

GROUND WATER IN THE LINN DISTRICT, NORTH-CENTRAL HIDALGO COUNTY, TEXAS

By
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This paper contains a resume of data obtained in the Linn district by Dr. J. T. Lonsdale in 1933 and 1939, by G. H. Cromack in 1945, and by the writer in 1947. The table of well records on pages 3 and 4 gives a general description of 25 shallow irrigation wells and 4 deep wells in the district, and the table on page 6 gives the chemical analyses of water from 13 of the wells. The driller's log of one of the deep wells (No. 734), just north of the irrigated district, is shown on page 5.

Shallow irrigation wells. - Two of the shallow irrigation wells in the Linn area, nos. 746 and 751, reported to have been drilled about 1930, are still in operation. From 1937 to 1940, 10 additional wells were put in service, and by June 1947 approximately 30 wells had been equipped with turbine pumps. The wells range in depth from 78 to 128 feet and reach the top of the water-bearing sand at depths ranging from 40 to 70 feet, depending more or less upon the topography. In the three wells for which data are available, nos. 746, 752, and 756, the sands are respectively 50, 44, and 58 feet thick. The static water levels range from 30 to 55 feet below the surface. It is reported that 13 shallow wells were drilled that did not yield enough water to justify the use of turbine pumps; the maximum yield that can be sustained is probably about 500 gallons a minute. All yields given in the table of well records are either estimated or reported. All the pumps are propelled by gasoline engines and the speed of the pump is adjusted to the maximum yield that the well can sustain.

A comparison of measurements made in 1945 and 1947 shows that there has been a considerable decline in water levels in some of the wells.

Irrigation practice varies widely according to the crops, which consist of citrus fruits, vegetables, and flowers. Fruit trees are irrigated once a month, on the average, with about $1\frac{1}{2}$ inches of water; vegetables require more water. The floral companies report that in winter their pumps run almost continuously. The areas irrigated by water from individual wells are said to range from 30 to 50 acres in extent.

The extent of the area in which shallow water irrigation wells have been developed successfully is about 12 square miles. It is said to be limited on the east and south by increasing salinity of the ground water. Wells east of the Southern Pacific Railway generally yield water that is too high in chloride for continuous use. For example, the water from well 755 contains

605 parts per million of chloride. One irrigation well (not listed in this report), about half a mile north of well 735, is in use on the Santa Anita Ranch. Not enough wells have been drilled west of the area to determine the possibilities of extending the area westward.

Deep wells. - The four deep wells recorded in the area, nos. 734, 739, 740, and 749 are, respectively, 1,020, 1,710, 910, and 1,404 feet deep. A log of well 734 is given on page and electrical logs for wells 739 and 740 are available in the Austin office of the United States Geological Survey. Measurements in 1944 and 1945 show the approximate natural flow of the wells, in gallons a minute, as follows: 734, 3; 739, 25; 740, 25; and 749, 300. The sodium in the water is high in proportion to the calcium and magnesium, and for this reason it may not be suitable for long-term irrigation except on very well drained soils.

Records of wells in Linn district, Hidalgo County, Texas

| Well | Distance from Linn | Owner | Date completed | Depth of well (ft.) | Water level | | Date of measurement | Yield (gallons a minute) | Method of lift | Use of water | Remarks |
|------|--------------------|---------------------|----------------|---------------------|--------------------------|----|-------------------------------|--------------------------|----------------|--------------|--|
| | | | | | Below land surface (ft.) | a/ | | | | | |
| 573 | 4½ miles southwest | J.E. Garrett | 1938 | 88 | d/51 | | Sept. 1, 1939 | 100 | T.G | Irr | Irrigates about 45 acres |
| 574 | 3½ miles southwest | Ivan A. White | 1929 | 85 | 34.9 | | June 21, 1945 | 400 | T.G | Irr | Irrigated about 10 acres of orchard and 20 acres of field crops in 1939. Re-drilled in 1938 |
| 575 | 2½ miles southwest | O. Mayhew | 1938 | 78 | d/32 | | Sept. 2, 1939 | 300 | T.G | Irr | Do. |
| 577 | 1½ miles southwest | Southern Floral Co. | 1937 | 88 | d/30.5 41.6 | | Sept. 2, 1939 June 7, 1947 | 300 | T.G | Irr | Irrigated 50 acres of plants and flowers in 1939. |
| 734 | 2½ miles northeast | Guerra Bros. | 1944 | 1,020 | d/+19 | | 1944 | 3 | Flows | S | Temperature 89½° F. See log. |
| 735 | 2½ miles northwest | Jesse Gaston | -- | 85 | -33.0 | | June 10, 1947 | 125 | T.G | Irr | |
| 736 | 1½ miles west | Niel Tennis | -- | 85 | -- | | -- | 350 | T.G | Irr | Pumping level 47.5 feet below land surface at estimated yield of 350 gallons a minute |
| 737 | 1 mile southwest | A. K. Polis | 1947 | 85 | -30.1 | | June 9, 1947 | -- | T. | Irr | Yield not tested; reported weak. |
| 738 | do. | do. | 1947 | 85 | 30.8 | | do. | -- | T. | Irr | Yield not tested. |
| 739 | 7 miles east | H. L. McBride | 1945 | 1,710 | + | | June 16, 1945 | 7125 | Flows | Irr | Temperature 96° F. Electrical log available at Austin office. |
| 740 | 1½ miles south | W. M. Doughty | 1939 | 910 | + | | May 11, 1945 | 25 | Flows | S | Temperature 91½° F. |
| 741 | 2 miles southwest | A. K. Polis | 1945 | 80 | 33.0 | | June 9, 1947 | 500 | T.G | Irr | Irrigates about 100 acres of orchard. |
| 742 | 2½ miles southwest | do. | 1945 | 80 | 29.6 40.5 | | June 21, 1945 June 9, 1947 | -- | T.G | Irr | Casing: 10 feet of 10-inch. Yield not tested. |
| 743 | do. | do. | 1938 | 78 | 35.1 | | June 9, 1947 | 300 | T.G | Irr | Irrigates about 60 acres of orchard. Pumped continuously for about 25 hours once a month. Temperature 78° F. |
| 744 | 2½ miles southwest | do. | -- | 80 | 31.5 36.9 | | June 21, 1945 June 9, 1947 | 300 | T.G | Irr | Dug and drilled. |
| 745 | 3 miles southwest | Southern Floral Co. | 1945 | 76 | 29.3 | | June 21, 1945 | -- | T.G | Irr | |
| 746 | 2½ miles southwest | Joe V. Hobson | 1930 | 90 | d/30 39.95 | | June 21, 1945 June 7, 1947 | 300 | T.G | Irr | Water-bearing sand reported from 40 to 90 feet. Pump set at 80 feet. Owner reports pump breaks suction at yield of 500 gallons a minute. |

a/ Measuring point is usually above ground at top of casing, pump base, pipe clamp or well curb. If below ground the figures are preceded by a minus (-) sign.

b/ Pump or lift: T, Turbine; Cf, centrifugal; C, cylinder.

Power: E, electric; G, gasoline engine; O, oil engine or diesel; Tr, tractor; W, windmill; H, hand. Number indicates horsepower.

c/ Use of water: D, domestic; S, stock; Irr, irrigation; PS, public supply; N, not used.

d/ Water level reported.

Records of wells in Linn district, Hidalgo County-- Continued

| Well | Distance from Linn | Owner | Date completed | Depth of well (ft.) | Water level | | Yield (gallons a minute) | Method of lift | Use of water | Remarks |
|------|--------------------|-----------------------|----------------|---------------------|--------------------------|-------------------------------|--------------------------|----------------|--------------|---|
| | | | | | Below land surface (ft.) | Date of measurement | | | | |
| 747 | 2½ miles southwest | -- Bourman | 1930 | 90± | d/30 | 1945 | -- | T.G | Irr | Irrigates 45 to 50 acres garden. |
| 748 | 2½ miles southwest | Rio Grande Floral Co. | 1940 | 78 | 27.7 31.5 | June 20, 1945 June 8, 1947 | 300 | T.G | Irr | Irrigates ferns and flowers. Temperature 78½° F. |
| 749 | 2¼ miles southwest | J. P. Cruise | 1945 | 1,494 | + | June 11, 1945 | 300 | Flows | S. Irr | Electrical log available at Austin office. |
| 750 | 3 miles southwest | Juan Medina | 1945 | 80 | 26.9 | June 21, 1945 | 300 | T.G | Irr | Irrigates 56 acres fruit and vegetables. |
| 751 | 3¼ miles southwest | O. J. Blaue | 1931 | 80 | 36.2 | June 9, 1947 | 300 | T.G | Irr | Temperature 79° F. |
| 752 | 5 miles southwest | Renaldo Vela | 1945 | 92 | 42.7 | June 21, 1945 | -- | -- | Irr | Sand reported from 48 to 92 feet. |
| 753 | 3¼ miles south | Clay Everhart | 1945 | 88 | d/32 35.9 | May 12, 1945 June 9, 1947 | 300 | T.Tr | Irr | Casing 45 feet of 12-inch inch. Pump set at 80° feet. Temperature 79° F. |
| 754 | 4¼ miles south | Fred Mischler | -- | 90± | d/30 35.1 | 1945 June 9, 1947 | 200 | T.G | Irr | Water reported in sand from 70 to 128 feet. Not used. |
| 755 | do. | C. C. Coones | 1946 | 90 | 37.2 | June 9, 1947 | 200 | T.G | Irr | Drawdown 27 feet after 10 minutes at 200 gallons a minute. Pump set at 87 feet. Sand and sandstone 45 to 90 feet. Reported failure to increase yield with dynamite. |
| 756 | do. | do. | 1945 | 128 | 55.1 | May 12, 1945 | -- | -- | -- | Water-bearing sand reported to be 58 feet thick. |
| 757 | 2½ miles southwest | S. L. Turner | 1936 | 80± | 31.2 | June 10, 1947 | 400 | T.G | Irr | Used 13 to 14 hours daily. Drawdown 15 feet after 10 minutes at 400 gallons a minute. |

a/ Measuring point is usually above ground at top of casing, pump base, pipe clamp or well curb. If below ground the figures are preceded by a minus (-) sign.

b/ Pump or lift: T, turbine; Cf, centrifugal; C, cylinder.
Power: E, electric; G, gasoline engine; O, oil engine or diesel; Tr, tractor; W, windmill; H, hand. Number indicates horsepower.

c/ Use of water: D, domestic; S, stock; Irr, irrigation; PS, public supply; N, not used

d/ Water level reported.

Driller's log, Linn district, Hidalgo County, Texas

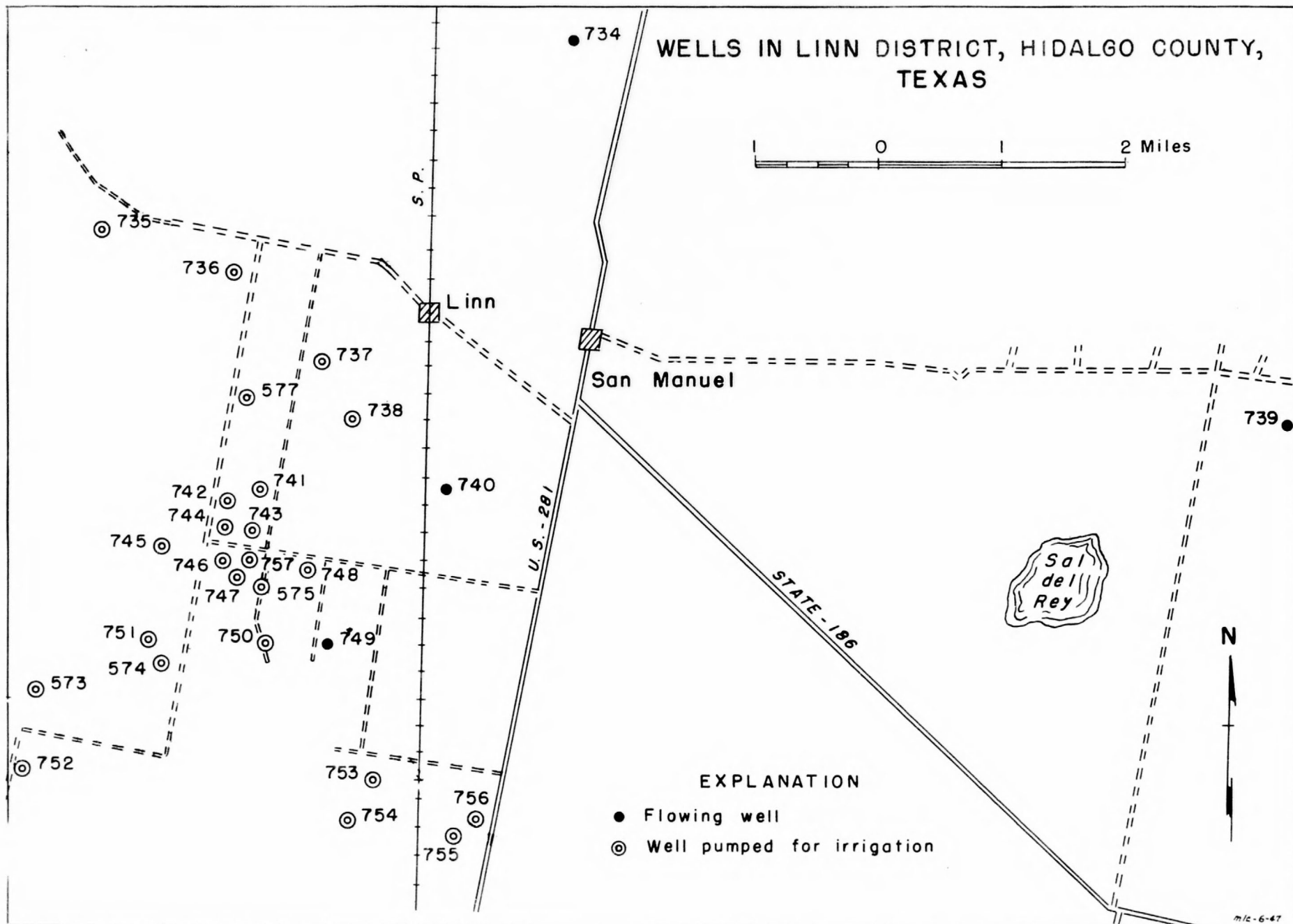
| | Thickness (feet) | Depth (feet) |
|---|---------------------|-----------------|
| Well 734 | | |
| Guerra Brothers, 2½ miles northeast of Linn | | |
| Soil | 18 | 18 |
| Caliche | 52 | 70 |
| Sand | 20 | 90 |
| Clay | 90 | 180 |
| Sand | 20 | 200 |
| Clay and rock | 60 | 260 |
| Clay and sand | 48 | 308 |
| Clay | 107 | 415 |
| Sand | 61 | 476 |
| Clay | 18 | 494 |
| Sand | 51 | 545 |
| Clay | 38 | 583 |
| Sand | 15 | 598 |
| Clay | 54 | 652 |
| Sand | 26 | 678 |
| Clay and rock | 38 | 716 |
| Clay and sand | 14 | 730 |
| Clay | 10 | 740 |
| Sand | 20 | 760 |
| Clay | 37 | 797 |
| Rock | 3 | 800 |
| Sand | 30 | 830 |
| Clay | 35 | 865 |
| Sand | 45 | 910 |
| Clay | 18 | 928 |
| Sand | 17 | 945 |
| Clay | 45 | 990 |
| Water sand | 30 | 1020 |
| TOTAL DEPTH | | 1020 |

Analyses of water from wells in the vicinity of Linn, Hidalgo County, Texas
(Results are in parts per million)

| Well | Owner | Depth of well (ft.) | Date of collection | Dissolved solids | Cal- cium (Ca) | Magne- sium (Mg) | Sodium and potassium (Na + K) | Bicar- bonate (HCO ₃) | Sul- fate (SO ₄) | Chlo- ride (Cl) | Ni- trate (NO ₃) | Total hardness as CaCO ₃ |
|------|-----------------------|------------------------------|-----------------------|---------------------|----------------------|------------------------|-------------------------------------|---|------------------------------------|-----------------------|------------------------------------|---|
| 577 | Southern Floral Co. | 88 | Sept. 1, 1939 | - | 56 | 32 | 264 | 381 | 109 | 292 | 9.8 | 271 |
| 734 | Guerra Bros. | 1,020 | May 5, 1945 | 2,020 | 53 | 14 | 623 | 123 | 928 | 338 | 1.8 | 190 |
| 739 | H. L. McBride | 1,710 | June 16, 1945 | 1,420 | 37 | 8.7 | 460 | 258 | 518 | 268 | 0.8 | 128 |
| 740 | W. M. Doughty | 910 | May 11, 1945 | 1,290 | 12 | 5.7 | 474 | 252 | 206 | 468 | 1.8 | 54 |
| 743 | A. K. Polis | 80 | June 21, 1945 | 1,020 | 61 | 44 | 259 | 192 | 102 | 438 | 19 | 333 |
| 745 | Southern Floral Co. | 90 | do. | 1,340 | 66 | 49 | 372 | 364 | 155 | 495 | 21 | 366 |
| 746 | Joe V. Hobson | 90 | do. | 938 | 74 | 41 | 211 | 201 | 145 | 330 | 38 | 353 |
| 748 | Rio Grande Floral Co. | 90 | June 16, 1945 | 814 | 58 | 33 | 199 | 204 | 94 | 299 | 31 | 280 |
| 749 | J. P. Cruise | 1,504 | May 11, 1945 | 1,260 | 9.8 | 4.4 | 466 | 305 | 226 | 402 | 1.5 | 42 |
| 751 | O. J. Blaue | 80 | June 21, 1945 | 953 | 67 | 36 | 241 | 248 | 104 | 360 | 23 | 315 |
| 753 | Clay Everhart | 88 | May 12, 1945 | 1,290 | 71 | 50 | 352 | 330 | 127 | 528 | 1.9 | 382 |
| 755 | C. C. Coons | 90 | June 8, 1947 | 1,870 | 108 | 55 | 528 | 636 | 252 | 605 | 9.6 | 496 |
| 757 | S. L. Turner | 85 | June 10, 1947 | 1,220 | 60 | 37 | 252 | 408 | 167 | 388 | 14 | 302 |

WELLS IN LINN DISTRICT, HIDALGO COUNTY, TEXAS

0 1 2 Miles



EXPLANATION

- Flowing well
- ⊙ Well pumped for irrigation