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PUBLIC WATER SUPPLIES IN WESTERN TEXAS

By
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PREPARED IN COOPERATION WITH THE UNITED STATES
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ILLUSTRATIONS

Figure 1. Index map showing location and type of public water supplies and ground-water subdivisions in western Texas

PUBLIC WATER SUPPLIES IN WESTERN TEXAS

By

W. L. Broadhurst, R. W. Sundstrom, and D. E. Weaver

ABSTRACT

This report gives a summarized description of the public water supplies in a region comprising 81 counties of western Texas and lying generally west of the hundredth meridian. It is the fourth and last of this series of reports concerning the public water supplies of the State. It gives the available data for each of 142 communities as follows: The population of the community; the name of the official from whom the information was obtained; the ownership of the waterworks, whether private or municipal; the source of supply, whether ground water or surface water; the amount of water consumed; the facilities for storage; the number of customers served; the character of the chemical and sanitary treatment of the water, if any; and the chemical analyses of the water. Where ground water is used the following are given also: Records of wells, including drillers' logs; character of the pumping equipment; and yield of the wells and water-level records where they are available.

Of the 142 public supplies, 133 are obtained from ground water, 5 from surface water, and 4 from a combination of both. The total amount of water used for public supply in the region averages about 78,000,000 gallons a day. Of this amount about 61,000,000 gallons a day is ground water and about 17,000,000 gallons a day is surface water.

The ground-water resources of the region from which public water supplies are drawn occur in rocks that range in age from Permian to Quaternary. The Ogallala formation of Tertiary age, which covers about 35,000 square miles of the High Plains in Texas, is the most important ground-water reservoir in the region. The formation furnishes water for 78 public supplies and for irrigating about 1,000,000 acres of land. The amount of water used for irrigating amounted to about 1,000,000 acre-feet in 1948. The Trinity and Fredericksburg groups of Lower Cretaceous age supply ground water in the western part of the Edwards Plateau, which constitutes an area of more than 22,000 square miles. These formations furnish small to large supplies to 20 municipalities. Sands of the Dockum group of Triassic age furnish meager to moderate supplies of water for 10 municipalities in areas east of the southern part of the High Plains and in the northern Pecos Valley in Texas. Local alluvial, bolson, or volcanic deposits furnish ground water in small to large amounts in scattered localities in the remainder of the region. The Permian rocks are of little importance as a source of ground water for public supply, owing to the highly mineralized water in them.

The results of the chemical analyses of 206 samples of water obtained from the public supplies of the region are given in this report. The analyses are reported in parts per million and in equivalents per million for those ions entering into ionic balance. Of the samples analyzed 57 percent contained silica in excess of 20

parts per million; about 9 percent contained iron in excess of 0.3 part per million; 78 percent had hardness in excess of 200 parts per million; about 18 percent contained sulfate in excess of 250 parts per million; 10 percent contained chloride in excess of 250 parts per million; 3 percent contained nitrate in excess of 20 parts per million; 37 percent contained fluoride in excess of 2 parts per million; and 12 percent contained dissolved solids in excess of 1,000 parts per million.

INTRODUCTION

Extent of Area and Scope of Report

This report gives a summarized description of the public water supplies in a region comprising 81 counties of western Texas and lying generally west of the hundredth meridian. It is the fourth and last of a series of reports 1/ on the public water supplies of Texas prepared by the United States Geological Survey in cooperation with the Texas Board of Water Engineers.

The need for certain basic data in the study of quantitative and qualitative problems of public water supply has long been apparent. This has been brought into sharper focus in Texas in recent years by the great increase in the demands for water for public and industrial supply. The phenomenal growth of many Texas cities has resulted in the need from time to time for expanding or rebuilding the waterworks systems. Some of the municipalities still use the original source of supply, some have developed additional sources of ground water, and others have replaced inadequate supplies of ground water with surface water.

This report gives in condensed form the available data for each municipality, as follows: Population of the community; name of the official from whom the information was obtained; ownership of the waterworks, whether private or municipal; source of supply, whether ground water or surface water; amount of water consumed; facilities for storage; number of customers served; character of the chemical and sanitary treatment of the water, if any; and the chemical analyses of the water. Where ground water is used the following are given also: Records of wells, including drillers' logs; character of the pumping equipment; and yield of the wells and water-level records where they are available. Unfortunately, many of the municipalities have kept poor records and some no records at all, and the information given for such municipalities necessarily is incomplete. The lack of data regarding the amount of water pumped and the resulting changes in water level or artesian pressure in the wells since they were drilled is unfortunate. Such information is of great importance, particularly in areas where the draft on the underground supplies approaches the practical limits of development.

Five of the 81 counties in the region have no public water supplies. The region has an area of 107,272 square miles and in 1940 had a population of 892,418. About half the people live in communities served by the public water supplies described in this report. The total amount of water pumped by these communities averages about 78,000,000 gallons a day. Of this amount about 61,000,000 gallons is ground water and about 17,000,000 gallons is surface water. Ground water is used at 133 localities, surface water at 5, and a combination of ground and surface water at 4.

1/ Sundstrom, R. W., Hastings, W. W., and Broadhurst, W. L., Public water supplies in eastern Texas: U. S. Geol. Survey Water-Supply Paper 1047, 1948.

Sundstrom, R. W., Broadhurst, W. L., and Dwyer, Mrs. B. C., Public water supplies in central and north-central Texas: U. S. Geol. Survey Water-Supply Paper 1069, in press.

Broadhurst, W. L., Sundstrom, R. W., and Rowley, Mrs. J. H., Public water supplies in southern Texas: U. S. Geol. Survey Water-Supply Paper 1070, in press.

Acknowledgments

The data presented in this report were collected by engineers and geologists of the Federal Geological Survey and the Texas Board of Water Engineers who are engaged in ground-water studies in Texas. The field work was done by J. R. Barnes, R. L. Cushman, J. H. Danta, W. C. Ellis, D. B. Knowles, J. W. Lang, E. R. Leggatt, R. A. Scalapino, and the writers. This report was prepared and written jointly by W. L. Broadhurst and R. W. Sundstrom, except for the section on the analyses of water which was written by D. E. Weaver. The analyses of water were made in the laboratory of the Geological Survey at Austin. Assistance given by city officials and well drillers, who furnished most of the information, is gratefully acknowledged.

GROUND WATER

The ground-water reservoirs of the region from which the public water supplies are drawn occur in rocks that range in age from Permian to Quaternary. The Permian rocks are of minor importance as a source of public water supply in Texas, owing to the highly mineralized water in them. The city of Paducah in Cottle County is believed to be the only city in the region using ground water from the Permian rocks, and the water it uses is highly mineralized. The most important sources of ground water are the Dockum group of Triassic age, which furnishes ground water for 10 localities; the Trinity and Fredericksburg groups of Lower Cretaceous age, which supply 21 localities; the lavas of Tertiary age, which are believed to supply 3 localities; the Ogallala formation of Tertiary age, which supplies 78 localities; and alluvial and bolson deposits of Quaternary age, which supply 27 localities.

For convenience in summarizing the sources of ground water, the region has been divided into five areas as shown in figure 1.

Area A

In Area A the ground-water supplies are obtained principally from the Ogallala formation of Tertiary age, and in a few localities in the southern part of the area some ground water for public supply is obtained from the underlying sands of Cretaceous age. The Ogallala formation, which covers about 35,000 square miles of the High Plains in Texas, is by far the most important ground-water reservoir in the region. It not only furnishes water for 78 public supplies in Area A, but approximately 1,000,000 acre-feet of water was pumped from about 8,500 irrigation wells to irrigate about 1,000,000 acres of land in 1948. The sediments were deposited by wind action and by streams, some of which long ago in geologic time had their headwaters in the Rocky Mountains. The Ogallala rests on an uneven floor of older rocks which were eroded into valleys and ridges before the Ogallala was deposited. However, owing to subsequent erosion, it has been completely removed from the valleys of the Pecos and Canadian Rivers. The formation ranges from a feather edge to nearly 600 feet in thickness, but in most places it is between 200 and 300 feet thick. It is composed chiefly of silt and fine-grained sand but contains some coarse sand and gravel. The coarser sediments which usually yield water freely to wells are present at all horizons but are most prominent in the lower part of the formation. The cities that are believed to draw some water from the underlying Cretaceous sands in the southern part of Area A are Lubbock, Lamesa, Seagraves, and Seminole.

Area B

Area B lies eastward from the High Plains escarpment. Along the border of the escarpment and in the southwestern part of the area, ground-water supplies are obtained from sandstones in the Dockum group of Triassic age in six localities, but these sandstones generally yield only meager supplies to wells. In the remainder of the area all the ground-water supplies are obtained from shallow alluvial deposits, except at Paducah where highly mineralized water is drawn from Permian rocks. Alluvial deposits furnish ground water for public supply in 15 localities, but in general these deposits are thin, and ground water suitable for public supplies and in large quantities is difficult to obtain in most of the area.

Area C

Area C extends southward from Areas A and B. It covers about 22,000 square miles and includes the western part of the Edwards Plateau. Sands and limestones of the Trinity and Fredericksburg groups of Lower Cretaceous age furnish all the public water supplies in the area. Del Rio uses water from San Felipe Springs, which issue from these rocks. The amount of ground water that can be obtained from the Lower Cretaceous rocks in the area varies greatly from place to place. In parts of the area erosion has formed deep valleys and much of the ground-water reservoir has been drained; in some places the sands of the Trinity group are thin or have a low permeability, or both; but in other places large supplies are furnished from both the sands of the Trinity group and limestones of the Fredericksburg group.

Area D

Area D comprises a large part of the region lying west of Area C. The ground-water reservoirs that furnish water for public supply in the area are found in the alluvial and bolson outwash deposits of Quaternary age, except in the northeastern part of the area where the public supplies of Pecos, Barstow, Kermit, Monahans, and Imperial are obtained from ground-water reservoirs in the Dockum group of Triassic age. The amount of ground water that can be obtained from the alluvial and bolson deposits varies greatly from place to place, and in many places the ground water in these deposits is highly mineralized. The Triassic rocks yield water acceptable for domestic purposes but the reservoirs generally do not yield large quantities of water to wells.

Area E

In Area E, which lies within Area D, ground water for public supply is obtained in part from volcanic lavas of Tertiary age, and perhaps in part from Cretaceous rocks that underlie the lava and from alluvium.

LIST OF MUNICIPALITIES AND PROBABLE SOURCE OF SUPPLY

The following table lists 137 of the municipalities in the region covered by this report that obtain their public water supplies in whole or in part from ground water, and gives the probable water-bearing formation or groups of formations from which the water is drawn.

Municipality	Probable water-bearing unit
Adrian	Ogallala formation
Alpine	Tertiary volcanic lava
Amarillo	Ogallala formation
Amherst	Do.
Andrews	Do.
Anton	Do.
Barnhart	Trinity group
Barstow	Dockum group
Big Lake	Trinity group
Big Spring	Alluvium
Booker	Ogallala formation
Borger	Do.
Bronte	Alluvium
Brownfield	Ogallala formation
Canadian	Alluvium
Canyon	Dockum group
Channing	Ogallala formation
Childress	Alluvium
Christoval	Trinity group
Clarendon	Ogallala formation
Claude	Do.
Coahoma	Do.
Colorado City	Dockum group
Crane	Alluvium
Crosbyton	Ogallala formation
Denver City	Do.
Dickens	Dockum group
Dimmitt	Ogallala formation
Dodson	Alluvium
Dougherty	Ogallala formation
Dumas	Do.
Eldorado	Fredericksburg group
El Paso	Alluvium and bolson deposits
Estelline	Alluvium
Fabens	Bolson deposits
Farwell	Ogallala formation
Floydada	Do.
Follett	Do.
Forsan	Trinity group
Fort Hancock	Bolson deposits
Fort Stockton	Trinity group
Friona	Ogallala formation
Grandfalls	Alluvium
Groom	Ogallala formation
Gruver	Do.
Hale Center	Do.
Happy	Do.
Hartley	Do.
Hadley	Do.
Hereford	Do.
Hermleigh	Dockum group
Higgins	Ogallala formation
Hitchland	Do.

Municipality	Probable water-bearing unit
Idalou	Ogallala formation
Imperial	Dockum group
Iraan	Trinity group
Jayton	Alluvium
Kermit	Dockum group
Lamesa	Ogallala formation and Trinity group
Lefors	Ogallala formation
Levelland	Do.
Littlefield	Do.
Lockney	Do.
Lorenzo	Do.
Lubbock	Ogallala formation and Trinity group
McCamey	Trinity group
McLean	Ogallala formation
Memphis	Do.
Mertzon	Trinity group
Miami	Ogallala formation
Midland	Do.
Monahans	Dockum group
Morse	Ogallala formation
Morton	Do.
Muleshoe	Do.
Odessa	Trinity group
O'Donnell	Ogallala formation
Olton	Do.
Ozona	Trinity group
Paducah	Permian rocks
Pampa	Ogallala formation
Panhandle	Do.
Perryton	Do.
Petersburg	Do.
Plainview	Do.
Plains	Do.
Post	Do.
Pringle	Do.
Quitaque	Alluvium
Ralls	Ogallala formation
Rankin	Trinity group
Roaring Springs	Alluvium
Robert Lee	Do.
Rock Springs	Trinity group
Roscoe	Ogallala formation
Rotan	Dockum group
Sanatorium	Alluvium
Sanderson	Trinity group
Santa Rita	Do.
Seagraves	Ogallala formation and Trinity group
Seminole	Do.
Shamrock	Ogallala formation
Silverton	Do.

Municipality	Probable water-bearing unit
Skellytown	Ogallala formation
Slaton	Do.
Snyder	Alluvium and Dockum group
Sonora	Fredericksburg group
South Plains	Ogallala formation
Spearman	Do.
Spur	Alluvium
Stanton	Ogallala formation
Stinnett	Do.
Stratford	Do.
Sudan	Do.
Tahoka	Do.
Texline	Do.
Texon	Trinity group
Tornillo	Bolson deposits
Tulia	Ogallala formation
Turkey	Alluvium
Van Horn	Bolson deposits
Vega	Ogallala formation
Wellington	Alluvium
Wheeler	Ogallala formation
White Deer	Do.
Wildorado	Do.
Ysleta	Bolson deposits

SURFACE WATER

In the region covered by this report only five municipalities use surface water exclusively, and a combination of ground and surface water is used by four cities. The total amount of surface water used by the nine municipalities amounts to an average of about 17,000,000 gallons a day. Of this amount San Angelo uses an average of about 6,000,000 gallons a day from reservoirs on the North, South, and Middle forks of the Concho River; El Paso uses an average of about 5,000,000 gallons a day from a diversion canal on the Rio Grande, and also uses about 11,000,000 gallons a day of ground water; Big Spring uses an average of about 1,300,000 gallons a day from reservoirs on Powell and Moss Creeks, and also uses about a million gallons a day of ground water; and Sweetwater uses an average of about 2,300,000 gallons a day from reservoirs on Sweetwater and Bitter Creeks. Small amounts of surface water are used by Aspermont, Roby, Robert Lee, and Bronte, at the last two in combination with ground water.

CHEMICAL CHARACTER OF WATER

Analyses of Water

The analyses given in this report show the chemical quality but not the sanitary fitness of the waters. However, with the exception of the water supply at Roby, all the surface supplies and in addition many of the ground-water supplies are reported to be chlorinated.

A single sample is ordinarily representative of a well water, as the chemical character of ground waters usually shows no material change in quality over long periods of time. Surface waters vary in chemical quality with rainfall and runoff. For this reason a single sample of a surface source is only an indication of the general nature of the water furnished to the public. Variation in quality of water from lakes is usually less than that from streams.

Water used for public supplies must be potable and should be low in mineral content so as to be free from tastes and any physiological reactions. All natural waters contain some dissolved mineral matter because water is a very good solvent and soluble material is widely distributed in the atmosphere and in the ground. In addition to the exact limits set for concentrations of toxic salts, the Public Health Service drinking-water standards recommend the following limits for concentrations of other minerals, which are quite commonly found in natural waters:

Iron (Fe) and manganese (Mn) together should not exceed 0.3 part per million.

Magnesium (Mg) should not exceed 125 parts per million.

Chloride (Cl) should not exceed 250 parts per million.

Sulfate (SO_4) should not exceed 250 parts per million.

Total solids should not exceed 500 parts per million for water of good quality. However, if such water is not available, total solids of 1,000 parts per million may be permitted.

Sometimes water that exceeds the recommended limits is used when no other water supply is available.

Water passes through a natural cycle beginning with precipitation from clouds, followed by percolation into the ground or runoff into surface streams and thence into the sea, and, finally, by evaporation into the atmosphere. The chemical quality of surface water is determined by the solubility of the material on the watershed over which it passes. Therefore, the amount of dissolved solids in surface waters varies greatly. For example, the water from Cottonwood Creek at Roby in Fisher County has over 4,000 parts per million of dissolved solids, whereas the other surface waters used for public supplies in western Texas are relatively low in dissolved solids.

In general, ground waters are somewhat more highly mineralized than surface waters. Some minerals, such as iron, are found in much greater amounts in ground waters than in surface waters. Ground waters that derive their chemical content from igneous rocks usually have a relatively high alkalinity, low hardness, and considerable silica, and sometimes they contain iron and manganese. Waters derived from sedimentary rocks are more variable in composition and usually contain bicarbonates of calcium and magnesium and some chloride. Chloride and sulfate are often the predominant anions in waters from formations containing deposits of salt and gypsum. Most of the ground-water supplies of cities in western Texas come from sedimentary rocks.

The most important considerations in evaluating the quality of water supplies are hardness, alkalinity, and total mineral content. The hardness of natural waters is caused largely by compounds of calcium and magnesium and sometimes iron and aluminum. The alkalinity of natural waters is caused by carbonates, bicarbonates, hydroxides, and, occasionally, silicates, borates, and phosphates. Salinity in water is a measure of the total mineral content and is due principally to the bicarbonates, sulfates, chlorides, and nitrates of calcium, magnesium, sodium, and potassium with other minor constituents.

The analyses are reported in parts per million, except for pH, and also in equivalents per million for those ions entering into ionic balance. Methods of analysis are those in general use by the U. S. Geological Survey. 2/

Mineral Constituents in Solution

Silica (SiO_2).-- Silica is found in most natural waters. It probably occurs in waters in the form of very finely divided particles in colloidal suspension. In the more alkaline waters some of the silica may be present in ionic form. Silica has no effect on the use of water for irrigation or domestic purposes, but causes a hard boiler scale if present in appreciable quantities in boiler-feed water. In low-pressure boilers the scale formation results in inefficient heat transfer, and in high-pressure boilers the scale may cause overheating and boiler-tube failure. Fifty-seven percent of the waters analyzed had more than 20 parts per million of silica, the highest being 80 parts per million and the lowest 5 parts per million.

Iron (Fe).-- Iron found in natural waters is usually present in the form of ferrous bicarbonate or ferrous or ferric sulfate. In the presence of oxygen these iron compounds are converted to ferric oxide and precipitated; hence, in surface water the iron content seldom is high. Iron is commonly found in ground water because of the wide distribution of iron in nature as hematite, and its solution in water containing carbonic acid. In public water supplies iron is objectionable because it causes stains on plumbing fixtures and on clothing washed in the iron-bearing water. Iron is particularly troublesome in water used for many industrial purposes. In the water supplies from wells examined in western Texas, the average iron content was 0.23 part per million, and in about 9 percent of the supplies it was above the limit of 0.3 part set by the U. S. Public Health Service standards. Concentrations of iron above 2 parts per million were noted in Dallam, Dickens, and Reagan Counties. The surface-water samples averaged 0.35 part per million.

Calcium (Ca), magnesium (Mg), and hardness.-- Calcium and magnesium in natural waters are usually derived from limestone, dolomite, gypsum, and, in places such as the Permian basin in western Texas, from bedded salt deposits containing chlorides and other salts of calcium and magnesium. Calcium and magnesium are objectionable because they are the principal causes of hardness. A hard water requires a relatively large quantity of soap to form lather. Hardness is caused for the most part by the bicarbonates and sulfates of calcium and magnesium. Temporary or carbonate hardness is that portion of the hardness which can be removed by boiling. It is caused principally by the presence of bicarbonates of calcium and magnesium. Permanent or noncarbonate hardness is caused by the combination of calcium and magnesium with sulfate, chloride, and nitrate.

2/ Collins, W. D., Notes on practical water analysis: U. S. Geol. Survey Water-Supply Paper 596-H, 1928

Am. Pub. Health Assoc., Standard methods for the examination of water and sewage, 9th ed., 1946.

Water having less than 50 to 75 parts per million of hardness is generally considered as sufficiently soft for ordinary use in a public water supply. Water having 75 to 150 parts per million of hardness is considered moderately hard, but still not sufficiently hard to interfere seriously in its uses or to cause much public demand for water softening. Hardness above 150 parts per million is noticed by most persons, and where the hardness is above 200 parts per million many users employ household softeners. The average hardness of supplies in western Texas is about 350 parts per million. Only 22 percent of the ground-water supplies showed less than 200 parts per million of hardness. In the surface supplies the average hardness found, with one exception, was 115 parts per million. At Roby, not included in the average, the hardness was 2,310 parts per million.

Sodium (Na) and potassium (K).-- Sodium and potassium salts are highly soluble and are present in many rocks. The more saline waters usually contain high proportions of sodium and a relatively small amount of potassium. Large amounts of these elements will cause "foaming" in boiler operations. Low sodium content is important in irrigation water, owing to the formation of "black alkali" in the soil by high-sodium waters. Sodium in water for irrigation use should not exceed 60 percent of the equivalents per million of the positive ions. 3/

In public supplies of western Texas the content of sodium and potassium ranged from 12 to 400 parts per million. In 87 percent of the supplies the sodium percentage was less than 50.

Alkalinity.-- Carbonate (CO_3), bicarbonate (HCO_3), and occasionally borate, silicate, and phosphate are responsible for the alkalinity of natural waters. Bicarbonate in natural waters results from the action on carbonate rocks of the carbon dioxide dissolved in water. Aside from its effect on the palatability of the water when present in excessive amounts, bicarbonate is of little significance in public water supplies. Carbonate is found in some samples that have been in contact with glass sampling bottles for some time, owing to the solvent action of water on soft glass.

Sulfate (SO_4).-- Sulfate is dissolved in large quantities from gypsum beds and occasionally from alkali deposits of sodium sulfate and from iron pyrite ores. Sulfate in waters that contain much calcium and magnesium contributes to the formation of hard scale in steam boilers and may increase the cost of softening. In the absence of air certain bacteria reduce sulfates to hydrogen sulfide which is objectionable because of its offensive odor and corrosiveness to iron pipes. In 18 percent of the water supplies analyzed the sulfate content exceeded 250 parts per million.

Chloride (Cl).-- Chloride has little effect on the utility of water except when present in large amounts. However, when chloride is in equilibrium with calcium and magnesium, it may increase the corrosiveness of water. Water having a chloride content above about 500 parts per million will taste salty to most people. Chloride exceeded 250 parts per million in 10 percent of the public water supplies of western Texas, and 100 parts per million in more than 21 percent.

3/ Wilcox, L. V., Explanation and interpretation of analyses of irrigation waters: U. S. Dept. Agr. Circ. 784, May 1948.

Nitrate (NO_3).-- Nitrate is the final oxidation product of organic nitrogen compounds. Generally, in mineral analyses of ground waters, nitrate has no sanitary significance, but at times nitrate in shallow wells is due to human or animal contamination.

Recent studies made in Illinois indicate that nitrate in excess of 70 parts per million may contribute to the ailment methemoglobinemia ("blue babies"). 4/ Further investigations are being made in Texas by the Texas State Department of Health in areas where nitrate is high. Examination of the public supplies listed showed the highest nitrate to be 35 parts per million, and only 3 percent of the supplies have nitrates exceeding 20 parts per million.

Fluoride (F).-- Fluoride is found in natural waters obtained from regions where fluorspar and cryolite occur. It has been identified as the causative agent of mottled tooth enamel, and the evidence indicates that its action on the teeth occurs during their period of formation. 5/ The U. S. Public Health Service has established a fluoride limit of 1.5 parts per million when the water is to be used on interstate carriers. Approximately 1 part per million of fluoride in water is thought to be desirable as a preventative of tooth decay. 6/ Some of the ground-water supplies in western Texas contain undesirable amounts of fluoride; analyses showed that 37 percent of the ground-water supplies contained more than 2 parts per million and 11 percent contained more than 4 parts per million of fluoride.

Dissolved solids.-- The dissolved solids represent the residue on evaporation of the total mineral content and organic matter present and may include some water of crystallization. More than 1,000 parts per million of dissolved solids is likely to produce a noticeable taste or in other respects to make the water undesirable for public supply. The average dissolved solids found in western Texas water supplies examined was 638 parts per million. The dissolved solids was in excess of 1,000 parts per million in only 12 percent of the supplies.

Hydrogen ion concentration (pH).-- The pH of a solution is a direct measure of its chemical activity and may also have some bearing on the utility of the supply for domestic or industrial purposes. Knowledge of hydrogen-ion concentration is used in waterworks, principally in chemical control of purification. The degree of acidity or alkalinity of the water, as indicated by the hydrogen-ion concentration, or pH, has an important bearing on the corrosiveness of water. Values lower than 7.0 denote increasing acidity and values higher than 7.0 denote increasing alkalinity. Acid waters are generally more corrosive than alkaline waters. Raw water in most western Texas wells and streams has a pH greater than 7.0.

4/ Faucett, R. L., and Miller, H. C., Methemoglobinemia occurring in infants fed milk diluted with well water of high nitrate content: Jour. Pediatrics, vol. 29, p. 593, Nov. 1946.

5/ Smith, H. V., Smith, M. C., and Foster, E. O., Mottled enamel in the Salt River Valley and the fluorine content of the water supplies: Univ. Agr. Exper. Sta., Tech. Bull. 61, 1936.

6/ Dean, H. T., Endemic fluorosis and its relation to dental caries: U. S. Public Health Repts., vol. 53, p. 1443, 1938

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Published Reports

Ground-water resources of the area southwest of Amarillo, Texas, by W. H. Alexander, Texas State Board of Water Engineers (mimeographed), 1946.

Geology and ground-water resources of the Balmorhea area, Western Texas, by W. N. White, H. S. Gale, and S. S. Nye: U. S. Geol. Survey Water-Supply Paper 849-C, 1941.

Geology and ground-water resources of the Big Spring area, Texas, by P. P. Livingston and R. R. Bennett: U. S. Geol. Survey Water-Supply Paper 913, 1944.

Ground-water resources of the El Paso area, Texas, by A. N. Sayre and P. P. Livingston: U. S. Geol. Survey Water-Supply Paper 919, 1945.

The High Plains and their utilization, by W. D. Johnson: U. S. Geol. Survey 21st Ann. Rept., pt. 4, c, Hydrography, pp. 609-741, 1901; 22nd. Ann. Rept., pt. 4, c, Hydrography, pp. 637-669, 1902.

Ground water in the High Plains of Texas, by W. N. White, W. L. Broadhurst, and J. W. Lang: U. S. Geol. Survey Water-Supply Paper 889-F, 1946.

Ground water in the High Plains of Texas, Progress Report No. 5, by J. W. Lang: Texas State Board of Water Engineers (mimeographed), 1945.

Ground water in the High Plains of Texas, Progress Report No. 6, by W. L. Broadhurst: Texas State Board of Water Engineers (mimeographed), 1946.

Geology and underground waters of the northern Llano Estacado, by C. L. Baker: Univ. Texas Bull. 57, 1915.

The geology and water resources of the eastern portion of the Panhandle of Texas, by C. N. Gould: U. S. Geol. Survey Water-Supply Paper 154, 1906.

The geology and water resources of the western portion of the Panhandle of Texas, by C. N. Gould: U. S. Geol. Survey Water-Supply Paper 191, 1907.

The Pecos River Basin joint investigation: National Resources Planning Board, 1942.

Preliminary report on the geology and ground-water resources of Reeves County, Texas, by D. B. Knowles: Texas State Board of Water Engineers (mimeographed), 1947.

In addition to the above-listed reports, mimeographed publications containing records of wells and springs, drillers' logs, partial chemical analyses of water from wells and springs, and a map showing the location of wells have been published by the Texas State Board of Water Engineers for the following counties in the region:

Andrews	Edwards	Ochiltree
Armstrong	Floyd	Oldham
Bailey	Gaines	Parmer
Briscoe	Hale	Pecos
Carson	Hansford	Potter
Castro	Hartley	Randall
Childress	Hockley	Roberts
Collingsworth	Howard	Scurry
Crosby	Irion	Swisher
Dallam	Lamb	Terry
Dawson	Lubbock	Tom Green
Deaf Smith	Martin	Val Verde
Donley	Midland	Winkler
Ector	Nolan	Yoakum

Unpublished Reports

The following typewritten reports giving results of ground-water investigations are available for reference in the offices of the Geological Survey and the Texas Board of Water Engineers at Austin:

Exploration of ground water for City of Childress, Texas, by W. O. George, 1945.

Progress report on the ground-water supply of the El Paso area, Texas, by P. P. Livingston and J. M. Birdsall, 1944.

Progress report on the ground-water resources of the El Paso area, Texas, by R. W. Sundstrom, 1945.

Water resources of the Lubbock district, by J. W. Lang, 1945.

Ground water in the area northwest of Yellowhouse Draw, Lubbock County, Texas by W. C. Ellis and R. A. Scalapino, 1948.

Midland city water supply, by G. H. Cromack, 1944.

Ground water in the vicinity of Paducah, Cottle County, Texas, by John H. Dante, 1946.

Ground-water conditions in the Roby-Camp Springs area, by J. W. Lang, 1944.

Ground-water resources of the Toyah area, Reeves County, Texas, by J. W. Lang, 1942.

NOTE: A number of additional reports were prepared during the war, but have not yet been released to the open file.

PUBLIC WATER SUPPLIES

ANDREWS COUNTY

Andrews

Population in 1940: 611.

Source of information: H. T. Wilson, president, Andrews County Independent School District, Nov. 27, 1946.

Source of supply: Four wells.

Well 1. Nine miles north of Andrews; drilled in 1946 by G. L. Taylor; depth, 190 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; pump set at 120 feet; static water level, 73 feet below land surface April 1946; yield reported, 200 gallons a minute.

Well 2. A quarter of a mile east of well 1; drilled in March 1946 by G. L. Taylor; depth, 200 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; pump set at 120 feet; static water level, 86 feet below land surface April 1946; yield reported, 300 gallons a minute.

Well 3. A quarter of a mile east of well 2; drilled in March 1946 by G. L. Taylor; depth, 200 feet; diameter, 13½ inches; deep-well turbine pump and 15-horsepower electric motor; pump set at 120 feet; static water level, 72 feet below land surface April 1946; yield reported, 300 gallons a minute.

Well 4. A quarter of a mile east of well 3; drilled in March 1946 by G. L. Taylor; depth, 200 feet; diameter, 13½ inches; deep-well turbine pump and 20-horsepower electric motor; pump set at 120 feet; static water level, 72 feet below land surface April 1946; yield reported, 300 gallons a minute.

Pumpage (estimated): Average, 115,000 gallons a day.

Storage: Elevated tank, 50,000 gallons; elevated tank, 100,000 gallons; two concrete ground reservoirs, 100,000 gallons each.

Number of customers: 350.

Treatment: Chlorination.

ANDREWS COUNTY

Andrews -- Continued

Analysis, composite sample of all wells

[Collected Nov. 27, 1946 Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	21	
Iron (Fe)	.12	
Calcium (Ca)	41	2.05
Magnesium (Mg)	42	3.45
Sodium (Na)	67	2.91
Potassium (K)	8.0	.20
Bicarbonate (HCO_3)	298	4.88
Sulfate (SO_4)	75	1.56
Chloride (Cl)	66	1.86
Fluoride (F)	5.2	.27
Nitrate (NO_3)	1.2	.02
Dissolved solids	494	
Total hardness as $CaCO_3$	275	
pH	8.0	

Driller's logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Hard rock	20	95
Red sand	9	12	Medium water-bearing sand	95	190
Pack sand	63	75			

Well 2

Surface soil	3	3	Hard rock	20	95
Red sand	9	12	Medium water-bearing sand	105	200
Pack sand	63	75			

Well 4

Surface soil	2	2	Fine sand, water bearing	55	155
Red sand	6	8			
Pack sand	22	30	Medium sand, water bearing	45	200
Sand	47	77			
Hard rock	23	100			

ARMSTRONG COUNTY

Claude

Population in 1940: 761.

Source of information: H. G. Nave, water superintendent, Dec. 4, 1947.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1930 by D. L. McDonald; depth, 250 feet; diameter, 18 inches; deep-well turbine pump and electric motor; yield, 60 gallons a minute.

Well 2. Drilled in 1930 by D. L. McDonald; depth, 250 feet; diameter, 18 inches; deep-well turbine pump and electric motor; yield, 40 gallons a minute.

Pumpage: Average, 68,000 gallons a day.

Storage: Two elevated storage reservoirs, 60,000 gallons each; elevated tank, 175,000 gallons.

Number of customers: 247.

Treatment: None.

Analysis, composite sample of wells 1 and 2

[Collected Dec. 4, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	50	
Iron (Fe)	.02	
Calcium (Ca)	31	1.55
Magnesium (Mg)	36	2.96
Sodium (Na)	40	1.76
Potassium (K)	3.2	.08
Bicarbonate (HCO_3)	290	4.75
Sulfate (SO_4)	41	.85
Chloride (Cl)	16	.45
Fluoride (F)	3.2	.17
Nitrate (NO_3)	7.9	.13
Dissolved solids	374	
Total hardness as $CaCO_3$	226	
pH	7.9	

BAILEY COUNTY

Muleshoe

Population in 1940: 1,327 (estimated 2,000 in 1944).

Source of information: W. E. Young, water superintendent, Mar. 2, 1945.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1936; depth, 100 feet; diameter, 16 inches; deep-well turbine pump and electric motor; pumping level, 23.15 feet below land surface while pumping 250 gallons a minute; yield, 250 gallons a minute; temperature, 64° F.

Well 2. Drilled in 1940; depth, 100 feet; diameter, 16 inches; deep-well turbine pump and electric motor; static water level, 1910 feet below land surface on Mar. 2, 1945; yield, 800 gallons a minute.

Pumpage (estimated): 200,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 380.

Treatment: None.

Analysis, well 1

[Collected Mar. 7, 1947. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million
Silica (SiO_2)	46	
Iron (Fe)	.08	
Calcium (Ca)	81	4.04
Magnesium (Mg)	83	6.83
Sodium (Na)	60	2.61
Potassium (K)	11	.28
Bicarbonate (HCO_3)	283	4.64
Sulfate (SO_4)	251	5.23
Chloride (Cl)	129	3.64
Fluoride (F)	3.0	.16
Nitrate (NO_3)	5.4	.09
Dissolved solids	845	
Total hardness as $CaCO_3$	544	
pH	7.7	

BAILEY COUNTY

Muleshoe -- Continued

Driller's log, well 1

	Thickness (feet)	Depth (feet)
Surface soil	2	2
Chalk and clay	15	17
Water sand	1	18
Gray clay	6	24
White water sand	4	28
Gray shale	4	32
Lime rock	2	34
Brown clay	6	40
Gray packed sand	5	45
Red water sand	30	75
Packed sand	10	85
Gray water sand	9	94
Red clay	6	100

BREWSTER COUNTY

Alpine

Population in 1940: 3,866.

Source of information: John Stovell, city engineer, Aug. 9, 1948.

Ownership: Municipal.

Source of supply: Four wells.

Well 3. On Alpine Hill southwest of Southern Pacific Railroad depot; drilled in 1924 by Tony Hess; depth, 385 feet; diameter, 10 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 165 feet below land surface Aug. 1948; yield, 200 gallons a minute.

Well 4. On Alpine Hill southwest of Southern Pacific Railroad depot; drilled in 1929; depth, 700 feet; diameter, 10 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 210 feet below land surface June 1948; yield, 200 gallons a minute.

East well. On north side of Southern Pacific Railroad, 1 mile east of depot; drilled in 1927; depth, 580 feet; (no water reported below 170 feet); deep-well turbine pump and 30-horsepower electric motor; static water level, 65.1 feet below land surface June 28, 1948; yield, 235 gallons a minute.

College well. On campus of Sul Ross State College; drilled in 1940; depth, 300 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 70 gallons a minute.

Pumpage (estimated): 300,000 gallons a day.

Storage: Concrete ground reservoir on Alpine Hill, 1,250,000 gallons.

Treatment: None.

Analysis, well 3

[Collected Nov. 10, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	42	
Iron (Fe)	.00	
Calcium (Ca)	47	2.35
Magnesium (Mg)	12	.99
Sodium (Na)	37	1.60
Potassium (K)	3.7	.09
Bicarbonate (HCO_3)	224	3.69
Sulfate (SO_4)	18	.37
Chloride (Cl)	25	.71
Fluoride (F)	.4	.02
Nitrate (NO_3)	16	.26
Dissolved solids	312	
Total hardness as $CaCO_3$	167	
pH	7.2	

BREWSTER COUNTY

Alpine -- Continued

Driller's log of abandoned city well

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soft brown soil and sub-soil	5	5	Hard blue and black rock, water bearing	30	160
Brown clay and gravel	15	20	Red and brown clay and gravel	5	165
Gravel and clay	13	33	Blue and black conglomerate	10	175
Gravel, water	3	36	Hard black and blue rock	35	210
Gravel and boulders, water	4	40	Soft red clay	8	218
Hard brown rock	20	60	Soft pink, red, and blue soapstone	7	225
Brown and yellow clay and soapstone	10	70	Blue and green sandy shale	5	230
Pink shale	5	75	Blue sandy rock	10	240
Hard red, brown, blue and black rock, water bearing	40	115	Hard red rock	18	258
Soft brown shale	5	120	Green shale and conglomerate	12	270
Hard black rock	5	125	Green shale and hard rock	10	280
Chocolate-colored shale	5	130	Green sandy shale	20	300

BRISCOE COUNTY

Quitaque

Population in 1940: 763.

Source of information: W. Middleton, water superintendent, Sept. 2, 1946.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. About 2 miles northeast of Quitaque; drilled in 1929; depth, 100 feet; diameter, 14 inches; deep-well turbine pump and 15-horsepower electric motor; pump set at 90 feet below land surface; static water level, 51 feet below land surface on Sept. 2, 1946; yield reported, 200 gallons a minute with a drawdown of 20 feet.

Well 2. Five hundred feet north of well 1; drilled in 1929; depth, 100 feet; diameter, 14 inches; deep-well turbine pump and 15-horsepower electric motor; pump set at 90 feet below land surface; yield reported, 200 gallons a minute.

Pumpage:

Average in gallons a day

	1945	1946
January	24,000	50,000
February	34,500	41,500
March	33,000	36,500
April	42,300	66,500
May	39,000	80,500
June	60,100	116,000
July	78,400	113,600
August	100,000	127,500
September	75,100	
October	53,500	
November	39,000	
December	36,100	

Storage: Ground reservoir, 54,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 206.

Treatment: Chlorination.

BRISCOE COUNTY

Quitaque -- Continued

Analysis, composite sample of finished water of wells 1 and 2

[Collected Mar. 28, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	24	
Iron (Fe)	.26	
Calcium (Ca)	66	3.29
Magnesium (Mg)	44	3.62
Sodium (Na)	170	7.40
Potassium (K)	6.9	.18
Bicarbonate (HCO_3)	418	6.85
Sulfate (SO_4)	184	3.83
Chloride (Cl)	122	3.44
Fluoride (F)	3.6	.19
Nitrate (NO_3)	11	.18
Dissolved solids	826	
Total hardness as $CaCO_3$	346	
pH	7.4	

Silverton

Population in 1940: 684.

Source of information: Mr. Summers, city secretary, Aug. 27, 1946.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Fifty feet north of City Hall; drilled in 1929; depth, 200 feet; diameter, 12 inches; cased to 142 feet below land surface; deep-well cylinder and 5-horsepower electric motor; static water level reported, 120 feet below land surface; cylinder set at 165 feet; yield reported, 90 gallons a minute.

Well 2. Three-fourths mile southeast of City Hall; drilled in 1933 by Leo McDade; depth, 202 feet; diameter, 9 inches; not cased; deep-well turbine pump and 15-horsepower electric motor; pump set at 160 feet below land surface; yield reported, 70 gallons a minute.

Well 3. Fifty feet east of City Hall; drilled in 1939 by J. F. Davis; depth, 200 feet; diameter, 16 to 8 inches; deep-well turbine pump and 3-horsepower electric motor; static water level, 116.9 feet below land surface in August 1946; yield reported, 50 gallons a minute.

BRISCOE COUNTY

Silverton -- Continued

Pumpage: Average, 100,000 gallons a day.

Storage: Elevated tank, 50,000 gallons; ground reservoir, 50,000 gallons.

Number of customers: 200.

Treatment: None.

Analysis, composite sample of all wells

[Collected Aug. 27, 1946. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	60	
Iron (Fe)	.01	
Calcium (Ca)	40	2.00
Magnesium (Mg)	34	2.80
Sodium (Na)	35	1.51
Potassium (K)	6.0	.15
Bicarbonate (HCO_3)	288	4.72
Sulfate (SO_4)	40	.83
Chloride (Cl)	24	.68
Fluoride (F)	3.6	.19
Nitrate (NO_3)	2.5	.04
Dissolved solids	387	
Total hardness as $CaCO_3$	240	
pH	7.5	

CARSON COUNTY

Groom

Population in 1940: 475.

Source of information: V. L. McCoy, water superintendent, June 25, 1948.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1946 by H. H. Heiskell; depth, 518 feet; diameter, 9 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 280 feet below land surface in 1946; yield, 105 gallons a minute.

Well 2. Drilled in 1929 by C. Meeker; depth, 450 feet; diameter, 6-5/8 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 270 feet below land surface in 1945; yield, 35 gallons a minute.

Well 3. Drilled in 1923; depth, 302 feet; diameter, 5-5/8 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 285 feet below land surface in 1945; yield, 20 gallons a minute.

Pumpage: 65,000 gallons a day.

Storage: Ground storage reservoir, 58,000 gallons; elevated tank, 55,000 gallons.

Number of customers: 204.

Treatment: None.

Analysis, well 1

[Collected June 25, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	34	
Iron (Fe)	.00	
Calcium (Ca)	42	2.10
Magnesium (Mg)	28	2.30
Sodium (Na)	21	.91
Potassium (K)	3.6	.09
Bicarbonate (HCO_3)	290	4.75
Sulfate (SO_4)	16	.33
Chloride (Cl)	5.5	.16
Fluoride (F)	.4	.02
Nitrate (NO_3)	3.8	.06
Dissolved solids	295	
Total hardness as $CaCO_3$	220	
pH	7.7	

CARSON COUNTY

Panhandle

Population in 1940: 978.

Source of information: Kelly M. Bender, water superintendent, Nov. 20, 1947.

Ownership: Municipal.

Source of supply: Two wells near waterworks plant in city. System connected to Santa Fe Railroad.

Well 1. Drilled in 1924; depth, 524 feet; diameter, 24 inches; air pump; static water level, 300 feet below land surface in 1937; yield, 350 gallons a minute; not used at present.

Well 2. Drilled in 1926; depth, 580 feet; diameter, 24 inches; pumped with same compressor as well 1; static water level, 300 feet below land surface in 1937; yield, 360 gallons a minute.

Pumpage: Average, 150,000 gallons a day.

Storage: Ground storage reservoir, 65,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 380.

Treatment: Chlorination.

Analysis, well 2

[Collected Dec. 1, 1938. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million
Calcium (Ca)	52	2.60
Magnesium (Mg)	28	2.30
Sodium and potassium (Na + K)	12	.52
Bicarbonate (HCO_3)	293	4.80
Sulfate (SO_4)	20	.42
Chloride (Cl)	10	.28
Fluoride (F)	1.1	.06
Nitrate (NO_3)	.0	.00
Dissolved solids	266	
Total hardness as $CaCO_3$	248	

CARSON COUNTY

Panhandle -- Continued

Driller's log, Railroad well in Panhandle

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy soil	5	5	Sandrock	40	345
Yellow clay and sand	111	116	Water sand	7	352
Fine-grained dry sand	29	145	Sandrock	28	380
Clay	30	175	Sand	5	385
Clay and gravel	3	178	Sand and clay	15	400
Sand and soapstone	4	182	Sandrock	20	420
Fine-grained sand	18	200	Yellow clay	20	440
Sandrock	4	204	Sand and clay	20	460
Hard-packed clay and sand	19	223	Sandrock	5	465
			Sand and clay	15	480
Dry sand	47	270	Sandrock	20	500
Clay	5	275	Clay and rock	15	515
Clay and gravel	30	305	Sandrock	29	544
			Sand	6	550

Skellytown

Population in 1940: 650.

Source of information: T. E. Morgan, operator, Oct. 5, 1948.

Owner: Southwestern Public Service Co.

Source of supply: Well owned by the Santa Fe Railroad; drilled in 1927 by Tye Brothers; depth, 418 feet; diameter, 14 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 300 feet below land surface in 1947; yield, 260 gallons a minute.

Pumpage (estimated): 50,000 gallons a day.

Storage: Elevated tank, 100,000 gallons.

Number of customers: 250.

Treatment: None.

CARSON COUNTY

Skellytown -- Continued

Analysis

[Collected Oct. 5, 1948. Analyzed by J. R. Avrett]

	Parts per million	Equivalents per million
Silica (SiO_2)	21	
Iron (Fe)	.05	
Calcium (Ca)	43	2.146
Magnesium (Mg)	23	1.891
Sodium (Na)	13	.565
Potassium (K)	4.8	.123
Bicarbonate (HCO_3)	220	3.606
Sulfate (SO_4)	27	.562
Chloride (Cl)	13	.367
Fluoride (F)	.6	.032
Nitrate (NO_3)	10	.161
Dissolved solids	262	
Total hardness as $CaCO_3$	202	
pH	7.5	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	White packed sand	35	260
Red bed	4	7	White sandrock	27	287
Brown clay, some sand	21	28	Light-brown sand	33	320
Yellow clay and sand	2	30	Coarse gravel and sand (water)	6	326
Yellow clay, sand and gravel	30	60	Fine gravel and coarse sand	14	340
Soft yellow sand, some gravel and clay	15	75	Fine gravel and coarse brown sand	10	350
Yellow packed sand, soft and dry	20	95	Coarse white sand and very fine gravel	21	371
Red packed sand and lime gravel	28	123	Yellow clay, some gravel	9	380
Red packed sand	37	160	Brown clay	15	395
Brown sand, soft and dry	15	175	Red clay and sand	18	413
Brown sand and clay	15	190	Brown quicksand, (second water)	5	418
Light fluffy clay, soft	8	198			
Packed sand, dry	27	225			

CARSON COUNTY

White Deer

Population in 1940: 733.

Source of information: R. M. Smith, water superintendent, June 24, 1948.

Ownership: Municipal.

Source of supply: Two wells at elevated tank.

Well 1. Drilled about 1925; depth, 382 feet; diameter, 10 inches; deep-well cylinder and pump jack and 15-horsepower electric motor; yield, 50 gallons a minute.

Well 2. Drilled about 1925; depth, 400 feet; diameter, 10 inches; deep-well turbine pump and 30-horsepower electric motor; yield, 150 gallons a minute.

Pumpage (estimated): 150,000 gallons a day.

Storage: Elevated tank, 55,000 gallons.

Number of customers: 204.

Treatment: None.

Analysis, well 2

[Collected June 24, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	30	
Iron (Fe)	.05	
Calcium (Ca)	41	2.064
Magnesium (Mg)	20	1.645
Sodium (Na)	26	1.131
Potassium (K)	3.2	.082
Bicarbonate (HCO_3)	258	4.229
Sulfate (SO_4)	18	.375
Chloride (Cl)	9.0	.253
Fluoride (F)	.2	.011
Nitrate (NO_3)	5.1	.082
Dissolved solids	285	
Total hardness as $CaCO_3$	185	
pH	7.4	

CARSON COUNTY

White Deer -- Continued

Driller's log, Railroad well in White Deer

	Thickness (feet)	Depth (feet)
Surface soil	10	10
Yellow clay	86	96
Brown caving sand	9	105
Sandy yellow clay	95	200
Yellow clay	40	240
Sandy yellow clay	56	296
Lime rock	10	306
Red clay	26	332
Red sandrock, water	3	335
Sandy red clay	10	345
Water, gravel	3	348
Sandy red clay	2	350
Red clay	12	362
Sandy red clay	38	400
Red clay	95	495
Red water sand	20	515
Red clay	5	520
Red sand	13	533
Red sand, "bad" water	24	557
Red clay	5	562

CASTRO COUNTY

Dimmitt

Population in 1940: 943.

Source of information: Glen Smith, water superintendent, Mar. 7, 1941.

Ownership: Municipal.

Source of supply: Well 1 block east of courthouse; drilled in 1929 by D. L. McDonald; depth, 206 feet; diameter, 16 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 600 gallons a minute; temperature, 63° F.

Pumpage (estimated): Summer, 400,000 gallons a day; winter, 100,000 gallons a day.

Storage: Concrete reservoir, 250,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 250.

Treatment: None.

Analysis

[Collected Mar. 7, 1941 Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	44	
Iron (Fe)	.16	
Calcium (Ca)	55	2.75
Magnesium (Mg)	33	2.71
Sodium (Na)	13	.55
Potassium (K)	6.2	.16
Bicarbonate (HCO_3)	288	4.72
Sulfate (SO_4)	38	.79
Chloride (Cl)	19	.54
Fluoride (F)	2.2	.12
Nitrate (NO_3)	.2	.00
Dissolved solids	353	
Total hardness as $CaCO_3$	273	
pH	7.6	

CASTRO COUNTY

Dimmitt -- Continued

Driller's log of abandoned well 160 feet east of city well

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	4	4	Lime rock	6	218
Caliche	11	15	Water sand and sand rock	60	278
Red sand	5	20	Lime rock	12	290
Sandrock	15	35	Water sand and sand-rock	38	328
Sand and sandrock	63	98	Hard sandrock	17	345
Hard sand	52	150	Water sand and sand-rock	49	394
White lime	10	160	Yellow clay	8	402
Water sand	4	164	Lime rock	13	415
Sandrock	4	168	"Red beds"	2	417
Water sand and sandrock	44	212			

CHILDRESS COUNTY

Childress

Population in 1940: 6,464.

Source of information: Witt Johnson, city manager, Sept. 16, 1947.

Ownership: Municipal.

Source of supply: Eleven wells and Lake Childress.

Well 1. In Michie Sand Hill Well field about 8 miles southwest of Childress; drilled by Layne-Texas Co. in 1947; depth, 80 feet; diameter, 8-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 31 feet below land surface Feb. 15, 1947; measured drawdown, 19 feet while pumping 64 gallons a minute on Aug. 30, 1947.

Well 2. In Michie Sand Hill Well field; drilled by Layne-Texas Co. in 1947; depth, 140 feet; diameter, 8-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 63.5 feet below land surface on Mar. 13, 1947; measured drawdown, 7.5 feet while pumping 166 gallons a minute on Aug. 30, 1947.

Well 3. In Michie Sand Hill Well field; drilled by Layne-Texas Co. in 1947; depth, 201 feet; diameter, 16 to 5-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 90 feet below land surface on Mar. 11, 1947; measured drawdown, 20 feet while pumping 190 gallons a minute on Aug. 30, 1947; temperature, 67° F.

Well 4. In Michie Sand Hill Well field; drilled by Layne-Texas Co. in 1947; depth, 120 feet; diameter, 16 to 8-5/8 inches; static water level, 42.5 feet on Aug. 30, 1947; deep-well turbine pump and 5-horsepower electric motor; measured drawdown, 7.5 feet while pumping 272 gallons a minute on Aug. 30, 1947.

Well 5. In Michie Sand Hill Well field; drilled by Layne-Texas Co. in 1947; depth, 133 feet; diameter, 16 to 8-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 53 feet below land surface on Aug. 30, 1947; measured drawdown, 8 feet while pumping 120 gallons a minute on Aug. 30, 1947.

Well 6. In Michie Sand Hill Well field; drilled by Layne-Texas Co. in 1947; depth, 107 feet; diameter, 16 to 8-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 32 feet below land surface on Aug. 30, 1947; measured drawdown, 14 feet while pumping 160 gallons a minute on Aug. 30, 1947; temperature, 66° F.

Well 7. In Michie Sand Hill Well field; drilled by Layne-Texas Co. in 1947; depth, 92 feet; diameter, 16 to 8-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 34 feet below land surface on Aug 30, 1947; measured drawdown, 9 feet while pumping 226 gallons a minute on Aug. 30, 1947.

CHILDRESS COUNTY

Childress -- Continued

Well 8. In Michie Sand Hill Well field; drilled by Layne-Texas Co. in 1947; depth, 111 feet; diameter, 16 to 8-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 36 feet below land surface on Mar. 11, 1947; measured drawdown, 9 feet while pumping 226 gallons a minute on Aug. 30, 1947.

Well 9. In Michie Sand Hill well field; drilled by Layne-Texas Co. in 1947; depth, 87 feet; diameter, 16 to 8-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 36 feet below land surface on Mar. 11, 1947; measured drawdown, 4.5 feet while pumping 350 gallons a minute on Aug. 30, 1947.

Well 10. In Michie Sand Hill Well field; drilled by Layne-Texas Co. in 1947; depth, 132 feet; diameter, 16 to 8-5/8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 62 feet below land surface on Aug. 30, 1947; measured drawdown, 13 feet while pumping 180 gallons a minute on Aug. 30, 1947.

62 Ranch Well. About 14 miles west of Childress on 62 Ranch; drilled in 1942; depth, 443 feet; diameter, 10 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 296 feet below land surface in January 1943 and 334 feet below land surface on Sept. 20, 1945; pumping level, 346 feet below land surface on Sept. 16, 1947; yield, 480 gallons a minute.

Lake Childress. Dam constructed in 1943; drainage area, about 12 square miles; lake floods 322 acres; average depth, 15 feet; capacity, 4,830 acre-feet.

Pumpage:

Average in gallons a day

	1946	1947
January	603,000	502,000
February	606,000	489,000
March	691,000	519,000
April	821,000	538,000
May	819,000	601,000
June	699,000	734,000
July	886,000	1,301,000
August	852,000	
September	561,000	
October	510,000	
November	507,000	
December	498,000	

Storage: Ground reservoir, 1,000,000 gallons; ground reservoir, 1,500,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 2,146.

CHILDRESS COUNTY

Childress -- Continued

Treatment: Chlorination.

Analyses

[Collected Sept. 17, 1947 Analyzed by B. C. Dwyer]

	Well 3		Well 6	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	20		16	
Iron (Fe)	.04		.25	
Calcium (Ca)	97	4.84	74	3.69
Magnesium (Mg)	20	1.64	22	1.81
Sodium (Na)	33	1.42	54	2.35
Potassium (K)	7.0	.18	5.8	.15
Bicarbonate (HCO_3)	226	3.70	266	4.36
Sulfate (SO_4)	85	1.77	84	1.75
Chloride (Cl)	54	1.52	44	1.24
Fluoride (F)	.2	.01	.8	.04
Nitrate (NO_3)	67	1.08	38	.61
Dissolved solids	504		470	
Total hardness as $CaCO_3$	324		275	
pH	7.2		7.7	

[Collected Sept. 17, 1947. Analyzed by B. C. Dwyer]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	8.0		17	
Iron (Fe)	.18		.17	
Calcium (Ca)	184	9.18	93	4.64
Magnesium (Mg)	23	1.89	23	1.89
Sodium (Na)	2.5	.11	70	3.04
Potassium (K)	3.2	.08	6.0	.15
Bicarbonate (HCO_3)	84	1.38	230	3.77
Sulfate (SO_4)	456	9.49	161	3.35
Chloride (Cl)	12	.34	70	1.97
Fluoride (F)	.2	.01	.4	.02
Nitrate (NO_3)	2.5	.04	38	.61
Dissolved solids	802		592	
Total hardness as $CaCO_3$	558		326	
pH	7.2		7.8	

CHILDRESS COUNTY

Childress -- Continued

Driller's logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy soil	4	4	Fine-grained cemented sand	30	80
Sand and boulders	46	50			

Well 2

Sandy soil	3	3	Fine-grained cemented sand	25	123
Sandy clay	12	15	Clay	5	128
Fine-grained cemented sand	65	80	Fine-grained cemented sand	10	138
Clay	3	83			
Fine-grained sand	10	93			
Clay	5	98			

Well 3

Top soil	3	3	Fine to coarse-grained sand	100	200
Red sand	52	55	Red beds	1	201
Gray sand	45	100			

Well 5

Surface soil	6	6	Fine to coarse-grained sand	91	132
Red sand	32	38	Red beds	1	133
Clay	3	41			

Well 6

Surface soil	5	5	Sandy clay	20	95
Red sand	40	45	Coarse-grained brown sand	10	105
Brown sand	18	63	Red beds	2	107
Coarse-grained sand	12	75			

Well 7

Surface soil	4	4	Coarse sand and gravel	45	91
Red sand	42	46	Red beds	1	92

Well 8

Surface soil	6	6	Gravel and coarse-grained sand	32	89
Red sand	39	45	Sand and gravel	6	95
Coarse-grained sand	12	57	Red beds	16	111

CHILDRESS COUNTY

Childress -- Continued

Driller's logs -- Continued

Well 9

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Coarse-grained sand	8	53
Red sand	36	40	Coarse-grained sand and gravel	33	86
Medium coarse-grained sand	5	45	Red beds	$\frac{1}{8}$	$86\frac{1}{8}$

Well 10

Surface soil	2	2	Sandy clay and gravel	21	119
Red sand	43	45	Gravel	12	131
Soft brown sand	35	80	Red and blue clay	1	132
Gravel and sand	18	98			

COCHRAN COUNTY

Morton

Population in 1940: 1,137.

Source of information: O. D. Vernon, water superintendent, Mar. 5, 1947.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1933 and drilled deeper in 1947; depth, 152 feet in 1933, 233 feet in 1947; diameter, 12 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 132 feet below land surface in 1946; yield, 750 gallons a minute.

Well 2. Drilled in 1941 by Carl Williams; depth, 207 feet; diameter, 10 inches; deep-well turbine pump and 35-horsepower electric motor; static water level, 95 feet below land surface on Aug. 2, 1941; drawdown, 108 feet while pumping 350 gallons a minute, 130 feet while pumping 600 gallons a minute; normal yield reported, 350 gallons a minute.

Pumpage (estimated): 100,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 500.

Treatment: None.

Analysis, well 2

[Collected Mar. 5, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	42	
Iron (Fe)	.04	
Calcium (Ca)	37	1.85
Magnesium (Mg)	51	4.19
Sodium (Na)	103	4.47
Potassium (K)	12	.31
Bicarbonate (HCO_3)	286	4.69
Sulfate (SO_4)	200	4.16
Chloride (Cl)	60	1.69
Fluoride (F)	4.0	.21
Nitrate (NO_3)	4.5	.07
Dissolved solids	654	
Total hardness as $CaCO_3$	302	
pH	7.6	

COCHRAN COUNTY

Morton -- Continued

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	6	6	Fine sand (little water)	18	108
Sandy caliche	8	14	Fine sand (some clay)	17	125
Pack sand and caliche	21	35	Gravel (some lime)	7	132
Fine packed sand	30	65	Yellow clay and gravel	23	155
Hard limestone	10	75	Yellow clay and sand	5	160
Fine packed sand	5	80	Sand with some clay	20	180
Hard limestone	5	85	Sand and gravel	12	192
Fine packed sand	5	90	Sand	15	207

COKE COUNTY

Bronte

Population in 1940: 754.

Source of information: C. W. Chapman, city secretary, May 8, 1946.

Ownership: Municipal.

Source of supply: One well and two lakes.

Well: Two miles south of Bronte about 60 feet north of the north bank of the Colorado River; dug in 1932; depth, 20 feet; diameter, 8 feet; jet pump and 5-horsepower electric motor; pump yields 60 gallons a minute, but pump runs dry in 40 minutes; well recovers in about 15 minutes.

Lake Chapman: About 1.2 miles southeast of Bronte; catchment area, 800 acres; lake supply inadequate in dry periods.

Lake Kaierim: About .6 mile east of Bronte; constructed in 1922; lake supply inadequate in dry periods.

Pumpage: Average, 45,000 gallons a day.

Storage: Elevated tank, 30,000 gallons.

Number of customers: 225.

Treatment: Aeration, sedimentation, and filtration.

Analysis, composite sample of lakes

[Collected May 8, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	5.6	
Iron (Fe)	1.0	
Calcium (Ca)	30	1.497
Magnesium (Mg)	7.1	.584
Sodium and potassium (Na + K)	5.8	.254
Bicarbonate (HCO_3)	113	1.852
Sulfate (SO_4)	17	.354
Chloride (Cl)	4.0	.113
Fluoride (F)	.0	.000
Nitrate (NO_3)	1.0	.016
Dissolved solids	135	
Total hardness as $CaCO_3$	104	
pH	7.2	

COKE COUNTY

Robert Lee

Population in 1940: 662.

Source of information: Fred O. Green, city secretary, May 9, 1946.

Ownership: Municipal.

Source of supply: Lake and well.

Lake. About 1½ miles southeast of Robert Lee; catchment area, 800 acres; does not furnish sufficient water during dry periods.

Well. Dug in 1943 on G. W. Hill Estate below city lake; depth, 24 feet; diameter, 5 feet; centrifugal pump and gasoline engine; static water level, 14.9 feet below land surface on May 19, 1946; yield, 30 gallons a minute.

Pumpage: Average, 40,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 200.

Treatment: Coagulation, sedimentation, and filtration.

Analysis, well

(Lake dry)

[Collected May 9, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	16	
Iron (Fe)	.14	
Calcium (Ca)	132	6.59
Magnesium (Mg)	48	3.95
Sodium (Na)	49	2.15
Potassium (K)	14	.36
Bicarbonate (HCO_3)	328	5.38
Sulfate (SO_4)	269	5.60
Chloride (Cl)	68	1.92
Fluoride (F)	.2	.01
Nitrate (NO_3)	8.8	.14
Dissolved solids	838	
Total hardness as $CaCO_3$	527	
pH	7.4	

COLLINGSWORTH COUNTY

Dodson

Population in 1940: 357.

Source of information: Arthur Weaver, pump operator, June 22, 1948.

Ownership: Municipal.

Source of supply: Well 2 miles northeast of Dodson on top of hill at concrete reservoir.

Well 2. Drilled in 1948; depth, 130 feet; diameter, 8 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 50 gallons a minute.

Pumpage: No record.

Storage: Concrete ground reservoir, 50,000 gallons.

Number of customers: About 200.

Treatment: None.

Analysis

[Collected June 22, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	29	
Iron (Fe)	.00	
Calcium (Ca)	67	3.34
Magnesium (Mg)	21	1.73
Sodium (Na)	9.2	.40
Potassium (K)	5.2	.13
Bicarbonate (HCO_3)	290	4.75
Sulfate (SO_4)	23	.48
Chloride (Cl)	6.1	.17
Fluoride (F)	.8	.04
Nitrate (NO_3)	17	.27
Dissolved solids	320	
Total hardness as $CaCO_3$	254	
pH	7.9	

COLLINGSWORTH COUNTY

Wellington

Population in 1940: 3,308.

Source of information: B. O. Handley, water superintendent, June 22, 1948.

Ownership: Municipal.

Source of supply: Eleven wells 2½ miles northeast of Wellington.

Well 1. Drilled in 1932; depth, 45 feet; diameter, 8 inches; gravel-walled; deep-well turbine pump and 3-horsepower electric motor; static water level, 15 feet below land surface June 1938; yield, 50 gallons a minute.

Well 2. About 450 feet from well 1; drilled in 1932; depth, 45 feet; diameter, 8 inches; gravel-walled; deep-well turbine pump and 3-horsepower electric motor; yield, 50 gallons a minute.

Well 3. About 450 feet from well 2; drilled in 1932; depth, 45 feet; diameter, 8 inches; gravel-walled; deep-well turbine pump and 3-horsepower electric motor; yield, 50 gallons a minute.

Well 4. About 450 feet from well 3; drilled in 1926; depth, 50 feet; diameter, 8 inches; concrete casing and screen; vertical centrifugal pump and 5-horsepower electric motor; yield, 50 gallons a minute.

Well 5. About 450 feet from well 4; drilled in 1926; depth, 50 feet; diameter, 8 inches; concrete casing and screen; vertical centrifugal pump and 5-horsepower electric motor; yield, 50 gallons a minute.

Well 6. About 450 feet from well 5; drilled in 1934; depth, 40 feet; diameter, 8 inches; gravel-walled; deep-well turbine pump and 3-horsepower electric motor; yield, 50 gallons a minute.

Well 7. About 450 feet from well 6; drilled in 1926; depth, 50 feet; diameter, 18 inches; concrete casing and screen; vertical centrifugal pump and 5-horsepower electric motor; yield, 50 gallons a minute.

Well 8. About 500 feet from well 7; drilled in 1926; depth, 50 feet; diameter, 18 inches; concrete casing and screen; deep-well cylinder pump and electric motor; yield, 20 gallons a minute.

Well 9. About 500 feet from well 8; drilled in 1926; depth, 50 feet; diameter, 8 inches; gravel-walled; deep-well turbine pump and 3-horsepower electric motor; yield, 75 gallons a minute.

Well 10. About 500 feet from well 9; drilled in 1946; depth, 45 feet; diameter, 8 inches; gravel-walled; deep-well turbine pump and 3-horsepower electric motor; yield, 100 gallons a minute.

COLLINGSWORTH COUNTY

Wellington -- Continued

Well 11. About 500 feet from well 10; drilled in 1946; depth, 45 feet; diameter, 8 inches; gravel-walled; deep-well turbine pump and 3-horsepower electric motor; yield, 100 gallons a minute.

Pumpage: Average, 250,000 gallons a day in winter and 600,000 gallons a day in summer.

Storage: Ground storage reservoir, 25,000 gallons; elevated tank, 100,000 gallons; ground storage reservoir under construction, 200,000 gallons.

Number of customers: 1,100.

Treatment: None.

Analysis, composite sample of all wells

[Collected June 22, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	32	
Iron (Fe)	.00	
Calcium (Ca)	82	4.09
Magnesium (Mg)	18	1.48
Sodium (Na)	71	3.10
Potassium (K)	4.0	.10
Bicarbonate (HCO_3)	388	6.36
Sulfate (SO_4)	66	1.37
Chloride (Cl)	30	.85
Nitrate (NO_3)	9.7	.16
Fluoride (F)	.6	.03
Dissolved solids	496	
Total hardness as $CaCO_3$	278	
pH	7.4	

COTTLE COUNTY

Paducah

Population in 1940: 2,677.

Source of information: J. A. Carroll, water superintendent, Sept. 16, 1947.

Ownership: Municipal.

Source of supply: Four wells in field 8 miles west of Paducah near South Pease River.

Well 2. Drilled about 1931; depth, 225 feet; diameter, 7 inches; deep-well turbine pump and 7½-horsepower electric motor; stati water level, 24.9 feet below land surface on Oct. 25, 1945, and 35.6 feet below land surface on Sept. 16, 1947; yield reported, 120 gallons a minute.

Well 3. Drilled about 1931; depth, 130 feet; diameter, 7 inches; pumped with air; static water level, 21.1 feet below land surface on Oct. 25, 1945, and 38.3 feet below land surface on Sept. 6, 1947; yield reported, 150 gallons a minute; temperature, 67° F.

Well 4. Drilled about 1931; depth, 130 feet; diameter, 7 inches; pumped with air; static water level, 35.8 feet below land surface on Sept. 16, 1947; yield reported, 150 gallons a minute.

Well 5. Drilled about 1931; depth, 127 feet; diameter, 7 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 28.2 feet below land surface on Oct. 25, 1945, and 33 feet below land surface on Sept. 16, 1947; yield reported, 150 gallons a minute.

Pumpage:

Average in gallons a day

	1944	1945	1946	1947
January		129,000	123,000	119,000
February		114,000	124,000	117,000
March	108,000	117,000	160,000	147,000
April		149,000	207,000	222,000
May	137,000	230,000	203,000	162,000
June	214,000	263,000	279,000	256,000
July	244,000	214,000	336,000	331,000
August	281,000	251,000	260,000	351,000
September	150,000	202,000	176,000	
October		271,000	140,000	
November	143,000	143,000	130,000	
December	124,000	130,000	124,000	

COTTLE COUNTY

Paducah -- Continued

Storage: Concrete reservoir at well field, 286,000 gallons; ground storage reservoir 3 miles west of Paducah, 250,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 680.

Treatment: Chlorination.

Analyses

[Collected Oct. 25, 1945. Analyzed by B. C. Dwyer and J. H. Rowley]

	Well 3		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	354	17.67	534	26.65
Magnesium (Mg)	101	8.31	144	11.84
Sodium and potassium (Na + K)	13	.57	337	14.65
Bicarbonate (HCO_3)	202	3.31	224	3.67
Sulfate (SO_4)	1,090	22.69	1,370	28.52
Chloride (Cl)	18	.51	730	20.59
Nitrate (NO_3)	2.8	.05	1.2	.02
Dissolved solids	1,680		3,240	
Total hardness as $CaCO_3$	1,300		1,920	

CRANE COUNTY

Crane

Population in 1940: 1,420.

Source of information: Albert Wright, water superintendent, Dec. 13, 1946.

Ownership: Municipal.

Source of supply: Five wells about 6¼ miles northwest of Crane, (sec. 35, blk. 31, University of Texas.)

Well 2. Drilled in Sept. 1946 by W. O. Bower; depth, 79 feet; diameter, 8 inches; casing perforated from 54 to 79 feet; deep-well turbine pump and 3-horsepower electric motor, pump set at 69 feet; static water level reported, 40 feet below land surface when drilled; yield reported, 60 gallons a minute when drilled.

Well 3. Drilled in November 1946 by W. O. Bower; depth, 82 feet; diameter, 8 inches; casing perforated from 52 to 82 feet; deep-well turbine pump and 3-horsepower electric motor, pump set at 72 feet; static water level reported, 42 feet below land surface when drilled; yield reported, 65 gallons a minute when drilled.

Well 4. Drilled in November 1946 by W. O. Bower; depth, 92 feet; diameter, 8 inches; casing perforated from 62 to 92 feet; deep-well turbine pump and 3-horsepower electric motor, pump set at 82 feet; static water level reported, 45 feet below land surface when drilled; yield reported, 70 gallons a minute when drilled.

Well 6. Drilled in November 1946 by W. O. Bower; depth, 90 feet; diameter, 14 inches; deep-well turbine pump and 3-horsepower electric motor; static water level reported, 43 feet below land surface when drilled; yield reported, 50 gallons a minute when drilled.

Well 7. Drilled in September 1946 by W. O. Bower; depth, 92 feet; diameter, 14 inches; casing perforated from 62 to 92 feet; deep-well turbine pump and 3-horsepower electric motor; pump set at 82 feet; static water level reported, 40 feet below land surface when drilled; yield reported, 80 gallons a minute when drilled.

(Note: This well field was not in operation on Dec. 13, 1946.)

CRANE COUNTY

Crane -- Continued

Pumpage:

Average in gallons a day

	1945	1946
January		52,370
February		63,048
March		58,410
April		79,855
May		75,907
June		92,324
July		91,994
August		111,565
September		89,542
October		62,926
November		58,306
December	60,290	

Storage: Elevated tank, 50,000 gallons; surface storage reservoir, 210,000 gallons.

Number of customers: 500.

Treatment: Zeolite softening and chlorination.

Analysis, composite sample of five wells

[Collected Dec. 13, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	48	
Iron (Fe)	.50	
Calcium (Ca)	32	1.597
Magnesium (Mg)	5.2	.428
Sodium (Na)	8.4	.364
Potassium (K)	2.1	.054
Bicarbonate (HCO_3)	95	1.557
Sulfate (SO_4)	15	.312
Chloride (Cl)	8	.226
Fluoride (F)	1.4	.074
Dissolved solids	199	
Total hardness as $CaCO_3$	101	
pH	7.6	

CRANE COUNTY

Crane -- Continued

Driller's logs

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand	13	13	Red sand	6	59
White caliche	20	33	Coarse brown sand and gravel, water	11	70
Pink flint rock	4	37	Fine brown sand, water	9	79
Brown sand	10	47	Red rock	1	80
Sand, little water	6	53			

Well 3

Surface sand	16	16	Brown sand, more water	3	54
Caliche, white	24	40	Sand and gravel, coarse	24	78
Brown sand	6	46	Red rock	1	79
Brown sand, water	5	51			

Well 4

Surface sand	14	14	Sand, rock shell, brown	1	61
Caliche, white	21	35	Brown sand, water	4	65
Sandy red rock	20	55	Coarse sand and gravel	20	85
Red rock	5	60	Red rock	2	87

Well 6

Surface sand	12	12	Coarse sand and gravel	5	65
Caliche, white	14	26	Coarse sand	16	81
Flint rock	2	28	Coarse sand and gravel	6	87
Brown sand	20	48	Red rock	3	90
Red rock	3	51			
Fine brown sand	9	60			

CROCKETT COUNTY

Ozona

Population in 1940: 2,150.

Source of information: W. D. Cooper, Manager, July 22, 1947.

Owner: Crockett County Water Control and Improvement District No. 1.

Source of supply: Three wells.

Well 1. Drilled in 1941 by J. C. Crowder; depth, 450 feet; diameter, 10 inches; deep-well turbine pump and 50-horsepower electric motor; static water level reported, 365 feet below land surface in July 1947; drawdown reported, 7 feet after pumping several hours at a rate of 450 gallons a minute.

Well 2. About 125 feet southwest of well 1; drilled in 1941 by J. C. Crowder; depth, 450 feet; diameter, 10 inches; deep-well submersible turbine pump and 30-horsepower electric motor; yield reported, 225 gallons a minute.

Well 3. About 125 feet west of well 1; well not completed July 22, 1947.

Pumpage (estimated): Average, 500,000 gallons a day.

Storage: Ground reservoir, 200,000 gallons.

Number of customers: 673.

Treatment: None.

Analysis, composite sample of wells 1 and 2

[Collected July 22, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	15	
Iron (Fe)	.16	
Calcium (Ca)	72	3.59
Magnesium (Mg)	17	1.40
Sodium (Na)	11	.46
Potassium (K)	5.0	.13
Bicarbonate (HCO_3)	272	4.46
Sulfate (SO_4)	16	.33
Chloride (Cl)	22	.62
Fluoride (F)	.8	.04
Nitrate (NO_3)	7.8	.13
Dissolved solids	301	
Total hardness as $CaCO_3$	250	
pH	7.7	

CROSBY COUNTY

Crosbyton

Population in 1940: 1,615.

Source of information: C. R. Saffel, water superintendent, Mar. 6, 1945.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1938 by L. A. Peoples; depth, 301 feet; diameter, 10 inches; deep-well turbine pump and 40-horsepower electric motor; yield, 190 gallons a minute.

Well 2. Drilled in 1938 by L. A. Peoples; depth, 312 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 225 gallons a minute.

Well 3. Drilled in 1939 by Ed. Ballard; depth, 314 feet; diameter, 10 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 350 gallons a minute.

Pumpage: (estimated): 150,000 gallons a day.

Storage: Ground reservoir, 110,000 gallons; elevated tank, 55,000 gallons.

Number of customers (estimated): 400.

Treatment: None.

Analysis, well 3

[Collected April 1939. Analyzed by State Health Dept.]

	Parts per million	Equivalents per million
Silica (SiO_2)	53	
Calcium (Ca)	40	2.00
Magnesium (Mg)	31	2.55
Sodium (Na)	69	3.00
Bicarbonate (HCO_3)	369	6.05
Sulfate (SO_4)	41	.85
Chloride (Cl)	21	.59
Fluoride (F)	2.8	.15
Nitrate (NO_3)	1.3	.02
Dissolved solids	477	
Total hardness as $CaCO_3$	227	
pH	7.5	

CROSBY COUNTY

Crosbyton -- Continued

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Sand and white pebbles water at 208 feet	37	245
Hard white caliche	42	45	Fine-grained yellow sand	15	260
Soft red caliche	22	67	Coarse-grained yellow sand	35	295
Sticky red clay	36	103	Blue shale	17	312
Sandy clay	67	170			
Hard sand rock	7	177			
Red clay	31	208			

Lorenzo

Population in 1940: 616.

Source of information: Wm. W. Mitchell, city secretary, Mar. 21, 1947.

Ownership: Municipal.

Source of supply: Well under elevated tank; drilled in 1927 by W. G. Hamlin; depth, 223 feet; diameter, 12 inches, cased to 79 feet; deep-well turbine pump and 10-horsepower electric motor; static water level reported, 80 feet below land surface in 1939; yield, 100 gallons a minute.

Pumpage: Minimum, 36,000 gallons a day; maximum, 134,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 160.

Treatment: None.

Analysis

[Collected Mar. 21, 1947. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	42	
Iron (Fe)	.09	
Calcium (Ca)	39	1.95
Magnesium (Mg)	39	3.21
Sodium (Na)	39	1.70
Potassium (K)	10	.26
Bicarbonate (HCO_3)	342	5.61
Sulfate (SO_4)	35	.73
Chloride (Cl)	20	.56
Fluoride (F)	3.2	.17
Nitrate (NO_3)	3.2	.05
Dissolved solids	386	
Total hardness as $CaCO_3$	258	
pH	7.4	

CROSBY COUNTY

Ralls

Population in 1940: 1,512.

Source of information: water superintendent, Mar. 6, 1945.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. At elevated tank; drilled in 1924; depth, 225 feet; diameter, 12 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 75 gallons a minute.

Well 2. Five blocks west of well 1; drilled in 1927; depth, 285 feet; diameter, 8 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 145 gallons a minute.

Pumpage: Average, 125,000 gallons a day.

Storage: Two ground storage reservoirs, 50,000 gallons each; elevated tank, 50,000 gallons.

Number of customers: 213 in 1936.

Treatment: None.

Analysis, well 2

[Collected Aug. 1944. Analyzed by State Health Dept.]

	Parts per million	Equivalents per million
Iron (Fe)	.15	
Calcium (Ca)	42	2.10
Magnesium (Mg)	36	2.96
Sodium (Na)	61	2.65
Bicarbonate (HCO_3)	372	6.10
Sulfate (SO_4)	48	1.00
Chloride (Cl)	21	.59
Fluoride (F)	3.5	.18
Nitrate (NO_3	4.4	.07
Dissolved solids	394	
Total hardness as $CaCO_3$	253	
pH	7.7	

CULBERSON COUNTY

Van Horn

Population in 1940: 1,250.

Source of information: G. N. Langdon, mayor, Aug. 13, 1948.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1948 by Layne-Texas Co.; depth, 600 feet; diameter, 12 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 490 feet below land surface August 1948.

Well 2. Drilled in 1931; depth, 602 feet; diameter, 12 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 490 feet below land surface May 1944; yield, 170 gallons a minute with drawdown of 40 feet; temperature, 80° F.

Pumpage: Average, 100,000 gallons a day.

Storage: Ground storage reservoir, 117,000 gallons; elevated tank, 50,000 gallons; elevated tank, 102,000 gallons.

Number of customers: 320.

Treatment: None.

Analysis, well 2

[Collected July 24, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	26	
Iron (Fe)	.02	
Calcium (Ca)	19	.95
Magnesium (Mg)	8.0	.66
Sodium (Na)	112	4.87
Potassium (K)	9.2	.24
Bicarbonate (HCO_3)	256	4.20
Sulfate (SO_4)	78	1.62
Chloride (Cl)	22	.62
Fluoride (F)	2.8	.15
Nitrate (NO_3)	8.0	.13
Dissolved solids	413	
Total hardness as $CaCO_3$	80	
pH	8.2	

CULBERSON COUNTY

Van Horn -- Continued

Driller's log, well 2

	Thickness (feet)	Depth (feet)
Top soil and sand	20	20
Sand and clay	30	50
Clay and some sand	30	80
Hard adobe clay	414	494
Clay and gravel	12	506
River-bed gravel (water)	96	602

DALLAM COUNTY

Dalhart

Population in 1940: 4,682.

Source of information: V. R. Wilson, water superintendent, Mar. 16, 1948.

Owner: Southwestern Public Service Co.

Source of supply: Five wells at Southwestern Public Service Co. power plant.

Well 11. Drilled in 1929 by Layne-Texas Co.; depth, 547 feet; diameter, 10 inches; cased to 520 feet; deep-well turbine pump and 60-horsepower electric motor; static water level, 244 feet below land surface November 1929; yield, 366 gallons a minute with drawdown of 37 feet.

Well 12. Drilled in 1938 by L. E. McDade; depth, 526 feet; diameter, 12½ inches, cased to 489 feet, 36 feet perforated; deep-well turbine pump and 50-horsepower electric motor; static water level, 264 feet below land surface December 1938; yield, 340 gallons a minute with drawdown of 78 feet after pumping 24 hours.

Well 13. Drilled in 1942 by H. H. Heiskell; depth, 542 feet; diameter, 12½ inches, 57 feet of perforations; deep-well turbine pump and 50-horsepower electric motor; static water level, 257.7 feet below land surface August 1942; yield, 400 gallons a minute with drawdown of 74 feet.

Well 14. Drilled in 1943 by H. H. Heiskell; depth, 555 feet; diameter, 26 inches; deep-well turbine pump and electric motor; static water level, 264 feet below land surface; yield, 195 gallons a minute with drawdown of 58 feet.

Well 15. Drilled in 1943 by H. H. Heiskell; depth, 550 feet; diameter, 12½ inches; deep-well turbine pump and electric motor; static water level, 267 feet below land surface; yield, 43 gallons a minute with drawdown of 104 feet after pumping 137 hours.

Pumpage: Minimum, 550,000 gallons a day; maximum, 1,650,000 gallons a day.

Storage: Elevated tank, 200,000 gallons; two ground reservoirs, 200,000 gallons each.

Number of customers: 1,598.

Treatment: Chlorination.

DALLAM COUNTY

Dalhart -- Continued

Analysis, well 13

[Collected Mar. 16, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	30	
Iron (Fe)	.05	
Calcium (Ca)	38	1.90
Magnesium (Mg)	31	2.55
Sodium (Na)	20	.87
Potassium (K)	1.6	.04
Bicarbonate (HCO_3)	238	3.90
Sulfate (SO_4)	43	.90
Chloride (Cl)	13	.37
Fluoride (F)	1.4	.07
Nitrate (NO_3)	6.0	.10
Dissolved solids	302	
Total hardness as $CaCO_3$	222	
pH	7.2	

Drillers' logs

Well 11

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	19	19	Clay	10	195
Sand	31	50	Sand	7	202
Sandy clay	2	52	Clay	55	257
Rock	6	58	Sand	22	279
Packed sand, gravel	24	82	Sand, boulders, and sandrock	3	282
Packed sand	61	143	Hard sand, clay streaks	9	291
Sand	10	153	Sand	70	361
Clay	20	173	Water sand	53	414
Sand	12	185	No record	133	547

Well 12

Surface soil	4	4	Hard packed sand	35	331
Sand and clay	181	185	Fine sand, some gravel, clay, water	26	357
Sand and gravel	10	195	Yellow clay	50	407
Gravel, hard rock	10	205	Fine to coarse sand, thin layers sandrock, water cavities	119	526
Sand, gravel, weak water	67	272			
Clay	18	290			
Gravel, weak water	6	296			

DALLAM COUNTY

Dalhart -- Continued

Drillers' logs -- Continued

Well 13

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Fine sand, water	10	320
Sandy clay	47	50	Coarse sand, gravel	15	335
Caliche	15	65	Clay	18	353
Sandy clay	30	95	Hard sandstone	7	360
Sand, little water	3	98	Fine sand	10	370
Clay	7	105	Coarse sand	22	392
Dry sand	5	110	Clay	5	397
Sandy clay	12	122	Fine sand	8	405
Clay and gravel	8	130	Yellow sandy clay	10	415
Sandy clay	20	150	Sand	25	440
Dry sand and gravel	75	225	Yellow clay	5	445
Sandy clay	10	235	Sandy clay	15	460
Brown clay	5	240	Clean coarse sand	11	471
Muddy water sand	32	272	Hard sand, clay	19	490
Yellow clay	16	288	Fine sand	30	520
Water sand, gravel	12	300	Coarse sand, gravel	20	540
Broken sand, clay	10	310	Brown clay	2	542

Well 14

Sand and clay	68	68	Clay, gravel	60	435
Hard caliche	17	85	Yellow clay, sand	20	455
Sand, clay	175	260	Coarse water sand	42	497
Coarse sand, gravel	70	330	Hard shale, sand, gravel	33	530
Loose gravel, sand	45	375	Coarse sand, gravel	25	555

Well 15

Top soil	3	3	Dry sand	103	248
Caliche	7	10	Coarse sand, hard shells	52	300
Red sand	10	20	Coarse sand, gravel	102	402
Caliche	27	47	Clay, gravel	15	417
White clay	33	80	Clean sand, gravel	51	468
Hard brown sand	5	85	Gravel, coarse sand, shells	52	550
Dry sand, clay	60	145			

Texline

Population in 1940: 385.

Source of information: Mr. Greer, Mar. 17, 1948.

Owner: Southwestern Public Service Co.

DALLAM COUNTY

Texline -- Continued

Source of supply: Two wells at power plant.

Well 1 (East well). Drilled in 1922; depth, 260 feet; diameter, 8 inches; static water level, 76 feet below land surface; yield, 62 gallons a minute; not used for a year; new pump to be installed.

Well 2 (West well). Drilled in 1922; depth, 297 feet; diameter, 8 inches; Sterling turbine pump and 20-40-horsepower electric motor; static water level, 76 feet below land surface; yield, 250 gallons a minute with drawdown of 20 feet.

Pumpage: Average, 150,000 gallons a day.

Storage: Elevated tank, 150,000 gallons.

Number of customers: 145.

Treatment: None.

Analysis, well 2

[Collected Mar. 17, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	12	
Iron (Fe)	2.2	
Calcium (Ca)	32	1.60
Magnesium (Mg)	27	2.22
Sodium (Na)	30	1.30
Potassium (K)	3.6	.09
Bicarbonate (HCO_3)	244	4.00
Sulfate (SO_4)	42	.87
Chloride (Cl)	8	.23
Fluoride (F)	1.0	.05
Nitrate (NO_3)	0.0	.00
Dissolved solids	298	
Total hardness as $CaCO_3$	191	
pH	7.2	

Driller's log of railroad well in Texline

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay and sand	25	25	Water sand	20	250
Packed sand	45	70	Hard rock	5	255
Quicksand	20	90	Soft blue clay	5	260
Hard rock	10	100	Coarse sand	25	285
Blue clay	130	230	Hard rock	10	295

DAWSON COUNTY

Lamesa

Population in 1940: 6,038.

Source of information: G. M. Roberts, city manager, Sept. 12, 1947.

Ownership: Municipal.

Source of supply: Eighteen wells.

Well 1. Drilled in 1929; depth, 300 feet; diameter, 10 to 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 175 gallons a minute.

Well 2. Drilled in 1929; depth, 160 feet; diameter 10 to 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 100 gallons a minute; temperature, 66½° F.

Well 3. Drilled in 1929; depth, 160 feet; diameter 10 to 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 125 gallons a minute.

Well 4. Drilled in 1935; depth, 150 feet; diameter, 10 to 8 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 72.2 feet below land surface on Dec. 21, 1945, and 82.33 feet below land surface on Sept. 12, 1947; yield, 60 gallons a minute; temperature, 67° F.

Well 5. Drilled in 1924; depth, 300 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 125 gallons a minute.

Well 6. Drilled in 1924; depth, 300 feet; diameter, 6 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 125 gallons a minute.

Well 7. Drilled in 1940; depth, 160 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 66 feet below land surface on Sept. 17, 1941, and 76 feet below land surface on Feb. 5, 1946; yield, 175 gallons a minute.

Well 8. Drilled in 1940; depth, 151 feet; diameter, 10 to 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 125 gallons a minute.

Well 9. Drilled in 1940; depth, 160 feet; diameter 10 to 8 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 35 gallons a minute.

Well 10. Drilled in 1945; depth, 163 feet; diameter, 12 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 95.2 feet below land surface on Sept. 13, 1947; yield, 200 gallons a minute.

Well 11. Drilled in 1945; depth, 160 feet; diameter, 12 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 100 gallons a minute; temperature, 66½° F.

DAWSON COUNTY

Lamesa -- Continued

Well 12. Drilled in 1945; depth, 160 feet; diameter, 12 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 69 feet below land surface on March 13, 1946; yield, 100 gallons a minute.

Well 13. Drilled in 1946; depth, 168 feet; diameter, 12 to 10 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 175 gallons a minute.

Well 14. Drilled in 1946; depth, 197 feet; diameter, 12 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 130 gallons a minute.

Well 15. Drilled in 1946; depth, 220 feet; diameter, 12 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 100 gallons a minute.

Well 16. Drilled in 1946; depth, 255 feet; diameter, 12 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 75 gallons a minute.

Well 17. Drilled in 1947; depth, 182 feet; diameter, 14 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 90 gallons a minute.

Well 18. Drilled in 1947; depth, 138 feet; diameter, 12 inches; pump not installed.

Pumpage (estimated): Minimum, 450,000 gallons a day; maximum, 1,500,000 gallons a day.

Storage: Ground reservoir, 250,000 gallons; two ground reservoirs, 200,000 gallons each; ground reservoir, 100,000 gallons; elevated tank, 200,000 gallons; elevated tank, 100,000 gallons.

Number of customers: Estimated, 2,000.

Treatment: Chlorination.

Analyses

[Collected Sept. 13, 1947. Analyzed by B. C. Dwyer]

	Well 6		Well 13	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	30		72	
Iron (Fe)	.0		.06	
Calcium (Ca)	28	1.40	74	3.69
Magnesium (Mg)	26	2.14	75	6.17
Sodium (Na)	260	11.29	54	2.34
Potassium (K)	13	.33	8.2	.21
Bicarbonate (HCO_3)	440	7.21	402	6.59
Sulfate (SO_4)	200	4.16	160	3.33
Chloride (Cl)	124	3.50	70	1.97
Fluoride (F)	5.2	.27	4.4	.23
Nitrate (NO_3)	2.5	.02	18	.29
Dissolved solids	905		760	
Total hardness as $CaCO_3$	177		493	
pH	8.0		7.5	

DAWSON COUNTY

Lamesa -- Continued

Analyses -- Continued

[Collected Sept. 13, 1947. Analyzed by B. C. Dwyer]

	Composite sample from 13 wells	
	Parts per million	Equivalents per million
Silica (SiO_2)	37	
Iron (Fe)	.03	
Calcium (Ca)	38	1.90
Magnesium (Mg)	57	4.69
Sodium (Na)	164	7.15
Potassium (K)	25	.64
Bicarbonate (HCO_3)	388	6.36
Sulfate (SO_4)	193	4.02
Chloride (Cl)	130	3.67
Fluoride (F)	5.6	.29
Nitrate (NO_3)	2.5	.04
Dissolved solids	843	
Total hardness as $CaCO_3$	330	
pH	7.6	

Driller's logs

Well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Caliche	30	30	Sand	20	80
Rock	10	40	Water sand	10	90
Sand	8	48	Sand	52	142
Water sand	10	58	Water sand	8	150
Sandrock	2	60	Red beds		150

Well 5

Red clay	4	4	Sand	90	190
Caliche	46	50	Porous sandrock, water	10	200
Cap rock	10	60	Red beds and thin-bedded blue shale streaks	100	300
Sand	30	90			
Water sand	10	100			

DAWSON COUNTY

Lamesa -- Continued

Driller's logs -- Continued

Well 7

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Coarse-grained sand, water	8	81
Sand and caliche	4	7	Sandy clay	2	83
Packed sand	8	15	Fine-grained sand, water	16	99
Hard sand	8	23	Brown clay	4	103
Sand and caliche rock	8	31	Fine packed sand	12	115
Sand and rock, light	10	41	Coarse-grained sand, water	20	135
Sand and rock, dark	7	48	Packed sand, tight	5	140
Coarse sand and fine gravel	9	57	Pink clay	11	151
Fine-grained sand, dry	4	61	Coarse-grained sand, water	6	157
Fine-grained sand and fine gravel, dry	7	68	Coarse water sand and some pea gravel	3	160
Packed sand	5	73			

Well 8

Surface soil	3	3	Sand and fine gravel, water	27	90
Packed sand	5	8	Clean sand and fine gravel, water	8	98
Sand	7	15	Packed sand	12	110
Hard sand	5	20	Pink clay	9	119
Hard limestone	4	24	Packed sand	14	133
Hard sand	21	45	Coarse sand and gravel	18	151
Gravel, medium	8	53			
Sand	10	63			

Well 9

Surface soil	3	3	Sandy clay	2	77
Hard caliche	7	10	Sand and gravel	18	95
Packed sand and rock	6	16	Packed sand	15	110
Sand and rock	30	46	Pink clay	10	120
Coarse sand and gravel	9	55	Sand, water	10	130
Sand and fine gravel	5	60	Sand and pea gravel, water	10	140
Packed sand	5	65	Coarse sand and pea gravel	12	152
Coarse sand and gravel, water	10	75	Red beds	8	160

DAWSON COUNTY

Lamesa -- Continued

Driller's logs -- Continued

Well 10

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Pink shale	12	120
Sand and shale	52	55	Sand, dry	8	128
Gravel	8	63	Sand, medium-fine-grained, water	20	148
Sand, water	45	108	Red clay	15	163

Well 11

Surface soil	4	4	Sand and gravel	20	80
Shale	11	15	Sand, dry	10	90
Caliche	10	25	Sand, water	17	107
Sand	5	30	Pink shale	28	135
Hard white rock	15	45	Sand, dry	10	145
Sand	15	60	Sand, water	15	160
			Red clay	5	165

Well 13

Top soil, caliche, and clay	58	58	Clay	55	130
Coarse gravel	7	65	Sand and fine gravel	20	150
Sand and fine gravel	10	75	Red beds	18	168

Well 14

Surface soil	4	4	Red shale	23	148
Shale	6	10	Yellow, sandy shale	17	165
Rock	11	21	Sand and gravel	27	192
Sandy shale	29	50	Red shale	4	196
Sand and gravel	75	125	Rock	1	197

Well 15

Surface soil	4	4	Caliche	25	160
Caliche	36	40	Red shale	20	180
Sandy shale	55	95	Blue sandy shale	5	185
Sand	10	105	Sand	33	218
Sand and gravel, water	30	135	Red shale	2	220

DAWSON COUNTY

Lamesa -- Continued

Driller's logs -- Continued

Well 16

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Sand and gravel	6	135
Rock	18	20	Caliche	35	170
Sandy shale	35	55	Sand	15	185
Rock	20	75	Caliche	17	202
Sandy shale	26	101	Red shale	20	222
Sand and gravel	20	121	Sand	31	253
Hard rock	8	129	Yellow clay	2	255

Well 17

Surface soil	3	3	Hard rock	9	127
Hard rock	19	22	Sand and gravel	6	133
Sandy shale	36	58	Caliche	34	167
Rock	19	77	Sand	6	173
Sandy shale	21	98	Caliche	9	182
Sand and gravel	20	118			

Well 18

Unknown	70	70	Solid rock	8	121
Solid rock	17	87	Open cavity	3	124
Coarse gravel	8	95	Water-bearing sand	11	135
Water-bearing sand	18	113	Red beds	3	138

DEAF SMITH COUNTY

Hereford

Population in 1940: 2,584.

Source of information: O. Carroll, water superintendent, March 1945.

Ownership: Municipal.

Source of supply: Two wells.

Well 2. At pumping station 7 blocks southeast of post office; dug to 50 feet and drilled from 50 to 200 feet; diameter, 14 inches; deep-well turbine pump and 50-horsepower electric motor; static water level reported, 60 feet below land surface in 1938; yield, 1,000 gallons a minute.

Well 3. About 150 feet northeast of well 2; drilled in 1939 by Bradford Supply Co.; depth, 160 feet; diameter, 20 inches; deep-well turbine pump and 50-horsepower electric motor; static water level reported, 65 feet below land surface in 1939 and 75 feet below land surface in 1941; yield, 1,325 gallons a minute.

Pumpage (estimated): 600,000 gallons a day.

Storage: Ground reservoir, 120,000 gallons; elevated tank, 175,000 gallons.

Number of customers: 750.

Treatment: None.

Analyses

[Collected March 1945. Analyzed by B. C. Dwyer and J. H. Rowley]

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	59		61	
Iron (Fe)	.02		.08	
Calcium (Ca)	46	2.30	54	2.70
Magnesium (Mg)	66	5.43	59	4.85
Sodium (Na)	32	1.40	60	2.61
Potassium (K)	9.5	.24	15	.38
Bicarbonate (HCO_3)	340	5.57	311	4.90
Sulfate (SO_4)	139	2.89	207	4.31
Chloride (Cl)	22	.62	30	.85
Fluoride (F)	3.5	.18	3.6	.19
Nitrate (NO_3)	7.0	.11	5.5	.09
Dissolved solids	557		648	
Total hardness as $CaCO_3$	386		378	
pH	7.6		7.8	

DICKENS COUNTY

Dickens

Population in 1940: 465.

Source of information: Cecil Meadors, mayor, Feb. 5, 1946.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. At 7th and Davis Streets; drilled in 1936 by L. A. Peoples; depth, 90 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; static water level, 77.0 feet below land surface in 1936; yield, 10 gallons a minute.

Well 2. At O'Neal Street and State Highway; drilled in 1936 by L. A. Peoples; depth, 156 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 18 gallons a minute.

Well 3. Forth feet east of well 2; drilled in 1945; depth, 150 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 30 gallons a minute.

Well 4. One block north and two blocks west of courthouse; drilled in 1935 by L. A. Peoples; depth, 110 feet; diameter, 12 to 8 inches; deep-well turbine pump and electric motor; static water level, 89.82 feet below land surface on Sept. 16, 1947; yield, 50 gallons a minute; temperature, 66½° F.

Pumpage: No record.

Storage: Stand pipe, 52,000 gallons.

Number of customers: 115.

Treatment: None.

DICKENS COUNTY

Dickens -- Continued

Analyses

[Collected Feb. 21, 1946. Analyzed by C. B. Cibulka]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		14	
Iron (Fe)	2.2		.03	
Calcium (Ca)	68	3.39	74	3.69
Magnesium (Mg)	17	1.40	20	1.64
Sodium (Na)	39	1.71	38	1.65
Potassium (K)	3.1	.08	4.6	.12
Bicarbonate (HCO_3)	258	4.23	303	4.97
Sulfate (SO_4)	47	.98	49	1.02
Chloride (Cl)	44	1.24	30	1.02
Fluoride (F)	1.0	.05	.4	.02
Nitrate (NO_3)	4.7	.08	4.5	.07
Dissolved solids	373		399	
Total hardness as $CaCO_3$	240		266	
pH	7.6		7.4	

	Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	18		16	
Iron (Fe)	.39		.06	
Calcium (Ca)	76	3.79	86	4.29
Magnesium (Mg)	20	1.64	25	2.06
Sodium (Na)	41	1.79	23	1.04
Potassium (K)	3.5	.09	3.8	.10
Bicarbonate (HCO_3)	282	4.62	246	4.03
Sulfate (SO_4)	61	1.27	55	1.15
Chloride (Cl)	47	1.33	60	1.69
Fluoride (F)	.6	.03	.8	.04
Nitrate (NO_3)	3.8	.06	30	.48
Dissolved solids	414		450	
Total hardness as $CaCO_3$	272		318	
pH	7.5		7.4	

DICKENS COUNTY

Dickens -- Continued

Driller's logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Gray sand	7	7	Sandrock	3	77
Soft sandrock	3	10	Coarse-grained sand and gravel	3	80
Gray sand	5	15	Rock	2	82
Red sticky clay	12	27	Sand and gravel	3	85
Coarse-grained yellow sand, dry	26	53	Hard rock	1	86
Soft sandrock	1	54	Sand and gravel	4	90
Coarse-grained sand and gravel, dry	20	74			

Well 2

Top soil	4	4	Fine-grained water sand	6	100
Red sticky clay	8	12	Sticky, dense blue clay	22	122
Blue clay and sand	15	27	Blue water sand	13	135
Dry sand	29	56	Blue clay	2	137
Hard rock	1	57	Coarse-grained blue water sand and gravel	19	156
Sand	3	60			
Hard rock	1	61			
Dry sand	22	83			
Sticky, dense blue clay	11	94			

Spur

Population in 1940: 2,136.

Source of information: J. H. Cowan, city secretary, Feb. 18, 1946.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. Dug in 1940; depth, 51 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 29.8 feet below land surface Feb. 18, 1946; yield, 250 gallons a minute; temperature, 64½° F.

Well 2. Dug in 1943; depth, 40 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 13.48 feet below land surface Feb. 18, 1946; yield, 200 gallons a minute.

DICKENS COUNTY

Spur -- Continued

Well 3. Dug in 1945; depth, 49 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 15.34 feet below land surface Feb. 18, 1946; yield, 200 gallons a minute.

Well 4. Dug in 1942; depth, 32 feet; diameter, 18 inches; deepened to 45 feet in 1947; deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute; temperature, 63½° F.

Pumpage:

	Average in gallons a day					
	1942	1943	1944	1945	1946	1947
January	115,000	109,000	135,000	124,000	140,000	163,000
February	107,000	105,000	130,000	124,000	138,000	171,000
March	123,000	120,000	135,000	137,000	193,000	200,000
April	111,000	140,000	171,000	169,000	274,000	245,000
May	--	161,000	175,000	258,000	251,000	224,000
June	215,000	170,000	178,000	219,000	340,000	371,000
July	246,000	169,000	207,000	249,000	416,000	393,000
August	161,000	254,000	238,000	304,000	425,000	413,000
September	133,000	--	169,000	230,000	225,000	--
October	137,000	166,000	145,000	134,000	193,000	--
November	130,000	176,000	137,000	132,000	170,000	--
December	106,000	131,000	128,000	131,000	200,000	--

Storage: Concrete reservoir and elevated tank, total capacity, 200,000 gallons.

Number of customers: 730.

Treatment: Chlorination.

DICKENS COUNTY

Spur -- Continued

Analyses

[Collected Feb. 18, 1946 and Sept. 16, 1947. Analyzed by C. B. Cibulka and B. C. Dwyer]

	Well 1		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	17		39	
Iron (Fe)	.06		.08	
Calcium (Ca)	129	6.44	124	6.19
Magnesium (Mg)	65	5.35	73	6.00
Sodium (Na)	305	13.28	100	4.36
Potassium (K)	15	.38	9.2	.23
Bicarbonate (HCO_3)	297	4.87	270	4.43
Sulfate (SO_4)	534	11.12	263	5.48
Chloride (Cl)	319	9.00	236	6.66
Fluoride (F)	3.6	.19	2.8	.15
Nitrate (NO_3)	17	.27	3.8	.06
Dissolved solids	1,550		984	
Total hardness as $CaCO_3$	590		610	
pH	7.7		7.7	

Driller's logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy loam	1	1	Coarse sand and gravel	2	32
Blue gumbo	5	6	Coarse sand	16	48
Clay	5	11	Soft rock	5	53
Quicksand	19	30			

Well 2

Sandy loam	4	4	Quicksand	29	42
Blue gumbo	5	9	Coarse sand	5	47
Clay	3	12	Soft rock	7	54
Sand	1	13			

Well 3

Sandy loam	3	3	Water sand	16	24
Gypsum	3	6	Clay	8	32
Clay	2	8			

DONLEY COUNTY

Clarendon

Population in 1940: 2,431.

Source of information: J. H. Casey, water superintendent, Dec. 4, 1947.

Ownership: Municipal.

Source of supply: Five wells.

Well 1. At Second and Park Streets; drilled in 1927 by Smith and Whitney; depth, 240 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 60 feet below land surface; pumping level, 90 feet below land surface when pumping 150 gallons a minute; yield, 150 gallons a minute.

Well 2. At Sully and White Streets; drilled in 1929; depth, 302 feet; diameter, 24 inches; pumped with air and 60-horsepower electric motor; yield, 225 gallons a minute.

Well 3. At North Front and Jefferson Streets; drilled in 1945 by Leonard Reid; depth, 165 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 125 gallons a minute.

Well 4. At Taylor Avenue and Rosenfield Street; drilled in 1945 by A. H. Moore; depth, 202 feet; diameter, 16 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 225 gallons a minute.

Well 5. At North Front and Ellerbe Streets; drilled in 1946 by A. H. Moore; diameter, 16 inches; deep-well turbine pump and 40-horsepower electric motor; yield, 130 gallons a minute.

Pumpage: Average, 225,000 gallons a day.

Storage: Ground storage reservoir, 276,000 gallons; stand pipe, 150,000 gallons.

Number of customers: 800.

Treatment: Chlorination.

DONLEY COUNTY

Clarendon -- Continued

Analysis, composite sample of five wells

[Collected Dec. 4, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	27	
Iron (Fe)	.08	
Calcium (Ca)	88	4.39
Magnesium (Mg)	11	.90
Sodium (Na)	6.0	.26
Potassium (K)	3.2	.08
Bicarbonate (HCO_3)	260	4.26
Sulfate (SO_4)	19	.40
Chloride (Cl)	26	.73
Fluoride (F)	.0	.00
Nitrate (NO_3)	15	.24
Dissolved solids	357	
Total hardness as $CaCO_3$	264	
pH	7.5	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Clay	23	108
Sand and clay	46	50	Sand and silt	12	120
Sand	4	54	Coarse-grained sand and gravel	2	122
Clay and caliche	26	80	Red beds	180	302
Water sand	5	85			

Hedley

Population in 1940: 637.

Source of information: J. P. Devine, former water superintendent, Apr. 26, 1948.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Two miles west of Hedley; drilled in 1925 by Bill Miller; depth, 112 feet; diameter, 8 inches; deep-well cylinder pump and 5-horsepower electric motor; static water level, 45 feet below land surface June 1936; yield, 20 gallons a minute.

DONLEY COUNTY

Hedley -- Continued

Well 2. About 50 feet north of well 1; drilled in 1925 by Bill Miller; depth, 100 feet; diameter, 6 inches; deep-well cylinder pump and 3-horsepower electric motor; yield, 10 gallons a minute.

Well 3. About 100 feet west of well 1; drilled in 1927 by Carlisle; depth, 115 feet; diameter, 8 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 100 gallons a minute.

Pumpage: Average, 30,000 gallons a day.

Storage: Ground storage reservoir, 14,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 200.

Treatment: None.

Analysis, well 1

[Collected May 19, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	13	
Iron (Fe)	.15	
Calcium (Ca)	72	3.59
Magnesium (Mg)	9.5	.78
Sodium and potassium (Na + K)	53	2.30
Bicarbonate (HCO_3)	320	5.25
Sulfate (SO_4)	31	.65
Chloride (Cl)	13	.37
Fluoride (F)	1.6	.08
Nitrate (NO_3)	20	.32
Dissolved solids	383	
Total hardness as $CaCO_3$	218	
pH	8.4	

Driller's log, city test well

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Loam	13	90
Loam	26	30	Packed sand	8	98
Sandy loam	35	65	Water-bearing sand	14	112
Clay loam	12	77			

ECTOR COUNTY

Odessa

Population in 1940: 9,573 (estimated 30,000 in 1947).

Source of information: A. L. Write, water superintendent, July 19, 1948.

Ownership: Municipal.

Source of supply: Fifty-two wells located in sec. 4 and 9, blk. 2, T. 2, Texas and Pacific Railway Co. Survey and sec. 44 and 45, blk. 42, T. 1, Texas and Pacific Railway Survey.

Well 1. Southwest corner of sec. 9; drilled in January 1944 by Hines Water Well Co.; depth, 145 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 159 gallons a minute with drawdown of 68 feet.

Well 2. About 1,000 feet east of well 1; drilled in February 1944 by Hines Water Well Co.; depth, 150 feet; diameter, 7 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 74 feet below pump base February 1947, 80.2 feet below pump base Sept. 26, 1947; yield, 250 gallons a minute with drawdown of 16 feet.

Well 3. About 1,000 feet east of well 2; drilled in March 1944 by Hines Water Well Co.; depth, 156 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 86.18 feet below pump base Sept. 30, 1947; yield, 167 gallons a minute.

Well 4. About 1,000 feet east of well 3; drilled in March 1944 by Hines Water Well Co.; depth, 148 feet; diameter, 10 inches; deep-well turbine pump and 3-horsepower electric motor; static water level, 81.24 feet below pump base Sept. 26, 1947; yield, 130 gallons a minute with drawdown of 32 feet.

Well 5. About 1,000 feet east of well 4; drilled in August 1944 by Hines Water Well Co.; depth, 150 feet; diameter, 10-3/4 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 78.07 feet below pump base Sept. 26, 1947; yield, 110 gallons a minute.

Well 6. About 1,000 feet east of well 5; drilled in March 1944 by Hines Water Well Co.; depth, 155 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 130 gallons a minute.

Well 7. Drilled in March 1944 by Hines Water Well Co.; depth, 139 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 230 gallons a minute when drilled; measured yield, 41 gallons a minute Oct. 18, 1947.

Well 8. About 1,450 feet north of well 2; drilled in March 1944 by Hines Water Well Co.; depth, 140 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 77.05 feet below pump base Sept. 25, 1947; pumping level, 109.13 feet below pump base Sept. 29, 1947; yield, 46 gallons a minute.

ECTOR COUNTY

Odessa -- Continued

Well 9. About 1,000 feet east of well 8; drilled in 1944 by Hines Water Well Co.; depth, 148 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; measured yield, 74 gallons a minute Oct. 18, 1947.

Well 10. About 1,000 feet east of well 9; drilled in 1944 by Hines Water Well Co.; depth, 156 feet; diameter, 7 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 87.86 feet below pump base Sept. 26, 1947; pumping level, 107.37 feet below pump base Sept. 26, 1947.

Well 11. About 1,000 feet east of well 10; drilled in January 1945 by Hines Water Well Co.; depth, 150 feet; diameter, 10-3/4 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 82.36 feet below pump base Sept. 26, 1947; pumping level, 109.0 feet below pump base Sept. 29, 1947; reported yield, 150 gallons a minute in 1945.

Well 12. About 1,000 feet east of well 11; drilled in March 1944 by Hines Water Well Co.; depth, 155 feet; diameter, 7 inches; deep-well turbine pump and 5-horsepower electric motor; reported yield, 95 gallons a minute in 1944.

Well 13. About 250 feet east and 500 feet south of well 3; drilled in March 1945 by Hines Water Well Co.; depth, 135 feet; diameter, 12½ inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 82.82 feet below pump base Sept. 30, 1947; pumping level, 103.5 feet below pump base Sept. 29, 1947; yield, 35 gallons a minute.

Well 14. About 200 feet south of well 13; drilled in 1945 by Hines Water Well Co.; depth, 135 feet; diameter, 12½ inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 38 gallons a minute.

Well 15. About 500 feet east and 1,000 feet north of well 9; drilled in May 1945 by Hines Water Well Co.; depth, 180 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 87.14 feet below pump base Sept. 26, 1947; pumping level, 132.7 feet below pump base Sept. 29, 1947.

Well 16. About 1,000 feet north of well 15; drilled in May 1945 by Hines Water Well Co.; depth, 150 feet; diameter, 10-3/4 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 88.76 feet below pump base Sept. 26, 1947; pumping level, 140.13 feet below pump base Sept. 29, 1947; yield, 95 gallons a minute.

Well 17. About 1,000 feet north of well 16; drilled in June 1945 by Hines Water Well Co.; depth, 165 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 78.9 feet below pump base Sept. 26, 1947; pumping level, 103.5 feet below pump base Sept. 29, 1947; yield, 110 gallons a minute in 1945.

Well 18. About 1,100 feet west of northeast corner of sec. 4; drilled in June 1945 by Hines Water Well Co.; depth, 175 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 47.16 feet below pump base Sept. 26, 1947; pumping level, 95.8 feet below pump base Sept. 29, 1947; yield, 140 gallons a minute in 1945.

ECTOR COUNTY

Odessa -- Continued

Well 19. About 1,500 feet east of well 17; drilled in August 1945 by Hines Water Well Co.; depth, 155 feet; diameter, 10 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 81.32 feet below pump base Sept. 26, 1947; pumping level, 138.8 feet below pump base Sept. 29, 1947; yield, 90 gallons a minute in 1945.

Well 20. About 1,200 feet north and 1,450 feet east of the southeast corner of sec. 4; drilled in August 1945 by Hines Water Well Co.; depth, 175 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 120 gallons a minute in 1945.

Well 21. About 1,350 feet north of well 20; drilled in January 1946 by Hines Water Well Co.; depth, 160 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 62.30 feet below pump base Sept. 26, 1947; yield, 180 gallons a minute in 1946.

Well 22. About 417 feet east and 316 feet south of the northwest corner of sec. 45; drilled in December 1945 by Bethel and Matthews; depth, 164 feet; diameter, 10 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 56.35 feet below pump base Sept. 29, 1947; pumping level, 119.4 feet below pump base Sept. 26, 1947; yield, 300 gallons a minute in January 1946.

Well 23. About 378 feet east and 61 feet north of the southwest corner of NW¼ sec. 45; drilled in January 1946 by Bethel and Matthews; depth, 156 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 54.65 feet below pump base Sept. 29, 1947; pumping level, 99.42 feet below pump base Sept. 29, 1947; yield, 180 gallons a minute in 1946.

Well 24. About 1,200 feet northeast of well 23; drilled in January 1946 by Bethel and Matthews; depth, 156 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 53.75 feet below pump base Sept. 29, 1947; pumping level, 97.35 feet below pump base Sept. 29, 1947; yield, 221 gallons a minute.

Well 25. About 258 feet west and 279 feet north of the southeast corner of the NW¼ sec. 45; drilled in February 1946 by Bethel and Matthews; depth, 164 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 55.21 feet below pump base Sept. 26, 1947; reported yield, 254 gallons a minute.

Well 26. About 269 feet west and 1,150 feet south of the northeast corner of the NW¼ sec. 45; drilled in February 1946 by Bethel and Matthews; depth, 174 feet; diameter, 10-3/4 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 54.89 feet below pump base Sept. 29, 1947; pumping level, 92.12 feet below pump base Sept. 29, 1947; yield, 257 gallons a minute.

Well 27. About 831 feet north of well 23; drilled in February 1946 by Bethel and Matthews; depth, 158 feet; diameter, 10-3/4 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 58.35 feet below pump base Sept. 29, 1947; yield, 192 gallons a minute.

ECTOR COUNTY

Odessa -- Continued

Well 28. About 1,040 feet west of well 20; drilled in May 1946 by Bethel and Matthews; depth, 150 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 79.19 feet below pump base Sept. 26, 1947; pumping level, 121.0 feet below pump base Sept. 29, 1947; reported yield, 170 gallons a minute.

Well 29. About 1,260 feet south of well 18; drilled in May 1946 by Bethel and Matthews; depth, 150 feet; diameter, 10 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 46.77 feet below pump base Sept. 29, 1947; pumping level, 68.4 feet below pump base Sept. 29, 1947; reported yield, 250 gallons a minute.

Well 30. About 1,000 feet west of northeast corner of sec. 44; drilled in November 1946 by Bethel and Matthews; depth, 160 feet; diameter, 10-3/4 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 60.09 feet below pump base Sept. 29, 1947; pumping level, 94.9 feet below pump base Sept. 29, 1947; yield, 211 gallons a minute.

Well 31. Drilled in December 1946 by Bethel and Matthews; depth, 160 feet; diameter, 10-3/4 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 55.01 feet below pump base Sept. 29, 1947; pumping level, 89.44 feet below pump base Sept. 29, 1947; yield, 210 gallons a minute in 1946.

Well 32. About 1,500 feet west of well 30; drilled in December 1946 by Bethel and Matthews; depth, 160 feet; diameter, 10-3/4 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 65.31 feet below pump base Sept. 29, 1947; pumping level, 107.6 feet below pump base Sept. 29, 1947; yield, 251 gallons a minute.

Well 33. About 1,300 feet south of well 32; drilled in December 1946 by Bethel and Matthews; depth, 147 feet; diameter, 10-3/4 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 54.12 feet below pump base Sept. 29, 1947; pumping level, 102.52 feet below pump base Sept. 29, 1947; yield, 178 gallons a minute.

Well 34. About 1,500 feet west of well 32; drilled in January 1947 by Bethel and Matthews; depth, 150 feet; diameter, 10-3/4 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 58.86 feet below pump base Sept. 29, 1947; pumping level, 100.25 feet below pump base Sept. 29, 1947; yield, 91 gallons a minute.

Well 35. About 1,300 feet south of well 34; drilled in January 1947 by Bethel and Matthews; depth, 140 feet; diameter, 10-3/4 inches; deep-well turbine pump and electric motor; static water level, 58.21 feet below pump base Sept. 29, 1947; yield, 152 gallons a minute.

ECTOR COUNTY

Odessa -- Continued

Well 36. About 100 feet west and 100 feet south of the northwest corner of the NW¼ sec. 45; drilled in January 1947 by Bethel and Matthews; depth, 180 feet; diameter, 10-3/4 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 54.54 feet below pump base Sept. 26, 1947; yield, 310 gallons a minute.

Well 37. About 1,050 feet southeast of well 22; drilled in January 1927 by Bethel and Matthews; depth, 166 feet; diameter, 10-3/4 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 56.67 feet below pump base Sept. 29, 1947; pumping level, 119.8 feet below pump base Sept. 29, 1947; yield, 223 gallons a minute in 1947.

Well 40. About 1,250 feet southwest of well 34; drilled in April 1948 by Bethel and Matthews; depth, 140 feet; well yielded insufficient water and was abandoned. See driller's log.

Well 41. Along the southern edge of sec. 45 about 3,400 feet from the east line; drilled in April 1948 by Bethel and Matthews; depth, 170 feet; diameter, 15 to 10-3/4 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 60 feet below land surface April 30, 1948; pumping level, 115 feet below land surface after pumping 6 hours at a rate of 150 gallons a minute; yield, 150 gallons a minute.

Well 42. About 1,200 feet north of well 41; drilled in May 1948 by Bethel and Matthews; depth, 170 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and 25-horsepower electric motor; static water level reported, 60 feet below land surface when drilled; pumping level, 125 feet below land surface after 4½ hours of pumping at a rate of 223 gallons a minute; yield, 223 gallons a minute.

Well 43. About 1,500 feet east of well 42; drilled in May 1948 by Bethel and Matthews; depth, 130 feet; diameter, 20 to 10-3/4 inches; deep-well turbine pump and 15-horsepower electric motor.

Well 44. About 1,300 feet north of well 43; drilled in June 1948 by Bethel and Matthews; depth, 175 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute.

Well 45. About 1,700 feet south of the north line and about 2,000 feet west of the east line of sec. 45; drilled in June 1948 by Bethel and Matthews; depth, 180 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and 25-horsepower electric motor.

Well 46. About 1,000 feet south of the north line and 600 feet west of the east line of sec. 45; drilled in June 1948 by Bethel and Matthews; depth, 180 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 125 gallons a minute after pumping 8 hours.

ECTOR COUNTY

Odessa -- Continued

Well 47. About 1,200 feet west of well 1; drilled in June 1948 by Bethel and Matthews; depth, 150 feet; diameter 16 inches; well abandoned because it did not yield sufficient water. See driller's log.

Well 48. About .2 mile west and .8 mile south of the intersection of Highways 80 and 51 in Odessa; drilled in July 1948 by Bethel and Matthews; depth, 130 feet; diameter, 15 to 10-3/4 inches; deep-well turbine pump and electric motor; drawdown, 46 feet after pumping 1 hour at a rate of 146 gallons a minute.

Well 49. About 2,200 feet south and 660 feet west of the intersection of Crane Avenue and Clement Street in Odessa; drilled in August 1948 by Bethel and Matthews; depth, 120 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and electric motor; static water level reported, 29 feet below land surface June 1948.

Well 50. About 2,200 feet south of the intersection of Crane Avenue and Clement Street; drilled in August 1948 by Bethel and Matthews; depth, 120 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and electric motor; static water level, 22 feet below land surface August 1948; yield, 243 gallons a minute after 1 hour pumping.

Well 51. About 1,100 feet south of the intersection of Crane Avenue and Clements Street; drilled in August 1948 by Bethel and Matthews; depth, 125 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and electric motor; static water level, 30 feet below land surface August 1948; yield, 164 gallons a minute after 6 hours of pumping.

Well 52. About 450 feet east of well 1; drilled in August 1948 by Bethel and Matthews; depth, 128 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and electric motor.

Well 53. About 1,100 feet east of well 49; drilled in August 1948 by Bethel and Matthews; depth, 125 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and electric motor.

Well 54. About 1,110 feet east of well 52; drilled in August 1948 by Bethel and Matthews; depth, 120 feet; diameter, 16 to 10-3/4 inches; deep-well turbine pump and electric motor.

Pumpage:

(Average in gallons a day)

	1946	1947	1948
January		1,417,000	1,680,000
February		1,508,000	1,832,000
March		1,707,000	2,287,000
April		--	3,139,000
May		--	3,433,000
June		--	
July		3,719,000	
August		3,477,000	
September		2,983,000	
October		2,287,000	
November		1,641,000	
December	1,363,000		

ECTOR COUNTY

Odessa -- Continued

Storage: Surface reservoir, 100,000 gallons; surface reservoir, 300,000 gallons; surface reservoir, 420,000 gallons; two surface reservoirs, 440,000 gallons each; surface reservoir, 500,000 gallons; elevated tank, 100,000 gallons; elevated tank, 500,000 gallons.

Number of customers: 4,141.

Treatment: Chlorination.

Analyses

[Collected Sept. 22, 1948. Analyzed by D. E. Weaver]

	Well 2		Well 28	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	38		32	
Iron (Fe)	.10		.15	
Calcium (Ca)	132	6.59	72	3.59
Magnesium (Mg)	34	2.80	17	1.40
Sodium (Na)	81	3.52	37	.09
Potassium (K)	4.8	.12	1.6	.04
Bicarbonate (HCO_3)	186	3.05	214	3.51
Sulfate (SO_4)	255	5.31	72	1.50
Chloride (Cl)	155	4.37	42	1.18
Fluoride (F)	1.4	.07	1.8	.09
Nitrate (NO_3)	14	.23	17	.27
Dissolved solids	877		406	
Total hardness as $CaCO_3$	470		250	
pH	7.5		7.7	

	Well 32		Well 44	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	32		44	
Iron (Fe)	.05		.05	
Calcium (Ca)	74	3.69	66	3.29
Magnesium (Mg)	15	1.23	14	1.15
Sodium (Na)	31	1.35	25	1.09
Potassium (K)	2.0	.05	3.6	.09
Bicarbonate (HCO_3)	214	3.51	220	3.61
Sulfate (SO_4)	66	1.37	44	.92
Chloride (Cl)	39	1.10	26	.73
Fluoride (F)	1.0	.05	2.0	.11
Nitrate (NO_3)	16	.26	12	.19
Dissolved solids	402		362	
Total hardness as $CaCO_3$	246		222	
pH	7.3		7.7	

ECTOR COUNTY

Odessa -- Continued

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Brown sand	35	110
Caliche	41	45	White sand	17	127
Brown sand	20	65	Brown sand	7	134
Sand and gravel	10	75	Sand	3	137
			Blue shale and red beds	8	145

Well 2

Surface soil	4	4	Sand and gravel, water	53	118
Caliche	36	40	Coarse sand and gravel	17	135
Brown sand, water	25	65	White sand	5	140
			Blue shale and red beds	10	150

Well 3

Surface soil	10	10	Hard sand	6	76
Caliche	35	45	Sand, water	72	148
Brown sand, dry	25	70	Blue shale	3	151
			Red beds	5	156

Well 4

Surface soil	5	5	Sand, water	4	74
Caliche	37	42	Hard sand	8	82
Hard sand	6	48	Sand, water	58	140
Sand, dry	22	70	Blue shale	3	143
			Red beds	5	148

Well 5

Surface soil	10	10	Yellow sand, little water	11	71
Caliche	25	35	Yellow sand	19	90
Sand	25	60	Sand, water	55	145
			Red beds	5	150

Well 6

Surface soil	5	5	Sand, water	70	140
Caliche	45	50	Brown sand, water	10	150
Brown sand	20	70	Red beds	5	155

ECTOR COUNTY

Odessa -- Continued

Drillers' logs -- Continued

Well 8

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	9	9	Sand	32	130
Caliche	54	63	Blue shale	4	134
Sand, water	5	68	Red beds	6	140
Sand and gravel	30	98			

Well 9

Surface soil	4	4	Hard sand	12	72
Caliche	36	40	Sand, water	66	138
Hard sand	10	50	Blue shale	7	145
Brown sand, dry	10	60	Red beds	3	148

Well 10

Surface soil	6	6	White sand, water	25	95
Caliche	34	40	Yellow sand	50	145
Hard sand	25	65	Blue shale	6	151
Sand, water	5	70	Red beds	5	156

Well 11

Surface soil	5	5	Blue shale	5	145
Caliche	60	65	Red beds	5	150
Sand, water	75	140			

Well 12

Surface soil	5	5	White sand	12	80
Caliche	35	40	Gravel and sand	5	85
Brown sand	20	60	Sand, water	64	149
Sand, water	8	68	Red beds	6	155

Well 13

Sand	15	15	Sand, water	45	120
Caliche	25	40	Blue shale	10	130
Clay	35	75	Red beds	5	135

Well 14

Surface soil	2	2	Sand, water	30	95
Caliche	33	35	Blue shale	5	100
Clay	10	45	Sand, water	26	126
Sand, dry	20	65	Blue shale	4	130
			Red beds	5	135

ECTOR COUNTY

Odessa -- Continued

Drillers' logs -- Continued

Well 16

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	5	5	White sand	20	85
Caliche	35	40	Brown sand	35	120
Red sand	20	60	Sand and gravel	18	138
Yellow sand	5	65	Blue shale and red beds	12	150

Well 17

Surface soil	3	3	Yellow clay	5	130
Caliche	42	45	Sand	20	150
Clay	15	60	Gravel	3	153
Sand	60	120	Blue shale	3	156
Blue shale	5	125	Red beds	9	165

Well 18

Surface soil	3	3	Sand, water	25	120
Caliche	42	45	Blue shale	5	125
Clay	15	60	Sand, water	25	150
Brown sand	30	90	Gravel	3	153
Blue shale	5	95	Red beds	12	165
			No record	10	175

Well 19

Surface soil	3	3	Sand	25	100
Caliche	32	35	Blue shale	15	115
Clay	5	40	Hard sand	10	125
Brown shale	10	50	Sand and gravel	22	147
Brown sand	15	65	Red beds	8	155
Sand and gravel	10	75			

Well 21

Surface soil	4	4	Blue shale	5	115
Caliche	41	45	Sand and gravel	30	145
Brown shale	15	60	Blue shale	5	150
Sand and gravel	40	100	Red beds	10	160
Sand	10	110			

Well 22

Caliche	50	50	Sand and gravel	90	160
Hard sand	5	55	Blue shale	3	163
Gravel, water	10	65	Red beds	1	164
Hard sand	5	70			

ECTOR COUNTY

Odessa -- Continued

Drillers' logs -- Continued

Well 23

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Sand, water	5	120
Caliche	31	35	Sand and gravel	20	140
Sand, dry	8	43	Sand	11	151
Hard sand, dry	7	50	Blue shale	3	154
Sand and gravel, water	65	115	Red rock	2	156

Well 24

Surface soil	3	3	Blue shale	14	147
Caliche	47	50	Gravel	7	154
Sand	15	65	Red beds	2	156
Sand and gravel	68	133			

Well 25

Surface soil	3	3	Brown sand	8	158
Caliche	52	55	Blue shale	4	162
Sand and gravel	95	150	Red rock	2	164

Well 26

Surface soil	3	3	Sand and gravel	80	140
Caliche	37	40	Brown sand	28	168
White sand	10	50	Blue shale	2	170
Red sand	10	60	Red beds	4	174

Well 27

Surface soil	3	3	Sand and gravel	102	152
Caliche	37	40	Blue shale	4	156
White sand	10	50	Red beds	2	158

Well 28

Caliche	28	28	Sand and gravel	15	90
Rock	17	45	Gravel	55	145
Caliche	25	70	Blue shale	1	146
Rock	5	75	Red beds	4	150

ECTOR COUNTY

Odessa -- Continued

Drillers' logs -- Continued

Well 29

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	15	15	Yellow clay	8	58
Hard caliche	15	30	Sand, water	72	130
Caliche	15	45	Blue shale	18	148
Gravel, water	5	50	Red beds	2	150

Well 30

Surface soil	5	5	Sand and gravel, water	97	152
Hard caliche	20	25	Blue shale	4	156
Sand, dry	30	55	Red beds	4	160

Well 32

Surface soil	5	5	Sand and gravel, water	82	147
Hard caliche	20	25	Blue shale	8	155
Sand, dry	40	65	Red beds	5	160

Well 33

Caliche	15	15	Blue shale	2	142
Hard sand	40	55	Red beds	5	147
Sand and gravel, water	85	140			

Well 34

Caliche	35	35	Blue shale	6	145
Sand	25	60	Red beds	5	150
Sand and gravel, water	79	139			

Well 35

Caliche	30	30	Blue shale	5	135
Yellow sand	25	55	Red beds	5	140
Sand and gravel, water	75	130			

Well 36

Caliche	35	35	Blue shale	15	175
Hard sand	20	55	Red beds	5	180
Sand and gravel, water	105	160			

ECTOR COUNTY

Odessa -- Continued

Drillers' logs -- Continued

Well 37

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Sand	3	83
Caliche	11	15	Hard brown lime	15	98
Hard rock	20	35	Sand and gravel	58	156
Yellow sand	20	55	Blue shale	5	161
Sand and gravel	25	80	Red beds	5	166

Well 40

Surface soil	5	5	Hard brown sand	10	100
Caliche	11	16	Hard rock	10	110
Hard rock	4	20	Blue shale	10	120
Hard yellow sand	30	50	Hard brown sand	10	130
Hard brown sand	10	60	Red bed	10	140
White sand, water	30	90			

Well 41

Surface soil	5	5	Hard lime	10	80
Sand	15	20	Gravel sand, water	45	125
Caliche	30	50	Blue shale	5	130
Brown sand	15	65	Gravel and sand	35	165
Hard sandy lime	5	70	Red bed	5	170

Well 42

Surface soil	3	3	Gravel and sand	85	155
Caliche	37	40	Blue shale	10	165
Yellow sand	30	70	Red bed	5	170

Well 43

Caliche	55	55	Sand	15	115
Yellow sand and gravel	25	80	Blue shale	10	125
Hard white sand	20	100	Red bed	5	130

Well 44

Surface soil	5	5	Gravel and sand	45	135
Caliche	35	40	Blue shale	10	145
Hard sand	20	60	Gravel	20	165
Gravel, water	15	75	Blue shale	5	170
Hard red sand	15	90	Red bed	5	175

ECTOR COUNTY

Odessa -- Continued

Drillers' logs -- Continued

Well 45

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Hard sand	20	110
Hard caliche	56	60	Gravel, water	65	175
Hard sand	15	75	Red bed	5	180
Gravel, water	15	90			

Well 46

Surface soil	2	2	Sand and gravel	30	155
Hard caliche	48	50	Blue shale	10	165
Yellow sand	25	75	Gravel	10	175
Gravel, water	50	125	Red bed	5	180

Well 47

Surface soil	4	4	Blue shale	15	125
Caliche	12	16	Brown sand	15	140
White sand	29	45	Blue shale	5	145
Rock	10	55	Red bed	5	150
Brown sand	55	110			

Well 48

Surface soil	2	2	White sand	20	95
Caliche	18	20	Brown sand	25	120
Hard rock	35	55	Blue shale	5	125
Sand and gravel, water	10	65	Red bed	5	130
Sand, water	10	75			

Well 49

Surface soil	5	5	Sand, water	70	112
Caliche	30	35	Blue shale	8	120
Brown sand	7	42			

Well 50

Surface soil	5	5	Sand, water	72	108
Caliche	21	26	Blue shale	8	116
Brown sand	10	36	Red bed	4	120

ECTOR COUNTY

Odessa -- Continued

Drillers' logs -- Continued

Well 51

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	5	5	Sand, water	66	110
Caliche	25	30	Blue shale	11	121
Brown sand	14	44	Red bed	4	125

Well 52

Surface soil	5	5	Sand, water	77	118
Caliche	30	35	Blue shale	7	125
Red sand	6	41	Red bed	3	128

Well 53

Caliche and red sand	25	25	Sand and gravel, water	70	115
Hard caliche	5	30	Blue shale	6	121
Hard sand	5	35	Red bed	4	125
White sand	10	45			

Well 54

Caliche	25	25	Blue shale	3	115
Red sand	15	40	Red bed	5	120
Sand and gravel, water	72	112			

EDWARDS COUNTY

Rocksprings

Population in 1940: 1,339.

Source of information: T. Osborne, water superintendent, Sept. 20, 1948.

Ownership: Municipal.

Source of supply: Three wells four blocks south of city hall.

West well. Drilled about 1928; depth, 475 feet; diameter, 8 inches; deep-well turbine pump and 15-horsepower electric motor; static water level reported, 426 feet below land surface in 1945; yield, 100 gallons a minute.

East well. About 65 feet from west well; drilled in 1931 by Layne-Texas Co.; depth, 602 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 443 feet below land surface in 1946; yield, 45 gallons a minute.

New well. About 125 feet east of east well; drilled in 1946 by Thompson and Carr; depth, 480 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 426 feet below land surface in 1946; yield, 60 gallons a minute.

Pumpage (estimated): 200,000 gallons a day.

Storage: Concrete ground storage reservoir, 150,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 370.

Treatment: Chlorination.

EDWARDS COUNTY

Rocksprings -- Continued

Analyses

[Collected Sept. 20, 1948. Analyzed by D. E. Weaver]

	West well		East well	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13		12	
Iron (Fe)	.05		.05	
Calcium (Ca)	48	2.396	47	2.346
Magnesium (Mg)	16	1.316	13	1.480
Sodium (Na)	4.8	.041	4.9	.034
Potassium (K)	2.8	.072	3.2	.082
Bicarbonate (HCO_3)	208	3.409	216	3.541
Sulfate (SO_4)	7.7	.160	9.5	.198
Chloride (Cl)	11	.310	10	.282
Fluoride (F)	.4	.021	.4	.021
Nitrate (NO_3)	3.2	.052	2.8	.045
Dissolved solids	215		215	
Total hardness as $CaCO_3$	186		191	
pH	7.6		7.6	

	New well	
	Parts per million	Equivalents per million
Silica (SiO_2)	12	
Iron (Fe)	.05	
Calcium (Ca)	47	2.346
Magnesium (Mg)	16	1.316
Sodium (Na)	5.2	.080
Potassium (K)	2.8	.072
Bicarbonate (HCO_3)	208	3.409
Sulfate (SO_4)	7.2	.150
Chloride (Cl)	11	.310
Fluoride (F)	.4	.021
Nitrate (NO_3)	2.5	.040
Dissolved solids	208	
Total hardness as $CaCO_3$	183	
pH	7.6	

EL PASO COUNTY

El Paso

Population in 1940: 96,810.

Source of information: E. J. Umbenhauer, water superintendent April 1947.

Ownership: Municipal.

Source of supply: Fifteen wells and Rio Grande.

Well 3. Montana and Chelsea Streets; drilled in 1922 by Layne-Texas Co.; depth, 862 feet; diameter, 26 inches; deep-well turbine pump and 100-horsepower electric motor; static water level, 113.62 feet below land surface Feb. 31, 1944; drawdown, 40.69 feet after pumping 100 hours, July 3, 1936; yield, 1,250 gallons a minute.

Well 4. Madison and White Oak Streets; drilled in 1924 by Layne-Texas Co.; depth, 882 feet; diameter, 24 inches; deep-well turbine pump and 100-horsepower electric motor; static water level, 70.11 feet below land surface February 1944; drawdown, 75 feet when pumping 730 gallons a minute; yield, 730 gallons a minute.

Well 8. One mile north of Mesa Pumping Plant; drilled in 1928 by Layne-Texas Co.; depth, 715 feet; diameter, 20 inches; deep-well turbine pump and 150-horsepower electric motor; static water level, 207.58 feet below land surface February 1944; yield, 1,370 gallons a minute; temperature, 82° F.

Well 9. Luna and Pera Streets; drilled in 1928; depth, 802 feet; diameter, 24 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 31.44 feet below land surface April 1944; yield, 700 gallons a minute.

Well 11. About 1.7 miles east of Mesa Pumping Plant; drilled in 1930 by C. R. Jensen; depth, 736 feet; diameter, 20 inches; deep-well turbine pump and 150-horsepower electric motor; static water level, 206.03 feet below land surface May 1, 1939; yield, 1,170 gallons a minute.

Well 14. San Antonio and Walnut Streets; drilled in 1937 by Layne-Texas Co.; depth, 703 feet; diameter, 36 inches; deep-well turbine pump and 100-horsepower electric motor; static water level, 32.78 feet below land surface July 7, 1939; drawdown, 31.77 feet when pumping 1,500 gallons a minute in 1937; yield, 1,500 gallons a minute.

Well 15. About 1 mile east of Mesa Pumping Plant; drilled in 1938 by Layne-Texas Co.; depth, 1,055 feet; diameter, 24 inches; deep-well turbine pump and electric motor; static water level, 222.28 feet below land surface when drilled; drawdown, 42.39 feet when pumping 1,800 gallons a minute; yield, 1,800 gallons a minute.

Well 17. San Antonio and Tornillo Streets; drilled in 1938 by C. R. Jensen; depth, 750 feet; diameter, 12½ inches; deep-well turbine pump and electric motor; static water level, 39.13 feet below land surface February 1944; yield, 1,320 gallons a minute.

EL PASO COUNTY

El Paso -- Continued

Well 18. Haddock Addition; drilled in 1938 by C. R. Jensen; depth, 902 feet; diameter, 24 inches; deep-well turbine pump and electric motor; static water level, 26.65 feet below land surface Feb. 28, 1940; drawdown, 59.5 feet when pumping 1,180 gallons a minute; yield, 1,180 gallons a minute.

Well 19. About 1.3 miles east-southeast of Mesa Pumping Plant; drilled in 1940 by C. R. Jensen; depth, 425 feet; diameter, 24 inches; deep-well turbine pump and electric motor; yield, 1,100 gallons a minute.

Well 20. One mile north of Mesa well field; drilled in 1941 by Layne-Texas Co.; depth, 909 feet; diameter, 24 inches; deep-well turbine pump and 250-horsepower electric motor; static water level, 206.48 feet below land surface June 21, 1941; yield, 1,550 gallons a minute.

Well 21. Two miles north of Mesa well field; drilled in 1941 by Layne-Texas Co.; depth, 806 feet; diameter, 24 inches; deep-well turbine pump and 250-horsepower electric motor; static water level, 196.91 feet below land surface June 25, 1941; drawdown, 51.09 feet after pumping 24 hours at a rate of 1,585 gallons a minute; yield, 1,585 gallons a minute.

Shallow wells 1, 2, and 3. At Rio Grande surface water treating plant located along canal; depths, about 50 feet; diameters, 24 inches; deep-well turbine pumps and electric motors; combined yield, about 3,000,000 gallons a day; water pumped to treating plant.

Surface water. River treating plant for taking surface water from canal on Rio Grande has a capacity of 10,000,000 gallons a day.

Pumpage:

Average in gallons a day

	GROUND WATER		SURFACE WATER
	Deep wells	Shallow wells	Rio Grande
1944	9,400,000	--	3,940,000
1945	10,610,000	--	4,110,000
1946	10,800,000	2,000,000 (est.)	5,120,000
1947	8,500,000	2,430,000	--

Storage: Seven ground reservoirs, total capacity 70,000,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 18,500.

Treatment: Well water, chlorination; surface water, screening, grit separation, chlorination, aeration, primary settling, secondary chlorination, coagulation with activated carbon, soda, ash and lime, flash mixing, flocculation, secondary settling, carbonation, and filtration.

EL PASO COUNTY

El Paso -- Continued

Analyses

[Collected: Well 3, Mar. 25, 1946; well 4, June 16, 1941. Analyzed by C. B. Cibulka and W. W. Hastings]

	Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	*33		*36	
Iron (Fe)	* .12		* .11	
Calcium (Ca)	55	2.75	52	2.60
Magnesium (Mg)	19	1.56	17	1.40
Sodium and Potassium (Na + K)	180	7.83	178	7.72
Bicarbonate (HCO_3)	169	2.38	162	2.66
Sulfate (SO_4)	67	1.39	56	1.17
Chloride (Cl)	282	7.95	278	7.84
Nitrate (NO_3)	1.5	.02	.8	.01
Dissolved solids	702		662	
Total hardness as $CaCO_3$	216		200	

*Determined in June and May 1937, respectively.

[Collected: Well 8, May 22, 1945; well 9, Mar. 25, 1946. Analyzed by D. M. Parrish and C. B. Cibulka]

	Well 8		Well 9	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)			*31	
Iron (Fe)			* .06	
Calcium (Ca)	51	2.55	22	1.10
Magnesium (Mg)	19	1.56	7.0	.58
Sodium and potassium (Na + K)	52	2.26	168	7.29
Bicarbonate (HCO_3)	200	3.28	205	3.37
Sulfate (SO_4)	69	1.44	77	1.60
Chloride (Cl)	51	1.44	142	4.00
Nitrate (NO_3)	13	.21	.0	.00
Dissolved solids	423		544	
Total hardness as $CaCO_3$	206		84	

*Determined in March 1937.

EL PASO COUNTY

El Paso -- Continued

Analyses -- Continued

[Collected: Mar. 25, 1946. Analyzed by C. B. Cibulka]

	Well 14		Well 15	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	*26			
Iron (Fe)	* .12			
Calcium (Ca)	25	1.25	27	1.35
Magnesium (Mg)	8.7	.72	10	.82
Sodium and potassium (Na + K)	152	6.59	138	6.01
Bicarbonate (HCO_3)	192	3.16	220	3.61
Sulfate (SO_4)	71	1.48	92	1.92
Chloride (Cl)	139	3.92	92	2.59
Nitrate (NO_3)	.0	.00	3.8	.06
Dissolved solids	519		530	
Total hardness as $CaCO_3$	98		108	

*Determined April 1937.

[Collected: Well 17, May 22, 1945; well 19, Mar. 25, 1946. Analyzed by D. M. Parrish and C. B. Cibulka]

	Well 17		Well 19	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	43	2.15	26	1.30
Magnesium (Mg)	12	.99	9.8	.81
Sodium and potassium (Na + K)	94	4.09	137	5.97
Bicarbonate (HCO_3)	184	3.02	224	3.68
Sulfate (SO_4)	87	1.81	92	1.92
Chloride (Cl)	85	2.40	85	2.40
Nitrate (NO_3)	.0	.00	4.7	.08
Dissolved solids	457		538	
Total hardness as $CaCO_3$	157		106	

[Collected Mar. 25, 1946 Analyzed by C. B. Cibulka]

	Well 20		Well 21	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	34	1.70	42	2.10
Magnesium (Mg)	13	1.07	14	1.15
Sodium and potassium (Na + K)	42	1.83	54	2.34
Bicarbonate (HCO_3)	188	3.09	210	4.00
Sulfate (SO_4)	28	.58	36	.75
Chloride (Cl)	29	.82	47	1.33
Nitrate (NO_3)	6.5	.10	3.8	.06
Dissolved solids	304		386	
Total hardness as $CaCO_3$	138		162	

EL PASO COUNTY

El Paso -- Continued

Drillers' logs

Well 11

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Clay	3	471
Caliche	11	15	Rock	1	472
Sand	55	70	Sand, gravel, and boulders	22	494
Clay	10	80	Clay	5	499
Gravel	20	100	Sand, gravel, and boulders	29	528
Clay	6	106	Clay	5	533
Sand	58	164	Sand, gravel, and boulders	57	590
Clay	6	170	Clay	12	602
Sand	30	200	Sand, gravel, and boulders	26	628
Clay	20	220	Clay	3	631
Sand	40	260	Sand, gravel, and boulders	57	688
Clay	15	275	Clay	4	692
Sand	33	308	Sand	16	708
Clay	4	312	Sand, gravel, and boulders	50	758
Sand and boulders	38	350			
Rock	1	351			
Sand	17	368			
Clay	4	372			
Sand and boulders	38	410			
Clay	4	414			
Sand, gravel, and boulders	54	468			

Well 15

Sandy soil	2	2	Sand	23	573
Caliche	6	8	Clay	27	600
Coarse sand and gravel	70	78	Sand	24	624
Clay	20	98	Clay	3	627
Sand	20	118	Sand	24	651
Layers of sand and clay	100	218	Clay	16	667
Clay	8	226	Rock	1	668
Sand	18	244	Sand	8	676
Clay	14	258	Clay	12	688
Sandy clay	12	270	Sandy clay	15	703
Clay	17	287	Sand	27	730
Sand (water sample)	25	312	Clay	8	738
Clay	15	327	Sandy clay	10	748
Sand	17	344	Sand	10	758
Hard sand	6	350	Sandy clay	44	802
Clay	82	432	Sand	12	814
Sand	15	447	Clay (water sample)	21	835
Clay	4	451	Sand (static head 226 ft.)	28	863
Sand	10	461	Clay	15	878
Sandy clay	54	515	Sandy clay	50	928
Sand	18	533	Sand	10	938
Clay	6	539	Clay and boulders	60	998
Sand (water sample)	9	548	Sand	25	1,023
Clay	2	550	Sandy clay	55	1,078

EL PASO COUNTY

Fabens

Population in 1940: 2,100.

Source of information: Mrs. L. W. Moore, bookkeeper, April 9, 1948.

Owner: Fabens Water Company.

Source of supply: Three wells.

Well 1. Drilled in 1938 by Burdick and Burdick; depth, 218 feet; diameter, 6 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 26.24 feet below land surface July 8, 1938; yield, 200 gallons a minute.

Well 2. Drilled in 1938 by Burdick and Burdick; depth, 218 feet; diameter, 6 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 200 gallons a minute.

Well 3. Drilled in May 1947; depth, 247 feet; diameter, 6 inches; deep-well turbine pump and electric motor; yield, 200 gallons a minute.

Pumpage: Average, 140,000 gallons a day.

Storage: Ground storage reservoir, 110,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 590.

Treatment: Chlorination.

Analyses

[Collected Apr. 9, 1948. Analyzed by H. D. Smith]

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	31		32	
Iron (Fe)	.05		.10	
Calcium (Ca)	52	2.60	54	2.70
Magnesium (Mg)	12	.99	12	.99
Sodium (Na)	109	4.74	105	4.58
Potassium (K)	10	.26	8.4	.21
Bicarbonate (HCO_3)	220	3.61	236	3.87
Sulfate (SO_4)	115	2.39	110	2.29
Chloride (Cl)	91	2.57	80	2.26
Fluoride (F)	.3	.02	.3	.02
Nitrate (NO_3)	.2	.00	2.5	.04
Dissolved solids	529		521	
Total hardness as $CaCO_3$	180		184	
pH	8.1		8.2	

EL PASO COUNTY

Tornillo

Population in 1940: 250.

Source of information: O. T. Smith, owner, Aug. 3, 1948.

Owner: O. T. Smith.

Source of supply: Well drilled by Jack Dougherty; depth, 320 feet; diameter, 6 inches; Hi-lift pump and 3-horsepower electric motor; static water level, 41.5 feet below land surface Aug. 3, 1948; yield, 50 gallons a minute.

Pumpage (estimated): 30,000 gallons a day.

Storage: Elevated tank, 21,000 gallons.

Number of customers: 82.

Treatment: Chlorination.

Analysis

[Collected Sept. 14, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	30	
Iron (Fe)	.30	
Calcium (Ca)	120	5.99
Magnesium (Mg)	38	3.12
Sodium (Na)	358	15.55
Potassium (K)	8.8	.23
Bicarbonate (HCO_3)	200	3.28
Sulfate (SO_4)	237	4.93
Chloride (Cl)	588	16.58
Fluoride (F)	1.0	.05
Nitrate (NO_3)	3.2	.05
Dissolved solids	1,480	
Total hardness as $CaCO_3$	456	
pH	7.8	

Ysleta
(Including adjacent Rio Grande territory)

Population in 1940: 2,100 (includes the city of Ysleta only).

Source of information: Edward Lang, water superintendent, Sept. 20, 1948.

Owner: El Paso Water Control and Improvement District No. 1.

Source of supply: Four wells.

EL PASO COUNTY

Ysleta -- Continued

Well 1. Drilled in 1946 by Layne-Texas Co.; depth, 704 feet; diameter, 14 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 102 feet below land surface Dec. 18, 1946; yield on test, 380 gallons a minute with drawdown of 62 feet; present yield, 400 gallons a minute.

Well 2. Drilled June 1947 by Layne-Texas Co.; depth, 689 feet; diameter, 14 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 20 feet below land surface; yield on test, 180 gallons a minute with drawdown of 42 feet; present yield, 535 gallons a minute.

Well 3. Drilled in 1947 by Layne-Texas Co.; depth, 786 feet; diameter, 14 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 50 feet below land surface Feb. 28, 1947; yield on test, 350 gallons a minute with drawdown of 50 feet; present yield, 460 gallons a minute.

Well 4. Drilled in 1947 by Layne-Texas Co.; depth, drilled to 600 feet and plugged back to 219 feet; diameter, 14 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 52 feet below land surface June 5, 1947; yield on test, 243 gallons a minute with drawdown of 26 feet; well not in use.

Pumpage: Average, 600,000 gallons a day.

Storage: Four elevated tanks, 200,000 gallons each.

Number of customers: 2,100.

Treatment: Chlorination.

Analysis, well 2

[Collected Sept. 20, 1948. Analyzed by J. R. Avrett]

	Parts per million	Equivalents per million
Silica (SiO_2)	28	
Iron (Fe)	.15	
Calcium (Ca)	26	1.30
Magnesium (Mg)	10	.82
Sodium (Na)	122	5.30
Potassium (K)	7.2	.18
Bicarbonate (HCO_3)	164	2.69
Sulfate (SO_4)	88	1.83
Chloride (Cl)	107	3.02
Fluoride (F)	.8	.04
Nitrate (NO_3)	1.2	.02
Dissolved solids	475	
Total hardness as $CaCO_3$	106	
pH	7.8	

FISHER COUNTY

Roby

Population in 1940: 947.

Source of information: J. Ammons, city commissioner, Sept. 15, 1947.

Ownership: Municipal.

Source of supply: Pond on Cottonwood Creek.

Pumpage (estimated): Summer, 130,000 gallons a day; winter, 65,000 gallons a day.

Storage: Stand pipe, 65,000 gallons.

Number of customers: 300. (Only a few customers use this source of supply for drinking water.)

Treatment: None.

Analysis

[Collected Sept. 15, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	16	
Iron (Fe)	.08	
Calcium (Ca)	628	31.35
Magnesium (Mg)	180	14.80
Sodium (Na)	389	16.90
Potassium (K)	13	.33
Bicarbonate (HCO_3)	304	4.98
Sulfate (SO_4)	2,170	45.18
Chloride (Cl)	456	12.86
Fluoride (F)	.8	.04
Nitrate (NO_3)	20	.32
Dissolved solids	4,020	
Total hardness as $CaCO_3$	2,310	
pH	7.8	

Rotan

Population in 1940: 2,029.

Source of information: John Price, alderman, Sept. 15, 1947.

Ownership: Municipal.

Source of supply: Nine wells at Camp Springs, 17½ miles west of Rotan, and one well in Rotan.

FISHER COUNTY

Rotan -- Continued

Well 1. In Camp Springs tract; dug; depth, 97 feet; diameter, 4 feet; jet pump and 1¼-horsepower electric motor; pumping level, 83.04 feet below land surface Sept. 15, 1947; yield, 10 gallons a minute; temperature, 70° F.

Well 2. In Camp Springs tract; drilled; depth, 60 feet; diameter, 10 inches; jet pump and 2-horsepower electric motor; yield, 20 gallons a minute; temperature, 70° F.

Well 3. In Camp Springs tract; drilled; depth, 60 feet; diameter, 10 inches; jet pump and 2-horsepower electric motor; yield, 25 gallons a minute.

Well 4. In Camp Springs tract; drilled by Frank Aaron; depth, 238 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 146.7 feet below land surface; yield, 5 gallons a minute.

Well 5. In Camp Springs tract; drilled; depth, 120 feet; diameter, 8 inches; jet pump and 2-horsepower electric motor.

Well 7. In Camp Springs tract; drilled by Frank Aaron; depth, 190 feet; diameter, 8 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 40 gallons a minute.

Well 8. In Camp Springs tract; drilled by Frank Aaron in 1941; depth, 205 feet; diameter, 10 inches; deep-well turbine pump and Diesel engine; yield, 150 gallons a minute.

Well 9. In Camp Springs tract; drilled by Sam Henderson in 1944; depth, 160 feet; diameter, 10 inches; deep-well turbine pump and Diesel engine; water level, 95 feet below land surface Sept. 15, 1947; yield, 85 gallons a minute.

Well 9-a. In Camp Springs tract; dug in 1934; depth, 40 feet; diameter, 12 feet; jet pump and 1-horsepower electric motor; water level, 30.1 feet below land surface Sept. 15, 1947; yield, 10 gallons a minute.

Rotan well. South of Rotan gin, .6 mile south of city hall; depth, 55 feet; diameter, 24 feet; deep-well turbine pump and 25-horsepower electric motor; static water level, 25.6 feet below land surface Sept. 15, 1947; yield, 200 gallons a minute.

FISHER COUNTY

Rotan -- Continued

Pumpage:

Average in gallons a day

	1945	1946	1947
January			111,300
February		105,300	138,300
March		106,700	97,200
April		149,500	138,000
May			163,800
June			219,400
July			199,400
August		245,400	243,700
September		146,500	
October		138,600	
November	58,500	115,800	
December	55,000	107,100	

Storage: Concrete ground reservoir, 54,000 gallons; steel ground storage tank, 100,000 gallons.

Number of customers: 758.

Treatment: None.

Analyses

[Collected Sept. 15, 1947. Analyzed by B. C. Dwyer]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	11		8.0	
Iron (Fe)	.04		.06	
Calcium (Ca)	65	3.24	96	4.79
Magnesium (Mg)	34	2.80	13	1.07
Sodium (Na)	28	1.20	6.4	.28
Potassium (K)	2.8	.07	2.0	.05
Bicarbonate (HCO_3)	304	4.98	118	1.93
Sulfate (SO_4)	61	1.27	179	3.73
Chloride (Cl)	34	.96	16	.45
Fluoride (F)	1.8	.09	.4	.02
Nitrate (NO_3)	.8	.01	3.8	.06
Dissolved solids	388		408	
Total hardness as $CaCO_3$	302		293	
pH	7.8		7.1	

FLOYD COUNTY

Dougherty

Population in 1940: 200.

Source of information: J. E. Newton, water superintendent, Nov. 17, 1945.

Owner: F. M. Dougherty.

Source of supply: Well drilled by D. L. Handley; depth, about 300 feet; diameter, 5-5/8 inches; deep-well turbine pump and oil engine; yield, 30 gallons a minute.

Pumpage: No record.

Storage: Concrete ground reservoir, 50,000 gallons; elevated tank, 35,000 gallons.

Number of customers: 30.

Treatment: None.

Analysis

[Collected Nov. 17, 1945. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	36	
Iron (Fe)	.04	
Calcium (Ca)	41	2.05
Magnesium (Mg)	36	2.96
Sodium (Na)	44	1.92
Potassium (K)	10	.26
Bicarbonate (HCO_3)	346	5.67
Sulfate (SO_4)	38	.79
Chloride (Cl)	18	.51
Fluoride (F)	2.8	.15
Nitrate (NO_3)	4.1	.07
Dissolved solids	400	
Total hardness as $CaCO_3$	250	
pH	8.3	

FLOYD COUNTY

Floydada

Population in 1940: 2,689.

Source of information: Floyd Johnson, water superintendent, Feb. 28, 1945.
Ownership: Municipal.
Source of supply: Three wells.

Well 1. Drilled in 1928 by D. L. McDonald; depth, 212 feet; diameter, 16 inches; deep-well turbine pump and electric motor; water level reported, 136 feet below land surface in 1938; yield, 380 gallons a minute; temperature, 64° F.

Well 2. Drilled in 1928 by D. L. McDonald; depth, 200 feet; diameter, 16 inches; deep-well turbine pump and 30-horsepower electric motor; yield, 308 gallons a minute.

Well 3. Drilled in 1920 by D. L. McDonald; depth, 160 feet; diameter, 30 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 150 gallons a minute.

Pumpage: Average, 280,000 gallons a day.

Storage: Ground storage reservoir, 200,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 777.

Treatment: None.

Analyses

[Collected Feb. 28, 1945. Analyzed by J. H. Rowley]

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	53		56	
Iron (Fe)	.02		.02	
Calcium (Ca)	39	1.95	36	1.80
Magnesium (Mg)	41	3.37	37	3.07
Sodium (Na)	26	1.12	41	1.78
Potassium (K)	9.3	.24	8.7	.22
Bicarbonate (HCO_3)	296	4.85	312	5.11
Sulfate (SO_4)	39	.81	39	.81
Chloride (Cl)	26	.73	23	.65
Fluoride (F)	4.4	.23	4.0	.21
Nitrate (NO_3)	3.5	.06	4.0	.06
Dissolved solids	387		404	
Total hardness as $CaCO_3$	266		242	
pH	7.5		7.7	

FLOYD COUNTY

Floydada -- Continued

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil, caliche, and red clay	27	27	Soft packed red clay	11	136
Clay and rock	14	41	Sandrock	8	144
Clay and sandrock	69	110	Clay and sand	6	150
Water sand	4	114	Clay and sandrock	4	154
Clay and sandrock	6	120	Water sand	6	160
Water sand	5	125			

Lockney

Population in 1940: 1,350.

Source of information: W. W. Miller, water superintendent, Feb. 28, 1945.

Ownership: Municipal.

Source of supply: Well drilled in 1927 by D. L. Handley; depth, 282 feet; diameter, 16 inches; deep-well turbine pump and oil engine; static water level, 65.67 feet below land surface Feb. 28, 1947; pumping level, 87.65 feet below land surface when pumping 500 gallons a minute; yield, 500 gallons a minute; temperature, 64° F.

Pumpage: Average, 120,000 gallons a day.

Storage: Concrete ground reservoir, 50,000 gallons; elevated steel tank, 75,000 gallons.

Number of customers: 235.

Treatment: None.

Analysis

[Collected Feb. 28, 1945 Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	57	
Iron (Fe)	.02	
Calcium (Ca)	46	2.30
Magnesium (Mg)	45	3.70
Sodium (Na)	52	2.25
Potassium (K)	13	.33
Bicarbonate (HCO_3)	376	6.16
Sulfate (SO_4)	38	.79
Chloride (Cl)	47	1.33
Fluoride (F)	3.6	.19
Nitrate (NO_3)	6.8	.11
Dissolved solids	494	
Total hardness as $CaCO_3$	300	
pH	7.4	

FLOYD COUNTY

South Plains

Population in 1940: 250.

Source of information: Raymond Upton, owner, Nov. 17, 1945.

Owner: Raymond Upton.

Source of supply: Well drilled by D. L. Handley; depth, 181 feet; diameter, 6 inches; deep-well cylinder and gasoline engine; yield, less than 50 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, 35,000 gallons.

Number of customers: 15.

Treatment: None.

Analysis

[Collected Nov. 17, 1945. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	50	
Iron (Fe)	.24	
Calcium (Ca)	42	2.10
Magnesium (Mg)	30	2.47
Sodium (Na)	32	1.38
Potassium (K)	9.9	.25
Bicarbonate (HCO_3)	311	5.10
Sulfate (SO_4)	26	.54
Chloride (Cl)	14	.39
Fluoride (F)	2.8	.15
Nitrate (NO_3)	1.2	.02
Dissolved solids	361	
Total hardness as $CaCO_3$	228	
pH	6.9	

GAINES COUNTY

Seagraves

Population in 1940: 3,225.

Source of information: Don Elder, water superintendent, Oct. 24, 1945.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. At pump station; drilled in 1929 by J. E. Stokes; depth, 192 feet; diameter, 10 inches; deep-well turbine pump and 3-horsepower electric motor; static water level, 75 feet below land surface in 1938; yield, 60 gallons a minute.

Well 2. At pump station; drilled in 1929 by J. E. Stokes; depth, 145 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; static water level, 75 feet below land surface in 1938; yield, 150 gallons a minute.

Well 3. At pump station; drilled in 1938 by W. A. Willis; depth, 183 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 83.3 feet below land surface Aug. 9, 1938; yield, 200 gallons a minute.

Well 4. At pump station; drilled in 1941 by Paul Pierson; depth, 180 feet; diameter, 12 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 200 gallons a minute.

Pumpage:

	Average in gallons a day		
	1943	1944	1945
January	95,800	103,500	121,700
February	86,500	98,300	156,000
March	107,200	134,100	178,400
April	165,200	176,500	240,300
May	158,000	192,800	308,800
June	218,100	310,900	358,200
July	237,600	270,300	255,400
August	317,600	279,800	362,400
September	193,500	171,500	
October	127,500	127,400	
November	116,300	126,100	
December	95,800	198,000	

Storage: Concrete ground reservoir, 65,000 gallons; elevated tank, 55,000 gallons.

Number of customers: 450.

Treatment: None.

GAINES COUNTY

Seagraves -- Continued

Analyses

[Collected May 23, 1944. Analyzed by W. W. Hastings]

	Well 1	
	Parts per million	Equivalents per million
Silica (SiO_2)	44	
Iron (Fe)	.05	
Calcium (Ca)	61	3.04
Magnesium (Mg)	90	7.40
Sodium (Na)	89	3.88
Potassium (K)	13	.33
Bicarbonate (HCO_3)	261	4.28
Sulfate (SO_4)	265	5.52
Chloride (Cl)	162	4.57
Fluoride (F)	2.8	.15
Nitrate (NO_3)	8.0	.13
Dissolved solids	863	
Total hardness as $CaCO_3$	522	
pH	7.6	

[Collected Oct. 24, 1945. Analyzed by C. B. Cibulka]

	Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	48		48	
Iron (Fe)	.08		.08	
Calcium (Ca)	60	2.99	62	3.09
Magnesium (Mg)	87	7.15	92	7.57
Sodium and potassium (Na + K)	90	3.66	94	3.74
Bicarbonate (HCO_3)	262	4.30	273	4.49
Sulfate (SO_4)	249	5.18	258	5.37
Chloride (Cl)	142	4.00	148	4.17
Fluoride (F)	5.2	.27	5.2	.27
Nitrate (NO_3)	2.8	.05	5.9	.10
Dissolved solids	851		958	
Total hardness as $CaCO_3$	507		533	
pH	8.4		8.4	

GAINES COUNTY

Seagraves -- Continued

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy soil	4	4	Sand and rock	64	155
Caliche	12	16	Yellow clay	33	188
Boulders and sand	71	87	Hard rock	4	192
Sand	4	91			

Well 2

Sandy soil	6	6	Boulders	4	89
White rock	12	18	Water sand	6	95
Sand and boulders	57	75	Sand and boulders	50	145
Hard rock	10	85			

Well 3

Sandy clay	7	7	Hard sandrock	10	155
Caliche	13	20	Sand, water	17	172
Sand	25	45	Gravel, water	6	178
Hard sandstone	10	55	Hard sandrock	4	182
Hard sand	38	93	Shale	1	183
Soft sand, water	52	145			

Seminole

Population in 1940: 1,761.

Source of information: J. S. Combs, city secretary, Nov. 7, 1945.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Half a block south of courthouse; drilled in 1939; depth, 145 feet; diameter, 10-3/4 to 8 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 56 feet below land surface Nov. 8, 1939; drawdown, 47 feet while pumping 145 gallons a minute; yield, 150 gallons a minute.

Well 2. Four blocks south and six blocks west of courthouse; drilled in 1940 by J. E. Stokes; depth, 188 feet; diameter, 12 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 200 gallons a minute.

Well 3. Two blocks south and eight blocks west of courthouse; drilled in 1945 by Gibbons and Taylor; depth, 250 feet; diameter, 13-3/8 to 10-3/4 inches; deep-well turbine pump and gasoline engine; static water level, 102.8 feet below land surface Oct. 22, 1945; measured drawdown, 55 feet while pumping 280 gallons a minute.

GAINES COUNTY

Seminole -- Continued

Pumpage (estimated): 250,000 gallons a day.

Storage: Concrete ground reservoir, 100,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 400.

Treatment: None.

Analyses

[Collected Nov. 7, 1945. Analyzed by C. B. Cibulka]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	45		56	
Iron (Fe)	.10		.08	
Calcium (Ca)	57	2.85	65	3.24
Magnesium (Mg)	45	3.70	54	4.44
Sodium (Na)	68	2.95	79	3.43
Potassium (K)	11	.28	11	.28
Bicarbonate (HCO_3)	265	4.35	266	4.37
Sulfate (SO_4)	123	2.56	173	3.60
Chloride (Cl)	89	2.51	109	3.07
Fluoride (F)	4.4	.23	4.8	.25
Nitrate (NO_3)	8.3	.13	6.4	.10
Dissolved solids	610		732	
Total hardness as $CaCO_3$	328		384	
pH	8.4		8.5	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	2	2	Hard sandy lime	11	112
Caliche and sand	21	23	Sandy yellow clay	5	117
Hard sand and caliche	40	63	Fine-to medium-grained sand, water	26	143
Soft yellow clay	7	70	Blue clay	2	145
Hard gray sandy lime	28	98			
Soft brown lime	3	101			

GAINES COUNTY

Seminole -- Continued

Drillers' logs -- Continued

Well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Hard rock	25	135
Caliche and sandrock	30	32	Yellow clay	5	140
Fine-grained, buff-colored sand	13	45	Fine-grained, light-yellow sandy clay	14	154
Fine-grained, buff-colored sand with hard caliche	7	52	Fine-grained, light-yellow sand	28	182
Medium fine-grained, light brown sand with hard caliche	28	80	Medium fine-grained dark-brown sand	58	240
Medium fine-grained, dark-brown sand	30	110	Sticky pink clay	10	250

GARZA COUNTY

Post

Population in 1940: 2,046.

Source of information: A. R. Carr, former water superintendent, Sept. 21, 1948.

Ownership: Municipal.

Source of supply: Seventeen wells.

East field, 3.5 miles west of Post.

Well 121. Drilled in 1912; depth, 97.5 feet; diameter, 23 to 9 inches; deep-well turbine pump and 2-horsepower electric motor; yield, 30 gallons a minute.

Well 124. Dug in 1912; depth, 98 feet; diameter, 10-5/8 inches; deep-well cylinder pump and 3-horsepower electric motor; yield, 20 gallons a minute.

Well 126. Drilled in 1912; depth, 98 feet; diameter, 10-5/8 inches; deep-well cylinder pump and 3-horsepower electric motor; yield, 20 gallons a minute.

Well 135. Drilled in 1916 by J. L. Williams; depth, 94 feet; diameter, 10-5/8 inches; deep-well turbine pump and 2-horsepower electric motor; static water level, 80 feet below land surface in 1916; yield, 20 gallons a minute.

West field, 5 miles west of Post.

Well 140. Dug in 1917 and later drilled deeper; depth, 120 feet; diameter, of dug well, 20 to 10 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 120 gallons a minute.

Well 146. Drilled in 1926 by D. L. McDonald; depth, 80 feet; diameter, 24 inches; deep-well cylinder pump and 5-horsepower electric motor; yield, 25 gallons a minute.

Well 147. Drilled in 1937 by L. A. Peeples; depth, 97 feet; diameter, 20 to 18 inches; deep-well cylinder pump and 5-horsepower electric motor; yield, 20 gallons a minute.

Well 148. Drilled in 1937 by L. A. Peeples; depth, 201 feet; diameter, 15 to 12 inches; deep-well cylinder pump and 5-horsepower electric motor; yield, 35 gallons a minute.

Well 152. Drilled in 1940 by Layne-Texas Co.; depth, 143 feet; diameter, 10-3/4 inches; deep-well turbine pump and 3-horsepower electric motor; static water level reported, 80 feet below land surface April 1940; yield, 25 gallons a minute with 5-foot drawdown.

Northwest field, 6 miles northwest of Post.

Well 149. Drilled in 1939 by L. A. Peeples; deep-well turbine pump and 3-horsepower electric motor.

GARZA COUNTY

Post -- Continued

Well 150. Drilled in 1939 by L. A. Peeples; depth, 115 feet; diameter, 12 inches; deep-well turbine pump and 5-horsepower electric motor.

Well 151. Drilled in 1940 by Layne-Texas Co.; depth, 110 feet; pump jack and 3-horsepower electric motor; static water level reported, 85 feet below land surface in 1940; gravel-walled; yield, 35 gallons a minute.

Well 153. Drilled in 1941 by Layne-Texas Co.; depth, 95 feet; diameter, 10-3/4 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level reported, 73 feet below land surface July 1941; yield, 60 gallons a minute.

Well 154. Drilled in 1944 by Layne-Texas Co.; depth, 98 feet; diameter, 10-3/4 inches; deep-well turbine pump and 5-horsepower electric motor; static water level reported, 66 feet below land surface July 1944; gravel-walled; yield, 94 gallons a minute.

Well 155. Drilled in 1945 by Layne-Texas Co.; depth, 97½ feet; diameter, 10-3/4 inches; deep-well turbine pump and 5-horsepower electric motor; static water level reported, 63 feet below land surface in June 1945; gravel-walled; yield, 85 gallons a minute.

Well 156. Drilled in 1946 by Layne-Texas Co.; depth, 95 feet; diameter, 10-3/4 inches; deep-well turbine pump and 5-horsepower electric motor; static water level reported, 64 feet below land surface July 1946; gravel-walled; yield, 77 gallons a minute.

Well 157. Drilled in 1946 by Layne-Texas Co.; depth, 101 feet; diameter, 10-3/4 inches; deep-well turbine pump and 5-horsepower electric motor; static water level reported, 59½ feet below land surface July 1946; yield, 133 gallons a minute.

Pumpage: Average, 300,000 gallons a day.

Storage: Ground storage reservoir, 1,600,000 gallons.

Number of customers: 850.

Treatment: Chlorination.

GARZA COUNTY

Post -- Continued

Analysis, composite sample

[Collected Nov. 29, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	56	
Iron (Fe)	.17	
Calcium (Ca)	44	2.20
Magnesium (Mg)	43	3.54
Sodium (Na)	78	3.39
Potassium (K)	6.4	.16
Bicarbonate (HCO_3)	344	5.64
Sulfate (SO_4)	81	1.69
Chloride (Cl)	58	1.64
Fluoride (F)	5.6	.29
Nitrate (NO_3)	2.0	.03
Dissolved solids	544	
Total hardness as $CaCO_3$	287	
pH	7.8	

Drillers' logs

Well 126

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and subsoil	4	4	Soft red rock	14	48
White dirt	20	24	Dry, gray sand	25	73
White rock	4	28	Water sand strata	25	98
Hard red rock	6	34	Red clay	$\frac{1}{2}$	$98\frac{1}{2}$

Well 135

Soil	4	4	Red sand	23	80
Red clay	16	20	Sand and water	12	92
Red sand	30	50	Red clay	2	94
Sandstone	7	57			

Well 147

Top soil	3	3	Fine, dry sand	6	71
Caliche	24	27	Fine, water sand	5	76
Clay	15	42	Sand and gravel	9	85
Sandrock	2	44	Gravel	4	89
Packed sand	21	65	Clay	8	97

GARZA COUNTY

Post -- Continued

Drillers' logs -- Continued

Well 148

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	3	3	Sand and gravel (water)	14	89
Clay and white rock	43	46	Clay	28	117
Sandrock	4	50	Packed sand, dry	57	174
Clay	16	66	Dry sandrock	2	176
Caliche rock	5	71	Dry clay	5	181
Clay	4	75	Dry, packed sand	20	201

Well 149

Top soil	4	4	Sandy clay, caving	26	73
Clay and caliche	21	25	Coarse sand, soft clay	17	90
Caliche	22	47	Red clay, joint	20	110

Well 150

Top soil	4	4	Rock	2	62
Clay and caliche rock	19	23	Dry sand	8	70
Caliche	22	45	Coarse sand and gravel	21	91
Red clay	6	51	Red clay, very sticky	24	115
Packed sand	9	60			

Well 151

Soil	3	3	Caliche	10	55
Caliche	11	14	Hard red clay	22	77
Sand and caliche	3	17	Quicksand and clay	10	87
Clay	3	20	Sand, gravel, boulders,		
Sand and clay	8	28	and clay	15	102
Clay	5	33	Hard layers	1	103
Caliche and hard red clay	12	45	Sand, gravel, and clay	2	105
			Red clay	5	110

Well 152

Surface soil	6	6	Fine soft sand	3	54
Clay	10	16	Hard layers	4	58
Caliche	18	34	Fine hard sand--brick		
Clay and caliche	3	37	dust, small amount	33	91
Hard caliche	11	48	Hard sand, more clay	9	100
Soft layers fine sand	2	50	Hard red clay and caliche	35	135
Hard layers	1	51	Clay, little sand	8	143

GARZA COUNTY

Post -- Continued

Drillers' logs -- Continued

Well 153

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand clay	20	20	Clay and caliche	20	74
Clay and caliche	28	48	Sand clay	20	94
Sand	6	54	Clay	1	95

Well 154

Surface soil	4	4	Fine sand, hard streaks	10	66
Yellow sandy clay	35	39	Yellow sand, good	31	97
Rock with soft streaks	17	56	Yellow clay	1	98

Well 155

Top soil	3	3	Sand and clay, took little water	11	67
Soft caliche	14	17	Good sand, took lots of mud	25	92
Caliche, hard streaks	7	24	Clay and rock	3	95
Hard caliche and lime rock	9	33	Soft sticky clay	9	104
Red clay	12	45			
Clay with hard layers	11	56			

Well 156

Surface soil	3	3	Hard caliche rock	6	39
Sandy clay, streaks of caliche	11	14	Red clay streaks, sandy	11	50
Hard caliche	3	17	Sandy clay	17	67
Caliche, soft streaks	16	33	Sand and fine gravel	25	92
			Red clay, sticky	3	95

Well 157

Surface soil	3	3	Hard sandy clay, caliche streaks	27	64
Sandy clay, caliche, soft streaks	12	15	Fine sand	3	67
Hard caliche	22	37	Sand and gravel	30	97
			Sandy clay	4	101

GRAY COUNTY

Lefors

Population in 1940: 809.

Source of information: C. W. Graham, water superintendent, Dec. 2, 1948.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. In block 10, Thut Heights Addition; drilled in 1940 by J. T. McCarty; depth, 130 feet; diameter, 15 inches; deep-well turbine pump and 10-horsepower electric motor.

Well 2. In block 11, Thut Heights Addition; drilled by Drake Lard; depth, 130 feet; diameter, 15 inches; deep-well turbine pump and 10-horsepower electric motor.

Pumpage (estimated): 40,000 gallons a day.

Storage: Elevated tank, 5,500 gallons.

Number of customers: 230.

Treatment: None.

Analysis, well 1

[Collected Oct. 5, 1948. Analyzed by J. R. Avrett]

	Parts per million	Equivalents per million
Silica (SiO_2)	21	
Iron (Fe)	3.8	
Calcium (Ca)	96	4.79
Magnesium (Mg)	17	1.40
Sodium (Na)	42	1.83
Potassium (K)	3.6	.09
Bicarbonate (HCO_3)	214	3.51
Sulfate (SO_4)	15	.31
Chloride (Cl)	144	4.06
Fluoride (F)	.7	.04
Nitrate (NO_3)	5.0	.08
Dissolved solids	514	
Total hardness as $CaCO_3$	310	
pH	7.5	

GRAY COUNTY

McLean

Population in 1940: 1,489.

Source of information: Pete Fulbright, water superintendent, June 25, 1948.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1927 by Edwards Well Co.; depth, 156 feet; diameter, 16 inches; 30-foot screen on bottom; deep-well turbine pump and 20-horsepower electric motor; static water level, 105 feet below land surface; yield, 300 gallons a minute.

Well 2. Drilled in 1936 by T. J. McCarty; depth, 167 feet; diameter, 12½ inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 110 feet; yield, 250 gallons a minute.

Well 3. Drilled in 1943 by Layne-Texas Co. for U. S. Prisoner of War Camp; depth, 209 feet; diameter, 10-3/4 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 115 feet below land surface; drawdown, 19 feet when pumping 220 gallons a minute Sept. 23, 1943; yield, 250 gallons a minute.

Pumpage: Average, 500,000 gallons a day.

Storage: Ground storage reservoir, 210,000 gallons; elevated tank, 60,000 gallons.

Number of customers: 463.

Treatment: None.

Analysis, well 3

[Collected June 25, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	28	
Iron (Fe)	1.4	
Calcium (Ca)	70	3.49
Magnesium (Mg)	6.3	.52
Sodium (Na)	27	1.17
Potassium (K)	1.2	.03
Bicarbonate (HCO_3)	252	4.13
Sulfate (SO_4)	16	.33
Chloride (Cl)	24	.68
Fluoride (F)	.0	.00
Nitrate (NO_3)	3.2	.05
Dissolved solids	304	
Total hardness as $CaCO_3$	200	
pH	7.3	

GRAY COUNTY

McLean -- Continued

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	5	5	Fair water sand and gravel	10	132
Sand and clay	25	30	Coarse sand and gravel	3	135
Fine, loose sand	5	35	Clay	6	141
Hard packed sand	42	77	Medium water sand	5	146
Soft, loose sand	18	95	Soft sandrock	1	147
Sandrock	1	96	Good water sand	4	151
Soft, loose sand	14	110	Medium sandrock	4	155
Sand, gravel, little clay	4	114	Hard sandrock	1	156
Medium sand, gravel	4	118			
Hard sandstone	4	122			

Well 3

Soil and clay	20	20	Rock	1	130
Sand	36	56	Good coarse sand, fine gravel	17	147
Hard sand and streaks of clay and gypsum	18	74	Rock and gravel	3	150
Coarse sand and fine gravel	55	129	Coarse white sand	53	203
			Red clay	6	209

Pampa

Population in 1940: 12,895.

Source of information: E. S. Lowery, water superintendent, Nov. 20, 1947.

Ownership: Municipal.

Source of supply: Five wells; another well being drilled.

Well 1 - South. Drilled by D. L. McDonald in 1939; depth, 450 feet; diameter, 16 inches; deep-well turbine pump and 125-horsepower electric motor; pump set at 420 feet; static water level, 347 feet below land surface in 1947; drawdown, 23 feet after pumping 600 gallons a minute for 36 hours; yield, 600 gallons a minute.

Well 2 - South. Drilled by D. L. McDonald in 1939; depth, 450 feet; diameter, 16 inches; deep-well turbine pump and 125-horsepower electric motor; pump set at 420 feet; static water level, 347 feet below land surface in 1947; drawdown, 23 feet after pumping 600 gallons a minute for 36 hours; yield, 600 gallons a minute.

GRAY COUNTY

Pampa -- Continued

Well 1 - North. Drilled by D. L. McDonald in 1935; depth, 395 feet; diameter, 18 inches; deep-well turbine pump and 60-horsepower electric motor; yield, 315 gallons a minute.

Well 3 - North. Drilled by D. L. McDonald; depth, 412 feet; diameter, 18 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 358 feet below land surface in 1947; drawdown, 22 feet after pumping 460 gallons a minute for 36 hours; yield, 460 gallons a minute.

Well 4 - North. Drilled by D. L. McDonald in 1945; depth, 414 feet; diameter, 15½ inches; deep-well turbine pump and 75-horsepower electric motor; pump set at 400 feet; static water level, 333 feet below land surface in 1947; drawdown, 40 feet after pumping 520 gallons a minute for 36 hours; yield, 520 gallons a minute.

Pumpage: Maximum, 3,000,000 gallons a day; minimum, 1,000,000 gallons a day; average, 1,500,000 gallons a day.

Storage: Ground storage reservoir, 100,000 gallons; four ground storage reservoirs, 3,360,000 gallons, 440,000 gallons, 220,000 gallons, and 220,000 gallons, respectively.

Number of customers: 4,000.

Treatment: None.

Analysis, composite sample of all wells

[Collected Nov. 30, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	12	
Iron (Fe)	.16	
Calcium (Ca)	59	2.94
Magnesium (Mg)	27	2.22
Sodium (Na)	113	4.91
Potassium (K)	12	.48
Bicarbonate (HCO_3)	230	3.77
Sulfate (SO_4)	141	2.94
Chloride (Cl)	132	3.72
Fluoride (F)	1.2	.06
Nitrate (NO_3)	4.0	.06
Dissolved solids	638	
Total hardness as $CaCO_3$	258	
pH	7.4	

HALE COUNTY

Abernathy

Population in 1940: 847.

Source of information: O. Rutledge, water superintendent, Nov. 16, 1945.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1934; depth, 200 feet; deep-well turbine pump and 25-horsepower electric motor; yield, 300 gallons a minute.

Well 2. Drilled in 1944 by Clowe and Clowan; depth, 226 feet; diameter, 15 inches; deep-well turbine pump and 40-horsepower electric motor; yield, 600 gallons a minute.

Pumpage: Average, 150,000 gallons a day in winter; 550,000 gallons a day in summer.

Storage: Elevated tank, 150,000 gallons.

Number of customers: 275.

Treatment: None.

Analysis, composite sample of wells 1 and 2

[Collected Nov. 16, 1945. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	37	
Iron (Fe)	.04	
Calcium (Ca)	49	2.45
Magnesium (Mg)	33	2.71
Sodium (Na)	23	.98
Potassium (K)	10	.26
Bicarbonate (HCO_3)	301	4.93
Sulfate (SO_4)	21	.44
Chloride (Cl)	30	.85
Fluoride (F)	2.2	.12
Nitrate (NO_3)	4.0	.06
Dissolved solids	358	
Total hardness as $CaCO_3$	258	
pH	7.2	

HALE COUNTY

Abernathy -- Continued

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	5	5	Red sandy clay, little water	15	150
Caliche	5	10	Sand and gravel, water	20	170
Red clay	50	60	Red sandy clay	2	172
Red sandy clay	10	70	Rock	25	197
Sand	10	80	Yellow sandy clay	29	226
Dry red sand	30	110			
Red clay	25	135			

Hale Center

Population in 1940: 836.

Source of information: R. C. Davis, water superintendent, Mar. 3, 1945.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1926 by W. G. Sears; depth, 120 feet; diameter, 12 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 51 feet below land surface; drawdown reported, 40 feet below land surface after pumping 543 gallons a minute for 12 hours; yield, 550 gallons a minute; temperature, 64° F.

Well 2. Drilled in 1936 by Garms and Mounts; depth, 123 feet; diameter, 12 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 350 gallons a minute.

Pumpage: Average, 150,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 214.

Treatment: None.

HALE COUNTY

Hale Center -- Continued

Analysis, well 2

[Collected Mar. 3, 1945. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	54	
Iron (Fe)	.02	
Calcium (Ca)	50	2.50
Magnesium (Mg)	52	4.28
Sodium (Na)	21	.91
Potassium (K)	8.8	.23
Bicarbonate (HCO_3)	349	5.72
Sulfate (SO_4)	43	.90
Chloride (Cl)	35	.99
Fluoride (F)	4.4	.23
Nitrate (NO_3)	5.2	.08
Dissolved solids	445	
Total hardness as $CaCO_3$	339	
pH	7.6	

Petersburg

Population in 1940: 496.

Source of information: L. A. Peeples, well driller, Nov. 30, 1945.

Ownership: Municipal.

Source of supply: Well drilled in 1945 by L. A. Peeples; depth, 222 feet; diameter, 12 inches; deep-well turbine pump and electric motor; yield, 600 gallons a minute; temperature, 63½° F. Municipal supply still under process of construction.

Pumpage: No record.

Analysis

[Collected Nov. 30, 1945 Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	42	
Iron (Fe)	.06	
Calcium (Ca)	36	1.80
Magnesium (Mg)	40	3.29
Sodium (Na)	34	1.50
Potassium (K)	11	.28
Bicarbonate (HCO_3)	334	5.47
Sulfate (SO_4)	34	.71
Chloride (Cl)	17	.48
Fluoride (F)	3.6	.19
Nitrate (NO_3)	1.2	.02
Dissolved solids	383	
Total hardness as $CaCO_3$	254	
pH	8.2	

HALE COUNTY

Plainview

Population in 1940: 8,492.

Source of information: S. E. Bolles, water superintendent, Feb. 28, 1945.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1937 by L. A. Peoples; depth, 301 feet; diameter, 18 inches; deep-well turbine pump and electric motor; yield, 852 gallons a minute with drawdown of 60 feet in 1937; temperature, 64° F.

Well 2. Drilled in 1937 by L. A. Peoples; depth, 301 feet; diameter, 18 inches; deep-well turbine pump and electric motor; yield, 628 gallons a minute with drawdown of 60 feet in 1937.

Well 3. Drilled in 1937 by L. A. Peoples; depth, 301 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 1,086 gallons a minute with drawdown of 63 feet in 1937.

Pumpage: Average, 1,050,000 gallons a day.

Storage: Concrete ground storage reservoir, 500,000 gallons; elevated tank, 200,000 gallons.

Number of customers: 2,127.

Treatment: None.

Analysis, well 1

[Collected Feb. 28, 1945. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	60	
Iron (Fe)	.00	
Calcium (Ca)	44	2.20
Magnesium (Mg)	37	3.04
Sodium (Na)	28	1.23
Potassium (K)	8.5	.22
Bicarbonate (HCO_3)	329	5.39
Sulfate (SO_4)	28	.58
Chloride (Cl)	18	.51
Fluoride (F)	3.6	.19
Nitrate (NO_3)	1.2	.02
Dissolved solids	390	
Total hardness as $CaCO_3$	262	
pH	7.4	

HALE COUNTY

Plainview -- Continued

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	5	5	Rock	6	116
Red caliche	29	34	White sand	21	137
Hard caliche and nodules	9	43	Red sand	10	147
Pink gravel	16	59	Hard sand	14	161
Sandy caliche	2	61	Sand	15	176
Red shale	9	70	Fine-grained sand	18	194
Sand and gravel	15	85	"Clean" sand	9	203
Packed sand	25	110	Gritty sand	10	213
			Coarse-grained sand	88	301

HALL COUNTY

Estelline

Population in 1940: 603.

Source of information: H. J. Rogers, co-owner, Mar. 28, 1948.

Owners: A. J. Rogers and H. J. Rogers.

Source of supply: Two wells.

Well 1. At elevated tank; dug in 1929; depth, 47 feet; diameter, 8 feet; deep-well cylinder pump and 5-horsepower electric motor; static water level, 37.8 feet below land surface Mar. 8, 1947; yield, 40 gallons a minute.

Well 2. About 250 feet south of well 1; drilled; depth, 58 feet; diameter, 8 inches; deep-well cylinder pump and 5-horsepower electric motor; yield, 45 gallons a minute.

Pumpage:

	Average in gallons a day		
	1945	1946	1947
January		23,800	24,600
February		26,200	25,900
March		19,300	
April		27,000	
May		26,300	
June		37,200	
July		34,200	
August		48,800	
September		29,000	
October		21,300	
November		24,800	
December	25,500	22,400	

Storage: Ground reservoir, 15,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 150.

Treatment: Chlorination.

HALL COUNTY

Estelline -- Continued

Analysis, composite sample of wells 1 and 2

[Collected Mar. 28, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	8.8	
Iron (Fe)	.09	
Calcium (Ca)	47	2.35
Magnesium (Mg)	28	2.30
Sodium (Na)	97	4.23
Potassium (K)	5.9	.15
Bicarbonate (HCO_3)	358	5.87
Sulfate (SO_4)	77	1.60
Chloride (Cl)	34	.96
Fluoride (F)	1.0	.05
Nitrate (NO_3)	34	.55
Dissolved solids	538	
Total hardness as $CaCO_3$	232	
pH	7.6	

Memphis

Population in 1940: 3,869.

Source of information: Roy Fultz, manager, June 1943.

Owner: Community Public Service Co.

Source of supply: Forty-one shallow wells in three well fields about 6 miles northwest of the city in Donley County, and one well on the Milam farm in Hall County. The Memphis well field in Donley County consists of three batteries of shallow dug wells ranging in depth from 12 to 25 feet. The east battery consists of 9 wells, the middle battery 16 wells, and the west battery 16 wells. Wells flow into collecting reservoirs. The water then flows through pipe lines by gravity into the city of Memphis. Combined yield of all wells, about 200 gallons a minute.

Milam farm well. Stand-by well; drilled in 1941; depth, 30 feet; diameter, 12 inches; deep-well turbine pump and electric motor; static water level, 10.2 feet below land surface in 1941; yield, 45 gallons a minute.

HALL COUNTY

Memphis -- Continued

Pumpage:

Average in gallons a day

	1941	1942	1943
January	141,935	135,483	154,838
February	182,142	196,428	160,714
March	119,354	151,612	151,612
April	153,333	176,666	176,666
May	138,709	148,387	
June	126,666	186,666	
July	154,838	219,354	
August	190,322	222,580	
September	173,333	223,333	
October	164,516	170,967	
November	203,333	230,000	
December	203,225	161,290	

Storage: Ground storage reservoir at Donley County well field, 510,000 gallons; elevated tank.

Treatment: Chlorination.

Analysis, composite sample of 41 wells in Donley County

[Collected May 20, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	26	
Iron (Fe)	.12	
Calcium (Ca)	73	3.64
Magnesium (Mg)	10	.82
Sodium and potassium (Na + K)	19	.81
Bicarbonate (HCO_3)	260	4.26
Sulfate (SO_4)	20	.42
Chloride (Cl)	17	.48
Fluoride (F)	.6	.03
Nitrate (NO_3)	5.0	.08
Dissolved solids	309	
Total hardness as $CaCO_3$	223	
pH	8.4	

HALL COUNTY

Turkey

Population in 1940: 930.

Source of information: G. O. Coker, water superintendent, Mar. 28, 1947.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Four and one-half miles southwest of Turkey; drilled in 1928 by S. H. Kimball; depth, 100 feet; diameter, 12 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 40 feet below land surface; yield, 200 gallons a minute.

Well 2. About 300 feet southwest of well 1; drilled in 1928 by S. H. Kimball; depth, 100 feet; diameter, 12 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute.

Pumpage: Average, 75,000 gallons a day.

Storage: Ground storage reservoir, 200,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 260.

Treatment: Chlorination.

Analysis, composite sample of wells 1 and 2

[Collected Mar. 28, 1947 Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	26	
Iron (Fe)	1.0	
Calcium (Ca)	152	7.49
Magnesium (Mg)	56	4.61
Sodium (Na)	93	4.05
Potassium (K)	8.5	.22
Bicarbonate (HCO_3)	262	4.29
Sulfate (SO_4)	384	7.99
Chloride (Cl)	140	3.95
Fluoride (F)	1.6	.08
Nitrate (NO_3)	10	.16
Dissolved solids	1,000	
Total hardness as $CaCO_3$	610	
pH	7.4	

HANSFORD COUNTY

Gruver

Population in 1940: 350.

Source of information: Earl Lowe, Southwestern Public Service Co., June 23, 1948.

Owner: Southwestern Public Service Co.

Source of supply: Two wells.

Well 1. Drilled in 1931 by A. H. Masiran; depth, 342 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 158.5 feet below land surface in July 1931; drawdown, 19 feet in 1948.

Well 2. Drilled in May 1948 by H. H. Heiskell; depth, 413 feet; diameter, 13 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 184 feet below land surface; drawdown, 37 feet when pumping 490 gallons a minute.

Pumpage: Average, 100,000 gallons a day.

Storage: Elevated tank, 50,000 gallons; ground storage reservoir to be installed, 100,000 gallons.

Number of customers: 250.

Treatment: None.

Analysis, well 2

[Collected June 23, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	33	
Iron (Fe)	1.8	
Calcium (Ca)	44	2.20
Magnesium (Mg)	31	2.55
Sodium (Na)	42	1.83
Potassium (K)	8.4	.21
Bicarbonate (HCO_3)	302	4.95
Sulfate (SO_4)	67	1.39
Chloride (Cl)	11	.31
Fluoride (F)	2.2	.12
Nitrate (NO_3)	7.8	.13
Dissolved solids	376	
Total hardness as $CaCO_3$	238	
pH	7.5	

HANSFORD COUNTY

Gruver -- Continued

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Brown sandy clay	10	10	Broken rock, sand	57	318
Light-brown sandy clay	110	120	Red clay	2	320
Broken sand, rock and clay	60	180	Very hard sandrock	2	322
			Red clay	2	324
Very fine water sand	10	190	Very hard sandrock	2	326
Light-brown sandy clay	35	225	Sand and gravel, water	14	340
Fine sand	36	261	Very hard sandrock	2	342

Hitchland

Population in 1940: 100.

Source of information: E. P. Siler, station agent, June 23, 1948.

Owner: C. R. I. & P. Railroad Co.

Source of supply: Well, which supplies the railroad as well as the city; drilled by D. L. McDonald; depth, 484 feet; diameter, 10 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 186.0 feet below land surface Aug. 3, 1936.

Pumpage: Average, 25,000 gallons a day.

Storage: Elevated tank, 48,000 gallons.

Number of customers: 7.

Treatment: None.

Analysis

[Collected June 23, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	35	
Iron (Fe)	.48	
Calcium (Ca)	51	2.55
Magnesium (Mg)	32	2.63
Sodium (Na)	26	1.13
Potassium (K)	8.8	.23
Bicarbonate (HCO_3)	254	4.16
Sulfate (SO_4)	87	1.81
Chloride (Cl)	10	.28
Fluoride (F)	1.8	.09
Nitrate (NO_3)	8.3	.13
Dissolved solids	373	
Total hardness as $CaCO_3$	259	
pH	7.5	

HANSFORD COUNTY

Hitchland -- Continued

Driller's log, well

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Sandy clay	132	155
Soft caliche	8	10	Rock	3	158
Hard caliche	3	13	Sandy clay	32	190
Yellow clay	7	20	Clean sand	85	275
Rock	3	23			

Morse

Population in 1940: 200.

Source of information: Earl Lowe, superintendent, Southwestern Public Service Co.
June 23, 1948.

Owner: Southwestern Public Service Co.

Source of supply: Well, drilled in 1931 by W. M. Brown; depth, 354 feet; deep-well turbine pump and 7½-horsepower electric motor; static water level, 159 feet below land surface in spring of 1948; drawdown, 20 feet.

Pumpage: No record.

Storage: Elevated tank, 4,500 gallons.

Number of customers: 15.

Treatment: None.

Analysis

[Collected June 23, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	44	
Iron (Fe)	1.2	
Calcium (Ca)	36	1.797
Magnesium (Mg)	28	2.303
Sodium (Na)	12	.522
Potassium (K)	9.6	.246
Bicarbonate (HCO_3)	242	3.967
Sulfate (SO_4)	24	.500
Chloride (Cl)	8.4	.237
Fluoride (F)	2.2	.116
Nitrate (NO_3)	5.8	.094
Dissolved solids	260	
Total hardness as $CaCO_3$	205	
pH	7.8	

HANSFORD COUNTY

Spearman

Population in 1940: 1,105.

Source of information: Leo Ducas, city manager, June 23, 1948.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1924 by Ed Wilbanks; depth, 348 feet; diameter, 10 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 256 feet below land surface May 23, 1936; drawdown, 25.2 feet after pumping 180 gallons a minute for 72 hours in 1936.

Well 2. Drilled; depth, 282 feet; diameter, 8 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 256.8 feet below land surface Aug. 14, 1936; drawdown, 22.9 feet after pumping 180 gallons a minute for 15 minutes.

Well 3. Drilled in June 1947 by Ed Wilbanks; depth, 405 feet; deep-well turbine pump and 120-horsepower natural gas engine; yield, 650 gallons a minute.

Pumpage: Average, 250,000 gallons a day.

Storage: Ground storage reservoir, 165,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 550.

Treatment: Chlorination.

Analysis, well 3

[Collected June 23, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	42	
Iron (Fe)	.00	
Calcium (Ca)	52	2.60
Magnesium (Mg)	27	2.22
Sodium (Na)	16	.70
Potassium (K)	1.6	.04
Bicarbonate (HCO_3)	256	4.20
Sulfate (SO_4)	43	.90
Chloride (Cl)	9.2	.26
Fluoride (F)	1.2	.06
Nitrate (NO_3)	7.0	.11
Dissolved solids	324	
Total hardness as $CaCO_3$	241	
pH	7.5	

HANSFORD COUNTY

Spearman -- Continued

Driller's log, well 1

	Thickness (feet)	Depth (feet)
Surface soil	3	3
Clay	40	43
Cap rock	15	58
Packed sand	202	260
Clay	20	280
Coarse white sand	68	348

HARTLEY COUNTY

Channing

Population in 1940: 475.

Source of information: D. S. Perkins, Southwestern Public Service Co., June 24, 1948.

Owner: Southwestern Public Service Co.

Source of supply: Three wells.

Well 1. Drilled in 1910 by R. L. Hood; depth, 328 feet; diameter, 6 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 288 feet below land surface; yield, 24 gallons a minute.

Well 2. Drilled; depth, 350 feet; diameter, 4 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 15 gallons a minute.

Well 3. Drilled in September 1946 by H. H. Heiskell; depth, 400 feet; diameter, 10 inches; casing perforated from 334 feet to 395 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 290 feet below land surface in September 1946; yield, 80 gallons a minute.

Pumpage: 25,000 gallons a day.

Storage: Ground storage reservoir, 20,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 100.

Treatment: None.

Analysis, well 3

[Collected June 24, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	32	
Iron (Fe)	.49	
Calcium (Ca)	43	2.146
Magnesium (Mg)	22	1.809
Sodium (Na)	9.0	.391
Potassium (K)	2.4	.061
Bicarbonate (HCO_3)	202	3.311
Sulfate (SO_4)	21	.437
Chloride (Cl)	13	.367
Fluoride (F)	.2	.011
Nitrate (NO_3)	13	.210
Dissolved solids	262	
Total hardness as $CaCO_3$	198	
pH	7.4	

HARTLEY COUNTY

Hartley

Population in 1940: 150.

Source of information: R. M. Williams, Dec. 3, 1948.

Owner: E. E. Williams.

Source of supply: Well drilled by R. Mitchell; depth, 400 feet; diameter, 6-1/4 inches; deep-well turbine pump and 15-horsepower electric motor.

Pumpage (estimated): 10,000 gallons a day.

Storage: Elevated tank, capacity unknown.

Treatment: None.

Analysis

[Collected Oct. 4, 1948. Analyzed by J. R. Avrett]

	Parts per million	Equivalents per million
Silica (SiO_2)	28	
Iron (Fe)	.00	
Calcium (Ca)	34	1.70
Magnesium (Mg)	29	2.38
Sodium (Na)	29	1.26
Potassium (K)	8.0	.20
Bicarbonate (HCO_3)	272	4.46
Sulfate (SO_4)	34	.71
Chloride (Cl)	8.0	.23
Fluoride (F)	1.2	.06
Nitrate (NO_3)	7.5	.12
Dissolved solids	314	
Total hardness as $CaCO_3$	204	
pH	7.5	

HEMPHILL COUNTY

Canadian

Population in 1940: 2,151.

Source of information: J. C. Reagan, water superintendent, June 24, 1948.

Ownership: Municipal.

Source of supply: Five wells, three at pumping station and two northeast of city along the flood plains of the Canadian River.

Well 1. At pumping plant; drilled in 1925; depth, 72 feet; diameter, 12½ inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 22 feet below land surface in 1935, 35 feet below land surface in 1948; yield, 100 gallons a minute.

Well 2. At pumping plant; drilled in 1932; depth, 69 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 150 gallons a minute.

Well 3. At city pumping plant; drilled in 1936; depth, 84 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 350 gallons a minute.

Well 4 - Owner's new well 1. Along the Canadian flood plains northeast of Canadian; drilled in 1945; depth, 94 feet; diameter, 12 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 405 gallons a minute.

Well 5 - Owner's new well 2. About 340 feet from well 4; drilled in 1947; depth, 109 feet; diameter, 12½ inches; deep-well turbine pump and 20-horsepower electric motor; pumping level, 70 feet below land surface; yield, 700 gallons a minute.

Pumpage: Average, 300,000 gallons a day.

Storage: Ground storage reservoir, 189,000 gallons; ground storage reservoir, 104,000 gallons; stand pipe, 100,000 gallons.

Number of customers: 700.

Treatment: Chlorination.

HEMPHILL COUNTY

Canadian -- Continued

Analyses

[Collected June 24, 1948. Analyzed by D. E. Weaver and H. D. Smith]

	Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	29		33	
Iron (Fe)	.05		.05	
Calcium (Ca)	78	3.89	52	2.60
Magnesium (Mg)	34	2.80	27	2.22
Sodium (Na)	186	8.07	87	3.78
Potassium (K)	5.6	.14	4.0	.10
Bicarbonate (HCO_3)	336	5.51	250	4.20
Sulfate (SO_4)	104	2.17	44	.92
Chloride (Cl)	245	6.91	123	3.47
Fluoride (F)	1.6	.08	1.2	.06
Nitrate (NO_3)	14	.23	3.2	.05
Dissolved solids	841		504	
Total hardness as $CaCO_3$	334		241	
pH	7.4		7.5	

	Well 5	
	Parts per million	Equivalents per million
Silica (SiO_2)	32	
Iron (Fe)	.05	
Calcium (Ca)	53	2.65
Magnesium (Mg)	27	2.22
Sodium (Na)	68	2.96
Potassium (K)	3.6	.09
Bicarbonate (HCO_3)	258	4.23
Sulfate (SO_4)	39	.81
Chloride (Cl)	99	2.79
Fluoride (F)	.8	.04
Nitrate (NO_3)	3.0	.05
Dissolved solids	457	
Total hardness as $CaCO_3$	244	
pH	7.3	

HOCKLEY COUNTY

Anton

Population in 1940: 548.

Source of information: A. H. Vincent, city secretary, Mar. 13, 1947.

Ownership: Municipal.

Source of supply: Well; drilled in 1936 by Panhandle Construction Co.; depth, 115 feet; diameter, 12 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 185 gallons a minute.

Pumpage: Average, 220,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 146.

Treatment: None.

Analysis

[Collected Mar. 13, 1947. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	62	
Iron (Fe)	.08	
Calcium (Ca)	104	5.19
Magnesium (Mg)	107	8.80
Sodium (Na)	83	3.59
Potassium (K)	18	.46
Bicarbonate (HCO_3)	337	5.52
Sulfate (SO_4)	360	7.50
Chloride (Cl)	166	4.68
Fluoride (F)	2.8	.15
Nitrate (NO_3)	12	.19
Dissolved solids	1,080	
Total hardness as $CaCO_3$	700	
pH	7.2	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	10	10	Fine sand, with some clay	14	56
Gray caliche	10	20	Red clay	9	65
White caliche	8	28	Packed sand and clay	17	82
Fine sand and clay	8	36	Sand (water)	33	115
Sand (water)	6	42			

HOCKLEY COUNTY

Levelland

Population in 1940: 3,091.

Source of information: L. E. Mabe, mayor, Mar. 15, 1947.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. Drilled in 1927; depth, 220 feet; diameter, 12 inches; deep-well turbine pump and 50-horsepower electric motor; yield, 500 gallons a minute.

Well 2. Drilled in 1930; depth, 208 feet; diameter, 10 inches; deep-well turbine pump and 30-horsepower electric motor; yield, 390 gallons a minute.

Well 3. Drilled in 1945 by M. L. Morgan; depth, 220 feet; diameter, 14 inches; deep-well turbine pump and 30-horsepower electric motor; yield, 500 gallons a minute.

Well 4. Drilled in 1946 by M. L. Morgan; depth, 231 feet; diameter, 14 inches; deep-well turbine pump and 30-horsepower electric motor.

Pumpage: Maximum in summer, 1,440,000 gallons a day; minimum in winter, 480,000 gallons a day.

Storage: Elevated tank, 75,000 gallons.

Number of customers: 1,416.

Treatment: Chlorination.

Analysis, well 1

[Collected Mar. 5, 1945. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	49	
Iron (Fe)	.10	
Calcium (Ca)	63	3.14
Magnesium (Mg)	69	5.67
Sodium (Na)	46	2.01
Potassium (K)	13	.33
Bicarbonate (HCO_3)	320	5.25
Sulfate (SO_4)	193	4.02
Chloride (Cl)	60	1.69
Fluoride (F)	3.4	.18
Nitrate (NO_3)	.5	.01
Dissolved solids	673	
Total hardness as $CaCO_3$	440	
pH	7.3	

HOCKLEY COUNTY

Levelland -- Continued

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	2	2	Hard rock	3	79
Sand	10	12	Extra soft sand	17	96
Soft clay	33	45	Extra hard rock	7	103
Hard rock	6	51	Sand (water)	20	123
Soft formation	4	55	Soft sandy clay	28	151
Rock	4	59	Sand (water)	47	198
Soft sand formation	17	76			

Well 4

Top soil	5	5	Sand and gravel, water	8	107
Mixed clay and caliche	12	17	Packed sand	11	118
Red sand	6	23	Brown clay	6	124
Sand, clay	9	32	Sand, water	6	130
Caliche and rock	11	43	Sand and gravel	13	143
Caliche	9	52	Brown clay	2	145
Sandrock	8	60	Sand and gravel, water	75	220
Lime rock	10	70	Gravel	5	225
Loose sand and rock	15	85	Clay	6	231
Sandy clay	14	99			

HOWARD COUNTY

Big Spring

Population in 1940: 12,604.

Source of information: R. C. Hester, production superintendent, Aug. 21, 1947.

Ownership: Municipal.

Source of supply: Twenty-nine wells in four well fields and two surface water lakes.

Two wells in City Park field, 2.5 miles southwest of city; 13 wells in sec. 17 well field; 7 wells in sec. 33 well field; and 6 wells in O'Barr well field in Glasscock County, 21 miles southwest of Big Spring.

Moss Creek Reservoir. Eight miles east of Big Spring; capacity, 2,500 acre-feet.

Powell Creek Reservoir. Twelve miles southwest of Big Spring; capacity, 1,600 acre-feet.

Table of well records

Well field	Well no.	Date drilled	Depth (ft)	Diameter (in.)	Motor (hp.)	Static water level (ft.)	Date	Drawdown (ft.)	Yield (gpm)	Temperature (°F)
City Park	1	1925	273	72	15	173.4	9-17-36	--	80	--
						247.0	9-12-47			
	4	1926	283	12	15	197.8	9-17-36	--	80	--
						247.0	9-12-47		40	
Section 17	9	1926	121	6	5	60.1	9-17-36	20.25	25-40	--
	13	1928	200	8	5	77.9	1-28-36	75	25	--
						100.0	9-12-47			
	16	1928	160	8	5	98.1	1-28-36	45	25	--
	18A	1926	160	8	5	93.3	1-22-36	30	40	--
						96.3	1-27-37			
						50.0	9-12-47		25	
	19	1926	183	6	5	107.9	5-26-37	70	40	--
						80.0	9-12-47			
	19A	1926	183	6	5	107.9	6- 9-37	70	40	68
						80.0	9-12-47			
	24A	1928	218	8	5	190.0	9-12-47	25	20	--
	24B	1939	223	8	5	200.0	9-12-47	15	25	--
	25	1928	235	8	5	197.5	3- 6-36	20	23	--
						220.0	9-12-47			
	40A	1934	277	8	7½	222.5	5- 3-37	27	35	--
	43	1926	260	8	5	218.0	9-12-47	17	23	--
	44	--	242	8	5	218.0	9-12-47	17	23	--
	47	--	242	8	5	218.0	9-12-47	17	23	--

HOWARD COUNTY

Big Spring -- Continued

Table of well records -- Continued

Well field	Well no.	Date drilled	Depth (ft.)	Diameter (in.)	Motor (hp.)	Static water level (ft.)	Date	Drawdown (ft.)	Yield (gpm)	Temperature (°F)
Section 33	50	1928	223	8	20	128.9	8-19-37	23	100	--
						112	9-12-47			
	52	1932	230	8	15	120	9-12-47	25	125	--
	53	1932	262	8	10	120	9-12-47	25	100	--
	53A	1935	316	12½-10	15	118	9-12-47	22	175	--
	54	1934	303	8	40	118	9-12-47	42	300	--
	59A	1929	300	12 -10	30	120	9-12-47	45	300	--
	59C	1932	285	12½	30	125	9-12-47	15	300	--
O'Barr	1	1943	129	12	10	88.5	9- 5-47	29	195	--
	2	1943	125	8	10	82.5	8-20-47	3.5	300	--
						107	9- 5-47			
	4	1944	255	12	10	85	9- 5-47	19	205	--
	7	1944	208	12	--	77	9- 5-47	1.5	250	--
	9	1947	150	12	10	70	8-25-47	2	197	--
	11	1947	229	12	10	95	9- 5-47	12.5	305	--

Pumpage:

Average in gallons a day

1945

	Lakes	Section 17 well field	Section 33 well field	City Park well field	O'Barr well field
January	78,000	407,000	650,000	45,000	
February	561,000	398,000	329,000	25,000	116,000
March	--	389,000	537,000	35,000	737,000
April	142,000	362,000	149,000	--	1,493,000
May	165,000	347,000	628,000	36,000	1,553,000
June	128,000	350,000	995,000	108,000	1,490,000
July	616,000	295,000	343,000	54,000	884,000
August	902,000	293,000	241,000	49,000	1,122,000
September	918,000	299,000	210,000	43,000	918,000
October	1,314,000	143,000	--	13,000	--
November	1,344,000	64,000	--	35,000	--
December	1,268,000	--	--	--	--

HOWARD COUNTY

Big Spring -- Continued

Pumpage -- continued:

1946

	Lakes	Section 17 well field	Section 33 well field	City Park well field	O'Barr well field
January	1,250,000	1,000	--	5,000	--
February	2,301,000	--	--	--	--
March	1,383,000	--	--	69,000	168,000
April	1,323,000	--	--	75,000	750,000
May	1,206,000	--	57,000	75,000	869,000
June	1,248,000	244,000	327,000	75,000	808,000
July	1,348,000	324,000	472,000	75,000	1,139,000
August	1,261,000	324,000	622,000	75,000	738,000
September	1,243,000	323,000	246,000	75,000	51,000
October	716,000	320,000	377,000	65,000	216,000
November	1,255,000	64,000	88,000	60,000	--
December	996,000	161,000	193,000	73,000	4,000

1947

January	1,207,000	160,000	163,000	71,000	16,000
February	1,300,000	29,000	--	72,000	100,000
March	1,260,000	241,000	--	75,000	58,000
April	1,236,000	314,000	6,000	75,000	613,000
May	1,292,000	311,000	57,000	73,000	619,000
June	1,409,000	322,000	364,000	75,000	1,106,000
July	1,551,000	316,000	578,000	58,000	968,000

Storage: Three ground reservoirs, 1 1,000,000 gallons each; two elevated tanks, 200,000 gallons each.

Number of customers: 3,723.

Treatment: Well water, chlorination; lake water, coagulation, filtration, and chlorination.

HOWARD COUNTY

Big Spring -- Continued

Analyses

[Collected Aug. 22, 1947. Analyzed by B. C. Dwyer]

O'Barr well field	Well 1		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	15		20	
Iron (Fe)	.04		.04	
Calcium (Ca)	94	4.69	78	3.89
Magnesium (Mg)	20	1.64	14	1.15
Sodium (Na)	11	.49	24	1.03
Potassium (K)	4.8	.12	4.1	.10
Bicarbonate (HCO_3)	318	5.21	258	4.23
Sulfate (SO_4)	29	.60	32	.67
Chloride (Cl)	36	1.02	40	1.13
Fluoride (F)	.6	.03	1.2	.06
Nitrate (NO_3)	5.0	.08	5.0	.08
Dissolved solids	372		345	
Total hardness as $CaCO_3$	316		252	
pH	7.2		7.2	

[Collected Aug. 21, 1947 Analyzed by B. C. Dwyer]

City Park well field	Well 4	
	Parts per million	Equivalents per million
Silica (SiO_2)	15	
Iron (Fe)	.04	
Calcium (Ca)	100	4.99
Magnesium (Mg)	10	.82
Sodium (Na)	28	1.20
Potassium (K)	5.8	.15
Bicarbonate (HCO_3)	294	4.82
Sulfate (SO_4)	46	.96
Chloride (Cl)	44	1.24
Fluoride (F)	1.0	.05
Nitrate (NO_3)	5.7	.09
Dissolved solids	409	
Total hardness as $CaCO_3$	290	
pH	7.2	

HOWARD COUNTY

Big Spring -- Continued

Analyses -- Continued

[Collected: Raw sample, Aug. 9, 1945; finished sample, Aug. 21, 1947. Analyzed by: C. B. Cibulka and B. C. Dwyer]

Moss Creek Reservoir	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)			3.4	
Iron (Fe)			.22	
Calcium (Ca)	30	1.497	40	1.997
Magnesium (Mg)	2.1	.173	6.9	.567
Sodium (Na)	] 3.5	.152	[20	.857
Potassium (K)			3.9	.010
Bicarbonate (HCO_3)	105	1.721	162	2.655
Sulfate (SO_4)	2	.042	17	.354
Chloride (Cl)	2.0	.056	14	.395
Fluoride (F)	--	--	.2	.011
Nitrate (NO_3)	.2	.003	1.0	.016
Dissolved solids	114		186	
Total hardness as $CaCO_3$	84		128	
pH			7.7	

[Collected Aug. 21, 1947 Analyzed by B. C. Dwyer]

Powell Creek Reservoir	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	7.1		1.0	
Iron (Fe)	.10		.00	
Calcium (Ca)	32	1.597	57	2.845
Magnesium (Mg)	4.1	.337	8.7	.715
Sodium (Na)	12	.516	14	.589
Potassium (K)	3.5	.090	6.4	.164
Bicarbonate (HCO_3)	132	2.168	156	2.562
Sulfate (SO_4)	3.8	.079	52	1.083
Chloride (Cl)	10	.282	22	.620
Fluoride (F)	.2	.011	.6	.032
Nitrate (NO_3)	.0	.000	1.0	.016
Dissolved solids	138		240	
Total hardness as $CaCO_3$	97		178	
pH	7.5		7.9	

HOWARD COUNTY

Big Spring -- Continued

Drillers' logs

O'Barr field well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	6	6	Gravel with some white clay	9	108
Fine gravel with small amount of yellow clay	18	24	Gravel with some yellow clay	10	118
Red clay	4	28	Apparent cavern (probably water)	2	120
Gravel with small amount of clay	54	82	Conglomerate	2	122
Cavern, first showing of water	3	85	Dark-red clay	7	129
Conglomerate	3	88			
Gravel with some yellow clay	11	99			

O'Barr field well 2

Top soil	3	3	Conglomerate	7	85
Red sandy clay	7	10	Soft yellow lime and clay	15	100
Red clay	24	34	Gravel and sand, some clay	19	119
Pink clay	6	40	Red beds	183	302
Soft white lime and clay	30	70			
Very porous white lime and clay, water bearing	8	78			

O'Barr field well 4

Top soil	24	24	Sand and gravel, some clay balls	7	217
Reddish-brown clay	11	35	Soft buff sand	23	240
Gravel and light-gray clay	8	43	Yellow sand	5	245
Coarse sand and gravel, clay	19	62	Reddish-buff sand and gravel	3	248
Brownish-yellow mud and gravel, water	10	72	Shale	16	264
Sand and gravel	40	112	Sandy clay	3	267
Conglomerate	42	154	Conglomerate	17	284
Sand and gravel	37	191	Yellow and red gravelly clay and shale	11	295
Conglomerate	19	210			

HOWARD COUNTY

Big Spring -- Continued

Drillers' logs -- Continued

O'Barr field well 7

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	10	10	Coarse sand and gravel some conglomerate	11	168
Sandy clay	29	39	Sandy and gravelly clay	6	174
Clayey gravel	6	45	Sand and gravel, some boulders and clay	10	184
Conglomerate	15	60	Yellowish-brown to blue sandy mud	8	192
Clay, sand, and boulders, water	14	74	Dark-red gravelly and sandy clay with thin beds of sandstone and streaks of yellow and blue clay	23	215
Conglomerate	5	79			
Soft yellow sand	11	90			
Coarse sand and gravel	64	154			
Yellow sandy and gravelly clay	3	157			

Coahoma

Population in 1940: 574.

Source of information: R. A. Marshall, city secretary, Aug. 22, 1947.

Ownership: Municipal.

Source of supply: Two wells.

Well 2. Dug in 1940; depth, 50 feet; diameter, 4 feet; deep-well turbine pump and 7½-horsepower electric motor; yield, 125 gallons a minute.

Well 3. About 150 feet east of well 2; drilled in 1946 by Ollie Williams; depth, 54 feet; diameter, 8 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 70 gallons a minute.

Pumpage (estimated): 80,000 gallons a day.

Storage: Elevated tank, 55,000 gallons.

Number of customers: 140.

Treatment: None.

HOWARD COUNTY

Coahoma -- Continued

Analysis

[Collected Aug. 22, 1947. Analyzed by B. C. Dwyer]

	Well 2	
	Parts per million	Equivalents per million
Silica (SiO_2)	63	
Iron (Fe)	.08	
Calcium (Ca)	249	12.43
Magnesium (Mg)	94	7.73
Sodium (Na)	177	7.69
Potassium (K)	20	.51
Bicarbonate (HCO_3)	260	4.26
Sulfate (SO_4)	335	6.97
Chloride (Cl)	590	16.64
Fluoride (F)	1.4	.07
Nitrate (NO_3)	26	.42
Dissolved solids	1,680	
Total hardness as $CaCO_3$	1,010	
pH	7.2	

Forsan

Population in 1940: 400.

Source of information: Tillman Shoults, owner, Aug. 22, 1947.

Owner: Tillman Shoults.

Source of supply: Well; drilled; depth, 280 feet; diameter, 6 inches; deep-well cylinder pump and 3-horsepower electric motor.

Pumpage: No record.

Storage: Elevated tank, 3,200 gallons.

Number of customers: 35.

Treatment: None.

HOWARD COUNTY

Forsan -- Continued

Analysis

[Collected Aug. 22, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	10	
Iron (Fe)	.54	
Calcium (Ca)	72	3.59
Magnesium (Mg)	7.6	.62
Sodium (Na)	42	1.81
Potassium (K)	7.0	.18
Bicarbonate (HCO_3)	234	3.84
Sulfate (SO_4)	42	.87
Chloride (Cl)	46	1.30
Fluoride (F)	1.0	.05
Nitrate (NO_3)	8.8	.14
Dissolved solids	352	
Total hardness as $CaCO_3$	210	
pH	7.8	

HUDSPETH COUNTY

Fort Hancock

Population in 1940: 450.

Source of information: J. A. Walton, pump operator, Sept. 20, 1948.

Owner: Texas and New Orleans Railroad.

Source of supply: Well in southern part of town; drilled; depth, 50 feet; diameter, 12 inches; triplex pump and 25-horsepower gasoline engine; static water level, 9 feet below land surface; yield, 200 gallons a minute.

Pumpage: 100,000 gallons a day.

Storage: Elevated tank, 20,000 gallons.

Number of customers: 73.

Treatment: None.

Analysis

[Collected Sept. 20, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	38	
Iron (Fe)	.00	
Calcium (Ca)	186	9.28
Magnesium (Mg)	45	3.70
Sodium (Na)	457	19.89
Potassium (K)	9.6	.25
Bicarbonate (HCO_3)	262	4.29
Sulfate (SO_4)	502	10.45
Chloride (Cl)	648	18.28
Fluoride (F)	1.0	.05
Nitrate (NO_3)	2.8	.05
Dissolved solids	2,020	
Total hardness as $CaCO_3$	649	
pH	7.5	

HUDSPETH COUNTY

Sierra Blanca

Population in 1940: 723.

Source of information: Wm. Melbreth, owner, Sept. 20, 1948.

Owner: Wm. Melbreth.

Source of supply: Two wells.

Well 1. Drilled in 1925 by M. C. Craley; depth, 1,000 feet; diameter, 6 inches; deep-well cylinder pump and 20-horsepower electric motor; static water level reported, 920 feet below land surface; yield, 40 gallons a minute.

Well 2. Drilled in 1942; depth, 1,000 feet; diameter, 6 inches; deep-well cylinder pump and 15-horsepower electric motor; yield, 35 gallons a minute.

Pumpage: Average, 36,000 gallons a day.

Storage: Elevated tank, 180,000 gallons.

Number of customers: 150.

Treatment: Chlorination.

Analysis, well 2

[Collected July 23, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	20	
Iron (Fe)	1.1	
Calcium (Ca)	68	3.39
Magnesium (Mg)	19	1.56
Sodium (Na)	496	21.57
Potassium (K)	22	.56
Bicarbonate (HCO_3)	340	5.57
Sulfate (SO_4)	373	7.77
Chloride (Cl)	468	13.20
Fluoride (F)	5.3	.28
Nitrate (NO_3)	16	.26
Dissolved solids	1,655	
Total hardness as $CaCO_3$	248	
pH	7.8	

HUTCHINSON COUNTY

Borger

Population in 1940: 10,018.

Source of information: R. R. Darrell, water superintendent, June 23, 1948.

Owner: Phillips Petroleum Co.

Source of supply: Eight wells at the Plains Water Station in Carson County 13 miles southwest of Borger.

Well 1. Drilled in 1926 by D. L. McDonald; depth, 410 feet; diameter, 18 inches; deep-well turbine pump and 100-horsepower electric motor; static water level, 235 feet below land surface in 1926; yield, 700 gallons a minute; temperature, 62° F.

Well 2. Drilled in June 1927 by D. L. McDonald; depth, 384 feet; diameter, 20 inches; deep-well turbine pump and 100-horsepower electric motor.

Well 3. Drilled in 1927 by D. L. McDonald; depth, 371 feet; diameter, 18 inches; deep-well turbine pump and 100-horsepower electric motor; yield, 700 gallons a minute.

Well 4. Drilled in May 1927 by D. L. McDonald; depth, 376 feet; diameter, 20 inches; deep-well turbine pump and 100-horsepower electric motor.

Well 5. Drilled in 1929 by D. L. McDonald; depth, 495 feet; diameter, 20 inches; deep-well turbine pump and 100-horsepower electric motor; static water level, 260 feet below land surface Sept. 10, 1929, and 280.5 feet below land surface July 30, 1947; yield, 700 gallons a minute.

Well 6. Drilled in 1936 by D. L. McDonald; depth, 535 feet; diameter, 20 inches; deep-well turbine pump and 100-horsepower electric motor; static water level, 243 feet below land surface Aug. 1, 1936; yield, 740 gallons a minute; drawdown, 24.5 feet a minute.

Well 7. Drilled in 1937 by D. L. McDonald; depth, 403 feet; diameter, 20 inches; static water level, 195 feet below land surface Apr. 18, 1937; yield, 700 gallons a minute.

Well 8. Drilled in 1937; depth, 459 feet; diameter, 20 inches; deep-well turbine pump and 100-horsepower electric motor; yield, 800 gallons a minute.

HUTCHINSON COUNTY

Borger -- Continued

Pumpage:

Average in gallons a day

	1947
January	698,745
February	692,000
March	695,000
April	760,000
May	793,000
June	1,041,000
July	1,260,000
August	1,479,000
September	1,278,000
October	1,011,000
November	820,000
December	758,000

Storage: Elevated tank, 20,000 gallons.

Treatment: None.

Analysis, composite sample

[Collected Nov. 14, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	28	
Iron (Fe)	.04	
Calcium (Ca)	46	2.30
Magnesium (Mg)	20	1.64
Sodium (Na)	24	1.03
Potassium (K)	7.6	.19
Bicarbonate (HCO_3)	248	4.07
Sulfate (SO_4)	24	.50
Chloride (Cl)	18	.51
Fluoride (F)	.4	.02
Nitrate (NO_3)	3.5	.06
Dissolved solids	295	
Total hardness as $CaCO_3$	197	
pH	8.0	

HUTCHINSON COUNTY

Borger -- Continued

Driller's log, well 5

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandrock	23	23	Clay and sand	22	283
Hard sandrock	22	45	Soft sandrock	10	293
Soft sandrock	23	68	Clay	12	305
Hard sandrock	21	89	Clay and sand	36	341
Medium sandrock	23	112	Sandrock	6	347
Hard sandrock	22	134	Soft sandrock	20	367
Soft sandrock	20	154	Soft sandrock	22	389
Hard sandrock	64	218	Soft sandrock	21	410
Medium sandrock	12	230	Red and blue clay and sand	21	431
Soft sandrock	10	240			
Soft sandrock	10	250	Clay and sandrock	23	454
Clay and sand	11	261	Clay and sandrock	22	476

Pringle

Population in 1940: 20.

Source of information: S. H. Chisum, county surveyor, June 24, 1948.

Ownership: Municipal.

Source of supply: Well, drilled in 1922; depth, 230 feet; static water level, 215 feet; windmill.

Storage: Elevated tank, 2,500 gallons.

Number of customers: 4.

Treatment: None.

HUTCHINSON COUNTY

Pringle -- Continued

Analysis

[Collected June 24, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	46	
Iron (Fe)	.52	
Calcium (Ca)	38	1.897
Magnesium (Mg)	29	2.385
Sodium (Na)	4.1	.178
Potassium (K)	1.6	.041
Bicarbonate (HCO_3)	226	3.704
Sulfate (SO_4)	20	.416
Chloride (Cl)	6.8	.192
Fluoride (F)	1.2	.063
Nitrate (NO_3)	5.8	.094
Dissolved solids	273	
Total hardness as $CaCO_3$	214	
pH	7.8	

Stinnett

Population in 1940: 635.

Source of information: F. B. Early, city commissioner, June 24, 1948.

Owner: Phillips Petroleum Co.

Source of supply: Eight wells at the Plains Water Station in Carson County 13 miles southwest of Borger, owned by the Phillips Petroleum Co., which supplies Phillips Petroleum Co. and the cities of Borger and Stinnett.

Pumpage: See Borger.

Storage: See Borger.

Number of customers: 120.

Treatment: None.

(For analysis of water see Borger)

IRION COUNTY

Barnhart

Population in 1940: 250.

Source of information: Floyd Burks, owner, Sept. 10, 1947.

Owner: Floyd Burks.

Source of supply: Two wells.

Well 1. Drilled about 1927; depth, 600 feet; diameter, 6 inches; deep-well cylinder pump and 5-horsepower electric motor; pumping level, 292.8 feet below land surface Sept. 10, 1947.

Well 2. Drilled about 1930; depth, 400 feet; diameter, 6 inches; deep-well cylinder pump and 5-horsepower electric motor; pumping level, 250.8 feet below land surface Sept. 10, 1947.

Pumpage (estimated): 11,000 gallons a day.

Storage: Concrete ground reservoir, 19,000 gallons.

Number of customers: 46.

Treatment: None.

Analysis, composite sample of wells 1 and 2

[Collected Aug. 20, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	10	
Iron (Fe)	.14	
Calcium (Ca)	74	3.69
Magnesium (Mg)	35	2.88
Sodium (Na)	45	1.96
Potassium (K)	7.1	.18
Bicarbonate (HCO_3)	298	4.88
Sulfate (SO_4)	88	1.83
Chloride (Cl)	66	1.86
Fluoride (F)	1.6	.08
Nitrate (NO_3)	3.8	.06
Dissolved solids	486	
Total hardness as $CaCO_3$	328	
pH	7.9	

IRION COUNTY

Mertzon

Population in 1940: 869.

Source of information: John Clark, owner, Aug. 20, 1947.

Owner: John Clark.

Source of supply: Three wells.

Well 1. East well; depth, 159 feet; diameter, 8 inches; deep-well cylinder pump and 2-horsepower gasoline engine; static water level, 104.3 feet below land surface Aug. 20, 1947.

Well 2. South well; drilled about 1932; depth, 159 feet; diameter, 5 inches; deep-well cylinder pump and windmill; static water level, 104.2 feet below land surface Aug. 20, 1947.

Well 3. West well; drilled in 1941; depth, 150 feet; diameter, 6 inches; deep-well cylinder pump and 3-horsepower gasoline engine; static water level, 105.9 feet below land surface Aug. 20, 1947.

Pumpage (estimated): Average, 4,800 gallons a day.

Storage: Two concrete ground reservoirs, 40,000 gallons each; two elevated tanks, 1,900 and 1,600 gallons, respectively.

Number of customers: 28.

Treatment: None.

Analysis, well 3

[Collected Aug. 20, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	5.0	
Iron (Fe)	.53	
Calcium (Ca)	100	4.99
Magnesium (Mg)	54	4.44
Sodium (Na)	168	7.30
Potassium (K)	11	.28
Bicarbonate (HCO_3)	330	5.41
Sulfate (SO_4)	307	6.39
Chloride (Cl)	182	5.13
Fluoride (F)	1.4	.07
Nitrate (NO_3)	.8	.01
Dissolved solids	992	
Total hardness as $CaCO_3$	472	
pH	7.8	

JEFF DAVIS COUNTY

Valentine

Population in 1940: 499.

Source of information: George W. Newton, water superintendent, Aug. 13, 1948.

Ownership: Municipal.

Source of supply: Well, drilled in 1944 by E. Harrell; depth, 870 feet; diameter, 8 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 270 feet below land surface; yield, 80 gallons a minute; temperature, 82° F.

Pumpage (estimated): 20,000 gallons a day.

Storage: Ground reservoir, 30,000 gallons; elevated tank, 23,000 gallons.

Number of customers: 125.

Treatment: None.

Analysis

[Collected Aug. 13, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	28	
Iron (Fe)	.15	
Calcium (Ca)	4.3	.215
Magnesium (Mg)	.8	.066
Sodium (Na)	71	3.093
Potassium (K)	7.6	.194
Bicarbonate (HCO_3)	152	2.498
Sulfate (SO_4)	27	.562
Chloride (Cl)	13	.367
Fluoride (F)	1.3	.068
Nitrate (NO_3)	4.5	.073
Dissolved solids	231	
Total hardness as $CaCO_3$	14	
pH	8.2	

KENT COUNTY

Jayton

Population in 1940: 770.

Source of information: Lee Rice, water superintendent, Sept. 15, 1947.

Ownership: Municipal.

Source of supply: Two wells, 2 miles west of town.

Well 1. Dug in 1934; depth, 35 feet; diameter, 16 feet; two deep-well cylinder pumps and 5-horsepower electric motor; static water level, 22.8 feet below land surface Sept. 15, 1947; yield, 60 gallons a minute.

Well 2. Drilled in 1945 by A. T. Leach; depth, 45 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 160 gallons a minute.

Pumpage (estimated): 125,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 148.

Treatment: None.

Analysis, well 2

[Collected Sept. 15, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	23	
Iron (Fe)	.04	
Calcium (Ca)	117	5.84
Magnesium (Mg)	11	.90
Sodium (Na)	9.4	.41
Potassium (K)	3.8	.10
Bicarbonate (HCO_3)	282	4.62
Sulfate (SO_4)	104	2.17
Chloride (Cl)	10	.28
Fluoride (F)	.4	.02
Nitrate (NO_3)	9.8	.16
Dissolved solids	454	
Total hardness as $CaCO_3$	337	
pH	7.6	

LAMB COUNTY

Amherst

Population in 1940: 749.

Source of information: E. D. House, water superintendent, Mar. 1, 1945.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1936 by J. M. Whitfield; depth, 210 feet; diameter, 12½ inches; deep-well turbine pump and 25-horsepower electric motor; yield, 250 gallons a minute.

Well 2. Drilled in 1942; depth, 218 feet; diameter, 12 inches; deep-well turbine pump and electric motor; yield, 250 gallons a minute.

Pumpage (estimated): 150,000 gallons a day.

Storage: Elevated tank, 75,000 gallons.

Number of customers: 200.

Treatment: None.

Analysis, well 1

[Collected Mar. 1, 1945. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million
Silica (SiO_2)	51	
Iron (Fe)	.08	
Calcium (Ca)	66	3.29
Magnesium (Mg)	52	4.28
Sodium (Na)	41	1.78
Potassium (K)	15	.38
Bicarbonate (HCO_3)	294	4.82
Sulfate (SO_4)	93	1.94
Chloride (Cl)	98	2.76
Fluoride (F)	2.0	.11
Nitrate (NO_3)	6.3	.10
Dissolved solids	577	
Total hardness as $CaCO_3$	378	
pH	7.7	

LAMB COUNTY

Littlefield

Population in 1940: 3,817.

Source of information: W. G. Street, water superintendent, Mar. 1, 1945.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Known as East well; drilled; depth, 130 feet; diameter, $15\frac{1}{2}$ inches; deep-well turbine pump and electric motor; yield, 400 gallons a minute.

Well 2. Known as West well; drilled; depth, 130 feet; diameter, $12\frac{1}{2}$ inches; deep-well turbine pump and electric motor; yield, 400 gallons a minute; temperature, 64° F.

Pumpage: Average, 400,000 gallons a day.

Storage: Concrete ground reservoir, 160,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 1,050.

Treatment: None.

Analysis, well 2

[Collected Mar. 1, 1945. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million
Silica (SiO_2)	42	
Iron (Fe)	.04	
Calcium (Ca)	62	3.09
Magnesium (Mg)	39	3.21
Sodium (Na)	46	2.00
Potassium (K)	14	.36
Bicarbonate (HCO_3)	303	4.97
Sulfate (SO_4)	77	1.60
Chloride (Cl)	69	1.95
Fluoride (F)	2.0	.11
Nitrate (NO_3)	1.8	.03
Dissolved solids	502	
Total hardness as $CaCO_3$	315	
pH	7.7	

LAMB COUNTY

Littlefield -- Continued

Driller's logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Subsoil	3	3	Water sand and gravel with clay balls	5	87
Chalk	3	6	White sand, water	11	98
Pink clay	14	20	Water gravel	2	100
Pink sandy clay	6	26	Yellow clay	19	119
Rock	5	31	Water sand	5	124
Caliche	9	40	Water sand and gravel	12	136
Pink sand and caliche	20	60	Yellow clay	12	148
Pink sand, seeps	9	69			
Water sand and gravel	13	82			

Well 2

Subsoil	4	4	Pink sand, seeps	11	68
Chalk	5	9	Water sand and gravel	12	80
Pink clay	13	22	Pink clay	14	94
Pink sandy clay	5	27	White water sand	4	98
Rock chalk	3	30	Yellow clay	17	115
Caliche	8	38	Water sand and gravel	13	128
Pink sand and caliche	19	57	Yellow clay	2	130

Olton

Population in 1940: 782.

Source of information: B. A. Dodson, water superintendent, Mar. 1, 1945.

Ownership: Municipal.

Source of supply: Well at elevated tank; drilled in 1933; depth, 200 feet; diameter, 12 inches; deep-well turbine pump and electric motor; yield, 250 gallons a minute.

Pumpage (estimated): 20,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 180.

Treatment: None.

LAMB COUNTY

Olton -- Continued

Analysis

[Collected Mar. 1, 1945. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million
Silica (SiO_2)	33	
Iron (Fe)	.12	
Calcium (Ca)	59	2.94
Magnesium (Mg)	29	2.38
Sodium (Na)	12	.50
Potassium (K)	7.9	.20
Bicarbonate (HCO_3)	289	4.74
Sulfate (SO_4)	22	.46
Chloride (Cl)	20	.56
Fluoride (F)	2.8	.15
Nitrate (NO_3)	6.8	.11
Dissolved solids	335	
Total hardness as $CaCO_3$	266	
pH	7.7	

Sudan

Population in 1940: 974.

Source of information: Frank White, water superintendent, Mar. 1, 1945.

Ownership: Municipal.

Source of supply: Five wells.

Well 1. Drilled in 1935 by H. J. McCarty; depth, 134 feet; diameter, 10 inches; deep-well turbine pump and electric motor.

Well 2. Drilled; depth, 134 feet; diameter, 10 inches; deep-well turbine pump and electric motor.

Well 3. Drilled; depth, 134 feet; diameter, 10 inches; deep-well turbine pump and electric motor.

Well 4. Drilled; depth, 150 feet; diameter, 10 inches; deep-well turbine pump and electric motor.

Well 5. Drilled; depth, 150 feet; diameter, 10 inches; deep-well turbine pump and electric motor.

Pumpage (estimated): 100,000 gallons a day.

LAMB COUNTY

Sudan -- Continued

Storage: Concrete ground reservoir, 100,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 298.

Treatment: None.

Analysis, well 5

[Collected Mar. 1, 1945. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million
Silica (SiO_2)	42	
Iron (Fe)	.00	
Calcium (Ca)	82	4.09
Magnesium (Mg)	23	1.89
Sodium (Na)	30	1.31
Potassium (K)	7.6	.19
Bicarbonate (HCO_3)	282	4.62
Sulfate (SO_4)	66	1.37
Chloride (Cl)	50	1.41
Fluoride (F)	1.2	.06
Nitrate (NO_3)	1.5	.02
Dissolved solids	453	
Total hardness as $CaCO_3$	299	
pH	7.7	

LIPSCOMB COUNTY

Booker

Population in 1940: 386.

Source of information: E. E. McKee, water superintendent, June 24, 1948.

Ownership: Municipal.

Source of supply: Two wells at city water tower.

Well 1. Drilled in 1928 by Dade; depth, 310 feet; diameter, 8 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 100 gallons a minute.

Well 2. Drilled in 1940; depth, 315 feet; diameter, $12\frac{1}{2}$ inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 95 feet below land surface in 1940; yield, 250 gallons a minute with drawdown of 21 feet.

Pumpage: Average, 40,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 215.

Treatment: None.

Analysis, well 1

[Collected June 24, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	45	
Iron (Fe)	.05	
Calcium (Ca)	69	3.44
Magnesium (Mg)	30	2.47
Sodium (Na)	26	1.13
Potassium (K)	3.6	.09
Bicarbonate (HCO_3)	272	4.46
Sulfate (SO_4)	34	.71
Chloride (Cl)	64	1.81
Fluoride (F)	.4	.02
Nitrate (NO_3)	5.1	.08
Dissolved solids	411	
Total hardness as $CaCO_3$	296	
pH	7.3	

LIPSCOMB COUNTY

Follett

Population in 1940: 431.

Source of information: Carl Fleming, water superintendent, June 24, 1948.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1928; depth, 369 feet; diameter, 6 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 170 feet below land surface; yield, 80 gallons a minute.

Well 2. Drilled in 1930; depth, 370 feet; diameter, 8 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 100 gallons a minute.

Pumpage (estimated): Summer, 150,000 gallons a day; winter, 40,000 gallons a day.

Storage: Ground storage reservoir, 70,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 150.

Treatment: None.

Analysis, composite sample

[Collected June 24, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	50	
Iron (Fe)	.05	
Calcium (Ca)	47	2.35
Magnesium (Mg)	25	2.06
Sodium (Na)	34	1.48
Potassium (K)	13	.33
Bicarbonate (HCO_3)	270	4.43
Sulfate (SO_4)	21	.44
Chloride (Cl)	45	1.27
Fluoride (F)	1.0	.05
Nitrate (NO_3)	4.5	.07
Dissolved solids	358	
Total hardness as $CaCO_3$	220	
pH	8.0	

LIPSCOMB COUNTY

Higgins

Population in 1940: 741.

Source of information: Ted Lorenz, water superintendent, June 24, 1948.

Ownership: Municipal.

Source of supply: Two wells 100 feet apart near city light plant.

Well 1. Drilled in 1926; depth, 130 feet; diameter, 10 inches; deep-well turbine pump and 20-horsepower electric motor; yield on test, 240 gallons a minute for 99 minutes; on continuous pumping, pumpage decreased to less than 200 gallons a minute.

Well 2. Drilled in 1938; depth, 133 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 200 gallons a minute.

Pumpage (estimated): Summer, 150,000 gallons a day; winter, 75,000 gallons a day.

Storage: Ground storage reservoir, 55,000 gallons; elevated tank, 250,000 gallons. (System tied into the Santa Fe Railroad reservoir, 185,000 gallons.)

Number of customers: 217.

Treatment: None.

Analysis, well 2

[Collected June 24, 1948. Analyzed by H. D. Smith]

	Parts per million	Equivalents per million
Silica (SiO_2)	46	
Iron (Fe)	.00	
Calcium (Ca)	71	3.54
Magnesium (Mg)	11	.90
Sodium (Na)	19	.83
Potassium (K)	4.8	.12
Bicarbonate (HCO_3)	286	4.69
Sulfate (SO_4)	9.5	.20
Chloride (Cl)	14	.39
Fluoride (F)	.6	.03
Nitrate (NO_3)	7.2	.12
Dissolved solids	292	
Total hardness as $CaCO_3$	222	
pH	7.5	

LUBBOCK COUNTY

Idalou

Population in 1940: 503.

Source of information: Mrs. J. T. Carlton, city secretary, Mar. 12, 1947.

Ownership: Municipal.

Source of supply: Well at elevated tank; drilled in 1925 by L. A. Peoples; depth, 125 feet; diameter, 15 inches; deep-well turbine pump and 10-horsepower electric motor.

Pumpage (estimated): 30,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 153.

Treatment: None.

Analysis

[Collected Mar. 12, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	32	
Iron (Fe)	.09	
Calcium (Ca)	54	2.70
Magnesium (Mg)	68	5.59
Sodium (Na)	36	1.58
Potassium (K)	9.1	.23
Bicarbonate (HCO_3)	372	6.10
Sulfate (SO_4)	67	1.39
Chloride (Cl)	78	2.20
Fluoride (F)	6.0	.32
Nitrate (NO_3)	5.5	.09
Dissolved solids	565	
Total hardness as $CaCO_3$	414	
pH	7.2	

Lubbock

Population in 1940: 31,853.

Source of information: A. L. King, city engineer, Sept. 25, 1945.

Ownership: Municipal.

LUBBOCK COUNTY

Lubbock -- Continued

Source of supply: Nineteen wells.

Well 1. Three-quarters of a mile northeast of Lubbock post office; drilled in 1925 by Gant Baker; depth, 98 feet; diameter, 24 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 28.4 feet below land surface Sept. 25, 1944; drawdown reported, 50 feet while pumping 60 gallons a minute in 1925; yield, 600 gallons a minute.

Well 2. Drilled in 1917 by T. P. Wright; depth, 300 feet; diameter, 24 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 81.3 feet below land surface Sept. 26, 1944; drawdown reported, 57 feet while pumping 617 gallons a minute in 1932.

Well 3. Drilled in 1925 by D. L. McDonald; depth, 210 feet; diameter, 24 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 72.3 feet below land surface Sept. 25, 1944.

Well 4. Drilled in 1928 by B. B. Baron; depth, 156 feet; diameter, 24 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 67.42 feet below land surface Oct. 2, 1934.

Well 5. Drilled in 1929 by Coy Rodgers; depth, 150 feet; diameter, 24 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 72.2 feet below land surface Sept. 26, 1944; drawdown, 49 feet while pumping 440 gallons a minute in 1929.

Well 6. Drilled in 1931 by D. L. McDonald; depth, 142 feet; diameter, 18 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 80.0 feet below land surface Sept. 25, 1944; drawdown, 64 feet while pumping 430 gallons a minute in 1932.

Well 7. Drilled in 1931 by D. L. McDonald; depth, 158 feet; diameter, 18 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 68.1 feet below land surface Sept. 28, 1944; drawdown, 56 feet while pumping 780 gallons a minute.

Well 8. Drilled in 1931 by D. L. McDonald; depth, 157 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 76.4 feet below land surface Sept. 28, 1944.

Well 9. Drilled in 1937 by B. B. Baron; depth, 151 feet; diameter, 22 to 18 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 66.5 feet below land surface Sept. 28, 1944; drawdown, 55 feet while pumping 650 gallons a minute in 1937.

Well 10. Drilled in 1938 by Crawford and Anderson; depth, 151 feet; diameter, 24 to 18 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 67.4 feet below land surface Sept. 25, 1944; yield, 850 gallons a minute March 1938.

LUBBOCK COUNTY

Lubbock -- Continued

Source of supply -- Continued:

Well 11. Drilled in 1938 by Crawford and Anderson; depth, 145 feet; diameter 24 to 18 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 61.7 feet below land surface Sept. 28, 1944; drawdown, 36 feet while pumping 500 gallons a minute in 1938.

Well 12. Drilled in 1938 by Crawford and Anderson; depth, 145 feet; diameter 22 to 18 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 58.4 feet below land surface Sept. 28, 1944; drawdown 53 feet while pumping 430 gallons a minute in 1938.

Well 13. Drilled in 1939 by Crawford and Anderson; depth, 150 feet; diameter, 22 to 18 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 53.7 feet below land surface Sept. 25, 1944; drawdown 35 feet while pumping 640 gallons a minute in 1939.

Well 14. Drilled in 1940 by Crawford and Anderson; depth, 135 feet; diameter, 22 to 18 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 59.4 feet below land surface Sept. 26, 1944; drawdown 65 feet while pumping 535 gallons a minute in 1940.

Well 15. Drilled in 1940 by Crawford and Anderson; depth, 135 feet; diameter 22 to 18 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 60.2 feet below land surface Sept. 25, 1944; drawdown, 41 feet while pumping 890 gallons a minute in 1940.

Well 16. Drilled in 1941 by L. A. Peoples; depth, 135 feet; diameter, 22 to 18 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 54.6 feet below land surface Sept. 28, 1944; drawdown, 78 feet while pumping 640 gallons a minute in 1941.

Well 17. Drilled in 1941 by L. A. Peoples; depth, 125 feet; diameter, 22 to 18 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 42.3 feet below land surface Sept. 30, 1944; drawdown, 45 feet while pumping 825 gallons a minute in 1943.

Well 18. Drilled in 1943 by Geo. Anderson; depth, 110 feet; diameter, 22 to 18 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 25.6 feet below land surface Sept. 30, 1944; drawdown, 65 feet while pumping 700 gallons a minute in 1943.

Well 19. Drilled in 1945 by L. A. Peoples; depth, 145 feet; diameter, 22 to 18 inches; deep-well turbine pump and electric motor; static water level, 26.5 feet below land surface Jan. 29, 1945; drawdown, 23 feet while pumping 1,050 gallons a minute.

LUBBOCK COUNTY

Lubbock -- Continued

Pumpage:

Average in gallons a day

	1942	1943	1944
January	2,440,000	2,850,000	2,630,000
February	2,620,000	3,170,000	2,750,000
March	3,040,000	4,500,000	4,500,000
April	3,150,000	4,670,000	4,070,000
May	5,100,000	4,430,000	4,400,000
June	6,150,000	5,280,000	6,170,000
July	5,730,000	6,160,000	5,000,000
August	4,840,000	8,220,000	5,960,000
September	2,780,000	4,700,000	4,100,000
October	2,480,000	3,480,000	3,420,000
November	2,830,000	3,080,000	3,090,000
December	2,690,000	2,720,000	2,750,000

Storage: Six concrete ground storage reservoirs, total capacity, 7,435,000 gallons.

Number of customers: 8,700.

Treatment: None.

Analyses

[Collected: Well 2, Feb. 15, 1944; well 5, Oct. 2, 1944. Analyzed by J. H. Rowley

	Well 2		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	52			
Iron (Fe)	.02			
Calcium (Ca)	57	2.85	53	2.65
Magnesium (Mg)	65	5.35	60	4.93
Sodium (Na)	79	3.44]	118	5.11
Potassium (K)	23	.59		
Bicarbonate (HCO_3)	318	5.21	318	5.21
Sulfate (SO_4)	169	3.52	153	3.19
Chloride (Cl)	110	3.10	150	4.23
Fluoride (F)	5.4	.28	--	--
Nitrate (NO_3)	7.5	.12	3.8	.06
Dissolved solids	746		694	
Total hardness as $CaCO_3$	410		379	
pH	8.1		--	

LUBBOCK COUNTY

Lubbock -- Continued

Analyses of water -- continued

[Collected Sept. 22, 1944. Analyzed by J. H. Rowley]

	Well 6		Well 13	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	78	3.89	76	3.79
Magnesium (Mg)	86	7.07	94	7.73
Sodium and potassium (Na + K)	114	4.94	166	7.21
Bicarbonate (HCO_3)	354	5.80	345	5.65
Sulfate (SO_4)	319	6.64	421	8.77
Chloride (Cl)	114	3.22	146	4.12
Fluoride (F)	3.3	.17	3.2	.17
Nitrate (NO_3)	4.1	.07	1.5	.02
Dissolved solids	893		1,080	
Total hardness as $CaCO_3$	548		576	

[Collected: Well 16, Sept. 25, 1944; well 19, Feb. 15, 1945. Analyzed by J. H. Rowley]

	Well 16		Well 19	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)			64	
Iron (Fe)			.06	
Calcium (Ca)	45	2.25	69	3.44
Magnesium (Mg)	58	4.77	80	6.58
Sodium and potassium (Na + K)	59	2.55	150	6.50
Bicarbonate (HCO_3)	249	4.08	317	5.20
Sulfate (SO_4)	120	2.50	272	5.66
Chloride (Cl)	98	2.76	190	5.36
Fluoride (F)	3.5	.18	4.1	.22
Nitrate (NO_3)	2.8	.05	5.1	.08
Dissolved solids	619		990	
Total hardness as $CaCO_3$	351		501	
pH			7.5	

LUBBOCK COUNTY

Lubbock -- Continued

Drillers' logs

Well 15

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Caliche	20	20	Water sand	17	85
Sandy red rock and red clay	32	52	Red clay	21	106
			Water sand	22	128
Hard sandrock	3	55	Red clay	2	130
Red water sand	8	63	Gray clay	20	150
Red sandrock	5	68	Caliche rock	10	160

Well 16

Top soil	4	4	Rock	2	63
Caliche clay and sandy caliche	31	35	Red sand, water	12	75
			Red clay	4	79
Caliche rock (water at 39 feet)	15	50	Sand and gravel, water	32	111
			Red clay	24	135
Red sand, water	11	61	Clayey fine-grained sand	18	153

Well 19

Top soil and caliche clay	20	20	Red sand, honeycomb rock and some gravel, water	11	94
Caliche clay and small rock	10	30	Coarse sand and gravel, water	13	107
Gray sand, water	13	43	Sandy red clay	33	140
Sandy red clay	40	83	Dry packed sand	11	151
			White caliche rock	3	154

Slaton

Population in 1940: 3,587.

Source of information: City secretary, Feb. 7, 1944.

Ownership: Municipal.

Source of supply: Three wells in well field about 1 mile north of town.

Well 1. Drilled in 1925 by W. M. Edwards; depth, 135 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 235 gallons a minute.

Well 2. Drilled by D. W. McDonald; depth, 125 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 140 gallons a minute.

LUBBOCK COUNTY

Slaton -- Continued

Source of supply -- continued:

Well 3. Drilled; depth, 206 feet; diameter, 18 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 99.6 feet below land surface Jan. 18, 1937; yield, 360 gallons a minute; temperature, 65° F.

Pumpage (estimated): 150,000 gallons a day.

Storage: Ground reservoir at well field, 50,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 950.

Treatment: None.

Analysis, well 1

[Collected Feb. 17, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million
Silica (SiO_2)	51	
Iron (Fe)	.02	
Calcium (Ca)	42	2.10
Magnesium (Mg)	51	4.19
Sodium (Na)	88	3.81
Potassium (K)	15	.38
Bicarbonate (HCO_3)	342	5.60
Sulfate (SO_4)	121	2.52
Chloride (Cl)	71	2.00
Fluoride (F)	5.9	.31
Nitrate (NO_3)	3.0	.05
Dissolved solids	611	
Total hardness as $CaCO_3$	314	
pH	8.3	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
No record	84	84	Hard red clay	3	119
Fine soft sand, little water	5	89	Fine-grained sand, water	4	123
Stiff red clay	3	92	Sand, water	9	132
Sand and clay	14	106	Large gravel, rock and coarse sand, water	3	135
Sand, some water	10	116			

LYNN COUNTY

O'Donnell

Population in 1940: 1,187.

Source of information: Rochelle Howard, water superintendent, Nov. 29, 1946.

Ownership: Municipal.

Source of supply: Nine wells.

Well 1. At elevated tank; depth, 82 feet; deep-well cylinder pump and 3/4-horsepower electric motor; static water level reported, 70 feet below land surface; yield reported, about 3 gallons a minute in November 1946.

Well 2. At elevated tank; depth, 82 feet; deep-well cylinder pump and 1½-horsepower electric motor; static water level reported, 70 feet below land surface; yield reported, about 2 gallons a minute in November 1946.

Well 3. At elevated tank; depth, 90 feet; deep-well cylinder pump and 3/4-horsepower electric motor; static water level reported, 70 feet below land surface; yield reported, about 3 gallons a minute in November 1946.

Well 4. In northeast corner of city limits; depth, 82 feet; deep-well cylinder and 3/4-horsepower electric motor; static water level reported, 70 feet below land surface; yield reported, about 4 gallons a minute in November 1946.

Well 5. In northeast corner of city limits; depth, 82 feet; deep-well cylinder pump and 3/4-horsepower electric motor; static water level reported, 70 feet below land surface; yield reported, about 5 gallons a minute in November 1946.

Well 6. At intersection of U. S. Highway 87 bypass and business routes north of O'Donnell; drilled in 1938; depth, 62 feet; deep-well cylinder pump and 2-horsepower electric motor; static water level reported, 58 feet below land surface; yield reported, about 8 gallons a minute in November 1946.

Well 7. West of intersection of U. S. Highway 87 bypass and business routes north of O'Donnell; drilled in 1945; depth, 64 feet; deep-well turbine pump and 3-horsepower electric motor; static water level reported, 52 feet below land surface; yield reported, 25 gallons a minute in November 1946.

Well 8. West of intersection of U. S. Highway 87 bypass and business routes north of O'Donnell; drilled in April 1945; depth, 62 feet; deep-well turbine pump and 3-horsepower electric motor; static water level reported, 52 feet below land surface.

LYNN COUNTY

O'Donnell -- Continued

Source of supply -- continued:

Well 9. West of elevated tank; drilled in 1934 by Charlie Nunally; depth, 67 feet; diameter, 5-5/8 inches; Hi-lift pump and 3-horsepower electric motor; static water level reported, 22 feet below land surface; yield reported, about 50 gallons a minute in November 1946.

Pumpage: Minimum, 50,000 gallons a day; maximum, 150,000 gallons a day.

Storage: Elevated tank, 55,000 gallons; ground storage reservoir, 76,900 gallons.

Number of customers: 300.

Treatment: Chlorination.

Analysis, composite sample of all wells

[Collected Nov. 29, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Iron (Fe)	.17	
Calcium (Ca)	116	5.79
Magnesium (Mg)	127	10.44
Sodium (Na)	296	12.88
Potassium (K)	40	1.02
Bicarbonate (HCO_3)	392	6.43
Sulfate (SO_4)	507	10.56
Chloride (Cl)	452	12.75
Fluoride (F)	5.6	.29
Nitrate (NO_3)	6.2	.10
Dissolved solids	1,890	
Total hardness as $CaCO_3$	812	
pH	7.4	

Tahoka

Population in 1940: 2,129.

Source of information: G. H. Hines, water superintendent, Nov. 29, 1946.

Ownership: Municipal.

Source of supply: Eight wells.

LYNN COUNTY

Tahoka -- Continued

Source of supply -- Continued:

Well 1. About 3 miles north of elevated tank; drilled in 1937 by L. A. Peoples; depth, 80 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 52 feet below land surface; yield, 150 gallons a minute.

Well 2. About 3 miles north of elevated tank; drilled in 1937 by L. A. Peoples; depth, 80 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute.

Well 3. Northeast of well 1; drilled in 1939 by L. A. Peoples; depth, 80 feet; diameter, 10 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 100 gallons a minute.

Well 4. Three miles north of elevated tank; drilled in 1939 by L. A. Peoples; depth, 80 feet; diameter, 10 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 100 gallons a minute.

Well 5. Three miles north of elevated tank, northeast of well 3; drilled in 1941 by L. A. Peoples; depth, 80 feet; diameter, 10 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 100 gallons a minute.

Well 6. Four miles north of elevated tank; drilled in January 1946 by L. M. Bankson; depth, 80 feet; diameter, 10 inches; well not equipped for service on Nov. 29, 1946.

Well 7. Four miles north of elevated tank; drilled in January 1946 by L. M. Bankson; depth, 80 feet; diameter, 10 inches; well not equipped for service on Nov. 29, 1946.

Well 8. Four miles north of elevated tank; drilled in November 1946 by G. C. Paulk; depth, 92 feet; diameter, 10 inches; pumping equipment not installed Nov. 29, 1946.

Pumpage (estimated): Average, 300,000 gallons a day.

Storage: Ground storage reservoir, 255,000 gallons; elevated tank, 55,000 gallons.

Number of customers: 678.

Treatment: Chlorination.

LYNN COUNTY

Tahoka -- Continued

Analysis, composite sample of five wells

[Collected Nov. 29, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	37	
Iron (Fe)	.04	
Calcium (Ca)	48	2.40
Magnesium (Mg)	45	3.70
Sodium (Na)	26	1.12
Potassium (K)	5.2	.13
Bicarbonate (HCO_3)	372	6.10
Sulfate (SO_4)	5.4	.11
Chloride (Cl)	28	.79
Fluoride (F)	5.6	.29
Nitrate (NO_3)	3.5	.06
Dissolved solids	387	
Total hardness as $CaCO_3$	305	
pH	7.8	

Driller's log, well 3

	Thickness (feet)	Depth (feet)
Top soil	6	6
Caliche	40	46
Sandrock	3	49
Hard rock	10	59
Sand and gravel	21	80
Yellow clay at 80 feet		

MARTIN COUNTY

Stanton

Population in 1940: 1,245.

Source of information: G. B. Shelburne, Dec. 18, 1946.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. Half a block north of elevated tank; drilled in 1927; depth, 142 feet; diameter, 6 inches; deep-well cylinder pump and 7½-horsepower electric motor; yield, 50 gallons a minute.

Well 2. A quarter of a block northwest of elevated tank; drilled in 1930; depth, 135 feet; diameter, 8 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 65 feet below land surface; yield, 150 gallons a minute.

Well 3. Three-quarters of a block northeast of elevated tank and half a block east of well 1; drilled in 1943 by Skeen Bros.; depth, 149 feet; diameter, 8 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 80 gallons a minute.

Well 4. Six hundred feet southwest of elevated tank; drilled in 1946 by L. Graves; depth, 160 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 150 gallons a minute.

Pumpage:

Average in gallons a day

	1945
January	34,931
February	43,421
March	35,185
April	66,160
May	93,265
June	139,407
July	65,865
August	110,326
September	94,126
October	49,760
November	54,201
December	52,508

Storage: Ground storage reservoir, 50,000 gallons; elevated tank, 75,000 gallons.

MARTIN COUNTY

Stanton -- Continued

Number of customers: 310.

Treatment: None.

Analysis, composite sample of wells 1, 2, and 3

[Collected Dec. 18, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	36	
Iron (Fe)	.17	
Calcium (Ca)	128	6.39
Magnesium (Mg)	65	5.35
Sodium (Na)	178	7.73
Potassium (K)	13	.33
Bicarbonate (HCO_3)	292	4.79
Sulfate (SO_4)	426	8.87
Chloride (Cl)	208	5.87
Fluoride (F)	3.2	.17
Nitrate (NO_3)	6.4	.10
Dissolved solids	1,210	
Total hardness as $CaCO_3$	587	
pH	7.4	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	4	4	Boulders	10	56
Caliche	20	24	Dry red sand	12	68
Boulders	5	29	Quicksand, water	18	86
Dry sand	7	36	Red clay	5	91
Boulders	5	41	Water sand and gravel	21	112
Dry sand	5	46	Lime rock	30	142

MIDLAND COUNTY

Midland

Population in 1940: 9,352.

Source of information: A. B. Cole, water superintendent, Dec. 18, 1946.

Ownership: Municipal.

Source of supply: Fourteen wells in two well fields.

Rosedale well 1. Two and three-quarter miles east of city hall; drilled in 1940 by Chas. Skeen; depth, 137 feet; diameter, 16 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 35 feet below land surface; yield, 130 gallons a minute when drilled.

Rosedale well 2. About 2-3/4 miles east of city hall; drilled in January 1940 by T. Hines; depth, 127 feet; diameter, 16 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 35 feet below land surface; yield, 160 gallons a minute when drilled.

Rosedale well 3. About 2-3/4 miles east of city hall; drilled in June 1940 by T. Hines; depth, 109 feet; diameter, 16 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 190 gallons a minute when drilled.

Rosedale well 4. About 2-3/4 miles east of city hall; drilled in June 1940 by Chas. Skeen; depth, 127 feet; diameter, 16 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 295 gallons a minute when drilled.

Rosedale well 7. Two and three-quarter miles east of city hall; drilled in 1942 by Chas. Skeen; depth, 130 feet; diameter, 16 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 225 gallons a minute.

Rosedale well 8. Two and three-quarter miles east of city hall; drilled in May 1941 by Chas. Skeen; depth, 147 feet; diameter, 16 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 225 gallons a minute.

Cloverdale well 1. Four miles east of city hall; drilled in 1927 by Layne-Texas Co.; depth, 110 feet; diameter, 20 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 35 feet below land surface; yield, 500 gallons a minute; drawdown, 15 feet.

Cloverdale well 3. Four miles east of city hall; drilled in 1934 by Watson and Hines; depth, 115 feet; diameter, 15½ inches; deep-well turbine pump and 10-horsepower electric motor; yield, 225 gallons a minute.

MIDLAND COUNTY

Midland -- Continued

Cloverdale well 4. Four miles east of city hall; drilled in 1935 by Watson and Hines; depth, 125 feet; diameter, 15½ inches; deep-well turbine pump and 20-horsepower electric motor; yield, 400 gallons a minute; drawdown, 25 feet.

Cloverdale well 5. Four miles east of city hall; drilled in 1935 by Watson and Hines; depth, 128 feet; diameter, 16 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 200 gallons a minute.

Cloverdale well 6. Four miles east of city hall; drilled in 1936 by Watson and Hines; depth, 128 feet; diameter, 17 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 400 gallons a minute; drawdown, 37 feet.

Cloverdale well 7. Four miles east of city hall; drilled in 1937 by Watson and Hines; depth, 115 feet; diameter, 16 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 300 gallons a minute; drawdown, 56 feet.

Cloverdale well 8. Four miles east of city hall; drilled in 1940 by Watson and Hines; depth, 135 feet; diameter, 16 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 300 gallons a minute.

Cloverdale well 9. Four miles east of city hall; drilled in 1946 by T. Hines; depth, 130 feet; diameter, 16 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 300 gallons a minute.

Pumpage (estimated): Average, 2,500,000 gallons a day.

Storage: Ground storage reservoir, 1,000,000 gallons; ground storage reservoir, 500,000 gallons; ground storage reservoir, 300,000 gallons; elevated tank, 2,225,000 gallons; elevated tank, 300,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 3,000.

Treatment: Chlorination.

MIDLAND COUNTY

Midland -- Continued

Analyses

[Collected Dec. 18, 1946 Analyzed by C. B. Cibulka]

	Rosedale well field-composite sample from 6 wells		Cloverdale well field-composite sample from 8 wells	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	53		53	
Iron (Fe)	.08		.27	
Calcium (Ca)	153	7.64	154	7.69
Magnesium (Mg)	94	7.73	95	7.81
Sodium (Na)	219	9.54	217	9.43
Potassium (K)	14	.36	15	.38
Bicarbonate (HCO_3)	244	4.00	244	4.00
Sulfate (SO_4)	540	11.24	541	11.26
Chloride (Cl)	344	9.70	342	9.65
Fluoride (F)	1.8	.09	3.2	.17
Nitrate (NO_3)	15	.24	14	.23
Dissolved solids	1,550		1,550	
Total hardness as $CaCO_3$	768		775	
pH	7.4		7.4	

Drillers' logs

Rosedale well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	10	10	Water sand	10	115
Caliche	15	25	Broken lime	5	120
Lime	15	40	Sand and gravel	10	130
Water sand	15	55	Brown sand	5	135
Lime	35	90	Red beds	2	137
Sand	15	105			

Rosedale well 2

Top soil	10	10	Yellow sand	5	85
Caliche	15	25	Hard gravel	30	115
Sand and caliche	10	35	Sand	5	120
Sand and gravel	12	47	Brown lime	5	125
Water sand	18	65	Red beds	2	127
Sand and gravel	15	80			

MIDLAND COUNTY

Midland -- Continued

Drillers' logs -- Continued

Rosedale well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	3	3	Sand	6	76
Caliche	42	45	Rock	4	80
Water sand	5	50	Sand and gravel	23	103
Lime	10	60	Red beds	6	109
Hard shells	10	70			

Rosedale well 4

Top soil	4	4	Sand and blue shale	25	100
Caliche	39	43	Gravel	25	125
Water sand	9	52	Red beds	2	127
Sand and gravel	23	75			

Rosedale well 8

Top soil	5	5	Packed sand and clay	5	60
Gray clay	5	10	Gravel, water, some sand	5	65
Caliche and clay	5	15	Water sand (1 foot of clay)	5	70
Chalk rock and caliche, very white	10	25	Water sand and gravel	5	75
Caliche (hard rock at 27 feet)	5	30	Gray clay (some red clay)	5	80
Hard rock	5	35	Clay (some red clay)	5	85
Gray clay (1 foot of hard rock)	5	40	Clay and gravel	20	105
Sand and gravel (1 foot of hard rock; tested 40 gallons a minute)	5	45	Shelly sandrock	5	110
Sand and gravel, little clay	5	50	Sandrock and clay	5	115
Gravel (1 foot of hard rock)	5	55	Hard gravel and clay	5	120
			Hard sandrock	5	125
			Water sand	10	135
			Gravel, sand, and some clay	5	140
			Sand and clay	5	145
			Red beds	2	147

Cloverdale well 3

Top soil	10	10	Gypsum	10	65
Caliche	10	20	Hard lime	6	71
Gypsum	10	30	Water sand and gravel	30	101
Sandy clay	15	45	Red rock	2	103
Clay	5	50	Water sand and gravel	12	115
Water sand	5	55	Gray clay	15	130

MIDLAND COUNTY

Midland -- Continued

Drillers' logs -- Continued

Cloverdale well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Caliche	35	35	Blue shale	8	93
Lime	11	46	Lime	1	94
Water sand	2	48	Red rock	1	95
Hard lime	12	60	Hard gravel	12	107
Gravel	13	73	Gravel	5	112
Red rock	5	78	Clay	13	125
Gravel	7	85			

Cloverdale well 5

Caliche	35	35	Blue shale	8	93
Lime	11	46	Red rock	2	95
Sand	4	50	Hard gravel	10	105
Lime	10	60	Gravel and shale	2	107
Gravel	13	73	Gravel	5	112
Red rock	5	78	Clay	16	128
Gravel	7	85			

Cloverdale well 6

Caliche	25	25	Lime and sand	14	74
Sand and clay	25	50	Sand and gravel	50	124
Water sand	10	60	Blue clay	4	128

Cloverdale well 8

Top soil	8	8	Water sand	20	80
Caliche	17	25	Shale	5	85
Hard sand	5	30	Hard shell	2	87
Hard lime	8	38	Sand and gravel	42	129
Lime	18	56	Red beds	6	135
Shale	4	60			

Cloverdale well 9

Sandy soil	10	10	Mixed sand and clay, water	6	63
Mixed clay and gypsum	27	37	Mixed fine sand and clay	22	85
Rock	8	45	Yellow clay	17	102
Clay	3	48	Mixed clay and sand	13	115
Dry packed sand	2	50	Yellow clay	14	129
Mixed sand and clay	5	55	Red beds	1	130
Rock	2	57			

MITCHELL COUNTY

Colorado City

Population in 1940: 5,213.

Source of information: H. F. McCorcle, pump supervisor, May 29, 1946.

Ownership: Municipal.

Source of supply: Sixteen wells.

Well 1. About 2,800 feet northeast of 17th and Chestnut Streets; drilled in 1927 by W. T. Vedder; depth, 223 feet; diameter, 15 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 124.8 feet below land surface Mar. 7, 1946; yield, 60 gallons a minute with pumping level of 156 feet below land surface Mar. 19, 1946.

Well 2. About 1,150 feet west of well 1; drilled in 1921 by W. T. Vedder; depth, 220 feet; diameter, 15 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 133.5 feet below land surface Mar. 5, 1946; yield, 75 gallons a minute with pumping level of 162 feet below land surface Mar. 6, 1946.

Well 3. About 2,050 feet south of well 2; drilled; depth, 220 feet; diameter, 8 inches; deep-well cylinder pump and 10-horsepower electric motor; static water level, 116.4 feet below land surface Mar. 5, 1946; yield, 23 gallons a minute.

Well 4. About 800 feet south of well 3; drilled in 1925 by Claude Bell; depth, 220 feet; deep-well turbine pump and 10-horsepower electric motor; static water level, 119.6 feet below land surface Mar. 5, 1946; yield, 21 gallons a minute with pumping level of 176 feet below land surface Mar. 9, 1946.

Well 5. About 500 feet south of well 4; drilled; depth, about 220 feet; deep-well turbine pump and 10-horsepower electric motor; static water level, 110.3 feet below land surface Mar. 7, 1946; yield, 75 gallons a minute with pumping level of 150 feet below land surface March 1946.

Well 6. About 425 feet northwest of well 5; drilled; depth, about 220 feet; deep-well cylinder pump and electric motor; static water level, 117.8 feet below land surface Mar. 5, 1946; yield, 22 gallons a minute with pumping level of 130.5 feet below land surface March 1946.

Well 7. About 400 feet northwest of well 6; drilled; depth, about 220 feet; deep-well cylinder pump and 10-horsepower electric motor; yield, 32 gallons a minute.

Well 8. About 400 feet north of well 7; drilled; depth, about 220 feet; deep-well cylinder pump and 10-horsepower electric motor; static water level, 110.9 feet below land surface Mar. 5, 1946; yield, 18 gallons a minute with pumping level of 196.8 feet below land surface March 1946.

MITCHELL COUNTY

Colorado City -- Continued

Well 9. About 400 feet north of well 7; drilled; depth, about 220 feet; deep-well cylinder pump and 10-horsepower electric motor; static water level, 112.9 feet below land surface Mar. 5, 1946; yield, 30 gallons a minute with pumping level of 200 feet below land surface March 1946.

Well 10. About 800 feet southeast of well 9; drilled in 1930; depth, 240 feet; diameter, 15 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 122 feet below land surface Mar. 6, 1946; yield, 75 gallons a minute with pumping level of 152 feet below land surface.

Well 11. About 2,750 feet northwest of well 10; drilled in 1936; depth, 233 feet; deep-well turbine pump and electric motor; static water level, 137.4 feet below land surface Mar. 7, 1946; yield, 90 gallons a minute with pumping level of 162 feet below land surface.

Well 12. About 1,550 feet northeast of well 11; drilled in 1944 by Olin House; depth, 255 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 143.3 feet below land surface Mar. 5, 1945; yield, 95 gallons a minute with pumping level of 192.5 feet below land surface March 1946.

Well 13. About 1,150 feet west of well 12; drilled in 1944 by Olin House; depth, 249 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 128.2 feet below land surface Mar. 5, 1946; yield, 55 gallons a minute with pumping level of 183 feet below land surface March 1946.

Well 14. About 1,250 feet south of well 13; drilled in 1944 by Olin House; depth, 238 feet; diameter, 10 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 127.9 feet below land surface Mar. 5, 1946; yield, 35 gallons a minute with pumping level of 171 feet below land surface March 1946.

Well 16. In City Park about 950 feet southwest of State Highway 18 and railroad; drilled in 1922; depth, 256 feet; deep-well cylinder pump and 5-horsepower electric motor; static water level, 77.2 feet below land surface Mar. 8, 1946; yield, 25 gallons a minute.

Well 17. About 500 feet east of well 16; drilled in 1922; depth, 256 feet; diameter, 8 inches; deep-well cylinder pump and 5-horsepower electric motor; static water level, 84.2 feet below land surface Mar. 8, 1945; yield, 20 gallons a minute.

MITCHELL COUNTY

Colorado City -- Continued

Pumpage:

Average in gallons a day

	1940
January	171,700
February	188,800
March	170,300
April	205,800
May	262,300
June	276,200
July	281,900
August	433,600
September	278,800
October	244,200
November	230,000
December	156,700

Storage: Four ground storage reservoirs, 1,000,000 gallons, 169,000 gallons, 125,000 gallons, and 125,000 gallons, respectively; elevated tank, 100,000 gallons; standpipe, 70,000 gallons.

Number of customers: 1,500.

Treatment: Chlorination.

Analysis, composite sample of 14 wells

[Collected May 29, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	16	
Iron (Fe)	.55	
Calcium (Ca)	94	4.69
Magnesium (Mg)	49	4.03
Sodium (Na)	90	3.91
Potassium (K)	26	.67
Bicarbonate (HCO_3)	336	5.51
Sulfate (SO_4)	298	6.20
Chloride (Cl)	54	1.52
Fluoride (F)	1.4	.07
Nitrate (NO_3)	.0	.00
Dissolved solids	830	
Total hardness as $CaCO_3$	436	
pH	7.9	

MITCHELL COUNTY

Colorado City -- Continued

Drillers' logs

Well 12

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand	10	10	Water sand	20	165
Sandy clay	10	20	Blue clay	17	182
Sand and gravel	20	40	Soft rock	2	184
Red clay	30	70	Hard rock	3	187
Sandrock	10	80	Water-bearing sand	68.5	255.5
Blue clay	25	105	Red beds	.5	256
Sandrock	40	145			

Well 13

Sand	5	5	Water sand	20	160
Red clay	10	15	Blue clay	10	170
Gravel	5	20	Rock	3	173
Sandrock	10	30	Water sand	76	249
Red clay	40	70	Red beds		249
Blue clay	70	140			

Well 14

Top sand	10	10	Blue clay	28	138
Sandstone	20	30	Water sand	7	145
Red clay	40	70	Blue clay	23	168
Sandstone	15	85	Sandstone and conglomerate	70	238
Red clay	25	110			

MOORE COUNTY

Dumas

Population in 1940: 2,117 (estimated 5,000 in 1947).

Source of information: J. W. Mills, city clerk, Nov. 21, 1947.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. Drilled in 1931 by Leo McDade; depth, 565 feet; diameter, 15½ inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 260 feet below land surface.

Well 2. Drilled in 1931; depth, 576 feet; diameter, 15½ inches; deep-well turbine pump and 50-horsepower electric motor.

Well 3. Drilled in 1944 by H. H. Heiskell; depth, 600 feet; diameter, 15½ inches; deep-well turbine pump and 50-horsepower electric motor; yield, 400 gallons a minute.

Well 4. Drilled in 1946; depth, 360 feet; diameter, 15½ inches; deep-well turbine pump and 50-horsepower electric motor; yield, 200 gallons a minute.

Pumpage: Maximum, 894,000 gallons a day; minimum, 235,000 gallons a day.

Storage: Ground storage reservoir, 200,000 gallons; elevated tank, 50,000 gallons.

Treatment: Chlorination.

Analysis, well 2

[Collected Mar. 17, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	16	
Iron (Fe)	.55	
Calcium (Ca)	43	2.15
Magnesium (Mg)	19	1.56
Sodium (Na)	95	4.13
Potassium (K)	10	.26
Bicarbonate (HCO_3)	339	5.56
Sulfate (SO_4)	98	2.04
Chloride (Cl)	11	.31
Fluoride (F)	1.8	.09
Nitrate (NO_3)	.0	.00
Dissolved solids	496	
Total hardness as $CaCO_3$	186	
pH	7.1	

MOTLEY COUNTY

Matador

Population in 1940: 1,376.

Source of information: H. O. Stanfield, water superintendent, Mar. 7, 1945.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1928 by Air Made Well Co.; depth, 277 feet; diameter, 28 to 6-5/8 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 72 feet below land surface August 1944; yield, 100 gallons a minute.

Well 3. About 1,250 feet north of well 1; drilled in 1939; depth, 293 feet; diameter, 12 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 85 feet below land surface March 1945; yield, 135 gallons a minute with drawdown of 35 feet; temperature, 64½° F.

Well 5. Drilled in 1946 by G. G. Sawtelle; depth, 145 feet; diameter, 12½ to 6-5/8 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 77.7 feet below land surface Sept. 16, 1947; yield, 100 gallons a minute.

Pumpage:

	Average in gallons a day			
	1944	1945	1946	1947
January	62,800	54,300	75,000	79,600
February	56,000	55,500	91,600	94,500
March	56,600		95,700	76,700
April	66,900		129,000	96,700
May			113,200	95,000
June	102,500		132,000	187,200
July	148,500		179,600	226,000
August	140,700		181,000	234,200
September	78,500		87,300	
October	68,700		73,000	
November	61,000		77,700	
December	52,700		76,200	

Storage: Ground reservoir, 100,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 340.

Treatment: None.

MOTLEY COUNTY

Matador -- Continued

Analyses

[Collected Mar. 7, 1945. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	25		23	
Iron (Fe)	.05		.05	
Calcium (Ca)	127	6.34	69	3.44
Magnesium (Mg)	35	2.88	20	1.64
Sodium (Na)	142	6.18	145	6.32
Potassium (K)	7.8	.20	5.3	.14
Bicarbonate (HCO_3)	354	5.80	392	6.43
Sulfate (SO_4)	139	2.89	92	1.92
Chloride (Cl)	204	5.75	102	2.88
Fluoride (F)	.5	.03	.9	.05
Nitrate (NO_3)	70	1.13	16	.26
Dissolved solids	925		685	
Total hardness as $CaCO_3$	461		254	
pH	7.0		7.2	

[Collected Sept. 16, 1947. Analyzed by B. C. Dwyer]

	Well 5	
	Parts per million	Equivalents per million
Silica (SiO_2)	20	
Iron (Fe)	.06	
Calcium (Ca)	97	4.84
Magnesium (Mg)	25	2.06
Sodium (Na)	126	5.46
Potassium (K)	10	.26
Bicarbonate (HCO_3)	370	6.06
Sulfate (SO_4)	110	2.29
Chloride (Cl)	138	3.89
Fluoride (F)	.8	.04
Nitrate (NO_3)	21	.34
Dissolved solids	749	
Total hardness as $CaCO_3$	345	
pH	7.8	

MOTLEY COUNTY

Matador -- Continued

Driller's log

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	4	4	Fine-grained yellow sand	13	102
Sand	4	8	Sand and gravel	3	105
Clay and gravel	12	20	Red clay and sand	10	115
Sand and clay	40	60	Sand and gravel	14	129
Yellow sand	25	85	Red shale	148	277
Fine-grained white sand	4	89			

Roaring Springs

Population in 1940: 514.

Source of information: J. D. Mitchell, city secretary, Sept. 16, 1947.

Owner: Roaring Springs Townsite Co.

Source of supply: Well on bank of Dutchman's Creek, 1 mile north of Roaring Springs; dug in 1913; depth, 24 feet; diameter 24 to 18 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 250 gallons a minute.

Pumpage (estimated): 70,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 110.

Treatment: None.

MOTLEY COUNTY

Roaring Springs -- Continued

Analysis

[Collected December 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	18	
Iron (Fe)	.04	
Calcium (Ca)	80	3.99
Magnesium (Mg)	31	2.55
Sodium (Na)	41	1.80
Potassium (K)	5.3	.14
Bicarbonate (HCO_3)	322	5.28
Sulfate (SO_4)	67	1.39
Chloride (Cl)	60	1.69
Fluoride (F)	2.0	.11
Nitrate (NO_3)	.8	.01
Dissolved solids	474	
Total hardness as $CaCO_3$	327	
pH	7.5	

NOLAN COUNTY

Roscoe

Population in 1940: 1,166.

Source of information: D. L. Kesler, pump operator, June 20, 1946.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1930; depth, 172 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level reported, 125 feet below land surface when drilled; yield, 135 gallons a minute in June 1946.

Well 2. About 100 feet east of well 1; drilled in 1944 by Jack Stewart; depth, 170 feet; diameter, 8 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 18 gallons a minute.

Well 3. Drilled in June 1946 by Olin House; depth, 180 feet; diameter, 8 inches; static water level, 88 feet below land surface June 25, 1946; no pumping equipment installed June 25, 1946.

Pumpage: No record.

Storage: Ground storage reservoir, 100,000 gallons; elevated tank, 55,000 gallons.

Number of customers: 275.

Treatment: Chlorination.

Analyses

[Collected June 20, 1946. Analyzed by C. B. Cibulka]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	19		21	
Iron (Fe)	.00		.00	
Calcium (Ca)	92	4.59	88	4.39
Magnesium (Mg)	22	1.81	21	1.73
Sodium (Na)	11	.48	17	1.76
Potassium (K)	5.3	.13	4.9	.13
Bicarbonate (HCO_3)	256	4.20	243	3.98
Sulfate (SO_4)	55	1.15	55	1.15
Chloride (Cl)	50	1.41	60	1.69
Fluoride (F)	1.8	.09	1.8	.09
Nitrate (NO_3)	10	.16	6.1	.10
Dissolved solids	420		437	
Total hardness as $CaCO_3$	320		306	
pH	7.6		7.4	

NOLAN COUNTY

Roscoe -- Continued

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	2	2	Sand and gravel, water	6	101
Caliche	10	12	Sandstone	27	128
Sandstone	8	20	Sand and gravel	5	133
Red sandy clay	24	44	Sandstone	33	166
Sandstone	51	95	Red shale	14	180

Sweetwater

Population in 1940: 10,367.

Source of information: Roy Duckett, water superintendent, June 2, 1946.

Ownership: Municipal.

Source of supply: Two impounding reservoirs.

Lake Trammel. On Sweetwater Creek about 8 miles south of Sweetwater; earth filled; dam built in 1914; lake-surface area, about 240 acres.

Lake Sweetwater. On Bitter Creek about 6 miles southeast of Sweetwater; earth filled; dam built in 1930; lake-surface area, about 800 acres.

Pumpage:

Average in gallons a day

	1945 Lake Trammel	1945 Lake Sweetwater	1946 Lake Trammel	1946 Lake Sweetwater
January			859,200	622,800
February			951,200	717,700
March			770,600	779,300
April			884,700	1,547,900
May			814,200	1,359,500
June			1,144,700	2,089,900
July	926,200	1,137,400		
August	948,000	1,455,800		
September	980,000	1,453,100		
October	856,100	958,900		
November	934,900	720,600		
December	769,400	659,500		

NOLAN COUNTY

Sweetwater -- Continued

Storage: Elevated tank, 750,000 gallons; standpipe, 280,000 gallons.

Number of customers: 2,500.

Treatment: Prechlorination, aeration, coagulation, sedimentation, filtration, and postchlorination.

Analysis of finished water, composite sample

[Collected July 2, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	4.3	
Iron (Fe)	.00	
Calcium (Ca)	49	2.446
Magnesium (Mg)	12	.987
Sodium (Na)	13	.057
Potassium (K)	5.1	.130
Bicarbonate (HCO_3)	162	2.655
Sulfate (SO_4)	38	.791
Chloride (Cl)	24	.677
Fluoride (F)	.2	.010
Nitrate (NO_3)	.2	.003
Dissolved solids	232	
Total hardness as $CaCO_3$	172	
pH	7.6	

OCHILTREE COUNTY

Perryton

Population in 1940: 2,325.

Source of information: Melvin Anderson, water superintendent, June 24, 1948.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled; depth, 295 feet; diameter, 12 inches; deep-well turbine pump and 50-horsepower electric motor; yield, 250 gallons a minute.

Well 2. Drilled in May 1946 by H. H. Heiskell; depth, 420 feet; diameter, 16 inches; deep-well turbine pump and electric motor; static water level, 248 feet below land surface May 1946; yield, 500 gallons a minute.

Well 3. Drilled in June 1948 by Goe Brothers; depth, 420 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; static water level, 265 feet below land surface June 1948; yield, 550 gallons a minute.

Pumpage: Average, 600,000 gallons a day.

Storage: Ground storage reservoir, 215,000 gallons; elevated tank, 35,000 gallons.

Number of customers: 1,015.

Treatment: None.

Analyses

[Collected June 24, 1948. Analyzed by D. E. Weaver]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	44		46	
Iron (Fe)	.00		.00	
Calcium (Ca)	40	2.00	42	2.10
Magnesium (Mg)	27	2.22	28	2.30
Sodium (Na)	25	1.09	27	1.17
Potassium (K)	5.2	.13	6.4	.16
Bicarbonate (HCO_3)	242	3.97	246	4.03
Sulfate (SO_4)	12	.25	33	.69
Chloride (Cl)	32	.90	25	.71
Fluoride (F)	2.4	.13	2.4	.13
Nitrate (NO_3)	7.0	.11	6.8	.11
Dissolved solids	301		338	
Total hardness as $CaCO_3$	211		220	
pH	7.5		7.6	

OCHILTREE COUNTY

Perryton -- Continued

Driller's log

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	7	7	Sandy clay	15	250
Sand and clay	18	25	Sand	70	320
Caliche	75	100	Sand and gravel	20	340
Sand, clay, and caliche	95	195	Sand	80	420
Sand, clay, and gravel	40	235	Clay and red rock		420

Well 3

Surface soil	11	11	Sandy clay, lime shells	110	320
Clay and caliche	117	128	Coarse sand and gravel	35	355
Sandy clay	13	141	Clay	30	385
Fine sand, dry	28	169	Coarse sand and gravel	22	407
Coarse sand and gravel	41	210	Clay	13	420
			Red shale rock		420

OLDHAM COUNTY

Adrian

Population in 1940: 187.

Source of information: John Horton, water manager, Nov. 20, 1947.

Ownership: Municipal.

Source of supply: Well, drilled in 1947 by John Hohenshelt; depth, 496 feet; diameter, 7 inches; deep-well cylinder pump and 5-horsepower electric motor; static water level, 455 feet below land surface; yield, 18 gallons a minute; temperature, 64° F.

Pumpage (estimated): 10,000 gallons a day.

Storage: Elevated tank, 20,000 gallons.

Treatment: None.

Analysis

[Collected Nov. 20, 1948. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	17	
Calcium (Ca)	4	.20
Magnesium (Mg)	4	.33
Sodium and potassium (Na + K)	371	16.15
Bicarbonate (HCO_3)	556	9.11
Sulfate (SO_4)	280	5.83
Chloride (Cl)	60	1.69
Nitrate (NO_3)	3.2	.05
Dissolved solids	1,010	
Total hardness as $CaCO_3$	26	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
No record	160	160	Blue shale	25	455
Hard sand	40	200	Water sand, first water	30	485
Pinkish red clay, no sand	160	360	Blue shale	9	494
Very fine dry sand, multicolored layers	70	430			

OLDHAM COUNTY

Vega

Population in 1940: 515.

Source of information: R. W. Armitage, city secretary, Nov. 20, 1947.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1930 by John Hohenshelt; depth, 300 feet; diameter, 7 inches; deep-well turbine pump and electric motor; static water level, 200 feet below land surface; yield, 125 gallons a minute.

Well 2. About 75 feet from well 1; drilled in 1943 by H. H. Heiskel; depth, 330 feet; diameter, 10 inches; deep-well turbine pump and electric motor; yield, 125 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, 50,000 gallons.

Treatment: None.

Analysis, composite sample

[Collected Nov. 20, 1947. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	29	
Calcium (Ca)	31	1.55
Magnesium (Mg)	52	4.28
Sodium and potassium (Na + K)	81	3.51
Bicarbonate (HCO_3)	218	3.58
Sulfate (SO_4)	200	4.16
Chloride (Cl)	28	.79
Nitrate (NO_3)	50	.81
Dissolved solids	598	
Total hardness as $CaCO_3$	292	

OLDHAM COUNTY

Wildorado

Population in 1940: 60.

Source of information: A. F. Moore, co-owner, Nov. 20, 1947.

Owners: W. E. O'Neil, C. C. Kellogg, and A. F. Moore.

Source of supply: Well, drilled about 1900; depth, 251 feet; diameter, 5 inches; deep-well cylinder pump and windmill and gasoline engine; temperature, 61° F.

Pumpage: No record.

Storage: Elevated tank, 5,000 gallons.

Treatment: None.

Analysis

[Collected Nov. 20, 1947. Analyzed by D. E. Weaver]

	Parts per million	Equivalents per million
Silica (SiO_2)	55	
Calcium (Ca)	29	1.447
Magnesium (Mg)	20	1.645
Sodium and potassium ($Na + K$)	28	1.232
Bicarbonate (HCO_3)	224	3.680
Sulfate (SO_4)	17	.354
Chloride (Cl)	6.0	.169
Nitrate (NO_3)	7.5	.121
Dissolved solids	227	
Total hardness as $CaCO_3$	154	

PARMER COUNTY

Farwell

Population in 1940: 1,250.

Source of information: B. N. Graham, city secretary, Mar. 2, 1945.

Owner: Texico-Farwell Water Works, Inc.

Source of supply: Two wells.

Well 1. North well; drilled; depth, 300 feet; diameter, 6 inches; deep-well turbine pump and electric motor; yield, 65 gallons a minute.

Well 2. South well; drilled; depth, 318 feet; diameter, 12 inches; deep-well turbine pump and electric motor; static water level, 70 feet below land surface in 1939; yield, 250 gallons a minute; temperature, 65° F.

Pumpage: Average, 200,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 200.

Treatment: None.

Analysis, well 2

[Collected Mar. 2, 1945. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million
Silica (SiO_2)	32	
Iron (Fe)	.04	
Calcium (Ca)	33	1.65
Magnesium (Mg)	25	2.06
Sodium (Na)	27	1.16
Potassium (K)	7.0	.18
Bicarbonate (HCO_3)	230	3.77
Sulfate (SO_4)	27	.56
Chloride (Cl)	16	.45
Fluoride (F)	2.8	.15
Nitrate (NO_3)	7.2	.12
Dissolved solids	290	
Total hardness as $CaCO_3$	186	
pH	7.8	

PARMER COUNTY

Friona

Population in 1940: 803.

Source of information: Mr. Wilson, city clerk, Oct. 6, 1948.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1929 by Leo McDade; depth, 216 feet; diameter, 10 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 150 gallons a minute.

Well 2. Drilled in 1935 by L. G. Simpson; depth, 192 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 100 gallons a minute.

Pumpage: 57,000 gallons a day.

Storage: Elevated tank, capacity unknown.

Number of customers: 348.

Treatment: Chlorination.

Analysis, composite sample

[Collected Oct. 6, 1948. Analyzed by J. R. Avrett]

	Parts per million	Equivalents per million
Silica (SiO_2)	37	
Iron (Fe)	.00	
Calcium (Ca)	32	1.60
Magnesium (Mg)	32	2.63
Sodium (Na)	28	1.22
Potassium (K)	6.8	.17
Bicarbonate (HCO_3)	252	4.13
Sulfate (SO_4)	28	.58
Chloride (Cl)	22	.62
Fluoride (F)	2.4	.13
Nitrate (NO_3)	9.5	.15
Dissolved solids	317	
Total hardness as $CaCO_3$	212	
pH	7.7	

PARMER COUNTY

Friona -- Continued

Driller's log, well 1

	Thickness (feet)	Depth (feet)
Red clay	25	25
White chalky sandstone	36	61
Packed sand	29	90
Brown packed sand (water at 155 feet)	125	215
Porous water sand	11	226
Sandstone	4	230

PECOS COUNTY

Fort Stockton

Population in 1940: 3,294.

Source of information: Cleve Nunn, manager of utilities, Oct. 21, 1946.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled; depth, 160 feet; diameter, 6 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 52.5 feet below land surface Oct. 21, 1946; yield, 450 gallons a minute.

Well 2. South well; drilled in 1932 by Arthur Powell; depth, 193 feet; diameter, 13 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 51.4 feet below land surface Oct. 21, 1946; yield, 750 gallons a minute.

Well 3. Middle well; drilled in 1946 by R. A. Cleveland; depth, 203 feet; diameter, 12 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 51.8 feet below land surface Oct. 21, 1946; yield, 500 gallons a minute.

Pumpage:

Average in gallons a day

	1946
January	315,000
February	299,000
March	350,000
April	589,000
May	435,000
June	688,000
July	678,000
August	728,000
September	490,000

Storage: Concrete ground reservoir, 100,000 gallons; two elevated tanks, total capacity, 175,000 gallons.

Number of customers: 794.

Treatment: Chlorination and ammoniation.

PECOS COUNTY

Fort Stockton -- Continued

Analyses

[Collected Oct. 21, 1946. Analyzed by C. B. Cibulka]

	Well 2		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		16	
Iron (Fe)	.06		.19	
Calcium (Ca)	156	7.79	156	7.79
Magnesium (Mg)	52	4.28	53	4.36
Sodium (Na)	238	10.34	235	10.20
Potassium (K)	38	.97	39	1.00
Bicarbonate (HCO_3)	276	4.52	274	4.49
Sulfate (SO_4)	427	8.89	424	8.83
Chloride (Cl)	350	9.87	352	9.93
Fluoride (F)	1.8	.09	1.8	.09
Nitrate (NO_3)	.4	.01	.8	.01
Dissolved solids	1,420		1,410	
Total hardness as $CaCO_3$	604		608	
pH	7.0		7.2	

Imperial

Population in 1940: 75.

Source of information: Mrs. E. E. Scarbrough, wife of former owner, Sept. 29, 1948.

Owner: Imperial Water Co.

Source of supply: Wells of the Byrd-Frost Water Co about 15 miles north of Imperial in Crane County.

Pumpage: 10,000 gallons a day.

Storage: Elevated tank, 8,000 gallons.

Number of customers: 75.

Treatment: None.

PECOS COUNTY

Imperial -- Continued

Analysis, composite sample of all wells

[Collected Oct. 26, 1946. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million
Silica (SiO_2)	39	
Iron (Fe)	.05	
Calcium (Ca)	64	3.194
Magnesium (Mg)	5.7	.469
Sodium (Na)	24	1.043
Potassium (K)	3.6	.092
Bicarbonate (HCO_3)	178	2.918
Sulfate (SO_4)	32	.666
Chloride (Cl)	32	.903
Fluoride (F)	1.0	.053
Nitrate (NO_3)	16	.258
Dissolved solids	293	
Total hardness as $CaCO_3$	183	
pH	7.4	

Iraan

Population in 1940: 1,000.

Source of information: Geo. L. Munnich, Dec. 13, 1946.

Owner: Iraan Ice, Water, and Gas Co.

Source of supply: Two wells about .4 mile south of ice plant.

Well 1. Drilled in 1936 by Fred Slaughter; depth, 210 feet; diameter, 8 inches; deep-well cylinder pump and 3-horsepower electric motor; static water level, 115.6 feet below land surface Dec. 13, 1946; yield, 25 gallons a minute.

Well 2. Drilled by Sam Parker; depth, 210 feet; diameter, 7 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 75 gallons a minute.

PECOS COUNTY

Iraan -- Continued

Pumpage:

Average in gallons a day

	1946
January	21,300
February	29,600
March	29,300
April	30,300
May	30,300
June	35,000
July	36,000
August	41,500
September	28,200
October	20,900
November	22,700
December	--

Storage: Concrete ground reservoir on top of hill, 19,000 gallons.

Number of customers: 174.

Treatment: None.

Analysis, well 1

[Collected Feb. 11, 1947. Analyzed by B. C. Dwyer]

	Parts per million	Equivalents per million
Silica (SiO_2)	12	
Iron (Fe)	.12	
Calcium (Ca)	152	7.59
Magnesium (Mg)	74	6.09
Sodium (Na)	221	9.61
Potassium (K)	24	.61
Bicarbonate (HCO_3)	292	4.79
Sulfate (SO_4)	233	4.85
Chloride (Cl)	500	14.10
Fluoride (F)	1.2	.06
Nitrate (NO_3)	6.2	.10
Dissolved solids	1,370	
Total hardness as $CaCO_3$	684	
pH	7.3	

PECOS COUNTY

Driller's log, well 2

	Thickness (feet)	Depth (feet)
Gray lime	38	38
Yellow lime	52	90
Yellow sandy lime	18	108
Yellow lime	68	176
Yellow sand and lime	4	180
Sand, water	30	210

POTTER COUNTY

Amarillo

Population in 1940: 51,686.

Source of information: M. V. Moss, city manager, June 23, 1948.

Ownership: Municipal.

Source of supply: Thirty-two wells southwest of Amarillo.

Palo Duro well 1. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor.

Palo Duro well 2. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor.

Palo Duro well 3. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor; pumping level, 95 feet below land surface in 1943, 117 feet below land surface in 1945; static water level, 61.0 feet below land surface in 1943; yield, 720 gallons a minute Jan. 30, 1942.

Palo Duro well 4. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor; pumping level, 95 feet below land surface in 1943, 130 feet below land surface in 1945; static water level, 61.0 feet below land surface in 1943; yield, 594 gallons a minute Jan. 30, 1942.

Palo Duro well 5. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor; pumping level, 70 feet below land surface in 1945; 121.0 feet below land surface in 1945; static water level, 35.0 feet below land surface in 1943; yield, 454 gallons a minute Jan. 30, 1942.

Palo Duro well 6. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor; pumping level, 100.0 feet below land surface in 1943, 128 feet below land surface in 1945; static water level, 88.0 feet below land surface in 1943; yield, 751 gallons a minute Jan. 30, 1942.

Palo Duro well 7. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor; pumping level, 52 feet below land surface in 1943, 114.0 feet below land surface in 1945; static water level, 38.0 feet below land surface in 1943; yield, 860 gallons a minute Jan. 30, 1942.

Palo Duro well 8. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor; pumping level, 86.0 feet below land surface in 1943, 130 feet below land surface in 1945; static water level, 61.0 feet below land surface in 1943; yield, 820 gallons a minute.

POTTER COUNTY

Amarillo -- Continued

Palo Duro well 9. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor; yield, 598 gallons a minute Jan. 30, 1942.

Palo Duro well 10. Drilled in 1927; depth, 200 feet; diameter, 10 inches; deep-well turbine pump and electric motor; yield, 450 gallons a minute Jan. 30, 1942.

Greely well 1. Drilled in 1944 by H. H. Heiskell; depth, 313 feet; diameter, 16 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 120.0 feet July 1944; pumping level, 189 feet July 1944 and 212 feet May 1946.

Greely well 2. Drilled in 1944 by H. H. Heiskell; depth, 264 feet; diameter, 16 inches; deep-well turbine pump and electric motor; static water level, 106.0 feet below land surface May 12, 1946; pumping level, 158 feet below land surface May 1946; yield, 1,115 gallons a minute with drawdown of 15 feet May 13, 1944.

Greely well 3. Drilled in 1944; depth, 283 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; static water level, 135.0 feet below land surface April 1945; pumping level, 156 feet below land surface April 1945 and 187 feet below land surface May 1946.

Greely well 4. Drilled in 1946 by H. H. Heiskell; depth, 305 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; yield, 800 gallons a minute.

Greely well 5. Drilled in 1946 by H. H. Heiskell; depth, 262 feet; diameter, 16 inches; deep-well turbine pump and electric motor; static water level, 126.0 feet below land surface Apr. 1, 1946; yield, 1,340 gallons a minute with drawdown of 44 feet Apr. 2, 1946.

Greely well 7. Drilled in May 1946 by H. H. Heiskell; depth, 303 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; yield, 900 gallons a minute.

Greely well 8. Drilled in 1946 by H. H. Heiskell; depth, 280 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; yield, 600 gallons a minute.

Bush well. Drilled in 1944 by H. H. Heiskell; depth, 260 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; static water level, 135.0 feet below land surface May 1944; pumping level, 182 feet below land surface May 1946; yield, 1,060 gallons a minute with drawdown of 24 feet May 5, 1944.

POTTER COUNTY

Amarillo -- Continued

Bush well 1. Drilled in 1943 by H. H. Heiskell; depth, 296 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; static water level, 150 feet below land surface May 25, 1943; pumping level, 198 feet below land surface May 1946; yield, 880 gallons a minute with drawdown of 36 feet May 26, 1943.

Bush well 2. Drilled in 1944 by H. H. Heiskell; depth, 250 feet; diameter, 16 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 153 feet below land surface June 1945; pumping level, 180 feet below land surface June 1945, 190 feet below land surface May 1946; yield, 1,100 gallons a minute with drawdown of 33 feet April 1944.

Bush well 3. Drilled in 1944 by H. H. Heiskell; depth, 239 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; static water level, 132 feet below land surface Apr. 22, 1944; pumping level, 200 feet below land surface May 1946; yield, 720 gallons a minute with drawdown of 49 feet Apr. 23, 1944.

Bush well 4. Drilled in 1943 by H. H. Heiskell; depth, 305 feet; diameter, 16 inches; deep-well turbine pump and 60-horsepower electric motor; static water level, 141 feet below land surface May 9, 1943; pumping level, 205 feet below land surface May 1946; yield, 880 gallons a minute with drawdown of 49 feet May 10, 1943.

Bush well 5. Drilled in 1943 by H. H. Heiskell; depth, 263 feet; diameter, 16 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 137 feet below land surface Apr. 23, 1943; pumping level, 192 feet below land surface May 1946; yield, 1,090 gallons a minute with drawdown of 18.5 feet Apr. 24, 1943.

McDonald well 1. Drilled in 1929 by D. L. McDonald; depth, 270 feet; diameter, 18 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 162.0 feet below land surface July 30, 1931; pumping level, 240 feet below land surface May 1946; yield, 750 gallons a minute with drawdown of 42 feet Sept. 1, 1941.

McDonald well 2. Drilled in 1929 by D. L. McDonald; depth, 270 feet; diameter, 18 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 160.0 feet below land surface Aug. 24, 1929; pumping level, 240.0 feet below land surface May 1946; yield, 750 gallons a minute.

McDonald well 3. Drilled in 1929 by D. L. McDonald; depth, 270 feet; diameter, 18 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 156 feet below land surface Aug. 13, 1929; pumping level, 230 feet below land surface May 1946; yield, 750 gallons a minute with drawdown of 37 feet.

POTTER COUNTY

Amarillo -- Continued

McDonald well 4. Drilled in 1929 by D. L. McDonald; depth, 322 feet; diameter, 18 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 162.0 feet below land surface Aug. 1, 1931; pumping level, 229 feet below land surface May 1936; yield, 750 gallons a minute with drawdown of 46 feet Sept. 2, 1931.

McDonald well 5. Drilled in 1929 by D. L. McDonald; depth, 336 feet; diameter, 18 inches; deep-well turbine pump and 75-horsepower electric motor; static water level, 163.0 feet below land surface Aug. 1, 1931; pumping level, 239 feet below land surface May 1946; yield, 750 gallons a minute with drawdown of 44 feet.

McDonald well 6. Drilled in 1947 by H. H. Heiskell; depth, 280 feet; diameter, 16 inches; deep-well turbine pump and 50-horsepower electric motor; yield, 750 gallons a minute.

Bassett well 1. Drilled in 1947 by H. H. Heiskell; depth, 265 feet; diameter, 16 inches; deep-well turbine pump and 50-horsepower electric motor; yield, 750 gallons a minute.

Bassett well 2. Drilled in 1947 by H. H. Heiskell; depth, 280 feet; diameter, 16 inches; deep-well turbine pump and 50-horsepower electric motor; yield, 750 gallons a minute.

Brinkman well 1. Drilled in 1944 by H. H. Heiskell; depth, 277 feet; diameter, 16 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 170 feet below land surface 1945; pumping level, 210 feet below land surface May 1946; yield, 700 gallons a minute with drawdown of 50 feet.

Pumpage:

Average in gallons a day

	1942	1943	1944	1945	1946	1947	1948
Jan.	3,400,000	4,600,000	5,470,000	5,980,000	5,810,000	6,290,000	5,040,000
Feb.	3,360,000	5,220,000	5,500,000	6,570,000	6,210,000	6,460,000	5,140,000
Mar.	3,360,000	5,980,000	5,780,000	7,970,000	7,210,000	6,700,000	6,220,000
Apr.	3,730,000	7,480,000	6,500,000	7,780,000	10,200,000	7,500,000	11,300,000
May	6,500,000	6,630,000	7,660,000	11,430,000	11,640,000	7,690,000	10,950,000
June	7,410,000	10,930,000	8,140,000	11,900,000	13,180,000	11,900,000	
July	10,300,000	7,820,000	9,000,000	12,250,000	15,160,000	16,180,000	
Aug.	6,150,000	11,500,000	10,950,000	11,800,000	15,400,000	15,260,000	
Sept.	5,190,000	8,960,000	8,150,000	11,500,000	8,540,000	13,820,000	
Oct.	4,400,000	6,640,000	6,680,000	7,020,000	6,780,000	10,020,000	
Nov.	4,550,000	6,190,000	6,310,000	6,910,000	6,230,000	6,390,000	
Dec.	4,430,000	5,300,000	5,840,000	6,000,000	6,240,000	5,210,000	

POTTER COUNTY

Amarillo -- Continued

Storage: Three ground storage reservoirs, 5,000,000 gallons each; three elevated tanks, 1,000,000 gallons each; one elevated tank, 500,000 gallons.

Number of customers: 16,812.

Treatment: None.

Analyses

[Collected June 23, 1948. Analyzed by H. D. Smith]

	Palo Duro well 2		Greely well 1	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	52		80	
Iron (Fe)	.00		.00	
Calcium (Ca)	44	2.20	32	1.60
Magnesium (Mg)	43	3.54	43	3.54
Sodium (Na)	23	1.00	25	1.09
Potassium (K)	6.4	.16	8.0	.20
Bicarbonate (HCO_3)	354	5.80	328	5.38
Sulfate (SO_4)	32	.67	34	.71
Chloride (Cl)	6.7	.19	7.0	.20
Fluoride (F)	4.4	.23	3.2	.17
Nitrate (NO_3)	5.1	.08	2.8	.05
Dissolved solids	376		372	
Total hardness as $CaCO_3$	287		257	
pH	7.5		7.6	

[Collected June 23, 1948. Analyzed by D. E. Weaver and H. D. Smith]

	Bush well 1		Brinkman well 1	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	67		62	
Iron (Fe)	.00		.00	
Calcium (Ca)	58	2.89	48	2.40
Magnesium (Mg)	26	2.14	27	2.22
Sodium (Na)	24	1.04	16	.70
Potassium (K)	6.0	.15	9.2	.24
Bicarbonate (HCO_3)	288	4.72	294	4.82
Sulfate (SO_4)	50	1.04	25	.52
Chloride (Cl)	9.0	.25	4.1	.12
Fluoride (F)	2.4	.13	2.8	.15
Nitrate (NO_3)	3.5	.06	2.8	.05
Dissolved solids	382		341	
Total hardness as $CaCO_3$	252		231	
pH	7.4		7.4	

POTTER COUNTY

Amarillo -- Continued

Drillers' logs

Greely well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Red water sand	40	140
Caliche	17	20	Water sand	60	200
Red sand	20	40	Water sand and shells	20	220
Caliche	40	80	Water sand	20	240
Sand and caliche	20	100	Fine water sand	40	280

Greely well 2

Soil	3	3	Water sand, shells	30	120
Red and yellow caliche	17	20	Red water sand, shells	120	240
Yellow sand, caliche	40	60	Hard shell, sand	20	260
Sand and shells	20	80	Brown and yellow clay	4	264
Red sand and shells	10	90			

Greely well 3

Soil	3	3	Sand and shells	180	260
Caliche	17	20	Water sand	19	279
Sand and caliche	60	80	Red shale	4	283

Greely well 4

Soil	3	3	Muddy sand and shells	70	150
White caliche	7	10	Red sand, coarse shells	130	280
Brown caliche	12	22	Red sand, clay, shells	15	295
White caliche	58	80	Red beds	10	305

Greely well 5

Soil	7	7	Sand	20	150
Sand and clay	43	50	Sand and shells	20	170
Caliche	30	80	Sand	30	200
Sand and caliche	40	120	Sand and shells	62	262
Sand and shells	10	130	Red rock	1	263

Bush well 1

Soil	3	3	Brown sandy clay	47	128
Brown clay	5	8	Fine-grained sand	32	160
Brown caliche	32	40	Sand and shell	90	250
Brown caliche	35	75	Clay and shell	10	260
Hard shell and gravel	6	81	Red and blue shale	36	296

POTTER COUNTY

Amarillo -- Continued

Drillers' logs -- Continued

Bush well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Brown sand and shells	54	154
Gray caliche	17	20	Clean water sand	76	230
Gray fine-grained sand	20	40	Red and blue shale, shells	11	241
Hard gray sand	60	100	Gray sand	9	250

Bush well 3

Soil	5	5	Dry sand, clay, and shells	54	130
Gray caliche, sand	15	20	Clean water sand	100	230
Red caliche, sand	40	60	Red shales and shells	9	239
Dry sand, clay, and shells	16	76			

Bush well 4

Soil	4	4	Sand and hard shells	19	229
Brown caliche clay	23	27	Loose red sand	24	253
Sandy clay	13	40	Hard shell, red blue clay	22	275
Brown clay and caliche	44	84	Red, blue and white clay	11	286
Brown clay and sandy clay	31	115	Fine gray sand	3	289
Brown sand	18	133	Hard shell	2	291
Fine water sand	60	193	Loose gray sand	6	297
Sand and shells	17	210	Red beds	8	305

McDonald well 1

Top soil (clay and sand)	4	4	Sandrock	4	186
Caliche	8	12	Sand and sand boulders	8	194
Yellowish clay	58	70	Sandy clay	19	213
Red sandy clay	12	82	Red cavey sand	10	223
Light sandy clay	13	95	Very fine-grained sand	15	238
Gray clayey sand	45	140	White clay	2	240
Soft red sandy clay	5	145	Red sand	11	251
Honeycombed sandrock	18	163	White clay	3	254
Red cavey sand	6	169	Clean red sand	5	259
Sandrock	1	170	Red clay	11	270
Soft honeycombed sandrock	12	182			

POTTER COUNTY

Amarillo -- Continued

Drillers' logs -- Continued

McDonald well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Clean red sand	3	163
Red clay	13	17	Gray clayey sand	7	170
Caliche	4	21	Loose sand boulders	6	176
Yellow clay	47	68	Clean red sand	4	180
Yellow sandy clay	19	87	Gray clayey sand	3	183
Gray sandy clay	5	92	Gray sand and sandrock	3	186
Light-gray sandy clay	8	100	Gray clayey sand	14	200
Soft red sandy clay	48	148	Soft sandrock	4	204
Honeycombed sandrock	3	151	Coarse sand and honey-combed sandrock	6	210
Dirty gray sand	9	160	No record	60	270

McDonald well 3

Soil	4	4	Honeycombed sand	6	176
Yellow clay	46	50	Red sandstone	14	190
Gray sandy clay	12	62	Red sand with thin clay strata	8	198
Red sandy clay	45	107	Red cavey sand	10	208
Red sandy clay, soft	43	150	Clayey gray sand	4	212
Sandrock	4	154	Red caving sand	3	215
Gray sand and rock	2	156	No record	55	270
Coarse sand and sandrock	14	170			

McDonald well 5

Soil	2	2	Red sand	12	212
Yellow clay	63	65	White sandy clay	3	215
Yellow sandy clay	33	98	Red sand	31	246
Gray sandy clay	34	132	Red sand with loose white rock	9	255
Yellow clayey sand	26	158	White sandy clay	3	258
Soft loose water-bearing sand and pebbles	6	164	Red sand	26	284
Yellow sand with thin clay streaks	30	194	Reddish-brown clay	28	312
White sandy clay	6	200	Red clay	5	317
			Gray sand	9	326
			Red beds	10	336

Brinkman well 1

Soil	4	4	Fine water sand, and shells	42	250
Caliche	6	10	Red and blue shale and shells	6	256
Brown caliche	110	120	Red, gray, and blue shells	21	277
Sand and shells	53	173			
Fine-grained sand and shells	35	208			

PRESIDIO COUNTY

Marfa

Population

Population in 1940: 3,805.

Source of information:
H. F. Dyer, water superintendent,
July 1948.

Ownership: Municipal.

Source of supply: Three wells on city lot at standpipe.

Well 2. Drilled in 1928 by Layne-Texas Co.; depth, 881 feet; diameter, 15½ inches to 281 feet and 10 inches from 281 to 881 feet; deep-well turbine pump and 125-horsepower electric motor; yield, 1,000 gallons a minute.

Well 3. Drilled in 1936 by J. H. Cass; depth, 889 feet; diameter, 10 inches to 306 feet and 8 inches from 306 to 889 feet; deep-well turbine pump and 100-horsepower electric motor; yield, 800 gallons a minute.

Well 4. Drilled in 1945 by Emmitt Harrell; depth, 1,100 feet; diameter, 16 inches to 314 feet and 11 inches from 314 to 1,100 feet; deep-well turbine pump and 65-horsepower electric motor; yield, 300 gallons a minute.

Pumpage (estimated): 1,000,000 gallons a day, which includes water sold to Fort D. A. Russell.

Storage: Ground reservoir, 83,000 gallons; elevated tanks; 325,000 gallons.

Number of customers: 1,200.

Treatment: None.

Analysis, well 2

(Collected July 19, 1948. Analyzed by H. D. Smith)

	Parts per million	Equivalents per million
Silica (SiO_2)	72	
Iron (Fe)	.05	
Calcium (Ca)	26	1.298
Magnesium (Mg)	2.2	.181
Sodium (Na)	59	2.570
Potassium (K)	13	.333
Bicarbonate (HCO_3)	192	3.147
Sulfate (SO_4)	26	.541
Chloride (Cl)	17	.479
Fluoride (F)	2.8	.147
Nitrate (NO_3)	4.2	.068
Dissolved solids	328	
Total hardness as $CaCO_3$	74	
pH	7.6	

PRESIDIO COUNTY

Marfa -- Continued

Drillers' logs

Well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Silt, sand, and gravel	18	18	Brown clay	53	580
Clay	20	38	Sandy shale	6	586
Sand	168	206	Broken lime	14	600
Water sand	34	240	Sand and shale	50	650
Hard sand	10	250	Lava wash	47	697
Sand and gravel	49	299	Water sand	21	718
Black rock	60	359	Brown clay	29	747
Pink clay	3	362	Water sand	23	770
Sandy clay	49	411	Brown clay	2	772
Water sand	15	426	Coarse sand	8	780
Sand	24	450	Sandrock	32	812
White clay	46	496	Sandy clay	11	823
Hard rock	31	527	Water sand and gravel	66	889

Well 4

Soil and clay	30	30	Sand and gravel	5	875
Sand and gravel	268	298	Clay	9	884
Brown rock	60	358	Gravel	5	889
Brown sand	212	570	Clay	1	890
Red rock	8	578	Brown lava rock	75	965
Sand and gravel	222	800	Clay and lava rock	25	990
Sticky clay	30	830	Brown lava rock	14	1004
Clay and some gravel	20	850	Clay and lava rock	29	1033
Clay	10	860	Broken clay and rock	67	1100
Clay and gravel	10	870			

Presidio

Population in 1940: 1,500.

Source of information:
A. H. Spangle, owner,
July 1948.

Source of supply: Two wells; depth, 48 feet; diameter, 12 inches; piston-type pumps and 15-horsepower electric motors.

Pumpage (estimated): 130,000 gallons a day.

Storage: None; pumped directly into pipe line.

PRESIDIO COUNTY

Presidio -- Continued

Number of customers: 115.

Treatment: None.

Analysis, composite sample

(Collected July 19, 1948. Analyzed by H. D. Smith)

	Parts per million	Equivalents per million
Silica (SiO_2)	60	
Iron (Fe)	.05	
Calcium (Ca)	78	3.89
Magnesium (Mg)	9.8	.81
Sodium (Na)	63	2.72
Potassium (K)	8.4	.21
Bicarbonate (HCO_3)	260	4.26
Sulfate (SO_4)	114	2.37
Chloride (Cl)	28	.79
Fluoride (F)	1.2	.06
Nitrate (NO_3)	9.6	.15
Dissolved solids	524	
Total hardness as $CaCO_3$	235	
pH	7.4	

RANDALL COUNTY

Canyon

Population in 1940: 2,600.

Source of information:
C. L. Key, water superintendent,
Dec. 4, 1947.

Ownership: Municipal.

Source of supply: Four wells.

Pomona well 1. Drilled in 1930 by Omer Kersey; depth, 490 feet; diameter, $15\frac{1}{2}$ to $12\frac{1}{2}$ inches; deep-well turbine pump and electric motor; static water level, 250 feet below land surface; pumping level, 425 feet below land surface; yield, 200 gallons a minute; temperature, 66° F.

Pomona well 2. Drilled in 1930 by Omer Kersey; depth, 520 feet; diameter, $15\frac{1}{2}$ to $12\frac{1}{2}$ inches; deep-well turbine pump and electric motor; yield, 250 gallons a minute.

Utility well. Drilled; depth, 490 feet; diameter, $15\frac{1}{2}$ to $12\frac{1}{2}$ inches; deep-well turbine pump and electric motor; pumping level, 335 feet below land surface while pumping 130 gallons a minute and 351 feet below land surface while pumping 185 gallons a minute; yield, 150 gallons a minute.

Muncey well. Drilled in 1943 by Muncey Bros.; depth, 504 feet; diameter, 14 to 10 inches; deep-well turbine pump and electric motor; yield, 450 gallons a minute.

Pumpage:

(Average in gallons a day)

1934	161,000	1941	249,000
1935	185,000	1942	189,000
1936	171,000	1943	235,000
1937	181,000	1944	296,000
1938	187,000	1945	246,000
1939	213,000	1946	384,000
1940	251,000	1947	430,000

Storage: Ground storage reservoir, 750,000 gallons; elevated tank, 250,000 gallons.

Treatment: None.

RANDALL COUNTY

Canyon -- Continued

Analysis, composite sample of four wells

(Collected Dec. 4, 1947. Analyzed by D. E. Weaver)

	Parts per million	Equivalents per million
Silica (SiO_2)	11	
Iron (Fe)	.05	
Calcium (Ca)	7.7	.38
Magnesium (Mg)	5.8	.48
Sodium (Na)	135	5.86
Potassium (K)	3.2	.08
Bicarbonate (HCO_3)	341	5.59
Sulfate (SO_4)	29	.60
Chloride (Cl)	17	.48
Fluoride (F)	2.2	.12
Nitrate (NO_3)	.5	.01
Dissolved solids	390	
Total hardness as $CaCO_3$	43	
pH	8.0	

Drillers' logs

Pomona well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Light-brown shale	72	337
Gyp	62	65	White water sand	20	357
Pink shale	19	84	Red shale	6	363
Gyp	3	87	Hard sandy shale	30	393
Red sandy shale	38	125	Brown shale	17	410
Brown shale	20	145	White water sand	33	443
Blue sandy shale	53	198	Blue shale	3	446
Red shale	34	232	Water sand	39	485
Blue shale	13	245	Blue sandy shale	3	488
Pink sandy shale	20	265			

RANDALL COUNTY

Canyon -- Continued

Drillers' logs

Pomona well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
No record	265	265	Hard sandstone?	30	393
Light-brown shale	60	325	Brown shale	27	420
Sand, no water	10	335	Sand, no water	5	425
White water sand	15	350	White water sand	15	440
Red shale	13	363	Blue sandy shale	50	490

Utility well

Soil	5	5	Red shale	105	295
Pink clay	10	15	Brown shale	33	328
Caliche and little lime rock	30	45	White sandstone	22	350
			Red shale	34	384
Caliche and little lime and sand	10	55	Gray sandstone	30	414
			Blue shale	3	417
Sand and caliche, red and gray	10	65	Gray sandstone	23	440
			Red shale and a little gray sandstone	16	456
White shale, first water	25	90			
Red shale	25	115	White sandstone (extra good)	29	485
Brown shale	45	160			
Blue shale	30	190	Red shale	5	490

REAGAN COUNTY

Big Lake

Population in 1940: 763.

Source of information:
Ross Clark, city secretary,
Aug. 21, 1947.

Ownership: Municipal.

Source of supply: Two wells.

Well 2. Half a block south of the county courthouse near elevated tank; depth, 535 feet; diameter, 6 inches; deep-well turbine pump and 25-horsepower electric motor; pump set at 390 feet; pumping level, 329.3 feet below land surface while pumping 140 gallons a minute Sept. 11, 1947; temperature, 69° F.

Well 3. Two blocks south of county courthouse; drilled in 1944 by W. A. Schooler; depth, 535 feet; diameter, 7 inches; cased to bottom; deep-well turbine pump and 25-horsepower electric motor, pump set at 410 feet; pumping level, 242.6 feet below land surface while pumping 150 gallons a minute Sept. 11, 1947; temperature, 69° F.

Pumpage:

(Average in gallons a day)

	1946	1947
January	--	46,800
February	41,840	54,600
March	41,700	50,000
April	57,000	55,400
May	69,900	79,600
June	72,200	108,000
July	86,800	123,200
August	85,000	--
September	111,200	--
October	58,200	--
November	56,700	--
December	44,800	--

Storage: Elevated tank, 65,000 gallons; concrete ground tank, 100,000 gallons.

Number of customers: 315.

Treatment: Occasional chlorination.

REAGAN COUNTY

Big Lake -- Continued

Analyses

(Collected Sept. 11, 1947. Analyzed by B. C. Dwyer)

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	6.0		6.0	
Iron (Fe)	.09		-	
Calcium (Ca)	182	9.08	167	8.34
Magnesium (Mg)	109	8.96	108	8.88
Sodium (Na)	289	12.56	306	13.30
Potassium (K)	24	.61	28	.72
Bicarbonate (HCO_3)	274	4.49	274	4.49
Sulfate (SO_4)	933	19.42	947	19.72
Chloride (Cl)	254	7.16	244	6.88
Fluoride (F)	2.4	.13	2.6	.14
Nitrate (NO_3)	.8	.01	.8	.01
Dissolved solids	1,940		1,940	
Total hardness as $CaCO_3$	902		861	
pH	7.3		7.4	

Santa Rita

Population in 1940: 75.

Source of information:
M. B. Rogers, clerk,
Sept. 11, 1947.

Owner: Group No. 1 Oil Co.

Source of supply: Two wells about 2 miles northeast of camp.

Well 1. Drilled by Signal Gasoline Co.; depth, 325 feet; diameter, 12 inches; cylinder pump and 5-horsepower electric motor; static water level, 192.9 feet below land surface Sept. 11, 1947; yield reported, 15 gallons a minute; water level measured while well 2 was pumping.

Well 2. Drilled by Signal Gasoline Co.; depth, 460 feet; diameter, 12 inches; deep-well turbine pump and 7½-horsepower electric motor; pump set at 230 feet; water level reported, 190 feet below land surface; yield reported, 44 gallons a minute; temperature, 69½° F.

REAGAN COUNTY

Santa Rita -- Continued

Pumpage: Maximum, 63,000 gallons a day; minimum, 30,000 gallons a day; average 42,000 gallons a day.

Storage: Two wooden ground tanks, 67,000 gallons each; one steel ground tank, 462,000 gallons.

Number of customers: 35.

Treatment: None.

Analysis, well 2

(Collected Sept. 11, 1947. Analyzed by B. C. Dwyer)

	Parts per million	Equivalents per million
Silica (SiO_2)	10	
Iron (Fe)	.11	
Calcium (Ca)	149	7.44
Magnesium (Mg)	93	7.65
Sodium (Na)	574	24.97
Potassium (K)	21	.54
Bicarbonate (HCO_3)	252	4.13
Sulfate (SO_4)	704	14.66
Chloride (Cl)	760	21.43
Fluoride (F)	2.6	.14
Nitrate (NO_3)	15	.24
Dissolved solids	2,450	
Total hardness as $CaCO_3$	754	
pH	7.7	

REAGAN COUNTY

Texon

Population in 1940: 1,123.
Source of information:
W. J. Grissett, assistant superintendent,
Aug. 20, 1947.

Owner: Big Lake Oil Co.

Source of supply; Six wells.

Well 1. Three miles north of Texon; drilled in 1932; depth, 359 feet; diameter, 7 inches; deep-well cylinder pump and electric motor; yield, 53 gallons a minute.

Well 2. Three miles north of Texon; drilled in 1932; depth, 360 feet; diameter, 7 inches; deep-well cylinder pump and electric motor; yield, 53 gallons a minute.

Well 3. Three miles north of Texon; drilled in 1938; depth, 359 feet; diameter, 7 inches; deep-well cylinder pump and electric motor; yield, 53 gallons a minute.

Well 4. At gasoline plant one-fourth mile northwest of Texon; drilled in 1925; depth, 400 feet; diameter, 7 inches; deep-well cylinder pump; yield,18 gallons a minute.

Well 5. At gasoline plant one-fourth mile northwest of Texon; drilled in 1925; depth, 400 feet; diameter, 7 inches; deep-well cylinder pump; yield, 7 gallons a minute.

Well 6. One and a half miles southwest of Texon; drilled about 1927; depth, 450 feet; diameter 7 inches; deep-well cylinder pump and electric motor; yield, 11 gallons a minute.

Pumpage (estimated): 140,000 gallons a day.

Storage: Seven steel tanks, total capacity 111,000 gallons.

Number of customers: 1,123.

Treatment: None.

REAGAN COUNTY

Texon -- Continued

Analyses

(Collected: Well 1, Aug. 20, 1947; well 3, Sept. 11, 1947. Analyzed by B. C. Dwyer)

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	17		11	
Iron (Fe)	.72		.28	
Calcium (Ca)	155	7.74	136	6.79
Magnesium (Mg)	90	7.40	84	6.91
Sodium (Na)	387	16.81	238	10.33
Potassium (K)	6.3	.16	16	.41
Bicarbonate (HCO_3)	260	4.26	246	4.03
Sulfate (SO_4)	903	18.80	813	16.93
Chloride (Cl)	310	8.74	112	3.16
Fluoride (F)	2.4	.13	2.6	.14
Nitrate (NO_3)	11	.18	11	.18
Dissolved solids	2,010		1,540	
Total hardness as $CaCO_3$	757		685	
pH	7.8		7.7	

(Collected Sept. 11, 1947. Analyzed by B. C. Dwyer)

	Well 5	
	Parts per million	Equivalents per million
Silica (SiO_2)	8.0	
Iron (Fe)	3.9	
Calcium (Ca)	156	7.79
Magnesium (Mg)	103	8.47
Sodium (Na)	285	12.40
Potassium (K)	19	.49
Bicarbonate (HCO_3)	262	4.29
Sulfate (SO_4)	985	20.51
Chloride (Cl)	144	4.06
Fluoride (F)	2.6	.14
Nitrate (NO_3)	9.0	.15
Dissolved solids	1,840	
Total hardness as $CaCO_3$	813	
pH	7.7	

REAGAN COUNTY

Texon -- Continued

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	10	10	Sand, water	46	266
Yellow lime	40	50	Red bed	14	280
White lime	105	155	White sand	58	338
Yellow lime	20	175	Red bed	4	342
Sandy lime	25	200	White sand	14	356
Brown sandy rock	20	220	Red bed	3	359

Well 2

Surface soil	17	17	Sand, water	12	312
Lime	200	217	Sandy lime	8	320
Sand	18	235	Lime and red rock	10	330
Lime	3	238	Hard sand rock	15	345
Sand	7	245	Sand, water	5	350
Lime	13	258	Hard sand rock	8	358
Red bed	14	272	Red rock	2	360
Broken lime and red rock	28	300			

Well 3

Surface soil	12	12	Sand rock	6	280
White lime	38	50	Sand, water	58	338
Yellow lime	125	175	Red rock	4	342
White lime and sand	45	220	Sand	14	356
Sand, water	46	266	Red rock	3	359
Red bed	8	274			

REEVES COUNTY

Balmorhea

Population in 1940: 1,000.

Source of information:
W. E. Gould, owner,
Dec. 11, 1946.

Owner: W. E. Gould.

Source of supply: Two wells.

Well 1. Four and a half miles west of city; drilled in 1928; depth, 79 feet; diameter, 6 inches; deep-well cylinder and 2-horsepower electric motor.

Well 2. One and a half miles west of city; drilled in 1928; depth, 67 feet; diameter, 6 inches; deep-well cylinder and 2-horsepower electric motor; yield, 15 gallons a minute.

Pumpage (estimated): Average, 21,000 gallons a day.

Storage: Two concrete storage reservoirs, 7,000 gallons each.

Number of customers: 60.

Treatment: Chlorination.

Analysis, composite sample of wells 1 and 2

(Collected Dec. 11, 1946. Analyzed by C. B. Cibulka)

	Parts per million	Equivalents per million
Silica (SiO_2)	32	
Iron (Fe)	.78	
Calcium (Ca)	178	8.88
Magnesium (Mg)	29	2.38
Sodium (Na)	274	11.92
Potassium (K)	6.8	.17
Bicarbonate (HCO_3)	376	6.16
Sulfate (SO_4)	517	10.76
Chloride (Cl)	220	6.20
Fluoride (F)	.8	.04
Nitrate (NO_3)	12	.19
Dissolved solids	1,450	
Total hardness as $CaCO_3$	563	
pH	7.0	

REEVES COUNTY

Pecos

Population in 1940: 4,855.

Source of information:
J. H. Oglesby, water superintendent,
Dec. 17, 1946.

Ownership: Municipal.

Source of supply: Five wells, 9½ miles southeast of city.

Well 1. Drilled in 1933 by Tom Simmonds; depth, 187 feet; diameter, 10 inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 87.8 feet below land surface Oct. 10, 1940; yield, 250 gallons a minute.

Well 2. Drilled in 1935 by Tom Simmonds; depth, 211 feet; diameter, 10 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 300 gallons a minute.

Well 3. Drilled in 1935 by Tom Simmonds, depth, 300 feet; diameter, 10 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 200 gallons a minute.

Well 4. Drilled in 1942 by D. M. Bassett; depth, 191 feet; diameter, 10 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 300 gallons a minute.

Well 5. Drilled in 1942 by D. M. Bassett; depth, 170 feet; diameter, 10 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 300 gallons a minute.

Pumpage:

(Average in gallons a day)

	1945	1946
January		452,600
February		451,100
March		571,500
April		687,100
May		719,300
June		890,100
July		968,600
August		972,900
September		696,300
October		546,100
November		481,000
December	429,100	425,700 first 15 days of month

REEVES COUNTY

Pecos -- Continued

Storage: Concrete storage reservoir, 1,500,000 gallons; ground storage reservoir, 200,000 gallons; elevated tank, 110,000 gallons.

Number of customers: 1,336.

Treatment: None.

Analysis, composite sample of five wells

(Collected Sept. 4, 1946. Analyzed by C. B. Cibulka)

	Parts per million	Equivalents per million
Silica (SiO_2)	27	
Iron (Fe)	.11	
Calcium (Ca)	91	4.54
Magnesium (Mg)	24	1.97
Sodium and potassium (Na + K)	62	2.69
Bicarbonate (HCO_3)	214	3.51
Sulfate (SO_4)	163	3.39
Chloride (Cl)	72	2.03
Fluoride (F)	2.0	.11
Nitrate (NO_3)	10	.16
Dissolved solids	578	
Total hardness as $CaCO_3$	320	
pH	7.0	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	10	10	Yellow clay	16	119
Red sand rock	20	30	Red sand, shale	17	136
Conglomerate	10	40	Red sand, water	6	142
Red sand rock	5	45	Light sand	5	147
Conglomerate	20	65	Dry sand	13	160
Yellow clay	5	70	Red sandrock and clay	17	177
Conglomerate	14	84	Sand and honeycomb, water	6	183
Sand and honeycomb, water	19	103	Red sandrock	4	187

REEVES COUNTY

Pecos -- Continued

Drillers' logs -- Continued

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil, sand and caliche	24	24	Red sand, water	13	93
Brown sandstone and clay	6	30	Yellow sand, loose rock	14	107
Hard white sandstone	23	53	Yellow clay and rock	3	110
Yellow clay with little sand and very small amount of water	27	80	Red sandstone, water	44	154
			Red shale	11	165
			Red sandstone, water	26	191
			Red sand and clay	20	211

Well 3

Top soil and caliche	30	30	Red sandstone, water	7	176
Red sandstone, yellow clay	6	36	Red clay	28	204
Brown rock, clay in seams, little water at 80 feet	44	80	Sand and black gravel, water	6	210
Red sandstone	10	90	Red clay	4	214
Red sandstone and gravel	20	110	Red sandstone, gravel, water	5	219
Red sandstone	8	118	Red sandstone	11	230
Red clay	1	119	Red clay	2	232
Red sandstone, water	29	148	Red sandstone	13	245
Red clay	8	156	Red clay	2	247
Very hard red sandstone	10	166	Red sandstone	28	275
Red clay	3	169	Red clay	25	300

Well 4

Top soil	3	3	Gray sand, water	10	95
Caliche	25	28	Sandy shale	35	130
Red shale	44	72	Red shale	30	160
Sandy red shale	13	85	Sticky red bed	31	191

REEVES COUNTY

Pecos -- Continued

Drillers' logs -- Continued

Well 5

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Caliche and gravel	30	30	Water sand	23	150
Yellow sand	10	40	Sticky red shale	5	155
Red shale	50	90	Broken sand	8	163
Red sand, water	5	95	Sandy shale	7	170
Red shale	2	97			
Red sand, water	28	125			
Red shale	2	127			

Toyah

Population in 1940: 464.

Source of information:
O. G. McPherson,
Dec. 11, 1946.

Owner: Texas and Pacific Railroad.

Source of supply: Impounding reservoir on Big Aguja Canyon, 47 miles southwest of Toyah.

Pumpage:

(Average in gallons a day)

	1946
March	17,635
April	22,393
May	20,226
June	25,080
July	24,542
August	19,000
September	11,217
October	11,800

Storage: Ground storage reservoir, 200,000 gallons; ground storage reservoir, 180,000 gallons; elevated tank, 150,000 gallons; elevated tank, 100,000 gallons.

REEVES COUNTY

Toyah -- Continued

Analyses

(Collected Dec. 11, 1946. Analyzed by C. B. Cibulka)

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	32		32	
Iron (Fe)	.68		.69	
Calcium (Ca)	37	1.847	35	1.747
Magnesium (Mg)	4.6	.378	5.5	.452
Sodium (Na)	17	.760	17	.748
Potassium (K)	3.6	.092	3.4	.087
Bicarbonate (HCO_3)	158	2.590	152	2.491
Sulfate (SO_4)	6.7	.139	6.9	.144
Chloride (Cl)	10	.282	12	.338
Fluoride (F)	1.0	.053	1.0	.053
Nitrate (NO_3)	.8	.013	.5	.008
Dissolved solids	191		189	
Total hardness as $CaCO_3$	111		110	
pH	7.5		7.2	

ROBERTS COUNTY

Miami

Population in 1940: 713.

Source of information:
C. Hubbard, plant operator,
June 24, 1948.

Owner: Southwestern Public Service Co.

Source of supply: Well; drilled in 1947; depth, 113 feet; diameter, 18 inches; deep-well turbine pump and electric motor; static water level, 45 feet below land surface Jan. 1947; yield, 320 gallons a minute with drawdown of 45 feet.

Pumpage (estimated): 65,000 gallons a day.

Storage: Ground reservoir on hill, 186,000 gallons.

Number of customers: 183.

Treatment: None.

Analysis

(Collected June 24, 1948. Analyzed by H. D. Smith)

	Parts per million	Equivalents per million
Silica (SiO_2)	28	
Iron (Fe)	.00	
Calcium (Ca)	59	2.945
Magnesium (Mg)	8.6	.707
Sodium (Na)	2.9	.126
Potassium (K)	6.0	.153
Bicarbonate (HCO_3)	214	3.508
Sulfate (SO_4)	5.7	.119
Chloride (Cl)	5.2	.147
Fluoride (F)	.6	.032
Nitrate (NO_3)	8.3	.134
Dissolved solids	246	
Total hardness as $CaCO_3$	183	
pH	7.9	

SCHLEICHER COUNTY

Eldorado

Population in 1940: 1,530

Source of information:
L. B. Burk, water superintendent,
Sept. 21, 1948.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Near city hall; drilled in 1938 by V. P. O'Harrow; depth, 361 feet; diameter, 8 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 280 feet below land surface when drilled; yield, 400 gallons a minute.

Well 2. Three blocks north and half a block east of city hall; drilled in 1939 by V. P. O'Harrow; depth, 361 feet; diameter, 8 inches; deep-well turbine pump and 40-horsepower electric motor; yield, 225 gallons a minute when drilled.

Pumpage (estimated): 125,000 gallons a day.

Storage: Concrete ground reservoir, 100,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 450.

Treatment: Chlorination.

Analyses

(Collected Sept. 21, 1948. Analyzed by D. E. Weaver)

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		12	
Iron (Fe)	.65		.45	
Calcium (Ca)	47	2.35	47	2.35
Magnesium (Mg)	24	1.97	24	1.97
Sodium (Na)	15	.65	15	.65
Potassium (K)	2.8	.07	3.2	.08
Bicarbonate (HCO_3)	212	3.47	212	3.47
Sulfate (SO_4)	27	.56	26	.54
Chloride (Cl)	26	.73	27	.76
Fluoride (F)	2.2	.12	2.0	.11
Nitrate (NO_3)	8.5	.14	6.7	.11
Dissolved solids	282		278	
Total hardness as $CaCO_3$	216		216	
pH	7.5		7.2	

SCHLEICHER COUNTY

Eldorado -- Continued

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Hard lime layers and caliche	32	268
Caliche and boulders	6	8	Hard lime	12	280
Hard lime layers	42	50	Hard gray lime	29	309
Caliche	2	52	Soft gray lime	5	314
Hard lime	15	67	Soft lime	8	322
Hard lime layers in caliche	19	86	Lime	8	330
Soft lime	16	102	Soft lime and flint	5	335
Hard lime layers	5	107	Lime	3	338
Caliche	3	110	Soft mixed rock	6	344
Hard layers and caliche	9	119	Hard rock	1	345
Hard lime	25	144	Soft porous lime, water	4	349
Lime layers and caliche	87	231	Hard light-gray lime	12	361
Lime and flint layers	5	236			

SCURRY COUNTY

Hermleigh

Population in 1940: 404.

Source of information:
Geo. O. Hale, pump operator,
June 20, 1946.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1928; depth, 220 feet; diameter, 6 inches; deep-well cylinder pump and 5-horsepower electric motor; yield, 3 gallons a minute.

Well 2. Drilled in 1928; depth, 240 feet; diameter, 6 inches; deep-well cylinder pump and 3/4-horsepower electric motor; yield, 3 gallons a minute.

Well 3. Drilled; depth, 260 feet; diameter, 6 inches; deep-well cylinder pump and 1-horsepower electric motor; yield, 3 gallons a minute.

Pumpage: No record.

Storage: Ground storage reservoir, 150,000 gallons (not used); elevated tank, 150,000 gallons.

Number of customers: 54.

Treatment: None.

Analysis, composite sample of three wells

(Collected June 20, 1946. Analyzed by C. B. Cibulka)

	Parts per million	Equivalents per million
Silica (SiO_2)	17	
Iron (Fe)	.12	
Calcium (Ca)	84	4.19
Magnesium (Mg)	21	1.73
Sodium (Na)	94	4.07
Potassium (K)	4.2	.11
Bicarbonate (HCO_3)	274	4.49
Sulfate (SO_4)	222	4.62
Chloride (Cl)	32	.90
Fluoride (F)	1.8	.09
Nitrate (NO_3)	.5	.01
Dissolved solids	626	
Total hardness as $CaCO_3$	296	
pH	8.1	

SCURRY COUNTY

Snyder

Population in 1940: 3,815.

Source of information:
Carl Keller,
May 20, 1946.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. At city hall; drilled in 1925 by D. D. Doty; depth, 160 feet; diameter, 17 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 250 gallons a minute in May 1946; temperature, 70° F.

Well 2. About 100 feet east of well 1; drilled in 1926 by D. D. Doty; depth, 165 feet; diameter, 17 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 66 feet below land surface May 23, 1946; yield, 250 gallons a minute with drawdown of 40 feet after 4 hours of pumping May 23, 1946.

Well 3. About .8 mile north of courthouse; drilled in 1928 by D. D. Doty; depth, 187 feet; diameter, 17 inches; no pumping equipment installed May 26, 1946; static water level, 45 feet below land surface May 22, 1946.

Well 4. About .3 mile east of courthouse; drilled in 1945 by D. D. Doty; depth, 205 feet; diameter, 17 to 12 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 30 feet below land surface May 24, 1946; yield, 125 gallons a minute; temperature, 69° F.

Pumpage (estimated): Average, 375,000 gallons a day.

Storage: Concrete ground reservoir, 150,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 925.

Treatment: None.

SCURRY COUNTY

Snyder -- Continued

Analyses

(Collected May 29, 1946. Analyzed by C. B. Cibulka)

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	27		27	
Iron (Fe)	.04		.05	
Calcium (Ca)	60	2.99	79	3.94
Magnesium (Mg)	23	1.89	28	2.30
Sodium (Na)	45	1.94	49	2.14
Potassium (K)	5.0	.13	4.8	.12
Bicarbonate (HCO_3)	308	5.05	316	5.18
Sulfate (SO_4)	32	.67	51	1.06
Chloride (Cl)	34	.96	66	1.86
Fluoride (F)	1.6	.08	1.6	.08
Nitrate (NO_3)	12	.19	20	.32
Dissolved solids	391		496	
Total hardness as $CaCO_3$	244		312	
pH	7.5		7.5	

(Collected May 29, 1946. Analyzed by C. B. Cibulka)

	Well 4	
	Parts per million	Equivalents per million
Silica (SiO_2)	27	
Iron (Fe)	.02	
Calcium (Ca)	56	2.80
Magnesium (Mg)	19	1.56
Sodium (Na)	40	1.75
Potassium (K)	3.8	.10
Bicarbonate (HCO_3)	292	4.79
Sulfate (SO_4)	24	.50
Chloride (Cl)	24	.68
Fluoride (F)	1.8	.09
Nitrate (NO_3)	9.4	.15
Dissolved solids	349	
Total hardness as $CaCO_3$	218	
pH	7.6	

SCURRY COUNTY

Snyder -- Continued

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Chalk rock	15	15	Red clay	31	90
Hard rock	2	17	Sand	30	120
Sandy clay	8	25	Chalk and sand	8	128
Rock	3	28	Clay	2	130
Sandy clay	3	31	Rock, water	7	137
Sandrock	10	41	Red clay	27	164
Hard rock	4	45	Rock	11	175
Soft rock	10	55	Red clay	8	183
Sandrock	4	59			

Well 2

Soft clay and sand	35	35	Hard rock	7	134
Sandrock, water	12	47	Sand	6	140
Blue clay	13	60	Sandrock	10	150
Hard rock	1	61	Rock, shale	4	154
Red and blue clay	31	92	Soft sand	2	156
Hard rock	1	93	Hard rock	3	159
Sand, water	4	97	Cave	1	160
Hard rock	1	98	Hard rock	1	161
Soft sand, water	5	103	Cave	1	162
Red clay	18	121	Hard rock	3	165
Sandrock	4	125	Yellow clay	14	179
Soft sand	2	127			

Well 3

Soil and clay	6	6	Hard rock	2	111
Chalk and gravel	14	20	Clay	2	113
Clay and gravel	21	41	Rock, soft	1	114
Sand	7	48	Sand, water	7	121
Sand and gravel	12	60	Hard rock	4	125
Yellow sand rock	7	67	Soft sand	9	134
Clay	5	72	Hard rock	2	136
Hard rock	2	74	Sandrock	4	140
Soft cave	1	75	Water sand	10	150
Hard rock	3	78	Rock, hard	7	157
Soft sand	4	82	Soft rock	5	162
Hard rock	2	84	Hard rock	4	166
Sandy clay	7	91	Soft rock	2	168
Hard rock	1	92	Hard rock	4	172
Sandy clay	6	98	Red clay	15	187
Red rock, sand	11	109			

SHERMAN COUNTY

Stratford

Population in 1940: 877.

Source of information:
Chester Guthrie, manager, Southwestern Public Service Co.
June 24, 1948.

Owner: Southwestern Public Service Co.

Source of supply: Two wells.

Well 2. Drilled; depth, 300 feet; diameter, 8 inches; deep-well turbine pump and electric motor; static water level, 220 feet below land surface; yield, 170 gallons a minute with drawdown of 30 feet.

Well 3. Drilled in 1930 by L. E. McDade; depth, 300 feet; diameter, 10 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 216 feet below land surface; yield, 225 gallons a minute.

Pumpage: Average, 125,000 gallons a day.

Storage: Ground reservoir, 20,000 gallons; elevated tank, 85,000 gallons.

Number of customers: 470.

Treatment: Chlorination.

Analysis, well 3

(Collected June 24, 1948. Analyzed by D. E. Weaver)

	Parts per million	Equivalents per million
Silica (SiO_2)	31	
Iron (Fe)	.00	
Calcium (Ca)	36	1.80
Magnesium (Mg)	36	2.96
Sodium (Na)	14	.61
Potassium (K)	5.2	.13
Bicarbonate (HCO_3)	244	4.00
Sulfate (SO_4)	48	1.00
Chloride (Cl)	10	.28
Fluoride (F)	1.2	.06
Nitrate (NO_3)	9.5	.15
Dissolved solids	314	
Total hardness as $CaCO_3$	238	
pH	7.6	

SHERMAN COUNTY

Stratford -- Continued

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	4	4	Packed sand	40	189
Soft sandstone	25	29	Loose, sliding sand	30	219
Yellow clay	60	89	Water, quicksand	81	300
Caliche	60	149			

STONEWALL COUNTY

Aspermont

Population in 1940: 1,041.

Source of information:
Marvin B. Austin, water superintendent,
Sept. 15, 1947.

Ownership: Municipal.

Source of supply: Lake Sellers; built in 1913 and enlarged in 1934; capacity, 500 acre-feet.

Pumpage: Average, 140,000 gallons a day.

Storage: Settling basin at treating plant, 100,000 gallons; elevated tank, 65,000 gallons.

Number of customers: 250.

Treatment: Coagulation, sedimentation, pre-and post-chlorination.

Analyses

(Collected: Sept. 15, 1947. Analyzed by B. C. Dwyer)

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	28		4.0	
Iron (Fe)	.08		.04	
Calcium (Ca)	91	4.54	120	5.99
Magnesium (Mg)	19	1.56	9.8	.81
Sodium (Na)	19	.84	3.9	.17
Potassium (K)	2.2	.06	3.0	.08
Bicarbonate (HCO_3)	250	4.10	50	.82
Sulfate (SO_4)	46	.96	236	4.96
Chloride (Cl)	50	1.41	44	1.24
Fluoride (F)	1.0	.05	.2	.01
Nitrate (NO_3)	30	.02	1.2	.02
Dissolved solids	460		502	
Total hardness as $CaCO_3$	305		340	
pH	7.7		6.8	

SUTTON COUNTY

Sonora

Population in 1940: 2,528.

Source of information:
R. M. McCarver, water superintendent,
July 22, 1947.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. About 1,500 feet northwest of city hall; drilled in 1938; depth, 303 feet; diameter, 10 inches; deep-well turbine pump and 40-horsepower electric motor; yield, 400 gallons a minute.

Well 2. East of well 1; drilled in 1938 by Layne-Texas Co.; depth, 303 feet; diameter, 10-3/4 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 276 feet below land surface in 1938; yield, 420 gallons a minute in 1938.

Well 3. Drilled in 1947 by Layne-Texas Co.; depth. 302 feet; diameter, 10-3/4 inches; deep-well turbine pump and 60-horsepower electric motor; static water level, 276 feet below land surface in June 1947; yield, 600 gallons a minute.

Pumpage (estimated): Average, 375,000 gallons a day.

Storage: Three concrete ground storage reservoirs, 50,000 gallons, 150,000 gallons, and 200,000 gallons, respectively. All reservoirs located on hill.

Number of customers: 800.

Treatment: Chlorination.

SUTTON COUNTY

Sonora -- Continued

Analysis of finished water, composite sample from 3 wells

(Collected July 22, 1947. Analyzed by B. C. Dwyer)

	Parts per million	Equivalents per million
Silica (SiO_2)	11	
Iron (Fe)	.00	
Calcium (Ca)	75	3.74
Magnesium (Mg)	20	1.64
Sodium (Na)	4.8	.21
Potassium (K)	4.4	.11
Bicarbonate (HCO_3)	304	4.98
Sulfate (SO_4)	8.8	.18
Chloride (Cl)	16	.45
Fluoride (F)	.2	.01
Nitrate (NO_3)	5.0	.08
Dissolved solids	297	
Total hardness as $CaCO_3$	269	
pH	7.5	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
White limestone	10	10	Hard limestone	1.5	171.5
Caliche and boulders	2.5	12.5	Hard layers and soft limestone	22.5	194
Hard limestone	1.5	14	Very hard limestone	6	200
Limestone and caliche	5	19	Hard limestone	12	212
Conglomerate	10	29	Limestone	6	218
Caliche	3	32	Light gray limestone	10	228
Soft limestone	9	41	Soft gray limestone	8	236
Hard limestone	5	46	Hard gray limestone	17	253
Limestone and caliche	8	54	Soft gray limestone	1	254
Very hard rock	4	58	Red clay and boulders	20.5	274.5
Soft gray limestone	1.5	59.5	Hard rock	1	275.5
Hard limestone	26.5	86	Soft rock	4.5	280
Hard limestone and caliche	2	88	Gravel and boulders, water	2	282
Hard limestone	13	101	Light gray limestone	3	285
Caliche and boulders	1	102	Soft limestone	3	288
Hard limestone	14	116	Porous limestone, water	2.5	290.5
Soft limestone	5	121	Very hard rock	2.5	293
Hard layers in soft limestone	10	131	Soft white limestone	3.5	296.5
Flint	1.5	132.5	Cavity, water	1.5	298
Flint layers and caliche	10.5	143	No sample	2	300
Hard layers and soft limestone	6	149	Tight sand	2	302
Very hard limestone	2	151	Brown flint	1	303
Hard layers and soft limestone	19	170			

SWISHER COUNTY

Happy

Population in 1940: 576.

Source of information:
Wm. F. Miller, water superintendent,
Mar. 6, 1945.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. About 20 feet north of elevated tank; drilled in 1928 by Leo McDade; depth, 179 feet; diameter, 6 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 25 gallons a minute; temperature, $62\frac{1}{2}^{\circ}$ F.

Well 2. About 40 feet south of well 1; drilled in 1928 by Travis Gillum, depth, 179 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 25 gallons a minute; temperature, $62\frac{1}{2}^{\circ}$ F.

Pumpage: No record.

Storage: Concrete ground reservoir, 150,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 100.

Treatment: None.

Analysis, well 2

(Collected Mar. 6, 1945. Analyzed by M. L. Begley)

	Parts per million	Equivalents per million
Silica (SiO_2)	38	
Iron (Fe)	.04	
Calcium (Ca)	47	2.35
Magnesium (Mg)	27	2.22
Sodium (Na)	24	1.06
Potassium (K)	5.9	.15
Bicarbonate (HCO_3)	283	4.64
Sulfate (SO_4)	26	.54
Chloride (Cl)	10	.28
Fluoride (F)	2.0	.11
Nitrate (NO_3)	13	.21
Dissolved solids	332	
Total hardness as $CaCO_3$	228	
pH	7.9	

SWISHER COUNTY

Tulia

Population in 1940: 2,055.

Source of information:
L. L. Schenault, water superintendent,
Mar. 3, 1945.

Ownership: Municipal.

Source of supply. Three wells.

Well 1. Drilled in 1922 by R. J. Stalling; depth, 198 feet; diameter, 18 inches; deep-well turbine pump and 40-horsepower electric motor; yield, 400 gallons a minute.

Well 2. Drilled in 1926 by G. E. Higgins; depth, 167 feet; diameter, 26 inches; deep-well turbine pump and 50-horsepower electric motor; static water level, 78.5 feet below land surface Mar. 3, 1945; yield, 515 gallons a minute.

Well 3. Drilled in 1914 by R. J. Stalling; depth, 140 feet; diameter, 18 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 200 gallons a minute.

Pumpage: No record.

Storage: Ground storage reservoir, 265,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 700.

Treatment: None.

Analysis, well 2

(Collected Mar. 3, 1945. Analyzed by M. L. Begley)

	Parts per million	Equivalents per million
Silica (SiO_2)	58	
Iron (Fe)	.06	
Calcium (Ca)	36	1.80
Magnesium (Mg)	31	2.55
Sodium (Na)	53	2.29
Potassium (K)	8.7	.22
Bicarbonate (HCO_3)	319	5.23
Sulfate (SO_4)	33	.69
Chloride (Cl)	22	.62
Fluoride (F)	5.2	.27
Nitrate (NO_3)	2.8	.05
Dissolved solids	377	
Total hardness as $CaCO_3$	218	
pH	7.8	

TERRELL COUNTY

Sanderson

Population in 1940: 2,150.

Source of information:
James Caroline, water superintendent,
Sept. 28, 1948.

Owner: Community Public Service Co.

Source of supply: Twelve wells.

Well 1. At ice plant near railroad on Wilson Street; drilled; depth reported, 470 feet; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 9 gallons a minute.

Well 2. Near well 1; drilled; depth, 415 feet; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 8 gallons a minute.

Well 3. Near elevated tank; drilled; depth, 470 feet; deep-well turbine pump and 7½-horsepower electric motor; yield, 22 gallons a minute.

Well 5. About 50 feet west of Wilson Street near the corner of Pine and Wilson Streets; drilled in 1940 by Layne-Texas Co.; depth, 525 feet; diameter, 12-3/4 to 6-5/8 inches; deep-well cylinder and electric motor; yield, 3 gallons a minute.

Well 7. Three blocks north and one block east of the courthouse; drilled by C. V. Cox; depth, 491 feet; diameter, 12 to 8 inches; deep-well cylinder and pump jack and electric motor; yield, 13 gallons a minute.

Well 8. Northeast of well 7; drilled in June 1943 by Brownie Locke; depth, 485 feet; diameter, 12 inches; deep-well cylinder and pump jack and 5-horsepower electric motor; yield, 10 gallons a minute.

Well 10. Northeast of well 8; drilled in July 1945 by Huffman and Brazell; depth, 525 feet; diameter, 10 to 8-1/4 inches; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 9 gallons a minute.

Well 11. About 850 yards northeast of well 10; drilled; depth, 545 feet; diameter, 8 inches; deep-well cylinder and pump jack and 7½-horsepower electric motor; yield, 13 gallons a minute.

Well 14. West of well 11; drilled in April 1946 by Huffman and Brazell; depth, 525 feet; diameter, 8-1/4 inches; deep-well cylinder and pump jack; yield, 7 gallons a minute.

Well 15. Northeast of well 11; drilled in April 1946 by Huffman and Brazell; depth, 580 feet; diameter, 8-5/8 inches; deep-well cylinder and pump jack and electric motor; yield, 8 gallons a minute.

TERRELL COUNTY

Sanderson -- Continued

Well 16. About 4,200 feet northwest of power plant; drilled; depth, 840 feet; diameter, 7 inches; deep-well cylinder and pump jack and electric motor; yield on test, 49 gallons a minute.

Well 17. South of well 16; drilled; depth, unknown; diameter, unknown; deep-well cylinder and pump jack and 5-horsepower electric motor; yield, 17 gallons a minute.

Pumpage (estimated): 150,000 gallons a day.

Storage: Concrete reservoir, rock reservoir, and steel tank; all elevated on hill; capacity, unknown.

Number of customers(estimated): 350.

Treatment: Hypo-chlorination.

Analysis, composite sample

(Collected Sept. 28, 1948. Analyzed by D. E. Weaver)

	Parts per million	Equivalents per million
Silica (SiO_2)	12	
Iron (Fe)	.65	
Calcium (Ca)	56	2.795
Magnesium (Mg)	22	1.809
Sodium (Na)	3.1	.135
Potassium (K)	2.4	.061
Bicarbonate (HCO_3)	230	3.775
Sulfate (SO_4)	26	.541
Chloride (Cl)	13	.367
Fluoride (F)	.6	.032
Nitrate (NO_3)	3.2	.052
Dissolved solids	268	
Total hardness as $CaCO_3$	230	
pH	8.3	

TERRELL COUNTY

Sanderson -- Continued

Drillers' logs

Well 5

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Hard rock	24	24	Yellow sandrock	10	350
White lime	61	85	White sandrock	10	360
White and gray lime	35	120	Sand rock	30	390
Yellow lime	40	160	Dark lime rock	5	395
Gray-blue lime	15	175	Blue lime rock	15	410
Yellow lime	40	215	Sandy blue rock	30	440
Gray lime	50	265	Fine white sandrock	10	450
Blue lime	35	300	Blue sandrock	50	500
Yellow sandrock	20	320	Gray sandrock	25	525
White sandrock	20	340			

Well 7

Gravel	6	6	Gray sand	15	360
Yellow lime	54	60	First water	5	365
Gray lime	75	135	Yellow sand	10	375
Yellow lime	95	230	Blue sand	15	390
Blue lime	30	260	Gray sand	45	435
Yellow lime	30	290	Yellow sand	15	450
Gray sandrock	15	305	Soapstone	15	465
Yellow sand	20	325	Soapstone	13	478
Blue sand	5	330	Rock	9	487
Yellow sand	15	345	Soapstone and sand	4	491

Well 8

Rock and caliche	10	10	Gray lime	60	280
Gray lime	100	110	Blue lime	30	310
Brown lime	20	130	Gray sandrock	40	350
Blue lime	20	150	Yellow sandrock strips of soapstone	135	485
Gray lime	30	180			
Yellow lime	40	220			

TERRELL COUNTY

Sanderson -- Continued

Drillers' logs -- Continued

Well 10

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Caliche	25	25	White sand	10	370
Broken lime	65	90	Yellow lime, sandy	20	390
Lime shells and caliche	35	125	Blue shale	15	405
Gray lime	40	165	Sand	10	415
White lime	20	185	Blue shale	45	460
Yellow lime, sandy	20	205	Sand	10	470
Gray lime	50	255	Blue sand	10	480
Blue lime	45	300	Blue lime	5	485
White sand	15	315	Blue lime, sandy	11	496
Yellow sand	45	360	Blue lime	14	510
			Blue shale	15	525

Well 11

Soil and caliche	11	11	Lime, sandy (water)	45	400
Broken lime	89	100	Gray lime	25	425
Yellow lime	65	165	Gray lime	40	465
White lime	45	210	Sand (water)	5	470
Yellow lime	50	260	Sandy lime	40	510
Blue lime	40	300	Sand	10	520
White lime	10	310	Blue shale	25	545
Yellow sand	45	355			

Well 14

Broken lime	15	15	Sandy lime	20	350
Gray lime	25	40	Blue shale	10	360
Yellow lime	10	50	Yellow sandy shale	25	385
Lime	85	135	Broken sand	10	395
Gray lime	25	160	Blue shale	10	405
Yellow caliche	15	175	Broken sand	7	412
Caliche	5	180	Blue shale	8	420
Yellow lime	65	245	Broken lime	10	430
Gray lime	49	294	Blue sandy shale	10	440
Yellow broken lime	9	303	Broken lime	20	460
Gray lime	7	310	Blue shale	30	490
Yellow broken lime	20	330	Brown sand, some green shale	35	525

TERRELL COUNTY

Sanderson -- Continued

Drillers' logs -- Continued

Well 15

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Caliche	25	25	Gray lime	25	375
Yellow lime	5	30	Blue shale	5	380
Gray lime	10	40	Yellow lime	10	390
Lime	60	100	Blue shale	5	395
Broken lime	5	105	Broken lime	15	410
Gray lime	20	125	Sandy blue shale	55	465
Lime	55	180	Blue shale, lime shells	30	495
Red shale, sandy	4	184	Blue sandy shale	5	500
Lime	16	200	Sandy lime	10	510
Yellow lime	50	250	Sandy lime	15	525
Gray lime	65	315	Sandy blue shale	20	545
Yellow broken lime	5	320	Blue shale	5	550
Broken sand	10	330	Red bed	5	555
Yellow sand, hard	20	350	Blue shale	5	560
			Lime	10	570
			Unknown	10	580

Well 16

Caliche	50	50	Lime, shells, and shale	65	515
Gravel	10	60	Broken sand	10	525
Caliche	5	65	Blue shale	15	540
Lime	20	85	Lime, shells, and shale	10	550
Brown lime and shale	20	105	Lime	5	555
Gray lime	10	115	Sandy lime	15	570
Lime and shells	75	190	Lime, shells, and shale	160	730
Lime and caliche	70	260	Lime	30	760
Blue lime	50	310	Gray lime	20	780
Yellow caliche	45	355	Brown lime	20	800
Sand and gravel	5	360	Brown lime	3	803
Yellow caliche	25	385	Sandy (?)	10	813
Sand, water	15	400	Blue lime	12	825
Water sand and gravel	15	415	Brown lime	10	835
Blue shale	10	425	Blue sand	5	840
Sandy lime	25	450			

TERRY COUNTY

Brownfield

Population in 1940: 4,009.

Source of information;
E. E. Jones, water superintendent,
May 24, 1944.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Dug and drilled; depth, 107 feet; deep-well turbine pump and electric motor; yield, 300 gallons a minute.

Well 2. Drilled in 1932; depth, 117 feet; deep-well turbine pump and electric motor; yield, 400 gallons a minute.

Well 3. Drilled in 1941 by Paul Pierson; depth, 132 feet; diameter, 13 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 400 gallons a minute.

Pumpage: No record.

Storage: Two concrete storage reservoirs, total capacity, 140,000 gallons; two elevated tanks, total capacity, 250,000 gallons.

Number of customers: 1,000.

Treatment: None.

Analysis, well 1

(Collected May 24, 1944. Analyzed by W. W. Hastings)

	Parts per million	Equivalents per million
Silica (SiO_2)	46	
Iron (Fe)	.05	
Calcium (Ca)	64	3.19
Magnesium (Mg)	61	5.02
Sodium (Na)	64	2.78
Potassium (K)	15	.38
Bicarbonate (HCO_3)	291	4.77
Sulfate (SO_4)	169	3.52
Chloride (Cl)	98	2.76
Fluoride (F)	3.0	.16
Nitrate (NO_3)	10	.16
Dissolved solids	740	
Total hardness as $CaCO_3$	410	
pH	7.9	

TERRY COUNTY

Brownfield -- Continued

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil, clay, and sand	33	33	Chert, crystalline sandstone	7	105
Soft red sand	36	69	Water sand, probably some water	1	106
Hard sand	5	74	Chert	4	110
Soft white sand (dry)	12	86	Gravel, water	20	130
Caliche	8	94	Red rock (red bed), clay	2	132
Water sand	4	98			

TOM GREEN COUNTY

Christoval

Population in 1940: 544.

Source of information:
H. H. Shaw, owner,
Aug. 19, 1947.

Owner: H. A. Shaw.

Source of supply: Dug well; depth, 40 feet; diameter, 4 by 7 feet at top and 8 by 16 feet at bottom; lined with concrete to a depth of 30 feet below the surface; centrifugal pump and 3-horsepower electric motor; static water level, 23 feet below land surface; pumping level, 24.52 feet below land surface Aug. 19, 1947; yield, 100 gallons a minute.

Pumpage: Average, 80,000 gallons a day.

Storage: Two concrete storage reservoirs, 14,000 gallons each.

Number of customers: 40.

Treatment: None.

Analysis

(Collected: Aug. 19, 1947. Analyzed by B. C. Dwyer)

	Parts per million	Equivalents per million
Silica (SiO_2)	15	
Iron (Fe)	.04	
Calcium (Ca)	104	5.19
Magnesium (Mg)	16	1.32
Sodium (Na)	5.1	.22
Potassium (K)	1.2	.03
Bicarbonate (HCO_3)	350	5.74
Sulfate (SO_4)	16	.33
Chloride (Cl)	22	.62
Fluoride (F)	.2	.01
Nitrate (NO_3)	3.5	.06
Dissolved solids	355	
Total hardness as $CaCO_3$	326	
pH	7.0	

TOM GREEN COUNTY

San Angelo

Population in 1940: 25,802.

Source of information:
Walter Beaty, water superintendent,
Aug. 19, 1947.

Owner: West Texas Utilities Co.

Source of supply: Four reservoirs.

Lake Concho. At south end of city near filtration plant; constructed in 1902; capacity, 459 acre-feet.

Lake Ben Ficklin. Above Lake Concho; constructed in 1918; capacity, 398 acre-feet.

Lake Metcalfa. Constructed in 1902; capacity, 425 acre-feet.

Lake Nosworthy. Constructed in 1930; capacity, 10,500 acre-feet.

Pumpage:

(Average in gallons a day)

	1946	1947
January	3,172,000	2,896,000
February	3,818,000	3,488,000
March	4,180,000	2,835,000
April	6,470,000	5,437,000
May	6,742,000	5,124,000
June	9,315,000	9,353,000
July	10,634,000	11,770,000
August	11,065,000	
September	6,750,000	
October	3,476,000	
November	3,617,000	
December	3,038,000	

Storage: Ground storage reservoir, 630,000 gallons; two elevated tanks, 250,000 gallons each.

Number of customers: 9,702.

TOM GREEN COUNTY

San Angelo -- Continued

Treatment: Coagulation, sedimentation, filtration, and chlorination.

Analyses

(Collected: Aug. 18, 1947. Analyzed by B. C. Dwyer)

Lake Nosworthy	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	11		14	
Iron (Fe)	.37		.06	
Calcium (Ca)	55	2.75	54	2.70
Magnesium (Mg)	20	1.64	21	1.73
Sodium (Na)	43	1.89	47	2.06
Potassium (K)	7.0	.18	7.0	.18
Bicarbonate (HCO_3)	228	3.74	228	3.74
Sulfate (SO_4)	29	.60	37	.77
Chloride (Cl)	74	2.09	76	2.14
Fluoride (F)	.6	.03	.4	.02
Nitrate (NO_3)	.0	.00	.0	.00
Dissolved solids	352		369	
Total hardness as $CaCO_3$	220		222	
pH	7.5		7.5	

Sanatorium

Population in 1940: 450.

Source of information:
T. E. Heskew, chief engineer,
Aug. 19, 1947.

Owner: State of Texas.

Source of supply: Two wells northeast of Sanatorium power plant, half a mile apart; auxiliary supply from North Concho River.

Well 1. Dug in 1930; depth, 80 feet; diameter, 12 feet; deep-well turbine pump and 40-horsepower electric motor; static water level, 18.5 feet below land surface Aug. 19, 1947; yield, 250 gallons a minute; reported decline considerable after several hours of pumping.

Well 2. Dug in 1938; depth, 80 feet; diameter, 12 feet; deep-well turbine pump and 40-horsepower electric motor; pumping level, 53.85 feet below land surface Aug. 19, 1947; yield 500 gallons a minute.

TOM GREEN COUNTY

Sanatorium -- Continued

Pumpage: Maximum, 375,000 gallons a day; minimum, 225,000 gallons a day.

Storage: Elevated tank, 100,000 gallons.

Number of customers: 1,350 patients and staff members.

Treatment: None.

Analysis, well 2

(Collected Aug. 19, 1947. Analyzed by B. C. Dwyer)

	Parts per million	Equivalents per million
Silica (SiO_2)	20	
Iron (Fe)	.04	
Calcium (Ca)	90	4.49
Magnesium (Mg)	52	4.28
Sodium (Na)	35	1.53
Potassium (K)	7.0	.18
Bicarbonate (HCO_3)	390	6.39
Sulfate (SO_4)	100	2.08
Chloride (Cl)	68	1.92
Fluoride (F)	.6	.03
Nitrate (NO_3)	3.8	.06
Dissolved solids	568	
Total hardness as $CaCO_3$	458	
pH	7.2	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Coarse tight sand	4	64
Loose gravel	20	24	Hard rock	5	69
Gravel and clay	4	28	Yellow shale	10	79
Hard conglomerate, water at 32 feet	32	60	Blue shale	1	80

UPTON COUNTY

McCamey

Population in 1940: 2,595

Source of information:
E. B. Heinze, city secretary,
Feb. 10, 1947.

Ownership: Municipal.

Source of supply: Two wells 15 miles southeast of McCamey in Pecos County.

Well 1. Drilled in 1929 by Layne-Texas Co.; depth, 272 feet; diameter 15½ to 8 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 167.6 feet below land surface Feb. 11, 1947; yield, 280 gallons a minute.

Well 2. Drilled in 1929 by Layne-Texas Co.; depth, 354 feet; diameter, 16 to 8 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 148.1 feet below land surface Feb. 10, 1947; yield, 280 gallons a minute.

Pumpage:

(Average in gallons a day)

	1946	1947
January	112,300	123,000
February	124,000	
March	140,000	
April	160,900	
May	198,000	
June	252,000	
July	290,000	
August	293,600	
September	199,000	
October	162,000	
November	115,600	
December	98,100	

Storage: Two ground storage reservoirs, 100,000 gallons each; elevated tank, 100,000 gallons.

Number of customers: 693.

Treatment: None.

UPTON COUNTY

McCamey -- Continued

Analysis, well 2

(Collected Feb. 10, 1947. Analyzed by B. C. Dwyer)

	Parts per million	Equivalents per million
Silica (SiO_2)	14	
Iron (Fe)	.09	
Calcium (Ca)	71	3.54
Magnesium (Mg)	25	2.06
Sodium (Na)	30	1.30
Potassium (K)	5.4	.14
Bicarbonate (HCO_3)	250	4.10
Sulfate (SO_4)	76	1.58
Chloride (Cl)	44	1.24
Fluoride (F)	1.2	.06
Nitrate (NO_3)	3.8	.06
Dissolved solids	397	
Total hardness as $CaCO_3$	280	
pH	7.2	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Caliche	155	155	Red sand with little clay	57	265
Pink clay	9	164	Red clay	1	266
White and yellow clay	11	175	Clay	2	268
Red sand with some clay	28	203	Rock	1	269
Pink sand	5	208	Sand	3	272

Well 2

Soil	16	16	Gravel and boulders	18	288
Caliche and gravel	129	145	Gravel and clay	7	295
Gravel	15	160	Fine sand	5	300
Caliche and gravel	10	170	Clay	6	306
Gravel, water	10	180	Fine sand	23	329
Caliche	40	220	Gravel and clay	3	332
Caliche and gravel	50	270	Clay	22	354

UPTON COUNTY

Rankin

Population in 1940: 672.

Source of information:
W. J. Pollard, operator,
Sept. 22, 1948.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. About 100 yards northeast of Yates Hotel; drilled in 1939; depth, 170 feet; diameter, 8 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 50 gallons a minute.

Well 2. About 300 yards south of well 1; drilled in 1948 by N. C. House; depth, 166 feet; diameter, 7 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 60 gallons a minute.

Pumpage (estimated): 100,000 gallons a day.

Storage: Concrete ground storage reservoir, 50,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 270.

Treatment: None.

Analyses

(Collected Sept. 22, 1948. Analyzed by J. R. Avrett and D. E. Weaver)

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	8.2		18	
Iron (Fe)	.10		.15	
Calcium (Ca)	150	7.49	150	7.49
Magnesium (Mg)	117	9.62	78	6.41
Sodium (Na)	276	11.99	142	6.18
Potassium (K)	7.6	.19	5.2	.13
Bicarbonate (HCO_3)	312	5.11	336	5.51
Sulfate (SO_4)	919	19.13	545	11.35
Chloride (Cl)	165	4.65	108	3.05
Fluoride (F)	3.0	.16	2.0	.11
Nitrate (NO_3)	15	.24	12	.19
Dissolved solids	1,820		1,230	
Total hardness as $CaCO_3$	856		695	
pH	7.2		7.2	

UPTON COUNTY

Rankin -- Continued

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	8	8	White sand rock	16	118
Gravel and caliche	17	25	Red rock	11	129
No record	33	58	White lime	2	131
Yellow lime	10	68	Yellow sand (water)	35	166
Sand and gravel (water)	34	102			

VAL VERDE COUNTY

Del Rio

Population in 1940: 13,343.

Source of information:
C. C. Brown, water superintendent,
Nov. 1, 1945.

Ownership: Municipal.

Source of supply: San Felipe Springs in northeastern Del Rio, about half a mile north of U. S. Highway 90.

Pumpage:

(Average in gallons a day)

	1943	1944
January	1,000,000	1,196,000
February	1,330,000	1,305,000
March	1,526,000	1,340,000
April	1,758,000	1,675,000
May	2,050,000	1,865,000
June	1,748,000	1,800,000
July	2,416,000	2,267,000
August	3,030,000	3,010,000
September	2,666,000	1,543,000
October	1,240,000	1,295,000
November	1,534,000	1,331,000
December	1,137,000	915,000

Storage: Two concrete elevated reservoirs, 2,250,000 gallons each.

Number of customers: 3,100.

Treatment: Chlorination and ammoniation.

VAL VERDE COUNTY

Del Rio -- Continued

Analysis

(Collected Nov. 1, 1945. Analyzed by C. B. Cibulka)

	Parts per million	Equivalents per million
Silica (SiO_2)	14	
Iron (Fe)	.05	
Calcium (Ca)	58	2.894
Magnesium (Mg)	7.6	.625
Sodium (Na)	27	1.174
Potassium (K)	4.0	.102
Bicarbonate (HCO_3)	254	4.163
Sulfate (SO_4)	6.2	.129
Chloride (Cl)	13	.367
Fluoride (F)	1.0	.053
Nitrate (NO_3)	5.8	.094
Dissolved solids	264	
Total hardness as $CaCO_3$	172	
pH	6.8	

WARD COUNTY

Barstow

Population in 1940: 558.

Source of information:
M. W. Nichols, water superintendent,
Oct. 9, 1948.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. About 4½ miles east of Barstow; drilled in 1930 by James Miles; depth, 117 feet; diameter, 8 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 95.72 feet below land surface Aug. 9, 1940; yield, 55 gallons a minute.

Well 2. About 30 feet south of well 1; drilled in July 1948 by C. C. and H. Drilling Co.; depth, 120 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 72 gallons a minute.

Pumpage (estimated): 75,000 gallons a day.

Storage: Concrete ground reservoir, 50,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 175.

Treatment: None.

Analysis, well 1

(Collected May 24, 1940. Analyzed by N. Talvite)

	Parts per million	Equivalents per million
Silica (SiO_2)	28	
Iron (Fe)	.12	
Calcium (Ca)	149	7.44
Magnesium (Mg)	51	4.19
Sodium (Na)	76	3.30
Potassium (K)	6.2	.16
Bicarbonate (HCO_3)	216	3.54
Sulfate (SO_4)	428	8.91
Chloride (Cl)	83	2.34
Fluoride (F)	1.2	.06
Nitrate (NO_3)	6.4	.10
Dissolved solids	935	
Total hardness as $CaCO_3$	582	

WARD COUNTY

Grandfalls

Population in 1940: 653.

Source of information:
L. J. Adams, manager,
Oct. 9, 1948.

Owner: L. C. Harrison Water Co.

Source of supply: Two wells.

Well 1. About 4½ miles northwest of town; drilled in 1940 by Boyd Hopkins; depth, 95 feet; diameter 8-1/4 inches; deep-well turbine pump and 100-horsepower natural gas engine; yield, 500 gallons a minute.

Well 2. South of well 1; drilled; depth, 95 feet; diameter, 8 inches; deep-well turbine pump and 75-horsepower electric motor; yield, 500 gallons a minute.

Pumpage (estimated): 200,000 gallons a day.

Storage: Two steel surface reservoirs, 24,000 and 32,000 gallons, respectively.

Number of customers: 247.

Treatment: None.

Analysis, well 1

(Collected May 15, 1940. Analyzed by N. Talvite)

	Parts per million	Equivalents per million
Silica (SiO_2)	18	
Iron (Fe)	.11	
Calcium (Ca)	94	4.69
Magnesium (Mg)	40	3.29
Sodium (Na)	367	15.96
Potassium (K)	9.6	.25
Bicarbonate (HCO_3)	240	3.93
Sulfate (SO_4)	324	6.75
Chloride (Cl)	463	13.06
Fluoride (F)	1.7	.09
Nitrate (NO_3)	1.0	.02
Dissolved solids	1,437	
Total hardness as $CaCO_3$	399	

WARD COUNTY

Monahans

Population in 1940: 3,944.

Source of information:
E. R. Blackmond, water superintendent,
Sept. 29, 1948.

Ownership: Municipal.

Source of supply: Twenty wells.

Unit 1. Five wells seven blocks north of city hall; all wells about 130 feet deep and each equipped with deep-well turbine pump and 5-horsepower electric motor; combined yield of five wells, 300 gallons a minute.

Unit 2. Twelve wells northwest of city limits; drilled between 1942 and 1947; depths, about 130 feet; deep-well turbine pumps and electric motors; combined yield, 957 gallons a minute.

Unit 3. Well 40 feet south of Victory and 140 feet west of city limits; drilled Jan. 1948; depth, 160 feet; diameter, 16 to 14 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 49 feet below land surface Mar. 1948; yield, 400 gallons a minute with drawdown of 52 feet after 3 hours of pumping Mar. 1948.

Unit 4. Well about 1,100 feet south of Unit 3; drilled in Jan. 1948; depth, 160 feet; diameter, 16 to 14 inches; deep-well turbine pump and 40-horsepower electric motor; yield, 350 gallons a minute with drawdown of 50 feet after pumping 6 hours May 1948.

Unit 5. Well about 1,100 feet south of Unit 4; drilled in Jan. 1948; depth, 160 feet; diameter, 16 to 14 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 300 gallons a minute with drawdown of 50 feet after 6 hours of pumping Aug. 1948.

Pumpage (estimated): 1,000,000 gallons a day.

Storage: Two elevated tanks, 56,000 gallons and 500,000 gallons, respectively; two concrete ground storage reservoirs, 200,000 gallons each.

Number of customers: 1,825.

Treatment: None.

WARD COUNTY

Monahans -- Continued

Analysis, well 1, unit 1

(Collected Apr. 29, 1941. Analyzed by B. Irelan and N. L. Lewis)

	Parts per million	Equivalents per million
Silica (SiO_2)	17	
Calcium (Ca)	32	1.60
Magnesium (Mg)	6.7	.55
Sodium and potassium (Na + K)	178	7.76
Bicarbonate (HCO_3)	265	4.34
Sulfate (SO_4)	149	3.10
Chloride (Cl)	76	2.14
Fluoride (F)	3.7	.19
Nitrate (NO_3)	8.8	.14
Dissolved solids	602	
Total hardness as $CaCO_3$	108	

WHEELER COUNTY

Shamrock

Population in 1940: 3,123.

Source of information:
T. M. Dickey, water superintendent,
Dec. 13, 1946.

Ownership: Municipal.

Source of supply: Bronco Springs and five wells 12 miles north of Shamrock.

Bronco Springs. In SE¼ sec. 41, blk. A8; water collected in galleries through tile drains; yield, about 150 gallons a minute.

Well 1. In NE¼ sec. 2, Poitevent subdivision; drilled by Kelly Well Co. in 1928; depth, 50 feet; diameter, 18 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 15 feet below land surface in 1928 and 26.52 feet below land surface Dec. 13, 1946; original yield, 175 gallons a minute; pump broke suction after pumping several hours in 1946.

Well 2. About 534 feet west of well 1; drilled by Kelly Well Co. in 1928; depth, 36 feet; diameter, 18 inches; deep-well turbine pump and 7½- horsepower electric motor; static water level, 8 feet below land surface in 1928 and 21.3 feet below land surface Dec. 14, 1946; original yield, 175 gallons a minute; pump broke suction after 4 or 5 hours of pumping in 1946.

Well 3. About 638 feet north of well 2; drilled by Kelly Well Co. in 1928; depth, 48 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 12 feet below land surface in 1928 and 31.0 feet below land surface Dec. 14, 1946; original yield, 250 gallons a minute; pump broke suction after pumping 4 or 5 hours in 1946.

Well 4. About 600 feet north of well 3; drilled by Kelly Well Co. in 1928; depth, 66 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 13.8 feet below land surface in 1928 and 34.9 feet below land surface Dec. 14, 1946; original yield, 250 gallons a minute; yield in 1946, 200 gallons a minute; temperature, 62° F.

Well 5. About 628 feet north of well 1; drilled by Kelly Well Co. in 1928; depth, 65 feet; diameter, 18 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 25 feet below land surface in 1928 and 42.8 feet below land surface Dec. 14, 1946; original yield, 250 gallons a minute; yield somewhat less in 1946.

Pumpage: Average, 690,000 gallons a day in 1945.

WHEELER COUNTY

Shamrock -- Continued

Storage: Ground storage reservoir in well field, 50,000 gallons; ground storage reservoir 1½ miles north of city, 1,000,000 gallons; ground storage reservoir in city, 1,000,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 1,129.

Treatment: None.

Analyses

(Collected Dec. 13, 1946. Analyzed by C. B. Cibulka)

	Bronco Springs		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	19		18	
Iron (Fe)	.05		.04	
Calcium (Ca)	67	3.344	68	3.394
Magnesium (Mg)	5.1	.419	4.5	.370
Sodium (Na)	5.8	.254	7.2	.315
Potassium (K)	2.3	.059	1.7	.043
Bicarbonate (HCO_3)	224	3.672	202	3.311
Sulfate (SO_4)	5.1	.106	7.6	.158
Chloride (Cl)	8.0	.226	6.0	.169
Fluoride (F)	.6	.032	.0	.000
Nitrate (NO_3)	2.5	.040	30	.484
Dissolved solids	218		261	
Total hardness as $CaCO_3$	188		188	
pH	7.4		7.4	

Wheeler

Population in 1940: 848.

Source of information:
J. E. Risner, water superintendent,
Dec. 16, 1946.

Ownership: Municipal.

Source of supply: Well 1½ miles west of town in $SE\frac{1}{4}SW\frac{1}{4}$ sec. 13, blk. A4; drilled in 1926 by L. D. Lancaster and others; depth, about 100 feet; diameter, 15 to 8 inches, 40 feet of 8-inch screen, gravel-walled; deep-well turbine pump and 15-horsepower electric motor; static water level reported, 27 feet below land surface; yield reported, 200 gallons a minute with drawdown of 17 feet.

WHEELER COUNTY

Wheeler -- Continued

Pumpage (estimated): Maximum 288,000; minimum 60,000; average, 150,000 gallons a day.

Storage: Steel ground tank at well, 50,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 200.

Treatment: Occasional chlorination.

Analysis

(Collected Dec. 16, 1946. Analyzed by C. B. Cibulka)

	Parts per million	Equivalents per million
Silica (SiO_2)	23	
Iron (Fe)	.08	
Calcium (Ca)	83	4.14
Magnesium (Mg)	6.3	.52
Sodium (Na)	24	1.06
Potassium (K)	1.8	.05
Bicarbonate (HCO_3)	294	4.82
Sulfate (SO_4)	14	.29
Chloride (Cl)	14	.39
Fluoride (F)	.6	.03
Nitrate (NO_3)	15	.24
Dissolved solids	349	
Total hardness as $CaCO_3$	233	
pH	7.4	

WINKLER COUNTY

Kermit

Population in 1940: 2,584

Source of information:
Fred W. Pearson, mayor,
May 15, 1947.

Ownership: Municipal.

Source of supply: Four wells.

Well 1 (Underwood). Drilled; depth, 700 feet; diameter, 12½ inches; deep-well turbine pump and 25-horsepower electric motor; yield, 350 gallons a minute.

Well 2 (Walton). Drilled in 1935 by Crandell and Osmond; depth, 545 feet; diameter, 12½ inches; deep-well turbine pump and 25-horsepower electric motor.

Well 3 (Underwood). Drilled in 1946 by Permian Well Service; depth, 510 feet; diameter, 13-3/8 inches; deep-well turbine pump and 25-horsepower electric motor; pump set at 180 feet; static water level reported, 90 feet below land surface when drilled; yield, 360 gallons a minute.

Well 4 (Walton). Drilled in 1946 by Permian Well Service; depth, 471 feet; diameter, 20 to 13-3/8 inches; gravel-walled and gun-perforated; deep-well turbine pump and 25-horsepower electric motor; static water level reported, 95 feet below land surface when drilled; yield, 360 gallons a minute.

Pumpage:

(Average in gallons a day)

1943	1944	1945	1946
195,000	262,000	335,000	590,000

Storage: Two ground storage reservoirs, 300,000 gallons each; elevated tank, 150,000 gallons.

Number of customers: 1,172.

Treatment: None.

WINKLER COUNTY

Kermit -- Continued

Analysis, well 4 (Walton)

(Collected May 15, 1947. Analyzed by B. C. Dwyer)

	Parts per million	Equivalents per million
Silica (SiO_2)	26	
Iron (Fe)	.02	
Calcium (Ca)	40	1.997
Magnesium (Mg)	7.2	.592
Sodium (Na)	25	1.073
Potassium (K)	4.6	.118
Bicarbonate (HCO_3)	146	2.393
Sulfate (SO_4)	34	.536
Chloride (Cl)	19	.095
Fluoride (F)	1.8	.048
Nitrate (NO_3)	3.0	
Dissolved solids	232	
Total hardness as $CaCO_3$	129	
pH	7.5	

Drillers' logs

Well 3 (Underwood)

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Caliche	44	44	Red rock	8	308
Sand	156	200	Gravel and sand (water)	7	315
Red beds	10	210	Sand	2	317
Sand and gravel (water)	13	223	Red bed	13	330
Red shale	3	226	Sand	5	335
Red bed	16	242	Red bed	81	416
Gravel (water)	6	248	Sand (water)	19	435
Red bed	32	280	Red bed	21	456
Sand	5	285	Sand	5	461
Red bed	15	300	Red bed	40	501

WHEELER COUNTY [illegible]

Result -- Continued

Analysis, well 4 (Watson)

(Collected May 15, 1947. Analyzed by R. C. Dwyer)

	Parts per million	Equivalents per million
Silica (SiO_2)	26	
Iron (Fe)	.02	
Calcium (Ca)	40	1.997
Magnesium (Mg)	7.2	.592
Sodium (Na)	23	1.072
Potassium (K)	4.6	.118
Bicarbonate (HCO_3)	116	2.393
Sulfate (SO_4)	24	.536
Chloride (Cl)	19	.096
Fluoride (F)	1.8	.048
Nitrate (NO_3)	8.0	
Dissolved solids	238	
Total hardness as $CaCO_3$	130	
pH	7.5	

Drillers' logs

Well 3 (Underwood)

Character	Thickness (feet)	Depth (feet)	Character	Thickness (feet)	Depth (feet)
Caliche	44	44	Red rock	8	308
Sand	156	200	Gravel and sand (water)	7	315
Red beds	10	210	Sand	2	317
Sand and gravel (water)	13	223	Red bed	13	330
Red shale	3	226	Sand	8	338
Red bed	16	242	Red bed	81	419
Gravel (water)	6	248	Sand (water)	15	434
Red bed	32	280	Red bed	21	455
Sand	5	285	Sand	15	470
Red bed	15	300	Red bed	40	501

WINKLER COUNTY

Kermit

Drillers' logs -- Continued

Well 4 (Walton)

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand and caliche	24	24	Red bed	8	358
Sand	158	182	Sand	5	363
Red bed	13	195	Red bed	5	368
Sand and gravel (water)	18	213	Sand	9	377
Red bed	38	251	Red bed	3	380
Sand and gravel (water)	5	256	Sand	10	390
Red bed	24	280	Red bed	13	403
Sand and gravel (water)	3	283	Sand	19	422
Red bed	37	320	Red bed	3	425
Sand	14	334	Sand (water)	23	448
Red bed	4	338	Red bed	8	456
Sand and gravel	1	339	Sand	13	469
Red bed	9	348	Red bed	2	471
Sand	2	350			

YOAKUM COUNTY

Plains

Population in 1940: 480.

Source of information:
D. B. McGinty, owner,
May 1945.

Owner: D. B. McGinty

Source of supply: Well drilled in 1940 by W. A. Willis; depth, 128 feet; diameter, 12 inches; deep-well turbine pump and gasoline engine; static water level reported, 72 feet below land surface in 1940.

Pumpage: No record.

Storage: Elevated tank, about 50,000 gallons.

Number of customers: 65.

Treatment: None.

Analysis

(Collected May 1945. Analyzed by J. H. Rowley)

	Parts per million	Equivalents per million
Silica (SiO_2)	42	
Iron (Fe)	.08	
Calcium (Ca)	114	5.69
Magnesium (Mg)	111	9.13
Sodium (Na)	179	7.78
Potassium (K)	34	.87
Bicarbonate (HCO_3)	241	3.95
Sulfate (SO_4)	779	16.22
Chloride (Cl)	102	2.88
Fluoride (F)	5.5	.29
Nitrate (NO_3)	8.0	.13
Dissolved solids	1,490	
Total hardness as $CaCO_3$	741	
pH	7.7	

YOAKUM COUNTY

Denver City

Population in 1940: 1,750.

Source of information:
Water superintendent,
December 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1939 by W. A. Willis; depth, 178 feet; diameter, 8 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 95 gallons a minute.

Well 2. Drilled in 1940 by W. A. Willis; depth, 180 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 150 gallons a minute.

Pumpage: Average, 48,300 gallons a day.

Storage: Two ground storage reservoirs and elevated tank, total capacity, 125,000 gallons.

Number of customers: 234.

Treatment: None.

Analysis, well 2

(Collected December 1944. Analyzed by W. W. Hastings)

	Parts per million	Equivalents per million
Silica (SiO_2)	61	
Iron (Fe)	.02	
Calcium (Ca)	62	3.09
Magnesium (Mg)	33	2.71
Sodium and potassium (Na + K)	44	1.91
Bicarbonate (HCO_3)	229	3.75
Sulfate (SO_4)	110	2.29
Chloride (Cl)	51	1.44
Fluoride (F)	2.7	.14
Nitrate (NO_3)	5.5	.09
Dissolved solids	559	
Total hardness as $CaCO_3$	290	
pH	7.8	

FIGURE 1

INDEX MAP SHOWING LOCATION AND TYPE OF PUBLIC WATER SUPPLIES AND GROUND-WATER SUBDIVISIONS IN WESTERN TEXAS

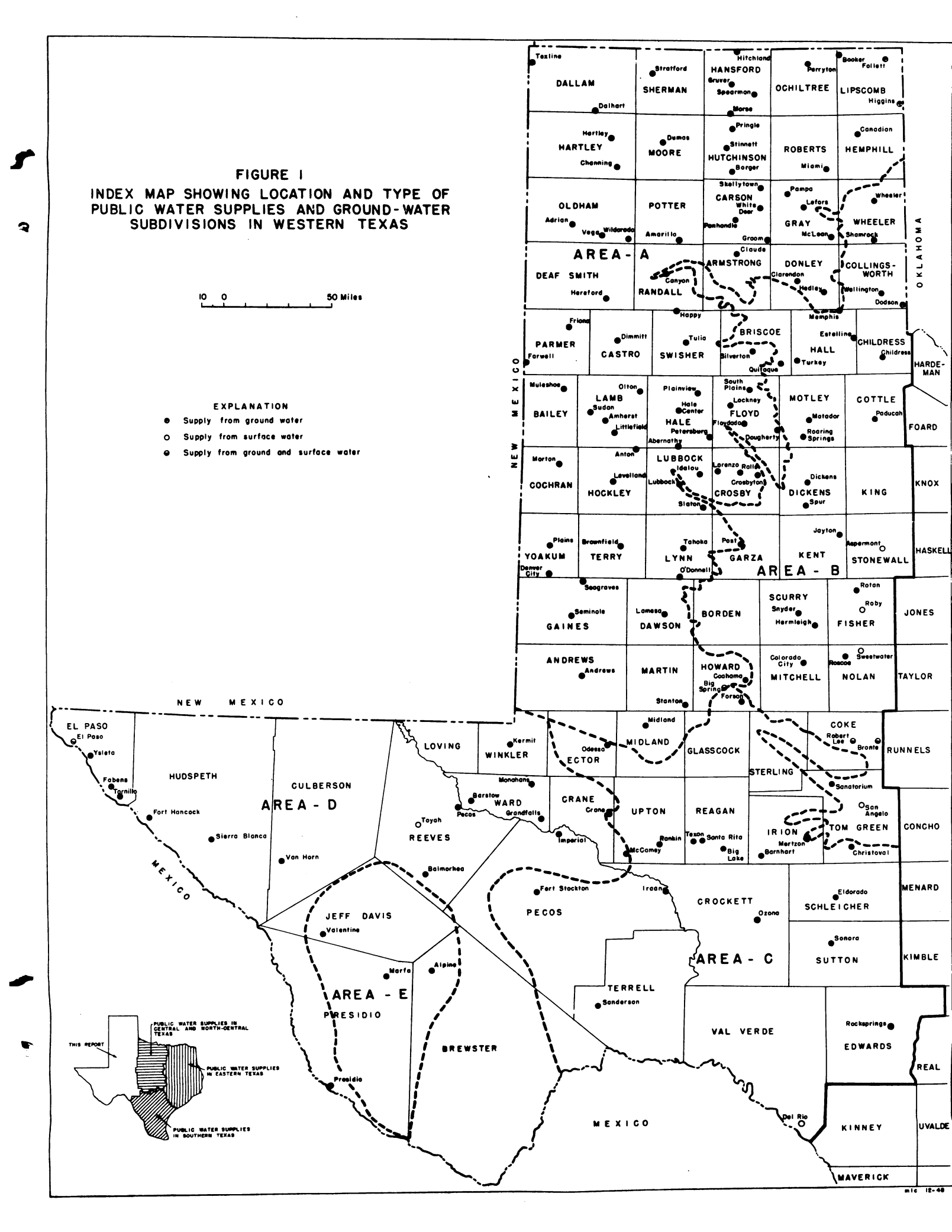

FIGURE 1

INDEX MAP SHOWING LOCATION AND TYPE OF PUBLIC WATER SUPPLIES AND GROUND-WATER SUBDIVISIONS IN WESTERN TEXAS

AREA - D

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