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# AQUIFER STRESS TEST RESULTS FOR THE "BIG WELL" SPANISH SPRINGS VALLEY WASHOE COUNTY, NEVADA

April 27, 1988

PROJECT 88-439



WILLIAM E. NORK, Inc.

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FOR THE "BIG WELL"  
SPANISH SPRINGS VALLEY  
WASHOE COUNTY, NEVADA

April 27, 1988

Project 88-439

Prepared for:

BROOKSIDE SAVINGS AND LOAN

Prepared by:  
WILLIAM E. NORK, INC.

William E. Nork



**WILLIAM E. NORK, Inc.**

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## 1.0 SUMMARY AND CONCLUSIONS

1. The referenced well was test pumped for a continuous period of five days at a rate of 1,500 gallons per minute. Recovery water levels were monitored for 2.5 days following termination of pumping.
2. Water levels were monitored in the pumped well and three observation wells.
3. Average Transmissivity of the aquifer was calculated to be 290,000 gallons per day per foot width. Average Coefficient of Storage was 0.0008. Data indicate a highly transmissive artesian aquifer.
4. The well is permitted for an annual duty of 146 million gallons per year. This translates to an average pumping rate of 278 gallons per minute.
5. Assuming constant pumping at the applied for average rate (278 gallons per minute) and zero recharge, interference (drawdown) in the nearest well (located approximately 3,100 feet to the northwest) that is completed in the same hydrostratigraphic unit is calculated to be 0.91 feet after one year, 1.09 feet after five years and 1.16 feet after 10 years.

*W.Q analyses attached  
5 May 88*



## 2.0 INTRODUCTION

The well is located in the SW 1/4 SW 1/4 Section 7, Township 20 North, Range 21 East M.D.B. & M (Figure 1.). It lies within the southeastern portion of Spanish Springs Valley, Washoe County, Nevada near the mouth of Spanish Springs Canyon. The water rights assigned to the well (Permits 47919 and 47920) have a combined annual duty not to exceed 146 million gallons per year (MGA) for quasi-municipal use and a diversion rate of 3.0 cfs (1,346 gallons per minute).

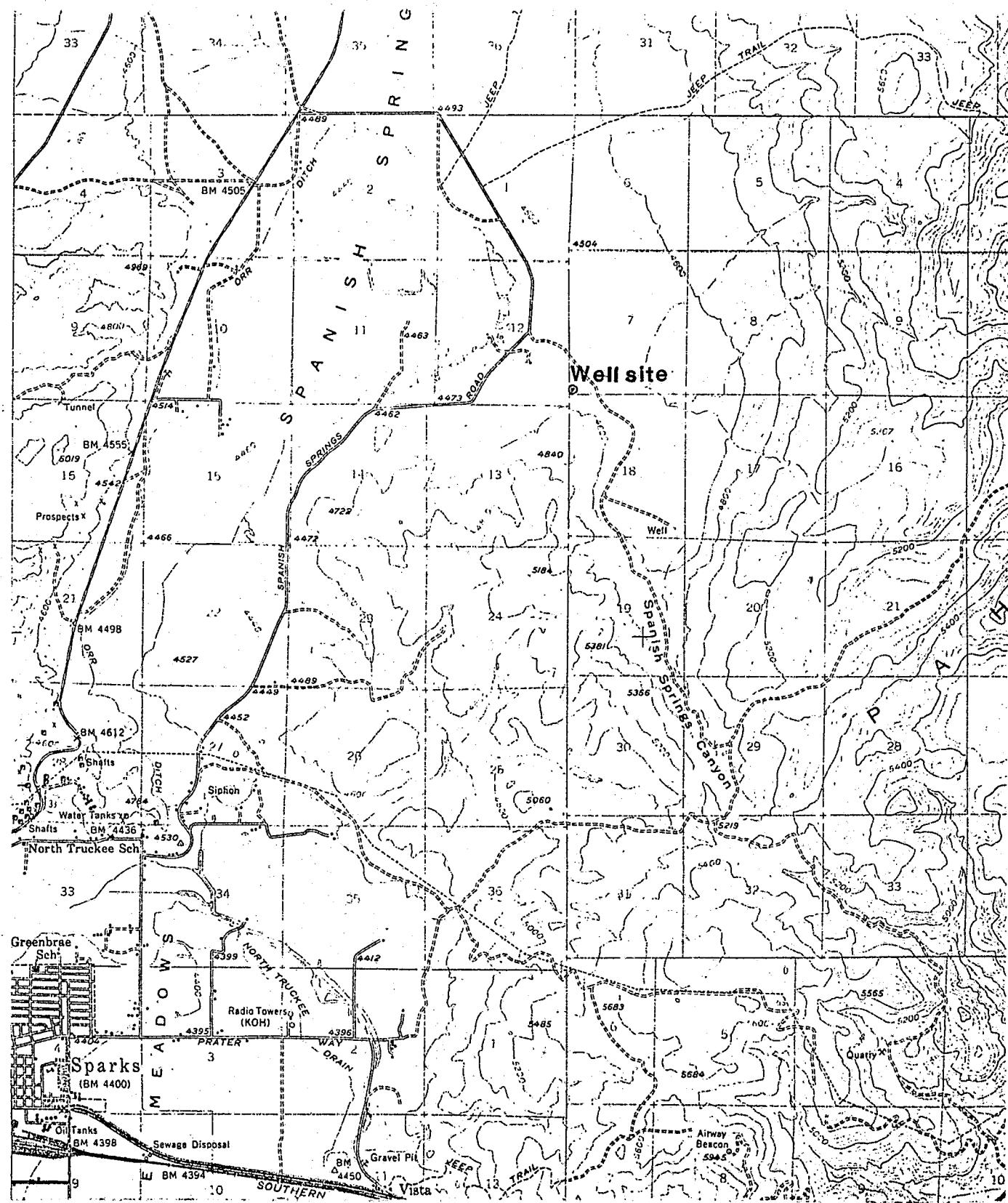
The well was drilled and completed to a depth of approximately 165 feet by Paul Williams and Sons. At the time it was completed, the well appeared to have the potential for the highest yield of any well in the basin and was, and still is, commonly referred to as the "Big Well" for want of a better designation.

The well was first test pumped in 1984. Carson Pump conducted a step-drawdown pumping test consisting of three steps (496, 890, and 1200 gpm) on May 1, 1984. A constant-discharge test followed, beginning on May 2, 1984 and lasted for two days, 16 hours. Pumping rate for that test was 1,480 gpm. Results of the test were analyzed and reported in a letter report (WEN, INC., 1984). The data suggested that the well was completed in an areally extensive, highly transmissive artesian aquifer. Based on those test results the well was rated at 3,000 gpm. However, the rating proved to be controversial, principally because it was far and away greater than any other well in the basin, and partly because equipment malfunctions may have masked boundaries which might effect the long term performance of the well.

Retesting of the well for the current owner, Brookside Savings and Loan, was conducted April 8 through 13, 1988 with recovery water levels monitored through April 16. This testing program included additional observation wells which were unavailable or unused during the previous testing effort. It was thought the data from the additional observation wells, as well as the longer duration test, would help identify the boundaries which were believed to exist, based on the geology of the area, but not observed in the previous test.

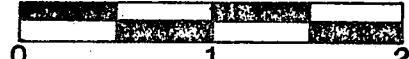
This report summarizes the testing program and the results of analysis of the data collected.





(ref. USGS Spanish Springs Valley Quadrangle, NV 15 min.)

scale



2 miles

Figure 1. Project location map.



### 3.0 TEST SUMMARY

Water levels were monitored in a total of four wells. These included the pumped well (Big Well) and three observation wells. The observation wells were:

North observation well - 2,050 feet north  
West observation well - 3,100 feet northwest, and  
East observation well - 4,600 feet southeast.

Relative locations are shown in Figure 2. The North observation well was utilized in the 1984 pumping test and was believed to be completed in the same consolidated-rock unit as the Big Well based on the response in the previous test. The West observation well was completed in late 1987 as an irrigation well for Spanish Springs Ranch and was also thought to be completed in the same unit on the basis of reported similar lithology and its high reported yield, but the degree of hydraulic communication was not known before the present test sequence. The East observation well reportedly did not penetrate the rock aquifer and was completed in the valley fill deposits. One additional well, located approximately one mile north of the Big Well, although not part of the formal observation well network, was measured just prior to termination of pumping for the purpose of comparison with monthly water level records maintained for the well by Washoe County Utilities Division.

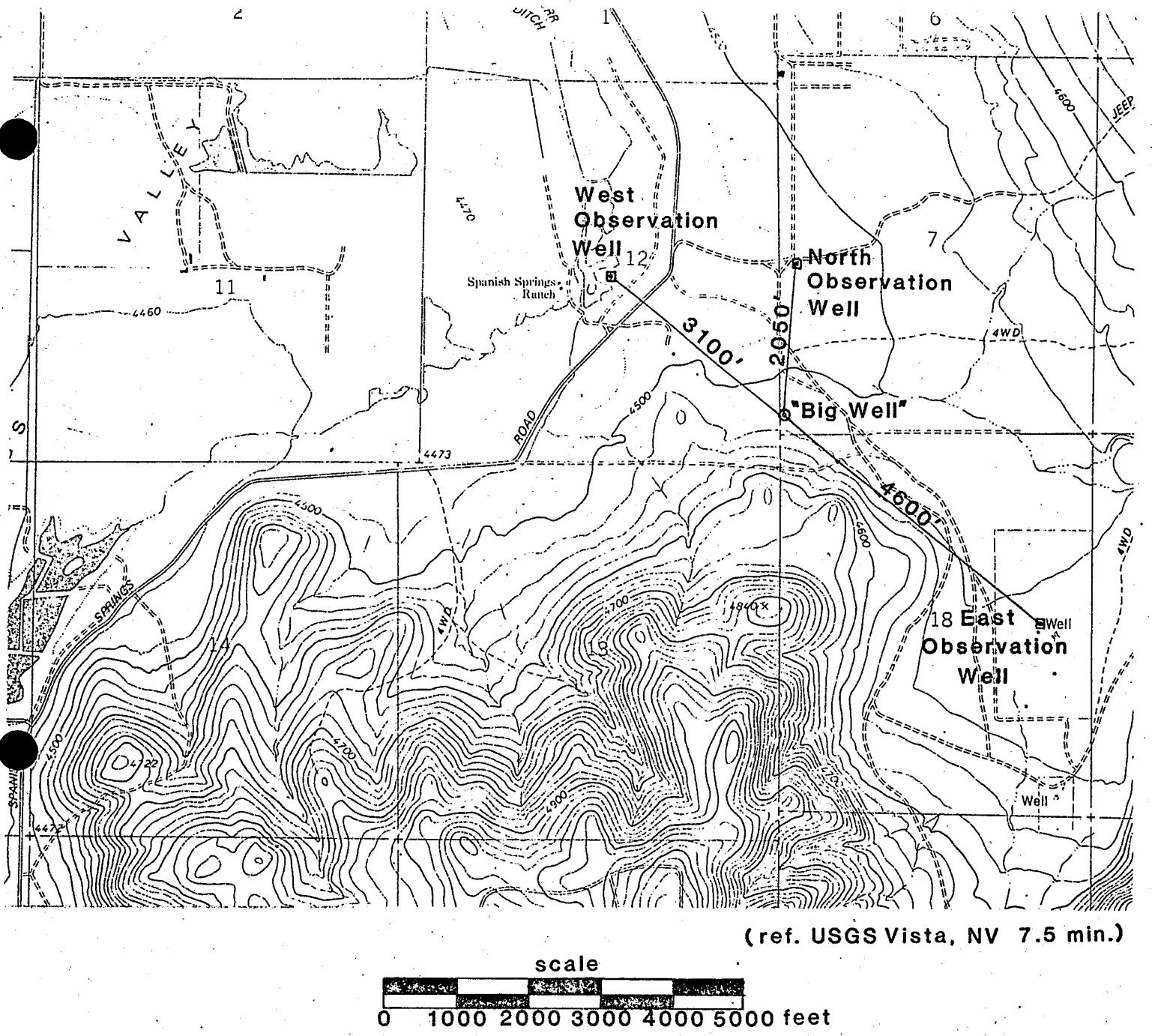
Test equipment was furnished by Owens Brothers Pump Company, Reno, Nevada. It comprised a line-shaft turbine test pump with a diesel prime driver. Flow rate was measured with a pipe weir with a 6.5-inch x eight-inch diameter orifice plate. Water levels were measured with electric water level sounders. Discharge from the well was conveyed to ponds at Spanish Springs Ranch via trenches and pipes, over a distance of one-half mile to the northwest.

The test sequence is summarized below.

Pumping commenced - 1130 hours 4/8/88  
Pumping rate - 1,500 gpm  
Pumping ended - 1130 hours 4/13/88  
Pumping test duration - five (5) days (7,200 minutes)  
Monitored recovery period - 2.5 days (3,600 minutes)

At one point in the test, at  $t = 1,830$  minutes, pumping was interrupted for 4.5 minutes to adjust the head spacing on the bowls. After the adjustment was made, the pumping rate was increased to 1,650 gpm for 40 minutes to compensate for the down time and then returned to 1,500 gpm for the remainder of the test.





- Pumping well
- Observation well
- Auxilliary observation well

Figure 2. Observation well network



Of the four wells which were monitored in detail during testing, three showed a measurable response attributable to pumping. These responses are summarized in Table 1, below.

Table 1. End of test drawdown, "Big Well" pumping test, 4/8-13/88.

Well	Static water level (feet)	Water level (feet)	Drawdown <sup>2</sup> (feet)
Pumped well	27.40	41.24	13.84
North observation	6.18	8.90	2.72
West observation	0.24	2.75	2.52
East observation	35.08	34.85	+0.23

- Notes - 1. All measurements relative to datum point.  
2. Drawdown measured at conclusion of test.  
3. Datum point above land surface.

The auxilliary observation well, located approximately one mile north of the pumped well, showed no response to the pumping test.

It was also observed that, after approximately two days of pumping, the artesian wells at Spanish Springs Ranch reportedly ceased to flow. This coincides to the time when drawdown in the West observation well approached two feet, at which point the piezometric head in that area would have been lowered to land surface.

Upon termination of testing, water levels were monitored closely for two and one-half days.

The field data sheets for the test are all to be found in Appendix A.



#### 4.0 ANALYSIS OF TEST DATA

Drawdown and recovery data (Appendix A) are plotted in Figures 3 through 12. They were analyzed to evaluate aquifer Transmissivity and Coefficient of Storage using the Theis Non-equilibrium Equation and the Cooper-Jacob modification of the Theis Equation. Calculations in support of the determinations of the aquifer characteristics are included in Figures 3 through 12. A summary of the analyses results is presented in Table 2.

Table 2. Aquifer characteristics, "Big Well" pumping test, 4/8-13/88.

Well	Data	Transmissivity (GPD/ft)	Coefficient of Storage
Pumped well	Drawdown	293,000	--
	Residual-drawdown	293,000	--
North Obs.	Drawdown	278,000	0.00084
	Drawdown	312,000	0.00080
	Residual-drawdown	283,000	--
West Obs.	Drawdown	264,000	0.00091
	Drawdown	283,000	0.00074
	Residual-	312,000	--
North & West	Distance-drawdown <sup>1</sup>	349,000	0.00070

Note - 1. Calculated for  $t = 1,000$  minutes.

The average values for Transmissivity and Coefficient of Storage are approximately 290,000 GPD/ft and 0.00082, respectively, excluding the values calculated from distance-drawdown data, which differ somewhat from those calculated from time-drawdown (and residual-drawdown) data. The reason for the discrepancy, is not clear from the data. However, it may be related to slight measurement error since drawdown in the North and West observation wells was very small, and even small errors in measurement could result in large errors in the distance-drawdown analysis.

The average values above, are similar to those from previous testing, 261,000 GPD/ft and 0.0004, respectively (WEN, INC, 1984).

Test data indicate that the aquifer is very transmissive and areally extensive. Distance drawdown data suggest that the



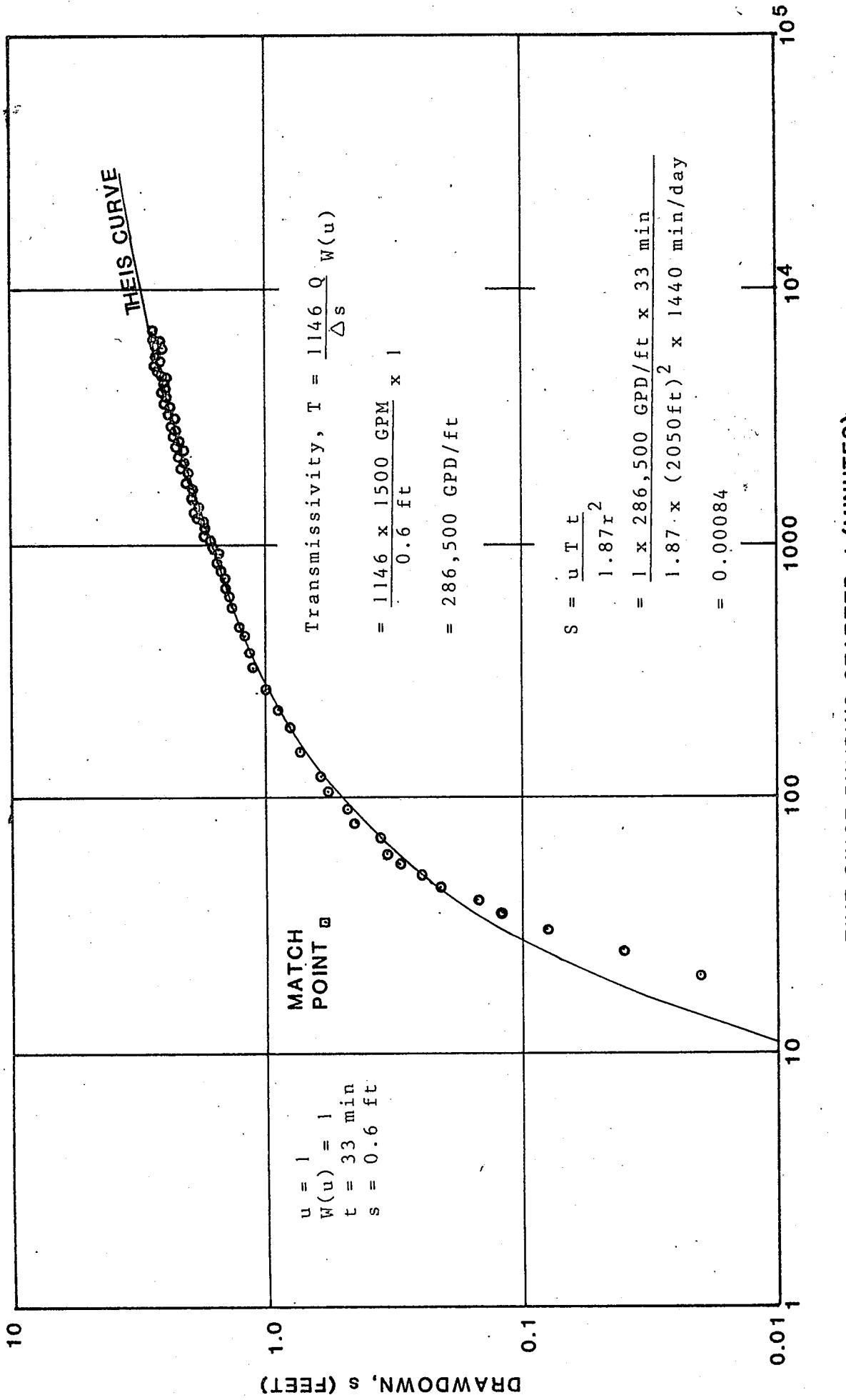


Figure 4. Big Well Constant-Discharge Pumping Test, 4/8-13/88, Drawdown Data for the North Observation Well (Theis Equation).

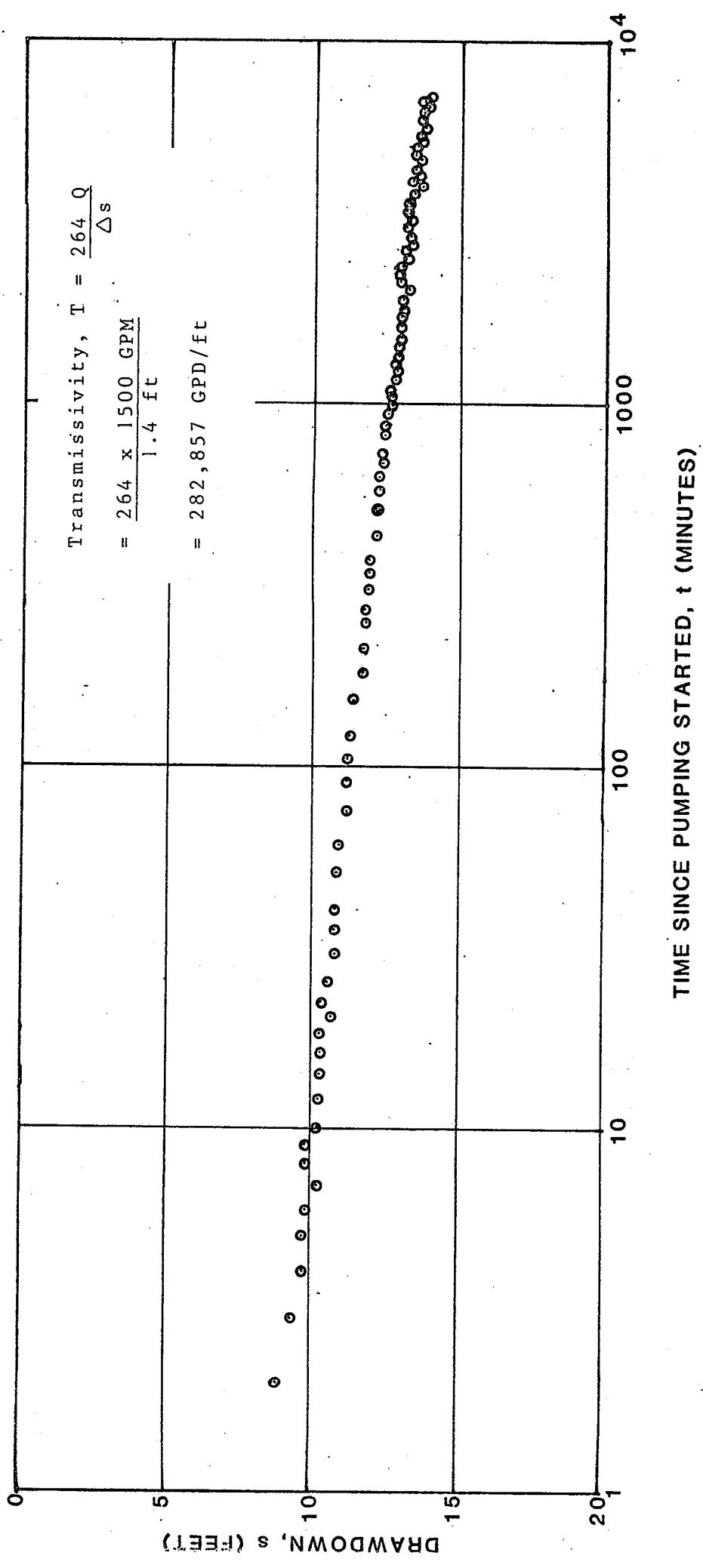


Figure 3. Big Well Constant-Discharge Pumping Test, 4/8-13/88, Drawdown Data for the Pumped Well.

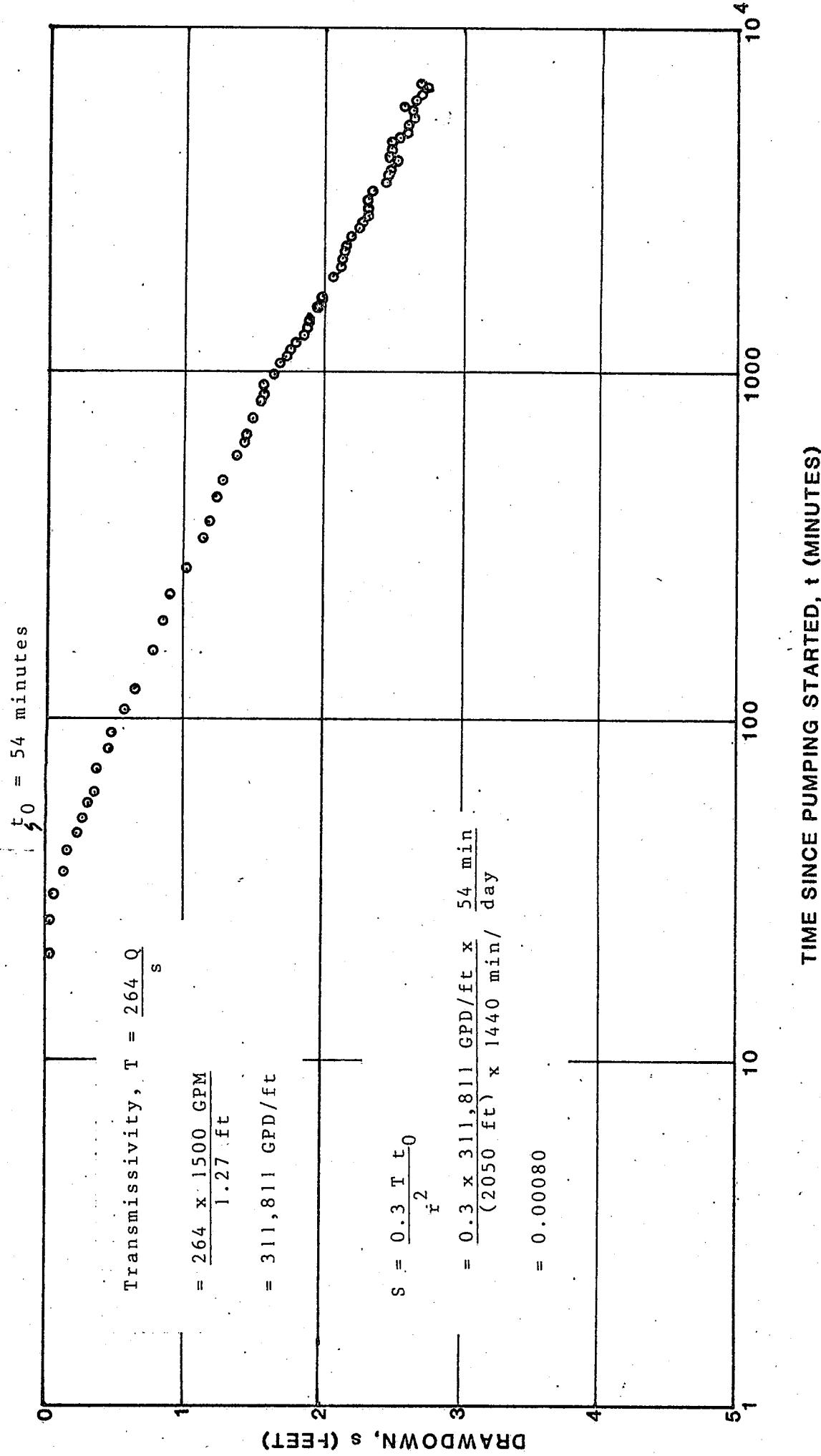


Figure 5. Big Well Constant-Discharge Pumping Test 4/8-13/88, Drawdown Data for the North Observation Well (Modified Theis Equation).

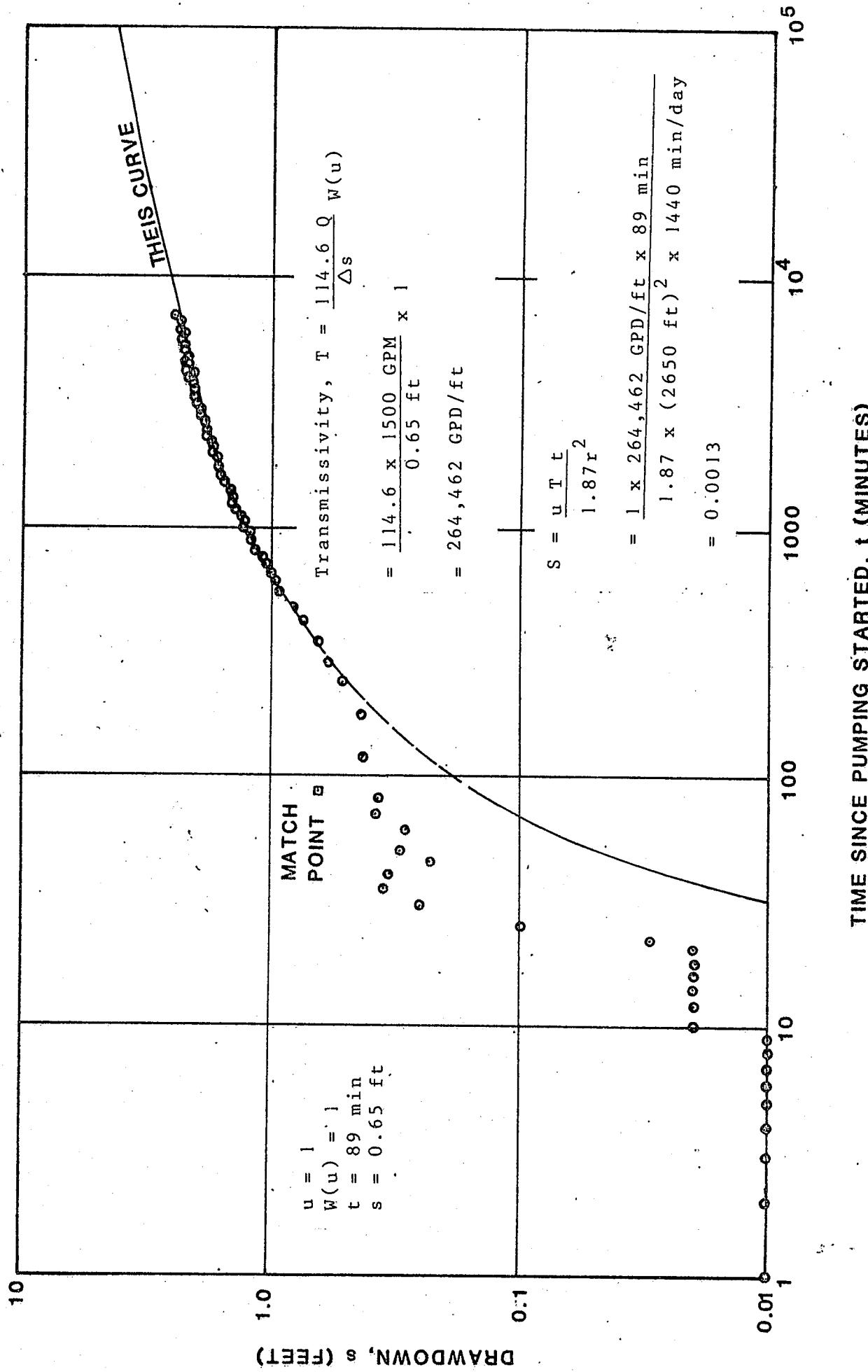


Figure 6. Big Well Constant-Discharge Pumping Test 4/8-13/88, Drawdown Data for the West Observation Well (Theis Equation).

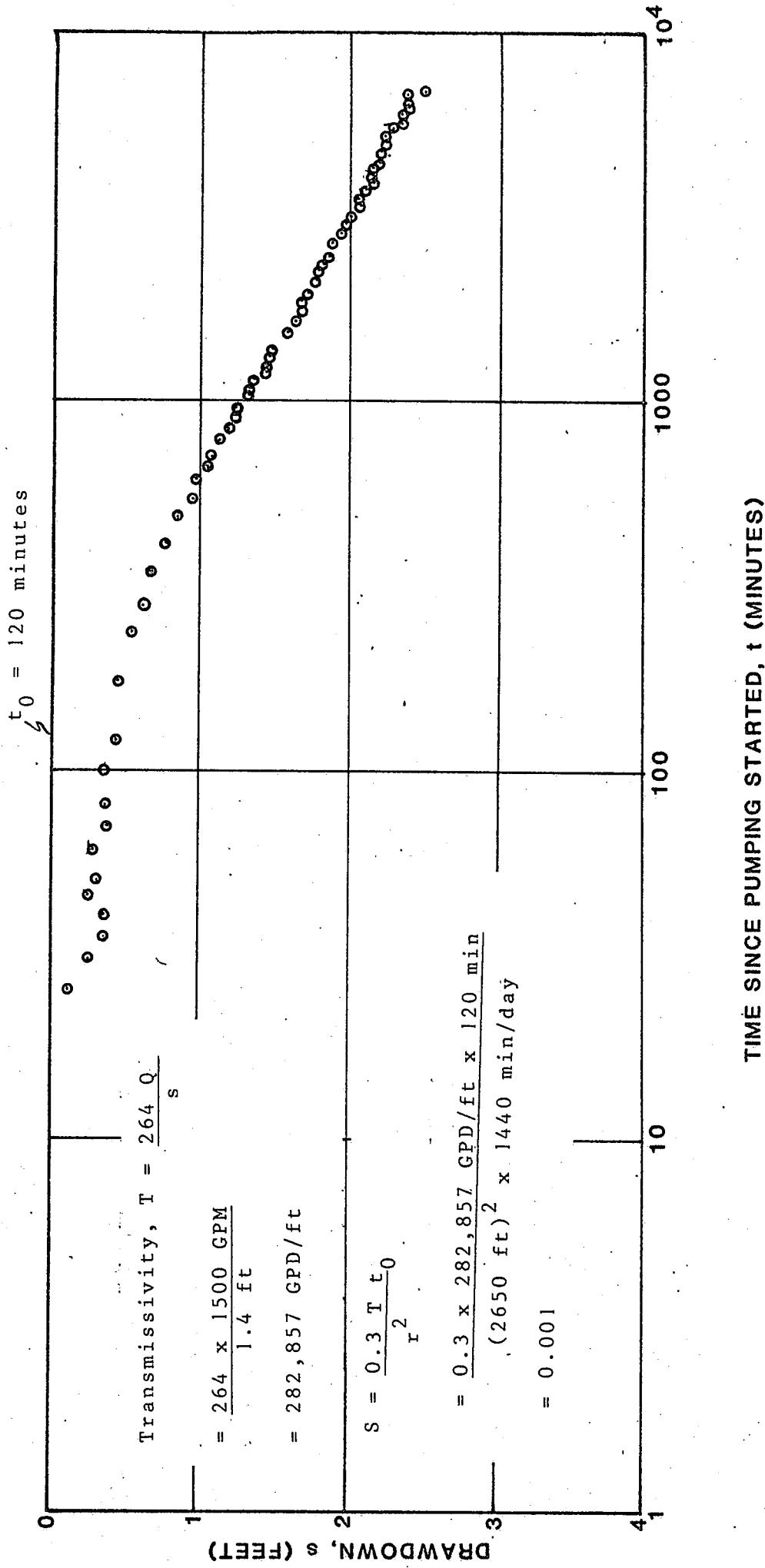


Figure 7. Big Well Constant-Discharge Pumping Test, 4/8-13/88, Drawdown data for the West Observation Well (Modified Theis Equation).

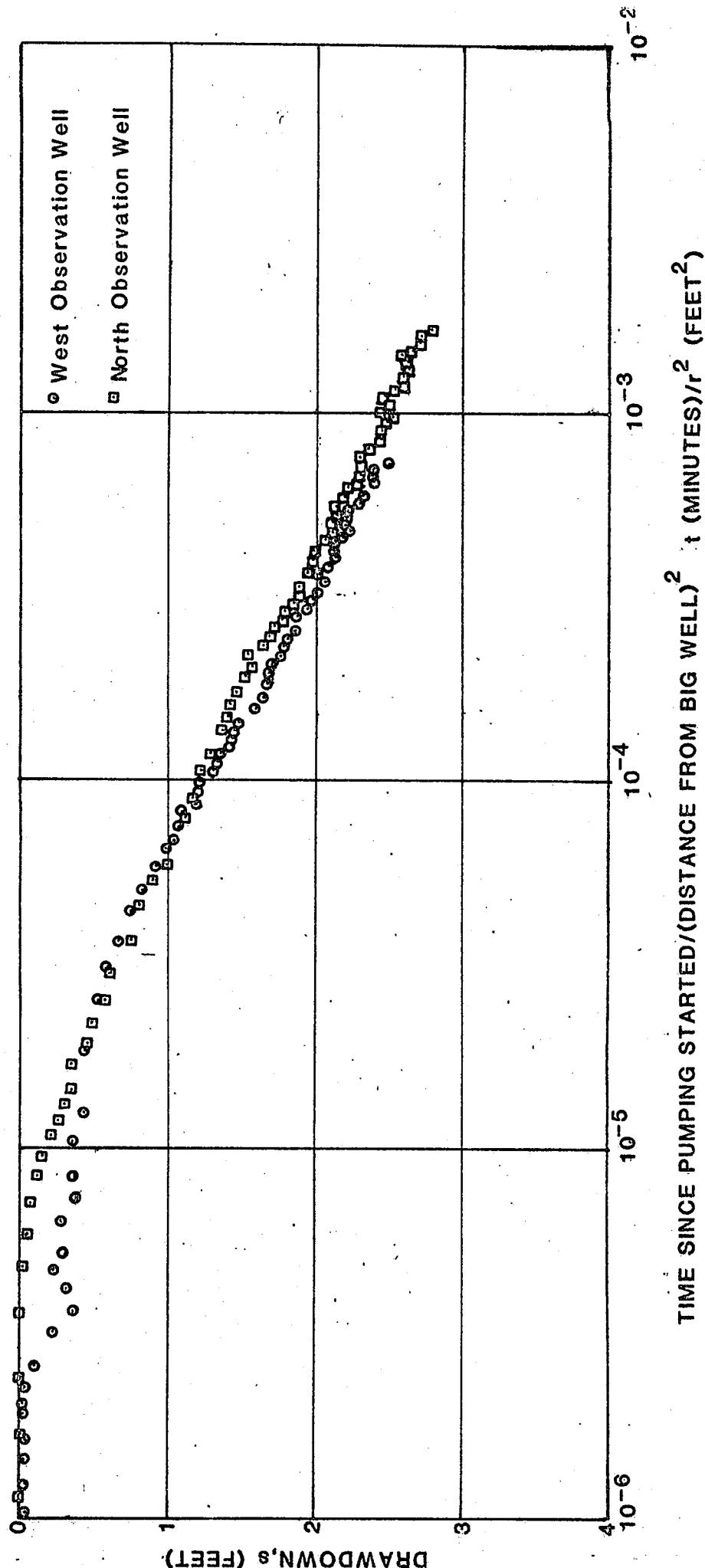


Figure 8. Big Well Constant-Discharge Pumping Test, 4/8-13/88, Drawdown Data for the North and West Observation Wells.

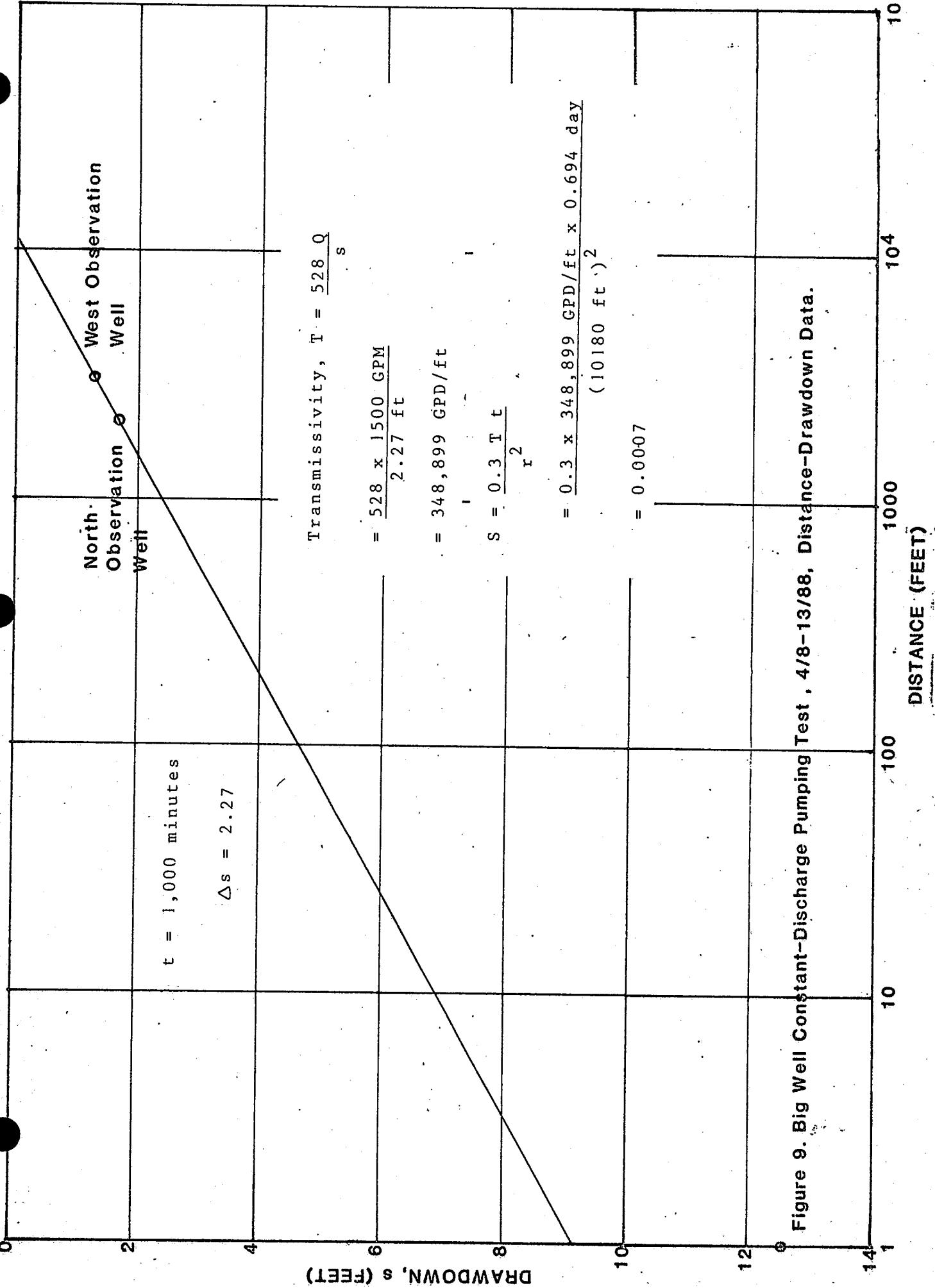


Figure 9. Big Well Constant-Discharge Pumping Test , 4/8-13/88, Drawdown Data.

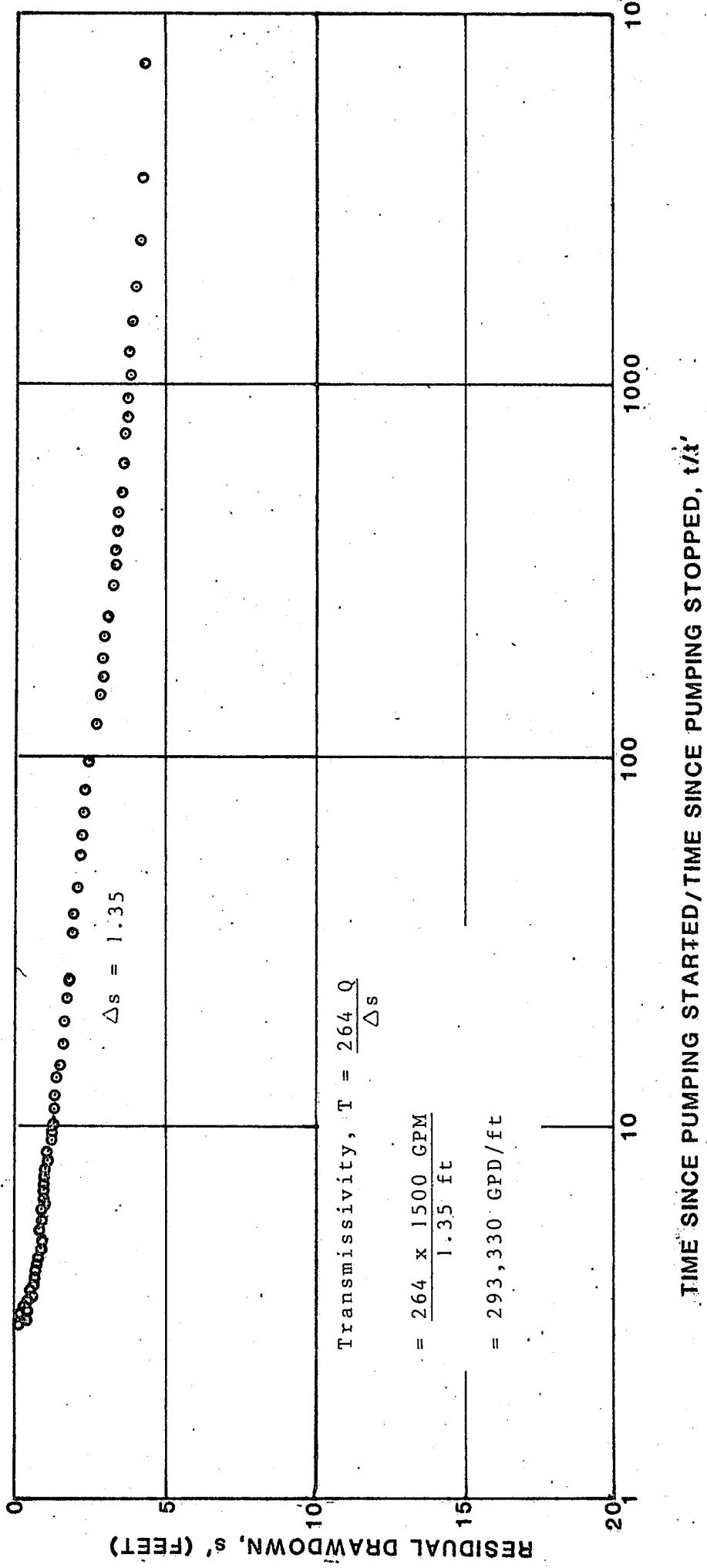


Figure 10. Big Well Constant-Discharge Pumping Test, 4/8-13/88, Residual-Drawdown Data for the Pumped Well.

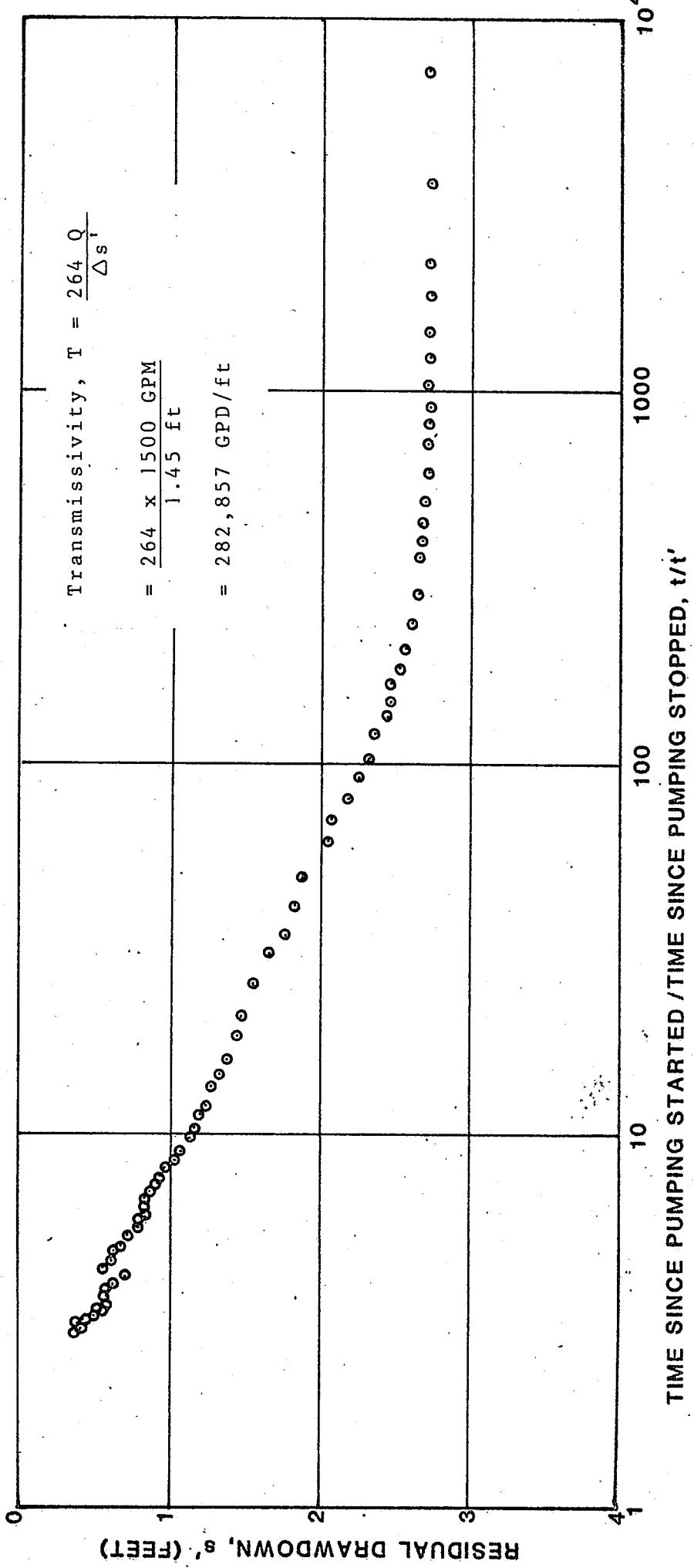


Figure 11. Big Well Constant-DischARGE Pumping Test, 4/8-13/88, Residual-Drawdown Data for the North Observation Well.

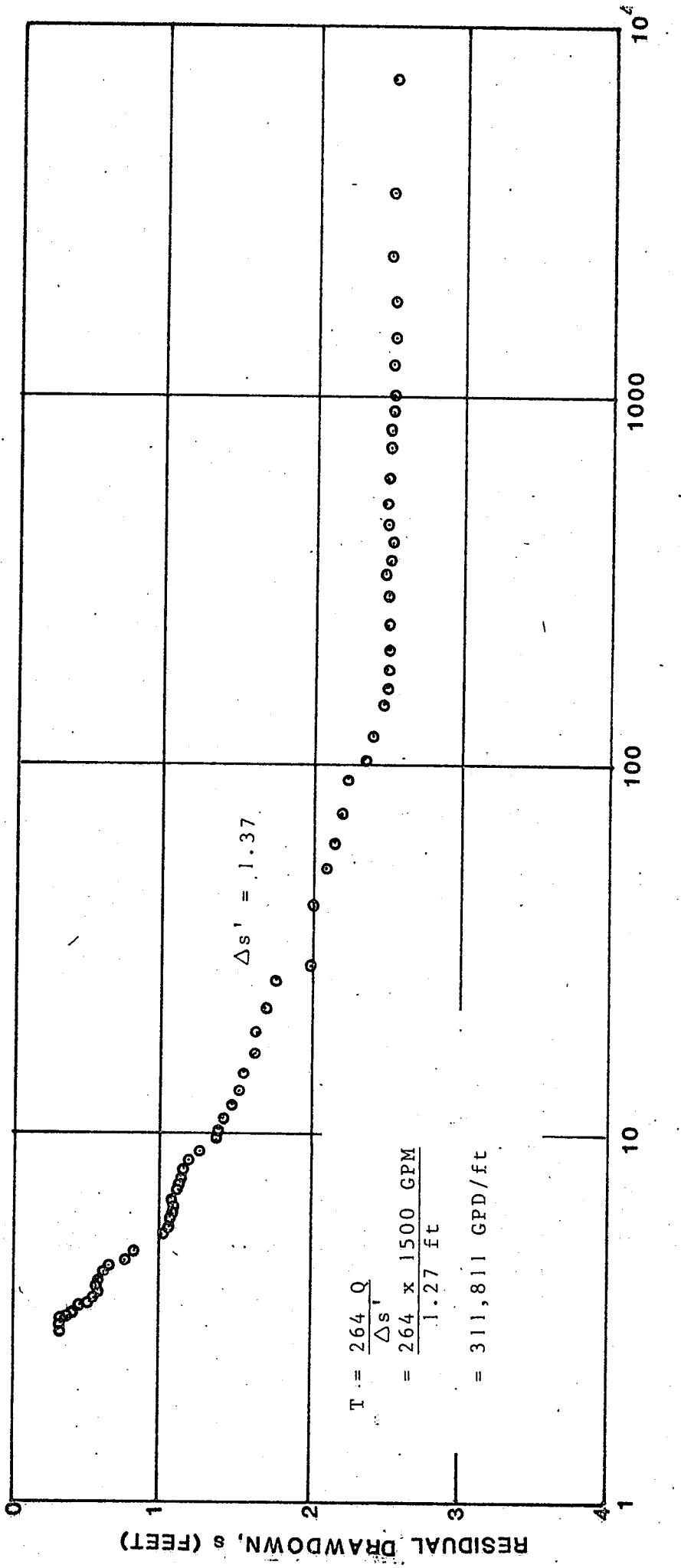


Figure 12. Big Well Constant-Discharge Pumping Test, 4/8-13/88, Residual-Drawdown Data for the West Observation Well.

radius of influence for the well under test conditions approached several miles. The aquifer appears to be fairly uniform and isotropic, with little difference in Transmissivity in either an northwest or north-south direction. No boundaries, either of a negative (discharge) or positive (recharge) nature manifested themselves during the test. This came as a surprise, since a major northwest-trending fault is believed to be coincident with the axis of Spanish Springs Canyon east of the well. This fault is well within the radius of influence of the well during the test and if boundaries exist, they should have manifested themselves. However, it is possible that both a discharge and recharge boundary exist, but are positioned to be mutually self-cancelling. However, this cannot be ascertained from the available data.

Also, there is a suggestion that the aquifer may exhibit dual porosity behavior, but again, cannot be determined with certainty from the available data. In the event dual porosity is present, aquifer characteristics were evaluated for late-time data, when dual-porosity effects are typically negated.

Inspection of the residual-drawdown (recovery) data in Figures 10, 11, and 12 shows that the recovery of the wells does not precisely mirror the drawdown response, as expected (compare to Figures 3, 5, and 7). Note the sharp increase in slope of the line beginning at  $t/t' = 4+$ . A first impression is that of a discharge boundary. However, based on the lack of an observed discharge boundary in the drawdown response and the observation that the  $s$  versus  $t/t'$  plots would otherwise have passed through the origin, this is probably not the case. There are other, and more likely, alternative causes. These are:

1. A significant precipitation event occurred approximately one day into the recovery period, well before the change in slope occurred. The increase in slope of the graphs several hours later may be the result of recharge to the aquifer from this event. Because the aquifer is highly transmissive and confined in this area, the response to recharge would have travelled at a high rate of speed through the aquifer.
2. Spanish Springs discharge into the ponds at Spanish Springs Ranch, northwest of the "Big Well". The rate of discharge could be influenced by the level of the ponds. Because the aquifer is highly transmissive, small changes in base level, may cause changes in discharge to the ponds. During the test, the water level in the nearest and largest pond was raised approximately two feet. This rise may have reduced the natural discharge to the pond and effected an increase in the rate of recovery of water levels in the wells.

The lack of any response in the East observation well and the auxilliary observation well one mile north of the "Big Well" has at least two explanations. Both of these wells are completed in the alluvium while the pumped well and other two observation wells are completed in the underlying volcanic rocks. There may be no direct hydraulic connection between the fractured rock aquifer and the overlying alluvium in this area. Alternatively, the two units may be connected; but the Coefficient of Storage in the overlying alluvium may be sufficiently large and the Transmissivity comparatively small so that the response could not be measured by the end of the test. A third alternative explanation may result from these two wells being located on the opposite side of a fault from the pumped well and other two observation wells (North and South), but there is insufficient information to confirm this assertion, either.



## 5.0 EFFECT ON REGIONAL WATER LEVELS

Under Permit Nos. 47919 and 47920, the annual duty assigned to the "Big Well" is 146 MGA. Correlating this to a pumping rate yields a continuous discharge, on average, of 278 gpm.

Utilizing the average aquifer characteristics as given in Section 4.0, above, the drawdown at any distance from the pumping the well at any point in time can be calculated employing the Theis Equation. Interference (drawdown) at the nearest permitted well to the "Big Well", the irrigation well in Section 12, T.20N., R.20E. at Spanish Springs Ranch, is presented below in Table 3. Calculations in support of the table are found in Appendix B.

Table 3. Calculated interference effects due to pumping the "Big Well".

Distance, r (feet)	Pumping rate, Q (gpm)	Time, t (years)	Drawdown, s (feet)
3,100	278	1	0.91
3,100	278	5	1.09
3,100	278	10	1.16

Note that the estimated values for interference (drawdown) assume that no recharge occurs. Since some recharge occurs, even in years with less than average precipitation, as suggested by the recovery data, long-term interference effects will likely be less than those postulated in Table 3.



## 6.0 SOURCES OF INFORMATION

Cooper, H.H., Jr., and C.E. Jacob, 1946. A generalized Graphical Method for evaluating formation constants and summarizing well field history: Trans. Am. Geophysical Union, Vol. 27, pp. 524-526.

Nork, William E., Inc., 1984. Correspondence dated May 29, 1988 letter/report prepared for Carson Pump.

Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using well storage: Trans. Am. Geophysical Union, pp. 519-524.

Other sources.

Drillers Reports to the State Engineer.

Spanish Springs, NV USGS 15-minute topographic quadrangle.  
Vista, NV USGS 7.5 minute topographic quadrangle.



APPENDIX A  
FIELD DATA SHEETS



**WILLIAM E. NORK, Inc.**

WELL NO. "Big Well"

TYPE OF PUMPING TEST Constant Q (1500)

PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS TOP OF CASINGDISTANCE FROM PUMPING WELL —LOCATION Spanish Spring ValleyPUMPING/OBSERVATION WELL  
OTHER OBSERVATION WELL(S)

N &amp; W/E

PUMP ON: DATE 4-8-88 TIME 11:30 am

PUMP OFF: DATE 4-13-88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)		t/t'	WATER LEVEL MEASUREMENT (feet)	PUMPING RATE (gpm)		REMARKS
	t	t'			s or s'	in/hr	
11:30 1/2	0.5			37.40		in/hr	
11:31	1			34.51	7.11		
11:32	2			36.36	8.96	53 1/2	1540
11:33	3			36.86	9.46		
11:34	4			37.17	9.77	50 1/2	1513
11:35	5			37.06	9.66		
11:36	6			37.33	9.93		
11:37	7			37.53	10.13	52 1/2	1533
11:38	8			37.24	9.84		
11:39	9			37.33	9.93		
11:40	10			37.51	10.11		
11:42	12			37.52	10.12	51	1511
11:44	14			37.59	10.19		
11:46	16			37.73	10.33		
11:48	18			37.76	10.36	50 1/4	1500
11:50	20			37.98	10.59		
11:52	22			37.87	10.47		
11:55	25			37.90	10.50		
12:00	30			38.06	10.66		
12:05	35			38.00	10.60	50 1/2	1513
12:10	40			38.12	10.70		gallon sample taken
12:15	45		trouble w/ sounding tube	37.95	begin using now MP above values adjusted	T = 16.5°C EC = 260 dmtmos	
12:20	50			38.19	10.79	50 1/4	1500
12:30	60			38.36	10.96		
12:45	75			38.44	11.04		
13:00	90			38.45	11.05	50 1/4	1500
13:15	105			38.59	11.19	50 1/4	1500
13:30	120			38.70	11.30		
14:00	150			38.85	11.45		
14:30	180			38.95	11.55		
15:00	210			39.06	11.64	50 1/4	1500

WELL NO. WEST WELL

TYPE OF PUMPING TEST CONSTANT Q

PUMPING RECOVERY DATA

M.P. FOR WATER LEVELS Top of case for success N.W.DISTANCE FROM PUMPING WELL 2650'LOCATION Spanish Spgs. Ranch

PUMPING/OBSERVATION WELL

OTHER OBSERVATION WELL(S)

N &amp; E

PUMP ON: DATE 4/8/88 TIME 1130PUMP OFF: DATE 4-13-88 TIME 1130

CLOCK TIME	ELAPSED TIME (minutes)		t/t'	WATER LEVEL MEASUREMENT (feet)	PUMPING RATE (gpm)	REMARKS
	t	t'		0.24	(s) or s'	
1130	0			0.24	0	
1130.5	0.5			0.24	0	
1131	1			0.25	0.01	
1132	2			0.25	0.01	
1133	3			0.25	0.01	
1134	4			0.25	0.01	
1135	5			0.25	0.01	
1136	6			0.25	0.01	
1137	7			0.25	0.01	
1138	8			0.25	0.01	
1139	9			0.25	0.01	
1140	10			0.26	0.02	
1142	12			0.26	0.02	
1144	14			0.26	0.02	
1146	16			0.26	0.02	
1148	18			0.26	0.02	
1150	20			0.26	0.02	
1152	22			0.27	0.03	
1155	25			0.34	0.10	
1200	30			0.49	0.25	
1205	35			0.59	0.35	
1210	40			0.57	0.33	
1215	45			0.47	0.23	
1220	50			0.54	0.30	
1230	60			0.53	0.29	
1240	70			0.62	0.38	
1250	80			0.61	0.37	
1310	100			0.60	0.36	
1330	120			0.67	0.43	
1427	177			0.68	0.44	
1530	240			0.76	0.52	Changed observation 4/14/88

## PUMPING TEST DATA

Page 2 of 3

WELL NO. "Big Well"

TYPE OF PUMPING TEST Constant Q 1500 gpm

PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS

top of casing

DISTANCE FROM PUMPING WELL

LOCATION Springs ValleyPUMPING/OBSERVATION WELL  
OTHER OBSERVATION WELL(S)

N &amp; W of E

PUMP ON: DATE 4/8/88 TIME 11:30 amPUMP OFF: DATE 4/8/88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)	t/t'	WATER LEVEL MEASUREMENT (feet)		PUMPING RATE (gpm)	REMARKS
			t	t'		
15:40	250		39.12	11.72		
16:00	270		39.11	11.71		
16:34	304		39.30	11.90		
17:08	338		39.31	11.91	50 1/4	1500
17:40	370		39.33	11.93		changed sample T=17°C EC=250 mmhos
18:10	430		39.53	12.13	50 1/2	1513
19:57	507		39.54	12.14		
21:10	580		39.66	12.26		changed sample T=17°C EC=250 mmhos
22:05	635		39.77	12.37		
22:50	680		39.80	12.40	50 1/4	1500
23:50	740		39.87	12.47		changed sample T=18°C EC=250 mmhos
0:57	807		39.85	12.45	50 1/4	1500
1:50	860		39.82	12.42		
2:58	928		39.90	12.50	50 1/4	1500
3:52	982		39.95	12.55		changed sample T=17.5°C EC=240 mmhos
5:00	1050		39.98	12.58	50 1/4	1500
5:55	1105		39.99	12.59	50	1496
6:56	1166		40.03	12.63	50 1/4	1500
7:56	1226		40.25	12.85	50 1/2	1513
8:49	1279		40.12	12.72	50 1/4	1500
10:23	1373		40.24	12.84	50 1/4	1500
11:32	1442		40.24	12.84	50 1/2	1513
12:46	1514		40.28	12.88	50 1/4	1500
14:34	1624		40.34	12.94		T=17°C EC=240 mmhos pH=7.51
16:37	1747		40.36	12.96	50 1/4	1500
17:57	1827		40.45	13.05	50 1/4	1500
18:05	—	—	—	—	60.8	1650
18:48	—	—	—	—	50 1/4	1500
19:44	1934		40.32	12.92		
21:19	2029		40.55	13.15	50 1/4	1500
22:58	2128		40.29	12.89	50 1/4	1500

changed sample T=17.5°C EC=230 mmhos pH=7.13

PUMP OFF AT 1800, PUMP EXTRA 150 gpm

PUMP ON AT 1804 for 40 minutes

changed sample T=17°C EC=250 mmhos pH=6.88

changed observer THR

## PUMPING TEST DATA

Page 3 of 3

WELL NO. Big Well

TYPE OF PUMPING TEST Constant Q 1500 gpm  
PUMPING/RECOVERY DATA  
M.P. FOR WATER LEVELS top of Casing  
DISTANCE FROM PUMPING WELL  
LOCATION Spanish Springs Valley

PUMPING/OBSERVATION WELL  
OTHER OBSERVATION WELL(S)

North, West, and East

PUMP ON: DATE 4-5-88 TIME 11:30 AM

PUMP OFF: DATE 4-13-88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)	t/t'	WATER LEVEL MEASUREMENT (feet)		PUMPING RATE (gpm)	REMARKS
			t	t' or s'		
0102	2252		40.30	12.90	50 1/4	1500
0250	2360		40.39	12.99	50 1/4	
0502	2492		40.58	13.18	50 1/4	
0705	2615		40.59	13.19	50 1/4	
0851	2721		40.75	13.35	50 1/4	1500
1056	2846		40.67	13.27	50 1/4	1500
1402	3032		40.53	13.13	50 1/4	Changed observer A.H.
1637	3187		40.67	13.27	50 1/4	double checked measurement.
1958	3388		40.66	13.26	50 1/4	note: Mr. Armstrong (SS Ranch) stated by to say that the wells on his property have stopped flowing.
2250	3560		40.66	13.26	50 1/4	Changed sample @ 1600 hrs. T = 18°C EC = 220 mmhos
0155	3745		40.75	13.35	50 1/4	Changed observer THR @ 2100 hrs. T = 18°C EC = 220 mmhos
0455	3925		41.01	13.61	51	1511
0805	4115		40.80	13.40	50 1/4	Changed sample at 2100 hrs. T = 18°C EC = 220 mmhos
						The pumping rate tended toward 1511 gpm after adjustment
1050	4280		40.89	13.49	50 1/4	1500
1150	4340		—	—	50 1/4	1500
1416	4486		40.82	13.42	50 1/2	1513
1655	4645		40.95	13.55	50 1/4	1500
1800	4710		—	—	50 1/2	1513
1945	4815		40.79	13.39	49 1/2	1488
2354	5064		40.89	13.49	50 1/4	1500
0351	5301		41.04	13.64	50 1/4	1500
0758	5548		41.02	13.62	50 1/4	1500
11:58	5788		41.09	13.69	50 1/4	1500
16:10	6040		40.97	13.57	50 1/4	1500
19:45	6255		41.04	13.64	50 1/4	1500
0:02	6512		41.19	13.79	50 1/4	1500
4:00	6750		41.10	13.70	50	1496
7:57	6987		41.25	13.85	50 1/4	1500
11:29	7199		41.24	13.84	50 1/4	1500

PUMP OFF at 11:30

Project No. 88-439

## PUMPING TEST DATA

Page 1 of 3

WELL NO. 1 North

TYPE OF PUMPING TEST Constant Q (1500 gpm)

PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS hole in casingDISTANCE FROM PUMPING WELL, 2050'LOCATION Sparsh Spring Valley

PUMPING/OBSERVATION WELL

OTHER OBSERVATION WELL(S) West  
EastPUMP ON: DATE 4-8-88 TIME 11:30 amPUMP OFF: DATE 4-13-88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)		t/t'	WATER LEVEL MEASUREMENT (feet)	PUMPING RATE (qpm)	REMARKS
	t	t'		6.18 (s) or s'		
11:30	0			6.18	0	
11:31	1			6.18	0	
11:32	2			6.18	0	
11:33	3			6.18	0	
11:34	4			6.18	0	
11:35	5			6.18	0	
11:37	7			6.18	0	
11:40	10			6.18	0	
11:45	15			6.18	0	
11:50	20			6.20	0.02	
11:55	25			6.22	0.04	
12:00	30			6.26	0.08	
12:05	35			6.30	0.12	
12:10	40			6.33	0.15	
12:15	45			6.39	0.21	
12:20	50			6.43	0.25	
12:25	55			6.48	0.30	
12:30	60			6.52	0.34	
12:40	70			6.54	0.36	
12:50	80			6.63	0.45	
13:00	90			6.66	0.48	
13:15	105			6.75	0.57	
13:30	120			6.79	0.61	
14:03	153			6.92	0.74	change observer A.H.
14:41	191			6.99	0.81	
15:14	224			7.08	0.90	
15:55	245			7.18	1.00	
17:02	332			7.30	1.12	
17:45	375			7.35	1.17	
18:49	439			7.40	1.22	
19:44	494			7.47	1.29	

WELL NO. NORTH OBS. WELL

TYPE OF PUMPING TEST Constant Q 1500 qpm  
PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS hole in casingDISTANCE FROM PUMPING WELL 2050'LOCATION Spartan Springs Valley

PUMPING/OBSERVATION WELL

OTHER OBSERVATION WELL(S)

W & EPUMP ON: DATE 4/8/88 TIME 11:30 amPUMP OFF: DATE 4-13-88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)	t/t'	WATER LEVEL MEASUREMENT (feet)	PUMPING RATE (qpm)	REMARKS
			6.18 (s or s')	Q	
8:03	573		7.55	1.37	
22:00	630		7.59	1.41	
22:46	676		7.61	1.43	
23:46	736		7.65	1.47	
0:52	802		7.70	1.52	
1:46	854		7.75	1.57	
2:53	923		7.72	1.54	
3:46	974		7.82	1.64	
4:56	1046		7.87	1.69	
5:50	1100		7.90	1.72	
6:52	1162		7.95	1.77	
7:43	1213		7.98	1.80	
8:22	1274		8.03	1.85	
10:16	1366		8.05	1.87	
11:03	1413		8.06	1.88	
13:27	1557		8.12	1.94	
15:38	1688		8.16	1.98	
17:10	1780		8.18	2.00	
19:21	1911		8.24	2.06	
21:04	2014		8.30	2.12	
22:52	2122		8.30	2.12	
00:57	2247		8.32	2.14	
02:44	2354		8.32	2.14	
04:34	2484		8.38	2.20	
06:58	2608		8.43	2.25	
08:43	2713		8.47	2.29	
10:33	2823		8.49	2.31	
13:25	2995		8.48	2.30	
16:14	3164		8.48	2.30	
19:19	3349		8.53	2.35	
22:33	3543		8.62	2.44	
					changed observer TR

WELL NO. North #1 observation well

TYPE OF PUMPING TEST Constant Q (1500 gpm)  
PUMPING RECOVERY DATA  
M.P. FOR WATER LEVELS B Head of hole increasing  
DISTANCE FROM PUMPING WELL 2050'  
LOCATION Spanish Springs

PUMPING / **OBSERVATION** WELL  
OTHER OBSERVATION WELL(S)

PUMP ON: DATE 4-18-88 TIME 11:30 AM  
PUMP OFF: DATE 4-13-88 TIME 11:30

WELL NO. WEST OBS. WELL

TYPE OF PUMPING TEST Constant Q 1500 gpm

PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS tip of crown - access nutDISTANCE FROM PUMPING WELL 2650'LOCATION Spanish Spgs. Ranch

PUMPING/OBSERVATION WELL

OTHER OBSERVATION WELL(S)

N E

PUMP ON: DATE 4/18/88 TIME 11:30 amPUMP OFF: DATE 4-13-88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)	t/t'	WATER LEVEL MEASUREMENT (feet)		PUMPING RATE (gpm)	REMARKS
			t	s) or s'		
16:19	289		0.24		Q	
17:17	347		0.84	0.60		
18:27	417		0.90	0.66		
19:30	480		0.99	0.75		
20:48	558		1.06	0.82		
21:48	618		1.18	0.94		
22:33	663		1.23	0.99		
23:32	722		1.28	1.04		
0:39	789		1.32	1.08		
1:34	834		1.35	1.11		
2:39	909		1.42	1.22		
3:32	952		1.46	1.22		
4:41	1031		1.55	1.31		
5:35	1085		1.57	1.33		
6:38	1148		1.59	1.35		
7:31	1201		1.66	1.42		
	1260		1.7	1.43		
9:40	1330		1.69	1.45		
10:47	1397		1.72	1.48		
12:57	1527		1.83	1.59		
14:45	1635		1.87	1.63		
16:49	1759		1.91	1.67		
19:08	1898		1.92	1.68		
20:45	1995		1.95	1.71		
22:39	2109		2.01	1.77		
00:43	2233		2.03	1.79		
02:31	2341		2.05	1.81		
04:40	2470		2.09	1.85		
08:32	2702		2.12	1.88		
10:45	2835		2.18	1.94		
13:37	3007		2.21	1.97		

WELL NO. WEST Observation Well

**TYPE OF PUMPING TEST      *Constant Q***

## PUMPING RECOVERY DATA

M.P. FOR WATER LEVELS ~~access nut - top of casing~~  
DISTANCE FROM PUMPING WELL 2450'  
LOCATION ~~Surge / Surge Pump~~

LOCATION Spanish Spring Ranch

PUMPING/OBSERVATION WELL

OTHER OBSERVATION WELL(S)

North & East

PUMP ON: DATE 4/8/84 TIME 11:30 AM

PUMP OFF: DATE 4-13-88 TIME 1130

Project No. 88-439

## PUMPING TEST DATA

time according to Amy's clock

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WELL NO. East (#3)

TYPE OF PUMPING TEST Constant Q

PUMPING RECOVERY DATA

M.P. FOR WATER LEVELS

DISTANCE FROM PUMPING WELL top of casingLOCATION Spanish Springs Valley

PUMPING/OBSERVATION WELL

OTHER OBSERVATION WELL(S) \_\_\_\_\_

N &amp; W

PUMP ON: DATE 4-8-88 TIME 1130

PUMP OFF: DATE 4-13-88 TIME 1130

CLOCK TIME	ELAPSED TIME (minutes)		t/t'	WATER LEVEL MEASUREMENT (feet)	PUMPING RATE (qpm)	REMARKS
	t	t'				
1128	-2		0930	35.08 (s or s)	Q	Widmer
1130	0			35.08		
1132	2			35.08		
1134	4			35.08		
1136	6			35.08		
1138	8			35.08		
1140	10			35.08	0	
1146	16			35.08		
1208	38			35.07	-.01	
1210	40			35.06	-.02	
1220	50			35.06	-.02	
1230	60			35.05	-.03	
1240	70			35.05	-.03	
1250	80			35.04	-.04	
1300	90			35.04	-.04	
1310	100			35.04	-.04	
14:16	166			35.03	-.05	
15:01	211			35.04	-.04	changed observer A.H.
16:08	278			35.05	-.03	
18:16	406			35.02	-.06	
20:32	542			35.02	-.06	
22:19	649			35.00	-.08	
0:24	774			35.05	-.03	changed observer THK
2:26	896			35.06	-.02	
4:27	1017			35.07	-.01	
6:28	1138			35.08	0	
8:27	1250			35.10	0.02	
10:00	1350			35.11	0.03	changed observer A.H.
13:14	1544			35.10	0.02	
15:10	1660			35.11	0.03	
19:00	1890			35.10	0.02	

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## PUMPING TEST DATA

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WELL NO. EAST OBS. WELL

TYPE OF PUMPING TEST Constant Q 1500 gpm  
PUMPING/RECOVERY DATA

PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS

... FOR WATER LEVELS TOP OF CALCIUM - hole  
DISTANCE FROM PUMPING WELL: 11-20'

DISTANCE FROM PUMPING WELL 4600  
LOCATION Springside Valley

LOCATION S. San Joaquin Valley

PUMPING / OBSERVATION WELL

OTHER OBSERVATION WELL(S)

NEW

PUMP ON: DATE 4/8/88 TIME 11:30

PUMP OFF: DATE 4-13-88 TIME 1130

WELL NO. "Big Well"

TYPE OF PUMPING TEST Constant Q . 1500 qpm  
PUMPING/RECOVERY DATAM.P. FOR WATER LEVELS top of casing

DISTANCE FROM PUMPING WELL

LOCATION High Spring ValleyPUMPING/OBSERVATION WELL  
OTHER OBSERVATION WELL(S)

N, S, W

PUMP ON: DATE 4-8-88 TIME 11:30 amPUMP OFF: DATE 4-13-88 TIME 11:30 am

CLOCK TIME	ELAPSED TIME (minutes)	t/t'	WATER LEVEL MEASUREMENT (feet.)		PUMPING RATE (qpm)	REMARKS
			t	-t'		
1130 1/2	7200 1/2	0.5	14401	31.69	4.29	
1131	7201	1	7201	31.55	4.15	
1132	7202	2	3601	31.45	4.05	
1133	7203	3	2401	31.43	4.03	
1134	7204	4	1801	31.30	3.90	
1135	7205	5	1441	31.25	3.85	
1136	7206	6	1201	31.16	3.76	
1137	7207	7	1030	31.16	3.76	
1138	7208	8	901	31.05	3.65	
1139	7209	9	801	31.03	3.63	
1140	7210	10	721	31.00	3.60	
1142	7212	12	601	30.94	3.54	
1144	7214	14	515	30.90	3.50	
1146	7216	16	451	30.80	3.40	
1148	7218	18	401	30.75	3.35	
1150	7220	20	361	30.70	3.30	
1152	7222	22	328	30.68	3.28	
1155	7225	25	289	30.58	3.18	
1200	7230	30	241	30.42	3.02	
1205	7235	35	207	30.31	2.91	
1210	7240	40	181	30.22	2.82	
1215	7245	45	161	30.21	2.81	
1220	7250	50	145	30.07	2.67	
1220	7260	60	121	29.97	2.57	
1245	7275	75	97	29.82	2.42	
1300	7290	90	81	29.73	2.33	
1315	7305	105	70	29.66	2.26	
1330	7320	120	61	29.57	2.17	
1345	7335	135	54.3	29.48	2.08	
1415	7365	165	44.6	29.45	2.05	
1445	7395	195	37.9	29.34	1.88	Light rain

WELL NO. B15 Well

TYPE OF PUMPING TEST Constant Q (130 gpm)  
PUMPING/RECOVERY DATA  
M.P. FOR WATER LEVELS Top of casing  
DISTANCE FROM PUMPING WELL \_\_\_\_\_  
LOCATION Squaw Springs Valley

PUMPING/OBSERVATION WELL  
OTHER OBSERVATION WELL(S) \_\_\_\_\_

N&W

PUMP ON: DATE 4/8/88 TIME 11:30  
PUMP OFF: DATE 4/13/88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)	t/t'	WATER LEVEL, MEASUREMENT (feet)		PUMPING RATE (gpm)	REMARKS
			t	t'		
1515	7425	225	33.0	29.22	1.82	
16:35	7505	305	24.6	29.07	1.67	
1715	7545	345	21.9	29.02	1.62	
1815	7605	405	18.8	28.92	1.52	
1917	7667	467	16.5	28.93	1.50	
2018	7728	528	14.6	28.86	1.46	
2120	7790	590	13.2	28.76	1.36	
2224	7854	654	12.0	28.74	1.34	
2321	7911	711	11.1	28.70	1.30	
0022	7972	772	10.3	28.62	1.22	
0122	8032	832	9.7	28.60	1.20	
0221	8091	891	9.1	28.54	1.14	
0326	8156	956	8.5	28.48	1.08	
0420	8210	1010	8.1	28.43	1.03	
0525	8275	1075	7.7	28.40	1.00	
0621	8331	1131	7.4	28.39	0.99	
0720	8390	1190	7.1	28.39	0.99	
0823	8453	1253	6.7	28.43	0.93	
0920	8510	1310	6.5	28.35	0.95	RAINING Steadily
1022	8572	1372	6.2	28.34	0.94	Changed observers LW an additional observer
1120	8630	1430	6.0	28.31	0.91	RAIN Stopped
1322	8752	1552	5.6	28.26	0.86	RAINING Again
1524	8874	1674	5.3	28.21	0.81	Rain Slacked
1722	8992	1792	5.0	28.20	0.80	1630-1645 HAIL
1936	9126	1926	4.7	28.18	0.78	
2145	9255	2055	4.50	28.09	0.69	
2345	9375	2175	4.31	28.08	0.68	Changed Observer TR clearing rain
0143	9493	2293	4.14	28.05	0.65	
0339	9609	2406	3.99	28.98	0.58	
0541	9731	2531	3.84	27.91	0.51	stopped raining
0737	9847	2647	3.72	27.92	0.52	clearing

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## PUMPING TEST DATA

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WELL NO. "Big Well"

TYPE OF PUMPING TEST Constant Q (1500 gpm)  
PUMPING/RECOVERY DATA

PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS

WELL FOR WATER LEVELS TOP OF CASING  
DISTANCE FROM PUMPING WELL 8

LOCATION Spanish Spring Valley

SECTION Spanish Spgs. Valley

PUMPING OBSERVATION WELL  
OTHER OBSERVATION WELL (C)

OTHER OBSERVATION WELL(S)

Nevir

PUMP ON: DATE 4-8-88 TIME 11:50

PUMP OFF: DATE 4-13-88 TIME 1130

100 110

## PUMPING TEST DATA

Page 1 OF 3

TYPE OF PUMPING TEST Constant Q (1500 gpm)  
PUMPING/RECOVERY DATA  
M.P. FOR WATER LEVELS hole in side of casing  
DISTANCE FROM PUMPING WELL 200  
LOCATION Spanish Springs

WELL NO. North Observation Well

PUMPING/OBSERVATION WELL  
OTHER OBSERVATION WELL(S) West

PUMP ON: DATE 4/8/88 TIME 1130  
PUMP OFF: DATE 4/13/88 TIME 1130

CLOCK TIME	ELAPSED TIME (minutes)	t/t'	WATER LEVEL MEASUREMENT (feet)		PUMPING RATE (gpm)	REMARKS
			t	t' or (s)		
1130	7200	0	8.90	2.72		Observer TR
1130.5	7201.5	0.5	1440	8.90	2.72	
1131	7201	1	7201	8.90	2.72	
1132	7202	2	360	8.90	2.72	
1133	7203	3	240	8.90	2.72	
1134	7204	4	180	8.90	2.72	
1135	7205	5	144	8.89	2.71	
1136	7206	6	120	8.89	2.71	
1137	7207	7	1030	8.89	2.71	
1138	7208	8	901	8.89	2.71	
1139	7209	9	801	8.89	2.71	
1140	7210	10	721	8.89	2.71	
1142	7212	12	601	8.89	2.71	
1144	7214	14	515	8.88	2.70	
1146	7216	16	451	8.86	2.68	
1148	7218	18	401	8.86	2.68	
1150	7220	20	361	8.85	2.67	
1155	7225	25	184	8.83	2.65	
1200	7230	30	241	8.78	2.60	
1205	7235	35	207	8.74	2.56	
1210	7240	40	181	8.71	2.53	
1215	7245	45	161	8.65	2.47	
1220	7250	50	145	8.64	2.46	
1225	7255	55	132	8.61	2.43	
1230	7300	60	121	8.55	2.37	
1240	7310	70	104	8.50	2.32	
1250	7320	80	91	8.42	2.24	
1300	7330	90	81	8.37	2.19	
1315	7345	105	70	8.27	2.09	
1330	7360	120	61	8.22	2.04	
1403	7353	153	48.0	8.05	1.87	451 ft Elevation

## PUMPING TEST DATA

Page 2 OF 3

WELL NO. North Observation

TYPE OF PUMPING TEST Constant Q (150 gpm)  
 PUMPING/RECOVERY DATA  
 M.P. FOR WATER LEVELS hole in Casing  
 DISTANCE FROM PUMPING WELL 255  
 LOCATION Spanish Spring Valley

PUMPING/OBSERVATION WELL  
 OTHER OBSERVATION WELL(S) \_\_\_\_\_

test

PUMP ON: DATE 4/4/88 TIME 11:30  
 PUMP OFF: DATE 4/10/88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)		t/t'	WATER LEVEL MEASUREMENT (feet)		PUMPING RATE (gpm)	REMARKS
	t	t'		G.18	S. or S		
1434	7384	184	40.1	8.00	1.82		
1506	7416	216	34.3	7.95	1.77		
1535	7445	245	30.4	7.84	1.66		
1651	7501	301	24.9	7.72	1.54		
1735	7565	365	20.7	7.67	1.49		
1833	7623	423	18.0	7.62	1.44		
1935	7685	485	15.8	7.37	1.39		
2039	7749	549	14.1	7.50	1.32		
2125	7795	595	13.1	7.46	1.28		
2227	7857	657	11.9	7.41	1.23		
2324	7914	714	11.1	7.39	1.21		
0025	7975	775	10.3	7.35	1.17		
0126	8136	836	9.6	7.30	1.12		
0225	8095	895	9.0	7.26	1.08		
0330	8160	960	8.5	7.21	1.03		
0424	8214	1014	8.1	7.14	0.96		
0528	8278	1078	7.7	7.10	0.92		
0625	8335	1135	7.3	7.09	0.91		
0723	8393	1193	7.0	7.06	0.88		
0827	8451	1257	6.7	7.01	0.83		Rainning Steadily
0927	8517	1317	6.5	7.02	0.84		Changed SICKERTS LIV <small>check last s' numbers</small>
1031	8581	1381	6.2	7.01	0.83		Rain Sporadic
1130	8640	1440	6.0	6.99	0.81		
1332	8762	1562	5.6	6.78	0.80		Rain Stopped
1530	8890	1680	5.3	6.90	0.72		
1730	9000	1800	5.0	6.86	0.68		
1925	9115	1915	4.8	6.80	0.62		
2140	9250	2050	4.51	6.79	0.61		Changed observer TR clearings
2338	9368	2168	4.32	6.74	0.56		Light Rain
0148	9598	2298	4.18	6.81	0.70		New Probe
0335	9605	2405	3.99	6.79	0.61		

Project No. 88-439

## PUMPING TEST DATA

Page 3 of 3

WEIL NO. North Observation

TYPE OF PUMPING TEST Constant Q (150 gpm)  
PUMPING/RECOVERY DATA  
M.P. FOR WATER LEVELS 15 m + 1.1 m  
DISTANCE FROM PUMPING WELL 2050'  
LOCATION Splash Springs

PUMPING/OBSERVATION WELL  
OTHER OBSERVATION WELL(S)

Wait, East

PUMP ON: DATE 4/8/88 TIME 11:30  
PUMP OFF: DATE 4/13/88 TIME 11:30

Project No. 88-439

## PUMPING TEST DATA

Page 1 of 3

TYPE OF PUMPING TEST CONSTANT Q (1500 gpm)

PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS less than hole-on top of casing  
DISTANCE FROM PUMPING WELL 2650'LOCATION SPANISH SPRINGS RANCHWELL NO. WEST OBSERVATION WELL

PUMPING/OBSERVATION WELL

OTHER OBSERVATION WELL(S) \_\_\_\_\_

NorthPUMP ON: DATE 4/8/88 TIME 11:30PUMP OFF: DATE 4/13/88 TIME 11:30

CLOCK TIME	ELAPSED TIME (minutes)		t/t'	WATER LEVEL MEASUREMENT (feet.)	PUMPING RATE (gpm)	REMARKS
	t	t'		0.24	s or (s)	
1130	7200	0	02	2.75	2.51	
1130.5	7200.5	0.5	14401	2.76	2.52	Observer: LW
1131	7201	1	7201	2.75	2.51	
1132	7202	2	3601	2.75	2.51	
1133	7203	3	2401	2.76	2.52	
1134	7204	4	1801	2.80	2.56	
1135	7205	5	1441	2.83	2.59	
1136	7206	6	1201	2.80	2.56	
1137	7207	7	1030	2.82	2.58	
1138	7208	8	901	2.81	2.57	
1139	7209	9	801	2.79	2.55	
1140	7210	10	721	2.77	2.53	
1142	7212	12	601	2.71	2.47	
1144	7214	14	515	2.69	2.45	
1146	7216	16	451	2.72	2.48	
1148	7218	18	401	2.77	2.53	
1150	7220	20	361	2.75	2.51	
1152	7222	22	328	2.69	2.45	
1155	7225	25	289	2.74	2.50	
1200	7230	30	241	2.69	2.49	
1205	7235	35	207	2.74	2.50	
1210	7240	40	181	2.73	2.49	
1215	7245	45	161	2.72	2.48	
1220	7250	50	145	2.69	2.45	
1230	7260	60	121	2.64	2.40	
1240	7270	70	104	2.56	2.32	
1250	7280	80	91	2.47	2.23	
1310	7300	100	73	2.43	2.19	
1330	7320	120	61	2.38	2.14	
1354	7324	144	50.9	2.33	2.09	Observer: TR
1424	7354	174	42.3	2.24	2.00	Light Rain

## PUMPING TEST DATA

Page 2 of 3WELL NO. West Observation

TYPE OF PUMPING TEST Constant Q (1.00 gpm)  
 PUMPING RECOVERY DATA  
 M.P. FOR WATER LEVELS Access H.L. t<sub>0</sub>, f<sub>c</sub>(t)  
 DISTANCE FROM PUMPING WELL 2650'  
 LOCATION Spanish Spring Valley

PUMPING/OBSERVATION WELL  
 OTHER OBSERVATION WELL(S) \_\_\_\_\_

PUMP ON: DATE 4/8/88 TIME 11:30  
 PUMP OFF: DATE 4/13/88 TIME 11:30

North

CLOCK TIME	ELAPSED TIME (minutes)	t/t'	WATER LEVEL MEASUREMENT (feet)		PUMPING RATE (qpm)	REMARKS		
			t	t'	0.24	s or s'	Q	
1554	7464	764	28.3	2.23	1.99			
1621	7491	291	25.7	2.00	1.76			
1725	7555	355	21.3	1.93	1.69			
1824	7614	414	18.4	1.88	1.64			
1925	7675	475	16.2	1.87	1.63			
2028	7738	538	14.4	1.80	1.56			
2135	7805	605	12.9	1.75	1.51			
2238	7868	668	11.8	1.71	1.47			
2334	7924	724	10.9	1.64	1.40			
0036	7986	786	10.2	1.61	1.37			
0136	8046	846	9.5	1.57	1.33			
0236	8106	906	8.9	1.49	1.25			
0340	8170	970	8.4	1.42	1.18			
0435	8225	1025	8.0	1.39	1.15			
0540	8290	1090	7.6	1.36	1.12			
0637	8347	1147	7.3	1.36	1.12			
0735	8405	1205	7.0	1.34	1.10			
0838	8462	1268	6.7	1.31	1.07			
0950	8540	1340	6.4	1.32	1.08			
1045	8595	1395	6.2	1.32	1.08			
1143	8653	1453	6.0	1.31	1.07			
1345	8775	1575	5.6	1.29	1.05			
1542	8892	1692	5.3	1.24	1.00			
1750	9080	1880	4.8	1.05	0.81			
2128	9238	2038	4.53	0.98	0.74			
2324	9354	2154	4.34	0.89	0.65			
0122	9472	2272	4.17	0.86	0.62			
0320	9590	2390	4.01	0.82	0.58			
0522	9712	2512	3.87	0.80	0.56			
0720	9830	2630	3.74	0.82	0.58			
1005	9995	2795	3.58	0.76	0.54			
								changed observer A.H.

Project No.: 88-439

## PUMPING TEST DATA

Page 3 of 3

W.H.C. NO. West Obsrv. well

TYPE OF PUMPING TEST Constant Q (1500 gpm)  
PUMPING/RECOVERY LINES

PUMPING/RECOVERY DATA

M.P. FOR WATER LEVELS across hole - top of cavity  
DISTANCE FROM PUMPING LINE

DISTANCE FROM PUMPING WELL 2650' LOCATION

LOCATION Spanish Springs Ranch

PUMPING (OBSERVATION WELL)

**OTHER OBSERVATION WELL(S)**

N  $\notin$  E

PUMP ON: DATE 4-8-88 TIME 1130

PUMP OFF: DATE 4-13-88 TIME 1130

Project No. 88-439

## PUMPING TEST DATA

Page / of /

WELL NO. Eastwell

TYPE OF PUMPING TEST Cutoff Q  
PUMPING/RECOVERY DATA  
M.P. FOR WATER LEVELS Access to cut Caving  
DISTANCE FROM PUMPING WELL 4600'  
LOCATION Spanish Springs Valley

PUMPING/OBSERVATION WELL  
OTHER OBSERVATION WELL(S)

West & North

PUMP ON: DATE 4/8/88 TIME 11:30

PUMP OFF: DATE 4/3/88 TIME 11:30

APPENDIX B  
CALCULATIONS IN SUPPORT OF TEXT



**WILLIAM E. NORK, INC.**  
 1026 West First Street  
 RENO, NEVADA 89503  
 (702) 322-2604

JOB 60-4127  
 SHEET NO. 1 OF 1  
 CALCULATED BY NKR DATE 4/25/85  
 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 SCALE \_\_\_\_\_

Assumptions

Transmissivity,  $T = 290,000 \text{ GPD/ft}$

Coefficient of Storage,  $S = 0.00082$

Radial distance,  $r = 3,100 \text{ ft}$

Pumping rate,  $Q = 27.8 \text{ gpm}$

$t = 1 \text{ year (365.25 days)}$

$$u = \frac{1.87 r^2 S}{T t} = \frac{1.87 \times (3,100 \text{ ft})^2 \times 0.00082}{290,000 \text{ GPD/ft} \times 365.25 \text{ days}} = 0.00014$$

$$\therefore W(u) = 8.30$$

$$S = \frac{114.6 Q}{T} \times W(u) = \frac{114.6 \times 27.8 \text{ gpm}}{290,000 \text{ GPD/ft}} \times 8.30 = 0.91 \text{ ft}$$

$t = 10 \text{ years (3652.5 days)}$

$$u = \frac{1.87 r^2 S}{T t} = \frac{1.87 \times (3,100 \text{ ft})^2 \times 0.00082}{290,000 \text{ GPD/ft} \times 3,652.5 \text{ days}} = 0.000014$$

$$\therefore W(u) = 10.60$$

$$S = \frac{114.6 Q}{T} \times W(u) = \frac{114.6 \times 27.8 \text{ gpm}}{290,000 \text{ GPD/ft}} \times 10.6 = 1.16 \text{ ft}$$

$t = 5 \text{ years (1826.25 days)}$

$$u = \frac{1.87 r^2 S}{T t} = \frac{1.87 \times (3,100 \text{ ft})^2 \times 0.00082}{290,000 \text{ GPD/ft} \times 1,826.25 \text{ days}} = 2.8 \times 10^{-5}$$

$$\therefore W(u) = 9.90$$

$$S = \frac{114.6 Q}{T} \times W(u) = \frac{114.6 \times 27.8 \text{ gpm}}{290,000 \text{ GPD/ft}} \times 9.90 = 1.09 \text{ ft}$$

IN TRIPPLICATE  
(PLEASE PRINT OR TYPE)

NEVADA STATE HEALTH LABORATORY

NEVADA DIVISION OF HEALTH

1660 N. Virginia Street

Reno, Nevada 89503

(702) 789-0335

79141

WATER CHEMISTRY ANALYSIS:

Attn: Fees may apply to some types of samples.

TYPE OF ANALYSIS:

- Check here for ROUTINE DOMESTIC ANALYSIS.  
Circle the constituents needed for PARTIAL ANALYSIS.

SAMPLING INSTRUCTIONS: 24 hr. test

The sample submitted must be representative of the source. Spring and surface water samples should be as free of dirt and debris as possible. Wells should be pumped thoroughly before sampling, changing the water in the casing at least three times. Product water from filters should be sampled after running for about ten (10) minutes.

Sampled by Remy H. Hanlan Date 4/19/88  
Owner Brookside S+L Phone \_\_\_\_\_  
Address 1828 Santelle  
City L. A. State CA

REPORT TO:

Name William York, Cawson Hn.-1  
Address 1024 W. First St.  
City Reno  
State NV Zip 89503

All of the information below must be filled in  
or the analysis will not be performed.

State NV County Washoe  
Township 2D Range 21 Section 7  
General Location Spanish Springs  
Source Address

REASON FOR ANALYSIS:

- Loan  
 Personal health reasons  
 Purchase of the property  
 Rental or sale of property  
 Subdivision approval  
 Other Domestic living  
Initials 721

USE OF WATER:

- Domestic drinking water  
 Geothermal  
 Industrial or mining  
 Irrigation  
 Other

SOURCE OF WATER:

Filter  Yes  No Type \_\_\_\_\_  
Public  Yes  No Name \_\_\_\_\_  
Spring \_\_\_\_\_ Surface \_\_\_\_\_  
Well  Depth 160 ft. Casing diameter 14 in.  
Hot ..... Cold ..... Casing depth 160 ft.  
IN USE  Yes  No

The results below are representative only of the sample submitted to this laboratory.

FOR LABORATORY USE ONLY							PRINT OTHER DESIRED CONSTITUENTS BELOW		
Constituent	ppm	Constituent	ppm	Constituent	ppm	Constituent	S.U.	Constituent	ppm
T.D.S. @ 103° C.	166	Chloride	7	Iron	0.00	Color	3		
Hardness	32	Nitrate	8.6	Manganese	0.00	Turbidity	0.2		
Calcium	8	Alkalinity	86	Copper	0.00	pH	8.47		
Magnesium	3	Bicarbonate	95	Zinc	0.01	EC	249		
Sodium	35	Carbonate	5	Barium	0.00				
Potassium	7	Fluoride	0.23	Boron	0.0			RECEIVED	
Sulfate	14	Arsenic	0.004	Silica	38				
				Chemical quality meets the State of Nevada Drinking Water Standards.				APR 26 1988	CONSUMER HEALTH PROTECTION

Fee 67.00	COL 2158	Remarks
Collected by Remy H. Hanlan	PCPT 2448	
PWS I.D.		
DWA-Pri.	Sec.	
1st	2nd	3rd
Date Rec'd 4/19/88	Init 721	
ppm = parts per million, milligrams per liter		
S.U. = Standard Units		

