Public Water Supplies in Central and North-Central Texas

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1069

Prepared in cooperation with the Texas Board of Water Engineers

1849—A CENTURY OF CONSERVATION—1949

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By R. W. SUNDSTROM, W. L. BROADHURST, *and* B. C. DWYER

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PUBLIC WATER SUPPLIES IN CENTRAL AND NORTH-CENTRAL TEXAS

By R. W. SUNDSTROM, W. L. BROADHURST, and B. C. DWYER

ABSTRACT

This report gives a summarized description of the public water supplies in 35 counties of central and north-central Texas, extending from the southern boundaries of Travis, Blanco, Gillespie, and Kerr Counties northward to the Texas-Oklahoma State line. It gives the available data as follows for each of the 145 communities: Population of the community; name of the official from whom the information was obtained; ownership of water works, whether private or municipal source of supply, whether ground water or surface water; the amount of water consumed; the facilities for storage; the number of customers served; the character of the chemical and sanitary treatment, if any; and 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; yields of the wells, and records of water levels, if available.

The communities served by these public supplies had a population of 657,116 in 1940. Ground water is used by 94 of these communities and surface water by 51. The total amount of water consumed averages about 79,000,000 gallons a day, of which approximately 18,500,000 gallons is obtained from ground water and approximately 60,500,000 gallons from surface water. The average consumption of ground water per community is small. Only 8 cities of more than 5,000 population use ground water exclusively for public supply, of which the largest had a population of 12,192 in 1940.

The ground-water reservoirs of the region, from which the public water supplies are drawn, are in rocks that range in age from Cambrian to Quaternary. For convenience in summarizing the sources of municipal water supplies, the region has been divided into four areas as shown on plate 1.

Area A includes and surrounds the Llano uplift, commonly known as the central mineral region of Texas. Surrounding this uplift are the Hickory sandstone member of the Riley formation and the Ellenberger group, the two oldest productive ground-water reservoirs in the State. In area B, with a few exceptions, little or no ground water suitable for public supplies is available. The Pennsylvanian and Permian rocks that cover most of the area yield either small or highly mineralized supplies, or both. Most of the public supplies in the area are obtained from surface water, In area C, ground-water reservoirs in the Cretaceous formations furnish nearly two-thirds of all the ground-water supplies of the region. Most prominent of these reservoirs are sands in the Trinity group, the Edwards limestone, and the Woodbine sand. In area D most public supplies are obtained from shallow sands and gravels of Quaternary age.

Only a small number of ground-water supplies receive any treatment. The dissolved solids in the ground-water supplies range from 125 to 2,610 parts per

systems. Most of the communities throughout the State originally used ground water; some still use the original source of supply, some have developed additional sources of ground water, and others have changed from inadequate supplies of ground water to surface water.

The available information for each community is given in condensed form as follows: Population in 1940; name of official from whom the information was obtained; owner of waterworks, whether private or municipal; source of supply, whether ground water or surface water; the amount of water consumed; the facilities for storage; the number of customers served; the character of the chemical and sanitary treatment of the water; and chemical analyses of the water. Where ground water is used the following information also is given: Records of wells, including depth, diameter, and drillers' logs; character of pumping equipment; yield of the wells; records of water levels, if available; and temperature of the water. Unfortunately, many communities have kept poor records, or no records at all, regarding the amount of ground water pumped and the resulting decline of water level or artesian pressure in the wells since they were drilled; for such localities the information given is necessarily incomplete. The availability of this information is very important, particularly in areas where the withdrawals from underground supplies are approaching the limits of safety or where enormous increases in withdrawals are anticipated.

ACKNOWLEDGMENTS

Grateful acknowledgment is made to the well drillers, city officials, and others who furnished most of the descriptive material that is given for each public supply. The investigation was made possible through the cooperation of the Geological Survey, United States Department of the Interior, and the Texas State Board of Water Engineers. Most of the field work was done by R. W. Sundstrom and W. L. Broadhurst, who were assisted by J. H. Dante, D. B. Knowles, W. C. Rasmussen, W. O. George, and G. H. Cromack. Most of the report was prepared by R. W. Sundstrom and W. L. Broadhurst under the direction of W. N. White, district engineer in charge of ground-water investigations in Texas. The analyses of water were made in the laboratory of the Geological Survey in Austin, and the section on the chemical character of water was prepared by Mrs. B. C. Dwyer, under the direction of W. W. Hastings, district chemist in charge of the laboratory.

million. Ninety-three percent of these supplies have less than 1,000 parts per million dissolved solids. The average hardness of the ground-water supplies is 213 parts per million. Most of the public supplies obtained from surface water are filtered and given further treatment which alters the chemical character of the water. The dissolved solids in the surface-water supplies range from 117 to 1,000 parts per million, except for one supply which contains 3,500 parts per million. The average hardness of the surface-water supplies is 188 parts per million. Of all the public supplies in the region, about 11 percent furnish water of less than 75 parts per million hardness, 51 percent range from 76 to 150 parts per million, and 24 percent are above 250 parts per million.

INTRODUCTION

EXTENT OF REGION AND SCOPE OF REPORT

This is the third in a series of reports prepared by the Texas State Board of War Engineers in cooperation with the United States Geological Survey giving summarized descriptions of the public water supplies throughout Texas. The first report, in 2 volumes covering 77 counties in eastern Texas, was released by the Texas State Board of Water Engineers in February 1945, and the second report, covering 42 counties in southern Texas, was released in November 1946.

The region covered by this report includes 53 counties in central and north-central Texas extending from the southern boundaries of Travis, Blanco, Gillespie, and Kerr Counties northward to the Texas-Oklahoma State line. (See map pl. 1.) It comprises 47,679 square miles and in 1940 had a population of 1,185,573.

The cities and towns in this region that have public water-supply systems had a population of 637,116 in 1940. They use, on the average, about 79,000,000 gallons of water a day, of which about 18,500,000 gallons is obtained from ground water and about 60,500,000 gallons from surface water. Of the 145 towns and cities listed in this report, 94 use ground water; the average consumption of ground water per community, therefore, is small. Only 8 cities of more than 5,000 population (Brady, Clebourne, Denton, Gainesville, Kerrville, Taylor, Vernon, and Weatherford) use ground water exclusively for public supply. Of these Denton in Denton County is the largest, and it had a population of 11,192 in 1940.

The need for certain basic data in the studies of quantitative and qualitative problems of public water supplies has long been apparent. This is especially true in Texas where, in recent years, there has been an enormous increase in the demands for water for public and industrial uses. The phenomenal growth of many Texas cities has resulted in the need from time to time for expanding or rebuilding the waterworks

GROUND WATER

The ground-water reservoirs of the region, from which the public water supplies are drawn, occur in rocks that range in age from Cambrian to Quaternary. From oldest to youngest the members, formations, or groups of formations and their ages are as follows: Hickory sandstone member of Riley formation, Cambrian; Ellenberger group, Ordovician; Strawn, Canyon, and Cisco groups, Pennsylvanian; Clearfork group, Permian; Trinity and Fredericksburg groups, Lower Cretaceous; Woodbine sand, Upper Cretaceous; Seymour formation and present stream deposits, Quaternary.

For convenience in discussing the sources of water for public supply, the region has been divided into four areas: A, B, C, and D on map (pl. 1).

The Hickory sandstone member of the Riley formation furnishes supplies to Eden and Brady in the southwestern part of the region, and the Ellenberger group probably furnishes the supplies for Burnet and Fredericksburg in the southern part of the region. (See area A.) These rocks crop out around the flanks of the Llano uplift in Llano and adjacent counties, and the beds dip rather steeply beneath younger rocks to great depths below the land surface within relatively short distances from the outcrops. Therefore, the territory in which these older rocks may be considered potential sources of water for public supplies is comparatively small.

Pennsylvanian and Permian rocks are exposed over much of the central and western parts of the region in areas B and D, but they are relatively unimportant as sources of public water supply. The Pennsylvanian rocks consist chiefly of alternating beds of shale, sandstone, limestone, and dolomite. The Permian rocks consist of a somewhat similar succession of beds, but they include considerable red and blue clay and gypsum. In general the beds of the Pennsylvanian and the Permian rocks that are sources of ground-water supplies dip westward beneath younger formations. Five towns—Bryson, Jacksboro, Mercury, Nocona, and Rochelle—obtain rather small quantities of water from sands in the Pennsylvanian formations; two towns, Merkel and Miles, obtain mineralized water from Permian rocks.

Sands and sandstones in the Trinity group of Lower Cretaceous age, which belong to the Travis Peak formation and the Paluxy sand, furnish water for practically all the public supplies in area C and for nearly two-thirds of the public supplies that are obtained from

ground water in the region. The Travis Peak strata crop out in an irregular pattern along the western boundary of area C and the southern boundary of area B. The Paluxy sand appears in irregular outcrop east of the Travis Peak outcrop from Coryell County northward at least to Wise County.

The Edwards limestone crops out in the southern part of area C. It is the source of supply for five towns all of which are in Williamson and Travis Counties.

The Woodbine sand of Upper Cretaceous age crops out along the eastern edge of area C, from southern Hill County northward to the Red River. It supplies water to only two towns in the region; Grandview in Johnson County and Mansfield in Tarrant County.

All the rocks of the Lower and Upper Cretaceous in this region dip eastward at an angle somewhat greater than the slope of the land surface; therefore, the ground-water reservoirs occur at increasingly greater depths eastward or down dip from the outcrops.

Surficial deposits of sand and gravel, to which the name Seymour formation has been given, furnish water for the public supplies of several towns and cities in area D. These deposits unconformably overlie the Permian rocks on the divides between the larger streams, principally in Haskell, Knox, Foard, and Wilbarger Counties. They are usually shallow but in some places reach depths of 50 feet, and, where sufficiently saturated, they yield water in considerable quantities to wells. The deposits are considered to be of Pleistocene age by most geologists.

A few supplies scattered throughout the region are obtained from shallow deposits in the flood plains or along the terraces of the present streams.

The following table gives the municipalities that use ground water and the probably geologic member, formation, or group of formations from which the supplies are obtained.

Municipalities served by ground water and the probable water-bearing unit from which the water is drawn

Alvarado	Trinity group.
Arlington	Do.
Baird	Do.
Bartlett	Do.
Belton	Do.
Bertram	Do.
Blanco	Recent stream deposits.
Blanket	Trinity group.
Brady	Hickory sandstone member of Riley formation.
Bryson	Cisco group.
Burkburnett	(?)
Burleson	Trinity group.
Burnet	Ellenberger group.
Chillicothe	(?)
Cleburne	Trinity group.
Clifton	Do.
Clyde	Do.
Coleman	Recent stream deposits.
Copperas Cove	Trinity group.
Cranfills Gap	Do.
Cross Plains	Do.
Crowell	Seymour formation (?).
Decatur	Trinity group.
De Leon	Do.
Denton	Do.
Desdemona	Do.
Dublin	Do.
Eden	Hickory sandstone member of Riley formation.
Electra	Recent stream deposits
Evant	Trinity group.
Everman	Do.
Fairy	Do.
Florence	Do.
Fredericksburg	Ellenberger group.
Gainesville	Trinity group.
Gatesville	Do.
Georgetown	Edwards limestone.
Glen Rose	Trinity group.
Godley	Do.
Goldthwaite	Do.
Goree	Seymour formation.
Gorman	Trinity group.
Granbury	Do.
Grandview	Woodbine sand.
Granger	Trinity group.
Handley	Do.
Haskell	Seymour formation.

Municipalities served by ground water and the probable water-bearing unit from which the water is drawn—Continued

Hico	Trinity group.
Holland	Do.
Hutto	Edwards limestone.
Iredell	Trinity group.
Jacksboro	Canyon group.
Jarrell	Edwards limestone.
Joshua	Trinity group.
Junction	(?)
Kerrville	Do.
Knox City	Seymour formation.
Lipan	Trinity group.
Lometa	Do.
Manor	Do.
Mansfield	Woodbine sand.
Melvin	Recent stream deposits.
Mercury	Strawn group.
Meridian	Trinity group.
Merkel	Clearfork group.
Miles	Do.
Morgan	Trinity group.
Muenster	Do.
Mullin	Do.
Munday	Seymour formation.
Nocona	Cisco group.
Oglesby	Trinity group.
Ovalo	Recent stream deposits.
Pflugerville	Edwards limestone.
Quanah	Recent stream deposits (?).
Rising Star	Trinity group.
Rochelle	(?)
Rochester	Seymour formation.
Rogers	Trinity group.
Round Rock	Edwards limestone.
Rule	Seymour formation.
Saint Jo	Trinity group.
Seymour	Recent stream deposits.
Sipe Springs	Trinity group.
Stephenville	Do.
Taylor	Do.
Thrall	Recent stream deposits.
Tuscola	Do.
Valley Mills	Trinity group.
Valley View	Do.
Vernon	Seymour formation (?).
Walnut Springs	Trinity group.
Weatherford	Do.
West Vernon	Seymour formation (?).

SURFACE WATER

In the region covered by this report 51 municipalities use surface water. Of these, 40 are in area B where, with the exception of a few localities, no ground water suitable for public supply is available. Most of area B is underlain by Pennsylvanian or Permian rocks that yield either scanty or highly mineralized supplies of ground water, or both.

Eight cities in the region use surface water in excess of a million gallons a day. Fort Worth is the largest and uses an average of more than 21,000,000 gallons a day from three reservoirs on the West Fork of the Trinity River. The next largest is Austin which uses an average of more than 13,000,000 gallons a day from the Colorado River. The third largest city is Wichita Falls which in the past has used an average of more than 6,000,000 gallons a day from Lake Wichita on Holliday Creek, supplemented by canal water from Lake Kemp. The city has recently constructed a new reservoir on the Little Wichita River which will be put into service soon. Brownwood, Abilene, and Temple use an average of 3,000,000 to 4,000,000 gallons a day. Brownwood obtains its supply from Lake Brownwood on Pecan Bayou, Abilene from three lakes on Elm and Cedar Creeks, and Temple from a lake on Leon River. Mineral Wells and Lampasas use more than 1,000,000 gallons a day, from reservoirs on Rock and Sulphur Creeks, respectively.

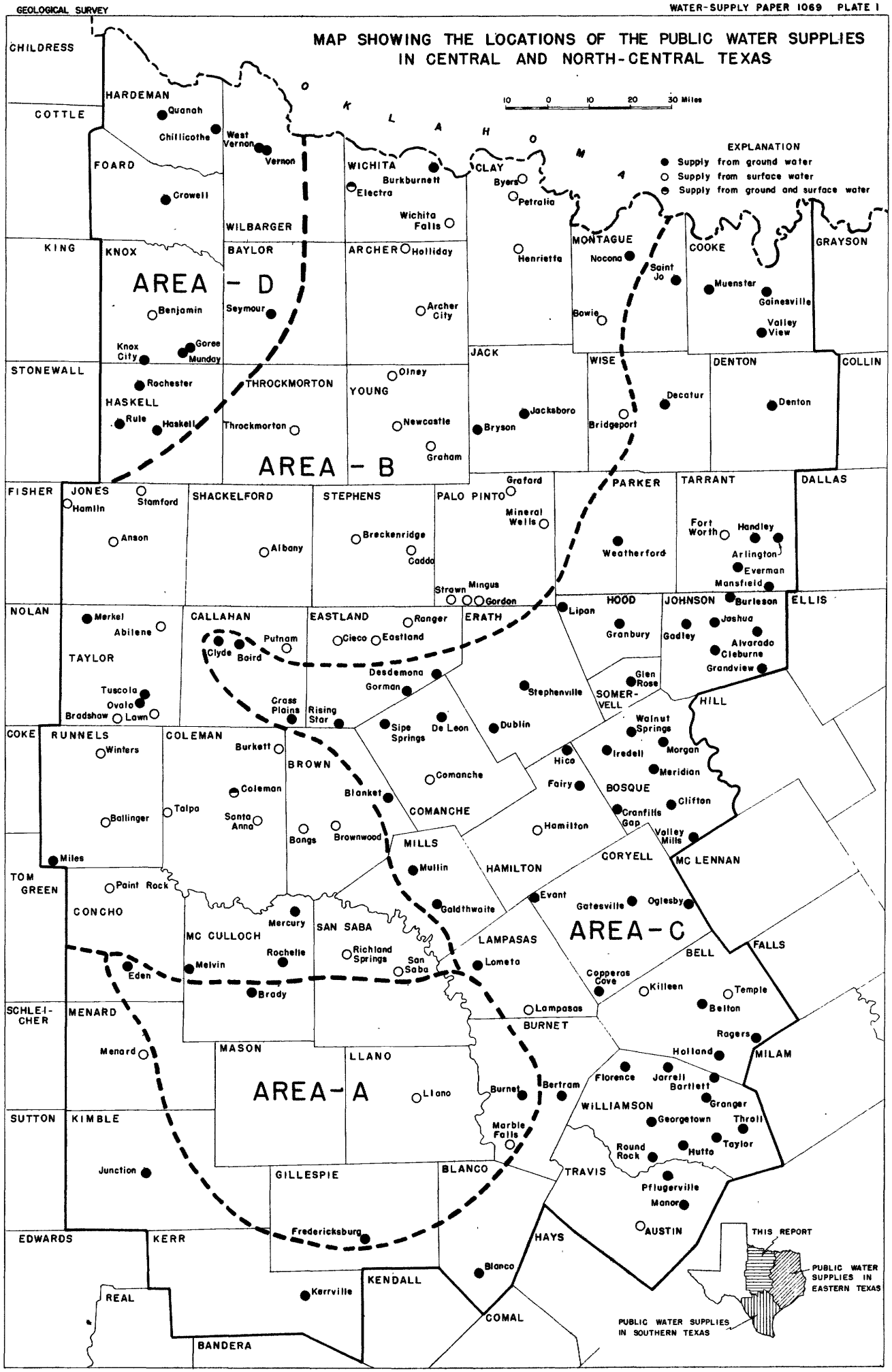
CHEMICAL CHARACTER OF WATER

ANALYSES OF WATER

The analyses in this report were made in the laboratory of the Water Resources Branch of the Geological Survey, United States Department of the Interior, Austin, Tex. The samples were collected in gallon pyrex bottles by the Geological Survey and the Texas State Board of Water Engineers. The analyses show the fitness of the water for industrial, domestic, or agricultural uses and have no bearing on the sanitary aspects of the samples.

One analysis of a sample from a well usually represents the character of the water for long periods, since the chemical composition of ground waters seldom changes over a period of years. Water from streams will often vary considerably in dissolved solids and hardness. Therefore, periodic analyses are needed to determine the variations in the composition of supplies that are obtained from rivers or of supplies that receive treatment.

About half of the public water supplies in this region receive treatment, one-third of which receive chlorination only. For all supplies


MAP SHOWING THE LOCATIONS OF THE PUBLIC WATER SUPPLIES IN CENTRAL AND NORTH-CENTRAL TEXAS
10 0 10 20 30 Miles
EXPLANATION
Supply from ground water
Supply from surface water
Supply from ground and surface water
OKLAHOMA
CHILDRESS
HARDEMAN
COTTLE
FOARD
KING
KNOX
BAYLOR
WILBARGER
WICHITA
CLAY
MONTAGUE
COOKE
GRAYSON
AREA - D
STONEWALL
HASKELL
THROCKMORTON
YOUNG
JACK
WISE
DENTON
COLLIN
AREA - B
FISHER
JONES
SHACKELFORD
STEPHENS
PALO PINTO
PARKER
TARRANT
DALLAS
NOLAN
TAYLOR
CALLAHAN
EASTLAND
ERATH
HOOD
JOHNSON
ELLIS
COKE
RUNNELS
COLEMAN
BROWN
COMANCHE
SOMERVELL
HILL
BOSQUE
MILLS
HAMILTON
CORYELL
MC LENNAN
TOM GREEN
CONCHO
MC CULLOCH
SAN SABA
LAMPASAS
AREA - C
BELL
FALLS
SCHLEICHER
MENARD
MASON
LLANO
BURNET
MILAM
WILLIAMSON
SUTTON
KIMBLE
GILLESPIE
BLANCO
TRAVIS
AREA - A
EDWARDS
KERR
KENDALL
HAYS
REAL
BANDERA
COMAL
Quanah
Chillicothe
West Vernon
Vernon
Crowell
Burkburnett
Electra
Wichita Falls
Byers
Petrolia
Henrietta
Nocona
Saint Jo
Muenster
Gainesville
Bowie
Valley View
Benjamin
Seymour
Archer City
Knox City
Goree
Munday
Rochester
Rule
Haskell
Throckmorton
Olney
Newcastle
Graham
Bryson
Jacksboro
Bridgeport
Decatur
Denton
Stamford
Hamlin
Anson
Albany
Breckenridge
Caddo
Graford
Mineral Wells
Strawn
Mingus
Gordon
Weatherford
Fort Worth
Handley
Arlington
Everman
Mansfield
Merkel
Abilene
Tuscola
Ovalo
Bradshaw
Lawn
Clyde
Baird
Putnam
Cisco
Eastland
Ranger
Desdemona
Gorman
Crass Plains
Rising Star
Lipan
Granbury
Godley
Joshua
Alvarado
Cleburne
Grandview
Glen Rose
Stephenville
Sipe Springs
De Leon
Dublin
Walnut Springs
Iredell
Morgan
Meridian
Hico
Fairy
Clifton
Cranfills Gap
Valley Mills
Comanche
Blanket
Winters
Ballinger
Talpa
Santa Anna
Coleman
Burkett
Bangs
Brownwood
Hamilton
Miles
Mullin
Paint Rock
Goldthwaite
Evant
Gatesville
Oglesby
Copperas Cove
Killeen
Temple
Belton
Mercury
Rochelle
Melvin
Eden
Brady
Richland Springs
San Saba
Lometa
Lampasas
Rogers
Holland
Florence
Jarrell
Bartlett
Granger
Georgetown
Round Rock
Hutto
Taylor
Throll
Menard
Llano
Burnet
Bertram
Marble Falls
Junction
Fredericksburg
Blanco
Pflugerville
Manor
AUSTIN
Kerrville
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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 results of the analyses are given in parts per million for the chemical constituents and in equivalents per million for those radicals that enter in ionic balance. The analyses were made by methods in general use.[1] The complete analyses for each public supply include results for silica (SiO_2), iron (Fe), calcium (Ca), magnesium (Mg), sodium (Na), 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). Each of the constituents is discussed in the following test.

MINERAL CONSTITUENTS IN SOLUTION

Silica (SiO_2) is found in all natural waters, and in the north-central Texas region most of the supplies have a silica content of less than 20 parts per million. Silica is usually present in greater quantities in the more alkaline waters. Well waters generally have a higher silica content than surface waters. The usefulness of water for domestic purpose is not affected by the usual amounts of silica found, although when the water is used in boilers silica may contribute to the formation of scale.

Iron (Fe) is dissolved from practically all soils and rocks. Iron may be dissolved from pipes, particularly from hot-water lines and boilers, in quantities large enough to be objectionable. Waters of low mineral content may be corrosive, especially if the pH is low. Water that contains more than 0.5 part per million of iron may be undesirable because of the "reddish" appearance of the water caused by oxidation of the iron, which stains white porcelain or enameled ware and fixtures and fabrics washed with the water. Iron is easily removed by aeration and filtration. Only about one-fourth of the supplies in the north-central Texas region had an iron content above 0.3 part per million.

Calcium (Ca) and magnesium (Mg) have somewhat different chemical properties, but their effects upon the industrial and domestic uses of water are so much alike that they are usually considered together. Calcium and magnesium are found in waters in contact with limestone, dolomite, calcareous sand, or gypsum. The salts of calcium and magnesium cause hardness in water (see hardness, p. 11); the scale found in containers in which water is heated or evaporated is almost entirely caused by these salts. Calcium and magnesium

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

are the predominate basic constituents in many supplies of lower mineral content in the north-central Texas region.

Sodium (Na) and potassium (K) are found in all natural waters. Moderate quantities of sodium and potassium have no effect on the suitability of water for domestic and industrial uses, though large quantities may cause trouble in the operation of steam boilers. Potassium is usually present in relatively small quantities, compared with sodium. The content of sodium in the supplies covered in this report differs widely; sodium generally is the principle basic constituent in the more highly mineralized waters.

Bicarbonate (HCO_3) in water results from the action of carbon dioxide dissolving the carbonates of calsium and magnesium from rocks and soils. Bicarbonate has little significance in the domestic use of water though when present in large amounts, it effects the palatibility of the water. Only a few of the ground-water supplies in the region contain sufficient quantities of bicarbonate to produce a noticeable taste in the supply.

Sulfate (SO_4) is dissolved from rocks and soils and especially from materials containing gypsum. Calcium sulfate in hard water will form a hard, adhering boiler scale and may influence the choice of the method of treatment for boiler-feed water. Sulfates is most north-central Texas supplies are below 250 parts per million. Some supplies from wells and a few from surface sources in the area have a higher sulfate content.

Chloride (Cl), when present in large amounts in the water, produces a salty taste, but otherwise has little influence in the domestic use of water. Appreciable quantities of chloride in equilibrium with calcium and magnesium may increase the corrosiveness of water. The chloride content of the waters analyzed varies widely in the north-central Texas region, though most supplies contain less than 250 parts per million. The chlorides in two public supplies are more than 1,000 parts; such water would be noticeably salty to most people.

Nitrate (NO_3) in water may indicate contamination by sewage as it represents the final stage of oxidation in the nitrogen cycle. Some nitrate may be dissolved from rocks and soils containing nitrate salts. The quantity of nitrate present in north-central Texas water supplies is generally low and the amounts of nitrates observed would have no effect on the value of the water for ordinary uses.

Fluoride (F) has recently been recognized by the medical profession as causing mottled enamel on teeth. If water containing more than 1.0 part per million of fluoride is used for drinking and cooking, mottling of teeth often occurs during calcification or formation of the

teeth of children. On the other hand, water containing from 0.3 to 1.0 part per million of fluoride may result in a lower incident of dental caries. Only about one-fourth of the waters of north-central Texas supplies contain fluoride above 1.0 part per million.

The dissolved solids represents the approximate quantity of total dissolved mineral substances in solution, though the value reported may include some organic matter and water of crystallization. If the dissolved solids in the water are more than 1,000 parts per million, the water is likely to contain enough of certain constituents to be undesirable for domestic and industrial uses. The analyses show that about 15 percent of the water supplies in this area have dissolved solids above 1,000 parts per million. The dissolved solids of the ground-water supplies in north-central Texas range from 125 parts to 2,610 parts per million. Ninety-three percent of these supplies have solids less than 1,000 parts per million. Surface waters in the area are generally of low mineral content. The dissolved solids in the surface water supplies ranged from 117 to 1,870 parts, except the Wichita Falls supply which contained 3,500 parts.

The hydrogen-ion concentration (pH) is an expression of the acidity of alkalinity of a water and is useful in determining the corrosiveness of the water as delivered to the distribution system. Oxygen, carbon dioxide, free acid, and acid-generating salts are the principal constituents that cause corrosion, whereas the alkalinity is a factor in decreasing corrosion. In many public supplies, corrosive attacks and destruction of metallic surfaces may be avoided by maintaining the pH slightly above 7.0, or in the alkaline range. The average pH of waters of public supplies in north-central Texas is 7.8.

HARDNESS

The hardness of water probably receives the most attention with reference to industrial and domestic use. Hardness is usually recognized by the increased quantity of soap required to produce lather and by the "scum" of insoluble salts formed when hard water is heated. Hardness is caused almost entirely by calcium and magnesium and is reported as the amount of calcium carbonate equivalent to the calcium and magnesium. The hardness caused by calcium and magnesium equivalent to the bicarbonate in a water is called "carbonate hardness" or "temporary hardness," and the remainder "noncarbonate hardness" or "permanent hardness." The character of the scale formed in steam boilers and the treatment is governed by the types of hardness found in the supply.

Several degrees of hardness are referred to in this report: waters with hardness of 75 parts per million or less are considered soft, those between 76 and 150 parts per million are moderately soft, those between 151 and 250 parts per million are moderately hard, and above 250 parts per million are very hard.

The average hardness of the ground-water supplies is 213 parts per million, while the average hardness of surface supplies in the region is 188 parts per million. The following table gives the total number of persons in 1940 using waters of different ranges of hardness from 137 public supplies in north-central Texas:

Range in hardness (parts per million)	Use	
	Individuals	Percent of total
1–75	72,889	11.2
76–150	331,979	51.2
151–250	86,576	13.4
>251	156,692	24.2

Wichita Falls, the third largest city in the area, obtains its water supply at the present time from Lake Kemp. The lake water has a hardness of 1,400 parts per million and dissolved solids of 3,500 parts. The city's new supply from Lake Kickapoo may be utilized during 1947. The water in Lake Kickapoo has a hardness of 58 parts and dissolved solids of 115 parts. When Wichita Falls with its 55,000 inhabitants starts receiving Lake Kickapoo water, the hardness distribution shown in the preceding table will be materially changed.

STANDARDS OF WATER QUALITY

The effect of various constituents in water that is used for public supplies and for industrial purposes with reference to Texas well waters is discussed by Cohen in an early bulletin by the Texas State Department of Health.[2] The standards most widely used now for quality of domestic water supplies are the United States Public Health Service drinking water standards for the drinking and culinary water supply used by common carriers in Interstate Commerce.[3]

[2] Cohen, Chester A., Chemical analyses of Texas well waters, Texas State Department of Health Bulletin, 1931.

[3] Public Health Service drinking water standards: Public Health Reports, vol. 61, pp. 371–384, 1946.

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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 maps showing the location of wells have been published by the Texas State Board of Water Engineers for the following counties in the area: Blanco, Brown, Callahan, Coleman, Eastland, Foard, Gillespie, Hardeman, Knox. San Saba, Stephens, Taylor, Travis, and Williamson.

UNPUBLISHED REPORTS

1940, Ground-water resources in the vicinity of Baird.

1941, Ground water in the vicinity of Crowell.

1942, Ground water in the vicinity of Burnet and Bertram.

1942, Ground-water resources in the vicinity of Gatesville.

1942, Ground-water resources in the vicinity of Menard and Melvin.

1942, Ground water in selected areas in Erath, Hood, and Hamilton Counties.

1943, Ground water in the vicinity of Wichita Falls.

1944, Ground-water resources in the vicinity of Nocona.

1944, Ground water at Coleman.

1946, Exploration of ground water at Childress.

PUBLIC WATER SUPPLIES

ARCHER COUNTY

ARCHER CITY

Population in 1940: 1,675.

Source of information: B. D. Robertson, water superintendent, September 20, 1946.

Ownership: Municipal.

Source of supply: Impounding reservoir on draw three-fourths mile southwest of city hall; capacity 90 acre-feet.

Pumpage (estimated): 200,000 gallons a day in summer, 100,000 gallons a day in winter.

Storage: Two concrete clear wells, 75,000 gallons each; elevated tank, 100,000 gallons.

Number of customers: 500.

Treatment: Coagulation, sedimentation, prechlorination and postchlorination.

Analysis of finished water

[Collected Sept. 20, 1946. pH is 6.8. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	5.7		Sulfate (SO_4)	44	0.916
Iron (Fe)	.32		Chloride (Cl)	18	.508
Calcium (Ca)	20	0.998	Fluoride (F)	.2	.010
Magnesium (Mg)	5.8	.477	Nitrate (NO_3)	.8	.013
Sodium (Na)	23	.983	Dissolved solids	166	
Potassium (K)	5.3	.136	Total hardness as $CaCO_3$	74	
Bicarbonate (HCO_3)	70	1.147			

HOLLIDAY

Population in 1940: 798.

Source of information: R. L. Yarbrough, water superintendent, September 20, 1946.

Ownership: Municipal.

Source of supply: City lake (dry in summer of 1946). Present supply from Lake Kemp.

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

Storage: Elevated tank, 100,000 gallons.

Number of customers: 235.

Treatment: Coagulation, sedimentation, hypochlorination.

Analysis of Lake Kemp finished water

[Collected Sept. 20, 1946. pH is 7.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.0		Sulfate (SO_4)	802	16.70
Iron (Fe)	.11		Chloride (Cl)	1,320	37.23
Calcium (Ca)	277	13.83	Fluoride (F)	.2	.01
Magnesium (Mg)	65	5.35	Nitrate (NO_3)	.8	.01
Sodium (Na)	810	35.21	Dissolved solids	3,460	
Potassium (K)	38	.97	Total hardness as $CaCO_3$	959	
Bicarbonate (HCO_3)	86	1.41			

BAYLOR COUNTY

SEYMOUR

Population in 1940: 3,328.
Source of information: City secretary, October 1943.
Ownership: Municipal.
Source of supply: Four wells.

Well 1. Known as east well; dug; depth, about 42 feet; diameter, 12 feet; deep-well turbine pump and electric motor; yield, 500 gallons a minute.

Well 2. Known as south well; 75 feet from well 1; dug; depth, 48 feet; deep-well turbine pump and electric motor; yield, 750 gallons a minute.

Well 3. Known as west well; depth, about 40 feet; deep-well turbine pump and electric motor; yield, 400 gallons a minute.

Well 4. Known as north well; drilled; depth, 38 feet; diameter, 18 inches; deep-well turbine pump and electric motor; yield, 350 gallons a minute.

Pumpage (estimated): Maximum, 500,000 gallons a day.
Storage: Elevated tank, about 75,000 gallons.
Number of customers: 725.
Treatment: None.

Analysis, well 3

[Collected Oct. 1945. pH is 7.9. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	79	1.64
Iron (Fe)	.04		Chloride (Cl)	84	2.37
Calcium (Ca)	68	3.39	Fluoride (F)	1.1	.06
Magnesium (Mg)	33	2.71	Nitrate (NO_3)	60	.97
Sodium (Na)	114	4.97	Total dissolved solids	656	
Potassium (K)	12	.31	Total hardness as $CaCO_3$	305	
Bicarbonate (HCO_3)	387	6.34			

BELL COUNTY

BELTON

Population in 1940: 3,572.
Source of information: Frank Hamner, water superintendent, Feb. 27, 1947.
Ownership: Municipal.
Source of supply: Three wells.

Well 1. Two blocks west of City Hall; date of drilling unknown; depth, 850 feet; diameter, 6 inches; equipped with air lift pump; yield, 350 gallons a minute when pumped with air.

Well 2. Sixty feet north of well 1: drilled in 1915 by D. C. Hammell; depth, 1,175 feet; diameter, 6 inches; well flows 100 to 150 gallons a minute when other wells are not pumping; air lift pump; yield, 350 gallons a minute.

Well 3. Drilled in 1943 by Kent and Preston; depth, 1,172 feet; diameter, 10 inches; static water level at ground surface; deep-well turbine pump and 40 horsepower electric motor, pump set at 200 feet; yield, 1,000 gallons a minute; temperature, 83° F.

Pumpage: Summer maximum, 1,000,000 gallons a day; winter average, 400,000 gallons a day.
Storage: Concrete ground reservoir, 90,000 gallons; concrete standpipe, 200,000 gallons.
Number of customers: 1,400.
Treatment: None.

Analysis, well 3

[Collected June 24, 1943. pH is 7.9. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Bicarbonate (HCO_3)	490	8.03
Iron (Fe)	.06		Chloride (Cl)	275	7.76
Calcium (Ca)	13	0.65	Fluoride (F)	4.0	.21
Magnesium (Mg)	7.6	.62	Nitrate (NO_3)	0	0
Sodium and potassium (Na + K)	519	22.56	Dissolved solids	1,448	
Sulfate (SO_4)	376	7.83	Total hardness as $CaCO_3$	64	

Driller's log,[1] *well 3*

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	24	24	Blue shale	13	778
Sand and lime	22	46	Lime	69	847
Lime and chalk	46	92	Trinity sand	23	870
Lime	43	135	Sandy shale	5	875
Gray shale	45	180	Trinity sand	12	887
Dark shale	15	195	Sand (water)	33	920
Lime	5	200	Dark shale	28	948
Lime and shale	60	260	Sandy lime	17	965
Gray shale and lime shells	35	295	Blue shale	2	967
Lime	35	330	Sandy lime	8	975
Gray shale and lime	85	415	Blue shale	109	1,084
Lime chalk	117	532	Red shale	2	1,086
Do	66	598	Trinity sand	44	1,130
Lime and shale, broken	64	662	Sand	36	1,166
Lime	48	710	Sand and gravel	4	1,170
Lime and shale, broken	55	765	Blue shale	2	1,172

[1] Geologic names used in this and the following logs are those used by the drillers.

HOLLAND

Population in 1940: 741.

Source of information: O. D. Harrell, water superintendent, Apr. 22, 1943.

Ownership: Municipal.

Source of supply: Well one block west of Missouri, Kansas & Texas Railway depot; drilled in 1929 by K. E. Edwards; depth, 1,993 feet; diameter, 8 to 6 inches; well flows 63 gallons a minute.

Pumpage (estimated): 95,000 gallons a day.

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

Number of customers: 120.

Treatment: None.

Analysis

[Collected Apr. 22, 1943. pH is 7.8. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	978	20.36
Iron (Fe)	.86		Chloride (Cl)	362	10.21
Calcium (Ca)	60	2.99	Fluoride (F)	5.4	.28
Magnesium (Mg)	42	3.45	Nitrate (NO_3)	9.4	.15
Sodium (Na)	712	30.95	Dissolved solids	2,395	
Potassium (K)	13	.33	Total hardness as $CaCO_3$	322	
Bicarbonate (HCO_3)	410	6.72			

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	8	8	Gumbo, white clay	49	1,115
Yellow clay, surface water	17	25	Water sand	5	1,120
Yellow clay—blue shale rock	6	31	Gray lime	20	1,140
Gray gumbo	44	75	Blue shale	25	1,165
Gumbo	75	150	Lime (shows a little water)	65	1,230
Lime	50	200	Blue shale	18	1,248
Blue limestone	50	250	White lime	102	1,350
Lime	110	360	Lime with streak of white clay, water	150	1,500
Lime with streak of blue clay	170	530	Lime	250	1,750
Gumbo	95	625	Do	45	1,795
Black shale	82	707	Gumbo	5	1,800
Gray limestone	13	720	Water sand	5	1,805
Blue shale with lime shells	86	806	Lime with streak of white clay	107	1,912
Gray limestone (Georgetown)	30	836	Trinity water sand	53	1,965
Gumbo with clay	154	990	Gumbo	5	1,970
Water sand (sulfur water, Edwards lime)	54	1,044	Black gumbo	23	1,993
Lime, 2 feet of sand, little water	22	1,066			

KILLEEN

Population in 1940: 1,263.

Source of information: Clifford Glazner, water superintendent, Feb. 27, 1947.

Ownership: Municipal.

Source of supply: Water for the municipal supply of Killeen is obtained from Camp Hood. Most of the Camp Hood water supply is derived from the Lampasas River.

Pumpage: Maximum, 253,000 gallons a day; minimum, 182,000 gallons a day.

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

Number of customers: 924.

Treatment: Chlorination.

Analysis

[Collected Feb. 27, 1947. pH is 8.1. Analyzed by Mrs. B. C. Dwyer]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	2.4		Sulfate (SO_4)	30	0.62
Iron (Fe)	.16		Chloride (Cl)	70	1.97
Calcium (Ca)	61	3.04	Fluoride (F)	.2	.01
Magnesium (Mg)	25	2.06	Nitrate (NO_3)	1.5	.02
Sodium and potassium (Na+K)	40.8	1.73	Dissolved solids	383	
Bicarbonate (HCO_3)	256	1.21	Total hardness as $CaCO_3$	255	

ROGERS

Population in 1940: 911.

Source of information: Frank Vaught, city secretary, Apr. 22, 1943.

Ownership: Municipal.

Source of supply: Well 1½ miles south of town; drilled in 1940 by Layne-Texas Co.; depth, 3,178 feet; diameter, 10¾ to 5 inches; well flowed 835 gallons a minute in 1940 with head of 166 feet above land surface; temperature, 120° F.

Pumpage: Well flows continuously into a lake. Amount used by city unknown.

Storage: Elevated tank.

Number of customers: 195.

Treatment: Aeration.

Analysis

[Collected Apr. 22, 1943. pH is 8.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	277	5.77
Iron (Fe)	.04		Chloride (Cl)	110	3.10
Calcium (Ca)	9.1	0.45	Fluoride (F)	2.8	.15
Magnesium (Mg)	2.9	.24	Nitrate (NO_3)	0	0
Sodium (Na)	381	16.57	Dissolved solids	1,060	
Potassium (K)	6.0	.15	Total hardness as $CaCO_3$	34	
Bicarbonate (HCO_3)	511	8.39			

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Lime and shale	250	2,139
Yellow clay	12	16	Shale and lime	18	2,157
Black shale	82	98	Lime	222	2,379
Gray shale	238	336	Lime and shale	56	2,435
Black shale	203	539	Shale and lime	32	2,467
Gray shale	49	588	Lime	28	2,495
Chalk	283	871	Lime and shale	73	2,568
Chalk and shale	10	881	Soft lime	21	2,589
Shale	16	897	Lime	160	2,749
Chalk and shale	35	932	Shale and lime	16	2,765
Chalk	182	1,114	Porous lime	11	2,776
Chalk and shale	57	1,171	Lime and shale	62	2,838
Black shale	62	1,233	Lime	5	2,843
Lime and shale	10	1,243	Sand and shale	15	2,858
Shale	22	1,265	Sand	8	2,866
Lime	82	1,347	Shale and sandy shale	30	2,896
Lime and shale	30	1,377	Lime and shale	14	2,910
Lime	120	1,497	Sand with layers of shale	100	3,010
Lime and shale	27	1,524	Hard shale	11	3,021
Lime	215	1,739	Sand and gravel	86	3,107
Shale	3	1,742	Shale	6	3,113
Lime and shale	24	1,766	Sand	59	3,172
Lime	123	1,889	Hard shale	6	3,178

TEMPLE

Population in 1940: 15,344.

Source of information: N. E. Trostle, water superintendent, Apr. 23, 1943.

Ownership: Municipal.

Source of supply: Lake on Leon River below highway bridge on United States Highway No. 81.

Pumpage: Average, 3,000,000 gallons a day in 1945.

Storage: Two elevated tanks, 500,000 gallons each; concrete ground reservoir, 3,000,000 gallons.

Number of customers: 4,000.

Treatment: Sedimentation, coagulation, filtration, and chlorination.

Analysis

[Collected Apr. 23, 1943. pH: Raw water, 8.0; finished water, 8.4. Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	12		12	
Iron (Fe)	.04		.04	
Calcium (Ca)	47	2.35	35	
Magnesium (Mg)	12	.99	28	1.75
Sodium and potassium (Na+K)	183	7.96	88	2.30
Bicarbonate (HCO_3)	307	5.03	104	3.84
Sulfate (SO_4)	79	1.64	83	1.72
Chloride (Cl)	162	4.57	155	1.73
Fluoride (F)	.5	.03	.5	4.37
Nitrate (NO_3)	2.0	.03	2.5	.03
Dissolved solids	651		455	.04
Total hardness as $CaCO_3$	167		202	

BLANCO COUNTY

BLANCO

Population in 1940: 453.

Source of information: V. J. Quinlan, water superintendent, Aug. 21, 1941.

Ownership: Municipal.

Source of supply: Well dug in 1941 by Works Progress Administration; depth, 13 feet; diameter, 60 x 96 inches; centrifugal pump and 7½-horsepower electric motor; static water level, 4.23 feet below land surface on August 21, 1941; yield, 70 gallons a minute.

Pumpage (estimated): 20,000 to 30,000 gallons a day.

Storage: Concrete reservoir, 109,000 gallons.

Treatment: None.

Analysis

[Collected Aug. 21, 1941. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	23	1.148	Chloride (Cl)	11	0.310
Magnesium (Mg)	9.5	.781	Fluoride (F)	.5	.026
Sodium and potassium (Na+K)	10	.445	Nitrate (NO_3)	10	.161
Bicarbonate (HCO_3)	98	1.606	Dissolved solids	125	
Sulfate (SO_4)	13	.271	Total hardness as $CaCO_3$	96	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Silt	4	4	Gravel	9	13

BOSQUE COUNTY

CLIFTON

Population in 1940: 1,732.

Source of information: Wm. C. Hurst, water superintendent, Feb. 6, 1946.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled in 1915 by E. E. Erickson; depth, 687 feet; diameter, 8 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level reported 20 feet below land surface; yield, 200 gallons a minute with a pumping level of 88 feet.

Well 2. About 800 feet from well 1; drilled in 1945; depth, 698 feet; diameter, 8 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 5 feet below land surface; yield, 150 gallons a minute with a pumping level of 68 feet.

Pumpage: Average, 135,000 gallons a day.

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

Number of customers: 508.

Treatment: None.

Analysis, well 1

[Collected Feb. 6, 1946. pH is 8.4. Analyzed by J. H. Rowley and P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	11		Sulfate (SO_4)	56	1.17
Iron (Fe)	.01		Chloride (Cl)	21	.59
Calcium (Ca)	3.4	0.17	Fluoride (F)	.2	.01
Magnesium (Mg)	1.9	.16	Nitrate (NO_3)	0	0
Sodium (Na)	193	8.41	Dissolved solids	506	
Potassium (K)	6.0	.15	Total hardness as $CaCO_3$	16	
Bicarbonate (HCO_3)	434	7.96			

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 1					
Gravel	30	30	Honeycomb lime	15	212
Blue shale and soapstone	12	42	White lime with few breaks	338	550
Lime	40	82	Very hard lime	11	561
Blue shale	4	86	Shale and gumbo	26	587
Hard lime	12	98	Black gumbo	3	590
Blue shale	10	108	Hard cap rock-pyrite	3	593
Hard cap rocks	2	110	Green shale and green sand	7	600
Green sand	4	114	Trinity sand (flowing lots of water)	46	646
Paluxy sand (lots of water)	18	132	Red bed	110	756
Gumbo	4	136	Sand	31	787
White lime	61	197			
Well 2					
Gravel	35	35	Honeycombed lime	4	187
Rock	55	90	Limestone	343	530
Black gumbo	3	93	Green shale	28	558
Green shale	2	95	Sand (cap rock)	2	560
Paluxy sand	25	120	Trinity sand	40	600
Black gumbo	3	123	Green shale	10	610
Rock	15	138	Red rock	56	666
Black gumbo	2	140	White sand	8	674
Limestone	43	183	Shale and gumbo	12	686

CRANFILLS GAP

Population in 1940: 600.

Source of information: A. C. Grimland, city secretary, Feb. 10, 1943.

Ownership: Municipal.

Source of supply: Well west of the city; drilled in 1934 by E. E. Erickson; depth, 549 feet; diameter, 6¼ to 3½ inches; equipped with deep-well cylinder and pump jack; static water level reported 120 feet below land surface in 1934.

Pumpage: No record.

Storage: Concrete ground reservoir on hill, 18,000 gallons.

Number of customers: 60.

Treatment: None.

Analysis

[Collected Feb. 10, 1943. pH is 8.4. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	8.8		Sulfate (SO_4)	90	1.87
Iron (Fe)	.2		Chloride (Cl)	31	.87
Calcium (Ca)	20	1.00	Fluoride (F)	1.1	.06
Magnesium (Mg)	14	1.15	Nitrate (NO_3)	2.0	.03
Sodium (Na)	132	5.73	Dissolved solids	476	
Potassium (K)	14	.36	Total hardness as $CaCO_3$	108	
Bicarbonate (HCO_3)	330	5.41			

IREDELL

Population in 1940: 483.

Source of information: J. W. Parks, city secretary, Feb. 10, 1943.

Ownership: Municipal.

Source of supply: Two wells: one owned by the city and the other leased by the city from R. S. Echols.

Well 1. Drilled about 1900; depth, 335 feet; diameter, 6 inches; deep-well cylinder and pump jack, cylinder set at 180 feet; well flowed when drilled.

Well 2. Owned by R. S. Echols; drilled in 1901 by Joe Candy; depth, 257 feet; diameter, 6 inches; deep-well cylinder and pump jack, cylinder set at 225 feet; water level reported about 75 feet below surface.

Pumpage: No record.

Storage: Tank, 42,000 gallons.

Number of customers: 55.

Treatment: None.

Analysis

[Collected Feb. 10, 1943. pH for each well is 8.4. Analyzed by J. H. Rowley]

	City well		R. S. Echols well	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		8	
Iron (Fe)	.12		.16	
Calcium (Ca)	44	2.20	35	1.75
Magnesium (Mg)	32	2.63	27	2.22
Sodium (Na)	49	2.15	70	3.06
Potassium (K)	11	.28	13	.33
Bicarbonate (HCO_3)	362	5.93	324	5.31
Sulfate (SO_4)	42	.87	67	1.39
Chloride (Cl)	16	.45	23	.65
Fluoride (F)	.2	.01	.1	.01
Nitrate (NO_3)	0	0	.2	0
Dissolved solids	387		403	
Total hardness as $CaCO_3$	242		198	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	20	20	Sandstone, limestone, and marl	100	266
Limestone	10	30	Soft and hard sand rock	45	311
Soft blue marl	80	110	Fine-grained sandstone	6	317
Blue marl	6	116	Packsand (flow of water)	18	325
Soft white stone	50	166			

MERIDIAN

Population in 1940: 1,016.

Source of information: W. B. Dorman, water superintendent, Feb. 6, 1946.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled about 1924; depth, 725 feet; diameter, 8 to 6 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 100 feet below pump base in February 1946; yield, 300 gallons a minute with drawdown of 50.0 feet; temperature, 73° F.

Well 2. Drilled in 1939 by J. L. Myers; depth, 733 feet; diameter, 12 to 8 inches; deep-well turbine and electric motor (submersible); yield, 330 gallons a minute.

Pumpage (estmated); 300,000 gallons a day in summer; 90,000 gallons a day in winter.

Number of customers: 240.

Treatment: None.

Analysis

[Collected Feb. 6, 1946, pH; Well 1, 7.3; well 2, 7.7. Analyzed by C. B. Cibulka]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	11		11	
Iron (Fe)	1.4		.04	
Calcium (Ca)	114	5.69	17	0.85
Magnesium (Mg)	14	.14	1.7	1.15
Sodium (Na)	120	7.03	162	5.22
Potassium (K)	7.5	.19	6.0	.15
Bicarbonate (HCO_3)	408	6.69	382	6.26
Sulfate (SO_4)	186	3.87	53	1.10
Chloride (Cl)	60	1.69	28	.79
Fluoride (F)	0	0	0	0
Nitrate (NO_3)	0	0	1.2	.02
Dissolved solids	714		468	
Total hardness as $CaCO_3$	342		50	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	10	10	Sand rock	2	610
Gravel	2	12	Gray shale	5	615
Hard lime	18	30	Brown gumbo	6	621
Soft lime	6	36	Red shale	9	630
Hard lime	8	44	Mixed shale	6	636
Water sand	10	54	Rock	1	637
Rock	16	70	Gray shale	13	650
Gray shale	11	81	Hard sand (water)	5	655
Rock	10	91	Water sand	15	670
Sandy shale	4	95	Hard sand (water)	16	686
Water sand	10	105	Soft sand	19	705
Lime rock	370	475	Soft sand (water)	15	720
Sandy shale	5	480	Hard sand	4	724
Water sand	15	495	Hard rock	1	725
Sandy shale	15	510	Coarse sand and gravel	8	733
Water sand	7	517	Hard lime	1	734
Lime rock	4	521	Yellow shale	4	738
Sandy shale	5	526	Rocky ridge shale	12	750
Water sand	10	536	Mixed red and gray shale	9	759
Green shale	5	541	Mixed red, yellow and gray shale	11	770
Red shale	9	550	Red shale	10	780
Red rock	1	551	Sandy lime	4	784
Red shale	32	583	Brown shale	2	786
Gray gumbo	4	587	Sandy lime	24	810
Green shale	8	595	Brown shale	9	819
Gray sandy shale	13	608			

MORGAN

Population in 1940: 503.

Source of information: C. C. McGhee, water superintendent, Feb. 10, 1943.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. At north edge of city; drilled in 1906 by J. S. Smith; depth, 675 feet; diameter, 4 inches; deep-well cylinder and pump jack; static water level reported 90 feet below land surface in 1943.

Well 2. At north edge of city; drilled in 1902 as an oil test; depth, 210 feet; effective depth as water well, about 800 feet; deep-well turbine pump set 110 feet below land surface; well reported to have flowed when drilled; static water level about 70 feet below land surface in 1943; yield, 300 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, 10,000 gallons.

Number of customers: 91.

Treatment: None.

Analysis

[Collected Feb. 10, 1943. pH is 8.3. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	11		Sulfate (SO_4)	45	0.94
Iron (Fe)	.05		Chloride (Cl)	12	.34
Calcium (Ca)	23	1.15	Fluoride (F)	.4	.02
Magnesium (Mg)	14	1.15	Nitrate (NO_3)	.2	
Sodium (Na)	106	4.62	Dissolved solids	414	
Potassium (K)	18	.46	Total hardness as $CaCO_3$	115	
Bicarbonate (HCO_3)	371	6.08			

VALLEY MILLS

Population in 1940: 803.

Source of information: R. L. Roberson, manager, Feb. 6, 1946.

Owner: Community Public Service Co.

Source of supply: Well at Avenue Eight and First Street; drilled about 1929; depth, 962 feet; diameter, 8 inches; deep-well turbine pump and 15-horsepower electric motor; well still flows when idle for several days; yield, 133 gallons a minute.

Pumpage: Average, 75,000 gallons a day in August 1945; 62,000 gallons a day in January 1946.

Storage: Ground reservoir on hill, 100,000 gallons.

Number of customers: 348.

Treatment: None.

Analysis

[Collected Feb. 6, 1946. pH is 8.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	95	1.98
Iron (Fe)	.02		Chloride (Cl)	36	1.02
Calcium (Ca)	3.0	0.15	Fluoride (F)		
Magnesium (Mg)	1.2	.10	Nitrate (NO_3)		
Sodium (Na)	225	9.79	Dissolved solids	582	
Potassium (K)	4.5	.12	Total hardness as $CaCO_3$	12	
Bicarbonate (HCO_3)	438	7.16			

WALNUT SPRINGS

Population in 1940: 723.

Source of information: J. S. Jackson, water superintendent, Jan., 1946.

Ownership: Municipal.

Source of supply: Well drilled about 1930 by Montgomery; depth, 545 feet; diameter, 8 inches; deep-well submersible turbine pump and 10-horsepower motor; yield, 105 gallons a minute.

Pumpage (estimated): 69,000 gallons a day in summer, 50,000 gallons a day in winter.

Storage: Concrete reservoir on hill, 135,000 gallons; ground reservoir, 72,000 gallons.

Number of customers: 225.

Treatment: None.

Analysis

[Collected Nov. 1945. pH is 7.0. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	38	0.79
Iron (Fe)	.08		Chloride (Cl)	14	.39
Calcium (Ca)	37	1.85	Fluoride (F)	.6	.03
Magnesium (Mg)	32	2.63	Nitrate (NO_3)	0	0
Sodium (Na)	57	2.46	Dissolved solids	383	
Potassium (K)	9.5	.24	Total hardness as $CaCO_3$	224	
Bicarbonate (HCO_3)	364	5.97			

BROWN COUNTY

BANGS

Population in 1940: 756.
Source of information: C. B. Loveless, city treasurer, Apr. 19, 1946.
Ownership: Municipal.
Source of supply: Water purchased from the city of Brownwood, see city of Brownwood.
Pumpage: Average, 33,000 gallons a day.
Storage: Concrete ground reservoir, 50,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 280.
Treatment: See city of Brownwood.
Analysis of water: See city of Brownwood.

BLANKET

Population in 1940: 327.
Source of information: T. M. McCulley, mayor, Mar. 21, 1946.
Ownership: Municipal.
Source of supply: Well drilled in 1928 by Elmer Simpson; depth, 180 feet; diameter, 6 inches; deep-well cylinder and pump jack and 1½ horsepower electric motor; static water level, 160.9 feet below land surface on March 21, 1946.
Pumpage: No record.
Storage: Ground storage tank, 2,000 gallons; elevated tank, 3,000 gallons.
Number of customers: 48.
Treatment: None.

Analysis, well 1

[Collected Mar. 21, 1946. pH is 7.5. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.5		Sulfate (SO_4)	154	3.21
Iron (Fe)	.14		Chloride (Cl)	94	2.65
Calcium (Ca)	94	4.69	Fluoride (F)	.2	.01
Magnesium (Mg)	64	5.26	Nitrate (NO_3)	1.8	.03
Sodium (Na)	52	2.25	Dissolved solids	704	
Potassium (K)	10	.26	Total hardness as $CaCO_3$	498	
Bicarbonate (HCO_3)	400	6.56			

BROWNWOOD

Population in 1940: 13,398.
Source of information: Mr. Martin, water superintendent, Apr. 19, 1946.
Ownership: Municipal.
Source of supply: Lake Brownwood, on Pecan Bayou, 9 miles north of Brownwood; capacity, 141,800 acre-feet.
Pumpage: Average, 3,830,000 gallons a day.
Storage: Two concrete ground reservoirs, on top of hill west of city, 1,000,000 gallons each.
Number of customers: 5,000.
Treatment: Aeration, coagulation, sedimentation, rapid sand filters, prechlorination, and postchlorination.

Analysis of raw water from Lake Brownwood

[Collected Apr. 19, 1946. pH is 7.3. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	3.4		Sulfate (SO_4)	21	0.437
Iron (Fe)	.06		Chloride (Cl)	42	1.185
Calcium (Ca)	45	2.246	Fluoride (F)	0	0
Magnesium (Mg)	6.0	.493	Nitrate (NO_3)	0	0
Sodium (Na)	25	1.071	Dissolved solids	223	
Potassium (K)	4.2	.107	Total hardness as $CaCO_3$	137	
Bicarbonate (HCO_3)	1.40	2.295			

BURNET COUNTY

BERTRAM

Population in 1940: 800.

Source of information: Roy Potts, operator of water plant, Jan. 15, 1946.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. Old well near elevated tank; drilled before 1910 by R. J. Bostic; depth, 430 feet; diameter, 8 inches; deep-well cylinder and pump jack and 5-horse power electric motor; static water level reported 350 feet below land surface; yield, 10 gallons a minute; temperature, 68° F.

Well 2. 100 yards east of elevated tank; drilled in 1944 by Layne-Texas Co.; depth, 423 feet; diameter, 8 inches; gravel-walled; deep-well cylinder and pump jack and 5-horsepower electric motor; static water level, 340 feet below land surface; yield, 14 gallons a minute; temperature, 68° F.

Well 3. About 4 blocks south of elevated tank; drilled in 1945 by W. Hunt; depth, 451 feet; diameter, 8 inches; gravel-walled; Peerless Hi-Lift pump and electric motor; yield, 14 gallons a minute.

Pumpage (estimated): 33,000 gallons a day.

Storage: Ground reservoir, 50,000 gallons; old elevated tank, 25,000 gallons; new elevated tank, 60,000 gallons.

Number of customers: 163.

Treatment: None.

Analysis of composite sample, wells 1 and 2

[Collected Jan. 15, 1946. pH is 7.7. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	19		Sulfate (SO_4)	56	1.17
Iron (Fe)	.29		Chloride (Cl)	44	1.24
Calcium (Ca)	74	3.69	Fluoride (F)	.6	.03
Magnesium (Mg)	38	3.12	Nitrate (NO_3)	.8	.01
Sodium (Na)	28	1.20	Dissolved solids	446	
Potassium (K)	9.5	.24	Total hardness as $CaCO_3$	340	
Bicarbonate (HCO_3)	354	5.80			

Driller's log, abandoned city well near well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	1	1	Crystal rock	6	290
White limestone	16	17	Soft sandy shale	10	300
Soft gray shale	3	20	Broken formation	25	325
Rock ledges, sand shale	32	52	Green shale	2	327
Green sandy shale	7	59	Fine sand—little water	8	335
Water sand, very fine	10	69	Gray sandy shale	3	338
Sand rock	1	70	Water sand—rock ledges	22	360
Shale rock ledges—6 inches thick	8	78	Coarse water sand—crystal rock	10	370
Hard shell bed	3	81	Green sandy shale	13	383
Broken formation—shale rock	69	150	Shell bed—crystal rock	2	385
Sand, shale	5	155	Green shale—shells—sticky	5	390
Broken formation shale shell beds	70	225	Light green sandstone	10	400
Hard rock	7	232	Coarse sand	2	402
Sandy shale	5	237	Green sandstone—crystal rock	31	433
Shell beds	7	244	Hard sandstone	7	440
Crystal rock—white	16	260	Crystal rock with some shale	13	453
Shell and shale	15	275	Hard blue lime rock	4	457
Hard rock	5	280	Sticky green shale	12	469
Sticky shale	4	284			

BURNET

Population in 1940: 1,945.

Source of information: C. A. Schilling, water superintendent, Jan. 15, 1946.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. At north limit of N. Main Street; drilled in 1937 by Johnson Well Drilling Co.; depth, 74 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; static water level reported 20 feet below land surface; yield, 200 gallons a minute; temperature, 69° F.

Well 2. About 50 feet north of well 1; drilled in 1937 by Johnson Well Drilling Co.; depth, 74 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 200 gallons a minute.

Average pumpage, in gallons a day, 1945

June	62,000	October	63,000
July	66,000	November	66,000
August	76,000	December	60,000
September	75,000		

Storage: Elevated tank, 60,000 gallons.

Number of customers: 370.

Treatment: None.

Analysis, well 1

[Collected Jan. 15, 1946. pH is 7.8. 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)	17	0.35
Iron (Fe)	.39		Chloride (Cl)	31	.87
Calcium (Ca)	97	4.84	Fluoride (F)	0	0
Magnesium (Mg)	32	2.63	Nitrate (NO_3)	19	.31
Sodium (Na)	16	.70	Dissolved solids	439	
Potassium (K)	1.8	.05	Total hardness as $CaCO_3$	374	
Bicarbonate (HCO_3)	408	6.69			

MARBLE FALLS

Population in 1940: 1,021.
Source of information: Rudolph Giesecke, water superintendent, Jan. 15, 1946.
Ownership: Municipal.
Source of supply: Colorado River.
Pumpage (estimated): 100,000 gallons a day.
Storage: Concrete settling basin, 100,000 gallons; elevated tank, 100,000 gallons.
Number of customers: 300.
Treatment: Coagulation, sedimentation, rapid sand filtration, and chlorination.

Analysis

[Collected Jan. 15, 1946. pH: Raw water, 7.9; finished water, 8.0. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	8.8		5.8	
Iron (Fe)	.08		.06	
Calcium (Ca)	51	2.546	46	2.30
Magnesium (Mg)	17	1.398	16	1.32
Sodium (Na)	21	.915	30	1.29
Potassium (K)	4.0	.102	8.7	.22
Bicarbonate (HCO_3)	181	2.968	181	2.97
Sulfate (SO_4)	30	.625	32	.67
Chloride (Cl)	48	1.354	53	1.49
Fluoride (F)	.2	.011	0	.00
Nitrate (NO_3)	.2	.003	.2	.00
Dissolved solids	271		285	
Total hardness as $CaCO_3$	197		181	

CALLAHAN COUNTY

BAIRD

Population in 1940: 1,810.
Source of information: R. L. Elliott, superintendent of utilities, Feb. 5, 1946.
Ownership: Municipal.
Source of supply: Eight wells, in well field adjacent to the Texas & Pacific R. R., 3½ miles west of Baird.

Well 1. Dug in 1927; depth, 42 feet; diameter, 6 feet; deep-well turbine pump and 1½-horsepower electric motor; yield, 20 gallons a minute.

Well 2. Dug in 1927; depth, 45 feet; diameter, 6 feet; deep-well turbine pump and 1½-horsepower electric motor; yield, 10 gallons a minute.

Well 3. Dug in 1927; diameter, 6 feet; deep-well turbine pump and 1½-horsepower electric motor; yield, 8 gallons a minute.

Well 4. Dug in 1927; depth, about 45 feet; diameter, 6 feet; deep-well turbine pump and 1½-horsepower electric motor; yield, 10 gallons a minute.

Well 5. Dug in 1927; depth, about 45 feet; diameter, 6 feet; deep-well turbine pump and 1½-horsepower electric motor; yield, 10 gallons a minute.

Well 6. Dug in 1929; depth, about 45 feet; diameter, 6 feet (not in use).

Well 7. Dug in 1929; depth, about 45 feet; deep-well turbine pump and 5-horsepower electric motor; yield, 15 gallons a minute.

Well 8. Dug about 1930; depth, about 45 feet; diameter, 6 feet; deep-well turbine pump and 5-horsepower electric motor; yield, 10 gallons a minute.

Well 10. Dug by W. P. A.; 15 feet wide and 30 feet long; depth, 38 feet; yield, 3 or 4 gallons a minute; well abandoned.

Average pumpage, in gallons a day

	1941	1942	1943	1944		1941	1942	1943	1944
January	44,800	60,600	45,100	45,400	July	82,600	93,400	100,000	89,000
February	49,000	64,000	63,400	48,100	August	94,400	88,800	106,000	95,800
March	43,000	49,300	52,100	39,800	September	62,700	60,800	77,700	61,500
April	57,700	56,000	53,800	57,800	October	56,700	46,200	49,300	57,400
May	47,900	50,900	69,800	58,300	November	52,700	45,800	51,600	54,600
June	57,600	57,900	78,500	70,300	December	46,900	49,200	46,800	44,400

Storage: Ground reservoir at well field, 136,000 gallons; elevated tank, 60,000 gallons.

Number of customers: 500.

Treatment: Chlorinated lime.

Analysis

[Collected Feb. 5, 1946. pH for each well is 7.0. Analyzed by C. B. Cibulka]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	12		16	
Iron (Fe)	.9		.30	
Calcium (Ca)	93	4.64	144	7.19
Magnesium (Mg)	10	.82	19	1.56
Sodium (Na)	36	1.58	61	2.64
Potassium (K)	5.0	.13	12	.31
Bicarbonate (HCO_3)	267	4.38	364	5.97
Sulfate (SO_4)	41	.85	83	1.73
Chloride (Cl)	66	1.86	136	3.84
Fluoride (F)	0	0	.2	.01
Nitrate (NO_3)	4.8	.08	9.6	.15
Dissolved solids	417		686	
Total hardness as $CaCO_3$	273		438	

Driller's log, test well in city of Baird well field

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Yellow surface sand	2	2	White sand	1	21
Sandy gray clay	1	3	Yellow sand	11	32
Sandy red clay	1	4	Fine yellow water sand	1	33
Yellow and red sand	2	6	Yellow clay	3	36
Red sand	1	7	Red water sand	1	37
Yellow sand	1	8	Yellow clay	1	38
Red sand	8	16	Yellow water sand	4	42
Yellow sand	4	20			

CLYDE

Population in 1940: 800.

Source of information: H. E. Swafford, water commissioner, Feb. 5, 1946.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. At elevated tank; dug; depth, 25 feet; diameter, 5 feet; deep-well turbine pump and electric motor; yield, 25 gallons a minute.

Well 2. 30 feet east of well 1; dug about 1939; depth, 25 feet; deep-well turbine pump and electric motor (pumped directly into well 1 and then from well 1 to the distribution system).

Pumpage (estimated): 50,000 gallons a day in summer, 25,000 gallons a day in winter.

Storage: Elevated tank, 50,000 gallons.
Number of customers: 125.
Treatment: Chlorination.

Analysis, composite sample

[Collected Feb. 5, 1946. pH is 7.3. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	28	7.59	Sulfate (SO_4)	123	0.03
Iron (Fe)	.05	2.30	Chloride (Cl)	162	.42
Calcium (Ca)	152	5.25	Fuoride (F)	.6	
Magnesium (Mg)	28	.28	Nitrate (NO_3)	26	
Sodium (Na)	121	7.81	Dissolved solids	919	
Potassium (K)	11	2.56	Total hardness as $CaCO_3$	494	
Bicarbonate (HCO_3)	478	4.57			

CROSS PLAINS

Population in 1940: 1,229.
Source of information: B. B. Huntington, water superintendent, Feb. 5, 1946.
Ownership: Municipal.
Source of supply: Six wells, 1½ miles northeast of Cross Plains.

Well 1. Dug; depth, 50 feet; diameter, 6 feet; deep-well cylinder and pump jack; static water level, 15 feet below surface, February 1946; yield, 20 gallons a minute.

Well 2. Dug; depth, 50 feet; diameter, 4 feet; deep-well cylinder and pump jack; yield, 20 gallons a minute.

Well 3. Drilled in 1945; depth, 50 feet; diameter, 8 inches; deep-well cylinder and pump jack; yield, 20 gallons a minute.

Well 4. Drilled; depth, 50 feet; diameter, 8 inches; deep-well cylinder and pump jack; yield, 20 gallons a minute.

Well 5. Drilled about 1941; depth, 50 feet; diameter, 8 inches; deep-well cylinder and pump jack; yield, 20 gallons a minute.

Well 6. Drilled about 1941; depth, 50 feet; diameter, 8 inches; deep-well cylinder and pump jack; yield, 20 gallons a minute.

Pumpage (estimated): Maximum, 170,000 gallons a day.
Storage: Ground reservoir, 72,000 gallons; elevated tank, 85,000 gallons.
Number of customers: 365.
Treatment: None.

Analysis

[Collected Feb. 5, 1946. pH for each well is 7.0. Analyzed by C. B. Cibulka]

	Well 2		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica Sio_2	19		11	
Iron (Fe)	.03		.04	
Calcium (Ca)	99	4.94	227	11.33
Magnesium (Mg)	13	1.07	23	1.89
Sodium (Na)	76	.16	138	6.01
Potassium (K)	6.2	6.61	12	.31
Bicarbonate (HCO_3)	403	1.00	520	2.66
Sulfate (SO_4)	48	1.61	128	7.98
Chloride (Cl)	57	.02	283	.01
Fluoride (F)	.4	.24	.2	.37
Nitrate (NO_3)	15		23	
Dissolved solids	533		1,100	
Total hardness as $CaCO_3$	300		661	

PUTNAM

Population in 1940: 487.
Source of information: John Fisher, pump operator, Jan., 1946.
Ownership: Municipal.
Source of supply: Lake 1 mile southwest of Putnam; reservoir capacity, 4,000,000 gallons.
Pumpage (estimated): 12,000 gallons a day.
Storage: Elevated tank, 50,000 gallons.
Treatment: None.

Analysis of lake water

[Collected Nov. 1945. pH is 7.4. 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)	51	1.062
Iron (Fe)	.23		Chloride (Cl)	18	.508
Calcium (Ca)	30	1.497	Fluoride (F)	0	0
Magnesium (Mg)	10	.822	Nitrate (NO_3)	0	0
Sodium (Na)	37	1.597	Dissolved solids	242	
Potassium (K)	4.4	.113	Total hardness as $CaCO_3$	116	
Bicarbonate (HCO_3)	150	2.459			

CLAY COUNTY

BYERS

Population in 1940: 427.
Source of information: J. F. Bridges, water superintendent, June 5, 1946.
Ownership: Municipal.
Source of supply: Lake one-half mile northwest of Byers.

Average pumpage, in gallons a day

	1945	1946		1945	1946
January		20,000	July		
February		19,000	August	21,000	
March		21,000	September	22,000	
April		27,000	October	17,000	
May		36,000	November	16,000	
June		40,000	December	18,000	

Storage: Settling tank at lake, 28,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 162.
Treatment: Coagulation, sedimentation, and hypochlorination.

Analysis

[Collected June 5, 1946. pH: Raw water, 7.8; finished water, 7.9. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	7.8		2.5	
Iron (Fe)	.06		.20	
Calcium (Ca)	27	1.348	37	1.847
Magnesium (Mg)	7.2	.592	7.0	.576
Sodium (Na)	22	.965	33	1.414
Potassium (K)	5.1	.130	5.3	.136
Bicarbonate (HCO_3)	134	2.196	143	2.360
Sulfate (SO_4)	6.9	.144	34	.708
Chloride (Cl)	24	.677	32	.902
Fluoride (F)	.2	.010	0	0
Nitrate (NO_3)	.5	.008	.2	.003
Dissolved solids	168		191	
Total hardness as $CaCO_3$	97		121	

HENRIETTA

Population in 1940: 2,391.
Source of information: C. C. McKinney, water superintendent, June 5, 1946.
Ownership: Municipal.
Source of supply: Little Wichita River 2 miles north of city.
Pumpage (estimated): 250,000 gallons a day.
Storage: Three settling basins, 200,000 gallons each; clear well, 200,000 gallons; standpipe, 85,000 gallons.
Number of customers: 800.
Treatment: Coagulation, sedimentation, filtration, and chlorination.

Analysis

[Collected June 5, 1946. pH: Raw water or finished water, 8.0. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	10		2.4	
Iron (Fe)	.11		.03	
Calcium (Ca)	59	2.94	64	3.19
Magnesium (Mg)	18	1.48	16	1.32
Sodium (Na)	173	7.51	159	6.91
Potassium (K)	19	.49	22	.56
Bicarbonate (HCO_3)	128	2.10	126	2.07
Sulfate (SO_4)	7.1	.15	22	.46
Chloride (Cl)	360	10.15	334	9.42
Fluoride (F)	.2	.01	.4	.02
Nitrate (NO_3)	.5	.01	.05	.01
Dissolved solids	778		755	
Total hardness as $CaCO_3$	221		226	

PETROLIA

Population in 1940: 597.
Source of information: T. D. Chatman, water superintendent, June 5, 1946.
Ownership: Municipal.
Source of supply: City lake 1.5 miles north of Petrolia.
Pumpage (estimated): 40,000 gallons a day.
Storage: Settling basin, 40,000 gallons; elevated tank, 55,000 gallons.
Number of customers: 173.
Treatment: Coagulation, sedimentation, filtration, and chlorination.

Analysis

[Collected June 5, 1946. pH: Raw water, 7.5; finished water, 9.5. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	7.3		6.2	
Iron (Fe)	1.9		.11	
Calcium (Ca)	20	0.998	3.6	0.18
Magnesium (Mg)	5.7	.469	3.9	.32
Sodium (Na)	31	1.335	218	9.48
Potassium (K)	5.0	.013	9.6	.25
Bicarbonate (HCO_3)	106	1.738	412	6.75
Sulfate (SO_4)	13	.271	126	2.62
Chloride (Cl)	27	.761	30	.85
Fluoride (F)	.4	.021	.2	.01
Nitrate (NO_3)	1.5	.024	.2	0
Dissolved solids	163		601	
Total hardness as $CaCO_3$	73		25	

COLEMAN COUNTY

BURKETT

Population in 1940: 198.

Source of information: W. N. Newton, owner, Apr. 18, 1946.

Owner: W. N. Newton.

Source of supply: Pecan Bayou, pumping station on west edge of town about 500 yards north of Highway 206.

Pumpage (estimated); Maximum, 44,000 gallons a day.

Storage: Elevated tank, 44,000 gallons.

Number of customers: 43.

Treatment: None.

Analysis

[Collected Apr. 18, 1946. pH is 7.2. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	1.5	0.03
Iron (Fe)	3.0		Chloride (Cl)	31	.87
Calcium (Ca)	70	3.49	Fluoride (F)	.2	.01
Magnesium (Mg)	11	.90	Nitrate (NO_3)	6.1	.10
Sodium (Na)	21	.90	Dissolved solids	302	
Potassium (K)	5.0	.13	Total hardness as $CaCO_3$	220	
Bicarbonate (HCO_3)	269	4.41			

COLEMAN

Population in 1940: 6,054.

Source of information: Herbert Shore, water superintendent, Apr. 19, 1946.

Ownership: Municipal.

Source of supply: Lake Scarbrough and 2 standby wells.

Lake Scarbrough: On Indian Creek 4½ miles north of Coleman; capacity 2,000 acre-feet.

Well 1. Dug in 1944; depth, 23 feet; diameter, 6 feet; centrifugal pump and 10-horsepower electric motor; yield, 250 gallons a minute.

Well 2. Dug in 1944; depth, 23 feet; diameter, 6 feet; deep-well turbine pump and 15-horsepower electric motor; yield, 150 gallons a minute.

Pumpage: Average, 400,000 gallons a day.
Storage: Ground reservoir, 500,000 gallons; elevated tank, 250,000 gallons.
Number of customers: 2,000.
Treatment: Coagulation, sedimentation, rapid sand filters, prechlorination and postchlorination.

Analysis of lake water

[Collected Apr. 19, 1946. pH of raw water is 8.1. Analyzed by J. H. Rowley and M. L. Begley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	4.8			
Iron (Fe)	.08			
Calcium (Ca)	47	2.346	42	2.096
Magnesium (Mg)	7.9	.650	7.3	.600
Sodium (Na)	10	.450	20	.878
Potassium (K)	4.9	.125		
Bicarbonate (HCO_3)	164	2.688	140	2.296
Sulfate (SO_4)	16	.333	22	.458
Chloride (Cl)	19	.536	48	.790
Fluoride (F)	.2	.011	.4	.021
Nitrate (NO_3)	.2	.003	.2	.003
Dissolved solids	193		189	
Total hardness as $CaCO_3$	150		134	

Analysis, well 1

[Collected Apr. 10, 1944. pH is 7.6. Analyzed by W. W. Hastings]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	143	2.98
Iron (Fe)	0		Chloride (Cl)	178	5.02
Calcium (Ca)	148	7.39	Fluoride (F)	.3	.02
Magnesium (Mg)	38	3.12	Nitrate (NO_3)	28	.45
Sodium and potassium (Na+K)	113	4.91	Dissolved solids	878	
Bicarbonate (HCO_3)	424	6.95	Total hardness as $CaCO_3$	526	

SANTA ANNA

Population in 1940: 1,641.
Source of information: Water Superintendent, Apr. 19, 1946.
Ownership: Municipal.
Source of supply: Lake San-Tana and Lake Sealy.

Average pumpage, in gallons a day

	1945	1946		1945	1946		1945	1946
January	69,000	94,000	May	108,000		September	138,000	
February	65,000	89,000	June	124,000		October	91,000	
March	74,000	103,000	July	116,000		November	104,000	
April	105,000		August	137,000		December	96,000	

Storage: Two steel reservoirs on hilltop, 55,000 gallons each.
Number of customers: 530.
Treatment: Coagulation and sedimentation.

Analysis of raw water

[Collected Apr. 19, 1946. pH is 8.2. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	5.4		Sulfate (SO_4)	8.3	0.173
Iron (Fe)	.38		Chloride (Cl)	20	.564
Calcium (Ca)	40	1.997	Fluoride (F)	.2	.011
Magnesium (Mg)	5.4	.444	Nitrate (NO_3)	.2	.003
Sodium (Na)	11	.493	Dissolved solids	171	
Potassium (K)	5.0	.128	Total hardness as $CaCO_3$	122	
Bicarbonate (HCO_3)	141	2.311			

TALPA

Population in 1940: 254.
Source of information: Charles Hill, manager, Apr. 18, 1946.
Owner: Mrs. E. M Hale.
Source of supply: Lake, 1 mile north of town.
Pumpage: No record.
Storage: Elevated tank, 13,500 gallons.
Number of customers: 70.
Treatment: None.

Analysis of raw water

[Collected Apr. 18, 1946. pH is 7.6. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	3.3	0.070
Iron (Fe)	1.5		Chloride (Cl)	13	.367
Calcium (Ca)	58	2.895	Fluoride (F)	.6	.032
Magnesium (Mg)	5.0	.411	Nitrate (NO_3)	2.2	.035
Sodium (Na)	6.0	.263	Dissolved solids	209	
Potassium (K)	4.5	.115	Total hardness as $CaCO_3$	165	
Bicarbonate (HCO_3)	194	3.180			

COMANCHE COUNTY

COMANCHE

Population in 1940: 2,435.
Source of information: N. R. Jones, city secretary, Mar. 20, 1946.
Ownership: Municipal.
Source of supply: Lake, 3½ miles southwest of town; capacity, 1,000 acre-feet.

Average pumpage, in gallons a day

	1945	1946		1945	1946		1945	1946
January	231,000	257,000	May	282,000		September	362,000	
February	200,000	308,000	June	333,000		October	256,000	
March	226,000		July	368,000		November	272,000	
April	235,000		August	403,000		December	271,000	

Storage: Concrete reservoir on top of hill on Wright Avenue, 550,000 gallons; settling tank at pumping station, 100,000 gallons.
Number of customers: 1,000.
Treatment: Chlorination.

Analysis

[Collected Mar. 20, 1946. pH: Raw water, 7.4; finished warer, 7.5 Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	6.4		6.0	
Iron (Fe)	.08		.04	
Calcium (Ca)	54	2.70	58	2.89
Magnesium (Mg)	13	1.07	14	1.15
Sodium (Na)	32	1.39	24	1.05
Potassium (K)	5.2	.13	6.1	.16
Bicarbonate (HCO_3)	200	3.28	196	3.22
Sulfate (SO_4)	47	.98	46	.96
Chloride (Cl)	36	1.02	38	1.07
Fluoride (F)	.2	.01	0	0
Nitrate (NO_3)	0	0	0	0
Dissolved solids	290		293	
Total hardness as $CaCO_3$	188		202	

DE LEON

Population in 1940: 2,318.

Source of information: Robert L. Wofford, water superintendent, Mar. 20, 1946.

Ownership: Municipal.

Source of supply: 11 wells.

Well 1. Drilled; depth, 200 feet; diameter, 6 inches; no pumping equipment in well; static water level, 45.37 feet March 20, 1946.

Well 2. Drilled; depth, 210 feet; diameter, 6 inches; deep-well cylinder and pump jack and 5-horsepower electric motor; yield, 15 gallons a minute.

Well 3. Drilled; depth, 210 feet; diameter, 6 inches; deep-well cylinder and pump jack and 15-horsepower electric motor; yield, 10 gallons a minute.

Well 4. Drilled; depth, 150 feet; diameter, 6 inches; deep-well turbine pump.

Well 5. Drilled; depth, 150 feet; diameter, 6 inches; deep-well cylinder and pump jack and electric motor; yield, 10 gallons a minute.

Well 6. Drilled by J. B. Tatum; depth, 150 feet; diameter, 6 inches; deep-well cylinder and pump jack and electric motor; yield, 10 gallons a minute.

Well 7. Drilled; depth, 210 feet; diameter, 8 inches; Peerless Hi-Lift pump and 3-horsepower electric motor; yield, 20 gallons a minute.

Well 8. Drilled; depth, 200 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 25 gallons a minute.

Well 9. Drilled by J. B. Tatum; depth, 200 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 25 gallons a minute.

Well 10. Drilled by J. B. Tatum; depth, 150 feet; diameter, 10 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 35 gallons a minute.

Well 11. Drilled by J. B. Tatum; depth, 150 feet; diameter, 16 inches: deep-well turbine pump and 5-horsepower electric motor; yield, 25 gallons a minute.

Average pumpage, in gallons a day

	1945	1946		1945	1946		1945	1946
January	43,600	54,000	May	48,000		September	78,000	
February	42,000		June	60,000		October	54,000	
March	42,000		July	72,000		November	54,000	
April	42,100		August	78,000		December	54,000	

Storage: Concrete ground reservoir, 1,000,000 gallons; elevated tank, 120,000 gallons.
Number of customers: 650.
Treatment: Chlorination.

Analysis

[Collected Mar. 20, 1946. pH for each well is 7.2. Analyzed by C. B. Cibulka]

	Well 8		Well 11	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	12		12	
Iron (Fe)	.03		.04	
Calcium (Ca)	150	7.49	162	8.09
Magnesium (Mg)	22	1.81	20	1.64
Sodium (Na)	17	.73	12	5.17
Potassium (K)	5.8	.15	8.4	.21
Bicarbonate (HCO_3)	296	4.85	390	6.39
Sulfate (SO_4)	33	.69	86	1.79
Chloride (Cl)	160	4.51	242	6.83
Fluoride (F)	0	0	0	0
Nitrate (NO_3)	8.2	.13	6.0	.10
Dissolved solids	675		912	
Total hardness as $CaCO_3$	465		486	

SIPE SPRINGS

Population in 1940: 575.
Source of information: Robert Humphrey, owner, Mar. 20, 1946.
Owner: Robert Humphrey.
Source of supply: Dug well; depth, 20 feet; diameter, 6 feet, walled with rock; centrifugal pump and 1½-horsepower electric motor.
Pumpage: Average, 4,100 gallons a day.
Storage: Elevated tank, 15,400 gallons.
Number of customers: 15.
Treatment: None.

Analysis, well 1

[Collected Mar. 20, 1946. pH is 7.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	43	0.90
Iron (Fe)	.35		Chloride (Cl)	27	.76
Calcium (Ca)	110	5.49	Fluoride (F)	0	0
Magnesium (Mg)	11	.90	Nitrate (NO_3)	5.0	.08
Sodium (Na)	35	1.53	Dissolved solids	436	
Potassium (K)	3.2	.08	Total hardness as $CaCO_3$	320	
Bicarbonate (HCO_3)	382	6.26			

CONCHO COUNTY

EDEN

Population in 1940: 1,603.
Source of information: C. O. Smith, water superintendent, Apr. 17, 1946.
Ownership: Municipal.
Source of supply: Well, 3 blocks north and 2 blocks west of Square on Ballard Street; drilled in 1944 (?); depth, 4,410 feet; diameter, 8 inches; deep-well turbine pump and electric motor; static water level reported 350 feet below land surface; yield, 225 gallons a minute; temperature, 105° F.

Pumpage (estimated): 150,000 gallons a day.
Storage: Concrete ground reservoir, 750,000 gallons; elevated tank, 55,000 gallons.
Number of customers: 386.
Treatment: None.

Analysis, well 1

[Collected Apr. 17, 1946. pH is 7.8. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	20		Sulfate (SO_4)	20	0.42
Iron (Fe)	.46		Chloride (Cl)	406	11.45
Calcium (Ca)	7.2	0.36	Fluoride (F)	2.4	.13
Magnesium (Mg)	2.0	.16	Nitrate (NO_3)	0	0
Sodium (Na)	423	18.37	Dissolved solids	1,130	
Potassium (K)	22	.56	Total hardness as $CaCO_3$	26	
Bicarbonate (HCO_3)	454	7.45			

PAINT ROCK

Population in 1940: 800.
Source of information: Walter Hagelstein, manager, Apr. 16, 1946.
Owner: Central Service Co.
Source of supply: Concho River.
Pumpage: Average, 40,000 gallons a day.
Storage: Rock reservoir, 53,600 gallons; settling basin, 55,000 gallons; elevated tank, 3,200 gallons.
Number of customers: 100.
Treatment: Chlorination, sedimentation.

Analysis

[Collected Apr. 16, 1946. pH of each well is 7.3. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	9.2		6.0	
Iron (Fe)	.19		.09	
Calcium (Ca)	74	3.69	61	3.04
Magnesium (Mg)	46	3.78	41	3.37
Sodium (Na)	101	4.41	92	4.01
Potassium (K)	7.7	.20	7.9	.20
Bicarbonate (HCO_3)	214	3.51	170	2.79
Sulfate (SO_4)	144	3.00	142	2.96
Chloride (Cl)	196	5.53	172	4.85
Fluoride (F)	.4	.02	.2	.01
Nitrate (NO_3)	1.2	.02	.4	.01
Dissolved solids	785		713	
Total hardness as $CaCO_3$	374		320	

COOKE COUNTY

GAINESVILLE

Population in 1940: 9,651.
Source of information: P. T. Booher, chief engineer, Feb. 25, 1944.
Ownership: Municipal.
Source of supply: Four wells.

Well 1. About 100 feet northeast of power plant; drilled in 1912; depth, 864 feet; diameter, 10 to 8 inches; casing perforated at 480–520, 640–680 and 800–860 feet; deep-well turbine pump set at 220 feet; static

water level, 110.6 feet below land surface February 25, 1944; yield, 450 gallons a minute.

Well 2. About 300 feet northwest of power plant; drilled in 1941, depth, 931 feet; diameter, 15½ to 8¼ inches; screened at 767–789, 856–873 and 887–927 feet; deep-well turbine pump; static water level reported 74 feet in 1931 and 138 feet about January 1, 1944; pumping level 186 feet; yield, 400 gallons a minute; temperature 69° F.

Well 3. At corner of Broadway and Ritchie Streets; drilled in 1937; depth, 1,025 feet; diameter, 18⅝ and 10¾ inches; screened at 776–798, 814–835, 879–921, 936–999 and 1,019–1,022 feet; deep-well turbine pump set at 250 feet; static water level reported 110 feet September 10, 1937; pumping level, 331 feet after pumping 720 gallons a minute for 100 hours in 1943; yield, 200 gallons a minute.

Well 4. At city barn; drilled in 1943; depth, 953 feet; diameter, 12 inches; static water level, 133.28 feet below concrete foundation February 25, 1944; pump not installed.

Average pumpage, in gallons a day

	1939	1940	1941	1942	1943
January	668,000	763,000	777,000	659,000	1,047,000
February	657,000	816,000	796,000	684,000	1,168,000
March	691,000	896,000	769,000	740,000	1,462,000
April	808,000	852,000	819,000	746,000	1,554,000
May	873,000	878,000	901,000	753,000	1,482,000
June	1,027,000	965,000	892,000	1,138,000	1,256,000
July	1,491,000	1,337,000	1,138,000	1,455,000	1,287,000
August	1,136,000	1,210,000	951,000	1,232,000	1,210,000
September	1,147,000	1,066,000	896,000	1,149,000	971,000
October	1,002,000	1,034,000	954,000	1,200,000	795,000
November	939,000	904,000	800,000	----------	897,000
December	790,000	800,000	669,000	----------	932,000

Storage: Two concrete ground reservoirs, 500,000 gallons each; steel ground reservoir, 50,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 3,050.

Treatment: None.

Analysis

[Collected well 1 Mar. 1944; well 2 Feb. 25, 1944. pH: Well 1,8.6; well 2, 7.8; well 3, 7.9. 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)	13	----------	10	----------	9.2	----------
Iron (Fe)	.16	----------	.02	----------	.01	----------
Calcium (Ca)	2.4	0.12	3.6	0.18	2.3	0.11
Magnesium (Mg)	1.0	.08	1.0	.08	.6	.05
Sodium (Na)	196	8.50	194	8.42	170	7.38
Potassium (K)	1.9	.05	3.0	.08	3.1	.08
Bicarbonate (HCO_3)	484	6.33	392	5.57	414	5.70
Sulfate (SO_4)	31	.65	31	.65	26	.54
Chloride (Cl)	5.0	.14	5.8	1.64	.10	.28
Fluoride (F)	.2	.01	.2	.01	.2	.01
Nitrate (NO_3)	1.2	.02	1.0	.02	1.2	.02
Dissolved solids	490	----------	536	----------	442	----------
Total hardness as $CaCO_3$	8	----------	13	----------	8	----------

Drillers' logs

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 1					
Surface soil	16	16	Sand	6	518
Gravel	7	23	Shale	8	526
Lime rock	78	101	Sand	7	533
Shale and boulders	41	142	Shale and sand	5	538
Rock	29	171	Sand	12	550
Shale	22	193	Red shale	26	576
Rock	3	196	Sand	9	585
Shale and sand	116	312	Hard shale and rock	9	594
Sand rock	2	314	Shale	21	615
Sand rock and shale	20	334	Shale and sand	6	621
Sand	8	342	Sand	7	628
Shale	7	349	Shale	12	640
Sand rock	7	356	Sand	10	650
Shale	6	362	Rock	4	654
Hard shale and sand	9	371	Shale	10	664
Blue shale	19	390	Sand	15	679
Shale and sand	41	431	Shale	4	683
Shale	12	443	Rock	5	688
Rock	2	445	Shale	26	714
Shale and boulders	7	452	Shale and boulders	23	737
Shale and sand rock	8	460	Shale	20	757
Rock	10	470	Rock	16	773
Shale	5	475	Shale	20	793
Sand	18	493	Sand	7	800
Hard shale	7	500	Sand and shale	16	816
Sand	9	509	Rock	4	820
Shale and sand	3	512	Sand	30	850
Well 2					
Surface soil	15	15	Sandy shale	24	560
Gravel	10	25	Sand	10	570
Blue clay	5	30	Lime and shale	65	635
Shale and shell	87	117	Sand	11	646
Sand rock	3	120	Shale	4	650
Blue slate	34	154	Sand	28	678
Lime	28	182	Sandy shale	35	713
Sand	13	195	Lime	5	718
Shale	40	235	Sand	14	732
Sand	25	260	Hard lime	2	734
Gumbo, layers sandstone	68	328	Red beds	5	739
Hard sand	22	350	Shale	25	764
Shale and lime	10	360	Coarse-grained sand and gravel	26	790
Soapstone	12	372	Shale	30	820
Shale and lime	31	403	Fine-grained sand	19	839
Soapstone	4	407	Shale	19	858
Gumbo	43	450	Sand	18	877
Hard sand	15	465	White lime	8	885
Soapstone	20	485	Sand	28	913
Sand	15	500	Lime	2	915
Lime and shale	27	527	Sandy gravel	15	930
Red beds	9	536	Yellow clay	1	931

Driller's logs—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 3					
Surface soil	5	5	Hard shale	18	520
Clay	15	20	Hard fine-grained sand	17	537
Gravel	10	30	Hard shale	18	555
Shale and shell	30	60	Lime and shell	2	557
Gray lime	22	82	Hard shale	27	584
Blue shale	6	88	Hard fine-grained sand	20	604
Gray lime	2	90	Sandy shale, layers of sand	36	640
Blue shale	10	100	Hard shale	25	665
Sandy lime	20	120	Sandy, layers sandy shale	33	698
Blue shale	6	126	Hard fine-grained sand	39	737
Hard sandy lime	19	145	Sandy lime	7	744
Gray shale	14	159	Red shale	6	750
Lime	1	160	Lime	2	752
Gray shale	8	168	Red and blue shale	22	774
White lime	9	177	Sand	32	806
Hard sandy lime	11	188	Sandy lime	5	811
Gray lime	4	192	Shale	6	817
Black shale	25	217	Sand	23	840
Hard lime	3	220	Hard sandy shale	5	845
White lime	25	245	Shale	29	874
Water sand	5	250	Fine-grained sand	29	903
Hard sand rock	3	253	Lime	4	907
Sand	24	277	Fine-grained sand	19	926
Shale	49	326	Shale	10	936
Sand	6	332	Fine-grained sand	22	958
Lime	4	336	Lime	3	961
Good sand	20	356	Sand	8	969
Fine-grained sand	16	372	Lime, shell	1	970
Sandy shale	24	396	Coarse-grained sand, small gravel, layers of shale	15	985
Hard shale	28	424	Shale	3	988
Sand	11	435	Good sand	15	1,003
Hard shale	25	460	Lime	5	1,008
Sandy lime	10	470	Hard shale and lime	17	1,025
Hard fine-grained sand	32	502			
Well 4					
Surface soil	8	8	Sand, shale, shells	15	650
Clay	16	24	Lime, shells	15	665
Brown shale and clay	3	27	Shale	10	675
Shale, shells	29	56	Sandy shale	9	684
Sand, shells	22	78	Lime, shale	6	690
Shale	39	117	Shale, hard sand	17	707
Shale, shells	35	152	Shale	10	717
Sandy shale	22	174	Sand—Trinity	33	750
Lime	28	202	Sandy shale	58	808
Sand, lime, shale	18	220	Shale	13	821
Lime, shale	23	243	Sandy shale	46	867
Sand	39	282	Sand	17	884
Sand and shale	18	300	Sand and shells	3	887
Sand, shale, clay	74	374	Sand, hard shells	36	923
Sand, shale, shells	55	429	Coarse-grained sand	6	929
Sand	23	452	Coarse-grained sand and shells	16	945
Shale, shells	22	474	Sandy shale	2	947
Sand, shale, shells	90	564	Shale	6	953
Sandy shale	71	635			

MUENSTER

Population in 1940: 599.

Source of information: I. A. Schoech, water superintendent, Feb. 25, 1944.

Ownership: Municipal.

Source of supply: Well; drilled in 1939; depth, 618 feet; diameter, 8¼ to 6⅝ inches, casing perforated from 563 to 618 feet; deep-well turbine pump, pump set at 270 feet; yield, 78 gallons a minute April 7, 1941.

Pumpage (estimated): Average, 25,000 gallons a day in 1943; maximum in summer, 40,000 gallons a day.

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

Number of customers: 186.

Treatment: None.

Analysis

[Collected Feb. 25, 1944. pH is 8.0. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	38	0.79
Iron (Fe)	.02		Chloride (Cl)	12	.34
Calcium (Ca)	2.4	0.12	Fluoride (F)	0	0
Magnesium (Mg)	.7	.06	Nitrate (NO_3)	2.0	.03
Sodium (Na)	162	7.05	Dissolved solids	418	
Potassium (K)	3.4	.09	Total hardness as $CaCO_3$	9	
Bicarbonate (HCO_3)	375	5.16			

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Gravel	9	9	Red-gray shale	45	310
Lime	24	33	Blue-gray shale	35	345
Sandy shale	7	40	Blue sandy shale	65	410
Gray shale	35	75	Red rock	20	430
Water sand	20	95	Lime-sand	15	445
Gray sandy shale	20	115	Gray shale	12	457
Blue shale	5	120	Water sand	8	465
Shale, lime shells	38	158	Sand, shale	5	470
Blue shale	17	175	Water sand	15	485
Lime	5	180	Lime	20	505
Shale, lime	20	200	Gray shale	5	510
Blue shale	13	213	Red beds	32	542
Yellow shale	7	220	Blue shale	28	570
Blue shale	33	253	Water sand	47	617
Broken lime	12	265	Hard lime	1	618

VALLEY VIEW

Population in 1940: 700.

Source of information: C. T. Nichols, co-owner, Feb. 25, 1944.

Owner: C. T. Nichols and Son.

Source of supply: Two wells.

Well 1. Drilled about 1912; depth, 420 feet; deep-well cylinder and pump jack; stand-by well.

Well 2. Drilled in 1935; depth, 817 feet; diameter, 10 to 6 inches; deep-well turbine pump, pump set at 200 feet; static water level reported 50 feet below land surface in 1935; yield, 165 gallons a minute.

Pumpage (estimated): Average, 40,000 gallons a day in summer; 20,000 gallons a day in winter.

Storage: Elevated tank, 10,000 gallons.

Number of customers: 150.

Treatment: None.

Analysis

[Collected Feb. 25, 1944. pH is 8.0. 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)	.02		Chloride (Cl)	6.0	.17
Calcium (Ca)	1.5	0.08	Fluoride (F)	.2	.01
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	1.2	.02
Sodium (Na)	187	8.11	Dissolved solids	467	
Potassium (K)	2.6	.07	Total hardness as $CaCO_3$	6	
Bicarbonate (HCO_3)	457	6.21			

CORYELL COUNTY

COPPERAS COVE

Population in 1940: 356.

Source of information: Forrest Aldridge, operator, June 3, 1946.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. At elevated tank; drilled in 1925; depth, 652 feet; diameter, 6 inches (?); deep-well turbine pump and 5-horsepower electric motor; static water level reported 140 feet below land surface; yield, 40 gallons a minute.

Well 2. About .25 mile south of well 1; drilled in 1944 by Layne-Texas Co.; depth, 640 feet; deep-well turbine pump and 20-horsepower electric motor; yield, 50 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, 30,000 gallons.

Number of customers: 130.

Treatment: None.

Analysis, well 2

[Collected June 3, 1946. pH is 7.8. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	700	14.57
Iron (Fe)	.43		Chloride (Cl)	530	14.95
Calcium (Ca)	27	1.35	Fluoride (F)	4.4	.23
Magnesium (Mg)	7.6	.62	Nitrate (NO_3)	1.8	.03
Sodium (Na)	750	32.61	Dissolved solids	2,280	
Potassium (K)	56	1.43	Total hardness as $CaCO_3$	98	
Bicarbonate (HCO_3)	380	6.23			

EVANT

Population in 1940: 500.

Source of information: Jack Elam, owner, June 4, 1946.

Owner: Jack Elam.

Source of supply: Two wells.

Well 1. At elevated tank; drilled in 1936; depth, 500 feet, diameter, 6 inches; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 9 gallons a minute; temperature, 72° F.

Well 2. One block north of well 1; drilled in 1944 by Edward Dyson; depth, 450 feet; diameter, 6 inches; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 5 gallons a minute.

Pumpage: No record.

Storage: Elevated tank, 5,500 gallons.

Number of customers: 100.

Treatment: None.

Analysis, well 1

[Collected June 4, 1946. pH is 7.9. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	65		Sulfate (SO_4)	334	6.95
Iron (Fe)	.52		Chloride (Cl)	246	6.94
Calcium (Ca)	16	0.80	Fluoride (F)	1.8	.09
Magnesium (Mg)	10	.82	Nitrate (NO_3)	5.0	.08
Sodium (Na)	412	17.90	Dissolved solids	1,280	
Potassium (K)	12	.31	Total hardness as $CaCO_3$	81	
Bicarbonate (HCO_3)	352	5.77			

GATESVILLE

Population in 1940: 3,177.

Source of information: Otho Johnson, water superintendent, June 4, 1946.

Ownership: Municipal.

Source of supply: Two wells.

Well 2. East of pump station; drilled; depth, 768 feet; diameter, 8 inches; deep-well turbine pump and 20-horsepower electric motor; static water level reported 138 feet below land surface; yield, 380 gallons a minute.

Well 3. North of pump station; drilled; depth, 786 feet, diameter, 10 to 8 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 440 gallons a minute.

Pumpage (estimated): 400,000 gallons a day.

Storage: Ground reservoir at pumping station, 96,000 gallons; elevated tank, 102,000 gallons.

Treatment; None.

Analysis, well 3

[Collected June 4, 1946. pH is 8.0. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	211	4.39
Iron (Fe)	.05		Chloride (Cl)	293	8.26
Calcium (Ca)	7.8	0.39	Fluoride (F)	3.0	.16
Magnesium (Mg)	4.4	.36	Nitrate (NO_3)	4.0	.06
Sodium (Na)	435	18.90	Dissolved solids	1,210	
Potassium (K)	22	.56	Total hardness as $CaCO_3$	38	
Bicarbonate (HCO_3)	448	7.34			

Drillers' log, city well at swimming pool in City Park

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand and clay	12	12	Red clay	70	540
Gray limestone	348	360	Water sand	10	550
Sandy limestone	25	385	Pink shale	33	583
Blue shale	5	390	Water sand	8	591
Sandy lime	33	423	Sandy shale	39	630
Water sand	14	437	Water sand and gravel	23	653
Sandy shale	10	447	Red shale	17	670
Water sand (Trinity)	19	466	Shale (top of Strawn)	30	700
Marly clay	4	470			

OGLESBY

Population in 1940: 360.

Source of information: Mrs. F. B. Lam, June 3, 1946.

Owner: F. B. Lam.

Source of supply: Well at elevated tank; drilled about 1935; depth, 1,187 feet; diameter, 6 inches; deep-well turbine pump and natural-gas engine.

Pumpage (estimated): Average, 11,500 gallons a day.

Storage: Elevated tank, 11,500 gallons.

Number of customers: 125.

Treatment: None.

Analysis

[Collected June 3, 1946. pH is 8.5. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	300	6.25
Iron (Fe)	.20		Chloride (Cl)	166	4.68
Calcium (Ca)	8.1	0.40	Fluoride (F)	2.2	.12
Magnesium (Mg)	7.3	.60	Nitrate (NO_3)	1.5	.02
Sodium (Na)	402	17.48	Dissolved solids	1,170	
Potassium (K)	27	.69	Total hardness as $CaCO_3$	50	
Bicarbonate (HCO_3)	493	8.10			

DENTON COUNTY

DENTON

Population in 1940: 11,192.

Source of information: L. R. Burrow, water and light superintendent, Feb. 26, 1944.

Ownership: Municipal.

Source of supply: Five wells.

Well 1. At northwest corner of power plant; drilled in 1937; depth, 1,142 feet; diameter, 8⅝ to 5⅜₁₆ inches, casing perforated from 980 to 1,140 feet; deep-well turbine pump and 30-horsepower electric motor, pump set at 450 feet; yield, 137 gallons a minute; temperature, 78° F.

Well 2. About 50 feet southeast of power plant; drilled about 1937; depth, about 1,142 feet; diameter, 6⅝ to 5⅜₁₆ inches; deep-well turbine pump and 30-horsepower electric motor, pump set at 450 feet; yield, 138 gallons a minute; temperature, 82° F.

Well 3. North of Ward School; drilled in 1939 by J. L. Myers & Sons; depth, 1,195 feet; diameter, 10 to 8¼ inches, casing perforated from 1,045 to 1,195; deep-well turbine pump and 100-horsepower electric motor, pump set at 500 feet; static water level, reported 200 feet below land surface; yield, 490 gallons a minute with drawdown of about 200 feet in 1939; present yield, 486 gallons a minute; temperature, 78° F.

Well 4. On McKinney Street, three blocks north of power plant; depth, about 1,142 feet; diameter, 13⅜ to 10¾ inches; deep-well turbine pump and 200-horsepower electric motor, pump set at 450 feet; yield, 400 gallons a minute.

Well 5. On Sherman Drive near Bell Street; drilled in 1940 by J. L. Myers & Sons; depth, 1,132 feet; diameter, 8 to 7 inches, casing perforated below 1,029 feet; deep-well turbine pump and 100-horsepower electric motor, pump set at 550 feet; yield, 286 gallons a minute.

West Denton Well. At corner of Prairie Street and Avenue D; drilled in 1930 by Q. D. Lewis; depth, 1,156 feet (originally drilled to 1,374 feet and plugged back); diameter, 15 to 12 inches, casing perforated from 1,058 to 1,156 feet, unused; reported salty water.

Average pumpage, in gallons a day

	1934	1935	1936	1937	1938	1939
January	670,000	824,000	847,000	932,000	922,000	726,000
February	712,000	712,000	934,000	826,000	843,000	818,000
March	663,000	819,000	908,000	806,000	913,000	910,000
April	686,000	846,000	1,090,000	910,000	854,000	847,000
May	821,000	817,000	1,020,000	1,070,000	951,000	1,080,000
June	1,350,000	947,000	1,320,000	1,180,000	1,100,000	1,110,000
July	1,460,000	1,180,000	1,330,000	1,360,000	1,220,000	1,440,000
August	1,290,000	1,200,000	1,580,000	1,200,000	1,320,000	1,350,000
September	776,000	862,000	1,060,000	840,000	1,130,000	1,290,000
October	954,000	924,000	930,000	884,000	1,130,000	1,120,000
November	1,050,000	912,000	952,000	800,000	917,000	977,000
December	688,000	824,000	840,000	755,000	714,000	855,000

	1940	1941	1942	1943	1944
January	1,030,000	1,040,000	1,240,000	1,040,000	1,350,000
February	996,000	1,040,000	1,250,000	1,100,000	----------
March	978,000	1,040,000	1,300,000	1,360,000	----------
April	1,120,000	1,100,000	1,310,000	1,490,000	----------
May	1,220,000	1,230,000	1,380,000	1,540,000	----------
June	1,180,000	1,250,000	1,400,000	1,760,000	----------
July	1,250,000	1,640,000	1,750,000	1,810,000	----------
August	1,300,000	1,680,000	1,500,000	1,870,000	----------
September	1,200,000	1,490,000	1,350,000	1,390,000	----------
October	1,200,000	1,490,000	1,210,000	1,410,000	----------
November	1,070,000	1,400,000	1,080,000	1,350,000	----------
December	974,000	1,290,000	926,000	1,220,000	----------

Storage: Concrete ground reservoir, 1,000,000 gallons; elevated tank, 300,000 gallons.

Number of customers: 4,200.

Treatment: Chlorination.

Analysis

[Collected Feb. 28, 1944. pH: Well 1, 8.3; well 2; 8.2; well 3, 8.2; well 4.7.9. Analyzed by J. H. Rowley]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13	----------	16	----------
Iron (Fe)	.01	----------	.02	----------
Calcium (Ca)	2.2	0.11	1.8	0.09
Magnesium (Mg)	1.9	.16	.4	.03
Sodium (Na)	227	9.85	231	10.03
Potassium (K)	5.3	.14	5.4	.14
Bicarbonate (HCO_3)	445	6.02	433	5.56
Sulfate (SO_4)	106	2.21	110	2.29
Chloride (Cl)	26	.73	30	.85
Fluoride (F)	.5	.03	.5	.03
Nitrate (NO_3)	0	0	1.8	.03
Dissolved solids	603	----------	610	----------
Total hardness as $CaCO_3$	14	----------	6	----------

	Well 3		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13	----------	16	----------
Iron (Fe)	.01	----------	.01	----------
Calcium (Ca)	2.0	0.10	2.2	0.11
Magnesium (Mg)	.5	.04	.8	.07
Sodium (Na)	226	9.82	193	8.39
Potassium (K)	5.8	.15	3.4	.09
Bicarbonate (HCO_3)	417	1.10	379	5.03
Sulfate (SO_4)	114	2.37	93	1.94
Chloride (Cl)	30	.85	18	.51
Fluoride (F)	.5	.03	.1	.01
Nitrate (NO_3)	1.8	.03	0	0
Dissolved solids	599	----------	513	----------
Total hardness as $CaCO_3$	7	----------	9	----------

Driller's logs

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 1					
Surface soil	6	6	Hard sand	12	772
Yellow clay	22	28	Blue shale	3	775
Lime	14	42	White lime	23	798
Blue shale	58	100	Blue shale	17	815
Sandy shale	10	110	Hard sandy shale	13	828
Blue shale	100	210	Blue shale	7	835
Blue lime	150	360	Hard white sand	22	857
Black shale	40	400	Shale and shells	32	889
Whitel lime	70	470	Blue shale	45	934
Putty sand	30	500	Hard lime	7	941
White sand	25	525	Blue shale	29	970
Putty sand	15	540	Shale	16	986
Pink and red gumbo	20	560	White lime and sand	21	1,007
Hard sand	20	580	Sand	13	1,020
Putty sand	20	600	White sand	7	1,027
Hard sand	75	675	Sand	8	1,035
Putty sand	5	680	Blue shale	5	1,040
White lime	2	682	Prime shale	3	1,043
Gumbo	5	687	Water sand	57	1,100
Sandy lime	35	722	Broken sand	20	1,120
White shale	8	730	Coarse-grained sand	20	1,140
Sand	15	745	Shale	2	1,142
Hard lime	15	760			
Well 5					
Surface soil	3	3	Sand rock	11	707
Red clay	12	15	Mixed shale	7	714
Sands	27	42	Mixed sandy shale	51	765
Gray shale	12	54	Gray shale	4	769
Gray rock	4	58	Hard sand	13	782
Gray shale	2	60	Lime rock	4	786
Sand	3	63	Gray shale	4	790
Gray shale	97	160	Green putty sand	6	796
Brown shale	10	170	Blue shale	9	805
Mixed rocky shale	150	320	Sandy lime	17	822
Hard rock	62	382	Blue sandy shale	5	827
Rock	8	390	Water sand	12	839
Black shale	28	418	Gray shale	31	870
Chalk rock	80	498	Lime rock	6	876
Sand	17	515	Hard sand	15	891
Lime rock	2	517	Green gumbo	2	893
Sand rock	11	528	Lime rock	7	900
Lime rock	2	530	Red shale	2	902
Gumbo, all colors	10	540	Lime rock	3	905
Sandy shale	7	547	Mixed sandy shale	51	956
Putty shale	11	558	Sand	14	970
Lime rock	5	563	Sandy shale	3	973
Sandy shale	22	585	Lime rock	1	974
Hard rock	7	592	Mixed shale	21	995
Sandy	8	600	Sandy shale	6	1,001
Rock	6	606	Gray shale	10	1,011
Sandy	11	617	Fine-grained sand	19	1,030
Sand rock	13	630	Sand rock	5	1,035
Sandy shale	7	637	Hard and soft sand	79	1,114
Rock	2	639	Hard sand	2	1,116
Shale	13	652	Gray shale	11	1,127
Hard sand	40	692	Red shale	5	1,132
Lime	4	696			

Driller's logs—Continued

West Denton Well

	Thickness (feet)	Depth (feet)
Soft yellow clay	22	22
Soft blue shale	28	50
Soft blue sand	17	67
Soft gray sand	3	70
Soft gray shale	20	90
Hard gray lime	20	110
Blue shale	20	130
Soft gray sand	5	135
Soft blue shale	38	173
Hard gray lime	7	180
Soft blue shale	17	197
Hard white lime	8	205
Soft brown shale	30	235
Hard gray lime	7	242
Soft blue shale	13	255
Soft brown shale	17	272
Hard blue lime	58	330
Hard gray lime	85	415
Blue lime shale	10	425
Soft blue shale	20	445
Hard gray lime	50	495
Hard white lime	15	510
Hard shell rock	20	530
Soft white sand	25	555
Soft blue shale	5	560
Hard gray sand	4	564
Soft gray shale	8	572
Soft white sand	8	580
Tough gray shale	37	617
Soft white sand	13	630
Hard white sand	3	633
Soft white water sand	47	680
Hard gray sand	18	698
Hard blue shale	5	703
Hard gray sand	19	722
Hard red shale	4	726
Hard brown lime	6	732
Soft gray sand	6	738
Hard white sand	18	756
Hard gray lime	4	760
Soft blue shale	6	766
Hard gray sand	14	780
Soft blue shale	4	784
Hard gray sand	11	795
Soft blue shale	20	815
Hard gray lime	10	825
Blue shale	5	830
Light sandy shale	15	845
Blue shale	5	850
Hard gray lime	13	862
Soft blue shale	12	875
Hard gray lime	4	879
Soft blue shale	9	888
Hard gray lime	12	900
Soft blue shale	5	905
Hard white sand	2	907
Soft white sand	19	926
Soft red shale	4	930
Hard white lime	20	950
Soft pink sand	20	970
Soft blue shale	14	984
Soft gray sand	8	992
Shale	6	998
Soft blue shale	8	1,006
Sandy shale	10	1,010
Hard white sand	9	1,025
Soft blue shale	5	1,035
Soft white sand	7	1,042
Sandy shale	16	1,058
Hard blue sand	4	1,062
Hard gray lime	16	1,078
Sandy shale	7	1,085
White sand	7	1,092
Hard white lime	9	1,101
Soft pink sand	4	1,105
Hard white sand	3	1,108
Soft white sand	12	1,120
Soft blue shale	3	1,123
Soft pink sand	11	1,134
Soft blue shale	11	1,145
Pink sand	11	1,156
White shale	24	1,180
Soft pink sand	12	1,192
Hard pink sand	36	1,228
Blue shale	6	1,234
Red shale	5	1,239
Pink sand	3	1,242
Red shale	5	1,247
Blue shale	5	1,252
Red shale	8	1,260
Hard gray lime	7	1,267
Soft gray sand	3	1,270
Soft brown shale	14	1,284
Soft gray sand	7	1,291
Hard gray sand	11	1,302
Soft white sand	9	1,311
Soft gray sand	31	1,342
Hard gray lime	6	1,348
Soft blue shale	6	1,354
Green sandy shale	10	1,364
Soft gray sand	10	1,374

EASTLAND COUNTY

CISCO

Population in 1940: 4,868.

Source of information: Geo. W. Downie, city secretary, Nov. 1945.

Ownership: Municipal.

Source of supply: Lake Cisco, 3 miles north of Cisco on north and west Sandy Creeks; capacity of reservoir, 40,000 acre-feet; constructed in 1921.

Average pumpage, in gallons a day, 1944

January	420,000	May	557,000	September	
February	420,000	June	900,000	October	480,000
March	465,000	July	1,130,000	November	557,000
April	660,000	August	1,130,000	December	

Storage: Two concrete standpipes, 165,000 gallons each; steel standpipe, 47,000 gallons.

Treatment: Aeration, chlorination, part-time treatment with alum and lime, activated carbon, settling, and filtration.

Analysis

[Collected Nov. 1945. pH of finished water is 7.3. Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	9.7		8.3	
Iron (Fe)	.10		.05	
Calcium (Ca)	40	1.997	40	1.997
Magnesium (Mg)	5.6	.461	5.8	.477
Sodium (Na)	9.8		6.0	.263
Potassium (K)		.424	4.7	.120
Bicarbonate (HCO_3)	121	1.983	116	1.901
Sulfate (SO_4)	21	.437	21	.437
Chloride (Cl)	16	.451	18	.508
Fluoride (F)	.2	.011	.2	.011
Nitrate (NO_3)	0	0	0	0
Dissolved solids	175		175	
Total hardness as $CaCO_3$	123		124	

DESDEMONA

Population in 1940: 198.

Source of information: W. H. Davis, owner, Feb. 6, 1946.

Owner: W. H. Davis.

Source of supply: Two wells.

Well 1. Drilled about 1932; depth 80 feet; diameter, 6 inches; deep-well cylinder and pump jack; static water level reported 60 feet below surface in 1945.

Well 2. Forty feet south of well 1; drilled about 1932; depth, 80 feet; diameter, 6 inches; deep-well cylinder and pump jack.

Pumpage: No record.

Treatment: None.

Composite analysis, wells 1 and 2

[Collected Feb. 6, 1946. pH is 7.2. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	20	0.42
Iron (Fe)	0		Chloride (Cl)	76	2.14
Calcium (Ca)	117	5.84	Fluoride (F)	0	0
Magnesium (Mg)	11	.90	Nitrate (NO_3)	9.4	.15
Sodium (Na)	26	1.12	Dissolved soilds	450	
Potassium (K)	6.1	.16	Total hardness as $CaCO_3$	337	
Bicarbonate (HCO_3)	324	5.31			

EASTLAND

Population in 1940: 3,849.

Source of information: A. L. LeClaire, water superintendent, Nov. 1945.

Ownership: Municipal.

Source of supply: Lake Eastland, about 1 mile northwest of the city on the north fork of the Leon River; reservoir capacity, 1,900 acre-feet. Lake was dry in 1930.

Average pumpage, in gallons a day

January	390,000	May	438,000	September	454,000
February	368,000	June	778,000	October	394,000
March	344,000	July	768,000	November	350,000
April	427,000	August	854,000	December	357,000

Storage: Two standpipes on hill, total capacity, 950,000 gallons.

Number of customers: 1,062.

Treatment: Alum, lime, chlorination, lime and ammonium chloride, activated carbon at times, settling, no filtration.

Analysis

[Collected Nov. 1945. pH: Raw water, 7.1; finished water, 8.8. Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	7.3		3.1	
Iron (Fe)	.75		.04	
Calcium (Ca)	27	1.348	34	1.697
Magnesium (Mg)	3.1	.255	3.4	.280
Sodium (Na)	11	.494	7.2	.313
Potassium (K)			5.4	.138
Bicarbonate (HCO_3)	88	1.442	54	.893
Sulfate (SO_4)	10	.208	48	.999
Chloride (Cl)	15	.423	19	.536
Fluoride (F)	.4	.021	0	0
Nitrate (NO_3)	.2	.003	0	0
Dissolved solids	158		158	
Total hardness as $CaCO_3$	80		99	

GORMAN

Population in 1940: 1,157.

Source of information: B. C. Eppler, water superintendent, Feb. 6, 1946.

Ownership: Municipal.

Source of supply: Five wells.

Well 1. At city pumping station; drilled in 1944 by Charles Gordon; depth, 100 feet; diameter, 6 inches; deep-well cylinder and pump jack; yield, 25 gallons a minute.

Well 2. Forty feet north of well 1; dug about 1914; depth, 84 feet; diameter, 6 feet, brick curb; two deep-well cylinders and pump jacks; yield, 30 gallons a minute each.

Well 4. Forty feet north of well 2; drilled in 1920 by Bradford Bros.; depth, 120 feet; diameter, 10 inches; deep-well cylinder pump jack; yield, 30 gallons a minute.

Source of supply—Continued

Well 5. One hundred fifty feet northeast of well 4; drilled in 1924 by Bradford Bros.; depth, 106 feet; diameter, 8 inches; deep-well cylinder and pump jack; yield, 30 gallons a minute.

Well 6. Sixty feet north of well 5; drilled in 1924 by Bradford Bros.; depth, 106 feet; diameter ,8 inches; deep-well cylinder and pump jack; static water level, reported 40 feet below the surface when well was repaired in 1945; yield, 25 gallons a minute.

Pumpage: 150,000 gallons a day in summer, 85,000 gallons a day in winter.

Storage: Elevated tank, 100,000 gallons; concrete ground reservoir, 19,000 gallons.

Treatment: None.

Analysis

[Collected Feb. 6, 1946. pH: Wells 1 and 6, each 7.2. Analyzed by C. B. Cibulka]

	Well 1		Well 2		Well 6	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	10		14		14	
Iron (Fe)	.30		.16		.08	
Calcium (Ca)	226		285		181	9.03
Magnesium (Mg)	15		17		14	1.15
Sodium (Na)	91		116		30	1.30
Potassium (K)	13		10		12	.31
Bicarbonate (HCO_3)	402		408		396	6.49
Sulfate (SO_4)	45		89		45	.94
Chloride (Cl)	311		409		147	4.15
Fluoride (F)	0		0		0	0
Nitrate (NO_3)	30		54		13	.21
Dissolved solids	939		1,200		742	
Total hardness as $CaCO_3$	626		782		509	

RANGER

Population in 1940: 4,553.

Source of information: M. H. Alexander, plant operator, Nov., 1945.

Ownership: Municipal.

Source of supply; Lake Hagaman, at head of Palo Pinto Creek, 2½ miles northeast of Ranger; capacity of lake, about 1,250 acre-feet.

Average pumpage in gallons a day

	1943	1944	1945		1943	1944	1945
January	293,000	249,000	278,000	July	510,000	390,000	413,000
February	298,000	245,000	287,000	August	506,000	412,000	470,000
March	294,000	310,000	302,000	September	327,000	278,000	
April	308,000	281,000	281,000	October	280,000	266,000	247,000
May	335,000	282,000	317,000	November	238,000	282,000	
June	402,000	376,000	391,000	December	226,000	268,000	

Storage: Clear well at pumping station, 50,000 gallons; standpipe on hill, 500,000 gallons.

Number of customers: 1,150.

Treatment: Aeration, prechlorination, alum and lime, settling, rapid filtration, postchlorination.

Analysis

[Collected Nov. 1945. pH: Raw water, 7.2; finished water, 7.3. Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	5.0		2.0	
Iron (Fe)	.11		.04	
Calcium (Ca)	39	1.947	44	2.196
Magnesium (Mg)	6.2	.510	6.8	.559
Sodium (Na)	38	1.660	32	1.372
Potassium (K)			4.9	.125
Bicarbonate (HCO_3)	102	1.672	91	1.492
Sulfate (SO_4)	18	.375	35	.729
Chloride (Cl)	73	2.059	72	2.031
Fluoride (F)	.2	.011	0	0
Nitrate (NO_3)	0	0	0	0
Dissolved solids	248		263	
Total hardness as $CaCO_3$	123		138	

RISING STAR

Population in 1940: 1,198.

Source of information: C. F. Carroll, water superintendent, Jan. 4, 1946.

Ownership: Municipal.

Source of supply: Five wells.

Well 1. At city hall; drilled in 1922; depth, 70 feet; diameter, 10 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level reported 20 feet below land surface; yield, 30 gallons a minute.

Well 2. One block southwest of city hall; dug in 1933; depth, 60 feet; diameter, 5 feet; jet pump and 3-horsepower electric motor; yield, 20 gallons a minute.

Well 3. Five blocks west of city hall; drilled about 1940; depth, 70 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 30 gallons a minute.

Well 4. Seven blocks northwest of city hall; drilled in 1941; depth, 75 feet; diameter, 8 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 30 gallons a minute.

Well 5. Two blocks south of city hall; drilled in 1944; depth, 75 feet; diameter, 6 inches; deep-well turbine pump and 3-horsepower electric motor; yield, 30 gallons a minute.

Pumpage: 187,000 gallons a day in summer; estimated 130,000 gallons a day in winter.

Storage: Elevated tank, 55,000 gallons.

Number of customers: 300.

Treatment: None.

Analysis

[Collected Feb. 4, 1946. pH: Well 1, 7.3; well 5, 7.0. Analyzed by C. B. Cibulka]

	Well 1		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		22	
Iron (Fe)	.04		.08	
Calcium (Ca)	98	4.80	111	5.54
Magnesium (Mg)	46	3.78	30	2.47
Sodium (Na)	30	1.29	106	4.62
Potassium (K)	5.6	.14	9.3	.24
Bicarbonate (HCO_3)	398	6.52	426	6.98
Sulfate (SO_4)	30	.62	62	1.29
Chloride (Cl)	105	2.96	143	4.03
Fluoride (F)	0	0	.2	.01
Nitrate (NO_3)	0	0	35	.56
Dissolved solids	569		883	
Total hardness as $CaCO_3$	434		400	

ERATH COUNTY

DUBLIN

Population in 1940: 2,546.

Source of information: W. M. Fewell, city secretary, Nov., 1945.

Ownership: Municipal.

Source of supply: Five wells, all at city pumping station.

Well 1. Drilled about 1911; depth, about 500 feet; diameter, 8 to 6 inches; deep-well turbine pump; yield, 90 gallons a minute.

Well 2. Drilled about 1911; depth, 330 feet; diameter, 6 inches; deep-well cylinder and steam engine; (unused).

Well 3. Drilled; depth, about 350 feet; diameter, 6 inches; deep-well cylinder and steam engine.

Well 4. Drilled; depth, 330 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 80 gallons a minute.

Well 5. Owned by Missouri-Kansas & Texas Railroad Co., used by city; depth, about 330 feet; diameter, 8 inches; deep-well turbine pump; yield, 76 gallons a minute.

Frisco well. East of railroad station; drilled in 1944; depth, 106 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 75 gallons a minute.

Pumpage: No record.

Storage: Standpipe, 60,000 gallons; two concrete ground storage reservoirs, capacity unknown.

Number of customers: 750.

Treatment: None.

Analysis

[Collected Nov., 1945. pH: Well 4, 6.9; Frisco well, 7.3. Analyzed by C. B. Cibulka]

	Well 4		Frisco well	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	15		11	
Iron (Fe)	.4		.10	
Calcium (Ca)	79	3.94	204	10.18
Magnesium (Mg)	33	2.71	8.3	.68
Sodium (Na)	11	.47	18	.80
Potassium (K)	4.1	.10	7.4	.19
Bicarbonate (HCO_3)	380	6.23	332	5.44
Sulfate (SO_4)	22	.46	132	2.75
Chloride (Cl)	17	.48	59	1.66
Fluoride (F)	.2	.01	0	0
Nitrate (NO_3)	2.2	.04	124	2.00
Dissolved solids	371		778	
Total hardness as $CaCO_3$	332		543	

STEPHENVILLE

Population in 1940: 4,768.

Source of information: J. P. Anderson, water superintendent, Nov. 1945.

Ownership: Municipal.

Source of supply: Five wells.

Well 1. At elevated tank; drilled in 1924 by W. A. Walker; depth, 600 feet; diameter, 10 to 8 inches; pumped with air; static water level, 256 feet; yield, 200 gallons a minute with drawdown of 31 feet.

Well 2. North of ground storage reservoir; drilled in 1932 by W. A. Walker; depth, 372 feet; diameter, 10 inches; deep-well turbine pump and 30-horsepower electric motor; yield, 250 gallons a minute.

Well 3. West of ground storage reservoir; drilled in 1938 by J. B. Tatum; depth, 370 feet; diameter, 12½ inches; deep-well turbine pump and 40-horsepower electric motor; yield, 300 gallons a minute.

Well 4. One block northeast of pumping station; drilled in 1940 by E. E. Thate; depth, 370 feet; diameter, 10 inches; deep-well turbine pump and 30-horsepower electric motor; yield, 250 gallons a minute.

Well 5. 500 feet northwest of pumping station; drilled in 1943 by C. Calloway; depth, 370 feet; diameter, 10 inches; deep-well turbine pump and 40-horsepower electric motor; yield, 300 gallons a minute.

Pumpage (estimated): Maximum, 1,250,000 gallons a day; winter average, about 800,000 gallons a day.

Storage: Elevated tank, 100,000 gallons; ground reservoir, 750,000 gallons.

Number of customers: 1,740.

Treatment: None.

Analysis

[Collected Nov. 1945. pH of wells 3 and 5, each 7.0. Analyzed by C. B. Cibulka]

	Well 3		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		16	
Iron (Fe)	.10		.10	
Calcium (Ca)	90	4.49	76	3.79
Magnesium (Mg)	38	3.12	29	2.38
Sodium (Na)	9.7	.42	19	.82
Potassium (K)	5.2	.13	5.0	.13
Bicarbonate (HCO_3)	383	6.28	341	5.59
Sulfate (SO_4)	39	.81	27	.56
Chloride (Cl)	36	1.02	33	.93
Fluoride (F)	.2	.01	.0	0
Nitrate (NO_3)	2.2	.04	2.5	.04
Dissolved solids	432		377	
Total hardness as $CaCO_3$	380		308	

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	6	6	Shale	16	168
Clay	6	12	Lignite	2	170
Lime	2	14	Dry sand	10	180
Shale	7	35	Red rock	4	184
Lime	7	42	Hard sand	26	210
Sand and water	3	45	Water	5	215
Shale	11	56	Shale	5	220
Lime	4	60	Dry sand	20	240
Broken lime	30	90	Clay and sand	33	273
Shale	8	98	Red bed	3	276
Do	17	115	Sand and water	14	290
Broken lime	23	138	Blue shale	10	300
Shale	10	148	Red bed	7	307
Red bed	4	152	Sand and gravel	44	351

FOARD COUNTY

CROWELL

Population in 1940: 1,817.

Source of information: H. N. Roberts, consulting engineer, June 21, 1945.

Ownership: Municipal.

Source of supply: Six wells about 8 miles north-northeast of Crowell and about 2 miles north-northeast of Margaret.

Well 1. On extreme end of east fork of pipe line from Margaret pumping station; drilled in 1944 by Bud Daniel; depth, 29 feet; diameter, 12 inches, gravel walled to 42 inches; deep-well turbine pump and 1-horsepower electric motor; yield, 20 gallons a minute.

Well 2. Three hundred feet west of well 1; drilled in 1944 by Bud Daniel; depth, 37 feet; diameter, 12 inches, gravel walled to 42 inches; deep-well turbine pump and 1-horsepower electric motor; yield, 20 gallons a minute.

Well 3. Three hundred feet west of well 2; drilled in 1944 by Bud Daniel; depth, about 30 feet; diameter, 12 inches, gravel walled to 42 inches;

Source of supply—Continued

deep-well turbine pump and 1-horsepower electric motor; yield, 20 gallons a minute.

Well 4. Center well of group of 3 wells on north fork of pipe line from Margaret pumping station; drilled in 1944 by Bud Daniel; depth, 27.5 feet; diameter, 12 inches, gravel walled to 42 inches, deep-well turbine pump and 1-horsepower electric motor; yield, 20 gallons a minute.

Well-5. Three hundred feet north of well 4; drilled in 1944 by Bud Daniel; depth, 27.5 feet; diameter, 12 inches, gravel walled to 42 inches; deep-well turbine pump and 1-horsepower electric motor; yield, 20 gallons a minute.

Well 6. Three hundred feet south of well 4; drilled in 1944 by Bud Daniel; depth, 25 feet; diameter, 12 inches, gravel walled to 42 inches; deep-well turbine pump and 1-horsepower electric motor; yield, 20 gallons a minute.

Average pumpage in gallons a day, 1945

January	85,000	April	64,000
February	70,000	May	106,000
March	64,000	June	131,000

Storage: Concrete ground reservoir at Margaret pumping station, 50,000 gallons; concrete ground reservoir at Crowell, 50,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 402.

Treatment: Chlorination.

Analysis

[Collected June 21, 1945. pH: Well 1, 7.5; well 3, 7.6; well 5, 7.7. Analyzed by J. H. Rowley]

	Well 1		Well 3		Well 5	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	17		19		17	
Iron (Fe)	.05		.10		.05	
Calcium (Ca)	62	3.09	90	4.49	68	3.39
Magnesium (Mg)	26	2.14	36	2.96	41	3.37
Sodium and potassium (Na+K)	23	.99	51	2.20	43	1.85
Bicarbonate (HCO_3)	265	4.34	300	4.92	317	5.20
Sulfate (SO_4)	56	1.17	131	2.73	88	1.83
Chloride (Cl)	11	.31	40	1.13	29	.82
Fluoride (F)	1.0	.05	1.0	.05	1.0	.05
Nitrate (NO_3)	22	.35	51	.82	44	.71
Dissolved solids	349		573		487	
Total hardness as $CaCO_3$	262		372		338	

Driller's log, test well 33

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Gray sand	5	5	Gray sand and gravel	1	20
Sandy red clay	5	10	Tan-colored sand	4	24
Coarse-grained red sand	2	12	Coarse-grained sand and gravel	4	28
Red sand and pea gravel	2	14	Fine-grained water sand	2	30
White sand and pea gravel	4	18	Sand and gravel	9	39
Red clay and pea gravel	1	19	Bird's-eye clay	1	40

GILLESPIE COUNTY

FREDERICKSBURG

Population in 1940: 3,544.

Source of information: Herman Rusche, assistant water superintendent, May 17, 1946.

Ownership: Municipal.

Source of supply: Four wells, 5 miles southeast of town, near the river.

Well 1. Drilled by Layne-Texas Co.; depth, 210 feet; diameter, 16 to 8⅝ inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 42 feet below land surface Apr. 14, 1939; yield, 145 gallons a minute, with a drawdown of 23 feet after 6 hours of pumping; temperature, 68° F.

Well 2. Drilled in 1935 by Layne-Texas Co.; depth, 39 feet; diameter, 8 inches, gravel walled to a diameter of 40 inches; well tested at 350 gallons a minute; not used at present; static water level, 28 feet below land surface Nov. 27, 1935.

Well 3. Drilled in 1939 by Layne-Texas Co.; depth, 260 feet; diameter, 15 to 12 inches; deep-well turbine pump and 20-horsepower electric motor; yield, 550 gallons a minute, with drawdown of 9 feet after 9 hours of pumping.

Well 4. Drilled in 1944 by Layne-Texas Co.; depth, 260 feet; diameter, 16 to 12¾ inches; deep-well turbine pump and 30-horsepower electric motor; static water level, 51.27 feet below land surface Apr. 17, 1946; yield, 550 gallons a minute, with drawdown of 11 feet.

Pumpage: Average, 200,000 gallons a day.

Storage: Concrete ground reservoir, 300,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 802.

Treatment: None.

Analysis

[Collected May 17, 1946. pH: Well 1, 7.7; well 2, 7.4; well 3, 7.0. 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		15		17	
Iron (Fe)	.88		.12		2.3	
Calcium (Ca)	92	4.59	96	4.79	121	6.04
Magnesium (Mg)	47	3.87	47	3.87	55	4.52
Sodium (Na)	35	1.51	32	1.38	66	2.85
Potassium (K)	7.8	.20	7.4	.19	10	.26
Bicarbonate (HCO_3)	358	5.87	357	5.85	412	6.75
Sulfate (SO_4)	36	.75	36	.75	53	1.10
Chloride (Cl)	117	3.30	120	3.38	192	5.42
Fluoride (F)	.4	.02	.2	.01	0	0
Nitrate (NO_3)	14	.23	15	.24	25	.40
Dissolved solids	578		583		827	
Total hardness as $CaCO_3$	423		433		528	

Driller's logs

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 1					
Unreported	80	80	Yellow rock	5	162
Gravel	5	85	Blue rock	8	170
Lime	7	92	Yellow and blue lime	5	175
Yellow lime	28	120	Gray and yellow lime	5	180
Yellow rock	18	138	Yellow sand rock	25	205
Gray and yellow rock	19	157	Blue rock	5	210
Well 3					
Soil and gravel	6	6	Gray lime	17	127
Sand	12	18	Yellow lime	28	155
Gravel	21	39	Pink rock	30	185
Red clay	46	85	Gray lime	3	188
Boulders and rock	5	90	Yellow lime	47	235
Hard limestone	6	96	Gray lime	4	239
Gray limestone	4	100	Pink limestone	16	255
Yellow lime	10	110	Honeycomb rock	5	260
Well 4					
Surface soil	6	6	Yellow lime	30	157
Sand	12	18	Pink rock	18	175
Gravel	22	40	Gray lime	8	183
Red clay	44	84	Yellow lime	47	230
Boulders and gravel	6	90	Gray lime	5	235
Hard yellow lime	3	93	Pink rock	1	236
Yellow and gray lime	9	102	Crevice	4	240
Gray lime	25	127			

HAMILTON COUNTY

FAIRY

Population in 1940: 117.

Source of information: M. E. Parks, Mar. 19, 1946.

Owner: M. E. Parks and others.

Source of supply: Well 100 yards northwest of M. E. Parks General Store; drilled by W. L. Jones; depth, 400 feet; diameter, 6 inches; deep-well cylinder and windmill.

Pumpage: No record.

Storage: Two elevated tanks, 5,000 and 7,500 gallons.

Number of customers: 10.

Treatment: None.

Analysis, well 1

[Collected Mar. 19, 1946. pH is 7.9. 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)	158	3.29
Iron (Fe)	1.7		Chloride (Cl)	52	1.47
Calcium (Ca)	24	1.20	Fluoride (F)	1.0	.05
Magnesium (Mg)	14	1.15	Nitrate (NO_3)	2.2	.04
Sodium (Na)	158	6.85	Dissolved solids	571	
Potassium (K)	12	.31	Total hardness as $CaCO_3$	118	
Bicarbonate (HCO_3)	284	4.66			

HAMILTON

Population in 1940: 2,725.

Source of information: Charles Taylor, city secretary, Mar. 19, 1946.

Ownership: Municipal.

Source of supply: Lake on Two-Mile Creek 2 miles east of city, constructed about 1923; capacity, 1,614 acre-feet.

Pumpage: Average, 160,000 gallons a day.

Storage: Concrete reservoir one-half mile west of city limits, 120,000 gallons; elevated tank, 100,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 675.

Treatment: Chlorination.

Analysis of raw water

[Collected Mar. 19, 1946. pH is 8.0. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	7.8		Sulfate (SO_4)	25	0.520
Iron (Fe)	.22		Chloride (Cl)	13	.367
Calcium (Ca)	59	2.945	Fluoride (F)	.2	.011
Magnesium (Mg)	5.2	.428	Nitrate (NO_3)	.5	.008
Sodium (Na)	9.4	.410	Dissolved solids	226	
Potassium (K)	4.8	.123	Total hardness as $CaCO_3$	169	
Bicarbonate (HCO_3)	183	3.000			

HICO

Population in 1940: 1,242.

Source of information: Roy Barnett, water superintendent, Mar. 19, 1946.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Drilled; dept, about 1,200 feet, plugged back to 350 feet; diameter, 12 inches; deep-well double-acting cylinder and pump jack and electric motor; temperature, 71° F.

Well 2. Drilled about 1915; depth, 335 feet; diameter, 7 inches; deep-well turbine pump and 15-horsepower electric motor; yield, 140 gallons a minute.

Average pumpage, in gallons a day

	1945	1946		1945	1946
January	51,000	65,000	July	87,000	
February	51,600	77,000	August	73,000	
March	49,000		September	73,000	
April	105,000		October	78,000	
May	65,000		November	60,000	
June	75,000		December	72,000	

Storage: Concrete settling basin, 100,000 gallons; two standpipes, 75,000 gallons each.

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

Analysis

[Collected Mar. 19, 1946. pH: Well 1, 7.4; well 2, 8.4. Analyzed by J. H. Rowley]

	Well 1 (raw water)		Well 2 (finished water)	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13		13	
Iron (Fe)	2.2		.06	
Calcium (Ca)	70	3.49	6.1	0.304
Magnesium (Mg)	36	2.96	29	2.385
Sodium (Na)	20	.89	34	1.477
Potassium (K)	8.4	.21	5.4	.138
Bicarbonate (HCO_3)	350	5.74	150	2.452
Sulfate (SO_4)	47	.98	49	1.020
Chloride (Cl)	29	.82	29	.818
Fluoride (F)	.2	.01	.2	.011
Nitrate (NO_3)	0	0	.2	.003
Dissolved solids	405			
Total hardness as $CaCO_3$	322			

HARDEMAN COUNTY

CHILLICOTHE

Population in 1940: 1,423.

Source of information: Earnest Tedmore, water superintendent, Sept. 20, 1946.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. Dug in 1917; depth, 80 feet; diameter, 18 feet; triplex cylinder pump and electric motor: static water level, 40 feet below land surface; yield, 100 gallons a minute.

Well 2. Dug in 1921; depth, 75 feet; diameter, 20 feet; triplex cylinder pump and electric motor; yield, 400 gallons a minute.

Well 3. Dug in 1929; depth, 50 feet; diameter, 8 feet; deep-well turbine pump and electric motor; yield, 200 gallons a minute.

Well 4. Drilled in 1946; depth, 35 feet; diameter, 12 inches; deep-well turbine pump and electric motor; yield, 35 gallons a minute.

Pumpage (estimated): 200,000 gallons a day in summer, 75,000 gallons a day in winter.

Storage: Four concrete ground reservoirs, total capacity 150,000 gallons; two elevated tanks, 50,000 gallons each.

Number of customers: 500.

Treatment: Chlorination.

Analysis, well 1

[Collected Sept. 20, 1946. pH is 7.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	26	3.99	Sulfate (SO_4)	62	1.29
Iron (Fe)	.12		Chloride (Cl)	52	1.47
Calcium (Ca)	80	3.99	Fluoride (F)	.2	.01
Magnesium (Mg)	29	2.38	Nitrate (NO_3)	51	.82
Sodium (Na)	57	2.49	Dissolved solids	523	
Potassium (K)	4.2	.11	Total hardness as $CaCO_3$	318	
Bicarbonate (HCO_3)	328	5.38			

QUANAH

Population in 1940: 3,767.
Source of information: C. Lacy, manager, Sept. 20, 1946.
Owner: Quanah Water Co.
Source of supply: Seven wells in 2 well fields—1 well field 8 miles north of town and 1 well field 10½ miles northeast of town along the Red River sand dunes.
Well field 8 miles north of town:

Well 1. Dug in 1924; depth, 62 feet; diameter, 5 feet; deep-well turbine pump and electric motor; yield, 250 gallons a minute.

Well field 10½ miles northeast of town:

Well 1. Drilled in 1931 by Southern Union Gas Co.; depth, 100 feet; diameter, 8 inches; deep-well turbine pump and electric motor; static water level, 23 feet below land surface; yield, 100 gallons a minute.

Well 2. Drilled in 1931 by Southern Union Gas Co.; depth, 100 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 100 gallons a minute.

Well 3. Drilled in 1931 by Southern Union Gas Co.; depth, 100 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 100 gallons a minute.

Well 4. Drilled in 1939 by the Southern Union Gas Co.; depth, 100 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 100 gallons a minute.

Well 5. Drilled in 1939 by the Southern Union Gas Co.; depth, 100 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 100 gallons a minute.

Well 6. Drilled in 1939 by Southern Union Gas Co.; depth, 100 feet; diameter, 8 inches; deep-well turbine pump and electric motor; yield, 100 gallons a minute.

Pumpage: 500,000 to 600,000 gallons a day in summer, 300,000 to 450,000 gallons a day in winter.
Storage: Ground reservoir, 500,000 gallons; elevated tank, 125,000 gallons.
Number of customers: 1,200.
Treatment: Chlorination.

Analysis of composite sample

[Collected Sept. 20, 1946. pH is 7.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	332	6.91
Iron (Fe)	.07		Chloride (Cl)	28	.79
Calcium (Ca)	167	8.34	Fluoride (F)	0	0
Magnesium (Mg)	33	2.71	Nitrate (NO_3)	38	.61
Sodium (Na)	34	1.49	Dissolved solids	809	
Potassium (K)	4.0	.10	Total hardness as $CaCO_3$	552	
Bicarbonate (HCO_3)	264	4.33			

Driller's log, well 1—10½ miles northeast of Quanah

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Brown clay	5	64
Sandy clay	3	5	Blue clay	2	66
Yellow sand	7	12	Brown clay	7	73
Brown sand	3	15	Blue rock	1	74
Gray water sand	5	20	Brown clay	2	76
Gray water sand and gravel	14	34	Blue clay	8	84
Rock	2	36	Brown clay	2	86
Sand and gravel	4	40	Blue clay	2	88
Gray sand and clay	6	46	Brown clay	7	95
Blue clay	5	51	Gypsum rock	3	98
Brown clay	5	56	Red clay	2	100
Gypsum rock	3	59			

HASKELL COUNTY

HASKELL

Population in 1940: 3,051.

Source of information: J. Belton Duncan, city secretary, Mar. 17, 1944.

Ownership: Municipal.

Source of supply: Five wells.

Well 1. Three and one-half blocks south of courthouse; dug in 1906; depth, 20 feet; stand-by well.

Well 2. Three and one-half blocks south of courthouse, just north of well 1; dug in 1906; depth, 20 feet; stand-by well.

Well 3. Three blocks west and 9½ blocks north of northwest corner of courthouse square; dug in 1926; depth, 36 feet; diameter, 20 feet; centrifugal pump and electric motor.

Well 4. One-half block south and one-half block west of southeast corner of courthouse square; dug by Mart Clifton in 1928; depth, 28 feet; diameter, 20 feet; centrifugal pump and electric motor, capacity, 400 gallons a minute; static water level, 19 feet below land surface on Mar. 17, 1944.

Well 5. One-half block south of southeast corner of courthouse square; dug by Mart Clifton in 1928; 28 feet, diameter, 20 feet; centrifugal pump and electric motor, capacity 400 gallons a minute; static water level, 19 feet below land surface on Mar. 17, 1944.

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

Storage: Elevated tank, 159,000 gallons.

Number of customers: 540.

Treatment: None.

Analysis, well 5

[Collected Mar. 17, 1944. pH is 7.6. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	251	5.23
Iron (Fe)	.02		Chloride (Cl)	365	10.29
Calcium (Ca)	151	7.54	Fluoride (F)	1.2	.06
Magnesium (Mg)	92	7.57	Nitrate (NO_3)	177	2.85
Sodium (Na)	221	9.60	Dissolved solids	1,490	
Potassium (K)	10	.26	Total hardness as $CaCO_3$	756	
Bicarbonate (HCO_3)	399	6.54			

ROCHESTER

Population in 1940: 611.
Source of information: J. A. Hudspeth, water superintendent, Mar. 24, 1944.
Ownership: Municipal.
Source of supply: Well at east side of elevated tank; dug in 1926; depth, 54 feet; diameter, 12 feet; deep-well turbine pump and 15-horsepower electric motor, pump set at 35 feet; static water level, 15 feet below land surface on Mar. 24, 1944; static water level reported 46 feet below land surface when dug; yield, 350 gallons a minute in 1944.
Storage: Elevated tank, 55,000 gallons.
Number of customers: 140.
Treatment: None.

Analysis

[Collected Mar. 24, 1946. pH is 7.6. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	59	1.23
Iron (Fe)	.14		Chloride (Cl)	43	1.21
Calcium (Ca)	75	3.74	Fluoride (F)	.6	.03
Magnesium (Mg)	17	1.40	Nitrate (NO_3)	129	2.08
Sodium (Na)	107	4.73	Dissolved solids	623	
Potassium (K)	5.2	.13	Total hardness as $CaCO_3$	257	
Bicarbonate (HCO_3)	333	5.46			

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Sand and gravel (water)	8	54
Silt, sand and gravel (dry)	42	46	Red beds		54

RULE

Population in 1940: 1,195.
Source of information: J. Ben Sellers, water superintendent, Mar. 20, 1944.
Ownership: Municipal.
Source of supply: Well at elevated tank; dug by D. H. Head in 1923; depth, 45 feet; diameter, 18 feet, curbed with concrete block 8 by 8 by 14 inches; centrifugal pump and 30-horsepower electric motor; static water level, 32.0 feet below land surface on Mar. 20, 1944; static water level reported about 28 feet when dug; drawdown 8.5 feet after pumping 445 gallons a minute for 89 minutes on Mar. 21, 1944.
Pumpage: Average, 96,000 gallons a day in 1943.
Storage: Elevated tank, 55,000 gallons.
Number of customers: 285.
Treatment: None.

Analysis

[Collected Mar. 21, 1944. pH is 7.8. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	57	1.19
Iron (Fe)	.05		Chloride (Cl)	73	2.06
Calcium (Ca)	91	4.54	Fluoride (F)	.4	.02
Magnesium (Mg)	24	1.97	Nitrate (NO_3)	152	2.45
Sodium (Na)	114	4.97	Dissolved solids	717	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	326	
Bicarbonate (HCO_3)	362	5.93			

HOOD COUNTY

GRANBURY

Population in 1940: 1,166.

Source of information: Jack Brown, city secretary, Aug. 13, 1942.

Ownership: Municipal.

Source of supply: Four wells.

Well 1. Drilled; depth, 175 feet; diameter, 6 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 75 gallons a minute.

Well 2. Drilled in 1933 by J. Hall; depth, 160 feet; deep-well turbine and 7½-horsepower electric motor; yield, 65 gallons a minute.

Well 3. Drilled in 1939 by Carlisle & Miller; depth, 685 feet; diameter, 10 to 6⅝ inches; deep-well turbine pump and electric motor; yield, 75 gallons a minute.

Well 4. Drilled in 1940 by C. H. Stoner; depth, 176 feet; diameter, 10 to 8 inches; deep-well turbine pump and electric motor; yield, 75 gallons a minute.

Average pumpage, in gallons a day

	1941	1942		1941	1942		1941	1942
January	135,000	158,000	May	126,000	137,000	September	142,000	
February	153,000	157,000	June	137,000	137,000	October	141,000	
March	111,000	135,000	July	148,000	201,000	November	132,000	
April	162,000	156,000	August	166,000		December	123,000	

Storage: Concrete ground reservoir, 200,000 gallons; standpipe, about 100,000 gallons.

Number of customers: 300.

Treatment: Hypochlorination.

Analysis, well 3

[Collected Aug. 13, 1942. Analyzed by B. Irelan]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Iron (Fe)	0.08		Sulfate (SO_4)	84	1.75
Calcium (Ca)	2.9	0.14	Chloride (Cl)	41	1.16
Magnesium (Mg)	.8	.06	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	216	9.38	Dissolved solids	574	
Bicarbonate (HCO_3)	406	6.67	Total hardness as $CaCO_3$	10	

Driller's log, well 3

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	6	6	Water sand	25	420
Dry sand	19	25	Gray lime	6	426
Quicksand and gravel	8	33	Water sand	21	447
Hard lime	10	43	Blue limestone	3	450
Gray shale	26	69	Water sand	7	457
Sandy lime	29	98	Lime and sand	8	465
Water sand	77	175	Blue shale	19	484
Gray shale	7	182	Water sand	14	498
Red shale	26	208	Blue shale	10	508
Blue shale	2	210	Black shale	2	510
Red shale	35	245	Water sand	14	524
Blue shale	5	250	Hard shale	24	548
Yellow shale	49	299	Water sand	6	554
Brown lime	15	314	Blue shale	93	647
Yellow shale	26	340	Water sand	25	672
Blue shale	51	391	Blue shale	13	685
Limestone	4	395			

LIPAN

Population in 1940: 300.

Source of information: Otis Tipton, operator, Nov. 1945.

Owner: David Pope.

Source of supply: Well 1¼ miles east of Lipan; dug several years ago; depth, 50 feet; diameter, 5 feet; two deep-well cylinders and pump jacks; static water level, 28 feet below land surface; yield, 40 gallons a minute.

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

Storage: Elevated tank, 20,000 gallons.

Number of customers: 63.

Treatment: None.

Analysis, well 1

[Collected Nov. 1945. pH is 7.0. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silicia (SiO_2)	16		Sulfate (SO_4)	23	0.48
Iron (Fe)	.10		Chloride (Cl)	25	.71
Calcium (Ca)	117	5.84	Fluoride (F)	.4	.02
Magnesium (Mg)	16	1.32	Nitrate (NO_3)	45	.73
Sodium (Na)	12	.52	Dissolved solids	477	
Potassium (K)	4.4	.11	Total hardness as $CaCO_3$	358	
Bicarbonate (HCO_3)	357	5.85			

JACK COUNTY

BRYSON

Population in 1940: 806.

Source of information: W. L. McCloud, water superintendent, Sept. 21, 1946.

Ownership: Municipal.

Source of supply: Eight wells.

Well 1. Drilled in 1937 by Layne-Texas Co.; depth, 240 feet; diameter, 7 inches; deep-well cylinder and pump jack and 3-horsepower electric motor; static water level, 129 feet below land surface; yield, 6 gallons a minute.

Source of supply—Continued

Well 2. Drilled in 1937 by Layne-Texas Co.; depth, 249 feet; diameter, 7 to 5⅜ inches; deep-well cylinder and pump jack and electric motor; yield, 4 gallons a minute.

Well 3. Drilled in 1937 by Nathan Harlan; depth, 235 feet; diameter, 5⅜ inches; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 6 gallons a minute.

Well 4. Drilled in 1938 by Mr. Pace; depth, 235 feet; diameter, 7 inches; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 5 gallons a minute.

Well 5. Drilled in 1938 by Mr. Pace; depth, 235 feet; diameter, 7 inches; deep-well cylinder and pump jack and electric motor; yield, 6 gallons a minute.

Well 6. Drilled in 1938 by Mr. Pace; depth, 235 feet; diameter, 5 inches; deep-well cylinder and pump jack and electric motor; yield, 6 gallons a minute.

Well 7. Drilled in 1946 by W. L. Thedford; depth, 300 feet; diameter 5⅜ inches; deep-well cylinder and pump jack and electric motor; yield, 8 gallons a minute.

Well 8. Drilled in 1946 by W. L. Thedford; depth, 250 feet; diameter, 5⅜ inches; pump not installed; yield on test, 10 gallons a minute.

Pumpage: Average, 35,000 gallons a day.

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

Number of customers: 156.

Treatment: Chlorination.

Analysis

[Collected Sept. 21, 1946. pH: Wells 1 and 3 each 7.8; well 6, 7.4. Analyzed by C. B. Cibulka]

	Well 1		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)	8.0		11		11	
Iron (Fe)	4.3		.01		.02	
Calcium (Ca)	10	0.50	19	0.95	18	0.90
Magnesium (Mg)	3.3	.27	6.2	.51	8.3	.68
Sodium (Na)	325	14.15	309	13.45	193	8.39
Potassium (K)	23	.59	21	.54	15	.38
Bicarbonate (HCO_3)	414	6.79	476	7.80	372	6.10
Sulfate (SO_4)	148	3.08	148	3.08	90	1.87
Chloride (Cl)	196	5.53	158	4.46	80	2.26
Fluoride (F)	1.4	.07	1.0	.05	1.4	.07
Nitrate (NO_3)	2.2	.04	3.5	.06	3.2	.05
Dissolved solids	921		911		603	
Total hardness as $CaCO_3$	38		73		79	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Sandy lime	9	108
Red sand	5	7	Sand	7	115
Yellow clay	30	37	Sandy shale	15	130
Sandstone	5	42	Water sand	28	158
Red sand and shale	4	46	Gray shale	12	170
Sand and grey shale	14	60	Sand	28	198
Blue shale	5	65	Sand and shale	10	208
Hard sand	9	74	Sand	34	242
Sandy shale	16	90	Shale	3	245
Blue shale	9	99			

JACKSBORO

Population in 1940: 2,368.
Source of information: R. H. Tate, water superintendent, Sept. 21, 1946.
Ownership: Municipal.
Source of supply: Eighteen wells in well field extending about 1¼ miles from the water tower southeastward. Most of the wells range in depth from 135 to 220 feet; most wells are 7 inches in diameter; all wells are equipped with deep-well cylinders and pump jacks operated by electric motors; average yield of each well, 11,000 gallons per 24 hours.
Pumpage: 200,000 gallons a day in summer, 150,000 gallons a day in winter.
Storage: Ground reservoir, 119,000 gallons; ground reservoir, 5,000 gallons; steel tank, 18,000 gallons; elevated tank, 75,000 gallons.
Number of customers: 725.
Treatment: Chlorination.

Analysis of composite sample

[Collected Sept. 21, 1946. pH is 7.7. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	32	0.67
Iron (Fe)	1.0		Chloride (Cl)	32	.90
Calcium (Ca)	25	1.25	Fluoride (F)	.8	.04
Magnesium (Mg)	5.2	.43	Nitrate (NO_3)	2.0	.03
Sodium (Na)	136	5.91	Dissolved solids	441	
Potassium (K)	9.9	.25	Total hardness as $CaCO_3$	84	
Bicarbonate (HCO_3)	378	6.20			

JOHNSON COUNTY

ALVARADO

Population in 1940: 1,324.
Source of information: J. M. Mallicote, city secretary, Feb. 12, 1943.
Ownership: Municipal.
Source of supply: Well at the north edge of city; drilled in 1931 by Q. D. Lewis; depth 1,677 feet; diameter, 15½ to 8 inches; deep-well turbine pump, pump set at 390 feet below the surface; yield, 185 gallons a minute.
Pumpage: No record.
Storage: Elevated tank, 85,000 gallons; concrete ground reservoir, 85,000 gallons.
Number of customers: 300.
Treatment: None.

Analysis, well 1

[Collected Feb. 12, 1943. pH is 8.4. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	74	1.54
Iron (Fe)	.06		Chloride (Cl)	62	1.75
Calcium (Ca)	2.4	0.12	Fluoride (F)	.2	.01
Magnesium (Mg)	.7	.06	Nitrate (NO_3)	.5	.01
Sodium (Na)	242	10.53	Dissolved solids	626	
Potassium (K)	4	.10	Total hardness as $CaCO_3$	9	
Bicarbonate (HCO_3)	459	7.50			

Driller's log well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Yellow clay	35	35	White sand	38	874
Yellow rock	30	65	Gray lime	30	904
Black sand	10	75	Blue shale	11	915
Gray shale	25	100	White lime	70	985
Brown shale	76	176	Gray lime	130	1115
Gray sand (Woodbine; water)	47	223	Gray shale	20	1135
Green shale	4	227	White lime	135	1270
White sand	5	232	Blue shale	45	1315
Blue shale	70	302	White sand (water)	60	1375
White lime	63	365	Blue shale	25	1400
Brown shale	10	375	Red shale	4	1404
White lime	20	395	White sand	21	1425
Gray shale	39	434	White sand (hard)	12	1437
White lime	46	480	White sand	3	1440
Gray shale	10	490	Red shale	87	1527
White lime	30	520	Blue shale	3	1530
Gray shale	45	565	Gray sand	4	1534
White lime	20	585	Red shale	23	1557
Gray shale	55	640	White sand (Trinity; water)	28	1585
White lime	15	655	Blue shale	20	1605
White shale	28	683	White sand (water)	15	1620
Blue shale	35	718	White sand (hard)	5	1625
Lime	25	743	White sand (soft)	5	1630
Blue shale	5	748	White sand (hard)	3	1633
Lime	32	780	White sand (soft)	22	1655
White sand (Paluxy)	18	798	Yellow shale	22	1677
Blue shale	38	836			

BURLESON

Population in 1940: 573.

Source of information: Mrs. N. L. Clark, Feb. 12, 1943.

Ownership: Municipal.

Source of supply: Well in southwest part of town, one block west of Highway 74; drilled in 1930; depth, 550 feet; deep-well cylinder and pump jack; the city has a second well leased from private owner as a stand-by well.

Pumpage: No record.

Storage: Elevated tank, 50,000 gallons.

Number of customers: 225.

Treatment: None.

Analysis, well 1

[Collected Feb. 12, 1943. pH is 8.8. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	12		Sulfate (SO_4)	41	0.85
Iron (Fe)	.01		Chloride (Cl)	13	.37
Calcium (Ca)	.8	0.04	Fluoride (F)	.6	.03
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	3.0	.05
Sodium (Na)	205	8.90	Dissolved solids	520	
Potassium (K)	8.0	.20	Total hardness as $CaCO_3$	4	
Bicarbonate (HCO_3)	480	7.88			

CLEBURNE

Population in 1940: 10,558.

Source of information: F. B. Stevens, engineer, Feb. 11, 1943.

Ownership: Municipal.

Source of supply: Six wells.

Well 1. At water works; depth, 950 feet; diameter, 8 inches; submersible deep-well turbine pump, pump set 700 feet below land surface; water level

Source of supply—Continued

reported 450 feet below surface Feb. 11, 1942; drawdown reported 75 feet when well is pumping 250 gallons a minute.

Well 2. At water works; drilled about 1900; depth, 950 feet; diameter, 6 inches; water level, reported 450 feet below surface Feb. 11, 1943; reported drawdown, 85 feet when pumping 175 gallons a minute.

Well 3. At water works; drilled in 1913; depth 1,196 feet; diameter, 8 inches; submersible deep-well turbine pump, pump set at 715 feet; static water level reported 365 feet below surface on Feb. 11, 1943; drawdown, reported 267 feet when pumping 182 gallons a minute.

Well 4. At water works; drilled in 1940 by Q. D. Lewis; depth, 935 feet; diameter, 8¼ to 6 inches; submersible deep-well turbine pump, pump set at 700 feet below surface; static water level reported 450 feet below surface on Feb. 11, 1943; pumping level reported 90 feet below static level when pumping 175 gallons a minute.

Well 5. One-half mile northwest of city water works; drilled in 1938 by Layne-Texas Co.; depth 1,274 feet; diameter, 16 to 5 inches, all sands underreamed and gravel-packed; static water level reported 350 feet below surface in January 1938; deep-well turbine pump, drawdown, reported 250 feet when pumping 400 gallons a minute.

Well 6. About 600 feet northeast of water works; drilled in 1941 by Layne-Texas Co.; depth, 1,206 feet; diameter, 22 to 8⅝ inches; deep-well turbine pump, set at 700 feet; static water level, 478 feet below surface in June 1941, drawdown, 46 feet when pumping 400 gallons a minute.

Average pumpage in gallons a day

	1941	1942		1941	1942
January	760,000	720,000	July	910,000	830,000
February	840,000	760,000	August	940,000	1,080,000
March	680,000	550,000	September	1,010,000	790,000
April	840,000	620,000	October	840,000	720,000
May	810,000	590,000	November	850,000	650,000
June	940,000	700,000	December	720,000	590,000

Storage: Concrete ground reservoir, 1,000,000 gallons; two elevated tanks, 125,000 gallons and 500,000 gallons.

Number of customers: 3,800.

Treatment: Chlorination.

Analysis, well 3

[Collected Feb. 11, 1943. pH is 8.8. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	102	2.12
Iron (Fe)	.02		Chloride (Cl)	52	1.47
Calcium (Ca)	2.3	0.11	Fluoride (F)	.3	.02
Magnesium (Mg)	1.2	.10	Nitrate (NO_3)	0	0
Sodium (Na)	231	10.03	Dissolved solids	612	
Potassium (K)	6.4	.16	Total hardness as $CaCO_3$	10	
Bicarbonate (HCO_3)	413	6.79			

Drillers' logs

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 4					
Sandy loam	6	6	Water sand	7	451
Gravel	6	12	Blue shale	19	470
Lime	133	145	Water sand	10	480
Shale	15	160	Sandy shale	40	520
Lime	35	195	Lime	82	602
Shale	10	205	Sandy shale (water)	13	615
Lime	70	275	Weatherford lime	235	850
Shale	10	285	Blue shale	10	860
Lime	50	335	Gray lime	30	890
Blue shale	54	389	Water sand	5	895
Brown shale	26	415	Shale	10	905
Lime	18	433	Water sand, good	26	931
Gray sand	111	444	Shale	5	936
Well 5					
Lime	40	40	Hard shale and lime	14	874
Brown shale	10	50	Lime	10	884
Lime	10	60	Shale and lime	11	895
Blue shale	5	65	Lime and layers of shale	6	901
White lime	20	85	Lime	10	911
Brown shale	25	110	Shale	2	913
Lime	5	115	Shaly sand	11	924
Blue shale	5	120	Lime	3	927
White lime	71	191	Sand and shale	6	933
Blue shale	29	220	Lime	2	935
White lime	70	290	Hard shale	16	951
Blue shale	4	294	Sand and streaks of shale	6	957
White lime	56	350	Sand and streaks of shale (cored)	8	965
Blue shale and shell	13	363	Sand	14	979
White lime	7	370	Hard shale	4	983
Blue shale	8	378	Sand broken with shale	13	996
Lime	10	388	Sand rock	3	999
Shale	6	394	Rock (cut with rock bit)	6	1,005
Lime	4	398	Sand	5	1,010
Hard shell, rock	17	415	Lime	3	1,013
Brown sandy shale	25	440	Sandy shale, layers of lime	41	1,054
Paluxy sand	12	452	Hard sand	11	1,065
Shale	8	460	Shale	2	1,067
Hard sandy shale and lime streaks	35	495	Sand	8	1,075
Sand	7	502	Shale	4	1,079
Lime	1	503	Sand	2	1,081
Sand	9	512	Sand and shale	8	1,089
Hard lime	1	513	Shale	35	1,124
Hard sand	8	521	Rock	4	1,128
Hard shale	3	524	Sand	16	1,144
Lime	2	526	Shale	2	1,146
Shale	6	532	Sand and shale	10	1,156
Lime	1	533	Sand broken with shale	21	1,177
Fine white sand	5	538	Sand rock	4	1,181
Sandy shale	11	549	Hard sand with layers of red sandy shale	9	1,190
Lime	1	550	Hard red shale	4	1,194
Shale	3	553	Sand	20	1,214
Hard lime	8	561	Rock	2	1,216
Hard shale	9	570	Sand and fine gravel	4	1,220
Lime	223	793	Shale and layers of sand	15	1,235
Sandy lime and streaks of shale	36	829	Sandy shale, layers of sand	19	1,254
Shale and streaks of lime	23	852	Yellow, red, and blue shale	20	1,274
Hard shale	8	860			

Driller's logs—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 6					
Surface soil	3	3	Shale and lime	7	904
Gravel	4	7	Good sand	32	936
Lime	47	54	Hard shale	5	941
Shale and lime	81	135	Shale and lime	21	962
Lime	19	154	Sand	9	971
Lime and shale	138	292	Rock	1	972
Lime	37	329	Shale	1	973
Shale and lime	19	348	Lime and shale	5	978
Hard shale	56	404	Sand	18	996
Sandy shale	16	420	Hard red and blue shale sand, rock layers	63	1,059
Lime and shale	17	437	Hard red shale	44	1,103
Paluxy sand	16	453	Sand rock	4	1,107
Shale	13	466	Shale and lime	5	1,112
Paluxy sand	10	476	Hard shale and sand	21	1,133
Shale	27	503	Sand	19	1,152
Hard shale	106	609	Rock	2	1,154
Lime and shale	74	683	Sand	30	1,184
Lime	109	792	Rock	3	1,187
Lime and shale	63	855	Hard shale	14	1,201
Lime	17	872	Hard rock	3	1,204
Shale and lime	19	891	Hard red and yellow shale	2	1,206
Sand	6	897			

GODLEY

Population in 1940: 317.

Source of information: H. W. Sawyer, owner, Feb. 11, 1943.

Owner: H. W. Sawyer.

Source of supply: Two wells.

Well 1. North side of town; drilled about 1913; depth, about 430 feet; diameter, 4 inches; deep-well cylinder and pump jack.

Well 2. Twenty six feet north of well 1; drilled 1931; depth, 428 feet; diameter, 6⅝ inches; deep-well cylinder and pump jack.

Pumpage: No record.

Storage: Two elevated wooden tanks, 20,000 gallons.

Number of customers: 92.

Treatment: None.

Analysis

[Collected Feb. 11, 1943. pH: Well 1, 8.3; well 2, 8.4. Analyzed by P. A. Witt]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13		11	
Iron (Fe)	.0		.01	
Calcium (Ca)	1.7	0.08	1.8	0.09
Magnesium (Mg)	.7	.06	.9	.07
Sodium (Na)	163	7.08	164	7.14
Potassium (K)	6.4	.16	4	.10
Bicarbonate (HCO_3)	369	6.05	370	6.08
Sulfate (SO_4)	39	.81	41	.85
Chloride (Cl)	18	.51	16	.45
Fluoride (F)	.2	.1	.4	.02
Nitrate (NO_3)	.0	.0	.0	.0
Dissolved solids	424		421	
Total hardness as $CaCO_3$	7		8	

GRANDVIEW

Population in 1940: 823.

Source of information: Olan Adwelt, Apr. 21, 1943.

Ownership: Municipal.

Source of supply: Well at west side of railroad track, one block south of Main Street; drilled in 1931 by Stinson of Hillsboro, Tex.; depth, 273 feet; diameter, 12 to 10 inches; deep-well turbine pump set at 195 feet; static water level, 51 feet below surface in 1931; yield, 300 gallons a minute.

Pumpage: Average, 80,000 gallons a day.

Storage: Elevated tank, 500,000 gallons; concrete ground reservoir, 80,000 gallons.

Number of customers: 245.

Treatment: None.

Analyses, well 1

[Collected Apr. 21, 1943. pH is 7.8. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	13		Sulfate (SO_4)	115	2.39
Iron (Fe)	.04		Chloride (Cl)	31	.87
Calcium (Ca)	21	1.05	Fluoride (F)	.5	.03
Magnesium (Mg)	8.6	.71	Nitrate (NO_3)	5.6	.09
Sodium (Na)	138	6.00	Dissolved solids	479	
Potassium (K)	3.4	.09	Total hardness as $CaCO_3$	88	
Bicarbonate (HCO_3)	273	4.47			

JOSHUA

Population in 1940: 810.

Source of information: J. D. Vroom, owner, Feb. 11, 1943.

Owner: J. D. Vroom.

Source of supply: Two wells.

Well 1. At northeast side of city at residence of owner; depth, 630 feet; diameter, 4½ inches; deep-well cylinder and pump jack; water level, 400 feet below surface Feb. 11, 1943; used as stand-by well.

Well 2. About 75 feet north of well 1; drilled by J. E. Millican in 1930; depth, 677 feet; diameter, 10 to 6 inches; deep-well cylinder and pump jack; static water level, 407 feet below surface in 1930.

Pumpage: Average, 25,000 gallons a day.

Storage: Elevated steel tank, 25,000 gallons; ground reservoir, 6,000 gallons.

Number of customers: 140.

Treatment: None.

Analysis, well 2

[Collected Feb. 11, 1946. pH is 9.0. Analyzed by P. A. Witt]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.2		Sulfate (SO_4)	33	0.69
Iron (Fe)	.05		Chloride (Cl)	12	.34
Calcium (Ca)	1.7	0.08	Fluoride (F)	.4	.02
Magnesium (Mg)	.7	.06	Nitrate (NO_3)	2.0	.03
Sodium (Na)	175	7.60	Dissolved solids	442	
Potassium (K)	4.2	.11	Total hardness as $CaCO_3$	7	
Bicarbonate (HCO_3)	414	6.77			

JONES COUNTY

ANSON

Population in 1940: 2,338.

Source of information: D. W. Gray, water superintendent, Sept. 20, 1946.

Ownership: Municipal.

Source of supply: Three lakes. Two lakes constructed in 1923 and 1936, 2½ miles southeast of pumping station. One lake constructed in 1940, 7 miles north of pumping station.

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

Storage: Four concrete ground reservoirs, 125,000 gallons each; elevated tank, 73,000 gallons.

Number of customers: 700.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis of North Lake finished water

[Collected Sept. 20, 1946. pH is 7.3. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	8.0		Sulfate (SO_4)	203	4.23
Iron (Fe)	.12		Chloride (Cl)	38	1.07
Calcium (Ca)	99	4.94	Fluoride (F)	0	0
Magnesium (Mg)	24	1.97	Nitrate (NO_3)	0	0
Sodium (Na)	24	1.03	Dissolved solids	500	
Potassium (K)	7.2	.18	Total hardness as $CaCO_3$	346	
Bicarbonate (HCO_3)	172	2.82			

HAMLIN

Population in 1940: 2,406.

Source of information: W. C. Roundtree, water superintendent, Sept. 19, 1946.

Ownership: Municipal.

Source of supply: Three lakes. One lake 1½ miles west of town on California Creek; another lake 3 miles west of town on California Creek; capacity of both lakes, 350,000,000 gallons, a third lake 5 miles south of town on Dry Kelly Creek; capacity, 900,000,000 gallons. All water taken from south lake since 1940.

Pumpage: 600,000 gallons a day in summer, 270,000 gallons a day in winter.

Storage: Ground reservoir, 147,000 gallons; elevated tank, 75,000 gallons.

Number of customers: 850.

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

Analysis of south lake raw water

[Collected Sept. 20, 1946. pH is 6.8. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.0		Sulfate (SO_4)	8.1	0.169
Iron (Fe)	.14		Chloride (Cl)	13	.367
Calcium (Ca)	27	1.348	Fluoride (F)	0	0
Magnesium (Mg)	7.1	.584	Nitrate (NO_3)	2.0	.032
Sodium (Na)	9.8	.427	Dissolved solids	158	
Potassium (K)	5.6	.143	Total hardness as $CaCO_3$	97	
Bicarbonate (HCO_3)	118	1.943			

STAMFORD

Population in 1940: 4,810.
Source of information: Frank Sosebee, water superintendent, Sept. 19, 1946.
Ownership: Municipal.
Source of supply: Reservoir on Clear Fork of the Brazos River.

Average pumpage, in gallons a day

	1940	1941	1942	1943
January	396,000	332,000	384,000	427,000
February	359,000	306,000	374,000	468,000
March	374,000	313,000	458,000	453,000
April	413,000	316,000	443,000	511,000
May	419,000	484,000	468,000	559,000
June	377,000	673,000	530,000	667,000
July	555,000	513,000	635,000	904,000
August	523,000	551,000	580,000	913,000
September	430,000	590,000	472,000	687,000
October	423,000	520,000	515,000	637,000
November	322,000	440,000	427,000	603,000
December	321,000	342,000	422,000	473,000

Storage: Reservoir 3 miles west of Leuders, 500,000 gallons; reservoir 2 miles east of pumping station, 1,000,000 gallons; rock reservoir, 2,000,000 gallons; elevated tank, 100,000 gallons.
Treatment: Coagulation, sedimentation, and chlorination.

Analysis of finished water

[Collected Sept. 19, 1946. pH is 9.5. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	7.4		Sulfate (SO_4)	189	3.93
Iron (Fe)	.10		Chloride (Cl)	80	2.26
Calcium (Ca)	84	4.19	Fluoride (F)	.4	.02
Magnesium (Mg)	7.5	.62	Nitrate (NO_3)	1.2	.02
Sodium (Na)	77	3.33	Dissolved solids	510	
Potassium (K)	7.0	.18	Total hardness as $CaCO_3$	240	
Bicarbonate (HCO_3)	55.9	2.09			

KERR COUNTY

KERRVILLE

Population in 1940: 5,572.
Source of information: P. J. De Geurin, Nov. 16, 1945.
Ownership: Municipal.
Source of supply: Four wells at pumping station in northwest part of city.

Well 1. Drilled; depth, 610 feet; diameter, 10 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, 55 feet below land surface; yield, 500 gallons a minute; temperature, 70.5° F.

Well 2. Drilled; depth, 650 feet; diameter, 10 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 500 gallons a minute.

Well 3. Drilled by J. R. Johnson in 1940; depth, 725 feet; diameter, 12 to 10 inches; static water level, 80 feet below land surface June 22, 1940; deep-well submersible pump and 25-horsepower electric motor; yield, 610 gallons a minute with a drawdown of 39 feet.

Well 4. Drilled by J. H. Crowder in 1945; depth, 606 feet; diameter, 14 to 10¾ inches; deep-well submersible pump and 40-horsepower electric motor; static water level, 84 feet below land surface in June 1945; yield, 670 gallons a minute with a drawdown of 37 feet after 20 hours of pumping; temperature, 71° F.

Average pumpage, in gallons a day

	1944	1945		1944	1945
January		475,000	July	1,116,000	1,058,000
February		454,000	August	1,165,000	1,075,000
March		503,000	September	600,000	933,000
April		542,000	October	578,000	567,000
May	544,000	794,000	November	537,000	
June	844,000	920,000	December	542,000	

Storage: Elevated concrete reservoir, 360,000 gallons.
Number of customers: 1,712.
Treatment: None.

Analysis

[Collected Nov. 16, 1945. pH: Well 2, 7.9; well 4, 7.4. Analyzed by J. H. Rowley]

	Well 2		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silico (SiO_2)	14		12	
Iron (Fe)	.26		.10	
Calcium (Ca)	79	3.94	66	3.29
Magnesium (Mg)	45	3.70	43	3.54
Sodium (Na)	11	.48	9.9	.43
Potassium (K)	66	.17		
Bicarbonate (HCO_3)	368	6.03	373	6.11
Sulfate (SO_4)	79	1.64	26	.54
Chloride (Cl)	20	.56	20	.56
Fluoride (F)	1.0	.05	1.0	.05
Nitrate (NO_3)	.5	.01	0	0
Dissolved solids	451		372	
Total hardness as $CaCO_3$	382		342	

Drillers' logs

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 3					
Surface soil	6	6	Hard gray lime	63	514
Gravel and clay	56	62	Hard red, white, pink and yellow lime	73	587
Blue shale	83	145	Hard pink and black sand	55	642
Black shale	9	154	White sand	34	676
Blue shale	81	235	Hard schist	49	725
Brown shale	33	268			
Hard red sand	183	451			
Well 4					
Surface soil	5	5	Red sandstone	56	342
Clay and gravel	37	42	White lime	14	356
Gravel	9	51	Water sand	8	364
Gray sandstone	43	94	Hard lime	48	412
Hard sandy shale	14	108	Red sand rock	10	422
Gray sandstone	36	144	Green shale	2	424
Blue shale	11	155	Red shale	11	435
Gray sandy shale	31	186	Green shale	6	441
Gray sandstone	51	237	Hard sandstone	135	576
Brown sandy shale	34	271	Gravel	8	584
Red sandy shale	15	286	Hard lime	22	606

KIMBLE COUNTY

JUNCTION

Population in 1940: 2,088.
Source of information: Dr. H. E. Wright, mayor, Apr. 17, 1946.
Ownership: Municipal.
Source of supply: Two wells, two blocks south of City Square on South Fifth Street.

Well 1. Dug; depth, 37 feet; diameter, 14 feet; centrifugal pump and 35-horsepower electric motor; yield, 500 gallons a minute; temperature, 65.5°F.

Well 2. Dug; depth, 14 feet; diameter, 10 feet; centrifugal pump and 35-horsepower electric motor; yield, 500 gallons a minute.

Pumpage (estimated): Average, 300,000 gallons a day.
Storage: Reservoir at wells, 100,000 gallons; reservoir in west part of city, 235,000 gallons.
Number of customers: 450.
Treatment: Chlorination.

Analysis, composite sample, wells 1 and 2

[Collected Apr. 17, 1946. pH is 7.2. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	9.2	0.19
Iron (Fe)	.06		Chloride (Cl)	14	.39
Calcium (Ca)	70	3.49	Fluoride (F)	.2	.01
Magnesium (Mg)	18	1.48	Nitrate (NO_3)	2.2	.04
Sodium (Na)	3.9	.17	Dissolved solids	273	
Potassium (K)	3.0	.08	Total hardness as $CaCO_3$	248	
Bicarbonate (HCO_3)	280	4.59			

KNOX COUNTY

BENJAMIN

Population in 1940: 599.
Source of information: W. M. Hertel, city manager, July 1946.
Ownership: Municipal.
Source of supply: Lake about 1½ miles south-southwest of Benjamin. Supply insufficient to supply city during extremely dry periods; water usually shipped to Benjamin from Knox City.
Pumpage: Average, 135,000 gallons a day.
Number of customers: 109.

Analysis of raw water

[Collected Oct. 5, 1945. Analyzed by J. H. Rowley and C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	40	2.000	Chloride (Cl)	18	0.508
Magnesium (Mg)	16	1.316	Fluoride (F)		
Sodium and potassium (Na+K)	20	.854	Nitrate (NO_3)	3.8	.061
Bicarbonate (HCO_3)	132	2.164	Dissolved solids	317	
Sulfate (SO_4)	69	1.437	Total hardness as $CaCO_3$	166	

GOREE

Population in 1940: 425.
Source of information: B. Justice, water superintendent, Mar. 22, 1944.
Ownership: Municipal.
Source of supply: Two wells.

Well 1. At south side of elevated tank; dug in 1925; depth, 45 feet; diameter, 12 feet; curbed with concrete blocks; deep-well turbine pump and 15-horsepower electric motor; static water level reported 28 feet below land surface in 1938, measured 21.7 feet below land surface Mar. 22, 1944; well can be pumped dry in 4 hours at 220 gallons a minute.

Well 2. At north side of elevated tank about 60 feet north of well 1; drilled in 1940; depth, 45 feet; diameter, 12 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 22.08 feet below land surface Mar. 22, 1944; yield, 150 gallons a minute.

Pumpage (estimated): 70,000 gallons a day in summer, 35,000 gallons a day in winter.
Storage: Elevated tank, 55,000 gallons.
Number of customers: 90.
Treatment: None.

Analysis, well 1

[Collected Mar. 22, 1944. pH is 7.9. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	26		Sulfate (SO_4)	386	8.04
Iron (Fe)	.02		Chloride (Cl)	296	8.35
Calcium (Ca)	113	5.64	Fluoride (F)	1.5	.08
Magnesium (Mg)	60	4.93	Nitrate (NO_3)	26	.42
Sodium (Na)	294	12.79	Dissolved solids	1,460	
Potassium (K)	10	.26	Total hardness as $CaCO_3$	528	
Bicarbonate (HCO_3)	410	6.73			

KNOX CITY

Population in 1940: 1,127.
Source of information: J. G. Dutton, water superintendent, Mar. 22, 1946.
Ownership: Municipal.
Source of supply: Well dug in 1930; depth, 38 feet; diameter, 12 feet; 2 centrifugal pumps driven by 15 and 25-horsepower electric motors; static water level, 18.5 feet Mar. 22, 1944; yield, 125 and 250 gallons a minute.
Pumpage (estimated): 175,000 gallons a day in summer, 60,000 gallons a day in winter.
Number of customers: 275.
Treatment: None.

Analysis, well 1

[Collected Mar. 22, 1944. Analyzed by M. L. Begley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	135	6.74	Sulfate (SO_4)	315	6.56
Magnesium (Mg)	55	4.52	Chloride (Cl)	251	7.08
Sodium and potassium (Na+K)	187	8.12	Nitrate (NO_3)	54	.87
Bicarbonate (HCO_3)	296	4.87	Dissolved solids	1,140	
			Total hardness as $CaCO_3$	563	

MUNDAY

Population in 1940: 1,545.
Source of information: R. B. Harrell, water superintendent, Mar. 22, 1944.
Ownership: Municipal.
Source of supply: Well at elevated tank; dug in 1922; depth, 37 feet; diameter, 20 feet; 2 deep-well turbine pumps and 25-horsepower electric motors; static water level, 13 feet below land surface Mar. 22, 1944; yield, 500 gallons a minute from each pump.
Pumpage (estimated): Average, 200,000 gallons a day.
Storage: Elevated tank, 50,000 gallons.
Number of customers: 260.
Treatment: None.

Analysis, well 1

[Collected Mar. 22, 1944. pH is 7.6. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	469	9.76
Iron (Fe)	.12		Chloride (Cl)	340	9.59
Calcium (Ca)	112	5.59	Fluoride (F)	1.9	.10
Magnesium (Mg)	99	8.14	Nitrate (NO_3)	183	2.95
Sodium (Na)	372	16.17	Dissolved solids	1,850	
Potassium (K)	15	.38	Total hardness as $CaCO_3$	686	
Bicarbonate (HCO_3)	481	7.88			

LAMPASAS COUNTY

LAMPASAS

Population in 1940: 3,426.
Source of information: Wade Wooten, water superintendent, Jan. 19, 1946.
Ownership: Municipal.
Source of supply: Sulphur Creek, pumping plant at south end of city.
Pumpage (estimated): Average, 1,250,000 gallons a day.
Storage: Standpipe, 225,000 gallons.
Number of customers: 923.
Treatment: Coagulation, sedimentation, chlorination.

Analysis of raw water

[Collected Jan. 19, 1946. pH is 8.0. 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)	25	0.52
Iron (Fe)	.63		Chloride (Cl)	102	2.88
Calcium (Ca)	72	3.59	Fluoride (F)	.2	.01
Magnesium (Mg)	39	3.21	Nitrate (NO_3)	1.8	.03
Sodium (Na)	51	2.23	Dissolved solids	501	
Potassium (K)	7.2	.18	Total hardness as $CaCO_3$	340	
Bicarbonate (HCO_3)	352	5.77			

LOMETA

Population in 1940: 915.
Source of information: C. M. Green, water superintendent, Jan. 18, 1946.
Ownership: Municipal.
Source of supply: Six wells.

Well 1. On top of hill near Eighth and Lampasas Streets; drilled in 1925 by Mr. Cass; depth, 594 feet; diameter, 10 to 6 inches; deep-well cylinder and pump jack and 5-horsepower electric motor; yield, 18 gallons a minute; temperature, 71° F.

Well 2. At Lampasas Street near Eighth Street; depth, 250 feet; diameter, 6 inches; deep-well cylinder and pump jack and 5-horsepower electric motor; yield, 5 gallons a minute.

Well 3. One hundred feet north of well 2; drilled by Marcus McLean in 1918; depth, 250 feet; diameter, 6 inches; deep-well cylinder and pump jack and 2-horsepower electric motor, electric motor also operates pump jack on well 4.

Well 4. About 10 feet from well 3; drilled by Marcus McLean in 1918; depth, 250 feet; diameter, 6 inches; deep-well cylinder and pump jack and electric motor on well 3.

Well 5. On Elm Street near East Railroad Street; drilled in 1941 by Ross Smart; depth, 300 feet; diameter, 6 inches; deep-well cylinder and pump jack and 3-horsepower electric motor, electric motor also operates pump jack on well 6; yield, 7 gallons a minute; temperature, 70° F.

Well 6. Ten feet west of well 5; drilled in 1943 by Ross Smart; depth, 300 feet; diameter, 6 inches; deep-well cylinder and pump jack operated by electric motor on well 5; static water level reported about 200 feet below land surface; yield, 7 gallons a minute; temperature, 69° F.

Pumpage (estimated): 50,000 gallons a day.
Storage: Concrete reservoir, 100,000 gallons.
Treatment: None.

Analysis

[Collected Jan. 18, 1946. pH: Well 1, 7.7; well 6, 7.9. Analyzed by C. B. Cibulka]

	Well 1		Well 6	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	7.0		7.0	
Iron (Fe)	.28		.39	
Calcium (Ca)	64	3.17	74	3.69
Magnesium (Mg)	50	4.11	58	4.77
Sodium (Na)	118	5.15	90	3.91
Potassium (K)	26	.67	15	.38
Bicarbonate (HCO_3)	401	6.57	396	6.49
Sulfate (SO_4)	228	4.75	200	4.16
Chloride (Cl)	62	1.75	72	2.03
Fluoride (F)	1.0	.05	1.0	.05
Nitrate (NO_3)	0	0	1.2	.02
Dissolved solids	754		726	
Total hardness as $CaCO_3$	365		423	

LLANO COUNTY

LLANO

Population in 1940: 2,658.

Source of information: H. C. Wallis, manager utilities, Glen O. Myers, plant operator, Feb. 13, 1946.

Ownership: Municipal.

Source of supply: Llano River dammed at site of water plant.

Average pumpage, in gallons a day

	1944	1945		1944	1945		1944	1945
January	104,000	94,000	May	134,000	175,000	September	153,000	188,000
February	97,000	112,000	June	174,000	173,000	October	121,000	160,000
March	107,000	120,000	July	209,000	264,000	November	125,000	149,000
April	173,000	146,000	August	195,000	202,000	December	114,000	148,000

Storage: Elevated tank, 100,000 gallons.

Treatment: Coagulation, sedimentation, rapid sand filters, and chlorination.

Analysis

[Collected Feb. 13, 1946. pH: Raw water, 7.8; finished water, 7.4. Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	15		5.0	
Iron (Fe)	0.78		.19	
Calcium (Ca)	28	1.398	40	1.997
Magnesium (Mg)	12	.987	20	1.645
Sodium (Na)	13	.559	9.1	.396
Potassium (K)	4.5	.115	7.8	.200
Bicarbonate (HCO_3)	130	2.131	162	2.655
Sulfate (SO_4)	15	.312	43	.895
Chloride (Cl)	21	.592	24	.677
Fluride (F)	.2	.011	.2	.011
Nitrate (NO_3)	.8	.013	0	0
Dissolved solids	180		234	
Total hardness as $CaCO_3$	119		182	

McCULLOCH COUNTY

BRADY

Population in 1940: 5,002.

Source of information: Edward Geeslin, manager, Jan. 18, 1946.

Ownership: Municipal.

Source of supply: Three wells.

Well 1. On west edge of town at west end of Commerce Street near Brady Creek, 50 yards north of power plant; drilled in 1921; depth, 2,114 feet; diameter, 15½ to 10 inches; deep-well turbine pump and 60-horsepower electric motor; static water level reported 134 feet below land surface; yield, 550 gallons a minute; temperature, 81° F.

Well 2. Four hundred feet south of the power plant; drilled in 1932 by Layne-Texas Co.; depth, 2,112 feet; deep-well turbine pump and 50-horsepower electric motor; yield, 434 gallons a minute.

Well 3. At corner of Oak and East First Street in the central part of the city; drilled in 1943 by Layne-Texas Co.; depth, 2,082 feet; diameter, 12¾ to 10¾ inches; deep-well submersible pump and 75, horsepower electric motor; yield, 750 gallons a minute.

Average pumpage in gallons a day

	1944	1945		1944	1945
January	772,000	945,000	July	1,582,000	1,134,000
February	894,000	1,100,000	August	1,693,000	1,578,000
March	743,000	931,000	September	1,101,000	1,228,000
April	1,057,000	1,134,000	October	930,000	950,000
May	1,104,000	1,183,000	November	1,025,000	776,000
June	913,000	1,263,000	December	865,000	

Storage: Concrete reservoir 2½ miles south of pumping plant, 1,000,000 gallons; elevated tank, 175,000 gallons.

Number of customers: 1,800.

Treatment: Hexametaphosphate.

Analysis

[Collected Jan. 18, 1946. pH: Well 1, 7.8; well 3, 7.9. Analyzed by C. B. Cibulka]

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	12		7.5	
Iron (Fe)	.32		.46	
Calcium (Ca)	59	2.94	24	1.20
Magnesium (Mg)	46	3.78	22	1.81
Sodium (Na)	12	.52	199	8.64
Potassium (K)	8.4	.21	23	.59
Bicarbonate (HCO_3)	366	6.00	402	6.76
Sulfate (SO_4)	41	.85	111	2.31
Chloride (Cl)	20	.56	107	3.02
Fluoride (F)	.8	.04	2.8	.15
Nitrate (NO_3)	0	0	0	0
Dissolved solids	389		694	
Total hardness as $CaCO_3$	336		150	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	20	20	Shale	20	1,365
Sand and gravel	12	32	Lime	15	1,380
Blue shale	18	50	Sand	12	1,392
Sandy shale	25	75	Lime	78	1,470
Sand	10	85	Sand	23	1,493
Gray sandy shale	20	105	Shale	17	1,510
White lime	11	116	Hard sand	25	1,535
Blue shale	74	190	Hard sand and shale	25	1,560
Red beds and shale	15	205	Coarse sand	35	1,595
Gray lime	6	211	Shale	10	1,605
Gray shale	24	235	Sandy shale	27	1,632
Lime	211	446	White lime	31	1,663
Sand	7	453	Sand	17	1,680
Lime	89	542	Red sand	16	1,696
Gray shale	13	555	Sand	29	1,725
Lime	40	595	Sand and red rock	25	1,750
Gray shale	5	600	Shale	20	1,770
Lime	530	1,130	Sand	65	1,835
Brown shale	5	1,135	Sand and shale	14	1,849
Lime	128	1,263	Sand	55	1,904
Shale	17	1,280	Hard white sand	24	1,928
Lime	10	1,290	Brown sand	175	2,103
Sandy shale	50	1,340	Blue shale	9	2,112
Red rock	5	1,345			

MELVIN

Population in 1940: 450.
Source of information: A. L. McDonald, operator, Jan. 17, 1946.
Owner: R. B. Hardin.
Source of supply: Dug well at east edge of town on creek bank; depth, 15 feet; diameter, 6 feet; centrifugal pump and 7½-horsepower electric motor; static water level, 11.1 feet below land surface Jan. 17, 1946; yield, 30 gallons a minute; temperature, 60° F.
Pumpage (estimated): Average, 30,000 gallons a day.
Storage: Two elevated tanks, 10,000 gallons each.
Number of customers: 175.
Treatment: Chlorination.

Analysis, well 1

[Collected Jan. 17, 1946. pH is 7.5. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	103	2.14
Iron (Fe)	.06		Chloride (Cl)	139	3.92
Calcium (Ca)	120	5.99	Fluoride (F)	.2	.01
Magnesium (Mg)	27	2.22	Nitrate (NO_3)	17	.27
Sodium (Na)	92	3.98	Dissolved solids	744	
Potassium (K)	16	.41	Total hardness as $CaCO_3$	410	
Bicarbonate (HCO_3)	382	6.26			

MERCURY

Population in 1940: 489.
Source of information: R. L. Gossett, water superintendent, Jan. 17, 1946.
Ownership: Municipal.
Source of supply: Well; drilled; depth, 430 feet; diameter, 6 inches; deep-well cylinder and pump jack and 3-horsepower electric motor; temperature, 68° F.
Pumpage (estimated): Average, 7,000 gallons a day.
Storage: Concrete standpipe, 14,400 gallons.
Number of customers: 35.
Treatment: None.

Analysis, well 1

[Collected Jan. 17, 1946. pH is 7.9. 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)	1.6	0.03
Iron (Fe)	.53		Chloride (Cl)	204	5.75
Calcium (Ca)	8.4	0.042	Fluoride (F)	.6	.03
Magnesium (Mg)	10	.82	Nitrate (NO_3)	.2	0
Sodium (Na)	310	13.46	Dissolved solids	848	
Potassium (K)	18	.46	Total hardness as $CaCO_3$	62	
Bicarbonate (HCO_3)	570	9.35			

ROCHELLE

Population in 1940: 515.
Source of information: M. A. Gainer, owner, Jan. 18, 1946.
Owners: M. A. Gainer and J. P. Boyd.

Source of supply: Well; drilled in 1930 by J. C. Verdell, depth, 300 feet; diameter, 6 inches; deep-well cylinder pump and windmill; temperature, 70° F.
Pumpage (estimated): Average, 3,000 gallons a day.
Storage: Elevated tank, 3,000 gallons.
Number of customers: 38.
Treatment: None.

Analysis, well 1

[Collected Jan. 18, 1946. pH is 8.2. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	5.5		Sulfate (SO_4)	226	4.71
Iron (Fe)	.64		Chloride (Cl)	68	1.92
Calcium (Ca)	28	1.40	Fluoride (F)	1.2	.06
Magnesium (Mg)	17	1.40	Nitrate (NO_3)	1.2	.02
Sodium (Na)	201	8.74	Dissolved solids	720	
Potassium (K)	15	.38	Total hardness as $CaCO_3$	140	
Bicarbonate (HCO_3)	318	5.21			

MENARD COUNTY

MENARD

Population in 1940: 2,375.
Source of information: Jim Stockton, water superintendent, Jan. 16, 1946.
Ownership: Municipal.
Source of supply: San Saba River.

Average pumpage, in gallons a day, 1945

January	103,000	May	136,000	September	204,000
February	104,000	June	149,000	October	141,000
March		July	174,000	November	142,000
April	117,000	August	213,000	December	

Storage: Elevated tank, 200,000 gallons; concrete ground reservoir, 120,000 gallons.
Treatment: Coagulation, sedimentation, prechlorination and postchlorination.

Analysis

[Collected Jan. 16, 1946. pH: Raw water, 8.2; finished water, 8.0. Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	11		8.2	
Iron (Fe)	.08		.11	
Calcium (Ca)	64	3.19	72	3.59
Magnesium (Mg)	22	1.81	22	1.81
Sodium (Na)	9.2	.40	1.1	.05
Potassium (K)	3.0	.08		
Bicarbonate (HCO_3)	262	4.66	276	4.52
Sulfate (SO_4)	11	.23	17	.35
Chloride (Cl)	20	.56	20	.56
Fluoride (F)	.2	.01	0	0
Nitrate (NO_3)	1.0	.02	1.2	.02
Dissolved solids	275		281	
Total hardness as $CaCO_3$	250		270	

MILLS COUNTY

GOLDTHWAITE

Population in 1940: 1,412.
Source of information: W. C. Barnett, utilities manager, Mar. 19, 1946.
Ownership: Municipal.
Source of supply: Seven wells.

Well 1. Dug by the Santa Fe Railroad Co. prior to 1910; depth, 50 feet, diameter, 30 feet; plunger pump and 3-horsepower electric motor; static water level, 30 feet below land surface Mar. 19, 1946; temperature, 62° F.

Well 2. Dug by the Santa Fe Railroad Co. prior to 1910; depth, 50 feet; diameter, 30 feet; Peerless Hi-lift pump and 3-horsepower electric motor; temperature, 63° F.

Well 3. Drilled; depth, 80 feet; diameter, 6 inches; deep-well cylinder and pump jack and 3-horsepower electric motor.

Well 4. Drilled; depth, 95 feet; diameter, 6 inches; deep-well cylinder and pump jack and 3-horsepower electric motor.

Well 5. Drilled in 1939 by Clyde D. Layne; depth, 370 feet; diameter, 8¼ to 6 inches; Peerless Hi-lift pump and 5-horsepower electric motor.

Well 6. One and one-half miles north of town; drilled in 1945 by Layne-Texas Co.; depth, 353 feet; diameter, 10¾ inches; deep-well submersible turbine pump and electric motor; yield, about 45 gallons a minute.

Well 7. Nine hundred feet north of old water plant; drilled in 1945 by Layne-Texas Co.; depth, 370 feet; diameter, 10¾ inches; deep-well turbine pump and electric motor; yield, about 45 gallons a minute.

Pumpage (estimated): 100,000 gallons a day.
Storage: Concrete reservoir on hilltop, 257,000 gallons; ground reservoir near the wells, 50,000 gallons.
Number of customers: 375.
Treatment: Hydrochlorination.

Analysis, well 6

[Collected Mar. 19, 1946. pH is 7.3. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	8.8		Sulfate (SO_4)	141	2.94
Iron (Fe)	.05		Chloride (Cl)	113	3.19
Calcium (Ca)	74	3.69	Fluoride (F)	.8	.04
Magnesium (Mg)	53	4.36	Nitrate (NO_3)	0	0
Sodium (Na)	105	4.56	Dissolved solids	732	
Potassium (K)	18	.46	Total hardness as $CaCO_3$	402	
Bicarbonate (HCO_3)	421	6.90			

Drillers' logs

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 5					
Surface soil	3	3	Hard sand	35	135
Lime	19	22	Broken sand	41	176
Blue soapstone	16	38	Sand and lime	40	216
Lime shell	2	40	Sandy lime	6	222
Yellow shale	8	48	Broken sand	13	235
Dry sand	22	70	Red bed	25	260
Sandy shale	10	80	Lime	27	287
Lime shell	2	82	Broken lime	61	348
Soft sand water	5	87	Water sand	20	368
Sand water	13	100	Red bed	2	370
Well 6					
Sand and gravel	5	5	Dry sand	15	235
Yellow sand rock	17	22	Lime and red rock	55	290
Gray lime and shale	6	28	Sand and lime	4	294
Lime and shale	22	50	Lime	4	298
Water sand	28	78	Sandy lime	11	309
Lime and sand	2	80	Sand	3	312
Sand	10	90	Water sand	8	320
Lime	7	97	Lime and shale	6	326
Sandy lime and shale	5	102	Sand and lime—red rock and fine gravel	6	332
Lime and shale	5	107	Lime and sandy shale	3	335
Sandy lime	7	114	Very limey sand and gravel	8	343
Lime	6	120	Shaly sand	4	347
Dry sand	5	125	Lime and shale	3	350
Lime and shale	75	200	Shale and yellow clay	3	353
Sandy lime	8	208			
Lime and red rock	12	220			
Well 7					
Black soil	5	5	Sand and shale	5	260
Gravel and sand rock	11	16	Sand, coarse, no water	5	265
Yellow sand rock	6	22	Sand	5	270
Gray lime and shale	19	41	Red rock	10	280
Sand water	39	80	Sandy red rock	18	298
Shale	15	95	Lime and red rock	22	320
Lime and shale	65	160	Sand and lime	27	347
Sand, lime and shale	25	185	Hard sand	15	362
White sandy lime	35	220	Coarse sand	5	367
Red rock	30	250	Red beds	3	370
Sand and red rock	5	255			

MULLIN

Population in 1940: 404.

Source of information: W. L. Smith, Mar. 21, 1946.

Owner: S. J. Eton.

Source of supply: Well; drilled about 1916 by Henry Hart; depth, about 100 feet; diameter, 6 inches; deep-well cylinder and windmill.

Pumpage: No record.

Storage: Elevated tank, 1,500 gallons.

Number of customers: 8.

Treatment: None.

Analysis, well 1

[Collected Mar. 21, 1946. pH is 7.5. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.6		Sulfate (SO_4)	51	1.06
Iron (Fe)	.30		Chloride (Cl)	152	4.29
Calcium (Ca)	151	7.54	Fluoride (F)	.2	.01
Magnesium (Mg)	95	7.81	Nitrate (NO_3)	221	3.56
Sodium (Na)	26	1.11	Dissolved solids	946	
Potassium (K)	7.9	.20	Total hardness as $CaCO_3$	768	
Bicarbonate (HCO_3)	472	7.47			

MONTAGUE COUNTY

BOWIE

Population in 1940: 3,407.

Source of information: Harry Davis, water superintendent, June 4, 1946.

Ownership: Municipal.

Source of supply: Lake Bowie 7½ miles north of Bowie, capacity 1,800 acre-feet

Average pumpage, in gallons a day, 1945

January	170,000	May	238,000	September	297,000
February	182,000	June	254,000	October	224,000
March	165,000	July	275,000	November	248,000
April	194,000	August	372,000	December	226,000

Storage: Two ground tanks at Lake, 70,000 gallons each; one settling basin at Lake, 150,000 gallons; ground reservoir, 187,000 gallons; standpipe, 90,000 gallons.

Number of customers: 1,500.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis

[Collected June 4, 1946. pH for both raw and finished water is 7.8. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	6.7		4.7	
Iron (Fe)	1.9		.06	
Calcium (Ca)	18	0.90	26	1.298
Magnesium (Mg)	7.2	.59	6.1	.502
Sodium (Na)	20	.88	19	.816
Potassium (K)	4.0	.12	4.9	.125
Bicarbonate (HCO_3)	104	1.70	69	1.131
Sulfate (SO_4)	14	.29	54	1.124
Chloride (Cl)	17	.48	16	.451
Fluoride (F)	.2	.01	.6	.032
Nitrate (NO_3)	.4	.01	.2	.003
Dissolved solids	143		167	
Total hardness as $CaCO_3$	74		90	

NOCONA

Population in 1940: 2,605.

Source of information: Water superintendent, Nov. 17, 1944.

Ownership: Municipal.

Source of supply: Nine wells.

Well 1. One block west of pump station; drilled; depth, 388 feet; diameter, (?); Peerless Hi-lift pump and electric motor; yield, 32 gallons a minute on Nov. 17, 1944.

Well 2. One block northwest of pump station; drilled in 1926; depth, 712 feet; diameter, 8 to 5⅜ inches; deep-well cylinder and pump jack and electric motor; static water level, 263 feet below land surface Nov. 1944; yield, 19 gallons a minute on Nov. 17, 1944.

Well 3. One hundred feet north of pump station; drilled in 1926; depth, 600 feet; diameter, 12 inches; Peerless Hi-lift pump and electric motor; yield, 10½ gallons a minute on Nov. 17, 1944.

Well 4. Fifty feet south of pump station; drilled in 1926; depth, 600 feet; diameter, 12 inches; deep-well cylinder and pump jack and electric motor; yield, 6½ gallons a minute on Nov. 17, 1944.

Well 5. One-quarter mile northeast of pump station; drilled in 1938; depth, 525 feet; diameter, 8 to 6⅝ inches; deep-well cylinder and pump jack and electric motor; static water level, 321 feet below land surface Nov. 16, 1944; yield, 12 gallons a minute on Nov. 13, 1944.

Well 6. One hundred and twenty-four feet north of well 5; drilled in 1942; depth, about 600 feet; diameter, 8 inches; deep-well cylinder and pump jack and electric motor; static water level, 306 feet below land surface November 1944; yield, 17 gallons a minute with a drawdown of 180 feet in November 1944.

Well 7. Approximately one-half mile south of pump station; drilled in 1938; depth, 500 feet; diameter, 10 inches; deep-well cylinder and pump jack and electric motor; static water level, 182 feet below land surface November 1944; yield, 23 gallons a minute with a drawdown of 164 feet in November 1944.

Well 8. Two hundred and fifty feet south of well 7; drilled in 1939; depth, 508 feet; diameter, 10 inches; Peerless Hi-lift pump and electric motor; static water level, 141 feet below land surface November 1944; estimated yield, 25 gallons a minute in November 1944.

Well 9. About 20 feet north of pump station; drilled in 1944; depth, 780 feet, cased to 680 feet, diameter, 8⅝ inches; deep-well cylinder and pump jack and electric motor; static water level, 209 feet below land surface Nov. 17, 1944; yield, 28 gallons a minute with a drawdown of 340 feet in November 1944.

Storage: Elevated tank, 100,000 gallons; concrete ground reservoir, 50,000 gallons.

Treatment: None.

Analysis

[Collected Nov. 17, 1944. pH of wells 1, 3, 6, 7, and 9 is 8.4 Analyzed by J. H. Rowley]

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13			
Iron (Fe)	.03			
Calcium (Ca)	2.6	0.13	2.7	0.13
Magnesium (Mg)	.7	.06	2.1	.17
Sodium (Na)	210	9.11	221	9.61
Potassium (K)				
Bicarbonate (HCO_3)	503	8.24	542	8.87
Sulfate (SO_4)	30	.62	34	.71
Chloride (Cl)	12	.34	11	.31
Fluoride (F)	1.6	.08		
Nitrate (NO_3)	1.5	.02	1.2	.02
Dissolved solids	532		574	
Total hardness as $CaCO_3$	10		15	

	Well 6		Well 7		Well 9	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	8.4				11	
Iron (Fe)	.34				10	
Calcium (Ca)	3.8	0.19	2.1	0.10	4.6	0.23
Magnesium (Mg)	.9	.07	.4	.03	1.4	.12
Sodium (Na)	278	12.09	205	8.92	481	20.91
Potassium (K)	4.5	.12			5.8	.15
Bicarbonate (HCO_3)	647	10.59	498	8.16	736	12.06
Sulfate (SO_4)	53	1.10	20	.42	53	1.10
Chloride (Cl)	19	.54	16	.45	286	8.07
Fluoride (F)	4.0	.21			3.0	.16
Nitrate (NO_3)	1.8	.03	1.2	.02	1.2	.02
Dissolved solids	708		518		1,210	
Total hardness as $CaCO_3$	13		6		18	

Drillers' logs

Well 5—partial log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	10	10	Gray shale	4	190
Yellow clay	15	25	Red shale	125	315
Shale	15	40	Sandy gray shale	25	340
Brown shale	10	50	Water sand	6	346
Sandy gray shale	44	94	Sandy gray shale	9	355
Water sand	7	101	Water sand	15	370
Gray shale	39	140	Sandy gray shale	4	374
Red shale	10	150	Water sand	21	395
Blue shale	25	175	Blue shale	5	400
Black shale	11	186	Red shale	5½	405½

Well 7—partial log

Red clay	25	25	Blue shale	28	230
Sand rock	10	35	Water sand	32	262
Red clay	13	48	Red clay	3	265
Sand rock	12	60	Blue shale	7	272
Water sand	12	72	Red clay	43	315
Red clay	33	105	Gray shale	7	322
Water sand	40	145	Red clay	9	331
Blue shale	20	165	Sandy shale	15	346
Sandy shale	12	177	Water sand	31	377
Water sand	25	202			

Drillers' logs—Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 8—partial log					
Red clay	16	16	Red clay	10	218
Sand rock	12	28	Sandy shale	13	231
Red clay	20	48	Water sand	51	282
Sand rock	15	63	Red clay	12	294
Green shale	17	80	Gray shale	28	322
Red clay	38	118	Red clay	23	345
Sandy shale	24	142	Sandy shale	25	370
Gray shale	8	150	Water sand	12	382
Red clay	30	180	Gray shale	16	398
Blue shale	5	185	Water sand	24	422
Water sand	23	208	Sandy shale	4	426
Well 9					
Sand, gravel, and shale	204	204	Sandy shale, lime, shells, and sand	32	682
Sand, shale, and shells	123	327	Sand	72	754
Clay, shale, and broken sand	92	419	Lime shells and white sand	26	780
Sand, shale, and shells	231	650			

SAINT JO

Population in 1940: 1,010.
Source of information: J. L. Farris, mayor, June 5, 1946.
Ownership: Municipal.
Source of supply: Well at City Hall; drilled in 1938 by Harry Baird; depth, 430 feet; diameter, 7 inches; deep-well turbine pump and electric motor; static water level reported 160 feet below land surface; yield, 80 gallons a minute.
Pumpage: Average, 66,300 gallons a day.
Storage: Ground reservoir, 120,000 gallons; elevated tank, 90,000 gallons.
Number of customers: 312.
Treatment: None.

Analysis

[Collected June 5, 1946. pH is 7.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	96	2.00
Iron (Fe)	.06		Chloride (Cl)	13	.37
Calcium (Ca)	102	5.09	Fluoride (F)	.4	.02
Magnesium (Mg)	33	2.71	Nitrate (NO_3)	3.8	.06
Sodium (Na)	27	1.17	Dissolved solids	504	
Potassium (K)	6.8	.17	Total hardness as $CaCO_3$	390	
Bicarbonate (HCO_3)	408	6.69			

PALO PINTO COUNTY

GORDON

Population in 1940: 532.
Source of information: J. A. Stewart, mayor.
Ownership: Municipal.
Source of supply: Lake about 1 mile southwest of Gordon; capacity, about 240 acre-feet.
Pumpage (estimated): 30,000 gallons a day.
Storage: Concrete reservoir on hill, 55,000 gallons.
Number of customers: 140.
Treatment: Chlorination (no filtration).

835237—49——7

Analysis

[Collected November 1945. pH is 7.2. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	8.6		Sulfate (SO_4)	13	0.271
Iron (Fe)	.30		Chloride (Cl)	8.0	.226
Calcium (Ca)	28	1.400	Fluoride (F)	.2	.011
Magnesium (Mg)	6.6	.543	Nitrate (NO_3)	.2	
Sodium (Na)	5.2	.224	Dissolved solids	128	.003
Potassium (K)			Total hardness as $CaCO_3$	97	
Bicarbonate (HCO_3)	101	1.656			

GRAFORD

Population in 1940: 804.

Source of information: Joe Baggett, water superintendent, May 23, 1946.

Ownership: Municipal.

Source of supply: Keechi Creek 1 mile west of town.

Pumpage: Average, 36,000 gallons a day.

Storage: Concrete settling reservoir; 30,000 gallons; elevated tank, 50,000 gallons.

Number of customers: 200.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis

[Collected May 23, 1946. pH: Raw water, 7.8; finished water, 7.0. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		8.2	
Iron (Fe)	.14		.26	
Calcium (Ca)	54	2.695	58	2.895
Magnesium (Mg)	4.5	.370	7.1	.584
Sodium (Na)	22	.943	15	.673
Potassium (K)	4.4	.113	5.1	.130
Bicarbonate (HCO_3)	186	3.049	110	1.803
Sulfate (SO_4)	17	.354	81	1.686
Chlorite (Cl)	25	.705	28	.790
Fluoride (F)	0	0	0	0
Nitrate (NO_3)	.8	.013	.2	.003
Dissolved solids	236		264	
Total hardness as $CaCO_3$	153		175	

MINERAL WELLS

Population in 1940: 6,303.

Source of information: T. A. Camp, water commissioner, January 1946.

Ownership: Municipal.

Source of supply: Reservoir, 6 miles east of Mineral Wells, on Rock Creek; reservoir capacity, 2,500,000,000 gallons.

Pumpage: Maximum, 2,000,000 gallons a day; winter average, about 1,500,000 gallons a day.

Storage: Ground reservoir, 1,090,000 gallons.

Number of customers: 2,300 (also supplies Camp Wolters).

Treatment: Alum and lime, prechlorination, rapid sand filtration, ammonia, and postchlorination.

Analysis

[Collected November 1945. pH: Raw water, 7.4; finished water, 7.3 Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	9.8		4.3	
Iron (Fe)	.09		.04	
Calcium (Ca)	38	1.897	42	2.096
Magnesium (Mg)	10	.822	10	.822
Sodium (Na)	14	.628	16	.677
Potassium (K)	5.2	.133	4.4	.113
Bicarbonate (HCO_3)	137	2.246	132	2.164
Sulfate (SO_4)	33	.687	43	.895
Chloride (Cl)	19	.536	23	.649
Fluoride (F)	.2	.011	0	0
Nitrate (NO_3)	0	0	0	0
Dissolved solids	221		217	
Total hardness as $CaCO_3$	136		146	

MINGUS

Population in 1940: 570.
Source of information: Pump operator, January 1946.
Owner: T. & P. Mercantile Co. owns lake; city owns distribution system.
Source of supply: T. & P. Mercantile Co. lake at Thurber.
Pumpage (estimated): 5,000 to 10,000 gallons a day.
Number of customers: 80.
Treatment: Chlorination and filtration.

Analysis of finished water

[Collected November 1945. pH is 7.2. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	7.9		Sulfate (SO_4)	4.3	0.090
Iron (Fe)	1.6		Chloride (Cl)	10	.282
Calcium (Ca)	22	1.098	Fluoride (F)	.2	.011
Magnesium (Mg)	5.4	.444	Nitrate (NO_3)	0	0
Sodium (Na)	12		Dissolved solids	117	
Potassium (K)		.513	Total hardness as $CaCO_3$	77	
Bicarbonate (HCO_3)	102	1.672			

STRAWN

Population in 1940: 1,107.
Source of information: A. M. Barrett, city secretary, November 1945.
Ownership: Municipal.
Source of supply: Lake No. 4 on Walnut Creek, 2½ miles north of Strawn; reservoir capacity, 400 acre-feet. New lake 5 miles west of Strawn on Russell's Creek; reservoir capacity, 1,200 acre-feet; available for city added supply, but not used at present.
Pumpage (estimated): 35,000 gallons a day in summer; about 30,000 gallons a day in winter.
Storage: Elevated tank, 100,000 gallons.
Number of customers: 330.
Treatment: H. T. H. alum, lime, and activated carbon.

Analysis

[Collected November 1945. pH: Raw water, 7.7; finished water, 7.0. Analyzed by J. H. Rowley]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	12		3.2	
Iron (Fe)	.24		.04	
Calcium (Ca)	46	2.296	90	4.492
Magnesium (Mg)	3.9	.321	3.5	.288
Sodium (Na)	3.0			
Potassium (K)		.131	3.8	.166
Bicarbonate (HCO_3)	150	2.459	106	1.737
Sulfate (SO_4)	7.8	.162	146	3.040
Chloride (Cl)	4.0	.113	6.0	.169
Fluoride (F)	.2	.011	0	0
Dissolved solids	158	.003	331	0
Total hardness as $CaCO_3$	131		239	

PARKER COUNTY

WEATHERFORD

Population: 5,924.

Source of information: E. C. Shelby, Sr., water superintendent, November 1945.

Ownership: Municipal.

Source of supply: Six wells.

Well 1. At Davis and Lee Streets; drilled in 1889; depth, 401 feet; diameter, 10 inches; deep-well turbine pump and 15-horsepower electric motor; yield 60 gallons a minute.

Well 2. Drilled in 1925 by Q. D. Lewis; depth, 500 feet; diameter, 8 inches; double action deep-well cylinder and pump jack; yield, 60 gallons a minute.

Well 3. Drilled in 1927 by Henry Measures; depth, 388 feet; diameter, 8 inches; deep-well turbine and 20-horsepower electric motor; yield, 100 gallons a minute.

Well 4. Drilled in 1941 by Layne-Texas Co.; depth, 401 feet; diameter, 16 inches; deep-well turbine pump and 25-horsepower electric motor; static water level, July 23, 1941, 295 feet; pumping level, 366 feet when pumping 152 gallons a minute.

Well 5. Drilled in 1941 by Layne-Texas Co.; depth, 456 feet; diameter, 16 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 65 gallons a minute; static water level, Sept. 21, 1941, 356 feet; pumping level, 440 feet when pumping 75 gallons a minute.

Well 6. Drilled in 1944 by Layne-Texas Co.; depth, 400 feet; diameter, 16 inches; deep-well turbine pump and 25-horsepower electric motor; yield, 72 gallons a minute.

Pumpage (estimated): Average, 450,000 gallons a day.

Customers: 1,750.

Storage: Two ground storage reservoirs, total capacity, 3,000,000 gallons.

Treatment: Chlorination.

Analysis

[Collected November 1945. pH for wells 1, 3, and 4 is 7.2. Analyzed by C. B. Cibulka]

	Well 1		Well 3		Well 4	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	14		15		15	
Iron (Fe)	.15		.10		.68	
Calcium (Ca)	61	3.04	68	3.39	63	3.14
Magnesium (Mg)	28	2.30	40	3.29	35	2.88
Sodium (Na)	106	4.62	83	3.62	91	3.95
Potassium (K)	20	.51	20	.51	18	.46
Bicarbonate (HCO_3)	396	6.49	420	6.88	403	6.61
Sulfate (SO_4)	109	2.27	110	2.29	105	2.19
Chloride (Cl)	59	1.66	57	1.61	57	1.61
Fluoride (F)	0	0	.6	.03	0	0
Nitrate (NO_3)	3.0	.05	0	0	1.0	.02
Dissolved solids	595		608		603	
Total hardness as $CaCO_3$	267		334		301	

Drillers' logs

Well 4

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	5	5	Hard shale	12	318
Sandy soil	16	21	Good sand	18	336
Hard sandy shale	13	34	Sandy shale	10	346
Hard white sandy shale with layers of hard fine sand	32	66	Sand	10	356
Hard fine-grained sand	7	73	Hard shale	15	371
Hard shale	9	82	Hard red and blue shale	18	389
Hard sandy lime	3	85	Sand	9	398
Blue shale	15	100	Red and blue shale	9	407
Lime	104	204	Red, blue and yellow shale	50	457
Lime and shale	25	229	Lime	12	469
Hard shale and lime	42	271	Shale	31	500
Lime	4	275	Hard black shale, layers of fine sand and lignite (bottom of Trinity)	6	506
Shale	19	294			
Fine-grained sand	12	306			

Well 5

Surface soil	3	3	Rock	3	200
Clay	5	8	Shale and rock	9	209
Sand	8	16	Hard rock	15	224
Shale	4	20	Hard lime rock and shale	12	236
Shale and lime streaks	15	35	Hard rock	5	241
Fine-grained white sand	7	42	Hard lime and shale	16	257
Hard lime	12	54	Hard lime rock	10	267
Sand and shale	11	65	Hard shale	2	269
Hard shale	4	69	Lime rock and shale	13	282
Sandy shale	5	74	Hard lime	11	293
Sand (cut good)	26	100	Shale and lime	16	309
Hard lime	8	108	Hard lime	15	324
Rock	1	109	Rock	2	326
Lime	3	112	Shale and lime	20	346
Hard lime and shale	13	125	Hard fine white sand	9	355
Hard sand	2	127	Shale and lime	18	373
Blue shale and lime	21	148	Lime sand and lime	11	384
Shale and boulders	5	153	Shale	3	387
Hard shale	18	171	Sand	9	396
Hard lime	6	177	Shale and lime	13	409
Shale	2	179	White sand and shale	11	420
Hard shale	11	190	Coarse white sand	21	441
Hard lime	3	193	Brown shale	20	461
Hard shale and lime	4	197			

RUNNELS COUNTY

BALLINGER

Population in 1940: 4,472.
Source of information: K. V. Northington, water superintendent, Apr. 17, 1946.
Ownership: Municipal.
Source of supply: Two lakes on Elm Creek.

Average pumpage, in gallons a day

	1945	1946		1945	1946		1945	1946
January	239,000	250,000	May	426,000		September	535,000	
February	247,000	311,000	June	521,000		October	325,000	
March	280,000	365,000	July	496,000		November	298,000	
April	293,000		August	565,000		December	242,000	

Storage: Elevated tank, 250,000 gallons; standpipe, 80,000 gallons; settling basin at pumping station, 315,000 gallons.
Number of customers: 1,551.
Treatment: Aeration, coagulation, sedimentation, filtration, chlorination.

Analysis

[Collected: Apr. 17, 1946. pH, Raw and finished water, is 7.4. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	20		6.0	
Iron (Fe)	.49		.03	
Calcium (Ca)	120	5.99	118	5.89
Magnesium (Mg)	83	6.83	82	6.74
Sodium (Na)	193	8.38	203	8.84
Potassium (K)	30	.77	36	.92
Bicarbonate (HCO_3)	193	3.16	202	3.31
Sulfate (SO_4)	232	4.83	245	5.10
Chloride (Cl)	495	13.96	495	13.96
Fluoride (F)	0	0	.2	.01
Nitrate (NO_3)	1.20	.02	.5	.01
Dissolved solids	1,270		1,290	
Total hardness as $CaCO_3$	641		632	

MILES

Population in 1940: 814.
Source of information: F. G. Lewin, water superintendent, Apr. 17, 1946.
Ownership: Municipal.
Source of supply: Two wells.

Well 1. Two hundred feet northeast of pump house; drilled about 1928 by the State highway department; depth, about 120 feet; diameter, 8 inches; deep-well cylinder and pump jack and 5-horsepower electric motor; reported yield, 90 to 120 gallons a minute.

Well 2. One hundred and fifty feet southeast of pump house; drilled in 1921 by J. O. Donaldson; depth, about 120 feet; diameter, 6 inches; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 28 gallons a minute.

Pumpage (estimated): Average, 100,000 gallons a day.
Storage: Ground reservoir, 50,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 208.
Treatment: Chlorination.

Analysis, well 1

[Collected Apr. 17, 1946. pH is 7.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	584	12.16
Iron (Fe)	.11		Chloride (Cl)	201	5.67
Calcium (Ca)	204	10.18	Fluoride (F)	1.8	.09
Magnesium (Mg)	85	6.99	Nitrate (NO_3)	5.2	.08
Sodium (Na)	133	5.78	Dissolved solids	1,390	
Potassium (K)	6.2	.16	Total hardness as $CaCO_3$	858	
Bicarbonate (HCO_3)	312	5.11			

WINTERS

Population in 1940: 2,335.

Source of information: C. D. Blackley, water superintendent, Apr. 17, 1946.

Ownership: Municipal.

Source of supply: Lake about 5 miles southeast of Winters.

Pumpage (estimated): 130,000 gallons a day.

Storage: Settling basin, 140,000 gallons; clear well, 25,000 gallons; 2 standpipes, 100,000 and 150,000 gallons.

Number of customers: 600.

Treatment: Coagulation, sedimentation, prechlorination, and postchlorination.

Analysis

[Collected Apr. 17, 1946. pH: Raw water, 7.6; finished water, 7.4. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	2.4		2	
Iron (Fe)	.14		.06	
Calcium (Ca)	58	2.89	60	2.99
Magnesium (Mg)	20	1.64	20	1.64
Sodium (Na)	16	.70	17	.72
Potassium (K)	9.6	.25	9.1	.23
Bicarbonate (HCO_3)	234	3.84	226	3.70
Sulfate (SO_4)	45	.94	54	1.12
Chloride (Cl)	24	.68	27	.76
Fluoride (F)	0	0	0	0
Nitrate (NO_3)	1.2	.02	.2	0
Dissolved solids	310		316	
Total hardness as $CaCO_3$	226		232	

SAN SABA COUNTY

RICHLAND SPRINGS

Population in 1940: 451.

Source of information: Herman Atchison, water superintendent, Jan. 18, 1946.

Ownership: Municipal.

Source of supply: Two springs at north end of Carter Street, one block north of Highway 190; discharge of south spring, 1,536 gallons a minute Oct. 28, 1938; water pumped from spring by centrifugal pump and 10-horsepower electric motor.

Storage: Elevated tank, 60,000 gallons.

Number of customers: 140.

Treatment: Chlorination.

Composite analysis

[Collected Jan. 18, 1946. pH is 7.7. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.2		Sulfate (SO_4)	13	0.27
Iron (Fe)	.06		Chloride (Cl)	58	1.64
Calcium (Ca)	104	5.19	Fluoride (F)	.4	.02
Magnesium (Mg)	23	1.89	Nitrate (NO_3)	3.8	.06
Sodium (Na)	30	1.31	Dissolved solids	448	
Potassium (K)	6.7	.17	Total hardness as $CaCO_3$	354	
Bicarbonate (HCO_3)	401	6.57			

SAN SABA

Population in 1940: 2,927.
Source of information: Reeves Kuykendall, city secretary, Jan. 18, 1946.
Ownership: Municipal.
Source of supply: Springs in eastern part of city; temperature, 72° F.
Pumpage: Average, 720,000 gallons a day.
Storage: Elevated tank, 100,000 gallons.
Number of customers: 650.

Analysis

[Collected Jan. 18, 1946. pH is 7.8. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.2		Sulfate (SO_4)	7.2	0.15
Iron (Fe)	.05		Chloride (Cl)	152	4.29
Calcium (Ca)	116	5.79	Fluoride (F)	0	0
Magnesium (Mg)	41	3.37	Nitrate (NO_3)	1.8	.03
Sodium (Na)	61	2.64	Dissolved solids	648	
Potassium (K)	12	.31	Total hardness as $CaCO_3$	458	
Bicarbonate (HCO_3)	466	7.64			

SHACKELFORD COUNTY

ALBANY

Population in 1940: 2,230.
Source of information: Roy Matthews, water superintendent, Sept. 19, 1946.
Ownership: Municipal.
Source of supply: Lake McCarty, 7 miles south of city.
Pumpage: 400,000 gallons a day in summer, 130,000 gallons a day in winter.
Storage: Elevated tank, 75,000 gallons.
Number of customers: 625.
Treatment: Aeration, coagulation, sedimentation, rapid sand filteration, and chlorination.

Analysis of raw water

[Collected: Sept. 19, 1946. pH is 7.7. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	21		Sulfate (SO_4)	26	0.54
Iron (Fe)	.04		Chloride (Cl)	170	4.79
Calcium (Ca)	57	2.85	Fluoride (F)	.2	.01
Magnesium (Mg)	17	1.40	Nitrate (NO_3)	.5	.01
Sodium (Na)	79	3.44	Dissolved solids	513	
Potassium (K)	11	.28	Total hardness as $CaCO_3$	212	
Bicarbonate (HCO_3)	160	2.62			

SOMERVELL COUNTY

GLEN ROSE

Population in 1940: 1,050.

Source of information: C. A. Stevenson, water superintendent, November 1945.

Ownership: Municipal.

Source of supply: Well at pumping station; drilled in 1934 by Layne-Texas Co.; depth, 320 feet; diameter, 8 inches; deep-well turbine pump with 10-horsepower electric motor; well flows from 20,000 to 30,000 gallons a day; pump not used much until recently; yield when pumping, 200 gallons a minute.

Pumpage (estimated): 75,000 to 100,000 gallons a day in summer, 50,000 gallons a day in winter.

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

Number of customers: 141.

Treatment: None.

Analysis

[Collected November 1945. pH is 7.2. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate (SO_4)	20	0.42
Iron (Fe)	.05		Chloride (Cl)	18	.51
Calcium (Ca)	25	1.25	Fluoride (F)	.2	.01
Magnesium (Mg)	22	1.81	Nitrate (NO_3)	.2	0
Sodium (Na)	97	4.20	Dissolved solids	386	
Potassium (K)	6.1	.16	Total hardness as $CaCO_3$	153	
Bicarbonate (HCO_3)	395	6.48			

STEPHENS COUNTY

BRECKENRIDGE

Population in 1940: 5,826.

Source of information: E. A. Cain, manager, May 24, 1946.

Owner: Community Public Service Co.

Source of supply: Two lakes on Clear Fork River about 10 miles northwest of Breckenridge near Crystal Falls.

Average pumpage, in gallons a day, 1945

January	332,000	May	464,000	September	609,000
February	345,000	June	571,000	October	430,000
March	387,000	July	610,000	November	421,000
April	362,000	August	692,000	December	403,000

Storage: Earth and ground reservoir at Crystal Falls, 3,000,000 gallons; settling basin in city, 1,000,000 gallons; clear well, 65,000 gallons; elevated tank 100,000 gallons.

Number of customers: 1,875.

Treatment: Coagulation, sedimentation, prechlorination, and postchlorination.

Analysis of finished water

[Collected May 24, 1946. pH is 7.8. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	2.0		Sulfate (SO_4)	758	15.78
Iron (Fe)	.28		Chloride (Cl)	411	11.59
Calcium (Ca)	190	9.48	Fluoride (F)	.4	.02
Magnesium (Mg)	66	5.43	Nitrate (NO_3)	.5	.01
Sodium (Na)	322	13.98	Dissolved solids	1,870	
Potassium (K)	17	.43	Total hardness as $CaCO_3$	746	
Bicarbonate (HCO_3)	117	1.92			

CADDO

Population in 1940: 700.
Source of information: John Luttrell, May 23, 1946.
Owner: John Luttrell.
Source of supply: Lake on small draw.
Pumpage: Average, 2,100 gallons a day.
Storage: Elevated tank, 6,000 gallons.
Number of customers: 22.
Treatment: Chlorination—part time.

Analysis of raw water

[Collected May 23, 1946. pH is 7.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	4.7		Sulfate (SO_4)	55	1.145
Iron (Fe)	1.3		Chloride (Cl)	8.0	.226
Calcium (Ca)	47	2.346	Fluoride (F)	0	0
Magnesium (Mg)	4.6	.378	Nitrate (NO_3)	1.8	.029
Sodium (Na)	7.2	.313	Dissolved solids	185	
Potassium (K)	3.9	.100	Total hardness as $CaCO_3$	136	
Bicarbonate (HCO_3)	106	1.737			

TARRANT COUNTY

ARLINGTON

Population in 1940: 4,240.
Source of information: G. C. Pearce, plant superintendent, May 22, 1946.
Ownership: Municipal.
Source of supply: Two wells.

Well 5. At end of West Main Street; drilled in 1930 by McKee & Hightower; depth, 900 feet; diameter, 12 inches; deep-well turbine pump and 100-horsepower electric motor; yield, 400 gallons a minute.

Well 6. About 500 feet from well 5 at the end of West Main Street; drilled in July 1942 by Layne-Texas Co.; depth 1,775 feet; diameter, 13⅜ to 7 inches, 184 casing perforated from 1,567 to 1,761 feet; deep-well turbine pump and 100-horsepower electric motor; static water level reported 267 feet below land surface in 1942; yield, 448 gallons a minute with drawdown of 72 feet; temperature, 85° F.

Pumpage (estimated): Maximum, 1,000,000 gallons a day; average, 800,000 gallons a day.
Storage: Elevated tank, 100,000 gallons; two ground reservoirs, 57,000 and 130,000 gallons each.
Treatment: None.

Analysis, composite sample, wells 5 and 6

[Collected May 22, 1946. pH is 8.6. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	189	3.93
Iron (Fe)	0		Chloride (Cl)	50	1.41
Calcium (Ca)	2.9	0.14	Fluoride (F)	1.6	.08
Magnesium (Mg)	1.3	.11	Nitrate (NO_3)	1.8	.03
Sodium (Na)	306	13.30	Dissolved solids	823	
Potassium (K)	7.4	.19	Total hardness as $CaCO_3$	12	
Bicarbonate (HCO_3)	505	8.29			

Driller's log; well 6

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sandy clay	10	10	Hard lime and shale	77	994
Blue shale	65	75	Sandy shale and sand	23	1,017
Sand	28	103	Shale and lime	58	1,075
Shale and lignite	30	133	Sandy lime and shale	55	1,130
Hard shale	9	142	Soft sandy lime	5	1,135
Sand	11	153	Lime and shale	143	1,278
Blue shale	50	203	Brown sandy lime	20	1,298
Hard rock	3	206	Shale and lime	22	1,320
Shale	9	215	Black and gray shale and lime	48	1,368
Sand	20	235	Sandy shale	31	1,399
Shale	102	337	Sandy shale and lime	31	1,430
Lime and shale	27	364	Sand	10	1,440
Shale	27	391	Lime and red shale	9	1,449
Lime and shale	147	538	Sand	26	1,475
Lime	8	546	Red and blue shale	17	1,492
Lime and shale	201	747	Sand	13	1,505
Sandy shale and lime	19	766	Blue shale and sand	28	1,533
Sand-few shale breaks	38	804	Red sandy shale	18	1,551
Sandy shale and sand	25	829	Sand	43	1,594
Shale	9	838	Shale and layers of sand	19	1,613
Sand and shale breaks	16	854	Sand	25	1,638
Sandy shale and lime	8	862	Sandy shale and sand	6	1,644
Sand	8	870	Sand	68	1,712
Sandy shale	7	877	Hard shale	6	1,718
Sand	11	888	Sand, gravel and shale	31	1,749
Shale	29	917	Red, blue, and yellow shale	26	1,775

EVERMAN

Population in 1940: 250.

Source of information: C. G. Vaughn, May 22, 1946.

Owner: C. G. Vaughn.

Source of supply: Two wells.

Well 1. Drilled in 1915 by T. M. Hellams; depth, about 600 feet; diameter, 6 inches; deep-well cylinder and pump jack and 10-horsepower steam engine; static water level reported 300 feet below land surface; yield, 20 gallons a minute.

Well 2. Drilled in 1915 by T. M. Hellams; depth, about 600 feet; diameter, 6 inches; deep-well cylinder and pump jack and 40-horsepower gasoline engine; yield, 20 gallons a minute.

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

Storage: Two steel tanks, 12,000 and 4,000 gallons.

Number of customers: 95.

Treatment: Occasional chlorination.

Analysis, well 2

[Collected May 22, 1946. pH is 8.8. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	15		Sulfate SO_4	44	0.92
Iron (Fe)	.14		Chloride (Cl)	15	.42
Calcium (Ca)	1.3	0.06	Fluoride (F)	.6	.03
Magnesium (Mg)	.5	.04	Nitrate (NO_3)	0	0
Sodium (Na)	203	8.84	Dissolved solids	516	
Potassium (K)	4.8	.12	Total hardness as $CaCO_3$	5	
Bicarbonate (HCO_3)	470	7.69			

FORT WORTH

Population in 1940: 177,662.

Source of information: Ewall Stephens, water superintendent, May 22, 1946.

Ownership: Municipal.

Source of supply: Three lakes.

Lake Worth. Constructed in 1914 on the west fork of the Trinity River about 9 miles west of Fort Worth; capacity, about 20,000 acre-feet.

Eagle Mountain Lake. Constructed in 1932 on the west fork of the Trinity River about 18 miles northwest of Fort Worth; capacity, 216,000 acre-feet.

Lake Bridgeport. Constructed about 1932 on the west fork of the Trinity River above Eagle Mountain Lake and about 4 miles northwest of Bridgeport; capacity, 284,000 care-feet.

Average pumpage, in gallons a day, 1945

January	18,730,000	May	22,650,000	September	26,500,000
February	18,800,000	June	24,100,000	October	18,700,000
March	19,200,000	July	25,540,000	November	18,400,000
April	18,200,000	August	27,900,000	December	18,250,000

Storage: Concrete reservoir on south side of city, 5,000,000 gallons; concrete reservoir on north side of city, 4,500,000 gallons; 3 elevated tanks, 500,000 gallons each; 2 elevated tanks, 100,000 gallons each; standpipe, 300,000 gallons.

Number of customers: 55,800.

Treatment: Aeration, coagulation, filtration, and chlorination.

Analysis

[Collected May 22, 1946. pH: Raw and finished water, 8.2. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	6.4		2.4	
Iron (Fe)	.23		.0	
Calcium (Ca)	43	2.146	46	2.296
Magnesium (Mg)	6.9	.567	7.0	.576
Sodium (Na)	16	.686	20	.862
Potassium (K)	4.8	.123	5.3	.135
Bicarbonate (HCO_3)	154	2.524	160	2.623
Sulfate (SO_4)	17	.354	23	.479
Chloride (Cl)	22	.620	26	.733
Fluoride (F)	.4	.021	.6	.032
Nitrate (NO_3)	.2	.003	.2	.003
Dissolved solids	190		201	
Total hardness as $CaCO_3$	136		144	

HANDLEY

Population in 1940: 3,000.

Source of information: E. Hoover, assistant cashier, May 22, 1946.

Ownership: Tarrant County Water Control and Improvement District No. 2.

Source of supply: Two wells.

Well 1. Drilled in 1930; depth, 1,364 feet; diameter, 8 to 6 inches; deep-well turbine pump and 75-horsepower electric motor; static water level reported 371 feet below land surface; yield, 224 gallons a minute.

Well 2. On a street west of water office three-fourths of a mile north of Highway 80; drilled in 1946 by Layne-Texas Co.; depth, 1,431 feet; diameter, 10¾ to 7 inches; deep-well turbine pump and electric motor to be installed.

Average pumpage, in gallons a day, 1945

January	137,000	May	191,000	September	190,000
February	92,000	June	183,000	October	135,000
March	107,000	July	152,000	November	147,000
April	130,000	August	154,000	December	

Storage: Ground reservoir at well 1, 35,000 gallons; ground reservoir at well 2, 75,000 gallons; elevated tank, 125,000 gallons.

Number of customers: 831.

Treatment: None.

Analysis well 1

[Collected May 22, 1946. pH is 8.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.6		Sulfate (SO_4)	90	1.87
Iron (Fe)	.05		Chloride (Cl)	86	2.43
Calcium (Ca)	3.2	0.16	Fluoride (F)	2.0	.11
Magnesium (Mg)	1.4	.12	Nitrate (NO_3)	2.0	.03
Sodium (Na)	302	13.13	Dissolved solids	777	
Potassium (K)	6.6	.17	Total hardness as $CaCO_3$	14	
Bicarbonate (HCO_3)	556	9.14			

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	2	2	Hard sandy lime and shale	43	764
Clay and sandy clay	10	12	Sandy shale	6	770
Sand and boulders	8	20	Lime and shale	3	773
Sand and layers of shale	15	35	Sandy shale	5	778
Shale	15	50	Shale	7	785
Sand and boulders	31	81	Sandy shale and lime	20	805
Rock	2	83	Shale and lime	37	842
Shale	12	95	Hard lime and streaks of sandy shale	30	872
Rock	2	97	Lime, shale and sandy shale	8	880
Sticky shale	10	107	Lime	36	916
Lime and streaks of hard rock	38	145	Lime and shale	24	940
Shale	11	156	Sandy shale and lime	15	955
Shale and lime	11	167	Lime and shale	41	996
Shale	8	175	Lime	5	1,001
Hard lime and shale	32	207	Shale with streaks of lime	28	1,029
Shale	11	218	Lime and sandy shale	48	1,077
Rock	1	219	Sandy shale	6	1,083
Hard lime and shale	23	242	Lime, shale and sand	12	1,095
Lime and shale	36	278	Shale and lime	6	1,101
Hard lime and shale	41	319	Sand, lime and shale	17	1,118
Sandy shale and lime	25	344	Sandy shale and lime	30	1,148
Shale and streaks of lime	37	381	Sandy shale with streaks of shale and lime	19	1,167
Shale and streaks of sandy shale and lime	17	398	Shale	3	1,170
Lime and shale	39	437	Sandy shale	12	1,182
Shale and streaks of sandy shale and lime	18	455	Lime	1	1,183
Shale and lime	27	482	Sand	4	1,187
Sandy shale	25	507	Hard lime	5	1,192
Shale and lime	16	523	Sandy shale	11	1,203
Sandy shale and lime	24	547	Sand, lime and shale	22	1,225
Shale	7	554	Shale, lime and streaks of sand	19	1,244
Sandy, sandy shale, and sandy lime	26	580	Sand	5	1,249
Sand and layers of sandy shale	20	600	Sandy shale	8	1,257
Shale and lime	7	607	Sand and sandy shale	63	1,320
Sand	10	617	Shale and sandy shale	4	1,324
Shale	4	621	Sand and pink and red shale (cuts good)	8	1,332
Sand and sandy shale	12	633	Shale and sandy shale	26	1,358
Shale and lime	12	645	Shale	6	1,364
Sandy shale and lime	5	650	Coarse sand and gravel (good)	20	1,384
Shale and lime	13	663	Shale and sandy shale	7	1,391
Sand and streaks of sandy shale	5	668	Coarse sand and gravel (good)	11	1,402
Sandy lime and shale	30	698	Shale	12	1,414
Hard lime	11	709	Sand (good)	10	1,424
Hard lime and shale	12	721	Shale	7	1,431

MANSFIELD

Population in 1940: 774.

Source of information: M. N. Farr, water superintendent, May 22, 1946.

Ownership: Municipal.

Source of supply: 2 wells.

Well 1. One block west and ½ block north of Memorial Hall; drilled by Mr. Rose, depth about 200 feet, diameter 10 to 8 inches; deep-well turbine pump and 10-horsepower electric motor; static water level reported 60 feet below land surface; yield 100 gallons a minute.

Well 3. Behind Memorial Hall; drilled in 1945 by S. Stoner, depth 200 feet, diameter 7 inches; deep-well turbine pump and 5-horsepower electric motor; static water level reported 43 feet below land surface; yield 75 gallons a minute.

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

Storage: Ground reservoir as Well 1, 4,500 gallons; ground reservoir at abandoned Well 2, 6,800 gallons; elevated tank, 50,000 gallons.

Number of customers: 291.

Treatment: None.

Analysis

[Collected May 22, 1946. pH: Well 1, 8.1; well 3, 9.1. Analyzed by C. B. Cibulka]

	Well 1		Well 3	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	10		12	
Iron (Fe)	.11		1.1	
Calcium (Ca)	11	0.55	4.0	0.20
Magnesium (Mg)	2.2	.18	.6	.05
Sodium (Na)	200	8.70	267	11.62
Potassium (K)	5.1	.13	8.3	.21
Bicarbonate (HCO_3)	324	5.31	466	7.64
Sulfate (SO_4)	159	3.31	176	3.66
Chloride (Cl)	31	.87	25	.71
Fluoride (F)	.4	.02	1.2	.06
Nitrate (NO_3)	3.2	.05	.4	.01
Dissolved solids	582		730	
Total hardness as $CaCO_3$	36		12	

TAYLOR COUNTY

ABILENE

Population in 1940: 27,292.

Source of information: L. A. Grimes, water superintendent, Apr. 18, 1946.

Ownership: Municipal.

Source of supply: Three lakes.

Lake Abilene. 10 miles southwest of the city; built about 1920; capacity, 45,000 acre-feet.

Lake Kirby. About 5 miles south of Abilene on east side of Highway 277; constructed in 1928; capacity, 8,500 acre-feet.

Lake Fort Phantom Hill. About 15 miles northeast of Abilene on Elm Creek; constructed in 1941; capacity, 74,000 acre-feet.

Average pumpage, in gallons a day

Lake Abilene		Lakes Kirby and Fort Phantom Hill	
1945			
January	2,180,000	January	1,590,000
February	1,390,000	February	2,200,000
March	558,000	March	3,030,000
April	321,000	April	3,305,000
May	396,000	May	4,580,000
June	517,000	June	5,090,000
July	1,250,000	July	4,210,000
August	1,383,000	August	5,270,000
September	1,550,000	September	4,760,000
October	2,470,000	October	1,590,000
November	2,510,000	November	1,606,000
December	2,410,000	December	1,195,000
1946			
January	2,480,000	January	1,210,000
February	2,350,000	February	1,200,000
March	2,430,000	March	1,970,000

Storage: Lake Abilene clear well, 675,000 gallons; Lake Fort Phantom Hill clear wells, 1,685,000 gallons; storage reservoir, 2,000,000 gallons.
Number of customers: 8,917.
Treatment: Coagulation, sedimentation, rapid sand filters, prechlorination, and postchlorination.

Analysis of raw water

[Collected Apr. 18, 1946. pH: Lake Abilene, 7.6; Lake Kirby, 8.0; Lake Fort Phantom Hill, 7.9. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Lake Abilene					
Silica (SiO_2)	9.6		Sulfate (SO_4)	21	0.437
Iron (Fe)	.25		Chloride (Cl)	15	.423
Calcium (Ca)	51	2.546	Fluoride (F)	.2	.011
Magnesium (Mg)	15	1.2384	Nitrate (NO_3)	0	0
Sodium (Na)	9.3	.405	Dissolved solids	234	
Potassium (K)	5.1	.130	Total hardness as $CaCO_3$	189	
Bicarbonate HCO_3	210	3.444			
Lake Kirby					
Silica (SiO_2)	5.5		Sulfate (SO_4)	11	0.229
Iron (Fe)	.70		Chloride (Cl)	9.0	.254
Calcium (Ca)	44	2.196	Fluoride (F)	1.0	.053
Magnesium (Mg)	12	.987	Nitrate (NO_3)	.5	.008
Sodium (Na)	13	.554	Dissolved solids	209	
Potassium (K)	2.9	.125	Total hardness as $CaCO_3$	159	
Bicarbonate (HCO_3)	202	3.318			
Lake Fort Phantom Hill					
Silica (SiO_2)	6.0		Sulfate (SO_4)	52	1.00
Iron (Fe)	.50		Chloride (Cl)	56	1.58
Calcium (Ca)	46	2.30	Fluoride (F)	.2	.01
Magnesium (Mg)	19	1.56	Nitrate (NO_3)	.2	.00
Sodium (Na)	52	2.24	Dissolved solids	360	
Potassium (K)	8.5	.22	Total hardness as $CaCO_3$	193	
Bicarbonate (HCO_3)	222	3.65			

BRADSHAW

Population in 1940: 300.
Source of information: C. M. Hunt, owner, Apr. 18, 1946.
Owner: C. M. Hunt.
Source of supply: Lake west of Bradshaw.
Pumpage: No record.
Storage: Elevated tank, 12,600 gallons.
Number of customers: 15.
Treatment: None.

Analysis of raw water

[Collected Apr. 18, 1946. pH is 7.5. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.3		Sulfate (SO_4)	7.4	0.154
Iron (Fe)	2.0		Chloride (Cl)	7.0	.197
Calcium (Ca)	34	1.697	Fluoride (F)	.2	.011
Magnesium (Mg)	7.2	.592	Nitrate (NO_3)	3.2	.052
Sodium (Na)	8.0	.346	Dissolved solids	177	
Potassium (K)	4.8	.123	Total hardness as $CaCO_3$	114	
Bicarbonate (HCO_3)	143	2.344			

LAWN

Population in 1940: 306.
Source of information: Alex Edwards, water superintendent, Apr. 17, 1946.
Ownership: Municipal.
Source of supply: Lake Stith, 1¼ miles southwest of city hall on road to Ovalo.
Pumpage: No record.
Storage: Standpipe, estimated 50,000 gallons.
Number of customers: 210.
Treatment: Chlorination.

Analysis of raw water

[Collected Apr. 17, 1946. pH is 7.7. 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)	45	0.937
Iron (Fe)	.25		Chloride (Cl)	30	.846
Calcium (Ca)	49	2.446	Fluoride (F)	.4	.021
Magnesium (Mg)	14	1.151	Nitrate (NO_3)	.2	.003
Sodium (Na)	23	1.009	Dissolved solids	281	
Potassium (K)	9.1	.233	Total hardness as $CaCO_3$	180	
Bicarbonate (HCO_3)	185	3.032			

MERKEL

Population in 1940: 2,005.
Source of information: Mack Busby, water superintendent, Apr. 17, 1946.
Ownership: Municipal.
Source of supply: Seven wells.

Well 1. In pump house about 3 blocks east of town along Highway 84; drilled in 1909; depth, about 100 feet; diameter, 8 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 100 gallons a minute.

Well 2. About 50 feet southeast of well 1; dug by J. B. Ferris; depth, 75 feet; diameter, 5 feet, lined with brick; connected with well 1 and pumped with same pump as used in well 1.

Well 3. About 0.2 mile east of well 1; drilled in 1925 by L. Sublett; depth, about 100 feet; diameter, 8 inches; jet pump and 3-horsepower electric motor; yield, 100 gallons a minute.

Well 4. About 20 feet south of well 3; dug in 1926 by W. E. Kimmery; depth, 70 feet, diameter, 10 feet, cement lined, connected by tunnel with well 3; pumped by pump in well 3.

Well 5. About 0.15 mile northeast of well 3; drilled in 1926 by L. Sublett, depth, 100 feet; diameter, 8 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 100 gallons a minute.

Well 6. About 20 feet south of well 5; dug in 1945 by W. E. Kimmery; depth, 63 feet; diameter, 15 feet, lined with cement, connected to well 5 by tunnel; pumped with pump in well 5.

Well 7. Drilled in 1926 by L. Sublett; depth, 100 feet; diameter, 8 inches; deep-well cylinder and pump jack and 3-horsepower electric motor; yield, 18 gallons a minute.

Pumpage (estimated): 67,000 gallons a day.
Storage: Concrete ground reservoir, 100,000 gallons; elevated tank, 50,000 gallons.
Number of customers: 300.
Treatment: Chlorination.

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Analysis

[Collected Apr. 17, 1946. pH: Wells 1 and 2, 7.2; wells 3 and 4, 7.5; wells 5, 6 and 7, 7.4. Ana yzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Composite sample, wells 1 and 2					
Silica (SiO_2)	21		Sulfate (SO_4)	1,410	29.36
Iron (Fe)	.06		Chloride (Cl)	161	4.54
Calcium (Ca)	468	23.16	Fluoride (F)	.8	.04
Magnesium (Mg)	90	7.40	Nitrate (NO_3)	123	1.98
Sodium (Na)	209	9.07	Dissolved solids	2,850	
Potassium (K)	12	.31	Total hardness as $CaCO_3$	1,530	
Bicarbonate (HCO_3)	245	4.02			
Composite sample, wells 3 and 4					
Silica (SiO_2)	20		Sulfate (SO_4)	269	5.60
Iron (Fe)	.16		Chloride (Cl)	43	1.21
Calcium (Ca)	120	5.99	Fluoride (F)	.6	.03
Magnesium (Mg)	43	3.54	Nitrate (NO_3)	52	.84
Sodium (Na)	77	3.34	Dissolved solids	832	
Potassium (K)	7.5	.19	Total hardness as $CaCO_3$	476	
Bicarbonate (HCO_3)	328	5.38			
Composite sample, wells 5 and 6					
Silica (SiO_2)	19		Sulfate (SO_4)	577	12.01
Iron (Fe)	.14		Chloride (Cl)	58	1.64
Calcium (Ca)	200	9.98	Fluoride (F)	.6	.03
Magnesium (Mg)	50	4.11	Nitrate (NO_3)	21	3.34
Sodium (Na)	102	4.44	Dissolved solids	1,180	
Potassium (K)	9.1	.23	Total hardness as $CaCO_3$	704	
Bicarbonate (HCO_3)	289	4.74			
Well 7					
Silica (SiO_2)	21		Sulfate (SO_4)	749	15.59
Iron (Fe)	.40		Chloride (Cl)	89	2.51
Calcium (Ca)	263	13.13	Fluoride (F)	1.0	.05
Magnesium (Mg)	64	5.26	Nitrate (NO_3)	7.0	1.13
Sodium (Na)	119	5.18	Dissolved solids	1,530	
Potassium (K)	16	.41	Total hardness as $CaCO_3$	920	
Bicarbonate (HCO_3)	287	4.70			

OVALO

Population in 1940: 500.

Source of information: M. A. Horton, Apr. 18, 1946.

Ownership: Municipal.

Source of supply: Well 2¾ miles east of Ovalo on Jim Ned Creek; dug by H. B. Coggins; depth, 24 feet; diameter, 3 feet, lined with cement blocks; deep-well cylinder and pump jack and 5-horsepower electric motor; static water level reported 18 feet below land surface.

Pumpage: No record.

Storage: Concrete reservoir, 12,000 gallons.

Number of customers: 40.

Treatment: None.

Analysis, well 1

[Collected Apr. 18, 1946. pH is 7.3. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	22		Sulfate (SO_4)	403	8.39
Iron (Fe)	3.1		Chloride (Cl)	280	7.90
Calcium (Ca)	110	5.49	Fluoride (F)	1.8	.09
Magnesium (Mg)	84	6.91	Nitrate (NO_3)	88	1.42
Sodium (Na)	315	13.71	Dissolved solids	1,570	
Potassium (K)	12	.31	Total hardness as $CaCO_3$	620	
Bicarbonate (HCO_3)	526	8.62			

TUSCOLA

Population in 1940: 300.

Source of information: F. C. Rogers, owner, Apr. 18, 1946.

Owner: F. C. Rogers.

Source of supply: Two dug wells.

Well 1. One block east from Highway 83 behind cafe on Main Street; depth, 28 feet; diameter, 6 feet; 2-inch centrifugal pump and 5-horsepower electric motor; static water level reported 20 feet below land surface; well pumps dry after several hours of pumping.

Well 2. In creek flat 0.2 mile south of War Highway 7 to Buffalo Gap; depth, 28 feet; diameter, 12 feet; centrifugal pump and 5-horsepower electric motor; static water level reported 16 feet below land surface; yield, 98 gallons a minute.

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

Storage: Two elevated tanks, 4,200 and 3,400 gallons.

Number of customers: 100.

Treatment: Chlorination and lime.

Analysis, well 2

[Collected Apr. 18, 1946. pH is 7.0. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	25		Sulfate (SO_4)	142	2.96
Iron (Fe)	.08		Chloride (Cl)	180	5.08
Calcium (Ca)	117	5.84	Fluoride (F)	1.0	.05
Magnesium (Mg)	50	4.11	Nitrate (NO_3)	114	1.84
Sodium (Na)	142	6.19	Dissolved solids	968	
Potassium (K)	5.9	.15	Total hardness as $CaCO_3$	498	
Bicarbonate (HCO_3)	388	6.36			

THROCKMORTON COUNTY

THROCKMORTON

Population in 1940: 1,133.

Source of information: H. A. Bachman, water superintendent, Sept. 19, 1946.

Ownership: Municipal.

Source of supply: Lake 1 mile southwest of town on South Elm Creek; capacity, 1,600 acre-feet.

Pumpage: Average, 100,000 gallons a day.

Storage: Three settling basins, 60,000 gallons each; elevated tank, 25,000 gallons.

Number of customers: 387.

Treatment: Aeration, coagulation, sedimentation, and chlorination.

Analysis of raw water

[Collected Sept. 19, 1946. pH is 7.4. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	26	0.541
Iron (Fe)	.17		Chloride (Cl)	25	.705
Calcium (Ca)	30	1.497	Fluoride (F)	.2	.010
Magnesium (Mg)	4.8	.395	Nitrate (NO_3)	.8	.013
Sodium (Na)	31	1.352	Dissolved solids	197	
Potassium (K)	3.5	.090	Total hardness as $CaCO_3$	95	
Bicarbonate (HCO_3)	126	2.065			

TRAVIS COUNTY

AUSTIN

Population in 1940: 87,930.

Source of information: Albert R. Davis, water superintendent, Nov. 4, 1946.

Ownership: Municipal.

Source of supply: Colorado River. Average monthly temperature in degrees Fahrenheit at raw-water intake: January, 54; February, 56; March, 61; Apr. 63; May, 67; June, 71; July, 72; August, 76; September, 77; October 71; November, 67; December, 58.

Average pumpage in thousands of gallons a day

	1942	1943	1944	1945	1946
January	7,250	8,470	9,490	10,270	9,710
February	6,880	8,850	9,250	9,830	9,840
March	8,100	9,270	9,440	10,070	10,670
April	7,820	10,750	12,100	9,310	10,980
May	8,470	11,500	10,560	11,750	11,140
June	11,820	13,990	14,750	13,800	16,170
July	11,470	15,110	19,380	15,370	19,650
August	11,580	18,020	18,660	16,950	19,700
September	8,450	10,770	12,240	13,260	12,350
October	7,840	8,110	11,120	10,600	11,950
November	7,850	9,240	10,940	10,950	
December	7,740	8,700	8,850	9,920	

Storage: Ground reservoir, 10,000,000 gallons.

Number of customers: 24,955.

Treatment: Prechlorination, coagulation, sedimentation, rapid sand filtration, and softening.

Analysis of finished water

[Collected May 14, 1945. pH is 9.4. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.9		Sulfate (SO_4)	26	0.541
Iron (Fe)	.03		Chloride (Cl)	38	1.072
Calcium (Ca)	14	.699	Fluoride (F)	0	0
Magnesium (Mg)	14	1.151	Nitrate (NO_3)	1.8	.029
Sodium (Na)	21	.899	Dissolved solids	175	
Potassium (K)	4.8	.123	Total hardness as $CaCO_3$	92	
Bicarbonate (HCO_3)	76	1.230			

MANOR

Population in 1940: 688.

Source of information: W. A. Boeneman, water superintendent, Mar. 20, 1940.

Ownership: Municipal.

Source of supply: Well about 200 feet southwest of post office in Manor; drilled in 1936 by W. B. Hinton; depth, 3,001 feet; diameter, 8 to 4 inches; static water level Mar. 20, 1941, 80 feet above land surface; well flowed 110 gallons a minute in 1941, original flow 150 gallons a minute in 1936; temperature, 110° F.

Pumpage (estimated): 21,000 gallons a day.

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

Number of customers: 43.

Treatment: None.

Analysis

[Collected Mar. 20, 1940. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	94	4.69	Chloride (Cl)	264	7.45
Magnesium (Mg)	24	1.97	Fluoride (F)	0	0
Sodium and potassium (Na+K)	517	22.48	Nitrate (NO_3)	3.2	.05
Bicarbonate (HCO_3)	366	6.00	Dissolved solids	1,828	
Sulfate (SO_4)	746	15.53	Total hardness as $CaCO_3$	335	

Driller's log

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Top soil	6	6	Clay	20	985
Yellow clay	11	17	Broken lime	25	1,010
Gravel	7	24	Georgetown lime	55	1,165
Yellow clay	31	55	Edwards lime	477	1,642
Blue clay	525	580	Hard blue shale	38	1,680
Chalk	53	633	Glen Rose lime	62	1,742
Chalk and pyrites	66	699	Hard lime	65	1,807
Chalk and flintrock	36	735	Sandy lime	143	1,950
Hard white flint	17	752	Comanche Peak	200	2,150
Chalk and pyrites	38	790	Walnut clay	210	2,360
Chalk, hard streaks	50	840	Sandy lime and shale	403	2,763
Chalk with hard streaks	40	880	Hard sand rock	22	2,785
Chalk	22	902	Trinity sand	216	3,001
Chalk, hard streaks	63	965			

PFLUGERVILLE

Population in 1940: 500.

Source of information: Otto Pfluger, water works operator, Mar. 21, 1941.

Owner: Pflugerville Gin Co.

Source of supply: Two wells.

Well 1. Drilled about 1910: depth, 650 feet; diameter, 8 inches; deep-well cylinder and gasoline engine; used as stand-by well since 1936.

Well 2. Drilled in 1938; depth, 696 feet; diameter, 6⅝ inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 125 feet below land surface Mar. 1941; yield, 60 gallons a minute; temperature, 75° F.

Pumpage: Maximum, 22,000 gallons a day in summer, 3,600 gallons a day in winter.

Storage: Elevated tank, 23,000 gallons.

Number of customers: 85.

Treatment: None.

Analysis, well 2.

[Collected Mar. 21, 1941. pH is 7.6. Analyzed by Texas State Board of Health]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	345	7.18
Iron (Fe)	.5		Chloride (Cl)	472	13.31
Calcium (Ca)	92	4.59	Fluoride (F)	.8	.04
Magnesium (Mg)	37	3.04	Nitrate (NO_3)	.4	.01
Sodium and Potassium (Na+K)	452	19.65	Dissolved solids	1,608	
Bicarbonate (HCO_3)	415	6.80	Total hardness as $CaCO_3$	382	

Driller's log, well 2.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	4	4	Gray lime	30	402
Blue Buda lime	46	50	Blue Del Rio clay	45	447
Sandy yellow lime	10	60	Blue-gray gumbo, tough	36	483
Blue broken lime	26	86	White Georgetown lime	111	594
Hard lime	14	90	Georgetown lime, black flint streaks	6	600
White chalk	25	115	Georgetown lime, porous	15	615
Blue shale	7	122	Hard gray Georgetown lime	16	631
White Austin chalk	181	303	Porous lime	59	690
Sandy gray shale	32	335	Hard gray lime	6	696
Black Eagle Ford shale	32	367			
Gray hard cap	5	372			

WICHITA COUNTY

BURKBURNETT

Population in 1940: 2,814.

Source of information: P. A. Wiggins, city manager, June 6, 1946.

Ownership: Municipal.

Source of supply: Fourteen wells about 3 miles southeast of town.

Wells 1 to 8. Three miles southeast of town on river flats; drilled by city in 1936; depth, 40 to 50 feet; diameters, 12 inches; static water level reported 8 feet below land surface; pumped by air; yield, about 3 gallons a minute each.

Well 9. About one-half mile southeast of pump station and about 3½ miles southeast of Burkburnett; drilled by city in 1942; depth, 48 feet; diameter, 6 inches; centrifugal pump and ½-horsepower electric motor; static water level, 11.7 feet below land surface; yield, 35 gallons a minute.

Well 10. 0.1 mile southeast of well 9; drilled by city in 1942; depth, 48 feet; diameter, 6 inches; centrifugal pump and ½-horsepower electric motor; yield, 50 gallons a minute.

Well 11. 0.1 mile northeast of well 10; drilled by city in 1942; depth, 48 feet; diameter, 6 inches; centrifugal pump and ½-horsepower electric motor; yield, 50 gallons a minute.

Well 12. 0.1 mile southeast of well 11; drilled by city in 1942; depth, 48 feet; diameter, 6 inches; centrifugal pump and ½-horsepower electric motor; yield, 50 gallons a minute.

Well 13. 0.14 mile northwest of well 11; drilled by city in 1942; depth, 48 feet; diameter, 6 inches; centrifugal pump and ½-horsepower electric motor; yield, 50 gallons a minute.

Source of supply—Continued

Well 14. 0.14 mile northwest of well 13; drilled by city in 1943; depth, 48 feet; diameter, 6 inches; centrifugal pump and ½-horsepower electric motor; yield, 35 gallons a minute.

Pumpage (estimated): Average, 350,000 gallons a day.

Storage: Two steel ground reservoirs at pump station, 55,000 gallons each; concrete ground reservoir at pump station, 190,000 gallons; elevated tank north of city hall, 55,000 gallons.

Treatment: Chlorination.

Analysis

[Collected June 6, 1946. pH: Well 2, 7.8; well 3, 8.0; well 12, 7.6. Analyzed by C. B. Cibulka]

	Well 2		Well 3		Well 12	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13		13		13	
Iron (Fe)	.06		.03		.05	
Calcium (Ca)	77	3.84	58	2.89	59	2.94
Magnesium (Mg)	58	4.77	52	4.28	36	2.96
Sodium (Na)	69	2.98	70	3.03	46	2.00
Potassium (K)	7.9	.20	4.2	.11	1.8	.05
Bicarbonate (HCO_3)	438	7.19	436	7.14	369	6.05
Sulfate (SO_4)	40	.83	42	.87	24	.50
Chloride (Cl)	72	2.03	63	1.78	35	.99
Fluoride (F)	.6	.03	.8	.04	.8	.04
Nitrate (NO_3)	106	1.71	30	.48	23	.37
Dissolved solids	679		572		420	
Total hardness as $CaCo_3$	430		358		295	

ELECTRA

Population in 1940: 5,588.

Source of information: Howard Hutchins, water superintendent, June 6, 1946.

Ownership: Municipal.

Source of supply: Lake on China Creek and 12 wells.

Well 1. Dug in 1937 by Works Projects Administration; depth, about 30 feet; diameter, 9 feet; centrifugal pump and ½-horsepower electric motor; water level reported 20 feet below land surface; yield, 40 gallons a minute.

Well 2. Two-hundred feet east of well 1; dug in 1937 by Works Projects Administration; depth, 30 feet; diameter, 9 feet; centrifugal pump and 2-horsepower electric motor; yield, 100 gallons a minute.

Well 3. Two-hundred feet east of well 2; dug in 1937 by Works Projects Administration; depth, 30 feet; diameter, 9 feet; centrifugal pump and 3-horsepower electric motor; yield, 100 gallons a minute.

Well 4. Two-hundred feet east of well 3; dug in 1937 by Works Projects Administration; depth, 30 feet; diameter, 9 feet; centrifugal pump and 2-horsepower electric motor; yield, 100 gallons a minute.

Well 5. Two-hundred feet east of well 4; dug in 1937 by Works Projects Administration; depth, 30 feet; diameter, 9 feet; centrifugal pump and 2-horsepower electric motor; yield, 100 gallons a minute.

Well 6. Two-hundred feet west of well 1; dug in 1940 by city; depth, 30 feet; diameter, 8 feet; centrifugal pump and 2-horsepower electric motor; yield, 50 gallons a minute; temperature, 82° F.

Well 7. Two-hundred feet east of well 5; dug in 1937 by city; depth, 30 feet; diameter, 8 feet; deep-well turbine pump and 2-horsepower electric motor; yield, 60 gallons a minute.

Source of supply—Continued

Well 8. Two-hundred feet east of well 6; dug in 1937 by city; depth, 30 feet; diameter, 8 feet; centrifugal pump and 1-horsepower electric motor; yield, 40 gallons a minute.

Well 10. Two-hundred feet east of well 8; dug in 1941 by city; depth, 30 feet; diameter, 6 feet; centrifugal pump and 2-horsepower electric motor; yield, 100 gallons a minute.

Well 11. Two hundred feet east of well 5; dug in 1941 by city; depth, 30 feet; diameter, 8 feet; centrifugal pump and 2-horsepower electric motor; yield, 100 gallons a minute.

Well 12. Two-hundred feet east of well 11; dug in 1941 by city; depth, 30 feet; diameter, 8 feet; centrifugal pump and 7½-horsepower electric motor; yield, 100 gallons a minute; temperature, 75° F.

Well 13. Two-hundred feet north of well 12; dug in 1945 by city; depth 30 feet; length, 100 feet; width, 15 feet; centrifugal pump and 15-horsepower electric motor; yield, 200 gallons a minute.

The city pumps on an average of 16 hours a day from the well field and 8 hours a day from the lake.

Average pumpage, in gallons a day

	1945	1946		1945	1946		1945	1946
January	260,000	313,000	May	364,000	414,000	September	359,000	--------
February	300,000	302,000	June	410,000	--------	October	303,000	--------
March	250,000	303,000	July	430,000	--------	November	286,000	--------
April	255,000	425,000	August	514,000	--------	December	325,000	--------

Storage: Two settling basins, 192,000 gallons each; elevated tank, 250,000 gallons.

Number of customers: 1,500.

Treatment: Coagulation, sedimentation, and chlorination.

Analysis

[Collected June 6, 1946. pH: Composite sample, 7.8; well 13, 8.0. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Composite sample				
Silica (SiO_2)	8.2	----------	7.4	----------
Iron (Fe)	.69	----------	.14	----------
Calcium (Ca)	39	1.947	45	2.25
Magnesium (Mg)	9.0	.740	28	2.30
Sodium (Na)	48	2.088	92	3.98
Potassium (K)	5.4	.138	4.6	.12
Bicarbonate (HCO_3)	142	2.328	308	5.05
Sulfate (SO_4)	7.5	.156	60	1.25
Chloride (Cl)	86	2.426	68	1.92
Fluoride (F)	0	0	.8	.04
Nitrate (NO_3)	.2	.003	24	.39
Dissolved solids	294	----------	484	----------
Total hardness as $CaCO_3$	134	----------	227	----------

Analysis—Continued

Well 13

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	14		Sulfate (SO_4)	72	1.50
Iron (Fe)	.29		Chloride (Cl)	92	2.59
Calcium (Ca)	42	2.10	Fluoride (F)	1.4	.07
Magnesium (Mg)	38	3.12	Nitrate (NO_3)	21	.34
Sodium (Na)	148	6.43	Dissolved solids	666	
Potassium (K)	13	.33	Total hardness as $CaCO_3$	261	
Bicarbonate (HCO_3)	456	7.48			

WICHITA FALLS

Population in 1940: 55,100.

Source of information: H. A. Gates, water works manager, June 6, 1946.

Ownership: Municipal.

Source of supply: Lake Wichita on Holiday Creek, 6 miles southwest of Wichita Falls, capacity 13,500 acre-feet; and canal from Lake Kemp, 12½ miles northeast of Seymour.

Average pumpage, in gallons a day

	1945	1946		1945	1946
January	4,480,000	5,900,000	July	8,110,000	
February	4,290,000	5,960,000	August	9,200,000	
March	4,580,000	6,400,000	September	8,500,000	
April	5,400,000	7,200,000	October	6,750,000	
May	6,500,000	7,420,000	November	6,240,000	
June	7,490,000		December	5,700,000	

Storage: Raw-water storage at filter plant, 19,000,000 gallons; underground storage at filter plant, 3,000,000 gallons; elevated tank, 500,000 gallons.

Number of customers: 11,939.

Treatment: Coagulation, sedimentation, filtration, prechlorination, and postchlorination.

Analysis of water from Lake Kemp

[Collected Sept. 10, 1946. pH: Raw water, 7.4; finished water, 7.9. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica SiO_2	0		0	
Iron (Fe)	.15		.07	
Calcium (Ca)	288	14.37	297	14.82
Magnesium (Mg)	70	5.76	69	5.67
Sodium (Na)	854	37.15	869	37.78
Potassium (K)	22	.56	22	.56
Bicarbonate (HCO_3)	80	1.31	76	1.18
Sulfate (SO_4)	831	17.30	844	17.58
Chloride (Cl)	1,390	39.20	1,420	40.05
Fluoride (F)	.6	.03	.4	.02
Nitrate (NO_3)	.2	.00	.2	0
Dissolved solids	3,500		3,560	
Total hardness as $CaCO_3$	1,010		1,020	

WILBARGER COUNTY

VERNON

Population in 1940: 9,277.
Source of information: Bud Daniels, water superintendent, Apr. 11, 1941.
Ownership: Municipal.
Source of supply: Eleven wells.

Well 1 (owner's No. 1–N). At Ackley and Bentley Streets; drilled in 1926 by Layne–Texas Co.; depth, 43 feet; diameter, 18 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 28.27 feet below pump base Apr. 11, 1941; yield, 125 gallons a minute; temperature, 68° F.

Well 2 (owner's No. 2–N). At Heard and Bentley Streets; drilled in 1926 by Layne–Texas Co.; depth, 42 feet; diameter, 18 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 28.23 feet Apr. 11, 1941; yield, 175 gallons a minute.

Well 3 (owner's No. 3–N). At Dean and Bentley Streets; drilled in 1926 by Layne–Texas Co.; depth, 44 feet; diameter, 18 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 22.21 feet below pump base Apr. 11, 1941; yield, 200 gallons a minute.

Well 4 (owner's No. 4–N). At Wonders and Bentley Streets; drilled in 1933 by the Kansas Drilling Co.; depth, 44 feet; diameter, 18 inches, deep-well turbine pump and 7½-horsepower electric motor; yield, 150 gallons a minute.

Well 5 (owner's No. 5–N). One block south and two blocks west of well 4; drilled in 1932 by the Kansas Drilling Co.; depth, 41 feet; diameter, 18 inches; deep-well turbine pump and 10-horsepower electric motor; static water level, 28.8 feet below pump base Apr. 11, 1941; temperature, 68° F.

Well 6 (owner's Smoker Field–West Well). Drilled in 1939 by H. E. Reed; depth, 41 feet; diameter, 18 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 300 gallons a minute.

Well 7 (owner's Smoker Field–South Well). Drilled in 1940 by H. E. Reed; depth, 41 feet; diameter, 8 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 150 gallons a minute.

Well 8 (owners Smoker Field–East Well). Drilled in 1940 by H. E. Reed; depth, 41 feet; diameter, 18 inches; deep-well turbine pump and 5-horsepower electric motor; yield, 150 gallons a minute; well has been pumped at 300 gallons a minute with a drawdown of 31 feet.

Well 9 (owner's No. 6–S). At corner of Wichita and Fannin Streets; drilled in 1931 by H. E. Reed; depth, 48 feet; diameter, 18 inches; deep-well turbine pump and 7½-horsepower electric motor; static water level, 25 feet below pump base; yield, 125 gallons a minute; temperature, 68° F.

Well 10 (owner's No. 7–S). At south side of Emperice Street between Lamar and Deaf Smith Streets; drilled by H. E. Reed; depth, 48 feet; diameter, 18 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 125 gallons a minute.

Well 11 (owner's No. 8–S). East side of Lamar Street between Paradise and Wichita Streets; drilled in 1931 by H. E. Reed; depth, 48 feet; diameter, 18 inches; deep-well turbine pump and 10-horsepower electric motor; yield, 125 gallons a minute.

Pumpage (estimated): 1,000,000 gallons a day.
Storage: Ten concrete ground reservoirs, total capacity 258,000 gallons; elevated tank, 500,000 gallons.
Treatment: Chlorination.

Analysis

[Collected Apr. 11, 1941. pH: Well 2, 8.3. Analyzed by J. H. Rowley]

	Well 2		Well 6		Well 10	
	Parts per million	Equivalent per million	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	20					
Iron (Fe)	.02					
Calcium (Ca)	73	3.64	60	2.99	75	3.74
Magnesium (Mg)	49	4.03	41	3.37	30	2.47
Sodium and potassium (Na+K)	78	3.39	78	3.37	63	2.73
Bicarbonate (HCO_3)	324	5.31	326	5.34	294	4.82
Sulfate (So_4)	93	1.94	59	1.23	49	1.02
Chloride (Cl)	63	1.78	73	2.06	53	1.49
Fluoride (F)	1.1	.06				
Nitrate (NO_3)	122	1.97	68	1.10	100	1.69
Dissolved solids	659		561		547	
Total hardness as $CaCO_3$	384		318		310	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	4	4	Fine-grained sand and clay balls	4	28
Silty sand	8	12	Coarse-grained sand	15	43
Coarse-grained sand	12	24			

WEST VERNON

Population in 1940: 955.

Source of information: Mr. Garrison, manager, Oct. 18, 1943.

Owner: West Texas Utilities Co.

Source of supply: Three wells.

Well 1. Drilled in 1926 by Layne-Texas Co.; depth, 46 feet; diameter, 18 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 198 gallons a minute.

Well 2. Drilled in 1926 by Layne-Texas Co.; depth, 44 feet; diameter, 18 inches; deep-well turbine pump and 7½-horsepower electric motor; yield, 184 gallons a minute.

Well 3. Drilled in 1926 by Layne-Texas Co.; depth, 41 feet; diameter, 8 inches; using a stand-by well not equipped with pump.

Average pumpage, in gallons a day

	1942	1943		1942	1943
January	40,000	42,100	July	79,200	119,000
February	39,000	47,600	August	84,500	165,000
March	31,000	42,000	September	53,100	102,700
April	44,500	50,000	October	37,600	
May	46,700	54,900	November	37,900	
June	62,600	68,500	December	36,000	

Storage: Elevated tank, 50,000 gallons.

Treatment: Chlorination.

Analysis, well 1

[Collected Oct. 18, 1946. Analyzed by J. H. Rowley]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	73	3.64	Sulfate (SO_4)	79	1.64
Magnesium (Mg)	50	4.11	Chloride (Cl)	69	1.95
Sodium and potassium (Na+K)	95	4.15	Nitrate (NO_3)	134	2.16
Bicarbonate (HCO_3)	375	5.15	Dissolved solids	685	
			Total hardness as $CaCO_3$	388	

Driller's log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	16	16	Sand and gravel	23	45
Sand, gravel, and clay	6	22	Clay	1	46

WILLIAMSON COUNTY

BARTLETT

Population in 1940: 1,668.

Source of information: R. B. Stockton, water superintendent, Feb. 5, 1941.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. At corner of Clark and Emma Streets; drilled; depth, 1,320 feet; diameter, 10 to 6 inches; air lift and 10-horsepower electric motor; well flows 35 gallons a minute when not pumped, original flow, 45 gallons a minute; yield when pumped, 125 gallons a minute; used as stand-by well.

Well 2. Southeast corner of Main and Emma Streets; drilled in 1936 by the Layne-Texas Co.; depth, 1,595 feet; diameter, 8 inches; deep-well turbine pump and 15-horsepower electric motor; flow when pump is idle, 10 gallons a minute; yield when pumped, 235 gallons a minute.

Pumpage: Average, 144,000 gallons a day.

Storage: Two concrete ground reservoirs, 77,000 gallons and 55,000 gallons; elevated tank, 100,000 gallons.

Number of customers: 450.

Treatment: None.

Analysis

[Collected Feb. 5, 1941. pH: Well 1, 8.5; well 2. 7.8. Analyzed by E. W. Lohr]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	13		16	
Iron (Fe)	.8		.1	
Calcium (Ca)	17	0.85	19	0.95
Magnesium (Mg)	15	1.23	10	.82
Sodium and potassium (Na+K)	632	27.48	562	24.44
Bicarbonate (HCO_3)	452	7.75	490	8.03
Sulfate (SO_4)	542	11.28	449	9.35
Chloride (Cl)	360	10.15	30	8.46
Fluoride (F)	7.2	.38	7.0	.37
Nitrate (NO_3)	0	0	0	0
Dissolved solids	1,806		1,613	
Total hardness as $CaCO_3$	104		88	

Driller's log, well 2

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil	3	3	Rock	5	1,003
Clay and gravel	53	56	Lime	380	1,041
Green shale	153	209	Limestone	10	1,051
Hard shale	75	284	Lime	31	1,082
Hard shale and chalk	15	299	Lime rock	31	1,113
Rock	29	328	Lime	24	1,137
Limestone	107	435	Lime rock	10	1,147
Rock	72	507	Lime and shale	17	1,164
Limestone	81	588	Lime	18	1,182
Rock	52	640	Rock	67	1,249
Lime and hard layers of brown shale	203	843	Rock in layers of shale	36	1,285
Rock	37	880	Lime rock	46	1,331
Shale	65	945	Rock with layers of shale	19	1,350
Rock	26	971	Lime	36	1,386
Hard lime	9	980	Rock	38	1,424
Rock	12	992	Lime	62	1,486
Lime	6	998	Shale and rock	109	1,595

FLORENCE

Population in 1940: 476.

Source of information: John Buchanan, water superintendent, Mar. 20, 1941.

Ownership: Municipal.

Source of supply: Well one block east of post office; drilled in 1928 by G. F. Hunt; depth, 685 feet; diameter, 8 to 6 inches; double-action cylinder pump and 10-horsepower electric motor; yield, 50 gallons a minute.

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

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

Number of customers: 114.

Treatment: None.

Analysis

[Collected May 2, 1939. Analyzed by E. W. Lohr and D. F. Riddell]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	34	1.70	Sulfate (SO_4)	111	2.31
Magnesium (Mg)	17	1.40	Chloride (Cl)	66	1.86
Sodium and potassium (Na + K)	164	7.14	Fluoride (F)	1.4	.07
Bicarbonate (HCO_3)	366	6.00	Dissolved solids	573	
			Total hardness as $CaCO_3$	156	

GEORGETOWN

Population in 1940: 3,682.

Source of information: L. D. Logan, Jr., water superintendent, February 1941.

Ownership: Municipal.

Source of supply: Well four blocks west of post office; dug in 1912; depth, 100 feet; diameter, 10 feet; two deep-well turbine pumps with 25- and 40-horsepower electric motors; yield of pumps, 500 and 750 gallons a minute, respectively.

Average pumpage, in gallons a day

	1939	1940	1941		1939	1940	1941
January	363,000	354,000	325,000	July	514,000	400,000	
February	370,000	361,000		August	569,000	511,000	
March	371,000	372,000		September	542,000	325,000	
April	450,000	372,000		October	450,000	330,000	
May	500,000	418,000		November	344,000	323,000	
June	560,000	378,000		December	321,000	310,000	

Storage: Two concrete reservoirs, 120,000 and 200,000 gallons; standpipe, 240,000 gallons.
Number of customers: 1,000.
Treatment: None.

Analysis

[Collected Feb. 10, 1941. pH is 7.2. Analyzed by J. W. Yett, Jr., and E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	10		Sulfate (SO_4)	36	0.75
Iron (Fe)	.05		Chloride (Cl)	35	.99
Calcium (Ca)	124	6.19	Fluoride (F)	0	0
Magnesium (Mg)	23	1.89	Nitrate (NO_3)	60	.97
Sodium and potassium (Na+K)	12	.53	Dissolved solids	477	
Bicarbonate (HCO_3)	360	5.90	Total hardness as $CaCO_3$	404	

GRANGER

Population in 1940: 1,723.
Source of information: A. F. Burkhart, water superintendent, Feb. 5, 1941.
Ownership: Municipal.
Source of supply: Well two blocks north and one block west of post office; drilled about 1908; depth, 2,531 feet; diameter, 8 to 4 inches; well flowed 63 gallons a minute Aug. 31, 1943; temperature, 106° F.
Pumpage: Average, 288,000 gallons a day from natural flow.
Storage: Two concrete ground reservoirs, 85,000 and 103,000 gallons; elevated tank, 100,000 gallons.
Number of customers: 390.
Treatment: None.

Analysis

[Collected Feb. 5, 1941. pH is 7.9. Analyzed by E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	17		Sulfate (SO_4)	359	7.47
Iron (Fe)	.24		Chloride (Cl)	330	9.31
Calcium (Ca)	18	.90	Fluoride (F)	2.7	.14
Magnesium (Mg)	8.3	.68	Nitrate (NO_3)	0	0
Sodium and potassium (Na+K)	523	22.75	Dissolved solids	1,481	
Bicarbonate (HCO_3)	452	7.41	Total hardness as $CaCO_3$	79	

HUTTO

Population in 1940: 597.
Source of information: Charles Henstrom, water plant operator, Mar. 21, 1941.
Owners: Mrs. C. E. Henstrom and Mrs. Benny Downing.
Source of supply: Well one-half mile southeast of post office; drilled in 1937 by George Hunt; depth, 790 feet; diameter, 8 inches; deep-well turbine pump and 15-horsepower gasoline engine; water level, 65.8 feet below concrete curb July 10, 1940.
Pumpage (estimated): 10,000 gallons a day.
Storage: Elevated tank, 30,000 gallons.
Number of customers: 115.
Treatment: None.

Analysis

[Collected Mar. 21, 1941. Analyzed by D. F. Riddell and E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	21	1.05	Chloride (Cl)	302	8.52
Magnesium (Mg)	12	.99	Fluoride (F)	4.2	.22
Sodium and potassium (Na+K)	527	22.92	Nitrate (NO_3)	0	0
Bicarbonate (HCO_3)	494	8.10	Dissolved solids	1,500	
Sulfate (SO_4)	391	8.14	Total hardness as $CaCO_3$	103	

JARRELL

Population in 1940: 350.
Source of information: F. J. Viktorin, owner, Mar. 20, 1941.
Owner: F. J. Viktorin.
Source of supply: Well four blocks north of post office; drilled in 1915 by Marion Johnson; depth, 615 feet; diameter, 6 inches; deep-well cylinder and gasoline engine.
Pumpage (estimated): 11,000 gallons a day.
Storage: Elevated tank, 12,000 gallons.
Number of customers: 60.
Treatment: None.

Analysis

[Collected Mar. 20, 1941. Analyzed by D. F. Riddell and E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	78	3.89	Chloride (Cl)	16	0.45
Magnesium (Mg)	26	2.14	Fluoride (F)	.6	.03
Sodium and Potassium (Na+K)	12	.52	Nitrate (NO_3)	8.8	.14
Bicarbonate (HCO_3)	342	5.61	Dissolved solids	330	
Sulfate (SO_4)	16	.33	Total hardness as $CaCO_3$	301	

ROUND ROCK

Population in 1940: 1,240.

Source of information: Jack Jordan, water superintendent, Mar. 20, 1941.
Ownership: Municipal.
Source of supply: Well two and one-half blocks south-southeast of post office; drilled in 1935 by Miles Robertson; depth, 222 feet; diameter, 30 to 12½ inches; deep-well turbine pump and 40-horsepower electric motor; static water level reported 20 feet below land surface; yield, 750 gallons a minute.
Pumpage (estimated): 40,000 gallons a day.
Storage: Elevated tank, 60,000 gallons.
Number of customers: 160.
Treatment: None.

Analysis

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

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Iron (Fe)	0.02		Sulfate (SO_4)	40	0.83
Calcium (Ca)	109	5.44	Chloride (Cl)	15	.42
Magnesium (Mg)	23	1.89	Fluoride (F)	.2	.01
Sodium and potassium (Na+K)	6.7	.29	Nitrate (NO_3)	14	.23
Bicarbonate (HCO_3)	374	6.13	Dissolved solids	408	
			Total hardness as $CaCO_3$	367	

Driller's log, well

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay	20	20	Limestone	202	222

TAYLOR

Population in 1940: 7,875.
Source of information: C. T. Walker, water superintendent, Feb. 3, 1941.
Ownership: Municipal.
Source of supply: Three wells.

Well 1. Northeast corner of Twelfth and Main Streets; drilled in 1913 by U. S. Oglesby; depth, 3,260 feet; diameter, 10 to 6⅝ inches; well flow 520 gallons a minute in 1941, original flow, 1,000 gallons a minute; deep-well turbine pump; yield, about 600 gallons a minute when pumped.

Well 2. About 1,500 feet north of well 1 in small city park; drilled in 1934 by Lanning & Coffield; depth, 3,308 feet; diameter, 12½ to 6⅝ inches; well flowed naturally about 520 gallons a minute in 1941; original flow, 840 gallons a minute; temperature, 115° F.

Well 3. Drilled in 1946 by Layne-Texas Co.; depth, about 3,300 feet; diameter, 10 to 8 inches; well not put in service February 29, 1947.

Pumpage: Average, 467,000 gallons a day.
Storage: Two concrete ground reservoirs, 150,000 and 350,000 gallons: elevated tank, 150,000 gallons.
Number of customers: 2,228.
Treatments: None.

Analysis

[Collected Mar. 21, 1941. pH: Well 1, 7.8; well 2, 7.9. Analyzed by E. W. Lohr]

	Well 1		Well 2	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	20		21	
Iron (Fe)	.10		.27	
Calcium (Ca)	17	0.85	15	0.75
Magnesium (Mg)	6.1	.50	5.2	.43
Sodium and potassium (Na+K)	462	20.09	464	20.34
Bicarbonate (HCO_3)	452	7.14	462	7.57
Sulfate (SO_4)	421	8.76	349	7.27
Chloride (Cl)	182	5.13	225	6.35
Fluoride (F)	2.7	.14	2.8	.15
Nitrate (NO_3)	0	0	0	0
Dissolved solids	1,333		1,310	
Total hardness as $CaCO_3$	68		59	

Drillers' logs

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well 1					
Black soil	8	8	Hard lime rock	811	2,370
Yellow clay	32	40	Blue shale and mud	70	2,440
Blue clay	460	500	Gray lime rock	30	2,470
White clay	200	700	Blue shale and mud	45	2,515
Soft white lime rock	100	800	Dark gray lime rock	65	2,580
Blue clay	260	1,060	Stratified sand and water	142	2,722
Hard white lime rock	30	1,090	Hard dark sand rock	40	2,762
Blue clay	90	1,180	Soft sand and water	50	2,812
Hard lime rock	135	1,315	Green shale	15	2,827
Stratified hard lime rock and soft sand rock	160	1,475	White soft sand and water	60	2,887
Hard white lime rock	81	1,556	Stratified sand and water	77	2,964
Blue clay	3	1,559	Hard sand rock	10	2,974
			Trinity sand and water	286	3,260
Well 2					
Surface soil	10	10	Georgetown lime	176	1,236
Taylor marl	188	198	Edwards lime	314	1,550
Pecan Gap lime	32	230	Comanche Peak lime	60	1,610
Chalky lime	290	520	Walnut blue clay	10	1,620
Chalk	380	900	Layers of shale	830	2,450
Eagle Ford shale	60	960	Travis Peak lime	250	2,700
Buda lime	50	1,010	Hard sand rock	15	2,715
Del Rio clay	50	1,060	Trinity sand and water	593	3,308

THRALL

Population in 1940: 436.

Source of information: A. W. Fuchs, operator, Mar. 21, 1941.

Owner: Thrall Cooperative Gin Co.

Source of supply: Well one block southeast of depot; dug; depth, 37 feet; diameter, 48 inches; injector pump and 2-horsepower electric motor; water level, 22.82 below land surface Feb. 4, 1941.

Pumpage (estimated): 9,000 gallons a day.

Storage: Elevated wooden tank, 5,000 gallons.

Number of customers: 60.

Treatment: None.

Analysis

[Collected Mar. 21, 1941. Analyzed by D. F. Riddell and E. W. Lohr]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Calcium (Ca)	180	8.98	Chloride (Cl)	84	2.37
Magnesium (Mg)	7	.58	Fluoride (F)	0	0
Sodium and potassium (Na+K)	29	1.28	Nitrate (NO_3)	75	1.21
Bicarbonate (HCO_3)	390	6.39	Dissolved solids	609	
Sulfate (SO_4)	42	.87	Total hardness as $CaCO_3$	480	

WISE COUNTY

BRIDGEPORT

Population in 1940: 1,735.

Source of information: L. P. Hardy, water superintendent, Sept. 21, 1946.

Ownership: Municipal.

Source of supply: Reservoir on the west fork of the Trinity River.

Pumpage: Average, 50,000 gallons a day.

Storage: Clear well, 55,000 gallons; elevated tank, 125,000 gallons.

Number of customers: 400.

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

Analysis of finished water

[Collected Sept. 21, 1946. pH is 6.8. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	6.7		Sulfate (SO_4)	98	2.04
Iron (Fe)	.11		Chloride (Cl)	45	1.27
Calcium (Ca)	63	3.14	Fluoride (F)	0	0
Magnesium (Mg)	11	.90	Nitrate (NO_3)	0	0
Sodium (Na)	46	1.99	Dissolved solids	375	
Potassium (K)	5.0	.13	Total hardness as $CaCO_3$	202	
Bicarbonate (HCO_3)	174	2.85			

DECATUR

Population in 1940: 2,578.

Source of information: B. F. Owens, water superintendent, Oct. 21, 1941.

Ownership: Municipal.

Source of supply: Two wells.

Well 1. Three blocks north and one block east of city hall; drilled in 1937 by Q. D. Lewis; depth, 520 feet; diameter, 18⅝ to 10 inches; deep-well turbine pump and electric motor; static water level, 375 feet below land surface February 1937; yield, 175 gallons a minute.

Well 2. Six blocks north and four blocks east of city hall; drilled in 1937 by Q. D. Lewis; depth, 520 feet; diameter, 18⅝ to 10 inches; deep-well turbine pump and electric motor; yield, 175 gallons a minute.

Average pumpage, in gallons a day, 1940

January	136,000	May	171,000	September	196,000
February	145,000	June	154,000	October	212,000
March	169,000	July	185,000	November	187,000
April	168,000	August	159,000	December	198,000

Storage: Ground storage at well 1, 120,000 gallons; standpipe, 60,000 gallons.

Number of customers: 605.

Treatment: None.

Analysis, well 2

[Collected Oct. 21, 1947. pH is 8.0. Analyzed by J. W. Yett, Jr.]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	16		Sulfate (SO_4)	21	0.44
Iron (Fe)	.04		Chloride (Cl)	6.0	.17
Calcium (Ca)	13	0.65	Fluoride (F)	.1	.01
Magnesium (Mg)	6.9	.57	Nitrate (NO_3)	.4	.01
Sodium and potassium (Na + K)	39 (calc.)	3.87	Dissolved solids	290	
Bicarbonate (HCO_3)	272	4.46	Total hardness as $CaCO_3$	61	

Drillers' log, well 1

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface soil	5	5	Hard blue shale	70	300
Lime, shale, and rock	15	20	Limestone	28	328
Lime and shale	50	70	Blue shale	12	340
Lime, shale, and sand	15	85	Sand (water)	6	346
Quicksand	11	96	Dark blue shale	89	435
Blue shale	6	102	Light blue shale	20	455
Grey sandy shale	18	120	Limestone	10	465
Sand (water)	48	168	Sand	12	477
Blue shale	27	195	Blue shale	8	485
Sand (water)	15	210	Fine sand	30	515
Blue sandy shale	20	230	Coarse sand	5	520

YOUNG COUNTY

GRAHAM

Population in 1940: 5,178.

Source of information: J. F. Niell, chief operator, Sept. 20, 1946.

Ownership: Municipal.

Source of supply: Lake on Flint Creek, 1½ miles north of pumping station; capacity, 6,600 acre-feet.

Average pumpage, in gallons a day, 1946

January	480,000	April	565,000	July	1,555,000
February	445,000	May	639,000	August	1,345,000
March	524,000	June	945,000		

Storage: Two clear wells at pumping station, 142,000 gallons; 2 reservoirs on hill, 100,000 and 300,000 gallons.

Number of customers: 1,850.

Treatment: Aeration, coagulation, sedimentation, rapid sand filtration, prechlorination and postchlorination.

Analysis

[Collected Sept. 20, 1946. pH: Raw water, 7.8; finished water, 9.0. Analyzed by C. B. Cibulka]

	Raw water		Finished water	
	Parts per million	Equivalents per million	Parts per million	Equivalents per million
Silica (SiO_2)	16		5.8	
Iron (Fe)	.24		.01	
Calcium (Ca)	34	1.697	18	0.898
Magnesium (Mg)	3.2	.263	4.1	.337
Sodium (Na)	20	.874	18	.778
Potassium (K)	4.2	.107	4.9	.125
Bicarbonate (HCO_3)	116	1.901	50	.820
Sulfate (SO_4)	12	.250	20	.416
Chloride (Cl)	28	.790	32	.902
Fluoride (F)	0	0	0.	0
Nitrate (NO_3)	0	0	0.	0
Dissolved solids	187		127	
Total hardness as $CaCO_3$	98		62	

NEWCASTLE

Population in 1940: 1,044.

Source of information: W. E. Jones, water superintendent, Sept. 20, 1946.

Ownership: Municipal.

Source of supply: Lake 1 mile south of city.

Pumpage (estimated): 100,000 gallons a day in summer, 50,000 gallons a day in winter.

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

Number of customers: 270.

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

Analysis of finished water

[Collected Sept. 20, 1946. pH is 10.5. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	9.5		Hydroxide (OH)	13	0.764
Iron (Fe)	.09		Sulfate (SO_4)	20	.416
Calcium (Ca)	33	1.647	Chloride (Cl)	10	.282
Magnesium (Mg)	.4	.033	Fluoride (F)	0	0
Sodium (Na)	42	1.837	Nitrate (NO_3)	1.0	.016
Potassium (K)	5.0	.128	Dissolved solids	123	
Carbonate (CO_3)	18	2.167	Total hardness as $CaCO_3$	84	

OLNEY

Population in 1940: 3,497.

Source of information: E. M. Corley, water superintendent, Sept. 20, 1946.

Ownership: Municipal.

Source of supply: Lake on Bear Creek 3 miles north, northwest of city hall; capacity, 2,100 acre-feet.

Pumpage: 800,000 gallons a day in summer, 450,000 gallons a day in winter.

Storage: Clear well at pumping station, 100,000 gallons; concrete reservoir, 500,000 gallons; elevated tank, 103,000 gallons.

Number of customers: 1,125.

Treatment: Coagulation, sedimentation, prechlorination, and postchlorination.

Analysis of finished water

[Collected Sept. 20, 1946. ph is 9.5. Analyzed by C. B. Cibulka]

	Parts per million	Equivalents per million		Parts per million	Equivalents per million
Silica (SiO_2)	4.5		Sulfate (SO_4)	7.4	0.15
Iron (Fe)	.04		Chloride (Cl)	168	4.74
Calcium (Ca)	18	0.90	Fluoride (F)	.2	.01
Magnesium (Mg)	7.1	.58	Nitrate (NO_3)	.2	0
Sodium (Na)	98	4.27	Dissolved solids	357	
Potassium (K)	3.2	.08	Total hardness as $CaCO_3$	74	
Bicarbonate (HCO_3)	38	.93			

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