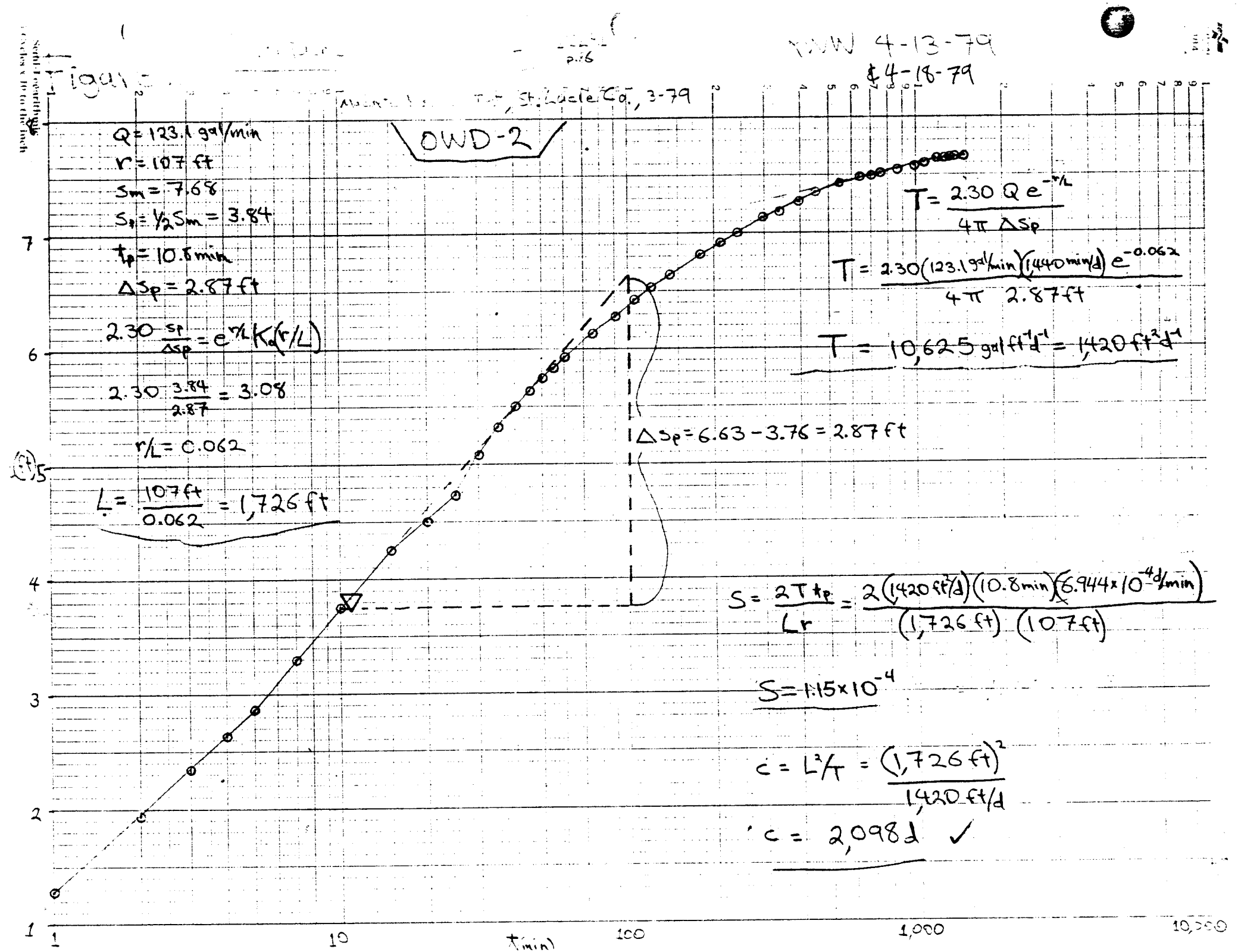
$$c = 2217\ \text{d}$$ ✓

$\Delta s_p = 5.07 - 1.95 = 3.12$ ✓

0 2 4 6 8 10

1 10 10^2 10^3 10^4

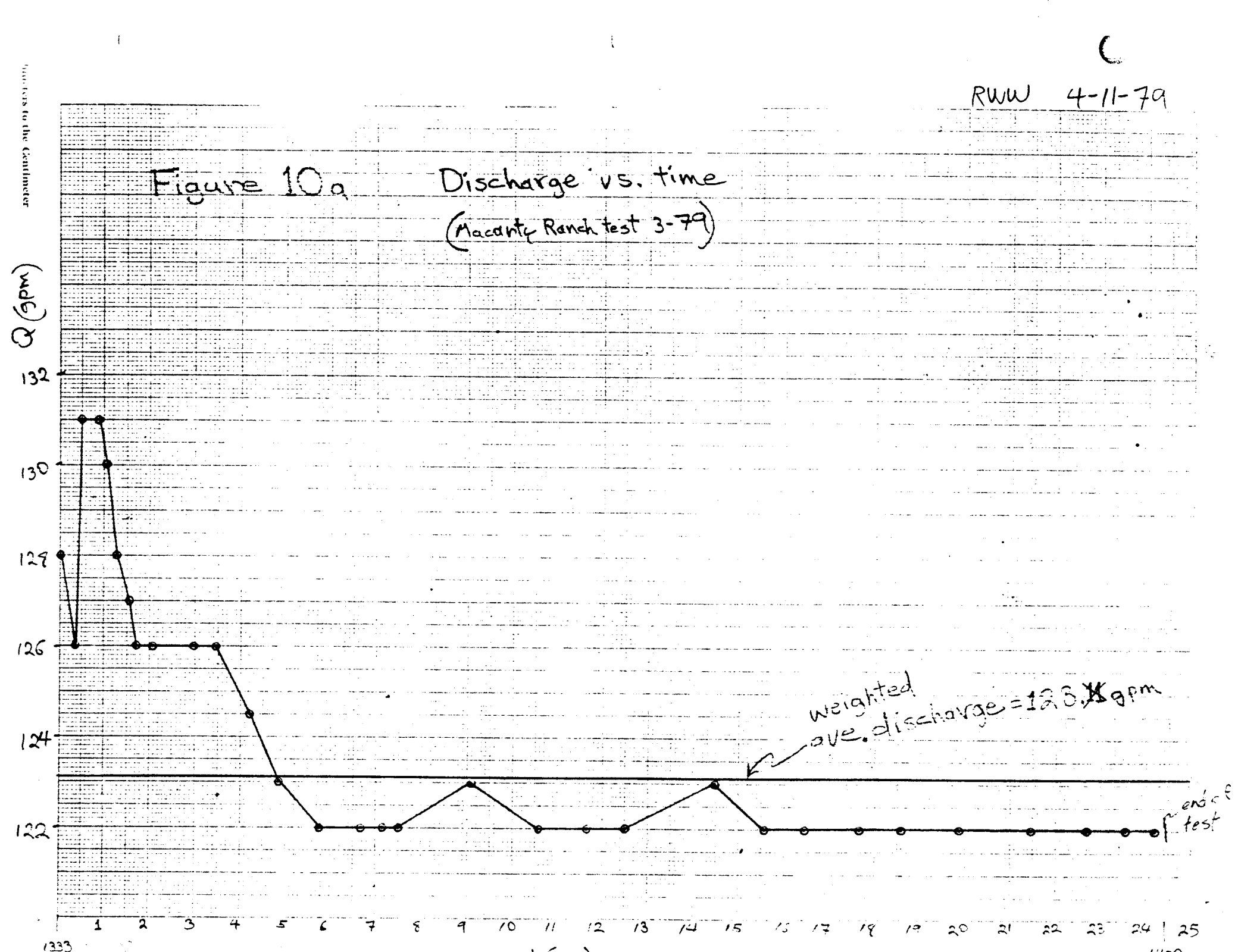
t (min)


OWD-2
Q = 123.1 gal/min
r = 107 ft
s_m = 7.68
$s_p = \frac{1}{2} s_m$ = 3.84
t_p = 10.8 min
Δs_p = 2.87 ft
$2.30 \frac{s_p}{\Delta s_p} = e^{r/L} K_0(r/L)$
$2.30 \frac{3.84}{2.87} = 3.08$
r/L = 0.062
$L = \frac{107 ft}{0.062} = 1{,}726$ ft
$\Delta s_p = 6.63 - 3.76 = 2.87$ ft
$T = \frac{2.30 Q e^{-r/L}}{4\pi \Delta s_p}$
$T = \frac{2.30 (123.1 gal/min)(1{,}440 min/d) e^{-0.062}}{4\pi \ 2.87 ft}$
$T = 10{,}625$ gal ft^{-1}d^{-1} = 1,420 ft^{2}d^{-1}
$S = \frac{2 T t_p}{L r} = \frac{2(1{,}420 ft^2/d)(10.8 min)(6.944 \times 10^{-4} d/min)}{(1{,}726 ft)(107 ft)}$
$S = 1.15 \times 10^{-4}$
$c = L^2/T = \frac{(1{,}726 ft)^2}{1{,}420 ft/d}$
c = 2,098 d ✓
s (ft)
t (min)
1
10
100
1,000
10,000

RWW 4-11-79

Figure 10a Discharge vs. time

(Macarty Ranch test 3-79)



Discharge Measurements

McCarty Ranch

QW field parameters 3/28/79 RWW-MAD-JSW

Temp = 25°C hardness (as $CaCO_3$) = 435 mg/l

Iron = 1 mg/l

sp. cond. = 1580

HCO_3 = 400 mg/l

SO_4 = < 50 mg/l

Figure 10

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WATER LEVEL MEASUREMENTS (Field) Measured by W&L / RWW

Location of Project 6" pipe 3" office outside

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3/28	1330	started @			15"+	128
	1340			same	15"	128
	1355				14.5"	126
	1402				15.75	130
	1425				15.75	130
	1435				15.50	129
	1450				15.00	128
	1505				14.75	
	1515			4 at 50	14.50	
	1523			5 at 50	14.50	
	1538				14.50	15.75" = 131
	1553				14.50	15.5 = 130
	1632				14.00	15.25 = 129
	1700				14.50	15.00 = 128
	1745				14.25	14.5 = 126
	1823				14.0	14.25-14.0 = 123
	1919				13 3/4	13.5 = 121
	2012				13 3/4	
	2040				13 3/4	
	2103				13 3/4	

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WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
2/23	2238			wet	14.0	V
2/29/79	0007				13.8	V
	0102				13.F	V
	203				13.8	V
	401				14	V
	508				13 3/4	V
	600				13 3/4	V
	712				13 3/4	V
	0807				13.75	V
	925				13 3/4	V
	1100				13 3/4	V
	1215				13 3/4	V
	1304				13.75	V
	1345				13 3/4	

a gate valve was not used to regulate the discharge. The production well was pumped to its capacity, and flow remained fairly constant throughout the test (figure 10a&b).

After a pumping period of 24 hours water level fluctuations became negligible, and the test was shut down. Water level recovery was closely monitored for the first two hours after shutdown, and the charts were pulled the next day. There was no precipitation during the test, and the microbarograph was malfunctioning, so there is no on site record of barometric pressure changes.

Computations

Figure 11a&b — Hantush method I
Figure 12 — Thiem method
Figure 13 — Hantush-Jacob method
Tables 1 and 2 — plotted values

Drawdowns in both shallow observation wells OWS-1 and OWS-2 were about 0.7 feet at the end of the test. This indicates that the aquifer is semiconfined. Therefore, all three of these methods are applicable to this test. Calculated transmissivity values are nearly the same for all methods, and calculated storage coefficients are close for the Hantush I and Hantush-Jacob methods. The values of $T = 10{,}000$ gpd/ft, and $S = 1 \times 10^{-4}$ have thus been adopted for this test. Also $K'/b' = 4.15 \times 10^{-4}\ d^{-1}$

RWW
6-29-79

OW 2 - 6" well, depth = 12

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m.p. = top of casing

WATER LEVEL MEASUREMENTS (Field) Measured by DSW-UW-RWW.

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	M.P. Elv.	~~W.L.~~ Elv. drawdown
3-29-79	0715				4.01		drawdown
	0845		4.0	0.03	3.97		
	1012		5.0	.97	4.03		
	1120				4.02		
	1400		5.0	1.0	4.0		
	1401				4.0		1.0
	1402				4.0		
	1403				4.0		
	1404				4.0		
	1405				4.0		
	1406				4.0		
	1407				4.0		
	1408				4.0		
	1409				4.0		
	1410				4.0		
	1412				4.0		1.0
	1415				4.0		1.0
	1420		5.0	1.01	3.99		1.01
	1425				3.99		1.01
	1430		5.0	1.02	3.98		1.02
	1435		5.0	1.02	3.98		1.02
	1440		5.0	1.05	3.95		1.05

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WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	M.P. Elv.	~~W.L.~~ Elv. drawdown
	1445		5.0	1.08	3.92		1.01
	1450		5.0	1.09	3.91		1.02
	1455			1.11	3.89		1.01
	1500			1.13	3.87		1.00
	1510			1.16	3.84		0.99
	1520			1.18	3.82		0.98
	1530		5.0	1.25	3.75		0.93
	1545		5.0	1.30	3.70		0.88
	1600		5.0	1.33	3.67		0.79
3-30-79	0910		3.10	0.22	2.88		0

assumed to be complete recovery.

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OWS-_

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WATER LEVEL MEASUREMENTS (Field) Measured by GWUT

Location of Project McCarty Ranch OWS-2

DATE	Minutes HOUR	WELL NO.	TAPE READING AT— Measg. point	TAPE READING AT— Water level	DEPTH TO WATER	WATER LEVEL Ft (MSL)	REMARKS
	1324	MW	6.0	2.30	3.70		
	1330		8.0	4.31	3.69		
	1335		8.0	4.30	3.70	0	
	3		9.0	5.29	3.71	.01	
	4		9.0	5.30	3.73	.0	
	5		"	5.31	3.69	+.01	
	6		"	5.28	3.72	-.02	
	7		"	5.26	3.74	.04	
	8		"	5.26	3.74	.04	
	9		"	5.25	3.75	.05	
	10			5.25	3.75	.05	
	12			5.23	3.77	.07	
	14			5.23	3.77	.07	
	17			5.24	3.76	.06	
	22			5.20	3.80	.10	
	25			5.20	3.80	.10	
	25			5.20	3.80	.10	
	30			5.18	3.82	.12	
	35			5.16	3.84	.14	
	45			5.12	3.88	.18	
	50			5.11	3.89	.19	
	60			5.09	3.91	.21	

OWS-2.

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WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Measg. point	TAPE READING AT— Water level	DEPTH TO WATER	Ft (MSL)	Remarks
	75		9.0	5.06	3.94	.24	
	90		9.0	5.02	3.98	.28	
	105		9.0	4.99	4.01	.31	
	120		9.0	4.96	4.04		
1637			6.0	1.91	4.09		
1700			5.0	.88	4.12		
"				"	"		
1822			5.0	.81	4.19		
1917			5.0	.79	4.21		
2014			5.0	.77	4.23		
21			5.0	.74	4.26		
2336			5.0	.71	4.29		
3/25/79	0003		5.0	.69	4.31		
	0113		5.0	.68	4.32		
	0203		5.0	.66	4.34		
	0401		5.0	.67	4.33		
	0507		5.0	.65	4.35		
	0600		5.0	.66	4.34		
	712		5.0	.65	4.35		
	0805		5.0	0.63	4.37		
	0924		5.0	.64	4.36		
	1005		5.0	.64	4.36		
	1103		5.0	.62	4.38		

OWS-2

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WATER LEVEL MEASUREMENTS (Field) Measured by G&H Editors 3/

Location of Project McCarty Ranch OWS-2

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
/79	1214		5.0	.63	4.37	
	1304		5.0	.62	4.38	
	1340		5.0	.61	4.39	
	1359		5.0	.60	4.40	
1400	0		5.0	.60	4.40	
	1			.61	4.39	
	2			.61	4.39	
	3			.63	4.37	
	4			.63	4.37	
	5			.63	4.37	
	7			.64	4.36	
	9			.64	4.36	
	12			.66	4.34	
	15			.67	4.33	
	20			.69	4.31	
	25			.72	4.28	
	30			.73	4.27	
	40			.75	4.25	
	50			.78	4.22	
	60			.82	4.18	
	79			.85	4.15	
1605				.92	4.08	

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WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3-30-79	1010		4.00	0.34	3.66	

Location Mcarty Ranch

Party RWW & JSW

Date 3-30-79

Station	BS	Avg	HI	FS	Avg	Elev.	REMARKS
	3.59						
TP-1	3.23	3.23	32.62			29.39	
	2.87						
				2.31			
TP-2				1.96	1.96	30.66	
				1.61			
	2.54						
	2.405	2.41	33.076				
	2.27						
				5.66			
				5.46	5.46	27.610	OWD-3 (top of casing)
				5.26			
TP-3				3.27			
				3.065	3.076	30.00	
				2.86			
	3.305						
	2.99	2.99	32.99				
	2.675						

CHECKED BY M. Dooley 4/16/79

Location Mcarty Ranch (pumping test) 375.38E.22.4323

Party RWW (instrument), JSW (rod) Date 3-30-79

LINE	Station	BS	Avg	HI	FS	Avg	Elev.	REMARKS
(1)		3.93						land surface elev. assumed to be 27 ft
2		3.70	3.70	33.40			29.70	above m.s.l. at production well (SL-185),
3		3.46						casing is 2.7 ft above land surface, elev.
4								at top of coupling 29.7 ft.
5					4.61			
6					4.365	4.37	29.084	OWS-1 (top of casing)
7					4.12			
8								
9					4.72			
10					4.39	4.39	29.01	OWD-1 (top of coupling)
11					4.06			
12								
13					4.25			
14					4.07	4.07	29.33	OWD-2 (top of coupling)
15					3.89			
16								
17					5.11			
18					4.975	4.98	28.42	OWS-2 (top of casing)
19					4.84			
20								
21					4.52			
22	TP-1				4.015	4.02	29.398	
23					3.51			
24								
25								

OWD-3

Macarty Ranch - St. Lucie Co.

OWD-3 — 6" well, depth = 120', r = 1140' south of production well

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m.p. = top of casing

WATER LEVEL MEASUREMENTS (Field) Measured by JSW-WAL-RWW

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	M.P. Elv.	W.L. Elv.
3-29-79	0715				4.01		
	0845		4.00	0.03	3.97		
	1012		5.0	.97	4.03		
	1120				4.02		
Pump off →	1400		5.0	1.0	4.0		
	1401				4.0		
	1402				4.0		
	1403				4.0		
	1404				4.0		
	1405				4.0		
	1406				4.0		
	1407				4.0		
	1408				4.0		
	1409				4.0		
	1410				4.0		
	1412				4.0		
	1415				4.0		
	1420		5.0	1.01	3.99		
	1425				[illegible]		
	1430		5.0	1.02	3.98		
	1435		5.0	1.02	3.98		
	1440		5.0	1.05	3.95		
					~~3.95~~		

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5.00
.97
4.03

WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	M.P. Elv.	W.L. Elv.
	1445		5.0	1.08	3.92		
	1450		5.0	1.09	3.91		
	1455			1.11	3.89		
	1500			1.13	3.87		
	1510			1.16	3.84		
	1520			1.18	3.82		
	1530		5.0	1.25	3.75		
	1545		5.0	1.30	3.70		
	1600		5.0	1.33	3.67		
3-30-79	0910		3.10	0.22	2.88		

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Discharge Measurements

McCarty Ranch

QW field parameters 3/28/79 RWW-MAD-JSW

Temp = 25°C hardness (as $CaCO_3$) = 435 mg/l

Iron = 1 mg/l HCO_3 = 400 mg/l

sp. cond. = 1580 micromhos SO_4 = < 50 mg/l

WMQ = 123 GPM

9-194
November 1949

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by W&R / RWW

Location of Project 6" pipe 3" orifice inchastt

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS Q (GPM)	
3/28	1330	started @			15" in	128	
	1340	.42 hrs		Same	15"	128	127
	1355	.12 hrs			14.5"	126	128
	1402	.38 hrs			15.75	130	131
	1425	.17 hrs			15.75	130	130
	1435	.25			15.50	130	129
	1450	.25			15.00	128	128
	1505				14.75	127	126
	1515			4 at 50	14.50	126	
	1523			Down 50	14.50	125	
	1538				14.50	126	
	1555	2.67 hrs.			14.50	126	126
	1632				14.40	126	
	1700				14.50	126	
	1745	.63			14.25	125	
	1823				14.0	123	124
	1919				13 3/4	122	
	2012				13 3/4	122	
	2040				13 3/4	122	
	2103		19.36		13 3/4	122	122

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November 1949

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS Q (GPM)	
2/23	2238				14.8	123	
2/29/79	0007				13.8	122	
	0102				13.8	122	
	203				13.8	122	
	401				14	123	
	508				13 3/4	122	
	600				13 3/4		
	712				13 3/4		
	0807				13.75		
	925				13 3/4		
	1100				13 3/4		
	1215				13 3/4		
	1304				13.75		122
	1345				13 3/4	122	

Computation of weighted mean Q

.42	X 127	= 53.34	2.67	X 126	= 336.42
.12	X 128	= 15.36	.63	X 124	= 78.12
.38	X 131	= 49.78	19.36	X 122	= 2361.92
.17	X 130	= 22.10	24.85		2981.29
.25	X 129	= 32.25			
.25	X 128	= 32.00			

WMQ = 123 GPM

OWS-2

9-194
November 1949

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION 3/

WATER LEVEL MEASUREMENTS (Field) Measured by G.W.H. & Others

Location of Project McCarty Ranch OWS-2

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3/29/79	1214		5.0	.63	4.37	.67
	1304		5.0	.62	4.38	.68
	1340		5.0	.61	4.39	69
	1359	1465	5.0	.60	4.40	.70
1400	0		5.0	.60	4.40	.70
	1			.61	4.39	.69
	2			.61	4.39	.69
	3			.63	4.37	.67
	4			.63	4.37	.67
	5			.63	4.37	.67
	7			.64	4.36	.66
	9			.64	4.36	.66
	12			.66	4.34	64
	15			.67	4.33	.63
	20			.69	4.31	.61
	25			.72	4.28	.58
	30			.73	4.27	.57
	40			.75	4.25	.55
	50			.78	4.22	.52
	60			.82	4.18	.48
1519	79			.85	4.15	.45
1605	125			.92	4.08	.38

U. S. GOVERNMENT PRINTING OFFICE 16—51605-2

9-194
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GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3-30-79	1010		4.00	0.34	3.66	

U. S. GOVERNMENT PRINTING OFFICE 16—51605-2

OWS-2

Radius = 142 Ft 3-30-79 RWW

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November 1949

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GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by GWH

Location of Project McCarty Ranch OWS-2

DATE	Minutes HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	WATER LEVEL Ft(MSL)	REMARKS
	1324	MIN	6.0	2.30	3.70		
	1330		8.0	4.31	3.69		
	13352		8.0	4.30	3.70	0	
	3		9.0	5.29	3.71	.01	
	4		9.0	5.30	3.70	.0	
	5		"	5.31	3.71	+.01	
	6		"	5.28	3.72	-.02	
	7		"	5.26	3.74	.04	
	8		"	5.26	3.74	.04	
	9		"	5.25	3.75	.05	
	10			5.25	3.75	.05	
	12			5.23	3.77	.07	
	14			5.23	3.77	.07	
	17			5.24	3.76	.06	
	22			5.20	3.80	.10	
	25			5.20	3.80	.10	
	25			5.20	3.80	.10	
	30			5.18	3.82	.12	
	35			5.16	3.84	.14	
	45			5.12	3.88	.18	
	50			5.11	3.89	.19	
	60			5.09	3.91	.21	

9-194
November 1949

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

B+

WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	Ft(MSL)	Remarks
	75		9.0	5.06	3.94	.24	
	90		9.0	5.02	3.98	.28	
	105		9.0	4.99	4.01	.31	
	120		9.0	4.96	4.04	.34	
1632	182		6.0	1.91	4.09	.39	
1700	205		5.0	.88	4.12	.42	
1745	250		6.0	1.21	4.16	.46	
1822	287		5.0	.81	4.19	.49	
1917	342		5.0	.79	4.21	.51	
2014	399		5.0	.77	4.23	.53	
21	448		5.0	.74	4.26	.56	
2236	541		5.0	.71	4.29	.59	
3/29/79	0003	628	5.0	.69	4.31	.61	
	0113	698	5.0	.68	4.32	.62	
	0203	748	5.0	.66	4.34	.64	
	0401	866	5.0	.67	4.33	.63	
	0507	932	5.0	.65	4.35	.65	
	0600	986	5.0	.66	4.34	.64	
	712	1058	5.0	.65	4.35	.65	
	0805	1110	5.0	0.63	4.37	.67	
	0925	1190	5.0	.64	4.36	.66	
	1005	1230	5.0	.64	4.36	.66	
	1103	1288	5.0	.62	4.38	.68	

McCarty Ranch Pumping Test

Summary Sheet

Date test begun — 3-26-79
Length of test — 34 hrs 27 min
Discharge — 123 gal/min

Hydraulic coefficient results

Hantush method I (semiconfined, unsteady-state)
well OWD-1 → $T = 9{,}971$ gal $d^{-1} ft^{-1}$
→ $S = 1.07 \times 10^{-4}$
well OWD-2 → $T = 10{,}625$ gal $d^{-1} ft^{-1}$
→ $S = 1.15 \times 10^{-4}$

Theim method (confined, steady-state)
$T = 9{,}396$ gal $d^{-1} ft^{-1}$
$S = 1.18 \times 10^{-3}$

Hantush-Jacob method (semiconfined, unsteady-state)

$T = 10{,}000 \text{ gal d}^{-1}\text{ft}^{-1}$

$S = 1.0 \times 10^{-4}$

well OWD-1 $\rightarrow K'/b' = 4.1 \times 10^{-4} \text{ d}^{-1}$

well OWD-2 $\rightarrow K'/b' = 4.2 \times 10^{-4} \text{ d}^{-1}$

Field observations of drawdown in shallow observation wells, plus data plots of deep observation wells indicate this is a semiconfined aquifer. Therefore, the following results are adopted for this test.

$T = 10{,}000 \text{ gal d}^{-1}\text{ft}^{-1}$

$S = 1 \times 10^{-4}$

$K'/b' = 4.15 \times 10^{-4} \text{ d}^{-1}$

Preparer — Ralph Wilcox

Introduction

The purpose of this test is to determine the transmissivity and storage coefficient of the main producing zone of the so-called shallow aquifer at this site. Determination of these parameters in Martin and St Lucie Counties, Florida is an objective of the Upper East Coast Project (459826800). This is a cooperative project with South Florida Water Management District.

Personnel conducting test

George Hill
Wes Miller
Bill Long
Ralph Wilcox
Jay Wendorf

Physical Conditions

The test site is located about 2.7 miles north of the Martin-St Lucie County line, and about 1 mile west of State Road 609 (figure 1). The lat-long of the production well is N27°14'40", W080°29'55" (T37S, R38E, Sec 23, NE SE NE).

Wells used in this test are described on figure 2. It should be noted that the screened intervals are not known on wells OWS-2 and OWD-3, but well depths are known.

The tested aquifer consists of unconsolidated shells and shell fragments with a minor component of sand (figure 3).

Anticipated boundries exist both south and west of the pumping test site (figure 1). Along the county line approximately 2.7 miles south of the test site is the C-23 canal. About 2 miles west of the test site is a rock quarry. Within this

LOCAL WELL NUMBER: SL-185

LOCATION: Two and one-half miles east of SR 609 extension, on McCarty Ranch. 4" production well

Depth Feet (Below Land Surface)	Geologic Description
0-1	Fine sand, black organic material
1-3	Red sand, some gray clay
3-6	Blue-gray clay and fine sand
6-10	Gray, sandy Ls and shell, some clay
10-15	Gray, sandy, Ls cement, 90% quartz sand
15-20	Shells, poorly cemented
20-27	Shells (coquina)
27-35	Shells (coquina)
35-40	Fine gray sand
40-46	Hard, cemented shell and Ls
46-50	Shell, sandy Ls (20% quartz) some clay
50-57	Fine gray sand
57-63	Fine gray sand, some shell
63-73	Sand, shell, clay
73-78	Very fine gray sand
78-88	Sand (75%), shell, clay
88-92	Sand on top of shell bed
92-103	Fine gray sand
103-107	Poorly cemented shell, lost mud
107-118	Shells (unconsolidated) some sand

ROUTING AND TRANSMITTAL SLIP		ACTION
1 TO (Name, office symbol or location) George Hill, WRD Jupiter	INITIALS	CIRCULATE
	DATE	COORDINATION
2	INITIALS	FILE
	DATE	INFORMATION
3	INITIALS	NOTE AND RETURN
	DATE	PER CONVERSATION
4	INITIALS	SEE ME
	DATE	SIGNATURE

REMARKS

Enclosed is the info. on the McCarty test well you requested. Bill Long has been to the site and should be able to find it again. Be sure to call John McCarty in advance and stop at the house before going to the wells.

Also enclosed are pumping test data for the old Ft. Pierce well field. This is orginal data and field notes so guard it closely.

Do NOT use this form as a RECORD of approvals, concurrences, disapprovals, clearances, and similar actions.

FROM (Name, office symbol or location)	DATE
Wm	3/12/79
	PHONE

OPTIONAL FORM 41
AUGUST 1967
GSA FPMR (41CFR) 100-11.206

GPO 643—16—81418-1 419-015 5041-101

Lat.-Long. 271440 0802955
Twp 37s Rg 38e Sec 24 SE¼, NE¼

Aquifer test: Goals Actual
24 hrs pumping
24 hrs recovery
Q of 150-200 gpm

Observation Well #1
2 inch diameter
98.4 ft deep (below LS)
1.6 ft MP (above LS)
88.4 - 98.4 ft screened (below LS)

N

Ranch Lane

Observation Well #2
4 inch diameter
100 ft deep (below LS)
2 ft MP (above LS)
80 ft screened (below LS)

Mc Carty Ranch Test Well
Lat.-Long. 271440 0802955
Twp 37s Rg 38e Sec 24 SE¼, NE¼

Aquifer test: Goals Actual
24 hrs pumping
24 hrs recovery
Q of 150-200 gpm

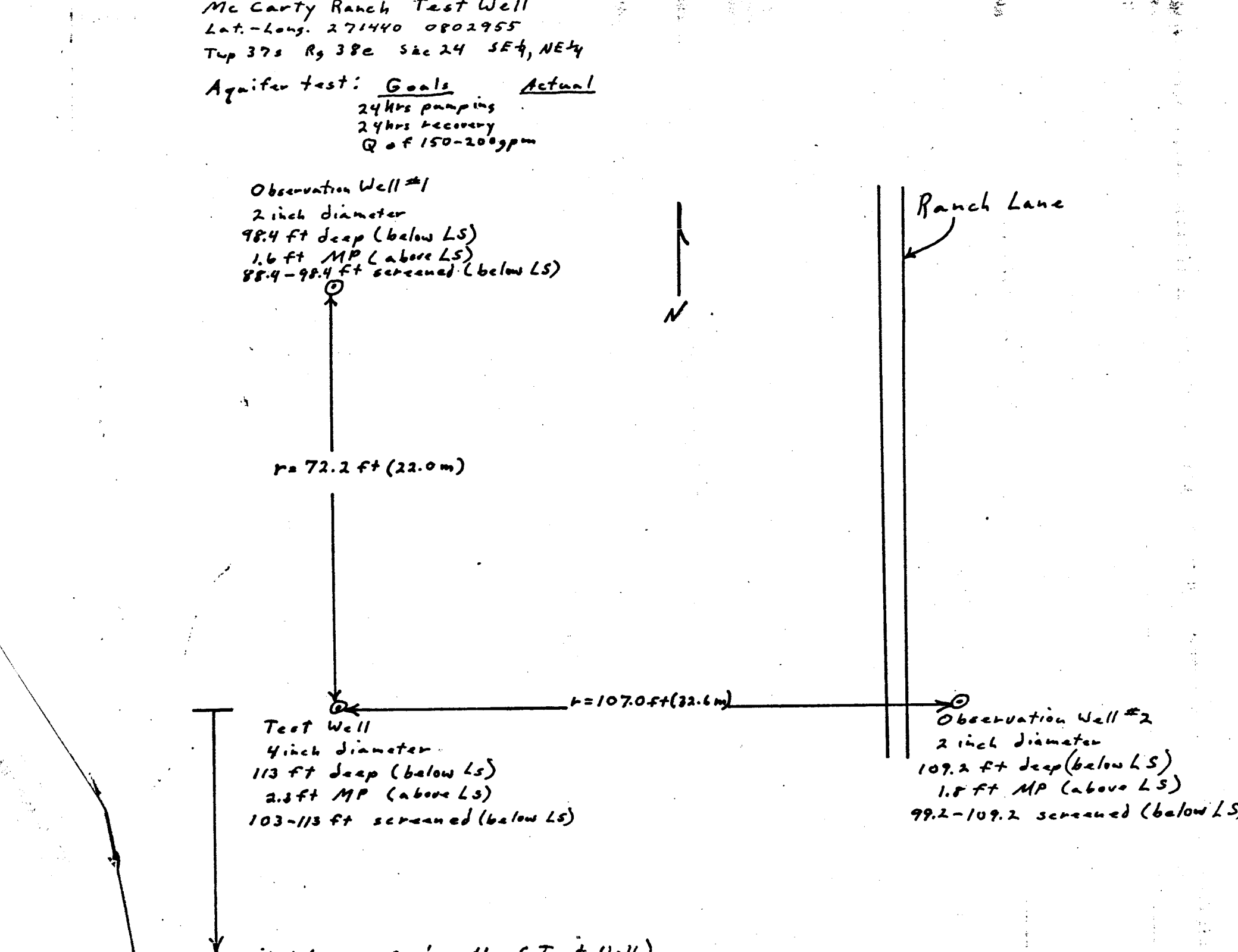
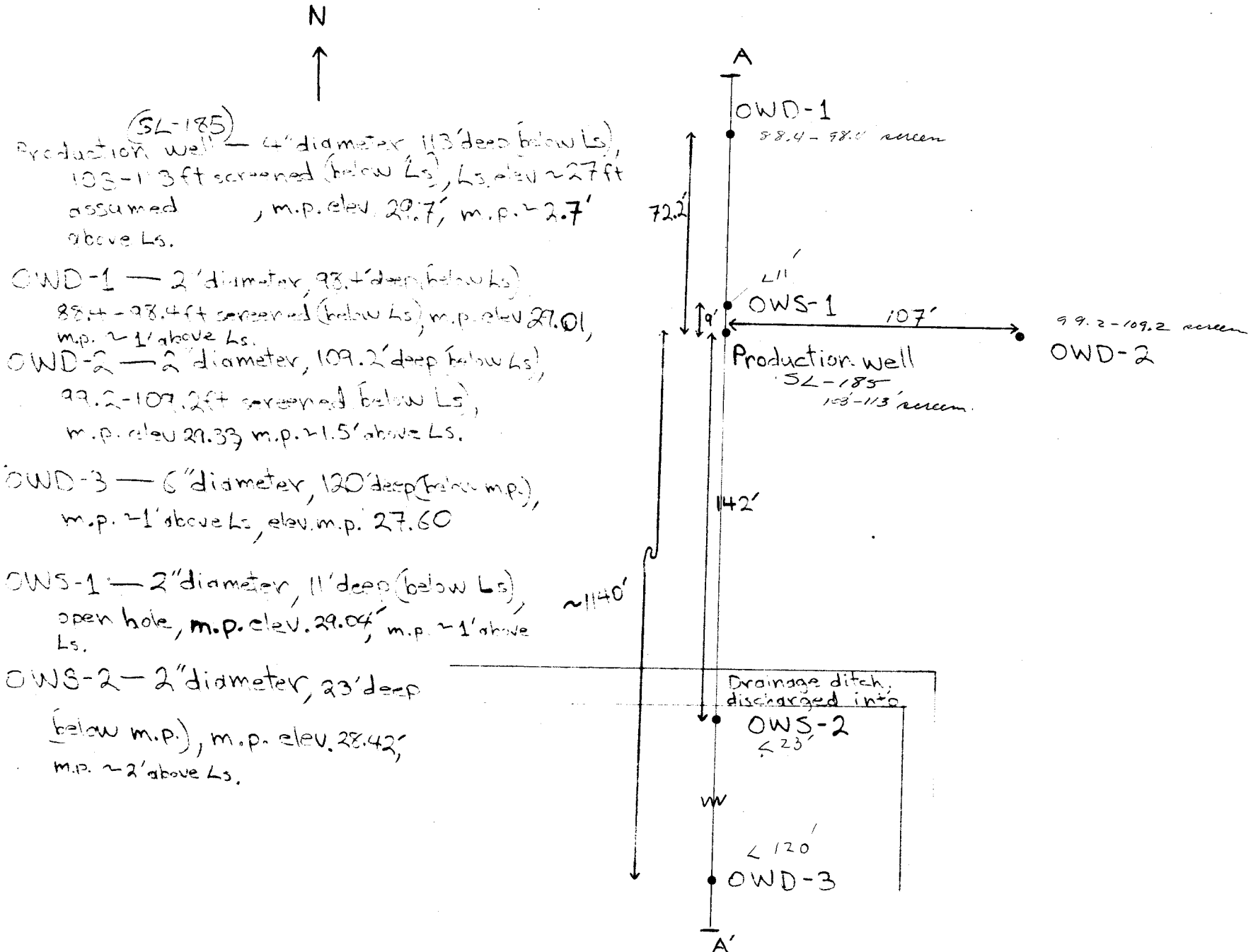


Figure 2 Mcarty Ranch pumping test site description



Production well (SL-185) — 4" diameter, 113' deep (below Ls), 103-113 ft screened (below Ls), Ls. elev ~27 ft assumed, m.p. elev. 29.7', m.p. ~2.7' above Ls.

OWD-1 — 2" diameter, 98.4' deep (below Ls), 88.4 - 98.4 ft screened (below Ls), m.p. elev 29.01, m.p. ~1' above Ls.

OWD-2 — 2" diameter, 109.2' deep (below Ls), 99.2-109.2 ft screened (below Ls), m.p. elev 29.33, m.p. ~1.5' above Ls.

OWD-3 — 6" diameter, 120' deep (below m.p.), m.p. ~1' above Ls, elev. m.p. 27.60

OWS-1 — 2" diameter, 11' deep (below Ls), open hole, m.p. elev. 29.04', m.p. ~1' above Ls.

OWS-2 — 2" diameter, 23' deep (below m.p.), m.p. elev. 28.42', m.p. ~2' above Ls.

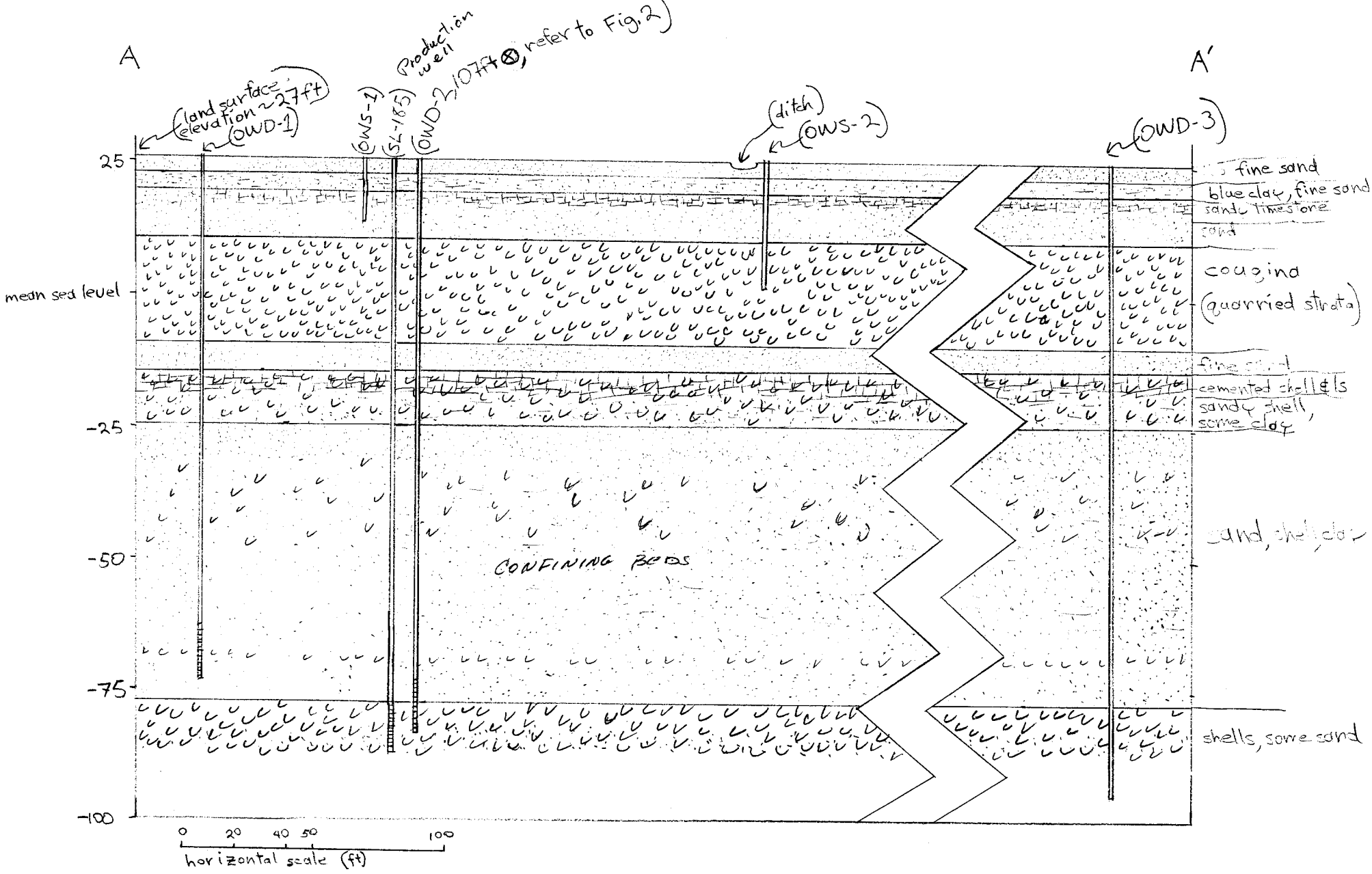


Figure 3 Cross sectional view of McCarty Ranch pumping test site. (cross section constructed with lithologic log of SL-185 only)

N

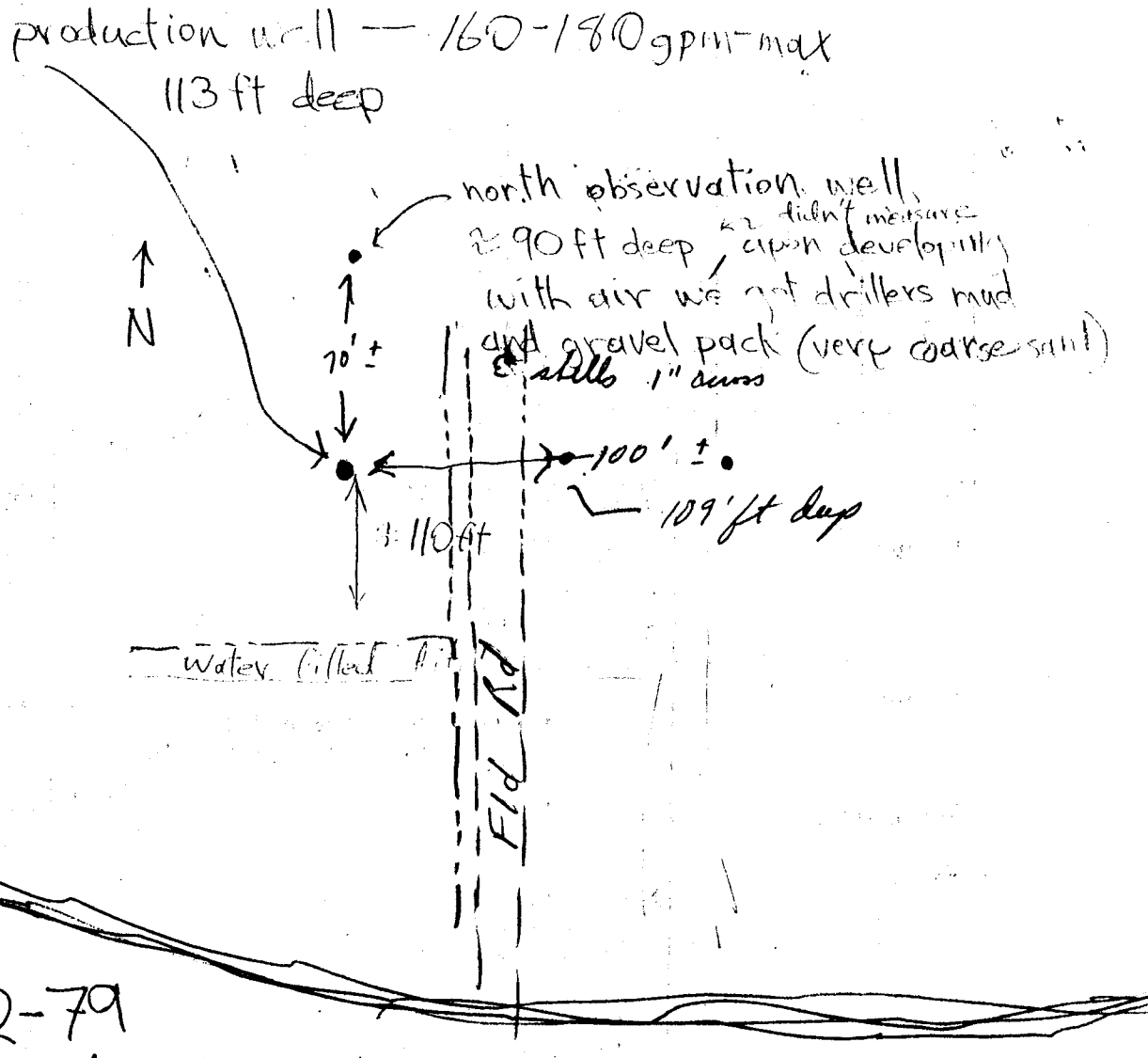
LOCAL WELL NUMBER: SL-185

LOCATION: Two and one-half miles east of SR 609 extension, on McCarty Ranch.

Depth Feet (Below Land Surface)	Geologic Description
0-1	Fine sand, black organic material
1-3	Red sand, some gray clay
3-6	Blue-gray clay and fine sand
6-10	Gray, sandy Ls and shell, some clay
10-15	Gray, sandy, Ls cement, 90% quartz sand
15-20	Shells, poorly cemented
20-27	Shells (coquina)
27-35	Shells (coquina)
35-40	Fine gray sand
40-46	Hard, cemented shell and Ls
46-50	Shell, sandy Ls (20% quartz) some clay
50-57	Fine gray sand
57-63	Fine gray sand, some shell
63-73	Sand, shell, clay
73-78	Very fine gray sand
78-88	Sand (75%), shell, clay
88-92	Sand on top of shell bed
92-103	Fine gray sand
103-107	Poorly cemented shell, lost mud
107-118	Shells (unconsolidated) some sand

3-8-79 RWW/WAL

Test of wells at Mearly Ranch for pumping test on following week



3-12-79

		held	read	dtw	
before development	North Obs well	32.0	0.68	31.32	m.p.
	Production well	5.0	0.48	4.52	m.p.
	East Obs well	6.0	1.57	4.43	m.p.

@ 1.10 of the developing 5.00 / 1.10 / 3.90

top of coupling

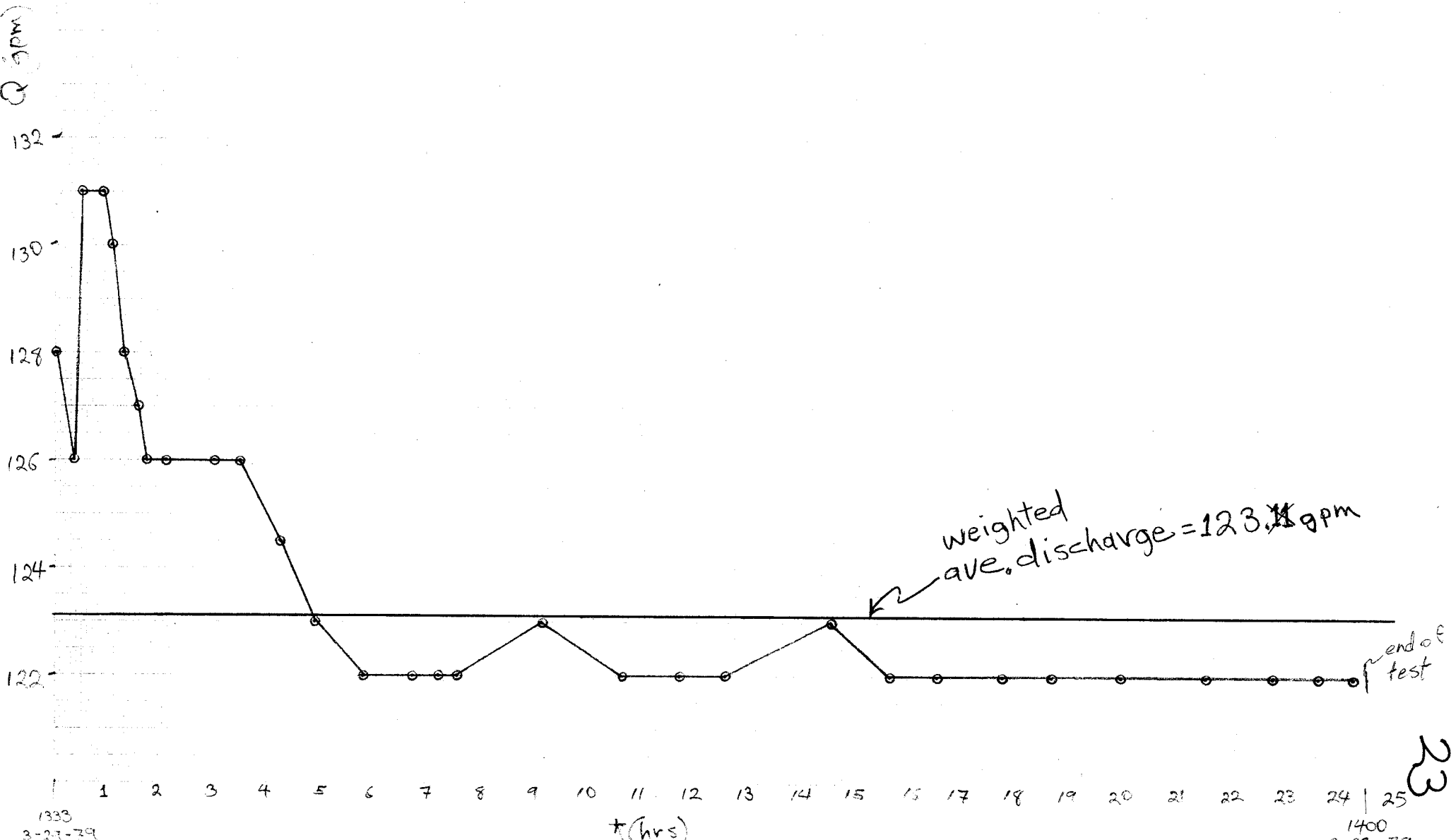
remeasure 4.32

RWW 4-11-79

Figure 10a

Discharge vs. time

(Macarty Ranch test 3-79)



McCarty Ranch

Discharge Measurements

QW field parameters 3/28/79 RWW-MAD-JSW

Temp = 25°C hardness (as $CaCO_3$) = 435 mg/l

Iron = 1 mg/l

sp. cond. = 158 [illegible] 45 = 400 u/l

SO_4 = < 50 mg/l

Figure 10b discharge measurements

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by W&L / RWW

Location of Project 6" pipe 3" orifice in bottle

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3/28	1330	started @			15" in	128
	1334			same	15"	128
	1355				14.5"	126
	1402				15.75	130
	1425				15.75	130
	1435				15.50	129
	1450				15.00	128
	1505				14.75	
	1515			up at SD	14.50	
	1523			down SD	14.50	
	1538				14.50	15.75" = 131
	1555				14.50	15.5 = 130
	1632				14.40	15.25 = 129
	1720				14.50	15.00 = 126
	1745				14.25	14.5 = 126
	1823				14.0	14 = 123
	1919				13 3/4	13.5 = 121
	2012				13 3/4	
	2040				13 3/4	
	2103				13 3/4	

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3/28	2238				14.0	
3/29/79	0007				13.8	
	0102				13.8	
	203				13.8	
	401				14	
	508				13 3/4	
	600				13 3/4	
	712				13 3/4	
	0807				13.75	
	925				13 3/4	
	1100				13 3/4	
	1215				13 3/4	
	1304				13.75	
	1345				13 3/4	

OWD-1

Figure 6b

Recovery chart for well OWD-1

Removed by JSW/RWW
3-30-77 WT 0850

held 5.09
read 0.66
dtw 4.34

WT 10.20
3-29-79
1400
dtw 13.50

1213
1302
12 min
18 min
(1400)
OWD
Δt min
5 min
1 min
3 min
1600
1545
90 (1535)
77 (1517)
62 min (1509)
50 min
40 min
30 min
26 min
20 min

WATER LEVEL RECORDER

GRAPHIC CONTROLS CORPORATION BUFFALO NEW YORK
RECORDING CHARTS
LDS-R (F-1)

OWD-1
Start 3-23-79

Figure 6a
Drawdown chart for well OWD-1

correction factor

$$\left[\frac{0.18\text{ft}}{.1237\text{min}} \times t_{\text{min}}\right] + S_{\text{chart}}$$

RWW 4-12-79

Almost correction is applied to the plotted values to account for the differences here between chart and actual values.

Recorded by RWW/WAL 3-27-79 WT 1010
hrs 1400
read 0953
dtw 13.47

13.29 / .18 corr.

actual d.t.w.

RECORDING CHARTS | GRAPHIC CONTROLS CORPORATION | BUFFALO, NEW YORK
LDS-R (F-1)
WATER LEVEL RECORDER

OWS-2

Figure 8a — Drawdown measurements made on well OWS-2.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by GWH

Location of Project McCarty Ranch OWS-2

DATE	Minutes HOUR	WELL NO. MIN	TAPE READING AT— Meas. point	Water level	DEPTH TO WATER	WATER LEVEL Ft (MSL)	REMARKS
	1324		6.0	2.30	3.70		
	1336		8.0	4.31	3.69		
	1335 2		8.0	4.30	3.70	0	
	3		9.0	5.29	3.71	.01	
	4		9.0	5.30	3.70	.0	
	5		"	5.31	3.69	+.01	
	6		"	5.28	3.72	-.02	
	7		"	5.26	3.74	.04	
	8		"	5.26	3.74	.04	
	9		"	5.25	3.75	.05	
	10			5.25	3.75	.05	
		11					
	12			5.23	3.77	.07	
	14			5.23	3.77	.07	
	17			5.24	3.76	.06	
	22			5.20	3.80	.10	
	25			5.20	3.80	.10	
	25			5.20	3.80	.10	
	30			5.18	3.82	.12	
	35			5.16	3.84	.14	
	45			5.12	3.88	.18	
	50			5.11	3.89	.19	
	60			5.09	3.91	.21	

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	Water level	DEPTH TO WATER	Ft (MSL)	Remarks
	75		9.0	5.06	3.94	.24	
	90		9.0	5.02	3.98	.28	
	105		9.0	4.99	4.01	.31	
	120		9.0	4.96	4.04	.34	
1632			6.0	1.91	4.09	.39	
1700			5.0	.88	4.12	.42	
"			"	"	"		
1822			5.0	.81	4.19	.49	
1917			5.0	.79	4.21	.51	
2014			5.0	.77	4.23	.53	
21			5.0	.74	4.26	.56	
2336			5.0	.71	4.29	.59	
3/29/79	0003		5.0	.69	4.31	.61	
	0113		5.0	.68	4.32	.62	
	0203		5.0	.66	4.34	.64	
	0401		5.0	.67	4.33	.63	
	0507		5.0	.65	4.35	.65	
	0600		5.0	.66	4.34	.64	
	712		5.0	.65	4.35	.65	
	0805		5.0	0.63	4.37	.67	
	0925		5.0	.64	4.36	.66	
	1005		5.0	.64	4.36	.66	
	1103		5.0	.62	4.38	.68	

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OWS-2

Figure 86 – Recovery measurements made on well OWS-2.

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GEOLOGICAL SURVEY
WATER RESOURCES DIVISION 3/

WATER LEVEL MEASUREMENTS (Field) Measured by GWH & Others

Location of Project McCarty Ranch OWS-2

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3/29/79	1214		5.0	.63	4.37	.67
	1304		5.0	.62	4.38	.68
	1340		5.0	.61	4.39	.69
	1359		5.0	.60	4.40	.70
1400	0		5.0	.60	4.40	
	1			.61	4.39	
	2			.61	4.39	
	3			.63	4.37	
	4			.63	4.37	
	5			.63	4.37	
	7			.64	4.36	
	9			.64	4.36	
	12			.66	4.34	
	15			.67	4.33	
	20			.69	4.31	
	25			.72	4.28	
	30			.73	4.27	
	40			.75	4.25	
	50			.78	4.22	
	60			.82	4.18	
	79			.85	4.15	
1605				.92	4.08	

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WATER LEVEL MEASUREMENTS (Field) Measured by

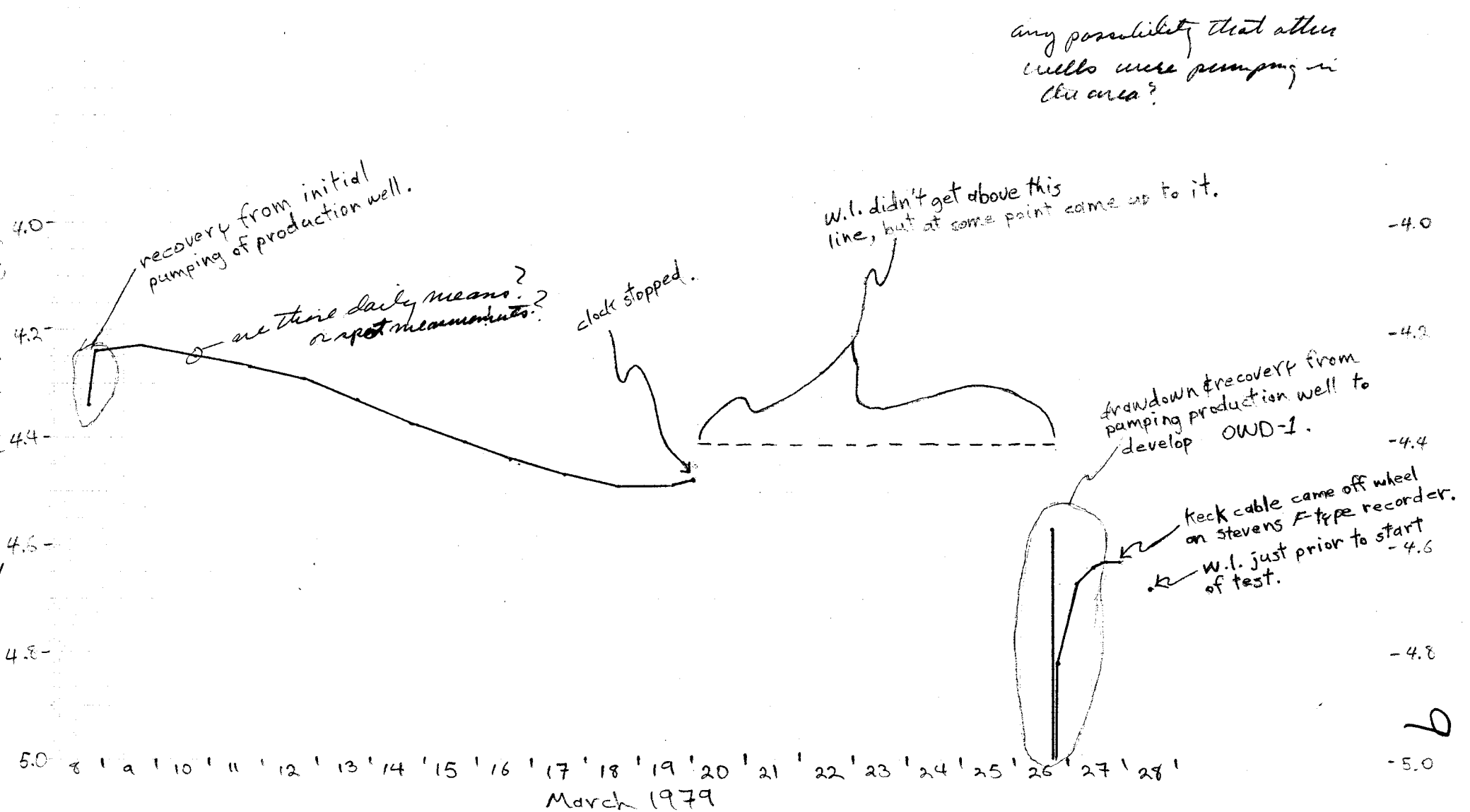
Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3-30-79	1010		4.00	0.34	3.66	

RWW 4-11-79

Figure 4a Background water level (OWD-2)

(Macarty Ranch test 3-79)



OWD-3

Moriarty Ranch - St. Lucie Co.

OWD-3 — 6" well, depth = 120', r = 1140' south of production well

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m.p. = top of casing

WATER LEVEL MEASUREMENTS (Field) Measured by DSW-WW-RWW

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	M.P. Elv.	~~W.L. Elv.~~ drawdown (ft)
3-27-79	0715				4.01		
	0845		4.00	2.03	3.97		
	1012		5.0	.97	4.03		
	1120				4.02		
	1400		5.0	1.0	4.0		
	1401				4.0		1.12
	1402				4.0		
	1403				4.0		
	1404				4.0		
	1405				4.0		
	1406				4.0		
	1407				4.0		
	1408				4.0		
	1409				4.0		
	1410				4.0		
	1412				4.0		1.12
	1415				4.0		1.12
	1420		5.0	1.01	3.99		1.11
	1425				3.99		1.11
	1430		5.0	1.02	3.98		1.10
	1435		5.0	1.02	3.98		1.10
	1440		5.0	1.05	3.95		1.07

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WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	M.P. Elv.	~~W.L. Elv.~~ drawdown (ft)
	1445		5.0	1.08	3.92		1.04
	1450		5.0	1.09	3.91		1.03
	1455			1.11	3.89		1.01
	1500			1.13	3.87		0.99
	1510			1.16	3.84		0.96
	1520			1.18	3.82		0.94
	1530		5.0	1.25	3.75		0.87
	1545		5.0	1.30	3.70		0.82
	1600		5.0	1.33	3.67		0.79
3-30-79	0910		3.10	0.22	2.88		0 assumed to be completely recovered

Figure 9

Drawdown and Recovery measurements for well OWD-3.

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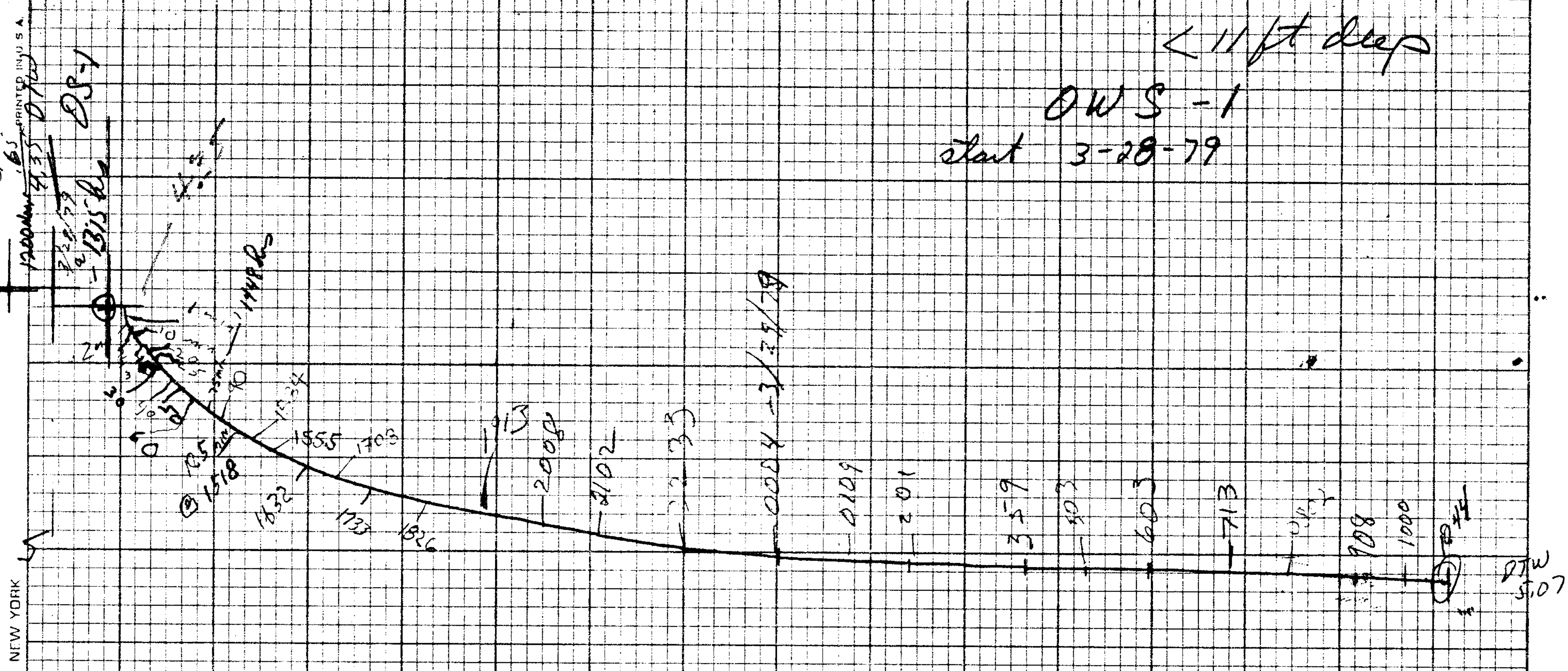


Figure 7a

Drawdown chart for well OWS-1

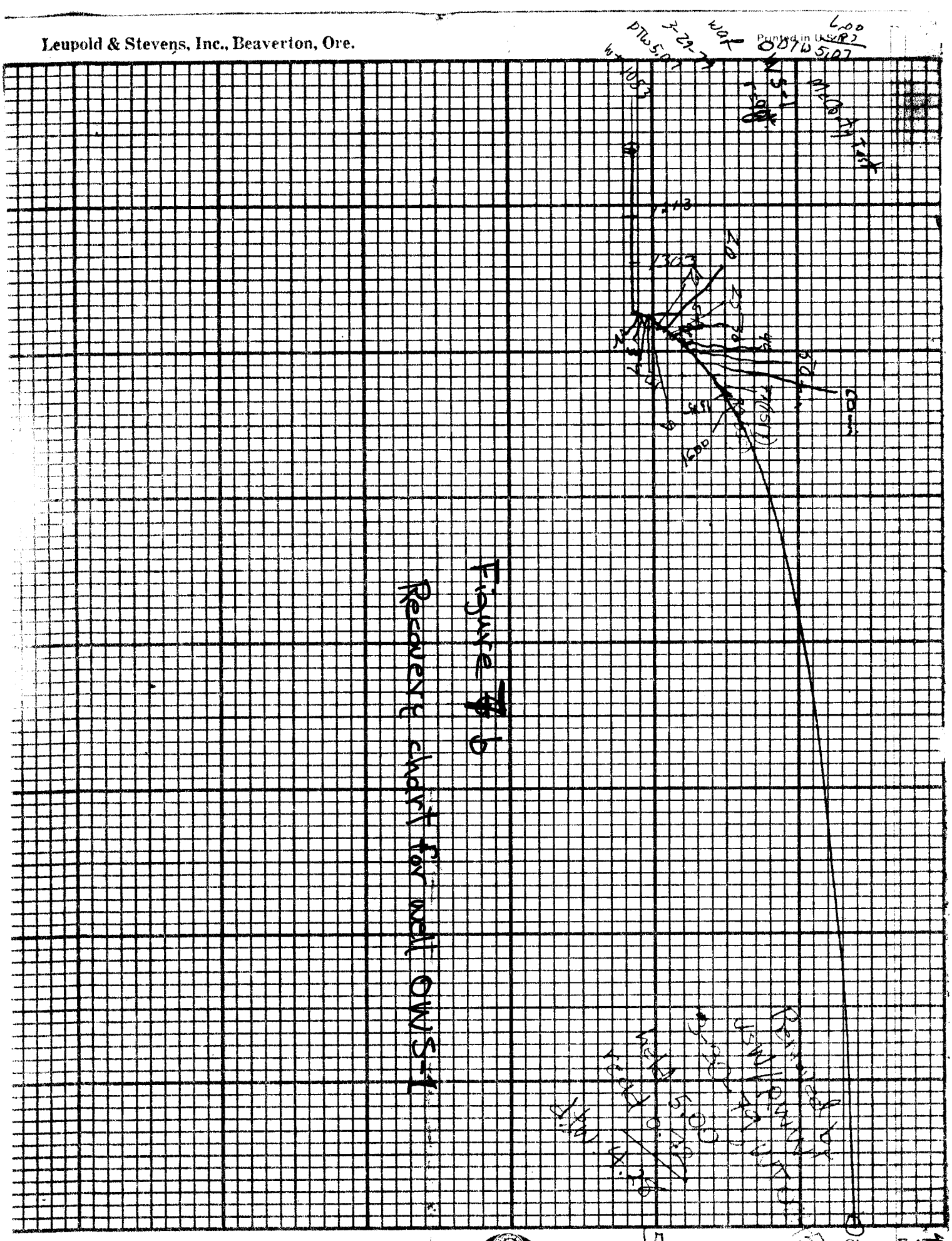
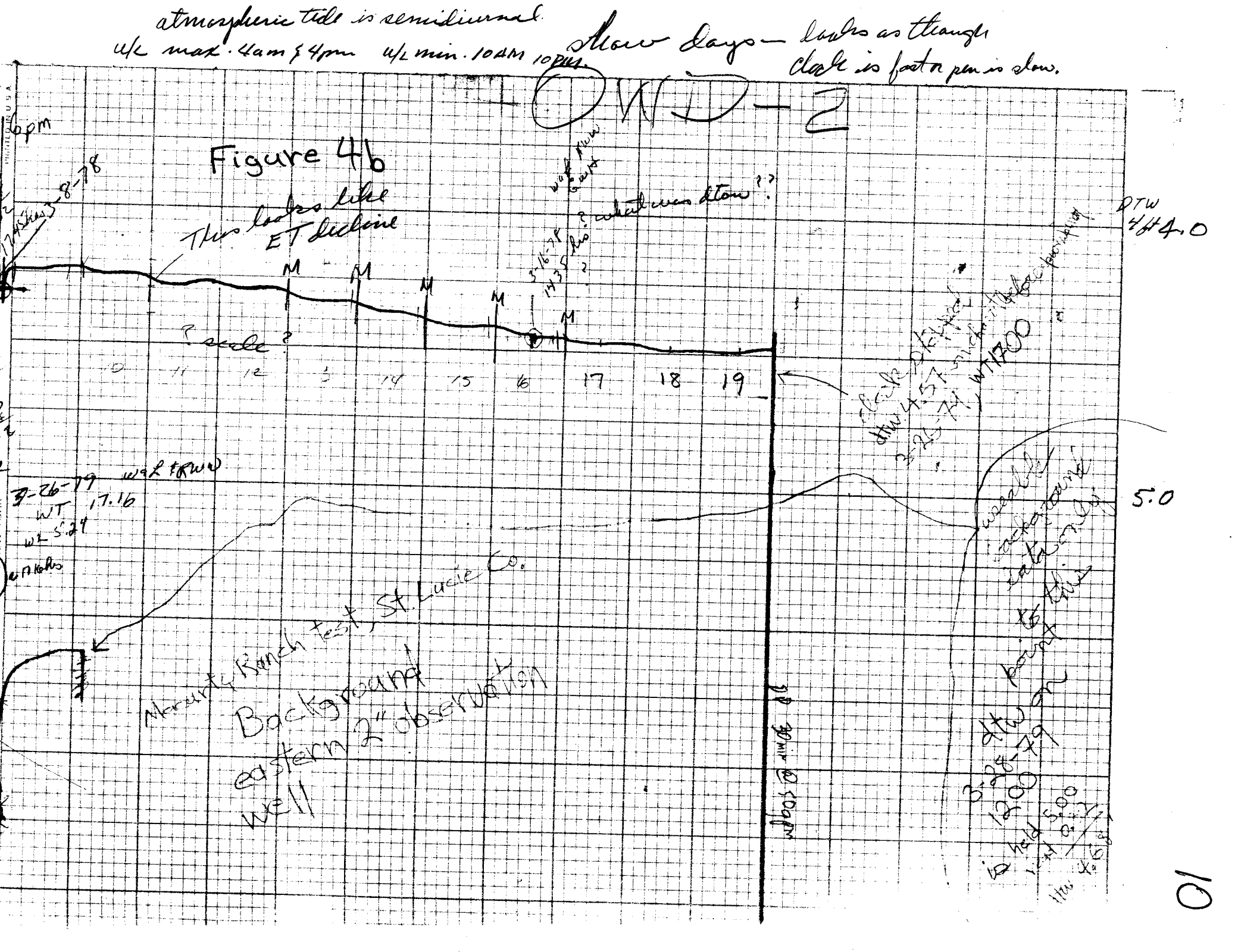


Figure #6
Recent chart for well OWS-1

atmospheric tide is semidiurnal

H/L max. 4am & 4pm H/L min. 10AM 10PM. Slow days — looks as though clock is fast or pen is slow.

OWTW-2



01

98,750

what was beginning DTOW??
?4.67?

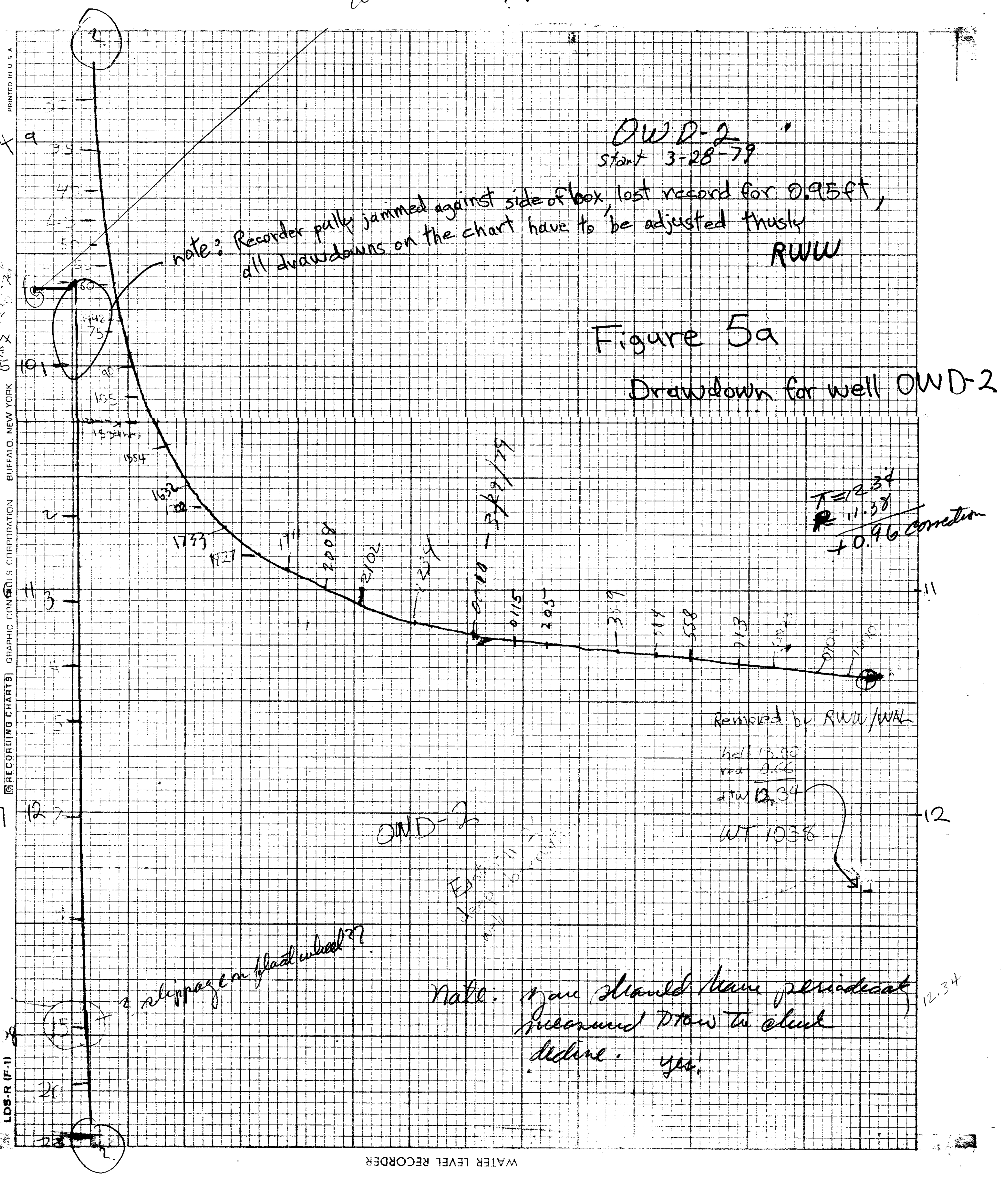
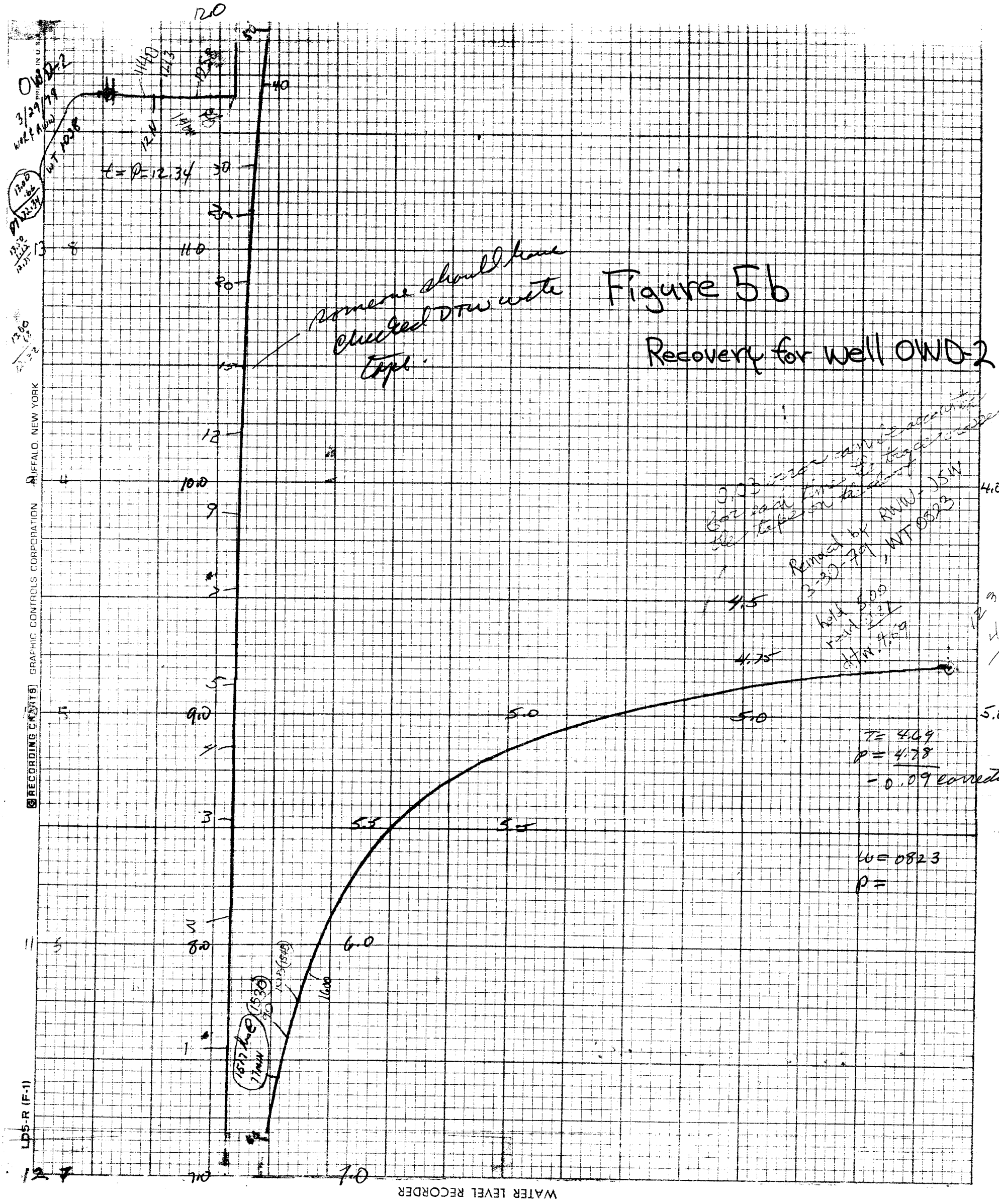


Figure 5a

Drawdown for well OWD-2

Figure 56

Recovery for well OWD-2

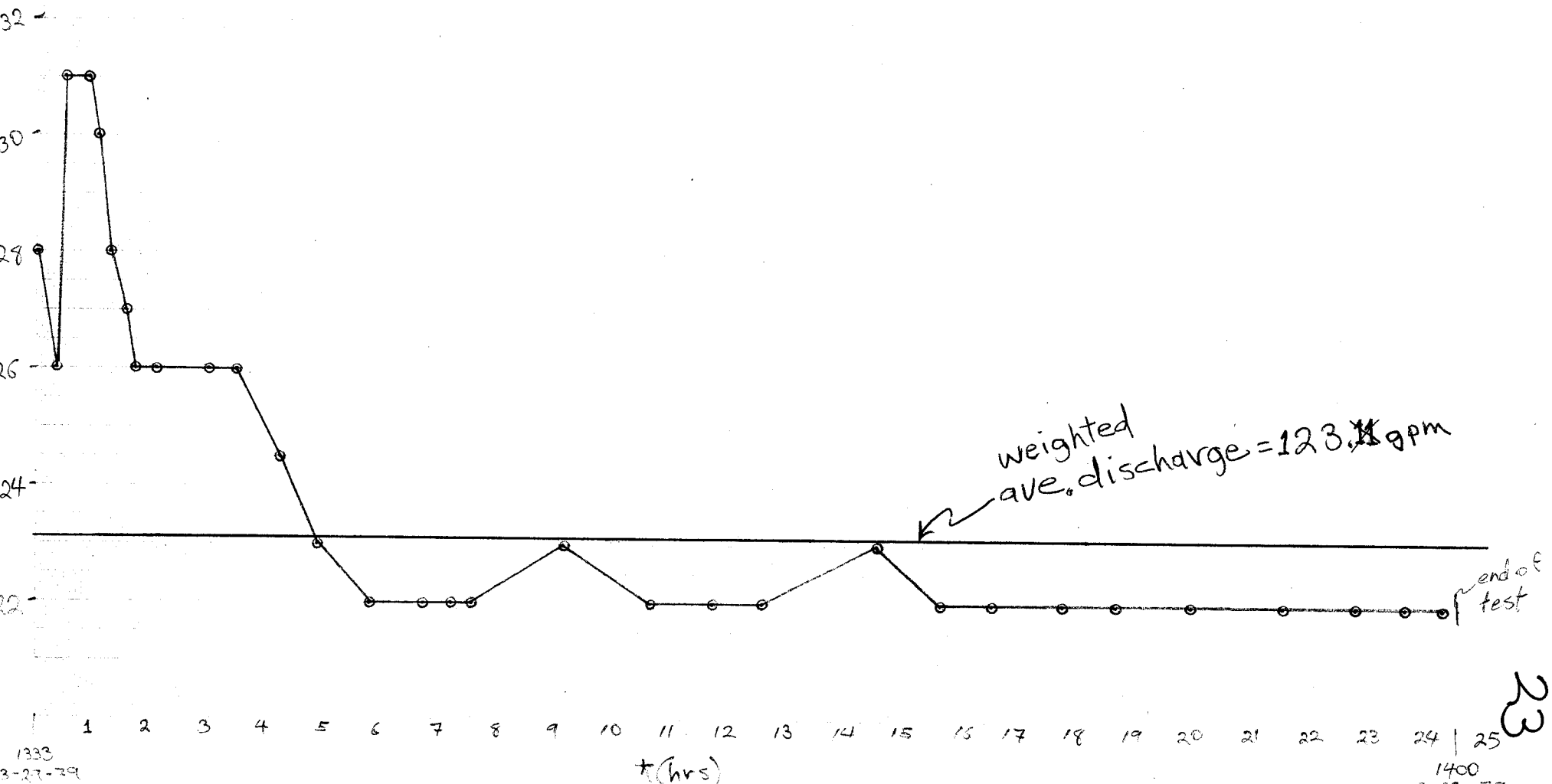


RWW 4-11-79

Figure 10a

Discharge vs. time

(Macarty Ranch test 3-79)



McCarty Ranch

Discharge Measurements

QW field parameters 3/28/79 RWW-MAD-JSW

Temp = 25°C hardness (as $CaCO_3$) = 435 mg/l

Iron = 1 mg/l 45 = 400 mg/l

sp. cond. = (158) SO_4 = < 50 mg/l

Figure 10b discharge measurements

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WATER LEVEL MEASUREMENTS (Field) Measured by W&L / RWW

Location of Project 6" pipe 3" orifice in bottle

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
3/28	1330	started @			15" in	128
	1334			same	15"	128
	1355				14.5"	126
	1402				15.75	130
	1425				15.75	130
	1435				15.50	129
	1450				15.00	128
	1505				14.75	
	1515			up at 50	14.50	
	1523			down 50	14.50	
	1538				14.50	15.75" = 131
	1555				14.50	15.5 = 130
	1632				14.40	15.25 = 129
	1700				14.50	15.00 = 126
	1745				14.25	14.5 = 126
	1823				14.0	14 = 123
	1917				13 3/4	13.5 = 121
	2012				13 3/4	
	2040				13 3/4	
	2103				13 3/4	

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WATER LEVEL MEASUREMENTS (Field) Measured by

Location of Project

DATE	HOUR	WELL NO.	TAPE READING AT— Meas. point	TAPE READING AT— Water level	DEPTH TO WATER	REMARKS
223	2238				14.0	
3/29/79	0007				13.8	
	0102				13.8	
	203				13.8	
	401				14	
	508				13 3/4	
	600				13 3/4	
	712				13 3/4	
	0807				13.75	
	925				13 3/4	
	1100				13 3/4	
	1215				13 3/4	
	1304				13.75	
	1345				13 3/4	

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