

WINCHESTER WASTEWAY PUMP TEST

1. Purpose of the Test

An aquifer test was made December 9-17, 1975 in the SE $\frac{1}{4}$ Section 11, T18N., R25E., Grant County in compliance to a joint request by the Eastern Region, Department of Ecology, and the U. S. Bureau of Reclamation, Ephrata. The purpose of the test was to determine the hydraulic properties of the unconsolidated material (Ringold Formation) which lie above the basalt, and to determine the effect of a well pumping from the unconsolidated material on Winchester Wasteway.

2. Test Data

The U. S. Bureau of Reclamation (USBR) augered 2-inch diameter observation wells at distances of 20, 50, 100, 200, 400, 1000, 1300, and 2200 feet from the pumped well. The 50, 100, 200, and 400 feet wells were paired as a shallow and a deep well. The depths and log of the deep and single observation wells are included in Appendix A. The depth, log, casing, and other pertinent information of the pumped well is included in the Drillers Report (Figure 1). USBR personnel measured all observation wells at 3-day intervals beginning about 2 weeks before the test and at varying intervals after the test in order to determine an upward or downward trend in water levels. The elevation of the ground surface and at the measuring point of each observation well was

leveled by the USBR (Appendix B).

A plan view of the pumped well and observation wells is shown in Figure 2. The pump, a deep-well electric turbine, had a valve on the discharge pipe to regulate flow. Rate of flow was determined by a 10-inch diameter Sparling meter, and the discharged water was piped about 3/4 mile toward the wasteway into a low-lying area (Figure 2).

3. The Test

The pump was started December 9 at 10:45 a.m. and stopped December 17 at 10:05 p.m. Both drawdown and recovery measurements were made. The rate of pumping varied from over 1000 gpm at the start to about 685 gpm when the pump was turned off. As indicated in Figure 3, the rate was changed to about 700 gpm after 165 minutes and remained relatively constant to average 693 gpm for the test period. After pumping for 10,815 minutes (about 7½ days), the pump was shut down and recovery measurements were started. These measurements were continued for 9,895 minutes (about 7 days). The drawdown and recovery measurements are included in Appendices C and D.

4. Results of Test

The storage coefficient and transmissivity were determined by the Theis nonequilibrium (log-log) and the Modified Theis (semi-log)

methods. The values obtained by both methods are reasonably consistent with each other, and are tabulated in Table 1 for comparison. The log-log and semi-log graphs and computations for the values shown in Table 1 are included in Appendices E and F. A transmissivity of 75,000 gpd/ft (gallons per day per foot) and storage of 0.07 would be reasonable values to describe the hydrologic property of this aquifer in the test area.

A profile of the water level before and after the pump test is shown in Figure 4. The profile joins all the wells measured during the test (Figure 2). The static water level before the test shows a gradient from east to west of about 20 feet per mile; after the pump was turned off, the gradient toward the pumped well increased to about 31 feet per mile.

It is evident even before the pump test that ground water was moving away from the Winchester Wasteway area filling a groundwater depression created by other irrigation wells west of the test area during the previous irrigation season. Using the transmissivity and gradient values from the test, the amount of water leaving the Winchester Wasteway area before the pump test was about 1.5 million gallons per day per mile. Immediately after the test, the amount had increased to about 2.3 million gallons per day per mile.

Well	Log-Log (Theis)	Semi-log (modified)
Pump	T - GPD/ft. S -	T = 67,760 GPD/ft S = -
20	T = 99,272 S = 0.12	T = 71,745 S = 0.41
50 (deep)	T = 86,323 S = 0.04	T = 67,760 S = 0.07
100 (deep)	T = 89,233 S = 0.007	T = 73,180 S = 0.02
200 (deep)	T = 72,198 S = 0.006	T = 70,366 S = 0.007
400 (deep)	T = 84,487 S = 0.008	T = 73,180 S = 0.002

TABLE 1. -- Summary of Transmissivity (T) and Storage (S) values computed by the log-log and semi-log methods.

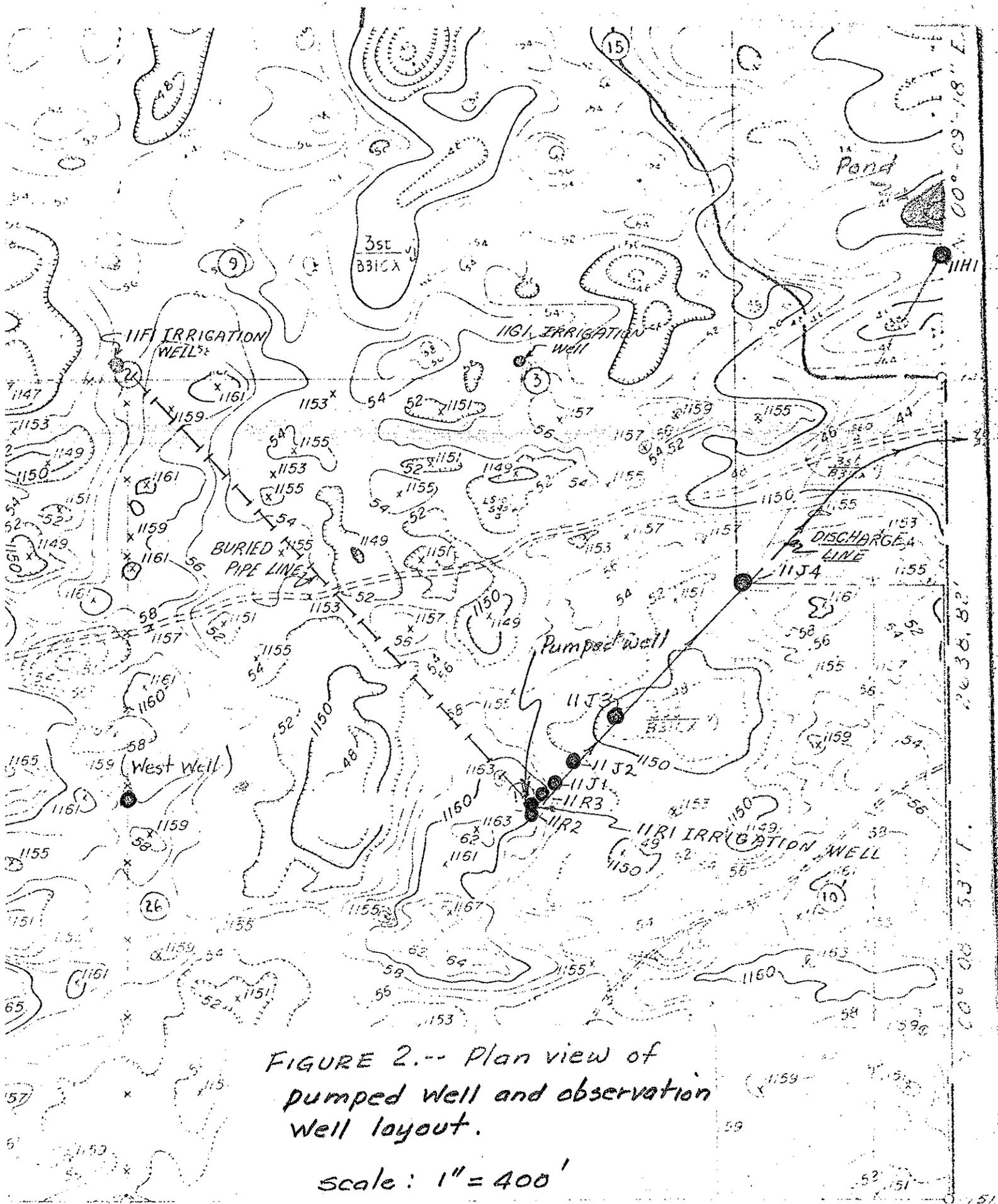


FIGURE 2.-- Plan view of pumped well and observation well layout.

scale: 1" = 400'

GALLONS PER MINUTE

1100
 1000
 900
 800
 700
 600

Start of test

Note: Each square represents 2 hours 24 minutes

End of test

9 10 11 12 13 14 15 16

DAY OF MONTH (DECEMBER)

FIGURE 3.-- PUMPING RATE DURING TEST

