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REPORT
OF
ARTESIAN WELL SUPERVISOR
ROSWELL ARTESIAN BASIN
NEW MEXICO

By
E. G. MINTON, JR.
Artesian Well Supervisor

Roswell, New Mexico

1942

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REPORT OF ARTESIAN WELL SUPERVISOR ROSWELL ARTESIAN BASIN, N. M.

E. G. MINTON, JR.
Artesian Well Supervisor

INTRODUCTION

Since March, 1931, the Roswell Artesian Basin has been under the supervision of the State Engineer by authority of an Act passed by the State Legislature, Chapter 131, Session Laws of 1931. Throughout the period of this report, the State has been cooperating with the Pecos Valley Artesian Conservancy District in the control and conservation of water. The Conservancy District, organized in 1933, has continuously plugged wells, before and throughout the period of this report.

During the period covered by this report, E. G. Minton, Jr., has held the position of Artesian Well Supervisor. Dale Gregg was on the staff from February 15, 1940, to January 1, 1942, and was used as special office engineer in preparing all artesian water rights preparatory to adjudication proceedings by the Court. On January 1, 1942, Mr. Gregg resigned to take other work.

PREPARATION FOR ADJUDICATION OF RIGHTS

Following the completion of the detailed survey of the entire Roswell Basin, Dale Gregg was assigned as office engineer for the purposes of contacting the owners of artesian water rights and assisting them in filing amended declarations of their rights to conform with the findings of the State Engineer's survey. By this procedure it was hoped to shorten considerably the time and expense involved in an adjudication suit of the groundwater rights, since it would then be necessary to hold hearings only upon those rights on which agreement could not be reached between the owner and the State Engineer's Office. This work continued into December 1941, when, because of the outbreak of hostilities, it became impossible to continue with the work.

Because of inflation due to the war, and the resulting increased amounts of money available to the general public, the buying and selling of farms in the Roswell Basin has been greatly accelerated during the last year or so. For these reasons it appears unlikely that the adjudication proceedings can be followed as originally planned. It seems inevitable that additional help and considerable more work will be necessary before the data can be in a condition to present to the court in adjudication proceedings.

ARTESIAN WELL PLUGGING

Since August 1934 when the first rig for plugging artesian wells was completed, the Pecos Valley Artesian Conservancy District has worked continuously in the plugging of leaky and abandoned artesian

wells throughout the period of this report, the district has had the assistance of the Works Progress Administration in this operation.

Up until about 1941 the Conservancy District has been engaged chiefly in the plugging of old wells which had been abandoned for many years. During that period any individual who was permitted to drill a new well was required to plug the old well at his own expense. Much difficulty was encountered by the drilling contractors in doing this work and many were not fully equipped to plug artesian wells. As a result, about 1941 the district changed their policy and began plugging all abandoned wells including those which had been replaced by new wells. It was felt by the Board of Directors of the district that all old or leaky wells could be more effectively plugged and at less cost to the tax payers per well if the district did all the work themselves.

During the period covered by this report the district plugged a total of 225 wells at a cost of \$49,869.83. Except for technical supervision, labor was furnished almost entirely by the Works Progress Administration. The following table shows the cost of this program by counties, exclusive of the labor furnished by the federal government.

| Counties | Number of Wells Plugged | Total Cost | Average Cost Per Well |
|---------------|-------------------------|-------------|-----------------------|
| Chaves County | 116 | \$26,922.22 | \$232.08 |
| Eddy County | 109 | \$22,947.61 | \$210.52 |

The average cost of plugging the 225 wells was \$221.64 per well. Since the beginning of the program in 1934 a total of 589 wells have been plugged. It is not known how many faulty or leaky wells remain to be plugged. It is estimated, however, that as many as 200 wells might be plugged by the district in the next three or four years.

OBSERVATION WELL LEVELS

Of the 100 representative wells used by Fiedler and Nye during the investigation (U.S.G.S. Water Supply Paper 639), only a few remain that can still be used for observation purposes. Most of the wells have been plugged. It has been necessary, therefore, to use other wells in these areas for observation purposes. The wells selected are as near to the original Fiedler and Nye wells as possible, in order to obtain records as nearly representative of those areas in which the original observation wells were located.

The wells are measured in January of each year, when there is little irrigation, and when the declines due to pumping have largely recovered, and the water table is relatively stable. Recordings made at this time of year have furnished the most reliable information of annual changes in artesian pressure or level. Bench marks are established at each well and elevations above sea level are determined.

The following table gives a partial list of representative well readings for the years 1927, 1931, 1936, 1940 and 1942. These years have been selected for the following reasons: 1927 represents the first year of record; 1931 was the year the basin was first placed under the control of the State Engineer; 1936 gives conditions following five years of control and supervision; 1940 was the last of about seven years of drought in the basin and the year of lowest artesian pressures on record; 1942 gives the record of artesian pressures following the year 1941 in which there was approximately 35 inches of precipitation on the basin. This is by far the highest year on record.

OBSERVATION WELL LEVELS

Chaves County

| Well No. | Location | 1927 | 1931 | 1936 | 1940 | 1942 |
|----------|-----------------------------------|----------|---------|---------|---------|-----------------|
| Be-7 | SW $\frac{1}{4}$ SE $\frac{1}{4}$ | 8-10-24 | 3575.14 | 3571.59 | | |
| Be-3 | SW $\frac{1}{4}$ SW $\frac{1}{4}$ | 9-10-24 | 3574.60 | 3571.75 | 3567.20 | 3565.96 3573.66 |
| W-36 | NE $\frac{1}{4}$ SW $\frac{1}{4}$ | 15-10-24 | 3570.00 | | | 3579.60 |
| F-51 | SW $\frac{1}{4}$ NE $\frac{1}{4}$ | 17-10-24 | | | 39.25* | 29.93* |
| P-49 | NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 21-10-24 | | | 3564.85 | 3574.32 |
| Be-40 | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 22-10-24 | 3567.00 | | 3564.37 | 3572.06 |
| S-103 | SE $\frac{1}{4}$ NE $\frac{1}{4}$ | 22-10-24 | | | +15.37* | +27.45* |
| S-114 | SW $\frac{1}{4}$ SE $\frac{1}{4}$ | 15-10-24 | | | 3563.50 | 3575.00 |
| G-3 | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 25-10-24 | 3556.48 | 3559.21 | | |
| L-42 | SE $\frac{1}{4}$ NW $\frac{1}{4}$ | 26-10-24 | 3559.00 | | | 3571.25 |
| S-34 | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | 34-10-24 | | | 3567.75 | 3576.95 |
| K-35 | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | 31-10-24 | | | 3578.03 | 3588.27 |
| G-13 | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 7-11-25 | 3579.00 | | 3569.88 | 3585.40 |
| P-4 | SE $\frac{1}{4}$ NE $\frac{1}{4}$ | 7-11-25 | 3552.60 | 3562.95 | 3555.60 | 3569.40 |
| S-73 | SE $\frac{1}{4}$ SE $\frac{1}{4}$ | 19-11-25 | 3563.00 | | 3558.00 | 3552.83 3569.50 |
| O-17 | NE $\frac{1}{4}$ NW $\frac{1}{4}$ | 22-11-25 | 3553.12 | 3561.76 | | |
| O-2 | NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 22-11-25 | | | 3546.70 | 3567.10 |
| T-17 | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 28-11-25 | | | 3553.65 | 3567.46 |
| T-14 | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 19-11-25 | 3574.00 | | 3559.90 | 3572.90 |
| M-19 | NE $\frac{1}{4}$ NW $\frac{1}{4}$ | 23-12-25 | 3535.00 | 3533.00 | 3528.59 | 3529.30 3544.40 |
| S-26 | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 15-13-25 | 3512.00 | | 3515.00 | 3515.58 3529.00 |
| T-15 | NW $\frac{1}{4}$ SW $\frac{1}{4}$ | 15-13-25 | 3516.00 | | | 3521.13 3529.80 |
| S-122 | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 27-13-25 | | | | 3518.22 3534.54 |
| M-34 | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 31-13-26 | | | 3526.50 | 3509.25 3531.50 |
| B-59 | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 28-14-26 | -28.00* | | | |
| H-90 | NW $\frac{1}{4}$ SW $\frac{1}{4}$ | 34-15-24 | | | 3586.00 | 3586.00 3598.20 |

* Elevation unknown. Figures denote water level in feet above or below ground surface datum. Plus or minus before figure indicates water level above or below ground surface

OBSERVATION WELL LEVELS

Eddy County

| Well No. | Location | 1927 | 1931 | 1936 | 1940 | 1942 |
|----------|-----------------------------------|----------|---------|---------|---------|---------|
| 2-229 | Lot 3 | 1-16-24 | 3580.00 | 3580.00 | 3577.00 | 3586.00 |
| T-13 | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 12-16-24 | 3577.65 | 3580.53 | 3572.22 | 3583.15 |
| C-65 | NW $\frac{1}{4}$ SE $\frac{1}{4}$ | 6-16-25 | | 3556.00 | 3554.70 | 3564.50 |
| 2-121 | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 9-16-25 | 3505.00 | 3484.00 | | |
| 2-178 | NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 30-16-26 | 3403.00 | 3406.05 | 3403.00 | 3420.70 |
| 2-195 | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 9-17-26 | 3393.00 | 3399.65 | 3395.45 | 3414.30 |
| C-75 | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | 9-17-26 | | | 3390.55 | 3412.40 |
| 2-74 | SW $\frac{1}{4}$ NE $\frac{1}{4}$ | 18-17-26 | | | 3405.51 | 3422.65 |
| 2-225 | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 26-17-26 | 3371.00 | | 3375.50 | 3399.66 |
| 3 | SW $\frac{1}{4}$ SE $\frac{1}{4}$ | 23-17-26 | 3384.21 | 3389.96 | 3377.95 | 3392.10 |
| 2-200 | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 32-17-26 | 3397.00 | | | 3406.17 |
| 2-11 | SW $\frac{1}{4}$ SW $\frac{1}{4}$ | 5-18-26 | 3377.00 | 3393.00 | 3391.56 | 3383.06 |
| 2-249 | NW $\frac{1}{4}$ SE $\frac{1}{4}$ | 9-18-26 | 3382.00 | | 3386.70 | 3382.53 |
| Mc-28 | NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 33-17-26 | | | 3393.35 | 3418.65 |
| 1 | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 5-18-26 | | 3388.00 | 3381.83 | |
| 0-15 | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 2-18-26 | | | 3380.20 | 3404.35 |
| 260 | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 33-18-26 | | | -11.74* | Flowing |
| 186 | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 30-18-26 | -63.00* | | | |
| 206 | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 25-19-25 | -21.00* | -23.40* | | -8.84* |
| S-30 | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 32-19-26 | | | +26.15* | +50.30* |
| K-3 | SW $\frac{1}{4}$ SE $\frac{1}{4}$ | 6-20-26 | | | +38.38* | +67.70* |

* Elevation unknown. Figures denote water level in feet above or below ground surface datum. Plus or minus before figure indicates water level above or below ground surface.

A comparison of the 1927 artesian heads with those of later years shows the results of conservation programs of the past fifteen years. The artesian head has been definitely improved. Test well data reflect a slight decrease in pressure head between 1927 and 1940, regardless of the fact that 1940 was the end of a period of very dry years. The large recharge resulting from this excessive precipitation in 1941 is reflected in the large plus changes in artesian pressure between the years 1940 and 1942.

The following figures were obtained from the yearly readings by averaging the periodic differences in heads in the test wells of successive east-west tiers of townships throughout the basin. Although this method gives equal weight to all wells regardless of location in the township tier, the data are fairly consistent and it is believed that the figures represent reasonably well the periodic changes in artesian pressures for the years of record.

APPROXIMATE CHANGES IN ARTESIAN PRESSURE IN FEET
(From Winter Test Well Readings)

| Township | 1927-1940 | 1927-1942 | 1940-1942 |
|-------------|-----------|-----------|-----------|
| 10 S. | -5.82 | + 8.66 | +10.00 |
| 11 S. | -7.50 | + 7.66 | +16.40 |
| 12 S. | -6.00 | + 9.00 | +15.00 |
| 13 S. | -4.00 | +15.00 | +15.00 |
| 16 S. | -2.73 | + 9.30 | +11.75 |
| 17 S. | -4.00 | +14.00 | +19.20 |
| 18 S. | +4.00 | +22.50 | +19.50 |
| 10 to 13 S. | -2.44 | +10.08 | +14.10 |
| 16 to 18 S. | -0.66 | +15.26 | +16.81 |
| 10 to 18 S. | -3.21 | +12.30 | +15.26 |

The absence of Townships 14 and 15 will be noted. These have been omitted because practically all of the wells in this area have been plugged and there are only one or two wells available for testing, these being too few for sufficient records. It is believed, however, that the records of the adjacent townships may be used to indicate reasonably the variations in pressure which occurred in the missing townships.

As was reported in the 12th and 13th Biennial Report, the test data revealed a slow but steady decline in artesian pressures from 1927 to 1939. The small increases in Townships 13 South and 18 South were probably due to intensive plugging operations in those areas prior to collecting the test data. In the upper Cottonwood Creek area where extensive well plugging has occurred, the pressure head has recovered and has not shown any decrease even through the dry cycle of the 1930's and 1940. In that area the pressure head continues to increase to some extent each year.

The artesian well data have been used as a rough check on the western limits of artesian flow in the basin, which may be compared with the limits shown in Water Supply Paper 639 for the year 1927. This comparison shows that with the exception of the area north of Roswell the January 1942 limits of artesian flow are all westward of the line found by Mr. Fiedler. In some areas the line has been moved to the west as much as $1\frac{1}{2}$ miles. In the Berrendo area north of Roswell the decline of artesian pressures has been checked and the basin has recovered to the extent that the western limits of artesian flows now approximate those in 1927.

ARTESIAN RECORDER WELLS

In 1925 and 1926 Mr. Fiedler installed automatic recording gages over three selected artesian wells in the basin. Up until 1940 these records have been kept by the artesian well supervisor in co-operation with the USGS and except for occasional breaks in the record the data for these three wells have been continuous since they were first installed.

In May 1940 the Pecos Valley Artesian Conservancy District obtained control of an unused artesian well about four miles southwest of Dexter, and in cooperation with the State Engineer and Geological Survey it was equipped with an automatic water stage recorder. In June and July of that year the conservancy district drilled two additional artesian test wells. One is located in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 21, Township 10 South, Range 24 East, and the other in the NE $\frac{1}{4}$ of Section 29, Township 11 South, Range 24 East. These wells have also been equipped with automatic water stage recorders. They are all serviced and maintained by the artesian well supervisor and the Geological Survey in cooperation.

Summaries of mean monthly water levels are computed for each of the six test wells, the water levels or pressures being computed to sea level datum. Where necessary, missing periods have been estimated to complete the record. These data are found in the following tables for each of the recorded wells for the four years covered by this report. All figures are given in feet elevation above mean sea level.

BERRENDO WELL

SW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 9, Township 10 South, Range 24 East. Elevation, 3586.12 feet above sea level at land surface. Highest mean annual water level, 3571.8 feet in 1942. Lowest mean annual water level 3563.0 feet in 1940. Drilled in 1912. Depth, 259 feet. Aquifers, 170 and 241 feet.

Elevation above mean sea level in feet

| Month | 1938 | 1939 | 1940 | 1941 | 1942 |
|-----------|--------|--------|--------|--------|--------|
| January | 3567.7 | 3567.3 | 3566.0 | 3565.3 | 3573.7 |
| February | 3567.1 | 3567.3 | 3566.1 | 3565.2 | 3573.8 |
| March | 3567.0 | 3565.8 | 3564.2 | 3564.8 | 3572.9 |
| April | 3565.0 | 3563.7 | 3562.1 | 3562.4 | 3571.6 |
| May | 3563.2 | 3562.8 | 3562.8 | 3566.9 | 3571.7 |
| June | 3563.0 | 3561.8 | 3561.5 | 3567.9 | 3570.2 |
| July | 3564.0 | 3562.1 | 3561.3 | 3566.1 | 3568.9 |
| August | 3561.0 | 3562.5 | 3560.0 | 3565.1 | 3567.9 |
| September | 3563.5 | 3561.4 | 3560.5 | 3567.9 | 3571.3 |
| October | 3565.7 | 3563.6 | 3562.7 | 3571.5 | 3572.6 |
| November | 3566.7 | 3564.6 | 3564.0 | 3572.8 | 3573.3 |
| December | 3567.0 | 3565.4 | 3565.0 | 3573.5 | 3573.6 |

ORCHARD PARK WELL

NW $\frac{1}{4}$ of Section 23, Township 12 South, Range 25 East. Elevation, 3546.19 feet above sea level at land surface. Highest mean annual water level, 3528.1 feet in 1942. Lowest mean annual water level, 3516.1 feet in 1940. Drilled in 1906. Depth, 810 feet. Aquifers, 790 to 800 feet.

Elevation above mean sea level in feet

| Month | 1938 | 1939 | 1940 | 1941 | 1942 |
|-----------|--------|--------|---------|--------|--------|
| January | 3535.5 | 3540.4 | 3531.0* | 3526.1 | 3544.0 |
| February | 3532.2 | 3527.6 | 3528.1 | 3523.0 | 3540.8 |
| March | 3523.2 | 3520.0 | 3516.7 | 3521.5 | 3531.6 |
| April | 3512.6 | 3511.7 | 3508.2 | 3509.6 | 3519.4 |
| May | 3512.7 | 3508.5 | 3513.0 | 3524.3 | 3520.2 |
| June | 3511.4 | 3505.8 | 3507.0* | 3527.9 | 3514.8 |
| July | 3524.4 | 3507.8 | 3506.0* | 3525.0 | 3513.5 |
| August | 3508.6 | 3505.1 | 3501.7 | 3517.4 | 3511.8 |
| September | 3516.9 | 3507.9 | 3502.6 | 3529.7 | 3526.3 |
| October | 3526.7 | 3521.7 | 3520.4 | 3540.4 | 3536.3 |
| November | 3530.8 | 3526.1 | 3529.1 | 3542.7 | 3539.0 |
| December | 3532.8 | 3529.0 | 3529.1 | 3543.7 | 3539.3 |

ARTESIA WELL

SW $\frac{1}{4}$ of Section 5, Township 18 South, Range 26 East. Elevation, 3394.5 feet above sea level at land surface. Highest mean annual water level, 3391.9 feet in 1942. Lowest mean annual water level, 3376.0 feet in 1940. Drilled in 1908. Depth, 1204 feet. Acquifers, 750 feet, 850 feet and 905 feet.

Elevation above mean sea level in feet

| Month | 1938 | 1939 | 1940 | 1941 | 1942 |
|-----------|--------|--------|---------|--------|--------|
| January | 3391.8 | 3385.0 | 3387.9 | 3381.0 | 3401.2 |
| February | 3386.9 | 3384.5 | 3382.3* | 3378.4 | 3400.9 |
| March | 3382.1 | 3380.2 | 3376.7* | 3378.7 | 3392.7 |
| April | 3374.8 | 3374.3 | 3371.0 | 3372.8 | 3386.1 |
| May | 3375.5 | 3376.2 | 3372.6 | 3384.0 | 3388.3 |
| June | 3374.4 | 3372.6 | 3371.1 | 3385.9 | 3383.6 |
| July | 3382.3 | 3369.8 | 3368.9 | 3378.1 | 3381.0 |
| August | 3374.4 | 3373.5 | 3365.0 | 3371.9 | 3378.3 |
| September | 3378.9 | 3372.4 | 3367.9 | 3383.5 | 3390.9 |
| October | 3383.3 | 3380.7 | 3378.4 | 3392.1 | 3397.6 |
| November | 3388.3 | 3383.9 | 3383.9 | 3396.4 | 3400.6 |
| December | 3388.4 | 3387.8 | 3385.7 | 3399.1 | 3401.9 |

BERRENDO-SMITH WELL

NE $\frac{1}{4}$ of Section 21, Township 10 South, Range 24 East. Elevation, 3580.65 feet above sea level at land surface. Highest mean annual water level, 3571.0 feet in 1942. Lowest mean annual water level, 3566.2 feet in 1941. Drilled in 1940. Depth, 324 feet. Acquifers, 269 feet to 288 feet; 310 feet to 324 feet.

* Estimated.

Elevation above mean sea level in feet

| Month | 1940 | 1941 | 1942 |
|-----------|--------|---------------------|--------|
| January | | 3564.5 | 3573.9 |
| February | | 3563.8 | 3573.7 |
| March | | 3563.4 | 3572.4 |
| April | | 3560.5 ^a | 3570.1 |
| May | | 3565.2 | 3570.2 |
| June | 3559.7 | 3566.1 | 3568.0 |
| July | 3559.4 | 3563.9 | 3567.2 |
| August | 3557.9 | 3563.2 | 3566.2 |
| September | 3558.4 | 3566.7 | 3570.7 |
| October | 3561.8 | 3570.9 | 3572.6 |
| November | 3563.6 | 3572.8 | 3573.5 |
| December | 3564.6 | 3573.6 | 3573.9 |

MOUNTAIN-VIEW WELL

NE $\frac{1}{4}$ of Section 29, Township 11 South, Range 24 East. Elevation, 3627.18 feet above sea level at land surface. Highest mean annual water level, 3569.6 feet in 1942. Lowest mean annual water level, 3564.2 feet in 1941. Drilled in 1940. Depth, 553 feet. Acquifers, 410 feet to 550 feet.

Elevation above mean sea level in feet

| Month | 1940 | 1941 | 1942 |
|-----------|--------|--------|--------|
| January | | 3562.3 | 3573.6 |
| February | | 3561.5 | 3573.3 |
| March | | 3560.8 | 3571.5 |
| April | | 3557.4 | 3568.9 |
| May | | 3561.9 | 3568.9 |
| June | | 3563.7 | 3566.4 |
| July | 3556.2 | 3562.1 | 3564.7 |
| August | 3553.4 | 3561.2 | 3563.5 |
| September | 3553.5 | 3564.4 | 3568.3 |
| October | 3558.2 | 3569.6 | 3571.1 |
| November | 3560.8 | 3572.0 | 3572.5 |
| December | 3562.5 | 3573.1 | 3573.1 |

GREENFIELD WELL

NE $\frac{1}{4}$ of Section 27, Township 13 South, Range 25 East. Elevation, 3523.76 feet above sea level at land surface. Highest mean annual water level 3517.5 feet in 1941. Lowest mean annual water level, 3516.4 feet in 1942. Drilled in 1940. Depth, 880 feet. Acquifers, 740 feet to 750 feet; 795 feet to 865 feet.

Elevation above mean sea level in feet

| Month | 1940 | 1941 | 1942 |
|-----------|---------|---------|--------|
| January | | 3516.7 | 3535.4 |
| February | | 3513.3 | 3531.6 |
| March | | 3511.0 | 3519.3 |
| April | | 3495.4 | 3504.5 |
| May | | 3513.0* | 3509.6 |
| June | 3496.0 | 3516.8 | 3506.0 |
| July | 3493.1 | 3515.1 | 3498.2 |
| August | 3485.0* | 3507.4 | 3498.3 |
| September | 3487.4 | 3519.7 | 3515.6 |
| October | 3508.8 | 3531.8 | 3525.1 |
| November | 3510.3 | 3534.5 | 3529.0 |
| December | 3510.5 | 3534.9 | 3529.9 |

NEW ARTESIAN WELLS

During the period covered by this report, 72 new artesian wells were drilled in the basin replacing old and leaky wells; of this number, 60 were drilled for irrigation use, while 12 were drilled for domestic use. All of the casing used was inspected and approved before being set, and the Artesian Well Supervisor or his representative was present at the time of the cementing. All of the wells met the State Engineer's rules and regulations regarding the drilling and equipping of artesian wells. These regulations are necessary not only to protect the basin against loss of water into the upper aquifers but to lengthen the life and usefulness of the wells themselves.

SHALLOW GROUND WATER

In his report on the shallow groundwater of the basin (12th and 13th Biennial Report of the State Engineer), Mr. A. M. Morgan states that approximately 45,000 acres of land are receiving water from shallow ground sources. About 35,000 acres are being irrigated solely from shallow groundwater, with the remaining 10,000 acres receiving shallow water supplemental to other sources of supply, such as surface water or artesian water.

Five test wells equipped with automatic water stage recorders are maintained by the State Engineer in cooperation with the U.S.G.S. Records of these wells reveal a steady decline in the water table until the year 1941 when unusual precipitation caused a substantial recharge. The heavily pumped areas in the vicinity of Dexter and Hagerman show a particularly large decline in water table because of the heavy draught upon the underground reservoirs.

The logs of 155 shallow wells have been filed in the Artesian Well Supervisor's Office of which 102 were drilled for irrigation purposes and the rest for domestic use.

* Estimated.

In April 1937 the Geological Survey in cooperation with the State Engineer selected 46 shallow observation wells in which regular monthly water level measurements have been made continuously. As a further check the Geological Survey makes spot measurements on the water levels in approximately 400 shallow wells of the basin. During January or February of each year, when the water levels are relatively stable, the changes in water level over given time periods are plotted on maps of the basin and contour lines of equal water level change are drawn.

It was determined that there was a general lowering of the water levels in the western part of the area irrigated from shallow water sources, particularly in January 1938 and January 1939. During the same period a general rise was observed in the levels in the eastern part of the area. During 1939 shallow water levels lowered over practically all of the irrigated areas in a belt from five to nine miles wide, and extending from Dayton to a few miles north of Roswell. In Chaves County the changes varied from a small rise to a decline of 6 ft., the latter occurring between Lake Arthur and Orchard Park. In Eddy County the lowering averaged about $1\frac{1}{2}$ ft. over an irrigated area of about 75 square miles.

From 1937 through 1939 the water levels declined over 9 ft. in the heavily pumped sections in Chaves County. The average decline was about 3 ft. The rise in water levels which occurred during 1938 along the Pecos River was reversed in the 1939 season and the water levels declined over almost all of that area.

During 1940 the water levels again fell over a greater part of the basin, the decline ranging from a few one hundredths of a foot to a maximum of about 6 ft. During the year 1941 the water levels rose sharply because of the unusually large precipitation which occurred during that season. Water levels over the basin were in general higher than those in 1938, and the indication was that they equaled the winter water levels of 1927. In the Roswell area the rise largely resulted from the flood of the basin by the waters of the Hondo River.

In one area in Townships 13 and 14 S., Range 25 E., and extending northward about four miles into Township 12 S., Range 25 E., the 1942 levels were lower than those in 1938. In this area the water levels declined about 5 ft. due in general to the heavy pumping occurring in this area.

CONCLUSION

The results of the control program initiated by the State Engineer and the well plugging program of the Conservancy District have been very encouraging. During the ten year period from 1931 to 1942 it was not possible for a number of reasons to obtain accurate measurements of the results of the programs. Part of this condition was due to the unusual season of 1941. In general, however, the two programs have done

much to benefit the basin and in conserving the artesian supply. Acknowledgement is hereby made to Mr. M. Y. Monical, President, and other personnel of the Pecos Valley Artesian Conservancy District for their valuable assistance and cooperation with the State Engineer's Office.