UNITED STATES DEPARTMENT OF THE INTERIOR

PUBLIC WATER SUPPLIES IN EASTERN TEXAS

Prepared in cooperation with the
TEXAS STATE BOARD OF WATER ENGINEERS

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PUBLIC WATER SUPPLIES IN EASTERN TEXAS

BY
R. W. SUNDSTROM, W. W. HASTINGS, AND W. L. BROADHURST

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CONTENTS

ILLUSTRATION

PUBLIC WATER SUPPLIES IN EASTERN TEXAS

By R. W. SUNDSTROM, W. W. HASTINGS, and W. L. BROADHURST

ABSTRACT

This report gives a summarized description of the public water supplies in 77 counties of eastern Texas, extending from the Louisiana boundary to a north-south line approximately along the ninety-seventh meridian. It gives the available data as follows for each of 323 communities: 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 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 is also given: Records of wells, including drillers' logs; character of the pumping equipment; yield of the wells and water level records where they are available.

The communities served by these public supplies had a population of 1,683,527 or about 26 percent of the population of the State in 1940.

Of the 323 public supplies, 273 are obtained from ground water, 46 from surface water, and 4 from a combination of both. The total amount of water used for public supply in the region averages about 157,000,000 gallons a day. Of this amount about 92,000,000 gallons is obtained from ground water and about 65,000,000 gallons from surface water.

The entire region lies within the Gulf Coastal Plain. The rocks that cover it are composed chiefly of alternating layers of sand, gravel, sandstone, limestone, clay, and shale, ranging in geologic age from Lower Cretaceous to Quaternary. Among the more important aquifers are the following: the basal sands of the Trinity group (called Travis Peak formation in central Texas and basal sands of the Trinity group in northeast Texas and referred to in this report as the Trinity sand), the Paluxy sand also of the Trinity group; the Woodbine sands of Upper Cretaceous age; sands of the Wilcox group, the Carrizo sand, the Queen City sand member of the Mount Selman formation, the Sparta sand, sands of the Yegua formation, the Catahoula and Oakville sandstones, sands of the Lagarto clay, and the Goliad and Willis sands of Tertiary age; and the Lissie formation, sands of the Beaumont clay, terrace deposits and Recent alluvial sands of Quaternary age.

For the purpose of discussing water-supply conditions and the relation of the geology to the ground water, the region has been divided into areas A, B, C, D, and E. (See fig. 1.) In area A all the ground water used for public supply is obtained from the Trinity, Paluxy, and Woodbine sands. The Trinity sands are the deepest, and wells drawing from these sands range from a depth of about 1,000 feet along the west edge of the area to more than 3,000 feet along the east edge. The Paluxy sand usually lies 400 to 800 feet above the Trinity, and the Woodbine sands several hundred feet above the Paluxy. In area B, with the exception of a

few localities, little or no ground water suitable for public supply is available. Of the 50 public supplies in the region using surface water, 38 are in this area. In area C, the sands of the Wilcox group are the most important source of ground water, except in the southeastern part where the Carrizo sand is the principal source of supply. In area D the Sparta sand, sands of the Yegua formation, the Catahoula and Oakville sandstones, and sands of the Lagarto clay are the sources of ground-water supply. In area E, which is adjacent to the Gulf Coast, the principal sources of ground water are the Goliad and Willis sands, and the sands of the Lissie formation and of the Beaumont clay. The total pumpage from these sands for public supply and for industrial use in the area reached an average of about 150,000,000 gallons a day in 1943.

Most of the public supplies obtained from surface water in eastern Texas are filtered and frequently are given further treatment, which alters the chemical character of the water. Only a few of the ground-water supplies receive any treatment. The iron is usually less than 0.2 parts per million. The calcium and magnesium content is generally somewhat higher in the southern part of the region than it is in the northern part. Calcium and magnesium are not the major basic constituents, however, and the quantity of the magnesium is usually much smaller than the calcium. Sodium and potassium are the principal basic constituents in most of the water. Bicarbonate is the principal acid constituent in most of the ground water, particularly the water obtained from the deeper water-bearing sands. Sulfate is less than 250 parts per million in most of the public supplies. The chloride content of the water varies widely, but in most cases is comparatively low. In a few supplies sodium chloride occurs in such concentration as to be unsuitable for some industrial purposes. Nitrate is generally low in east Texas water. Fluoride is less than one part per million in most of the water, both surface and ground water. Total dissolved solids are less than 1,000 parts per million in more than 90 percent of the water. Approximately 75 percent of the people in east Texas use water with a hardness of less than 60 parts per million. The hardness averages 88 parts per million in surface supplies, and 80 parts per million in ground-water supplies.

INTRODUCTION

EXTENT OF AREA AND SCOPE OF REPORT

This report gives a summarized description of public water supplies in eastern Texas from the Louisiana border westward to an irregular line that follows the west boundary of the following counties, listed from north to south: Grayson, Collin, Dallas, Ellis, Hill, McLennan, Falls, Milam, Lee, Bastrop, Fayette, Lavaca, and Jackson. The line is approximately along the ninety-seventh meridian. (See fig. 1.)

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 the 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. At the start, most of the municipalities used ground water and most of them still use it. Some of them still use the original source of supply, some have developed additional

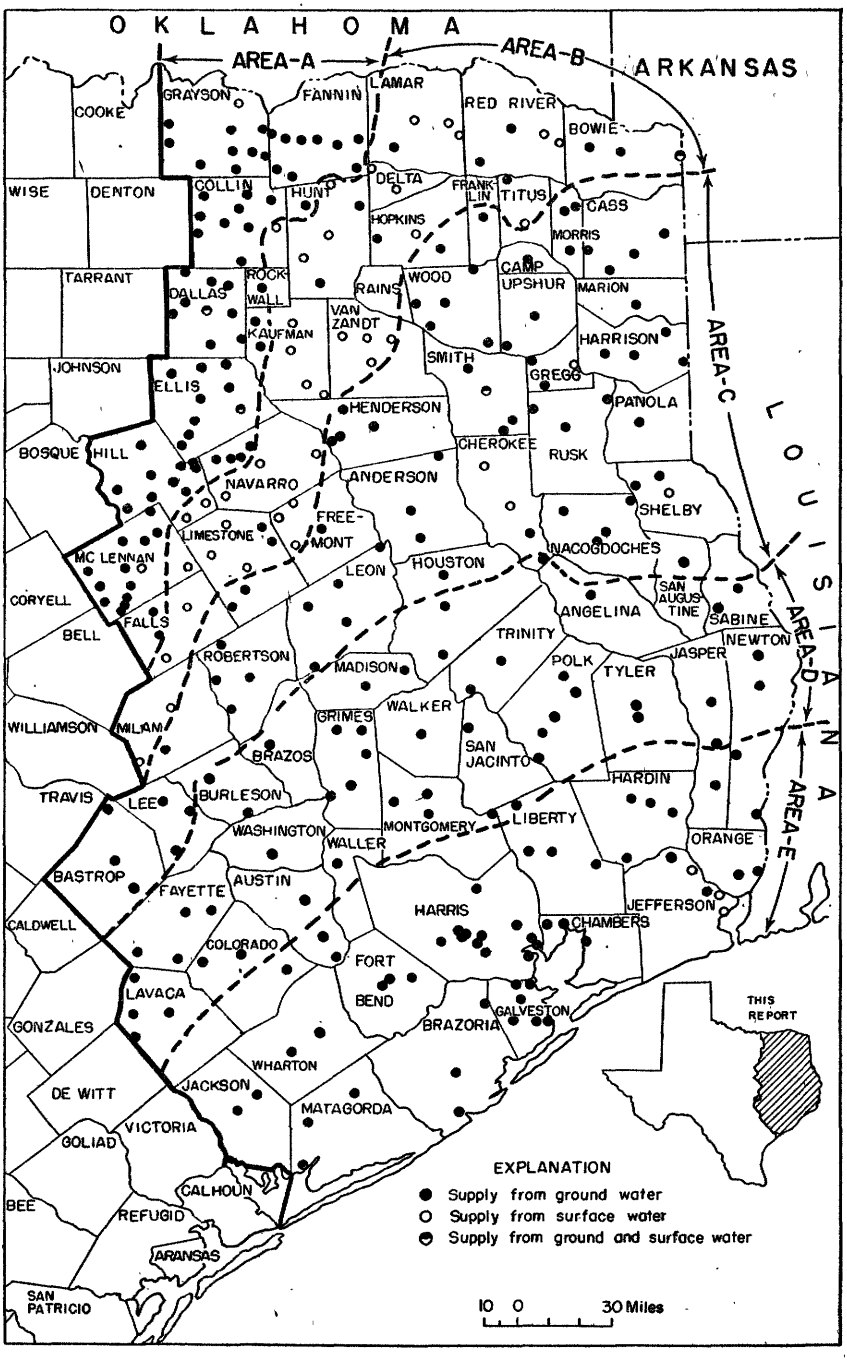

FIGURE 1.—Index map showing location and type of public water supplies and ground-water subdivisions in eastern Texas.

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; and chemical analyses of the water. Where ground water is used the following is given: Records of wells, including drillers' logs; character of pumping equipment; yield of the wells and water-level records where they are available. Unfortunately many of the municipalities have kept very poor records and sometimes 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 the water level or artesian pressure in the wells since they were drilled is particularly unfortunate. Such information is of vital importance, and the lack of it is often the cause of serious trouble, particularly in areas where the draft on the underground supplies approaches the limits of safety.

The public water supplies described are distributed over 77 counties having an area of 62,769 square miles, which is nearly 24 percent of the total area of the State. The places supplied have a total population of 1,683,527, or a little more than 26 percent of the total population of the State, according to the 1940 census. The total amount of water pumped by these communities averages about 157,000,000 gallons a day. Of this amount about 92,000,000 gallons is obtained from ground water and about 65,000,000 gallons from surface water. Ground water is used at 273 localities, surface water at 46, and a combination of ground and surface water at 4.

This publication has been prepared during the course of a cooperative ground-water study in Texas by the Geological Survey, United States Department of the Interior, and the Texas State Board of Water Engineers.

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 W. O. George, N. A. Rose, W. F. Guyton, W. H. Alexander, Jr., J. W. Lang, B. A. Barnes, G. H. Cromack, C. R. Follett, and the writers. The report was written and assembled by R. W. Sundstrom and W. L. Broadhurst under the direction of

W. N. White, principal engineer in charge. Most of the analyses of water were made in the laboratory of the Geological Survey at Austin under the direction of W. W. Hastings, who also wrote the section in this report on analyses of water. Assistance given by city officials and well drillers, who furnished most of the information, is gratefully acknowledged. Among the well drillers, the writers are especially grateful to the Layne-Texas Co. which furnished a large number of the logs published in this report, data on pumping tests, and water-level measurements.

GROUND WATER

It is not within the scope of this report to discuss the more complex details of the occurrence of ground water in each locality; and the review that follows is brief and general. In many parts of the area, however, detailed studies of the geology and ground-water resources have been made and reports have been issued. The reader is referred to the bibliography on pages 18–19 for a list of such reports.

The entire region lies within the Gulf Coastal Plain. The rocks that cover it are composed chiefly of alternating layers of sand, gravel, sandstone, limestone, clay, and shale, ranging in geologic age from Lower Cretaceous to Quaternary. Among the more important aquifers are the following: The basal sands of the Trinity group of Lower Cretaceous age (called Travis Peak formation in central Texas and the basal sand of the Trinity group in northeast Texas and referred to in this report as the Trinity sand), the Paluxy sand also of the Trinity group; the Woodbine sand of Upper Cretaceous age; sands of the Wilcox group, the Carrizo sand, the Queen City sand member of the Mount Selman formation, the Sparta sand, sands of the Yegua formation, the Catahoula and Oakville sandstones, sands of the Lagarto clay and the Goliad and Willis sands of Tertiary age; and the Lissie formation, sands of the Beaumont clay, terrace deposits and Recent alluvial sands of Quaternary age. Each of these units has an outcrop area from which it dips beneath younger formations to increasingly greater depths. In most of the region the dip is toward the east or southeast. In a relatively small area on the west flank of the Sabine uplift in Harrison, Marion, Gregg, and Rusk Counties the dip is toward the west or northwest.

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

Area A.—In area A, all the ground water used for public supply is obtained from the Trinity, Paluxy, and Woodbine sands. Throughout this area the Trinity sands lie at considerable depth beneath the surface. Along the west edge of the area wells in the Trinity are about

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1,000 feet deep at Crawford, in McLennan County; 1,400 feet at Aquilla, 1,280 to 1,575 feet at Whitney, 1,784 feet at Hillsboro, and 1,835 feet at Itasca, in Hill County; 2,508 feet at Midlothian, in Ellis County; and 1,500 feet at Whitesboro, in Grayson County. Farther east they are much deeper; for example, 3,633 feet at Garland, in Dallas County; 2,950 feet at Waxahachie, in Ellis County; and about 3,300 feet at Hubbard, in Hill County. As the sands become deeper and the distance to the outcrop increases, the mineral content of the water usually increases, although exceptions to this general rule are frequent. The well at Hubbard, in Hill County, reported to have reached the Trinity sands at a depth of about 3,300 feet, flowed salty water. However, at Garland the well to the Trinity sands, 3,633 feet deep, yields satisfactory water for the public supply.

Water in the sands is under artesian pressure throughout the area, and in many localities the wells flowed when drilled. In localities where withdrawals have been large the artesian pressure has declined considerably. The maximum decline in the area centers around Dallas, where in 1926 one of the city wells is reported to have had a flow of 700 gallons a minute. The static water level in a nearby well is now more than 80 feet below the surface.

The Paluxy sand, which usually lies 400 to 800 feet above the Trinity, has not been used extensively as a source of public water supply but is heavily drawn upon for industrial supply at Dallas. In most of the area the Paluxy sand does not furnish large quantities of water to wells, and the pumpage from it is not large. In several cities water from the formation has been used in conjunction with water from the Trinity and Woodbine sands.

The Woodbine sand is encountered several hundred feet above the Paluxy sand and because of its shallower depth is used extensively for public water supply in the area from Hill County north, expecially for the medium and smaller towns; and also in the eastern part of the area where the Trinity sand is very deep and probably contains salty water. In localities where wells to the Woodbine sand have been pumped heavily there has been a large decline in the water levels.

The following table lists the municipalities in area A that obtain their public supplies from ground water and gives the probable water-bearing formation or group of formations from which the water is drawn.

Municipality	*Probable water-bearing formation*
Abbott	Trinity sand.
Anna	Woodbine sand.
Aquilla	Trinity sand.
Barry	Woodbine sand.
Bells	Do.
Blooming Grove	Do.

Municipality—Continued	*Probable water-bearing formation*
Blue Ridge	Woodbine sand.
Bonham	Do.
Brandon	Do.
Bynum	Do.
Carrollton	Do.
Celina	Paluxy and Woodbine sands.
Chilton	Trinity sand.
China Spring	Do.
Collinsville	Paluxy sand.
Crandall	Woodbine sand.
Crawford	Trinity sand.
Dallas	Do.
Dodd City	Woodbine sand.
Ector	Do.
Eddy	Trinity sand.
Emhouse	Woodbine sand.
Ennis	Do.
Ferris	Do.
Forney	Do.
Forreston	Do.
Frisco	Paluxy sand.
Frost	Woodbine sand.
Garland	Trinity and Woodbine sands.
Grand Prairie	Woodbine sand.
Gunter	Do.
Hewitt	Trinity sand.
Hillsboro	Trinity, Paluxy, and Woodbine sands.
Honey Grove	Woodbine sand.
Howe	Do.
Irene	Do.
Irving	Do.
Italy	Do.
Itasca	Trinity and Woodbine sands.
Ladonia	Woodbine sand.
Lancaster	Do.
Leonard	Do.
Leroy	Trinity sand.
Lorena	Do.
Lott	Do.
McGregor	Do.
McKinney	Trinity and Woodbine sands.
Malone	Trinity sand.
Melissa	Woodbine sand.
Mertens	Do.
Mesquite	Do.
Midlothian	Trinity and Woodbine sands.
Milford	Trinity sand.
Moody	Do.
Palmer	Woodbine sand.
Princeton	Do.
Prosper	Do.
Red Oak	Do.

Municipality—Continued	*Probable water-bearing formation*
Richardson	Woodbine sand.
Rockwall	Paluxy and Woodbine sands.
Ross	Trinity sand.
Savoy	Woodbine sand.
Seagoville	Do.
Sherman	Trinity and Woodbine sands.
Speegleville	Trinity sand.
Tom Bean	Woodbine sand.
Trenton	Do.
Van Alstyne	Do.
Waxahachie	Trinity and Woodbine sands.
West	Trinity sand.
Whitesboro	Do.
Whitewright	Woodbine sand.
Whitney	Trinity sand.
Windom	Woodbine sand.
Wylie	Do.

Area B.—This area consists of a belt bordering area A on the east and southeast where in general little or no ground water suitable for public supply is available. Exceptions to this rule occur as follows: In the northernmost part of the area in Hunt, Lamar, Red River, and Bowie Counties five towns—Bogata, Talco, Commerce, Cumby, and Quinlan—obtain their public supplies from the Nacatoch sand, and one town—Clarksville—obtains its supply from the Blossom sand. Both of these sands are of Upper Cretaceous age. Mexia, in Limestone County, in the southern part of the area, obtains its public water supply from fractured limestone of the Midway group of Paleocene age in a faulted zone northwest of the city. Four widely scattered localities, Tehuacana, Roxton, New Boston, and Texarkana, are supplied with water from shallow wells in alluvial deposits. All other public supplies in the area are obtained from surface water.

Area C.—This is a funnel shaped area that borders area B on the southeast and widens toward the northeast to include the East Texas syncline. Considering this area as a whole the sands of the Wilcox group are the most important sources of ground water. They constitute the only available source of ground-water supply in the outcrop area of the group, comprising a belt 10 to 25 miles wide along the west and north boundaries of area C and all of Shelby and Panola Counties and parts of Marion, Harrison, Gregg, Rusk, and Nacogdoches Counties on the opposite side of the syncline in the southeastern part of the area. In the area occupied by the syncline the public supplies are obtained from sands of the Wilcox group, the Carrizo sand, and in a few municipalities from the Queen City sand member of the Mount Selman formation. The sands of the Wilcox group, however, are the most prolific. For example, at Palestine in Anderson County, which is situated nearly at the trough of the syncline, two

city wells more than 1,600 feet deep draw from sands of the Wilcox group and yield more than 1,000 gallons a minute each. At Tyler, farther northeast and also in the trough of the syncline, the three city wells, 1,042 to 1,086 feet deep, draw 350 to 650 gallons a minute each from sands of the Wilcox group. In the southeastern part of the area, in Nacogdoches and northern Angelina Counties, the water in the Wilcox is rather highly mineralized and the Carrizo sand is the principal source of supply.

The following table lists the municipalities in area C that obtain their public supplies from ground water and gives the probable water-bearing formation or group of formations from which the water is drawn.

Municipality:	*Probable water-bearing formation*
Alba	Wilcox group.
Alto	Carrizo sand.
Appleby	Do.
Arp	Wilcox group.
Athens	Do.
Atlanta	Do.
Avinger	Wilcox group or Carrizo sand.
Bastrop	Recent alluvium (river deposits).
Big Sandy	Carrizo sand.
Bremond	Wilcox group.
Buffalo	Do.
Calvert	Do.
Carthage	Do.
Centerville	Queen City sand member of the Mount Selman formation.
Como	Wilcox group.
Cushing	Carrizo sand.
Daingerfield	Wilcox group and Carrizo sand.
Elgin	Wilcox group.
Elkhart	Carrizo sand.
Eustace	Wilcox group.
Fairfield	Do.
Franklin	Carrizo sand.
Frankston	Queen City sand member of the Mount Selman formation.
Garrison	Wilcox group.
Gilmer	Do.
Gladewater	Wilcox group and Carrizo sand.
Grapeland	Carrizo sand.
Hallsville	Do.
Hawkins	Queen City sand member of the Mount Selman formation.
Hearne	Wilcox group.
Henderson	Do.
Hughes Springs	Wilcox group and Carrizo sand.
Jefferson	Wilcox group.
Jewett	Carrizo sand.

Municipality—Conuinued	*Probable water-bearing formation*
Karnack	Wilcox group.
Kilgore	Do.
Kosse	Do.
Lexington	Carrizo sand.
Lindale	Wilcox group.
Linden	Do.
Lufkin	Carrizo sand.
Malakoff	Wilcox group.
Marshall	Do.
Mineola	Wilcox group and Carrizo sand.
Mount Vernon	Wilcox group.
Nacogdoches	Carrizo sand.
Naples	Wilcox group.
Normangee	Carrizo sand.
Oakwood	Queen City sand member of the Mount Selman formation.
Omaha	Wilcox group.
Palestine	Do.
Pittsburg	Wilcox group and Carrizo sand.
Quitman	Wilcox group.
Rockdale	Do.
San Augustine	Do.
Smithville	Carrizo sand?.
Tatum	Wilcox group.
Tenaha	Do.
Thornton	Recent alluvium.
Timpson	Wilcox group.
Trinidad	Do.
Troup	Do.
Tyler	Do.
Waskom	Do.
Winnsboro	Carrizo sand.

Area D.—This area constitutes a strip south and southeast of area C in which the Sparta sand, sands of the Yegua formation, the Catahoula and Oakville sandstones, and sands of the Lagarto clay are the sources of ground water for public supply. These sands appear at the surface in bands of outcrop having a southwest-northeast direction, dip in general toward the Gulf, and are encountered in the order named above in traveling over the area toward the Gulf. The Sparta sand and sands of the Yegua formation furnish most of the public supplies in the northern one-third of the area. In the central and southern portions the Catahoula and Oakville sandstones and sands in the Lagarto clay are the sources of supply.

The following table lists the municipalities in area D that obtain their public supplies from ground water and gives the probable water-bearing formation or group of formations from which the water is drawn.

Municipality:	Probable water-bearing formation
Anderson	Catahoula sandstone.
Bedias	Yegua formation.
Bellville	Oakville sandstone or sands of the Lagarto clay.
Brenham	Oakville sandstone.
Bryan	Sparta sand.
Caldwell	Carrizo and Sparta sands.
Camden	Catahoula sandstone.
Cleveland	Sands of the Lagarto clay.
Columbus	Recent alluvium.
Conroe	Oakville sandstone and sands of the Lagarto clay.
Corrigan	Jackson formation.
Crockett	Sparta sand.
Doucette	Sands of the Lagarto clay or Oakville sandstone.
Fayetteville	Oakville sandstone.
Flatonia	Yegua formation.
Fostoria	Oakville sandstone.
Goodrich	Sands of the Lagarto clay.
Groveton	Jackson formation.
Halletsville	Oakville sandstone or sands of Lagarto clay.
Hemphill	Sparta sand.
Hempstead	Sands of the Lagarto clay or Oakville sandstone.
Huntsville	Catahoula sandstone.
Iola	Yegua formation.
Kirbyville	Sands of the Lagarto clay or Oakville sandstone.
LaGrange	Catahoula sandstone.
Livingston	Sands of the Lagarto clay.
Lovelady	Yegua formation.
Madisonville	Do.
Midway	Do.
Montgomery	Sands of the Lagarto clay or Oakville sandstone.
Moulton	Catahoula sandstone.
Navasota	Do.
Newton	Sands of the Lagarto clay.
New Willard	Sands of the Lagarto clay or Oakville sandstone.
Oakhurst	Do.
Pineland	Yegua formation.
Schulenburg	Oakville sandstone.
Shiner	Do.
Shiro	Catahoula sandstone.
Somerville	Yegua formation.
Trinity	Jackson formation.
Weimar	Oakville sandstone.

Municipality—Continued	Probable water-bearing formation
Wiergate	Sands of the Lagarto clay or Oakville sandstone.
Willis	Do.
Woodville	Do.
Yoakum	Sands of the Lagarto clay.

Area E.—In area E, which is adjacent to the Gulf coast, the principal sources of ground water are the Goliad and Willis sands and sands of the Lissie formation and the Beaumont clay. These sands, in common with most of the rocks of the region, dip in the general direction of the Gulf. The underground reservoirs in the sands furnish very large quantities of water for public supply and industrial use, particularly in the Houston-Pasadena, Baytown, and Texas City-Alta Loma district in Harris and Galveston Counties, where the total pumpage for these purposes reached an average of about 150,000,000 gallons a day in 1943. With the exception of Beaumont, Port Arthur, Port Neches, and Sabine Pass, all the municipalities obtain their supplies from one or more of the above-named sands. The largest supply is that of Houston, which obtains all its water from wells and is the largest city in the United States that is served entirely with ground water. Some of the city wells at Houston obtain good water from depths of more than 2,000 feet. The equivalent of an average of about 90,000,000 gallons a day is pumped from wells for rice irrigation in Harris, Waller, Fort Bend, Wharton, and Matagorda Counties.

The following table lists the municipalities in area E that obtain their public supplies from ground water. Because of the difficulty of distinguishing between the different sands in many of the wells the name of the probable formation or group of formations from which the water is drawn is omitted.

Alvin
Anahuac
Angleton
Bay City
Baytown
Bellaire
Bessmay
Blessing
Call
Cove
Crosby
Daisetta
Dayton
Deweyville
Dickinson
Eagle Lake
Edna
El Campo
Freeport
Galveston
Ganado
Goose Creek
Highlands
Honey Island
Houston
Humble
Kemah
Kountze
Lamarque
LaPorte
League City
Liberty
Mont Belvieu
Nederland
Orange
Orangefield
Palacios
Pasadena
Richmond
Rosenberg
Sealy
Silsbee
Sour Lake
Sugarland
Texas City
Texas City Heights
Tomball
Volt
Wallis
Wharton

SURFACE WATER

In the region covered by this report 50 municipalities use surface water. Of these, 38 are in area B, where, with the exception of a few localities, little or no ground water suitable for public supply is available. The requirements of most of these places are comparatively small. The consumption by Texarkana, which averages nearly 3,000,000 gallons of surface water a day, is by far the largest. Of the 12 municipalities using surface water outside of area B, four are in area A, five in area C, and three in area E.

In area A the public supplies of Dallas, the second largest city in the State, and Waco, tenth in size (1940 census), are derived mostly from surface sources. In 1943 Dallas used an average of about 32,000,000 gallons of surface water a day, most of it from a reservoir on the Elm Fork of the Trinity River, together with an average of about 3,500,000 gallons a day of ground water. In 1942 Waco used an average of about 5,500,000 gallons a day from a reservoir on the Bosque River. In 1942 Denison used on an average about 2,500,000 gallons a day from Randell Lake on Shawnee Creek, which empties into Red River below Denison Dam. These three cities use more than 60 percent of all the surface water consumed for public supply in the region.

In area C about two-thirds of the water used by Tyler and the entire supply of Rusk, Jacksonville, Longview, and Center is obtained from reservoirs on creeks, the total consumption averaging about 5,000,000 gallons a day.

In area E, Beaumont, Port Arthur, and Port Neches in Jefferson County obtain their public supplies from the Neches River. In 1943 about 12,000,000 gallons, on an average, was used daily by these three places or about 18 percent of all the surface water used in the region.

CHEMICAL CHARACTER OF WATER

ANALYSES OF WATER

Most of the analyses in this report were made in the water-resources laboratory of the Geological Survey, United States Department of the Interior, Austin, Tex. Of the 419 analyses listed, 400 were made by chemists of the Geological Survey, from samples collected in gallon Pyrex bottles by the Geological Survey and Texas Board of Water Engineers. Twelve analyses were made by the Texas State Department of Health, five by L. C. Billings, city of Dallas, and two by Southwestern Laboratories. The analyses show the quantities of dissolved minerals, which determine the fitness of the water for industrial or agricultural use or for those domestic uses that are affected by the dissolved constituents, without any reference to the sanitary aspects of the sample.

The analyses are as representative of the chemical character of the water throughout the year as could be expected from one sampling. In supplies that are obtained from wells, the analysis of a single sample is probably adequate, as the chemical quality in individual wells seldom shows any material variation. Many of the supplies were obtained from several wells or groups of wells which furnish waters that differ considerably in chemical composition. For such supplies, analyses are generally given for each of the several sources. For many treated waters and supplies from streams, a single sample is not representative, as a river water may show at different times a variation of as much as 100 percent in hardness and dissolved solids.

Only a small number of the ground-water supplies receive any treatment. Most of the public supplies obtained from surface waters are filtered and frequently are given further treatment which alters the chemical character of the water. For all supplies that are treated a brief description of the process is given, with the operations and chemicals listed in the order in which they are used.

The analyses were made by methods in general use.[1] The complete analysis for each public supply includes results for silica (SiO_2), iron (Fe), calcium (Ca), magnesium (Mg), sodium (Na) or sodium and potassium as sodium, potassium (K), bicarbonate (HCO_3), sulfate (SO_4), chloride (Cl), fluoride (F), nitrate (NO_3), total hardness reported as $CaCO_3$, dissolved solids, and hydrogen ion concentration (pH). The analyses are reported in parts per million of the different constituents, and for those radicles entering into ionic balance the equivalents per million are also given. Each of the constituents is discussed in the following text.

MINERAL CONSTITUENTS IN SOLUTION

Silica (SiO_2) is found in all natural waters and is usually present in quantities less than 30 parts per million in the waters used for the municipal supplies in eastern Texas. More alkaline waters generally contain larger amounts of silica than less alkaline waters. In general, well waters are higher in silica than surface waters. Silica does not affect the usefulness of the water except as it contributes to the formation of boiler scale.

Iron (Fe) is dissolved from practically all rocks and frequently also from iron pipes, particularly from hot water lines and boilers, in sufficiently large quantities to be objectionable. Water that contains much iron is objectionable because of its "reddish" appearance after exposure to the air and because of stains on white porcelain or enam-

[1] Collins, W. D., Notes on practical water analysis: U. S. Geol. Survey Water-Supply Paper 596-H, pp. 235-266, 1928; Am. Public Health Assoc., Standard methods of the examination of water and sewage, 7th ed., 1932.

eled ware and fixtures and on clothes or other fabrics washed in it. Many ground-water supplies in eastern Texas contain objectionable quantities of iron in the raw water; however, iron is easily removed from solution by aeration and will settle out in the process of purification. Water furnished to the municipalities in eastern Texas usually contains less than 0.2 part per million of iron.

Appreciable quantities of calcium (Ca) and magnesium (Mg) are found in waters in contact with limestone, dolomite, calcareous sand, or gypsum. The salts of calcium and magnesium make water hard (see Hardness, p. 17). Calcium and magnesium together with silica and iron form practically all the scale found in steam boilers or other vessels in which water is heated or evaporated. In general, the calcium and magnesium content of the waters in the southern part of the eastern Texas area is somewhat higher than in the northern part. Calcium and magnesium are not the major basic constituents in these waters, and the quantity of magnesium is usually much smaller than calcium.

Sodium (Na) and potassium (K) are found in all natural waters. The quantities of potassium are generally comparatively small in most waters. Moderate quantities of sodium and potassium have no effect on the suitability of the water either for domestic or for most industrial uses. The analyses show that the sodium and potassium together are the main basic constituents in most waters reported here.

Bicarbonate (HCO_3) occurs in water largely through the action of carbon dioxide, which enables the water to dissolve carbonates of calcium and magnesium from rocks. Aside from its effect on the palatibility of the water when present in excessive amounts, bicarbonate is of little significance in public water supplies. Bicarbonate is the principal acid radicle in most of the waters analyzed, particularly those supplies obtained from the deeper water-bearing sands. Surface-water supplies are generally low in bicarbonate.

Sulfate (SO_4) may be dissolved in large quantities from gypsum or from alkali deposits of sodium sulfate. It is formed by the oxidation of sulfides of iron and is therefore present in considerable quantities in water from mines and beds of shale. Sulfate in waters that contain much calcium and magnesium causes the formation of hard scale in steam boilers and may increase the cost of softening the water. Although the analyses show that sulfate is the main acid radicle in many waters, sulfate in most water supplies in eastern Texas is less than 250 parts per million.

The chloride (Cl) content of the water analyzed varies widely, although in general it is less than 250 parts per million. Appreciable quantities of chloride in equilibrium with calcium and magnesium

may increase the corrosiveness of the water. Chloride in large amounts causes a salty taste, otherwise it has little significance in the domestic use of the water. In a few water supplies sodium chloride is the main constituent and occurs in such concentrations as to be unsatisfactory for some industrial purposes.

Nitrate (NO_3) in a water may indicate contamination by sewage or other organic material, as it is considered to be the final oxidation product of nitrogenous organic material. The quantities present in water in eastern Texas is generally low and has no effect on the value of the water for ordinary uses.

The relation of the occurrence of fluoride (F) in water to the mottled enamel of teeth has been recognized for some time.[2] Mottled enamel has been found associated with water having a fluoride content of about 1.0 part per million or more.[3] Additional studies [4] have indicated that dental caries (decay) has been decreased by the use of drinking water containing measurable amounts of fluoride though not as much as 1.0 part per million. Most of the waters of eastern Texas, both surface and underground, contained less than 1.0 part per million of fluoride.

The total solids consist mainly of the dissolved minerals in solution. Although a little organic matter and water of crystallization are sometimes included, the figure for total dissolved solids for the analyses in this report may be taken as representative of the total dissolved mineral constituents in the water. More than 1,000 parts per million of dissolved solids are likely to produce a noticeable taste or in other respects make the water less desirable for a public supply. The analyses show that less than 10 percent of the samples analyzed exceeded 1,000 parts per million. Many municipal supplies in Dallas, Ellis, Falls, Fannin, Hill, Kaufman, McLennan, and Navarro Counties are somewhat more concentrated than the waters generally used throughout eastern Texas. The underground waters in these counties, though, were quite soft with the exception of those in Falls County. In most supplies the dissolved minerals were mainly sodium bicarbonate and sodium sulfate.

The corrosiveness of the water as delivered to the distribution system is of importance, and in this connection the hydrogen ion concentration (pH) or degree of acidity or alkalinity is of interest. Dissolved oxygen, carbon dioxide, free acid, and acid-generating salts are the main constituents in water that cause corrosion. The alkalinity of the water is a factor in decreasing corrosion. A public

[2] Smith, H. V., and Smith, M. C., Mottled enamel in Arizona and its correlation with concentration of fluorides in water supplies: Univ. Arizona, College Agr. Bull. 43, p. 284, 1932.

[3] Dean, H. T., Chronic endemic dental fluorisis: Am. Med. Assoc. Jour., vol. 107- pp. 1269–1272, 1936.

[4] Dean, H. T., Jac, P., Arnold, F. A., Jr., and Elvove, E., Domestic water and dental caries: Public Health Rpts, vol. 56, pp. 365–381, 761–792, 1941.

water supply should be noncorrosive to the extent that the water will not attack and destroy metal surface and result in "red water." Corrosion may be inhibited by proper treatment control or protective coating on the metal surfaces. The pH of some ground and surface waters in eastern Texas is low, but treatment is generally practiced to prevent corrosion.

HARDNESS

Hardness of a water supply probably receives the most attention with reference to domestic or industrial use. Hardness is caused almost entirely by calcium and magnesium and is reported as the amount of calcium carbonate equivalent to the calcium and magnesium. Hard water is generally recognized by the increased quantity of soap required to produce a lather and by the deposits of insoluble salts formed when it is heated or evaporated. The hardness caused by the calcium and magnesium equivalent to the bicarbonate in a water is called "carbonate hardness" and the remainder "noncarbonate hardness," or equivalent to the old terms "temporary hardness" and "permanent hardness." The character of the scale formed in steam boilers end the method of treatment are dependent on the type of hardness found in the supply. Carbonate hardness represents much of the mineral content of the water analyzed.

Approximately 75 percent of the population in eastern Texas receive water with a hardness of less than 60 parts per million. Such water is entirely satisfactory for all domestic uses though with a hardness near 60 softening may be profitable for steam-boiler plants or other industrial uses.

More than 18 percent of the inhabitants use water having a hardness between 60 and 180 parts per million. Such waters are considered moderately hard to hard in the upper range. Though softening by municipalities is generally not practiced, treatment of any supply in this group is profitable for many industrial uses.

The average hardness of all the supplies from wells is not much different from surface water supplies. However, the hardness of river water may be expected to vary materially throughout the year so that the surface-water analyses reported may not represent the average composition of the stream water. The average hardness of all surface water supplies is 88 parts per million and for ground water the average hardness is 80 parts.

STANDARDS OF WATER QUALITY

The effect of various constituents in water used for public supplies and for industrial purposes with reference to well waters in Texas is discussed by Cohen [5] in an early bulletin by the Texas State Depart-

[5] Cohen, C. A., Chemical analyses of Texas well waters: Texas State Dept. Health Bull., 1931.

ment of Health. The standards most widely used now for quality of domestic water supplies are the United States Public Health Service drinking-water standards for drinking and culinary water supply by common carriers in interstate commerce.[6] Almost 90 percent of the cities in eastern Texas have water supplies that comply with the Public Health Service standards. Allowable limits of mineral constituents for many industrial uses have been reported by Moore.[7]

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Geology and ground-water resources of the Lufkin area, Texas: U. S. Geol. Survey Water-Supply Paper 849–A, 58 pp., 1941, by W. N. White, A. N. Sayre, and J. F. Heuser.

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Geology and underground waters of northeastern Texas: U. S. Geol. Survey Water-Supply Paper 276, 78 pp., 1911, by C. H. Gordon.

Geology and underground waters of the southeastern part of the Texas Coastal Plain: U. S. Geol. Survey Water-Supply Paper 335, 365 pp. 1914, by A. Deussen.

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

[6] Public Health Service drinking-water standards: Public Health Repts., vol. 158, pp. 69–82, 1943.

[7] Moore, E. W., Progress report of the Committee on Quality Tolerances of Water for Industrial Uses: New England Water Works Assoc., vol. 54, p. 263, 1940.

location of wells have been published by the Texas State Board of Water Engineers for the following counties in the area:

Austin	Gregg	Montgomery
Brazoria	Grimes	Morris
Burleson	Hardin	Nacogdoches
Camp	Harris	Orange
Cass	Harrison	Panola
Chambers	Henderson	Rusk
Cherokee	Hopkins	Sabine-San Augustine
Colorado	Jackson	Shelby
Dallas	Jasper-Newton	Smith
Fayette	Jefferson	Titus
Fort Bend	Lavaca	Upshur
Franklin	Lee	Waller
Freestone	Leon	Wharton
Galveston	Marion	Wood

UNPUBLISHED REPORTS

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

Ground-water supply of Baytown, 1941.
Ground water available for the town of Brazoria, 1941.
Ground water in the Brenham-Gay Hill-Navasota area, 1942.
Ground-water supply of Bryan, 1944.
Development of ground water for public supply at Commerce, 1944.
Ground water in the vicinities of Daingerfield and Hughes Springs, 1941.
Water supply in the vicinity of Denton, 1944.
Ground water available for city of Freeport, 1941.
Ground-water supply of Galveston and vicinity, 1941; Results of test drilling near Alta Loma, 1941.
Water resources in Gladewater-Big Sandy area, 1942.
Ground-water resources of Grand Prarie and vicinity, 1943.
Water supply at Granger, 1944.
Ground-water resources in the vicinity of Jasper, 1941.
Water supply of Lamarque, 1942.
Ground water in the vicinities of Longview and Woodall, 1942.
Progress report on test drilling and pumping in the Sparta sand in the Lufkin area, 1943.
Ground water in the vicinity of Marlin, 1944.
Ground-water supply at the Peninsula Flying Field near Matagorda, 1943.
Ground water in the vicinity of McGregor, 1942.
Ground-water resources in the vicinity of Normangee, 1939.
Ground-water resources in the vicinity of Palestine, 1942.
Ground water near Port O'Connor, 1941.
Ground water in the Sand Flat area in Rusk and Nacogdoches Counties, 1942.
Ground-water supply of Somerville, 1939.
Ground-water supply of Texarkana, 1941.
Ground-water supply in the vicinity of Texas City, 1941.
Pump settings in wells at Blackland Flying Field near Waco, 1943.
Ground-water supply in West Point-Flatonia area, 1942.

PUBLIC WATER SUPPLIES

ANDERSON COUNTY

ELKHART

Population in 1940: 751.

Source of information: Eugene Bratz, water superintendent, June 14, 1944.

Ownership: Municipal.

Source of supply: Well at elevated tank; drilled in 1935 by Layne-Texas Co.; depth, 640 feet; diameter, 8 to 6 inches; 58 feet of screen near bottom; deep-well turbine pump and 15-horsepower electric motor.

Pumpage (estimated): Average, 20,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Treatment: None.

Analysis, well 1

[Collected June 14, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	81	1.69
Iron (Fe)	2.4		Chloride (Cl)	21	.59
Calcium (Ca)	53	2.65	Fluoride (F)	.1	.01
Magnesium (Mg)	16	1.32	Nitrate (NO_3)	.8	.01
Sodium (Na)	13	.56	Total dissolved solids	298	
Potassium (K)	7.0	.18	Total hardness as $CaCO_3$	198	
Bicarbonate (HCO_3)	146	2.39	pH	7.7	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay	60	60	Water sand	40	370
Red shale	20	80	Hard shale	58	428
Blue soft shale	80	160	Water sand and sand rock	40	468
Gumbo	18	178	Hard shale	4	472
Hard gumbo	101	279	Hard shale mixed with sand	98	570
Hard shale	23	302	Water sand	70	640
Sand rock and boulders	28	330			

FRANKSTON

Population in 1940: 1,216.

Source of information: J. P. Hardee, water superintendent, June 14, 1944.

Ownership: Municipal.

Source of supply: Well 150 feet east of elevated tank in northeast part of town; dug in 1928; depth, 20 feet; diameter, 12 feet; brick wall; centrifugal pump and 1-horsepower electric motor; static water level, 8 feet below land surface in June 1944; yield, 75 gallons a minute with draw-down of 8 feet after pumping 12 hours; temperature, 65½° F.

Pumpage: Average, 30,000 gallons a day.

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

Number of customers: 200.

Treatment: None.

Analysis, well 1

[Collected June 14, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	24		Sulfate (SO_4)	4	0.083
Iron (Fe)	.01		Chloride (Cl)	3.0	.085
Calcium (Ca)	5.0	0.250	Fluoride (F)	.4	.021
Magnesium (Mg)	1.6	.132	Nitrate (NO_3)	11	.177
Sodium (Na)	3.0	.130	Total dissolved solids	74	
Potassium (K)	2.6	.067	Total hardness as $CaCO_3$	19	
Bicarbonate (HCO_3)	13	.213	pH	6.7	

PALESTINE

Population in 1940: 12,144.

Source of information: Fred Elsker, water superintendent, June 14, 1944.

Ownership: Municipal.

Source of supply: Two wells at pump station about 2 miles west of city.

Well 1. At east end of dam; drilled in April 1940 by Layne-Texas Co.; depth, 2,018 feet but plugged back to 1,617 feet; diameter, 16 to 8⅝ inches; screens from 1,304 to 1,395 and 1,439 to 1,596 feet; deep-well turbine pump and 100-horsepower electric motor; pump set at 320 feet; static water level, 148 feet below land surface in May 1940; yield, 1,023 gallons a minute with draw-down of 125 feet; temperature, 89° F.

Well 2. At west end of dam, 1,150 feet west of well 1; drilled in June 1940 by Layne-Texas Co.; depth, 1,600 feet; diameter, 16 to 8 inches; screens from 1,273 to 1,388, 1,426 to 1,471, 1,479 to 1,502, and 1,514 to 1,584 feet; deep-well turbine pump and 100-horsepower electric motor; pump set at 320 feet; yield, 1,340 gallons a minute with a pumping level of 279 feet.

Average pumpage, in gallons a day

	1941	1943	1944		1941	1943	1944
January	657,000	595,000	750,000	July	789,000	1,155,000	
February	699,000	610,000	681,000	August	1,229,000	1,128,000	
March	630,000	716,000	860,000	September	962,000	992,000	
April	516,000	662,000	855,000	October	818,000	803,000	
May	723,000	823,000	930,000	November	533,000	754,000	
June	551,000	923,000		December	706,000	836,000	

Storage: Elevated tank, 350,000 gallons.

Number of customers: 3,200.

Treatment: None.

Analyses

[Collected June 14, 1944. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	20		20	
Iron (Fe)	.02		.06	
Calcium (Ca)	3.4	0.170	3.6	0.180
Magnesium (Mg)	.8	.066	.7	.058
Sodium (Na)	72	3.140	56	2.414
Potassium (K)	1.7	.043	1.8	.046
Bicarbonate (HCO_3)	195	3.195	151	2.481
Sulfate (SO_4)	3	.062	5.2	.108
Chloride (Cl)	5.0	.141	3.0	.085
Fluoride (F)	.4	.021	.2	.011
Nitrate (NO_3)	0	0	.8	.013
Total dissolved solids	217		170	
Total hardness as $CaCO_3$	12		12	
pH	8.2		8.1	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand	13	13	Shale	22	744
Clay	22	35	Fine-grained grey sand	32	776
Lignite	2	37	Lignite	8	784
Sand, shale, and lignite	120	157	Sandy shale	98	882
Shale	25	182	Sand	14	896
Sand	62	244	Sandy shale	216	1,112
Shale	16	260	Hard sandy shale	74	1,186
Sandy shale	45	305	Shale	99	1,285
Sand	6	311	Rock (very hard)	9	1,294
Sand, shale, and lignite	71	382	Sand	90	1,384
Shale	14	396	Shale	16	1,400
Shale, layers of rock	4	400	Shale and sand	36	1,436
Shale	32	432	Sand	153	1,589
Sand	12	444	Shale	78	1,667
Sandy shale	23	467	Fine shaly sand and lignite	50	1,717
Shale	23	490	Sandy shale	44	1,761
Sandy shale	48	538	Hard shale	30	1,791
Sand	27	565	Sandy shale	94	1,885
Shale	10	575	Rock	1	1,886
Sandy shale	25	600	Shale	27	1,913
Shale	19	619	Sand	25	1,938
Sandy shale	101	720	Shale	80	2,018
Rock	2	722			

Well 2

Surface clay	12	12	Hard shale	27	758
Coarse brown sand	8	20	Shale	33	791
White clay	3	23	Sand	8	799
Gray sand	10	33	Sandy shale and shale	89	888
Layers sand and clay	41	74	Sand and sandy shale	19	907
Sandy shale and lignite	89	163	Sandy shale	170	1,077
Shale	21	184	Hard shale	30	1,107
Sand	55	239	Sandy shale	10	1,117
Sandy shale and lignite	127	366	Sandy shale and sand	87	1,204
Sand, layers of lignite	14	380	Shale	20	1,224
Shale	21	401	Shale and sandy shale	40	1,264
Hard layers	3	404	Sand	55	1,319
Shale	34	438	Sand rock	4	1,323
Sand	18	456	Hard-packed sand	44	1,367
Sandy shale	18	474	Rock	1	1,368
Hard shale	17	491	Hard sandy shale	15	1,383
Sandy shale	59	550	Rock	4	1,387
Rock	2	552	Hard sand, shale, boulders	83	1,470
Sandy shale	32	584	Sand (shaly)	28	1,498
Hard shale	24	608	Sand (good)	82	1,580
Shale	123	731	Hard sandy shale	20	1,600

ANGELINA COUNTY

LUFKIN

Population in 1940: 9,567.

Source of information: J. W. Lewis, city manager, Oct. 4, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 3. At Redland: about 4 miles north of Lufkin; drilled in 1939 by Layne-Texas Co.; depth, 1,168 feet; diameter, 16 to 10 inches; screens from 1,055 to 1,106 and 1,116 to 1,167 feet; deep-well turbine pump and electric motor; yield, 850 gallons a minute; temperature, 88° F.

Well 4. At pumping plant about 1 mile north of Lufkin; drilled in 1944 by Layne-Texas Co.; depth, 66 feet; diameter, 24 to 16 inches; screen from 20 to 66 feet; deep-well turbine pump and electric motor; yield, 150 gallons a minute; temperature, 66° F.

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

Storage: Four surface reservoirs, 200,000 gallons each; elevated tank, 400,000 gallons.

Number of customers: 2,179.

Treatment: Chlorination.

Analyses

[Collected Oct. 4, 1944. Analyzed by J. H. Rowley.]

	Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_4)	17		58	
Iron (Fe)	.02		1.4	
Calcium (Ca)	1.4	0.08	7.9	0.394
Magnesium (Mg)	.6	.05	3.7	.304
Sodium (Na)	126	5.35	26	1.140
Potassium (K)	2.6	.06	4.1	.105
Bicarbonate (HCO_3)	235	3.86	55	.902
Sulfate (SO_4)	66	1.37	6.5	.135
Chloride (Cl)	11	.31	32	.903
Fluoride (F)	0	0	0	.0
Nitrate (NO_3)	0	0	.2	.003
Total dissolved solids	351		181	
Total hardness	6		35	
pH	8.0		6.2	

Driller's log

Well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand	2	2	Soft green shale and shell, rock at 700 feet	51	712
Red clay	24	26	Rock	2	714
Shale	10	36	Hard sticky shale rock at 729 feet	11	725
Fine greensand, shale	23	59	Soft green shale	10	735
Soft blue shale, shells	65	124	Rock	1	736
Soft rock	1	125	Soft shale	19	755
Soft brown shale and shells	80	205	Sand	5	760
Soft brown shale and shells	20	225	Soft brown shale, rock at 775 feet	11	771
Rock	1	226	Soft shale, thin layers of sand	16	787
Soft shale	10	236	Hard rock	1	788
Rock	2	238	Soft shale, thin layers of rock	16	804
Shale, rock at 287 feet and 304 feet	67	305	Soft shale	10	814
Sticky shale, rock at 325 feet	33	338	Hard brown shale	42	856
Soft brown shale	23	361	Hard sticky shale	42	898
Brown shale, thin sandy layers	20	381	Soft shale	5	903
Brown shale, rock at 435 feet	55	436	Rock	1	904
Sand layers, shale, some lignite	28	464	Hard sticky shale, rock at 912 feet	8	912
Brown shale	19	483	Rock	1	913
Fine sand	9	492	Sticky shale	12	925
Soft shale	14	506	Hard rock	1	926
Fine sand (static head 144 feet)	57	563	Soft blue shells and shale	53	979
Brown shale, thin layers of rock	12	575	Sticky shale and shells	7	986
Sand	21	596	Soft shale	35	1,021
Brown shale, shells, lignite rock	26	622	Sand	5	1,026
Hard sticky shale	5	627	Hard shale	3	1,029
Rock	2	629	Soft rock	1	1,030
Soft shale, shells, lignite	4	633	Shale, thin layers sand	26	1,056
Rock	2	635	Sand	10	1,066
Soft green shale and shells	11	646	Water sand	23	1,089
Green sticky shale, shells	15	661	White water sand	95	1,184
			Soft shale	4	1,188

AUSTIN COUNTY

BELLVILLE

Population in 1940: 1,347.

Source of information: Elgin Ueckert, water superintendent, February 1944.

Ownership: Municipal.

Source of supply: Two wells (Nos. 1 and 3).

Well 1. 1 block southwest of courthouse; drilled in 1928 by J. W. Jackson; depth, 786 feet; diameter, 10 inches; screens from 487 to 509, 690 to 711, and 720 to 740 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 83 feet below land surface in 1941; yield, 248 gallons a minute with draw-down of 10 feet; temperature, 79° F.

Well 3. 1 block southwest of courthouse; drilled in 1937 by J. W. Jackson; depth, 754 feet; diameter, 8 inches; deep-well turbine pump and electric motor; static water level 83 feet below land surface; yield, 242 gallons a minute; temperature, 78½° F.

Pumpage (estimated): Maximum, 130,000 gallons; minimum, 55,000 gallons; average, 90,000 gallons a day.

Storage: Concrete ground reservoir, 55,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 425.

Treatment: Zeolite softening.

Analyses

[Collected Feb. 19, 1944. Analyzed by J. H. Rowley]

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	29		28	
Iron ($Fe)_2$	.08		.58	
Calcium (Ca)	68	3.39	72	3.59
Magnesium (Mg)	12	.99	12	.99
Sodium (Na)	92	4.02	97	4.21
Potassium (K)	9.1	.23	9.4	.24
Bicarbonate (HCO_3)	367	6.02	381	6.25
Sulfate (SO_4)	46	.96	45	.94
Chloride (Cl)	58	1.64	65	1.83
Fluoride (F)	.2	.01	.2	.01
Nitrate (NO_3)	.2	0	.2	0
Total dissolved solids	495		517	
Total hardness as $CaCO_3$	219		229	
pH	7.3		7.3	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red sand	27	27	Rock	5	364
Sand	32	59	Sand	18	382
Sandy clay	9	68	Gumbo	66	448
Sand	17	85	Sandy shale	12	460
Sandy clay	11	96	Gumbo	28	488
Gumbo	92	188	Water sand	20	508
Rock	5	193	Sandy shale	6	514
Hard sand	16	209	Gumbo	61	575
Rock	5	214	Sandy shale	15	590
Gumbo	63	277	Gumbo	91	681
Rock	1	278	Sand	7	688
Gumbo	54	332	Rock	2	690
Sand	2	334	Water sand	21	711
Rock	5	339	Gumbo	9	720
Sand	6	345	Water sand	40	760
Gumbo	3	359	Sand and black gumbo	26	786

Well 3

Limey shale	48	48	Tough shale and rock	3	355
Sand and shale	11	59	Good sand	14	369
Hard shale	45	104	Rock	4	373
Tough, gummy shale	77	181	Tough shale	68	441
Lime rock	8	189	Sand	13	454
Hard sand	5	194	Tough shale and rock	18	472
Hard shale and rock	22	216	Sand (hard)	28	500
Tough, gummy shale	62	278	Tough shale	62	562
Rocky shale	7	285	Rock	16	578
Hard rock and sand	4	289	Hard tough shale	44	622
Tough shale and lime	38	327	Hard sandy shale	16	640
Hard lime rock	7	334	Tough, rocky shale	38	678
Sand and boulders	8	342	Hard sand	27	705
Tough shale	10	352	Sand	49	754

SEALY

Population in 1940: 2,000.

Source of information: L. E. Kurtz, water superintendent, February 1944.

Owner: Texas Community Public Service Co.

Source of supply: Well at pumping station of the Texas Community Public Service Co., 5 blocks northwest of post office; drilled in 1930 by Layne-Texas Co.; depth, 304 feet; diameter, 10 to 8 inches; screens from 245 to 268 and 277 to 301 feet; deep-well turbine pump; static water level, 52 feet below land surface in 1942; yield, 200 gallons a minute with drawn-down of 28 feet.

Average pumpage in 1943, in gallons a day

January	46,200	April	52,600	July	77,800	October	52,300
February	54,100	May	72,700	August	69,600	November	57,500
March	45,100	June	71,600	September	68,200	December	45,200

Storage: Ground reservoir, 25,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 400.

Treatment: None.

Analysis, well 1

[Collected Feb. 19, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	22		Sulfate (SO_4)	3.4	0.071
Iron (Fe)	.02		Chlorine (Cl)	29	.818
Calcium (Ca)	48	2.396	Fluoride (F)	.2	.011
Magnesium (Mg)	2.8	.230	Nitrate (NO_3)	1.2	.019
Sodium (Na)	17	.760	Total dissolved solids	203	
Potassium (K)	2.9	.074	Total hardness as $CaCO_3$	131	
Bicarbonate (HCO_3)	155	2.541	pH	7.6	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Gumbo	40	198
Yellow clay	50	53	Sand	21	219
Rock	17	70	Clay	24	243
Sand	2	72	Water sand	22	265
Clay	18	90	Clay	10	275
Sand	41	131	Water sand	24	299
Gumbo	6	137	Clay	5	304
Sand	21	158			

WALLIS

Population in 1940: 900.

Source of information: Frank Pazderny, owner, February 1944.

Owner: Frank Pazderny.

Source of supply: Well 1½ blocks south of post office; drilled in 1911 by Chas. Novosad; depth, 140 feet; diameter, 3 inches; 8 feet of screen at bottom; deep-well cylinder pump; static water level, 60 feet below land surface on Feb. 19, 1944.

Pumpage (estimated): Average, 1,200 gallons a day.

Storage: Elevated tank, 4,500 gallons.

Number of customers: 15.

Treatment: None.

Analysis, well 1

[Collected Feb. 19, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	28		Sulfate (SO_4)	12	0.25
Iron (Fe)	.02		Chloride (Cl)	36	1.02
Calcium (Ca)	66	3.29	Fluoride (F)	.2	.01
Magnesium (Mg)	10	.82	Nitrate (NO_3)	1.0	.02
Sodium (Na)	43	1.89	Total dissolved solids	365	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	206	
Bicarbonate (HCO_3)	297	4.87	pH	8.4	

BASTROP COUNTY

BASTROP

Population in 1940: 1,976.

Source of information: Bryan Sanders, water superintendent, February 1943.

Ownership: Municipal.

Source of supply: Three wells on Buttonwood Street near the Colorado River.

Well 1. Drilled in 1923 by Layne-Texas Co.; depth, 58 feet; diameter, 24 inches; screen at 28–42 feet; deep-well turbine pump and 50-horsepower electric motor; static water level, 16.75 feet below land surface; yield, 500 gallons a minute.

Well 2. Drilled in 1927 or 1928 by Layne-Texas Co.; depth, 52 feet; diameter, 16 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 150 gallons a minute.

Well 3. Drilled in 1943 by Layne-Texas Co.; depth, 47 feet; diameter, 24 inches; static water level, 22 feet below land surface; yield, 500 gallons a minute.

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

Storage: Reservoir on top of hill at the CCC Camp, 214,000 gallons; standpipe, 120,000 gallons.

Number of customers: 500.

Treatment: Chlorination.

Analysis, well 2

[Collected June 25, 1942. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	38	0.79
Iron (Fe)	.02		Chloride (Cl)	34	.96
Calcium (Ca)	75	3.74	Fluoride (F)	.2	.01
Magnesium (Mg)	16	1.32	Nitrate (NO_3)	.8	.01
Sodium (Na)	47	.47	Total dissolved solids	359	
Potassium (K)			Total hardness as $CaCO_3$	203	
Bicarbonate (HCO_3)	271	4.44	pH	7.3	

ELGIN

Population in 1940: 2,008.

Source of information: Otto Francke, water superintendent, February 1943.

Ownership: Municipal.

Source of supply: Well (No. 3) 4½ miles east of Elgin; drilled in 1935 by Layne-Texas Co.; depth, 68 feet; diameter, 24 inches (gravel packed); deep-well turbine pump and 15-horsepower electric motor; static water level, 1.0 foot below land surface; yield, 450 gallons a minute with draw-down of 18 feet.

Pumpage (estimated): Average, 250,000 gallons a day, of which 70,000 gallons is used by railroad.

Storage: Ground reservoir at pumping station, 88,000 gallons; standpipe, 50,000 gallons.

Number of customers: 573.

Treatment: None.

Analysis, well 3

[Collected Feb. 10, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	30		Sulfate (SO_4)	30	0.625
Iron (Fe)	2.3		Chloride (Cl)	118	3.328
Calcium (Ca)	27	1.348	Fluoride (F)	.4	.021
Magnesium (Mg)	9.1	.748	Nitrate (NO_3)	1.0	.016
Sodium (Na)	50	2.172	Total dissolved solids	331	
Potassium (K)	5.8	.148	Total hardness as $CaCO_3$	105	
Bicarbonate (HCO_3)	26	.426	pH	7.4	

SMITHVILLE

Population in 1940: 3,100.

Source of information: B. F. Wesson, water superintendent, February 1943.

Ownership: Municipal.

Source of supply: Two wells 3 blocks west of Main Street near the Colorado River.

Well 1. Drilled in 1910; depth, 650 feet; diameter, 8 inches; deep-well turbine pump and 20-horsepower electric motor; static water level reported, 20 feet below measuring point; yield, 400 gallons a minute.

Well 2. Drilled in 1910; depth, 651 feet; diameter, 8 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 400 gallons a minute.

Pumpage (estimated): Maximum, 150,000 gallons; minimum, 80,000 gallons; average, 100,000 gallons a day.

Storage: Ground reservoir, 50,000 gallons; elevated tank, 150,000 gallons.

Number of customers: 800.

Treatment: Aeration over baffle aerator and coke bed.

Analyses

[Collected Feb. 10, 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		13	
Iron (Fe)	.14		.06	
Calcium (Ca)	45	2.25	11	0.55
Magnesium (Mg)	18	1.48	5.5	.45
Sodium (Na)	139	6.03	266	11.58
Potassium (K)	7.8	.20	8.8	.23
Bicarbonate (HCO_3)	274	4.49	683	11.20
Sulfate (SO_4)	156	3.25	1.2	.02
Chloride (Cl)	78	2.20	52	1.47
Fluoride (F)	.3	.02	2.0	.11
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	596		708	
Total hardness as $CaCO_3$	186		50	
pH	8.3		8.4	

BOWIE COUNTY

DE KALB

Population in 1940: 1,287.

Source of information: R. P. Napp, water superintendent, July 10, 1941.

Ownership: Municipal.

Source of supply: Four wells, 2 blocks northwest of post office.

Well 1. Drilled in 1927 by Air Made Well Co.; depth, 165 feet; diameter, 8 to 6 inches; air lift; static water level, 45 feet below top of well casing in July 1941; reported yield, 125 gallons a minute in 1927 and about 50 gallons a minute in 1941.

Well 2. Drilled in 1940 by Air Made Well Co.; depth, 177 feet; diameter, 8 to 6 inches; air lift; yield, 22 gallons a minute in August 1940.

Well 3. Drilled in 1940 by Air Made Well Co.,; depth , 177 feet; diameter, 8 to 6 inches; air lift; static water level, 34 feet below land surface in July 1941; yield, 18 gallons a minute in August 1940..

Well 4. Drilled in 1940 by Air Made Well Co.; depth 177 feet; diameter, 8 to 6 inches; air lift; yield, 20 gallons a minute in August 1940.

Pumpage (estimated): Maximum, 94,000 gallons; average, 70,000 gallons a day.
Storage: Concrete ground reservoir, 50,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 325.
Treatment: Occasional chlorination.

Analyses

[Collected July 10, 1941. Analyzed by J. W. Yett, Jr.]

	Well 1		Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	12	0.60	34	1.70	27	1.35
Magnesium (Mg)	4.5	.37	6.6	.54	9.6	.79
Sodium (Na) and Potassium (K)	12	.52	10	.45	17	.73
Bicarbonate (HCO_3)	12	.20	16	.26	21	.34
Sulfate (SO_4)	4	.08	5	.10	32	.67
Chloride (Cl)	20	.56	20	.56	26	.73
Nitrate (NO_3)	40	.65	110	1.77	70	1.13
Total dissolved solids	166		306		253	
Total hardness as $CaCO_3$	48		112		107	
pH					9.0	

NEW BOSTON

Population in 1940: 1,111.
Source of information: W. C. Case, water superintendent, Nov. 2, 1943.
Ownership: Municipal.
Source of supply: Three springs 3 miles south of New Boston.
Pumpage (estimated): Maximum, 96,000 gallons; average, 70,000 gallons a day.
Storage: Elevated tank, 60,000 gallons.
Number of customers: 369.
Treatment: Chlorinated lime.

Analysis, composite sample

[Collected Nov. 2, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_4)	20		Sulfate (SO_4)	4	0.083
Iron (Fe)	.35		Chloride (Cl)	8.0	.226
Calcium (Ca)	6.4	0.319	Fluoride (F)	.2	.011
Magnesium (Mg)	1.5	.123	Nitrate (NO_3)	7.5	.121
Sodium (Na)	4.2	.184	Total dissolved solids	69	
Potassium (K)	1.7	.043	Total hardness as $CaCO_3$	22	
Bicarbonate (HCO_3)	13	.213	pH	7.6	

TEXARKANA

Population in 1940: 28,840.

Source of information: J. R. Wood, manager, Texarkana Water Corp., Sept. 22, 1943.

Owner: Texarkana Water Corp.

Source of supply: Three well fields and one impounding reservoir.

Arkansas station well field. Near East Ninth Street and Jefferson Avenue; 24 wells ranging in depth from 40 to 50 feet; diameter, 6 inches; vacuum pumps; reported combined yield, about 700,000 gallons a day; temperature, 68° F.

Texas station well field. About 1 mile west of Texarkana; 10 wells ranging in depth from 40 to 50 feet; diameter, 5 inches; vacuum pumps; reported combined yield, about 300,000 gallons a day.

Bringle station well field. 6 miles northwest of Texarkana; 10 wells about 37 feet deep; diameter, 8 inches; vacuum pumps; temperature, 67° F.

Impounding reservoir. At Bringle station well field; built in 1928; drainage area, 5.23 square miles, area under water, 252 acres; average depth of water, 10.8 feet; capacity, 912,520,000 gallons.

Average pumpage, in gallons a day

	1940	1941	1943		1940	1941	1943
January	1,300,000	1,440,000	2,330,000	July	1,720,000	----------	3,020,000
February	1,440,000	1,460,000	2,350,000	August	1,660,000	----------	3,310,000
March	1,420,000	1,440,000	2,340,000	September	1,630,000	----------	----------
April	1,420,000	1,470,000	2,390,000	October	1,630,000	----------	----------
May	1,480,000	1,630,000	2,560,000	November	1,500,000	----------	----------
June	1,560,000	1,720,000	2,830,000	December	1,470,000	----------	----------

Storage: None.

Treatments: Arkansas station, aeration and chlorination; Texas station, chlorination; Bringle station, coagulation with lime and alum, sedimentation, activated carbon, rapid sand filter, and chlorination.

Analyses

[Collected Sept. 22, 1943. Analyzed by J. H. Rowley]

	Arkansas station well field		Texas station well field	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	34	----------	26	----------
Iron (Fe)	.02	----------	.01	----------
Calcium (Ca)	8.9	0.444	2.4	1.120
Magnesium (Mg)	4.1	.337	1.2	.099
Sodium (Na)	16	.704	7.4	.321
Potassium (K)	3.5	.090	2.5	.064
Bicarbonate (HCO_3)	24	.393	10	.164
Sulfate (SO_4)	2	.042	3	.062
Chloride (Cl)	32	.903	8.0	.226
Fluoride (F)	.2	.011	0	0
Nitrate (NO_3)	14	.226	9.4	.152
Total dissolved solids	144	----------	71	----------
Total hardness as $CaCO_3$	39	----------	11	----------
pH	5.4	----------	5.6	----------

Analyses—Continued

	Bringle station well field		Bringle Lake (raw water)	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	36		5.1	
Iron (Fe)	.11		.03	
Calcium (Ca)	16	0.799	9.3	0.464
Magnesium (Mg)	4.4	.362	2.7	.222
Sodium (Na)	19	.806	5.5	.240
Potassium (K)	2.8	.072	4.2	.107
Bicarbonate (HCO_3)	55	.902	34	.557
Sulfate (SO_4)	2	.042	3	.062
Chloride (Cl)	37	1.044	14	.395
Fluoride (F)	.2	.040	.2	.011
Nitrate (NO_3)	2.5	2.039	.5	.008
Total dissolved solids	149		68	
Total hardness as $CaCO_3$	58		34	
pH	6.6		6.6	

BRAZORIA COUNTY

ALVIN

Population in 1940: 3,087.

Source of information: H. W. Wood, water superintendent, January 1941.

Ownership: Municipal.

Source of supply: Two wells (Nos. 1 and 2).

Well 1. Drilled in 1909; depth, 750 feet; diameter, 8 (?) inches; deep-well turbine pump and electric motor; static water level, 42.5 feet below measuring point in 1933 and 67.5 feet in November 1939; water-level measurments made by H. W. Wood.

Well 2. Drilled in 1936 by Layne-Texas Co.; depth, 715 feet; diameter, 13½ to 6⅝ inches; screen from 604 to 715 feet; deep-well turbine pump and electric motor; static water level, 52.5 feet below measuring point on Jan. 20, 1937; yield, 420 gallons a minute with draw-down of 100 feet on Dec. 22, 1936, and 330 gallons a minute with draw-down of 90 feet on Jan. 20, 1937.

Average pumpage, in gallons a day

	1939	1940	1941		1939	1940	1941
January	85,900	114,500	121,200	July	118,800	123,200	
February	95,200	114,200	110,800	August	115,100	130,900	
March	84,500		116,900	September	135,000	134,000	
April	115,000	117,000	139,200	October	119,000	127,500	
May	101,900	123,500		November	111,400	120,300	
June	103,700	121,800		December	94,200	120,300	

Storage: Concrete reservoir, 1,260 gallons; elevated tank, 50,000 gallons.

Number of customers: 540.

Treatment: None.

Analyses

[Collected Jan. 20, 1941. Analyzed by J. W. Yett, Jr.]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	19		18	
Iron (Fe)	.03		.04	
Calcium (Ca)	17	0.85	16	0.80
Magnesium (Mg)	5.4	.44	5.0	.41
Sodium (Na)	263	11.44	259	11.24
Potassium (K)				
Bicarbonate (HCO_3)	342	5.61	342	5.61
Sulfate (SO_4)	1	.02	1	.02
Chloride (Cl)	250	7.05	240	6.77
Fluoride (F)	1.0	.05	1.0	.05
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	730		709	
Total hardness as $CaCO_3$	65		60	
pH	8.4		8.1	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Clay	38	273
Clay	16	20	Shale	30	303
Sand and muck	49	69	Shale and sand	23	326
Clay	6	75	Tough clay	64	390
Sand	14	89	Sand and shale	16	406
Clay	46	135	Clay	13	419
Sand	25	160	Sandy shale	23	441
Clay	7	167	Tough clay	149	590
Sand	23	190	Sand	125	715
Clay	28	218	Clay	7	722
Sand	17	235			

ANGLETON

Population in 1940: 1,763.

Source of information: E. L. Coole, city secretary, and Luther Patterson, well driller, at Angleton, January 1941.

Ownership: Municipal.

Source of supply: Two wells (Nos. 1 and 3).

Well 1. Drilled by Luther Patterson; date unknown; depth 1,012 feet; diameter, 6 inches; deep-well turbine pump and electric motor.

Well 3. Drilled in 1940 by Layne-Texas Co.; depth, 938 feet; diameter, 10¾ to 5 inches; deep-well turbine pump and electric motor; static water level, 14.02 feet below measuring point on Nov. 1, 1940; yield, 250 gallons a minute on Nov. 1, 1940.

Average pumpage, in gallons a day

	1939	1940	1941		1939	1940	1941
January		63,600	82,300	July	58,400	75,700	
February		69,200	80,800	August	59,800	75,400	
March		56,600	67,800	September	65,800	87,100	
April		70,900	76,600	October	56,100	75,400	
May		66,300	84,800	November	53,100	83,100	
June		80,700		December	51,900	62,600	

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

Treatment: Aeration and chlorination.

Analyses

[Collected Jan. 20, 1941. Analyzed by J. W. Yett, Jr., and E. W. Lohrl

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		15	
Iron (Fe)	.06		1.0	
Calcium (Ca)	12	0.60	12	0.60
Magnesium (Mg)	4.3	.35	4.1	.34
Sodium (Na) + Potassium (K)	305	13.25	274	11.93
Bicarbonate (HCO_3)	384	6.29	402	6.59
Sulfate (SO_4)	1	.02	1	.02
Chloride (Cl)	278	7.84	222	6.26
Fluoride (F)	1.0	.05		
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	801		728	
Total hardness as $CaCO_3$	48		47	
pH	8.0		7.9	

Drillers' log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	8	8	Sand, layers of clay	70	728
Sand	52	60	Fine-grained sand	24	752
Clay	23	83	Clay	21	773
Streaks of sand and clay	105	188	Sand, layers of clay	26	799
Clay	17	205	Clay	26	825
Sand	19	224	Sand	18	843
Clay, streaks of mealy clay	78	302	Clay	30	873
Clay	31	333	Broken clay and sand	39	912
Mealy clay	22	355	Sand	22	934
Clay	38	393	Clay	41	975
Broken clay and sand	112	505	Sand, layers of clay	27	1,002
Sand, streaks of clay	83	588	Clay	10	1,012
Clay	70	658			

FREEPORT

Population in 1940: 2,579.

Source of information: J. E. Reed, Jr., water superintendent, June 1941.

Ownership: Municipal.

Source of supply: Four wells (Nos. 1, 2, 3, and 4).

Well 1. At pumping station 110 West 2d Street; drilled in 1920; depth, 250 feet; diameter, 6 inches; air lift; yield, 65 gallons a minute.

Well 2. At pumping station 110 West 2d Street; drilled in 1920; depth, 250 feet; diameter, 6 inches; air lift; yield, 85 gallons a minute.

Well 3. At pumping station 110 West 2d Street; drilled in 1936 by Layne-Texas Co.; depth, 250 feet; diameter, 6 inches; air lift; static water level, 37.02 feet below measuring point on Sept. 6, 1936; yield, 65 gallons a minute.

Well 4. At 8th and Mesquite Streets; drilled in 1941 by Layne-Texas Co.; depth, 249 feet; diameter, 13 inches; deep-well turbine pump and electric motor; static water level, 60.0 feet below measuring point on June 27, 1941; yield, 250 gallons a minute.

Pumpage: Average, 206,000 gallons a day in 1941.

Storage: Two steel ground reservoirs, 12,000 gallons each; elevated tank, 50,000 gallons.

Number of customers: 806.

Treatment: Chlorination.

Analysis, well 3

[Collected June 20, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	1	0.02
Iron (Fe)	.04		Chloride (Cl)	155	4.37
Calcium (Ca)	21	1.05	Fluoride (F)	.6	.03
Magnesium (Mg)	12	.99	Nitrate (NO_3)	2.6	.04
Sodium (Na), Potassium (K)	291	12.65	Total dissolved solids	816	
			Total hardness as $CaCO_3$	102	
Bicarbonate (HCO_3)	624	10.23	pH	8.0	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red and blue clay	20	20	Sand, shale, shells	22	172
Sand	8	28	Blue clay	53	226
Red and blue clay	74	102	Sand (water)	25	250
Shale and shells	23	125	Clay	1	251
Blue clay	25	150			

Well 2

Red and yellow clay	15	15	Blue clay	25	150
Fine-grained sand	10	25	Sand, shale, shells	22	172
Coarse-grained sand	10	35	Blue clay	53	225
Blue and yellow clay	65	100	Sand	25	250
Shale and shells	25	125			

Driller's logs—Continued

Well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	5	5	Sticky clay	11	137
Clay	3	8	Soft shale and shells	38	175
Fine sandy clay	15	23	Sticky clay	51	226
Sand and shells	8	31	Sand	23	249
Clay	69	100	Clay	1	250
Sticky shale	26	126			

Well 4

Surface soil	3	3	Good water sand	24	230
Red clay	54	57	Shale	2	232
Soft red clay	120	177	Fine-grained sand	15	247
Sticky red shale	29	206	Shale	2	249

BRAZOS COUNTY

BRYAN

Population in 1940: 11,842.

Source of information: C. M. Ramsey, superintendent of utilities, June 1944.

Ownership: Municipal.

Source of supply: Five wells about 3½ miles northwest of Bryan. All wells are in line about 2,200 feet apart.

Well 1. Drilled in 1938 by Layne-Texas Co.; depth, 557 feet; diameter, 8⅝ to 6⅝ inches; screens from 462 to 475 and 494 to 544 feet; deep-well turbine pump and 30-horsepower electric motor; static water level, 137.27 feet below pump base June 24, 1944; yield, 261 gallons a minute with 73 feet of draw-down July 1, 1944.

Well 2. 2,500 feet northeast of well 1; drilled in 1939 by Layne-Texas Co.; depth, 523 feet; diameter, 16 to 8⅝ inches; screen from 435 to 523 feet; deep-well turbine pump and 50-horsepower electric motor; static water level, 166.70 feet below pump base July 2, 1944; yield, 315 gallons a minute with a draw-down of 64 feet June 24, 1944.

Well 3. 2,500 feet northeast of well 2; drilled in 1939 by Layne-Texas Co.; depth, 498 feet; diameter, 16 to 8⅝ inches; screen from 422 to 492 feet; deep-well turbine pump and 50-horsepower electric motor; static water level, 162.15 feet below pump base July 2, 1944; yield, 346 gallons a minute with a draw-down of 82 feet July 6, 1944; temperature, 80° F.

Well 4. 2,500 feet northeast of well 3; drilled in 1939 by Layne-Texas Co.; depth, 677 feet; diameter, 16 to 8⅝ inches; screens from 391 to 422 and 549 to 600 feet; deep-well turbine pump and 50-horsepower electric motor; static water level, 152.97 feet below pump base June 14, 1944; yield, 424 gallons a minute with draw-down of 70 feet June 15, 1944; temperature, 80½° F.

Well 5. About 2,400 feet south of well 1; drilled in 1943 by Layne-Texas Co.; depth, 584 feet; diameter, 16 to 8⅝ inches; screens from 430 to 485 and 534 to 573 feet; deep-well turbine pump and 60-horsepower electric motor; static water level, 114.57 feet below pump base June 24, 1944; yield, 582 gallons a minute with a draw-down of 90 feet June 19, 1944.

Pumpage [8] (computed by multiplying the rate of pumpage from each well by the amount of time operated):

Average pumpage, in gallons a day

	1940	1941	1942	1943	1944
January		1,170,000	1,330,000	1,550,000	1,700,000
February		1,170,000	1,330,000	1,550,000	1,550,000
March	1,100,000	1,200,000	1,440,000	1,640,000	1,600,000
April	1,360,000	1,270,000	1,380,000	1,780,000	1,650,000
May	1,360,000	1,450,000	1,320,000	1,900,000	1,600,000
June	1,020,000	1,220,000	1,550,000	1,850,000	1,700,000
July	1,250,000	1,400,000	1,770,000	2,100,000	
August	1,550,000	1,520,000	1,970,000	2,050,000	
September	1,800,000	1,670,000	1,470,000	2,050,000	
October	1,550,000	1,670,000	1,780,000	1,700,000	
November	1,350,000	1,540,000	1,630,000	1,800,000	
December	1,100,000	1,280,000	1,400,000	1,800,000	

Storage: Ground storage reservoir at well field, 300,000 gallons; three ground reservoirs in Bryan, total about 2,200,000 gallons; elevated tank, 250,000 gallons.

Treatment: Aeration and chlorination.

Analyses

[Collected Nov. 10, 1942, and Aug. 23, 1943. Analyzed by P. A. Witt and J. H. Rowley]

	Well 2		Well 3		Well 4		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	18		16		15		19	
Iron (Fe)	.04		.05		.25		.10	
Calcium (Ca)	2.0	0.100	1.5	0.075	2.1	0.10	1.7	0.085
Magnesium (Mg)	.3	.025	.2	.016	.5	.04	.2	.016
Sodium and Potassium (Na+K)	67	2.900	71	3.093	192	8.34	69	2.994
Bicarbonate (HCO_3)	156	2.557	163	2.672	436	7.16	159	2.613
Sulfate (SO_4)	5.7	.119	2.4	.050	1.6	.03	1.5	.031
Chloride (Cl)	12	.338	16	.451	45	1.27	16	.451
Fluoride (F)	.2	.011	.2	.011	.3	.02	0	0
Nitrate (NO_3)	0	0	0	0	.2	0	0	0
Total dissolved solids	184		188		474		184	
Total hardness as $CaCO_3$	6		4		7		5	
pH	8.2		8.2		8.2		8.1	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	13	13	Light-gray shale and layers of shell	125	254
Sand	10	23	Rock	1	255
Rock	1	24	Gray shale, boulders, and layers of shell	26	281
Gray shale	27	51	Sand and layers of shale	12	293
Brown shale	27	78	Gray shale and shell	27	320
Sand	3	81	Gray shale and layers of sand	13	333
Brown shale	2	83	Sandy shale	20	353
Sand	5	88	Gray shale and streaks of sand	27	380
Brown shale	10	98	Hard brown sandy shale with streaks of sand and lignite	33	413
Fine-grained green sand	13	111			
Brown shale	17	128			
Rock	1	129			

[8] Water furnished to Texas Agricultural and Mechanical College and the town of College Station included in the following table.

Driller's logs—Continued

Well 1—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand with streaks of brown shale and lignite	23	436	Hard shale, shell, and layers of limerock	34	1,174
Sandy shale, lignite, shell, and layers of sand	19	455	Rock	4	1,178
Hard shale	3	458	Shale	2	1,180
Hard sand rock	10	468	Rock	1	1,181
Sand and layers of shale	12	480	Hard shale	39	1,220
Sand	59	539	Hard-packed sand	7	1,227
Brown shale and shell	10	549	Shale	4	1,231
Brown shale, shell, and lignite	14	563	Hard-packed sand, layers of rock, shell, and shale	15	1,246
Sand	5	568	Rock, shale, shell, and layers of hard rock	21	1,267
Brown and green shale, shell, and lignite	52	620	Shale	9	1,276
Rock	1	621	Rock, shale, shell, and layers of hard rock and pyrite	15	1,291
Brown shale, shell, lignite, and pyrite	23	644	Brown shale and lignite	53	1,344
Sand with shale breaks	40	684	Sandy shale	80	1,424
Shale, shell, and lignite	36	720	Shale and streaks of sandy shale	10	1,434
Rock	1	721	Muddy sand with layers of shale	32	1,466
Shale and shell	9	730	Sand and layers of shale	14	1,480
Sandy shale and lignite	28	758	Sandy shale	5	1,485
Shale	3	761	Sand (cored)	9	1,494
Sandy shale, layers of sand, lignite, and glaucinite	23	784	Sand, shale, lignite, and mica	31	1,525
Sand, sandy shale, and streaks of shale and shell	42	826	Brown and gray shale and lignite	31	1,556
Shale, shell, and lignite	21	847	Sand rock	2	1,558
Fine-grained sand	7	854	Hard brown and green shale and lignite	20	1,578
Hard brown shale and lignite	32	886	Hard brown and green shale, lignite, and streaks of sandy shale	48	1,626
Brown shale, shell, and layers of sand	28	914	Sandy shale and lignite	26	1,652
Brown shale and shell	12	926	Muddy sand	49	1,701
Rock	1	927	Sand rock	3	1,704
Muddy sand and streaks of brown shale	58	985	Hard-packed sand	2	1,706
Rock	2	987	Rock	3	1,709
Brown shale, shell, and lignite	41	1,028	Fine-grained hard-packed sand	42	1,751
Brown sandy shale, lignite, and shell	22	1,050	Shale, sandy shale, lignite, and shell	16	1,767
Rock	1	1,051	Rock	1	1,768
Hard brown shale, shell, and lignite	5	1,056			
Hard brown and gray shale, shell, and lignite	84	1,140			

Well 2

Red and white clay	27	27	Gray shale, boulders, and shell	54	295
Sandy shale	23	50	Rock	1	296
Gray shale	108	158	Sand and shale	11	307
Rock	2	160	Sand and shell	30	337
Gray shale and shell	47	207	Sand and shale	25	362
Rock	1	208	Fine-grained sand	30	392
Gray shale, boulders, and shell	32	240	Shale, lignite, and sand	46	438
Rock	1	241	Sand and shale	85	523

Well 3

Clay	28	28	Gray shale and shell	24	247
Red and white clay	47	75	Shale, shell, and boulders	23	270
Rock	1	76	Rock	1	271
Sandy shale	28	104	Shale, shell, and boulders	24	295
Sand	12	116	Sand and shale layers	19	314
Rock	1	117	Shale and shell	28	342
Hard, green sand	24	141	Shale and sand	31	373
Gray shale	44	185	Shale and sand layers	20	393
Rock	2	187	Shale and sandy shale	24	417
Shale and rock layers	3	190	Sand	72	489
Rock	1	191	Shale	9	498
Gray shale	32	223			

Drillers' logs—Continued

Well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	8	8	Shale and boulders	27	291
Yellow clay	24	32	Rock	1	292
Rock	1	33	Gray shale	31	323
Gray shale	46	79	Sandy shale	15	338
Rock	1	80	Gray shale and shells	21	359
Gray shale	13	93	Sand with shale breaks	30	389
Sand and shale	31	124	Shale	5	394
Shale	7	131	Sand (tight)	31	425
Sandy shale and shell	16	147	Shale	25	450
Gray shale	35	182	Sandy shale	69	519
Shale	22	204	Sand	5	524
Shale and boulders	5	209	Shale	5	529
Rock	1	210	Sand	68	597
Shale	10	220	Brown shale	26	623
Rock	1	221	Hard sand	10	633
Shale	10	231	Sandy shale	16	649
Rock	1	232	Sandy shale (cored)	2	651
Shale	2	234	Shale and lime	8	659
Rock	1	235	Sand and sandy shale	18	677
Gray shale	29	264			

Well 5

Black soil	3	3	Sand and layers of shell and sand	13	373
Yellow clay	6	9	Hard shale and layers of hard sand	19	392
Sandy clay	8	17	Hard sand	10	402
Blue clay	12	29	Sand and layers of shale and shell	16	418
Shale with sand breaks	60	89	Sand	9	427
Rock	1	90	Sand and layers of shell and lignite	22	449
Shale and shell layers	28	118	Sand with few shale breaks	16	465
Shale	27	145	Hard sand	5	470
Rock	1	146	Sand with few hard streaks	23	493
Shale	24	170	Sand with lignite and shale breaks	37	530
Hard shale and layers of hard sand	113	283	Hard shale	5	535
Hard rock	2	285	Sand with few shale breaks	44	579
Hard shale, shell, and layers of hard sand	42	327	Sandy shale	5	584
Sand and layers of shale	8	335			
Sand and layers of shell	25	360			

BURLESON COUNTY

CALDWELL

Population in 1940: 2,165.

Source of information: C. W. Bullock, water superintendent, June 1943.

Ownership: Municipal.

Source of supply: Three wells at water plant about one-half mile northeast of Caldwell.

Well 1. Drilled about 1937; depth, 180 feet; diameter, 12 inches; deep-well turbine pump and electric motor; natural flow, 60 gallons a minute; yield when pumped, 240 gallons a minute.

Well 2. Drilled about 1937; depth, 271 feet; diameter, 12 inches; deep-well turbine pump and electric motor; natural flow, 60 gallons a minute; yield when pumped, 240 gallons a minute.

Well 3. Drilled in 1942 by Layne-Texas Co.; depth, 1,210 feet; diameter, 10¾ to 5 inches; screen from 1,048 to 1, 206 feet; deep-well turbine pump and electric motor; static water level, 7 feet above land surface Mar. 20, 1942;

natural flow, 132 gallons a minute; pumping level, 24 feet below pump base when pumping 310 gallons a minute Mar. 20, 1942; temperature, 83° F.

Pumpage: No record.

Storage: Ground reservoir, 130,000 gallons; standpipe, 150,000 gallons.

Number of customers: 540.

Treatment: None.

Analysis, well 1

[Collected June 25, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	25		Sulfate (SO_4)	4	0.083
Iron (Fe)	3.8		Chloride (Cl)	20	.564
Calcium (Ca)	7.1	0.354	Fluoride (F)	.2	.011
Magnesium (Mg)	1.8	.148	Nitrate (NO_3)	0	0
Sodium (Na)	8.6	.370	Total dissolved solids	92	
Potassium (K)	8.2	.210	Total hardness as $CaCO_3$	25	
Bicarbonate (HCO_3)	26	.426	pH	6.0	

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand	10	10	Tough shale	7	476
Black shale	34	44	Sand and shale	7	483
Packed sand	46	90	Tough shale	16	499
Hard black shale	13	103	Sand	17	516
Sandy shale	9	112	Sand and shale streaks	3	519
Fine packed sand	44	156	Sand (tested)	32	551
Hard shale	3	159	Sandy shale	31	582
Sand	57	216	Tough shale	14	596
Tough shale	4	220	Sand	31	627
Sand	18	238	Shale	6	633
Tough shale	2	240	Sand	15	648
Sand	3	243	Sandy shale	23	671
Tough shale	5	248	Tough shale	14	685
Sand	4	252	Sand	39	724
Tough shale	32	284	Tough shale	5	729
Sand	2	286	Sand and shale streaks	10	739
Tough shale	25	311	Sticky shale	47	786
Sand	6	317	Shale and sand streaks	15	801
Sandy shale	5	323	Sticky shale	25	826
Sand	48	371	Shale and sand breaks	16	842
Sandy shale	19	390	Lime and sticky shale	79	921
Hard sand rock	3	393	Sticky shale	15	936
Tough sticky shale	12	405	Sand	4	940
Tough shale	10	415	Shale and sand streaks	23	963
Sand	54	469	Sand (tested)	41	1,004

SOMERVILLE

Population in 1940: 1,621.

Source of information: H. C. Harden, mayor, Nov. 2, 1939.

Owner: Gulf States Utilities Co.

Source of supply: Well drilled in 1914; depth, 198 feet; diameter, 8 inches; pumped with air; reported static water level, 60 feet below ground surface; yield, 150 gallons a minute.

Pumpage: Average, 50,000 gallons a day.

Storage: Ground reservoir and elevated tank.

Treatment: Chlorination.

Analysis, well 1

[Collected Nov. 2, 1939. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Iron (Fe)	2.5		Sulfate (SO_4)	222	4.62
Calcium (Ca)	69	3.44	Chloride (Cl)	585	16.50
Magnesium (Mg)	3.5	.29	Fluoride (F)	.5	.03
Sodium and potassium (Na+K)	587	25.54	Nitrate (NO_3)	3.6	.04
Bicarbonate (HCO_3)	492	8.06	Total dissolved solids	1,810	
			Total hardness as $CaCO_3$	187	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy loam	30	30	Clay	10	100
Sand	10	40	Lignite	8	108
Lignite	16	56	Gumbo	40	148
Clay	7	63	Lignite	10	158
Sand rock	5	68	Shale	10	168
Clay	3	71	Water sand	12	180
Chalk	19	90	Shale and clay	18	198

CAMP COUNTY

PITTSBURG

Population in 1940: 2,916.

Source of information: Southwestern Gas & Electric Co., May 16, 1942.

Owner: Southwestern Gas & Electric Co.

Source of supply: Two wells (Nos. 3 and 5).

Well 3. Drilled in 1923 by Layne-Texas Co.; depth, 460 feet; diameter, 24 to 12 inches; deep-well turbine pump and 40-horsepower electric motor; reported yield, 500 gallons a minute.

Well 5. Drilled in 1941 by Layne-Texas Co.; depth, 466 feet; diameter 18 to 10 inches; screens from 162 to 225, 386 to 407, and 417 to 449 feet; deep-well turbine pump and 30-horsepower electric motor; static water level, 169 feet below land surface May 31, 1941; yield, 310 gallons a minute with draw-down of 61 feet May 31, 1941.

Pumpage: Average, 100,000 gallons a day.

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

Treatment: None.

Analyses

[Collected Oct. 14, 1941. Analyzed by J. W. Yett, Jr.]

	Well 3		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	18		12	
Iron (Fe)	.10		.40	
Calcium (Ca)	8.6	0.43	8.7	0.43
Magnesium (Mg)	2.2	.18	2.1	.17
Sodium (Na)	95	4.12	92	3.98
Potassium (K)				
Bicarbonate (HCO_3)	192	3.15	180	2.95
Sulfate (SO_4)	61	1.27	65	1.35
Chloride (Cl)	10	.28	9.0	.25
Nitrate (NO_3)	2.0	.03	2.0	.03
Total dissolved solids	291		289	
Total hardness as $CaCO_3$	30		30	

Drillers' log, well 5

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red clay	12	12	Rock	1	250
Sand	26	38	Sandy shale and sand streaks	38	288
Rock	1	39	Shale and lignite	38	326
Blue clay	10	49	Hard fine-grained sand	16	342
Rock	1	50	Sandy shale and-sand layers	19	361
Hard fine-grained sand	32	82	Rock	1	362
Shale and lignite	15	97	Sandy shale and sand layers	24	386
Sand	15	112	Hard fine-grained sand	23	409
Shale, lignite, and sand	36	148	Sandy shale	9	418
Sand	49	197	Hard sand	18	436
Rock	1	198	Rock	1	437
Sand	25	223	Hard sand	19	456
Shale	3	226	Hard shale and lignite	10	466
Hard sand with shale rock	23	249			

CASS COUNTY

ATLANTA

Population in 1940: 2,453.

Source of information: E. C. McKinnon, city secretary, Jan. 8, 1941.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. At West Grand and Thomas Streets; drilled about 1909, deepened from 512 to 842 feet in 1936 by Layne-Texas Co.; diameter, 8 to 6 inches; screen from 708 to 836 feet; deep-well turbine pump and electric motor; pump set at 180 feet; static water level, 58 feet below land surface on Feb. 13, 1936; yield, 138 gallons a minute with draw-down of 132 feet.

Well 2. At West Grand and Thomas Streets; drilled in 1936 by Layne-Texas Co.; depth, 844 feet; diameter, 13⅜ to 7 inches; screen from 737 to 836 feet; deep-well turbine pump and 30-horsepower electric motor; pump set at 150 feet; static water level, 54 feet below land surface on Feb. 4, 1936; yield, 400 gallons a minute with draw-down of 78 feet.

Pumpage (estimated): Average, 160,000 gallons a day.

Storage: Elevated tank, 225,000 gallons.

Number of customers: 550.

Treatment: None.

Analyses

[Collected Jan. 8, 1941. Analyzed by E. W. Lohr and J. W. Yett, Jr.]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	20		20	
Iron (Fe)	.29		.07	
Calcium (Ca)	1.9	0.09	2.6	0.13
Magnesium (Mg)	.7	.06	.8	.07
Sodium (Na) + Potassium (K)	81	3.52	215	9.35
Bicarbonate (HCO_3)	200	3.28	382	6.27
Sulfate (SO_4)	12	.25	2	.04
Chloride (Cl)	5.0	.14	115	3.24
Nitrate (NO_3)	.2	0	.2	0
Total dissolved solids	225		545	
Total hardness as $CaCO_3$	8		10	
pH	8.4		8.4	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	1	1	Rock	1	529
Sandy clay	26	27	Shale	54	583
Sand	2	29	Lignite	10	593
Muddy sand and lignite	65	94	Sandy shale	56	649
Sand and lignite	74	168	Sand and shale layers	37	686
Green sand	29	197	Hard rock	1	687
Boulders and sand	4	201	Sand	8	695
Sand and lignite	77	278	Rock and boulders	10	705
Hard rock	.5	278.5	Fine-grained sand	33	738
Sandy shale and lignite	54.5	333	Boulders	1	739
Soft rock	2	335	Fine-grained sand	28	767
Sandy shale	40	375	Rock	2	769
Fine sand and shale	63	438	Good sand	32	801
Shale	12	450	Hard layers	7	808
Sandy shale	20	470	Good sand	35	843
Fine sand (fair)	42	512	Rock	1	844
Shale	16	528			

AVINGER

Population in 1940: 624.

Source of information: Mr. Young, pump operator, Oct. 28, 1941.

Owner: Thomas & Ware.

Source of supply: Well on State Highway 49, south of post office; drilled in 1938 by J. C. Boling; depth, 380 feet; diameter, 10 to 5 inches; bottom 20 feet perforated; deep-well turbine pump and 5-horsepower electric motor; 17-stage pump set at 250 feet; reported static water level, 100 feet below land surface when drilled; reported yield, 65 gallons a minute.

Pumpage (estimated): Average, 25,000 gallons a day.

Number of customers: About 120.

Treatment: None.

Analysis, well 1

[Collected Oct. 28, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	6.4	0.32	Sulfate (SO_4)	15	0.31
Magnesium (Mg)	1.2	.10	Chloride (Cl)	6.0	.17
Sodium (Na)	38	1.64	Fluoride (F)	.3	.02
Potassium (K)			Total dissolved solids	115	
Bicarbonate (HCO_3)	98	1.61	Total hardness as $CaCO_3$	22	

HUGHES SPRINGS

Population in 1940: 767.

Source of information: A. B. Hall, water superintendent, Oct. 14, 1941.

Ownership: Municipal.

Source of supply: Well on 4th Street north of schoolhouse; drilled in 1935 by Layne-Texas Co.; depth, 359 feet; diameter, 13⅜ to 8 inches; screens from 284 to 307 and 323 to 353 feet; static water level, 182 feet below land surface on Aug. 21, 1935; yield, 94 gallons a minute with draw-down of 93 feet.

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

Storage: Standpipe, 100,000 gallons.

Number of customers: 103.

Treatment: Aeration, coagulation with lime, sedimentation, and rapid sand filter.

Analysis, well 1

[Collected Oct. 14, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	17	0.35
Iron (Fe)	10		Chloride (Cl)	6.0	.17
Calcium (Ca)	14	0.70	Nitrate (NO_3)	.5	.01
Magnesium (Mg)	5.6	.46	Total dissolved solids	117	
Sodium, potassium (Na+K)	18	.78	Total hardness as $CaCO_3$	58	
Bicarbonate (HCO_3)	86	1.41			

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy shale	10	10	Good sand	32	313
Shale	15	25	Rock	1	314
Sandy shale	93	118	Sand	39	353
Shale and lignite	106	224	Sandy shale	6	359
Sand and shale	57	281			

LINDEN

Population in 1940: 1,168.

Source of information: Mr. Elrod, water superintendent, Oct. 13, 1941.

Ownership: Municipal.

Source of supply: Well 1 block west and 1 block south of the intersection of U. S. Highway 59 and State Highway 11; drilled in 1934 by Layne-Texas Co.; depth, 825 feet; diameter, 8 to 6 inches; screens from 642 to 685, 730 to 750, and 802 to 823 feet; deep-well turbine pump and electric motor; static water level, 135 feet below land surface in 1934; yield, 118 gallons a minute with draw-down of 46 feet.

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

Storage: Elevated tank, 50,000 gallons.

Number of customers: 175.

Treatment: None.

Analysis, well 1

[Collected Oct. 13, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Bicarbonate (HCO_3)	440	7.21
Iron (Fe)	.08		Sulfate (SO_4)	3	.06
Calcium (Ca)	3.0	0.15	Chloride (Cl)	174	4.91
Magnesium (Mg)	1.2	.10	Nitrate (NO_3)	0	0
Sodium (Na) + Potassium (K)	274	11.93	Total dissolved solids	698	
			Total hardness as $CaCO_3$	12	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	1	1	Shale	20	397
Clay	24	25	Rock	1	398
Rock	3	28	Sticky shale	56	454
Shale	37	65	Hard-packed sand	13	467
Muddy sand and lignite	50	115	Hard shale	29	496
Hard shale	32	147	Rock	3	499
Hard rock	2	149	Hard shale	37	536
Shale	111	260	Sandy shale	118	654
Rock	1	261	Hard-packed sand	24	678
Muddy sand	19	280	Sand and shale	44	722
Shale and boulders	24	304	Hard sand	22	744
Hard sand	16	320	Shale	38	782
Hard rock	2	322	Sandy shale	18	800
Sand	21	343	Sand	25	825
Rock sand	2	345	Sandy shale	18	843
Sand	32	377			

CHAMBERS COUNTY

ANAHUAC

Population in 1940: 1,500.

Source of information: J. R. Watson, water superintendent, Apr. 19, 1944.

Owner: G. C. Chambliss.

Source of supply: Three wells.

Well 1. Drilled in 1936 by George Abshier; depth, 95 feet; diameter, 2 inches; screened from 85 to 95 feet; deep-well cylinder; temperature, 71½° F.

Well 2. Drilled in 1936 by George Abshier; depth, 96 feet; diameter, 3 inches; screened from 86 to 96 feet; deep-well cylinder; static water level, 6.89 feet on July 24, 1941.

Well 3. Drilled in 1940 by George Abshier; depth, 96 feet; diameter, 2 inches; screened from 86 to 96 feet; deep-well cylinder.

Pumpage (estimated): Minimum 7,000 gallons; maximum, 14,000 gallons; average, 10,000 gallons a day.

Storage: Two elevated tanks, 7,000 gallons each.

Number of customers: 400.

Treatment: None.

Analysis, well 1

[Collected July 24, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	64	3.19	Sulfate (SO_4)	8	0.17
Magnesium (Mg)	17	1.40	Chloride (Cl)	106	2.99
Sodium and potassium (Na+K)	134	5.86	Total dissolved solids	548	
Bicarbonate (HCO_3)	445	7.29	Total hardness as $CaCO_3$	231	

Drillers' log, abandoned well

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Gray clay	72	72	Blue clay with fine-grained sand and shale	16	156
Fine-grained sand with clay	21	93	Blue sandy clay	10	166
Fine-grained sand	12	105	Blue sandy clay with fine-grained sand	15	181
Dark gray clay	10	115	Fine-grained sand with clay	22	203
Blue clay	25	140			

COVE

Population in 1940: 150.

Source of information: Mrs. O. G. Joseph, Apr. 19, 1944.

Owner: Mrs. O. G. Joseph.

Source of supply: Well drilled in 1937 by Amos Jennische; depth, 125 feet; diameter, 2 inches; screen from 107 to 125 feet; pumped with air; static water level, 27.90 feet Apr. 8, 1941.

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

Storage: Elevated tank, 200 gallons.

Number of customers: Six.

Treatment: None.

Analysis, well 1

[Collected Mar. 5, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	87	4.34	Sulfate (SO_4)	20	0.42
Magnesium (Mg)	21	1.73	Chloride (Cl)	330	9.31
Sodium and potassium (Na+K)	222	9.66	Total dissolved solids	860	
Bicarbonate (HCO_3)	366	6.00	Total hardness as $CaCO_3$	303	

MONT BELVIEU

Population in 1940: 600.

Source of information: O. B. Crumpler, Apr. 19, 1944.

Owner: Crumpler Bros.

Source of supply: Well drilled in 1938 by Homer Wright; depth, 304 feet; diameter, 7 inches; screen from 282 to 304 feet; pumped with air; reported static water level, 73 feet in 1938; temperature, 77° F.

Pumpage (estimated): Minimum, 60,000 gallons; maximum, 120,000 gallons; average, 90,000 gallons a day.

Storage: Concrete ground reservoir, 60,000 gallons; elevated tank, 10,000 gallons.

Number of customers: 250.

Treatment: None.

Analysis, well 1

[Collected Mar. 31, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	12	0.60	Sulfate (SO_4)	36	0.75
Magnesium (Mg)	4.1	.34	Chloride (Cl)	260	7.33
Sodium and potassium (Na+K)	302	13.11	Fluoride (F)	1.4	.07
Bicarbonate (HCO_3)	360	5.90	Total dissolved solids	844	
			Total hardness as $CaCO_3$	47	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and sand	20	20	Fine-grained sand	33	237
Clay	20	40	Green shale	4	241
Sandy shale	138	178	Fine-grained sand	42	283
Hard shale	26	204	Coarse-grained sand	21	304

CHEROKEE COUNTY

ALTO

Population in 1940: 1,141.

Source of information: S. F. Harrison, city secretary, June 16, 1944.

Ownership: Municipal.

Source of supply: Two wells at pump station in northwest part of town.

Well 1. Drilled in 1922; depth, 605 feet; diameter, 6 inches; air lift; reported static water level, 130 feet below land surface; yield, 100 gallons a minute with draw-down of 14 feet; stand-by well.

Well 2. Drilled in 1929 by Layne-Texas Co.; depth, 557 feet; diameter, 10 to 6 inches; screen from 480 to 545 feet; deep-well turbine pump and 10-horsepower electric motor; pump set at 200 feet; reported static water level, 141 feet below land surface in 1936 and 154 feet in June 1944; yield, 83 gallons a minute with draw-down of 20 feet; temperature, 76° F.

Pumpage: Average, 20,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 310.

Treatment: Aeration.

Analysis, well 1

[Collected June 16, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	3	0.06
Iron (Fe)	.02		Chloride (Cl)	63	1.78
Calcium (Ca)	2.2	0.11	Fluoride (F)	.6	.03
Magnesium (Mg)	.9	.07	Nitrate (NO_3)	0	0
Sodium (Na)	261	11.36	Total dissolved solids	643	
Potassium (K)	5.0	.13	Total hardness as $CaCO_3$	9	
Bicarbonate (HCO_3)	597	9.80	pH	8.3	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Blue shale	34	337
Clay	12	14	Sand rock	2	339
Black sand	32	46	Shale	3	342
Hard rock	2	48	Sand rock	1	343
Oil shale and green sand	10	58	Shale	2	345
Gray water sand	55	113	Hard rock	1	346
Gray sand and lignite	23	136	Gumbo	14	360
Brown sandy shale	86	222	Broken formation	44	404
Gumbo	20	242	Shale	3	407
Rock	1	243	Rock	1	408
Shale and boulders	27	270	Shale	3	411
Gumbo	10	280	Rock	1	412
Gummy shale	17	297	Shale, streaks of sand	32	444
Rock	2	299	Gumbo	27	471
Shale	3	302	White water sand	85	556
Rock	1	303	Gumbo	1	557

JACKSONVILLE

Population in 1940: 7,213.

Source of information: E. J. Byron, water superintendent, June 14, 1944.

Ownership: Municipal.

Source of supply: Impounding reservoir; built in 1922; original capacity, 300,000,000 gallons; rated capacity of treating plant, 1,000,000 gallons a day.

Average pumpage, in gallons a day

	1941	1942	1943	1944		1941	1942	1943	1944
January	----------	----------	349,200	461,000	July	559,000	602,500	769,200	----------
February	----------	412,600	385,000	454,000	August	615,200	----------	774,100	----------
March	405,200	436,900	427,700	471,000	September	536,000	----------	595,000	----------
April	424,500	403,200	432,800	492,000	October	451,400	444,500	448,000	----------
May	486,900	416,000	507,500	531,000	November	422,600	443,800	449,000	----------
June	566,400	588,500	622,900	----------	December	413,800	----------	461,000	----------

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

Number of customers: 1,550.

Treatment: Aeration, coagulation, sedimentation, rapid sand filter, and chlorination.

Analysis of raw water

[Collected June 14, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14	----------	Sulfate (SO_4)	3.7	0.077
Iron (Fe)	1.3	----------	Chloride (Cl)	3.0	.085
Calcium (Ca)	6.1	0.304	Fluoride (F)	1.4	.074
Magnesium (Mg)	3.0	.247	Nitrate (NO_3)	1.8	.029
Sodium (Na)	2.7	.116	Total dissolved solids	69	----------
Potassium (K)	1.6	.041	Total hardness as $CaCO_3$	28	----------
Bicarbonate (HCO_3)	27	.443	pH	6.9	----------

RUSK

Population in 1940: 5,699.

Source of information: J. D. Norton, water superintendent, June 16, 1944.

Ownership: Municipal.

Source of supply: Impounding reservoir; built in 1925; original capacity, 42,000,000 gallons; rated capacity of treating plant, 600,000 gallons a day.

Pumpage: Maximum, 300,000 gallons; minimum, 125,000 gallons; average, 200,000 gallons a day.

Storage: Four settling basins, 262,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 450.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis of raw water

[Collected June 16, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12	----------	Sulfate (SO_4)	5.7	0.119
Iron (Fe)	1.0	----------	Chloride (Cl)	7.0	.197
Calcium (Ca)	5.5	0.275	Fluoride (F)	.4	.021
Magnesium (Mg)	3.5	.288	Nitrate (NO_3)	.2	.003
Sodium (Na)	3.3	.144	Total dissolved solids	62	----------
Potassium (K)	1.7	.043	Total hardness as $CaCO_3$	28	----------
Bicarbonate (HCO_3)	25	.410	pH	7.0	----------

WELLS

Population in 1940: 696.

Source of information: Joe Rady, city engineer, May 15, 1936.

Ownership: Municipal.

Source of supply: Well near elevated tank; drilled in 1935 by Niel Scroggins; depth, 400 feet; diameter, 8 to 6 inches; perforated liner from 301 to 400 feet; deep-well turbine pump and gasoline engine; reported yield, 100 gallons a minute.

Pumpage: No record.

Storage: Elevated tank.

Treatment: None.

Analysis, well 1

[Collected June 1940. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	38		Sulfate (SO_4)	66	1.37
Iron (Fe)	3.1		Chloride (Cl)	28	.79
Calcium (Ca)	15	0.75	Nitrate (NO_3)	.5	.01
Magnesium (Mg)	8.3	.68	Total dissolved solids	270	
Sodium (Na) and Potassium (K)	61	2.64	Total hardness as $CaCO_3$	72	
Bicarbonate (HCO_3)	116	1.90	pH	6.6	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	15	15	Water sand	25	203
Water sand	4	19	Sandy shale	97	300
Broken clay and sandy shale	46	65	Water sand	86	386
Clay and shale	36	101	Shale	4	400
Brown shale with broken gravel	77	178			

COLLIN COUNTY

ANNA

Population in 1940: 509.

Source of information: Wayne Shelby, water superintendent, Mar. 21, 1943.

Owner: Sherley Bros.

Source of supply: Well at general store east of railroad in center of Anna; drilled in 1911; depth, 1,065 feet; diameter, 6 inches; Peerless Hi-lift pump and 7½-horsepower electric motor; capacity, 50 gallons a minute; water level Mar. 21, 1943, 149.70 feet below pump base, 1 foot above ground.

Pumpage (estimated): Maximum 15,000; minimum, 10,000; average, 13,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Treatment: None.

Analysis

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	800	16.66
Iron (Fe)	3.4		Chloride (Cl)	1,180	33.14
Caclium (Ca)	14	0.70	Fluoride (F)	1.6	.08
Magnesium (Mg)	8.0	.66	Nitrate (NO_3)	.5	.01
Sodium (Na)	1,370	59.51	Total dissolved solids	3,790	
Potassium (K)	20	.51	Total hardness as $CaCO_3$	68	
Bicarbonate (HCO_3)	701	11.49	pH	8.2	

BLUE RIDGE

Population in 1940: 450.

Source of information: R. G. Lamm, mayor, Feb. 19, 1943.

Ownership: Municipal.

Source of supply: Well drilled in 1939 by Layne-Texas Co.; depth, 1,853 feet; diameter 6⅝ to 5 inches; Peerless Hi-lift pump and 10-horsepower electric motor; static water level, 149 feet, Feb. 9, 1939; pumping level, 157 feet when pumping 30 gallons a minute Feb. 9, 1942, and 163.3 feet when pumping 89 gallons a minute Mar. 12, 1942.

Pumpage (estimated): Average, 5,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Treatment: None.

Analysis

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	109	2.27
Iron (Fe)	.09		Chloride (Cl)	34	.96
Calcium (Ca)	1.3	0.06	Fluoride (F)	.7	.04
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	1.5	.02
Sodium (Na)	207	9.18	Total dissolved solids	548	
Potassium (K)	2.8	.07	Total hardness as $CaCO_3$	5	
Bicarbonate (HCO_3)	358	5.89	pH	8.2	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Hard shale	3	1,362
Yellow clay	45	49	Blue shale	35	1,397
Blue shale	99	148	Hard shale layers	28	1,425
Hard blue shale	52	200	Sand	75	1,500
Hard shale, chalk rock	60	260	Hard layers	2	1,502
Chalk rock	168	428	Shale	162	1,664
Chalk rock, layers of shale	24	452	Hard shale and streaks limestone	89	1,753
Chalk rock	72	524	Layers rock and shale	38	1,791
Blue shale	756	1,274	Sand	56	1,847
Hard layers	1	1,275	Hard shale and limestone	6	1,853
Blue shale	84	1,359			

CELINA

Population in 1940: 994.

Source of information: D. C. Sheets, water superintendent, Feb. 18, 1943.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1925; depth, 1,541 feet; diameter, 8 to 5⅞ inches; cased with 8-inch casing to 1,321 feet, 6-inch casing to 1,501 feet, open hole from 1,501 to 1,541 feet; deep-well turbine pump; set at 180 feet; static water level, 130± feet below land surface in March 1928; yield, 125 gallons a minute.

Well 2. Drilled in August 1927; depth, 700 feet; diameter, 8 to 5⅞ inches; pumped with air; reported yield, 125 gallons a minute; static water level, 170 feet below land surface in March 1928 and 183.70 feet on Feb. 18, 1943.

Pumpage (estimated): Maximum, 35,000; minimum, 25,000; average, 30,000 gallons a day.

Storage: Ground reservoir, 50,000 gallons; elevated tank, 75,000 gallons.

Treatment: None.

Analyses

[Collected May 12, 1942. Analyzed by Texas State Health Department]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	19		18	
Iron (Fe)	.18		.16	
Calcium (Ca)	3	0.15	2	0.10
Magnesium (Mg)	1	.08	1	.08
Sodium (Na)	302	13.12	182	7.91
Bicarbonate (HCO_3)	677	11.10	372	6.10
Sulfate (SO_4)	74	1.54	63	1.31
Chloride (Cl)	25	.71	25	.71
Fluroide (F)	1.6	.08	1.8	.09
Nitrate (NO_3)	.4	.01	.4	.01
Total dissolved solids	759		478	
Total hardness as $CaCO_3$	11		9	

FARMERSVILLE

Population in 1940: 2,206.

Source of information: Water superintendent, Feb. 19, 1943.

Ownership: Municipal.

Source of supply: Two lakes about one-half mile southwest of Farmersville, each reported to cover about 35 acres and to have a depth of 20 feet.

Pumpage (estimated): Maximum, 100,000; minimum, 50,000; average, 75,000 gallons a day.

Storage: Three concrete ground reservoirs, 100,000 gallons each; steel standpipe, 100,000 gallons.

Treatment: Aluminum sulfate, chloride of lime, coagulation, and sedimentation.

Analyses

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

	Raw Water		Treated Water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	6.2		3.6	
Iron (Fe)	.08		.05	
Calcium (Ca)	60	2.995	61	3.045
Magnesium (Mg)	4.3	.345	3.9	.321
Sodium (Na)	6.6	.287	14	
Potassium (K)	4.8	.123		
Bicarbonate (HCO_3)	197	3.229	183	3.000
Sulfate (SO_4)	17	.354	29	.604
Chloride (Cl)	4.0	.113	11	.310
Fluoride (F)	1.2	.063	.8	.042
Nitrate (NO_3)	0	0	.2	.003
Total dissolved solids	222		225	
Total hardness as $CaCO_3$	167		168	
pH	7.8		7.8	

FRISCO

Population in 1940: 670.

Source of information: Water superintendent.

Ownership: Municipal.

Source of supply: Well drilled in 1924 by J. L. Myers & Son; depth, 1,680 feet; diameter, 10 inches; pumped with air; static water level, 250± feet below land surface in 1924; yield, 75 gallons a minute in 1943.

Pumpage (estimated): Maximum, 45,000; minimum, 37,000; average, 40,000 gallons a day.

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

Treatment: None.

Analysis

[Collected Feb. 17, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	96	2.00
Iron (Fe)	.03		Chloride (Cl)	19	.54
Calcium (Ca)	2.3	0.11	Fluoride (F)	.9	.05
Magnesium (Mg)	.6	.05	Nitrate (NO_3)	2.5	.04
Sodium (Na)	272	11.82	Total dissolved solids	690	
Potassium (K)	3.2	.08	Total hardness as $CaCO_3$	8	
Bicarbonate (HCO_3)	470	9.43	pH	8.2	

McKINNEY

Population in 1940: 8,555.

Source of information: E. L. Taylor, water superintendent, Feb. 27, 1943.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1936 by Layne-Texas Co.; depth, 3,230 feet; diameter, 12 to 6⅝ inches; 12-inch casing to 625 feet, 8-inch casing to about 2,600 feet, and 6⅝-inch casing to bottom; deep-well turbine pump having eight stages of impellers set at 440 feet below the surface; well flowed 36 gallons a minute in 1935; static water level reported, 20 to 30 feet below surface in 1936; water level, 55.03 feet below pump base on Feb. 17, 1943,

after pump had been shut down 25 minutes; temperature, 114° F.; reported yield, 620 gallons a minute with pumping level of 350 feet in 1943.

Well 2. Drilled in 1939 by Layne-Texas Co.; depth, 1,280 feet; diameter, 12 to 6 inches; cased to about 1,000 feet with 12-inch casing and remainder 6-inch perforated pipe; well is underreamed to 24 inches and gravel-walled below 1,000 feet; equipped with deep-well turbine pump having 15 stages of impellers set at 490 feet; static water level, 264 feet in 1939; reported yield, 270 gallons a minute with draw-down of 150 feet.

Pumpage (estimated): Maximum, 500,000; minimum, 250,000; average, 350,000 gallons a day. Prospective increase to supply U. S. Government hospital 600,000 to 900,000 gallons a day.

Storage: Two concrete surface reservoirs, combined capacity 235,000 gallons; 1 steel standpipe, capacity 235,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Feb. 27, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	18		Sulfate (SO_4)	247	5.14
Iron (Fe)	.09		Chloride (Cl)	212	5.98
Calcium (Ca)	9.1	0.45	Fluoride (F)	.4	.02
Magnesium (Mg)	3.3	.27	Nitrate (NO_3)	2.0	.03
Sodium (Na)	388	16.89	Total dissolved solids	1,080	
Potassium (K)	6.4	.16	Total hardness as $CaCO_3$	36	
Bicarbonate (HCO_3)	340	6.60	pH	8.3	

Log of abandoned well, drilled in 1935

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Black waxy soil	15	15	Lime shale	50	1,617
Chalk	33	48	Lime	8	1,625
Chalk, sand, and sand rock	25	73	Lime shale	2	1,627
Chalk	97	170	Shale lime	6	1,633
Shale	57	227	Shale	35	1,668
Shale, sand, chalk, lime shell	92	319	Lime and shale	5	1,673
Shale	138	457	Shale and lime shell streaks	45	1,718
Blue shale	27	484	Shale and lime	6	1,724
Shell lime	12	496	Lime rock, broken lime	14	1,738
Lime shell	7	503	Lime and shale	37	1,775
Shale	42	545	Shale and lime shell	30	1,805
Shale, lime shell, broken	73	618	Shale and shell	72	1,877
Shale	225	843	Shale and lime rock	30	1,907
Shale and broken shell	154	997	Shale	24	1,931
Shale	55	1,052	Lime	21	1,952
Cap rock	6	1,058	Shale and shell	46	1,998
Woodbine water sand	12	1,070	(Measured pipe and corrected depth, 2,015.)		
Shale	35	1,105	Broken lime	75	2,090
Chalk	44	1,149	Sand	30	2,120
Sand	13	1,162	Broken lime	22	2,142
Shale and lime	83	1,245	Sand and lime	6	2,148
Hard shale	40	1,285	Sand, shale, lime, sand	95	2,243
Hard sandy shale	22	1,307	Sand and lime	60	2,303
Sand and iron pyrites	21	1,328	Sand lime and hard sandy shale	30	2,333
Pyrites, hard shale, sand streaks	62	1,390	Sand lime and shale	11	2,344
Hard shale	114	1,504	Broken lime and red bed	46	2,390
Red beds, line	50	1,554	Broken sandy lime	8	2,398
Lime	4	1,558	Lime—broken lime and sand	24	2,422
(Measured depth and found 43 feet too deep; corrected depth 1,515 feet.)			Broken sandy lime	32	2,454
			Broken lime shale	20	2,474
Lime and sand streaks	20	1,535	Do	23	2,497
Lime	32	1,567	Do	5	2,502

[*Log of abandoned well, drilled in 1935*—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Broken sandy lime	34	2,536	Sandy lime and sand	7	2,845
Lime and shale	114	2,650	Sandy lime and shale	15	2,860
Sandy lime	60	2,710	Soft sand	25	2,885
Sticky shale	5	2,715	Sandy lime	5	2,890
Broken lime	13	2,728	(Not given)	26	2,916
Broken lime and shell	24	2,752	Hard lime	13	2,929
Broken lime	13	2,765	Sandy shale	7	2,936
Sand	17	2,782	Red bed shale	41	2,977
Shale	11	2,793	Red bed and lime	45	3,022
Sand	10	2,803	Lime and sand	8	3,030
Do	9	2,812	Sand	30	3,060
Sandy lime	8	2,820	Lime	8	3,068
Sand and lime streaks	18	2,838			

MELISSA

Population in 1940: 175.

Source of information: Ray Craft, owner, Feb. 19, 1943.

Owner: Ray Craft.

Source of supply: Well located under elevated tank; drilled in 1911; depth, 1,462 feet; diameter, 4 inches; pumped with air; static water level, 146 feet below land surface on Feb. 22, 1940; yield, 30 gallons a minute.

Pumpage (estimated): Maximum, 8,000; minimum, 4,000; average, 6,000 gallons a day.

Storage: Elevated tank, 20,000 gallons.

Treatment: None.

Analysis

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	11		Sulfate (SO_4)	13	0.27
Iron (Fe)	.36		Chloride (Cl)	1,260	35.68
Calcium (Ca)	8.4	0.42	Fluoride (F)	2.2	.12
Magnesium (Mg)	4.5	.37	Nitrate (NO_3)	10	.16
Sodium (Na)	1,120	48.83	Total dissolved solids	2,850	
Potassium (K)	6.2	.16	Total hardness as $CaCO_3$	40	
Bicarbonate (HCO_3)	826	13.55	pH	8.4	

PRINCETON

Population in 1940: 564.

Source of information: Jim Chapell, mayor, Feb. 29, 1942.

Ownership: Municipal.

Source of supply: Well at elevated tank; depth, 1,475 feet; diameter, 6 inches; pumped with air; yield, 50 gallons a minute.

Pumpage (estimated): Maximum, 18,000; minimum, 12,000; average, 15,000 gallons a day.

Storage: Elevated tank, 30,000 gallons.

Treatment: None.

Analysis

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	19		Sulfate (SO_4)	654	13.62
Iron (Fe)	.05		Chloride (Cl)	660	18.61
Calcium (Ca)	10	0.50	Fluoride (F)	2.7	.14
Magnesium (Mg)	4.4	.36	Nitrate (NO_3)	.5	.01
Sodium (Na)	1,030	44.88	Total dissolved solids	2,800	
Potassium (K)	10	.26	Total hardness as $CaCO_3$	43	
Bicarbonate (HCO_3)	831	13.62	pH	8.3	

PROSPER

Population in 1940: 271.

Source of information: U. N. Clary, water superintendent, Apr. 10, 1942.

Ownership: Municipal.

Source of supply: Well at elevated tank; drilled in 1942 by J. L. Myers & Sons; depth, 619 feet; diameter, 7 inches; Peerless Hi-lift pump; static water level, 270 feet below land surface on Mar. 10, 1942; yield, 30 gallons a minute with 10 feet of draw-down.

Pumpage (estimated): Average, 6,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 84.

Treatment: None.

Analysis

[Collected Apr. 10, 1942. Analyzed by Texas State Health Department]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	320	6.66
Iron (Fe)	1.0		Chloride (Cl)	295	8.32
Calcium (Ca)	12	0.60	Fluoride (F)	3.3	.17
Magnesium (Mg)	5	.41	Nitrate (NO_3)	.4	.01
Sodium (Na), Potassium (K)	670	29.13	Total dissolved solids	1,780	
Bicarbonate (HCO_3)	927	15.19	Total hardness as $CaCO_3$	51	

Driller's log

	Thickness (feet)	Depth (feet)
Rock	38	38
Shale	540	578
Water sand	41	619

WYLIE

Population in 1940: 419.

Source of information: Water superintendent, February 1943.

Ownership: Municipal.

Source of supply: Well at elevated tank; drilled in 1923; depth, 2,790 feet; diameter, 12 inches; pumped with air; static water level, 90 feet below surface in 1942; yield, 125 gallons a minute.

Pumpage (estimated): Maximum, 60,000; minimum, 30,000; average, 45,000 gallons a day.

Storage: Concrete ground reservoir, 80,000 gallons; elevated tank, 50,000 gallons.

Treatment: None.

Analysis

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	1.4		Sulfate (SO_4)	118	2.46
Iron (Fe)	.02		Chloride (Cl)	35	.99
Calcium (Ca)	2.7	0.13	Fluoride (F)	1.9	.10
Magnesium (Mg)	1.0	.08	Nitrate (NO_3)	2.5	.04
Sodium (Na)	306	13.32	Total dissolved solids	804	
Potassium (K)	3.4	.09	Total hardness as $CaCO_3$	10	
Bicarbonate (HCO_3)	516	10.03	pH	8.6	

COLORADO COUNTY

COLUMBUS

Population in 1940: 2,422.

Source of information: R. Lee Hastedt, city manager, Feb. 21, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. 3 blocks northwest of post office; dug well; depth, 48 feet; diameter, 144 inches; centrifugal pump and 15-horsepower electric motor; yield, 350 gallons a minute.

Well 2. 7 blocks northeast of post office; drilled in 1938; depth, 48 feet; diameter, 8 inches; 8 feet of perforated screen at bottom; deep-well turbine pump and 25-horsepower electric motor; yield, 500 gallons a minute.

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

Storage: Elevated tank, 75,000 gallons.

Number of customers: 625.

Treatment: None.

Analysis, well 2

[Collected Feb. 21, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	18	0.37
Iron (Fe)	.02		Chloride (Cl)	19	.54
Calcium (Ca)	115	5.74	Fluoride (F)	.2	.01
Magnesium (Mg)	10	.82	Nitrate (NO_3)	34	.55
Sodium (Na)	13	.56	Total dissolved solids	407	
Potassium (K)	4.8	.12	Total hardness as $CaCO_3$	328	
Bicarbonate (HCO_3)	352	5.77	pH	8.4	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	3	3	Sand and gravel	44	48
Clay	1	4			

EAGLE LAKE

Population in 1940: 2,124.

Source of information: C. W. Nispel, manager, Feb. 21, 1944.

Owner: Central Power & Light Co.

Source of supply: Two wells (Nos. 2 and 3).

Well 2. About 3 blocks east of post office; drilled in 1927 by Layne-Texas Co.; depth, 462 feet; diameter, 16 to 8 inches; screens from 274 to 294 feet and 376 to 460 feet; deep-well turbine pump and 15-horsepower electric motor; pump set at 140 feet; static water level, 26.6 feet below land surface on Dec. 17, 1927; yield, 650 gallons a minute with draw-down of 49.4 feet.

Well 3. Drilled in 1941 by Layne-Texas Co.; depth, 262 feet; diameter, 10¾ to 8⅝ inches; screen from 372 to 459 feet; deep-well turbine pump and 25-horsepower electric motor; static water level, 23 feet below land surface on Mar. 19, 1941; yield, 540 gallons a minute with draw-down of 109 feet.

Average pumpage in 1943, in gallons a day

January	215,000	April	211,000	July	248,000	October	235,000
February	197,000	May	196,000	August	260,000	November	196,000
March	176,000	June	187,000	September	200,000	December	186,000

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

Number of customers: 494.

Treatment: Chlorination.

Analyses

[Collected Feb. 21, 1944. Analyzed by J. H. Rowley]

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	25		24	
Iron (Fe)	.05		.04	
Calcium (Ca)	58	2.895	49	2.446
Magnesium (Mg)	4.3	.354	3.3	.271
Sodium (Na)	16	.675	12	.502
Potassium (K)	2.3	.059	4.1	.105
Bicarbonate (HCO_3)	167	2.737	146	2.393
Sulfate (SO_4)	7.6	.158	4.7	.098
Chloride (Cl)	41	1.156	29	.818
Fluoride (F)	.3	.016	0	0
Nitrate (NO_3)	1.0	.016	.5	.008
Total dissolved solids	259		206	
Total hardness as $CaCO_3$	162		136	
pH	8.6		8.6	

Drillers' log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	11	11	Clay	2	241
Sand and gravel	26	37	Sandy rock	1	242
Clay and sand	20	57	Gumbo	29	271
Clay, sand, and gravel	13	70	Good sand	21	292
Lime, gravel, and clay	22	92	Rock and packed sand	33	325
Rock	3	95	Rock	1	326
Lime, clay, and gravel	51	146	Packed sand	6	332
Lime and sandy lime	13	159	Hard sandy clay	16	348
Rock	9	168	Sand	11	359
Lime and streaks of clay	5	173	Hard gumbo	22	381
Clay	10	183	Sand	39	420
Sand	14	197	Clay and gumbo	4	424
Lime and clay	12	209	Sand	36	460
Sand and lime	30	239	Clay	2	462

WEIMAR

Population in 1940: 1,353.

Source of information: G. G. Medders, water superintendent, Feb. 21, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. 3 blocks southwest of post office; drilled in 1926 by Layne-Texas Co.; depth, 602 feet; diameter, 16 inches; air lift and 30-horsepower electric motor; static water level, 134 feet below measuring point on Apr. 17, 1937; yield, 100 gallons with draw-down of 106 feet.

Well 2. 3½ blocks west of post office; drilled in 1935 by A. E. Fawcett, Jr.; depth, 605 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 170 feet below measuring point on Apr. 16, 1937.

Pumpage: No record.

Storage: Ground reservoir, 75,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 500.

Treatment: Aeration.

Analysis, well 2

[Collected Feb. 21, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	18		Sulfate (SO_4)	7.6	0.16
Iron (Fe)	.14		Chloride (Cl)	133	3.75
Calcium (Ca)	30	1.50	Fluoride (F)	.5	.03
Magnesium (Mg)	8.7	.72	Nitrate (NO_3)	.5	.01
Sodium (Na)	167	7.26	Total dissolved solids	558	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	111	
Bicarbonate (HCO_3)	347	5.69	pH	8.4	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	6	6	Sand	32	275
Sand and layers of clay	56	62	Shale and clay	206	481
Rock	2	64	Rock	2	483
Sandy clay	13	77	Soapstone	27	510
Muddy sand	59	136	Soft sandstone	23	533
Sand and layers of rock	7	143	Hard-packed sand	23	556
Sandy clay	70	213	Hard shale	13	569
Rock	4	217	Rock	2	571
Soapstone	10	227	Sand	8	579
Rock	6	233	Rock	2	581
Hard-packed sand	8	241	Gumbo	31	612
Rock	2	243	Sand	7	619

Well 2

Surface material	10	10	Sand and clay	10	200
Sand and rock	41	51	Gumbo	21	221
Rock	1	52	Sand and rock	24	245
Sandy clay	5	57	Soapstone	8	253
Sand and rock	15	72	Sand and rock	21	274
Rock	1	73	Clay	4	278
Sand and clay	9	82	Shale and clay	41	319
Sand and rock	5	87	Sand and rock	10	329
Clay	23	110	Gumbo	30	359
Clay and rock	25	135	Hard shale	63	422
Clay	5	140	Sand and shale	20	442
Soapstone	7	147	Lime and gumbo	61	503
Sand and lime	1	148	Hard shale	18	521
Sand and rock	5	153	Sand and boulders	71	592
Clay	37	190	Gumbo	13	605

DALLAS COUNTY

CARROLLTON

Population in 1940: 921.

Source of information: A. D. Duncan, water superintendent, Feb. 23, 1944.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Known as north well; about 0.4 mile east of railroad on north side of Belt Line R. R.; drilled in 1940; depth, 410 feet; equipped with deep-well cylinder pump and 7½-horsepower electric motor; cylinder set at 193 feet; static water level reported, 65 feet below land surface June 1940; reported yield, 75 gallons a minute.

Well 2. Known as south well; drilled in April 1929; depth, 320 feet; lower 20 feet perforated; equipped with deep-well cylinder pump and 5-horsepower electric motor; static water level reported, 150 feet below land surface August 1942; reported yield, 60 gallons a minute.

Well 3. 20 feet south of well 2; used as stand-by well only.

Pumpage (estimated): 90,000 gallons a day.

Number of customers: 208.

Treatment: None.

Analyses

[Collected Aug. 14, 1942. Analyzed by W. W. Hastings]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	8.8	0.44	6.4	0.32
Magnesium (Mg)	3.6	.30	3.9	.32
Sodium and potassium (Na+K)	819	35.59	797	34.65
Bicarbonate (HCO_3)	805	13.20	793	13.00
Sulfate (SO_4)	554	11.55	407	8.47
Chloride (Cl)	404	11.39	488	13.76
Fluoride (F)	3.6	.19	1.6	.08
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	2,190		2,090	
Total hardness as $CaCO_3$	37		32	

DALLAS

Population in 1940: 294,734.

Source of information: Homer A. Hunter, water superintendent, February 1944.

Ownership: Municipal.

Source of supply: Five wells and Lake Dallas.

Well 33. 1½ miles south of Dallas County Courthouse; drilled in 1920; depth, 2,773 feet; diameter, 10 to 6⅝ inches; reported to have flowed at the rate of 700 gallons a minute until 1926; static water level, 90 feet above surface on Nov. 12, 1923, 59 feet below surface in 1933; present yield, 960 gallons a minute.

Well 34. In Oak Cliff; drilled in 1924; depth, 2,700 feet; diameter, 26 to 10 inches; static water level, 82 feet below surface on Feb. 23, 1940; drawdown, 178 feet when pumping 1,000 gallons a minute February 1940.

Well 35. In Oak Cliff; drilled in 1924; depth, 2,750 feet; diameter, 18 to 10 inches; static water level, 132 feet below surface on Feb. 23, 1940; pumping level, 360 feet below the surface when pumping 1,000 gallons a minute February 1940.

Well 38. 3½ miles southwest of Dallas County Courthouse; drilled in 1930 by R. H. Dearing & Sons; depth, 2,634 feet; diameter, 18 to 6⅝ inches;

yield, 1,200 gallons a minute in 1931, 930 gallons a minute in 1935; temperature, 104° F.

Well 39. 3½ miles south of Dallas County Courthouse; drilled in 1938 by Layne-Texas Co.; depth, 2,921 feet; diameter, 18 to 8 inches; screened from 2,620 to 2,883 feet; underreamed and gravel walled; draw-down reported, 198 feet when pumping 1,158 gallons a minute; temperature, 115° F.

Lake Dallas. About 30 miles north-northwest of Dallas in Denton County on Elm Fork of the Trinity River; capacity at spillway level, 62,000,000,000 gallons; estimated annual discharge, about 550 second-feet.

Average pumpage, in gallons a day, from wells

1939	5,064,000	1941	4,852,000	1943	3,594,000
1940	5,140,000	1942	4,476,000		

Average pumpage, in gallons a day, from Lake Dallas

1942	25,500,000	1943	32,300,000

Treatment: Well supply, none; Lake Dallas supply, coagulation, sedimentation, rapid sand filteration, aeration, chlorination, and odor control.

Analyses

[Dates of collection: For well 33, Apr. 29, 1937; for well 34, Feb. 10, 1941; for well 35, July 14, 1941; for well 38, Jan. 9, 1941; for well 39, Nov. 10, 1940; for Lake Dallas, Feb. 29, 1944. Analyzed by L. C. Billings, water superintendent and chief chemist, water purification plant, city of Dallas]

	Well 33		Well 34		Well 35		Well 38		Well 39	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	19.3		33.6		22.6		23		63.6	
Iron (Fe)	.05		.35		.22		.12		.26	
Calcium (Ca)	4.3	0.21	4.5	2.25	5.4	2.70	5.1	2.55	7.4	0.37
Magnesium (Mg)	1.6	.13	4.0	.33	.5	.04	1.4	.12	1.2	.10
Sodium, potassium (Na +K)	358	15.57	386	16.78	375	16.30	419	20.74	399	17.35
Bicarbonate (HCO_3)	544	9.08	500	8.20	526	8.63	477	7.82	550	9.02
Sulfate (SO_4)	178	3.71	296	6.16	225	4.68	366	7.62	234	4.87
Chloride (Cl)	114	3.22	98	2.76	110	3.10	105	2.96	102	2.88
Nitrate (NO_3)					0		0	0	0	0
Total dissolved solids	981		1,020		1,010		1,080		1,080	
Total hardness (soap)	14		20		16		18		20	
pH	8.4		8.4		8.4		8.4			

	Lake Dallas, finished water			Lake Dallas, finished water	
	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	5.8		Sulfate (SO_4)	84	1.75
Iron (Fe)	.04		Chloride (Cl)	14	.39
Calcium (Ca)	45	2.25	Fluoride (F)	.3	.02
Magnesium (Mg)	.4	.03	Nitrate (NO_3)	2.8	.05
Sodium (Na)	35	1.53	Total dissolved solids	210	
Potassium (K)	4.3	.11	Total hardness	114	
Carbonate (CO_3)	40	1.33	pH	9.4	
Hydroxide (OH)	6.4	.38			

Driller's log, well 38

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	14	14	Shale	3	1,636
Blue shale	113	127	Limestone and sand	55	1,691
Shale and shell rock	48	175	Limestone and shale	33	1,724
Shale	340	515	Limestone	86	1,810
Sand	24	539	Limestone and shale	70	1,880
Shale and shell rock	121	660	Shell rocks and sand	85	1,965
Broken limestone	5	665	Sand and shale	40	2,005
Sand	40	705	Limestone and sand	47	2,052
Shale	55	760	Limestone and shale	78	2,130
Sandstone	15	775	Sand	39	2,169
Broken sandstone	35	810	Sand and shale	34	2,203
Shale and lime shell	99	909	Gumbo and clay	1	2,204
Limestone	45	954	Sand and shale	22	2,226
Shale	29	983	Gumbo, clay, and hard sand	12	2,238
Limestone	436	1,419	Sand and shale	46	2,284
Broken limestone and sand	37	1,456	Red beds	8	2,292
Sand	16	1,472	Shale and limestone and red beds	4	2,296
Gumbo and clay	19	1,491	Red beds	18	2,314
Sand	10	1,501	Sand	34	2,348
Gumbo and clay	2	1,503	Red beds	14	2,362
Sand	28	1,531	Sand	159	2,521
Broken sandstone	18	1,549	Broken sandstone	5	2,526
Sand	26	1,575	Broken sand and shell rocks	50	2,576
Shale and limestone	23	1,598	Shale and lime shells	58	2,634
Limestone and sand	35	1,633			

GARLAND

Population in 1940: 2,233.

Source of information: C. E. Newman, water superintendent, Feb. 23, 1944.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. At city waterworks; drilled in 1922 by T. E. Schutt; depth, 2,303 feet; diameter, 10 to 4½ inches; static water level reported, 109 feet below surface on Mar. 19, 1932, and 119 feet below surface in 1936; reported drawdown, 166 feet when pumping 173 gallons a minute in 1936; temperature, 106° F.

Well 2. About 2,400 feet from well 1; drilled in 1936 by Layne-Texas Co.; depth, 2,318 feet; diameter, 10 to 5⅝ inches; bottom 98 feet perforated; equipped with deep-well turbine pump and 30-horsepower electric motor; static water level reported, 150 feet below surface Oct. 9, 1936; drawdown, 167 feet when pumping 278 gallons a minute; temperature, 105° F.

Well 3. 1.25 miles west of well 1; drilled in 1942 by J. L. Myers & Sons; depth, 3,633 feet; static water level, 155 feet November 1942; drawdown, 67 feet when pumping 500 gallons a minute.

Pumpage (estimated): Maximum, 1,000,000 gallons; minimum, 350,000 gallons; average, 800,000 gallons a day.

Storage: Three concrete ground reservoirs, 75,000 gallons, 150,000 gallons, and 315,000 gallons; elevated tank, 75,000 gallons.

Treatment: None.

Analyses

[Dates of collection: For wells 1 and 2, July 3, 1942; for well 3, Feb. 23, 1944. Water from wells 1 and 2 analyzed by W. W. Hastings; that from well 3 by J. H. Rowley]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)					25	
Iron (Fe)					.02	
Calcium (Ca)	4.0	0.20	4.4	0.22	3.9	0.19
Magnesium (Mg)	1.5	.12	3.9	.32	.9	.07
Sodium and potassium (Na+K)	322	14.44	332	14.43	437	31
Bicarbonate (HCO_3)	622	9.20	628	10.30	518	8.50
Sulfate (SO_4)	166	3.46	174	3.62	370	7.70
Chloride (Cl)	33	.93	32	.90	97	2.74
Fluoride (F)	2.0	.11	2.2	.12	1.8	.09
Nitrate (NO_3)	2.5	.04	2.0	.03	.8	.01
Total dissolved solids	847		860		1,170	
Total hardness as $CaCO_3$	16		27		13	
pH					8.6	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	5	5	Soapstone and shale	28	1,169
White rock	445	450	Boulders and shale	26	1,195
White gravel	4	454	Rock	4	1,199
White rock	122	576	Water sand	35	1,234
Gumbo and boulder	35	611	Rock	2	1,236
Soapstone	25	636	Gumbo	8	1,244
Soapstone and shale	45	681	Hard rock	2	1,246
Soapstone	22	703	Boulders and gumbo	8	1,254
Soapstone and shale	63	766	Boulders and rocks	10	1,264
Sand	4	770	Gumbo and rock	15	1,279
Soapstone	10	780	Sand and rock	10	1,289
Gumbo and soapstone	82	862	Sandy soapstone and gravel	35	1,324
Soapstone and boulders	40	902	Shale and red beds	15	1,339
Soapstone and shale	60	962	Gumbo and soapstone	78	1,417
Soapstone	12	974	Hard rock	1	1,418
Soapstone and boulders	10	984	Gumbo	8	1,426
Gumbo	20	1,004	Shale and red beds	68	1,494
Gumbo and soapstone	20	1,024	Gravel	12	1,506
Soapstone	49	1,073	Red beds and sandy soapstone	43	1,549
Soapstone and shale	40	1,113	Hard limestone	611	2,160
Soapstone and boulders	11	1,124	Water sand	104	2,264
Soapstone	10	1,134	Soapstone and sandstone	39	2,303
Gumbo and rock	7	1,141			

Well 2

Soil	6	6	Sand and sandy shale	10	1,235
White rock	553	559	Hard shale	10	1,245
Hard shale and lime	106	665	Hard sand and layers of shale	23	1,268
Sticky shale	13	678	Hard shale	67	1,335
Rock	1	679	Hard sandstone	10	1,345
Hard black shale	38	717	Shale	16	1,361
Shale	22	739	Rock	3	1,364
Shale and boulders	36	775	Sandy shale	20	1,384
Brittle shale and sand	19	794	Rock	2	1,386
Shale and boulders	114	908	Sand rock	5	1,391
Shale	117	1,025	Hard sand and shale	15	1,406
Gray shale	96	1,121	Shale and red beds	41	1,447
Rock	2	1,123	Hard sandy shale	48	1,495
Hard shale	30	1,153	Hard sand	15	1,510
Hard sand rock	6	1,159	Shale and red beds	24	1,534
Hard shale	18	1,177	Hard shale	9	1,543
Sandy shale and streaks of hard shale	43	1,220	Rock	1	1,544
Shale and boulders	5	1,225	Hard shale, red beds, and gravel	28	1,572

Drillers' logs—Continued

Well 2—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Hard sand and shale	10	1,582	Hard shale, lime, and red beds	7	2,182
Shale, lime, gravel, and red beds	20	1,602	Hard shale, red beds, and streaks of sand	15	2,197
Hard lime	10	1,612	Hard shale, lime, and streaks of sand	18	2,215
Lime and hard shale	30	1,642	Sand	19	2,234
Hard lime	12	1,654	Sandstone	14	2,248
Hard lime and shale	59	1,713	Sandy chalk	2	2,250
Shale, lime, and red beds	14	1,727	Sand	53	2,303
Limestone and hard shale	54	1,781	Sand and hard shale	9	2,312
Hard shale and lime	377	2,158	Hard shale	6	2,318
Hard lime	4	2,162			
Hard sandy shale	13	2,175			

Well 3

Surface soil, black	3	3	Shale and shells	50	2,417
White rock	608	611	Shale, streaks of lime, shells	85	2,502
Chalk	9	620	Shale, streaks of lime	18	2,520
Shale	60	680	Lime, streaks of shale	42	2,562
Shale and chalk streaks	125	805	Shale and shells	48	2,610
Shale and lime shells	193	998	Shale, streaks of sand	78	2,638
Sticky shale, streaks of lime	103	1,101	Shale, lime streaks	55	2,693
Shale and lime shells	112	1,213	Shale, sand streaks	13	2,706
Shale, streaks of lime	151	1,364	Lime and shale	9	2,715
Shale	8	1,372	Sticky shale	28	2,743
Sand, shale streaks	21	1,393	Shale, lime streaks	69	2,812
Sand	5	1,398	Hard gray lime	38	2,850
Lime rock	8	1,406	Lime, shale	5	2,855
Shale and shells	102	1,508	Sticky shale, lime streaks	51	2,906
Shale, lime streaks	22	1,530	Broken shale, lime	91	2,997
Shale, streaks of sand	20	1,550	Shale, sand streaks	63	3,060
Shale, lime streaks	24	1,574	Sand	15	3,075
Streaks of shale, lime streaks	399	1,973	Sand, streaks of shale	7	3,082
Streaks of sand	2	1,975	Shale, lime streaks	6	3,088
Shale and lime streaks	87	2,062	Lime and shale	11	3,099
Sand	7	2,069	Lime, streaks of sand	56	3,155
Lime, streaks of sand	16	2,085	Sand	23	3,178
Sand and shale	67	2,152	Sand, streaks of shale	30	3,208
Sand	8	2,160	Hard sand	17	3,225
Hard lime	12	2,172	Shale, streaks of lime, sand	82	3,307
Broken lime and shale	58	2,230	Hard lime, streaks of sand	83	3,390
Sand	15	2,245	Sand	100	3,490
Shale, hard lime	15	2,260	Sand, lime streaks	10	3,500
Hard sand and shale	10	2,270	Lime	10	3,510
Sand	34	2,304	Sandy shale	30	3,540
Sand streaks, hard lime	11	2,315	Sand, streaks of lime	60	3,600
Sandy lime	38	2,353	Sandy lime	33	3,633
Broken lime and shale	14	2,367			

GRAND PRAIRIE

Population in 1940: 1,595, (estimated in 1943, 12,000).

Source of information: J. C. Swadley, water commissioner, June 27, 1943.

Ownership: Municipal.

Source of supply: Eight wells.

Well 1. About 0.1 mile northwest of city hall; drilled in 1925; depth, 370 feet; diameter, 5½ inches; equipped with deep-well turbine pump and 7½-horsepower electric motor; yield, 30 gallons a minute.

Well 2. About 0.2 mile northwest of city hall; drilled in 1938; depth, 372 feet; diameter, 8 to 6 inches; equipped with deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute May 1938, 90 gallons a minute May 1943, 46 gallons a minute June 1943; temperature, 75° F.

Well 3. About 0.25 mile northwest of city hall; drilled in 1941; depth, 419 feet; diameter, 10 to 6 inches; equipped with deep-well turbine pump and 15-horsepower electric motor; static water level, 125 feet below surface May 1942, 166 feet below surface August 1942; yield, 165 gallons a minute May 1941, 125 gallons a minute August 1941, 104 gallons a minute June 1943; temperature, 73° F.

Well 4. About 0.3 mile northwest of city hall; drilled in 1942; depth, 474 feet; diameter, 12½ to 4 inches; equipped with deep-well turbine pump and 15-horsepower electric motor; static water level, 190 feet February 1942; yield, 90 gallons a minute February 1942, 65 gallons a minute 1943.

Well 5. About 0.25 mile north of city hall; drilled in 1942; depth, 345 feet; diameter, 12½ to 6 inches; equipped with deep-well turbine pump and 15-horsepower electric motor; static water level, 130 feet March 1942; yield, 150 gallons a minute March 1942, 120 gallons a minute April 1943, 75 gallons a minute June 1943; temperature, 71° F.

Well 6. About 0.6 mile northeast of city hall; drilled in 1942; depth, 430 feet; diameter, 10 to 7 inches; equipped with deep-well turbine pump and 15-horsepower electric motor; static water level, 160 feet August 1942; yield, 166 gallons a minute June 1943; temperature, 73° F.

Well 7. About 0.6 mile northeast of city hall; drilled in 1942; depth, 412 feet; diameter, 10 to 7 inches; equipped with deep-well turbine pump and 15-horsepower electric motor; static water level, 157 feet October 1942; yield, 160 gallons a minute June 1943.

Well 8. 1 mile west of city hall; drilled in 1942; depth, 283 feet; diameter, 8 inches; equipped with deep-well turbine pump and 7½-horsepower electric motor; static water level, 160 feet December 1942; yield, 90 gallons a minute February 1943, 30 gallons a minute June 1943.

Pumpage: Average, 600,000 gallons a day.

Storage: Elevated tank, capacity 50,000 gallons.

Number of customers: 2,091.

Treatment: None.

Analyses

[Collected June 30, 1943. Analyzed by J. H. Rowley]

	Well 2		Well 3		Well 6	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		9.2		10	
Iron (Fe)	.14		.03		.04	
Calcium (Ca)	1.9	0.09	2.0	0.10	2.1	0.10
Magnesium (Mg)	.9	.07	.3	.02	.5	.04
Sodium and potassium (Na+K)	255	11.07	233	10.11	237	10.30
Bicarbonate (HCO_3)	531	8.72	506	8.31	517	8.49
Sulfate (SO_4)	87	1.81	65	1.35	68	1.42
Chloride (Cl)	20	.56	16	.45	15	.42
Fluoride (F)	1.2	.06	1.2	.06	1.2	.06
Nitrate (NO_3)	4.7	.08	4.0	.06	2.8	.05
Total dissolved solids	646		580		633	
Total hardness as $CaCO_3$	8		6		7	
pH	8.7		8.6		8.8	

Drillers' logs

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Brown shale	19	245
Clay	7	10	Sand	15	260
Sandy clay, surface water	5	15	Sticky shale	5	265
Yellow clay	23	38	Lime	15	280
Black shale	42	80	Gray shale	27	307
Brown shale	20	100	Brown shale	5	312
Blue shale	25	125	Brown gumbo	8	320
Sand	5	130	Water sand	18	338
Gray shale	15	145	Hard rock	4	342
Water sand	15	160	Brown shale	18	360
Gray shale	33	193	Water sand	7	367
Water sand	27	220	Brown shale	5	372
Lime	6	226			

Well 3

Black soil	3	3	Gray shale	3	258
Clay	17	20	Brown shale	6	264
Gray sand and clay	2	22	Sandy lime	6	270
Clay	26	48	Sand	29	299
Dark shale	72	120	Lime rock	4	303
Gray sandy shale	10	130	Water sand	17	320
Shell rock	1	131	Black shale	4	324
Gray sandy shale	21	152	Brown shale	5	329
Water sand	8	160	Sticky shale	6	335
Brown shale	5	165	Lime	12	347
Rock	1	166	Brown sandy shale	8	355
Dark gray shale	14	180	Hard sand	20	375
Water sand	13	193	Brown shale	18	393
White shale	11	204	White shale	7	400
Water sand	33	237	Sandy shale	7	407
Lime	3	240	Lime rock	8	415
Sand	8	248	Brown shale	4	419
Hard lime	7	255			

Well 4

Surface soil	8	8	Lime rock	3	253
Sandy clay	12	20	Sandy shale	7	260
Sand and gravel	5	25	Brown shale	8	268
Sandy clay	14	39	Gray shale	4	272
Shale	86	125	Sand	49	321
Sand rock, dry	5	130	Black shale	4	325
White shale	10	140	Gray sandy shale	17	342
Sandy shale	6	146	Hard sand	20	362
Sand	7	153	Gray shale	6	368
Brown shale	7	160	Dark brown shale	15	383
Gray shale	15	175	Gray shale	5	388
Sand	18	193	Sand	16	404
White shale	3	196	Gray shale	4	408
Sand	18	214	Black shale	7	415
Brown shale	11	225	Gray putty sand	5	420
Sandy shale	25	250	Gray shale	54	474

Well 5

Surface soil	6	6	Lime rock	3	251
Mixed clay	9	15	Gray shale	7	258
Dark sand	1	16	Brown shale	4	262
Mixed clay	13	29	Lime rock	3	265
Blue shale	35	64	Sandy shale	5	270
Shale	76	140	Gray shale	20	290
Sand	9	149	Lime rock	1	291
Blue shale	26	175	Water sand	14	305
Gray sandy shale	7	182	Black shale	8	313
Sand	33	215	Blue shale	7	320
Brown shale	20	235	Sand	13	333
Gray shale	3	238	Lime rock	1	334
Sand	10	248	Gray shale	11	345

Drillers' logs—Continued

Well 6

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Sand	5	242
Clay	11	14	Shale	18	260
Sand and gravel	34	48	Hard sand	10	270
Shale	72	120	Sand	7	277
Sand rock	2	122	Gray shale	30	307
Sandy shale	15	137	Dark sandy shale	18	325
Sand	5	142	Gray shale	4	329
Shale	13	155	Sand	6	335
Rock	17	172	Shale	11	346
Shale	17	189	Sand	29	375
Dark shale	14	203	Hard sand	3	378
Rock	15	218	Soft sand	44	422
Gray shale	7	225	Black shale	8	430
Sandy shale	12	237			

Well 7

Clay	17	17	Sandy shale	6	228
Sand, gravel and clay	11	28	Sand	19	247
Clay	15	43	Brown shale	13	260
Shale	70	113	Sand	17	277
Gray sandy shale	4	117	Gray shale	40	317
Sand rock	3	120	Sand rock	8	325
Gray sandy shale	13	133	Dark shale	6	331
Hard sand rock	3	136	Sand	6	337
Sand	12	148	Dark shale	12	349
Brown shale	32	180	Gray sandy shale	9	358
Gray shale	18	198	Sand	52	410
Hard sandy lime	7	205	Shale	2	412
Gray shale	17	222			

Well 8

Black soil	5	5	Hard shale	8	156
Yellow clay	10	15	Sandy shale	26	182
Mixed clay	15	30	Hard rock	2	184
Blue shale	80	110	Sandy shale	22	206
Sandy shale	15	125	Sand	34	240
Brown shale	21	146	Mixed shale	43	283
Gray shale	2	148			

IRVING

Population in 1940: 1,089.

Source of information: City water superintendent, Aug. 13, 1942.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Northwest of city hall; drilled in 1924 by Mr. Stanley; depth, 397 feet; diameter, 6 inches; equipped with deep-well turbine pump and 10-horsepower electric motor; static water level, 108 feet in 1924, 126 feet in July 1941, 150 feet July 1942; yield reported, 80 gallons a minute; temperature, 74° F.

Well 2. 1 block east and 1½ blocks north of city hall; drilled in 1939 by J. L. Myers & Sons; depth, 494 feet; diameter, 8⅝ to 7 inches; equipped with deep-well turbine pump and 10-horsepower electric motor; static water level, 118 feet Dec. 15, 1939; draw-down reported, 56 feet when pumping 125 gallons a minute.

Pumpage (estimated): Average, 120,000 gallons a day.

Treatment: None.

Analyses

[Collected Aug. 13, 1942. Analyzed by W. W. Hastings]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	10	0.52	2	0.10
Magnesium (Mg)	3.9	.32	1.5	.12
Sodium and potassium (Na+K)	622	27.04	621	27.00
Bicarbonate (HCO_3)	677	11.10	634	10.39
Sulfate (SO_4)	554	11.55	591	12.30
Chloride (Cl)	182	5.13	155	4.37
Fluoride (F)	1.6	.08		
Nitrate (NO_3)	1.5	.02	1.0	.02
Total dissolved solids	1,710		1,680	
Total hardness as $CaCO_3$	42		6	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	8	8	Gray shale	52	310
Sand rock	7	15	Sandy shale	10	320
Sand and gravel	22	37	Black shale	2	322
Gray shale	121	158	Sandy shale	13	335
Brown shale	32	190	Mixed shale	20	355
Gray shale	35	225	Rock	5	360
Water sand	5	230	Pink shale	4	364
Sand rock	2	232	Sand, some water	3	367
Sandy shale	11	243	Gray sandy shale	22	389
Dirty sand, some water	15	258	Water sand	105	494

LANCASTER

Population in 1940: 1,151.

Source of information: Mr. McCurdy, water plant operator, Aug. 7, 1942.

Ownership: Municipal.

Source of supply: Well in the northeast part of Lancaster; drilled by Mr. Sharp; depth, 1,057 feet; diameter, 8 inches; equipped with deep-well turbine pump and 40-horsepower motor; static water level reported, 140 feet below the surface; yield, 250 gallons a minute; temperature, 82° F.

Pumpage (estimated): Average, 60,000 gallons a day.

Treatment: None.

Analysis, well 1

[Collected Aug. 7, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	10	0.50	Chloride (Cl)	134	3.78
Magnesium (Mg)	1.5	.12	Fluoride (F)	1.6	.08
Sodium and potassium (Na+K)	520	22.61	Nitrate (NO_3)	5.0	.08
Bicarbonate (HCO_3)	567	9.30	Total dissolved solids	1,430	
Sulfate (SO_4)	480	9.99	Total hardness as $CaCO_3$	31	

MESQUITE

Population in 1940: 1,045.

Source of information: Mr. Parker, July 29, 1941.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. About 0.45 mile west of center of Mesquite; drilled in 1909 by Mr. Shook; depth, 1,475 feet; diameter, 6 to 4 inches; equipped with deep-well turbine pump and 20-horsepower electric motor; well flowed until 1914; yield, 140 gallons a minute; used as stand-by well.

Well 2. About 0.45 mile west of center of Mesquite; drilled in 1940 by Layne-Texas Co.; depth, 2,555 feet; diameter, 8⅝ to 5½ inches; equipped with deep-well turbine pump and 30-horsepower motor; static water level, 62 feet below surface Feb. 25, 1941; draw-down 245 feet while pumping 260 gallons a minute.

Pumpage (estimated): Average, 75,000 gallons a day.

Storage: Brick ground reservoir, 35,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 325.

Treatment: None.

Analyses

[Collected July 31, 1941. Analyzed by W. W. Hastings]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	5.2	0.26	4.1	0.20
Magnesium (Mg)	2.4	.20	1.6	.13
Sodium and potassium (Na+K)	782	34.00	394	17.13
Bicarbonate (HCO_3)	942	15.44	564	9.25
Sulfate (SO_4)	317	6.60	307	6.39
Chloride (Cl)	440	12.41	63	1.78
Fluoride (F)			1.4	.07
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	2,010		1,070	
Total hardness as $CaCO_3$	23		16	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Hard shale	29	1,634
Yellow clay	22	26	Shale	2	1,636
Black shale	90	116	Sandy shale	20	1,656
Hard shale	34	150	Shale and lime	52	1,708
Hard gray shale	31	181	Hard shale	11	1,719
Chalk and shale	28	209	Shale and lime	50	1,769
Chalk	394	603	Lime and shale	261	2,030
Gray and brown shale	70	673	Lime	28	2,058
Chalk	60	773	Lime and shale	129	2,187
Black shale	248	981	Shale	12	2,199
Gray shale	35	1,016	Hard lime	6	2,205
Shale	234	1,250	Lime and shale	101	2,306
Sand	14	1,264	Shale and lime	52	2,358
Rock and sand layers	11	1,275	Shale, lime, and thin layers of sand	28	2,386
Hard shale	38	1,313	Sand	8	2,394
Shale and shell	35	1,348	Sand and red shale (core)	3	2,397
Sand and layers of shale	68	1,426	Lime and shale	10	2,407
Hard shale	12	1,438	Shale and sand layers	23	2,430
Sand and shale	20	1,458	Sandy shale	41	2,471
Sand	46	1,504	Sand (core)	13	2,484
Hard shale	23	1,527	Hard shale	14	2,498
Sand	4	1,531	Sand	10	2,508
Hard shale	23	1,554	Shale	47	2,555
Sand	16	1,570			
Sandy shale	35	1,605			

RICHARDSON

Population in 1940: 720.

Source of information: R. K. Ashby, water superintendent, June 18, 1942.

Ownership: Municipal.

Source of supply: Well in center of Richardson; drilled in 1925 by R. H. Dearing & Sons; depth, 1,947 feet; diameter, 8¼ to 6 inches; lower 161 feet perforated; equipped with deep-well turbine pump and 15-horsepower electric motor; yield 121 gallons a minute; temperature, 106° F.

Pumpage (estimated): Average, 36,000 gallons a day.

Treatment: None.

Analysis, well 1

[Collected July 3, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	4.0	0.20	Chloride (Cl)	23	0.65
Magnesium (Mg)	1.5	.12	Fluoride (F)	1.1	.06
Sodium and potassium (Na+K)	294	12.77	Nitrate (NO_3)	2.5	.04
Bicarbonate (HCO_3)	598	9.80	Total dissolved solids	742	
Sulfate (SO_4)	122	2.54	Total hardness as $CaCO_3$	16	

SEAGOVILLE

Population in 1940: 760.

Source of information: Pump operator, July 31, 1941.

Ownership: Municipal.

Source of supply: Well 1 block southwest of Texas and New Orleans R. R. Station; drilled in 1912 by Mr. Wellerford; depth 1,731 feet; plugged back to 1,550 feet; diameter 4 inches; equipped with deep-well turbine pump; static water level reported 60 feet below surface July 31, 1941; well was reported to have flowed as late as 1926.

Pumpage (estimated): Average, 25,000 gallons a day.

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

Treatment: None.

Analysis, well 1

[Collected July 31, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	22		Sulfate (SO_4)	356	7.41
Iron (Fe)	.06		Chloride (Cl)	572	16.13
Calcium (Ca)	5.2	0.26	Fluoride (F)	4.2	.22
Magnesium (Mg)	2.4	.20	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	926	40.27	Total dissolved solids	2,400	
Bicarbonate (HCO_3)	1,040	16.98	Total hardness as $CaCO_3$	23	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Hard red sand	16	16	Hard blue soapstone	12	950
Hard red sand rock	2	18	Hard black gumbo	12	962
Firm black shale	52	70	Hard black shale	109	1,071
Hard black gumbo	74	144	Hard black gumbo	6	1,077
Firm black shale	42	186	Hard gray shell rock	2	1,979
Hard black gumbo	18	204	Soft gray shale	119	1,198
Hard black shale	27	231	Hard black gumbo	26	1,124
Hard black gumbo	30	261	Hard black shell rock	5	1,229
Hard black shale	12	273	Hard gray shell rock	2	1,231
Hard black gumbo	7	280	Hard black gumbo	11	1,242
Soft black shale	26	306	Hard black shale	40	1,282
Soft gray sandy shale	6	312	Hard black gumbo	12	1,294
Soft black gumbo	18	330	Hard gray sandy shale	100	1,394
Soft white lime rock	112	442	Soft yellow gumbo	80	1,474
Hard blue lime	27	469	Hard black sand rock	2	1,476
Soft white lime rock	140	609	Soft dark sand	8	1,484
Hard white lime rock	83	692	Hard yellow gumbo	10	1,494
Hard black shale	116	808	Hard blue soapstone	4	1,498
Hard brown shell rock	2	810	Hard yellow gumbo	14	1,512
Hard gray sand rock	2	812	Hard gray sand rock	10	1,522
Hard black gumbo	14	826	Hard gray water sand	19	1,541
Hard black shale	112	938	Soft black gunpowder shale	52	1,593

DELTA COUNTY

COOPER

Population in 1940: 2,537.

Source of information: Edward Cantrell, water superintendent, Sept. 14, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir near town; developed in 1914; drainage area, 2 square miles; area under water, 15 acres; reported inadequate during drought.

Pumpage (estimated): Maximum, 150,000 gallons; average, 80,000 gallons a day.

Storage: Elevated tank, 100,000 gallons.

Number of customers: 345 metered and 345 flat rate.

Treatment: Aeration, coagulation with alum and lime, rapid sand filter, and chlorination.

Analysis of raw water

[Collected Sept. 14, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	1.5		Sulfate (SO_4)	1.0	0.021
Iron (Fe)	.20		Chloride (Cl)	1.0	.028
Calcium (Ca)	7.2	0.359	Fluoride (F)	.2	.011
Magnesium (Mg)	1.6	.132	Nitrate (NO_3)	.8	.013
Sodium (Na)	2.5	.107	Total dissolved solids	41	
Potassium (K)			Total hardness as $CaCO_3$	25	
Bicarbonate (HCO_3)	32	.525	pH	7.5	

PECAN GAP

Population in 1940: 409.

Source of information: John W. Patterson, city secretary, Sept. 15, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir half a mile west of town; developed in 1935; area under water, 3 acres.

Pumpage (estimated): Maximum, 15,000 gallons; average, 7,000 gallons a day.

Storage: Elevated tank, 25,000 gallons.

Number of customers: 66.

Treatment: Chlorination.

Analysis of raw water

[Collected Sept. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	4.1		Sulfate (SO_4)	2.0	0.042
Iron (Fe)	.16		Chloride (Cl)	1.0	.028
Calcium (Ca)	15	0.749	Fluoride (F)	.2	.011
Magnesium (Mg)	2.6	.214	Nitrate (NO_3)	.5	.008
Soldium (Na)	3.5	.152	Total dissolved solids	75	
Potassium (K)	2.8	.072	Total hardness as $CaCO_3$	48	
Bicarbonate (HCO_3)	67	1.098	pH	8.4	

ELLIS COUNTY

ENNIS

Population in 1940: 7,087.

Source of information: Joe Gilmore, water superintendent, Jan. 27, 1943.

Ownership: Municipal.

Source of supply: Two wells and lake; wells used for public supply, lake for industrial plants and railroad.

Well 1. At pumping station; drilled in 1926; depth, 1,796 feet; diameter, 20 to 8¼ inches; originally drilled to 3,560 feet, but salty water found below 1,796 feet; deep-well turbine pump; yield, 446 gallons a minute.

Well 2. At pumping station; drilled in 1935; depth, 1,796 feet; diameter, 13 inches; deep-well turbine pump; yield, 520 gallons a minute; static water level, 162 feet below surface Jan. 6, 1937; pumping level, 278 feet while pumping 508 gallons a minute on Jan. 6, 1937.

Lake. On Little Mustang Creek, 1¾ miles west of Ennis; capacity, 951 acre-feet.

Pumpage: No record of pumpage from wells; supply reported adequate for public use. Railroad uses 11,000,000 to 14,000,000 gallons a month from lake.

Storage: Well system—1 concrete ground reservoir, capacity 100,000 gallons; 1 elevated tank, capacity 100,000 gallons. Lake system—1 elevated tank, capacity 50,000 gallons.

Number of customers: 2,000.

Treatment: None.

Analyses

[Collected Jan. 27, 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	10		11	
Iron (Fe)	.06		.31	
Calcium (Ca)	4.5	0.22	4.6	0.23
Magnesium	2.1	.17	2.1	.17
Sodium (Na)	785	34.11	807	35.09
Potassium (K)			9.0	.23
Bicarbonate (HCO_3)	990	16.23	1,033	16.94
Sulfate (SO_4)	488	10.16	500	10.41
Chloride (Cl)	277	7.81	285	8.04
Fluoride (F)	5.6	.29	6.0	.32
Nitrate (NO_3)	.5	.01	.8	.01
Total dissolved solids	2,060		2,140	
Total hardness as $CaCO_3$	20		20	
pH	8.2		8.4	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and shale	100	100	Hard lime	7	2,687
Lime and shale	8	108	Lime	20	2,707
Sandy shale	452	560	Sandy lime	25	2,732
Austin chalk	487	1,047	Lime and broken lime	52	2,784
Sticky shale	183	1,230	Shale	2	2,786
Shale	147	1,377	Broken lime	4	2,792
Sticky shale	68	1,445	Lime	6	2,798
Sand	46	1,491	Sandy shale and lime	8	2,806
Shale	12	1,503	Broken lime	44	2,850
Sticky shale	105	1,608	Lime and shale	8	2,858
Lime	2	1,610	Broken lime	42	2,900
Hard shale	82	1,692	Lime	34	2,934
Sticky shale	7	1,699	Hard lime	10	2,944
Sand	4	1,703	Lime	43	2,987
Hard sand	4	1,707	Sticky shale	5	2,992
Hard sand and shale	25	1,736	Lime	20	3,012
Hard sand	60	1,796	Broken lime	24	3,036
Sticky shale	24	1,820	Lime	29	3,165
Hard shale	14	1,834	Broken lime and shale	15	3,180
Lime	6	1,840	Broken lime	20	3,200
Shale	10	1,850	Broken lime and hard shale	10	3,210
Sticky shale	53	1,903	Lime	110	3,320
Hard shale	42	1,945	Broken lime	58	3,378
Lime	85	2,030	Hard shale	15	3,393
Gumbo	2	2,032	Sand	16	3,409
Lime	83	2,115	Sandy shale	15	3,424
Shale	5	2,120	Hard shale	2	3,426
Limestone	316	2,436	Hard shale and sandy lime	20	3,446
Hard shale	4	2,440	Sand	14	3,460
Lime	6	2,446	Sticky shale	6	3,466
Hard shale	10	2,456	Sandy lime	5	3,471
Lime	44	2,500	Hard shale	3	3,474
Sand	5	2,505	Sticky shale	10	3,484
Sandy shale	30	2,535	Sandy shale	6	3,490
Lime	14	2,549	Sandy shale and lime	7	3,497
Hard sandy shale	11	2,560	Hard lime	3	3,500
Lime	13	2,573	Hard shale and lime	5	3,505
Hard shale	5	2,578	Sandy lime	3	3,508
Lime	5	2,583	Lime	1	3,509
Broken lime and hard shale	7	2,590	Sand	8	3,517
Lime	14	2,604	Sandy shale	20	3,537
Soft shale	10	2,614	Hard sand and shale	5	3,542
Sticky shale	4	2,618	Sandy lime	6	3,548
Broken lime and hard shale	7	2,625	Sandy shale	4	3,552
Hard lime	3	2,628	Hard sand	3	3,555
Broken lime and hard shale	17	2,645	Sand	5	3,560
Broken lime and shale	35	2,680			

Drillers' logs—Continued

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and shale	100	100	Shale	12	1,503
Lime and shale	8	108	Sticky shale and boulders	103	1,608
Sandy shale	452	560	Lime	2	1,610
Chalk	487	1,047	Hard shale and boulders	82	1,692
Sticky shale	183	1,230	Sticky shale	7	1,699
Shale	147	1,377	Sand	4	1,703
Sticky shale	68	1,445	Hard sand	93	1,796
Sand	46	1,491			

FERRIS

Population in 1940: 1,436.

Source of information: L. T. Gleason, water superintendent, Jan. 27, 1943.

Ownership: Municipal.

Source of supply: Well 1 mile north of standpipe just across county line in Dallas County; depth, 1,408 feet; diameter, 8 inches; well reported to have flowed when drilled more than 40 years ago and still flows when the pump has been shut off 2 or 3 days; deep-well turbine pump and 5-horsepower electric motor; pump setting at 40 feet; yield, 90,000 gallons per day.

Pumpage: No records available. Mr. Gleason reports well is pumped from 12 to 16 hours a day, with the heaviest pumping in summer.

Storage: Standpipe, 100,000 gallons; ground-storage reservoir at pumping plant, 200,000 gallons.

Number of customers: 308.

Treatment: None.

Analysis

[Collected Jan. 27, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	11		Sulfate (SO_4)	337	7.02
Iron (Fe)	.08		Chloride (Cl)	126	3.55
Calcium (Ca)	3.1	0.15	Fluoride (F)	3.0	.16
Magnesium (Mg)	1.7	.14	Nitrate (NO_3)	0	0
Sodium (Na)	519	22.57	Total dissolved solids	1,377	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	14	
Bicarbonate (HCO_3)	750	12.30	pH	8.4	

FORRESTON

Population in 1940: 233.

Source of information: Mrs. V. C. Harvill, Jan. 27, 1943.

Owner: Mrs. V. C. Harvill.

Source of supply: Well reported to be 750 to 800 feet deep; diameter, 4 inches; deep-well cylinder and pump jack; static water level reported, 30 feet below land surface.

Pumpage: No record.

Storage: Elevated tank, estimated 15,000 gallons.

Number of customers: 56.

Treatment: None.

Analysis

[Collected Jan. 27, 1943. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	11		Sulfate (SO_4)	501	10.43
Iron (Fe)	.10		Chloride (Cl)	195	5.50
Calcium (Ca)	5.0	0.25	Fluoride (F)	5.0	.26
Magnesium (Mg)	1.9	.16	Nitrate (NO_3)	8.2	.13
Sodium (Na)	645	28.08	Total dissolved solids	1,750	
Potassium (K)	8.0	.20	Total hardness as $CaCO_3$	20	
Bicarbonate (HCO_3)	754	12.37	pH	8.4	

ITALY

Population in 1940: 1,224.

Source of information: W. R. Wardlaw, operator, Jan. 27, 1943.

Owner: Community Public Service Co.

Source of supply: Two wells.

Well 1. Reported to be 700 feet deep; pumped with air; used as emergency supply only.

Well 2. Reported 900 to 1,000 feet deep; deep-well turbine pump; no data available on yield or water levels.

Storage: Elevated tank, estimated capacity 50,000 gallons.

Number of customers: 300.

Treatment: Aeration.

Analysis, well 2

[Collected Jan. 28, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	514	10.70
Iron (Fe)	.31		Chloride (Cl)	111	3.13
Calcium (Ca)	3.9	0.19	Fluoride (F)	3.3	.17
Magnesium (Mg)	1.9	.16	Nitrate (NO_3)	.2	0
Sodium (Na)	569	24.73	Total dissolved solids	1,570	
Potassium (K)	11	.28	Total hardness as $CaCO_3$	18	
Bicarbonate (HCO_3)	694	11.36	pH	8.4	

MIDLOTHIAN

Population in 1940: 1,017.

Source of information: E. C. Alderman, city secretary, Jan. 27, 1943.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled about 1934; depth, 2,508 feet; diameter, 10 to 6 inches; deep-well turbine pump set at 384 feet; pumping level in 1934, 342 feet below surface; yield, 200 gallons a minute.

Well 2. Depth, 690 feet; old well, underreamed in 1940 by Layne-Texas Co. to a diameter of 14 inches; cased with 8-inch casing and screened from 510 to 690 feet; deep-well turbine pump; static water level Jan. 15, 1942, 280 feet below land surface; yield, 117 gallons a minute with pumping level at 367 feet.

Pumpage (estimated): Average, 60,000 gallons a day.

Storage: Elevated tank, 60,000 gallons; ground-storage reservoir, 75,000 gallons.

Number of customers: 348.

Treatment: None.

Analyses

[Collected Jan. 27, 1943. Analyzed by P. A. Witt]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	15		8.0	
Iron (Fe)	.02		.04	
Calcium (Ca)	4.3	0.21	4.5	0.22
Magnesium (Mg)	1.2	.10	1.3	.11
Sodium (Na)	263	11.43	378	16.45
Potassium (K)	6.8	.17	6.8	.17
Bicarbonate (HCO_3)	497	8.15	488	7.99
Sulfate (SO_4)	77	1.60	368	7.66
Chloride (Cl)	73	2.06	45	1.27
Fluoride (F)	1.9	.10	.6	.03
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	687		1,050	
Total hardness as $CaCO_3$	16		16	
pH	8.2		8.4	

MILFORD

Population in 1940: 767.

Source of information: Roy Wade, water superintendent, Jan. 16, 1943.

Ownership: Municipal.

Source of supply: Well, depth unknown; reported to draw from Trinity sand at more than 2,000 feet; diameter, 8 inches; flowed until about 7 years ago; deep-well turbine pump has been installed for the last 15 or 20 years; yield, 65 gallons a minute; original static water level reported, 90 feet above land surface; static water level, 35 feet below the surface in March 1942.

Pumpage (estimated): Average, about 20,000 gallons a day.

Storage: Elevated tank, 60,000 gallons.

Number of customers: 190.

Treatment: None.

Analysis

[Collected Jan. 16, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	245	5.10
Iron (Fe)	.04		Chloride (Cl)	110	3.10
Calcium (Ca)	13	0.65	Fluoride (F)	1.2	.06
Magnesium	5.2	.43	Nitrate (NO_3)	0	0
Sodium (Na)	358	15.57	Total dissolved solids	1,010	
Potassium (K)	7.8	.20	Total hardness as $CaCO_3$	54	
Bicarbonate (HCO_3)	439	7.20	pH	8.4	

PALMER

Population in 1940: 697.

Source of information: R. O. Smith, water superintendent, Jan. 27, 1943.

Ownership: Municipal.

Source of supply: Well drilled in 1937; depth, 1,472 feet; diameter, 6 inches; pumped with air.

Pumpage (estimated): Average, 12,000 gallons a day.

Storage: Elevated tank, 40,000 gallons; ground-storage reservoir, 60,000 gallons.

Number of customers: 185.

Treatment: None.

Analysis

[Collected Jan. 27, 1943. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	23		Sulfate (SO_4)	293	6.10
Iron (Fe)	.0		Chloride (Cl)	454	12.80
Calcium (Ca)	5.5	0.27	Fluoride (F)	4.8	.25
Magnesium (Mg)	2.3	.19	Nitrate (NO_3)	10	.16
Sodium (Na)	782	33.99	Total dissolved solids	2,040	
Potassium (K)	7.6	.19	Total hardness as $CaCO_3$	23	
Bicarbonate (HCO_3)	934	15.33	pH	8.2	

RED OAK

Population in 1940: 400.

Source of information: Quint Chapman, operator, Jan. 27, 1943.

Owner: Vandergrift & Orr.

Source of supply: Well, 850 feet deep; drilled in 1939; diameter, 6 inches; equipped with deep-well cylinder pump and pump jack; static water level, 140 feet; yield, 50 gallons a minute.

Pumpage: No records.

Storage: Elevated tank, estimated 8,000 gallons.

Treatment: None.

Analysis

[Collected Jan. 27, 1943. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	11		Sulfate (SO_4)	394	8.20
Iron (Fe)	.04		Chloride (Cl)	98	2.76
Calcium (Ca)	4.6	0.23	Fluoride (F)	1.3	.07
Magnesium (Mg)	1.5	.12	Nitrate (NO_3)	2.5	.04
Sodium (Na)	460	20.01	Total dissolved solids	1,270	
Potassium (K)	8.2	.21	Total hardness as $CaCO_3$	18	
Bicarbonate (HCO_3)	579	9.50	pH	8.2	

WAXAHACHIE

Population in 1940: 8,655.

Source of information: J. D. Murphee, water superintendent, Jan. 28, 1943.

Ownership: Municipal.

Source of supply: Seven wells, of which three wells supply most of the water; these wells draw from the Trinity sand and are reported to be about 2,950 feet deep.

Well 1. At the waterworks; drilled about 1913; depth, 2,950 feet; diameter, 6 inches; flowed when drilled; stopped flowing in 1932; static water level reported land 40 feet below the surface in January 1943; deep-well turbine pump; yield, 250 gallons a minute.

Well 2. On Coffman Street; drilled in 1919; depth, about 2,950 feet; diameter, 8 inches; deep-well turbine pump; yield, 400 gallons a minute.

Well 3. Depth, about 2,950 feet; diameter, 12 inches; deep-well turbine pump; yield, 550 gallons a minute.

Wells 4 to 7. These wells are in the vicinity of the pumping station; pumped by air; yield, from 60 to 80 gallons a minute, each used for stand-by supply.

Pumpage: Average, about 400,000 gallons a day.

Storage: Elevated tank, 450,000 gallons; elevated tank, 60,000 gallons; standpipe, 200,000 gallons.

Number of customers: 2,300.

Treatment: None.

Analysis, well 1

[Collected Jan. 28, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	112	2.33
Iron (Fe)	.07		Chloride (Cl)	288	8.12
Calcium (Ca)	5.4	0.27	Fluoride (F)	1.7	.09
Magnesium (Mg)	2.1	.17	Nitrate (NO_3)	3.0	.05
Sodium (Na)	429	18.67	Total dissolved solids	1,130	
Potassium (K)	7.2	.18	Total hardness as $CaCO_3$	22	
Bicarbonate (HCO_3)	530	8.70	pH	8.4	

FALLS COUNTY

CHILTON

Population in 1940: 750.

Source of information: G. de Graffenried, owner, June 14, 1944.

Owner: G. de Graffenried.

Source of supply: Well 2½ miles northeast of town; drilled in 1924 by Sun Oil Co.; depth 2,709 feet; diameter, 10 to 6 inches; 300 feet of screen; reported natural flow when drilled, 800 gallons a minute and 72 pounds pressure at land surface; temperature, 112° F.

Pumpage: Flows continuously.

Storage: Elevated tank, 53,500 gallons.

Number of customers: 125 and Humble Oil Co. camp.

Treatment: None.

Analysis, well 1

[Collected June 13, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	25		Sulfate (SO_4)	802	16.70
Iron (Fe)	.14		Chloride (Cl)	66	1.86
Calcium (Ca)	55	2.75	Fluoride (F)	3.1	.16
Magnesium (Mg)	17	1.40	Nitrate (NO_3)	0	0
Sodium (Na)	491	21.36	Total dissolved solids	1,680	
Potassium (K)	12	.31	Total hardness as $CaCO_3$	208	
Bicarbonate (HCO_3)	433	7.10	pH	7.8	

LOTT

Population in 1940: 1,021.

Source of information: J. W. Steen, city secretary, June 13, 1944.

Ownership: Municipal.

Source of supply: Well about three-fourths mile northeast of town; drilled in 1940 by Layne-Texas Co.; depth, 3,305 feet; reported natural flow, 533 gallons a minute and pressure of 66 pounds at land surface; temperature, 138° F.

Pumpage: Maximum, 144,000 gallons a day; flow choaked to daily requirements.

Storage: Elevated tank, 72,000 gallons.

Number of customers: 250.

Treatment: None.

Analysis, well 1

[Collected June 13, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	30		Sulfate (SO_4)	749	15.59
Iron (Fe)	2.4		Chloride (Cl)	83	2.34
Calcium (Ca)	78	3.89	Fluoride (F)	2.3	.12
Magnesium (Mg)	18	1.48	Nitrate (NO_3)	0	0
Sodium (Na)	415	18.06	Total dissolved solids	1,560	
Potassium (K)	14	.36	Total hardness as $CaCO_3$	268	
Bicarbonate (HCO_3)	350	5.74	pH	8.1	

MARLIN

Population in 1940: 6,542.

Source of information: John V. Barton, water superintendent, June 13, 1944.

Ownership: Municipal.

Source of supply: Impounding reservoir built in 1923; drainage area, 18 square miles; capacity, 500,000,000 gallons.

Average pumpage, in gallons a day [1]

1938	1939	1940	1941	1942
429,000	431,000	419,000	421,000	432,000

[1] Capacity of treating plant, 1,000,000 gallons a day.

Storage: Clear well, 250,000 gallons; elevated tank, 150,000 gallons.

Number of customers: 1,370.

Treatment: Aeration, coagulation, sedimentation, rapid sand filter, and chlorination.

Analysis of raw water

[Collected June 13,1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	13	0.271
Iron (Fe)	.10		Chloride (Cl)	5.0	.141
Calcium (Ca)	41	2.046	Fluoride (F)	2.0	.105
Magnesium (Mg)	2.7	.222	Nitrate (NO_3)	1.5	.024
Sodium (Na)	5.4	.235	Total dissolved solids	160	
Potassium (K)	3.4	.087	Total hardness as $CaCO_3$	114	
Bicarbonate (HCO_3)	125	2.049	pH	7.6	

ROSEBUD

Population in 1940: 1,842.

Source of information: G. J. Vlha, city secretary, June 13, 1944.

Ownership: Municipal.

Source of supply: Impounding reservoir about 1½ miles west of town; built in 1918–19; area under water, about 35 acres; maximum depth, 18 feet when completed and 10 feet in 1944. Well was drilled about 100 feet east of reservoir in 1940 by Layne-Texas Co.; depth, 3,692 feet; diameter, 10¾ to 5 inches; casing perforated from 3,352 to 3,692 feet; reported natural flow, 825 gallons a minute; temperature, 150° F. (Water reported too highly mineralized for municipal supply.)

Pumpage: Maximum, 150,000 gallons; average, 70,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 480.

Treatment: Aeration, coagulation, sedimentation, and chlorination.

Analyses

[Collected June 13, 1944. Analyzed by J. H. Rowley]

	Raw lake water		Well	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	2.6			
Iron (Fe)	.05			
Calcium (Ca)	80	3.99	270	13.48
Magnesium (Mg)	7.1	.58	42	3.45
Sodium (Na)	15	.64	1,420	61.66
Potassium (K)	4.7	.12		
Bicarbonate (HCO_3)	105	1.72	209	3.43
Sulfate (SO_4)	166	3.46	3,320	69.12
Chloride (Cl)	4.0	.11	214	6.04
Fluoride (F)	.8	.04		
Nitrate (NO_3)	.2	0	.2	0
Total dissolved solids	336		5,370	
Total hardness as $CaCO_3$	228		846	
pH	7.7			

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	10	10	Sand	3	3,200
Clay	20	30	Hard shale	5	3,205
Broken shale	145	175	Sandy lime	10	3,215
Shale	670	845	Sandy lime and shale	30	3,245
Shale and chalk	91	936	Shale and lime	59	3,304
Chalk	390	1,326	Hard sandy lime	10	3,314
Shale	120	1,446	Sandy shale	16	3,330
Chalk	22	1,468	Sand and layers of shale	15	3,345
Shale	62	1,530	Sand	48	3,393
Shale and lime	31	1,561	Shale and lime	3	3,396
Lime	18	1,579	Sand	5	3,401
Lime and shale	60	1,639	Hard shale	2	3,403
Lime	157	1,796	Sand	30	3,433
Chalk and lime	34	1,830	Hard shale	12	3,445
Lime	52	1,882	Sand	72	3,517
Shale	5	1,887	Red and blue shale	5	3,522
Lime	44	1,931	Sand and layers of shale	152	3,674
Lime and shale	1,082	3,013	Sand	13	3,687
Sand	5	3,018	Shale	5	3,692
Shale and lime	179	3,197			

FANNIN COUNTY

BONHAM

Population in 1940: 6,349.

Source of information: R. A. Jackson, water superintendent, Sept. 17, 1943.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. 50 feet east of pump station; depth, 1,200 feet; diameter, 6 inches; air lift; yield, 320 gallons a minute.

Well 2. 200 feet east of pump station; drilled in 1926 by R. H. Dearing & Sons; depth, 1,191 feet; diameter, 10 to 8 inches; casing perforated from 1,150 to 1,191 feet; deep-well turbine pump and 50-horsepower electric motor; pump set at 250 feet; yield, 500 gallons a minute; temperature, 90½° F.

Well 3 is being drilled.

Average pumpage in 1943, in gallons a day

January	340,000	March	263,000	May	393,000	July	449,000
February	330,000	April	380,000	June	355,000	August	511,000

Storage: Elevated tank, 300,000 gallons; concrete ground reservoir, 150,000 gallons.

Number of customers: 1,800.

Treatment: Chlorination.

Analyses

[Collected Sept. 17, 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	20		18	
Iron (Fe)	.16		.02	
Calcium (Ca)	3.2	0.16	2.0	0.10
Magnesium (Mg)	.3	.02	.3	.02
Sodium (Na)	300	13.05	319	13.89
Potassium (K)	2.4	.06	3.6	.09
Bicarbonate (HCO_3)	440	7.22	473	7.76
Sulfate (SO_4)	205	4.27	199	4.14
Chloride (Cl)	61	1.72	76	2.14
Fluoride (F)	1.0	.05	1.2	.06
Nitrate (NO_3)	1.8	.03	0	0
Total dissolved solids	837		861	
Total hardness as $CaCO_3$	9		6	
pH	8.6		8.4	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay	10	10	Hard sandy shale	26	947
Clay and sand	15	25	Sand	21	968
Shale and gumbo	315	340	Hard sandy shale	37	1,005
Hard rock	2	342	Red beds	13	1,018
Shale	10	352	Sandy shale	40	1,058
Shell rock	6	358	Broken red beds	41	1,099
Sandy shale	21	379	Broken shale	37	1,136
Sand rock	1	380	Sand rock	1	1,137
Shale and lime shells	540	920	Sand	43	1,180
Sand rock	1	921	Broken sand	7	1,187

DODD CITY

Population in 1940: 308.

Source of information: S. D. McGee, Jr., owner, Sept. 13, 1943.

Owner: S. D. McGee, Jr.

Source of supply: Well drilled in 1910 by Sharpe & Brailey; depth, 1,660 feet; diameter, 6 to 4 inches; lower 40 feet perforated; deep-well cylinder pump and 10-horsepower gasoline engine; cylinder set at 220 feet; static water level, 182 feet below land surface in 1940; yield, 8 gallons a minute.

Pumpage: Average, 2,400 gallons a day.

Storage: Elevated tank, 22,000 gallons.

Number of customers: 76.

Treatment: None.

Analysis, well 1

[Collected Sept. 13, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	256	5.33
Iron (Fe)	.12		Chloride (Cl)	78	2.20
Calcium (Ca)	1.9	0.09	Fluoride (F)	1.4	.07
Magnesium (Mg)	.4	.03	Nitrate (NO_3)	2.0	.03
Sodium (Na)	352	15.31	Total dissolved solids	960	
Potassium (K)	3.6	.09	Total hardness as $CaCO_3$	6	
Bicarbonate (HCO_3)	481	7.89	pH	8.4	

ECTOR

Population in 1940: 457.

Source of information: W. B. Holcomb, operator, Sept. 16, 1943.

Owner: K. Kimball.

Source of supply: Well drilled in 1912; depth, 460 feet; diameter, 6 to 5 inches; lower 20 feet of casing perforated; deep-well cylinder pump and 5-horsepower gasoline engine; cylinder set at 240 feet; static water level, 60 feet below land surface in July 1943; yield, about 15 gallons a minute.

Pumpage: Maximum, 3,600 gallons; average, 2,400 gallons a day.

Storage: Elevated tank, 6,000 gallons.

Number of customers: 135.

Treatment: None.

Analysis, well 1

[Collected Sept. 16, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	74	1.54
Iron (Fe)	.14		Chloride (Cl)	46	1.30
Calcium (Ca)	2.8	0.14	Fluoride (F)	2.5	.13
Magnesium (Mg)	.4	.03	Nitrate (NO_3)	2.8	.05
Sodium (Na)	375	16.29	Total dissolved solids	932	
Potassium (K)	1.0	.03	Total hardness as $CaCO_3$	8	
Bicarbonate (HCO_3)	822	13.47	pH	8.6	

HONEY GROVE

Population in 1940: 2,456.

Source of information: I. M. Thompson, water superintendent, Sept. 15, 1943.

Ownership: Municipal.

Source of supply: Well 1 mile north of town; drilled in 1911; depth, 1,673 feet; diameter, 8 to 6 inches; air lift; static water level, 135 feet below land surface when drilled, 167 feet in 1939, 260 feet in June 1943; yield, 320 gallons a minute with draw-down of 30 feet; temperature, 91° F.

Pumpage: Average, about 130,000 gallons a day.

Storage: Concrete ground reservoir, 238,000 gallons; elevated tank, 150,000 gallons.

Number of customers: 600.

Treatment: None.

Analysis, well 1

[Collected Sept. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	212	4.41
Iron (Fe)	.07		Chloride (Cl)	79	2.23
Calcium (Ca)	2.8	0.14	Fluoride (F)	1.8	.09
Magnesium (Mg)	.2	.02	Nitrate (NO_3)	2.5	.04
Sodium (Na)	345	15.02	Total dissolved solids	941	
Potassium (K)	2.0	.05	Total hardness as $CaCO_3$	8	
Bicarbonate (HCO_3)	515	8.46	pH	8.6	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Blue rock	208	208	Blue gumbo, hard	6	991
Blue sand, hard	3	211	Sand rock, hard	2	993
Blue sand, soft; some salty water	30	241	Shale and soapstone, soft	15	1,008
White soapstone, soft (probably pipe clay)	7	248	Sand rock, hard	1	1,009
Blue sand rock, hard	3	251	Blue shale, soft	53	1,062
Shale and soapstone, soft	23	274	White soapstone, soft	13	1,075
Blue sand rock, hard	2	276	Blue gumbo, hard	34	1,109
White soapstone, soft (probably pipe clay)	8	284	Blue shale, soft	16	1,125
Blue gumbo, medium (probably marl)	28	312	Blue sand rock, hard	3	1,128
Blue shale, soft, with boulders	58	370	White soapstone, soft	12	1,140
Blue sand rock, hard	2	372	Blue gumbo, hard	41	1,181
Blue shale and stone, soft	79	451	Blue shale, soft	61	1,242
Blue gumbo, hard	29	480	Sand rock, soft	5	1,247
Blue shale, soft, with thin layers of rock or boulders	230	710	Gravel, hard	8	1,255
Blue sand rock, hard	1	711	White sand, hard	2	1,257
Shale and soapstone, soft	29	740	Red marl, hard	24	1,281
Blue shale, soft; boulders and thinner layer of sand	233	973	Red beds, hard, laminated, with soapstone and boulders	284	1,565
Blue sand rock, very hard; a light showing of gas	5	978	Blue gumbo, hard	9	1,574
White soapstone, soft	5	983	White sandstone, soft, on hard sand rock	9	1,583
Blue sand rock, hard	2	985	White sand rock, hard (cap rock)	2	1,585
			White sand, soft (good coarse-grained sand with fine red specks)	84	1,669
			Blue shale, soft	4	1,673

LADONIA

Population in 1940: 1,279.

Source of information: Jack Morrow, city secretary, Sept. 15, 1943.

Ownership: Municipal.

Source of supply: Well 1 block west of railroad station; drilled in 1911 by W. E. Tomerlin; depth, 2,551 feet; diameter, 8 to 4 inches; deep-well turbine pump and 10-horsepower electric motor; pump set at 286 feet; well originally flowed; yield, 75 gallons a minute; temperature, 103° F. (Water reported unfit for drinking.)

Pumpage (estimated): Average, 25,000 gallons a day.

Storage: Elevated tank, 100,000 gallons.

Number of customers: 175.

Treatment: None.

Analysis, well 1

[Collected Sept. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	30	0.62
Iron (Fe)	.85		Chloride (Cl)	2,960	83.48
Calcium (Ca)	27	1.35	Fluoride (F)	2.2	.12
Magnesium (Mg)	9.0	.74	Nitrate (NO_3)	1.5	.02
Sodium (Na)	2,160	93.92	Total dissolved solids	5,580	
Potassium (K)	13	.33	Total hardness as $CaCO_3$	104	
Bicarbonate (HCO_3)	738	12.10	pH	7.8	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Light sandy soil	8	8	Light blue marl	66	1,827
Clay sub-soil	23	31	White grayish sand—Woodbine	108	1,935
Sand rock with shells	2	33	Exact log not known	371	2,306
Blue fine sand, water	8	41	Sand	54	2,360
Rock	2	43	Clay marl	5	2,365
Soapstone and marl	6	49	Sand	40	2,405
Shale with layers of soft sand rock	60	109	Gumbo	5	2,410
Shale with streaks of gumbo	232	341	Sand	103	2,513
White rock—Austin chalk	196	537	Blank (?)	38	2,551
Shale with streaks of gumbo	1,224	1,761			

LEONARD

Population in 1940: 1,331.

Source of information: Luster Stallings, mayor, Sept. 16, 1943.

Ownership: Municipal.

Source of supply: Well at the south edge of town; drilled in 1910; depth, 1,219 feet; deepened in 1918 to 1,653 feet by R. H. Dearing & Sons; diameter, 8 inches; deep-well turbine pump and 15-horsepower electric motor; pump set at 360 feet; static water level below land surface, 237 feet in 1940 and 284 feet in August 1943; yield, 45 gallons a minute.

Pumpage: Average, 35,000 gallons a day.

Storage: Concrete ground reservoir, 50,000 gallons; elevated tank, 52,000 gallons.

Number of customers: 347.

Treatment: Ammoniation and chlorination.

Analysis, well 1

[Collected Sept. 16, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	18		Sulfate (SO_4)	127	2.64
Iron (Fe)	.16		Chloride (Cl)	470	13.26
Calcium (Ca)	4.2	0.21	Fluoride (F)	1.7	.09
Magnesium (Mg)	2.0	.16	Nitrate (NO_3)	0	0
Sodium (Na)	584	25.38	Total dissolved solids	1,510	
Potassium (K)	4.2	.11	Total hardness as $CaCO_3$	18	
Bicarbonate (HCO_3)	602	9.88	pH	8.2	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	2	2	Hard sandstone	3	715
White rock	178	180	Streaks of rock, soapstone and gumbo	38	753
Shale	120	300	Sand rock	5	758
White rock	41	341	Shale with shell rocks	42	800
Shale and gumbo	68	409	Shale with boulder rocks, 5 to 8 feet apart	180	980
Rock and gumbo	97	506	Soft lime stone rock	120	1,100
Brown shale and soapstone	92	598	Sand rock	2	1,102
Soft sand rock	2	600	Shale	61	1,163
Shale	93	693	Sand rock	2	1,165
Hard sand rock	2	695	Water-bearing sand	54	[1] 1,219
Water-bearing sand (very hard) streaked with soapstone	17	712			

[1] Deepened to 1,653 feet in 1918 but remainder of log not available.

SAVOY

Population in 1940: 298.

Source of information: Max Arterberty, city secretary, Sept. 16, 1943.

Source of supply: Well under the elevated tank; drilled in 1936 by Witherspoon; depth, 528 feet; diameter, 6 to 5 inches; lower 20 feet of casing perforated; deep-well turbine pump and 7½-horsepower electric motor; pump set at 330 feet; static water level, 185 feet below land surface when drilled and 245 feet in September 1943; yield when drilled, 57 gallons a minute, with draw-down of 45 feet after 24 hours pumping, present yield reported, 35 gallons a minute; temperature 72½° F.

Pumpage: Maximum, 14,000 gallons; average, 6,500 gallons a day.

Storage: Concrete ground reservoir, 10,000 gallons; elevated tank, 30,000 gallons.

Number of customers: 95.

Treatment: None.

Analysis, well 1

[Collected Sept. 16, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	75	1.56
Iron (Fe)	.07		Chloride (Cl)	26	.73
Calcium (Ca)	1.2	0.06	Fluoride (F)	.9	.05
Magnesium (Mg)	.2	.02	Nitrate (NO_3)	.8	.01
Sodium (Na)	200	8.71	Total dissolved solids	532	
Potassium (K)	1.4	.04	Total hardness as $CaCO_3$	4	
Bicarbonate (HCO_3)	395	6.48	pH	8.4	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Water sand	5	295
Clay	5	8	Blue sandy shale	14	309
Yellow clay	12	20	Broken shale	17	326
Bluish yellow clay	10	30	Blue shale	47	373
Blue shale	10	40	Water sand (traces of lignite)	8	381
Blue gumbo	105	145	Broken shale	51	432
Broken shale	92	237	Blue sandy shale	16	448
Blue sand rock	1	238	Sandy (little? water)	2	450
Water sand	1	239	Blue sandy shale	11	461
Blue sandy shale	7	246	Gray sandy shale	24	485
Blue gumbo	14	260	Blue gumbo	28	513
Hard blue sand rock	4	264	Sand rock	2	515
Blue sandy shale	4	268	Water sand	12	527
Water sand	3	271	Blue shale	1	528
Blue gumbo	19	290			

TRENTON

Population in 1940: 634.

Source of information: Elzie Cockrum, water superintendent, Sept. 16, 1943.

Ownership: Municipal.

Source of supply: Well under elevated tank; drilled in September 1938 by Layne-Texas Co.; depth, 1, 472 feet; diameter, 8 to 5 inches; Hi-lift rotary pump and 10-horsepower electric motor; pump set at 435 feet; static water level, 307 feet below land surface when drilled and 321 feet on Dec. 22, 1941; yield, 60 gallons a minute with draw-down of 50 feet.

Pumpage: Maximum, 43,700 gallons; average, 27,400 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 138.

Treatment: None.

Analysis, well 1

[Collected Sept. 16, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15	----------	Sulfate (SO_4)	220	4.58
Iron (Fe)	.10	----------	Chloride (Cl)	45	1.27
Calcium (Ca)	1.5	0.07	Fluoride (F)	1.0	.05
Magnesium (Mg)	.3	.02	Nitrate (NO_3)	0	0
Sodium (Na)	299	12.99	Total dissolved solids	868	----------
Potassium (K)	2.6	.07	Total hardness as $CaCO_3$	4	----------
Bicarbonate (HCO_3)	442	7.25	pH	8.3	----------

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Chalk rock	330	330	Sand	28	1,142
Shale	150	480	Shale	61	1,203
Black shale	20	500	Sand	4	1,207
Shale	143	643	Rock	1	1,208
Layers of rock	5	648	Shale	100	1,308
Shale	36	684	Hard brittle shale	83	1,391
Sand and shale	21	705	Rock	1	1,392
Hard shale	248	953	Hard sand with shale breaks	14	1,406
Hard sand	1	954	Sand and shale (cored)	10	1,416
Sticky shale	58	1,012	Sand and shale	13	1,429
Hard layers of shale	62	1,074	Sand and layers of shale	24	1,453
Sand	34	1,108	Sand and shale	19	1,472
Sand and streaks of shale	6	1,114			

WINDOM

Population in 1940: 290.

Source of information: Carl E. Wright, city secretary, Sept. 15, 1943.

Ownership: Municipal.

Source of supply: Well under elevated tank; drilled in 1936 by Layne-Texas Co.; depth, 1,691 feet; diameter, 6 to 5 inches; lower 71 feet of casing perforated; deep-well turbine pump and 10-horsepower electric motor; pump set at 290 feet (pump lowered 40 feet in 1941; city plans to lower pump another 40 feet); static water level, 229 feet below land surface when drilled and 259 feet in July 1940; yield, 35 gallons a minute; temperature 93° F.

Pumpage: No record.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 66.

Treatment: None.

Analysis, well 1

[Collected Sept. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	267	5.56
Iron (Fe)	.13		Chloride (Cl)	74	2.09
Calcium (Ca)	2.4	0.12	Fluoride (F)	1.0	.05
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	0	0
Sodium (Na)	352	15.31	Total dissolved solids	986	
Potassium (K)	3.8	.10	Total hardness as $CaCO_3$	8	
Bicarbonate (HCO_3)	486	7.97	pH	8.3	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
White rock	70	70	Shale, hard streaks of lime at 1,293	104	1,295
Gray shale	110	180	Shale, streaks of lime	22	1,317
Sandy shale, hard streaks	28	208	Rock	3	1,320
Shale	129	337	Shale	5	1,325
Sandy shale and lime	5	342	Sand and lime, streaks of shale, cored at 1,339	33	1,358
Shale	28	370	Sandy shale, cored	2	1,360
Rock	3	373	Shale, cored	3	1,363
Shale	20	393	Shale, streaks of sand and lime	65	1,428
Sand	5	398	Shale, lignite, and red bed	82	1,510
Shale	147	545	Shale, streaks of sandy lime and red bed	48	1,558
Rock	1	546	Hard sandy shale, shale streaks	39	1,597
Shale	176	722	Sand rock, cored	6	1,603
Hard shale	9	731	Sandy shale, little oil show, cored	2	1,605
Shale	31	762	Woodbine water sand, cored, no recovery	23	1,628
Hard lime	14	776	Woodbine water sand, with streaks of shale	57	1,685
Hard lime and shale	26	802	Shale and lignite	6	1,691
Hard shale	27	829			
Hard lime and hard streaks	10	839			
Shale with steaks of lime	113	952			
Hard lime	7	959			
Shale	63	1,022			
Shale, streaks of lime and boulders	22	1,044			
Shale	23	1,067			
Shale and boulders	124	1,191			

FAYETTE COUNTY

FAYETTEVILLE

Population in 1940: 445.

Source of information: Water superintendent, July 8, 1942.

Ownership: Municipal.

Source of supply: Well 2 blocks east of post office; drilled in 1927 by Layne-Texas Co.; depth, 908 feet; diameter, 12 to 8 inches; screens from 768 to 790 and 860 to 902 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 72 feet below land surface on July 16, 1927; yield, 85 gallons a minute.

Pumpage (estimated): Average, 15,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 115.

Treatment: None.

Analysis

[Collected July 8, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	60		Sulfate (SO_4)	31	0.65
Iron (Fe)	.02		Chloride (Cl)	48	1.35
Calcium (Ca)	5.6	0.28	Fluoride (F)	.2	.01
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	240	10.44	Total dissolved solids	648	
Bicarbonate (HCO_3)	534	8.75	Total hardness as $CaCO_3$	16	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay and boulders	51	51	Gumbo	33	520
Sand	10	61	Soft shale	21	541
Clay	15	76	Shale and gumbo	25	566
Sand	12	88	Shale and rock	22	588
Shale	91	179	Shale and gumbo	45	633
Sand and shale	10	189	Gumbo	7	640
Hard shale	192	381	Shale and gumbo	60	700
Rock	1	382	Soft shale	32	732
Sand	4	386	Gumbo	32	764
Rock	1	387	Sand	28	792
Hard shale	35	422	Gumbo	71	863
Clay	14	436	Rock	1	864
Shale and gumbo	38	474	Sand	40	904
Soft shale	7	481	Gumbo	4	908
Hard shale	6	487			

FLATONIA

Population in 1940: 1,024.

Source of information: Water superintendent, July 6, 1942.

Ownership: Municipal.

Source of supply: Well 2 blocks east of post office, drilled in 1925 by Louis Kiel; depth, 945 feet; diameter, 10 to 4 inches; deep-well turbine pump and 10-horsepower electric motor; pump set at 200 feet; reported static water level, 100 feet below land surface in 1939; yield, 150 gallons a minute; temperature, 81° F.

Pumpage (estimated): Average, 75,000 gallons a day.
Storage: Concrete reservoir, 50,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 232.
Treatment: Contact-bed aeration.

Analysis

[Collected July 6, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	74		Sulfate (SO_4)	105	2.19
Iron (Fe)	1.0		Chloride (Cl)	168	4.74
Calcium (Ca)	57	2.84	Fluoride (F)	.2	.01
Magnesium (Mg)	5.5	.45	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	150	6.52	Total dissolved solids	675	
Bicarbonate (HCO_3)	174	2.85	Total hardness as $CaCO_3$	164	
			pH	6.8	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Black dirt	18	18	Hard rock	6	500
Sand rock	18	36	Lignite	8	508
White sand	36	72	Sand	3	511
Quicksand	5	77	Sand rock	8	519
White sand	18	95	Sand, water	9	528
Sand, water	8	103	Sand rock	48	576
Yellow sand	9	112	Gumbo	14	590
Sand rock	5	117	Hard rock	12	602
Yellow sand	16	133	Gumbo	14	616
Joint clay	8	141	Hard clay mixed with sand	16	632
Gumbo	20	161	Sand rock	37	669
Joint clay	22	183	Gumbo	21	690
Coal gum mixed with clay	60	243	Sand rock	26	716
Blue sand rock, water	50	293	Hard slate rock	5	721
Gumbo mixed with coal gum	52	345	Gumbo	6	727
Sand rock	12	357	Sand, water	12	739
Sand, water	6	363	Soft rock	9	748
Blue sand rock	60	423	Hard rock	4	752
Gumbo	28	451	Soft rock	33	785
Blue sand rock	13	464	Hard rock	3	788
Sand, water	18	482	Gumbo mixed with shale	137	925
Blue sand rock	6	488	Sand, water	10	935
Brown sand	6	494	Gumbo	10	945

LA GRANGE

Population in 1940: 2,531.

Source of information: Plant superintendent, Texas Public Service Co., June 23, 1943.

Owner: Texas Public Service Co.

Source of supply: Three wells.

Well 1. At Colorado and Jackson Streets; drilled in 1922; depth, 265 feet; diameter, 8 inches; air lift; static water level reported, 50 feet below land surface in 1942; draw-down reported, 112 feet after pumping 48 hours at 100 gallons a minute; estimated yield, 140 gallons a minute.

Well 2. At Main and Northline Streets; drilled in 1936 by Layne-Texas Co.; depth, 293 feet; diameter, 13 to 8 inches; screen from 120 to 143 feet; deep-well turbine pump; static water level, 34 feet below land surface on June 16, 1936, and 57 feet in 1937; yield, 191 gallons a minute on Aug. 6, 1936, and 140 gallons on July 8, 1942.

Well 3. At Northline Street near the Colorado River; drilled in 1910 by Taylor Roberts Co.; depth, 192 feet; diameter, 10 inches; air lift; reported to have flowed in 1910; static water level, 29.8 feet below land surface on June 24, 1942; estimated yield, 150 gallons a minute; stand-by well.

Average pumpage, in gallons a day

	1938	1939	1940	1941	1942
January	92,000	102,000	112,000	110,000	102,000
February	168,000	135,000	103,000	109,000	92,000
March	123,000	106,000	114,000	106,000	117,000
April	121,000	136,000	115,000	120,000	121,000
May	128,000	142,000	148,000	130,000	----------
June	139,000	136,000	142,000	135,000	----------
July	163,000	154,000	169,000	170,000	----------
August	175,000	157,000	225,000	175,000	----------
September	146,000	149,000	190,000	160,000	----------
October	142,000	135,000	161,000	165,000	----------
November	120,000	114,000	124,000	120 000	----------
December	103,000	110,000	115,000	110,000	----------

Storage: Three ground reservoirs, 35,000, 46,250, and 15,000 gallons; standpipe, 144,000 gallons.

Number of customers: 636.

Treatment: None.

Analyses

[Collected June 23, 1943. Analyzed by W. W. Hastings]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	69	----------	72	----------	85	----------
Iron (Fe)	.03	----------	.02	----------	.02	----------
Calcium (Ca)	14	0.70	18	0.90	5.0	0.25
Magnesium (Mg)	2.0	.16	1.1	.09	.4	.03
Sodium and potassium (Na+K)	220	9.57	194	8.44	216	9.39
Bicarbonate (HCO_3)	388	6.36	368	6.03	400	6.56
Sulfate (SO_4)	70	1.46	56	1.17	48	1.00
Chloride (Cl)	92	2.59	77	2.17	73	2.06
Fluoride (F)	.2	.01	.3	.02	.6	.03
Nitrate (NO_3)	.8	.01	1.4	.02	0	0
Total dissolved solids	659	----------	601	----------	632	----------
Total hardness as $CaCO_3$	43	----------	50	----------	14	----------

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Yellow clay	10	10	Sand and layers of shale	8	138
Red Clay	11	21	Hard green shale	12	150
Sand and gravel	4	25	Shale and lignite	11	161
Yellow clay	2	27	Fine-grained sand with layers of shale	26	187
Hard sand and shale	38	65	Sand, shale, and lignite	29	216
Rock	1	66	Fine-grained sand	12	228
Hard green shale	6	72	Sand, shale, and lignite	35	263
Hard green shale and sand	42	114	Green and brown shale	30	293
Sand with layers of shale	15	129			
Rock	1	130			

SCHULENBURG

Population in 1940: 1,970.

Source of information: Plant superintendent, July 6, 1942.

Owner: Center Power & Light Co.

Source of supply: Two wells, 2 blocks west and 2 blocks south of post office.

Well 1. Drilled in 1929 by Layne-Texas Co.; depth, 279 feet; diameter, 8 inches; screen from 220 to 260 feet; deep-well turbine pump and 25-horsepower motor; static water level, 91 feet below land surface on Mar. 23, 1929, and 99 feet on Mar. 22, 1942; yield, 125 gallons a minute; temperature, 74½° F.

Well 2. Drilled in 1938 by Layne-Texas Co.; depth, 672 feet; diameter, 18⅝ to 6⅝ inches; screen from 644 to 666 feet; deep-well turbine pump and 25-horsepower electric motor; pump set at 240 feet; flowed on July 12, 1939; pumping yield, 265 gallons a minute with draw-down to 191 feet on Jan. 12, 1939; temperature, 82½° F.

Storage: Ground reservoirs, 28,000 and 100,000 gallons; standpipe, 105,000 gallons.

Treatment: None.

Analyses

[Collected July 6, 1942. Analyzed by W. W. Hastings]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	25		83	
Iron (Fe)	.12		.00	
Calcium (Ca)	42	2.10	9.4	0.47
Magnesium (Mg)	7.0	.58	1.0	.08
Sodium and potassium (Na + K)	162	7.04	250	10.87
Bicarbonate (HCO_3)	378	6.20	513	8.41
Sulfate (SO_4)	28	.58	26	.54
Chloride (Cl)	102	2.88	88	2.48
Fluoride (F)	.4	.02	.2	.01
Nitrate (NO_3)	1.8	.03	0	0
Total dissolved solids	555		719	
Total hardness as $CaCO_3$	134		28	
pH	8.4		8.0	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	12	12	Fine-grained sand	8	242
Sand rock and clay	66	78	Gravel	8	250
Soft clay	63	141	Good sand	24	274
Hard stone and clay	90	231	Rock	2	276
Clay	3	234	Gravel	3	279

Well 2

Soil and clay	15	15	Shale	114	375
Coarse sand	5	20	Hard white sand	6	381
Clay and boulders	60	80	Shale and boulders	181	562
Clay	74	154	Shale	50	612
Hard sand	4	158	Hard sand	24	636
Sand	20	178	Loose sand	30	666
Gravel	60	238	Shale	7	673
Sand	23	261			

FORT BEND COUNTY

RICHMOND

Population in 1940: 2,026.

Source of information: S. J. Butler, water superintendent, Apr. 4, 1944.

Ownership: Municipal.

Source of supply: Well drilled in 1934 by Fawcett; depth 398 feet; diameter, 10¾ to 8 inches; screens from 260 to 277 and 295 to 312 feet; deep-well turbine pump; static water level, 30 feet below land surface; yield, 210 gallons a minute with draw-down of 32.5 feet in October 1943; temperature, 73° F.

Pumpage (estimated): Minimum, 70,000 gallons; maximum, 120,000 gallons; average, 90,000 gallons a day.

Storage: Concrete ground reservoir, 53,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 380.

Treatment: None.

Analysis

[Collected Apr. 4, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	20	0.42
Iron (Fe)	.02		Chloride (Cl)	52	1.47
Calcium (Ca)	62	3.09	Fluoride (F)	.6	.03
Magnesium (Mg)	9.5	.78	Nitrate (NO_3)	.0	.00
Sodium (Na)	40	1.76	Total dissolved solids	331	
Potassium (K)	4.9	.13	Total hardness as $CaCO_3$	198	
Bicarbonate (HCO_3)	234	3.84	pH	7.3	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sandy loam	10	10	Medium coarse gray water sand	46	223
Red sandy clay	20	30	Yellow-red clay	22	245
Red clay	31	61	Medium coarse gray water sand	19	264
Red sand and joint clay	39	100	Yellow and red clay	24	288
Fine gray water sand	42	142	Coarse gray water sand	37	325
Joint clay and sand	5	147	Red sand	6	331
Medium coarse gray water sand	27	174	Coarse red water sand	64	395
Yellow clay	3	177	Red clay	3	398

ROSENBERG

Population in 1940: 3,457.

Source of information: Joe Catron, water superintendent, Apr. 5, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1931 by Layne-Texas Co.; depth, 390 feet, deepened to 493 feet in 1940; diameter, 12½ to 10 inches; screens from 254 to 275, 375 to 377, and 400 to 480 feet; deep-well turbine pump and electric motor;

static water level, 42 feet below land surface on May 7, 1943; reported yield, 840 gallons a minute; temperature, 74° F.

Well 2. Approximately 1,000 feet from well 1; drilled in 1934 by Layne-Texas Co.; depth, 515 feet; diameter, 10 inches; deep-well turbine pump and electric motor; reported yield, 570 gallons a minute with draw-down of 34 feet; temperature, 74° F.

Pumpage (estimated): Minimum, 150,000 gallons; maximum, 250,000 gallons; average, 200,000 gallons a day.

Storage: Elevated tank, 150,000 gallons.

Number of customers: 885.

Treatment: None.

Analyses

[Collected Apr. 5, 1944. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		20	
Iron (Fe)	.56		.05	
Calcium (Ca)	72	3.59	57	2.85
Magnesium (Mg)	11	.90	9.1	.75
Sodium (Na)	124	5.41	129	5.61
Potassium (K)	11	.28	5.4	.14
Bicarbonate (HCO_3)	284	4.66	294	4.82
Sulfate (SO_4)	19	.40	19	.40
Chloride (Cl)	180	5.08	145	4.09
Fluoride (F)	.8	.04	.8	.04
Nitrate (NO_3)	.2	0	0	0
Total dissolved solids	586		530	
Total hardness as $CaCO_3$	224		180	
pH	7.3		7.5	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Clay	53	252
Clay	21	25	Sand (good)	33	285
Sand	16	41	Clay	18	303
Clay	31	72	Gumbo	28	331
Sand	18	90	Sand and gravel	48	379
Clay	41	131	Gumbo	5	384
Sand	68	199	Sand	6	390

Well 2

Soil	2	2	Good water sand	43	290
Clay	33	35	Clay	14	304
Fine sand	20	55	Sand	152	456
Water sand	70	125	Clay	6	462
Sticky clay	47	172	Sand	20	482
Water sand	18	190	Clay	8	490
Clay	57	247	Sand	25	515

SUGARLAND

Population in 1940: 1,500.

Source of information: A. H. Weth, plant engineer, Apr. 4, 1944.

Owner: Fort Bend Utilities Co.

Source of supply: Well drilled in 1920 by Layne-Texas Co.; depth, 1,606 feet; diameter, 24 to 8 inches; screen from 1,515 to 1,576 feet; deep-well turbine pump and 100-horsepower electric motor; static water level, 30.76 feet below land surface in July 1943; yield, 588 gallons a minute; temperature, 85° F.

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

Storage: Concrete ground reservoir, 83,000 gallons.

Number of customers: 455.

Treatment: Chlorination.

Analysis

[Collected Apr. 4, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	16	0.33
Iron (Fe)	.03		Chloride (Cl)	61	1.72
Calcium (Ca)	14	0.70	Fluoride (F)	1.0	.05
Magnesium (Mg)	3.6	.30	Nitrate (NO_3)	.2	.00
Sodium (Na)	119	5.18	Total dissolved solids	363	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	50	
Bicarbonate (HCO_3)	259	4.25	pH	7.6	

FRANKLIN COUNTY

MOUNT VERNON

Population in 1940: 1,443.

Source of information: F. J. Joyce, Jr., water superintendent, June 8, 1942.

Ownership: Municipal.

Source of supply: Spring and three wells.

Spring. At pumping station 1 mile south of courthouse; estimated flow, 15 gallons a minute in June 1942.

Wells 1 and 2. About one-fourth mile northeast of pumping station; drilled in 1936; depth, 80 feet; diameter, 6 inches; air lift; yield, 20 gallons a minute each.

Well 3. Half mile southeast of pumping station; drilled in 1941 by V. E. West; depth, 140 feet; plugged back to 80 feet; diameter, 6 inches; screen from 50 to 80 feet; Hi-lift deep-well pump and 3-horsepower electric motor; static water level, 18 feet below land surface in June 1942; yield, 30 gallons a minute.

Pumpage: Average, 25,000 to 30,000 galllons a day.

Storage: Ground reservoir, 60,000 gallons; elevated tank, 50,000 gallons.

Number of customers: About 300.

Treatment: None.

Analyses

[Collected June 19, 1942. Analyzed by W. W. Hastings]

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	40		87	
Iron (Fe)	3.2		2.2	
Calcium (Ca)	13	0.649	1.7	0.085
Magnesium (Mg)	6.7	.551	1.1	.090
Sodium and potassium (Na+K)	49	2.137	22	.949
Bicarbonate (HCO_3)	118	1.934	48	.787
Sulfate (SO_4)	3.7	.077	2.6	.054
Chloride (Cl)	46	1.297	5.0	.141
Fluoride (F)	.4	.021	.4	.021
Nitrate (NO_3)	.5	.008	7.5	.121
Total dissolved solids	221		198	
Total hardness as $CaCO_3$	60		9	
pH	7.2		7.0	

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red clay and sand	15	15	Blue sand (water bearing)	18	79
White sand (water bearing)	46	61	Shale	61	140

FREESTONE COUNTY

FAIRFIELD

Population in 1940: 1,047.

Source of information: Vernon Gillin, water superintendent, Apr. 20, 1943.

Ownership: Municipal.

Source of supply: Well 1 block west of courthouse; drilled in 1935 by Layne-Texas Co.; depth, 584 feet; diameter, 13 inches; underreamed to 36 inches and gravel packed; deep-well turbine pump and electric motor; static water level, 148 feet below land surface on Mar. 2, 1935; present yield, 190 gallons a minute.

Pumping test Mar. 2, 1935

Water level (feet)	Time	Yield (gallons per minute)	Water level (feet)	Time	Yield (gallons per minute)
148 (static)	7 a. m.	335	215	1 p. m.	322
209	8 a. m.	328	217	5 p. m.	322
210	9 a. m.	325	218	6 p. m.	322
213	10 a. m.	322	215	7 p. m.	318

Average pumpage, in gallons a day

	1940	1941	1942		1940	1941	1942
January	26,900	29,800	28,600	July	49,500	46,700	48,400
February	29,400	31,400	26,300	August	64,800	57,960	50,600
March	40,600	30,400	28,700	September	52,400	48,300	34,100
April	37,700	35,700	28,600	October	42,700	39,600	34,500
May	40,200	39,400	30,500	November	31,600	30,800	28,700
June	42,600	39,500	36,400	December	31,300	28,500	

Storage: Steel ground reservoir, 100,000 gallons; elevated tank, 100,000 gallons.
Number of customers: 263.
Treatment: Chlorination.

Analysis, well 1

[Collected April 1943. Analyzed by P. A. Witt and W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	42		Sulfate (SO_4)	8.8	0.183
Iron (Fe)	.44		Chloride (Cl)	19	.536
Calcium (Ca)	19	0.948	Fluoride (F)	.2	.011
Magnesium (Mg)	5.2	.428	Nitrate (NO_3)	.5	.008
Sodium (Na)	39	1.702	Total dissolved solids	212	
Potassium (K)	4.0	.102	Total hardness as $CaCO_3$	69	
Bicarbonate (HCO_3)	149	2.442	pH	7.8	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	1	1	Water sand	17	284
Clay	12	13	Sandy shale	24	308
Clay and sand	18	31	Hard shale and lignite	12	320
Clay	15	46	Hard shale and sand	11	331
Sand and clay	23	69	Very hard rock	2	333
Shale and streaks of sand	27	96	Hard shale	11	344
Shale	6	102	Hard shale and streaks of sand	20	364
Lignite and shale	5	107	Sandy shale	10	374
Shale	30	137	Water sand (excellent)	24	398
Hard shale	6	143	Hard shale	1	399
Sandstone	1	144	Sandy shale	5	404
Sandy shale	5	149	Shale	4	408
Rock	1	150	Sand and sandy shale	15	423
Sandy shale	9	159	Sandy shale	2	425
Sand	20	179	Water sand (good)	10	435
Shale	6	185	Shale	2	437
Hard shale and sand	19	204	Hard shale	7	444
Shale	20	224	Water sand (exellent)	52	496
Hard shale	4	228	Sandy shale	99	595
Sandy shale	12	240	Dark shale	7	602
Hard shale	18	258	Well finished at 584 feet		
Very hard shale	9	267			

STREETMAN

Population in 1940: 292.
Source of information: J. N. McKissack, water superintendent, Apr. 21, 1943.
Ownership: Municipal.
Source of supply: Two impounding reservoirs west of town.
Pumpage (estimated): Average, 15,000 to 20,000 gallons a day.
Storage: Settling basin, 40,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 82.

Treatment: Coagulation with lime and alum, sedimentation, filtration through two high-pressure filters, and chlorination.

Analysis of finished water

[Collected Apr. 1, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	4.6		Sulfate (SO_4)	45	0.937
Iron (Fe)	.10		Chloride (Cl)	16	.451
Calcium (Ca)	40	1.997	Fluoride (F)	.2	.011
Magnesium (Mg)	.9	.074	Nitrate (NO_3)	.5	.008
Sodium (Na)	15	.635	Total dissolved solids	170	
Potassium (K)	4.2	.107	Total hardness as $CaCO_3$	104	
Carbonate (CO_3)	27	.900	pH	8.4	
Hydroxide (OH)	8.6	.506			

TEAGUE

Population in 1940: 3,157.

Source of information: B. H. Tyus, plant operator, Apr. 21, 1943.

Ownership: Municipal.

Source of supply: Two impounding reservoirs about 1 mile west of town; capacity, 210,000,000 and 138,000,000 gallons, respectively.

Pumpage: Average, 320,000 gallons a day in 1942, of which 165,000 gallons was used by railroad.

Storage: Ground reservoir, 135,000 gallons; elevated tank, 175,000 gallons; coagulation basin, 180,000 gallons.

Number of customers: 850.

Treatment: Aeration, coagulation with the use of alum and soda ash, activated carbon, sedimentation, filtration through rapid sand filters, chlorination, and treatments of reservoirs occasionally with copper sulfate to reduce algae.

Analysis of finished water

[Collected April 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	1.3		Sulfate (SO_4)	19	0.396
Iron (Fe)	.04		Chloride (Cl)	24	.677
Calcium (Ca)	12	0.599	Fluoride (F)	.2	.011
Magnesium (Mg)	4.0	.329	Nitrate (NO_3)	.5	.008
Sodium (Na)	26	1.115	Total dissolved solids	129	
Potassium (K)	6.4	.164	Total hardness as $CaCO_3$	46	
Bicarbonate (HCO_3)	68	1.115	pH	7.8	

WORTHAM

Population in 1940: 1,267.

Source of information: B. E. Bounds, water superintendent, Apr. 21, 1943.

Ownership: Municipal.

Source of supply: Two impounding reservoirs in the northeast part of town.

Pumpage: From 16,000 to 30,000 gallons a day.

Storage: Three ground settling basins, 52,000 gallons each; elevated tank, 55,000 gallons.

Number of customers: 270.

Treatment: Coagulation with lime and alum, sedimentation, and chlorination.

Analysis of finished water

[Collected April 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	1.4		Sulfate (SO_4)	51	1.062
Iron (Fe)	.04		Chloride (Cl)	9.0	.254
Calcium (Ca)	34	1.697	Fluoride (F)	.3	.016
Magnesium (Mg)	12	.987	Nitrate (NO_3)	0	0
Sodium (Na)	13	.579	Total dissolved solids	201	
Potassium (K)	7.2	.184	Total hardness as $CaCO_3$	134	
Bicarbonate (HCO_3)	129	2.115	pH	8.2	

GALVESTON COUNTY

DICKINSON

Population in 1940: 1,500.

Source of information: Miss Rosa Yedel, secretary, Dickinson Water Works, Apr. 20, 1944.

Owner: Dickinson Water Works (Dickinson Ice Co.).

Source of supply: Two wells.

Well 1. Abandoned.

Well 2. Drilled in 1935 by Texas Water Supply Corp.; depth, 576 feet; diameter, 6 (?) inches; screens reported from 498 to 519 and 535 to 578 feet; deep-well turbine pump and 6-horsepower electric motor; reported yield, 150 gallons a minute.

Well 3. Drilled in 1936 by Texas Water Supply Corp.; depth, 576 feet; diameter, 6 (?) inches; screens reported from 498 to 519 and 535 to 578 feet; air lift.

Pumpage (estimated): Minimum, 13,000; maximum, 17,000 gallons a day.

Storage: Elevated steel tank.

Number of customers: 260.

Treatment: Chlorination and treatment with copper sulfate.

Analyses

[Dates of collection: Well 1, Mar. 29, 1935; well 2, Feb. 20, 1939; and well 3, Apr. 20, 1944. Analyzed by Margaret D. Foster, E. W. Lohr, and J. H. Rowley]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)					14	
Iron (Fe)	0.04				.02	
Calcium (Ca)	5.0	0.25			5.4	0.27
Magnesium (Mg)	1.5	.12			1.3	.11
Sodium, potassium (Na+K)	181	7.87			185.6	8.01
Bicarbonate (HCO_3)	370	6.06	366	6.00	370	6.07
Sulfate (SO_4)	1.7	.04	1	.02	2	.04
Chloride (Cl)	75	2.12	77	2.17	79	2.23
Fluoride (F)					1.0	.05
Nitrate (NO_3)	.6	.10	.9	.01	.2	0
Total dissolved solids	447				467	
Total hardness as $CaCO_3$	19		16		19	
pH					8.1	

GALVESTON

Population in 1940: 60,862.

Source of information: R. W. Owens, water superintendent, and Layne-Texas Co.

Ownership: Municipal.

Source of supply: 14 wells.

Well 1. Drilled in 1914 by Layne-Texas Co.; depth, 840 feet; diameter, 12 inches; screen from 713 to 815 feet; deep-well turbine pump and 50-horsepower electric motor; water level, 86.9 feet below measuring point on May 5, 1944.

Well 2. Drilled in 1914 by Layne-Texas Co.; depth, 855 feet; diameter, 12 inches; screens from 724 to 754 and 762 to 846 feet; deep-well turbine pump and 50-horsepower motor; water level, 89.4 feet below measuring point on May 5, 1944.

Well 3. Drilled in 1916 by Layne-Texas Co.; depth, 866 feet; diameter, 12 inches; screen from 723 to 856 feet; deep-well turbine pump and 50-horsepower electric motor; water level, 88 feet below measuring point on Apr. 18, 1944 (air-line measurement).

Well 4. Drilled in 1916 by Layne-Texas Co.; depth, 873 feet; diameter, 12 inches; screen from 714 to 857 feet; deep-well turbine pump and 35-horsepower electric motor; water level below 80 feet on Apr. 18, 1944.

Well 5. Drilled in 1916 by Layne-Texas Co.; depth, 888 feet; diameter, 12 inches; screen from 714 to 867 feet; deep-well turbine pump and 50-horsepower electric motor.

Well 6. Drilled in 1922 by Layne-Texas Co.; depth, 850 feet; diameter, 12 inches; screen from 744 to 844 feet; deep-well turbine pump and 50-horsepower electric motor; water level, 80 feet below measuring point on Nov. 30, 1943 (air-line measurement).

Well 7. Drilled in 1927 by Layne-Texas Co.; depth, 843 feet; diameter, 24 to 12 inches; screen from 739 to 840 feet; deep-well turbine pump and 60-horsepower electric motor; water level, 49.4 feet below measuring point on June 24, 1939.

Well 8. Drilled in 1935 by Layne-Texas Co.; depth, 884 feet; diameter, 20 inches; underreamed and graveled; screen from 703 to 884 feet; deep-well turbine pump and 150-horsepower electric motor; water level, 79.1 feet below measuring point on Apr. 18, 1944.

Well 9. Drilled in March 1942 by Layne-Texas Co.; depth, 764 feet; diameter, 18⅝ inches; underreamed to 30-inch diameter; screen from 669 to 761 feet; deep-well turbine pump and 75-horsepower electric motor; reported yield, 1,002 gallons a minute with draw-down of 53 feet.

Well 10. Drilled in March 1942 by Layne-Texas Co.; depth, 766 feet; diameter, 18⅝ inches; underreamed to 30-inch diameter and graveled; screen from 646 to 767 feet; deep-well turbine pump and 75-horsepower electric motor; water level, 69.0 feet below measuring point on May 18, 1943; reported yield, 1,025 gallons a minute with draw-down of 45 feet.

Well 11. Drilled in April 1942 by Layne-Texas Co.; depth, 794 feet; diameter, 18⅝ inches; underreamed to 30-inch diameter and graveled; screen from 656 to 767 feet; deep-well turbine pump and 75-horsepower electric motor; water level, 80.7 feet below measuring point on May 18, 1943; reported yield, 1,012 gallons a minute with draw-down of 49 feet.

Well 12. Drilled in April 1942 by Layne-Texas Co.; depth, 781 feet; diameter, 18⅝ inches; underreamed to 30-inch diameter and graveled; screen from 636 to 776 feet; deep-well turbine pump and 75-horsepower electric motor; water level, 112.0 feet below measuring point on Apr. 18, 1944;

yield, 1,390 gallons a minute with draw-down of 50.7 feet after 24 hours of pumping.

Well 13. Drilled in June 1942 by Layne-Texas Co.; depth, 810 feet; diameter, 18⅝ inches; underreamed to 30-inch diameter and graveled; screen from 640 to 763 feet; deep-well turbine pump and 75-horsepower electric motor; water level, 72.4 feet below measuring point on May 18, 1943; reported yield, 1,040 gallons a minute with draw-down of 34 feet.

Well 14. Drilled in July 1942 by Layne-Texas Co.; depth, 805 feet; diameter, 18⅝ inches; underreamed to 30-inch diameter and graveled; screen from 661 to 775 feet; water level, 96.3 feet below measuring point on May 22, 1944; reported yield, 1,040 gallons a minute with 30 feet draw-down.

Average pumpage, in gallons a day

1930	1935	1940	1941	1942	1943
4,685,000	4,567,000	6,929,000	8,063,000	7,158,000	9,947,000

Storage: Six concrete surface reservoirs, two of 4,000,000 gallons each, two of 3,000,000 gallons each, two of 1,781,000 gallons each; steel standpipe, 625,000 gallons.

Treatment: Chlorination.

Analyses

[Collected May 27, 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	23		26	
Iron (Fe)	.05		.03	
Calcium (Ca)	17	0.83	13	0.65
Magnesium (Mg)	5.2	.43	3.8	.31
Sodium (Na)	271	11.77	241	10.49
Potassium (K)				
Bicarbonate (HCO_3)	322	5.28	346	5.67
Sulfate (SO_4)	2	.04	2	.04
Chloride (Cl)	272	7.67	202	5.70
Fluoride (F)	.7	.04	.8	.04
Nitrate (NO_3)	1.0	.02	0	0
Total dissolved solids	760		670	
Total hardness as $CaCO_3$	64		48	
pH	8.1		8.2	

[Collected May 27, 1943, and Aug. 6, 1941. Analyzed by J. H. Rowley and W. W. Hastings]

	Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	18		26	
Iron (Fe)	.06		.16	
Calcium (Ca)	57	2.85	51	2.55
Magnesium (Mg)	18	1.48	17	1.40
Sodium (Na)	510	22.16	478	20.78
Potassium (K)				
Bicarbonate (HCO_3)	328	5.38	340	5.57
Sulfate (SO_4)	3	.06	2	.04
Chloride (Cl)	745	21.01	675	19.04
Fluoride (F)	.4	.02	.7	.04
Nitrate (NO_3)	1.0	.02	2.5	.04
Total dissolved solids	1,560		1,420	
Total hardness as $CaCO_3$	216		198	
PH	8.0			

Analyses—Continued

[Collected May 27, 1943. Analyzed by J. H. Rowley]

	Well 5		Well 6	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	28		25	
Iron (Fe)	.06		.05	
Calcium (Ca)	46	2.30	23	1.15
Magnesium (Mg)	14	1.15	7.2	.59
Sodium (Na)	469	20.39	317	13.80
Potassium (K)				
Bicarbonate (HCO_3)	335	5.49	331	5.43
Sulfate (SO_4)	2	.04	2	.04
Chloride (Cl)	648	18.28	355	10.01
Fluoride (F)	.5	.03	.7	.04
Nitrate (NO_3)	.2	0	.8	.02
Total dissolved solids	1,380		908	
Total hardness as $CaCO_3$	172		87	
pH	8.0		8.4	

	Well 7		Well 8	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	23		18	
Iron (Fe)	.08		.08	
Calcium (Ca)	33	1.65	46	2.30
Magnesium (Mg)	11	.90	15	1.23
Sodium and potassium (Na+K)	393	17.08	502	21.82
Bicarbonate (HCO_3)	332	5.44	332	5.44
Sulfate (SO_4)	2	.04	3	.04
Chloride (Cl)	500	14.10	702	19.80
Fluoride (F)	.6	.03	.5	.03
Nitrate (NO_3)	1.0	.02	1.0	.02
Total dissolved solids	1,450		1,460	
Total hardness as $CaCO_3$	128		176	
pH	8.2		7.9	

[Collected May 28, 1943. Analyzed by J. H. Rowley]

	Well 9		Well 10	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	25		25	
Iron (Fe)	.09		.04	
Calcium (Ca)	19	0.95	12	0.60
Magnesium (Mg)	5.5	.45	3.6	.30
Sodium (Na)	248	10.78	208	9.04
Potassium (K)				
Bicarbonate (HCO_3)	352	5.77	347	5.69
Sulfate (SO_4)	2	.04	2	.04
Chloride (Cl)	224	6.32	148	4.17
Fluoride (F)	.7	.04	.8	.04
Nitrate (NO_3)	.8	.01	0	0
Total dissolved solids	711		576	
Total hardness as $CaCO_3$	70		45	
pH	8.0		8.2	

Analyses—Continued

[Collected May 27 and 28, 1943. Analyzed by J. H. Rowley]

	Well 11		Well 12	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	24		24	
Iron (Fe)	.12		.04	
Calcium (Ca)	17	0.85	13	0.65
Magnesium (Mg)	4.8	.39	3.7	.30
Sodium and potassium (Na+K)	261	11.34	198	8.56
Bicarbonate (HCO_3)	338	5.54	347	5.69
Sulfate (SO_4)	3	.06	2	.04
Chloride (Cl)	245	6.91	134	3.78
Fluoride (F)	.9	.05	.6	.03
Nitrate (NO_3)	1.2	.02	0	0
Total dissolved solids	728		557	
Total hardness as $CaCO_3$	62		48	
pH	8.2		8.5	

[Collected July 3, 1942, and May 28, 1943. Analyzed by J. H. Rowley and Southwestern Laboratories]

	Well 13		Well 14	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	26		28	
Iron (Fe)	.09		.25	
Calcium (Ca)	16	0.80	32	1.60
Magnesium (Mg)	4.6	.38	11	.90
Sodium and potassium (Na+K)	196	8.53	259	11.27
Bicarbonate (HCO_3)	332	5.44	336	5.51
Sulfate (SO_4)	2	.04	1.8	.04
Chloride (Cl)	170	4.79	294	8.29
Fluoride (F)	.8	.04		
Nitrate (NO_3)	0	0		
Total dissolved solids	594		809	
Total hardness as $CaCO_3$	59		96	
pH	8.5		8.0	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	2	2	Blue clay	42	288
Clay	4	6	Gumbo	19	307
Sand	5	11	Clay and shale	58	365
Clay	59	70	Clay	47	412
Sand	10	80	Sand	12	424
Clay	10	90	Clay	291	715
Sand	41	131	Sand	102	817
Clay	61	192	Clay	23	840
Gumbo	54	246			

Well 2

Soil	2	2	Sand	13	523
Clay	13	15	Clay	68	591
Sand	6	21	Sand	26	617
Sandy clay	48	69	Clay	58	675
Clay	14	83	Clay	46	721
Sand	8	91	Sand	32	753
Clay	15	106	Clay	9	762
Sand	22	128	Sand	83	845
Shell and clay	8	136	Clay	10	855
Clay	374	510			

Drillers' logs—Continued

Well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and clay	10	10	Gumbo	68	304
Sand	8	18	Clay and shale	46	350
Clay	58	76	Soft clay	151	501
Clay and shale	10	86	Sand	10	511
Sand	44	130	Gumbo	184	695
Clay and shale	50	180	Hard layers	2	697
Soft clay	26	206	Fine-grained muddy sand	30	727
Gumbo	10	216	Sand	133	860
Clay and shale	20	236	Gumbo	6	866

Well 4

Soil and clay	10	10	Clay and shale	21	457
Sandy clay	123	133	Gumbo	230	687
Soft clay	118	251	Fine-grained muddy sand	25	712
Clay and shale	48	299	Sand	145	857
Gumbo	137	436	Gumbo	16	873

Well 5

Soil and clay	16	16	Sand	6	151
Sand	12	28	Clay	277	428
Clay	4	31	Sand	17	445
Sand	12	43	Clay	138	583
Sandy clay	39	82	White sand	27	610
Clay	20	102	Clay	95	705
Sand	26	128	Sand	167	872
Clay	17	145	Clay	16	888

Well 7

Soil	3	3	Soft clay	312	625
Clay	99	102	Clay with streaks of sand	44	669
Loose sand	23	125	Tough clay	29	698
Tough clay	116	241	Coarse-grained hard sand	141	839
Soft clay	161	402	Gumbo	4	843
Gumbo	10	412			

Well 8

Soil	2	2	Sand	33	550
Sand and clay	180	182	Shale	76	626
Sandy clay	18	200	Sand	21	647
Shale	140	340	Shale	78	725
Sand and shale	25	365	Sand	12	737
Shale	16	381	Shale	68	805
Sand	29	410	Sand and shale	84	889
Sand and shale	28	438	Sand	91	980
Shale	17	455	Shale	20	1,000
Sand and shale	62	517			

Well 9

Surface clay	30	30	Shale	17	341
Sand	10	40	Sand and shale layers	27	368
Clay and sand	10	50	Clay	26	394
Clay	39	89	Clay and sand layers	38	432
Sand and clay	32	121	Sand	36	468
Clay and sand layers	35	156	Clay	82	550
Sand	15	171	Sand	11	561
Clay and sand	16	187	Clay and layers of sand	45	606
Clay	24	211	Sandy clay	28	634
Sandy clay	82	293	Clay	29	663
Clay	15	308	Sand	98	761
Sand	16	324	Clay	3	764

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Drillers' logs—Continued

Well 10

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	15	15	Sand and soft shale	66	361
Hard sandy clay	37	52	Shale and sand	13	374
Soft sandy clay	5	57	Sand and sandy shale	18	392
Sand	31	88	Shale and sandy shale	11	403
Sand and clay streaks	24	112	Sand and shale	7	410
Sandy shale	11	123	Shale	23	433
Sand	5	128	Sand, sandy shale, and shell	19	452
Sandy shale	15	143	Shale	8	460
Sand	21	164	Shale with sandy shale breaks	68	528
Sandy shale and layers of sand	25	189	Sand with sticky shale breaks	38	566
Hard clay	25	214	Sticky shale with sand breaks	50	616
Soft sand and shale	58	272	Sticky shale and sandy shell	22	638
Hard shale	16	288	Sand	125	763
Sandy shale	7	295	Sticky shale	3	766

Well 11

Clay	12	12	Hard shale	38	665
Sand and clay	138	150	Sand	80	745
Clay	12	162	Hard shale layers	4	749
Sandy clay	44	206	Sand	22	771
Clay and layers of sand	300	506	Clay	11	782
Clay	24	530	Sand	9	791
Sandy clay	45	575	Clay	3	794
Sand and layers of clay	52	627			

Well 12

Black soil	2	2	Clay	30	322
Clay	4	6	Sand and streaks of clay	62	384
Sandy clay	69	75	Clay and layers of sand	118	502
Gray sand	49	124	Tough clay	52	554
Sand and clay streaks	10	134	Sandy clay	52	606
Sand	13	147	Hard clay	38	644
Sand and clay streaks	65	212	Sand	133	777
Sandy clay	80	292	Sticky shale	4	781

Well 13

Black soil	2	2	Sandy shale	15	362
Clay	6	8	Hard shale	5	367
Sandy clay	20	28	Sandy shale	2	369
Clay	36	64	Sand and shell	29	398
Sandy clay	22	86	Hard sand, shale, and shell	3	401
Sand	18	104	Sand	9	410
Clay	55	159	Sandy shale	28	438
Sand	11	170	Sand and layers of shell	42	480
Shale	20	190	Shale and layers of sand and shell	74	554
Sandy shale with sand breaks	64	254	Sand and layers of shell	14	568
Shale and layers of sand	22	276	Sticky shale with layers of shell and sand	73	641
Shale	20	296	Sand	162	803
Sand	11	307	Clay	7	810
Sandy shale and shell	24	331			
Sand and shale breaks	16	347			

Drillers' logs—Continued

Well 14

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Black soil	5	5	Clay with sand breaks	114	526
Clay	11	16	Tough clay	20	546
Sand	25	41	Clay with sand streaks	54	600
Sandy clay	45	86	Sand	5	605
Sand with clay streaks	35	121	Sandy clay	11	616
Sandy clay	51	172	Hard shale with sand and shell breaks	12	628
Sand with clay streaks	17	189	Sand, shale, and shell	15	643
Tough clay	11	200	Hard shale with sand and shell streaks	11	654
Sand with streaks of shale and shell	19	219	Sand	12	666
Sandy shale	17	236	Hard shale with sand and shell streaks	11	677
Hard shale	5	241	Hard sand with shale breaks	23	700
Sand, shale, and shell	44	285	Sand	98	798
Hard shale with streaks of sand and shell	98	383	Tough clay	7	805
Sand	29	412			

KEMAH

Population in 1940: 550.

Source of information: H. T. James, owner, Apr. 7, 1944.

Owner: H. T. James.

Source of supply: Two wells.

Well 1. Drilled in 1938 by Charles Ellis; depth, 605 feet; diameter, 6 to 4 inches; deep-well turbine pump; static water level, 32.3 feet below measuring point Mar. 21, 1939.

Well 2. Drilled in 1939 by McMasters & Pomeroy; depth, 690 feet; diameter, 6 to 4 inches; deep-well turbine pump and 5-horsepower electric motor; reported yield, 90 gallons a minute; temperature, 74° F.

Storage: Three steel surface tanks, 6,000 1,000, and 500 gallons.

Number of customers: 160 to 170.

Treatment: Periodic chlorination.

Analyses

Dates of collection: Well 1, Mar. 21, 1939, and Well 2, Apr. 7, 1944. Analyzed by E. W. Lohr and J. H Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)			14	
Iron (Fe)			.11	
Calcium (Ca)			12	0.60
Magnesium (Mg)			3.9	.32
Sodium (Na)			215	9.33
Potassium (K)			3.4	.09
Bicarbonate (HCO_3)	416	6.82	398	6.52
Sulfate (SO_4)	1	.02	2	.04
Chloride (Cl)	96	2.71	133	3.75
Fluoride (F)			.6	.03
Nitrate (NO_3)			0	0
Total dissolved solids			600	
Total hardness as $CaCO_3$	63		46	

LAMARQUE

Population in 1940: 500.

Source of information: G. R. Westerlage, water superintendent, Apr. 19, 1944.

Owner: Galveston County Water Control & Improvement District No. 3.

Source of supply: Two wells.

Well 1. Drilled in 1940 by H. H. Ellis; depth about 500 feet; equipped with deep-well turbine pump; stand-by well.

Well 2. Drilled in 1943 by Texas Water Supply Corp.; never used because of excessive yield of sand; water level, 75.1 feet below measuring point on Apr. 19, 1944, while well 3 was pumping.

Well 3. About 50 feet southeast of well 2; drilled in August 1943 by Layne-Texas Co.; depth, 708 feet; underreamed to 30-inch diameter and graveled; vertical slotted screen from 578 to 610 feet and 665 to 700 feet; deep-well turbine pump; reported yield, 300 gallons a minute with drawdown of 53 feet after 48 hours of pumping.

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

Number of customers: 400.

Treatment: None.

Analysis, well 3

[Collected Apr. 19, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	2	0.04
Iron (Fe)	.50		Chloride (Cl)	178	5.02
Calcium (Ca)	7.7	0.38	Fluoride (F)	1.0	.05
Magnesium (Mg)	2.2	.18	Nitrate (NO_3)	1.2	.02
Sodium (Na)	265	11.53	Total dissolved solids	698	
Potassium (K)	3.4	.09	Total hardness as $CaCO_3$	28	
Bicarbonate (HCO_3)	430	7.05	pH		

Drillers' log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	5	5	Shale	12	465
Sand	17	22	Sand	10	475
Clay	14	36	Shale	8	483
Sandy shale	30	66	Sand	12	495
Shale	17	83	Shale	7	502
Sandy shale	8	91	Sand and layers of shale	50	552
Fine-grained gray sand	14	105	Hard shale	31	583
Shale	62	167	Sand	24	607
Sandy shale	14	181	Sand and hard shale	7	614
Sticky shale	98	279	Hard shale and shell	23	637
Sandy shale and shell	34	313	Sand	13	650
Sand	3	316	Sand and shale	6	656
Shale	12	328	Sand, shale, and shell	12	668
Sand, shale, and shell	37	365	Sand	39	707
Shale and shell	69	434	Shale	1	708
Sand	19	453			

LEAGUE CITY

Population in 1940: 800.

Source of information: Mrs. Salmon.

Owner: Galveston County Water Control & Improvement District No. 1.

Source of supply: Well drilled in 1940 by Layne-Texas Co.; depth, 701 feet; diameter, 8 inches; screen from 617 to 692 feet; deep-well turbine pump and 10-

horsepower electric motor; static water level, 50 feet below measuring point May 27, 1940; reported yield, 150 gallons a minute with draw-down of 14 feet.

Pumpage (estimated): 20,000 gallons a day.

Storage: Elevated tank, 55,000 gallons.

Number of customers: 185 to 200.

Treatment: Periodic chlorination.

Analysis, well 1

[Collected July 24, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	22		Sulfate (SO_4)	3	0.06
Iron (Fe)	.01		Chloride (Cl)	195	5.50
Calcium (Ca)	8.9	0.44	Fluoride (F)	.9	.05
Magnesium (Mg)	3.4	.28	Nitrate (NO_3)	0	0
Sodium (Na) + Potassium (K)	242	10.53	Total dissolved solids	633	
Bicarbonate (HCO_3)	344	5.64	Total hardness as $CaCO_3$	36	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	1	1	Shale and sandy shale	45	290
Yellow clay	19	20	Shale	114	404
Sand	4	24	Shell	20	424
Clay	22	46	Shale and shell	14	438
Sandy clay and shell	38	84	Sand and shale	20	458
Sandy blue shale and shell	15	99	Shale	37	495
Sandy shale	30	129	Shale and sandy shale	32	527
Sand	12	141	Shale	27	554
Shale and shell	6	147	Sandy shale	18	572
Fine-grained sand with thin shale breaks	34	181	Shale	43	615
Coarse-grained sand	17	198	Sand	75	690
Shale and shell	5	203	Sandy shale	8	698
Sticky clay	42	245	Shale	3	701

TEXAS CITY

Population in 1940: 5,748.

Source of information: Community Public Service Co., Layne-Texas Co.

Owner: Community Public Service Co.

Source of supply: Four wells.

Well 2. Drilled in 1913 by Layne-Texas Co.; depth, 783 feet; diameter, 8 inches; screens from 685 to 706 feet and 724 to 765 feet; had flow of 72,000 gallons a day when drilled; ceased flowing in 1915; deep-well turbine pump and electric motor; temperature, 81° F.

Well 5. Drilled in 1937 by Layne-Texas Co.; depth, 772 feet; diameter, 16 to 8⅝ inches; screens from 503 to 513, 544 to 559, 637 to 652, 675 to 699, and 732 to 764 feet; underreamed to 30-inch diameter and graveled; deep-well turbine pump set at 140 feet, and 25-horsepower electric motor; water line, 69 feet below measuring point on Aug. 7, 1941; reported yield, 440 gallons a minute with draw-down of 57 feet.

Well 6. Drilled in 1942 by Layne-Texas Co.; depth, 764 feet; diameter, 20 and 10¾ inches; screens from 551 to 572 and 675 to 759 feet; sands underreamed to 30-inch diameter and graveled; deep-well turbine pump set at

190 feet and 40-horsepower electric motor; water level, 100 feet below measuring point on Jan. 24, 1942; reported yield, 500 gallons a minute with draw-down of 60 feet.

Well 7. Drilled in 1944 by Layne-Texas Co.; depth, 780 feet; diameter, 20 and 10¾ inches; screens from 548 to 569 and 685 to 769 feet; sands underreamed to 30-inch diameter and graveled; deep-well turbine pump set at 240 feet and 50-horsepower electric motor; water level, 103 feet below measuring point Feb. 22, 1944; reported yield, 350 gallons a minute with draw-down of 79 feet.

Average pumpage, in gallons a day

1930	1935	1940	1941	1942	1943
106,400	128,500	253,000	320,600	402,400	513,100

Storage: Concrete surface reservoir, 480,000 gallons; elevated steel tank, 100,000 gallons.

Number of customers: 2,065 in March 1944.

Treatment: Chlorination.

Analyses

[Dates of collection: Feb. 21, 1939, and Feb. 10, 1943. Analyzed by E. W. Lohr and J. H. Rowley]

	Well 2		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)			18	
Iron (Fe)			.03	
Calcium (Ca)			7.0	0.35
Magnesium (Mg)			2.5	.21
Sodium (Na)			322	13.98
Potassium (K)				
Bicarbonate (HCO_3)	503	8.25	490	8.03
Sulfate (SO_4)	1	.02	1	.02
Chloride (Cl)	250	7.05	228	6.43
Fluoride (F)			1.0	.05
Nitrate (NO_3)	.0	.00	.5	.01
Total dissolved solids	821		820	
Total hardness as $CaCO_3$	41		28	
pH			8.0	

[Dates of collection: Apr. 14, 1944, and July 1944. Analyzed by M. L. Begley and J. H. Rowley]

	Well 6		Well 7	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)			19	
Iron (Fe)			.15	
Calcium (Ca)	6.1	0.30	8.0	0.40
Magnesium (Mg)	2.0	.16	3.1	.25
Sodium (Na)	309	13.45	306	13.32
Potassium (K)			6.6	.17
Bicarbonate (HCO_3)	485	7.95	366	6.00
Sulfate (SO_4)	2	.04	2	.04
Chloride (Cl)	210	5.92	285	8.04
Fluoride (F)			1.0	.05
Nitrate (NO_3)	.0	.00	.5	.01
Total dissolved solids	778		834	
Total hardness as $CaCO_3$	23		33	
pH			7.8	

Drillers' logs

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	12	12	Sand	24	572
Sand	68	80	Gumbo	105	677
Clay	8	88	Sand	36	713
Sand	40	128	Gumbo	9	722
Clay	302	430	Sand	44	766
Gumbo	118	548	Gumbo	17	783

Well 5

Soil	14	14	Sand and shell	14	479
Sand	36	50	Sand and layers of shale	58	537
Sandy clay	43	93	Sand	29	566
Sand	8	101	Tough shale	43	609
Sandy shale	52	153	Sand	7	616
Shale	79	232	Tough shale	21	637
Sand	10	242	Sand	21	658
Sandy shale	71	313	Tough shale	5	663
Sand	12	325	Sand	47	710
Sandy shale	33	358	Tough shale	10	720
Tough shale	14	372	Sand	45	765
Sandy shale	93	465	Tough shale	7	772

Well 6

Clay	11	11	Shale and sand breaks	47	445
Sand, clay, and layers of shell	48	59	Tough shale	13	458
Clay	23	82	Sand	4	462
Sand	28	110	Shale and sand breaks	10	472
Clay	34	144	Shale and sandy shale	6	478
Sand	6	150	Shale	20	498
Clay	74	224	Sticky shale	42	540
Sand	22	246	Fine-grained gray sand	27	567
Shale	26	272	Shale	5	572
Sand	10	282	Sand	4	576
Shale and sand	27	309	Tough shale	61	637
Shale	5	314	Sand and shale	15	652
Sandy shale	21	335	Shale	19	671
Sand	9	344	Sand	30	701
Shale and layers of shell	15	359	Shale	8	709
Shale and sand breaks	29	388	Sand	50	759
Sand	10	398	Shale	5	764

Well 7

Clay	11	11	Sandy shale	5	462
Sand and clay	50	61	Sand	15	477
Clay	21	82	Sandy shale	49	526
Sand	29	111	Shale	12	538
Clay	109	220	Sand	27	565
Sand and shell	26	246	Tough shale	55	620
Sand, shale, shell	18	264	Sand and shale	16	636
Shale	8	272	Shale	10	646
Sandy shale	10	282	Tough shale	15	661
Shale and sand	20	302	Sandy shale	5	666
Shale	10	312	Shale	14	680
Sandy shale	32	344	Sand	17	697
Sand and shale	44	388	Shale and shell	8	705
Sand	9	397	Sand	66	771
Shale and sand breaks	54	451	Shale	9	780
Tough shale	6	457			

TEXAS CITY HEIGHTS

Population in 1940 (estimated): 1,600.

Source of information: R. W. Palmer, water superintendent, Apr. 14, 1944.

Owner: Galveston County Water Control and Improvement District No. 4.

Source of supply: Three wells.

Well 1. Drilled by H. H. Ellis in 1938; depth reported, 400 feet; deep-well turbine pump and 5-horsepower electric motor; reported yield, 25 gallons a minute.

Well 2. Drilled in 1940 by H. H. Ellis; depth, 486 feet; diameter, 4 inches; screen from 473 to 486 feet; deep-well turbine pump and 3-horsepower electric motor; static water level reported, 96 feet below surface in October 1942; reported yield, 60 gallons a minute; temperature, 77° F.

Well 3. Drilled in 1944 by Layne-Texas Co.; depth, 707 feet; diameter, 8 to 4 inches; screens from 470 to 513 and 656 to 698 feet; deep-well turbine pump; static water level reported, 122 feet below measuring point on Apr. 27, 1944.

Pumpage (estimated): 120,000 gallons a day.

Storage: Two wooden surface reservoirs, 20,000 gallons each; elevated tank, 50,000 gallons.

Number of customers (estimated): 400.

Treatment: Chlorination.

Analyses

[Dates of collection: Dec. 15, 1938, Mar. 10, 1943, and Oct. 7, 1944. Analyzed by E. W. Lohr and J. H. Rowley]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)					17	
Iron (Fe)					.05	
Calcium (Ca)			7.0	0.35	7.2	0.36
Magnesium (Mg)			3.8	.31	2.7	.22
Sodium, potassium (Na+K)			330	14.33	323	13.97
Bicarbonate (HCO_3)	586	9.61	611	10.02	544	8.92
Sulfate (SO_4)	1	.02	1	.02	2	.04
Chloride (Cl)	173	4.88	175	4.94	197	5.56
Fluoride (F)					.6	.03
Nitrate (NO_3)	3.0	.05	.05	.01	.2	.00
Total dissolved solids	791		818		822	
Total hardness as $CaCO_3$	24		33		29	
pH					8.0	

Drillers' log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Clay with sand layers	60	380
Clay	23	25	Clay	11	391
Sand	10	35	Sand	9	400
Clay	9	44	Sand with layers of shale	40	440
Sand	10	54	Sand	73	513
Clay	38	92	Hard sandy shale	19	532
Sand	8	100	Shale with layers of sand	14	546
Clay	80	180	Shale	33	579
Clay with sand layers	40	220	Sandy shale	46	625
Clay	25	245	Sand	12	637
Sand	31	276	Shale	15	652
Sandy clay	4	280	Sand	46	698
Clay with sand layers	35	315	Shale	9	707
Sand	5	320			

GRAYSON COUNTY

BELLS

Population in 1940: 454.

Source of information: J. J. Hogan, water superintendent, Feb. 23, 1943.

Ownership: Municipal.

Source of supply: Well drilled in 1936 by Layne-Texas Co.; depth, 710 feet; diameter, 7 to 4½ inches; screen from 678 to 707 feet; deep-well turbine pump and 7-horsepower electric motor, 20-stage pump, bottom of suction pipe at 266 feet; static water level, 200 feet below land surface on May 7, 1936; yield, 54 gallons a minute with drawdown of 32 feet.

Pumpage (estimated): Maximum, 15,000 gallons; minimum, 10,000 gallons; average, 12,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Feb. 23, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	40	0.83
Iron (Fe)	.05		Chloride (Cl)	13	.37
Calcium (Ca)	1.1	0.05	Fluoride (F)	.8	.04
Magnesium (Mg)	.6	.05	Nitrate (NO_3)	.2	.00
Sodium (Na)	147	6.40	Total dissolved solids	391	
Potassium (K)	2.4	.06	Total hardness as $CaCO_3$	5	
Bicarbonate (HCO_3)	324	5.32	pH	8.2	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	27	27	Hard sand	5	462
Sand	4	31	Shale	11	473
Sticky blue shale	19	50	Rock	1	474
Hard shale	184	234	Shale and boulders	46	520
Hard tough shale	18	252	Rock	2	522
Hard shale	117	369	Shale, sand and boulders	48	570
Rock	1	370	Shale	20	590
Hard shale and boulders	7	377	Hard brown shale	16	606
Hard shale	24	401	Hard shale	15	621
Boulders and hard shale	20	421	Hard sandy shale and lime	30	651
Shale and boulders	11	432	Hard shale	23	674
Sand	5	437	Hard sand	31	705
Shale	20	457	Hard shale	5	710

COLLINSVILLE

Population in 1940: 653.

Source of information: J. L. Pearson, water superintendent, Feb. 22, 1943.

Ownership: Municipal.

Source of supply: Well drilled in 1928; depth, about 800 feet; diameter, 6 or 8 inches; deep-well turbine pump and 10-horsepower electric motor; pump set at 350 feet; static water level, 200 feet below land surface; yield, 25 gallons a minute.

Pumpage (estimated): Maximum, 20,000 gallons; minimum, 15,000 gallons a day.

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

Number of customers: 90.

Treatment: None.

DENISON

Population in 1940: 15,581.

Source of information: B. H. Barnhill, Feb. 24, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir about 2 to 3 miles northwest of city; area, about 280 acres; average depth, about 20 feet; drainage area of creek supplying the lake, about 14 square miles.

Pumpage: Maximum, 3,000,000 gallons; minimum, 1,800,000 gallons; average, 2,500,000 gallons a day.

Storage: Standpipe, 1,000,000 gallons.

Treatment: Coagulation with ferric sulfate and lime, sedimentation, rapid sand filter, and chlorination.

Analyses

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

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	4.6		2.6	
Iron (Fe)	.08		.05	
Calcium (Ca)	44	2.196	35	1.747
Magnesium (Mg)	6.3	.518	5.9	.485
Sodium (Na)	4.9	.212	8.2	.355
Potassium (K)	4.8	.123		
Bicarbonate (HCO_3)	138	2.262	100	1.639
Sulfate (SO_4)	18	.375	25	.520
Chloride (Cl)	13	.367	13	.367
Fluoride (F)	.8	.042	1.0	.053
Nitrate (NO_3)	.2	.003	.5	.008
Total dissolved solids	184		155	
Total hardness as $CaCO_3$	136		112	
pH	7.8		7.6	

GUNTER

Population in 1940: 481.

Source of information: Mrs. H. H. Cunningham, owner, Feb. 22, 1943.

Ownership: Private.

Source of supply: Well drilled about 1904; depth reported, about 1,000 feet; diameter, unknown; deep-well turbine pump and Ford V-8 motor.

Storage: Elevated tank, 50,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Feb. 22, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	53	1.10
Iron (Fe)	.06		Chloride (Cl)	13	.37
Calcium (Ca)	1.6	0.08	Fluoride (F)	1.6	.08
Magnesium (Mg)	.7	.06	Nitrate (NO_3)	3.5	.06
Sodium (Na)	308	13.40	Total dissolved solids	771	
Potassium (K)	3.0	.08	Total hardness as $CaCO_3$	7	
Bicarbonate (HCO_3)	733	12.01	pH	8.4	

HOWE

Population in 1940: 546.

Source of information: Observation, Feb. 23, 1943.

Ownership: Municipal.

Source of supply: Well near elevated tank.

Storage: Steel surface reservoir, about 20,000 gallons; elevated tank, about 5,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Feb. 23, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	135	2.81
Iron (Fe)	.03		Chloride (Cl)	35	.99
Calcium (Ca)	2.1	0.10	Fluoride (F)	1.3	.07
Magnesium (Mg)	.8	.07	Nitrate (NO_3)	3.0	.05
Sodium (Na)	365	15.87	Total dissolved solids	939	
Potassium (K)	4.0	.10	Total hardness as $CaCO_3$	8	
Bicarbonate (HCO_3)	746	12.22	pH	8.4	

SHERMAN

Population in 1940: 17,156.

Source of information: Roscoe Russell, water superintendent, Feb. 24, 1943.

Ownership: Municipal.

Source of supply: Nine wells in northwest part of city.

Well 1. Drilled in 1921 by B. J. Harper; depth, 2,100± feet (original depth, 2,366 feet, but highly mineralized water was encountered and well was plugged back); diameter, 8 inches; deep-well turbine pump and electric motor; yield, 300 gallons a minute with pumping level at 292 feet on Apr. 2, 1942. (Simultaneous pumping of wells 1 and 2, pumping level 362 feet).

Well 2. Drilled before 1923 by the Texas Tool & Tong Co., Inc.; depth, 2,146 feet; diameter, 12 to 8 inches; deep-well turbine pump and electric motor; pump set at 420 feet; static water level, 297 feet below land surface on Aug. 14, 1941; yield, 500 gallons a minute with pumping level at 385 feet in February 1939.

Wells 3 to 9. Drilled before 1923; depth, from 770 to 790 feet; one well has deep-well turbine pump, four have air lift, and two have pump jacks; static water level reported, from 280 to 300 feet below land surface in 1943; turbine pump yields 300 gallons a minute.

Pumpage: Maximum, 1,600,000 gallons; minimum, 1,250,000 gallons; average, 1,400,000 gallons a day.

Storage: Concrete ground reservoir, 1,500,000 gallons; elevated tank, 750,000 gallons; standpipe, 280,000 gallons.

Treatment: None.

Analyses

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

	Well 1		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	15		12	
Iron (Fe)	.03		.11	
Calcium (Ca)	3.7	0.18	.9	0.04
Magnesium (Mg)	1.3	.11	.5	.04
Sodium (Na)	351	15.28	127	5.53
Potassium (K)	3.0	.08	2.2	.06
Bicarbonate (HCO_3)	426	6.99	269	4.41
Sulfate (SO_4)	118	2.46	42	.87
Chloride (Cl)	218	6.15	12	.34
Fluoride (F)	.5	.03	1.0	.05
Nitrate (NO_3)	1.0	.02	0	0
Total dissolved solids	930		352	
Total hardness as $CaCO_3$	14		4	
pH	8.4		8.2	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)
Surface clay	28	28
Hard rock	4	32
Yellow water sand	2	34
Blue shale	457	491
Sand rock	2	493
Water sand	18	511
Blue shale	218	729
Water sand	23	752
Shale with thin strata rock	67	819
Blue shale with strata lime rock	93	912
Layers lime rock and shale	50	962
Blue shale with strata of lime rock every 20 feet	57	1,019
Lime rock and shale in layers of 1 foot	75	1,094
Lime rock with strata of blue marl	43	1,137
Hard lime with breaks	41	1,178
Lime with shale	77	1,255
Lime rock and shale	109	1,364
Hard lime rock	23	1,387
Hard lime rock with layers of marl	15	1,402
Sand rock	6	1,408
Sandy shale in layers	10	1,418
Fine-grained sand	39	1,457
Sand and marl	59	1,516
Hard lime rock	1	1,517
Sharp fine-grained sand with streaks of marl	29	1,546
White marl	4	1,550
Fine-grained sand with red rock	18	1,568
Water sand in 4-foot strata with marl	19	1,587
Hard sand	8	1,595
Red, blue, and white marl	83	1,678
Sand, lime rock	28	1,706
Sand with red and blue marl mixed	21	1,727
Hard sand rock	8	1,735
Fine-grained sand	28	1,763
Sand rock	9	1,772
Fine-grained sand with thin layers marl	23	1,795
Sand rock	4	1,799
Marl	10	1,809
Sand	9	1,818
Sand with streaks of marl	22	1,840
Red rock	13	1,853
Hard sand	7	1,860
Sand with streaks of red rock	25	1,885
Red marl, sandy	3	1,888
Fine-grained hard sand	26	1,914
Water sand, hard	8	1,922
Red, blue, pink, and white marl, sandy	44	1,966
Sand rock, sand	14	1,980
Sand	20	2,000
Sandstone	2	2,002
Sand rock, water	17	2,019
Fine water sand, soft	8	2,027
Fine water sand, hard	27	2,054
Water sand, soft streaks	14	2,068
Layers of rock sand and marl, blue and red	26	2,094
Hard sand and rock	4	2,098
Sand rock and sand layers with marl	13	2,111
Red marl with streaks of sand	22	2,133
Water sand	10	2,143
Hard sand rock	3	2,146
Red gumbo	4	2,150
Red marl	2	2,152
Sand rock, red marl	13	2,165
Red marl	2	2,167
Sand rock, broken	8	2,175
Red, blue shale, sandy	14	2,189
Red marl	7	2,196
Soft sand rock	4	2,200
Hard rock	2	2,202
Lime rock, hard	2	2,204
Hard red shale	2	2,206
Red, blue, and white shale	9	2,215
Hard lime	1	2,216
Hard sand rock	3	2,219
Red shale, some blue	47	2,266
Sand rock	4	2,270
Red shale	26	2,296
Sand rock	1	2,297
Red shale	4	2,301
Sand rock	4	2,305
Hard sand rock	3	2,308
Red marl	2	2,310
Rock, red shale	8	2,318

Drillers' logs—Continued

Well 1—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand rock, red shale	8	2,326	Layers of sand rock and red shale, rock rather hard	11	2,355
Red shale	3	2,329	Very hard sharp sand rock	1	2,356
Red, white, blue shale, hard	3	2,332	Hard shale	2	2,358
Sand rock	4	2,336	Hard sharp sand rock	3	2,361
Layers of sand, rock, red, white, and blue shale	8	2,344	Hard sand rock	5	2,366

Well 2

Surface clay	15	15	Lime rock and boulders	12	1,190
Water sand	35	40	Gumbo and boulders	12	1,202
Sandy shale	22	62	Hard lime rock	10	1,212
Rock	1	63	Gumbo and boulders	8	1,220
Water sand	10	73	Hard lime rock	4	1,224
Sand rock	1	74	Lime rock and boulders	14	1,238
Shale	16	90	Hard lime rock	12	1,250
Sand rock	4	94	Lime rock and boulders	15	1,265
Shale	58	152	Marl and boulders	10	1,275
Sandy shale	10	162	Gumbo and boulders	10	1,285
Blue Gumbo	20	182	Hard lime rock	6	1,291
Rock sand	20	202	Hard lime rock and boulders	2	1,293
Shale	10	212	Hard rock and boulders	3	1,296
Marl	28	240	Hard lime rock	19	1,315
Marl and sand	12	252	Lime rock and boulders	10	1,325
Blue marl	48	300	Hard lime rock	5	1,330
Marl	30	330	Red and blue marl	22	1,352
Hard sand rock	4	334	Hard lime rock	14	1,366
Marl	8	342	Hard rock	1	1,367
Gumbo	40	382	Hard lime rock	32	1,399
Marl, very tough	20	402	Sand rock and marl	3	1,402
Marl	40	442	Hard sand rock	3	1,405
Hard lime rock	2	444	Sand rock and marl	50	1,455
Marl and sand rock	18	462	Rock sand and marl	40	1,495
Hard lime rock	2	464	Fine water sand	15	1,510
Hard marl and sand rock	32	496	Blue gumbo	10	1,520
Hard lime rock	13	509	Pack sand and marl	25	1,545
Sand rock	19	528	Hard sand rock	10	1,555
Blue gumbo	11	539	Pack sand, soft	10	1,565
Tough gumbo	40	579	Pack sand and boulders	20	1,585
Sand rock	16	595	Lime shales	4	1,589
Blue gumbo	45	640	Sand rocks and marl	13	1,602
Hard sand rock	10	650	Hard sand rock	8	1,610
Gumbo	10	660	Hard lime rock	2	1,612
Sand rock	30	690	Blue shale and boulders	33	1,645
Rock sand and boulders	30	720	Blue shale	15	1,660
Hard sand rock	10	730	Pack sand and marl	35	1,695
Rock sand and boulders	16	746	Lime, water sand	20	1,715
Rock sand	10	756	Red, blue, and white marl	20	1,735
Sand rock and boulders	4	760	Hard sand rock	3	1,738
Rock sand	20	780	Red marl	10	1,748
Water sand	60	840	Pack sand and boulders	17	1,765
Sand rock	20	860	Lime boulders	5	1,770
Rock sand and boulders	15	875	Red, blue, and white marl	15	1,785
Water sand	25	900	Lime, water sand	15	1,800
Sand rock	10	910	Hard sand rock and boulders	72	1,872
Hard sand rock and boulders	20	930	Hard sand rock	20	1,892
Sand rock	8	938	Red marl	10	1,902
Chalk rock	10	948	Sand rock	10	1,912
Hard lime rock	6	954	Red and blue marl	33	1,945
Hard chalk rock	2	956	Fine-grained sand, soft	2	1,947
Sand rock	33	989	Red marl and sand	25	1,972
Hard shale	11	1,000	Pack sand	25	1,997
Sand rock	34	1,034	Hard sand rock	2	1,999
Hard rock and boulders	2	1,036	Sand rock and water	6	2,005
Hard lime rock	2	1,038	Tough blue gumbo	10	2,015
Rock	4	1,042	Water sand	2	2,017
Sand rock	4	1,046	Hard sand rock and water sand	18	2,035
Gumbo	20	1,066	Tough blue gumbo	10	2,045
Sand rock	12	1,078	Water sand	5	2,050
Rock sands and boulders	42	1,120	Sand rock and boulders	5	2,055
Sand rock	30	1,150	Water sand and boulders	50	2,105
Hard rock	2	1,152	Water sand	25	2,130
Hard lime rock	4	1,156	Hard sand rock	2	2,132
Hard lime rock and boulders	4	1,160	Water sand	11	2,143
Lime rock and boulders	12	1,172	Sand rock	3	2,146
Hard lime rock	6	1,178			

TOM BEAN

Population in 1940: 274.

Source of information: A. H. Davis, water superintendent, Feb. 23, 1943.

Ownership: Municipal.

Source of supply: Well near elevated tank; drilled in 1935; depth, 1,192 feet; diameter, 6 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 30 gallons a minute with pumping level at 320 feet below the surface in 1942.

Pumpage (estimated): Maximum, 15,000 gallons; minimum, 10,000 gallons; average, 12,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Feb. 23, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	99	2.06
Iron (Fe)	.07		Chloride (Cl)	103	2.90
Calcium (Ca)	2.0	0.10	Fluoride (F)	1.7	.09
Magnesium (Mg)	.8	.06	Nitrate (NO_3)	0	0
Sodium (Na)	342	14.85	Total dissolved solids	895	
Potassium (K)	3.6	.09	Total hardness as $CaCO_3$	8	
Bicarbonate (HCO_3)	614	10.05	pH	8.3	

VAN ALSTYNE

Population in 1940: 1,650.

Source of information: Mr. Miller, pump operator, Feb. 22, 1942.

Ownership: Municipal.

Source of supply: Two wells near elevated tank.

Well 1. Drilled, date unknown; depth, 1,155 feet; air lift; yield, 50 gallons a minute.

Well 2. Drilled about 1905; depth, 1,155 feet; diameter, 8 to 6 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 90 gallons a minute.

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

Storage: Ground reservoir, 45,000 gallons; elevated tank, 100,000 gallons.

Treatment: None.

Analysis, well 2

[Collected Feb. 22, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	1,400	29.06
Iron (Fe)	.14		Chloride (Cl)	472	13.31
Calcium (Ca)	13	0.65	Fluoride (F)	2.6	.14
Magnesium (Mg)	6.6	.54	Nitrate (NO_3)	.8	.01
Sodium (Na)	1,170	50.69	Total dissolved solids	3,380	
Potassium (K)	13	.33	Total hardness as $CaCO_3$	60	
Bicarbonate (HCO_3)	591	9.69	pH	8.4	

WHITESBORO

Population in 1940: 1,560.

Source of information: Water superintendent, Feb. 23, 1943.

Ownership: Municipal.

Source of supply: Two wells near standpipe.

Well 1. Depth, about 1,500 feet; diameter, 12 to 7 inches; air lift; yield, about 90 gallons a minute.

Well 2. Drilled in 1935 by Layne-Texas Co.; depth, 1,518 feet; diameter, 10 to 5½ inches; screens from 1,384 to 1,426 and 1,445 to 1,508 feet; deep-well turbine pump and 40-horsepower electric motor; 13-stage pump set at 299 feet; static water level, 171 feet below land surface on May 11, 1935; yield, 318 gallons a minute with draw-down of 139 feet on May 11, 1935; present yield reported, 400 gallons a minute.

Pumpage (estimated): Average, 15,000 gallons a day.

Storage: Ground reservoir, 85,000 gallons; standpipe 90,000 gallons.

Treatment: None.

Analysis, well 2

[Collected Feb. 23, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	48	1.00
Iron (Fe)	.03		Chloride (Cl)	91	2.57
Calcium (Ca)	2.7	0.13	Fluoride (F)	1.0	.05
Magnesium (Mg)	1.4	.12	Nitrate (NO_3)	0	0
Sodium (Na)	233	10.15	Total dissolved solids	612	
Potassium (K)	3.2	.08	Total hardness as $CaCO_3$	12	
Bicarbonate (HCO_3)	419	6.86	pH	8.3	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Rotary	3	3	Shale and lime	27	970
Surface soil	2	5	Sticky shale	11	981
Clay	5	10	Sand	10	991
Sandy clay	15	25	Hard shale	9	1,000
Hard shale	26	51	Shell and sand	18	1,018
Shale and boulders	27	78	Shale and lime sand	22	1,040
Sandy shale and boulders	40	118	Sand and lignite	10	1,050
Hard shale	45	163	Hard lime	8	1,058
Rock	1	164	Shale, lime, and rock	25	1,083
Gravel	21	185	Lime, sandy	7	1,090
Rock	2	187	Hard lime	9	1,099
Hard shale	11	198	Hard shale	27	1,126
Shale, sand, gravel	153	351	Sand	7	1,133
Limestone	6	357	Hard shale	5	1,138
Sandy lime	46	403	Shale and slate	8	1,146
Limestone	2	405	Red beds	52	1,198
Shale, lime, and sand	37	442	Lime rock	19	1,217
Limestone	2	444	Sand	10	1,227
Shale, lime, and sand	7	451	Hard lime	12	1,239
Sticky shale	12	463	Packed sand	10	1,249
Rock	7	470	Lime and sand	30	1,279
Shale and hard lime	177	647	Sand	10	1,289
Rock	1	648	Red beds, limes	10	1,299
Shale and lime	36	674	Sand, good	5	1,304
Blue lime	8	682	Red bed, lime	10	1,314
Shale and lime	30	712	Hard packed sand	13	1,327
Hard lime	4	716	Lime and sand	8	1,335
Lime rock	6	722	Rock	1	1,336
Shale and hard lime	43	765	Sand	3	1,339
Sticky shale	6	771	Shale	4	1,343
Lime rock	37	808	Sand	6	1,349
Shale and lime	3	811	Lime, shale, and sand	9	1,358
Sticky shale	30	841	Hard sandy lime	31	1,389
Sandy shale	35	876	Good sand	26	1,415
Hard shale	4	880	Sand and shale	12	1,427
Sandy shale	25	905	Lime, rock, and shale	17	1,444
Hard shale	6	911	Sandy lime	11	1,455
Sandy shale boulders	7	918	Sand, good	24	1,479
Shale and shells	7	925	Rock	1	1,480
Sandy shale	2	927	Sand	28	1,508
Shale and lime	8	935	Red bed	1	1,509
Lime and lime rock	8	943	Lime and shale	9	1,518

WHITEWRIGHT

Population in 1940: 1,537.

Source of information: Water superintendent, Feb. 23, 1943.

Ownership: Municipal.

Source of supply: Two wells just east of the railroad station.

Well 1. Drilled about 1904; depth, 1,160 feet; diameter, 8 inches; air lift; static water level, 240 feet below land surface in 1938; yield, about 90 gallons a minute.

Well 2. Drilled in 1938 by J. L. Myers; depth 1,190 feet; diameter, 8 inches; deep-well turbine pump and 25-horsepower electric motor, pump set at 400 feet; static water level, 240 feet below land surface in 1938; yield, 150 gallons a minute.

Pumpage (estimated): Maximum, 50,000 gallons; minimum, 40,000 gallons; average, 45,000 gallons a day.

Storage: Three ground reservoirs, 116,000, 74,000 and 74,000 gallons; standpipe, 80,000 gallons.

Treatment: None.

Analysis, well 2

[Collected Feb. 23, 1943. Analyzed by J. H. Rowley.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	111	2.31
Iron (Fe)	.05		Chloride (Cl)	61	1.72
Calcium (Ca)	1.5	0.07	Fluoride (F)	1.7	.09
Magnesium (Mg)	.6	.05	Nitrate (NO_3)	2.0	.03
Sodium (Na)	284	12.35	Total dissolved solids	742	
Potassium (K)	3.2	.08	Total hardness as $CaCO_3$	6	
Bicarbonate (HCO_3)	513	8.40	pH	8.4	

GREGG COUNTY

GLADEWATER

Population in 1940: 4,454.

Source of information: B. P. Dake and Earl Parker, water superintendents, January 1942 and April 1943.

Ownership: Municipal.

Source of supply: Three wells (Nos. 4, 5, and 6).

Well 4. In Upshur County 1½ miles west of town; drilled in 1937 by Layne-Texas Co. to 455 feet and plugged back to 293 feet; diameter, 20 to 10¾ inches; screen from 205 to 268 feet; sand underreamed to 30 inches and gravel walled; deep-well turbine pump and 25-horsepower electric motor; pump set at 240 feet; static water level, 72 feet below land surface on Aug. 6, 1937, and 79 feet on Nov. 26, 1940; yield, 153 gallons a minute with drawdown of 143 feet on Apr. 30, 1943; temperature, 74° F.

Well 5. In south edge of town; drilled in 1940 by Layne-Texas Co.; depth, 279 feet; diameter, 18⅝ to 8 inches; screen from 202 to 265 feet; sand underreamed to 28 inches and gravel walled; deep-well turbine pump and 15-horsepower electric motor; pump set at 220 feet; static water level, 90 feet below land surface on June 27, 1940; yield, 124 gallons a monute with drawdown of 130 feet on June 27, 1940; estimated yield 50 gallons a minute in April 1943; temperature, 69½° F.

Well 6. Near elevated tank; drilled in 1943 by Layne-Texas Co.; depth, 400 feet; diameter, 10 inches; sand underreamed to 30 inches and gravel walled; deep-well turbine pump and 25-horsepower electric motor; pump set at 310 feet; static water level, 150 feet below land surface when drilled; yield, 140 gallons a minute with draw-down of 160 feet on July 31, 1943; temperature, 70° F.

Average pumpage, in gallons a day

	1939	1940	1941		1939	1940	1941
January	205,000			July	269,000		351,000
February		253,500		August	316,000	264,000	332,900
March	211,200		231,800	September			282,000
April	231,600	209,700	238,000	October		209,800	249,000
May	247,500	212,900	280,500	November			232,000
June	219,700		267,500	December	181,000	212,700	214,000

Storage: Three ground reservoirs, 184,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 823.

Treatment: None.

Analyses

[Collected Apr. 4, 1940 and Jan. 22, 1942. Analyzed by E. W. Lohr and J. H. Rowley]

	Well 4		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)				
Iron (Fe)				
Calcium (Ca)	32	1.60	11	0.54
Magnesium (Mg)	6.1	1.50	3	.20
Sodium (Na)	311	13.52	267	11.61
Potassium (K)				
Bicarbonate (HCO_3)	427	7.00	451	7.40
Sulfate (SO_4)	30	.62	34	.70
Chloride (Cl)	282	7.95	150	4.23
Fluoride (F)	.2	.01	.4	.02
Nitrate (NO_3)	20	.32	20	.32
Total dissolved solids	871		687	
Total hardness as $CaCO_3$	104		37	

[Collected Aug. 17, 1943. Analyzed by J. H. Rowley]

	Well 6			Well 6	
	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	12	0.250
Iron (Fe)	.15		Chloride (Cl)	63	1.777
Calcium (Ca)	3.9	0.195	Fluoride (F)	.2	.011
Magnesium (Mg)	1.2	.009	Nitrate (NO_3)	.2	.003
Sodium (Na)	104	4.525	Total dissolved solids	286	
Potassium (K)	1.6	.041	Total hardness as $CaCO_3$	15	
Bicarbonate (HCO_3)	172	2.819	pH	7.9	

Drillers' logs

Well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red clay	10	10	Shale	68	208
Sand	17	27	Sand	46	254
Rock	1	28	Shale	46	300
Black sand	26	54	Blue shale	12	312
Rock	1	55	Sand	25	337
Sand	16	71	Blue shale	118	455
Shale and lime	69	140			

Well 5

Surface sand	3	3	Shale	50	208
Clay	10	13	Sand (good)	60	268
Shale	121	134	Sandy shale	11	279
Sand (no good)	24	158			

KILGORE

Population in 1940: 6,708.

Source of information: Bud Hester, May 24, 1943.

Ownership: Municipal.

Source of supply: Three wells (Nos. 1, 3, and 4).

Well 1. Near elevated tank; drilled in 1931 by Layne-Texas Co.; depth, 875 feet; diameter, 15½ to 8¼ inches; screen from 773 to 873 feet; deep-well turbine pump and 30-horsepower electric motor; static water level, 87 feet below land surface when drilled, 155 feet on Dec. 11, 1939, 157 feet on Nov. 26, 1940, and 162 feet on Sept. 3, 1941; yield, 285 gallons a minute on May 24, 1943.

Well 3. Near elevated tank; drilled in 1934 by Layne-Texas Co.; depth, 906 feet; diameter, 10 to 6⅝ inches; screen from 802 to 906 feet; deep-well turbine pump and 25-horsepower electric motor; static water level, 134 feet below land surface in 1934, 150 feet on Dec. 11, 1939, 153 feet on Nov. 26, 1940, and 157 feet on Sept. 3, 1941; yield, 350 gallons a minute on May 24, 1943; temperature, 80° F.

Well 4. In city park; drilled in 1934 by Layne-Texas Co.; depth, 780 feet; diameter, 16 to 10 inches; screens from 607 to 625 and 665 to 755 feet; deep-well turbine pump and 40-horsepower electric motor; static water level, 111 feet below land surface on Sept. 14, 1934; yield, 615 gallons a minute on May 24, 1943.

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

Storage: Elevated tank capacity unknown.

Number of customers: Unknown.

Treatment: Aeration and chlorination.

Analyses

[Collected October 3, 1941. Analyzed by E. W. Lohr]

	Well 1		Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)					4.4	0.22
Magnesium (Mg)					3.9	.32
Sodium, potassium (Na + K)					636	27.66
Bicarbonate (HCO_3)	598	9.81	586	9.61	604	9.90
Sulfate (SO_4)	27	.56	23	.48	23	.48
Chloride (Cl)	740	20.87	780	22.00	630	17.77
Fluoride (F)	.7	.04	.6	.03	.5	.03
Total dissolved solids	1,780		1,830		1,600	
Total hardness as $CaCO_3$	17		23		27	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface material	1	1	Shale and lignite	89	433
Clay	6	7	Sand	18	451
Sandy clay	15	22	Shale	4	455
Shale and boulders	56	78	Sand	36	491
Shale and layers of sand	63	141	Shale and streaks of sand	87	578
Shale	64	205	Sand	28	606
Sand	21	226	Shale and boulders	35	641
Shale	44	270	Shale and lignite	76	717
Shale and streaks of hard sand	56	326	Sticky shale	32	749
Coarse-grained gray sand	18	344	White sand	126	875

Well 3

Surface soil	1	1	Red clay	16	16
Clay	6	7	Sand	10	26
Sandy clay	12	19	Sandy shale	51	77
Shale and layers of sand	15	34	Rock	1	78
Shale and boulders	41	75	Sandy shale	38	116
Sand rock	2	77	Shale	41	157
Sand, boulders and shale	80	157	Sandy shale	22	179
Shale and sand	66	223	Shale and streaks of sand	51	230
Sandy shale	14	237	Rock	1	231
Shale, sand, and lignite	286	523	Shale	8	239
Shale and boulders	52	575	Sandy shale	48	287
Sand	30	605	Fine-grained sand	16	303
Shale and boulders	32	637	Shale and streaks of sand	76	379
Shale, boulders, and lignite	77	714	Shale	29	408
Sticky shale	15	729	Sandy shale	199	607
Sand	9	738	Sand	20	627
Sticky shale	9	747	Sand and shale	113	740
Sand	159	906	Sand	40	780

LONGVIEW

Population in 1940: 13,758.

Source of information: W. K. Ream, water superintendent, and B. A. Crocker, city engineer, December 1943.

Ownership: Municipal.

Source of supply: Big Sandy Creek, diversion dam near town of Big Sandy in Upshur County.

Average pumpage, in gallons a day

	1941	1942	1943		1941	1942	1943
January	666,000	751,000	936,000	July	1,080,000	1,026,000	1,872,000
February	776,000	826,000	1,317,000	August	1,149,000	1,189,000	1,929,000
March	636,000	815,000	1,176,000	September	1,075,000	946,000	1,955,000
April	815,000	1,029,000	1,100,000	October	895,000	850,000	1,626,000
May	828,000	847,000	1,258,000	November	816,000	1,164,000	1,576,000
June	989,000	924,000	1,675,000	December	773,000	1,106,000	

NOTE.—Supplies town of Greggton and Harmon General Hospital.

Storage: Ground reservoir, 5,000,000 gallons; elevated tanks, 350,000 gallons.
Number of customers: 3,000.
Treatment: Coagulation, sedimentation, rapid sand filter, and chlorination.

Analysis of finished water

[Collected Dec. 13, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	31	0.645
Iron (Fe)	.6		Chloride (Cl)	14	.395
Calcium (Ca)	22	1.098	Fluoride (F)	.6	.032
Magnesium (Mg)	2.8	.230	Nitrate (NO_3)	1.2	.019
Sodium (Na)	6.2	.271	Total dissolved solids	129	
Potassium (K)	4.1	.105	Total hardness as $CaCO_3$	61	
Bicarbonate (HCO_3)	37	.613	pH	9.0	

GRIMES COUNTY

ANDERSON

Population in 1940: 500.
Source of information: Plant superintendent, Dec. 3, 1942.
Owner: Sun Utility Co.
Source of supply: Well 200 feet southeast of post office; drilled in 1911; depth, 289 feet; diameter, 8 to 4 inches; air lift; static water level, 90.24 feet below measuring point on Dec. 3, 1942; yield, 26 gallons a minute; temperature, 72° F.
Pumpage (estimated): Average, 10,000 gallons a day.
Storage: Ground reservoir, 11,000 gallons; elevated tank, 15,000 gallons.
Number of customers: 84.
Treatment: None.

Analysis, well 1

[Collected Jan. 7, 1943. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	73		Sulfate (SO_4)	25	0.52
Iron (Fe)	.00		Chloride (Cl)	135	3.81
Calcium (Ca)	63	3.14	Fluoride (F)	.1	.01
Magnesium (Mg)	5.0	.41	Nitrate (NO_3)	1.5	.02
Sodium (Na)	106	4.61	Total dissolved solids	575	
Potassium (K)	15	.38	Total hardness as $CaCO_3$	178	
Bicarbonate (HCO_3)	254	4.16	pH	7.8	

BEDIAS

Population in 1940: 500.

Source of information: Plant superintendent, Jan. 9, 1942.

Owner: Sun Utility Co.

Source of supply: Well drilled in 1939 by Layne-Texas Co.; depth, 497 feet; diameter, 6⅝ to 4½ inches; deep-well cylinder and pump jack and 5-horsepower electric motor; static water level, 60 feet below land surface on Jan. 4, 1943; yield, 28 gallons a minute;

Pumpage (estimated): Average, 12,500 gallons a day.

Storage: Elevated tank, 20,000 gallons.

Number of customers: 60.

Treatment: None.

Analysis, well 1

[Collected Jan. 9, 1943. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	32		Sulfate (SO_4)	286	5.95
Iron (Fe)	.00		Chloride (Cl)	240	6.77
Calcium (Ca)	55	2.75	Fluoride (F)	0	0
Magnesium (Mg)	11	.90	Nitrate (NO_3)	4.0	.06
Sodium (Na)	293	12.74	Total dissolved solids	1,070	
Potassium (K)	20	.51	Total hardness as $CaCO_3$	182	
Bicarbonate (HCO_3)	256	4.20	pH	7.2	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	35	35	Shale	18	321
Shale	28	63	Soft shale	14	335
Shale and sand	37	100	Hard shale	5	340
Sand	8	108	Hard sand	19	359
Sandy shale	32	140	Hard shale	45	404
Sand	12	152	Gumbo	13	417
Hard clay	10	162	Sandy shale	22	439
Hard clay and sand	10	172	Sand	17	456
Hard shale	66	238	Shale	4	460
Sandy shale	12	250	Sand	39	499
Hard shale	12	262	Shale	6	505
Hard shale and sand	41	303			

IOLA

Population in 1940: 500.

Source of information: Plant superintendent, Feb. 11, 1942.

Owner: Sun Utility Co.

Source of supply: two wells 0.15 mile north of post office.

Well 1. Drilled in 1925 by D. E. Vernon; depth, 402 feet; diameter, 5⅝ to 4 inches; screens from 300 to 320 and 390 to 402 feet; air lift; static water level, 101.79 feet below land surface on Dec. 11, 1942; yield, 20 gallons a minute.

Well 2. Drilled in 1928 by D. E. Vernon; depth, 260 feet; diameter, 6 inches; air lift; static water level, 101.31 feet below land surface on Dec. 11, 1942.

Pumpage (estimated): Average, 5,000 gallons a day.

Storage: Ground reservoir, 6,000 gallons; elevated tank, 12,000 gallons.

Number of customers: 60.

Treatment: None.

Analyses

[Collected Dec. 11, 1942. Analyzed by W. W. Hastings]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	40			
Iron (Fe)	.07			
Calcium (Ca)	48	2.40	28	1.40
Magnesium (Mg)	12	.99	5.8	.48
Sodium (Na)	226	9.83	256	11.13
Potassium (K)				
Bicarbonate (HCO_3)	229	3.75	207	3.39
Sulfate (SO_4)	113	2.35	136	2.83
Chloride (Cl)	251	7.08	240	6.77
Fluoride (F)	.1	.01	.1	.01
Nitrate (NO_3)	1.2	.02	0	0
Total dissolved solids	838		768	
Total hardness as $CaCO_3$	170		94	
pH	8.3			

NAVASOTA

Population in 1940: 6,138.

Source of information: Plant superintendent, Nov. 30, 1942.

Owner: Gulf States Utilities Co.

Source of supply: Three wells (Nos. 6, 8, and 10) at pumping station and ice plant.

Well 6. Drilled in 1918; depth, 211 feet; diameter, 8 inches; air lift; static water level, 43 feet below land surface in 1939; temperature, 73° F.

Well 8. Drilled in 1925 by McMasters & Pomeroy; depth, 304 feet; diameter, 12 to 10 inches; screens from 188 to 208, 218 to 238, and 273 to 283 feet; air lift; static water level, 45 feet below land surface on Jan. 27, 1927; yield, 320 gallons a minute; temperature, 74° F.

Well 10. Drilled in 1938 by Layne-Texas Co.; depth, 350 feet; diameter, 20 to 5⅝ inches; screens from 175 to 255 and 266 to 276 feet; air lift; static water level 67 feet below land surface on July 28, 1938; temperature, 74° F.

Average pumpage, in gallons a day

	1941	1942		1941	1942
January	141,000	120,000	July	250,000	295,000
February	136,000	105,000	August	248,000	266,000
March	138,000	165,000	September	175,000	205,000
April	141,000	170,000	October	189,000	190,000
May	158,000	170,000	November	200,000	165,000
June	215,000	290,000	December	123,000	207,000

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

Number of customers: 765.

Treatment: Stabilized with phosphate, ammoniation, and chlorination.

Analyses

[Collected Sept. 12, 1942. Analyzed by W. W. Hastings]

	Well 6		Well 8		Well 10	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	31		29		37	
Iron (Fe)	.02		.10		.40	
Calcium (Ca)	19	0.95	21	1.05	23	1.15
Magnesium (Mg)	3.5	.29	3.0	.25	3.4	.28
Sodium and potassium (Na+K)	214	9.31	220	9.57	238	10.35
Bicarbonate (HCO_3)	502	8.21	518	8.49	556	9.11
Sulfate (SO_4)	5.9	.12	2	.04	2	.04
Chloride (Cl)	77	2.17	82	2.31	93	2.62
Fluoride (F)	.4	.02	.3	.02	.3	.02
Nitrate (NO_3)	0	0	0	0	0	0
Total dissolved solids	598		615		671	
Total hardness as $CaCO_3$	62		65		72	
pH	7.9		7.8		7.8	

Driller's log, well 10

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Black soil	4	4	Hard shale, sand layers	21	270
Yellow shale	125	129	Hard shale	9	279
Hard sand	6	135	Hard shale, layers of sand	13	292
Hard sandy shale	18	153	Hard shale	20	312
Soft shale	19	172	Hard sandy shale	10	322
Hard sand	4	176	Hard shale	28	350
Sand and gravel	25	201			
Hard layers packed sand and shale	48	249			

SHIRO

Population in 1940: 500.

Source of information: Plant superintendent, Dec. 5, 1942.

Owner: Sun Utility Co.

Source of supply: Well 1 block east of post office; drilled in 1912; depth, 320 feet; diameter, 4 inches; air lift; static water level, 33.2 feet below land surface on Dec. 5, 1942.

Pumpage (estimated): Average, 3,000 gallons a day.

Storage: Concrete reservoir, 10,000 gallons; elevated tank, 25,000 gallons.

Number of customers: 38.

Treatment: None.

Analysis, well 1

[Collected Dec. 4, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	66		Sulfate (SO_4)	62	1.29
Iron (Fe)	.08		Chloride (Cl)	184	5.19
Calcium (Ca)	90	4.49	Fluoride (F)	.2	.01
Magnesium (Mg)	5.5	.45	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	135	5.87	Total dissolved solids	719	
Bicarbonate (HCO_3)	265	4.34	Total hardness as $CaCO_3$	247	
			pH	7.9	

HARDIN COUNTY

HONEY ISLAND

Population in 1940: 200.

Source of information: J. C. Whiddon, mill foreman, April 1944.

Owner: Kirby Lumber Corp.

Source of supply: Well (owner's No. 3) drilled in 1939 by Frank Balcar; depth, 293 feet; diameter, 8 to 6 inches; air lift; estimated yield, 125 gallons a minute; temperature, 71° F.

Pumpage: No data.

Storage: Steel ground reservoir, 5,000 gallons; elevated tank, 37,000 gallons.

Number of customers: 200.

Treatment: None.

Analysis, well 3

[Collected Apr. 13, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	51	2.54	Chloride (Cl)	71	2.00
Magnesium (Mg)	2.2	.18	Fluoride (F)	.3	.02
Sodium and potassium (Na+K)	31	1.36	Nitrate (NO_3)	0	0
Bicarbonate (HCO_3)	122	2.00	Total dissolved solids	219	
Sulfate (SO_4)	3	.06	Total hardness as $CaCO_3$	136	

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red clay	24	24	Shale	44	160
Sand	2	26	Sand	4	164
Clay	10	36	Clay	18	182
Shale	11	47	Shale	34	216
Brown sand	33	80	Brown sand	37	253
Clay	30	110	Clay	2	255
Sand	6	116	Gravel and sand	38	293

KOUNTZE

Population in 1940: 1,000.

Source of information: O. P. Roden, owner, April 1944.

Owner: O. P. Roden.

Source of supply: Well drilled in 1939 by Alvin Crews; depth, 138 feet; diameter, 5 inches; equipped with deep-well turbine pump; reported static water level, 30 feet below land surface on Apr. 6, 1942; temperature, 70½° F.

Pumpage: Minimum, 6,300 gallons; maximum, 11,760 gallons; average, 8,400 gallons a day.

Storage: Elevated tank, 6,000 gallons

Number of customers: 75.

Treatment: None.

Analysis, well 1

[Collected Apr. 6, 1942. Analyzed by B. Irelan]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	44		Sulfate (SO_4)	8.9	0.185
Iron (Fe)	6.8		Chloride (Cl)	32	.903
Calcium (Ca)	14	0.699	Fluoride (F)	.1	.005
Magnesium (Mg)	2.2	.181	Nitrate (NO_3)	.2	.003
Sodium and potassium (Na+K)	33	1.445	Total dissolved solids	172	
Bicarbonate (HCO_3)	75	1.229	Total hardness as $CaCO_3$	44	
			pH	6.8	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Hard clay	35	70
Clay	18	20	Sand	10	80
Clay with streaks of sand	15	35	Clay	21	101
			Sand	37	138

SILSBEE

Population in 1940: 2,525.

Source of information: L. A. Rainey, water superintendent, April 1944.

Ownership: Municipal.

Source of supply: Well drilled in 1931 by Layne-Texas Co.; diameter, 16 to 6⅝ inches; depth, 356 feet; screen from 286 to 353 feet; deep-well turbine pump and 25-horsepower electric motor; static water level, 52 feet below land surface on Jan. 1, 1938; yield, 325 gallons a minute with draw-down of 38 feet after 15 hours of pumping; temperature, 72° F.

Pumpage (estimated): Minimum, 100,000 gallons; maximum, 175,000 gallons; average, 150,000 gallons a day.

Storage: Concrete ground reservoir, 65,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 655.

Treatment: Chlorination.

Analysis, well 1

[Collected Apr. 8, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	33	1.64	Chloride (Cl)	12	0.34
Magnesium (Mg)	1.0	.08	Fluoride (F)	.1	.01
Sodium and potassium (Na+K)	9.9	.43	Nitrate (NO_3)	0	0
Bicarbonate (HCO_3)	104	1.70	Total dissolved solids	112	
Sulfate (SO_4)	5	.10	Total hardness as $CaCO_3$	86	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay	16	16	Sand	14	65
Sand	15	31	Clay	17	82
Clay	20	51	Sand	274	356

SOUR LAKE

Population in 1940: 1,504.

Source of information: V. V. Gerber, water superintendent, April 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1941 by Homer Wright; depth, 177 feet; diameter, 9 to 6 inches; screen from 153 to 176 feet; deep-well turbine pump; static water level, 6.07 feet below measuring point on Apr. 9, 1942.

Well 2. Drilled in 1941 by Homer Wright; depth, 177 feet; diameter, 9 to 6 inches; screen from 153 to 177 feet; static water level, 6.03 feet below measuring point on Apr. 9, 1942; temperature, 74½° F.

Pumpage (estimated): Minimum, 20,000 gallons; maximum, 40,000 gallons; average, 30,000 gallons a day.

Storage: Surface tank, 4,000 gallons; elevated tank, 65,000 gallons.

Number of customers: 290.

Treatment: Chlorination.

Analysis, composite sample of wells 1 and 2

[Collected Apr. 19, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	2	0.04
Iron (Fe)	.10		Chloride (Cl)	210	5.92
Calcium (Ca)	28	1.40	Fluoride (F)	.6	.03
Magnesium (Mg)	3.5	.29	Nitrate (NO_3)	.2	.00
Sodium (Na)	189	8.20	Total dissolved solids	591	
Potassium (K)	3.8	.10	Total hardness as $CaCO_3$	84	
Bicarbonate (HCO_3)	244	4.00	pH	7.7	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and clay	30	30	Sand	12	88
Sand	8	38	Blue shale	18	106
Clay and sand	16	54	Dark blue sand	16	122
Sand	8	62	Blue shale	20	142
Blue clay	14	76	Coarse-grained water sand	35	177

HARRIS COUNTY

BAYTOWN

Population in 1940: 5,000.

Source of information: T. L. Satterwhite, 1942 and 1944.

Ownership: Baytown Utilities Co.

Source of supply: Four wells (Nos. 10, 13, 20, and 21).

Well 10. Drilled in 1925 by Layne-Texas Co.; depth, 545 feet; diameter, 24 to 8 inches; screens from 338 to 378 and 443 to 543 feet; deep-well turbine pump and 100-horsepower electric motor; pump set at 128 feet; static water level, 50.3 feet below land surface in October 1931; temperature, 76° F.; stand-by well.

Well 13. Drilled in 1925 by Layne-Texas Co.; depth, 542 feet; diameter, 24 to 10 inches; screen from 406 to 509 feet; deep-well turbine pump and 125-horsepower electric motor; pump set at 206 feet; static water level, 65.1 feet below land surface in October 1931; yield, 1,263 gallons a minute with pumping level at 201 feet in 1942; temperature, 77° F.

Well 20. Drilled in 1935 by Layne-Texas Co.; depth, 516 feet; diameter, 24 to 12½ inches; screen from 364 to 506 feet; deep-well turbine pump and 200-horsepower electric motor; pump set at 235 feet; static water level reported, 114 feet below land surface in February 1935; yield, 1,400 gallons a minute and pumping level at 201 feet in 1942.

Well 21. Drilled in 1936 by Layne-Texas Co.; depth, 568 feet; diameter, 26 to 16 inches; screens from 345 to 385 and 525 to 565 feet; deep-well turbine pump and 350-horsepower electric motor; pump set at 256 feet; static water level reported, 126 feet below land surface in August 1936; yield, 2,500 gallons a minute with pumping level at 227.5 feet in 1942.

Pumpage: Minimum, 165,000 gallons; maximum, 270,000 gallons; average, 200,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 500.

Treatment: None.

Analyses

[Collected Feb. 2, 1939, and May 24, 1940. Analyzed by E. W. Lohr]

	Well 10		Well 13		Well 20	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Bicarbonate (HCO_3)	357	5.845	388	6.36	360	5.90
Sulfate (SO_4)	3	.062	4	.08	3	.06
Chloride (Cl)	48	1.354	119	3.36	76	2.14
Nitrate (NO_3)	.4	.006				
Total dissolved solids	379		519		426	
Total hardness as $CaCO_3$	33		40		34	

BELLAIRE

Population in 1943 (estimated): 1,350.

Source of information: D. Jeter, water superintendent, 1944.

Ownership: Municipal.

Source of supply: Well drilled in 1937 by Layne-Texas Co.; depth, 827 feet; diameter, 10¾ to 5 inches; screen from 651 to 708 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 54 feet in April 1943; pumping level, 88 feet; yield, 250 gallons a minute; temperature, 77° F.

Pumpage: Minimum, 65,000 gallons; maximum, 107,000 gallons; average, 90,000 gallons a day.

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

Number of customers: 517.

Treatment: None.

Analysis, well 1

[Collected Feb. 16, 1939. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Bicarbonate (HCO_3)	232	3.80	Nitrate (NO_3)	0.1	0.00
Sulfate (SO_4)	6	.12	Total dissolved solids	249	
Chloride (Cl)	29	.82	Total hardness as $CaCO_3$	129	
Fluoride (F)	.3	.02			

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Sand and shale	65	495
Clay	11	14	Clay	54	549
Sand	6	20	Tough clay	49	598
Clay	37	57	Sand	5	603
Sand	10	67	Clay	10	613
Clay	13	80	Sand	13	626
Sand	14	94	Clay	5	631
Clay	13	107	Sand	18	649
Sand	81	188	Hard clay	5	654
Clay	12	200	Sand	23	677
Shale	30	230	Clay	5	682
Clay	65	295	Sand	14	696
Shale	10	305	Clay	40	736
Clay	10	315	Sand	5	741
Sand	35	350	Clay	20	761
Shale and sand	26	376	Hard sand	45	806
Clay	23	399	Do	16	822
Sand	21	420	Clay	5	827
Hard clay	10	430			

BROOKHAVEN

Population in 1943 (estimated): 1,200.
Source of information: Mr. Straus, May 1944.
Ownership: Brookhaven Addition.
Source of supply: Two wells.

Well 1. Drilled in 1935 by McMasters & Pomeroy; depth, 592 feet; diameter, 6 inches; screen from 549 to 592 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute.

Well 2. Drilled in 1939 by McMasters & Pomeroy; depth, 602 feet; diameter, 6 to 4 inches; screen from 542 to 602 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 53 feet in 1939; yield, 150 gallons a minute.

Pumpage (estimated): Average, 120,000 gallons a day.
Storage: Ground pressure tank, 5,000 gallons; elevated tank, 20,000 gallons.
Number of customers: 300.
Treatment: None.

CHANNELVIEW

Population in 1940: 50 (in 1944, 600).
Source of information: C. S. Wood, 1944.
Owner: Harris County Fresh Water District No. 6.
Source of supply: Well drilled in 1940 by McMasters & Pomeroy; depth, 640 feet; diameter, 8 to 6 inches; screen from 600 to 640 feet; yield, 200 gallons a minute.

Pumpage: Average, 30,000 gallons a day.
Storage: Elevated tank, 50,000 gallons.
Number of customers: 128.
Treatment: Occasional chlorination.

Analysis, well 1

[Collected Oct. 4, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	16	0.80	Sulfate (SO_4)	13	0.27
Magnesium (Mg)	7.3	.60	Chloride (Cl)	31	.87
Sodium and potassium (Na+K)	91	3.96	Fluoride (F)	.4	.02
Bicarbonate (HCO_3)	256	4.20	Total hardness as $CaCO_3$	70	
			Total dissolved solids	285	

CLINTON PARK

Population in 1943 (estimated): 2,140.
Source of information: C. B. King, May 1944.
Owner: Clinton Park Water Co.
Source of supply: Well drilled in 1941 by McMasters & Pomeroy; depth, 640 feet; diameter, 6 inches; screens from 307 to 328, 406 to 426, and 599 to 618 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 86 feet Aug. 22, 1941; yield, 125 gallons a minute.
Pumpage (estimated): Average, 214,000 gallons a day.
Storage: Pressure tank, 25,000 gallons.
Number of customers: 533.
Treatment: None.

COADY-OAKLAND ESTATES

Population in 1944 (estimated): 1,000.
Source of information: Mrs. L. W. McLean, May 1944.
Owner: L. W. McLean Waterworks.
Source of supply: two wells.

Well 1. Depth, 485 feet; diameter, 4 inches; screen from 465 to 485 feet; yield, 40 gallons a minute; temperature, 73° F.

Well 2. Depth, 501 feet; diameter, 6 inches; screen from 481 to 501 feet; yield, 40 gallons a minute.

Pumpage (estimated): Minimum, 50,000 gallons; maximum, 75,000 gallons; average, 65,000 gallons a day.
Storage: Two pressure tanks, 6,500 gallons each.
Treatment: None.

CROSBY

Population in 1940: 750.
Source of information: T. E. Reidland, May 1944.
Owner: T. E. Reidland.
Source of supply: Two wells.

Well 1. Drilled in 1937 by T. E. Reidland; depth, 226 feet; diameter, 6 to 3 inches; screen from 206 to 226 feet; deep-well cylinder pump and 10-horsepower electric motor; static water level, 53 feet below land surface in 1941.

Well 2. Drilled in 1937 by T. E. Reidland; depth, 226 feet; diameter, 6 to 3 inches; screen from 206 to 226 feet; deep-well cylinder pump and 10-horsepower electric motor; static water level, 53 feet below land surface in 1941.

Pumpage: Minimum, 40,000 gallons; maximum, 75,000 gallons; average 60,000 gallons a day.

Storage: Elevated tank, 59,000 gallons.

Number of customers: 135.

Treatment: None.

Analysis, well 1

[Collected Oct. 13, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	6.8	0.34	Sulfate (SO_4)	2	0.04
Magnesium (Mg)	3.6	.30	Chloride (Cl)	28	.79
Sodium and potassium (Na+K)	96	4.18	Fluoride (F)	.2	.01
Bicarbonate (HCO_3)	244	4.00	Total dissolved solids	256	
			Total hardness as $CaCO_3$	32	

FOSTER PLACE

Population in 1943: 860.

Source of information: Mrs. Lillian Gilbert, Manager, May 1944.

Owner: Foster Estate.

Source of supply: Two wells.

Well 3. Drilled in 1937 by Texas Water Supply Corp.; depth, 475 feet; diameter, 6 inches; screen from 427 to 455 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 45 feet below land surface Aug. 1, 1937; yield, 100 gallons a minute.

Well 4. Drilled in 1941 by Texas Water Supply Corp.; depth, 531 feet; diameter, 6 inches; screen from 500 to 530 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 76 feet below land surface May 1941; yield, 200 gallons a minute with a draw-down of 38 feet in 1941.

Pumpage (estimated): 65,000 gallons a day.

Storage: Pressure tank, 5,000 gallons; elevated tank, 15,000 gallons.

Treatment: None.

Drillers' log, well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	26	26	Sand	14	314
Shale	168	194	Gumbo	76	390
Hard sand	43	241	Sand	37	427
Shale	7	248	Gumbo	59	486
Sand	35	283	Sand	45	531
Gumbo	17	300			

GALENA PARK

Population in 1943 (estimated): 1,875.

Source of information: Mr. Foreman, water superintendent, May 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1936; depth, 680 feet; diameter, 13⅜ to 6 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 155 feet below land surface March 1944; yield, 475 gallons a minute.

Well 2. Drilled in 1942 by Layne-Texas Co.; depth, 740 feet; deep-well turbine pump and 40-horsepower electric motor; static water level, 127 feet below pump base; pumping level, 163 feet below pump base; yield, 475 gallons in 1942.

Pumpage (estimated): Minimum, 100,000 gallons; maximum, 250,000 gallons; average, 150,000 gallons a day.

Storage: Ground reservoir, 50,000 gallons; ground reservoir, 200,000 gallons; elevated tank, 100,000 gallons.

Treatment: Chlorination.

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Shale	22	495
Clay	12	15	Tough clay	39	534
Fine sand and clay	9	24	Hard sand	5	539
Clay	10	34	Shale	40	579
Fine sand, streaks of clay	43	77	Sand	18	597
Clay with sandy layers	85	162	Shale	13	610
Fine sand, streaks, and sandy clay	50	212	Sand	41	651
Clay	60	272	Shale	5	656
Clay, sandy layers	30	302	Fine sand	24	680
Sand	15	317	Sandy shale	5	685
Clay with layers of sand	84	401	Sand	51	736
Clay	67	468	Sandy shale	4	740
Sand	5	473			

GARDEN OAKS

Population in 1943 (estimated): 3,940.

Source of information: Mr. J. W. Mount, water superintendent, May 1944.

Owner: Harris County Water Control and ImprovementDistrict 3.

Source of supply: two wells.

Well 1. Drilled in 1937 by McMasters & Pomeroy; depth, 300 feet; diameter, 6 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 125 gallons a minute.

Well 2. Drilled in 1940 by Layne-Texas Co.; depth, 834 feet; diameter, 13⅜ to 7 inches; screens from 362 to 426, 540 to 584, 682 to 766, and 794 to 814 feet; static water level, 93 feet below pump base Oct. 3, 1940; yield, 1,120 gallons a minute with draw-down of 73 feet.

Pumpage: Average, 620,000 gallons a day.

Storage: Ground reservoir, 130,000 gallons; elevated tank, 100,000 gallons.

Treatment: None.

Analysis, well 2

[Collected Aug. 24, 1940. Analyzed by Texas State Department of Health]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	18		Sulfate (SO_4)	52	1.08
Iron (Fe)	.14		Chloride (Cl)	36	1.02
Calcium (Ca)	39	1.95	Fluoride (F)	.4	.02
Magnesium (Mg)	12	.99	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	66	2.87	Total dissolved solids	312	
Bicarbonate (HCO_3)	226	3.70	Total hardness as $CaCO_3$	147	
			pH	7.7	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy soil	3	3	Hard white clay	53	536
Clay	8	11	Sand	47	583
White sand	15	26	Clay	19	602
Red sand	27	53	Sand, layers of rock	29	631
Red clay	51	104	Clay	18	649
Hard blue and white clay	32	136	Sand	16	665
Blue, white, and brown clay	99	235	Sandy clay	11	676
Sand	48	283	Sand	88	764
Clay	13	296	Clay	25	789
Sand and clay	21	317	Sand	21	810
Clay and sand breaks	34	351	Clay	81	891
Sand	72	423	Sand	34	925
Hard sandy clay	60	483			

GARDEN VILLAS

Population in 1943 (estimated): 2,500.

Source of information: Mr. Randolph, May 1944.

Owner: W. T. Carter Lumber Co.

Source of supply: two wells.

Well 1. Drilled in 1923; depth, 897 feet; diameter, 8 to 6 inches; screen from 797 to 897 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 250 gallons a minute.

Well 2. Drilled in 1929 by Layne-Texas Co.; depth, 908 feet; diameter, 8 to 5 inches; screens from 643 to 662, 838 to 858, and 859 to 905 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 31 feet June 1929 and 62 feet below pump base May 20, 1939; yield, 275 gallons a minute.

Pumpage (estimated): Average, 160,000 gallons a day.

Storage: Concrete ground reservoir, 75,000 gallons; elevated tank, 125,000 gallons.

Number of customers: 635.

Treatment: Chlorination.

Analysis, well 1

[Collected Feb. 18, 1941. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Bicarbonate (HCO_3)	254	4.16	Total dissolved solids	297	
Sulfate (SO_4)	20	.42	Total hardness as $CaCO_3$	58	
Chloride (Cl)	36	1.02			

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Sand	8	512
Clay	39	42	Gumbo	59	571
Sandy clay	5	47	Sand	8	579
Clay	3	50	Gumbo	33	612
Sand	18	68	Hard shale	28	640
Clay	17	85	Sand	10	650
Hard clay	45	130	Clay	5	655
Clay	59	189	Sand	20	675
Clay, streaks of sand	10	199	Hard shale	51	726
Clay	56	255	Gumbo	20	746
Hard sand, clay layers	15	270	Hard shale	5	751
Gumbo	64	334	Soft shale	12	763
Fine sand	5	339	Hard shale	5	768
Sandy gumbo	44	383	Sand	28	796
Sand	10	393	Clay	29	825
Gumbo, layers of sand	32	425	Sand and gravel	45	870
Gumbo	79	504	Clay	5	875

GENOA

Population in 1940: 400.

Source of information: C. E. Cade, 1944.

Ownership: Municipal.

Source of supply: Well drilled in 1928 by Layne-Texas Co.; depth, 832 feet; diameter, 6 to 4 inches; screens from 655 to 667, 711 to 721, and 809 to 832 feet; deep-well cylinder pump and electric motor; static water level, 48.1 feet below land surface Apr. 3, 1931, 55.6 feet Aug. 12, 1936, and 90.6 feet Aug. 15, 1941.

Pumpage (estimated): Average, 2,000 gallons a day.

Storage: Pressure tank, 1,400 gallons.

Number of customers: 14.

Treatment: None.

Analysis, well 1

[Collected Mar. 3, 1939. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Bicarbonate (HCO_3)	388	6.36	Nitrate (NO_3)	0	0
Sulfate (SO_4)	1	.02	Total dissolved solids	449	
Chloride (Cl)	76	2.14	Total hardness as $CaCO_3$	30	
Fluoride (F)	1.5	.08			

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Fine muddy sand	42	403
Clay	73	75	Gumbo	85	488
Sand	16	91	Sand	21	509
Clay	60	151	Gumbo	148	657
Gumbo	122	273	Sand	18	675
Sand	5	278	Gumbo	25	701
Soft shale	21	299	Sand	16	717
Sand	15	314	Gumbo	89	806
Gumbo	47	361	Sand	26	832

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GOOSE CREEK

Population in 1940: 6,929.

Source of information: J. W. Harkins, city manager, May 1944.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1927 by Layne-Texas Co.; depth, 838 feet; diameter 10 to 6 inches; screen from 735 to 834 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 250 gallons a minute.

Well 2. Drilled about 1927 by Humble Oil & Refining Co.; depth, 970 feet; diameter, 8 to 6 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 225 gallons a minute.

Well 3. Drilled in 1939 by Layne-Texas Co.; depth, 485 feet; diameter, 13⅜ to 6 inches; screen from 385 to 485 feet; yield, 500 gallons a minute.

Pumpage: Minimum, 360,000 gallons; maximum, 468,000 gallons; average 400,000 gallons a day.

Storage: Concrete ground reservoir, 55,000 gallons; concrete ground reservoir, 110,000 gallons; elevated tank, 65,000 gallons.

Number of customers: 2,250.

Treatment: None.

Analyses

[Collected Nov. 10, 1941. Analyzed by J. W. Yett, Jr.]

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	12	0.60	12	0.60
Magnesium (Mg)	5.6	.46	6.1	.50
Sodium and potassium (Na+K)	234	10.14	218	9.48
Bicarbonate (HCO_3)	488	8.00	476	7.81
Sulfate (SO_4)	2	.04	2	.04
Chloride (Cl)	94	2.65	94	2.65
Fluoride (F)			1.6	.08
Total dissolved solids	577		568	
Total hardness as $CaCO_3$	26		54	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Coarse water sand	202	202	Shell and shale	52	655
Shale	148	350	Sand	48	703
Water sand	112	462	Gumbo	20	723
Gumbo	62	524	Gumbo and shale	18	741
Water sand	64	588	Sand and gravel	42	783
Sand and shale	12	600	Sand	54	837
Gumbo	3	603	Gumbo	1	838

GREENS BAYOU

Population in 1940: 1,500.

Source of information: John C. Calhoun, Jr., May 1944.

Owner: Harris County Fresh Water District 5.

Source of supply: Well drilled in 1940 by Layne-Texas Co.; depth, 750 feet; diameter, 13⅜ to 6⅝ inches; screens from 595 to 630, 640 to 662, 677 to 701, and 715 to 740 feet; deep-well turbine pump and 40-horsepower electric motor;

static water level, 97 feet below pump base June 10, 1940; yield, 520 gallons a minute with draw-down of 75 feet in 1940.

Pumpage: Minimum, 33,000 gallons; maximum, 92,000 gallons; average, 80,000 gallons a day.

Storage: Elevated tank, 100,000 gallons.

Number of customers: 400.

Treatment: None.

HIGHLAND FARMS AND WILLOW GROVE ADDITION

Population in 1944 (estimated): 2,000.

Source of information: Mable Leach, office manager, 1944.

Owner: Harris County Fresh Water District 1.

Source of supply: Two wells.

Well 1. Drilled in 1935 by J. H. Morton; depth, 500 feet; diameter, 4 inches; screen from 460 to 500 feet; deep-well turbine pump and 10-horsepower electric motor.

Well 2. Drilled in 1939 by C. A. Williams; depth, 480 feet; diameter, 6 inches; screen from 440 to 480 feet; deep-well turbine pump and electric motor.

Pumpage (estimated): Minimum, 125,000 gallons; maximum, 185,000 gallons; average, 160,000 gallons a day.

Storage: Two pressure tanks.

Number of customers: 500 (estimated).

Treatment: None.

HIGHLANDS

Population in 1940: 2,500.

Source of information: H. T. Delano, water superintendent, May 1944.

Owner: Harris County Water Control and Improvement District 1.

Source of supply: Two wells.

Well 1. Drilled in 1931 by Layne-Texas Co.; depth, 537 feet; diameter, 8 to 4 inches; screen from 502 to 537 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 100 gallons a minute in 1931.

Well 2. Drilled in 1940 by McMasters & Pomeroy; depth, 606 feet; diameter, 8 to 6 inches; screens from 417 to 479, 508 to 524, and 569 to 589 feet; deep-well turbine pump and 25-horsepower electric motor; static water level, 80 feet below pump base April 1940; yield, 500 gallons a minute with draw-down of 92 feet in 1940.

Pumpage: Minimum, 63,000 gallons; maximum, 145,000 gallons; average, 90,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 550.

Treatment: Chlorination.

Analysis, well 2

[Collected Oct. 13, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	9.6	0.48	Sulfate (SO_4)	7	0.15
Magnesium (Mg)	6.1	.50	Chloride (Cl)	35	.99
Sodium and potassium (Na+K)	104	4.52	Fluoride (F)	1.0	.05
Bicarbonate (HCO_3)	262	4.29	Total dissolved solids	292	
			Total hardness as $CaCO_3$	49	

HOUSTON

Population in 1940: 384,514 (estimated in 1943, 460,493).
Source of information: Files of city of Houston, water department, May 1944.
Ownership: Municipal.
Source of supply: 23 wells located at six well fields.

Well field	Well No.	Date drilled	Depth (feet)	Diameter (inches)	Horsepower motor	Static level (February, 1944)	Pumping level (February, 1944)	Yield (gallons per minute)	Temperature (°F.)
Central	C-16	1925	1,535	24 to 10	75	142	167	850	82.0
	D-17	1925	980	24 to 10 7/16	50	133	280	450	79.5
	F-1	1927	1,540	24 to 12	125	145	210	1,200	83.5
	F-5	1927	1,456	24 to 12	125	148	220	1,675	83.0
	F-10	1927	1,320	24 to 12	125	-------	-------	350	-------
	F-11	1935	953	24 to 13	200	-------	253	1,250	77.0
	F-12	1935	2,041	24 to 13	200	-------	194	1,100	89.0
East End	1	1930	1,637	24 to 12½	150	147	195+	1,400	85.0
	2	1943	2,063	24 to 12½	150	141	220	2,000	90.5
Heights	5	1931	1,858	24 to 13 7/16	75	82	165	2,000	82.0
	6	1936	1,232	25 to 13	150	125	186	2,350	81.0
	7	1937	1,458	25 to 13	150	-------	-------	2,000	81.0
	8	1938	1,252	21½ to 12¾	150	134	207	1,725	80.5
Northeast	1	1931	1,876	24 to 12½	200	117	188	2,000	88.0
	2	1938	1,291	21½ to 12¾	150	148	184	1,800	79.0
Scott St.	2	1926	1,521	24 to 16½	100	147	-------	1,020	85.5
	3	1928	1,350	24 to 16¾	150	150	238	1,280	78.5
	4	1930	1,756	24 to 12½	150	141	180	1,825	84.0
	5	1938	957	21½ to 12¾	150	150	239	1,600	77.5
South End	2	1917	830	24 to 12	75	125	251	700	78.5
	4	1919	777	24 to 10	75	93	144	1,070	75.0
	5	1931	1,618	24 to 12½	200	-------	203	1,785	85.0
	6	1935	1,796	24 to 13 7/16	200	-------	183	1,200	84.0

All wells equipped with deep-well turbine pumps.

Pumpage: Maximum, 51,607,000 gallons; minimum, 28,229,000 gallons; average, 35,148,000 gallons a day.

Total monthly and yearly pumpage

	1941	1942	1943
January	730,338,000	824,032,000	1,026,436,000
February	653,402,000	722,227,000	884,237,000
March	737,168,000	862,050,000	1,001,400,000
April	788,379,000	872,078,000	1,067,371,000
May	856,713,000	1,011,236,000	1,143,511,000
June	839,553,000	975,297,000	1,151,627,000
July	975,054,000	972,415,000	1,193,882,000
August	997,265,000	1,004,793,000	1,168,717,000
September	886,301,000	955,777,000	1,059,413,000
October	869,146,000	1,040,640,000	1,092,042,000
November	794,095,000	941,871,000	997,991,000
December	817,079,000	950,732,000	1,043,325,000
Year	9,944,493,000	11,133,148,000	12,829,052,000

Storage: Ground reservoirs—Central plant, 19,000,000 gallons; East End plant, 3,200,000 gallons; Heights plant, 750,000 gallons; North East plant, 3,200,000 gallons; Scott Street, 2,000,000 gallons; South End plant, 2,000,000 gallons. Elevated tanks—Central plant (standpipe), 800,000 gallons; West Dallas near Shepherd Drive, 500,000 gallons; Brownwood and Lathrop Streets, 200,000 gallons; Magnolia Park, 100,000 gallons.

Number of customers: 74,217 (December 1943).

Treatment: Chlorination and ammoniation.

Analyses

[Collected April 1944. Analyzed by W. W. Hastings and J. H. Rowley]

	Central well F-12		East End well 2		Heights well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		18		18	
Iron (Fe)	.02		.04		.04	
Calcium (Ca)	9.2	0.46	5.3	0.26	15	0.75
Magnesium (Mg)	2.6	.21	1.0	.08	2.9	.24
Sodium (Na)	202	8.79	225	9.77	203	8.83
Potassium (K)	5.0	.13	5.2	.13	4.0	.10
Bicarbonate (HCO_3)	410	6.72	470	7.72	408	6.69
Sulfate (SO_4)	2	.04	3	.06	2	.04
Chloride (Cl)	98	2.76	83	2.34	111	3.13
Fluoride (F)	1.4	.07	2.2	.12	1.2	.06
Nitrate (NO_3)	0	0	0	0	0	0
Total dissolved solids	538		574		558	
Total hardness as $CaCO_3$	34		17		50	
pH	7.6		7.7		7.6	

	Northeast well 1		Scott St. well 4		South End well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	18		16		19	
Iron (Fe)	.05		.04		.03	
Calcium (Ca)	9.9	0.49	11	0.55	16	0.80
Magnesium (Mg)	3.0	.25	3.6	.30	4.5	.37
Sodium (Na)	165	7.18	143	6.22	96	4.17
Potassium (K)	5.9	.15	6.6	.17		
Bicarbonate (HCO_3)	354	5.81	329	5.39	257	4.21
Sulfate (SO_4)	2	.04	3	.06	4	.08
Chloride (Cl)	77	2.17	62	1.75	37	1.04
Fluoride (F)	1.0	.05	.8	.04	.2	.01
Nitrate (NO_3)	0	0	0	0	0	0
Total dissolved solids	456		421		303	
Total hardness as $CaCO_3$	47		42		58	
pH	7.6		7.7		7.9	

Drillers' logs

Central well F-12

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Fill and sand	25	25	Sand, good	3	719
Sand	60	85	Hard layers and sand	41	760
Sand with clay streaks	199	284	Clay, hard	22	782
Clay	16	300	Fine sand	17	799
Sand, good	62	362	Clay	22	821
Clay	17	379	Rock	1	822
Sand, good	20	399	Sand, good	42	864
Clay	10	409	Sand, packed	8	872
Sand and clay layers	24	433	Sand, good	27	899
Clay	44	477	Clay, loose	15	914
Sand, good	62	539	Sand, good	27	941
Clay	37	576	Clay, loose	19	960
Sand, good	14	590	Clay, hard	16	976
Clay and sand layers	14	604	Clay, loose	27	1,003
Sand, good	18	622	Clay, hard	43	1,046
Lime and sand	7	629	Gravel and lime	23	1,069
Sand, good	26	655	Gumbo	20	1,089
Clay	3	658	Shale	10	1,099
Sand, good	17	675	Shale, sticky	14	1,113
Clay	8	683	Gumbo and shale	30	1,143
Sand, good	6	689	Shale	37	1,180
Clay	27	716	Shale and sand	25	1,205

Drillers' logs—Continued

Central well F-12—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Gumbo	20	1,225	Shale and boulders	11	1,778
Shale, sandy	12	1,237	Gumbo	11	1,789
Shale, sticky	13	1,250	Sand, shale, and boulders	10	1,799
Shale, sandy	19	1,269	Gumbo	8	1,807
Sand	26	1,295	Boulders and shale	2	1,809
Gumbo	4	1,299	Hard shale and lime	21	1,830
Shale, sticky	9	1,308	Gumbo, hard shale	27	1,857
Sand and shale	29	1,337	Gumbo	8	1,865
Shale, sticky	10	1,347	Shale	12	1,877
Sand and shale	17	1,364	Shale and sand	45	1,922
Sand	9	1,373	Gumbo	6	1,928
Gumbo	16	1,389	Sand	3	1,931
Shale, sandy	15	1,404	Gumbo	21	1,952
Sand	9	1,413	Gumbo, shale, and lime	22	1,974
Gumbo and shale	21	1,434	Sand	46	2,020
Sand	21	1,456	Gumbo	40	2,060
Gumbo	9	1,463	Hard sand	14	2,074
Sand	33	1,496	Gumbo	21	2,095
Gumbo	85	1,581	Sand	20	2,115
Sand	8	1,589	Gumbo	6	2,121
Gumbo and hard shale	35	1,624	Sandy shale	81	2,202
Gumbo	87	1,711	Gumbo	6	2,207
Shale, hard	15	1,726	Sandy shale	19	2,226
Gumbo	29	1,755	Gumbo, few boulders	33	2,259
Sand and boulders	12	1,767			

East End well 1

Clay	159	159	Gumbo	22	1,120
Shale	63	222	Sand	44	1,164
Sand	43	265	Gumbo	13	1,177
Gumbo	89	354	Sand	25	1,202
Sand	37	391	Gumbo	23	1,225
Gumbo	72	463	Sand	5	1,230
Sand	44	507	Gumbo	5	1,235
Gumbo	10	517	Sand	33	1,268
Sand	26	543	Gumbo	95	1,363
Gumbo	74	617	Hard shale	63	1,426
Sand	51	668	Gumbo	42	1,468
Gumbo	134	802	Shale	33	1,501
Coarse-grained sand	55	857	Gumbo	23	1,524
Gumbo	79	936	Sand	54	1,578
Sand	71	1,007	Gumbo	5	1,583
Gumbo	18	1,025	Sand	81	1,664
Sand	73	1,098			

Heights well 5

Soil	8	8	Gumbo	33	676
Clay	18	26	Sand	38	714
Sand	22	48	Sand and shale	29	743
Clay	69	117	Hard sand	12	755
Sandy clay	30	147	Gumbo	10	765
Clay	29	176	Sand	40	805
Sandy clay	20	196	Layers of sand and shale	21	826
Clay	41	237	Gumbo	35	861
Sand	15	252	Sand	36	897
Clay	10	262	Tough gumbo	76	973
Sand and shale	23	285	Sand and shale	14	987
Clay and gravel	18	303	Gumbo with layers of sand and shale	4	991
Clay	31	334	Sandy shale	35	1,026
Sandy clay	22	356	Tough gumbo	27	1,053
Hard clay and boulders	30	386	Fine-grained sand	57	1,110
Hard sand	5	391	Sand and layers of gumbo	15	1,125
Sand, water	20	411	Gumbo	51	1,176
Clay	22	433	Sandy clay	5	1,181
Sand	20	453	Sand	38	1,219
Sandy clay	18	471	Fine-grained sand and shale	22	1,241
Gumbo	25	496	Gumbo	76	1,317
Clay and gravel	65	561	Sand	8	1,325
Sand	14	575	Gumbo	5	1,330
Gumbo and boulders	47	622	Fine-grained hard sand	15	1,345
Sand	21	643			

Drillers' logs—Continued

Heights well 5—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Gumbo	70	1,415	Shale	12	1,673
Hard sandy shale and boulders	22	1,437	Gumbo	18	1,691
Gumbo	11	1,448	Shale, sand, and water	36	1,727
Gumbo and boulders	5	1,453	Gumbo	53	1,780
Gumbo	40	1,493	Shale, sand, and water	33	1,813
Sand and gumbo	14	1,507	Gumbo	8	1,821
Gumbo	55	1,562	Hard shale and sand	22	1,843
Hard sandy shale	16	1,578	Rock	2	1,845
Gumbo	18	1,596	Hard shale and sand	2	1,847
Sand and shale	17	1,613	Sand	4	1,851
Sand	22	1,635	Rock	1	1,852
Hard sand with layers of shale	26	1,661	Sand and shale	13	1,865
			Gumbo and shale	225	2,090

Northeast well 1

Rotary to surface	5	5	Sand, water	8	1,276
Shale	107	112	Blue shale	36	1,312
Shale and fine-grained sand	18	130	Sand, water	8	1,320
Shale	15	145	Hard gummy sand	11	1,331
Sand	42	187	Gumbo and boulders	39	1,370
Gumbo and shale	105	292	Sand rock	2	1,372
Sand	3	295	Boulders	20	1,392
Gumbo and shale	17	312	Blue shale	7	1,399
Gumbo and boulders	90	402	Sand and shale	49	1,448
Rock	14	416	Gumbo, boulders, and hard sand	39	1,487
Gumbo, shale, and lime	36	452	Ledges of rock	62	1,549
Sandy shale	10	462	Sand, shale, and boulders	15	1,564
Shale and gumbo	3	465	Sand	10	1,574
Sand and shale	3	468	Boulders and rock	57	1,631
Sand and boulders	3	471	Gumbo	53	1,684
Gumbo and boulders	70	541	Rock	2	1,686
Sand	96	637	Sand	2	1,688
Shale and boulders	2	639	Gumbo and shale	102	1,790
Shale and sand	29	668	Rock	2	1,792
Shale and gumbo	22	690	Sandy shale	9	1,801
Sand and gravel	34	724	Fine-grained sand	31	1,832
Shale and gumbo	48	772	Sand	12	1,844
Rock, shale, and lime	32	804	Shale	6	1,850
Gumbo	12	816	Sand	26	1,876
Gumbo, lime, and boulders	40	856	Gumbo	23	1,899
Tough gumbo	43	899	Hard shale	11	1,910
Sand	10	909	Gray sandy shale	3	1,913
Gumbo	12	921	Blue sand and pink shale	10	1,923
Sand and boulders	104	1,025	Pink shale	8	1,931
Sand	15	1,040	Shale	5	1,936
Shale and gumbo	60	1,100	Gumbo	40	1,976
Boulders	12	1,112	Broken lime	8	1,984
Sand	8	1,120	Blue shale	29	2,013
Sand rock	8	1,128	Gumbo	52	2,065
Boulders	34	1,162	Sand	40	2,105
Hard gummy sand	10	1,172	Sand and boulders	26	2,131
Gumbo	40	1,212	Gumbo	3	2,134
Hard sand	8	1,220	Sand	12	2,146
Sand and gravel	33	1,253	Gumbo	4	2,150
Gummy sand	15	1,268			

Scott St. well 4

Surface soil	6	6	Sand	10	518
Clay	25	31	Gumbo	25	543
Sand	20	51	Sand	42	585
Clay	68	119	Sand rock	1	586
Sand	22	141	Sand	7	593
Clay	75	216	Gumbo	6	599
Sand	12	228	Clay and white gravel	33	632
Sandy clay	18	246	Sand	34	666
Clay	88	334	Gumbo	15	681
Sand	12	346	Clay	18	699
Clay	79	425	Sand	26	725
Sand	59	484	Clay	11	736
Clay	24	508	Sand	27	763

Drillers' logs—Continued

Scott St. well 4—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay and gravel	52	815	Sand and layers of shale	17	1,430
Sand and gravel	26	841	Tough gumbo	29	1,459
Clay	8	849	Sand and layers of shale	54	1,513
Sand	14	863	Gumbo	5	1,518
Clay	5	868	Sand	3	1,521
Sand (core)	47	915	Hard shale	15	1,536
Clay	13	928	Sand (good)	15	1,551
Hard shale	15	943	Sand and shale	10	1,561
Clay	15	958	Shale (sticky)	16	1,577
Hard sand (core)	37	999	Sand and layers of shale	33	1,610
Gumbo	12	1,007	Gumbo	75	1,685
Hard shale	17	1,024	Sand and layers of shale	73	1,758
Gumbo	13	1,037	Gumbo	31	1,789
Sand	15	1,052	Hard shale	22	1,811
Clay	11	1,063	Tough gumbo	23	1,834
Sand	21	1,084	Shale	14	1,848
Tough gumbo	31	1,115	Shale and sand	20	1,868
Sand	39	1,154	Gumbo	66	1,934
Gumbo	94	1,248	Hard shale and packed sand	22	1,956
Shale	74	1,322	Gumbo	28	1,984
Gumbo	24	1,346	Shale and packed sand	45	2,029
Sand (core)	11	1,357	Gumbo and shale (hard)	67	2,096
Sandy shale (core)	51	1,408	Sand and thin layers of shale	39	2,135
Gumbo	5	1,413	Tough gumbo	10	2,145

South End well 5

Surface	6	6	Sand with streaks of shale	29	1,041
Fine-grained sand	6	12	Sand	17	1,058
Clay	20	32	Hard shale	4	1,062
Sand	22	54	Sandy shale	30	1,092
Rock	1	55	Gumbo	10	1,102
Sand	11	66	Sand, with hard layers	26	1,128
Clay	267	333	Gumbo	38	1,166
Sand	70	403	Shale	21	1,187
Sandy clay	38	441	Gumbo	79	1,266
Sand	21	462	Sand, with hard layers	13	1,279
Clay	41	503	Rock	1	1,280
Sand	11	514	Layers of sandy shale	12	1,292
Clay, some sand, and gravel	39	553	Gumbo	36	1,328
Sandy shale	12	565	Sand, with hard layers	69	1,397
Gumbo	2	567	Sandy shale	3	1,400
Sand	4	571	Rock	1	1,401
Gumbo and shale	11	582	Layers of sand and shale	23	1,424
Sand	16	598	Gumbo	19	1,443
Sandy shale	73	671	Sand with streaks of shale	58	1,501
Sand	26	697	Sand	35	1,536
Sandy shale	14	711	Gumbo	7	1,543
Sand	52	763	Layers of sand and shale	15	1,558
Sandy shale	10	773	Sand	38	1,596
Sand	23	796	Gumbo and shale	94	1,690
Gumbo	4	800	Sand	14	1,704
Sand, with hard streaks	46	846	Shale and boulders	6	1,710
Gummy shale	12	858	Rock and shale	18	1,728
Sand with streaks of shale	30	888	Gumbo	6	1,734
Gumbo	35	923	Sand	2	1,736
Sand and shale	29	952	Rock and gumbo	278	2,014
Shale	11	963	Sandy shale	4	2,018
Sand with streaks of shale	14	977	Gumbo	45	2,063
Shale	11	988	Sandy shale	13	2,076
Hard sand with streaks of shale	19	1,007	Gumbo	32	2,108
Shale	5	1,012	Sand	13	2,121

HUMBLE

Population in 1940: 1,371.
Source of information: A. M. Thompson, mayor, April 1944.
Ownership: Municipal.
Source of supply: Three wells.

Well 1. Drilled in 1935; depth, 1,140 feet; screen from 1,085 to 1,140 feet; deep-well turbine pump and 15-horsepower electric motor; flow, 20 gallons a minute in 1941; yield when pumped, 140 gallons a minute.

Well 2. Drilled in 1934; depth, 740 feet; diameter, 8⅝ to 6⅝ inches; screens from 630 to 650 and 710 to 740 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 31 feet below pump base May 21, 1938; yield, 240 gallons a minute.

Well 3. Drilled in 1941 by Texas Water Supply Co.; depth, 377 feet; diameter, 10 to 6 iinches; screen from 317 to 377 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 48 feet below pump base September 1941; yield, 400 gallons a minute.

Pumpage (estimated): 50,000 gallons a day.
Storage: Ground reservoir, 50,000 gallons; elevated tank, 100,000 gallons.
Number of customers: 550.
Treatment: None.

Analyses

[Collected Oct. 13, 1941. Analyzed by J. W. Yett, Jr.]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	3.2	0.16	34	1.70	46	2.30
Magnesium (Mg)	4.9	.40	9.7	.80	9.7	.80
Sodium (Na)	165	7.17	70	3.04	39	1.70
Bicarbonate (HCO_3)	323	5.29	238	3.90	207	3.39
Sulfate (SO_4)	2	.04	7	.15	8	.17
Chloride (Cl)	83	2.34	53	1.49	44	1.24
Fluoride (F)	1.2	.06	.4	.02	.2	.01
Nitrate (NO_3)	[1]		[1]		[1]	
Total dissolved solids	418		291		249	
Total hardness as $CaCO_3$	28		126		156	

[1] Less than 20 parts per million.

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	20	20	Sand and boulders	22	714
Sand with streaks of clay	60	80	Gumbo	4	718
Clay	127	207	Sand and boulders	16	734
Sand	173	380	Gumbo	66	800
Sticky shale	134	414	Sand rock	16	816
Gumbo	111	525	Gumbo	214	1,030
Shale and streaks of rock	70	595	Sand	40	1,070
Gumbo	10	605	Gumbo	40	1,110
Shale and boulders	85	690	Sand	30	1,140
Rock	2	692			

KASHMERE GARDENS

Population in 1943: 2,010.

Source of information: Albert Bock, manager, May 1944.

Owner: Texas Water Co.

Source of supply: Well drilled in 1940 by McMasters & Pomeroy; depth, 544 feet; diameter, 6 inches; screen from 494 to 544 feet; deep-well turbine pump and 7½-horsepower electric motor; yield, 125 gallons a minute; temperature, 75½° F.

Pumpage: Minimum, 60,000 gallons; maximum, 85,000 gallons; average, 69,000 gallons a day.

Storage: Two ground reservoirs, 4,500 gallons each; elevated tank, 75,000 gallons.

Number of customers: 500.

Treatment: Chlorination.

LA PORTE

Population in 1942: 3,072.

Source of information: C. Geffken, acting water superintendent, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1925 by J. G. Taylor; depth, 570 feet; diameter, 10 inches; screen from 500 to 570 feet; pumped with air; static water level, 95 feet, Dec. 30, 1941.

Well 2. Drilled in 1933 by J. W. Jackson; depth, 585 feet; diameter, 10 to 8 inches; screens from 425 to 510 and 545 to 585 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 83.3 feet; yield, 300 gallons a minute; temperature, 76½° F.

Pumpage: Minimum, 100,000 gallons; maximum, 133,000 gallons; average, 115,000 gallons a day.

Storage: Ground reservoir, 81,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 700.

Treatment: Chlorination.

Analyses

[Collected Aug. 5, 1939, and Jan. 18, 1939. Analyzed by E. W. Lohr]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Bicarbonate (HCO_3)	372	6.10	406	6.66
Sulfate (SO_4)	1	.02	1	.02
Chloride (Cl)	63	1.78	76	2.14
Nitrate (NO_3)			.2	.00
Total dissolved solids	413		462	
Total hardness as $CaCO_3$	30		24	

LINDALE PARK

Population in 1943 (estimated): 5,600.

Source of information: E. R. Anderson, water superintendent, 1944.

Ownership: Harris County Water Control District 2.

Source of supply: Two wells.

Well 1. Drilled in 1925 by McMasters & Pomeroy; depth, 856 feet; diameter, 8 to 5½ inches; screens from 624 to 659, 730 to 772, 793 to 814, and 835

to 845 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 70 feet below pump base Feb. 11, 1938; yield, 400 gallons a minute; temperature, 77½° F.

Well 2. Drilled in 1940 by McMasters & Pomeroy; depth, 853 feet; diameter, 12 to 8 inches; screens from 626 to 648, 708 to 752, 764 to 774, 799 to 821, and 831 to 843 feet; deep-well turbine pump and 50-horsepower electric motor; static water level, 104 feet below pump base June 17, 1940; yield, 760 gallons a minute.

Pumpage: Minimum, 200,000 gallons; maximum, 288,000 gallons; average, 240,000 gallons a day.

Storage: Two concrete ground reservoirs, 34,000 gallons each; elevated tank, 66,000 gallons.

Number of customers (estimated): 1,400.

MEADOWBROOK ADDITION

Population in 1943: 2,085.

Source of information: R. H. Pheil, 1944.

Owner: East End Waterworks.

Source of supply: Two wells.

Well 1. Drilled in 1926 by Luther Patterson; depth, 670 feet; diameter, 6 inches; screen from 626 to 670 feet; pumped with air; static water level, 25 feet below top of casing June 16, 1926; yield, 375 gallons a minute in 1939.

Well 2. Drilled in 1941 by McMasters & Pomeroy; depth, 1,157 feet; diameter, 10 to 6 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 108 feet July 31, 1941; yield, 530 gallons a minute.

Pumpage (estimated): Average, 95,000 gallons a day.

Storage: Elevated tank.

Number of customers: 400.

Treatment: None.

OAKWOOD AND AIRLINE

Population in 1943 (estimated): 3,400.

Source of information: Albert Bock, manager, 1944.

Owner: Texas Water Co.

Source of supply: Two wells.

Well 1. Drilled in 1939 by McMasters & Pomeroy; depth, 411 feet; diameter, 6 to 4 inches; screen from 372 to 411 feet; deep-well turbine pump and 5-horsepower electric motor; yield, 75 gallons a minute; temperature, 73° F.

Well 2. Drilled in 1941 by McMasters & Pomeroy; depth, 753 feet; diameter, 8 to 6 inches; screens from 496 to 520, 615 to 648, and 712 to 743 feet; deep-well turbine pump and electric motor; static water level, 91 feet below pump base May 1941; yield, 90 gallons a minute; temperature, 74° F.

Pumpage: Minimum, 105,000 gallons; maximum, 142,000 gallons; average, 110,000 gallons a day.

Storage: Two concrete ground reservoirs, 250,000 gallons each; concrete ground reservoir, 42, 000 gallons; elevated tank, 50,000 gallons.

Number of customers: 850.

PASADENA

Population in 1944 (estimated): 17,000.

Source of information: W. R. Williams, water superintendent, 1944.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. Drilled in 1930 by McMasters & Pomeroy; depth, 834 feet; diameter, 10 inches; screens from 648 to 710, 726 to 755, and 793 to 812 feet; deep-well turbine pump and 30-horsepower electric motor; static water level, 130 feet below pump base Mar. 15, 1941; yield, 365 gallons a minute.

Well 2. Drilled in 1935 by McMasters & Pomeroy; depth, 834 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level, 128 feet below pump base Mar. 15, 1941; yield, 250 gallons a minute.

Well 3. Drilled in 1941 by McMasters & Pomeroy; depth, 350 feet; diameter, 8 inches; screen from 300 to 350 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 81.5 feet below land surface July 15, 1941; yield, 250 gallons a minute.

Well 4. Drilled in 1943 by Layne-Texas Co.; depth, 1,203 feet; diameter, 18⅝ to 11¾ inches; deep-well turbine pump and 125-horsepower electric motor; static water level, 138 feet below pump base June 1943; yield, 1,000 gallons a minute with draw-down of 54 feet in 1943; temperature, 81½° F.

Pumpage: Average, 1,250,000 gallons a day.

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

Number of customers: 1,800.

Treatment: Chlorination.

Analysis, well 3

[Collected Aug. 13, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	19	0.94	Chloride (Cl)	36	1.02
Magnesium (Mg)	8.0	.60	Fluoride (F)	.3	.02
Sodium and potassium (Na+K)	86	3.72	Nitrate (NO_3)	.5	.01
Bicarbonate (HCO_3)	244	4.00	Total dissolved solids	283	
Sulfate (SO_4)	13	.27	Total hardness as $CaCO_3$	80	

Driller's logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil and clay	48	48	Hard sand	12	518
Fine sand	12	60	Gumbo	14	532
Clay	24	84	Hard sand and shale	18	550
Fine sand	12	96	Water sand	30	580
Shale and clay	66	172	Gumbo	43	623
Sand (fine)	14	184	Hard sand	9	632
Clay and sand	44	230	Gumbo	16	648
Sand	14	244	Water sand (screen)	62	710
Clay	8	252	Gumbo	16	726
Water sand	8	260	Water sand (screen)	29	755
Red clay	14	274	Gumbo, streaks of sand	38	793
Water sand	56	330	Water sand (screen)	19	812
Clay, streaks of sand	176	506	Gumbo	23	835

Drillers' logs—Continued

Well 4

No log	563	563	Shale	65	885
Clay	9	572	Sand	7	892
Sand	28	600	Shale	25	917
Clay	20	620	Sand	25	942
Sand	10	630	Sand and shale	30	972
Clay	10	640	Sand	28	1,000
Sand	12	652	Shale	10	1,010
Clay	23	675	Sand	20	1,030
Sand	25	690	Shale	49	1,079
Clay	24	714	Sandy shale	17	1,096
Sand	26	740	Sand	21	1,117
Shale	20	760	Shale	4	1,121
Sand	15	775	Sand and shale breaks	47	1,168
Shale	10	785	Sand and shale	11	1,179
Sandy shale	25	810	Sand	25	1,204
Sand	10	820	Shale	3	1,207

PELLY

Population in 1940: 3,712.

Source of information: P. G. Sanders, water superintendent, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1928; depth, 408 feet; diameter, 6 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute.

Well 2. Drilled in 1942 by Layne-Texas Co.; depth, 610 feet; deep-well turbine pump and 60-horsepower electric motor; static water level, 143 feet below pump base in 1942; yield, 520 gallons a minute with draw-down of 21 feet.

Pumpage: Average, 37,500 gallons a day.

Storage: Concrete ground reservoir, 110,000 gallons; elevated tank, 7,500 gallons.

Number of customers: 950.

Treatment: Chlorination.

Analysis, well 2

[Collected Apr. 29, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	24		Sulfate (SO_4)	2	0.04
Iron (Fe)	.12		Chloride (Cl)	189	5.33
Calcium (Ca)	16	0.80	Fluoride (F)	1.4	.07
Magnesium (Mg)	5.5	.45	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	277	11.90	Total dissolved solids	752	
Bicarbonate (HCO_3)	476	7.80	Total hardness as $CaCO_3$	62	
			pH	7.6	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy soil	2	2	Clay	23	432
Clay	10	12	Sand	6	438
Sand	5	17	Clay	13	451
Clay	188	205	Sandy clay	10	461
Tough clay	68	273	Clay	23	484
Clay and sand	32	305	Sandy clay	10	494
Sandy clay	17	322	Clay	35	529
Sand, hard	32	354	Hard sand	5	534
Sand	55	409	Clay	76	610

SOUTH HOUSTON

Population in 1943: 1,180.

Source of information: Frank Houck, water superintendent, April 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1927 by J. A. Walling; depth, 668 feet; diameter, 8 inches; screen from 600 to 668 feet; deep-well turbine pump and electric motor; static water level, 82.3 feet below pump base June 5, 1941.

Well 2. Drilled in 1935 by McMasters & Pomeroy; depth, 916 feet; diameter, 8 to 6 inches; screen, from 856 to 916 feet; deep-well turbine pump and electric motor; static water level, 95.9 feet below pump base June 5, 1941.

Pumpage: Average, 165,000 gallons a day.

Storage: Concrete ground reservoir, 95,000 gallons; elevated tank, 65,000 gallons.

Number of customers (estimated): 700.

Treatment: Chlorination.

Analyses

[Collected Feb. 19, 1941, and Jan. 27, 1942. Analyzed by J. W. Yett, Jr.]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Bicarbonate (HCO_3)	309	5.07	338	5.54
Sulfate (SO_4)	2	.04	10	.21
Chloride (Cl)	43	1.21	48	1.35
Total dissolved solids	330		372	
Total hardness as $CaCO_3$	39		28	

SOUTHSIDE PLACE

Population in 1940: 1,263.

Source of information: Glen Miller, water superintendent, April 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 2. Drilled in 1935 by McMasters & Pomeroy; depth, 998 feet; diameter, 8 to 6 inches; screens, from 918 to 942 and 948 to 988 feet; deep-well turbine pump and 10-horsepower electric motor; static water level, 86 feet below pump base June 1943; pumping level, 103 feet April 1943; yield, 250 gallons a minute; temperature, 80° F.

Well 3. Drilled in 1941; depth, 894 feet; diameter, 13 to 8⅝ inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 65 feet below pump base June 1943; pumping level, 130 feet April 1943; yield 400 gallons a minute.

Pumpage: Average, 100,000 gallons in 1941, 94,000 gallons in 1942, 125,600 gallons in 1943.

Average monthly pumpage in 1943, in gallons a day

January	78,100	April	124,100	July	128,300	October	157,100
February	109,600	May	124,100	August	163,700	November	117,400
March	93,600	June	131,200	September	182,500	December	97,100

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

Number of customers: 390.

Treatment: None.

Analysis, well 2

[Collected Apr. 10, 1944. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	18		Sulfate (SO_4)	13	0.27
Iron (Fe)	.08		Chloride (Cl)	38	1.07
Calcium (Ca)	46	2.30	Fluoride (F)	.2	.01
Magnesium (Mg)	11	.90	Nitrate (NO_3)	.2	.00
Sodium (Na)	43	1.88	Total dissolved solids	303	
Potassium (K)	9.4	.24	Total hardness as $CaCO_3$	160	
Bicarbonate (HCO_3)	242	3.97	pH	7.8	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay	33	33	Gumbo	13	623
Red sand	12	45	Sand and boulders	17	6 0
White clay	25	70	Gumbo	6	646
Sand	9	79	Hard sand	20	666
Red clay	61	140	Hard sandy shale	19	685
Boulders	1	141	Rock	2	687
Clay	109	250	Gumbo and boulders	13	700
Sand	25	275	Hard sand	17	717
Clay	35	310	Sandy shale and boulders	15	732
Sand	20	330	Sand and gravel	25	757
Clay	30	360	Sandy shale	5	762
Sand and boulders	50	410	Hard sand	22	784
Clay	12	422	Gumbo	76	860
Sand	12	434	Sand and boulders	27	887
Clay and boulders	36	470	Gumbo	24	911
Sand and boulders	37	507	Sand and gravel	33	944
Gumbo	13	520	Gumbo	4	948
Sand and boulders	29	549	Sand and gravel	40	988
Gumbo	7	556	Gumbo	10	998
Sand and boulders	54	610			

TOMBALL

Population in 1940: 668.

Source of information: C. L. Coleman, water superintendent, 1944.

Ownership: Municipal.

Source of supply: Well drilled in 1937 by Luther Patterson; depth, 303 feet; diameter, 8 inches; screen from 248 to 293 feet; deep-well turbine pump and 10-horsepower electric motor; yield, 200 gallons a minute; temperature, 73° F.

Pumpage: Average, 165,000 gallons a day, of which an average of 17,000 gallons a day is used by railroad.

Storage: Elevated tank, 55,000 gallons.

Number of customers: 100.

Treatment: None.

Analysis, well 1

[Collected Oct. 14, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	51	2.546	Sulfate (SO)	8	.167
Magnesium (Mg)	4.9	.403	Chloride (Cl)	30	.846
Sodium and potassium (Na+K)	14	.604	Fluoride (F)	.6	.032
Bicarbonate (HCO_3)	153	2.508	Total dissolved solids	184	
			Total hardness	147	

WEST OAKS

Population in 1944 (estimated): 150.

Source of information: R. W. Gillette, 1942 to 1944.

Ownership: Community.

Source of supply: Three wells.

Well 1. Drilled in 1938 by Luther Patterson; depth, 403 feet; diameter, 6 inches; screen from 368 to 403 feet; deep-well turbine pump and 5-horsepower electric motor; static water level, 35 feet below top of casing June 1938; yield, 200 gallons a minute.

Well 2. Drilled in 1939 by Luther Patterson; depth, 701 feet; diameter, 6 inches; screen from 645 to 697 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 200 gallons a minute.

Well 3. Drilled in 1940 by Luther Patterson; depth, 400 feet; diameter, 6 inches; screen from 360 to 400 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute.

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

Storage: Pressure tank, 7,500 gallons; two elevated tanks, 10,000 and 40,000 gallons.

Number of customers: 36.

Treatment: None.

Analysis, well 1

[Collected Feb. 10, 1939. Analyzed by E. W. Lohr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Bicarbonate (HCO_3)	254	4.163	Fluoride (F)	0.1	0.005
Sulfate (SO_4)	8	.167	Total dissolved solids	332	
Chloride (Cl)	68	1.918	Total hardness as $CaCO_3$	222	
Nitrate (NO_3)	.3	.004			

WEST UNIVERSITY PLACE

Population in 1940 (estimated): 9,221.

Source of information: J. A. Metcalfe, water superintendent, 1944.

Ownership: Municipal.

Source of supply: Three wells.

Well 3. Drilled in 1938 by Layne-Texas Co.; depth, 768 feet; diameter, 13⅜ to 6⅝ inches; screens from 632 to 642, 650 to 691, 700 to 708, 714 to 722, and 734 to 756 feet; deep-well turbine pump and 30-horsepower electric motor; static water level, 51 feet below base of pump Mar. 13, 1938; yield, 500 gallons a minute.

Well 4. Drilled in 1939 by Layne-Texas Co.; depth, 1,183 feet; diameter, 16 to 8⅝ inches; screens from 944 to 976, 998 to 1,021, 1,033 to 1,065, 1,087 to 1,131, and 1,147 to 1,169 feet; deep-well turbine pump and 125-horsepower electric motor; static water level, 82 feet below pump base April 1943; pumping level, 143 feet below pump base April 1943; yield, 1,900 gallons a minute.

Well 5. Drilled in 1941 by Layne-Texas Co.; depth 1,673 feet; diameter, 20 to 12½ inches; screens from 1,205 to 1,221, 1, 309 to 1,340, 1,360 to 1,370, 1,400 to 1,440, 1,470 to 1,489, 1,559 to 1,619, and 1,627 to 1,649 feet; deep-well turbine pump and 150-horsepower electric motor; static water level, 106 feet below pump base April 1943; pumping level, 168 feet below pump base April 1943; yield, 2,300 gallons a minute.

Average pumpage, in gallons a day

1941	850,000	1942	980,000	1943	1,030,000

Storage: Ground reservoir, 200,000 gallons; two elevated tanks, 250,000 gallons each.

Number of customers: 3,927.

Treatment: Chlorination and ammoniation.

Analyses

[Collected Sept. 17, 1943. Analyzed by J. H. Rowley]

	Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	18		18	
Iron (Fe)	.04		.09	
Calcium (Ca)	18	0.90	22	1.10
Magnesium (Mg)	5.1	.42	6.2	.51
Sodium and potassium (Na+K)	98	4.26	93	4.03
Bicarbonate (HCO_3)	265	4.34	265	4.34
Sulfate (SO_4)	9.8	.20	6.0	.12
Chloride (Cl)	36	1.02	41	1.16
Fluoride (F)	.4	.02	.4	.02
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	317		324	
Total hardness as $CaCO_3$	66		80	
pH	8.1		8.0	

Drillers' log, well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Hard sand	20	646
Clay	8	12	Shale	5	651
Red sand	10	22	Sand	74	725
Clay	5	27	Clay and sand streaks	11	736
Sandy clay	10	37	Sand and clay breaks	31	767
Red clay	13	50	Clay	4	771
Red fine-grained sand	11	61	Sand	26	797
Red clay	43	104	Sticky shale	35	832
Fine-grained sand and clay	24	128	Sand	8	840
Red clay	18	146	Clay	9	849
Sand	14	160	Sand	20	869
Blue and red clay	127	287	Shale	26	895
Sand	11	298	Rock	1	896
Clay	28	326	Sand and shale	12	908
Sand	15	341	Hard shale	34	942
Clay and sand streaks	20	361	Sand	29	971
Sand	34	395	Hard shale	17	988
Shale	8	403	Sand	28	1,016
Sand	43	446	Shale	9	1,025
Hard shale	20	466	Sand	37	1,062
Sand	23	489	Shale and streaks of sand	26	1,088
Shale and sand	17	506	Sand	40	1,128
Shale	10	516	Shale	15	1,143
Sand	19	535	Sand	23	1,166
Hard shale	11	546	Clay	31	1,197
Hard sand	24	570	Rock	1	1,198
Shale	12	582	Sand	6	1,204
Sand	19	601	Clay with streaks of sand	9	1,213
Shale	8	609	Sand	16	1,229
Broken sand and shale	17	626	Hard shale	41	1,270

HARRISON COUNTY

HALLSVILLE

Population in 1940: 1,000.

Source of information: J. W. Johnson and T. A. Brown, Dec. 2, 1943.

Ownership: Municipal.

Source of supply: Well 1,000 feet southeast of post office; drilled in 1939 by Layne-Texas Co. to 613 feet and plugged back to 201 feet; diameter, 10 inches; screen from 180 to 200 feet; deep-well turbine pump and 10-horsepower electric motor; static water level reported, 90 feet below land surface; yield, 100 gallons a minute with draw-down of 35 feet after 10 hours of pumping.

Pumpage: Average, 15,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 117.

Treatment: Occasional chlorination.

Analysis, well 1

[Collected Oct. 17, 1941. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Bicarbonate (HCO_3)	156	2.56
Iron (Fe)	.13		Sulfate (SO_4)	105	2.19
Calcium (Ca)	2.8	0.14	Chloride (Cl)	17	.48
Magnesium (Mg)	1.7	.14	Nitrate (NO_3)	0	0
Sodium (Na)	114	4.95	Total dissolved solids	333	
Potassium (K)			Total hardness as $CaCO_3$	14	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	3	3	Sandy shale	6	275
Yellow clay	10	13	Sand	10	285
Black sticky shale	106	119	Sandy shale	33	318
Rock	1	120	Brittle shale	68	386
Shale and boulders	22	142	Black shale	69	455
Sandy shale	20	162	Sandy shale	46	501
Good white sand	38	200	Fine-grained gray sand	91	592
Blue shale	44	244	Shale	10	602
Rock	1	245	Rock	1	603
Sandy shale	7	252	Shale and lignite	10	613
Black sand	17	269			

KARNACK

Population in 1940: 850.

Source of information: T. J. Taylor, owner, Nov. 2, 1943.

Owner: T. J. Taylor.

Source of supply: Well three-quarters of a mile southwest of Karnack; drilled in 1942 by B. F. Eddington to 430 feet and plugged back to 306 feet; diameter, 12 to 6 inches; air lift; static water level, 70.3 feet below land surface on Mar. 16, 1942; yield, 30 gallons a minute.

Pumpage: Maximum, 36,000 gallons; average, 15,000 gallons a day.

Storage: Two steel tanks, 50,000 gallons.

Number of customers: 90.

Treatment: None.

Analysis, well 1

[Collected Nov. 2, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	20	0.42
Iron (Fe)	.01		Chloride (Cl)	41	1.16
Calcium (Ca)	5.9	0.29	Fluoride (F)	.2	.01
Magnesium (Mg)	1.8	.15	Nitrate (NO_3)	3.5	.06
Sodium (Na)	139	6.05	Total dissolved solids	377	
Potassium (K)	4.4	.11	Total hardness as $CaCO_3$	22	
Bicarbonate (HCO_3)	301	4.93	pH	8.2	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	22	22	Sandy shale	22	160
Blue shale	33	55	Lignite	5	165
Sand	11	66	Shale	38	203
Shale	34	100	Shale, streaks of sand	87	290
Sandy shale	37	137	Rock	1	291
Rock	1	138	Gumbo and shale	139	430

MARSHALL

Population in 1940: 18,410.

Source of information: H. J. Graeser, city manager, Nov. 4, 1943.

Ownership: Municipal.

Source of supply, wells 61 to 70

Well No.	Date completed	Depth (feet)	Diameter (inches)	Pump and power [1]	Water level		Yield (gallons per minute)	Temperature °F
					Feet below land surface	Date		
61	1906	200	10	T, E, 20	14	November 1941	88	
62	1936	240	8	T, E, 20			145	65
63	1932	300	10	T, E, 15	22.2	November 1941	132	64.5
64	1925	300	10	T, E, 15	19.7	do	145	64.5
65	1928	300	8	T, E, 15			120	
66	1927	300	8	T, E, 25			145	
67	1937	473	16, 8	T, E, 40	114	June 1937	210	
68	1937	375	16, 8	T, E, 30	180.9	November 1941	198	69
69	1936	351	18, 12	T, E, 30	181.8	do	145	
70	1938	422	16, 8	T, E, 30			158	71

[1] T, deep-well turbine; E, electric. Number indicates horsepower.

Well numbers correspond to those in mimeographed report "Water resources of Harrison County, Tex.," released by the Texas Board of Water Engineers and Geological Survey in September 1943. Wells 61 to 66, inclusive, are at the old pump station on the Jefferson road and correspond to city well numbers 1, 18, 17, 9, 12, and 11, respectively; wells 67 to 70, inclusive, are within the city limits and correspond to city wells 1 at new pump station, 2 on Higgins Street, 3 on south Washington Avenue, and 4 on east Grand Avenue, respectively.

Analyses

[Collected Nov. 12, 1941. Analyzed by W. W. Hastings]

	Well 62		Well 64		Well 69		Well 70	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Iron (Fe)					0.10			
Calcium (Ca)	7.6	0.379	4.8	0.240	15	0.75	6.0	0.30
Magnesium (Mg)	9.0	.740	6.6	.543	.5	.04	11	.90
Sodium (Na)	} 2.5	.109	16	.696	100	4.35	109	4.74
Potassium (K)								
Bicarbonate (HCO_3)	31	.508	24	.393	189	3.10	195	3.20
Sulfate (SO_4)	26	.541	42	.874	77	1.60	103	2.14
Chloride (Cl)	6.5	.183	7.0	.197	16	.45	20	.56
Fluoride (F)	.2	.011	.1	.005	.2	.01	0	0
Nitrate (NO_3)	[1]		[1]		[1]		[1]	
Total dissolved solids	67		88		302		345	
Total hardness as $CaCO_3$	56		39		40		62	

[1] Less than 20 parts per million.

Drillers' logs

Well 61

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	1	1	Gray clay	3	242
Sand and clay	11	12	Coarse-grained sand	7	249
Red and yellow rock	14	26	Lignite	4	253
Lignite	1	27	White sand, water	4	257
Gray sand	17	44	Lignite	1	258
Gray clay	23	67	Gray sand	17	275
Soft dark-brown clay	8	75	Lignite	5	280
Lignite	5	80	Gray clay and sand	10	290
Clay	4	84	Gray sand	20	310
Lignite	8	92	Clay and lignite	10	320
White clay	8	100	Gray clay	10	330
Sandstone	1	101	Lignite	2	332
Gray clay	11	112	Sand and clay	1	333
Gray sand	4	116	"Shelly" rock	3	336
Lignite	1	117	Sharp sand	31	367
Gray clay	4	121	Soft gray sand rock	51	418
Sandstone	3	124	Hard sand rock	1	419
Gray clay	6	130	Soft gray rock	86	505
Lignite	1	131	Hard rock	3	508
Gray sand	8	139	Sand rock	2	510
Hard rock	21	160	Sand and clay	10	520
Sand and clay	12	172	Hard rock	6	526
Lignite	3	175	Pipe clay	22	548
Sand and gray clay	15	190	Hard rock	1	549
Lignite	3	193	Gray sand	28	577
White sand	17	210	Pipe clay	6	583
Lignite	1	211	Lignite	1	584
Gray sand	26	237	Gray sand rock	11	595
Not given	1	238	Lignite, clay, and sand	15	610
Sandstone	1	239			

Well 62

Surface soil	3	3	Water sand	8	152
Blue gumbo	21	24	Gray gumbo	5	157
Quicksand	6	30	Water sand	3	160
Sand, gravel, and water	10	40	Lignite	1	161
Sand and water	20	60	Gray gumbo	57	218
Lignite	2	62	Unknown	22	240
Gray gumbo	82	144			

Drillers' logs—Continued

Well 67

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Rotary	5	5	Soft shale with layers of lignite and fine-grained sand	30	273
Surface soil	3	8	Fine-grained sand and blue shale	28	301
Red clay	12	20	Rock	1	302
Gray sandy shale	26	46	Fine-grained dark-colored sand	45	347
Soft rock	1	47	Fine-grained sand and shale	22	369
Soft gray shale	15	62	Rock	2	371
Lignite, shale, and sand	47	109	Soft blue shale with some sand	68	439
Fine-grained silty sand	15	124	Rock	1	440
Soft shale	16	140	Soft shale with layers of fine-grained sand	44	484
Hard rock	1	141	Rock	1	485
Soft shale	9	150	Soft shale	41	526
Soft rock	1	151			
Hard gray shale	35	186			
Soft shale and silty sand	29	215			
Hard shale	12	227			
Fine-grained silty sand	16	243			

Well 68

Rotary	4	4	Fine-grained sand with layers of lignite	25	268
Surface soil and red clay	2	6	Rock	1	269
White sand	47	53	Fine-grained dark-gray sand	45	314
Loam, white sand, and lignite	17	70	Rock	3	317
Lignite	15	85	Dark-gray sand	47	364
Sand and shale	14	99	Soft rock	1	365
Rock	1	100	Coarse-grained sand	18	383
Gray sand and mica	20	120	Rock	1	384
Silty sand with layers of shale	70	190	Soft shale	92	476
Sand with layers of shale	53	243			

Well 69

Surface soil	12	12	Rock	1	175
White sand	14	26	Shale and boulders	10	185
Shale and lignite	24	50	Fine-grained gray sand and boulders	15	200
Gummy shale with streaks of lignite	35	85	Shale	35	235
Shale and boulders	20	105	Dark-gray fine-grained sand	18	253
Fine-grained gray sand	13	118	Rock	1	254
Shale	39	157	Sand and shale	10	264
Rock	3	160	Gray water sand	87	351
Shale	14	174	Sand and shale	20	371

Well 70

Red clay	26	26	Lignite	5	245
Coarse-grained loose gray sand	38	64	Fine-grained silty sand	17	262
Fine-grained gray sand and shale	87	151	Soft shale and fine-grained dark-gray sand	67	329
Rock	1	152	Fine-grained dark-gray sand and shale	37	366
Sand	5	157	Sand	6	372
Lignite	3	160	Hard rock	1	373
Soft blue shale and fine-grained sand	42	202	Dark-gray sand	30	403
Rock	5	207	Rock	2	405
Hard brown shale with layers of sand	33	240	Sticky brown shale	74	479

WASKOM

Population in 1940: 564.

Source of information: J. P. Jones, Dec. 3, 1943.

Owner: Allen Thomas.

Source of supply: Two wells.

Well 1. Drilled in 1924 by W. M. Waterman Lumber Co.; depth, 151 feet; diameter, 6⅝ inches; deep-well turbine pump and 5-horsepower electric motor; pump set at 120 feet; yield, 100 gallons a minute.

Well 2. Drilled in 1925 by W. M. Waterman Lumber Co., depth, 150 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; static water level, 79.2 feet below land surface on Oct. 29, 1941; stand-by well.

Pumpage: No record.

Storage: Elevated tank, 25,000 gallons.

Number of customers: 25.

Treatment: None.

Analysis, well 1

[Collected Oct. 29, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	16	0.80	Sulfate (SO_4)	77	1.60
Magnesium (Mg)	16	1.32	Chloride (Cl)	130	3.67
Sodium (Na)	172	7.47	Nitrate (NO_3)	(1)	
Potassium (K)			Total dissolved solids	540	
Bicarbonate (HCO_3)	262	4.29	Total hardness as $CaCO_3$	105	

[1] Less than 20 parts per million.

HENDERSON COUNTY

ATHENS

Population in 1940: 4,765.

Source of information: Ramond Shelton, water superintendent, and Lonnie Dowell, assistant fire chief, July 27, 1943.

Ownership: Municipal.

Source of supply: Three wells about 0.3 mile northeast of courthouse.

Well 1. Drilled in 1910 by John Shackleford; depth, 1,000 feet; diameter, 6 to 4 inches; screen from 640 to 784 feet; static water level reported, 200 feet below land surface when drilled; pump removed, well now unused.

Well 2. Drilled about 1914 by Claude Witherspoon; depth, 1,000 feet; diameter, 8 to 6 inches; deep-well turbine pump and 25-horsepower electric motor; static water level reported, 200 feet below land surface when drilled; yield, 100 gallons a minute; temperature, 75° F.

Well 3. Drilled in 1932 by Layne-Texas Co.; depth, 1,019 feet; diameter, 12 to 6 inches; screens from 317 to 337, 360 to 381, 487 to 532, 575 to 620, and 732 to 782 feet; deep-well turbine pump and 60-horsepower electric motor; static water level reported, 123 feet below land surface in 1935; draw-down, 47 feet after 42 minutes of pumping 445 gallons a minute; present yield reported, 400 gallons a minute; temperature, 75° F.

Pumpage: No record.

Storage: Concrete reservoir, 50,000 gallons; elevated tank, 50,000 gallons (concrete reservoir unused, 100,000 gallons).

Number of customers: 950.

Treatment: None.

Analyses

[Collected July 27, 1943. Analyzed by J. H. Rowley]

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	18		20	
Iron (Fe)	.38		.47	
Calcium (Ca)	13	0.649	12	0.599
Magnesium (Mg)	2.2	.181	2.1	.173
Sodium (Na)	43	1.877	45	1.968
Potassium (K)	3.2	.082	4.0	.102
Bicarbonate (HCO_3)	144	2.360	147	2.410
Sulfate (SO_4)	4.0	.083	7.2	.150
Chloride (Cl)	10	.282	8.0	.226
Fluoride (F)	.6	.032	1.0	.053
Nitrate (NO_3)	2.0	.032	.2	.003
Total dissolved solids	167		172	
Total hardness as $CaCO_3$	42		38	
pH	8.0		7.9	

Drillers' log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	17	17	Gray sand, fine	20	512
Brown sand	10	27	Shale	5	517
White sand	26	53	Lignite and shale	17	534
Lignite and clay	10	63	Sand and lignite	20	554
Sand and lignite	12	75	Sandy shale	78	632
Shale	28	103	Shale and boulders	5	637
Rock	1	104	Rock	2	639
Shale	38	142	Sandy shale	58	697
Sandy shale and lignite	32	174	Hard sandy shale	30	727
Shale and lignite	77	251	Boulders	1	728
Sandy shale	17	268	Sandy shale	4	732
Rock	1	269	Boulders	1	733
Shale	8	277	Shale	6	739
Sandy shale	14	291	Boulders	1	740
Shale and lignite	5	296	Sandy shale	2	742
Sandy shale	17	313	Boulders	1	743
Shale and lignite	48	361	Sandy shale	120	863
Sandy shale, real fine	66	427	Boulders	1	864
Shale and streaks sand	34	461	Sandy shale	82	946
Sandy shale	18	479	Shale	33	979
Rock, hard	3	482	Sticky shale	40	1,019
Sand and shale	10	492			

EUSTACE

Population in 1940: 500.

Source of information: M. C. Andrews, coowner, July 28, 1943.

Owners: V. E. West and M. C. Andrews.

Source of supply: Well 1 block south of railroad station; drilled in 1940 by V. E. West; depth, 186 feet; diameter, 8 inches; 22 feet of screen near bottom of well; deep-well turbine pump and 3-horsepower electric motor; static water level reported, 20 feet when drilled; yield, 15 gallons a minute; temperature, 69° F.

Pumpage: Average, 3,500 gallons a day.

Storage: Elevated tank, 1,400 gallons.

Number of customers: 60.

Treatment: None.

Analysis

[Collected July 28, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	8.0	0.17
Iron (Fe)	.17		Chloride (Cl)	80	2.26
Calcium (Ca)	4.0	0.20	Fluoride (F)	1.0	.05
Magnesium (Mg)	1.2	.10	Nitrate (NO_3)	.5	.01
Sodium (Na)	163	7.10	Total dissolved solids	424	
Potassium (K)	3.6	.09	Total hardness as $CaCO_3$	15	
Bicarbonate (HCO_3)	305	5.00	pH	8.4	

MALAKOFF

Population in 1940: 2,168.

Source of information: T. A. Bartlett, Sr., president, July 28, 1943.

Owner: Malakoff Water Co.

Source of supply: Well (No. 2) 2 blocks west of railroad station and south of tracks; drilled in 1936; depth, 365 feet; diameter, 6 inches; deep-well turbine pump and 7½-horsepower electric motor; pump set at 200 feet; static water level, 84 feet below land surface on July 28, 1943; yield, 83 gallons a minute with draw-down of 30 feet; temperature, 71° F.

Pumpage: Maximum, 42,000 gallons; average, 24,000 gallons a day.

Storage: Three galvanized tanks, combined capacity 6,900 gallons.

Number of customers: 204.

Treatment: None.

Analysis

[Collected July 28, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	2.0	0.04
Iron (Fe)	.04		Chloride (Cl)	92	2.59
Calcium (Ca)	2.9	0.14	Fluoride (F)	1.0	.05
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	.2	.00
Sodium (Na)	156	6.77	Total dissolved solids	406	
Potassium (K)	3.8	.10	Total hardness as $CaCO_3$	9	
Bicarbonate (HCO_3)	266	4.37	pH	8.4	

TRINIDAD

Population in 1940: 750.

Source of information: J. W. Bradley, operator, July 28, 1943.

Owners: V. E. West and M. C. Andrews.

Source of supply: Well 2 blocks south of railroad station; dug in 1939 by J. W. Bradley; depth, 45 feet; diameter, 7 feet; cylinder pump and 3-horsepower electric motor; static water level reported, 40 feet below land surface.

Pumpage: Average, 3,300 gallons a day.

Storage: Steel pressure tank, 5,000 gallons.

Number of customers: 75.

Treatment: Chlorination occasionally.

Analysis

[Collected July 28, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	8.5		Sulfate (SO_4)	7.4	0.154
Iron (Fe)	.05		Chloride (Cl)	15	.423
Calcium (Ca)	60	2.995	Fluoride (F)	.4	.021
Magnesium (Mg)	3.6	.296	Nitrate (NO_3)	30	.484
Sodium (Na)	5.9	.257	Total dissolved solids	228	
Potassium (K)	3.0	.077	Total hardness as $CaCO_3$	182	
Bicarbonate (HCO_3)	155	2.541	pH	7.7	

HILL COUNTY

ABBOTT

Population in 1940: 264.

Source of information: Claude Barnett, water superintendent, Jan. 15, 1943.

Ownership: Municipal.

Source of supply: Well 1 block east of railroad station; drilled in 1898; depth, 1,850 feet; diameter, 12 to 2 inches; pump jack and deep-well cylinder; cylinder set at 160 feet; static water level reported, 90 feet below land surface in 1942; well flowed when drilled in 1898 and ceased flowing in 1899; present yield, 33 gallons a minute.

Pumpage (estimated): Maximum, 15,000 gallons; minimum, 8,000 gallons; average, 12,000 gallons a day.

Storage: Concrete ground reservoir, 50,000 gallons; elevated tank, 25,000 gallons.

Number of customers: 74.

Treatment: None.

Analysis, well 1

[Collected Jan. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	683	14.22
Iron (Fe)	.08		Chloride (Cl)	40	1.13
Calcium (Ca)	46	2.30	Fluoride (F)	2.3	.12
Magnesium (Mg)	22	1.81	Nitrate (NO_3)	4.0	.06
Sodium (Na)	401	17.43	Total dissolved solids	1,410	
Potassium (K)	12	.31	Total hardness as $CaCO_3$	206	
Bicarbonate (HCO_3)	386	6.32	pH	8.2	

AQUILLA

Population in 1940: 500.

Source of information: Miss Annie Hunt, operator, Jan. 15, 1943.

Owner: B. O. Poole.

Source of supply: Well about 1 block west of railroad tracks on south side of the main east-and-west street; drilled about 1908; depth reported, about 1,400 feet; well flows directly into water mains with sufficient pressure to supply all parts of the town; pressure at one house tap estimated to be between 10 and 15 pounds; pressure reported to be slowly diminishing.

Pumpage: No record.

Storage: None.

Number of customers: 63.

Treatment: None.

Analysis, well 1

[Collected Jan. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	8.5		Sulfate (SO_4)	1,090	22.67
Iron (Fe)	.10		Chloride (Cl)	73	2.06
Calcium (Ca)	22	1.10	Fluoride (F)	5.0	.26
Magnesium (Mg)	28	2.30	Nitrate (NO_3)	.2	00
Sodium (Na)	668	29.03	Total dissolved solids	2,160	
Potassium (K)	22	.56	Total hardness as $CaCO_3$	170	
Bicarbonate (HCO_3)	488	8.00	pH	7.8	

BRANDON

Population in 1940: 236.

Source of information: Mr. Kirby, Jan. 14, 1943.

Ownership: Private.

Source of supply: Well; reported depth, 670 feet; diameter, 6 inches; pump jack and deep well cylinder; well supplies cotton gin and the town.

Pumpage: No record.

Storage: Elevated tank, about 15,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Jan. 14, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	8.0		Sulfate (SO_4)	466	9.70
Iron (Fe)	.13		Chloride (Cl)	228	6.43
Calcium (Ca)	4.0	0.20	Fluoride (F)	4.0	.21
Magnesium (Mg)	2.1	.17	Nitrate (NO_3)	4.6	.07
Sodium (Na)	595	25.86	Total dissolved solids	1,640	
Potassium (K)	18	.46	Total hardness as $CaCO_3$	18	
Bicarbonate (HCO_3)	628	10.28	pH	8.4	

BYNUM

Population in 1940: 350.

Source of information: Ennis Smith, owner, Jan. 14, 1943.

Owner: Mr. Ennis Smith.

Source of supply: Well drilled in 1913; depth, 760 feet; diameter, 10 to 4 inches; pump jack and deep-well cylinder pump; yield, 15 gallons a minute.

Pumpage: Average, 5,000 gallons a day.

Storage: Elevated tank, 16,000 gallons.

Number of customers: 65.

Treatment: None.

Analysis, well 1

[Collected Jan. 14, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	7.0		Sulfate (SO_4)	538	11.20
Iron (Fe)	.06		Chloride (Cl)	199	5.61
Calcium (Ca)	4.5	0.22	Fluoride (F)	4.4	.23
Magnesium (Mg)	2.4	.20	Nitrate (NO_3)	4.5	.07
Sodium (Na)	705	30.66	Total dissolved solids	1,900	
Potassium (K)	11	.28	Total hardness as $CaCO_3$	21	
Bicarbonate (HCO_3)	870	14.25	pH	8.2	

HILLSBORO

Population in 1940: 7,799.

Source of information: T. A. Bullock, city engineer, Jan. 13, 1943.

Ownership: Municipal.

Source of supply: 11 wells.

Uptown well 2. At pumping station about 2 blocks west of courthouse; drilled in 1939; depth, 1,810 feet; diameter, 6⅝ inches; pump jack and deep-well cylinder; flowed when drilled in 1919, ceased flowing in 1930; reported static water level, 125 feet below land surface in 1943; yield, 60 gallons a minute with drawn-down of 215 feet.

Uptown well 3. At pumping station; drilled in 1919; depth, 830 feet; diameter, 8 inches; submersible deep-well turbine pump; reported static water level, 150 feet below land surface in 1943; yield, 70 gallons a minute with draw-down of 275 feet.

Well 1. About 0.6 mile west of courthouse; drilled in 1912; depth, about 200 feet; diameter, 8 inches; pump jack and deep-well cylinder; reported static water level, about 90 feet below land surface in 1942; yield, 30 gallons a minute with draw-down of about 100 feet.

Well 2. Near well 1; drilled in 1919; depth, about 200 feet; diameter, 5 inches; pump jack and deep-well cylinder; yield, 30 gallons a minute.

Well 3. About 0.1 mile northeast of well 1; drilled in 1922; depth, about 200 feet; diameter, 8 inches; submersible deep-well turbine pump; yield, 65 gallons a minute.

Well 4. About 0.2 mile west of pumping station; drilled in 1924; depth, about 200 feet; diameter, 8 inches; pump jack and deep-well cylinder; yield, 30 gallons a minute.

Well 5. About 0.3 mile northwest of pumping station; drilled in 1925 by Stinson & Gathings; depth, 200 feet; diameter, 8 inches; pump jack and deep-well cylinder; yield, 30 gallons a minute.

Well 6. About 0.1 mile northeast of well 5; drilled in 1924 by Stinson & Gathings; depth, 185 feet; diameter 8 inches; pump jack and deep-well cylinder; yield, 30 gallons a minute.

Well 10. 1.3 miles west of courthouse; drilled in 1930 by Layne-Texas Co.; depth, 1,784 feet; diameter, 12 to 8 inches; screens set opposite Woodbine, Paluxy, and Travis Peak sands; deep-well turbine pump; static water level, 125 feet below land surface; yield, 350 gallons a minute with draw-down of 245 feet.

Well 11. About 0.1 mile west of well 2; drilled in 1941 by Layne-Texas Co.; depth, 833 feet; diameter, 13 inches; deep-well turbine pump;

static water level, 150 feet below land surface in 1941; pumping level below air line; yield, 65 gallons a minute.

Well 12. About 0.1 mile northwest of well 6; drilled in 1941 by Layne-Texas Co.; depth, 830 feet; diameter, 13 inches; deep-well turbine pump; static water level, 135 feet below land surface in 1941; yield, 90 gallons a minute with draw-down of 293 feet.

Average pumpage, in gallons a day

	1940	1941	1942		1940	1941	1942
January	422,000	387,000	408,000	July	425,000	420,000	444,000
February	400,000	350,000	372,000	August	465,000	493,000	443,000
March	424,000	373,000	378,000	September	478,000	450,000	394,000
April	411,000	386,000	363,000	October	426,000	399,000	384,000
May	413,000	450,000	386,000	November	389,000	371,000	372,000
June	413,000	419,000	426,000	December	373,000	378,000	330,000

Storage: 3 concrete ground reservoirs, combined capacity 1,240,000 gallons elevated tank, 110,000 gallons.

Number of customers: 2,100.

Treatment: Sedimentation and chlorination.

Analyses

[Collected Jan. 13, 1943. Analyzed by J. H. Rowley]

	Uptown well 2		Uptown well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	18		6.5	
Iron (Fe)	.70		.02	
Calcium (Ca)	3.5	0.18	13	0.65
Magnesium (Mg)	1.6	.13	8.3	.68
Sodium (Na)	254	11.06	488	21.22
Potassium (K)	14	.36	17	.43
Bicarbonate (HCO_3)	464	7.63	468	7.67
Sulfate (SO_4)	116	2.42	649	13.51
Chloride (Cl)	59	1.66	62	1.75
Fluoride (F)	.3	.02	.5	.03
Nitrate (NO_3)	0	0	1.0	.02
Total dissolved solids	695		1,480	
Total hardness as $CaCO_3$	16		66	
pH	8.3		8.2	

	Well 1		Well 10		Well 11	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	10		6.5		6.0	
Iron (Fe)	.02		.02		.12	
Calcium (Ca)	2.7	0.13	55	2.75	11	0.55
Magnesium (Mg)	1.1	.09	25	2.06	8.4	.69
Sodium (Na)	278	12.10	496	21.58	629	27.35
Potassium (K)	11	.28			16	.41
Bicarbonate (HCO_3)	508	8.32	399	6.54	561	9.20
Sulfate (SO_4)	160	3.33	861	17.93	796	16.57
Chloride (Cl)	35	.99	66	1.86	105	2.96
Fluoride (F)	.2	.01	.4	.02	4.7	.25
Nitrate (NO_3)	2.5	.04	2.5	.04	1.2	.02
Total dissolved solids	751		1,710		1,850	
Total hardness as $CaCO_3$	12		240		62	
pH	8.3		7.9		8.0	

Drillers' logs

Uptown well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and clay	18	18	Limestone with some layers of blue shale	491	1,452
Shaly white rock	8	26	Water sand (Glen Rose)	62	1,514
Blue shale	65	91	Sandstone	33	1,547
Sandstone	1	92	Red, pink, and white marl, with a few layers of sandstone	28	1,575
Water sand	9	101	Blue and white marl with some layers of sandstone	22	1,597
Sandstone, water sand, and blue shale	32	133	Red, pink, white, and blue marl, with layers of sandstone	37	1,634
Blue shale with some sandstone	46	179	Layers of white sand with pink, red, and white marl	37	1,671
Water sand	15	194	Very fine water sand mixed with marl	15	1,686
Sand with some sandstone and blue shale	14	208	Sandstone	6	1,692
Very hard sandstone	4	212	Water sand	8	1,700
Blue shale	115	327	Sandstone with layers of marl	11	1,711
Layers of soft white limestone and light blue shale	13	340	Hard sand (water)	9	1,720
White limestone with some light blue shale	450	790	Sandstone	3	1,723
Water sand	30	820	Good water sand	69	1,792
Hard sandstone	3	823	Layers of hard sandstone and red and brown shale	18	1,810
Water sand	17	840			
Sandstone	19	859			
Light blue shale with few streaks of sandstone	40	899			
Blue shale	18	917			
Thin layers of blue shale with limestone	44	961			

Well 5

Black shale	15	15	Water shale and sand	5	150
Sand and shale	40	55	Sandstone (water)	25	175
Shale and sand	45	100	Shale	25	200
Blue sticky clay	45	145			

Well 6

Black shale	15	15	Shale	68	148
Sand and shale	60	75	Sandstone	37	185
Do	5	80	Shale	5	190

Well 10

Surface soil	10	10	Hard sandstone	3	750
Yellow clay and gravel	5	15	Shale	14	764
Hard fine sand	35	50	Limestone	5	769
Hard shale	67	117	Hard sandstone	18	787
Sand	17	134	Hard white clay	2	789
Sandstone	2	136	Shale and sandy limestone	43	832
Sand	22	158	Sandy limestone	53	885
Hard shale	22	180	Limestone	33	918
Pyrites of iron	1	181	Sandy limestone and shale	12	930
Hard shale	102	283	Limestone	15	945
Hard chalk	22	305	Shale layers and sandy limestone	18	963
Limestone	36	341	Hard sandy limestone	3	966
Hard limestone	33	374	Limestone and shale	8	974
Broken limestone and shale	19	393	Sandy limestone and shale	56	1,030
Limestone	37	430	Sandy limestone and hard shale	35	1,065
Broken limestone and shale	42	472	Hard limestone	5	1,070
Hard limestone	2	474	Limestone	30	1,100
Chalk	26	500	Hard limestone	16	1,116
Limestone	6	506	Limestone	24	1,140
Limestone and shale	57	563	Hard limestone	20	1,160
Hard shale and limestone	45	608	Limestone and shale	31	1,191
Shale	72	680	Hard limestone	24	1,215
Limestone	10	690	Shale and limestone	9	1,224
Hard limestone	16	706	Sandy limestone and shale	32	1,256
Do	16	722	Limestone	54	1,310
Shale and boulders	14	736	Hard sandy limestone	25	1,335
Hard sandstone	1	737			
Shale	10	747			

Drillers' log—Continued

Well 10—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy shale, streaks of hard sand	55	1,390	Hard sandy limestone	12	1,620
Packed sand	29	1,419	Red shale and hard red sand	27	1,647
Shale	5	1,424	Red sandstone and shale	13	1,660
Hard sand and streaks of shale	15	1,439	Sand	10	1,670
Rock	17	1,456	Hard gravel and sand	3	1,673
Red shale	14	1,470	Sandy limestone and gravel	3	1,676
Shale	30	1,500	Sandstone	4	1,680
Red shale	75	1,575	Shale	12	1,692
Blue shale	15	1,590	Hard rock	4	1,696
Hard red shale	12	1,602	Hard shale	4	1,700
Hard shale	6	1,608	Shale	19	1,719
			Hard shale	65	1,784

Well 11

Surface soil	5	5	Gray limestone	30	425
Dark shale	45	50	White limestone	30	455
Sandstone	5	55	Gray limestone	20	475
Blue clay	15	70	Blue shale	45	520
Water sand	5	75	White limestone	105	625
Blue shale	20	95	Blue shale	15	640
Sand, shale	25	120	White limestone	10	650
Blue shale	38	158	Blue shale	55	705
Sand, shale	12	170	Sandstone	5	710
Hard sand	20	190	Hard gray limestone	30	740
Blue shale	90	280	Blue shale	37	777
White limestone	70	350	Limestone	2	779
Blue shale	5	355	Shale and sand	4	783
White limestone	25	380	Sand, water	50	833
Blue shale	15	395	Dark limestone	9	842

HUBBARD

Population in 1940: 1,871.

Source of information: Water superintendent, Jan. 14, 1943.

Ownership: Municipal.

Source of supply: Small impounding reservoirs near town, developed about 1900. (City attempted to obtain ground-water supply in 1892 or 1893; well about 3,300 feet deep flowed salty water.)

Pumpage: No record.

Storage: Elevated tank, about 50,000 gallons.

Treatment: Coagulation and sedimentation with alum and lime; chlorination.

Analysis of finished water

[Collected Jan. 14, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	11		Sulfate (SO_4)	31	0.64
Iron (Fe)	.05		Chloride (Cl)	3.0	.08
Calcium (Ca)	40	2.00	Fluoride (F)	.6	.03
Magnesium (Mg)	4.9	.40	Nitrate (NO_3)	.2	.00
Sodium (Na)	9.5	.41	Total dissolved solids	176	
Potassium (K)	3.2	.08	Total hardness as $CaCO_3$	120	
Bicarbonate (HCO_3)	130	2.13	pH	7.6	

IRENE

Population in 1940: 267.

Source of information: C. O. Hawkins, owner, Jan. 15, 1943.

Owner: C. O. Hawkins.

Source of supply: Well west of railroad in Irene; drilled in 1910; depth, 915 feet; diameter, 5 inches; pump jack and deep-well cylinder pump; flowed about 8 feet above land surface in 1910, ceased flowing about 1913; static water level in 1942 reported about 50 feet below land surface; yield, about 50 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, about 16,000 gallons.

Number of customers: 54.

Treatment: None.

Analysis, well 1

[Collected Jan. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	7.0		Sulfate (SO_4)	505	10.51
Iron (Fe)	.04		Chloride (Cl)	460	12.97
Calcium (Ca)	5.7	0.28	Fluoride (F)	4.4	.23
Magnesium (Mg)	2.4	.20	Nitrate (NO_3)	2.0	.03
Sodium (Na)	812	35.29	Total dissolved solids	2,180	
Potassium (K)	10	.26	Total hardness as $CaCO_3$	24	
Bicarbonate (HCO_3)	750	12.29	pH	8.0	

ITASCA

Population in 1940: 1,759.

Source of information: Water superintendent, Jan. 14, 1943.

Ownership: Municipal.

Source of supply: two wells (Nos. 2 and 3).

Well 2. At pumping station; drilled in 1924; depth, 293 feet; diameter, 8 inches; pump jack and deep-well cylinder pump; static water level, 114 feet below land surface in 1939; well is used for stand-by; yield, 70 gallons a minute.

Well 3. At pumping station; drilled in 1939 by Layne-Texas Co.; depth, 1,835 feet; diameter, 8⅝ to 6⅝ inches; 90 feet of screen at bottom; deep-well turbine pump; static water level, 133 feet below land surface on Apr. 20, 1939; yield, 180 gallons a minute with draw-down of 252 feet. (Nearby well drilled in 1894 to a depth of 1,785 feet flowed when drilled, and static water level in 1927 was 67 feet below land surface.)

Pumpage: Average, 60,000 gallons a day.

Storage: Standpipe, 100,000 gallons; concrete ground reservoir, 167,000 gallons.

Number of customers: 408.

Treatment: None.

Analysis, well 3

[Collected Jan. 14, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	80	1.67
Iron (Fe)	.01		Chloride (Cl)	67	1.89
Calcium (Ca)	.6	0.03	Fluoride (F)	.3	.02
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	1.5	.02
Sodium (Na)	240	10.44	Total dissolved solids	638	
Potassium (K)	7.4	.19	Total hardness as $CaCO_3$	4	
Bicarbonate (HCO_3)	434	7.10	pH	8.4	

Drillers' log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Shale	5	1,390
Yellow clay	22	26	Hard shale and layers of anhydrate	36	1,426
Black shale	110	136	Hard shale	20	1,446
Sandstone	1	137	Sandy shale	30	1,476
Black shale	52	185	Sand	40	1,516
Rock	3	188	Layers of sand and shale	8	1,524
Sandy shale	10	198	Blue shale	9	1,533
Brown shale	48	246	Sand	13	1,546
Sand	8	254	Hard blue and gray shale	8	1,554
Sand and sandy shale	37	291	Sand	20	1,574
Hard shale and limestone	134	425	Hard shale	11	1,585
Limestone	202	627	Sand	20	1,605
Limestone and layers of hard shale	29	656	Hard blue shale	21	1,626
Limestone	174	830	Sand	18	1,644
Limestone and layers of shale	15	845	Hard blue shale	22	1,666
Sand	7	852	Red shale	13	1,679
Sandy shale	40	892	Hard red and blue shale	17	1,696
Shale and layers of limestone	46	938	Hard blue and brown shale	25	1,721
Limestone	16	954	Sand	13	1,734
Shale and layers of sand	25	979	Layers of sand and shale	20	1,754
Limestone and layers of shale	57	1,036	Sand	25	1,779
Shale	81	1,117	Shale	6	1,785
Limestone	115	1,232	Sand	9	1,794
Do	2	1,234	Sand and layers of hard shale	15	1,809
Limestone and layers of shale	88	1,322	Hard sandy shale	5	1,814
Limestone	35	1,357	Hard blue, red, and brown shale	17	1,831
Sandy shale	28	1,385			

MALONE

Population in 1940: 429.

Source of information: R. V. Reavis, Jan. 14, 1943.

Ownership: Municipal.

Source of supply: Well near elevated tank; drilled in 1924 by R. H. Dearing & Sons; depth, 2,471 feet; diameter, 13 to 6⅝ inches; reported natural flow about 50 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, about 50,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Jan. 14, 1943. Analyzed by J. H. Rowley.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	18		Sulfate (SO_4)	2,070	43.14
Iron (Fe)	.18		Chloride (Cl)	76	2.14
Calcium (Ca)	147	7.34	Fluoride (F)	1.4	.07
Magnesium (Mg)	49	4.03	Nitrate (NO_3)	1.0	.02
Sodium (Na)	855	37.18	Total dissolved solids	3,350	
Potassium (K)	20	.51	Total hardness as $CaCO_3$	568	
Bicarbonate (HCO_3)	225	3.69	pH	7.8	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	6	6	Paluxy sand	12	1,708
Clay, gravel, and shale	264	270	Limestone and soapstone	368	2,076
White limestone	376	646	Glen Rose sand	72	2,148
Shale, gumbo, boulders	210	856	Limestone, hard and broken	231	2,379
1st Woodbine sand	25	881	Limestone, very hard	5	2,384
Shale, limestone, soapstone	159	1,040	Trinity sand, fine quality, unbroken	87	2,471
2d Woodbine sand	21	1,061			
Limestone, broken and hard	635	1,695			

MERTENS

Population in 1940: 251.

Source of information: Russel Goodman, mayor, Jan. 14, 1943.

Ownership: Municipal.

Source of supply: Well at elevated tank; drilled in 1931; reported depth, 1,400 feet; diameter, 8 inches; deep-well turbine pump; yield, about 80 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 56.

Treatment: None.

Analysis, well 1

[Collected Jan. 14, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	480	9.99
Iron (Fe)	.12		Chloride (Cl)	173	4.88
Calcium (Ca)	5.2	0.26	Fluoride (F)	2.9	.15
Magnesium (Mg)	1.8	.15	Nitrate (NO_3)	1.0	.02
Sodium (Na)	492	21.39	Total dissolved solids	1,400	
Potassium (K)	19	.49	Total hardness as $CaCO_3$	20	
Bicarbonate (HCO_3)	442	7.25	pH	8.2	

MOUNT CALM

Population in 1940: 525.

Source of information: Luther Carter, water superintendent, Jan. 15, 1943.

Ownership: Municipal.

Source of supply: Three small impounding reservoirs. (The city has made attempts to obtain water from wells, but salt water was encountered to a depth of 3,500 feet.)

Pumpage: No record.

Storage: Elevated tank, about 50,000 gallons.

Number of customers: 105.

Treatment: Chlorination; reservoirs treated in summer with copper sulfate.

Analysis of raw water

[Collected Jan. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	1.8		Sulfate (SO_4)	23	0.48
Iron (Fe)	.13		Chloride (Cl)	3.0	.08
Calcium (Ca)	28	1.40	Fluoride (F)	.4	.02
Magnesium (Mg)	4.3	.35	Nitrate (NO_3)	.2	0
Sodium (Na)	12	.51	Total dissolved solids	146	
Potassium (K)	5.6	.14	Total hardness as $CaCO_3$	88	
Bicarbonate (HCO_3)	111	1.82	pH	7.8	

WHITNEY

Population in 1940: 824.

Source of information: R. H. Wilson, water superintendent, Jan. 13, 1943.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. At pumping station; drilled prior to 1900; reported depth, 1,575 feet; diameter, 6 inches; flows; pressure when drilled reported to have been about 40 feet above land surface and yield about 140 gallons a minute; present yield, about 20 gallons a minute.

Well 2. About 100 feet southeast of well 1; drilled in 1925; depth, 1,280 feet; diameter, 6 inches; flows; pressure, 29 feet above land surface; yield, about 40 gallons a minute.

Well 3. About 300 feet southwest of well 1; drilled in 1942 by Layne-Texas Co.; depth, 1,282 feet; diameter, 8 to 5 inches; casing perforated from 1,129 to 1,282 feet; flows 65 gallons a minute.

Pumpage: No record.

Storage: Concrete ground reservoir, 51,000 gallons; elevated tank, 55,000 gallons.

Number of customers: 265.

Treatment: None.

Analysis of composite sample, wells 1, 2, and 3

[Collected Jan. 13, 1943. Analyzed by J. H. Rowley]

Silica (SiO_2)	10	----------	Sulfate (SO_4)	129	2.69
Iron (Fe)	.03	----------	Chloride (Cl)	37	1.04
Calcium (Ca)	3.6	0.18	Fluoride (F)	.3	.02
Magnesium (Mg)	1.6	.13	Nitrate (NO_3)	1.5	.02
Sodium (Na)	223	9.68	Total dissolved solids	622	----------
Potassium (K)	8.6	.22	Total hardness as $CaCO_3$	16	----------
Bicarbonate (HCO_3)	394	6.44	pH	8.4	----------

Drillers' log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Black soil and gravel	20	20	Gray limestone	30	890
Chalk	10	30	Blue shale	15	905
Shale and shell	95	125	Gray limestone	15	920
Gray limestone	15	140	Sandy limestone	15	935
Shale	70	210	Gray limestone	25	960
White limestone	30	240	Sandy shale	10	970
Gray shale	60	300	Sand	15	985
Gray limestone	10	310	Hard shell	2	987
Blue gumbo	5	315	Sand	3	990
Blue shale	40	355	Brown sand and limestone	8	998
Gray limestone	10	365	Sand	15	1,013
Limestone	20	385	Blue shale	4	1,017
Limestone and flint	15	400	Red rock	3	1,020
Blue shale	12	412	Shale and limestone	5	1,025
Do	18	430	Sandy shale	5	1,030
Sand	30	460	Sandy lime	10	1,040
Do	6	466	Limestone	7	1,047
White limestone	1	467	Blue shale	28	1,075
Do	113	580	Limestone	5	1,080
Gray limestone	10	590	Hard limestone	14	1,094
White limestone	20	610	Sandy limestone	6	1,100
Blue limestone	20	630	Limestone	7	1,107
White limestone	85	715	Blue shale	9	1,116
Blue shale	15	730	Red shale	7	1,123
White limestone	105	835	Sandy limestone	5	1,128
Broken limestone	25	860	Sand	42	1,270

HOPKINS COUNTY

COMO

Population in 1940: 412.

Source of information: A. B. Moore, well driller, July 21, 1942.

Ownership: Municipal.

Source of supply: Well in north part of town; drilled in 1926 by B. A. Moore; depth, 229 feet; diameter, 6 inches; casing perforated from 149 to 229 feet; air lift; static water level, 58.8 feet below land surface on July 21, 1942; yield, 10 gallons a minute with draw-down of 7 feet after 6 hours of pumping on July 23, 1942; reported yield, 75 gallons a minute when drilled; temperature, 70° F.

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

Number of customers: About 100.

Treatment: None.

Analysis, well 1

[Collected July 23, 1942. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	47		Sulfate (SO_4)	53	1.103
Iron (Fe)	3.2		Chloride (Cl)	25	.705
Calcium (Ca)	24	1.198	Fluoride (F)	.1	.005
Magnesium (Mg)	9.4	.773	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	45	1.973	Total dissolved solids	280	
Bicarbonate (HCO_3)	130	2.131	Total hardness as $CaCO_3$	99	
			pH	7.3	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface material	47	47	Coal	2	102
Water sand	12	59	Shale	33	135
Coal	1	60	Packed sand, shale streaks	94	229
Shale	40	100			

CUMBY

Population in 1940: 642.

Source of information: M. F. Cross, mayor.

Ownership: Municipal.

Source of supply: Well near elevated tank; drilled in 1924; depth, 710 feet; diameter, 8 to 4 inches; one joint of perforated casing at bottom; deep-well turbine pump and 15-horsepower electric motor; pump set at 480 feet; static water level reported, 90 feet below land surface in 1937; yield, 55 gallons a minute with draw-down more than 300 feet; temperature, 77° F.

Pumpage: Average, 30,000 to 35,000 gallons a day.

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

Treatment: None.

Analysis, well 1

[Collected July 29, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	22		Sulfate (SO_4)	41	0.85
Iron (Fe)	.03		Chloride (Cl)	38	1.07
Calcium (Ca)	1.4	0.07	Fluoride (F)	.01	.01
Magnesium (Mg)	.4	.03	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	220	9.57	Total dissolved solids	555	
Bicarbonate (HCO_3)	472	7.74	Total hardness as $CaCO_3$	5	
			pH	8.9	

SULPHUR SPRINGS

Population in 1940: 6,742.

Source of information: W. B. Raney, water superintendent, Nov. 18, 1943.

Ownership: Municipal.

Source of supply: Two impounding reservoirs, one at west edge of city built in 1905, capacity 230,000,000 gallons; the other 2 miles northwest, built 1938, capacity 120,000,000 gallons.

Average pumpage, in gallons a day

	1941	1942	1943		1941	1942	1943
January	296,000	331,000	337,000	July	539,000	528,000	566,000
February	303,000	305,000	330,000	August	514,000	495,000	658,000
March	307,000	234,000	344,000	September	330,000	305,000	499,000
April	352,000	330,000	366,000	October	371,000	361,000	352,000
May	422,000	475,000	433,000	November	326,000	340,000	
June	425,000	422,000	495,000	December	307,000	318,000	

Storage: Elevated tank, 250,000 gallons.

Number of customers: 2,000.

Treatment: Aeration, coagulation, sedimentation, rapid sand filter, and chlorination.

Analyses of lake water

[Collected Nov. 18, 1943. Analyzed by W. W. Hastings]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	2.7		2.0	
Iron (Fe)	.06		.02	
Calcium (Ca)	10	0.499	29	1.447
Magnesium (Mg)	4.4	.362	4.5	.370
Sodium (Na)	11	.467	11	.476
Potassium (K)	3.4	.087	2.6	.067
Bicarbonate (HCO_3)	52	.852	34	.557
Sulfate (SO_4)	17	.354	74	1.541
Chloride (Cl)	6.0	.169	9.0	.254
Fluoride (F)	.6	.032	.1	.005
Nitrate (NO_3)	.5	.008	.2	.003
Total dissolved solids	88		158	
Total hardness as CaC_3	43		91	
pH	7.6		6.8	

HOUSTON COUNTY

CROCKETT

Population in 1940: 4,536.

Source of information: Geo. Sraun, water superintendent, June 21, 1943.

Ownership: Municipal.

Source of supply: Two wells 4 blocks west of city hall.

Well 1. Drilled in 1930 by Layne-Texas Co.; depth, 544 feet; diameter, 16 to 8 inches; screen from 415 to 538 feet; deep-well turbine pump and 40-horsepower electric motor; pump set at 190 feet; static water level, 113.5 below measuring point on Aug. 12, 1930; yield, 508 gallons a minute with draw-down of 63 feet.

Well 2. Drilled in September 1934 by Layne-Texas Co.; depth, 576 feet; diameter 16 to 8⅝ inches; screens from 386 to 428, 491 to 512, and 532 to 553 feet; deep-well turbine pump and 40-horsepower electric motor; pump set at 199 feet; static water level, 150 feet below measuring point on July 11, 1940; yield, 400 gallons a minute with draw-down of 55 feet.

Pumpage (estimated): Average, 350,000 gallons a day.

Storage: Two ground reservoirs, 200,000 gallons; two elevated tanks, 75,000 gallons.

Number of customers: 1,000.

Treatment: Splash aeration, filtration through slow sand filters containing limestone sand with graduated gravel base at the bottom of the filter, and chlorination.

Analyses

[Collected June 21, 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2			
			Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	43		37		39	
Iron (Fe)	1.7		1.6		.08	
Calcium (Ca)	7.4	0.369	32	1.597	22	1.098
Magnesium (Mg)	3.5	.288	5.2	.428	4.5	.370
Sodium (Na)	54	2.339	26	1.136	51	2.226
Potassium (K)	3.8	.097	4.8	.123	4.0	.102
Bicarbonate (HCO_3)	73	1.197	75	1.229	104	1.705
Sulfate (SO_4)	45	.937	52	1.083	51	1.062
Chloride (Cl)	34	.959	34	.959	36	1.015
Fluoride (F)	0	0	.2	.011	.2	.011
Nitrate (NO_3)	0	0	.1	.002	.2	.003
Total dissolved solids	231		237		264	
Total hardness as $CaCO_3$	33		101		73	
pH	6.4		6.4		7.7	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	10	10	Hard shale	20	194
Sand	6	16	Sand rock	1	195
Hard shale	26	42	Hard shale	6	201
Sand	13	55	Sand rock	1	202
Shale	36	91	Hard shale	9	211
Rock	1	92	Rock	1	212
Hard sand, lignite	20	112	Hard shale and rock	38	250
Sand rock	2	114	Hard black sand	25	275
Hard shale	10	124	Hard shale and streaks of sand	60	335
Sand rock	1	125	Hard shale	9	344
Hard shale	12	137	Hard sand	15	359
Sand rock	1	138	Sand and shale	32	391
Hard shale	24	162	Sand	43	434
Sand rock	1	163	Lignite	6	440
Hard shale	10	173	Sand	104	544
Sand rock	1	174			

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Rotary platform		5	Sand	15	312
Top soil	1	6	Shale and lignite	63	375
Clay	12	18	Sand	76	451
Clay with hard sand	42	60	Lignite	10	461
Shale and boulders	188	248	Sand with shale breaks	47	508
Sand	18	266	Sticky shale	20	528
Shale and lignite	3	269	Sand	20	548
Sand	24	293	Sand with small shale breaks	8	576
Shale and lignite	4	297			

GRAPELAND

Population in 1940: 1,327.

Source of information: Ben Brooks, water superintendent, June 24, 1943.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled by J. W. Jackson; depth, 746 feet; diameter, 6 inches; 60 feet of screen at bottom; deep-well turbine pump; static water level reported, 185 feet below measuring point; yield 130 gallons a minute.

Well 2. Drilled in 1941 by Layne-Texas Co.; depth 784 feet; diameter 8 to 6 inches; deep-well turbine pump; reported yield 190 gallons a minute with draw-down of 15 feet.

Pumpage (estimated): Average, 60,000 to 75,000 gallons a day.

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

Number of customers: 235.

Treatment: None.

Analyses

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

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	12		13	
Iron (Fe)	.89		.04	
Calcium (Ca)	1.1	0.05	1.1	0.05
Magnesium (Mg)	.3	.02	.3	.02
Sodium (Na)	138	6.02	148	6.42
Potassium (K)	2.0	.05	1.8	.05
Bicarbonate (HCO_3)	316	5.19	320	5.25
Sulfate (SO_4)	31	.65	32	.67
Chloride (Cl)	9.0	.25	19	.54
Fluoride (F)	.8	.04	1.0	.05
Nitrate (NO_3)	.8	.01	2.0	.03
Total dissolved solids	361		376	
Total hardness as $CaCO_3$	4		4	
pH	8.0		8.0	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand	8	8	Sand and shale	69	250
Sand and clay	30	38	Hard shale	210	460
Sand	70	108	Sand	30	490
Green sand	7	115	Gumbo, boulders	50	540
Rock	2	117	Boulders	15	555
Sand and shale	60	177	Gumbo	81	636
Rock	4	181	Sand	110	746

LOVELADY

Population in 1940: 542.

Source of information: Grady Stone, water superintendent, June 24, 1943.

Ownership: Municipal.

Source of supply: Well, 0.5 mile east of water tower; drilled about 1936; depth, 150 feet; diameter, 8 inches; 22 feet of screen at bottom; deep-well turbine pump; yield, 90 gallons a minute.

Pumpage (estimated): Average, about 20,000 gallons a day.

Storage: Ground reservoir, 55,000 gallons; elevated tank, 50,000 gallons.

Treatment: Aeration, coagulation with lime, sedimentation, chlorination.

Analysis, well 1

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	50		Sulfate (SO_4)	85	1.77
Iron (Fe)	13		Chloride (Cl)	71	2.00
Calcium (Ca)	25	1.25	Fluoride (F)	.9	.05
Magnesium (Mg)	5.6	.46	Nitrate (NO_3)	0	0
Sodium (Na)	133	5.79	Total dissolved solids	503	
Potassium (K)	7.6	.19	Total hardness as $CaCO_3$	86	
Bicarbonate (HCO_3)	236	3.87	pH	7.2	

HUNT COUNTY

BOLES ORPHAN HOME (about 5 miles north of Quinlan)

Population in 1943: 300.

Source of information: Mrs. J. B. Nelson, home superintendent, Sept. 13, 1943.

Owner: Boles Orphan Home.

Source of supply: Well 1,000 feet east of the home; drilled in 1936; depth, 560 feet; deep-well turbine pump and 5-horsepower electric motor; reported yield, 30 to 40 gallons a minute; temperature, 75° F.

Pumpage (estimated): Maximum, 50,000 gallons; average, 25,000 gallons a day.

Storage: Elevated tank, 25,000 gallons.

Number of customers: Home.

Treatment: None.

Analysis, well 1

[Collected Sept. 13, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	21		Sulfate (SO_4)	161	3.35
Iron (Fe)	.09		Chloride (Cl)	492	13.88
Calcium (Ca)	4.7	0.23	Fluoride (F)	2.9	.15
Magnesium (Mg)	1.4	.12	Nitrate (NO_3)	6.8	.11
Sodium (Na)	663	28.81	Total dissolved solids	1,710	
Potassium (K)	5.0	.13	Total hardness as $CaCO_3$	18	
Bicarbonate (HCO_3)	719	11.80	pH	8.0	

CADDO MILLS

Population in 1940: 390.

Source of information: Ed Morgan, water superintendent, Sept. 13, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir 0.5 mile southwest of town; constructed in 1939; area under water, 50 acres.

Pumpage (estimated): Average, 8,000 to 10,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 106.

Treatment: Coagulation with sedimentation, chlorination, alum, and lime.

Analysis of raw water

[Collected Sept. 13, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	36	0.750
Iron (Fe)	.15		Chloride (Cl)	30	.846
Calcium (Ca)	52	2.595	Fluoride (F)	.6	.032
Magnesium (Mg)	4.1	.337	Nitrate (NO_3)	.8	.013
Sodium (Na)	22	.949	Total dissolved solids	256	
Potassium (K)	6.0	.153	Total hardness as $CaCO_3$	147	
Bicarbonate (HCO_3)	146	2.393	pH	7.5	

CELESTE

Population in 1940: 730.

Source of information: Ellis Sumron, water superintendent, and J. W. Ewing, city secretary, Sept. 23, 1943.

Ownership: Municipal.

Source of supply: Well near elevated tank; drilled in August 1937 by Marks & Meadows; depth, 1,880 feet; diameter, 8 inches; deep-well turbine pump and 15-horsepower electric motor; pump set at 340 feet; static water level, 223 feet below land surface in 1940 and 261 feet on Dec. 16, 1942; yield, 35 gallons a minute.

Pumpage (estimated): Average, 10,000 gallons a day. From July 25 to Aug. 25, 1943, pumpage was 950,000 gallons, of which 400,000 gallons was supplied to city of Leonard.

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

Number of customers: 142.

Treatment: None.

Analysis, well 1

[Collected Sept. 13, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	23		Sulfate (SO_4)	170	3.54
Iron (Fe)	.07		Chloride (Cl)	105	2.96
Calcium (Ca)	2.6	0.13	Fluoride (F)	1.6	.08
Magnesium (Mg)	.7	.06	Nitrate (NO_3)	2.2	.04
Sodium (Na)	326	14.19	Total dissolved solids	896	
Potassium (K)	18	.46	Total hardness as $CaCO_3$	10	
Bicarbonate (HCO_3)	501	8.22	pH	8.1	

COMMERCE

Population in 1940: 4,699.

Source of information: M. J. Salmon, water superintendent, Sept. 14, 1943.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. About 200 feet north of pump station on North Washington Street; drilled in 1914 by Tomlin; depth, 500 feet; diameter, 10 to 8 inches; perforated from 374 to 412 feet; static water level, 125 feet below land surface when drilled, 190 feet in 1918, 227 feet in 1925, 220 feet in 1935, 228 feet in 1941, and 226 feet on Nov. 7, 1943.

Well 2. 583 feet northwest of well 1; drilled in 1923 by Jones; depth, 580 feet; diameter, 12½ inches; casing perforated from 375 to 435 feet; deep-well turbine pump and 60-horsepower electric motor; pump set at 400 feet; reported static water level, 235 feet below land surface on Feb. 6, 1939; yield, 285 gallons a minute with draw-down of 70 feet; temperature, 72½° F.

Well 3. 542 feet southeast of well 1; drilled in 1936 by J. L. Myers & Sons; depth, 433 feet; diameter, 12½ to 10 inches; casing perforated from 365 to 405 feet; deep-well turbine pump and 60-horsepower electric motor, pump set at 400 feet; static water level, 210 feet below land surface when drilled and 235 feet in 1939; yield, 335 gallons a minute.

Average pumpage in 1943, in gallons a day

January	303,000	March	334,000	May	365,000	July	430,000
February	288,000	April	358,000	June	363,000	August	494,000

Storage: Two concrete ground reservoirs, 260,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 1,254.

Treatment: None.

Analyses

[Collected Sept. 14, 1943. Analyzed by J. H. Rowley]

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		10	
Iron (Fe)	.03		.03	
Calcium (Ca)	2.7	0.13	2.9	0.14
Magnesium (Mg)	.5	.04	.4	.03
Sodium (Na)	256	11.15	266	11.56
Potassium (K)	10	.26	6.4	.16
Bicarbonate (HCO_3)	474	7.76	471	7.71
Sulfate (SO_4)	73	1.52	91	1.89
Chloride (Cl)	80	2.26	80	2.26
Fluoride (F)	.5	.03	.3	.02
Nitrate (NO_3)	.8	.01	.5	.01
Total dissolved solids	678		694	
Total hardness as $CaCO_3$	8		8	
pH	9.0		8.8	

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	8	8	Hard lime or cap rock	1	365
Yellow clay	7	15	Hard coarse sand, water bearing	40	405
Yellow sandy clay	8	23	Black shale, soft	7	412
Dark blue shale	177	200	Black sandy shale	5	417
Hard lime rock	2	202	Dark gray shale	8	425
Gray shale	3	205	Dark gray sandy shale	5	430
Hard lime rock	5	210	Black shale	3	433
Medium hard lime rock	5	215			
Variation of light and dark gray shale	149	364			

GREENVILLE

Population in 1940: 13,995.

Source of information: Scot Wright, city commissioner of utilities, Sept. 11, 1943.

Ownership: Municipal.

Source of supply: Four impounding reservoirs north of city supplied with water from the Sabine River (these reservoirs also supply the small towns of Revilon and Penill); capacity, No. 1, 36,000,000 gallons; No. 2, 52,000,000 gallons; No. 3, 136,000,000 gallons; and No. 4, 636,000,000 gallons.

Pumpage: Maximum, 2,950,000 gallons; average, 2,500,000 gallons a day in 1943.

Storage: Four concrete ground reservoirs, 415,000 gallons each; standpipe, 178,000 gallons.

Number of customers: 3,617.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis of raw water from concrete reservoir No. 2

[Collected Sept. 11, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	5.6		Sulfate (SO_4)	27	0.562
Iron (Fe)	.05		Chloride (Cl)	9.0	.254
Calcium (Ca)	38	1.897	Fluoride (F)	.6	.032
Magnesium (Mg)	4.9	.403	Nitrate (NO_3)	.2	.003
Sodium (Na)	12	.523	Total dissolved solids	174	
Potassium (K)	4.3	.110	Total hardness as $CaCO_3$	115	
Bicarbonate (HCO_3)	127	2.082	pH	7.7	

QUINLAN

Population in 1940: 677.

Source of information: W. G. Griffis, water commissioner, Sept. 11, 1943.

Ownership: Municipal.

Source of supply: Well 1 block east and ½ block south of post office; drilled in 1910 by Chilcote; depth, 157 feet; diameter, 6 inches; lower 40 feet of casing perforated; deep-well turbine pump and 5-horsepower electric motor; pump set at 140 feet; static water level reported, 100 feet below land surface; yield, 18 gallons a minute; temperature, 68½° F.

Pumpage: No record.

Storage: Elevated tank, 12,600 gallons.

Number of customers: 125.

Treatment: None.

Analysis, well 1

[Collected Sept. 11, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	111	2.31
Iron (Fe)	4.2		Chloride (Cl)	63	1.78
Calcium (Ca)	60	2.99	Fluoride (F)	.5	.03
Magnesium (Mg)	4.1	.34	Nitrate (NO_3)	3.0	.05
Sodium (Na)	161	6.99	Total dissolved solids	612	
Potassium (K)	5.0	.13	Total hardness as $CaCO_3$	166	
Bicarbonate (HCO_3)	383	6.28	pH	7.3	

WOLF CITY

Population in 1940: 1,339.

Source of information: W. O. Gilmer, city secretary, Sept. 15, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir 0.5 mile east of town; constructed in 1916; area under water, 56 acres; maximum depth 40 feet. (A well drilled to a depth of 1,760 feet yielded saline water.)

Pumpage: Maximum, 50,000 gallons; average, about 35,000 gallons a day.

Storage: Two concrete ground reservoirs; elevated tank, 32,000 gallons; combined capacity, 172,000 gallons.

Number of customers: 300.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis of raw water

[Collected Sept. 15, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	7.6		Sulfate (SO_4)	12	0.250
Iron (Fe)	.06		Chloride (Cl)	1	.028
Calcium (Ca)	16	0.799	Fluoride (F)	.6	.032
Magnesium (Mg)	4.2	.345	Nitrate (NO_3)	1.0	.016
Sodium (Na)	5.5	.239	Total dissolved solids	96	
Potassium (K)	4.8	.123	Total hardness as $CaCO_3$	57	
Bicarbonate (HCO_3)	72	1.180	pH	7.7	

JACKSON COUNTY

EDNA

Population in 1940: 2,724.

Source of information: J. E. Porch, water superintendent, Oct. 1, 1942.

Ownership: Municipal.

Source of supply: Well drilled in 1930 by Layne-Texas Co.; depth, 416 feet; diameter, 6 inches; deep-well turbine pump; yield, 532 gallons a minute; temperature, 75° F.

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

Storage: Ground reservoir, 100,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 700.

Treatment: None.

Analysis, well 1

[Collected Oct. 1, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	2.0	0.04
Iron (Fe)	.07		Chloride (Cl)	144	4.06
Calcium (Ca)	25	1.25	Fluoride (F)	.4	.02
Magnesium (Mg)	13	1.07	Nitrate (NO_3)	0	0
Sodium (Na)	181	7.86	Total dissolved solids	561	
Potassium (K)			Total hardness as $CaCO_3$	116	
Bicarbonate (HCO_3)	370	6.06	pH	7.7	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Shale	14	261
Sandy clay	37	40	Sand	44	305
Clay	14	54	Rock	2	307
Sand	12	66	Sand	37	344
Clay	65	131	Shale	5	349
Shale with sand	41	172	Sand	12	361
Sand	5	177	Shale and sand	7	368
Clay with sand	21	198	Sand	44	412
Sand	8	206	Rock	1	413
Shale	17	223	Shale	3	416
Sand and gravel	24	247			

GANADO

Population in 1940: 717.

Source of information: E. D. Andrews, water superintendent, Sept. 30, 1942.

Ownership: Municipal.

Source of supply: Well drilled in 1938 by McMaster & Pomeroy; depth, 267 feet; diameter, 6 inches; screen from 224 to 256 feet; deep-well turbine pump; yield, 169 gallons.

Pumpage (estimated): Average, 35,000 gallons a day.

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

Number of customers: 200.

Treatment: None.

Analysis, well 1

[Collected Sept. 30, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	35		Sulfate (SO_4)	14	0.29
Iron (Fe)	.05		Chloride (Cl)	105	2.96
Calcium (Ca)	90	4.49	Fluoride (F)	.2	.01
Magnesium (Mg)	17	1.40	Nitrate (NO_3)	1.0	.02
Sodium (Na)	31	1.36	Total dissolved solids	465	
Potassium (K)			Total hardness as $CaCO_3$	294	
Bicarbonate (HCO_3)	242	3.97	pH	7.4	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface and clay	19	19	Sand and gravel	76	200
Sand	33	52	Gumbo	24	224
Clay	10	62	Sand and gravel	32	256
Sand	12	74	Gumbo	11	267
Gumbo	50	124			

JASPER COUNTY

BESSMAY

Population in 1940: 500.

Source of information: D. R. Byrd, superintendent, Apr. 14, 1942.

Owner: Kirby Lumber Co.

Source of supply: Three wells at sawmill of Kirby Lumber Co.

Well 1. Drilled in 1902; depth, about 1,100 feet; diameter, 8 inches; air lift.

Well 2. Drilled by O. C. Adams; depth, 761 feet; diameter, 5 inches; screen from 704 to 749 feet; air lift.

Well 3. Drilled in 1936 by Frank Balcar; depth, 280 feet; diameter, 9 inches; screen from 260 to 280 feet.

Pumpage (estimated): Average, 500,000 gallons a day for sawmill and town.

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

Number of customers: 175.

Treatment: None.

Analyses

[Collected April 14, 1942. Analyzed by W. W. Hastings]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	17	0.85	20	1.00	6.8	0.34
Magnesium (Mg)	2.2	.18	1.7	.14	2.2	.18
Sodium (Na)	39	1.70	36	1.57	27	1.17
Potassium (K)						
Bicarbonate (HCO_3)	146	2.39	146	2.39	61	1.00
Sulfate (SO_4)	4	.08	4	.08	3	.06
Chloride (Cl)	7.5	.21	6	.17	23	.65
Fluoride (F)	.1	.01	.3	.02		
Nitrate (NO_3)	0	0	0	0	0	.00
Total dissolved solids	142		140		92	
Total hardness as $CaCO_3$	51		56		26	

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red clay	18	18	Clay	24	194
Yellow sand	3	21	Brown sand	57	251
Reddish and gray clay	77	98	Shale rock	1	252
Shale	52	150	Gravel	8	260
Sandy shale	20	170	Sand	20	280

JASPER

Population in 1940: 3,497.

Source of information: Grover Calvert, water superintendent, Apr. 10, 1941.

Ownership: Municipal.

Source of supply: Well at 900 North Main Street; drilled in 1930 by Layne-Texas Co.; depth, 581 feet; diameter, 10 to 6 inches; screens from 403 to 445 and 534 to 577 feet; deep-well turbine pump and electric motor; static water level, 70 feet below land surface in 1930; yield, 411 gallons a minute with draw-down of 55 feet.

Pumpage (estimated): Average, 140,000 gallons a day.

Storage: Ground reservoir, 300,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 450.

Treatment: Chlorination.

Analysis, well 1

[Collected Apr. 10, 1941. Analyzed by E. W. Lohr and J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	58		Sulfate (SO_4)	14	0.292
Iron (Fe)	.07		Chloride (Cl)	4.1	.116
Calcium (Ca)	9.3	0.464	Fluoride (F)	.2	.011
Magnesium (Mg)	1.0	.082	Nitrate (NO_3)	0	0
Sodium (Na)	10	.435	Total dissolved solids	126	
Potassium (K)			Total hardness as $CaCO_3$	27	
Bicarbonate (HCO_3)	35	.574	pH	6.5	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy soil	2	2	Sand and clay streaks	113	364
Sandy red clay	16	18	Clay	9	373
Sandy clay and gravel	11	29	Sand and gravel	18	391
Sand	7	36	Sand and lignite	12	403
Clay	7	43	Sand	49	452
Sand	27	70	Gumbo	8	460
Sand, gravel, and clay streaks	69	139	Sand	14	474
Sandy clay	45	184	Hard shale	42	516
Sand	21	205	Sand	65	581
Clay	15	220	Rock	1	582
Sand	31	251			

KIRBYVILLE

Population in 1940: 1,088.

Source of information: F. L. Henry, water superintendent, Apr. 10, 1942.

Ownership: Municipal.

Source of supply: Well drilled in 1927 by J. W. Jackson; depth, 1,490 feet; diameter, 6 inches; flows 175 gallons a minute.

Pumpage (estimated): Average, 80,000 gallons a day.

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

Number of customers: 280.

Treatment: None.

Analysis, well 1

[Collected Apr. 10, 1942. Analyzed by B. Irelan]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	28		Sulfate (SO_4)	12	0.250
Iron (Fe)	.30		Chloride (Cl)	7.0	.197
Calcium (Ca)	40	1.997	Fluoride (F)	.1	.005
Magnesium (Mg)	1.7	.140	Nitrate (NO_3)	0	0
Sodium (Na) + Potassium (K)	32	1.397	Total dissolved solids	214	
Bicarbonate (HCO_3)	188	3.082	Total hardness as $CaCO_3$	107	
			pH	7.8	

JEFFERSON COUNTY

BEAUMONT

Population in 1940: 59,061 (estimated in 1944, 90,000).

Source of information: F. H. Newman, water superintendent, Apr. 14, 1944.

Ownership: Municipal.

Source of supply: Neches River. Water is obtained through a canal from a point 5 miles upstream from Beaumont.

Pumpage (estimated): Minimum, 6,000,000 gallons; maximum, 9,000,000 gallons; average, 7,500,000 gallons a day.

Storage: Concrete ground reservoir, 5,000,000 gallons; two elevated tanks, 1,000,000 and 500,000 gallons.

Number of customers: 14,760.

Treatment: Aeration, coagulation with alum and lime, sedimentation, rapid sand filter, and chlorination.

Analysis of raw water

[Collected Apr. 14, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	14	0.291
Iron (Fe)	.96		Chloride (Cl)	24	.677
Calcium (Ca)	9.3	0.464	Fluoride (F)	.6	.032
Magnesium (Mg)	3.7	.304	Nitrate (NO_3)	.5	.008
Sodium (Na)	15	.640	Total dissolved solids	131	
Potassium (K)	3.6	.092	Total hardness as $CaCO_3$	38	
Bicarbonate (HCO_3)	30	.492	pH	6.5	

NEDERLAND

Population in 1940: 1,500.

Source of information: Geo. Crane, water superintendent, April 1944.

Ownership Municipal.

Source of supply: Wells.

Well 1. Drilled in 1935 by F. L. Balcar; depth, 510 feet; diameter, 6 inches; deep-well turbine pump; static water level, 13.90 feet below measuring point on Mar. 7, 1941; reported yield, 70 gallons a minute.

Well 2. Drilled in 1937 by F. L. Balcar; depth, 510 feet; diameter, 6 to 4½ inches; screen from 488 to 510 feet; deep-well turbine pump; reported yield, 70 gallons a minute; temperature, 75° F.

Pumpage (estimated): Minimum, 140,000 gallons; maximum, 170,000 gallons; average, 160,000 gallons a day.

Storage: Elevated tank, 80,000 gallons.

Number of customers: 700.

Treatment: None.

Analyses

[Collected Jan. 10, 1945. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silicia (SiO_2)	25		26	
Iron (Fe)	.10		.01	
Calcium (Ca)	8.2	0.41	4.5	0.22
Magnesium (Mg)	2.8	.23	1.5	.12
Sodium (Na)	328	14.25	269	11.71
Potassium (K)	7.0	.18	5.1	.13
Bicarbonate (HCO_3)	273	4.47	285	4.67
Sulfate (SO_4)	2	0.04	2	.04
Chloride (Cl)	372	10.49	261	7.36
Fluoride (F)	1.0	.05	1.2	.06
Nitrate (NO_3)	1.5	.02	2.8	.05
Total dissolved solids	885		721	
Total hardness as $CaCO_3$	32		17	
pH	7.6		7.8	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Yellow clay	32	32	Hard shale	30	300
Sand	6	38	Gumbo	26	326
Shale	22	60	Rock	1	327
Gumbo	10	70	Pink shale	23	350
Blue shale	39	109	Gumbo	32	382
Sand	52	161	Hard shale	53	435
Shale	11	172	Soft shale	23	458
Black gumbo	13	185	Sandy shale	22	480
Gray shale	60	245	Rock	2	482
Sandstone	1	246	Sand, water	28	510
Gumbo	24	270			

PORT ARTHUR

Population in 1940: 46,140.

Source of information: J. L. Swanson, water superintendent, April 1944.

Ownership: Municipal.

Source of supply: Neches River. Water is diverted by canal 15 miles upstream from Beaumont.

Pumpage (estimated): Minimum, 3,000,000 gallons; maximum, 4,000,000 gallons; average, 3,500,000 gallons a day.

Storage: Earthen raw-water reservoir, 300,000,000 gallons; concrete ground reservoir, 1,000,000 gallons; two elevated tanks, 300,000 gallons each.

Number of customers: No data.

Treatment: Aeration, coagulation, sedimentation, rapid sand filter, and chlorination.

Analysis of raw water

[Collected Apr. 13, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	19	0.396
Iron (Fe)	.40		Chloride (Cl)	38	1.072
Calcium (Ca)	11	0.549	Fluoride (F)	.6	.032
Magnesium (Mg)	3.5	.288	Nitrate (NO_3)	.2	.003
Sodium (Na)	22	.943	Total dissolved solids	142	
Potassium (K)	3.3	.084	Total hardness as $CaCO_3$	42	
Bicarbonate (HCO_3)	22	.361	pH	6.7	

PORT NECHES

Population in 1940: 2,487 (estimated in 1944, 5,000).

Source of information: J. R. Hennan, water superintendent, April 1944.

Ownership: Municipal.

Source of supply: Neches River. Water is diverted by canal from a point 15 miles upstream from Beaumont.

Pumpage (estimated): Minimum, 500,000 gallons; maximum, 700,000 gallons; average, 600,000 gallons a day.

Storage: Two concrete ground reservoirs, 120,000 and 240,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 1,000.

Treatment: Coagulation, sedimentation, rapid sand filter, and chlorination.

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Analysis of raw water

[Collected Apr. 13, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	25		Sulfate (SO_4)	13	0.27
Iron (Fe)	1.5		Chloride (Cl)	26	.73
Calcium (Ca)	10	0.499	Fluoride (F)	.6	.03
Magnesium (Mg)	2.8	.230	Nitrate (NO_3)	.5	.00
Sodium (Na)	16	.681	Total dissolved solids	158	
Potassium (K)	3.0	.077	Total hardness as $CaCO_3$	36	
Bicarbonate (HCO_3)	27	.443	pH	6.7	

VOTH

Population in 1940: 600.

Source of information: E. L. Jones, water superintendent, April 1944.

Owner: Kirby Lumber Corp.

Source of supply: Well drilled in 1937 by J. D. Adams; depth, 315 feet; diameter 8 inches; screen from 275 to 315 feet; air lift; reported to have flowed 12 gallons a minute when drilled; temperature, 72½° F.

Pumpage: No record.

Storage: Steel ground reservoir, 12,000 gallons; elevated tank, 50,000 gallons

Number of customers: 150.

Treatment: None.

Analysis, well 1

[Collected Mar. 11, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	6.9	0.34	Chloride (Cl)	69	1.9
Magnesium (Mg)	1.8	.15	Fluoride (F)	.7	.0
Sodium and potassium (Na+K)	176	7.65	Nitrate (NO_3)	0	0
Bicarbonate (HCO_3)	375	6.15	Total dissolved solids	315	
Sulfate (SO_4)	1	.02	Total hardness as $CaCO_3$	25	

KAUFMAN COUNTY

CRANDALL

Population in 1940: 580.

Source of information: John R. Crawford, Jr., operator, July 30, 1943.

Owner: Crandall Deep Well Co.

Source of supply: Well two blocks east of railroad station and 100 feet south of tracks; drilled about 1910; depth, about 2,400 feet; diameter, 6 to 4 inches; jet pump and 1½-horsepower motor; reported to have flowed when drilled; static water level, 55 feet below land surface in 1943; yield, 7 gallons a minute with draw-down of 20 feet; temperature, 95° F.

Pumpage: No record.

Storage: Steel pressure tank, about 2,000 gallons.

Number of customers: 40.

Treatment: None.

Analysis, well 1

[Collected July 30, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	269	5.60
Iron (Fe)	.06		Chloride (Cl)	1,210	34.13
Calcium (Ca)	8.5	0.42	Fluoride (F)	3.7	.19
Magnesium (Mg)	3.1	.25	Nitrate (NO_3)	2.2	.04
Sodium (Na)	13	58.98	Total dissolved solids	3,470	
Potassium (K)	4.0	.10	Total hardness as $CaCO_3$	34	
Bicarbonate (HCO_3)	1,210	19.79	pH	8.2	

FORNEY

Population in 1940: 1,295.

Source of information: A. A. Hinton, manager, July 30, 1943.

Owner: Forney Ice & Water Co.

Source of supply: Well 2 blocks west and 2 blocks north of railroad station; drilled in 1909; depth, 2,051 feet; diameter, 6 inches; deep-well turbine pump and 5-horsepower electric motor; pump set at 100 feet; reported to have flowed until 1920; static water level, 65 feet below land surface in 1942; yield, 100 gallons a minute with draw-down of 30 feet; temperature, 100° F.

Pumpage: Average, 75,000 gallons a day.

Storage: Concrete reservoir, 30,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 325.

Treatment: None.

Analysis, well 1

[Collected July 30, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.0		Sulfate (SO_4)	453	9.43
Iron (Fe)	.02		Chloride (Cl)	548	15.46
Calcium (Ca)	6.7	0.33	Fluoride (F)	4.0	.21
Magnesium (Mg)	2.1	.17	Nitrate (NO_3)	14	.23
Sodium (Na)	985	42.81	Total dissolved solids	2,570	
Potassium (K)	3.8	.10	Total hardness as $CaCO_3$	25	
Bicarbonate (HCO_3)	1,100	18.08	pH	8.2	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Shale	28	1,870
Clay	16	20	Hard rock	4	1,874
Sand	4	24	Blue shale	21	1,895
Shale with streaks of gumbo	710	734	Reddish brown clay	32	1,927
White rock	360	1,094	Soft lime	12	1,939
Shale	25	1,119	Shale	6	1,945
Lime rock	3	1,121	Sand	6	1,951
Shale	140	1,261	Light gray shale	12	1,963
Sandy shale	7	1,268	Hard lime	10	1,973
Shale with hard streaks	66	1,334	Shale	7	1,980
Sandy shale	8	1,342	Hard rock	5	1,985
Black gumbo	425	1,767	Hard sand	2	1,987
Sandy shale	13	1,780	Do	12	1,999
Hard gumbo	7	1,787	Blue shale	16	2,015
Sandy rock	19	1,806	Shale with hard streaks	10	2,025
Lime rock	4	1,810	Hard rock (some grit)	8	2,033
Sand with streaks of lime	32	1,842	Red shale	18	2,051

KAUFMAN

Population in 1940: 2,654.

Source of information: Brown Fender, water superintendent, July 30, 1943.

Ownership: Municipal.

Source of supply: Two impounding reservoirs 1 mile northeast of city; capacity, about 1,000,000,000 gallons; drainage area, 1.8 square miles.

Pumpage: Maximum, 350,000 gallons; average, 200,000 gallons a day.

Storage: Two concrete ground reservoirs, 250,000 gallons each; elevated tank, 109,000 gallons.

Number of customers: 650.

Treatment: Coagulation with lime and alum, sedimentation, and chlorination.

Analysis of raw water

[Collected July 30, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	7.3	0.152
Iron (Fe)	.61		Chloride (Cl)	4.0	.113
Calcium (Ca)	18	0.898	Fluoride (F)	.6	.032
Magnesium (Mg)	2.9	.238	Nitrate (NO_3)	.5	.008
Sodium (Na)	7.8	.338	Total dissolved solids	100	
Potassium (K)	3.0	.077	Total hardness as $CaCO_3$	57	
Bicarbonate (HCO_3)	76	1.246	pH	8.6	

KEMP

Population in 1940: 990.

Source of information: Maurice Mullins, water superintendent, July 30, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir 2 miles southeast of town; area of reservoir, 60 acres; maximum depth, 20 feet.

Pumpage: Maximum, 100,000 gallons; average, 75,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 300.

Treatment: Coagulation with lime and alum, sedimentation, and chlorination.

Analysis of raw water

Collected July 30, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	21	0.437
Iron (Fe)	.69		Chloride (Cl)	4.0	.113
Calcium (Ca)	22	1.098	Fluoride (F)	1.2	.063
Magnesium (Mg)	5.1	.419	Nitrate (NO_3)	.8	.013
Sodium (Na)	7.3	.316	Total dissolved solids	117	
Potassium (K)	2.8	.072	Total hardness as $CaCO_3$	76	
Bicarbonate (HCO_3)	78	1.279	pH	7.6	

MABANK

Population in 1940: 963.

Source of information: L. L. Harper, water superintendent, July 30, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir 2 miles southeast of town; capacity, about 98,000,000 gallons; drainage area, 150 acres.

Pumpage: Maximum, 70,000 gallons; average, 60,000 gallons a day.

Storage: Three concrete ground reservoirs, 100,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 235.

Treatment: Coagulation with lime and alum, sedimentation, and chlorination.

Analysis of raw water

[Collected July 30, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.4		Sulfate (SO_4)	3	0.062
Iron (Fe)	.40		Chloride (Cl)	4.0	.113
Calcium (Ca)	7.8	0.389	Fluoride (F)	1.2	.063
Magnesium (Mg)	2.7	.222	Nitrate (NO_3)	.2	.003
Sodium (Na)	7.3	.317	Total dissolved solids	62	
Potassium (K)	2.6	.067	Total hardness as $CaCO_3$	31	
Bicarbonate (HCO_3)	46	.754	pH	7.8	

TERRELL

Population in 1940: 8,796.

Source of information: Frank McClary, water superintendent, July 30, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir 2 miles east of city; area, 300 acres; maximum depth, 18 feet.

Pumpage: Maximum, 1,250,000 gallons; average, 1,000,000 gallons a day.

Storage: Elevated tank, 285,000 gallons.

Number of customers: 1,650.

Treatment: Coagulation with alum, charcoal, rapid sand filter, and chlorination.

Analysis of raw water

[Collected July 30, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	10	0.208
Iron (Fe)	.78		Chloride (Cl)	4.0	.113
Calcium (Ca)	16	0.799	Fluoride (F)	.4	.021
Magnesium (Mg)	3.9	.321	Nitrate (NO_3)	.8	.013
Sodium (Na)	4.0	.176	Total dissolved solids	92	
Potassium (K)	3.6	.092	Total hardness as $CaCO_3$	56	
Bicarbonate (HCO_3)	69	1.033	pH	8.4	

LAMAR COUNTY

BLOSSOM

Population in 1940: 858.

Source of information: L. C. Smallman, pumper, Sept. 20, 1943.

Ownership: Municipal.

Source of supply: Small impounding reservoir 1 mile north of town; built in 1934; area under water, 45 acres; maximum depth of water, 18 feet.

Storage: Concrete ground reservoir, 20,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 160.

Treatment: Coagulation, sedimentation, pressure filter, and chlorination.

Analysis of raw water

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	2.1		Sulfate (SO_4)	3.0	0.062
Iron (Fe)	.02		Chloride (Cl)	1.0	.028
Calcium (Ca)	15	0.749	Fluoride (F)	.4	.021
Magnesium (Mg)	1.8	.148	Nitrate (NO_3)	.5	.008
Sodium (Na)	4.6	.199	Total dissolved solids	72	
Potassium (K)	2.8	.072	Total hardness as $CaCO_3$	45	
Bicarbonate (HCO_3)	64	1.049	pH	7.9	

DEPORT

Population in 1940: 822.

Source of information: K. V. Kimball, city secretary, Sept. 21, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir about 3 miles west of town; area under water, 14 acres.

Average pumpage in 1943, in gallons a day [1]

April	12,000	June	12,000	August	20,000
May	11,000	July	15,000		

[1] Maximum, 30,000 gallons; minimum, 9,000 gallons a day.

Storage: Elevated tank, 65,000 gallons.

Number of customers: 155.

Treatment: Aeration, coagulation with lime and alum, sedimentation, pressure filter, and chlorination.

Analysis of raw water

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	2.1		Sulfate (SO_4)	2.4	0.050
Iron (Fe)	.03		Chloride (Cl)	3.0	.085
Calcium (Ca)	19	0.948	Fluoride (F)	1.0	.053
Magnesium (Mg)	2.6	.214	Nitrate (NO_3)	1.0	.016
Sodium (Na)	9.1	.396	Total dissolved solids	92	
Potassium (K)	2.8	.072	Total hardness as $CaCO_3$	58	
Bicarbonate (HCO_3)	87	1.426	pH	8.2	

PARIS

Population in 1940: 18,678.

Source of information: W. F. Hick, water superintendent, Sept. 21, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir (Lake Crook) about 4 miles north of town; built in 1923; area under water, 1,400 acres; drainage area, 48 square miles; capacity when full, 4,000,000,000 gallons; capacity of treating plant, 3,000,000 gallons a day. This lake supplies Camp Maxey with 59,000,000 to 75,000,000 gallons per month through government-operated treating plant.

Pumpage: Maximum, 2,800,000 gallons; minimum, 1,000,000 gallons; average, 1,600,000 gallons a day.

Storage: Elevated tank, 500,000 gallons; standpipe, 300,000 gallons.

Number of customers: No record.

Treatment: Aeration, coagulation, sedimentation, rapid sand filter, chlorination, and copper-sulfate treatment to lake during summer months for the reduction of algae.

Analysis of raw water

[Collected Sept. 21, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.6		Sulfate (SO_4)	16	0.333
Iron (Fe)	.02		Chloride (Cl)	4.0	.113
Calcium (Ca)	16	0.799	Fluoride (F)	.4	.021
Magnesium (Mg)	2.1	.173	Nitrate (NO_3)	1.2	.019
Sodium (Na)	5.6	.245	Total dissolved solids	85	
Potassium (K)	4.1	.105	Total hardness as $CaCO_3$	49	
Bicarbonate (HCO_3)	51	.836	pH	7.3	

ROXTON

Population in 1940: 900.

Source of information: Dr. Jas. Creed, Sept. 17, 1943.

Owner: Lamar County Water District.

Source of supply: Three wells.

Well 1. 500 feet southeast of railroad station; dug in 1907; depth, 38 feet; diameter, 10 feet; deep-well turbin pump and 2-horsepower electric motor; static water level, 10 feet below land surface; yield, 75 gallons a minute.

Well 2. 500 feet southeast of railroad station; dug in 1937; depth, 31 feet; diameter, 12 feet; deep-well turbine pump and 2-horsepower electric motor; static water level, 10 feet below land surface; yield, 75 gallons a minute.

Well 3. Near south edge of town; dug in 1907; depth, 40 feet; diameter, 12 feet; deep-well turbine pump and 1-horsepower electric motor; used as stand-by well.

Pumpage: Average, 20,000 gallons a day.

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

Number of customers: 100.

Treatment: Chlorination.

Analysis of composite sample, wells 1 and 2

[Collected Sept. 17, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	4.8		Sulfate (SO_4)	110	2.29
Iron (Fe)	.04		Chloride (Cl)	162	4.57
Calcium (Ca)	188	9.38	Fluoride (F)	0	0
Magnesium (Mg)	10	.82	Nitrate (NO_3)	70	1.13
Sodium (Na)	76	3.30	Total dissolved solids	836	
Potassium (K)	5.3	.14	Total hardness as $CaCO_3$	510	
Bicarbonate (HCO_3)	345	5.65	pH	7.2	

LAVACA COUNTY

HALLETTSVILLE

Population in 1940: 1,581.

Source of information: A. B. Dusek, utilities superintendent, Feb. 22, 1944.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. 1½ blocks northeast of post office; depth, 329 feet; diameter, 6 inches; air lift; flowed until 1942.

Well 2. Near well 1; depth, 480 feet; diameter, 3 inches; air lift; flowed until 1942.

Well 3. Near wells 1 and 2; depth, 412 feet; diameter, 4½ inches; air lift; flowed until 1942.

Average pumpage, in gallons a day

	1942	1943		1942	1943		1942	1943
January	134,300	148,350	May	138,500	162,830	September	130,200	156,930
February	116,100	141,850	June	163,700	146,160	October	130,900	145,290
March	125,100	131,250	July	131,500	163,870	November	117,400	157,230
April	134,800	147,330	August	150,960	175,420	December	117,600	139,710

Storage: Concrete ground reservoir, 40,000 gallons; elevated tank, 125,000 gallons.

Number of customers: 461.

Treatment: None.

Analysis, well 2

[Collected Feb. 22, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	129	2.69
Iron (Fe)	.23		Chloride (Cl)	183	5.16
Calcium (Ca)	16	0.80	Fluoride (F)	.1	.01
Magnesium (Mg)	5.4	.44	Nitrate (NO_3)	0	0
Sodium (Na)	285	12.41	Total dissolved solids	835	
Potassium (K)	9.4	.24	Total hardness as $CaCO_3$	62	
Bicarbonate (HCO_3)	367	6.03	pH	8.5	

MOULTON

Population in 1940: 643.

Source of information: William Wachtender, water superintendent, Feb. 21, 1944.

Ownership: Municipal.

Source of supply: Well 1 block south of post office; drilled in 1918; depth, about 660 feet; diameter, 4 inches; air lift; static water level reported, 90 feet below land surface; yield, 65 gallons a minute.

Pumpage (estimated): Minimum, 5,000 gallons; maximum, 20,000 gallons; average, 12,000 gallons a day.

Storage: Concrete ground reservoir, 11,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 108.

Treatment: None.

Analysis, well 1

[Collected Feb. 21, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	71		Sulfate (SO_4)	64	1.33
Iron (Fe)	.13		Chloride (Cl)	160	4.51
Calcium (Ca)	71	3.54	Fluoride (F)	.1	.01
Magnesium (Mg)	3.8	.31	Nitrate (NO_3)	1.2	.02
Sodium (Na)	165	7.18	Total dissolved solids	744	
Potassium (K)	19	.49	Total hardness as $CaCO_3$	192	
Bicarbonate (HCO_3)	345	5.65	pH	8.4	

SHINER

Population in 1940: 1,520.

Source of information: J. F. Degenhart, water superintendent, Feb. 22, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Three blocks east of post office; drilled in 1925 by Layne-Texas Co., depth, 315 feet; diameter, 24 to 6 inches; deep-well turbine pump; well flows; yield, 200 gallons a minute with pumping level at 122 feet below land surface on Sept. 8, 1935.

Well 2. Three blocks east of post office; drilled in 1938 by Layne-Texas Co.; depth, 400 feet; diameter, 12¾ to 8⅝ inches; deep-well turbine pump; static water level, 27 feet below measuring point July 1, 1938; yield, 108 gallons a minute with draw-down of 50 feet.

Pumpage (estimated): Average, 75,000 gallons a day.

Storage: Concrete ground reservoir, 85,000 gallons; elevated tank, 115,000 gallons.

Number of customers: 350.

Treatment: None.

Analyses

[Collected Feb. 22, 1944. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	20		28	
Iron (Fe)	.52		.04	
Calcium (Ca)	90	4.49	77	3.84
Magnesium (Mg)	3.5	.29	9.1	.75
Sodium (Na)	32	1.41	73	3.17
Potassium (K)	7.1	.18	13	.33
Bicarbonate (HCO_3)	300	4.92	331	5.43
Sulfate (SO_4)	19	.40	23	.48
Chloride (Cl)	37	1.04	77	2.17
Fluoride (F)	.2	.01	.2	.01
Nitrate (NO_3)	0	0	.2	0
Total dissolved solids	366		471	
Total hardness as $CaCO_3$	239		230	
pH	8.2		8.1	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	5	5	Sand	8	94
Clay	32	37	Rock and sand	2	96
Shale	30	67	Sand with streaks of clay	22	118
Rock	3	70	Sand and gravel	20	138
Shale	4	74	Sand and shale	25	163
Sand	1	75	Rock	1	164
Shale	3	78	Fine-grained sand and shale	120	284
Shale and sand	7	85	Shale	31	315
Rock	1	86			

YOAKUM

Population in 1940: 4,733.

Source of information: L. W. Sheckles, city manager, Feb. 22, 1944.

Source of supply: Four wells 1 mile southwest of town in DeWitt County.

Well 1. Drilled in 1932 by Johnson; depth, 105 feet; diameter, 10 inches; deep-well turbine pump; static water level, 25 feet below land surface; used as stand-by well.

Well 2. Drilled in 1927; depth, 175 feet; diameter, 10 inches; deep-well turbine pump; static water level reported, 25 feet below land surface; reported yield, 150 gallons a minute.

Well 3. Drilled in 1927; depth, 175 feet; diameter, 10 inches; deep-well turbine pump; static water level, 17.8 feet below measuring point on May 12, 1937; yield, 175 gallons a minute with draw-down of 26.5 feet.

Well 4. Drilled in 1940 by Layne-Texas Co.; depth, 109 feet; diameter, 24 to 10½ inches; deep-well turbine pump; static water level, 21 feet below land surface on Sept. 26, 1940; yield, 375 gallons a minute; temperature, 75° F.

Average pumpage, in gallons a day

	1942	1943		1942	1943		1942	1943
January	250,000	196,000	May	261,000	307,000	September	232,000	319,000
February	192,000	241,000	June	339,000	268,000	October	256,000	242,000
March	238,000	209,000	July	266,000	305,000	November	218,000	238,000
April	200,000	268,000	August	229,000	272,000	December	191,000	233,000

Storage: Concrete ground reservoir, 40,000 gallons; elevated tank, 250,000 gallons.

Number of customers: 1,400.

Treatment: None.

Analysis, well 4

[Collected Feb. 22, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	39		Sulfate (SO_4)	24	0.50
Iron (Fe)	.05		Chloride (Cl)	75	2.12
Calcium (Ca)	66	3.29	Fluoride (F)	.2	.01
Magnesium (Mg)	10	.82	Nitrate (NO_3)	6.9	.11
Sodium (Na)	67	2.92	Total dissolved solids	436	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	206	
Bicarbonate (HCO_3)	272	4.46	pH	8.4	

Drillers' log, well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Yellow clay	30	141
White clay	8	11	Hard clay and chalk	38	179
White sand	15	26	Hard clay and packed sand	7	186
Yellow sand	36	62	Cored hard sand	2	188
Packed sand	10	72	Cored hard clay	2	190
Packed sand and chalk	17	89	Hard clay	11	201
Hard clay, sand, and chalk	22	111			

LEE COUNTY

DIME BOX

Population in 1940: 509.

Source of information: C. W. Bridges, director, Feb. 18, 1944.

Owner: City Water Co.

Source of supply: Well across street from post office; drilled in 1914 by Kiel Caldwell; depth, 465 feet; diameter, 4 inches; deep-well cylinder pump; static water level, 39 feet below land surface; yield, 20 gallons a minute.

Pumpage (estimated): Average, 5,000 gallons a day.

Storage: Elevated tank, 10,000 gallons.

Number of customers: 65.

Treatment: None.

Analysis, well 1

[Collected Feb. 18, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	40	0.833
Iron (Fe)	.32		Chloride (Cl)	39	1.100
Calcium (Ca)	6.6	0.329	Fluoride (F)	.6	.032
Magnesium (Mg)	1.4	.115	Nitrate (NO_3)	2.2	.035
Sodium (Na)	94	4.070	Total dissolved solids	281	
Potassium (K)	3.6	.092	Total hardness as $CaCO_3$	222	
Bicarbonate (HCO_3)	159	2.606	pH	8.4	

GIDDINGS

Population in 1940: 2,166.

Source of information: R. A. Toler, city manager, Feb. 18, 1944.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Drilled in 1931 by Layne-Texas Co.; depth, 1,364 feet; diameter, 12 to 6 inches; deep-well turbine pump; reported static water level, 160 feet below land surface in 1930; yield, 100 gallons a minute.

Well 2. Drilled in 1935 by Layne-Texas Co.; depth, 1,354 feet; diameter, 13⅜ to 6 inches; deep-well turbine pump; static water level, 193 feet below measuring point in 1944; yield, 272 gallons a minute; temperature, 94½°F.

Well 3. Drilled in 1942 by Layne-Texas Co.; depth, 1,196 feet; diameter, 12¾ to 6⅝ inches; screens from 884 to 974, 1,024 to 1,054, and 1,154 to 1,194 feet; static water level, 154 feet below measuring point on June 10, 1942; yield, 390 gallons a minute with draw-down of 65 feet; temperature, 89° F.

Average pumpage, in gallons a day

	1942	1943		1942	1943		1942	1943
January		127,000	May		155,000	September	135,000	159,000
February		148,000	June		137,000	October	130,000	139,000
March		144,000	July	122,000	155,000	November	152,000	169,000
April		166,000	August	143,000	158,000	December	127,000	143,000

Storage: Ground reservoir, 55,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 500.

Treatment: None.

Analyses

[Collected Feb. 18, 1944. Analyzed by J. H. Rowley]

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	12		10	
Iron (Fe)	.01		.10	
Calcium (Ca)	5.1	0.25	17	0.85
Magnesium (Mg)	2.1	.17	5.8	.48
Sodium (Na)	417	18.11	307	13.33
Potassium (K)	9.4	0.24	15	.38
Bicarbonate (HCO_3)	779	12.78	261	4.28
Sulfate (SO_4)	155	3.23	344	7.16
Chloride (Cl)	94	2.65	127	3.58
Fluoride (F)	1.9	.10	.4	.02
Nitrate (NO_3)	.8	.01	.2	.00
Total dissolved solids	1,080		964	
Total hardness as $CaCO_3$	21		66	
pH	8.5		8.2	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Shale	184	782
Shale	224	226	Sand	54	836
Rock	1	227	Shale	171	1,007
Shale	6	233	Sand and shale	66	1,073
Rock, hard and soft	30	263	Sandy shale	29	1,102
Shale	24	287	Fine-grained sand	34	1,136
Sand	38	325	Gumbo	20	1,156
Shale	12	337	Hard shale	114	1,270
Sand	7	344	Rock	1	1,271
Shale	4	348	Sticky shale	23	1,294
Rock	1	349	Good sand	45	1,339
Shale	22	371	Sticky shale	6	1,345
Rock	1	372	Fine-grained sand	10	1,355
Shale	142	514	Sticky shale	8	1,363
Shale, hard layers	84	598			

Well 2

Soil	4	4	Rock	8	541
White clay	5	9	Hard brown shale	21	562
Fine-grained gray sand	5	14	Rock	1	563
White clay	16	30	Brown shale	24	587
Fine-grained gray sand	6	36	Rock	1	588
Red clay	30	66	Hard brown shale	67	655
Black sandy shale	157	223	Hard rock	1	656
Shale, layers of rock	14	237	Lignite and shale	15	671
Hard rock, layers of shale	24	261	Hard brown shale	50	721
Hard shale	11	272	Fine-grained gray sand	112	833
Black shale	99	371	Brown shale and boulders	177	1,010
Rock	2	373	Brown shale and shell	32	1,042
Hard shale	28	401	Hard shale and layers of sand	54	1,096
Rock	1	402	Hard brown shale	15	1,111
Hard shale	71	473	Fine-grained gray sand	32	1,143
Hard rock	1	474	Dark brown shale	25	1,168
Hard brown shale	30	504	Hard shale	123	1,291
Hard sand	3	507	Hard packed sand	58	1,349
Hard brown shale	26	533	Brown shale	1	1,350

Well 3

Surface soil and gravel	3	3	Shale and sand breaks	3	554
White clay	18	21	Sticky shale	18	572
Sandy clay	8	29	Sandy shale	18	590
Sand and gravel	2	31	Tough sticky shale	21	611
Soft shale	27	58	Tough shale	36	647
Hard shale	3	61	Tough sticky shale	22	669
Fine-grained sand	15	76	Sand breaks	2	671
Sand and shale breaks	15	91	Tough sticky shale	12	683
Sand	6	97	Sticky shale and shell breaks	15	698
Hard sandy rock	1	98	Tough sticky shale	36	734
Tough shale	24	122	Hard shale	31	765
Sand and shale breaks	14	136	Sand and shell	76	841
Blue shale	17	153	Tough sticky shale	49	890
Sand	8	161	Hard shale	9	899
Blue shale	8	169	Sandy shale	11	910
Sandy breaks	2	171	Shale and shell	6	916
Brown shale	22	193	Sand	18	934
Blue shale, hard	27	220	Sticky shale	5	939
Sand—cut good	16	236	Hard sand	5	944
Sand rock, hard	6	242	Rock	4	948
Sand and shale breaks	5	247	Sand and shell	70	1,018
Sand rock and shale breaks	7	254	Tough sticky shale	28	1,046
Sand breaks	2	256	Sand and shell	26	1,072
Lignite	12	268	Fine-grained hard packed sand	37	1,109
Rock	4	272	Sand and shell, layers of shale	109	1,218
Shale and sand breaks	19	291	Sand and shell	40	1,258
Shale and rock layers	16	307	Tough shale	24	1,282
Shale	9	316	Sand	5	1,287
Shale and gravel	18	334	Hard shale	33	1,320
Tough shale	72	406	Sand and shell	12	1,332
Sand rock	1	407	Sticky shale	17	1,349
Tough sticky shale	4	411	Sand and shale layers	5	1,354
Sandy shale	2	413	Sand and shale breaks	42	1,396
Sticky shale and lime layers	9	422	Hard packed sand	28	1,424
Tough sticky shale	6	428	Soft shale	2	1,426
Hard shale	10	438	Sticky shale	20	1,446
Tough sticky shale	22	460			
Sticky shale	91	551			

LEXINGTON

Population in 1940: 531.

Source of information: Mr. Jenkins, commissioner, Feb. 18, 1944.

Ownership: Municipal.

Source of supply: Well drilled in 1938 by Reihner Bros.; depth, 517 feet; diameter, 6 to 4 inches; deep-well turbine pump; yield, 80 gallons a minute; temperature, 76°F.

Pumpage (estimated): Average, 20,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 118.

Treatment: None.

Analysis, well 1

[Collected Feb. 18, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	74	1.541
Iron (Fe)	.10		Chloride (Cl)	19	.536
Calcium (Ca)	37	1.847	Fluride (F)	.1	.005
Magnesium (Mg)	8.3	.683	Nitrate (NO_3)	.2	.003
Sodium (Na)	43	1.850	Total dissolved solids	285	
Potassium (K)	9.6	.246	Total hardness as $CaCO_3$	126	
Bicarbonate (HCO_3)	155	2.541	pH	8.5	

LEON COUNTY

BUFFALO

Population in 1940: 737.

Source of information: T. Boyken, water superintendent, Apr. 20, 1944.

Ownership: Municipal.

Source of supply: Well one block northeast of the railroad station; drilled in 1936 by J. W. Jackson; depth, 681 feet; diameter, 8 to 6 inches; screen from 619 to 681 feet; deep-well turbine pump; yield, 500 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 140.

Treatment: None.

Analysis, well 1

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	19		Sulfate (SO_4)	14	0.291
Iron (Fe)	.10		Chloride (Cl)	8.0	.226
Calcium (Ca)	14	0.699	Fluoride (F)	0	0
Magnesium (Mg)	2.7	.222	Nitrate (NO_3)	1.0	.016
Sodium (Na)	46	2.010	Total dissolved solids	183	
Potassium (K)	3.0	.077	Total hardness as $CaCO_3$	46	
Bicarbonate (HCO_3)	151	2.475	pH	8.0	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	20	20	Hard sand	14	282
Sandy shale	40	60	Gumbo and shale	44	326
Shale and sand	67	127	White sand	46	372
Tough shale	23	160	Hard sand	4	376
Sandy shale	17	167	White sand	20	396
Soapstone	3	170	Hard sand	9	405
Sandy shale	38	208	Sand	63	468
Boulders	2	210	Shale and gumbo	28	496
Sandy shale	24	234	Tough gumbo	10	506
Tough shale	34	268	Blue sand	175	681

CENTERVILLE

Population in 1940: 900.

Source of information: H. W. Wallace, water superintendent, Apr. 20, 1943.

Ownership: Municipal.

Source of supply: Well 1 block west of the courthouse in Centerville; drilled in 1940 by Layne-Texas Co.; depth, 360 feet; deep-well turbine pump.

Pumpage: Average, 120,000 gallons a day.

Storage: Elevated tank, 30,000 gallons.

Number of customers: 116.

Treatment: None.

Analysis, well 1

[Collected Apr. 20, 1943. Analyzed by W. W. Hastings and P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	131	2.73
Iron (Fe)	.04		Chloride (Cl)	35	.99
Calcium (Ca)	41	2.05	Fluoride (F)	0	0
Magnesium (Mg)	15	1.23	Nitrate (NO_3)	0	0
Sodium (Na)	71	3.07	Total dissolved solids	411	
Potassium (K)	9.4	.24	Total hardness as $CaCO_3$	164	
Bicarbonate (HCO_3)	175	2.87	pH	8.1	

JEWETT

Population in 1940: 515.

Source of information: T. C. Evans, mayor, Apr. 20, 1944.

Ownership: Municipal.

Source of supply: Well, 3 blocks north of the railroad in the center of town; drilled about 1935; depth, 670 feet; diameter, 12 inches; screens from 307 to 329, 346 to 368, and 378 to 392 feet; deep-well turbine pump and 25-horsepower electric motor; pump set at 170 feet; static water level reported, 70 feet below land surface.

Pumpage (estimated): Average 7,500 gallons a day.

Storage: Elevated tank, 35,000 gallons.

Number of customers: 74.

Treatment: None.

Analysis, well 1

[Collected Apr. 20, 1943. Analyzed by W. W. Hastings and P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	22	0.458
Iron (Fe)	.04		Chloride (Cl)	24	.677
Calcium (Ca)	39	1.947	Fluoride (F)	0	0
Magnesium (Mg)	5.9	.485	Nitrate (NO_3)	.5	.008
Sodium (Na)	21	.915	Total dissolved solids	219	
Potassium (K)	7.4	.189	Total hardness as $CaCO_3$	122	
Bicarbonate (HCO_3)	146	2.393	pH	8.0	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand and light clay	30	30	Rock	1	193
Soft yellow clay	6	36	Shale	4	197
Sandy shale	6	42	Rock	1	198
Hard shale	14	56	Shale	16	214
Do	3	59	Hard shale	17	231
Sand with some clay	27	86	Tough hard shale	38	269
Sand	7	93	Fine sand	16	285
Tough shale	12	105	Tough shale	8	293
Lignite	2	107	Fine gray sand	14	307
Tough shale	43	150	Fine white sand	40	347
Lignite	2	152	Fine white sand (coarse)	46	393
Hard shale	40	192	Tough shale	6	399

NORMANGEE

Population in 1940: 535.

Source of information: Will Hunt, mayor, Apr. 20, 1944.

Ownership: Municipal.

Source of supply: Well at elevated tank in Normangee; drilled by the Texas Water Supply Corp. of Houston; depth, 1,209 feet; diameter, 8 to 6 inches; deep-well turbine pump; yield, 150 gallons a minute. (Prior to 1941 Normangee obtained its water supply from a nearby well tapping upper sands which contained water high in iron and very low in pH.)

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

Storage: Elevated tank, 50,000 gallons.

Number of customers: 106.

Treatment: None.

Analysis, well 1

[Collected Apr. 20, 1943. Analyzed by W. W. Hastings and P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	12	0.250
Iron (Fe)	.01		Chloride (Cl)	14	.395
Calcium (Ca)	.4	0.020	Fluoride (F)	.4	.021
Magnesium (Mg)	.3	.025	Nitrate (NO_3)	1.0	.016
Sodium (Na)	95	4.120	Total dissolved solids	250	
Potassium (K)	4.8	.123	Total hardness as $CaCO_3$	2	
Bicarbonate (HCO_3)	220	3.606	pH	8.2	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	34	34	Shale and boulders	145	545
Sand	12	46	Sand and shale	65	610
Clay	10	56	Sticky shale	55	665
Boulders	1	57	Fine-grained sand and shale	84	749
Clay	3	60	Hard shale	11	760
Boulders	1	61	Shale	47	807
Clay	3	64	Sticky shale	68	875
Boulders	1	65	Sand and shale	65	940
Sand and clay	10	75	Shale and rock	20	960
Sand	5	80	Rock	1	961
Clay	30	110	Sand, shale, and rock	68	1,029
Boulders	1	111	Sand and rock	15	1,044
Clay	1	112	Sticky shale	4	1,048
Sand and shale	288	300	Sand	30	1,078
Sand and soft shale	85	385	Shale and rock	6	1,084
Hard shale	15	400	Sand	125	1,209

OAKWOOD

Population in 1940: 1,086.

Source of information: G. S. Biggs, water superintendent, Apr. 20, 1943.

Ownership: Municipal.

Source of supply: Well drilled in 1930; depth, 189 feet; diameter, 12 to 6 inches; deep-well turbine pump and 7½-horsepower electric motor; bottom of suction pipe 146 feet below land surface; original static water level reported, 10 feet below land surface; static water level, 30 feet in 1942; yield, 30 gallons a minute with pumping level at 87 feet on Apr. 20, 1943.

Pumpage (estimated): Average, 15,000 to 20,000 gallons a day.

Storage: Elevated tank, 60,000 gallons.

Number of customers: 116.

Treatment: None.

Analysis, well 1

[Collected Apr. 20, 1943. Analyzed by W. W. Hastings and P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	11		Sulfate (SO_4)	27	0.562
Iron (Fe)	.02		Chloride (Cl)	9.0	.254
Calcium (Ca)	35	1.747	Fluoride (F)	0	0
Magnesium (Mg)	8.4	.691	Nitrate (NO_3)	.5	.008
Sodium (Na)	29	1.251	Total dissolved solids	213	
Potassium (K)	4.0	.102	Total hardness as $CaCO_3$	122	
Bicarbonate (HCO_3)	181	2.967	pH	8.0	

LIBERTY COUNTY

CLEVELAND

Population in 1940: 1,783.

Source of information: D. J. Billingsley, operator, Apr. 11, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. North well at pump station; drilled in 1938 by Layne-Texas Co.; depth, 845 feet; diameter, 13⅜ to 7 inches; deep-well turbine pump; yield, 378 gallons a minute with draw-down of 73 feet.

Well 2. South well at pump station; drilled in 1938 by Layne-Texas Co.; depth, 929 feet; diameter, 13⅜ to 7 inches; screens from 614 to 637, 752 to 771, and 793 to 833 feet; deep-well turbine pump; yield, 353 gallons a minute with draw-down of 78 feet; temperature, 78½° F.

Pumpage (estimated): Maximum, 110,000 gallons a day; minimum, 85,000 gallons a day; average, 97,000 gallons a day.

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

Number of customers: 673.

Treatment: None.

Analysis, well 2

[Collected Apr. 11, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	15	0.31
Iron (Fe)	.12		Chloride (Cl)	27	.76
Calcium (Ca)	34	1.70	Fluoride (F)	.6	.03
Magnesium (Mg)	7.2	.59	Nitrate (NO_3)	.5	.01
Sodium (Na)	90	3.91	Total dissolved solids	377	
Potassium (K)	6.7	.17	Total hardness as $CaCO_3$	114	
Bicarbonate (HCO_3)	321	5.26	pH	7.7	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	6	6	Clay	98	433
Soft yellow clay	14	20	Hard layers	1	434
Sand	6	26	Clay	61	495
Soft clay	24	50	Hard layers	2	497
Sand	29	79	Clay	29	526
Clay	2	81	Hard layers	1	527
Sand	29	110	Clay	83	610
Clay	5	115	Sand	26	636
Sand	30	145	Clay	10	646
Clay	61	206	Gumbo	105	751
Coarse-grained sand and gravel	11	217	Sand	19	770
Clay	17	234	Sticky shale	21	791
Gravel	51	285	Hard sandy shale	22	813
Soft yellow clay and sand	4	289	Sand breaks and shale	17	830
Sand and gravel	25	314	Sticky shale	80	910
Clay with sand breaks	21	335	Sand	16	926
			Sticky shale	3	929

DAISETTA

Population in 1940: 2,000.

Source of information: W. G. Winters, superintendent, Apr. 17, 1944.

Owner: Hull-Daisetta Water Co.

Source of supply: Well in south Hull; drilled in 1940 by Pitre Water Well Drilling Co.; depth, 365 feet; diameter, 6 inches; screen from 327 to 350 feet; deep-well turbine pump; temperature, 74½° F.

Pumpage (estimated): Average, 45,000 gallons a day.

Storage: Ground reservoir in south Hull, 1,500 gallons; elevated tank in Daisetta, 20,000 gallons.

Number of customers: 220.

Treatment: None.

Analysis, well 1

[Collected Apr. 17, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	24		Sulfate (SO_4)	4.7	0.10
Iron (Fe)	.03		Chloride (Cl)	44	1.24
Calcium (Ca)	50	2.50	Fluoride (F)	.8	.04
Magnesium (Mg)	3.2	.26	Nitrate (NO_3)	.5	.01
Sodium (Na)	46	2.02	Total dissolved solids	288	
Potassium (K)	4.0	.10	Total hardness as $CaCO_3$	138	
Bicarbonate (HCO_3)	213	3.49	pH	7.9	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	20	20	Sand	5	96
Fine-grained sand	10	30	Clay	60	156
Coarse-grained sand	33	63	Fine-grained sand	19	175
Clay	1	64	Clay	23	198
Coarse-grained sand	11	75	Rock	6	204
Clay	3	78	Clay	30	234
Coarse-grained sand	4	82	Gravel	3	237
Yellow clay	3	85	Clay	71	308
Coarse-grained sand	5	90	Coarse-grained sand	57	365
Clay	1	91			

DAYTON

Population in 1940: 1,279.

Source of information: W. S. Neel, city secretary, Apr. 17, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. At pump station; drilled in 1929; depth, 395 feet; diameter, 8 to 6 inches; screen from 314 to 376 feet; deep-well turbine pump; yield, 300 gallons a minute.

Well 2. At pump station; drilled in 1929 by J. A. Walling; depth, 399 feet; diameter, 8 to 6 inches; screen from 316 to 376 feet; deep-well turbine pump; yield, 300 gallons a minute; temperature, 73° F.

Pumpage (estimated): Average, 180,000 gallons a day.

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

Number of customers: 344.

Treatment: Chlorination.

Analysis, well 2

[Collected Apr. 17, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	2.0	0.04
Iron (Fe)	.11		Chloride (Cl)	207	5.84
Calcium (Ca)	40	2.00	Fluoride (F)	.8	.04
Magnesium (Mg)	4.4	.36	Nitrate (NO_3)	0	0
Sodium (Na)	170	7.38	Total dissolved solids	590	
Potassium (K)	4.0	.10	Total hardness as $CaCO_3$	118	
Bicarbonate (HCO_3)	239	3.92	pH	7.7	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	52	52	Sandy shale	11	170
Sand	11	63	Shale	43	213
Clay	7	70	Gumbo	97	310
Boulder	2	72	Sand	75	385
Red clay	41	113	Shale	14	399
Sticky clay	46	159			

LIBERTY

Population in 1940: 3,087.

Source of information: Wm. L. Schupp, water superintendent, Nov. 18, 1943.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. At elevated tank; depth, 680 feet; diameter, 6 inches; flows from 30 to 85 gallons a minute; temperature, 76½° F.

Well 2. At power plant; drilled in 1939 by the Texas Water Supply Co.; depth, 565 feet; diameter, 13 to 7 inches; deep-well turbine pump; static water level at land surface in November 1943; yield, 321 gallons a minute with draw-down of 57 feet; temperature, 75½° F.

Well 3. At power plant; drilled in 1939; depth, 351 feet; diameter, 8 inches; deep-well turbine pump; temperature, 72° F.

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

Storage: Concrete ground reservoir, 25,000 gallons; elevated tank, 65,000 gallons.

Number of customers: 520.

Treatment: None.

Analyses

[Collected Nov. 18, 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		21		21	
Iron (Fe)	.08		.08		.10	
Calcium (Ca)	76	3.79	70	3.49	53	2.65
Magnesium (Mg)	11	.90	6.6	.54	4.7	.39
Sodium (Na)	112	4.85	62	2.68	54	2.36
Potassium (K)	3.5	.09	3.6	.09	2.9	.07
Bicarbonate (HCO_3)	149	2.44	190	3.11	240	3.93
Sulfate (SO_4)	3.7	.08	6.8	.14	9.5	.20
Chloride (Cl)	251	7.08	125	3.53	46	1.30
Fluoride (F)	.2	.01	.4	.02	.6	.03
Nitrate (NO_3)	1.0	.02	.2	.01	.8	.01
Total dissolved solids	636		419		312	
Total hardness as $CaCO_3$	234		202		152	
pH	7.6		7.5		7.5	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay	12	12	Sand and gravel	14	320
Sand	48	60	Sticky shale	40	360
Clay	20	80	Sand	16	376
Sand	14	94	Sticky shale	69	445
Clay	25	119	Sand	10	455
Sand and clay	27	146	Sand and shale	10	465
Sticky shale	110	256	Sticky shale	58	523
Sand	42	298	Sand	39	562
Sticky shale	8	306	Sticky Shale	3	565

LIMESTONE COUNTY

COOLIDGE

Population in 1940: 1,102.

Source of information: Bill Strickling, operator, Apr. 21, 1943.

Ownership: Municipal.

Source of supply: Two impounding reservoirs 0.5 mile northwest of Coolidge.

Pumpage (estimated): From 16,000 to 30,000 gallons a day.

Storage: Three ground settling basins at pumping plant, 52,000 gallons each; elevated tank, 50,000 gallons.

Number of customers: 240.

Treatment: Coagulation with lime and alum, sedimentation, and chlorination.

Analysis of finished water

[Collected Apr. 21, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	1.2		Sulfate (SC_4)	36	0.750
Iron (Fe)	.08		Chloride (Cl)	7.0	.197
Calcium (Ca)	27	1.348	Fluoride (F)	.2	.011
Magnesium (Mg)	4.1	.337	Nitrate (NO_3)	0	0
Sodium (Na)	7.9	.343	Total dissolved solids	134	
Potassium (K)	6.2	.159	Total hardness as $CaCO_3$	84	
Bicarbonate (HCO_3)	75	1.229	pH	7.8	

GROESBECK

Population in 1940: 2,272.

Source of information: Alva Grimes, water superintendent, Apr. 21, 1943.

Ownership: Municipal.

Source of supply: Navasota River.

Pumpage: Average, 320,000 gallons a day.

Storage: Elevated tank, 200,000 gallons.

Number of customers: 550.

Treatment: Coagulation with lime and alum, sedimentation, rapid sand filter, and chlorination.

Analysis of finished water

[Collected Apr. 21, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.0		Sulfate (SO_4)	64	1.33
Iron (Fe)	.16		Chloride (Cl)	49	1.38
Calcium (Ca)	61	3.04	Fluoride (F)	.1	.01
Magnesium (Mg)	5.4	.44	Nitrate (NO_3)	3.5	.06
Sodium (Na)	37	1.61	Total dissolved solids	316	
Potassium (K)	5.2	.13	Total hardness as $CaCO_3$	174	
Bicarbonate (HCO_3)	149	2.44	pH	7.9	

KOSSE

Population in 1940: 881.

Source of information: J. J. Adams, operator, Apr. 21, 1943.

Ownership: Municipal.

Source of supply: Well at pumping plant 2½ miles east of Kosse; drilled in 1939 by Layne-Texas Co.; depth, 155 feet (drilled to 700 feet and plugged back); diameter, 6 inches; deep-well turbine pump; yield, 70 gallons a minute.

Storage: Ground reservoir at pumping station, 50,000 gallons; elevated tank, 50,000 gallons.

Treatment: Soda ash and high-pressure zeolite filter.

Analyses

[Dates of collection: Treated water, June 24, 1942; raw water, Apr. 21, 1943. Analyzed by B. Irelan and J. H. Rowley]

	Finished water		Raw water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	34		28	
Iron (Fe)	.10		20	
Calcium (Ca)	58	2.89	120	5.99
Magnesium (Mg)	37	3.04	43	3.54
Sodium (Na) + Potassium (K)	223	9.70	109	4.74
Bicarbonate (HCO_3)	366	6.00	324	5.31
Sulfate (SO_4)	171	3.56	155	3.23
Chloride (Cl)	215	6.06	203	5.73
Fluoride (F)	.2	.01	0	0
Nitrate (NO_3)	0	0	.2	0
Total dissolved solids	926		869	
Total hardness as $CaCO_3$	296		476	
pH	7.0		7.7	

MEXIA

Population in 1940: 6,410.

Source of information: R. C. Daniels, water superintendent, Apr. 21, 1943.

Ownership: Municipal.

Source of supply: Three wells 3 miles west of town.

Well 1. Drilled in 1925; depth, 320 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 290 gallons a minute.

Well 2. Drilled in 1925; depth, 320 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 300 gallons a minute.

Well 3. Drilled in 1925; depth, 450 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 240 gallons a minute.

(Stand-by supply from spring at Springfield, 7 miles southwest of Mexia, will supply an additional 1,000,000 gallons daily.)

Average pumpage, in gallons a day

	1940	1941	1942		1940	1941	1942
January	441,000	488,000	491,000	July	568,000	625,000	627,000
February	432,000	448,000	510,000	August	486,000	590,000	499,000
March	420,000	492,000	485,000	September	481,000	496,000	554,000
April	443,000	506,000	481,000	October	486,000	500,000	500,000
May	457,000	515,000	489,000	November	487,000	464,000	452,000
June	540,000	570,000	524,000	December	451,000	466,000	435,000

Storage: Standpipe, 86,000 gallons.
Number of customers: 1,486.
Treatment: Aeration, sedimentation, and chlorination.

Analyses

[Collected Apr. 21, 1943. Analyzed by P. A. Witt and W. W. Hastings]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	22		19		21	
Iron (Fe)	.02		.10		.08	
Calcium (Ca)	41	2.05	31	1.55	30	1.50
Magnesium (Mg)	8.4	.69	7.4	.61	8.0	.66
Sodium (Na)	205	8.90	128	5.55	126	5.49
Potassium (K)	4.8	.12	6.2	.16		
Bicarbonate (HCO_3)	392	6.43	342	5.61	340	5.57
Sulfate (SO_4)	4.9	.10	13	.27	7.7	.16
Chloride (Cl)	184	5.19	69	1.95	67	1.89
Fluoride (F)	.4	.02	.4	.02	.4	.02
Nitrate (NO_3)	1.0	.02	1.0	.02	.5	.01
Total dissolved solids	665		466		442	
Total hardness as $CaCO_3$	137		108		108	
pH	7.7		7.9		7.7	

Drillers' log of well 1 at Mexia Internment Camp, about one-fourth mile north of city wells

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	38	38	Hard rock	6	335
Blue shale, hard	221	259	Soft sand	2	337
Sandy shale, soft	9	268	Hard rock	1	338
Blue shale	29	297	Soft sand	2	340
Rock, hard	6	303	Hard rock	2	342
Lost returns on mud	1	304	Soft sand	1	343
Rock, hard	1	305	Rocks	1	344
Rock, soft	1	306	Sand, broken rock	2	346
Rock, hard	8	314	Rock	3	349
Broken rock, hard and soft streaks	10	324	Sand, broken rock	1	350
Rock, hard	2	326	Rock	3	353
Broken rock and sand	3	329	Sand	1	354
			Rock	6	360

PRAIRIE HILL

Population in 1940: 500.

Source of information: Mrs. C. C. Evans, owner, April 1943.

Owner: Mrs. C. C. Evans.

Source of supply: Impounding reservoir west of town.

Pumpage: No record.

Storage: Elevated tank, 10,000 gallons.

Treatment: None.

Analysis of raw water

[Collected April 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	4.4		Sulfate (SO_4)	15	0.312
Iron (Fe)	.30		Chloride (Cl)	7.0	.197
Calcium (Ca)	38	1.897	Fluoride (F)	.4	.021
Magnesium (Mg)	4.3	.354	Nitrate (NO_3)	.5	.008
Sodium (Na)	6.3	.273	Total dissolved solids	160	
Potassium (K)	5.0	.128	Total hardness as $CaCO_3$	113	
Bicarbonate (HCO_3)	129	2.114	pH	7.8	

TEHUACANA

Population in 1940: 408.

Source of information: Water superintendent, April 1943.

Ownership: Municipal.

Source of supply: Well 0.5 mile west of town; depth, about 50 feet; diameter, 12 inches; deep-well turbine pump.

Storage: Elevated tank, 20,000 gallons.

Treatment: None.

Analysis, well 1

[Collected April 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	4.6		Sulfate (SO_4)	17	0.35
Iron (Fe)	.15		Chloride (Cl)	23	.65
Calcium (Ca)	108	5.39	Fluoride (F)	.2	.01
Magnesium (Mg)	3.1	.25	Nitrate (NO_3)	39	.63
Sodium (Na)	34	1.46	Total dissolved solids	429	
Potassium (K)	2.2	.06	Total hardness as $CaCO_3$	282	
Bicarbonate (HCO_3)	337	5.52	pH	7.9	

THORNTON

Population in 1940: 745.

Source of information: R. A. Black, water superintendent, April 1943.

Ownership: Municipal.

Source of supply: Dug well 6 miles west of town; depth, 14 feet; diameter, 8 feet with lateral trenches; flows by gravity from well to ground reservoir at west edge of town.

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

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

Number of customers: 135.

Treatment: Chlorination.

Analysis, well 1

[Collected April 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	29		Sulfate (SO_4)	7.4	0.154
Iron (Fe)	.20		Chloride (Cl)	13	.367
Calcium (Ca)	18	0.898	Fluoride (F)	.2	.011
Magnesium (Mg)	3.3	.271	Nitrate (NO_3)	6.9	.111
Sodium (Na)	13	.557	Total dissolved solids	145	
Potassium (K)	3.8	.097	Total hardness as $CaCO_3$	58	
Bicarbonate (HCO_3)	72	1.180	pH	7.8	

MADISON COUNTY

MADISONVILLE

Population in 1940: 2,095.

Source of information: T. H. Allen, water superintendent, June 25, 1943.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1933 by Layne-Texas Co.; depth, 190 feet (drilled to 380 feet and plugged back to 190 feet); diameter, 14 inches; deep-well turbine pump and electric motor; screen from 160 to 190 feet; static water level reported, 47 feet below land surface in 1933; yield, 400 gallons a minute.

Well 2. 100 feet from well 1; drilled in 1936 by Layne-Texas Co.; depth, 190 feet (drilled to 874 feet and plugged back to 190 feet); diameter, 14 inches; screen from 160 to 190 feet; deep-well turbine pump; yield, about 400 gallons a minute.

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

Number of customers: 500.

Treatment: None.

Analysis, well 1

[Collected June 25, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	51		Sulfate (SO_4)	131	2.73
Iron (Fe)	2.1		Chloride (Cl)	271	7.64
Calcium (Ca)	75	3.74	Fluoride (F)	.7	.04
Magnesium (Mg)	14	1.15	Nitrate (NO_3)	0	0
Sodium (Na)	185	8.05	Total dissolved solids	632	
Potassium (K)	10	.26	Total hardness as $CaCO_3$	244	
Bicarbonate (HCO_3)	170	2.79	pH	7.2	

MIDWAY

Population in 1940: 500.

Source of information: Pump operator, June 25, 1943.

Ownership: Municipal.

Source of supply: Well drilled in 1928; reported depth, 209 feet; diameter, 6 inches; deep-well turbine pump and 5-horsepower electric motor; static water level reported, 85 feet below the surface; yield, about 40 gallons a minute.

Pumpage (estimated): Average, 14,000 gallons a day.

Storage: Elevated tank, 3,500 gallons.

Number of customers: 71.

Treatment: None.

Analysis, well 1

[Collected June 25, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	42		Sulfate (SO_4)	68	1.42
Iron (Fe)	2.7		Chloride (Cl)	149	4.20
Calcium (Ca)	42	2.10	Fluoride (F)	1.0	.06
Magnesium (Mg)	8.4	.69	Nitrate (NO_3)	0	0
Sodium (Na)	142	6.18	Total dissolved solids	575	
Potassium (K)	9.0	.23	Total hardness as $CaCO_3$	140	
Bicarbonate (HCO_3)	215	3.52	pH	7.8	

MARION COUNTY

JEFFERSON

Population in 1940: 2,797.

Source of information: Mr. Meyer, water superintendent, Mar. 24, 1943.

Ownership: Municipal.

Source of supply: Well at Dallas Street and Cypress Creek; drilled in 1926 by Layne-Texas Co.; depth, 780 feet; diameter, 12 to 8 inches; screen from 742 to 780 feet; reported natural flow of 50 gallons a minute when drilled, but stopped flowing in 1937; deep-well turbine pump and 50-horsepower electric motor; pump set at 120 feet; yield, 200 gallons a minute with a pumping level of 57 feet on test; present yield, 150 gallons a minute; temperature, 78° F.

Pumpage: Average, about 200,000 gallons a day.

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

Number of customers: 500.

Treatment: None.

Analysis, well 1

[Collected May 5, 1942. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	0.7	0.01
Iron (Fe)	.10		Chloride (Cl)	299	8.43
Calcium (Ca)	2.0	0.10	Fluoride (F)	.8	.04
Magnesium (Mg)	.9	.07	Nitrate (NO_3)	0	0
Sodium, potassium (Na+K)	395	17.16	Total dissolved solids	985	
Bicarbonate (HCO_3)	540	8.85	Total hardness as $CaCO_3$	8	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand	30	30	Sandy shale	21	306
Sandy clay	30	60	Sand	11	317
Dark sand	11	71	Rock	1	318
Rock	1	72	Sand	22	340
Sand and rock layers	4	76	Shale	12	352
Rock	1	77	Rock	1	353
Sand and rock layers	5	82	Sticky shale	65	418
Rock	1	83	Sandy shale	41	459
Fine sand	11	94	Gumbo	35	494
Rock	1	95	Shale	96	590
Fine sand	35	129	Sand	10	600
Soft shale	18	147	Gumbo	46	646
Lignite	5	152	Rock	1	647
Shale	20	172	Sand and shale	21	668
Sandstone	2	174	Shale	21	689
Gumbo and soapstone	25	199	Rock	2	691
Lignite	5	204	Gumbo and shale	26	717
Soapstone	5	209	Sand and lime	18	735
Gumbo and soapstone	12	221	Sand and lignite	2	737
Shale and lignite	13	234	Shale	4	741
Rock	1	235	Sandstone	2	743
Shale	26	261	Sand	36	779
Shale and soapstone	24	285	Gumbo	2	781

MATAGORDA COUNTY

BAY CITY

Population in 1940: 6,590 (estimated in 1943, 8,500).
Source of information: S. A. Russell, water superintendent, April 1943.
Ownership: Municipal.
Source of supply: Three wells.

Well 1. At pumping station about 2 blocks east of the city hall; depth, 444 feet; diameter, 20 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 10.4 feet below surface July 26, 1934; reported yield, 602 gallons a minute when drilled.

Well 2. South of the pump station; drilled in 1912; depth, 435 feet; diameter, 10 inches; deep-well turbine pump and 40-horsepower electric motor; yield reported, 565 gallons per minute when drilled.

Well 3. South of pump station; drilled in 1940; depth, 811 feet; diameter, 6⅝ inches; sand formation underreamed to 30 inches and gravel-walled; deep-well turbine pump and 40-horsepower electric motor; yield reported, 545 gallons per minute; static water level, 6 feet below surface when drilled.

Average pumpage, in gallons a day

Month	1941	1942	1943	Month	1941	1942	1943
January		211,400	302,100	July		257,200	
February		274,000	308,200	August		274,500	
March		237,600	271,900	September	320,600	270,500	
April		256,300	271,900	October	224,400	233,600	
May		280,000		November	241,700	269,100	
June		319,100		December	215,500	245,600	

Storage: Two elevated steel tanks, 50,000 and 150,000 gallons.
Number of customers: 1,500.
Treatment: Periodical chlorination.

Analyses

[Collected Apr. 6, 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		13		19	
Iron (Fe)	.12		3.1		.68	
Calcium (Ca)	35	1.75	33	1.65	46	2.30
Magnesium (Mg)	15	1.23	14	1.15	20	1.64
Sodium (Na)	59	2.57	67	2.90	85	3.71
Potassium (K)	3.6	.09	3.0	.08	3.6	.09
Bicarbonate (HCO_3)	258	4.23	268	4.39	316	5.18
Sulfate (SO_4)	16	.33	12	.25	21	.44
Chloride (Cl)	38	1.07	40	1.13	74	2.09
Fluoride (F)	.2	.01	.2	.01	.6	.03
Nitrate (NO_3)	0	0	.2	0	0	0
Total dissolved solids	308		315		426	
Total hardness as $CaCO_3$	149		140		197	
pH			8.0			

Drillers' logs

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Pink gumbo	49	190
Clay and sand	18	21	Sticky shale	38	228
Sand	17	38	Blue gumbo	40	268
Clay and sand	37	75	Sandy shale	27	295
Tough clay	37	112	Blue gumbo	90	385
Hard sand	29	141	Water sand and gravel	50	435

Well 3

Soil and clay	13	13	Shale	24	573
Sand and layers of clay	126	129	Fine-grained sharp sand	10	583
Red, blue, and gray clay	133	272	Blue mixed shale	36	619
Sandy clay and sand	51	323	Sharp sand	44	663
Blue shale	20	343	Shale	9	672
Sand and clay breaks	10	353	Sand and shale breaks	36	708
Shale	39	392	Shale	17	725
Brown sand and shale breaks	37	429	Sand	20	745
Shale	8	437	Shale	9	754
Sand with shale breaks	33	470	Sand and shale breaks	31	785
Shale	26	496	Shale with streaks of sand	21	806
Sand with shale breaks	53	549	No record	5	811

BLESSING

Population in 1940: 500.

Source of information: A. B. Pierce, owner, May 1943.

Owner: A. B. Pierce.

Source of supply: Well about 2 blocks west of Texas and New Orleans R. R.; drilled in 1907 by L. A. Layne; depth, 625 feet; diameter, 4 inches; air lift and 3-horsepower electric motor; flow reported, 90 gallons a minute when drilled.

Storage: Elevated tank.

Analysis

[Collected Apr. 8, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	18		Sulfate (SO_4)	19	0.40
Iron (Fe)	2.9		Chloride (Cl)	38	1.07
Calcium (Ca)	40	2.00	Fluoride (F)	.4	.02
Magnesium (Mg)	19	1.56	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	62.2	2.62	Total dissolved solids	339	
Bicarbonate (HCO_3)	286	4.69	Total hardness as $CaCO_3$	178	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Black soil	4	4	Sand	19	399
Clay	37	41	Hard rock	19	418
Sand	15	56	Gumbo	62	480
White clay	34	90	Red rock	11	491
Muddy sand	22	112	Gumbo	87	578
Red clay	71	183	Rock	5	583
Rock	8	191	Sand	35	618
Lime rock	129	320	Gumbo	6	624
Clay and cobblestones	60	380			

PALACIOS

Population in 1940: 2,288 (estimated in 1943, 4,000).
Source of information: Water superintendent, May 1943.
Ownership: Municipal.
Source of supply: Four wells.

Well 1. At pumping station about 3 blocks northwest of city hall; depth, about 590 feet; diameter, 12 inches; static level, 15.69 feet below surface Apr. 2, 1944; used as stand-by well.

Well 2. At pumping station about 3 blocks northwest of city hall; depth, about 590 feet; used as stand-by well.

Well 3. Two blocks north of city hall; drilled in 1936 by Layne-Texas Co.; depth, 607 feet; diameter, 13⅜ to 6 inches; deep-well turbine pump and 20-horsepower electric motor; flow reported, 25 gallons a minute when drilled; yield reported, 250 gallons a minute.

Well 4. Two blocks north of city hall; drilled in 1941 by Layne-Texas Co.; depth, 590 feet; diameter, 13⅜ to 6⅝ inches, deep-well turbine pump and 20-horsepower electric motor; static water level reported, 14 feet below land surface June 28, 1941.

Storage: Ground reservoir, 75,000 gallons; elevated steel tank, 75,000 gallons.
Number of customers: No record.
Treatment: None.

Analyses

[Collected Apr. 8, 1943. Analyzed by J. H. Rowley]

	Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silicia (SiO_2)	17		17	
Iron (Fe)	.05		.06	
Calcium (Ca)	6.6	0.33	5.8	0.29
Magnesium (Mg)	2.8	.23	3.2	.26
Sodium and potassium (Na+K)	177.8	7.69	169	7.36
Bicarbonate (HCO_3)	353	5.79	348	5.71
Sulfate (SO_4)	17	.35	18	.37
Chloride (Cl)	73	2.06	63	1.78
Fluoride (F)	1.0	.05	1.0	.05
Nitrate (NO_3)	.2	.05	.0	.00
Total dissolved solids	475		456	
Total hardness as $CaCO_3$	28		28	

Drillers' logs

Well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	7	7	Sand	3	345
Sand	8	15	Clay	14	359
Clay	44	59	Sand	14	373
Sand	7	66	Shale	3	376
Clay	109	175	Sand	38	414
Sand	7	182	Shale	31	445
Clay	40	222	Sand	7	452
Sandy clay	24	246	Shale	28	480
Sand	12	258	Sand	6	486
Clay	48	306	Shale	60	546
Sand	12	318	Sand	42	588
Shale	24	342	Shale	19	607

Well 4

Soil	1	1	Shale	11	304
Clay	14	15	Sand	12	316
Sand	4	19	Shale and streaks of shell	43	359
Sandy clay	24	43	Sand	21	380
Sand	8	51	Shale	63	443
Clay	55	106	Shale and layers of sand	17	460
Sandy clay	20	126	Shale and layers of shell	21	481
Clay and caliche	30	156	Shale	30	511
Sandy clay	16	172	Hard shale	25	536
Sand, clay, and caliche	44	216	Good sand	33	569
Soft shale	29	245	Shale	3	572
Shale and layers of shell	23	268	Sand	6	578
Shale	18	286	Shale	12	590
Tough shale	7	293			

McLENNAN COUNTY

BRUCEVILLE

Population in 1940: 500.

Source of information: E. B. Firquin, Jr., owner, Jan. 9, 1943.

Owner: E. B. Firquin, Jr.

Source of supply: Well at north side of town, 1 block from railroad station; drilled before 1900; depth, 1,565 feet; diameter, 6 inches; deep-well cylinder,

pump jack, and gasoline engine; flowed when drilled; static water level reported, 80 to 100 feet below land surface in 1943.

Pumpage: No record.

Storage: Elevated wooden tank, about 2,000 gallons.

Number of customers: Not reported.

Treatment: None.

Analysis, well 1

[Collected Jan. 9, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.5		Sulfate (SO_4)	719	14.97
Iron (Fe)	35		Chloride (Cl)	198	5.58
Calcium (Ca)	17	0.85	Fluoride (F)	3.2	.17
Magnesium (Mg)	15	1.23	Nitrate (NO_3)	.2	.00
Sodium (Na), Potassium (K)	611	26.57	Total dissolved solids	1,810	
Bicarbonate (HCO_3)	484	7.93	Total hardness as $CaCO_3$	104	
			pH	8.0	

CHINA SPRING

Population in 1940: 214.

Source of information: China Spring Water Co., A. M. Humberson, manager, Jan. 7, 1943.

Owner: China Spring Water Co.

Source of supply: Well 150 yards south of post office; drilled before 1900; depth, 1,110 feet; diameter, 6 inches at surface; deep-well cylinder, pump jack, and electric motor; reported flow, 40 gallons a minute when drilled; present water level undetermined.

Storage: Small tank.

Treatment: None.

Analysis, well 1

[Collected Jan. 7, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	307	6.39
Iron (Fe)	0		Chloride (Cl)	69	1.95
Calcium (Ca)	6.9	0.34	Fluoride (F)	1.8	.09
Magnesium (Mg)	7.7	.63	Nitrate (NO_3)	0	0
Sodium (Na), Potassium (K)	348	15.11	Total dissolved solids	985	
Bicarbonate (HCO_3)	466	7.65	Total hardness as $CaCO_3$	48	
			pH	8.4	

CRAWFORD

Population in 1940: 471.

Source of information: Homer Brown, water superintendent, Jan. 6, 1943.

Ownership: Municipal.

Source of supply: Well 200 yards northwest of railroad station; drilled before 1900; depth, approximately 1,000 feet; diameter at surface, 5 inches; deep-well cylinder, pump jack, and electric motor; cylinder set at 170 feet; flowed when drilled.

Pumpage (estimated): Average, 12,000 gallons a day in winter and 27,000 gallons a day in summer.

Storage: Elevated tank, estimated 50,000 gallons.

Number of customers: 125.

Treatment: None.

Analysis, well 1

[Collected Jan. 9, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	214	4.46
Iron (Fe)	.04		Chloride (Cl)	38	1.07
Calcium (Ca)	5.6	0.28	Fluoride (F)	1.4	.07
Magnesium (Mg)	5.0	.41	Nitrate (NO_3)	1.8	.03
Sodium (Na)	284	12.33	Total dissolved solids	789	
Potassium (K)	3.6	.09	Total hardness as $CaCO_3$	34	
Bicarbonate (HCO_3)	457	7.48	pH	8.3	

EDDY

Population in 1940: 407.

Source of information: I. N. Hendrick, manager, Jan. 9, 1943.

Owner: Sun Utility Co.

Source of supply: Well in center of town, west of highway; depth, 1,630 feet; diameter, 6 inches at surface; air lift and semi-Diesel type motor; water level reported, 80 to 100 feet below land surface; temperature, 96° F.

Pumpage: Not reported.

Storage: Approximately 15,000 gallons.

Number of customers: 100.

Treatment: None

Analysis, well 1

[Collected Jan. 9, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	284	5.91
Iron (Fe)	.02		Chloride (Cl)	131	3.69
Calcium (Ca)	7.2	0.36	Fluoride (F)	1.8	.09
Magnesium (Mg)	4.5	.37	Nitrate (NO_3)	1.0	.02
Sodium (Na)	372	16.19	Total dissolved solids	1,040	
Potassium (K)	3.8	.10	Total hardness as $CaCO_3$	36	
Bicarbonate (HCO_3)	445	7.31	pH	8.4	

HEWITT

Population in 1940: 79.

Source of information: W. D. Chapman, owner, Jan. 9, 1943.

Owner: W. D. Chapman.

Source of supply: Well in southeast part of town, 2 blocks north of school; drilled in 1899; depth, 1,646 feet; small cylinder pump and gasoline engine; static water level, approximately 100 feet below land surface.

Pumpage: 5,000 to 8,000 gallons a day in addition to supplies for railroad and schools.

Storage: 6,000 gallons.

Number of customers: 40.

Treatment: None.

Analysis, well 1

[Collected Jan. 9, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	327	6.81
Iron (Fe)	.14		Chloride (Cl)	93	2.62
Calcium (Ca)	14	0.70	Fluoride (F)	1.8	.09
Magnesium (Mg)	6.4	.53	Nitrate (NO_3)	.2	.00
Sodium (Na)	367	15.94	Total dissolved solids	1,050	
Potassium (K)			Total hardness as $CaCO_3$	62	
Bicarbonate (HCO_3)	467	7.65	pH	8.2	

LEROY

Population in 1940: 250.

Source of information: S. E. Morgan, manager, Jan. 8, 1943.

Owner: Farmers & Merchants Gin Co.

Source of supply: Well 300 yards southeast of railroad station; drilled in 1914 by Dearing & Sons; depth, 2,311 feet; diameter, 6 to 4 inches; estimated natural flow, 15 to 20 gallons a minute; pressure reported, 40 pounds at surface in 1936; temperature reported, 114° F.

Storage: None.

Treatment: None.

Analysis, well 1

[Collected Jan. 8, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	1,830	38.10
Iron (Fe)	.45		Chloride (Cl)	242	6.83
Calcium (Ca)	112	5.59	Fluoride (F)	2.1	.11
Magnesium (Mg)	46	3.78	Nitrate (NO_3)	1.5	.02
Sodium (Na)	933	40.57	Total dissolved solids	3,330	
Potassium (K)			Total hardness as $CaCO_3$	468	
Bicarbonate (HCO_3)	298	4.88	pH	7.6	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and clay	16	16	Hard lime	15	1,900
Sand and gravel	74	90	White marl	25	1,925
Shale	204	294	Sand	5	1,930
Soft white rock	81	375	White marl	4	1,934
Shale and thin rock	478	853	Hard brown rock	8	1,942
Hard sand rock	4	857	White marl	23	1,965
First woodbine sand	3	860	Soft lime	23	1,988
Shale and soapstone	12	872	Hard brown rock	7	1,995
Hard rock	6	878	White marl	30	2,025
Shale and thin rock	82	960	Hard lime	45	2,070
Gumbo	20	980	White marl	20	2,090
Shale	48	1,028	Hard lime	8	2,098
Lime rock	402	1,430	Hard shale	20	2,118
Blue shale	7	1,437	Hard brown rock	7	2,125
Limestone and marl	308	1,745	Soft marl and lime	40	2,165
Hard sand	1	1,746	Hard lime	15	2,180
Soapstone	9	1,755	Shale	6	2,186
Hard lime	45	1,800	Hard lime	14	2,200
Marl and lime	45	1,845	Hard sand	45	2,245
Hard sand, flow of salt water	1	1,846	Soft marl	11	2,256
Hard brown sand	9	1,855	Good sand	52	2,308
Shale and marl	15	1,870	Hard lime	3	2,311
Hard brown rock	15	1,885			

LORENA

Population in 1940: 342.

Source of information: I. N. Hendricks, manager, Jan. 9, 1943.

Owner: Sun Utility Co.

Source of supply: Well; reported depth, 1,600 feet; diameter, 6 inches at surface; air lift.

Storage: Elevated tank, 30,800 gallons.

Treatment: None.

Analysis, well 1

[Collected Jan. 9, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	234	4.87
Iron (Fe)	.29		Chloride (Cl)	69	1.95
Calcium (Ca)	5.6	0.28	Fluoride (F)	1.6	.08
Magnesium (Mg)	3.2	.26	Nitrate (NO_3)	1.5	.02
Sodium (Na)	321	13.96	Total dissolved solids	904	
Potassium (K)	4.2	.11	Total hardness as $CaCO_3$	27	
Bicarbonate (HCO_3)	470	7.69	pH	8.4	

MART

Population in 1940: 2,856.

Source of information: Miss Alma Patrick, city secretary, Apr. 21, 1943.

Ownership: Municipal.

Source of supply: Mart Lake, 6.3 miles northwest of city; capacity, 640 million gallons; drainage area, 1,450 acres; 29,644 feet of 10-inch and 3,700 feet of 8-inch pipe line; two pumps with capacity of 500 gallons a minute each and crude oil engines.

Pumpage: Average, 300,000 gallons a day.

Storage: Standpipe, 70,000 gallons.

Treatment: Chlorination.

Analysis of sample from hydrant at city hall

[Collected Apr. 21, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	2.5		Sulfate (SO_4)	16	0.333
Iron (Fe)	.06		Chloride (Cl)	8.0	.226
Calcium (Ca)	36	1.797	Fluoride (F)	.6	.032
Magnesium (Mg)	5.3	.436	Nitrate (NO_3)	1.0	.016
Sodium (Na)	9.8	.426	Total dissolved solids	158	
Potassium (K)	4.4	.113	Total hardness as $CaCO_3$	112	
Bicarbonate (HCO_3)	132	2.164	pH	7.9	

McGREGOR

Population in 1940: 2,662.

Source of information: Lloyd Sebastian, manager, Jan. 6, 1943.

Owner: Community Public Service Co.

Source of supply: Two wells near north edge of town.

Well 1. Drilled in 1908 by Darley; depth, 1,080 feet; diameter, 12 to 8 inches; deep-well turbine pump and electric motor; pump set at 300 feet

in 1943; static water level reported, 150 feet below land surface; yield, 200 gallons a minute with draw-down of 35 feet in 1942; temperature, 85° F.

Well 2. 300 feet north of well 1; drilled in 1942 by Layne-Texas Co.; depth, 1,250 feet; diameter, 8⅝ to 6⅝ inches; deep-well turbine pump and 15-horsepower electric motor; pump set at 400 feet; static water level, 175 feet below land surface when drilled; yield, 65 gallons a minute with draw-down of 175 feet.

Pumpage: 120,000 to 130,000 gallons a day in winter; 160,000 gallons a day in summer.

Storage: Concrete ground reservoir, 110,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 655.

Treatment: None.

Analyses

[Collected Jan. 6, 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	10		13	
Iron (Fe)	0		0	
Calcium (Ca)	6.3	0.31	5.6	0.28
Magnesium (Mg)	4.6	.38	2.4	.20
Sodium (Na)	309	13.54	276	12.02
Potassium (K)			4.6	.12
Bicarbonate (HCO_3)	470	7.71	494	8.11
Sulfate (SO_4)	214	4.46	123	2.56
Chloride (Cl)	67	1.89	66	1.86
Fluoride (F)	1.0	.05	1.7	.09
Nitrate (NO_3)	.5	.01	0	0
Total dissolved solids	844		736	
Total hardness as $CaCO_3$	34		24	
pH	8.2		8.4	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Black soil	3	3	Lime	102	795
Sandy chalk	17	20	Lime and shale	103	898
Broken lime	98	118	Lime	46	944
Hard lime	37	155	Sandy lime	13	957
Shale and lime	26	181	Sandy lime and shale	25	982
Hard lime rock	1	182	Sandy shale	32	1,014
Broken lime	7	189	Sand	21	1,035
Lime	25	214	Shale and shandy layers	17	1,052
Broken lime	21	235	Red bed	11	1,063
Blue shale	13	248	White sand, fine	9	1,072
Shale and hard layers	19	267	Blue shale, hard	18	1,090
Broken layer rock	4	271	Shale, hard	15	1,105
Shale and lime	99	370	Shale, lime, and red bed	31	1,136
Lime	79	449	Shale and sandy shale	14	1,150
Lime and shale	66	515	Lime	10	1,160
Sandy lime	18	533	Sandy shale	20	1,180
Lime and shale	117	650	Shale	23	1,203
Sandy lime	10	660	Blue shale	27	1,250
Lime and shale	33	693			

MOODY

Population in 1940: 931.

Source of information: Lloyd Sebastian, manager, Jan. 5, 1943.

Owner: Community Public Service Co.

Source of supply: Well drilled about 1905; depth, 1,700 feet; diameter, 6 inches at surface; air lift and 40-horsepower electric motor; bottom of 1½-inch airline, 435 feet; temperature, 89° F.

Pumpage: 75,000 to 85,000 gallons a day in summer; 35,000 to 45,000 gallons a day in winter.

Storage: Concrete ground reservoir, 79,000 gallons; elevated tank, 55,000 gallons.

Number of customers: 315.

Treatment: None.

Analysis, well 1

[Collected Jan. 5, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	266	5.54
Iron (Fe)	.00		Chloride (Cl)	133	3.75
Calcium (Ca)	7.8	0.39	Fluoride (F)	.5	.03
Magnesium (Mg)	4.9	.40	Nitrate (NO_3)	1.6	.02
Sodium (Na)	365	15.85	Total dissolved solids	1,010	
Potassium (K)	3.8	.10	Total hardness as $CaCO_3$	40	
Bicarbonate (HCO_3)	451	7.40	pH	8.2	

ROSS

Population in 1940: 52.

Source of information: John J. Heil, manager, Jan. 8, 1943.

Owner: Ross Gin Co.

Source of supply: Well 250 yards south of post office near gin; drilled in 1925 by Jim Maresh; depth, 1,950 feet; diameter, 8 inches at surface; cylinder pump and windmill; cylinder set at 220 feet.

Pumpage: Not measured.

Storage: Small wooden tank.

Treatment: None.

Analysis, well 1

[Collected Jan. 8, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	486	10.12
Iron (Fe)	2.7		Chloride (Cl)	82	2.31
Calcium (Ca)	8.6	0.43	Fluoride (F)	3.1	.16
Magnesium (Mg)	5.7	.47	Nitrate (NO_3)	.2	.00
Sodium (Na)	456	19.84	Total dissolved solids	1,300	
Potassium (K)			Total hardness as $CaCO_3$	45	
Bicarbonate (HCO_3)	498	8.15	pH	8.4	

SPEEGLEVILLE

Population in 1940: 111.

Source of information: N. G. Alford, owner, Jan. 6, 1943.

Owner: N. G. Alford.

Source of supply: Well 0.5 mile west of town; drilled in 1901 by Lee Hannan; depth, 1,120 feet; diameter, 6 inches at surface; flowed 15 feet above surface when drilled; no flow in last 10 years; cylinder pump and electric motor.

Pumpage: No record.

Storage: Small tank.

Treatment: None.

Analysis, well 1

[Collected Jan. 6, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.6		Sulfate (SO_4)	585	12.18
Iron (Fe)	.06		Chloride (Cl)	63	1.78
Calcium (Ca)	13	0.65	Fluoride (F)	3.3	.17
Magnesium (Mg)	14	1.15	Nitrate (NO_3)	.2	.00
Sodium (Na)	472	20.54	Total dissolved solids	1,410	
Potassium (K)			Total hardness as $CaCO_3$	90	
Bicarbonate (HCO_3)	501	8.21	pH	8.2	

WACO

Population in 1940: 55,982.

Source of information: George J. Roban, water superintendent, Jan. 8, 1943.

Ownership: Municipal.

Source of supply: Lake on Bosque River; capacity, 39,000 acre-feet when built about 1930. (The city still uses a few water wells for display fountains and special industrial requirements. It was reported that the estimated natural flow of water from 12 wells in Waco was more than 10 million gallons a day in 1891 with pressure as high as 76 pounds, enough to raise the water 175 feet above the land surface. Because of these wells, Waco has been called the "Geyser City." Some of the wells in the lower part of town still have a flow. The yield diminished considerably, but the yield and pressure have recovered somewhat since the city started to use surface water.)

Average pumpage, in gallons a day

	1941	1942		1941	1942
January	3,960,000	4,660,000	July	6,140,000	8,530,000
February	3,910,000	4,560,000	August	6,510,000	7,620,000
March	3,930,000	4,890,000	September	6,270,000	5,560,000
April	4,210,000	4,790,000	October	4,840,000	5,220,000
May	4,640,000	4,860,000	November	4,520,000	4,890,000
June	4,700,000	6,140,000	December	4,200,000	4,930,000

Storage: Treated water, 5,850,000 gallons; clear water, 1,000,000 gallons.

Number of customers: 14,000.

Treatment: Aeration, coagulation (100 pounds of alum per million gallons), sedimentation, activated carbon, rapid sand filtration, and chlorination (7 pounds per million gallons). (Capacity of treating plant, 15,000,000 gallons a day.)

Analyses

[Collected Jan. 8, 1943. Analyzed by J. H. Rowley]

	Raw water		Finished water		Well 1 (at filtration plant)	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	7.6		2.8		16	
Iron (Fe)	.06		.18		.04	
Calcium (Ca)	70	3.49	69	3.44	5.9	29
Magnesium (Mg)	11	.90	11	.90	3.1	26
Sodium (Na)	30	1.29	31	1.35	280	12.19
Potassium (K)	.6	.02	.7	.2		
Bicarbonate (HCO_3)	217	3.55	207	3.39	434	710
Sulfate (SO_4)	52	1.08	57	1.19	208	4.33
Chloride (Cl)	33	.93	35	.99	43	1.21
Fluoride (F)	.8	.04	1.0	.05	2.0	.11
Nitrate (NO_3)	5.9	.10	5.7	.09	0	0
Total dissolved solids	335		335		779	
Total hardness as $CaCO_3$	218		217		27	
pH	8.2		7.8		8.3	

Drillers' log, well 1 [1]

[At filtration plant on west side of Vermont and Brazos River Streets]

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Austin: White lime	165	165	Basal Sand:		
Edwards and Del Rio: Brown slate	185	350	"Trinity" water sand	30	1,735
Georgetown: Blue slate	215	565	Brown sandy slate	65	1,800
Edwards, Comanche Peak, and Walnut:			Blue gumbo	55	1,855
White lime	435	1,000	Brown water sand	30	1 885
Blue slate, small sulphur water above 1,200 feet	70	1,070	Sandy lime	15	1,900
Glen Rose:			Red slate	5	1,905
White lime	485	1,555	Sandy lime	35	1,940
Blue slate	105	1 660	Black slate	10	1,950
White lime	45	1,705	White sand rock	5	1,955
			White lime	5	1,960
			White sand	80	2,040
			Sandy lime	6	2,046

[1] Bureau of Economic Geology, University of Texas, Bull. No. 2340, p. 155.

WEST

Population in 1940: 1,979.

Source of information: John Kubala, water superintendent, Jan. 8, 1943.

Ownership: Municipal.

Source of supply: Well at corner of Pine and Regan Streets; drilled in 1894; depth, 2,010 feet; diameter, 12 to 3½ inches; deep-well turbine pump and 25-horsepower electric motor; pump set at 167 feet; bottom of suction at 181 feet; sucks air after 9 hours of pumping at 225 gallons a minute; flowed when drilled; static water level reported, 30 feet below land surface in 1926, 54 feet in February 1932, 66 feet in May 1942, and 88.9 feet below pump base 4 hours after pump was shut off on Jan. 8, 1943.

Storage: Standpipe and underground reservoirs, 235,000 gallons.

Number of customers: 574.

Treatment: Chlorination.

Analysis, well 1

[Collected Jan. 8, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	234	4.87
Iron (Fe)	.00		Chloride (Cl)	46	1.30
Calcium (Ca)	16	0.80	Fluoride (F)	.6	.03
Magnesium (Mg)	.0	.66	Nitrate (NO_3)	.2	.00
Sodium (Na)	269	11.69	Total dissolved solids	804	
Potassium (K)	4.0	.10	Total hardness as $CaCO_3$	73	
Bicarbonate (HCO_3)	430	7.05	pH	8.2	

MILAM COUNTY

CAMERON

Population in 1940: 5,040.

Source of information: R. W. Hester, water superintendent, Feb. 12, 1943.

Owner: Community Public Service Co.

Source of supply: Surface supply from Little River 1 mile west of Cameron. Storage reservoirs and treating plant 2 blocks east and 1 block north of courthouse in Cameron.

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

Storage: Ground reservoir, also used for settling basin, 2,000,000 gallons; standpipe, 173,000 gallons.

Number of customers: 1,000.

Treatment: Alum and activated carbon, coagulation and sedimentation, and chlorination.

Analyses

[Collected Feb. 12, 1943. Analyzed by P. A. Witt]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	5.8		5.2	
Iron (Fe)	.0		.04	
Calcium (Ca)	74	3.69	76	3.79
Magnesium (Mg)	25	2.06	23	1.89
Sodium (Na)	62	2.70	64	2.79
Potassium (K)	6.0	.15	7.2	.18
Bicarbonate (HCO_3)	278	4.56	284	4.66
Sulfate (SO_4)	65	1.35	68	1.42
Chloride (Cl)	92	2.59	88	2.48
Fluoride (F)	.3	.02	.2	.01
Nitrate (NO_3)	4.8	.08	4.8	.08
Total dissolved solids	472		476	
Total hardness as $CaCO_3$	288		283	
pH	7.9		8.0	

ROCKDALE

Population in 1940: 2,136.

Source of information: J. W. Offield, water superintendent, Feb. 12, 1943.

Ownership: Municipal.

Source of supply: Wells about 300 feet apart in the southwest part of Rockdale.

Well 1. Dug; depth, 80 feet; diameter, 10 feet; deep-well turbine pump and 5-horsepower electric motor; yield, 125 gallons a minute.

Well 2. Dug; depth, 80 feet; diameter, 8 feet; deep-well turbine pump and 5-horsepower electric motor; yield, 150 gallons a minute.

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

Number of customers: 590.

Treatment: Aeration and sedimentation.

Analysis, well 2

[Collected Feb. 12, 1943. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	29		Sulfate (SO_4)	34	0.71
Iron (Fe)	.05		Chloride (Cl)	193	5.44
Calcium (Ca)	58	2.89	Fluoride (F)	.2	.01
Magnesium (Mg)	21	1.73	Nitrate (NO_3)	5.8	.09
Sodium (Na)	52	2.27	Total dissolved solids	497	
Potassium (K)	13	.33	Total hardness as $CaCO_3$	231	
Bicarbonate (HCO_3)	59	.97	pH	7.9	

THORNDALE

Population in 1940: 898.

Source of information: Amos Snyder, water superintendent, Feb. 12, 1943.

Ownership: Municipal.

Source of supply: Surface supply from a lake 1 mile southwest of Thorndale.

Pumpage (estimated): Maximum, 75,000 gallons; average, 25,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 110.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis of raw water

[Collected Feb. 12, 1943. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	3.2		Sulfate (SO_4)	24	0.500
Iron (Fe)	.05		Chloride (Cl)	12	.338
Calcium (Ca)	56	2.795	Fluoride (F)	.4	.021
Magnesium (Mg)	8.1	.666	Nitrate (NO_3)	.5	.008
Sodium (Na)	15	.633	Total dissolved solids	231	
Potassium (K)	8.4	.215	Total hardness as $CaCO_3$	174	
Bicarbonate (HCO_3)	210	3.442	pH	8.0	

MONTGOMERY COUNTY

CONROE

Population in 1940: 4,624.

Source of information: H. T. Schroeder, engineer, September 1942 and Apr. 11, 1944.

Owner: Gulf States Utilities Co.

Source of supply: Three wells.

Well 1. Drilled in 1921; depth, 205 feet; diameter, 6 inches; air lift; yield, about 60 gallons a minute in 1942; used as stand-by well.

Well 2. Drilled in 1924; depth, 1,221 feet; diameter, 8 inches; air lift; yield, about 440 gallons a minute in 1942.

Well 3. Drilled in 1938; depth, 221 feet; diameter, 16 to 8½ inches; deep-well turbine pump and 15-horsepower electric motor; reported static water level, 64 feet below land surface in May 1938; reported yield, 500 gallons a minute with draw-down of 56 feet.

Average pumpage, in gallons a day

	1942	1943		1942	1943		1942	1943
January	236,000	245,000	May	224,000	263,000	September	238,000	398,000
February	225,000	191,000	June	234,000	288,000	October	254,000	380,000
March	228,000	219,000	July	240,000	242,000	November	203,000	320,000
April	210,000	231,000	August	246,000	449,000	December	188,000	338,000

Storage: Surface reservoir, 38,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 1,045.
Treatment: Aeration, adjustment of pH with lime, and chlorination.

Analyses, well 2

[Collected Apr. 11, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	26		Sulfate (SO_4)	22	0.46
Iron (Fe)	2.7		Chloride (Cl)	46	1.30
Calcium (Ca)	40	2.00	Fluoride (F)	.2	.01
Magnesium (Mg)	7.4	.61	Nitrate (NO_3)	1.0	.02
Sodium (Na)	81	3.54	Total dissolved solids	369	
Potassium (K)	7.8	.20	Total hardness as $CaCO_3$	130	
Bicarbonate (HCO_3)	278	4.56	pH	7.9	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	50	50	Pack sand	10	505
Fine sand	30	80	Shale	65	570
Shale	90	170	Sand	20	590
Sand	35	205	Hard sand	16	606
Shale	45	250	Sand	24	630
Hard sand, some gravel	55	305	Shale	55	685
Clay	17	322	Sand	25	710
Pack sand	12	334	Gumbo	20	730
Sand	24	358	Shale	50	780
Clay	10	368	Gumbo and shale	110	890
Shale	32	400	Shale	50	940
Pack sand	8	408	Pack sand	40	980
Shale	17	425	Shale	80	1,060
Pack sand	6	431	Water sand	106	1,166
Clay	29	460	Gumbo	20	1,186
Pack sand	20	480	Sand	35	1,221
Clay	15	495			

FOSTORIA

Population in 1940: 1,000.

Source of information: Frank Thomas, master mechanic, Apr. 11, 1944.

Owner: Foster Lumber Co.

Source of supply: Two wells (Nos. 3 and 4).

Well 3. Drilled in 1918; depth, 1,222 feet; diameter, 6 inches; air lift; natural flow, about 50 gallons a minute in 1944.

Well 4. Drilled in 1937 by Layne-Texas Co.; depth, 1,191 feet; diameter, 6⅝ to 5 inches; air lift; natural flow, about 110 gallons a minute in 1944.

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

Storage: Elevated tank, 40,000 gallons.

Number of customers: 220.

Treatment: None.

Analysis, well 3

[Collected June 5, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	4.8	0.24	Chloride (Cl)	41	1.16
Magnesium (Mg)	2.4	.20	Fluoride (F)	.8	.04
Sodium and potassium (Na+K)	123	5.77	Nitrate (NO_3)	2.0	.03
Bicarbonate (HCO_3)	244	4.00	Total dissolved solids	320	
Sulfate (SO_4)	26	.54	Total hardness as $CaCO_3$	22	

MONTGOMERY

Population in 1940: 750.

Source of information: Luther Cleveland, water superintendent, Apr. 11, 1944.

Owner: H. F. Mickles.

Source of supply: Well, drilled in 1940; depth, 230 feet; diameter, 6 inches; deep-well cylinder pump and 5-horsepower electric motor; static water level, 94 feet below land surface in June 1942.

Pumpage: Average, 5,000 gallons a day.

Storage: Elevated tank, 10,000 gallons.

Number of customers: 59.

Treatment: None.

Analysis

[Collected Apr. 11, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	25		Sulfate (SO_4)	4.9	0.10
Iron (Fe)	.05		Chloride (Cl)	42	1.18
Calcium (Ca)	126	6.29	Fluoride (F)	.6	.03
Magnesium (Mg)	7.6	.62	Nitrate (NO_3)	.2	.00
Sodium (Na)	20	.85	Total dissolved solids	433	
Potassium (K)	6.4	.16	Total hardness as $CaCO_3$	346	
Bicarbonate (HCO_3)	403	6.61	pH	7.0	

WILLIS

Population in 1940: 904.

Source of information: T. E. Darden, city secretary, Apr. 11, 1944.

Ownership: Municipal.

Source of supply: Well, drilled in 1941 by Layne-Texas Co.; depth, 365 feet; diameter, 10¾ to 4½ inches; deep-well turbine pump and 20-horsepower electric motor; static water level, 182.7 feet below measuring point in June 1942; yield, 105 gallons a minute with draw-down of 85 feet in July 1941.

Pumpage (estimated): Average, 12,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 90.

Treatment: None.

Analysis

[Collected June 10, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium	72	3.59	Chloride (Cl)	65	1.83
Magnesium (Mg)	16	1.32	Fluoride (F)	.8	.04
Sodium and potassium (Na+K)	41	1.78	Nitrate (NO_3)	1.0	.02
Bicarbonate (HCO_3)	262	4.29	Total dissolved solids	348	
Sulfate (SO_4)	23	.48	Total hardness as $CaCO_3$	245	

Drillers' log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	25	25	Hard sand	10	254
Gravel	15	40	Shale	22	276
Clay	10	50	Hard fine-grained sand	21	297
Sand	30	80	Shale	23	320
Clay	50	130	Hard sand	13	333
Sandy clay	ii	iii	Fine-grained sand	28	361
Clay	27	168	Shale	4	365
Clay with hard streaks	76	244			

MORRIS COUNTY

DAINGERFIELD

Population in 1940: 1,032.

Source of information: Jim Moore, water superintendent, Mar. 14, 1942.

Ownership: Municipal.

Source of supply: Well drilled in 1939 by Layne-Texas Co.; depth, 654 feet; diameter, 13⅞ to 8 inches; screens from 258 to 279, 301 to 321, and 357 to 378 feet; deep-well turbine pump and 15-horsepower electric motor; pump set at 270 feet; static water level, 210 feet below land surface in July 1939; yield, 140 gallons a minute with draw-down of 47 feet in 1939; present yield reported, 140 gallons a minute; temperature, 60° F.

Pumpage (estimated): Average, 400,000 gallons a day.

Storage: Steel ground reservoir on hill 100 feet above downtown area, 100,000 gallons.

Number of customers: 156.

Treatment: Aeration and slow sand filter.

Analysis, well 1

[Collected Nov. 2, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	29		Sulfate (SO_4)	24	0.500
Iron (Fe)	.08		Chloride (Cl)	7.0	.197
Calcium (Ca)	8.0	0.399	Fluoride (F)	.2	.011
Magnesium (Mg)	3.2	.263	Nitrate (NO_3)	.2	.003
Sodium (Na)	6.3	.272	Total dissolved solids	99	
Potassium (K)	6.0	.154	Total hardness as $CaCO_3$	33	
Bicarbonate (HCO_3)	23	.377	pH	7.3	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red sandy clay	25	25	Rock	2	276
Sand	7	32	Sand	55	331
Yellow clay	37	69	Hardpan	2	333
Black shale	23	92	Sand	53	386
Sandy shale	23	115	Shale	23	409
Sand and lignite	16	131	Sandy shale	66	475
Shale	5	136	Rock	1	476
Sand and lignite	25	161	Hard blue shale	67	543
Sand	21	182	Shale	27	570
Rock	1	183	Rock	7	577
Shale	47	230	Black shale	77	654
Sand	44	274			

NAPLES

Population in 1940: 821.

Source of information: Mr. Smith, mayor, Mar. 11, 1942.

Ownership: Municipal.

Source of supply: Well 2½ blocks west of railroad station; drilled in 1935 by Layne-Texas Co.; depth, 864 feet (plugged back to 450 feet); diameter, 13 to 6 inches; screens from 297 to 354 and 397 to 430 feet; deep-well turbine pump and 15-horsepower electric motor; pump set at 280 feet; static water level, 123 feet below land surface on Mar. 31, 1935; yield, 88 gallons a minute with drawdown of 155 feet.

Pumpage (estimated): Average, 16,000 gallons a day.

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

Number of customers: 130.

Treatment: None.

Analysis, well 1

[Collected Dec. 1, 1943. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	1.4	0.03
Iron (Fe)	.47		Chloride (Cl)	114	3.22
Calcium (Ca)	3.0	0.15	Fluoride (F)	1.4	.07
Magnesium (Mg)	.8	.07	Nitrate (NO_3)	.2	.00
Sodium (Na)	225	9.78	Total dissolved solids	578	
Potassium (K)	3.6	.09	Total hardness as $CaCO_3$	11	
Bicarbonate (HCO_3)	411	6.74	pH	8.3	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red clay	10	10	Shale, sand layers	38	346
Blue clay	51	61	Shale	57	403
Shale	46	107	Sand	33	436
Hard shale	50	157	Shale	40	476
Shale, lignite, fine-grained sand	91	248	Shale, layers rock	51	527
Rock	1	249	Shale	66	593
Hard shale	49	298	Sand	7	600
Sand	10	308	Shale	264	864

OMAHA

Population in 1940: 623.

Source of information: Thomas & Ware Water Co., Mar. 11, 1942.

Owner: Thomas & Ware Water Co.

Source of supply: Well 2½ blocks east and 1 block north of railroad station; drilled in 1930; depth, 260 feet; diameter, 12 to 6 inches; lower 40 feet of casing perforated; air lift; reported static water level, 60 feet below land surface; reported yield, 100 gallons a minute; temperature, 66° F.

Pumpage: No record.

Storage: Ground reservoir and elevated tank, capacity unknown.

Number of customers: 74.

Treatment: None.

Analysis, well 1

[Collected Mar. 11, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)			Sulfate (SO_4)	17	0.35
Iron (Fe)			Chloride (Cl)	22	.62
Calcium (Ca)	8.8	0.44	Fluoride (F)	0	0
Magnesium (Mg)	2.2	.18	Nitrate (NO_3)	30	.48
Sodium (Na)	21	.93	Total dissolved solids	104	
Potassium (K)			Total hardness as $CaCO_3$	31	
Bicarbonate (HCO_3)	6.0	.10	pH	5.4	

NACOGDOCHES COUNTY

APPLEBY

Population in 1940: 500.

Source of information: J. P. Coon, water superintendent, June 15, 1944.

Owners: Citizens of Appleby.

Source of supply: Well at north edge of town; drilled in 1913; depth, 560 feet; diameter, 5⅜16 to 4 inches; cylinder pump and electric motor; reported yield, 40 gallons a minute.

Pumpage: No data.

Storage: Steel tank, 1,000 gallons.

Number of customers: 16.

Treatment: Aeration.

Analysis, well 1

[Collected Aug. 18, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	3.8	0.079
Iron (Fe)	6.6		Chloride (Cl)	5.0	.141
Calcium (Ca)	1.8	0.090	Fluoride (F)	0	0
Magnesium (Mg)	1.0	.082	Nitrate (NO_3)	0	0
Sodium (Na)	3.5	.151	Total dissolved solids	48	
Potassium (K)	3.0	.077	Total hardness as $CaCO_3$	9	
Bicarbonate (HCO_3)	11	.180	pH	5.8	

CUSHING

Population in 1940: 473.

Source of information: E. D. Beck, city secretary, June 15, 1944.

Ownership: Municipal.

Source of supply: Well near elevated tank; drilled in 1936 by J. N. Heard; depth, 320 feet; diameter, 6 to 4½ inches; screen from 280 to 320 feet; deep-well turbine pump and electric motor; static water level reported, 115 feet below land surface in September 1936 and 117 feet in June 1944; yield, 50 gallons a minute; temperature, 71° F.

Pumpage: Average, 15,000 to 18,000 gallons a day.

Storage: Concrete ground reservoir, 10,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 121.

Treatment: Aeration, coagulation with lime and alum, pressure filter, and occasion chlorination.

Analysis, well 1

[Collected June 15, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	37	0.770
Iron (Fe)	1.0		Chloride (Cl)	11	.310
Calcium (Ca)	12	0.599	Fluoride (F)	.2	.011
Magnesium (Mg)	4.3	.354	Nitrate (NO_3)	.2	.003
Sodium (Na)	8.0	.347	Total dissolved solids	115	
Potassium (K)	2.2	.056	Total hardness as $CaCO_3$	48	
Bicarbonate (HCO_3)	16	.262	pH	6.8	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Reklaw member of Mount Selman formation:			Reklaw member of Mount Selman formation—Cont.		
Clay	50	50	Gumbo	22	208
Shale, sandy shale, and rock	115	165	Carrizo sand:		
Sand, water	21	186	Sand, water	99	307
			Gumbo	13	320

GARRISON

Population in 1940: 770.

Source of information: N. G. Garrison, Apr. 3, 1942.

Ownership: Municipal.

Source of supply: Well half a mile northeast of town; drilled in 1939 by Merle R. Pretty; depth, 340 feet; diameter, 10¾ to 4½ inches; screen from 296 to 336 feet; deep-well turbine pump and 15-horsepower electric motor; static water level, 94.9 feet below land surface when drilled; yield, 110 gallons a minute with draw-down of 115.5 feet after 24 hours of pumping; temperature, 71° F.

Storage: Elevated tank, 50,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Sept. 4, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	7.0	0.15
Iron (Fe)	.08		Chloride (Cl)	14	.39
Calcium (Ca)	2.2	0.11	Fluoride (F)	.2	.01
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	2.2	.04
Sodium (Na)	157	6.81	Total dissolved solids	399	
Potassium (K)	1.8	.05	Total hardness as $CaCO_3$	8	
Bicarbonate (HCO_3)	343	6.42	pH	8.4	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Blue clay	12	12	Hard rock	1	234
Lignite	30	42	Sandy shale	8	242
Hard sandy shale	101	143	Hard rock	1	243
Hard rock	2	145	Sandy shale	29	272
Sandy shale	3	148	Hard rock	1	273
Hard rock	1	149	Sandy shale	6	279
Sandy shale	34	183	Hard rock	3	282
Hard rock	1	184	Blue shale	14	296
Sticky shale	2	186	Water sand	40	336
Hard rock and shale	16	202	Gumbo	4	340
Sandy shale	31	233			

NACOGDOCHES

Population in 1940: 7,538.

Source of information: Mr. Stallings, city manager, June 15, 1944.

Ownership: Municipal.

Source of supply: Two wells (Nos. 6 and 7).

Well 6. Drilled in 1929 by Layne-Texas Co.; depth, 485 feet; diameter, 20 to 8 inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 17 feet below land surface on Apr. 28, 1937; yield, 700 gallons a minute with draw-down of 50 feet; temperature, 75° F.

Well 7. Drilled in 1933 by Layne-Texas Co.; depth, 484 feet; diameter, 20 to 10 inches; screen from 380 to 470 feet; deep-well turbine pump and 30-horsepower electric motor; static water level, 21 feet below land surface on Apr. 28, 1937; yield, 710 gallons a minute with draw-down of 56.5 feet after pumping 3 hours; temperature, 75° F. Pumps were lowered 30 feet in 1942.

Average pumpage, in gallons a day

	1941	1942	1943	1944		1941	1942	1943	1944
January	479,000	503,000	443,000	522,000	July	701,000	821,000	890,000	
February	428,000	488,000	485,000	508,000	August	700,000	746,000	758,000	
March	443,000	513,000	478,000	517,000	September	644,000	598,000	619,000	
April	504,000	536,000	579,000	516,000	October	623,000	498,000	550,000	
May	527,000	584,000	705,000	570,000	November	497,000	409,000	488,000	
June	565,000	699,000	738,000		December	502,000	410,000	491,000	

Storage: Concrete ground reservoir, 110,000 gallons; elevated tank, 250,000 gallons.

Number of customers: 1,904.

Treatment: Aeration and chlorination.

Analyses

[Collected Feb. 7, 1945. Analyzed by J. H. Rowley]

	Well 6		Well 7	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13		12	
Iron (Fe)	.42		.41	
Calcium (Ca)	3.1	0.155	2.0	0.100
Magnesium (Mg)	1.0	.082	.6	.049
Sodium (Na)	55	2.348	53	2.315
Potassium (K)	4.3	.110	3.7	.095
Bicarbonate (HCO_3)	123	2.016	112	1.836
Sulfate (SO_4)	22	.458	22	.458
Chloride (Cl)	9.0	.254	9.0	.254
Fluoride (F)	.0	.000	.2	.011
Nitrate (NO_3)	.2	.003	0	0
Total dissolved solids	172		161	
Total hardness as $CaCO_3$	12		7	
pH	6.1		6.1	

Drillers' logs

Well 6

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Rotary	3	3	Hard sand rock	1	215
Surface sand	4	7	Hard sandy shell	4	219
Sandy clay	9	16	Hard sand rock	1	220
Iron ore rock	2	18	Hard sandy shale	18	238
Black sand	19	37	Hard sand rock	1	239
Green rock	1	38	Gumbo	18	257
Green shale	37	75	Rock	2	259
Sand rock	1	76	Shale	19	278
Shale	30	106	Gumbo	4	282
Gumbo and shale	16	122	Hard sand	3	285
Gray shale	31	153	Gumbo	27	312
Sand rock	1	154	Gray shale and sand	26	338
Hard shale	25	179	Gumbo	15	353
Brown gumbo	28	207	Gray sandy shale	16	369
Hard sand rock	4	211	White water sand	112	481
Hard sandy shale	3	214	Gumbo	4	485

Drillers' logs—Continued

Well 7

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand	7	7	Hard sand	7	214
Sand clay	9	16	Hard rock	1	215
Iron ore rock	2	18	Sandy shale	4	219
Black sand	19	37	Sand rock	1	220
Green rock	1	38	Hard sandy shale	18	238
Green shale	37	75	Sand rock	1	239
Sand rock	1	76	Hard shale	18	257
Boulders and black shale	30	106	Shale and rock	2	259
Shale and boulders	47	153	Hard shale	53	312
Sand rock	1	154	Sandy shale	57	369
Hard shale	25	179	White sand	5	374
Sticky shale	28	207	Good sand	110	484

NAVARRO COUNTY

BARRY

Population in 1940: 350.

Source of information: R. W. Varnell, water superintendent, Feb. 22, 1944.

Owner: Barry Deep Well Co.

Source of supply: Well drilled in 1917 by Fred M. Allison; depth, 1,721 feet; diameter, 4½ to 3¾ inches; deep-well cylinder pump and 1½-horsepower electric motor; pump set at 160 feet; reported static water level, 18 feet below land surface in 1917 and 50 to 60 feet in 1943; yield, 10 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, 32,000 gallons.

Number of customers: 25.

Treatment: None.

Analysis, well 1

[Collected Feb. 22, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	351	7.31
Iron (Fe)	.14		Chloride (Cl)	588	16.58
Calcium (Ca)	4.8	0.24	Fluoride (F)	2.2	.12
Magnesium (Mg)	1.5	.12	Nitrate (NO_3)	2.2	.04
Sodium (Na)	946	41.12	Total dissolved solids	2,450	
Potassium (K)	9.0	.23	Total hardness as $CaCO_3$	18	
Bicarbonate (HCO_3)	1,080	17.70	pH	7.6	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Shale	12	1,571
Clay	56	60	Cap rock	1	1,572
Shale	160	220	Water sand	53	1,625
Rock	2	222	Rock	4	1,629
Shale	588	810	Shale	20	1,649
White lime	418	1,228	Rock	2	1,651
Shale	72	1,300	Shale	42	1,693
Gumbo	80	1,380	Rock	1	1,694
Shale	171	1,551	Sand and shale	17	1,711
Rock	8	1,559	Water sand	10	1,721

BLOOMING GROVE

Population in 1940: 821.

Source of information: S. W. Grant, water superintendent, Feb. 21, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. About 40 feet east of waterworks building; drilled in 1907; depth, 1,436 feet; diameter, 6 to 3½ inches; air lift; reported static water level, 55 feet below land surface on July 9, 1907; measured static water level, 251.12 feet below top of airline Feb. 21, 1944, while well 2 was pumping; 241.55 feet after well 2 was shut down 15½ hours Feb. 22, 1944; used as stand-by well since 1925.

Well 2. About 50 feet north of waterworks building; drilled in 1925 by R. H. Dearing & Sons; depth, 1,488 feet; diameter, 6⅝ to 5⅜₁₆ inches; deep-well turbine pump and 15-horsepower electric motor; pump set at 400 feet; yield, 100 gallons a minute.

Pumpage (estimated): Average, 50,000 gallons a day during summer; 30,000 gallons a day during winter.

Storage: Concrete ground reservoir, 60,000 gallons; elevated tank, 40,000 gallons.

Number of customers: 158.

Treatment: None.

Analysis, well 2

[Collected Feb. 21, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	172	3.58
Iron (Fe)	.05		Chloride (Cl)	760	21.43
Calcium (Ca)	6.2	0.31	Fluoride (F)	2.4	.13
Magnesium (Mg)	2.4	.20	Nitrate (NO_3)	7.1	.11
Sodium (Na)	981	42.65	Total dissolved solids	2,500	
Potassium (K)	9.2	.24	Total hardness as $CaCO_3$	26	
Bicarbonate (HCO_3)	1,110	18.19	pH	7.7	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface dirt, clay, and water sand, 2 feet; hard rock at 16 feet	35	35	Black cavy shale	131	1,296
Blue gritty shale and gumbo	315	350	Hard sand caprock	13	1,309
Blue shale and gumbo	12	362	Streaks of water sand and shells	6	1,315
Tough gumbo	20	382	Hard sandrock and pyrites of iron	8	1,323
White lime rock	3	385	Water sand	17	1,340
Gumbo	505	890	Hard rock	4	1,344
Black shale	3	893	Light blue cavy shale	9	1,353
White lime rock	72	965	Hard rock	1	1,354
Black caving shale and hard flint boulders	200	1,165	Light blue cavy shale and boulders	82	1,436

Well 2

Rock and shale	565	565	First Woodbine sand	17	1,345
Chalk (white rock)	385	950	Shale, gumbo, soapstone	53	1,398
Rock and shale	347	1,297	Rock	3	1,401
First Woodbine sand	28	1,325	Second Woodbine sand	49	1,450
Rock	3	1,328	Shale, gumbo, limestone	38	1,488

CORSICANA

Population in 1940: 15,232.

Source of information: Fred M. Blucher, city engineer, Feb. 22, 1944.

Ownership: Municipal.

Source of supply: Lake Halbert, impounding reservoir 5 miles southeast of city hall; developed in 1923; maximum capacity, 9,350 acre-feet, 6,500 acre-feet available; area of lake, 540 acres; maximum depth, 35 feet. (Before 1894, supply was obtained from an impounding reservoir known as Lake Beaton. Between 1894 and 1923 water was obtained from five wells about 2,500 feet deep in Corsicana. The wells flowed when drilled and later ceased flowing. The water was highly mineralized and had a temperature of about 120° F. An impounding reservoir was used to supplement the wells.)

Average pumpage, in gallons a day

1939	1940	1941	1942	1943
102,000	124,000	110,000	113,000	129,000

Storage: Two elevated tanks, 200,000 and 400,000 gallons.

Number of customers: 3,500.

Treatment: Aeration, coagulation with alum and lime, activated carbon, sedimentation, rapid sand filter, and chlorination.

Analysis of finished water

[Collected Feb. 22, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	2.8		Sulfate (SO_4)	87	1.811
Iron (Fe)	.06		Chloride (Cl)	7.0	.197
Calcium (Ca)	42	2.096	Fluoride (F)	.7	.037
Magnesium (Mg)	7.8	.641	Nitrate (NO_3)	.5	.008
Sodium (Na)	21	.924	Total dissolved solids	232	
Potassium (K)	4.7	.120	Total hardness as $CaCO_3$	137	
Bicarbonate (HCO_3)	105	1.721	pH	7.6	

DAWSON

Population in 1940: 1,155.

Source of information: G. E. Sellers, water superintendent, Feb. 21, 1944.

Ownership: Municipal.

Source of supply: Impounding reservoir about 1 mile south of town; area, 72 acres; average depth, 8 feet; pump at lake forces water ½ mile to filter plant and booster station; pumps with 250 and 500 gallons per minute at booster station deliver water to elevated tank and distribution system. (Before Apr. 2, 1937, water was obtained from a well about 1,000 feet deep; water reported salty; yield, 25 gallons a minute; casing pulled and well filled when surface water system installed.)

Pumpage (estimated): Average, 17,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 224.

Treatment: Coagulation with alum and lime, sedimentation, and chlorination.

Analysis of finished water

[Collected Feb. 21, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	5.3		Sulfate (SO_4)	63	1.312
Iron (Fe)	.28		Chloride (Cl)	10	.282
Calcium (Ca)	56	2.795	Fluoride (F)	1.3	.068
Magnesium (Mg)	3.8	.312	Nitrate (NO_3)	5.5	.089
Sodium (Na)	20	.871	Total dissolved solids	256	
Potassium (K)	5.2	.133	Total hardness as $CaCO_3$	155	
Bicarbonate (HCO_3)	144	2.360	pH	7.4	

EMHOUSE

Population in 1940: 281.

Source of information: Mr. Hoffman, mayor, and Fred M. Allison, driller, Feb. 22, 1944.

Owners: Local citizens.

Source of supply: Well about 100 feet west of railroad loading dock; drilled in 1917 by Fred M. Allison; depth, 2,017 feet; diameter, 6 to 3¾ inches; deep-well cylinder pump and electric motor; reported static water level, 25 feet above land surface on Nov. 7, 1917, and flow of 35 gallons a minute; flowed until about 1925.

Storage: Elevated tank, 3,200 gallons.

Treatment: None.

Analysis, well 1

[Collected Feb. 22, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	15		Sulfate (SO_4)	491	10.22
Iron (Fe)	.32		Chloride (Cl)	612	17.26
Calcium (Ca)	9.4	0.47	Fluoride (F)	2.3	.12
Magnesium (Mg)	3.0	.25	Nitrate (NO_3)	3.2	.05
Sodium (Na)	1,040	45.00	Total dissolved solids	2,740	
Potassium (K)	11	.28	Total hardness as $CaCO_3$	36	
Bicarbonate (HCO_3)	1,120	18.36	pH	7.5	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	5	5	Rock	2	1,758
Clay	55	60	Sand and shale	5	1,763
Shale	213	273	Rock	2	1,765
Rock	2	275	Shale	35	1,800
Shale	75	350	Rock	1	1,801
Rock	3	353	Water sand (First Woodbine)	11	1,812
Shale	572	925	Lime	24	1,836
Austin chalk	402	1,327	Shale	34	1,870
Shale	93	1,420	Rock	2	1,872
Gumbo	80	1,500	Shale	30	1,902
Shale	188	1,688	Rock	3	1,905
Rock	2	1,690	Shale	15	1,920
Shale	4	1,694	Gumbo	30	1,950
Iron rock	10	1,704	Rock	2	1,952
Shale	4	1,708	Water sand (Second Woodbine)	18	1,970
Rock	1	1,709	Lime	47	2,017
Water sand (First Woodbine)	47	1,756			

FROST

Population in 1940: 671.

Source of information: Robert Freeman, water superintendent, Feb. 21, 1944.

Ownership: Municipal.

Source of supply: Well near elevated tank and standpipe; drilled in 1901 by C. L. Witherspoon; depth, 1,184 feet; diameter, 8 to 6 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 60 gallons a minute; temperature, 92° F.

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

Storage: Elevated tank, 100,000 gallons; standpipe, 80,000 gallons.

Number of customers: 185.

Treatment: None.

Analysis, well 1

[Collected Feb. 21, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	14		Sulfate (SO_4)	441	9.18
Iron (Fe)	.03		Chloride (Cl)	131	3.69
Calcium (Ca)	3.5	0.17	Fluoride (F)	2.1	.11
Magnesium (Mg)	1.1	.09	Nitrate (NO_3)	4.4	.07
Sodium (Na)	594	25.83	Total dissolved solids	1,600	
Potassium (K)	10	.26	Total hardness as $CaCO_3$	13	
Bicarbonate (HCO_3)	812	13.31	pH	7.8	

KERENS

Population in 1940: 1,287.

Source of information: Earl M. McClung, city secretary, Feb. 22, 1944.

Ownership: Municipal.

Source of supply: Impounding reservoir 3 miles east of Kerens; capacity, 778 acre-feet; average depth, 8 feet. (Before 1935 water was obtained from 16 wells; depth, about 50 feet; diameter, 6 feet. The water was of poor quality and the yield was insufficient during the summers. Fred M. Allison reported that he drilled a test well to the Woodbine sand at about 4,000 feet and found salty water.)

Pumpage: Average, 50,000 gallons a day in 1940; 47,500 gallons a day in 1941.

Storage: Concrete settling basin, 50,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 342.

Treatment: Coagulation with alum and lime, sedimentation, and chlorination.

Analysis of finished water

[Collected Feb. 22, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	2.0		Sulfate (SO_4)	57	1.187
Iron (Fe)	.18		Chloride (Cl)	4.0	.113
Calcium (Ca)	30	1.497	Fluoride (F)	.2	.011
Magnesium (Mg)	2.0	.164	Nitrate (NO_3)	.8	.013
Sodium (Na)	2.6	.115	Total dissolved solids	125	
Potassium (K)	2.2	.056	Total hardness as $CaCO_3$	83	
Bicarbonate (HCO_3)	31	.508	pH	7.8	

NEWTON COUNTY

CALL

Population in 1940: 250.

Source of information: J. M. Prichard, Kirby Lumber Co., Apr. 15, 1942.

Owner: Kirby Lumber Co.

Source of supply: Well drilled in 1935 by John Adams; depth, 529 feet; diameter, 8 inches; screen from 489 to 529 feet; air lift; static water level reported, 40 feet below land surface; yield, 325 gallons a minute.

Pumpage (estimated): Average, 150,000 gallons a day, of which 70 percent is used by sawmill.

Storage: Ground reservoir, 5,500 gallons; two elevated tanks, 65,000 and 31,000 gallons.

Number of customers: No record.

Treatment: None.

Analysis, well 1

[Collected Apr. 15, 1942. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	17	0.848	Chloride (Cl)	7.0	0.197
Magnesium (Mg)	1.0	.082	Fluoride (F)	.1	.005
Sodium (Na)	8.5	.370	Nitrate (NO_3)	0	0
Potassium (K)			Total dissolved solids	68	
Bicarbonate (HCO_3)	61	1.000	Total hardness as $CaCO_3$	46	
Sulfate (SO_4)	4	.083			

DEWEYVILLE

Population in 1940: 950.

Source of information: C. D. Allen, Perry-Moore Lumber Co., Apr. 15, 1942.

Owner: Perry-Moore Lumber Co.

Source of supply: Well drilled in 1927 by George Glidden; depth, 105 feet; diameter, 8 inches; screen from 75 to 105 feet; deep-well turbine pump and 30-horsepower electric motor; static water level reported, 12 feet below land surface; yield, 350 gallons a minute.

Pumpage (estimated): Average, 375,000 gallons a day; used to supply town and sawmill.

Number of customers: 125.

Treatment: None.

Analysis, well 1

[Collected Apr. 15, 1942. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	20	1.00	Chloride (Cl)	22	0.62
Magnesium (Mg)	4.6	.38	Fluoride (F)	.3	.02
Sodium (Na)	40	1.74	Nitrate (NO_3)	0	0
Potassium (K)			Total dissolved solids	162	
Bicarbonate (HCO_3)	146	2.40	Total hardness as $CaCO_3$	68	
Sulfate (SO_4)	3	.06			

NEWTON

Population in 1940: 1,200.

Source of information: Fred Bailey, Apr. 10, 1941.

Ownership: Municipal.

Source of supply: Well across railroad tracks west of courthouse; drilled in 1938 by McMasters-Pomeroy Co.; depth, 200 feet; diameter, 6 to 5 inches; deep-well turbine pump and electric motor; static water level, 11 feet below land surface in 1938; yield, 55 gallons a minute.

Pumpage: Average, 55,000 gallons a day.

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

Number of customers: 112.

Treatment: None.

Analysis, well 1

[Collected Apr. 10, 1941. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	24		Sulfate (SO_4)	2.1	0.044
Iron (Fe)	.02		Chloride (Cl)	7.0	.197
Calcium (Ca)	5.9	0.294	Fluoride (F)	0	0
Magnesium (Mg)	1.2	.099	Nitrate (NO_3)	0	0
Sodium (Na)	6.3	.274	Total dissolved solids	62	
Potassium (K)			Total hardness as $CaCO_3$	20	
Bicarbonate (HCO_3)	26	.426	pH	6.5	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand	3	3	Sand and shale	30	94
Clay	4	7	Clay	21	115
Sand	21	28	Shale	37	152
Clay	4	32	Sand and gravel	37	189
Sand	26	58	Shale	11	200
Shale	6	64			

WIERGATE

Population in 1940: 1,000.

Source of information: Wier Long Leaf Lumber Co., May 21, 1942.

Owner: Wier Long Leaf Lumber Co.

Source of supply: Well drilled in 1925 by McMasters & Pomeroy; depth, 232 feet; diameter, 6 to 4 inches; screen from 190 to 222 feet; air lift; static water level reported, 30 feet below land surface; yield, 500 gallons a minute.

Storage: Two elevated tanks, 20,000 gallons each.

Number of customers: 425.

Treatment: None.

Analysis, well 1

[Collected May 21, 1942. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	4.0	0.200	Chloride (Cl)	6.0	0.169
Magnesium (Mg)	1.5	.123	Fluoride (F)	.3	.016
Sodium (Na)	3.0	.130	Nitrate (NO_3)	0	0
Potassium (K)			Total dissolved solids	24	
Bicarbonate (HCO_3)	12	.197	Total hardness as $CaCO_3$	16	
Sulfate (SO_4)	3	.062			

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Cinders	3	3	Clay	11	100
Surface sand	12	15	Sand	18	118
Gravel	15	30	Clay	64	182
Sand	21	51	Sand and gravel	39	221
Clay	15	66	Clay	11	232
Sand	23	89			

ORANGE COUNTY

ORANGE

Population in 1940: 7,472 (estimated in 1944, 45,000).
Source of information: D. O. Gideon, water superintendent, Apr. 13, 1944.
Owner: Gulf States Utilities Co.
Source of supply: Five wells.

Well 1. Drilled by Layne-Texas Co.; depth, 685 feet; diameter, 16 to 6 inches; screens from 326 to 348 and 645 to 685 feet; deep-well turbine pump; well flows 30 gallons a minute; yield, 422 gallons a minute with reported draw-down of 9 feet; temperature, 76° F.

Well 2. Depth, 650 feet; diameter, 8 inches; centrifugal pump; well flowed on Feb. 7, 1941.

Well 3. Drilled in 1924; depth, 755 feet; diameter, 16 to 8 inches; deep-well turbine pump; screen from 672 to 737 feet; well flows.

Well 4. Drilled in 1941 by Layne-Texas Co.; depth, 749 feet; diameter, 16 to 8⅝ inches; screen from 613 to 734 feet; deep-well turbine pump; static water level, 0.57 foot above ground on Sept. 22, 1941.

Well 5. Drilled in 1943 by Layne-Texas Co.; depth, 740 feet; diameter, 20 to 10¾ inches; screens from 442 to 473 and 560 to 740 feet; yield, 2,089 gallons a minute with draw-down of 81 feet.

Average pumpage, in gallons a day

Month	1938	1939	1940	1941	1942	1943	1944
January	481,600	329,600	531,900	549,200	1,004,000	2,028,000	2,801,000
February	411,100	329,300	439,000	567,100	1,016,000	1,762,000	3,096,000
March	399,800	349,700	457,400	651,300	1,379,000	1,966,000	2,916,000
April	363,200	368,800	481,600	757,400	1,249,000	2,093,000	3,378,000
May	337,200	431,700	536,500	758,300	1,446,000	2,238,000	----------
June	397,900	502,800	492,900	784,400	1,527,000	2,727,000	----------
July	389,300	506,600	493,500	817,000	1,433,000	2,687,000	----------
August	402,000	472,200	475,900	936,900	1,610,000	2,699,000	----------
September	436,100	521,200	493,200	934,900	1,461,000	2,682,000	----------
October	373,500	496,900	515,300	927,500	1,844,000	2,633,000	----------
November	351,100	516,500	456,700	851,900	1,871,000	2,738,000	----------
December	336,100	393,900	473,600	921,900	1,932,000	2,726,000	----------

Storage: Two ground storage reservoirs, 75,000 gallons each; two elevated tanks, 100,000 and 500,000 gallons.
Number of customers: 3,000.
Treatment: Chlorination.

Analyses

[Collected Apr. 12, 1941. Analyzed by J. W. Yett, Jr., and E. W. Lohr]

	Well 1		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	51		48	
Iron (Fe)	.39		.34	
Calcium (Ca)	9.2	0.46	8.6	0.43
Magnesium (Mg)	3.0	.25	2.0	.16
Sodium and potassium (Na+K)	92	3.57	105	4.58
Bicarbonate (HCO_3)	168	2.75	198	3.25
Sulfate (SO_4)	2.2	.05	1.6	.03
Chloride (Cl)	52	1.47	67	1.89
Nitrate (NO_3)	.4	.01	.3	.00
Total dissolved solids	286		335	
Total hardness as $CaCO_3$	35		30	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	60	60	Coarse-grained sand	25	349
Sand	53	113	Gumbo	91	440
Clay	3	116	Sandy shale	40	480
Sand	47	163	Gumbo	50	530
Coarse-grained sand	7	170	Hard fine-grained sand	110	640
Gumbo	154	324	Coarse-grained sand	45	685

Well 3

Clay	50	50	Shale	35	480
Sand	35	85	Gumbo	60	540
Clay	13	98	Fine-grained sand	61	601
Sand	85	183	Sand	39	640
Gumbo	220	403	Sand and some gravel	30	670
Hard fine-grained sand	32	435	Gravel	30	700
Fine-grained sand	10	445	Coarse gravel	55	755

ORANGEFIELD

Population in 1940: 500.

Source of information: John Denney, water superintendent.

Owner: Rufus Webb.

Source of supply: Well; depth, 400 feet; diameter, 4 inches; temperature 76½° F.

Storage: Pressure tank, 500 gallons.

Number of customers: 150.

Treatment: None.

Analysis, well 1

[Collected Apr. 13, 1944. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	2.4	0.120	Sulfate (SO_2)	2	0.042
Magnesium (Mg)	.7	.058	Chloride (Cl)	71	2.002
Sodium and potassium (Na+K)	111	4.819	Nitrate (NO_3)	.2	.003
Bicarbonate (HCO_3)	180	2.950	Total dissolved solids	321	
			Total hardness as $CaCO_3$	9	

ORANGEFIELD (EAST OF COW BAYOU)

Population in 1940: 500.
Source of information: V. F. Kesmer.
Owner: Sun Oil Co.
Source of supply: Well drilled in 1923 by Sun Oil Co.; depth, 659 feet; diameter, 6 inches; screen from 564 to 651 feet; equipped with deep-well turbine pump; well flowed Feb. 17, 1941; temperature, 78½° F.
Pumpage (estimated): Minimum, 5,000 gallons a day; maximum, 10,000 gallons a day; average, 6,000 gallons a day.
Storage: Steel pressure tank, 5,000 gallons.
Number of customers: 28.
Treatment: None.

PANOLA COUNTY

CARTHAGE

Population in 1940: 2,178.
Source of information: H. A. Gillis, water superintendent, Nov. 3, 1943.
Ownership: Municipal.
Source of supply: Two wells.

Well 1. At waterworks plant ½ block north of courthouse; drilled with cable tools in 1919; depth, 255 feet; diameter, 8 inches; air lift; screen from 215 to 255 feet; yield reported, 250 gallons a minute; used as stand-by well.

Well 2. At waterworks plant ½ block north of courthouse and about 100 feet from well 1; drilled in 1926; depth, 255 feet; diameter, 8 inches; air lift; screen from 215 to 255 feet; yield reported, 175 gallons a minute.

Pumpage (estimated): 160,000 gallons a day.
Storage: Ground reservoir, 100,000 gallons; elevated steel tank, 50,000 gallons.
Number of customers: 482.
Treatment: None.

Analysis, well 2

[Collected Nov. 3, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	22		Sulfate (SO_4)	3	0.062
Iron (Fe)	.11		Chloride (Cl)	17	.480
Calcium (Ca)	11	0.549	Fluoride (F)	.2	.011
Magnesium (Mg)	2.8	.230	Nitrate (NO_3)	1.2	.019
Sodium (Na)	72	3.120	Total dissolved solids	246	
Potassium (K)	2.6	.066	Total hardness as $CaCO_3$	39	
Bicarbonate (HCO_3)	207	3.393	pH	7.6	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand	2	2	Sand	40	255
Clay and layers of sand	68	70	Lignite		255
Gumbo	145	215			

POLK COUNTY

CAMDEN

Population in 1940: 500.

Source of information: Sawmill superintendent, October 1941.

Owner: W. T. Carter Lumber Co.

Source of supply: Well at sawmill of Carter Lumber Co.; drilled in 1935 by Layne-Texas Co.; depth, 404 feet; diameter, 12 to 8 inches; screen from 362 to 402 feet; deep-well turbine pump and electric motor; yield, 120 gallons a minute.

Pumpage: No record. Well supplies sawmill, company houses and other buildings, and public school.

Storage: Elevated tank, 12,000 gallons.

Treatment: None.

Analysis, well 1

[Collected Oct. 23, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	48		Sulfate (SO_4)	12	0.25
Iron (Fe)	.14		Chloride (Cl)	19	.54
Calcium (Ca)	13	0.64	Fluoride (F)	.3	.02
Magnesium (Mg)	2.4	.20	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	29	1.27	Total dissolved solids	163	
Bicarbonate (HCO_3)	79	1.30	Total hardness as $CaCO_3$	42	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and clay	34	34	Shale	226	363
Broken sand and clay	103	137	Sand	41	404

CORRIGAN

Population in 1940: 1,402.

Source of information: A. B. Knox, water superintendent, Oct. 23, 1941.

Ownership: Municipal.

Source of supply: Well across road from railroad station; drilled in 1937 by A. E. Fawcett; depth, 200 feet; deep-well turbine pump and 7½-horsepower electric motor; static water level, 35 feet below pump base in 1937; yield, 175 gallons a minute.

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

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

Treatment: None.

Analysis, well 1

[Collected Oct. 23, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	72		Sulfate (SO_4)	61	1.28
Iron (Fe)	.15		Chloride (Cl)	24	.68
Calcium (Ca)	19	0.94	Fluoride (F)	.1	.00
Magnesium (Mg)	3.6	.30	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	31	1.33	Total dissolved solids	229	
Bicarbonate (HCO_3)	37	.60	Total hardness as $CaCO_3$	62	

GOODRICH

Population in 1940: 200.

Source of information: E. D. Edmonds, owner, Oct. 23, 1941.

Owner: E. D. Edmonds.

Source of supply: Well, drilled; depth, 370 feet; diameter, 4 inches; screen from 342 to 370 feet; deep-well cylinder and electric motor-driven pump jack; static water level, 2 feet below top of casing; yield, 10 gallons a minute.

Pumpage: Average, 7,500 gallons a day.

Storage: Elevated tank, 1,700 gallons; elevated tank, 2,000 gallons.

Number of customers: 65.

Treatment: None.

Analysis, well 1

[Collected Oct. 23, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	19		Sulfate (SO_4)	12	0.25
Iron (Fe)	.13		Chloride (Cl)	18	.51
Calcium (Ca)	17	0.84	Fluoride (F)	1.0	.05
Magnesium (Mg)	2.4	.20	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	87	3.77	Total dissolved solids	277	
Bicarbonate (HCO_3)	244	4.00	Total hardness as $CaCO_3$	52	

LIVINGSTON

Population in 1940: 1,851.

Source of information: Luther Mays, water superintendent, Oct. 24, 1941.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1938 by Layne-Texas Co.; depth, 232 feet; diameter, 16 to 8⅝ inches; screen from 183 to 232 feet; deep-well turbine pump and electric motor; static water level, 80 feet below pump base Apr. 9, 1938; yield, 235 gallons a minute.

Well 2. Drilled in 1939 by Layne-Texas Co.; depth, 268 feet; diameter, 16 to 8⅝ inches; deep-well turbine pump and electric motor; static water level, 106.5 feet below pump base Oct. 24, 1941; yield, 250 gallons a minute.

Average pumpage, in gallons a day

	1939	1940	1941		1939	1940	1941
January	165,000	170,000	170,000	July	225,000	260,000	228,000
February	200,000	195,000		August	230,000	200,000	241,000
March	150,000	195,000	205,000	September	200,000	200,000	
April	200,000	210,000	200,000	October	190,000	180,000	
May	250,000	198,000	194,000+	November	200,000	170,000	
June	275,000	250,000	210,000	December	190,000	150,000	

Storage: Ground reservoir, 34,000 gallons; two elevated tanks, 50,000 and 75,000 gallons.

Number of customers: 710.

Treatment: None.

Analyses

[Collected Oct. 24, 1941. Analyzed by W. W. Hastings]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	27		25	
Iron (Fe)	.06		.06	
Calcium (Ca)	36	1.80	221	11.06
Magnesium (Mg)	7.3	.60	21	1.70
Sodium and potassium (Na+K)	69	2.94	80	3.48
Bicarbonate (HCO_3)	259	4.25	305	5.00
Sulfate (SO_4)	12	.25	8	.17
Chloride (Cl)	31	.87	392	11.06
Fluoride (F)	.1	.00	.2	.01
Nitrate (NO_3)	.2	.00	0	0
Total dissolved solids	311		897	
Total hardness as $CaCO_3$	120		638	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	1	1	Gummy shale	34	165
Clay	84	85	Hard muddy sand	20	185
Hard shale	20	105	White sand (good)	47	232
Sand	26	131			

Well 2

Surface soil	1	1	Sand with hard layers of shale	35	229
Clay	67	68	Brittle shale	12	241
Sand with layers of clay	40	108	Hard shale	27	268
Shale	86	194			

NEW WILLARD

Population in 1940: 700.

Source of information: Sawmill manager, Oct. 23, 1941.

Owner: Texas Longleaf Lumber Co.

Source of supply: Well drilled in 1912; depth, 412 feet; diameter, 8 inches; pumped with air.

Pumpage: No record. Supplies sawmill and company houses and other buildings.

Storage: Elevated tank.

Treatment: None.

Analysis, well 1

[Collected Oct. 23, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	60		Sulfate (SO_4)	8.0	0.17
Iron (Fe)	.04		Chloride (Cl)	40	1.13
Calcium (Ca)	37	1.86	Fluoride (F)	.2	.01
Magnesium (Mg)	3.4	.28	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	29	1.27	Total dissolved solids	241	
Bicarbonate (HCO_3)	128	2.10	Total hardness as $CaCO_3$	107	

RED RIVER COUNTY

ANNONA

Population in 1940: 446.

Source of information: R. L. Harvey, water superintendent, Sept. 22, 1943.

Owner: Texas and Pacific Ry.

Source of supply: Impounding reservoir northwest of town; capacity, 90,000,000 gallons. (City attempted to develop ground-water supply; a well was drilled in 1936 by B. J. Harper to a depth of 873 feet, but saline water was obtained from sand between 839 and 872 feet.)

Pumpage: Average, 6,000 gallons a day.

Storage: Elevated tank, 30,000 gallons.

Number of customers: 45.

Treatment: Coagulation with alum, pressure filter, and chlorination.

Analysis of raw water

[Collected Sept. 22, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	7.1		Chloride (Cl)	3.0	0.085
Iron (Fe)	.94		Fluoride (F)	.6	.032
Calcium (Ca)	46	2.296	Nitrate (NO_3)	.8	.013
Magnesium (Mg)	2.1	.173	Total dissolved solids	167	
Sodium (Na)	6.0	.263	Total hardness as $CaCO_3$	124	
Potassium (K)	4.8	.123	pH	8.0	
Bicarbonate (HCO_3)	159	2.606			
Sulfate (SO_4)	5.9	.123			

Driller's log, abandoned well

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	6	6	Shale and boulders	133	563
Shale	100	106	Rock	2	565
White rock	30	136	Shale	159	724
Hard shale	124	260	Rock	3	727
White marl	5	265	Shale	5	732
Hard sandy shale	21	286	Rock	27	759
Hard white lime	102	388	Sandy shale	78	837
Broken shale	18	406	Soft rock	2	839
Hard lime and shale	19	425	Sand (salty water)	33	872
Hard lime	5	430	Shale	1	873

AVERY

Population in 1940: 477.

Source of information: W. G. Bryan, postmaster, Sept. 22, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir half a mile north of town; built in 1936; 17 acres under water. (City attempted to develop ground-water supply; well drilled in 1934 by Layne-Texas Co. to a depth of 1,320 feet, encountered salt water at 1,180 feet; well filled and abandoned.)

Pumpage: Average, 12,500 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 81.

Treatment: Coagulation, pressure filter, and chlorination.

Analysis of raw water

[Collected Sept. 22, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	5.0		Sulfate (SO_4)	23	0.479
Iron (Fe)	.12		Chloride (Cl)	35	.987
Calcium (Ca)	32	1.597	Fluoride (F)	.2	.011
Magnesium (Mg)	2.7	.222	Nitrate (NO_3)	.8	.013
Sodium (Na)	15	.633	Total dissolved solids	170	
Potassium (K)	5.3	.136	Total hardness as $CaCO_3$	91	
Bicarbonate (HCO_3)	67	1.098	pH	7.3	

BOGATA

Population in 1940: 800.

Source of information: W. C. Kelly, water superintendent, Sept. 21, 1943.

Ownership: Municipal.

Source of supply: One main well and four feeder wells at northeast edge of town; dug in 1937. Depth of main well, 30 feet; diameter, 24 feet. Feeder wells are 200 to 500 feet from main well; depth, 30 feet; diameter, about 6 feet; centrifugal pump and 7½-horsepower electric motor; yield, 100 gallons a minute; temperature, 76° F.

Pumpage: Maximum, 25,000 gallons; average, 15,000 gallons a day.

Storage: Concrete ground reservoir, 10,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 96.

Treatment: Aeration and chlorination.

Analysis, well 1

[Collected Sept. 21, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	46		Sulfate (SO_4)	7.4	0.154
Iron (Fe)	.03		Chloride (Cl)	6.0	.169
Calcium (Ca)	4.9	0.245	Fluoride (F)	0	0
Magnesium (Mg)	1.0	.082	Nitrate (NO_3)	3.2	.052
Sodium (Na)	9.3	.404	Total dissolved solids	114	
Potassium (K)	3.4	.087	Total hardness as $CaCO_3$	16	
Bicarbonate (HCO_3)	27	.443	pH	6.8	

CLARKSVILLE

Population in 1940: 4,095.

Source of information: W. C. Pinson, Jr., water superintendent, Sept. 21, 1943.

Ownership: Municipal.

Source of supply: Three wells in northwest part of town.

Well 1. Drilled in 1905; depth, 602 feet; diameter, 6 to 5 inches; air lift; static water level, 144 feet below land surface; yield, 160 gallons a minute; used as stand-by well.

Well 2. Drilled in 1905; depth, 602 feet; diameter, 4 inches; air lift; yield, 105 gallons a minute; used as stand-by well.

Well 3. Drilled in 1930 by Layne-Texas Co.; depth, 602 feet; diameter, 16 to 8 inches; screen from 523 to 600 feet; deep-well turbine pump and 75-

horsepower electric motor; pump set at 430 feet; static water level, 144 feet below land surface; yield, 507 gallons a minute with draw-down of 276 feet when drilled; present yield reported, 650 gallons a minute; temperature, 73° F.

Pumpage: Average, 250,000 gallons a day in summer and 175,000 gallons a day in winter.

Storage: Two concrete ground reservoirs, 350,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 1,006.

Treatment: None.

Analysis, well 3

[Collected Sept. 21, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	201	4.18
Iron (Fe)	.04		Chloride (Cl)	204	5.75
Calcium (Ca)	5.3	0.26	Fluoride (F)	.4	.02
Magnesium (Mg)	1.0	.08	Nitrate (NO_3)	2.0	.03
Sodium (Na)	384	16.70	Total dissolved solids	1,030	
Potassium (K)	4.8	.12	Total hardness as $CaCO_3$	17	
Bicarbonate (HCO_3)	437	7.18	pH	8.4	

Drillers' log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	2	2	Hard shale	177	460
Clay and lime	10	12	Hard black sand	12	472
Lime rock	30	42	Hard soapstone	51	523
Hard shale	120	162	Hard packed sand	13	536
Hard shale and soapstone	87	249	Hard sand rock	2	538
Hard shale	25	274	Hard packed sand	64	602
Hard flintrock	9	283			

ROBERTSON COUNTY

BREMOND

Population in 1940: 1,106.

Source of information: Charles Clark, water superintendent, Feb. 11, 1943.

Ownership: Municipal.

Source of supply: Well at pumping station; drilled in 1942 by Layne-Texas Co.; active static water level reported, 121 feet below land surface; yield, 84 gallons a minute with pumping level at 190 feet in July 1942.

Pumpage (estimated): About 25,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 166.

Treatment: None.

Analysis, well 1

[Collected Feb. 11, 1943. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	19		Sulfate (SO_4)	28	0.58
Iron (Fe)	.05		Chloride (Cl)	63	1.78
Calcium (Ca)	42	2.10	Fluoride (F)	.2	.01
Magnesium (Mg)	8.2	.67	Nitrate (NO_3)	1.0	.02
Sodium (Na)	66	2.81	Total dissolved solids	334	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	138	
Bicarbonate (HCO_3)	205	3.36	pH	8.3	

CALVERT

Population in 1940: 2,366.

Source of information: J. L. Crouch, water superintendent, Feb. 11, 1943.

Owner: Gulf States Utilities Co.

Source of supply: Two wells across the street from railroad station in Calvert.

Well 1. Depth, 680 feet; diameter, 8 inches; air lift; yield, 200 gallons a minute.

Well 2. Drilled in 1927; depth, 679 feet; diameter, 16 to 10 inches; screens from 534 to 578, 616 to 637, and 659 to 679 feet; deep-well turbine pump and electric motor; during test in 1927, static water level was 7.8 feet below measuring point and yield 248 gallons a minute with draw-down of 24 feet; in 1942, static water level was 14 feet and yield 200 gallons a minute with draw-down of 45 feet.

Pumpage: Average, 70,000 gallons; maximum, 120,000 gallons a day.

Storage: Standpipe, 90,000 gallons; ground reservoir, 26,000 gallons.

Number of customers: 367.

Treatment: None.

Analysis, well 2

[Collected Feb. 11, 1943. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	1.6	0.03
Iron (Fe)	.02		Chloride (Cl)	111	3.13
Calcium (Ca)	6.3	0.31	Fluoride (F)	.4	.02
Magnesium (Mg)	1.5	.12	Nitrate (NO_3)	2.0	.03
Sodium (Na)	321	13.97	Total dissolved solids	807	
Potassium (K)	6.0	.15	Total hardness as $CaCO_3$	22	
Bicarbonate (HCO_3)	692	11.34	pH	8.3	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	20	20	Sand	24	225
White sand	10	30	Sandy shale	36	261
Clay	10	40	Sand	68	329
Sand	3	43	Rock	1	330
Rock	2	45	Sand	65	395
Clay	10	55	Hard brittle shale	75	470
Brittle clay	51	106	Clay with streaks of sand	64	534
Blue soapstone	25	131	Sand	50	584
Lignite	14	145	Clay	12	596
Hard pack sand	10	155	Sand	20	614
Rock	5	160	Boulders	2	616
Clay	10	170	Sand	49	665
Hard sandy shale	26	196	Boulders	1	666
Sand stone	5	201	Sand	1	667

754993—48——17

FRANKLIN

Population in 1940: 1,087.

Source of information: G. S. Stobart, water superintendent, Feb. 12, 1943.

Owner: Gulf States Utilities Co.

Source of supply: Well on south side of railroad about 1 block west of railroad station; drilled about 1923; depth, 176 feet; air lift.

Pumpage (estimated): Average, 58,000 gallons a day.

Storage: Ground reservoir, 50,000 gallons; elevated tank, 55,000 gallons.

Number of customers: 284.

Treatment: Lime, chlorinated lime, and hexameta phosphate fed into well, sedimentation, sand filtration, and chlorination.

Analysis of finished water

[Collected Feb. 12, 1943. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	30	0.625
Iron (Fe)	.02		Chloride (Cl)	21	.592
Calcium (Ca)	36	1.797	Fluoride (F)	0	0
Magnesium (Mg)	1.9	.156	Nitrate (NO_3)	0	0
Sodium (Na)	11	.473	Total dissolved solids	158	
Potassium (K)	4.6	.118	Total hardness as $CaCO_3$	98	
Bicarbonate (HCO_3)	81	1.327	pH	8.2	

HEARNE

Population in 1940: 3,511.

Source of information: W. A. Wilkerson, water superintendent, Feb. 11, 1943.

Ownership: Municipal.

Source of supply: Two wells at pumping station in Hearne.

Well 1. Drilled in 1911 by Taylor-Robertson Co.; depth, 748 feet; diameter, 8 to 6 inches; screen from 688 to 748 feet; air lift; flowed when drilled; static water level, about 17 feet below land surface in 1943; used as stand-by.

Well 2. Drilled in 1935 by Layne-Texas Co.; depth, 1,275 feet; diameter, 12 to 6 inches; screen from 1,125 to 1,275 feet; deep-well turbine pump and electric motor; yield, 675 gallons a minute.

Pumpage: Average from Apr. 1, 1942, to Mar. 1, 1943, 116,000 gallons a day.

Storage: Two elevated tanks, 50,000 and 150,000 gallons.

Number of customers: 780.

Treatment: None.

Analyses

[Collected Feb. 11, 1943. Analyzed by P. A. Witt]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	10		6.2	
Iron (Fe)	.31		.12	
Calcium (Ca)	5.3	0.26	4.8	0.24
Magnesium (Mg)	1.1	.09	.8	.07
Sodium (Na)	173	7.52	175	7.63
Potassium (K)	5.8	.15	7.6	.19
Bicarbonate (HCO_3)	406	6.66	410	6.73
Sulfate (SO_4)	3.0	.06	2.9	.06
Chloride (Cl)	44	1.24	46	1.30
Fluoride (F)	.2	.01	.2	.01
Nitrate (NO_3)	3.0	.05	2.0	.03
Total dissolved solids	446		448	
Total hardness as $CaCO_3$	18		16	
pH	8.3		8.3	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay	12	12	Packed sand	19	473
Sand	28	40	Gray sand and boulders	10	483
Clay and gravel	28	68	Packed sand	12	495
Clay, gravel, boulders, and rock	57	125	Fine-grained sand	10	505
Packed sand	25	150	Clay and boulders	15	520
Gumbo	40	190	Gravel, sand, and boulders	15	535
Sand	10	200	Clay and boulders	11	546
Gravel	40	240	Rock	2	548
Clay and gravel	145	385	Packed sand	22	570
Gravel	20	405	Gravel and boulders	8	578
Clay and boulders	40	445	Clay and boulders	52	630
Gravel and boulders	5	450	Gravel and boulders	30	660
Rock	4	454	Hard packed sand	10	670
			Water sand and gravel	78	748

Well 2

Surface soil	2	2	Rock	2	516
Yellow clay	14	16	Sand	35	551
Coarse-grained sand	12	28	Sandy shale	97	648
Hard shale	62	90	Rock	1	649
Sandy shale	25	115	Hard shale	7	656
Rock	1	116	Rock	3	659
Sandy shale	15	131	Shale and boulders	11	670
Sand	10	141	Sand	92	762
Shale	44	185	Sandy shale	57	819
Sand	51	236	Rock	3	822
Sandy shale	53	289	Sand	62	884
Sand	22	311	Shale and lignite	53	937
Shale	57	368	Hard shale	113	1,050
Rock	1	369	Sandy shale	18	1,063
Sand	20	389	Sand	23	1,091
Shale	48	437	Lignite	21	1,112
Lignite	11	448	Fine-grained sand	17	1,129
Sand	45	493	Good coarse-grained sand	146	1,275
Shale	21	514			

ROCKWALL COUNTY

ROCKWALL

Population in 1941: 1,318.

Source of information: W. M. McCoulskey, water superintendent, July 31, 1941.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1902 by Deering Drilling Co.; depth, 1,840 feet; diameter, 6 to 3½ inches; deep-well turbine pump and 10-horsepower electric motor; yield, 35 gallons a minute.

Well 2. Drilled in 1941 by Layne-Texas Co.; depth, 3,347 feet; diameter, 8⅝ to 4½ inches; screen from 3,242 to 3,342 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 123 feet below pump base Sept. 18, 1941; yield, 134 gallons a minute with a draw-down of 127 feet Sept. 18, 1941.

Pumpage (estimated): Maximum, 20,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 225.

Treatment: None.

Analyses

[Collected July 31, 1941 and Nov. 16, 1941. Analyzed by W. W. Hastings and J. W. Yett, Jr.]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)			26	
Iron (Fe)			.04	
Calcium (Ca)	10	0.50	2.9	1.45
Magnesium (Mg)	4.4	.36	1.2	.10
Sodium and potassium (Na+K)	1,530	66.39	311	13.52
Bicarbonate (HCO_3)	1,080	17.70	598	9.82
Sulfate (SO_4)	43	.90	199	4.14
Chloride (Cl)	1,720	48.65	36	1.02
Fluoride (F)			1.7	.09
Nitrate (NO_3)			.1	.00
Total dissolved solids	3,840		912	
Total hardness as $CaCO_3$	43		78	
pH			8.6	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and clay	15	15	Blue shale	335	1,385
Blue rock	120	135	Fine sand	5	1,390
Shale	505	640	Blue shale	432	1,822
White limestone	410	1,050	Sand (water)	20	1,844

Well 2

White clay	25	25	Shale	11	2,322
Blue shale	730	755	Sandy shale	22	2,344
Chalk and shale	48	803	Red and blue shale	64	2,408
Chalk	140	943	Hard lime	12	2,420
Chalk and shale	428	1,371	Red and blue shale	34	2,454
Shale	163	1,534	Lime	8	2,462
Sticky shale	6	1,540	Shale and lime	147	2,509
Shale	313	1,853	Lime	40	2,549
Hard shale	27	1,880	Shale and lime	203	2,852
Tough shale	5	1,885	Lime	34	2,886
Hard shale	11	1,896	Lime and shale	153	3,039
Sand	5	1,901	Shale (cored 3,044 to 3,058 feet)	57	3,096
Hard shale	21	1,922	Shale and lime	118	3,214
Sand	18	1,940	Red bed	12	3,226
Hard shale	8	1,948	Red bed and layers of hard lime	21	3,247
Shale	12	1,960	Shale and lime	8	3,255
Sand	7	1,967	Sand (cored)	16	3,271
Shale	19	1,986	Hard shale, thin layers sand	17	3,288
Sand	10	1,996	Shale and sand	17	3,305
Shale (cored 2,100 to 2,110 feet)	204	2,200	Sandy shale and sand	20	3,325
Sand (cored 2,219 to 2,235 feet)	40	2,240	Hard shale	4	3,329
Shale	2	2,242	Sandy shale and sand	11	3,340
Sand	6	2,246	Hard shale	2	3,342
Shale	47	2,295			
Sandy shale	16	2,311			

RUSK COUNTY

HENDERSON

Population in 1940: 6,437.

Source of information: J. L. Horner, water superintendent, Nov. 3, 1943.

Ownership: Municipal.

Source of supply: Two wells (Nos. 4 and 6).

Well 4. Drilled in 1936 by Layne-Texas Co.; depth, 583 feet; diameter, 12 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 148 feet below land surface in November 1940; yield, 375 gallons a minute with pumping level at 235 feet on Feb. 1, 1943, and 340 gallons a minute with pumping level at 270 feet on Aug. 30, 1943; yield and pumping level measured after 6 hours of pumping.

Well 6. Drilled in 1942 by Layne-Texas Co.; depth, 609 feet; diameter 16 to 10¾ inches; screen from 487 to 592 feet; deep-well turbine pump and 40-horsepower electric motor; pump set at 300 feet: yield, 274 gallons a minute with pumping level at 263 feet on Feb. 1, 1943, and 230 gallons a minute with pumping level at 289 feet on Aug. 30, 1943; yield and pumping level measured after 6 hours of pumping; temperature, 70° F.

Average pumpage, in gallons a day [1]

	1942	1943		1942	1943		1942	1943
January	347,500	317,000	May	358,000	368,000	September	350,000	446,500
February	330,000	315,000	June	401,000	446,500	October	327,000	363,500
March	336,700	307,500	July	470,000	473,000	November	295,000	----
April	335,000	323,000	August	436,000	594,500	December	292,000	----

[1] Maximum daily pumpage, 775,000 gallons.

Storage: Three concrete ground reservoirs, 150,000 gallons each; two elevated tanks, 50,000 and 250,000 gallons.

Number of customers: 1,400.

Treatment: Chlorination.

Analyses

[Collected: Well 4, June 19, 1936; well 6, August 1942. Analyzed by E. W. Lohr and W. W. Hastings]

	Well 4		Well 6	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)	3	0.15	5	0.25
Magnesium (Mg)	2	.16	2	.16
Sodium and potassium (Na+K)	63	2.74	88	3.83
Bicarbonate (HCO_3)	171	2.80	201	3.29
Sulfate (SO_4)	(1)	----	6	.12
Chloride (Cl)	10	.28	7	.20
Fluoride (F)	----	----	.4	.04
Nitrate (NO_3)	----	----	.4	.01
Total dissolved solids	162	----	230	----
Total hardness as $CaCO_3$	17	----	21	----

[1] Less than 10 parts per million.

Drillers' logs

Well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	10	10	Rock	1	316
Yellow sand	10	20	Sandy shale	49	365
Sandy shale	80	100	Shale	35	400
Shale and lignite	45	145	Gray sand	12	412
Fine-grained sand	15	160	Shale	15	427
Sandy shale and lignite	92	252	Sand	52	479
Fine-grained sand	16	268	Shale	3	482
Shale and lignite	27	295	Sand	78	560
Sand	20	315	Brown shale and lignite	23	583

Well 6

Soil	3	3	Shale	4	206
Yellow clay	30	33	Fine-grained sand and lignite	188	394
Blue sand and shale	61	94	Fine-grained packed sand	30	424
Sand and layers of lignite	17	111	Sand (good)	22	446
Fine-grained sand	15	126	Shale	23	469
Shale and layers of sand	65	191	Sand (good)	130	599
Fine-grained sand	10	201	Hard lignite	7	606
Soft rock	1	202	Sand	3	609

OVERTON

Population in 1940: 2,313.

Source of information: Joe Singleton, city secretary, Oct. 7, 1941.

Ownership: Municipal.

Source of supply: Two wells (Nos. 1 and 3).

Well 1. Drilled in 1931 by Layne-Texas Co.; depth, 889 feet; diameter, 10 inches; screens from 247 to 268, 283 to 328, 484 to 505, and 841 to 863 feet; deep-well turbine pump and 25-horsepower electric motor; static water level, 143 feet below land surface in November 1940; reported yield, 175 gallons a minute.

Well 3. Drilled in 1941 by Layne-Texas Co.; depth, 338 feet; diameter, 10¾ inches; screens from 246 to 288 and 309 to 330 feet; deep-well turbine pump and 30-horsepower electric motor; pump set at 230 feet; static water level reported, 158 feet below land surface when drilled; yield, 300 gallons a minute with draw-down of 36 feet.

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

Treatment: Aeration, coagulation, sedimentation, and chlorination.

Analyses

[Collected: Well 1, Mar. 18, 1936; Well 3, Oct. 7, 1941. Analyzed by E. W. Lohr and J. W. Yett, Jr.]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Calcium (Ca)			11	0.54
Magnesium (Mg)			3.6	.30
Sodium and potassium (Na+K)			32	1.40
Bicarbonate (HCO_3)	134	2.20	24	.40
Sulfate (SO_4)	67	1.39	61	1.28
Chloride (Cl)	24	.68	20	.56
Fluoride (F)			0	0
Nitrate (NO_3)			0	0
Total dissolved solids	366		140	
Total hardness as $CaCO_3$	110		42	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	10	10	White sand	42	331
Sand	10	20	Sandy shale and lignite	154	485
Shale	7	27	Green sand	40	525
Muddy sand	52	79	Shale and boulders	20	545
Shale and boulders	79	158	Rock	5	550
Sandy shale	23	181	Sandy shale and lime	65	615
Green sand	20	201	Shale and boulders	65	680
Shale	5	206	Rock	3	683
White sand	27	233	Shale and lignite	113	796
Shale	7	240	Shale	23	819
White sand	34	274	Sand	70	889
Sandy shale	15	289			

Well 3

Sandy clay	15	15	Rock	1	170
Sand	12	27	Hard green sand	9	179
Sandy shale	10	37	Rock	1	180
Brown shale	69	106	Sandy green shale	10	190
Rock	1	107	Shale	4	194
Brown shale	43	150	Sandy shale and boulders	10	204
Rock	1	151	Sandy shale and shale	15	219
Shale	3	154	White sand, streaks of shale, and lignite	85	304
Rock	1	155	Sandy shale and lignite	3	307
Shale and sandy shale	8	163	White sand	21	328
Hard green sand	6	169	Shale	10	338

TATUM

Population in 1940: 427.

Source of information: W. F. Daniels, city secretary, Nov. 3, 1943.

Ownership: Municipal.

Source of supply: Well near elevated tank; drilled in 1938 by Layne-Texas Co.; depth, 427 feet; deep-well turbine pump and 10-horsepower electric motor; static water level, 43.6 below land surface on Nov. 3, 1943; yield, 200 gallons a minute with draw-down of 60 feet.

Pumpage: Average, 12,500 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 63.

Treatment: None.

Analysis, well 1

[Collected Nov. 3, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	7.2	0.15
Iron (Fe)	.01		Chloride (Cl)	143	4.03
Calcium (Ca)	1.7	0.08	Fluoride (F)	1.0	.05
Magnesium (Mg)	.6	.05	Nitrate (NO_3)	3.2	.05
Sodium (Na)	336	14.61	Total dissolved solids	832	
Potassium (K)	7.4	.19	Total hardness as $CaCO_3$	6	
Bicarbonate (HCO_3)	650	10.65	pH	8.3	

SABINE COUNTY

HEMPHILL

Population in 1940: 739.

Source of information: City secretary, May 8, 1942.

Ownership: Municipal.

Source of supply: Well 2 blocks east of courthouse; drilled in 1928 by W. K. Banker; depth, 631 feet; diameter, 8 to 6 inches; screen from 595 to 631 feet; deep-well turbine pump and 7½-horsepower electric motor; static water level, 101.35 feet below measuring point, which is 1.6 feet above land surface, on May 8, 1942; measurement, 15 hours after pumping stopped; yield, 40 gallons a minute; temperature, 80°F.

Pumpage (estimated): Average, 20,000 gallons a day.

Storage: Ground reservoir, 50,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 80.

Treatment: None.

Analysis, well 1

[Collected May 22, 1942. Analyzed by B. Irelan]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Bicarbonate (HCO_3)	1,040	17.06
Iron (Fe)	.09		Sulfate (SO_4)	3	.06
Calcium (Ca)	2.0	0.10	Chloride (Cl)	191	5.39
Magnesium (Mg)	1.0	.08	Nitrate (NO_3)	.5	.01
Sodium (Na) and Potassium (K)	514	22.34	Total dissolved solids	1,260	
			Total hardness as $CaCO_3$	9	

PINELAND

Population in 1940: 267.

Source of information: H. H. Newton, superintendent, May 19, 1942.

Owner: Temple Lumber Co.

Source of supply: Three wells at sawmill.

Well 1. Drilled in 1918 by J. D. Adams; depth, 597 feet; diameter, 8 to 4½ inches; screen from 552 to 597 feet; deep-well turbine pump and 15-horsepower electric motor; reported static water level, 110 feet below land surface; yield, 200 gallons a minute.

Well 2 (unused). Drilled in 1927 by J. D. Adams; depth, 479 feet; diameter, 6 to 4½ inches; screen from 439 to 479 feet; air lift; static water level, 86.6 feet below land surface on May 19, 1942; yield, 150 gallons a minute.

Well 3. Drilled in 1938 by F. R. Balcar; depth, 557 feet; diameter, 8 to 4½ inches; screens from 450 to 492 and 505 to 535 feet; deep-well turbine pump and 15-horsepower electric motor; static water level reported, 130 feet below land surface; yield, 125 gallons a minute; used to supply water for swimming pool and as stand-by well for city.

Pumpage (estimated): Average, 240,000 gallons a day.

Storage: Four ground reservoirs, 45,000 gallons.

Treatment: None.

Analyses

[Collected May 19, 1942. Analyzed by J. W. Yett, Jr.]

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	56		22	
Iron (Fe)	.02		.05	
Calcium (Ca)	5.4	0.27	3.0	0.15
Magnesium (Mg)	1.8	.15	1.0	.08
Sodium (Na)	248	10.78	292	12.68
Potassium (K)				
Bicarbonate (HCO_3)	256	4.20	400	6.57
Sulfate (SO_4)	202	4.21	207	4.31
Chloride (Cl)	98	2.76	71	2
Fluoride (F)	.1	.01	.6	.03
Nitrate (NO_3)	1.0	.02	0	0
Total dissolved solids	752		800	
Total hardness as $CaCO_3$	21		12	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	51	51	Rock	2	297
Rock	2	53	Shale and gumbo	138	435
Gumbo	27	80	Rock	11	446
Shale	73	153	Shale and sand	12	458
Fine black sand	4	157	Sand	13	471
Coarse gravel	2	159	Rock	1	472
Gumbo	120	279	Sand	20	492
Rock	2	281	Gumbo	38	530
Gumbo	14	295	Sand	20	557

SAN AUGUSTINE COUNTY

SAN AUGUSTINE

Population in 1940: 304.

Source of information: Power plant operator, May 6, 1942.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1911 to depth of about 900 feet and later deepened to 1,200 feet; well did not yield sufficient water and was later shot with dynamite at about 600 feet; air lift; static water level, 108.69 feet below measuring point on May 6, 1942; yield, 75 gallons a minute; temperature, 75° F.

Well 2. Drilled in 1925 by W. K. Banker; depth, 625 feet; diameter, 6 inches; screened about 479 to 520 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 102.37 feet below measuring point on May 6, 1942; yield, 145 gallons a minute; temperature, 75° F.

Storage: Ground reservoir and elevated tank; capacity unknown.

Treatment: None.

Analyses

[Collected May 6, 1942. Analyzed by J. W. Yett, Jr.]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		13	
Iron (Fe)	2.6		1.0	
Calcium (Ca)	.9	0.04	.4	0.02
Magnesium (Mg)	1.1	.09	.9	.07
Sodium (Na) + Potassium (K)	366	15.91	385	16.74
Bicarbonate (HCO_3)	956	15.67	980	16.07
Sulfate (SO_4)	6.1	.13	20	.42
Chloride (Cl)	7.0	.20	10	.28
Fluoride (F)	.7	.04	1.1	.06
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	890		931	
Total hardness as $CaCO_3$	6		4	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay	18	18	Blue gypsum	8	307
Soft limerock	13	31	Shale	7	314
Green shale	4	35	Gumbo and boulders	34	340
Limerock	8	43	Lignite	5	353
Shale showing oil	4	47	Brown gumbo	57	410
Mixed green sand and shale	30	77	Brown soapstone	7	417
Hard limerock	4	81	Brown gumbo	60	477
Artesian water strata, flowed small stream	8	89	Water sand and gravel	45	522
Brown shale	22	111	Very hard blue gumbo	24	546
Limerock, hard	2	113	Soft limestone	3	549
Brown shale	57	170	Tough gumbo	11	560
Gumbo	12	182	Very hard rock	2	562
Brown muck	108	290	Tough gumbo	4	566
Soapstone	9	299	Shale showing oil	9	575
			Gumbo	50	625

SAN JACINTO COUNTY

COLDSPRING

Population in 1940: 500.

Source of information: Owner, Oct. 23, 1941.

Ownership: Private.

Source of supply: Spring about one-fourth mile north of courthouse; water is pumped from spring to elevated tank by 3-inch centrifugal pump and gasoline engine.

Pumpage (estimated): Average, 2,500 gallons a day.

Storage: Elevated tank, 5,000± gallons.

Number of customers: 70.

Treatment: None.

Analysis of spring water

[Collected October 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	3.0	0.062
Iron (Fe)	.16		Chloride (Cl)	8.0	.226
Calcium (Ca)	4.2	0.210	Fluoride (F)	.3	.016
Magnesium (Mg)	2.0	.165	Nitrate (NO_3)	5.0	.081
Sodium (Na)	1.2	.052	Total dissolved solids	39	
Potassium (K)			Total hardness as $CaCO_3$	22	
Bicarbonate (HCO_3)	6.0	.098			

OAKHURST

Population in 1940: 500.

Source of information: Texas Long Leaf Lumber Co., Oct. 23, 1941.

Owner: Texas Long Leaf Lumber Co.

Source of supply: Well drilled about 1911; depth, 250 feet; diameter, 6 inches; deep-well cylinder pump and gasoline engine; static water level, 114 feet below land surface in 1940; yield, 30 gallons a minute.

Pumpage: Not known.

Storage: Elevated tank, 20,000 gallons.

Number of customers: 30.

Treatment: None.

Analysis, well 1

[Collected October 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	61		Sulfate (SO_4)	12	0.25
Iron (Fe)	.18		Chloride (Cl)	28	.79
Calcium (Ca)	55	2.75	Fluoride (F)	.4	.02
Magnesium (Mg)	3.6	.30	Nitrate (NO_3)	0	0
Sodium (Na)	56	2.44	Total dissolved solids	366	
Potassium (K)			Total hardness as $CaCO_3$	152	
Bicarbonate (HCO_3)	268	4.39			

SHELBY COUNTY

CENTER

Population in 1940: 3,010.

Source of information: Eros Carriker, water superintendent, June 15, 1944.

Ownership: Municipal.

Source of supply: Mill creek, at small division dam 5 miles southwest of Center.

Pumpage: Maximum, 200,000 gallons; average, 150,000 gallons a day. Capacity of treating plant, 500,000 gallons a day.

Storage: Two elevated tanks, 50,000 and 100,000 gallons.

Number of customers: 700.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis of raw water

[Collected June 15, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	6.6	0.137
Iron (Fe)	1.3		Chloride (Cl)	5.0	.141
Calcium (Ca)	5.0	0.250	Fluoride (F)	1.7	.089
Magnesium (Mg)	2.4	.197	Nitrate (NO_3)	.8	.013
Sodium (Na)	5.7	.248	Total dissolved solids	75	
Potassium (K)	1.8	.046	Total hardness as $CaCO_3$	22	
Bicarbonate (HCO_3)	22	.361	pH	7.2	

TENAHA

Population in 1940: 608.

Source of information: Lem Hill, city secretary, Apr. 4, 1942.

Ownership: Municipal.

Source of supply: Well near elevated tank; drilled in 1941 by Layne-Texas Co., depth, 519 feet; diameter, 10¾ to 6⅝ inches; screens from 407 to 429 and 456 to 508 feet, gravel-walled; deep-well turbine pump and 10-horsepower electric motor; pump set at 160 feet; static water level, 110 feet below land surface when drilled; reported yield, 75 gallons a minute with draw-down of about 16 feet.

Pumpage (reported estimate): Average, 10,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 125.

Treatment: None.

Analysis, well 1

[Collected 1941. Analyzed by Texas State Department of Health]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	26		Fluoride (F)	2.8	0.14
Iron (Fe)	.56		Total dissolved solids	971	
Sulfate (SO_4)	10	0.28	Total hardness as $CaCO_3$	33	
Chloride (Cl)	151	4.26	pH	8.8	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand and clay	28	28	Sandy shale	11	197
Lignite	7	35	Sand	13	210
Sand and shale	16	51	Sandy shale and lignite	154	364
Sand	15	66	Rock	2	366
Shale	20	86	Shale and boulders	37	403
Sandy shale	94	180	Sand	107	510
Shale	6	186	Shale	9	519

TIMPSON

Population in 1940: 1,494.

Source of information: H. C. Meador, water superintendent, Apr. 3, 1942.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. 1 block north of railroad station; drilled about 1907; depth, 677 feet; diameter, 10 inches; reported 67 feet of screen near bottom of well; air lift; yield, about 60 gallons a minute after several hours of pumping.

Well 2. 2 blocks east of railroad station; drilled in 1940 by Layne-Texas Co.; drilled to 691 feet and plugged back to 421 feet; diameter, 13⅝ to 6⅝ inches; screen from 359 to 421 feet, gravel-walled; deep-well turbine pump and 20-horsepower electric motor; pump set at 180 feet; static water level reported, 113 feet below land surface when drilled; yield, 90 gallons a minute with draw-down of 140 feet; temperature, 70° F.

Pumpage: Maximum, 100,000 gallons; minimum, 30,000 gallons; average, 65,000 gallons a day.

Storage: Elevated tank, 75,000 gallons.

Number of customers: 300.

Treatment: None.

Analyses

[Collected July 25, 1941. Analyzed by Texas State Department of Health]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Iron (Fe)	0.06		0.1	
Calcium (Ca)	6	0.30	5	0.25
Magnesium (Mg)	2	.16	2	.16
Sodium and potassium (Na+K)	176	7.67	279	12.13
Bicarbonate (HCO_3)	397	6.51	634	10.39
Sulfate (SO_4)	38	.79	2	.04
Chloride (Cl)	28	.79	71	2.00
Fluoride (F)	.6	.03	1.4	.07
Nitrate (NO_3)	.5	.01	2.7	.04
Total dissolved solids	468		772	
Total hardness as $CaCO_3$	23		20	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	11	11	Fine-grained gray sand	25	374
Hard sandy shale	58	69	Rock	1	375
Shale	10	79	Fine-grained gray sand	42	417
Rock	4	83	Shale	25	442
Sandy shale	34	117	Shale and lignite	20	462
Shale and lignite	30	147	Shale	14	476
Shale	29	176	Sand	32	508
Rock	2	178	Shale	32	540
Shale	42	220	Rock	1	541
Sand and shale	34	254	Sand and sandy shale	26	567
Fine-grained gray sand	32	286	Shale	12	579
Hard shale and lignite	36	322	Rock	1	580
Rock	2	324	Sand and layers of rock	18	598
Shale	17	341	Hard sand	19	617
Sand	7	348	Hard shale and layers of rock	15	632
Rock	1	349	Sand	59	691

SMITH COUNTY

ARP

Population in 1940: 1,139.

Source of information: D. H. Mason, water superintendent, July 20, 1943.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. 2 blocks west of railroad station; drilled in 1935 by Neil Scroggins; depth, 368 feet; diameter, 10 to 8 inches; deep-well turbine pump and electric motor; static water level, 160.9 feet below land surface on July 20, 1943; used as stand-by well.

Well 2. 20 feet north of well 1; drilled in 1940 by J. C. Boling; depth, 525 feet; screen below 380 feet; deep-well turbine pump and 15-horsepower electric motor; pump set at 290 feet; static water level, 234.8 feet below land surface 1 hour after shutdown on July 20, 1943; yield, 100 gallons a minute with pumping level at 263 feet after 3 hours of pumping.

Pumpage: No record.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 134.

Treatment: None.

Analysis, well 2

[Collected July 20, 1943. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	67	0.140
Iron (Fe)	.33		Chloride (Cl)	12	.34
Calcium (Ca)	2.9	0.14	Fluoride (F)	.4	.02
Magnesium (Mg)	.4	.03	Nitrate (NO_3)	1.0	.02
Sodium (Na)	133	5.80	Total dissolved solids	372	
Potassium (K)	3	.08	Total hardness as $CaCO_3$	8	
Bicarbonate (HCO_3)	260	4.28	pH	8.6	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand and clay	30	30	Blue sand	23	153
Water sand	30	60	Hard sand	12	165
Hard sand	10	70	Sand rock	27	192
Water sand	30	100	Hard sand	76	268
Hard sand	30	130	Water sand	100	368

Well 2

Clay	50	50	Quicksand	112	312
Sand (water)	3	53	Shale	75	387
Shale	109	162	Sand (water)	25	412
Sand (water)	5	167	Shale	28	440
Shale	33	200	Sand (water)	85	525

LINDALE

Population in 1940: 820.

Source of information: C. E. Cannon, water superintendent, July 26, 1943.

Ownership: Municipal.

Source of supply: Well at southwest corner of school ground; drilled in 1939 by Layne-Texas Co., depth, 753 feet; diameter, 10 to 5½ inches; deep-well turbine pump and 25-horsepower electric motor; pump set at 350 feet; static water level, 219 feet below land surface in 1939; yield, 116 gallons a minute with draw-down of 97 feet.

Pumpage: Average, 35,000 gallons a day.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 156.

Treatment: None.

Analysis, well 1

[Collected July 26, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	14	0.291
Iron (Fe)	.12		Chloride (Cl)	4.0	.113
Calcium (Ca)	10	0.499	Fluoride (F)	.6	.032
Magnesium (Mg)	2.9	.238	Nitrate (NO_3)	2.0	.032
Sodium (Na)	38	1.673	Total dissolved solids	152	
Potassium (K)	4.8	.123	Total hardness as $CaCO_3$	37	
Bicarbonate (HCO_3)	126	2.065	pH	8.2	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Yellow sand and streaks of shale	56	56	Sand	10	505
Shale and hard layers	14	70	Shale	17	522
Rock	1	71	Sand	13	535
Hard green shale and fine-grained sand	44	115	Shale	8	543
Sand	22	137	Sand	10	553
Sand and layers of shale	45	182	Shale and lignite	29	482
Shale	11	193	Sand and breaks of shale and lignite	27	609
Lignite	18	211	Shale	27	626
Shale and streaks of sand	76	287	Rock	1	627
Sandy shale	38	325	Shale	28	655
Sand	98	423	Sand	8	663
Shale	43	466	Sandy shale	26	689
Sand	10	476	Sand	20	709
Hard rock	1	477	Shale	23	732
Shale	18	495	Rock	1	733
			Shale	20	753

TROUP

Population in 1940: 1,526.

Source of information: Will S. Fite, city secretary, July 20, 1943.

Ownership: Municipal.

Source of supply: Well at old pumping station near west edge of city; drilled in 1940 by Layne-Texas Co.; depth, 342 feet; diameter, 8⅝ inches; deep-well turbine pump and 20-horsepower electric motor; pump set at 230 feet; static water level, 105 feet below land surface in September 1940; yield, 250 gallons a minute with draw-down of 88 feet.

Pumpage (estimated): Average, 85,000 gallons a day.

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

Number of customers: 275.

Treatment: Aeration and charcoal filter.

Analysis, well 1

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	233	4.85
Iron (Fe)	1.8		Chloride (Cl)	28	.79
Calcium (Ca)	34	1.70	Fluoride (F)	.4	.02
Magnesium (Mg)	15	1.23	Nitrate (NO_3)	0	0
Sodium (Na)	100	.34	Total dissolved solids	489	
Potassium (K)	7.0	.18	Total hardness as $CaCO_3$	146	
Bicarbonate (HCO_3)	109	1.79	pH	7.3	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand	2	2	Shale	7	300
Clay	20	22	Rock	1	301
Sand	2	24	Sand	30	331
Shale	237	261	Shale	11	342
Sand	32	293			

TYLER

Population in 1940: 28,279.

Source of information: J. M. Lloyd, water superintendent, August 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir and three wells (Nos. 2, 3, and 4).

Bellwood Lake. On Indian Creek, about 4 miles southwest of courthouse; estimated storage, 1,770 acre-feet (about 555,000,000 gallons).

Well 2. At intersection of Robert Street and Glenwood Boulevard; drilled in 1937 by Layne-Texas Co.; depth, 1,086 feet; diameter, 16 to 8⅝ inches; screen from 928 to 1,066 feet; deep-well turbine pump and 60-horsepower electric motor; pump set at 430 feet; static water level, 258 feet below land surface in July 1937; yield, 350 gallons a minute with draw-down of 118 feet; temperature, 77° F.

Well 3. On Robertson Avenue near the south city limits; drilled in 1938 by Layne-Texas Co.; depth, 1,057 feet; diameter, 13⅜ to 6⅝ inches; screen from 785 to 950 feet; deep-well turbine pump and 100-horsepower electric motor; pump set at 420 feet; static water level, 219 feet below land surface in 1938; yield, 350 gallons a minute with draw-down of 140 feet.

Well 4. Near intersection of Fifth Street and the International Great Northern R. R.; drilled in 1939 by Layne-Texas Co.; depth, 1,042 feet; diameter, 13⅜ to 6⅝ inches; screen from 844 to 1,030 feet; deep-well turbine pump and 100-horsepower electric motor; pump set at 400 feet; static water level, 263 feet below land surface in July 1939; yield, 650 gallons a minute with draw-down of 75 feet.

Pumpage: Minimum, 1,600,000 gallons; maximum, 4,500,000 gallons; average, 2,800,000 gallons a day. (All water obtained from lake in winter; one-third from wells in summer.)

Storage: Standpipe, 750,000 gallons; elevated tank, 500,000 gallons.

Number of customers: 7,456.

Treatment: Surface water—Aeration, coagulation with alum and lime, sedimentation, rapid sand filter, and chlorination. Well 4—Aeration, coagulation with alum and lime, pressure filter, and chlorination.

Analyses

Dates of collection: Wells 2 and 3, Aug. 3, 1943; Well 4, July 27, 1943; raw lake water, July 26, 1943. Analyzed by J. H. Rowley]

	Well 2		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	11		13	
Iron (Fe)	.01		.06	
Calcium (Ca)	8.4	0.419	10	0.499
Magnesium (Mg)	1.7	.140	2.3	.189
Sodium (Na)	29	1.243	30	1.296
Potassium (K)	4.0	.102	3.8	.097
Bicarbonate (HCO_3)	94	1.541	108	1.770
Sulfate (SO_4)	8.3	.173	8.5	.177
Chloride (Cl)	6.0	.169	4.0	.113
Fluoride (F)	.4	.021	.4	.021
Nitrate (NO_3)	0	0	0	0
Total dissolved solids	115		125	
Total hardness as $CaCO_3$	28		34	
pH	8.1		8.2	

	Well 4		Raw lake water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		8.6	
Iron (Fe)	3.5		.04	
Calcium (Ca)	28	1.398	5.2	0.260
Magnesium (Ng)	4.5	.370	2.0	.164
Sodium (Na)	53	2.318	4.5	.194
Potassium (K)	6.8	.174	2.8	.072
Bicarbonate (HCO_3)	93	1.524	20	.328
Sulfate (SO_4)	61	1.270	2	.042
Chloride (Cl)	50	1.410	9.0	.254
Fluoride (F)	1.0	.053	1.0	.053
Nitrate (NO_3)	.2	.003	.8	.013
Total dissolved solids	276		56	
Total hardness as $CaCO_3$	88		21	
pH	7.2		7.0	

Drillers' logs

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	3	3	Hard rock	1	282
Red sandy clay	38	41	Soft shale and layers rock	10	292
Soft blue shale	18	59	Soft green and brown shale with some lignite	20	312
Soft rock	1	60	Fine-grained gray sand	13	325
Soft blue shale	36	96	Fine-grained gray sand, shale, and lignite	31	356
Fine-grained gray sand with broken soft shale	75	171	Good gray sand and lignite	25	381
Soft gray shale	20	191	Soft gray shale and layers of lignite	27	408
Coarse-grained white sand with lignite	79	270	Soft shale	10	418
Soft shale	11	281			

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Drillers' logs—Continued

Well 2—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Fine-grained silty sand	30	448	Gray and brown shale	20	823
Brown shale	32	480	Rock	1	824
Sand	9	489	Hard shale and thin layers sand	22	846
Soft shale	4	493	Rock	1	847
Sand	127	620	Soft shale	14	861
Gray and brown shale with breaks of sand	10	630	Hard fine-grained gray sand	35	896
Shale with breaks of sand	10	640	Shale	3	899
Sand (finer than that logged above with a thickness of 127 ft.)	17	657	Rock	1	900
Broken fine-grained sand and shale	34	691	Hard fine-grained gray sand	10	910
Rock	1	692	Shale	5	915
Fine-grained broken sand and shale	10	702	Rock	1	916
Rock	1	703	Hard shale	6	922
Fine-grained sand and shale	28	731	Rock	1	923
Soft shale	18	749	Soft shale	11	934
Fine-grained gray sand	36	785	Hard fine-grained sand	17	951
Rock	1	786	Shale and layers of sand	13	964
Shale with thin layers sand	17	803	Medium white sand with thin shale breaks in top	78	1,042
			Rock	1	1,043
			Sand and lignite breaks	21	1,064

Well 3

Surface soil	4	4	Coarse-grained white sand	24	606
Red clay	14	18	Rock	1	607
Soft blue shale	127	145	Fine-grained gray sand	22	629
Coarse-grained white sand	34	179	Hard shale	12	641
Soft shale, thin layers of rock and lignite	43	222	Rock	1	642
Fine-grained dark gray sand	10	232	Hard sand	8	650
Hard brown shale	38	270	Rock	15	665
Soft brown shale, sand, and lignite	22	292	Gray sand with mica	32	697
Sand, soft, shale, and lignite	28	320	Soft shale	8	705
Soft shale, thin layers, fine-grained sand, and lignite	50	370	Rock	1	706
Hard shale and fine-grained sand	57	427	Shale	2	708
Gray sand and thin layers of shale	20	447	Rock	1	709
Good gray sand and some lignite	38	485	Hard shale	40	749
Soft gray shale and layers of lignite	17	502	Soft shale and thin layers of sand	28	777
Soft shale, sand, and lignite	23	525	Fine-grained sand with shale breaks	43	820
Soft shale	40	565	Rock	1	821
Sand	12	577	Soft shale	14	835
Soft shale	5	582	Gray sand with lignite	18	853
			Soft shale and layers of sand	29	882
			Hard shale	15	897
			Fine-grained gray sand	53	950
			Hard shale	12	962
			Soft shale and lignite layers	95	1,057

Well 4

Red sand and clay	28	28	Soft brown shale, layers of fine-grained sand	50	341
Gray shale and layers of gray sand	25	53	Hard brown shale	36	377
Rock	1	54	Fine-grained sand	11	388
Soft shale and sand	22	76	Soft shale, thin layers of sand	16	404
Rock	1	77	Hard rock	1	405
Soft shale	5	82	Hard shale	11	416
Gray sand and shale	14	96	Soft shale, layers of sand	68	484
White sand	32	128	Rock	1	485
Soft shale, lignite, and sand	82	210	Soft shale, layers of sand	43	528
Coarse-grained white sand, some lignite	25	235	Hard fine-grained sand and shale	50	578
Shale and breaks sand	12	247	Rock	1	579
Coarse-grained white sand	13	260	Soft shale	7	586
Rock	1	261	Hard fine-grained silty sand	24	610
Hard brown shale, layers of hard rock	30	291	Soft brown shale, layers of sand and lignite	40	650

Drillers' logs—Continued

Well 4—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Hard fine-grained sand	16	666	Soft shale	7	790
Hard rock	1	667	Rock	1	791
White sand	21	688	Soft brown shale	46	837
Soft shale	6	694	Fine-grained gray sand and lignite	26	863
Rock	1	695	Soft shale	5	868
Soft brown shale, sand breaks	29	724	Rock	1	869
Fine-grained gray sand, mica, and lignite	23	747	Soft shale	9	878
Hard shale	7	754	Rock	1	879
Hard rock	1	755	Soft shale	11	890
Fine-grained sand and shale	13	768	Fine-grained gray sand and lignite	136	1,026
Soft shale	14	782			
Rock	1	783			

TITUS COUNTY

MOUNT PLEASANT

Population in 1940: 4,528.

Source of information: Bill Lyle, plant operator, Nov. 18, 1943.

Ownership: Municipal.

Source of supply: Two impounding reservoirs; old reservoir built in 1901, area 31.4 acres, capacity 120,000,000 gallons; new reservoir built in 1938, area 140 acres, capacity 500,000,000 gallons.

Pumpage: Maximum, 720,000 gallons; minimum, 200,000 gallons; average, 400,000 gallons a day.

Storage: Standpipe, 99,000 gallons.

Number of customers: 1,085.

Treatment: Coagulation, sedimentation, rapid sand filter, and chlorination.

Analyses

[Collected Nov. 18, 1943. Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	1.6		0.9	
Iron (Fe)	.67		.12	
Calcium (Ca)	11	0.549	15	0.749
Magnesium (Mg)	6.0	.493	5.9	.485
Sodium (Na)	21	.899	20	.879
Potassium (K)	4.2	.107	4.6	.118
Bicarbonate (HCO_3)	42	.688	36	.590
Sulfate (SO_4)	13	.271	28	.583
Chloride (Cl)	37	1.044	37	1.044
Fluoride (F)	.6	.032	.2	.011
Nitrate (NO_3)	.8	.013	.2	.003
Total dissolved solids	129		140	
Total hardness as $CaCO_3$	52		62	
pH	6.7		6.7	

TALCO

Population in 1940: 912.

Source of information: J. B. Osborn, mayor, May 21, 1942.

Ownership: Municipal.

Source of supply: Well 3½ miles northwest of Talco in Red River County; drilled in 1937 by Layne-Texas Co.; depth, 408 feet; diameter, 20 to 10¾ inches; screen from 281 to 404 feet; deep-well turbine pump and 60-horsepower electric motor; natural flow 23 gallons a minute on May 21, 1942, after pump had been off 22 hours; pump yield, 500 gallons a minute with pumping level at 180 feet; temperature, 68° F.

Pumpage: Average, 40,000 gallons a day.

Storage: Concrete ground reservoir, 22,000 gallons; elevated tank, 22,000 gallons.

Treatment: None.

Analysis, well 1

[Collected May 21, 1942. Analyzed by B. Irelan]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	2.0	0.04
Iron (Fe)	.05		Chloride (Cl)	326	9.19
Calcium (Ca)	2.8	0.14	Fluoride (F)	.3	.02
Magnesium (Mg)	1.0	.08	Nitrate (NO_3)	.2	.00
Sodium and potassium (Na+K)	413	17.95	Total dissolved solids	1,030	
Bircarbonate (HCO_3)	544	8.92	Total hardness as $CaCO_3$	11	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Yellow clay	10	10	Sand	22	136
White sand	5	15	Shale	148	284
Yellow clay	13	28	Rock	2	286
Rock	1	29	Sand (good)	100	386
Sandy shale	85	114	Sandy shale	22	408

TRINITY COUNTY

GROVETON

Population in 1940: 940.

Source of information: Miss Willie Evans, city secretary, and W. H. Parker, pump operator, June 23, 1943.

Ownership: Municipal.

Source of supply: Two wells 116 feet apart near elevated tank in Groveton.

Well 1. Drilled in 1926 by J. H. Kimball; depth, 467 feet; diameter, 16 to 8 inches; screens from 166 to 171, 207 to 213, 260 to 295, and 420 to 465 feet; deep-well turbine pump and electric motor; pump set at 185 feet; yield, 155 gallons a minute.

Well 2. Drilled in 1936 by A. E. Faucett; depth, 476 feet; diameter, 13 to 8 inches; deep-well turbine pump and electric motor; static water level, 125 feet below measuring point on Aug. 4, 1936; yield, 100 gallons a minute.

Pumpage (estimated): Average, 20,000 gallons a day.
Storage: Ground reservoir, 35,000 gallons; elevated tank, 30,000 gallons.
Number of customers: 325.
Treatment: Chlorination.

Analysis of composite sample, wells 1 and 2

[Collected June 23, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	44		Sulfate (SO_4)	216	4.50
Iron (Fe)	.18		Chloride (Cl)	102	2.88
Calcium (Ca)	6.8	0.34	Fluoride (F)	.4	.02
Magnesium (Mg)	1.0	.08	Nitrate (NO_3)	.3	.00
Sodium (Na)	282	12.28	Total dissolved solids	845	
Potassium (K)	10	.26	Total hardness as $CaCO_3$	21	
Bicarbonate (HCO_3)	339	5.56	pH	7.8	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	30	30	Sand	3	200
Black shale	4	34	Gumbo	3	203
Blue sandy shale	13	47	Sand	13	216
Shale and lignite	4	51	Sandstone	4	220
Sandy shale	12	63	Soapstone	35	255
Fine blue sand	5	68	Sand	40	295
Shale and lignite	12	80	Gumbo	8	303
Fine gray sand	6	86	Sandstone	4	307
Shale and lignite	25	111	Gumbo and boulders	14	321
Soapstone	1	112	Shale and lignite	30	351
Shale and lignite	17	129	Sand and gumbo	11	362
Sand	6	135	Gumbo and lignite	28	390
Sandstone	6	141	Hard rock	1	391
Sand and soapstone	31	172	Tough gumbo	13	404
Soapstone	13	185	Shale and lignite	15	419
Sandstone	2	187	Sandstone	1	420
Gray sand	5	192	Gray sand	47	467
Soapstone	5	197			

Well 2

Sandy soil	17	17	Gumbo	9	257
Shale	3	20	Sand	38	295
Sand	42	62	Gumbo	11	306
Lignite and shale	19	81	Rock	3	309
Hard shale	25	106	Gumbo	22	331
Soapstone	29	135	Hard sandy shale	19	350
Sand	6	141	Sand	10	360
Shale	9	150	Gumbo	28	388
Soapstone	5	155	Shale	2	390
Lignite and shale	9	164	Rock	1	391
Soapstone	10	174	Shale	26	417
Lignite and shale	16	190	Sandstone	2	419
Gumbo	50	240	Gumbo	5	424
Rock	1	241	Sand	52	476
Hard shale	7	248			

TRINITY

Population in 1940: 2,217.

Source of information: J. A. Henner, city manager, June 1943.

Ownership: Municipal.

Source of supply: Two wells about 3 miles south and 1½ miles west of Trinity.

Well 1. Drilled in 1925 by Layne-Texas Co.; depth, 445 feet; diameter, 10 inches; screens from 215 to 236, 258 to 298, 320 to 340, and 404 to 422 feet; well flowed 10 gallons a minute when drilled; air lift; yield, 177 gallons a minute with pumping level at 40 feet.

Well 2. Drilled in 1941 by A. E. Faucett; depth, 452 feet; diameter, 13 to 6 inches; air lift; screens from 225 to 248, 259 to 274, 286 to 295, 314 to 352, 366 to 379, and 409 to 431 feet; static water level reported, 60 feet below land surface; yield, 500 gallons a minute when pumped with three air compressors; present yield, 300 gallons a minute.

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

Storage: Ground storage at wells, 100,000 gallons; two elevated tanks in Trinity, 50,000 gallons.

Number of customers: 375.

Treatment: None.

Analyses

[Collected June 1943. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	54		48	
Iron (Fe)	.02		.04	
Calcium (Ca)	12	0.60	12	0.60
Magnesium (Mg)	.5	.04	.8	.07
Sodium (Na)	250	10.89	262	11.41
Potassium (K)	12	.31	12	.31
Bicarbonate (HCO_3)	324	5.31	334	5.47
Sulfate (SO_4)	2	.04	2	.04
Chloride (Cl)	228	6.43	242	6.83
Fluoride (F)	1.0	.05	.2	.01
Nitrate (NO_3)	.5	.01	2.2	.04
Total dissolved solids	739		758	
Total hardness as $CaCO_3$	32		34	
pH	7.7		7.7	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	2	2	Fine gray sand	33	299
Clay	12	14	Gumbo	8	307
Sand and gravel	10	24	Fine sand with shale	37	344
Soapstone	2	26	Gumbo	10	354
Fine gray sand	5	31	Sand and lignite	18	372
Soapstone	9	40	Gumbo	8	380
Lignite	5	45	Sand	10	390
Soapstone	17	62	Sandstone	4	394
Hard fine sand	5	67	Gumbo	11	405
Tough gumbo	135	202	Sandstone	3	408
Lignite	6	208	Hard packed sand	20	428
Sand	25	233	Sandstone	4	432
Gumbo	12	245	Fine sand	10	442
Lignite and shale	15	260	Sandstone	3	445

Drilllers' logs—Continued

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay and sand	18	18	Sand and shale	4	279
Sand	16	34	Sand	4	283
Shale, sand, and clay	8	42	Sand and shale	3	286
Sand and gravel	11	53	Sand	11	297
Lignite and sand	3	56	Lignite and shale	20	317
Lignite	4	60	Sand	33	350
Lignite and sand	15	75	Sand and shale	6	356
Sandy shale	13	88	Lignite and hard shale	10	366
Shale	30	118	Sand with shale streaks	13	379
Rock	2	120	Shale	6	385
Hard sand and shale	6	126	Sand and lignite	8	393
Sand and shale	6	132	Hard sand, lignite, and shale	7	400
Sand	4	136	Sand and shale	8	408
Sand and shale	37	173	Sand	4	412
Hard shale	23	196	Sand and shale	3	415
Hard shale and lignite	19	215	Sand	15	430
Sand, shale, and lignite	10	225	Hard shale	2	432
Sand and gravel	27	252	Rock	4	436
Sand and shell	3	255	Hard sand and shale	12	448
Shale and lignite	5	260	Rock	4	452
Sand	15	275			

TYLER COUNTY

DOUCETTE

Population in 1940: 250.

Source of information: Postmaster, Oct. 23, 1941.

Source of supply: Well drilled by Paul Atchinson; depth, 334 feet; diameter, 6 inches; deep-well cylinder pump and 1½-horsepower electric motor; static water level, 143 feet below land surface in October 1941; yield, 10 gallons a minute.

Pumpage (estimated): Average, 2,000 gallons a day.

Storage: Elevated tank, 10,000 gallons.

Number of customers: 30.

Treatment: None.

Analysis, well 1

[Collected Oct. 23, 1941. Analyzed by W. W. Hastings.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	31		Sulfate (SO_4)	8.0	0.167
Iron (Fe)	.12		Chloride (Cl)	21	.592
Calcium (Ca)	29	1.448	Fluoride (F)	.4	.021
Magnesium (Mg)	2.3	.189	Nitrate (NO_3)	0	0
Sodium (Na)	15	.652	Total dissolved solids	183	
Potassium (K)			Total hardness as $CaCO_3$	96	
Bicarbonate (HCO_3)	110	1.803			

WOODVILLE

Population in 1940: 1,521.

Source of information: City secretary, Oct. 23, 1943.

Ownership: Municipal.

Source of supply: Well drilled in 1934 by Layne-Texas Co.; depth, 402 feet; diameter, 8 to 4½ inches; screen from 359 to 402 feet; deep-well turbine pump and electric motor; static water level, 90 feet below land surface Apr. 9, 1941; reported yield, 140 gallons a minute with draw-down of 11.5 feet.

Pumpage (estimated): Average, 42,000 gallons a day.
Storage: Ground reservoir, 50,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 225.
Treatment: Aeration and sedimentation.

Analysis, well 1

[Collected Apr. 9, 1941. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	46		Sulfate (SO_4)	7	0.146
Iron (Fe)	.11		Chloride (Cl)	24	.677
Calcium (Ca)	36	1.797	Fluoride (F)	0	0
Magnesium (Mg)	2.3	.189	Nitrate (NO_3)	0	0
Sodium (Na)	15	.672	Total dissolved solids	197	
Potassium (K)			Total hardness as $CaCO_3$	99	
Bicarbonate (HCO_3)	112	1.836	pH	6.5	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	2	2	Lime and soapstone	71	274
Clay	17	19	Shale	28	302
Coarse-grained sand	36	55	Hard shale	10	312
Clay	16	71	Sandy shale	27	339
Sand with streaks of clay	35	106	Fine sand and shale	20	359
Clay	34	140	Good coarse-grained sand	43	402
Sand and limestone	53	193	Clay	2	404
Clay	10	203			

UPSHUR COUNTY

BIG SANDY

Population in 1940: 609.
Source of information: John W. Prothro, water superintendent, Nov. 25, 1941.
Ownership: Municipal.
Source of supply: Well in western part of town; drilled in 1935 by the Austin Bridge Co.; depth, 409 feet; diameter, 8 to 6⅝ inches; slotted casing from 284 to 409 feet; deep-well turbine pump and 5-horsepower electric motor; pump set at 100 feet; static water level reported, 60 feet below land surface in 1935; yield, 90 gallons a minute with draw-down of 30 feet.
Pumpage (estimated): Average, 25,000 gallons a day.
Storage: Concrete reservoir, 50,000 gallons; elevated tank, 50,000 gallons.
Treatment: None.

Analysis, well 1

[Collected Nov. 25, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	24	1.198	Sulfate (SO_4)	7.0	0.146
Magnesium (Mg)	3.9	.321	Chloride (Cl)	6.0	.169
Sodium (Na)	48	2.087	Fluoride (F)	0	0
Potassium (K)			Total dissolved solids	133	
Bicarbonate (HCO_3)	134	2.196	Total hardness as $CaCO_3$	22	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red sand	28	28	Sand	10	296
Red clay and sand	48	76	Sand and gravel	112	408
Sand	208	284	Sandstone	1	409
Cap rock	2	286			

GILMER

Population in 1940: 3,138.

Source of information: Ed Gooch, water superintendent, Nov. 25, 1941.

Owner: East Texas Public Service Co.

Source of supply: Three wells (Nos. 1, 3, and 4).

Well 1. Between Harrison and Tyler Streets east of Cotton Belt R. R.; drilled in 1925 by Layne-Texas Co.; depth, 450 feet; diameter, 10 to 8 inches; screen from 380 to 446 feet; deep-well turbine pump and 10-horsepower electric motor; pump set at 150 feet; static water level, 104 feet below land surface on Jan. 30, 1937; yield, 130 gallons a minute with draw-down of 34 feet.

Well 2. Abandoned.

Well 3. At south end of city park; drilled in 1937 by Layne-Texas Co.; depth, 554 feet; diameter, 10 inches; screen from 328 to 433 feet; deep-well turbine pump and 40-horsepower electric motor; pump set at 280 feet; static water level, 96 feet below land surface on Apr. 18, 1937; yield, 480 gallons a minute with draw-down of 93 feet; temperature, 68½° F.

Well 4. Between Cross and Taylor Streets, west of Cotton Belt R. R.; drilled in 1940 by Layne-Texas Co.; depth, 517 feet; diameter, 10 inches; screen from 304 to 497 feet; deep-well turbine pump and 40-horsepower electric motor; pump set at 280 feet; reported static water level, 110 feet below land surface; yield, 500 gallons a minute with draw-down of 134 feet.

Average pumpage, in gallons a day

	1942	1943		1942	1943		1942	1943
January	242,000	275,000	May	288,000	304,000	September	301,000	339,000
February	208,000	273,000	June	257,000	351,000	October	288,000	--------
March	215,000	263,000	July	345,000	452,000	November	257,000	--------
April	216,000	306,000	August	299,000	382,000	December	258,000	--------

Storage: Concrete reservoir, 100,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 742.

Treatment: None.

Analysis, well 3

[Collected Nov. 18, 1943. Analyzed by W. W. Hastings.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13	----------	Sulfate (SO_4)	33	0.687
Iron (Fe)	.04	----------	Chloride (Cl)	18	.508
Calcium (Ca)	3.0	0.150	Fluoride (F)	.2	.011
Magnesium (Mg)	.7	.058	Nitrate (NO_3)	2.2	.035
Sodium (Na)	102	4.435	Total dissolved solids	281	----------
Potassium (K)	3.4	.087	Total hardness as $CaCO_3$	10	----------
Bicarbonate (HCO_3)	213	3.491	pH	7.2	----------

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface clay and sand	20	20	Sand and lime	24	238
Red clay	10	30	Hard sand rock	1	239
Sand	10	40	Sand and boulders	16	255
Clay	20	60	Gumbo	17	272
Water sand	52	112	Lignite	2	274
Sand	10	122	Sand	7	281
Clay	25	147	Gumbo	57	338
Packed sand	19	166	Gumbo and boulders	3	341
Sand rock	1	167	Gumbo	13	354
Water sand	13	180	Shale, lime, and boulders	31	385
Sand	1	181	Water sand	64	449
Sand and boulders	12	193	Gumbo	5	454
Sand	6	199	Water sand	36	490
Gumbo	7	206	Gumbo	1	491
Sand	8	214			

Well 2

Surface soil	8	8	Rock	1	246
Clay	7	15	Sandy shale and boulders	47	293
Sand	10	25	Gray sand	15	308
Sandy clay	37	62	Shale	42	350
Sand	41	103	Good sand	132	482
Shale and boulders	81	184	Sticky shale	4	486
Hard sand	61	245			

Well 3

Yellow clay	5	5	Brown shale	11	230
Red sandy clay	10	15	Packed sand	20	250
Black shale	36	51	Rock	1	251
Sand	45	96	Sand and lignite	2	253
Black shale	42	138	Packed sand	10	263
Rock	1	139	Shale	13	276
Black shale	14	153	Fine-grained sand boulders	44	320
Rock	2	155	Sand	134	454
Brown shale	63	218	Gumbo	100	554
Rock	1	219			

Well 4

Surface sand	14	14	Sand	3	198
Clay	3	17	Sandy shale	10	208
Yellow sand	10	27	Shale and lignite	83	291
Brown shale	21	48	Sandy shale	7	298
Sandy shale	21	69	Sandy shale and lignite	29	327
Rock	1	70	Brown sand	8	335
Sand	27	97	Hard shale	29	364
Rock	1	98	Hard sandy lime	7	371
Sand	17	115	Sand	30	401
Hard sandy shale and lignite	12	127	Sand and shale	14	415
Shale	38	165	Sand	28	443
Rock	1	166	Shale and sand	12	455
Sandy shale	13	179	Sand	9	464
Rock	2	181	Shale	5	469
Sand	6	187	Sand and shale	25	494
Shale	8	195	Shale	23	517

VAN ZANDT COUNTY

CANTON

Population in 1940: 715.

Source of information: Z. W. Moore, mayor, and A. M. Graham, water superintendent, Sept. 10, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir half a mile west of town; developed about 1923; drainage area, 100 acres; area under water, 35 acres; maximum depth, 25 feet. (City attempted to obtain ground-water supply in 1923 but was unsuccessful.)

Pumpage (estimated): Maximum, 75,000 gallons; average, 50,000 gallons a day.

Storage: Three concrete reservoirs, 25,000 gallons each; elevated tank, 75,000 gallons.

Number of customers: 280.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis of raw water

[Collected Sept. 10, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	2.5		Sulfate (SO_4)	3	0.062
Iron (Fe)	.02		Chloride (Cl)	4.0	.113
Calcium (Ca)	5.0	0.250	Fluoride (F)	.2	.011
Magnesium (Mg)	2.0	.164	Nitrate (NO_3)	.5	.008
Sodium (Na)	4.0	.172	Total dissolved solids	42	
Potassium (K)	2.6	.067	Total hardness as $CaCO_3$	21	
Bicarbonate (HCO_3)	28	.459	pH	6.8	

EDGEWOOD

Population in 1940: 738.

Source of information: B. B. Brandon, mayor, Sept. 10, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir 1 mile south of town; built in 1923; area under water, 20 acres; capacity, 23,000,000 gallons.

Pumpage (estimated): Maximum, 75,000 gallons; average, 35,000 gallons a day.

Storage: Three concrete reservoirs, 25,000 gallons each; elevated tank, 50,000 gallons.

Treatment: Coagulation with alum and lime, sedimentation, and chlorination.

Analysis of raw water

[Collected Sept. 10, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.3		Sulfate (SO_4)	31	0.645
Iron (Fe)	.05		Chloride (Cl)	37	1.044
Calcium (Ca)	17	0.849	Fluoride	.6	.032
Magnesium (Mg)	7.1	.584	Nitrate (NO_3)	1.2	.019
Sodium (Na)	24	1.053	Total dissolved solids	159	
Potassium (K)	4.8	.123	Total hardness as $CaCO_3$	72	
Bicarbonate (HCO_3)	53	.869	pH	7.6	

GRAND SALINE

Population in 1940: 1,641.

Source of information: R. L. Simmons, water superintendent, Sept. 10, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir northwest of town; built in 1924; drainage area, 2 square miles; area under water, 55 acres; capacity, 399 acre-feet.

Pumpage (estimated): Maximum, 200,000 gallons; minimum, 80,000 gallons; average, 125,000 gallons a day.

Storage: Elevated tank, 104,000 gallons.

Number of customers: 600.

Treatment: Coagulation with alum and lime, sedimentation, and chlorination.

Analysis of raw water

[Collected Sept. 10, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	7.5		Sulfate (SO_4)	17	0.354
Iron (Fe)	.02		Chloride (Cl)	26	.733
Calcium (Ca)	13	0.649	Fluoride (F)	.2	.011
Magnesium (Mg)	6.7	.551	Nitrate (NO_3)	1.0	.016
Sodium (Na)	12	.537	Total dissolved solids	120	
Potassium (K)	3.2	.082	Total hardness as $CaCO_3$	60	
Bicarbonate (HCO_3)	43	.705	pH	7.2	

WILLS POINT

Population in 1940: 1,976.

Source of information: H. G. Turner, water superintendent, Sept. 10, 1943.

Ownership: Municipal.

Source of supply: Impounding reservoir north of town; built about 1915; area under water, 50 acres.

Pumpage: No record.

Storage: Four concrete reservoirs, 450,000 gallons; elevated tank, 56,000 gallons.

Number of customers: 620.

Treatment: Coagulation with alum and lime, sedimentation, and chlorination.

Analysis of raw water

[Collected Sept. 10, 1943. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.1		Sulfate (SO_4)	7.1	0.148
Iron (Fe)	.08		Chloride (Cl)	1.0	.028
Calcium (Ca)	10	0.499	Fluoride (F)	.4	.021
Magnesium (Mg)	4.6	.378	Nitrate (NO_3)	2.2	.035
Sodium (Na)	5.9	.256	Total dissolved solids	75	
Potassium (K)	3.2	.082	Total hardness as $CaCO_3$	44	
Bicarbonate (HCO_3)	60	.983	pH	7.8	

WALKER COUNTY

HUNTSVILLE

Population in 1940: 5,108.

Source of information: R. H. Perry, acting water superintendent, Oct. 22, 1941.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1936 by Layne-Texas Co.; depth, 680 feet; diameter, 14 inches; deep-well turbine pump; static water level, 200 feet below land surface on Nov. 3, 1937; yield, 480 gallons a minute with draw-down of 82 feet.

Well 2. Drilled in 1940 by Layne-Texas Co.; depth, 739 feet; diameter, 16 inches; deep-well turbine pump; static water level, 178 feet below land surface on June 24, 1940; yield, 725 gallons a minute.

Average pumpage, in gallons a day

	1939	1940	1941		1939	1940	1941
January	311,000	302,000	307,000	July	380,000	353,000	337,000
February	362,000	349,000	345,000	August	410,000	378,000	364,000
March	310,000	309,000	270,000	September	475,000	371,000	375,000
April	326,000	347,000	308,000	October	358,000	328,000	----------
May	324,000	319,000	333,000	November	371,000	379,000	----------
June	415,000	364,000	347,000	December	312,000	312,000	----------

Storage: Concrete ground reservoir, 135,000 gallons; two elevated tanks, 85,000 and 400,000 gallons.

Number of customers: 1,000.

Treatment: Softening through zeolite filter.

Analyses

[Collected Oct. 22, 1941. Analyzed by W. W. Hastings]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	57	----------	52	----------
Iron (Fe)	.09	----------	.07	----------
Calcium (Ca)	96	4.79	90	4.49
Magnesium (Mg)	3.0	.25	2.7	.22
Sodium (Na)	52	2.26	51	2.22
Potassium (K)				
Bicarbonate (HCO_3)	317	5.20	287	4.70
Sulfate (SO_4)	14	.29	20	.42
Chloride (Cl)	63	1.78	60	1.69
Fluoride (F)	.3	.02	.1	.01
Nitrate (NO_3)	.5	.01	.2	.00
Total dissolved solids	476	----------	440	----------
Total hardness as $CaCO_3$	253	----------	231	----------

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Red clay	2	2	Sand and shale	16	331
Sandy clay	8	10	Shale and sand	26	357
White sandy clay	23	33	Sand with shale breaks	40	397
Sand with breaks	22	55	Shale and sand	49	446
Clay	3	58	Sand and shale	40	486
Sand	3	61	Shale	24	510
White clay	26	87	Sand and shale	42	552
Yellow clay	71	158	Shale and sand	63	615
Sand	7	165	Sand and shale	36	651
Shale	60	225	Shale	4	655
Rock	1	226	Sand	6	661
Yellow and blue shale	44	270	Shale	72	733
Sand and shale	38	308	Shale and sand	18	751
Shale	7	315	Shale	23	774

Well 2

Filled in gravel, cinder, and clay sand	15	15	Shale and sand	38	567
Sand	16	31	Good sand	29	596
White clay	25	56	Shale	5	601
Brown and white clay	27	83	Sand and shale	38	639
Sandy clay	7	90	Sand	9	648
Clay	12	102	Shale and strips of sand	20	668
Clay and sandy clay	24	126	Shale and sand	37	705
Sandy shale	16	142	Shale	7	712
Sand with shale	41	183	Sand	5	717
Do	18	201	Sandy shale	14	731
Shale	18	219	Shale	7	738
Sand and shale	23	242	Sand and shale	10	748
Shale	5	247	Shale	8	756
Sand	10	257	Shale and thin layers of sand	31	787
Shale	13	270	Shale	15	802
Sandy shale	5	275	Hard shale	20	822
Shale	5	280	Sandy shale	22	844
Sand	8	288	Hard sand	11	855
Shale	10	298	Sandy shale	51	906
Blue shale and layers of sand	24	322	Fine sand	11	917
Blue shale with hard layers	14	336	Sandy shale	12	929
Shale	25	361	Hard shale	5	934
Shale and strips of sand	32	393	Sandy shale	9	943
Shale	11	404	Sand	6	949
Shale and thin layers of sand	24	428	Shale	12	961
Hard shale	17	445	Good sand	18	979
Shale and layers of sand	15	460	Rock	1	980
Hard shale	14	474	Hard shale	12	992
Sandy shale	5	479	Hard sandy shale	24	1,016
Hard shale	13	492	Hard shale	8	1,024
Hard shale and sand	37	529			

WALLER COUNTY

HEMPSTEAD

Population in 1940: 1,674.

Source of information: J. C. Calhoun, water superintendent, Apr. 5, 1944.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1930 by Layne-Texas Co.; depth, 868 feet; deep-well turbine pump; used as stand-by well only.

Well 2. About 80 feet southwest of well 1; drilled in 1939 by Layne-Texas Co.; depth, 745 feet; diameter, 10 to 5½ inches; gravel-walled; screens from 487 to 515 and 669 to 709 feet; deep-well turbine pump; static water level, 56.9 feet below measuring point on Feb. 14, 1939; reported yield, 200 gallons a minute with draw-down of 48 feet after 12 hours of pumping; temperature, 80° F.

Pumpage (estimated): Minimum, 52,000 gallons; maximum, 60,000 gallons; average, 55,000 gallons a day.

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

Number of customers: 376.

Treatment: Aeration.

Analysis of finished water, well 2

[Collected Apr. 5, 1944. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	19		Sulfate (SO_4)	6.0	0.12
Iron (Fe)	.06		Chloride (Cl)	39	1.10
Calcium (Ca)	30	1.50	Fluoride (Fl)	.8	.04
Magnesium (Mg)	6.1	.50	Nitrate (NO_3)	.2	.00
Sodium (Na)	118	5.15	Total dissolved solids	408	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	100	
Bicarbonate (HCO_3)	370	6.06	pH	7.2	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	2	2	Sand	60	272
Clay	47	49	Rock	1	273
Sand	38	87	Gumbo	84	357
Clay	20	107	Sand	19	376
Fine sand	12	119	Gumbo	12	388
Clay	8	127	Sand	14	402
Soft rock	9	136	Gumbo	26	428
Clay	34	170	Sand	19	447
Rock	1	171	Gumbo	34	481
Clay	8	179	Sand	33	514
Rock	1	180	Gumbo	169	683
Sand	31	211	Sand	36	719
Rock	1	212	Gumbo	149	868

WASHINGTON COUNTY

BRENHAM

Population in 1940: 6,435.

Source of information: City engineer, June 23, 1942.

Ownership: Municipal.

Source of supply: Three wells and a spring.

Well 5. Drilled in 1933 by Layne-Texas Co.; depth, 1,515 feet; diameter, 12½ to 8 inches; screen from 1,210 to 1,240, 1,295 to 1,320, and 1,440 to 1,500 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 42 feet in 1933; yield, 508 gallons a minute with draw-down of 243 feet in 1933; temperature, 91° F; used as stand-by well.

Well 6. Drilled in 1935 by J. W. Jackson; depth- 200 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 240 gallons a minute; temperature, 71½° F.

Well 8. Drilled in 1934 by J. W. Jackson; depth, 198 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 180 gallons a minute; temperature, 72½° F.

Spring. In Creek Valley, used as auxiliary supply; yield, estimated at 375,000 gallons a day.

Average pumpage, in gallons a day

1935	1936	1937	1938	1939	1940	1941
271,000	310,000	321,000	289,000	326,000	351,000	339,000

Storage: Ground storage reservoir, 625,000 gallons; standpipe, 114,000 gallons.
Number of customers: 1,500.
Treatment: Coagulation, sedimentation, and chlorination.

Analyses

[Collected June 23, 1942. Analyzed by J. W. Yett, Jr., and B. Irelan]

	Well 5		Well 6		Well 8		Spring	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	59		19		24		18	
Iron (Fe)	.07		.08		.06		.04	
Calcium (Ca)	33	1.65	133	6.64	128	6.39	136	6.79
Magnesium (Mg)	1.1	.09	3.5	.29	3.4	.28	2.7	.22
Sodium and Potassium (Na+K)	113	4.93	25	1.10	19	.82	21	.90
Bicarbonate (HCO_3)	358	5.87	361	5.92	360	5.90	316	5.18
Sulfate (SO_4)	13	.27	20	.42	3	.06	31	.65
Chloride (Cl)	18	.51	42	1.18	49	1.38	34	.96
Fluoride (F)	.3	.00	.2	.01	.3	.02	.1	.01
Nitrate (NO_3)	.0	.02	31	.50	8.0	.13	69	1.11
Total dissolved solids	425		473		446		519	
Total hardness as $CaCO_3$	87		346		334		350	
pH	7.7		7.3		7.3		7.7	

Drillers' logs

Well 5

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	11	11	Shale and lime	89	813
Sand	10	21	Sand and shale (cored)	15	833
Sandy clay and boulders	92	113	Shale	63	896
Yellow clay	30	143	Sticky shale	30	926
Hard sand	11	154	Shale	290	1,216
Sandy clay	27	181	Sand	10	1,226
Hard sand	15	196	Hard green shale	34	1,260
Hard sandy clay	40	236	Hard shale	40	1,300
Sandy clay	80	315	Sand	6	1,306
Sandy lime	26	341	Tough shale	68	1,374
Clay	17	358	Hard shale	65	1,439
Hard lime	18	376	Sand and shale	15	1,454
Lime	5	381	Sand	39	1,493
Brown and gray shale	105	486	Hard shale	117	1,610
Sand	15	501	Shale	66	1,676
Shale	53	554	Sandy shale	20	1,696
Sand	12	566	Shale	299	1,995
Shale	93	659	Black shale	115	2,110
Broken sand, shale, and lime	40	699	Lignite and shale	82	2,192
Shale	30	729	Plugged back to 1,515 feet		

Well 6

Surface black soil	15	15	Coarse-grained sand	16	108
Sand and lime	12	27	Limerock	4	112
Limerock	16	43	Coarse-grained sand, water	16	128
Lime-clay	15	58	Tough clay	57	185
Coarse-grained sand	5	63	Sandy clay, water	15	200
Tough clay	19	82			

WHARTON COUNTY

EL CAMPO

Population in 1940: 3,906.

Source of information: Local manager, Central Power & Light Co., April 1940.

Owner: Central Power & Light Co.

Source of supply: Two wells.

Well 1. Drilled in 1926 by McMasters & Pomeroy; depth, 1,188 feet; diameter, 17 to 6 inches; screens from 856 to 878, 990 to 1,011, and 1,051 to 1,072 feet (deepened in 1936 by Layne-Texas Co., additional screen not known); deep-well turbine pump and 20-horsepower electric motor; static water level, 43.33 feet below pump base, Apr. 19, 1935; yield, 250 gallons a minute.

Well 2. Drilled in 1929; depth, 1,098 feet; deep-well turbine pump and electric motor; yield, 550 gallons a minute.

Pumpage (estimated): Average, 260,000 gallons a day.

Storage: Ground storage reservoir and elevated tank.

Number of customers: 925.

Analyses

[Tap sample collected Apr. 6, 1947; well 2, Apr. 13, 1940. Analyzed by E. W. Lohr and B. C. Dwyer]

	Tap sample		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16			
Iron (Fe)	.09			
Calcium (Ca)	7.8	0.39		
Magnesium (Mg)	2.6	.21		
Sodium (Na)	163	2.08		
Potassium (K)	4.2	.11		
Bicarbonate (HCO_3)	283	4.64	266	4.37
Sulfate (SO_4)	3.3	.07	7	.15
Chloride (Cl)	108	3.05	74	2.09
Nitrate (NO_3)	0	0	0	0
Fluoride	.6	.03		
Total dissolved solids	445		351	
Total hardness as $CaCO_3$	30		52	
pH	7.8			

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	8	8	Hard rock	5	606
Sand	22	30	Sand and boulders	18	624
Sand, water	10	40	Gumbo	6	630
Red sand	50	90	Packed sand	25	655
Yellow clay	30	120	Gumbo	22	677
Sand	10	130	Sand and boulders	20	697
Yellow clay	20	150	Packed sand	10	707
Sand, water	30	180	Sand, shale and boulders	15	722
Clay	10	190	Gumbo	12	734
Sand	14	204	Sand and boulders	20	754
Packed sand	16	220	Gumbo	27	781
Gumbo	14	234	Sand and boulders	40	821
Sand, water	30	264	Gumbo	31	852
Gumbo	66	330	Sand and gravel	24	876
Sand and boulders	50	380	Gumbo	5	881
Gumbo and boulders	59	439	Shale	10	891
Sand and boulders	21	460	Sand rock	6	897
Hard rock	3	463	Sandy shale	20	917
Sand rock	6	469	Gumbo	12	929
Sand and boulders	132	601	Shale	35	964

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Drillers' logs, well 1—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Hard sand	20	984	Gumbo	25	1,118
Sand, water	26	1,010	Brown shale	30	1,148
Shale	10	1,020	Sand, water	22	1,170
Blue gumbo	25	1,045	Gumbo	18	1,188
Sand and boulders	38	1,083			

WHARTON

Population in 1940: 4,386.

Source of information: A. H. Whiddon, assistant superintendent, March 1940.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1926 by McMasters & Pomeroy; depth, 940 feet; diameter, 18 to 12 inches; deep-well turbine pump and 40-horsepower electric motor; static water level, 25.01 feet below pump base Mar. 11, 1940; yield, 675 gallons a minute.

Well 2. Drilled in 1931 by Layne-Texas Co.; depth, 413 feet; diameter, 16 to 12 inches; screens from 212 to 222, 278 to 299, 311 to 333, and 350 to 393 feet; deep-well turbine pump and 75-horsepower electric motor; static water level, 26.65 feet below pump base June 4, 1934; yield, 800 gallons a minute.

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

Storage: Ground reservoir, 60,000 gallons; elevated tank, 300,000 gallons.

Treatment: None.

Analyses

[Collected Mar. 11, 1940. Analyzed by E. W. Lohr]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Iron (Fe)	0.12			
Calcium (Ca)	37	1.85		
Magnesium (Mg)	13	1.07		
Sodium and potassium (Na+K)	70	3.05		
Bicarbonate (HCO_3)	253	4.15	250	4.10
Sulfate (SO_4)	23	.48	14	.29
Chloride (Cl)	47	1.33	44	1.24
Fluoride (F)	0	0		
Nitrate (NO_3)	.4	.01	1.2	.02
Total dissolved solids	315		300	
Total hardness as $CaCO_3$	146		201	

Drillers' log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	13	13	Clay	11	311
Sand and gravel	91	104	Sand and gravel	11	322
Clay	14	118	Rock	2	324
Sand	10	128	Sand and gravel	13	337
Clay	80	208	Clay	18	355
Sand	14	222	Sand	39	394
Clay	13	235	Rock	6	400
Sand	7	242	Sand	8	408
Clay	40	282	Clay	5	413
Sand	18	300			

WOOD COUNTY

ALBA

Population in 1940: 675.

Source of information: W. I. Mathews, mayor, Jan. 31, 1942.

Ownership: Municipal.

Source of supply: Well drilled in 1915; depth, about 500 feet; diameter, 8 inches; pumped with air; static water level reported, about 85 feet below land surface.

Pumpage: Average, 15,000 gallons a day.

Storage: Ground collecting reservoir and elevated tank.

Number of customers: 150.

Treatment: None.

Analysis, well 1

[Collected Jan. 31, 1942. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	11	0.56	Chloride (Cl)	279	7.87
Magnesium (Mg)	1.9	.16	Fluoride (F)	.1	.01
Sodium and potassium (Na+K)	296	12.87	Nitrate (NO_3)	2.0	.03
Bicarbonate (HCO_3)	342	5.61	Total dissolved solids	763	
Sulfate (SO_4)	5	.10	Total hardness as $CaCO_3$	36	

HAWKINS

Population in 1940: 1,200.

Source of information: Mr. Smith, city secretary, Jan. 26, 1942.

Ownership: Municipal.

Source of supply: Well 2½ blocks north and 2 blocks east of railroad station; drilled in 1941 by C. G. Vaught; depth, 400 feet; diameter, 8 inches; deep-well turbine pump and gasoline motor; yield, 250 gallons a minute.

Pumpage: No record. Only a part of Hawkins is supplied by city.

Storage: Elevated tank, about 20,000 gallons.

Number of customers: 35.

Treatment: None.

Analysis, well 1

[Collected Jan. 26, 1942. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	0.8	0.040	Chloride (Cl)	3.5	0.099
Magnesium (Mg)	.7	.058	Fluoride (F)	0	0
Sodium and potassium (Na+K)	7.8	.339	Nitrate (NO_3)	0	0
Bicarbonate (HCO_3)	18	.295	Total dissolved solids	25	
Sulfate (SO_4)	2	.042	Total hardness as $CaCO_3$	5	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand	50	50	Shale with sandy streaks	94	274
White sand (water)	20	70	Sand (water)	42	316
Sand	20	90	Shale	20	336
Sand and shale	50	140	Sand	64	400
Sandy shale	40	180			

MINEOLA

Population in 1940: 3,223.

Source of information: Mr. Blandford, manager, Feb. 26, 1942.

Owner: Southwestern Gas & Electric Co.

Source of supply: Two wells at power and ice plant.

Well 1. Drilled in 1924 by Layne-Texas Co.; depth, 452 feet; diameter, 12 to 8 inches; screens from 122 to 152, 269 to 289, 308 to 328, 368 to 383, and 406 to 447 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 58 feet below pump base Apr. 1, 1939; yield, 410 gallons a minute.

Well 2. Drilled in 1927 by Layne-Texas Co.; depth, 455 feet; diameter, 12 to 8 inches; screens at 296 to 339, 374 to 391, and 423 to 455 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 375 gallons a minute.

Pumpage (estimated): Average, 160,000 gallons a day.

Storage: Ground reservoir, 255,000 gallons; elevated tank.

Treatment: Aeration and chlorination.

Analysis, well 1

[Collected Feb. 26, 1942. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Iron (Fe)	0.3		Sulfate (SO_4)	12	0.25
Calcium (Ca)	5.6	0.28	Chloride (Cl)	10	.28
Magnesium (Mg)	1.7	.14	Fluoride (F)	.1	.00
Sodium and potassium (Na + K)	44	1.91	Nitrate (NO_3)	1.0	.02
Bicarbonate (HCO_3)	110	1.80	Total dissolved solids	129	
			Total hardness as $CaCO_3$	21	

Drillers' logs

Well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil and sand	6	6	Gumbo and boulders	45	275
Red clay	4	10	Water sand	21	296
Sand	60	70	Gumbo	10	306
Brown clay	10	80	Water sand	26	332
Clay	16	96	Lignite	11	343
Water sand	57	153	Gumbo	11	354
Clay	7	160	Lignite	16	370
Sand rock	1	161	Water sand	15	385
Pack sand	13	174	Gumbo and lignite	8	393
Sand rock	1	175	Gumbo	28	421
Clay	7	182	Water sand	30	451
Clay and gumbo	48	230	Gumbo	1	452

Drillers' logs—Continued

Well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	5	5	Gumbo and lignite	56	235
Clay	10	15	Shale	20	255
Sand	44	59	Shale and fine-grained sand	45	300
Clay	48	107	White sand	39	339
Sand	51	158	Gumbo	43	382
Clay	7	165	Rock	1	383
Rock	3	168	Find-grained sand	15	398
Sand	10	178	Gumbo	27	425
Rock	1	179	Sand	30	455

QUITMAN

Population in 1940: 800.

Source of information: A. G. Wright, Feb. 17, 1942.

Owner: Thomas & Ware Water Co.

Source of supply: Well drilled in 1937 by J. C. Boling; depth, 365 feet; diameter, 12 to 8 inches; screen from 345 to 365 feet; deep-well turbine pump and 7½-horsepower electric motor; yield, 160 gallons a minute.

Pumpage (estimated): 84,000 gallons a day.

Storage: Elevated tank, 20,000 gallons.

Number of customers: 140.

Treatment: None.

Analysis, well 1

[Collected Feb. 17, 1942. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Iron (Fe)	0.05		Sulfate (SO_4)	52	1.083
Calcium (Ca)	4.8	0.240	Chloride (Cl)	9.0	.254
Magnesium (Mg)	2.4	.197	Fluoride (F)	0	0
Sodium and potassium (Na+K)	69	3.000	Nitrate (NO_3)	6.0	.097
Bicarbonate (HCO_3)	122	2.000	Total dissolved solids	203	
			Total hardness as $CaCO_3$	22	

WINNSBORO

Population in 1940: 2,092.

Source of information: W. W. Butler, city secretary, February 1942.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1926 by Layne-Texas Co.; depth, 155 feet; diameter, 36 to 8 inches; screen from 140 to 155 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 250 gallons a minute.

Well 2. Drilled in 1940 by Texas Water Supply Corp.; depth, 216 feet; diameter, 13⅜ inches; screen from 185 to 210 feet; deep-well turbine pump and 20-horsepower electric motor; static water level, 90 feet below pump base Feb. 14, 1942; yield, 370 gallons a minute; temperature, 64° F.

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

Storage: Ground reservoir, 120,000 gallons; elevated tank, 85,000 gallons.

Treatment: Aeration.

Analysis, well 2

[Collected Feb. 14, 1942. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Iron (Fe)	0.05		Sulfate (SO_4)	7	0.146
Calcium (Ca)	8.8	0.439	Chloride (Cl)	10	.282
Magnesium (Mg)	3.6	.296	Fluoride (F)	.1	.005
Sodium and potassium (Na+K)	12	.522	Nitrate (NO_3)	32	.516
Bicarbonate (HCO_3)	18	.295	Total dissolved solids	82	
			Total hardness as $CaCO_3$	37	

Driller's test log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	20	20	Sand	45	417
Sand and black shale	41	61	Sticky shale	5	422
Sand, fine (sampled)	83	144	Sand	6	428
Cavity	6	150	Hard shale	26	454
Sand, fine (sampled)	18	168	Sand	15	469
Sticky shale	6	174	Sticky shale	64	533
Sand, fine (sampled)	19	193	Sand, streaks of shale	3	536
Sand, coarse (sampled)	17	210	Sand	17	553
Sticky blue shale	6	216	Hard rock	1	554
Blue sandy shale	61	277	Sand	26	580
Gray sandy shale	74	351	Gumbo	53	633
Hard brittle shale	21	372			

INDEX