

RESULTS OF THE FALL 2005 AQUIFER
TESTS IN SIERRA VALLEY

Draft Report-For Review Purpose Only

prepared for
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INTRODUCTION

Knowledge of aquifer characteristics is important for estimating drawdowns due to pumping of wells, estimating groundwater flows, and for other purposes. Aquifer tests have been conducted in the Vinton, Chilcoot, Loyalton, Sierra Brooks, River View Estates, and Grizzly Ranch areas. Prior to formation of the District, aquifer tests were conducted on three irrigation wells, and the results were presented by the California Department of Water Resources (1980) in the report "Sierra Valley Groundwater Study". The other aquifer tests referenced have primarily been conducted as part of hydrogeologic studies for new developments in or near the District. No such test had been conducted in the area southeast of Beckwourth or farther east prior to the Fall 2005 tests. Two sites in this area were selected for these tests. The first was at the Goodwin Ranch, located about a mile southeast of the Beckwourth Airport. The second was at the Green Gulch Ranch, located about four miles farther east. Appendix A contains completion reports (where available) for wells used for the aquifer tests.

GOODWIN RANCH PUMP TEST

Figure 1 shows the locations of the wells that were used for this test. Well T23N/R15E-29N3 was the pumped well. This well is

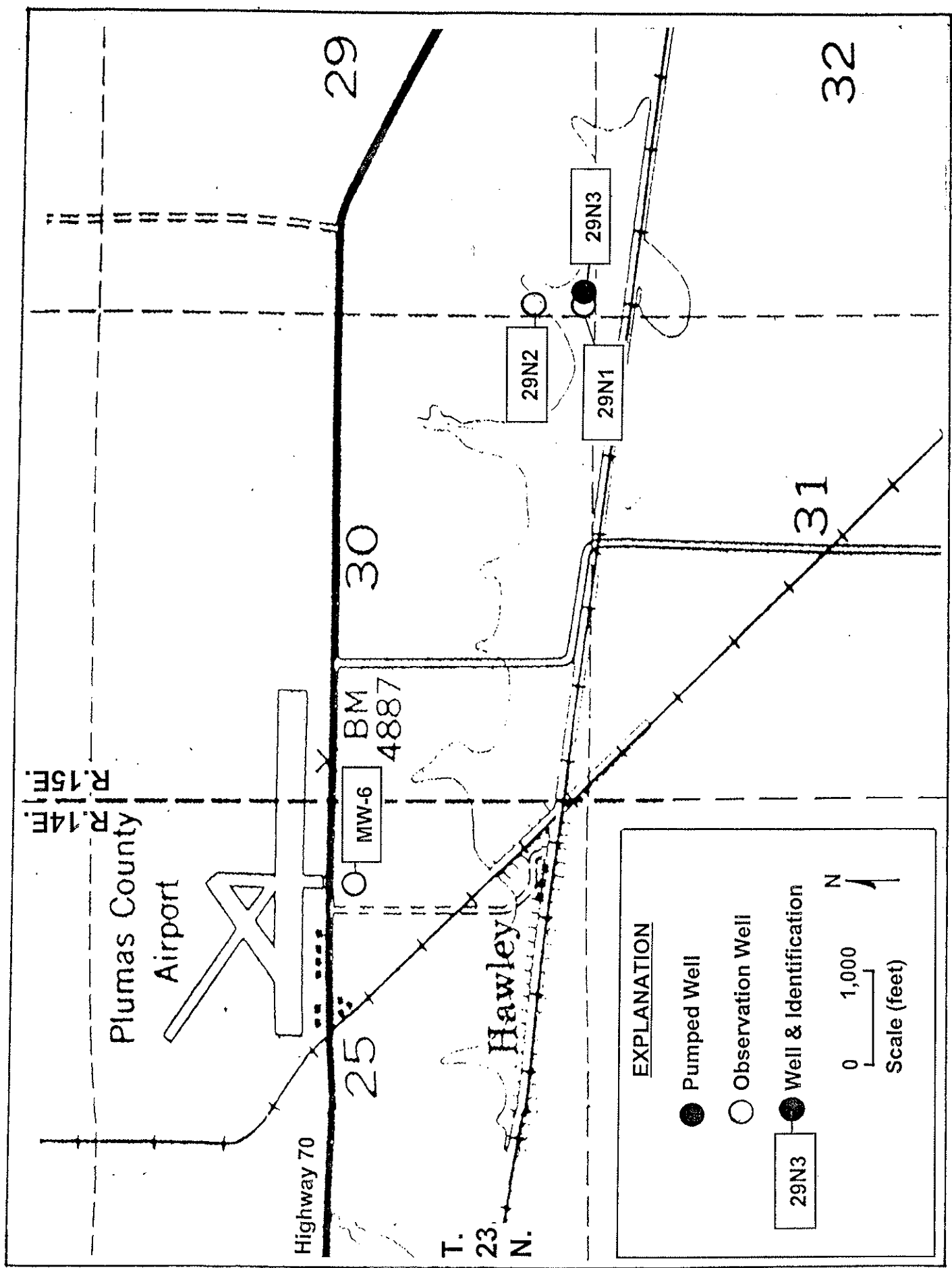


FIGURE 1- LOCATION OF WELLS USED IN GOODWIN RANCH TEST

indicated to be 500 feet deep and the perforated interval is unknown. Four observation wells were used for these test. Unused Well 29N2 is 298 feet deep and the casing is perforated from the land surface to 298 feet in depth. This well is located 260 feet from the pumped well. Unused Well 29N1 is 696 feet deep and is located 700 feet from the pumped well. The perforated interval is unknown. Sierra Valley GMD cluster monitor well MW-6 was also used for observation purposes. This site has a shallow well perforated from 115 to 130 feet in depth, and a deep well perforated from 310 to 340 feet in depth. MW-6 is located 7,100 feet from the pumped well. The aquifer test site is indicated to be north of where a regional confining clay layer is present. Measurements for this test are provided in Appendix B.

Drawdown Measurements

Pumped Well

The existing totalizing flowmeter in Well 29N3 was used to measure pumpage during the test. The pump in the well was turned off at 10:25 AM on September 22, 2005 prior to the test. Some antecedent water-level measurements were then made. Pumping began at 10:30 AM on September 23 and continued until 10:30 AM on September 24, 2005. A total of 1,874,300 gallons was pumped from the well during the test and the average pumping rate was 1,300 gpm. The static level in Well 29N3 prior to pumping was 52.1 feet below

the measuring point. After about one hour of pumping, the pumping level was about 160.1 foot, after about nine hours of pumping, the pumping level was 162.8 feet. Below that depth, the water level could not be measured. The drawdown was 110.7 feet and the specific capacity was 11.8 gpm per foot after about nine hours of pumping. Transmissivity could not be determined from the drawdown measurements in the pumped well.

Observation Wells

Figure 2 shows drawdown measurements for Well 29N2. Depth to water in this well was 53.1 feet prior to pumping and 78.2 feet near the end of the pumping period. The drawdown was thus 25.1 feet. A transmissivity of 23,000 gpd per foot and storage coefficient of 0.002 were indicated by these measurements. Because of its shallow depth, this well is indicated to tap only part of the aquifer tapped by the pumped well. This is the reason why a higher transmissivity value was obtained from measurements on this observation well, compared to the pumped well (discussed later).

Figure 3 shows drawdown measurements for Well 29N1. Depth to water in this well prior to pumping was 50.1 feet. Near the end of the pumping period, depth to water was 65.8 feet. The drawdown was thus 15.7 feet. A transmissivity of 26,000 gpd per foot and storage coefficient of 0.01 were indicated by these measurement.

Depth to water in MW-6S was 38.50 feet prior to pumping and

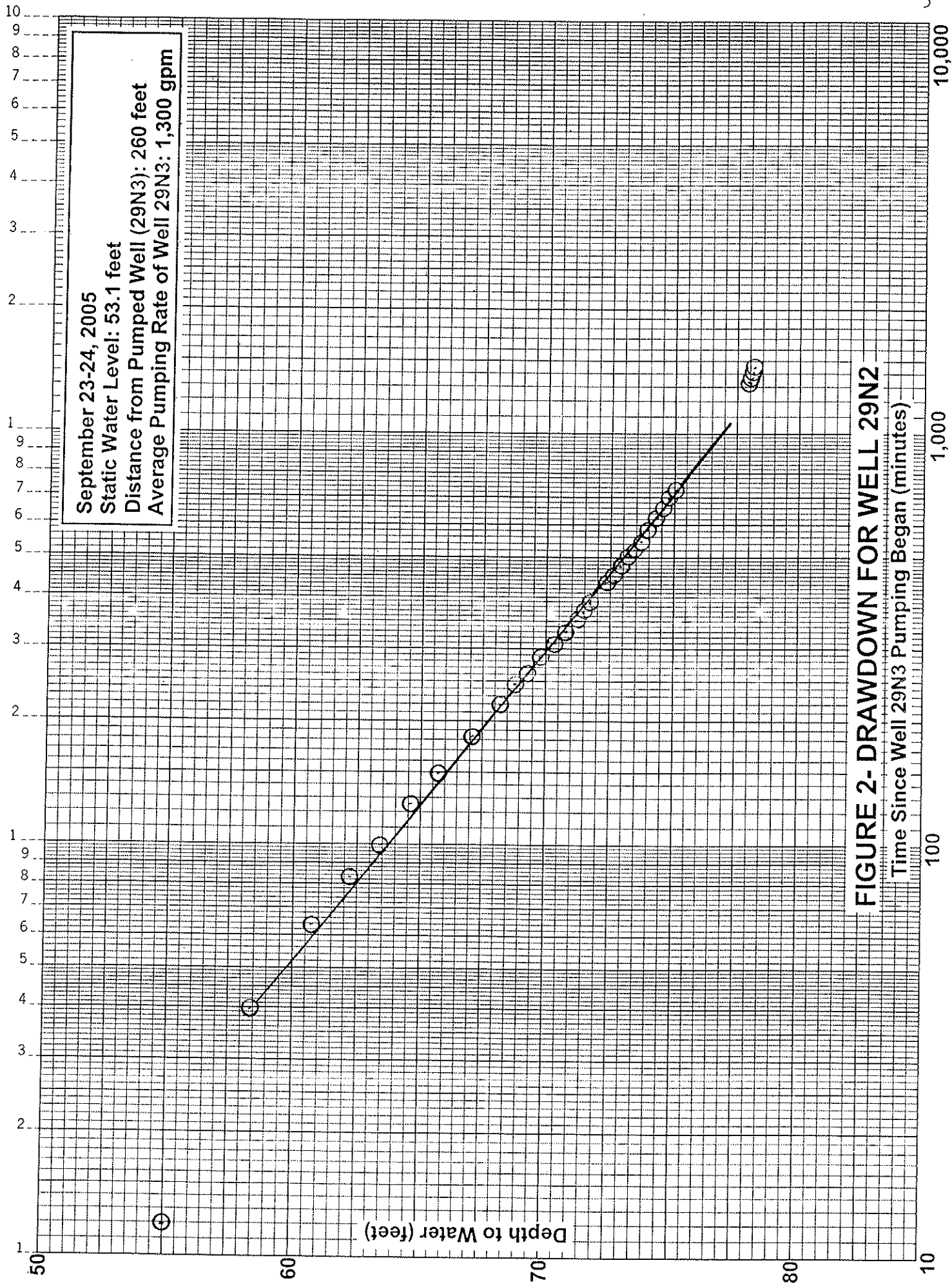


FIGURE 2- DRAWDOWN FOR WELL 29N2
Time Since Well 29N3 Pumping Began (minutes)

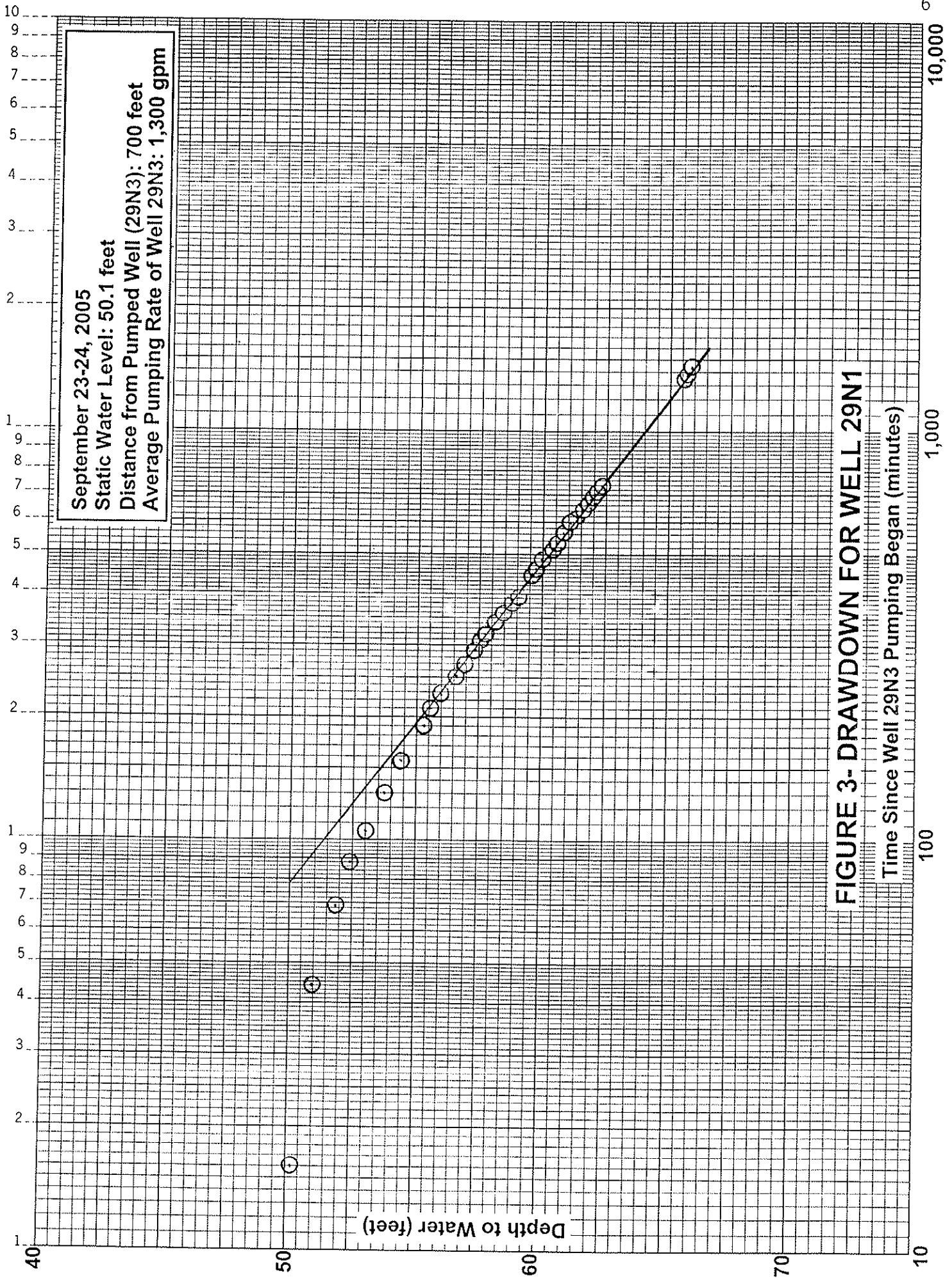


FIGURE 3- DRAWDOWN FOR WELL 29N1

Time Since Well 29N3 Pumping Began (minutes)

38.59 feet at the end of the pumping period. The apparent drawdown was 0.09 foot. Recovery measurements (discussed later) indicate that this water-level decline was not due to pumping of Well 29N3. This is because the water level in MW-6S continued to decline after pumping of Well 29N3 stopped. Depth to water in MW-6D was 32.93 feet prior to pumping and 33.01 feet at the end of the pumping period. The apparent drawdown was thus 0.08 foot. Recovery measurements indicate that about one-third of this water-level decline was due to pumping of Well 29N3, as there was a water-level recovery of about 0.03 foot after pumping stopped.

Recovery Measurements

Pumped Well

After 24 hours of recovery, depth to water in Well 29N3 was 52.0 feet, or 0.2 foot above the static level prior to pumping. Figure 4 shows corrected recovery measurements for the pumped well. A transmissivity of 13,600 gpd per foot was indicated by these measurements, in excellent agreement with the value from the drawdown measurements.

Observation Wells

Afer 24 hours of recover, depth to water in Well 29N2 was 52.9 feet, or 0.2 foot above the static level prior to pumping. Figure 5 shows corrected recovery measurements for Well 29N2. A transmis-

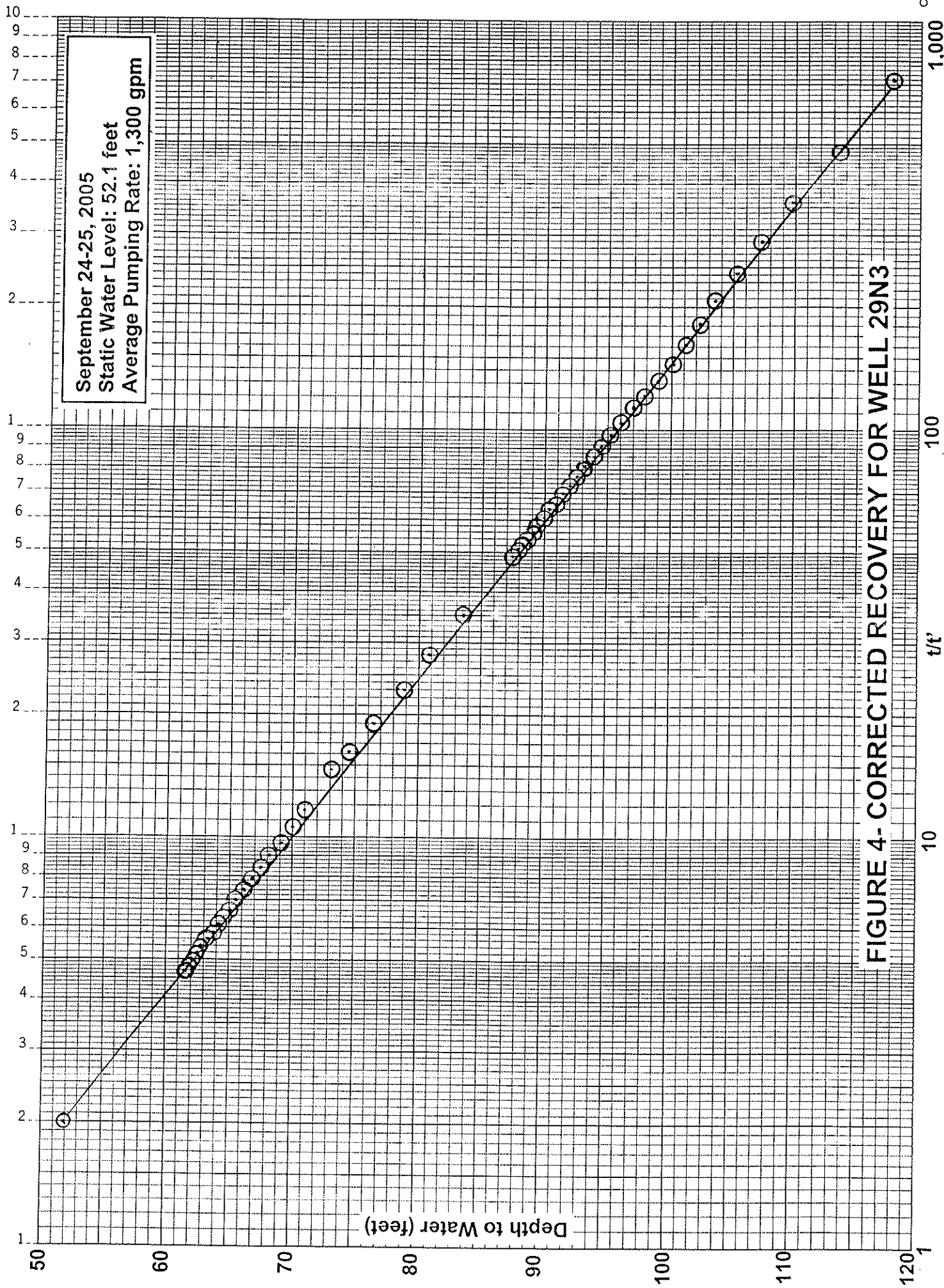


FIGURE 4- CORRECTED RECOVERY FOR WELL 29N3

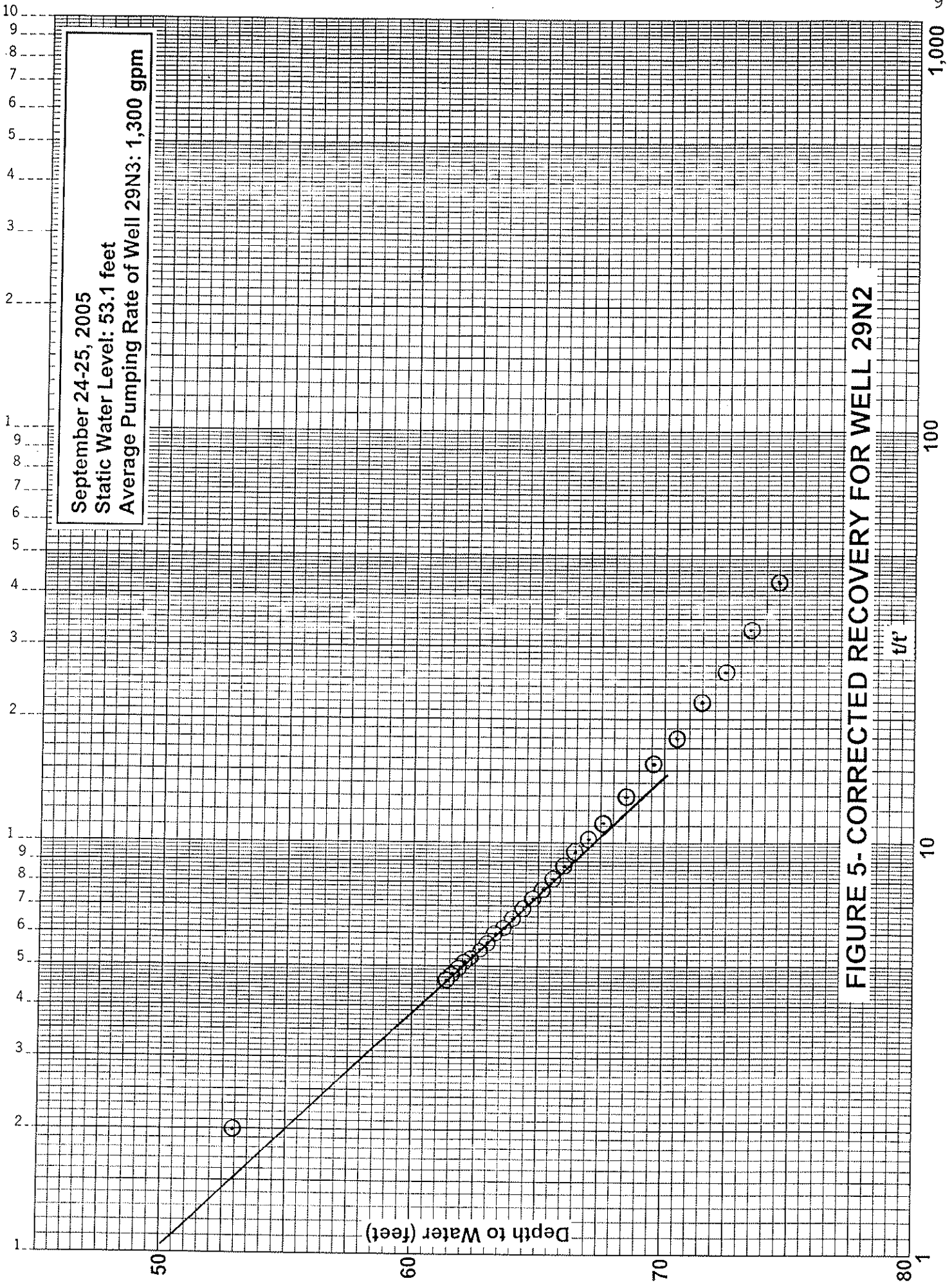


FIGURE 5- CORRECTED RECOVERY FOR WELL 29N2

sivity of 20,000 gpd per foot was indicated by these measurements. After 24 hours of recovery, depth to water in Well 29N1 was 49.9 feet, or 0.2 foot above the static level prior to pumping. Figure 6 shows corrected recovery for Well 29N1. A transmissivity of 24,000 gpd per foot was indicated by these measurements.

After 24 hours of recovery, depth to water in MW-6S was 38.9 feet, or 0.4 foot below the static level prior to pumping. Measurements for this well indicate that there was an antecedent water-level decline in this well, and this trend continued throughout the test. Pumping of Well 29N3 did not influence the water level in MW-6S.

After 24 hours of recovery depth to water in MW-6D was 32.98 feet, or 0.05 foot below the static level prior to pumping. The water level in this well apparently responded only slightly due to pumping of Well 29N3, as discussed previously.

GREEN GULCH RANCH PUMP TEST

Figure 7 shows the locations of wells used for the Green Gulch Ranch pump test. Well T23N/R15E-26R1 was pumped for the test. This well taps the lower aquifer and is perforated from 440 to 763 feet in depth. The pumping rate was measured with the existing flowmeter in the well. Three other irrigation wells were used as observation wells for the test. Well 26G1 is perforated from 500 to 780 feet in depth and was located about 4,600 feet from the

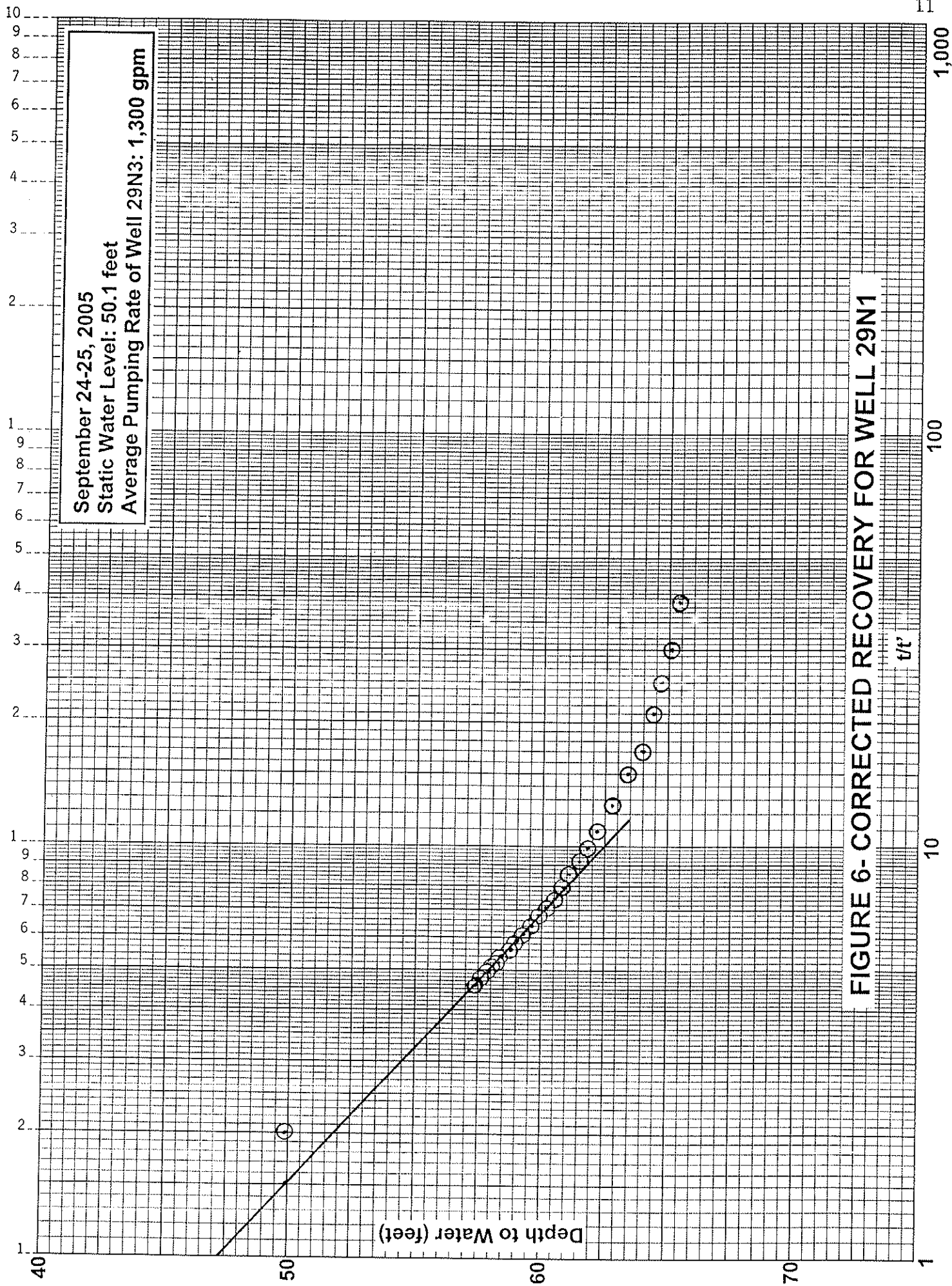


FIGURE 6- CORRECTED RECOVERY FOR WELL 29N1

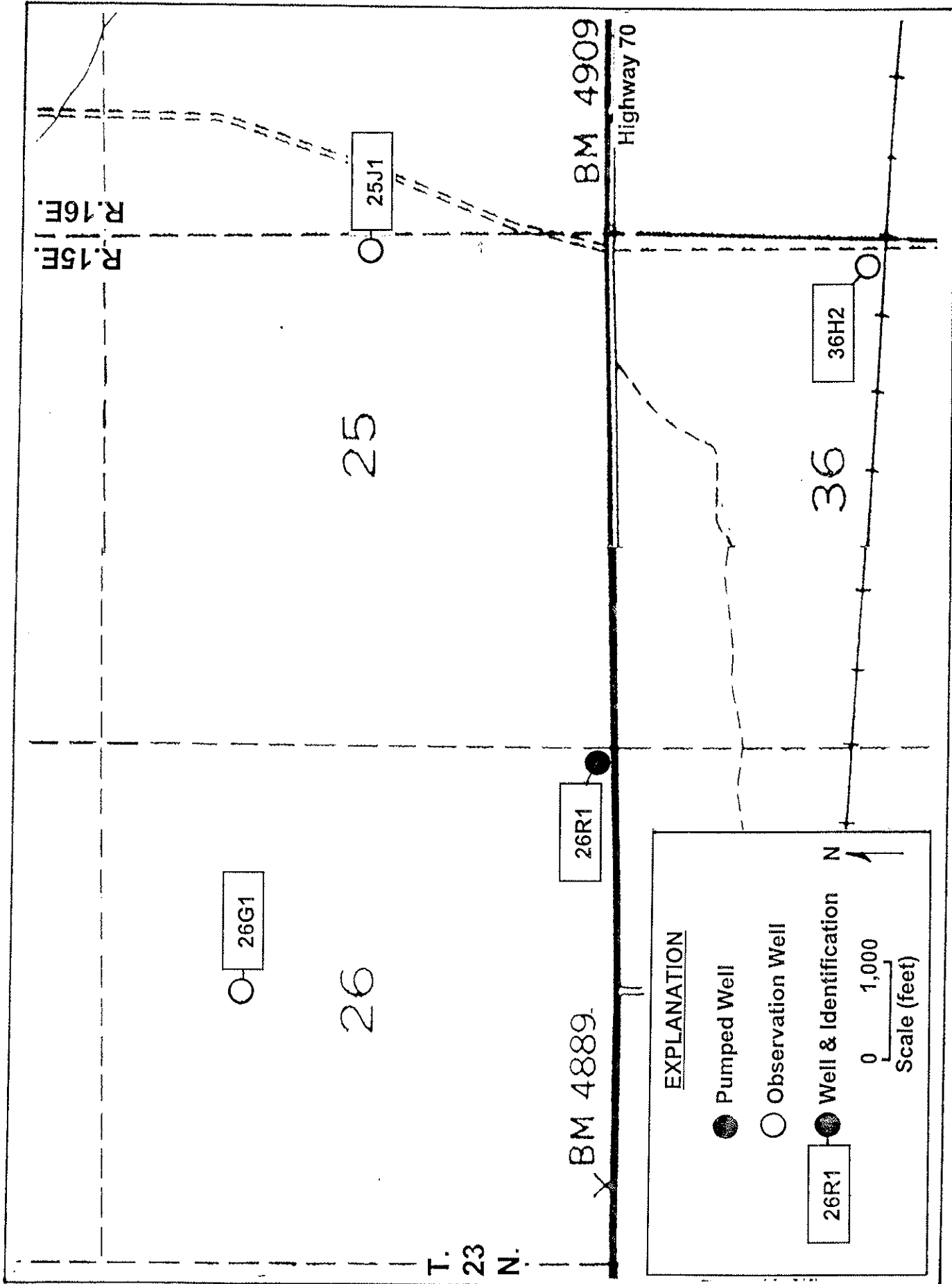


FIGURE 7- LOCATION OF WELLS USED IN GREEN GULCH RANCH TEST

pumped well. Well 25J1 is perforated from 312 to 784 feet in depth and is located about 5,500 feet from the pumped well. Well 36H2 is perforated from 636 to 688 feet in depth and is located about 6,200 feet from the pumped well. Measurements for the pump test are provided in Appendix C.

Drawdown Measurements

Pumped Well

Well 26R1 was not pumped for at least four days prior to the test. Pumping began at 8:00 AM on September 26, 2005 and continued until 8:00 AM on September 27. A total of 1,963,300 gallons was pumped and the average pumping rate was 1,365 gpm. The static water level prior to pumping was 112.5 feet below the measuring point. After about 12 hours of pumping, the pumping level was 319.8 feet. No further measurements of the pumping level could be made. After 12 hours of pumping, the drawdown was 207.3 feet, and the specific capacity was 6.6 gpm per foot. Drawdown measurements in the pumped well could not be used to determine aquifer transmissivity.

Observation Wells

Depth to water in Well 25J1 was 120.2 feet prior to pumping of Well 26R1 and was 118.1 feet at the end of pumping. Recovery measurements indicated that the water level in this well did not

respond to pumping of Well 26R1. Depth to water in Well 26G1 was 107.5 feet about four and a half hours after pumping of Well 26R1 began and was 106.9 feet at the end of the pumping period. Recovery measurements indicated that the water level in this well also was not affected by pumping of Well 26R1. Depth to water in Well 36H2 was 111.4 feet prior to pumping of Well 26R1 and 110.8 feet at the end of pumping. Recovery measurements indicate that the water-level in this well did not respond to pumping of Well 26R1.

Recovery Measurements

Pumped Well

After 24 hours of recovery, depth to water was 117.0 feet, or 4.5 feet below the static level prior to pumping. Figure 8 provides corrected recovery measurements for the pumped well. A transmissivity of 12,400 gpd per foot was indicated by these measurements, in good agreement with the specific capacity value for the test.

Observation Wells

Depth to water in Well 25J1 was 117.7 feet about seven hours after pumping stopped, or about 0.4 foot shallower than prior to when pumping stopped. Depth to water in Well 25G1 was 106.8 feet about 24 hours after pumping stopped, or 0.1 foot shallower than prior to when stopped. Depth to water in Well 36H2 was 110.2 feet

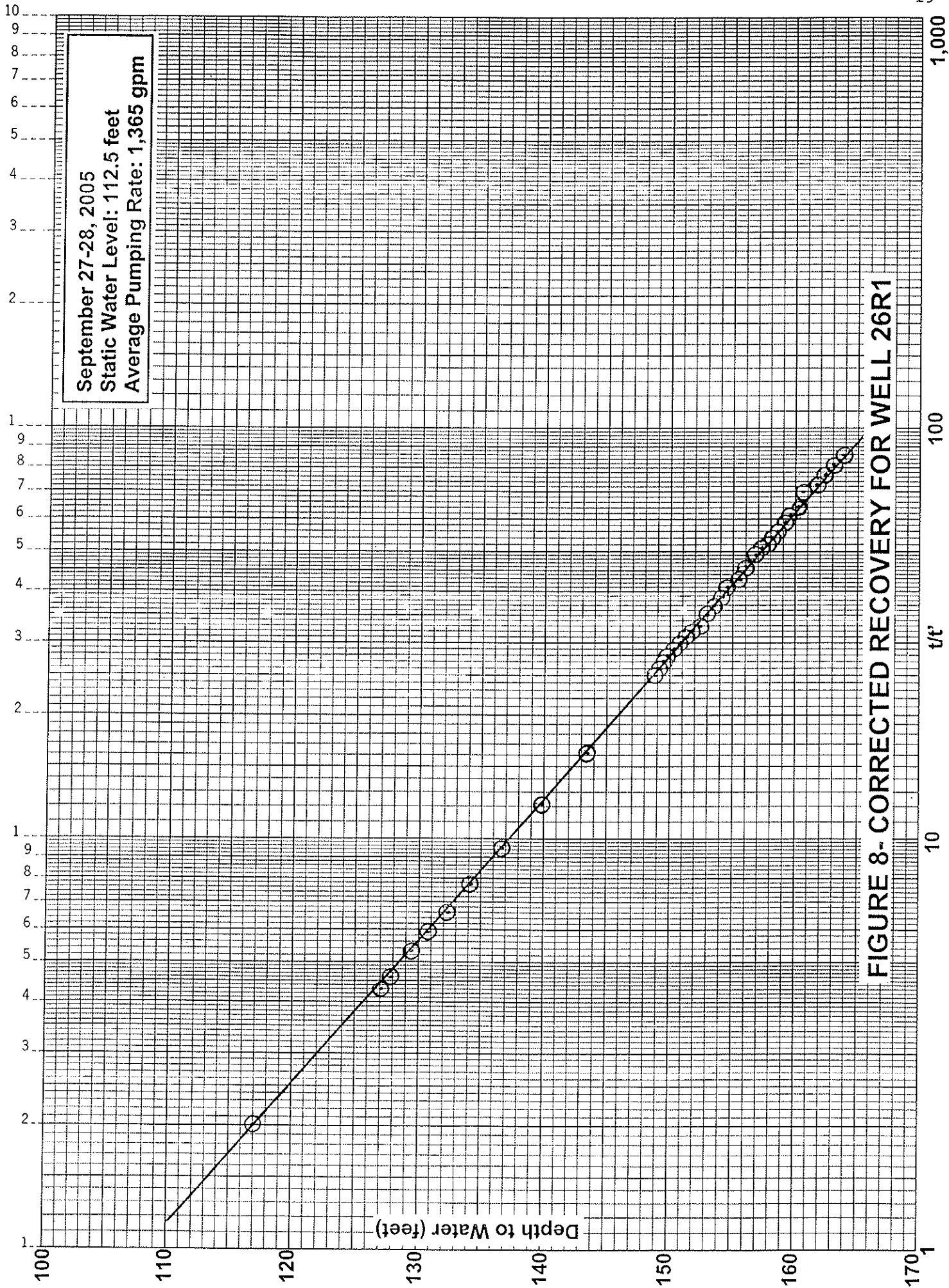


FIGURE 8 - CORRECTED RECOVERY FOR WELL 26R1

about 24 hours after pumping stopped, or 0.6 foot shallower than prior to when pumping stopped. The water levels in each of the observation wells thus didn't respond to pumping of Well 26R1, but rather indicated a water-level recovery, following the cessation of summer pumping.

SUMMARY AND CONCLUSIONS

Two aquifer tests were conducted in Sierra Valley in Fall 2005. At the Goodwin Ranch site, the best value for transmissivity was from corrected recovery measurements for the pumped well, or 13,600 gpd per foot. A storage coefficient of 0.002 was determined from measurements in an observation well within 300 feet of the pumped well. At the Green Gulch Ranch site, the best value for the transmissivity was also from corrected recovery measurements from the pumped well, or 12,400 gpd per foot. The results of these tests provide valuable information on aquifer characteristics in Sierra Valley.