

GEOLOGICAL SURVEY CIRCULAR 221



THE INDUSTRIAL UTILITY OF PUBLIC WATER SUPPLIES IN THE WEST SOUTH-CENTRAL STATES, 1952

By E. W. Lohr, J. R. Avrett, B. Ireland, G. A. Billingsley, and T. B. Dover

UNITED STATES DEPARTMENT OF THE INTERIOR
Oscar L. Chapman, Secretary

GEOLOGICAL SURVEY
W. E. Wrather, Director

GEOLOGICAL SURVEY CIRCULAR 221

THE INDUSTRIAL UTILITY OF PUBLIC WATER SUPPLIES IN THE
WEST SOUTH-CENTRAL STATES, 1952

By E. W. Lohr, J. R. Avrett, B. Ireland, G. A. Billingsley, and T. B. Dover

Washington, D. C., 1952

Free on application to the Geological Survey, Washington 25, D. C.

CONTENTS

	Page
Introduction	1
Arkansas	3-24
Arkadelphia	3
Blytheville	4
Camden	5
Conway	6
El Dorado	7
Fayetteville	8
Forrest City	9
Fort Smith	10
Helena	11
Hope	12
Hot Springs	13
Jonesboro	14
Little Rock	15
Magnolia	16
Malvern	17
North Little Rock	17
Paragould	18
Pine Bluff	19
Russellville	20
Stuttgart	21
Texarkana	22
West Memphis	23
Louisiana	24-40
Alexandria	24
Bastrop	26
Baton Rouge	27
Bogalusa	29
Bossier City	29
Crowley	30
Gretna	31
Jefferson Parish	32
Lafayette	33
Lake Charles	34
Monroe	35
New Iberia	36
New Orleans	37
Shreveport	39
Oklahoma	40-60
Ada	40
Ardmore	41
Bartlesville	42
Chickasha	43
Duncan	44
El Reno	45
Enid	46
Lawton	47
McAlester	48
Miami	49
Muskogee	50
Norman	51
Oklahoma City	52
Okmulgee	53
Ponca City	54
Sapulpa	55
Seminole	56

	Page
Oklahoma--Continued	
Shawnee	57
Stillwater	58
Tulsa	59
Texas	60-123
Abilene	60
Alice	62
Amarillo	63
Austin	65
Baytown	66
Beaumont	67
Big Spring	68
Borger	70
Brownsville	71
Brownwood	72
Bryan	73
Cleburne	74
Corpus Christi	75
Corsicana	77
Dallas	78
Del Rio	80
Denison	81
Denton	82
El Paso	83
Fort Worth	85
Galveston	87
Grand Prairie	88
Greenville	89
Harlingen	90
Houston	91
Kingsville	93
Laredo	94
Longview	95
Lubbock	96
Lufkin	98
McAllen	99
Marshall	100
Midland	101
Odessa	102
Orange	103
Pampa	104
Paris	105
Pasadena	106
Plainview	107
Port Arthur	108
San Angelo	109
San Antonio	110
San Benito	111
Sherman	112
Sweetwater	113
Temple	114
Texarkana	115
Texas City	116
Tyler	117
University Park	119
Victoria	120
Waco	121

CONTENTS--Continued

	Page	Page
Texas--Continued		
West University Place	122	Wichita Falls 123

ILLUSTRATION

- Figure 1. Map of the United States showing sections covered by the nine circulars on the industrial utility of public water supplies of the United States, 1952. The shaded portion represents the section of the country covered by this circular..... 2

THE INDUSTRIAL UTILITY OF PUBLIC WATER SUPPLIES IN THE WEST SOUTH CENTRAL STATES, 1952

By E. W. Lohr, J. R. Avrett, B. Ireland,
G. A. Billingsley, and T. B. Dover

INTRODUCTION

The location of industrial plants is dependent on an ample water supply of suitable quality. Information relating to the chemical characteristics of the water supplies is not only essential to the location of many plants but is also an aid in the manufacture and distribution of many commodities.

Public water supplies are utilized extensively as a source of supply for many industrial plants, used either as delivered for domestic consumption or with further treatment if necessary to meet specific needs of the plant, such as water for processing, cooling, and steam generation. The industrial use of water in the United States in 1950 was estimated to be more than 75 billion gallons per day from private sources. In addition, about 6 billion gallons per day was estimated to be taken from public water supplies.

U. S. Geological Survey Water-Supply Paper 658, "The industrial utility of public water supplies in the United States, 1932" contains information pertaining to the public water supplies of 670 of the larger cities throughout the United States. This report, which is still in print and being distributed, has filled an important need in the field of water-supply engineering. The demand for more up-to-date information and more extended coverage has led to studies by the Geological Survey for revision of the information contained in the 1932 report. The revised report, which will include data pertaining to public water supplies of more than 1,200 cities in the United States, will eventually be published as a Geological Survey Water-Supply Paper. However, in order that the information might be available at the earliest possible time, nine preliminary reports are being issued which give data on the larger cities in each state. These nine reports are being released as Geological Survey Circulars, each covering a group of states as delineated by the Bureau of Census in taking the census of the population of the country. (See fig. 1). The reports give descriptive information and analytical data for approximately three-fourths of the cities that will be included in the final report for each of the states.

This circular is the fourth of the series and includes data for the States of Arkansas, Louisiana, Oklahoma, and Texas. (See fig. 1). The report gives the population (1950) of the city, population served, ownership, sources and treatment of supplies, capacity of treatment plants, storage facilities for both raw and finished waters, and chemical analyses of the water for 22 cities in Arkansas, 14 in Louisiana, 20 in Oklahoma, and 54 in Texas. The data for each city are essentially the same as will appear in the complete report for the whole country.

Data for the supplies in Arkansas were compiled under the direction of G. A. Billingsley, district chemist, Fayetteville, Ark.; in Louisiana and Texas by J. R. Avrett, chemist, under the supervision of Burdge Ireland, district chemist, Austin, Tex.; and in Oklahoma by T. B. Dover, chemist, Stillwater, Okla. Review and final assembly of the data were made by E. W. Lohr in the Washington office, under the supervision of S. K. Love, Chief, Quality of Water Branch.

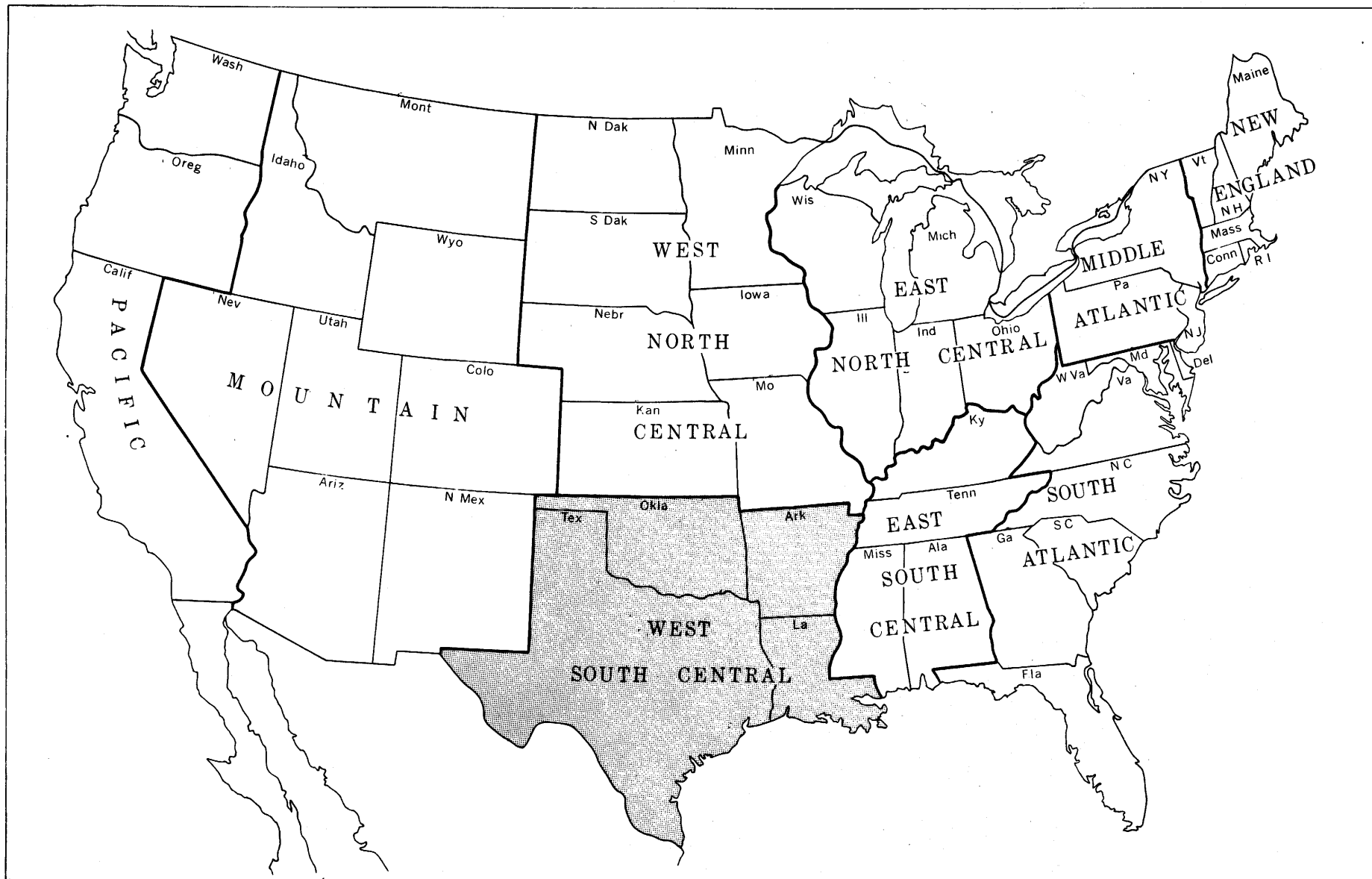


Figure 1. Map of the United States showing sections covered by the nine circulars on the industrial utility of public water of the United States, 1952. The shaded portion represents the section of the country covered by this circular.

ARKANSAS

ARKADELPHIA (Population, 6,819)

Ownership: Arkadelphia Water Co. (General Water Works Corp.).

Source: Ouachita River.

Treatment: Coagulation with lime and alum, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 700,000 gpd.

Raw-water storage: None.

Finished-water storage: 440,000 gal.

The treatment plant is located on the bank of Ouachita River about 300 yd east of Ouachita College athletic field.

Analyses of samples collected daily from the Ouachita River at Arkadelphia show there is some variation in the chemical character of the water throughout the year, but the dissolved solids is usually low.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water		Raw water ^a	Finished water
Silica (SiO ₂)	6.4	4.8	Hardness as CaCO ₃ :		
Iron (Fe) .....	.12	.05	Total	29	59
Manganese (Mn)	--	.01	Noncarbonate.....	6	27
Calcium (Ca)	8.1	19	Color.....	--	6
Magnesium (Mg).....	2.1	2.8	pH.....	--	8.6
Sodium (Na)	4.2	3.0	Specific conductance		
Potassium (K)	1.7	1.1	(micromhos at		
Carbonate (CO ₃)	0	--	25 C.).....	76.7	126
Bicarbonate (HCO ₃)	28	^b 39	Turbidity.....	--	2
Sulfate (SO ₄)	7.4	26	Temperature (F.)...	--	60
Chloride (Cl)	4.1	3.8	Date of collection...	--	Dec. 4,
Fluoride (F) .....	.1	.1			1951
Nitrate (NO ₃)	1.4	1.1			
Dissolved solids.....	54	84			

^aAverage of analyses of 10-day composites of daily samples collected at Arkadelphia for the year October 1950, to September 1951.

^bIncludes the equivalent of less than 5 ppm of carbonate (CO₃).

ARKANSAS

BLYTHEVILLE (Population, 16,234)

Ownership: Blytheville Water Co.

Source: 3 wells (3 to 5), each 1,500 ft deep and reported to yield 1,200, 1,800, and 1,800 gpm, respectively.

Treatment: Aeration (spray and contact beds), sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 2,500,000 gpd.

Raw-water storage: None.

Finished-water storage: 850,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 4	Finished water ^a		Well 4	Finished water ^a
Silica (SiO ₂)	10	9.9	Hardness as CaCO ₃ :		
Iron (Fe)	2.6	.06	Total	27	27
Manganese (Mn)	--	--	Noncarbonate.....	0	0
Calcium (Ca)	7.7	7.3	Color	--	--
Magnesium (Mg).....	1.9	2.2	pH	6.6	7.6
Sodium (Na)	29	30	Specific conductance		
Potassium (K)	3.4	5.1	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	189	195
Bicarbonate (HCO ₃)	98	101	Turbidity	--	--
Sulfate (SO ₄)	11	10	Temperature (F.)...	77	75
Chloride (Cl)	2.5	3.0	Date of collection...	May 22, 1950	Apr. 24, 1946
Fluoride (F) .....	.0	.0			
Nitrate (NO ₃) .....	.8	.8			
Dissolved solids.....	118	118			
Depth (feet)				1,500	
Diameter (inches)				10	
Date drilled				1938	
Percent of supply				--	

^aComposite.

ARKANSAS

CAMDEN (Population, 11,372)

Ownership: Municipal.

Source: Ouachita River.

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

Rated capacity of treatment plant: 1,750,000 gpd.

Raw-water storage: --

Finished-water storage: 1,100,000 gal.

The treatment plant is located at end of East Washington St. The treatment plant capacity will be increased by 1,500,000 gpd within 9 months. Analyses of daily samples collected from the Ouachita River at Camden show some variation in chemical character, but the dissolved solids is usually low.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water ^b		Raw water ^a	Finished water ^b
Silica (SiO ₂)	9.8	4.5	Hardness as CaCO ₃ :		
Iron (Fe) .....	.43	.11	Total	26	53
Manganese (Mn)	--	.00	Noncarbonate.....	5	28
Calcium (Ca)	7.3	17	Color	--	7
Magnesium (Mg).....	1.8	2.6	pH	7.3	7.5
Sodium (Na)	11	8.6	Specific conductance		
Potassium (K)	2.0	1.3	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	114	148
Bicarbonate (HCO ₃)	26	30	Turbidity	--	2
Sulfate (SO ₄)	6.1	23	Temperature (F.)...	--	62
Chloride (Cl)	17	15	Date of collection...	1946-47	Dec. 4, 1951
Fluoride (F) .....	.1	.2			
Nitrate (NO ₃)	1.7	.4			
Dissolved solids.....	81	92			

^a Average of analyses of 10-day composites of daily samples collected at Camden for the year October 1946, to September 1947.

^b City tap.

ARKANSAS

CONWAY (Population, 8,610)

Ownership: Municipal.

Source: Cadron Creek.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 1,500,000 gpd.

Raw-water storage: --

Finished-water storage: 1,150,000 gal.

The treatment plant is located about 6 miles northwest of Conway. There is some variation in the chemical character of the water throughout the year, but the dissolved solids at all times is low.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water ^a		Raw water	Finished water ^a
Silica (SiO ₂)	7.6	6.5	Hardness as CaCO ₃ :		
Iron (Fe) .....	.25	.31	Total	14	20
Manganese (Mn) .....	.00	.00	Noncarbonate.....	3	12
Calcium (Ca)	3.0	6.2	Color.....	27	5
Magnesium (Mg).....	1.6	1.2	pH.....	6.6	6.9
Sodium (Na)	2.0	2.2	Specific conductance		
Potassium (K)	1.3	1.8	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	32.8	57.0
Bicarbonate (HCO ₃)	13	10	Turbidity	4	1
Sulfate (SO ₄)	2.6	11	Temperature (F.)...	47	53
Chloride (Cl)	2.8	4.8	Date of collection...	Nov. 21,	Nov. 21,
Fluoride (F) .....	.1	.1		1951	1951
Nitrate (NO ₃)	2.7	1.0			
Dissolved solids.....	32	40			

^a City tap.

ARKANSAS

EL DORADO (Population, 23,076)

Ownership: El Dorado Water Co.

Source: 6 wells (2, 6 to 10), 160, 720, 725, 700, 718, and 737 ft deep. The yield of the wells is reported to be 570, (well 6, not reported), 630, 1,050, 300, and 1,000 gpm. Wells 6 and 9 are for auxiliary or emergency supply.

Treatment: None.

Storage: 1,500,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 2	Well 10	Wells (city tap) ^a
Silica (SiO ₂)	40	10	18
Iron (Fe)	3.1	.02	.02
Manganese (Mn)	--	--	--
Calcium (Ca)	7.4	2.2	4.0
Magnesium (Mg).....	3.8	.6	1.7
Sodium (Na).....	9.5	106	102
Potassium (K)	4.4	1.5	
Carbonate (CO ₃)	0	9	4
Bicarbonate (HCO ₃).....	17	213	224
Sulfate (SO ₄).....	20	.8	.8
Chloride (Cl)	18	36	33
Fluoride (F) .....	.0	.1	.2
Nitrate (NO ₃) .....	.1	.1	1.5
Dissolved solids	114	275	286
Hardness as CaCO ₃ :			
Total	34	8	17
Noncarbonate	20	0	0
Color	--	--	--
pH.....	6.8	8.1	--
Specific conductance (micromhos at 25 C.).....	133	454	--
Turbidity	--	--	--
Temperature (F.)	65	74	--
Date of collection	Nov. 28, 1945	Nov. 28, 1945	Feb. 15, 1950
Depth (feet)	160	737	
Diameter (inches)	--	15-10	
Date drilled	1926	1945	
Percent of supply	--	--	

^aAnalyzed by U. S. Public Health Service, Bethesda, Md.

ARKANSAS

FAYETTEVILLE (Population, 17, 091)

Ownership: Municipal; supplies also the communities of Combs, Farmington, Greenland, and Johnson. Total population supplied, about 20, 100.

Source: West Fork White River (impounded), two-thirds of supply; Clear Creek (impounded), one-third of supply. Auxiliary or emergency supply, Wilson Lake.

Treatment: West Fork White River: coagulation with lime and iron salts, sedimentation, slow anthrafiltration, and chlorination. Clear Creek: coagulation with lime and alum, sedimentation, slow anthrafiltration, and chlorination.

Rated capacity of treatment plants: West Fork White River plant, 2, 000, 000 gpd; Clear Creek plant, 1, 000, 000 gpd.

Raw-water storage: Not known.

Finished-water storage: West Fork White River reservoir, 3, 750, 000 gal; Clear Creek reservoir, 1, 000, 000 gal.

West Fork White River treatment plant is located on Mount Sequoyah in Fayetteville. Clear Creek treatment plant is 4 miles north of Fayetteville on Johnson Road. The plants supply different sections of the city and the only mixing of the finished water from the two sources is that which might occur in the distribution mains.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water (city tap) ^a		Finished water (city tap) ^a
Silica (SiO ₂)	5.2	Hardness as CaCO ₃ :	
Iron (Fe) .....	.29	Total	71
Manganese (Mn) .....	.00	Noncarbonate	15
Calcium (Ca)	26		
Magnesium (Mg)	1.5	Color	5
Sodium (Na)	3.1	pH	7.3
Potassium (K)	1.5	Specific conductance	
Carbonate (CO ₃)	0	(micromhos at	
Bicarbonate (HCO ₃)	68	25 C.).....	153
Sulfate (SO ₄)	12	Turbidity	1
Chloride (Cl)	4.8	Temperature (F.).....	60
Fluoride (F) .....	.1	Date of collection	Dec. 3, 1951
Nitrate (NO ₃)	4.0		
Dissolved solids	93		

^a At U.S.G.S. laboratory, Bureau of Research, University of Arkansas.

ARKANSAS

FORREST CITY (Population, 7,607)

Ownership: Municipal.

Source: 3 wells (1 to 3), 530, 502, and 530 ft deep, and reported to yield 450, 350, and 750 gpm, respectively.

Treatment: Aeration, softening with lime, coagulation with lime and alum, sedimentation (upward flow cylindrical tanks), recarbonation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 1,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 2,250,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1	Well 2	Finished water (city tap)
Silica (SiO ₂)	24	27	22
Iron (Fe)	1.7	1.2	.32
Manganese (Mn)	--	--	.00
Calcium (Ca)	58	53	11
Magnesium (Mg)	23	21	17
Sodium (Na)	6.7	11	12
Potassium (K)	4.1	4.1	1.4
Carbonate (CO ₃)	0	0	7
Bicarbonate (HCO ₃)	297	287	106
Sulfate (SO ₄)	5.3	3.3	17
Chloride (Cl)	6.0	7.0	5.0
Fluoride (F) .....	.2	.0	.3
Nitrate (NO ₃) .....	.5	.2	.3
Dissolved solids	274	268	148
Hardness as CaCO ₃ :			
Total	239	219	97
Noncarbonate	0	0	0
Color	--	--	7
pH	7.0	7.0	8.7
Specific conductance (micromhos at 25 C.)	407	359	219
Turbidity	--	--	2
Temperature (F.)	64	64	52
Date of collection	June 26, 1946	June 26, 1946	Dec. 26, 1951
Depth (feet)	530	502	
Diameter (inches)	8	8	
Date drilled	1937	1935	
Percent of supply	--	--	

ARKANSAS

FORT SMITH (Population, 47, 942)

Ownership: Municipal; supplies also Alma, Camp Chaffee, Mountainburg, Van Buren, and other communities. Total population supplied, about 72,300.

Source: Clear Creek impounded in Lake Fort Smith, approximately 22 miles northeast of the city.

Treatment: Coagulation with iron salts and lime, sedimentation, rapid sand filtration, chlorination, and ammoniation.

Rated capacity of treatment plant: 9,000,000 gpd.

Raw-water storage: Lake Fort Smith, 3,900,000,000 gal.

Finished-water storage: 23,000,000 gal.

The treatment plant is 1 mile north of Mountainburg.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water ^b		Raw water ^a	Finished water ^b
Silica (SiO ₂)	7.6	6.6	Hardness as CaCO₃:		
Iron (Fe) .....	.02	.20	Total	14	29
Manganese (Mn)	--	.00	Noncarbonate.....	0	11
Calcium (Ca)	3.6	9.1	Color.....	10	20
Magnesium (Mg).....	1.3	1.6	pH.....	6.8	7.7
Sodium (Na)	2.1	1.6	Specific conductance		
Potassium (K) .....	.3	.4	(bicromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	41.0	71.2
Bicarbonate (HCO ₃)	18	22	Turbidity.....	--	3
Sulfate (SO ₄)	3.0	12	Temperature (F.)...	--	41
Chloride (Cl)	1.5	2.5	Date of collection...	July 27, 1949	Dec. 27, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃)	1.3	.8			
Dissolved solids.....	31	59			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	13	20	9	6.7	7.1	6.3	23	29	15	22	152	3
Finished water...	21	34	13	8.9	9.4	8.4	48	60	28	0	0	0

^aCollected at spillway, Lake Fort Smith.

^bCity tap.

ARKANSAS

HELENA (Population, 11,236)

Ownership: Municipal; also supplies suburban area. Total population supplied, 12,000.

Source: 3 wells (NW, NE, and SE), 493, 612, and 495 ft deep, and reported to yield 750, 750, and 1,000 gpm.

Treatment: Chlorination, and calgon and soda ash for corrosion control.

Rated capacity of treatment plant: 3,460,000 gpd.

Raw-water storage: --

Finished-water storage: 1,550,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1 NW ^a	Finished water ^b		Well 1 NW ^a	Finished water ^b
Silica (SiO ₂)	20	29	Hardness as CaCO ₃ :		
Iron (Fe) .....	.57	.33	Total	46	42
Manganese (Mn)	--	.00	Noncarbonate.....	0	0
Calcium (Ca)	12	10	Color	--	20
Magnesium (Mg)	3.9	4.0	pH	7.4	8.0
Sodium (Na)	169	166	Specific conductance		
Potassium (K)	7.6	3.5	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	999	749
Bicarbonate (HCO ₃)	394	358	Turbidity	--	1
Sulfate (SO ₄) .....	.8	3.5	Temperature (F.)...	66	56
Chloride (Cl)	69	74	Date of collection...	June 27, 1946	Dec. 26, 1951
Fluoride (F) .....	.8	.7			
Nitrate (NO ₃) .....	.2	.8			
Dissolved solids.....	479	472			
Depth (feet)					493
Diameter (inches)					14-12
Date drilled					1905
Percent of supply					--

^aRaw water.

^bCity tap.

ARKANSAS

HOPE

(Population, 8,605)

Ownership: Municipal.

Source: 5 wells (1 to 5), 1,480, 620, 620, 620, and 1,500 ft deep. The yield of the wells is reported to be 292, 147, 156, 340, and 250 gpm.

Treatment: Chlorination (average residual 0.15 ppm).

Rated capacity of treatment plant: 1,800,000 gpd.

Raw-water storage: None.

Finished-water storage: 786,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1	Well 2	Well 3	Well 4	Well 5
Silica (SiO ₂)	8.0	17	17	19	9.9
Iron (Fe) .....	.16	.18	.11	.25	.07
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	3.4	21	16	21	.8
Magnesium (Mg)	1.2	3.4	2.9	4.0	1.9
Sodium (Na)	419	115	124	107	444
Potassium (K)	3.8	3.0	2.9	3.2	16
Carbonate (CO ₃)	28	0	0	0	10
Bicarbonate (HCO ₃)	517	267	260	264	549
Sulfate (SO ₄)	44	46	52	43	44
Chloride (Cl)	292	36	41	31	320
Fluoride (F) .....	.3	.6	.4	.0	2.2
Nitrate (NO ₃) .....	.2	.0	.0	.0	3.6
Dissolved solids	1,060	376	386	361	1,120
Hardness as CaCO ₃ :					
Total	14	66	52	69	10
Noncarbonate	0	0	0	0	0
Color	--	--	--	--	7
pH	8.2	8.3	8.1	8.1	8.4
Specific conductance (micromhos at 25 C.)	1,880	622	635	593	1,920
Turbidity	--	--	--	--	--
Temperature (F.)	100	78	78	78	98
Date of collection	Oct. 26, 1945	Oct. 26, 1945	Oct. 26, 1945	Oct. 26, 1945	Mar. 27, 1951
Depth (feet)	1,480	620	620	620	1,500
Diameter (inches)	8-6-4	8	8	10	12-8
Date drilled	1918	1933	1933	1943	1950
Percent of supply	--	--	--	--	--

ARKANSAS

HOT SPRINGS (Population, 29,307)

Ownership: Municipal.

Source: 4 artificial lakes (Hot Springs, Dillion, Bethel, and Sanderson).

Treatment: Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 6,000,000 gpd.

Raw-water storage: 4 lakes.

Finished-water storage: 1,200,000 gal.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water (city tap)		Finished water (city tap)
Silica (SiO ₂)	4.5	Hardness as CaCO ₃ :	
Iron (Fe) .....	.18	Total	33
Manganese (Mn) .....	.00	Noncarbonate	15
Calcium (Ca)	11		
Magnesium (Mg)	1.3	Color	7
Sodium (Na)	1.7	pH	8.8
Potassium (K) .....	.5	Specific conductance	
Carbonate (CO ₃)	--	(micromhos at	
Bicarbonate (HCO ₃)	^a 22	25 C.).....	76.5
Sulfate (SO ₄)	12	Turbidity	2
Chloride (Cl)	4.0	Temperature (F.).....	--
Fluoride (F) .....	.1	Date of collection	Dec. 3,1951
Nitrate (NO ₃) .....	.0		
Dissolved solids	50		

^aIncludes the equivalent of less than 5 ppm of carbonate (CO₃).

ARKANSAS

JONESBORO (Population, 16,310)

Ownership: Municipal; supplies also Nettleton. Total population supplied, about 17,700.

Source: 5 wells (1, 2, Lamarr St., Culberhouse, and Johnson St.), 132, 150, 215, and 150 ft deep (depth not reported on Johnson St. well). The yield of the wells is reported to be 1,000, 800, 1,200, 1,100, and 900 gpm.

Treatment: Aeration, ammoniation, chlorination, and fluoridation.

Rated capacity of treatment plant: 6,000,000 gpd.

Raw-water storage: --

Finished-water storage: Elevated tank, 1,500,000 gal; ground reservoir, 1,000,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1	Well 2	Lamarr well	Finished water (city tap)
Silica (SiO ₂)	26	26	32	27
Iron (Fe).....	.09	.15	.10	.06
Manganese (Mn)	--	--	--	--
Calcium (Ca)	12	19	12	19
Magnesium (Mg)	7.0	9.4	4.0	9.4
Sodium (Na).....	17	13	11	18
Potassium (K)	1.8	2.9	1.4	1.6
Carbonate (CO ₃)	0	0	0	--
Bicarbonate (HCO ₃).....	62	96	64	^a 87
Sulfate (SO ₄)	26	15	3.6	26
Chloride (Cl).....	14	13	9.5	18
Fluoride (F) .....	.0	.0	.0	.1
Nitrate (NO ₃)	2.8	.8	8.6	3.2
Dissolved solids	141	150	122	165
Hardness as CaCO ₃ :				
Total	59	86	46	86
Noncarbonate	8	7	0	15
Color.....	--	--	--	--
pH	6.5	7.0	6.7	8.4
Specific conductance (micromhos at 25 C.)	217	230	165	263
Turbidity	--	--	--	--
Temperature (F.)	61	61	60	--
Date of collection	May 3, 1950	May 3, 1950	May 3, 1950	Apr. 25, 1946
Depth (feet)	132	150	215	
Diameter (inches)	10	10	10	
Date drilled	1929	1929	1930	
Percent of supply	--	--	--	

^aIncludes the equivalent of less than 5 ppm of carbonate (CO₃).

ARKANSAS

LITTLE ROCK (Population, 105,213)

Ownership: Little Rock Municipal Water Works. Supplies also Cammack Village, North Little Rock, Park Hill, and other suburban areas. Total population supplied, about 164,700.

Source: Alum Fork of Saline River impounded in Lake Winona, 33 miles west of the city. The watershed is uninhabited and lies almost wholly within the Ouachita National Forest. Arkansas River, emergency supply.

Treatment: Coagulation with lime and alum, ammoniation, chlorination, sedimentation, rapid sand filtration, alkali for the adjustment of pH, and fluoridation.

Rated capacity of treatment plant: 23,000,000 gpd.

Raw-water storage: Lake Winona, 13,500,000 gal; auxiliary reservoir, 92,000,000 gal.

Finished-water storage: 10,200,000 gal.

Raw water is delivered to the treatment plant, located in the city, by gravity flow. The elevation of the treatment plant is such that the major portion of the distribution system is also served by gravity.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water ^b		Raw water ^a	Finished water ^b
Silica (SiO ₂)	3.5	4.5	Hardness as CaCO ₃ :		
Iron (Fe)	--	.14	Total	11	18
Manganese (Mn)	--	.00	Noncarbonate.....	3	6
Calcium (Ca)	2.4	4.5	Color	35	12
Magnesium (Mg)	1.2	1.7	pH	7.1	7.1
Sodium (Na)	1.0	2.1	Specific conductance		
Potassium (K)	--	.4	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	--	46.9
Bicarbonate (HCO ₃)	10	15	Turbidity	10	1
Sulfate (SO ₄) .....	.0	4.9	Temperature (F.)...	--	58
Chloride (Cl)	2.0	3.0	Date of collection...	Jan. 18, 1951	Dec. 26, 1951
Fluoride (F) .....	.0	1.0			
Nitrate (NO ₃)	--	.1			
Dissolved solids.....	25	31			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	7	10	5	6.5	7.2	6.1	10	18	8	14	40	5
Finished water...	14	22	8	8.3	9.7	7.0	20	30	12	0	0	0

^a Analyzed by Little Rock Water Department.

^b City tap.

ARKANSAS

MAGNOLIA (Population, 6, 918)

Ownership: Municipal.

Source: 4 wells (1 to 4), 435, 428, 410, and 425 ft deep, and reported to yield 320, 380, 468, and 500 gpm.

Treatment: Chlorination.

Rated capacity of treatment plant: 2, 000, 000 gpd.

Raw-water storage: None.

Finished-water storage: 811, 000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 3	Well 4	Finished water (city tap)
Silica (SiO ₂)	10	12	11
Iron (Fe) .....	.02	.08	.14
Manganese (Mn)	--	--	.00
Calcium (Ca)	8.8	5.6	7.8
Magnesium (Mg).....	1.6	.8	1.8
Sodium (Na).....	69	86	75
Potassium (K)	4.5	1.9	2.1
Carbonate (CO ₃)	--	--	0
Bicarbonate (HCO ₃).....	^a 192	^a 218	197
Sulfate (SO ₄).....	18	8.9	16
Chloride (Cl)	5.0	6.0	7.2
Fluoride (F) .....	.0	.1	.2
Nitrate (NO ₃) .....	.2	.2	.8
Dissolved solids	215	230	224
Hardness as CaCO ₃ :			
Total	29	17	27
Noncarbonate	0	0	0
Color	--	--	7
pH.....	8.5	8.3	7.9
Specific conductance (micromhos at 25 C.).....	338	359	348
Turbidity	--	--	2
Temperature (F.)	--	71	58
Date of collection	Jan. 17, 1946	Nov. 8, 1950	Dec. 4, 1951
Depth (feet)	413	425	
Diameter (inches)	12	8	
Date drilled	1944	1951	
Percent of supply	--	--	

^aIncludes the equivalent of less than 5 ppm of carbonate (CO₃).

ARKANSAS

MALVERN (Population, 8,072)

Ownership: Municipal; supplies also a small number of people outside the city limits. Total population supplied, about 8,120.

Source: Ouachita River.

Treatment: Coagulation with lime and alum, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 1,200,000 gpd.

Raw-water storage: --

Finished-water storage: 960,000 gal.

The treatment plant is located on Front Street near Missouri Pacific Depot in Malvern. Analyses of composites of daily samples collected from the Ouachita River near Malvern show a variation in chemical character, but the dissolved solids is low.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water ^b		Raw water ^a	Finished water ^b
Silica (SiO ₂)	7.5	2.5	Hardness as CaCO₃:		
Iron (Fe) .....	.04	.18	Total	22	41
Manganese (Mn) .....	.00	.00	Noncarbonate.....	1	18
Calcium (Ca)	6.3	13	Color.....	--	5
Magnesium (Mg).....	1.5	2.1	pH.....	7.4	7.4
Sodium (Na)	4.6	2.5	Specific conductance		
Potassium (K)	1.0	.9	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	64.9	99.5
Bicarbonate (HCO ₃)	28	28	Turbidity.....	--	2
Sulfate (SO ₄)	4.3	19	Temperature (F.)...	--	46
Chloride (Cl)	2.6	3.2	Date of collection...	1946-47	Dec. 4, 1951
Fluoride (F) .....	.3	.1			
Nitrate (NO ₃)	1.9	.6			
Dissolved solids.....	48	61			

^aAverage of analyses of 10-day composites of daily samples from the Ouachita River near Malvern for the year October 1946, to September 1947.

^bCity tap.

NORTH LITTLE ROCK (Population, 44,097)

Ownership: Supplied by Little Rock (see Little Rock).

ARKANSAS

PARAGOULD (Population, 9,668)

Ownership: Municipal.

Source: 3 wells (1 to 3), 500, 505, and 507 ft deep, and reported to yield 1,000, 900, and 900 gpm, respectively.

Treatment: Chlorination.

Rated capacity of treatment plant: 3,000,000 gpd.

Raw-water storage: --

Finished-water storage: 250,000 gal.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water ^a		Finished water ^a
Silica (SiO ₂)	14	Hardness as CaCO ₃ :	
Iron (Fe)	1.0	Total	14
Manganese (Mn)	--	Noncarbonate	0
Calcium (Ca)	3.2	Color	--
Magnesium (Mg)	1.5	pH	8.2
Sodium (Na)	63	Specific conductance	
Potassium (K)	3.2	(micromhos at	
Carbonate (CO ₃)	9	25 C.).....	288
Bicarbonate (HCO ₃)	162	Turbidity	--
Sulfate (SO ₄)	1.4	Temperature (F.).....	--
Chloride (Cl)	3.2	Date of collection	Apr. 25, 1946
Fluoride (F) .....	.1		
Nitrate (NO ₃) .....	.8		
Dissolved solids	183		

^aComposite sample, wells 1 and 2.

ARKANSAS

PINE BLUFF (Population, 37,162)

Ownership: General Waterworks Corp.

Source: 3 wells (8 to 10), 835-850, 838, and 835-850 ft deep, and reported to yield 1,250, 1,000, and 1,050 gpm, respectively.

Treatment: Aeration, rapid anthrafiltration, sedimentation, polyphosphate (Calgon) for corrosion control, and chlorination.

Rated capacity of treatment plant: 6,170,000 gpd.

Raw-water storage: None.

Finished-water storage: Reservoir, 13,000,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 8	Well 9	Well 10	Finished water (composite)
Silica (SiO ₂)	12	12	13	18
Iron (Fe).....	3.3	14	3.3	.64
Manganese (Mn)	--	--	--	.00
Calcium (Ca)	7.0	11	7.0	6.9
Magnesium (Mg)	2.3	3.3	2.2	2.7
Sodium (Na).....	12	11	14	13
Potassium (K)	6.9	7.2	6.4	6.3
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	65	82	70	67
Sulfate (SO ₄)	3.3	.6	3.7	4.2
Chloride (Cl).....	2.8	3.0	2.5	2.8
Fluoride (F) .....	.4	.4	.4	.3
Nitrate (NO ₃) .....	.2	.2	.2	.7
Dissolved solids	80	89	85	92
Hardness as CaCO ₃ :				
Total	27	41	26	28
Noncarbonate	0	0	0	0
Color.....	--	--	--	6
pH	7.9	7.9	8.0	6.8
Specific conductance (micromhos at 25 C.)	119	139	132	125
Turbidity	--	--	--	2
Temperature (F.)	--	--	--	76
Date of collection	Nov. 8, 1945	Nov. 8, 1945	Nov. 8, 1945	Dec. 26, 1951
Depth (feet)	835-850	838	835-850	
Diameter (inches)	16	24-16-10	24-16-10	
Date drilled	1938	1929	1945	
Percent of supply	--	--	--	

ARKANSAS

RUSSELLVILLE (Population, 8, 166)

Ownership: Russellville Water Co.

Source: Illinois Bayou.

Treatment: Aeration, coagulation with lime and alum, calgon, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 1, 400, 000 gpd.

Raw-water storage: None.

Finished-water storage: 743, 000 gal.

The treatment plant is located about 5 miles north of the city, just off U. S. Highway 64. There is some variation in the chemical character of the water during the year but the dissolved solids is low at all times.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	6.3	4.5	Hardness as CaCO ₃ :		
Iron (Fe) .....	.25	.25	Total	15	33
Manganese (Mn) .....	.00	.00	Noncarbonate.....	3	19
Calcium (Ca)	3.6	9.8	Color.....	30	12
Magnesium (Mg).....	1.4	2.0	pH.....	6.8	7.1
Sodium (Na)	1.4	1.9	Specific conductance		
Potassium (K)	1.0	.8	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	30.9	69.6
Bicarbonate (HCO ₃)	14	17	Turbidity	3	5
Sulfate (SO ₄)	2.4	15	Temperature (F.)...	47	53
Chloride (Cl)	1.8	3.0	Date of collection...	Nov. 21,	Nov. 21,
Fluoride (F) .....	.2	.3		1951	1951
Nitrate (NO ₃)	1.0	2.2			
Dissolved solids.....	29	53			

ARKANSAS

STUTTGART (Population, 7,276)

Ownership: Municipal.

Source: 3 wells (1 to 3), 125, 125, and 850 ft deep. The yield of the wells is reported to be 400, 200, and 1,100 gpm.

Treatment: None.

Storage: 265,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1	Well 3	3 wells (composite)
Silica (SiO ₂)	24	1.0	28
Iron (Fe)	1.1	2.8	.74
Manganese (Mn)	--	--	.02
Calcium (Ca)	55	28	72
Magnesium (Mg)	12	12	17
Sodium (Na)	27	32	28
Potassium (K)	1.6	7.0	1.2
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	266	190	326
Sulfate (SO ₄)	16	1.8	23
Chloride (Cl)	8.5	28	14
Fluoride (F) .....	.1	.0	.2
Nitrate (NO ₃) .....	.0	.2	.1
Dissolved solids	279	213	348
Hardness as CaCO ₃ :			
Total	187	119	250
Noncarbonate	0	0	0
Color	--	--	10
pH	7.6	8.1	7.4
Specific conductance (micromhos at 25 C.)	438	387	540
Turbidity	--	--	2
Temperature (F.)	--	--	48
Date of collection	July 17, 1946	July 17, 1946	Dec. 26, 1951
Depth (feet)	125	850	
Diameter (inches)	--	6	
Date drilled	--	1946	
Percent of supply	--	--	

ARKANSAS

TEXARKANA

(Population, 40,628; 15,875 in Arkansas)

Ownership: Municipal; supplies also suburban areas. Total population supplied, about 42,628.

Source: 3 well fields and 1 impounding reservoir: Arkansas Station, 22 wells ranging in depth from 40 ft to 50 ft; Texas Station, 12 wells ranging in depth from 40 ft to 50 ft; Bringle Station (used for emergency), 6 wells each about 37 ft deep; and Bringle Lake (Clear Creek impounded).

Treatment: Wells: aeration, alkali for adjustment of pH, and chlorination. Lake: prechlorination, coagulation with lime and alum, sedimentation, rapid sand filtration, postchlorination, and carbonation at times.

Rated capacity of treatment plant: 3,075,000 gpd.

Raw-water storage: --

Finished-water storage: 4,000,000 gal.

The Arkansas Station well field is near East 9th St. and Jefferson Ave.; Texas Station is about 1 mile west of Texarkana; Bringle Station, 6 miles northwest of Texarkana; and the impounding reservoir, at Bringle Station well field.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Arkansas Station		Finished water ^b	Finished water ^c
		Raw water	Finished water		
Silica (SiO ₂)	5.1	38	36	26	36
Iron (Fe) .....	.03	.48	.19	.01	.11
Manganese (Mn)	--	.05	.01	--	--
Calcium (Ca)	9.3	7.6	17	2.4	16
Magnesium (Mg)	2.7	5.1	5.6	1.2	4.4
Sodium (Na)	5.5	19	20	7.4	19
Potassium (K)	4.2	2.5	2.6	2.5	2.8
Carbonate (CO ₃)	0	0	16	0	0
Bicarbonate (HCO ₃)	34	31	18	10	55
Sulfate (SO ₄)	3.0	5.6	5.7	3.0	2.0
Chloride (Cl)	14	33	36	8.0	37
Fluoride (F) .....	.2	.1	.1	.0	.2
Nitrate (NO ₃) .....	.5	12	13	9.4	2.5
Dissolved solids	68	151	176	71	149
Hardness as CaCO ₃ :					
Total	34	40	65	11	58
Noncarbonate	6	14	24	3	13
Color	--	5	8	--	--
pH	6.6	5.8	9.1	5.6	6.6
Specific conductance (micromhos at 25 C.)	115	199	235	64.0	220
Turbidity	--	2	4	--	--
Temperature (F.)	--	66	65	--	--
Date of collection	Sept. 22, 1943	Dec. 4, 1951	Dec. 4, 1951	Sept. 22, 1943	Sept. 22, 1943

^aBringle Lake.

^bTexas Station.

^cBringle Station.

ARKANSAS

WEST MEMPHIS (Population, 9,112)

Ownership: Municipal.

Source: 3 wells (1 to 3), each 1,509 ft deep. The yield of the wells is reported to be 300, 800, and 1,500 gpm.

Treatment: None.

Storage: 400,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1	Well 2		Well 1	Well 2
Silica (SiO ₂)	10	11	Hardness as CaCO ₃ :		
Iron (Fe) .....	.25	.16	Total	12	10
Manganese (Mn)	--	--	Noncarbonate.....	0	0
Calcium (Ca)	3.3	2.6	Color	--	--
Magnesium (Mg)	1.0	.9	pH	7.6	7.4
Sodium (Na)	41	45	Specific conductance		
Potassium (K)	2.5	1.3	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	195	236
Bicarbonate (HCO ₃)	120	122	Turbidity	--	--
Sulfate (SO ₄)	3.3	5.5	Temperature (F.)...	76	76
Chloride (Cl)	1.2	3.0	Date of collection...	Nov. 2,	Mar. 8,
Fluoride (F) .....	.0	.0		1945	1950
Nitrate (NO ₃)	1.1	.7			
Dissolved solids.....	125	131			
Depth (feet)				1,509	1,509
Diameter (inches)				10-6	10
Date drilled				1929	1946
Percent of supply				--	--

LOUISIANA

ALEXANDRIA (Population, 34, 913)

Ownership: Municipal; supplies about 1, 500 people outside of city limits. Total population supplied, about 35, 400.

Source: 18 wells (U. S. G. S. R-7, R-12, R-15 to R-18, R-20, R-404 to R-406, R-408 to R-410, and R-421 to R-426) ranging in depth from 253 to 1, 202 ft; 1 well (R-458), 341 ft deep, used only in emergency. The yield of wells R-7, R-12, R-15, and R-405 is reported to be 400, 473, 400, and 400 gpm, respectively. (Data not available on other wells.)

Treatment: Chlorination.

Raw-water storage: None.

Finished-water storage: 3, 200, 000 gal.

The wells are pumped individually. The wells at Madison St., 5th and Monroe Sts., N. 3rd and McNutt Sts. pump into the main reservoir at 5th and Monroe Sts. The wells at the City Park pump into the reservoir at that location. The wells at 4th and Casson Sts. and at Bolton and Rapides Ave. have small storage tanks into which they pump.

The water is chlorinated at the intake of each of the storage points. It is pumped from storage into the distribution system.

There is considerable difference in the chemical composition of the water from the individual wells. The greater number of the wells deliver water that is very soft. The analyses selected show approximately the range in dissolved solids and hardness of the waters from the wells.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well R-404	Well R-408	Well R-423	Well R-409	Well R-15
Silica (SiO ₂)	28	30	47	28	49
Iron (Fe) .....	.51	9.0	.03	13	.15
Manganese (Mn) .....	.0	.3	--	.4	--
Calcium (Ca)	19	97	1.2	116	1.3
Magnesium (Mg)	4.4	50	.4	62	.5
Sodium (Na)	250	7.1	121	21	89
Potassium (K)					
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	591	548	297	600	212
Sulfate (SO ₄)	16	2.0	1.0	55	11
Chloride (Cl)	77	9.0	14	30	11
Fluoride (F)	--	--	1.2	--	.9
Nitrate (NO ₃) .....	.0	.0	.0	.0	.1
Dissolved solids	689	458	335	626	270
Hardness as CaCO ₃ :					
Total	66	448	4	544	5
Noncarbonate	0	0	0	53	0
Color	--	--	--	--	0
pH	8.1	6.8	7.5	6.8	--
Specific conductance (micromhos at 25 C.)	1, 130	817	--	1, 050	--
Turbidity	--	--	--	--	--
Temperature (F.)	--	68	--	68	--
Date of collection	Aug. 25, 1949	May 13, 1948	Aug. 25, 1943	May 13, 1948	Oct. 22, 1938

LOUISIANA

	Well R-404	Well R-408	Well R-423	Well R-409	Well R-15
Depth (feet)	253	326	786	1, 027	1, 202
Diameter (inches)	8	12-8	12-8	12-6	12
Date drilled	1941	1941	--	1941	1935
Percent of supply	--	--	--	--	--

LOUISIANA

BASTROP (Population, 12, 769)

Ownership: People Water Service, Inc. ; supplies about 225 people outside city limits. Total population supplied, about 13, 000.

Source: 3 wells (U. S. G. S. wells Mo-18, Mo-19, and Mo-65) 800, 600, and 630 ft deep, and reported to yield 250, 650, and 950 gpm, respectively.

Treatment: None.

Storage: 240, 000 gal.

The analysis given is representative of the water served to the consumers.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Well Mo-65 (city well 3)		Well Mo-65 (city well 3)
Silica (SiO ₂)	11	Hardness as CaCO ₃ :	
Iron (Fe) .....	.03	Total	6
Manganese (Mn)	--	Noncarbonate	0
Calcium (Ca)	1.7	Color	35
Magnesium (Mg) .....	.4	pH	8.0
Sodium (Na)	281	Specific conductance	
Potassium (K)	1.2	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	1, 220
Bicarbonate (HCO ₃)	422	Turbidity	--
Sulfate (SO ₄)	1.9	Temperature (F.).....	74
Chloride (Cl)	186	Date of collection	Feb. 27, 1951
Fluoride (F) .....	.6		
Nitrate (NO ₃) .....	.5		
Dissolved solids	697		
Depth (feet)			630
Diameter (inches)			12 ³ / ₄ -8
Date drilled			1948
Percent of supply			--

LOUISIANA

BATON ROUGE (Population, 125, 629)

Ownership: The Baton Rouge Water Works Co., Istrouma Water Co., and Dixie Water Co.; supplying approximately 109,000, 11,000, and 6,000 people, respectively.

Source: 30 wells (The Baton Rouge Water Works Co., 19 wells; Istrouma Water Co., 8 wells; and Dixie Water Co., 3 wells). Three of the wells of the Baton Rouge Water Works Co. are 339, 338, and 343 ft deep; the remaining wells range in depth from 1,496 to 2,712 ft. The wells of the Istrouma Water Co. range in depth from 1,060 to 1,939 ft. The wells (EB-154, EB-447, and EB-514) of the Dixie Water Co. are 2,434, 1,626, and 2,865 ft deep, respectively.

Treatment: Chlorination of the water furnished by the Baton Rouge Water Works Co. and the Dixie Water Co. No treatment of water furnished by the Istrouma Water Co.

Storage: The Baton Rouge Water Works Co., 6,140,000 gal; the Istrouma Water Co., 30,000 gal; and the Dixie Water Co., 120,000 gal.

The wells are pumped individually by electric pumps. The water is pumped directly into the distribution system and to storage. All of the analyses are of water from the wells of the Baton Rouge Water Works Co. at different location or pumping stations, and are representative of the water served to the consumers.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well EB-100 ^a	Well EB-151 ^b	Well EB-413 ^c	Well EB-444 ^d	Well EB-456 ^e
Silica (SiO ₂)	34	24	28	24	23
Iron (Fe)	1.3	.07	.10	.23	.13
Manganese (Mn) .....	.05	.00	--	.00	.00
Calcium (Ca)	62	1.4	3.6	1.0	1.3
Magnesium (Mg)	18	.2	1.7	.3	.2
Sodium (Na)	20	82	73	91	83
Potassium (K)	2.4	2.4	4.4	2.0	3.2
Carbonate (CO ₃)	0	6	10	19	10
Bicarbonate (HCO ₃)	314	191	165	190	186
Sulfate (SO ₄)	1.0	11	13	11	9.0
Chloride (Cl)	7.2	6.2	8.0	5.0	3.8
Fluoride (F) .....	.1	.1	.2	.3	.3
Nitrate (NO ₃)	2.5	.0	2.8	.2	1.0
Dissolved solids	300	219	228	241	223
Hardness as CaCO ₃ :					
Total	228	4	16	4	4
Noncarbonate	0	0	0	0	0
Color	--	--	--	--	--
pH	7.5	8.7	8.7	9.0	8.8
Specific conductance (micromhos at 25 C.)	505	344	322	383	347
Turbidity	--	--	--	--	--
Temperature (F.)	70	96	88	93	86
Date of collection	May 9, 1951	May 9, 1951	Sept. 26, 1949	May 9, 1951	May 9, 1951

^aFront Street.

^bGovernment Street Station.

^cBaton Rouge Water Works Well 3.

^dFirst Street.

^eScotlandville, La.

LOUISIANA

	Well EB-100	Well EB-151	Well EB-413	Well EB-444	Well EB-456
Depth (feet)	343	2,664	1,732	2,253	1,895
Diameter (inches)	18-12	12-6	12-9 5/8	--	--
Date drilled	--	--	1946	1946	1947
Percent of supply	--	--	--	--	--

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well EB-504 ^f	Well EB-510 ^g		Well EB-504 ^f	Well EB-510 ^g
Silica (SiO ₂)	28	36	Hardness as CaCO ₃ :		
Iron (Fe)	--	.24	Total	6	2
Manganese (Mn)	--	.00	Noncarbonate.....	0	0
Calcium (Ca) .....	.6	.4	Color.....	--	--
Magnesium (Mg).....	1.0	.3	pH.....	8.7	8.3
Sodium (Na)	76	67	Specific conductance		
Potassium (K)	10	.4	(micromhos at		
Carbonate (CO ₃)	162	^h 162	25 C.).....	326	279
Bicarbonate (HCO ₃)	16	9.6	Turbidity	--	--
Sulfate (SO ₄)	4.0	4.0	Temperature (F.)...	88	85
Chloride (Cl)	--	.1	Date of collection...	Sept. 26, 1949	May 9, 1951
Fluoride (F) .....	.2	1.2			
Nitrate (NO ₃)	226	202			
Dissolved solids.....					
Depth (feet)				1,777	1,605
Diameter (inches)				--	12-9 5/8
Date drilled				1949	1951
Percent of supply				--	--

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	106	124	72	8.1	8.5	7.6	--	--	--	67	300	25
Finished water...	99	120	72	7.9	8.1	7.7	--	--	--	--	--	--

^fGovernment Street Station, well 4.

^gLula Street.

^hIncludes the equivalent of less than 5 ppm of carbonate (CO₃).

LOUISIANA

BOGALUSA (Population, 17, 798)

Ownership: Municipal; supplies approximately 500 persons outside of city limits.

Total population supplied, about 18,300.

Source: 6 wells (U. S. G. S. wells Wa-34, Wa-41, Wa-44 to Wa-47) 1,500, 1,442, 1,450, 1,500, 1,500, and 1,500 ft deep. Emergency supply can be furnished by the Gaylord Container Corp.

Treatment: None.

Storage: 2 elevated tanks, each 250,000 gal; 2 underground tanks, each 500,000 gal.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Well Wa-41		Well Wa-41
Silica (SiO ₂)	48	Hardness as CaCO ₃ :	
Iron (Fe) .....	.06	Total	2
Manganese (Mn)	--	Noncarbonate	0
Calcium (Ca) .....	.2	Color	7
Magnesium (Mg) .....	.3	pH	8.0
Sodium (Na)	44	Specific conductance	
Potassium (K) .....	.8	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	204
Bicarbonate (HCO ₃)	105	Turbidity	--
Sulfate (SO ₄)	9.3	Temperature (F.).....	--
Chloride (Cl)	4.5	Date of collection	June 21, 1950
Fluoride (F) .....	.2		
Nitrate (NO ₃) .....	.0		
Dissolved solids	165		
Depth (feet)			1,442
Diameter (inches)			12-9 5/8
Date drilled			1950
Percent of supply			--

BOSSIER CITY (Population, 15,470)

Ownership: City of Shreveport.

Source: Supplied by city of Shreveport (See Shreveport).

LOUISIANA

CROWLEY

(Population, 12,784)

Ownership: Central-Louisiana Electric Co.

Source: 3 wells (U.S.G.S. wells Ac-169, Ac-170, and Ac-280), 280, 247, and 257 ft deep, and reported to yield 1,250, 900, and 1,400 gpm, respectively.

Treatment: Aeration (trays), softening with lime, coagulation with iron salts, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 5,100,000 gpd.

Raw-water storage: None.

Finished-water storage: 1,060,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well Ac-280 ^a	Finished water		Well Ac-280 ^a	Finished water
Silica (SiO ₂)	32	28	Hardness as CaCO₃:		
Iron (Fe)	1.7	.14	Total	216	81
Manganese (Mn)	--	--	Noncarbonate.....	0	0
Calcium (Ca)	54	7.7	Color	--	5
Magnesium (Mg).....	20	15	pH	7.3	8.6
Sodium (Na)	65	69	Specific conductance		
Potassium (K)	6.0	2.8	(bicromhos at		
Carbonate (CO ₃)	0	10	25 C.).....	691	432
Bicarbonate (HCO ₃)	396	205	Turbidity	--	--
Sulfate (SO ₄) .....	.5	.8	Temperature (F.)...	--	70
Chloride (Cl)	26	29	Date of collection...	Sept. 16,	Apr. 4,
Fluoride (F) .....	.2	.2		1950	1951
Nitrate (NO ₃)	8.2	2.0			
Dissolved solids.....	405	259			
Depth (feet)				257	
Diameter (inches)				12-10	
Date drilled				1942	
Percent of supply				--	

^aRaw water.

LOUISIANA

GRETN (Population, 13,813)

Ownership: Municipal.

Source: Mississippi River. Emergency supply may be obtained from nearby industrial supply wells.

Treatment: Plain sedimentation, softening with lime, coagulation with iron salts, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 2,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 1,250,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	8.4	9.8	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.05	Total	127	65
Manganese (Mn) .....	.00	.00	Noncarbonate.....	34	35
Calcium (Ca)	35	21	Color.....	--	--
Magnesium (Mg).....	9.7	3.0	pH.....	7.3	9.8
Sodium (Na)	13	13	Specific conductance		
Potassium (K)	--	4.4	(micromhos at		
Carbonate (CO ₃)	0	15	25 C.).....	317	237
Bicarbonate (HCO ₃)	114	6	Turbidity	--	--
Sulfate (SO ₄)	38	42	Temperature (F.)...	--	--
Chloride (Cl)	14	15	Date of collection...	May 14,	May 14,
Fluoride (F) .....	.3	.3		1951	1951
Nitrate (NO ₃)	3.0	2.5			
Dissolved solids.....	193	133			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	--	--	--	7.8	8.0	7.8	115	130	100	800	1200	700
Finished water...	--	--	--	9.6	9.6	9.6	70	75	60	2	2	2

LOUISIANA

JEFFERSON PARISH

Ownership: East Jefferson Water District 1; supplies Harahan, Kenner, Metairie, Shrewsbury, Southport, and other communities. Total population supplied, about 62,000.

Source: Mississippi River. Emergency supply can be obtained from the New Orleans public supply.

Treatment: Plain sedimentation, softening with lime, coagulation with lime and iron salts, ammoniation, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 10,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 3,500,000 gal.

The treatment plant for East Jefferson Water District 1 is at Shrewsbury.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	10	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.03	Total	156	75
Manganese (Mn)	--	.00	Noncarbonate.....	38	48
Calcium (Ca)	41	21	Color.....	--	--
Magnesium (Mg).....	13	5.5	pH.....	7.7	8.9
Sodium (Na)	21	21	Specific conductance		
Potassium (K)	--	2.0	(micromhos at		
Carbonate (CO ₃)	0	5	25 C.).....	400	279
Bicarbonate (HCO ₃)	144	23	Turbidity.....	--	--
Sulfate (SO ₄)	41	56	Temperature (F.)...	--	--
Chloride (Cl)	26	27	Date of collection...	Oct. 12, 1951	Oct. 12, 1951
Fluoride (F) .....	.3	.2			
Nitrate (NO ₃)	3.0	2.0			
Dissolved solids.....	234	163			

Regular determinations at treatment plant

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	--	165	67	--	8.2	7.5	--	--	--	500	1600	45
Finished water...	--	43	23	--	10	9.8	--	116	79	0	0	0

LOUISIANA

LAFAYETTE
(Population, 33,541)

Ownership: Municipal.

Source: 5 wells (U.S.G.S. wells Lf-1, Lf-433, Lf-491, Lf-492, and Lf-503), 220, 204, 214, 213, and 212 ft deep. The total yield of the wells is reported to be from 1,500 to 2,000 gpm.

Treatment: Aeration (trays), coagulation with sodium aluminate, softening with lime, sedimentation, addition of polyphosphate (Calgon) for stabilization, rapid (anthrafilt) filtration, and chlorination.

Rated capacity of treatment plant: 3,000,000 gpd.

Raw-water storage: None.

Finished-water storage: Surface storage, 1,000,000 gal; elevated tank, 500,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well Lf-491	Finished water		Well Lf-491	Finished water
Silica (SiO ₂)	46	37	Hardness as CaCO ₃ :		
Iron (Fe)	3.6	.15	Total	123	95
Manganese (Mn)	--	.1	Noncarbonate.....	0	6
Calcium (Ca)	36	27	Color	0	0
Magnesium (Mg).....	8.0	6.8	pH.....	7.0	8.9
Sodium (Na)	9.8	9.7	Specific conductance		
Potassium (K)	1.2	2.0	(micromhos at		
Carbonate (CO ₃)	0	19	25 C.).....	278	258
Bicarbonate (HCO ₃)	151	77	Turbidity	--	--
Sulfate (SO ₄)	9.3	10	Temperature (F.)...	--	--
Chloride (Cl)	8.2	12	Date of collection...	Oct. 25, 1949	Apr. 5, 1951
Fluoride (F) .....	.5	.2			
Nitrate (NO ₃) .....	.0	.2			
Dissolved solids.....	195	161			
Depth (feet)				214	
Diameter (inches)				24-16-10	
Date drilled				1949	
Percent of supply				--	

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	123	--	--	6.9	--	--	133	--	--	0	--	--
Finished water...	--	--	--	9.5	--	--	85	--	--	0	--	--

LOUISIANA

LAKE CHARLES (Population, 41,272)

Ownership: Gulf States Utilities Co.

Source: 5 wells ("A", "K", "L", "M", and "N") for regular supply; Calcasieu Lake for auxiliary supply. The depths of the wells are reported to be 693, 680, 696, 690, and 676 ft, and the yields, 1,500, 1,500, 1,500, 1,760, and 1,500 gpm, respectively.

Treatment: Aeration (contact beds), softening, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 3,000,000 gpd.

Raw-water storage: None (except Calcasieu Lake).

Finished-water storage: 1,500,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well "L"	Finished water		Well "L"	Finished water
Silica (SiO ₂)	50	48	Hardness as CaCO ₃ :		
Iron (Fe)	1.6	.04	Total	108	109
Manganese (Mn)	--	--	Noncarbonate.....	0	0
Calcium (Ca)	27	28	Color	10	--
Magnesium (Mg).....	9.7	9.5	pH	7.1	7.7
Sodium (Na)	80	77	Specific conductance		
Potassium (K)	6.4	5.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	580	594
Bicarbonate (HCO ₃)	170	160	Turbidity	--	--
Sulfate (SO ₄)	2.4	2.6	Temperature (F.)...	73	74
Chloride (Cl)	99	105	Date of collection...	Oct. 25,	Apr. 6,
Fluoride (F) .....	.4	.5		1949	1951
Nitrate (NO ₃) .....	.0	.2			
Dissolved solids.....	359	348			
Depth (feet)				696	
Diameter (inches)				16-10	
Date drilled				1946	
Percent of supply				--	

LOUISIANA

MONROE (Population, 38,572)

Ownership: Municipal; supplies approximately 5,000 people outside of the city limits. Total population supplied, about 43,600.

Source: Bayou De Siard for regular supply; Ouachita River for auxiliary or emergency supply.

Treatment: Prechlorination, aeration (spray), coagulation with alum, sedimentation, addition of soda ash for pH control, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 9,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 3,000,000 gal.

At the time of the collection of the samples lime instead of soda ash was being used for pH control in the treatment process.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Bayou Desiard ^a	Finished water		Bayou Desiard ^a	Finished water
Silica (SiO ₂)	0.8	0.5	Hardness as CaCO ₃ :		
Iron (Fe) .....	.25	.04	Total	19	36
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	20
Calcium (Ca)	4.3	11	Color	--	--
Magnesium (Mg)	1.9	2.1	pH	6.7	7.0
Sodium (Na)	7.6	7.7	Specific conductance		
Potassium (K)	1.6	--	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	81	130
Bicarbonate (HCO ₃)	27	20	Turbidity	--	--
Sulfate (SO ₄)	3.1	16	Temperature (F.)...	76	76
Chloride (Cl)	5.2	16	Date of collection...	May 1,	May 1,
Fluoride (F) .....	.3	.2		1951	1951
Nitrate (NO ₃)	1.5	.5			
Dissolved solids.....	51	75			

^aRaw water.

LOUISIANA

NEW IBERIA (Population, 16,467)

Ownership: Central-Louisiana Electric Co.

Source: 4 wells (U. S. G. S. wells I-1, I-12, I-18, and I-63) for regular supply; Bayou Teche, auxiliary or emergency supply. The depths of the wells are reported to be 290, 250, 278, and 288 ft; and the yields (well I-1, not reported), 1,800, 1,000, and 1,760 gpm, respectively.

Treatment: Aeration (cascades), softening with lime, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 1,850,000 gpd.

Raw-water storage: None.

Finished-water storage: 500,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well I-1	Finished water		Well I-1	Finished water
Silica (SiO ₂)	42	36	Hardness as CaCO ₃ :		
Iron (Fe)	1.7	.24	Total	395	151
Manganese (Mn)	--	--	Noncarbonate.....	0	0
Calcium (Ca)	99	16	Color	10	5
Magnesium (Mg).....	36	27	pH	7.2	7.6
Sodium (Na)	20	26	Specific conductance		
Potassium (K)	12	1.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	785	391
Bicarbonate (HCO ₃)	540	216	Turbidity	--	--
Sulfate (SO ₄) .....	.5	.5	Temperature (F.)...	74	--
Chloride (Cl)	8.5	13	Date of collection...	Oct. 19,	Mar. 19,
Fluoride (F) .....	.8	.2		1950	1951
Nitrate (NO ₃) .....	.0	10			
Dissolved solids.....	476	231			
Depth (feet)				290	
Diameter (inches)				12-10	
Date drilled				--	
Percent of supply				--	

LOUISIANA

NEW ORLEANS
(Population, 570,445)

Ownership: Municipal.

Source: Mississippi River. Auxiliary and emergency supplies can be obtained from Jefferson Parish, East Jefferson Water District 1.

Treatment: Carrollton Plant, plain sedimentation, softening with lime, sedimentation, activated carbon at times for taste and odor control, coagulation with ferrous sulphate, sedimentation, ammoniation, polyphosphates for stabilization, chlorination, rapid sand filtration, postchlorination, and addition of activated carbon when required.

Algiers Plant, prechlorination, coagulation with ferrous sulphate, softening with lime, sedimentation, ammoniation, rapid sand filtration, postchlorination, and addition of activated carbon for taste and odor control when required.

Rated capacity of treatment plants: Carrollton Plant, 112,000,000 gpd; Algiers Plant, 7,000,000 gpd.

Raw-water storage: None.

Finished-water storage: Carrollton Plant, 15,000,000 gal; Algiers Plant, 7,000,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water ^a	Raw water ^b	Finished water ^b
Silica (SiO ₂)	10	12	10	10
Iron (Fe).....	.36	.08	.17	.03
Manganese (Mn) .....	.00	.00	.00	.00
Calcium (Ca)	47	16	48	20
Magnesium (Mg)	14	8.1	14	8.3
Sodium (Na).....	21	21	21	20
Potassium (K) .....	.8	.8	.8	.8
Carbonate (CO ₃)	0	0	0	6
Bicarbonate (HCO ₃).....	161	37	162	24
Sulfate (SO ₄)	51	52	51	58
Chloride (Cl).....	24	26	24	27
Fluoride (F) .....	.3	.2	.3	.3
Nitrate (NO ₃)	2.5	2.0	2.0	2.0
Dissolved solids	262	158	266	166
Hardness as CaCO ₃ :				
Total	175	73	177	84
Noncarbonate	43	43	45	54
Color.....	--	--	--	--
pH.....	7.5	7.1	7.5	8.8
Specific conductance (micromhos at 25 C.)	438	270	439	285
Turbidity	--	--	--	--
Temperature (F.)	--	--	--	--
Date of collection	Aug. 31, 1951	Aug. 31, 1951	Aug. 31, 1951	Aug. 31, 1951

^aCarrollton Plant.

^bAlgiers Plant.

LOUISIANA

Regular determinations at treatment plant, 1950^a

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	95	135	61	8.1	8.5	7.9	133	200	88	535	1770	55
Finished water...	35	52	27	10.1	10.6	9.5	75	109	54	.1	1.2	.0

^aCarrollton Plant.

LOUISIANA

SHREVEPORT
(Population, 127,206)

Ownership: Municipal; supplies Bossier City, and approximately 27,000 people outside of the city limits, including Barksdale Field. Total population supplied, about 169,700.

Source: Cross Lake.

Treatment: (Both plants) addition of lime, ammoniation, coagulation with alum, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: Cross Lake Plant, 15,000,000 gpd; McNeill St. Plant, 14,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 6,000,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water ^a		Raw water ^a	Finished water ^a
Silica (SiO ₂)	7.8	7.4	Hardness as CaCO ₃ :		
Iron (Fe) .....	.19	.06	Total	48	68
Manganese (Mn) .....	.00	.00	Noncarbonate.....	24	35
Calcium (Ca)	10	18	Color.....	--	--
Magnesium (Mg).....	5.7	5.6	pH.....	6.9	7.1
Sodium (Na)	23	23	Specific conductance		
Potassium (K)	2.0	3.2	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	230	270
Bicarbonate (HCO ₃)	30	40	Turbidity	--	--
Sulfate (SO ₄)	25	33	Temperature (F.)...	73	74
Chloride (Cl)	36	41	Date of collection...	May 3,	May 3,
Fluoride (F) .....	.3	.1		1951	1951
Nitrate (NO ₃)	1.0	.0			
Dissolved solids.....	133	162			

Regular determinations at treatment plant

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	22	30	7	6.6	7.5	6.0	38	42	33	17	35	9
Finished water...	32	38	27	9.0	9.5	8.5	63	68	60	0	0	0

^aCross Lake Plant.

OKLAHOMA

ADA

(Population, 15, 995)

Ownership: Municipal.

Source: Byrd's Mill Spring, in watershed of Clear Boggy Creek, tributary to Muddy Boggy Creek. The water plant is located just south of the city limits at the spring.

Treatment: Chlorination.

Raw-water storage: --

Finished-water storage: Elevated storage, 1, 000, 000 gal.

The water plant is just south of the city limits at the spring. The water is pumped from the storage reservoir at the plant to the distribution mains.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	7.7	Hardness as CaCO ₃ :	
Iron (Fe) .....	.0	Total	362
Manganese (Mn)	--	Noncarbonate	20
Calcium (Ca)	81	Color	5
Magnesium (Mg)	39	pH	7.9
Sodium (Na)	4.3	Specific conductance	
Potassium (K) .....	.8	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	608
Bicarbonate (HCO ₃)	418	Turbidity	--
Sulfate (SO ₄)	8.6	Temperature (F.).....	--
Chloride (Cl)	5.5	Date of collection	May 3, 1951
Fluoride (F) .....	.0		
Nitrate (NO ₃)	4.0		
Dissolved solids	357		

OKLAHOMA

ARDMORE (Population, 17,890)

Ownership: Municipal.

Source: Hickory Creek, impounded in Mountain Lake, and a small lake in a natural depression, both in watershed of Caddo Creek. Mountain Lake overflows into City Lake.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, and chlorination. Copper sulfate is used for the control of algae.

Rated capacity of treatment plant: 5,500,000 gpd.

Raw-water storage: Mountain Lake and small natural lake, 2,304 acre-ft.

Finished-water storage: 1,720,000 gal.

The treatment plant is about 5 miles south of the city at City Lake.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	3.4	Hardness as CaCO ₃ :	
Iron (Fe) .....	.02	Total	148
Manganese (Mn)	--	Noncarbonate	15
Calcium (Ca)	49	Color	5
Magnesium (Mg)	6.3	pH	7.7
Sodium (Na)	7.9	Specific conductance	
Potassium (K)	1.8	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	313
Bicarbonate (HCO ₃)	163	Turbidity	--
Sulfate (SO ₄)	22	Temperature (F.).....	--
Chloride (Cl)	8.2	Date of collection	May 3, 1951
Fluoride (F) .....	.1		
Nitrate (NO ₃) .....	.5		
Dissolved solids	181		

OKLAHOMA

BARTLESVILLE (Population, 19,228)

Ownership: Municipal.

Source: Butler Creek impounded in Lake Hudson, in watershed of Verdigris River. Auxiliary supply, Caney River.

Treatment: Coagulation with alum and lime, sedimentation, carbon at times, rapid sand filtration, and chlorination. Copper sulfate when needed for algae control.

Rated capacity of treatment plant: 6,000,000 gpd.

Raw-water storage: 1,726,000,000 gal.

Finished-water storage: 1,400,000 gal.

The treatment plant is at the northern boundary of the city.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Finished water	Finished water		Finished water	Finished water
Silica (SiO ₂)	0.6	2.0	Hardness as CaCO ₃ :		
Iron (Fe) .....	.10	.26	Total	69	69
Manganese (Mn)	--	--	Noncarbonate.....	19	18
Calcium (Ca)	21	22	Color.....	15	15
Magnesium (Mg).....	4.1	3.5	pH.....	8.1	7.6
Sodium (Na)	4.7	4.7	Specific conductance		
Potassium (K)	3.6	2.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	171	170
Bicarbonate (HCO ₃)	61	62	Turbidity	--	--
Sulfate (SO ₄)	20	19	Temperature (F.)...	--	--
Chloride (Cl)	9.0	10	Date of collection...	May 16,	July 25,
Fluoride (F) .....	.0	.1		1951	1951
Nitrate (NO ₃) .....	.7	.1			
Dissolved solids.....	105	103			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Temperature		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	51	54	45	7.3	7.5	7.1	45	48	40	50	54	45
Finished water...	48	51	44	8.1	8.7	7.7	60	62	58	48	51	44

OKLAHOMA

CHICKASHA
(Population, 15,842)

Ownership: Municipal.

Source: Washita River. The water is taken directly from the river to the treatment plant at northeast edge of town at the river.

Treatment: Coagulation with alum and lime, sedimentation, carbon at times, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 3,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 2,250,000 gal.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	15	Hardness as CaCO ₃ :	
Iron (Fe) .....	.0	Total	748
Manganese (Mn)	--	Noncarbonate	484
Calcium (Ca)	196	Color	5
Magnesium (Mg)	63	pH	7.5
Sodium (Na)	78	Specific conductance	
Potassium (K)	4.8	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	1,520
Bicarbonate (HCO ₃)	322	Turbidity	--
Sulfate (SO ₄)	529	Temperature (F.).....	--
Chloride (Cl)	79	Date of collection	Nov. 10, 1950
Fluoride (F) .....	.1		
Nitrate (NO ₃) .....	.1		
Dissolved solids	1,120		

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	--	--	--	8.2	--	--	--	--	--	--	--	--
Finished water...	270	--	--	7.4	--	--	--	--	--	--	--	--

OKLAHOMA

DUNCAN (Population, 15,325)

Ownership: Municipal.

Source: Clear Creek impounded in Clear Creek Lake (sometimes called Chisholm Trail Lake) 11 miles northeast of the city. Auxiliary supply, Fitzpatrick Creek impounded in Lake Duncan, 8 miles northeast of the city.

Treatment: Coagulation with alum and lime, sedimentation, carbon at times, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 1,750,000 gpd.

Raw-water storage: Clear Creek Lake, 9,600 acre-ft; Lake Duncan, 5,000 acre-ft.

Finished-water storage: 3,620,000 gal.

The treatment plant is about 5 miles east of the city.

At the time of sampling the entire supply was being taken from Clear Creek Lake. Lake Duncan is seldom used.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	1.2	Hardness as CaCO ₃ :	
Iron (Fe) .....	.0	Total	222
Manganese (Mn)	--	Noncarbonate	89
Calcium (Ca)	61	Color	0
Magnesium (Mg)	17	pH	8.5
Sodium (Na)	6.5	Specific conductance	
Potassium (K)	4.1	(micromhos at	
Carbonate (CO ₃)	--	25 C.).....	443
Bicarbonate (HCO ₃)	^a 162	Turbidity	--
Sulfate (SO ₄)	102	Temperature (F.).....	--
Chloride (Cl)	6.5	Date of collection	Feb. 8, 1951
Fluoride (F) .....	.1		
Nitrate (NO ₃)	1.1		
Dissolved solids	280		

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	--	--	--	8.0	8.2	7.6	--	--	--	--	--	--
Finished water...	--	--	--	7.9	8.2	7.1	--	--	--	--	--	--

^aIncludes the equivalent of less than 5 ppm of carbonate (CO₃).

OKLAHOMA

EL RENO (Population, 10, 991)

Ownership: Municipal.

Source: 11 wells, 51 to 55 ft deep, all located in the same general area at the north edge of the city limits. The yield of the wells is reported to range from 100 to 530 gpm.

Treatment: Softening with lime and soda ash, sedimentation (upward flow cylindrical tanks), recarbonation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 3, 000, 000 gpd.

Raw-water storage: --

Finished-water storage: 1, 500, 000 gal.

The treatment plant is near the wells.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw Water ^a	Finished water ^a		Raw Water ^a	Finished water ^a
Silica (SiO ₂)	18	14	Hardness as CaCO ₃ :		
Iron (Fe) .....	.0	.02	Total	370	127
Manganese (Mn)	--	--	Noncarbonate.....	146	63
Calcium (Ca)	94	26	Color.....	5	0
Magnesium (Mg).....	33	15	pH.....	7.5	7.9
Sodium (Na)	96	131	Specific conductance		
Potassium (K)	6.2	5.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	1,080	878
Bicarbonate (HCO ₃)	273	77	Turbidity	--	--
Sulfate (SO ₄)	185	188	Temperature (F.)...	--	--
Chloride (Cl)	115	115	Date of collection...	Feb. 8,	Feb. 8,
Fluoride (F) .....	.6	.7		1951	1951
Nitrate (NO ₃)	1.5	1.0			
Dissolved solids.....	688	534			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	230	288	204	7.2	--	--	350	528	304	--	--	--
Finished water...	65	75	55	8.8	--	--	138	150	120	--	--	--

^aWells 10, 13, 17, and 21 pumping at time of the collection of the samples.

OKLAHOMA

ENID

(Population, 36,017)

Ownership: Municipal; also supplies Vance Air Force Base.

Source: Wells (6 well fields): Carrier Field, 16 wells (1 to 16, well 14 abandoned) 65 to 75 ft deep; Northwest Field, 10 wells (1 to 10, well 4 abandoned) approximately 60 ft deep; Van Buren Field, 8 wells (1 to 8, wells 4 and 7 abandoned) approximately 55 ft deep; 2 wells (1 and 2) back of Water Plant, 45 ft deep; 5 wells (1 to 5) Ames Terrace, Frisco-Right-of-Way, approximately 60 ft deep; 7 wells (1 to 7) Ames Terrace, between the towns of Ames and Drummond, approximately 120 ft deep. (The wells of the last named group are not being used because of litigation.) The yield of the wells being used is reported to range from 50 to 225 gpm, which is 60 percent of capacity.

Treatment: Chlorination.

Rated capacity of treatment plant: 7,000,000 gpd.

Raw-water storage: --

Finished-water storage: 16,000,000 gal.

The water from all the wells is mixed at the plant before being pumped to the city and distribution. The analysis given represents mixed water from 31 wells being pumped at the time of the collection of the sample.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	23	Hardness as CaCO ₃ :	
Iron (Fe) .....	.02	Total	172
Manganese (Mn)	--	Noncarbonate	0
Calcium (Ca)	51	Color	0
Magnesium (Mg)	11	pH	7.1
Sodium (Na)	58	Specific conductance	
Potassium (K)	3.2	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	575
Bicarbonate (HCO ₃)	266	Turbidity	--
Sulfate (SO ₄)	21	Temperature (F.).....	--
Chloride (Cl)	39	Date of collection	May 17, 1951
Fluoride (F) .....	.1		
Nitrate (NO ₃)	9.1		
Dissolved solids	346		

OKLAHOMA

LAWTON (Population, 34,757)

Ownership: Municipal; also supplies Fort Sill and Medicine Park. Total population supplied, about 43,500.

Source: Medicine Bluff Creek impounded in Lake Lawtonka, about 15 miles northwest of Lawton at the town of Medicine Park.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 12,500,000 gpd.

Raw-water storage: 42,000 acre-ft.

Finished-water storage: 6,500,000 gal.

The treatment plant is at Medicine Park.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	2.4	Hardness as CaCO ₃ :	
Iron (Fe) .....	.0	Total	144
Manganese (Mn)	--	Noncarbonate	12
Calcium (Ca)	44	Color	0
Magnesium (Mg)	8.2	pH	7.8
Sodium (Na)	9.1	Specific conductance	
Potassium (K)	2.4	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	307
Bicarbonate (HCO ₃)	160	Turbidity	--
Sulfate (SO ₄)	19	Temperature (F.).....	--
Chloride (Cl)	10	Date of collection	Feb. 7, 1951
Fluoride (F) .....	.1		
Nitrate (NO ₃) .....	.4		
Dissolved solids	175		

16098

OKLAHOMA

MCALESTER (Population, 17,878)

Ownership: Municipal; also supplies a small population outside the city limits.

Total population supplied, about 17,900.

Source: Bull, Bodark, and Lily Pad Creeks impounded in Lake McAlester, 6 to 8 miles northwest of the city.

Treatment: Coagulation with alum and lime, sedimentation, activated carbon at times, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 3,000,000 gpd.

Raw-water storage: 13,800 acre-ft.

Finished-water storage: 3,400,000 gal.

The treatment plant is about 3 miles north of the State Penitentiary.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	1.4	Hardness as CaCO ₃ :	
Iron (Fe) .....	.05	Total	45
Manganese (Mn)	--	Noncarbonate	20
Calcium (Ca)	13	Color	5
Magnesium (Mg)	3.0	pH	7.9
Sodium (Na)	6.2	Specific conductance	
Potassium (K)	2.0	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	120
Bicarbonate (HCO ₃)	30	Turbidity	--
Sulfate (SO ₄)	28	Temperature (F.).....	--
Chloride (Cl)	5.5	Date of collection	May 2, 1951
Fluoride (F) .....	.1		
Nitrate (NO ₃) .....	.2		
Dissolved solids	74		

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	26	20	32	7.0	7.4	6.8	22	28	16	--	--	--
Finished water...	32	24	36	8.5	8.8	8.0	50	60	30	--	--	--

OKLAHOMA

MIAMI
(Population, 11,801)

Ownership: Municipal.

Source: 5 wells (1 to 5), 1,233, 1,000, 1,252, 1,116, and 1,345 ft deep. The yield of the wells is reported to be 300, 300, 350, 470, and 510 gpm.

Treatment: None.

Storage: 2,000,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Wells 3 & 4 ^a (composite)	Well 3	Well 4
Silica (SiO ₂)	9.1	--	--
Iron (Fe) .....	.01	--	--
Manganese (Mn)	--	--	--
Calcium (Ca)	31	--	--
Magnesium (Mg).....	14	--	--
Sodium (Na).....	29	--	--
Potassium (K)	2.5	--	--
Carbonate (CO ₃)	0	--	--
Bicarbonate (HCO ₃).....	149	152	148
Sulfate (SO ₄).....	15	--	--
Chloride (Cl)	42	120	16
Fluoride (F) .....	.3	--	--
Nitrate (NO ₃)	1.4	--	--
Dissolved solids	217	326	169
Hardness as CaCO ₃ :			
Total	135	152	134
Noncarbonate	13	27	13
Color	5	--	--
pH.....	8.1	--	--
Specific conductance (micromhos at 25 C.).....	386	663	305
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	May 15, 1951	May 15, 1951	May 15, 1951
Depth (feet)		1,252	1,116
Diameter (inches)		10 $\frac{3}{4}$	15
Date drilled		1921	1946
Percent of supply		--	--

^aPumping at the time of the collection of the samples.

OKLAHOMA

MUSKOGEE
(Population, 37,289)

Ownership: Municipal.

Source: Neosho River.

Treatment: Prechlorination, coagulation with alum and lime, softening with excess lime, sedimentation, recarbonation, rapid sand filtration, and post-chlorination.

Rated capacity of treatment plant: 7,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 10,000,000 gal.

The water is taken directly from the river to the treatment plant northeast of Muskogee just above the confluence of the Neosho with the Arkansas River.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	9.1	7.1	Hardness as CaCO₃:		
Iron (Fe) .....	.14	.05	Total	120	88
Manganese (Mn)	--	--	Noncarbonate.....	35	50
Calcium (Ca)	37	24	Color.....	100	5
Magnesium (Mg).....	6.8	6.9	pH.....	7.7	9.3
Sodium (Na)	8.8	8.6	Specific conductance		
Potassium (K)	2.9	2.5	(micromhos at		
Carbonate (CO ₃)	0	8	25 C.).....	277	217
Bicarbonate (HCO ₃)	104	30	Turbidity.....	--	--
Sulfate (SO ₄)	42	48	Temperature (F.)...	51	52
Chloride (Cl)	8.0	12	Date of collection...	Nov. 29, 1951	Nov. 29, 1951
Fluoride (F) .....	.0	.1			
Nitrate (NO ₃)	2.8	2.4			
Dissolved solids.....	180	137			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	85	90	68	7.8	8.2	6.0	115	128	88	35	300	20
Finished water...	30	40	23	8.7	9.4	8.4	75	90	56	--	--	--

OKLAHOMA

NORMAN (Population, 27, 006)

Ownership: Municipal; University of Oklahoma. The University has its own wells and supply system and serves an estimated total population of 15, 000.

Source: Municipal; 12 wells (1 to 12), 535 to 671 ft deep. Well 7 was not being pumped at the time of the collection of sample since it was being used as an observation well. Two additional wells were under construction. Several wells pump directly into the distribution mains.

Treatment: None.

Storage: 1, 000, 000 gal.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Municipal wells (composite)		Municipal wells (composite)
Silica (SiO ₂)	9.7	Hardness as CaCO ₃ :	
Iron (Fe) .....	.02	Total	8
Manganese (Mn)	--	Noncarbonate	0
Calcium (Ca)	2.0	Color	5
Magnesium (Mg) .....	.7	pH	9.1
Sodium (Na)	207	Specific conductance	
Potassium (K)	3.2	(micromhos at	
Carbonate (CO ₃)	34	25 C.).....	877
Bicarbonate (HCO ₃)	359	Turbidity	--
Sulfate (SO ₄)	96	Temperature (F.).....	--
Chloride (Cl)	13	Date of collection	May 21, 1951
Fluoride (F) .....	.3		
Nitrate (NO ₃) .....	.5		
Dissolved solids	550		

OKLAHOMA

OKLAHOMA CITY (Population, 243,504)

Ownership: Municipal.

Source: North Canadian River by diversion into two off-channel reservoirs, Lake Hefner and Lake Overholser, approximately 8 miles northwest of the center of the city.

Treatment: (Both plants) softening with excess lime, coagulation with alum, carbon at times for taste and odor control, sedimentation, recarbonation, rapid sand filtration, and chlorination.

Rated capacity of treatment plants: Lake Hefner Plant, 24,000,000 gpd; Lake Overholser Plant, 15,000,000 gpd.

Raw-water storage: Lake Hefner, 75,000 acre-ft; Lake Overholser, 16,000 acre-ft.

Finished-water storage: Elevated, 5,500,000 gal; other, 25,500,000 gal.

Lake Overholser treatment plant is in the city and water from this plant is generally served in the central and southern parts of the city.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water ^a		Raw water ^a	Finished water ^a
Silica (SiO ₂)	1.7	1.7	Hardness as CaCO ₃ :		
Iron (Fe) .....	.12	.0	Total	183	90
Manganese (Mn)	--	--	Noncarbonate.....	39	49
Calcium (Ca)	47	18	Color.....	60	5
Magnesium (Mg).....	16	11	pH.....	8.2	10.4
Sodium (Na)	50	49	Specific conductance		
Potassium (K)	5.4	5.4	(micromhos at		
Carbonate (CO ₃)	0	b16	25 C.).....	596	479
Bicarbonate (HCO ₃)	176	0	Turbidity.....	--	--
Sulfate (SO ₄)	70	73	Temperature (F.)...	--	--
Chloride (Cl)	60	64	Date of collection...	May 26, 1951	May 26, 1951
Fluoride (F) .....	.3	.3			
Nitrate (NO ₃)	1.3	.5			
Dissolved solids.....	364	262			

Regular determinations at treatment plant, 1950^c

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	143	150	136	8.5	8.9	8.1	190	200	175	14	25	10
Finished water...	39	53	26	10.3	11.0	9.6	90	100	73	--	--	--

^aLake Hefner.

^bSample contained 5 ppm of Hydroxide (OH).

^cFiscal year, July 1949, to June 1950.

OKLAHOMA

OKMULGEE (Population, 18,317)

Ownership: Municipal.

Source: Salt Creek impounded in Lake Okmulgee.

Treatment: Coagulation with alum and lime, sedimentation, carbon when necessary, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 6,000,000 gpd.

Raw-water storage: 4,300,000,000 gal.

Finished-water storage: 2,150,000 gal.

The treatment plant is about 3 miles west of the city.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	5.0	Hardness as CaCO ₃ :	
Iron (Fe) .....	.20	Total	68
Manganese (Mn)	--	Noncarbonate	35
Calcium (Ca)	17	Color	25
Magnesium (Mg)	6.2	pH	8.1
Sodium (Na)	28	Specific conductance	
Potassium (K)	2.1	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	289
Bicarbonate (HCO ₃)	40	Turbidity	--
Sulfate (SO ₄)	16	Temperature (F.).....	52
Chloride (Cl)	58	Date of collection	Nov. 29, 1951
Fluoride (F) .....	.0		
Nitrate (NO ₃) .....	.2		
Dissolved solids	171		

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness. as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	22	22	20	7.0	7.0	6.8	--	--	--	75	140	50
Finished water...	32	36	28	8.6	9.0	8.0	66	70	60	17	20	15

OKLAHOMA

PONCA CITY
(Population, 20, 180)

Ownership: Municipal.

Source: Turkey Creek impounded in Lake Ponca, 50 percent of supply; 5 wells, all approximately 60 ft deep, 50 percent of supply.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, chlorination, and ammoniation.

Rated capacity of treatment plant: 8, 000, 000 gpd.

Raw-water storage: Lake Ponca, 14, 930 acre-ft.

Finished-water storage: 2, 500, 000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Lake Ponca (raw water)	Wells (raw water) ^a	Finished water ^b
Silica (SiO ₂)	--	--	5.0
Iron (Fe)	--	--	.0
Manganese (Mn)	--	--	--
Calcium (Ca)	27	121	56
Magnesium (Mg).....	6.0	97	9.8
Sodium (Na).....	11	132	27
Potassium (K)			4.4
Carbonate (CO ₃)			0
Bicarbonate (HCO ₃).....	109	486	206
Sulfate (SO ₄).....	11	361	30
Chloride (Cl)	7.0	126	32
Fluoride (F)	--	--	.1
Nitrate (NO ₃)	6.5	44	1.0
Dissolved solids	134	1,120	268
Hardness as CaCO ₃ :			
Total	92	701	180
Noncarbonate	3	303	11
Color	--	--	5
pH.....	--	--	7.9
Specific conductance (micromhos at 25 C.).....	213	1,700	469
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	July 21, 1950	July 21, 1950	May 17, 1951

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	136	140	130	8.0	8.2	7.9	125	130	120	15	20	10
Finished water...	180	190	170	7.4	7.5	7.3	200	215	191	--	--	--

^aComposite (wells 1 to 4).

^bLake Ponca 50 percent; wells (1, 2, and 4) 50 percent.

OKLAHOMA

SAPULPA
(Population, 13,031)

Ownership: Municipal.

Source: Rock Creek impounded in Lake Sahoma.

Treatment: Coagulation with alum and lime, sedimentation, carbon at times, rapid sand filtration, and chlorination. Copper sulfate is used for algae control when needed.

Rated capacity of treatment plant: 2,500,000 gpd.

Raw-water storage: 3,000 acre-ft.

Finished-water storage: 2,475,000 gal.

The treatment plant is at the east edge of the city limits.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	3.9	Hardness as CaCO ₃ :	
Iron (Fe) .....	.02	Total	98
Manganese (Mn)	--	Noncarbonate	57
Calcium (Ca)	29	Color	20
Magnesium (Mg)	6.3	pH	7.5
Sodium (Na)	17	Specific conductance	
Potassium (K)	2.8	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	297
Bicarbonate (HCO ₃)	50	Turbidity	--
Sulfate (SO ₄)	50	Temperature (F.).....	--
Chloride (Cl)	31	Date of collection	May 15, 1951
Fluoride (F) .....	.1		
Nitrate (NO ₃)	1.7		
Dissolved solids	181		

SEMINOLE
(Population, 11, 863)

Ownership: Municipal.

Source: 15 wells (1 to 15), 525 to 763 ft deep, all within the city limits. The yield of the wells is reported to range from 40 to 240 gpm.

Treatment: Chlorination of water from 9 wells pumped through the main pumping station. Other wells pump directly into distribution system and are not chlorinated.

Rated capacity of treatment plant: 7, 300, 000 gpd.

Raw-water storage: None.

Finished-water storage: 2, 500, 000 gal.

Wells 10 and 11 were not in use at time of collection of samples.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Wells 1 to 9 (com- posite)	Well 12	Well 13	Well 15	Finished water (city tap)
Silica (SiO ₂)	--	--	--	--	9.8
Iron (Fe)	--	--	--	--	.02
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	--	--	--	--	36
Magnesium (Mg)	--	--	--	--	8.2
Sodium (Na)	--	--	--	--	40
Potassium (K)	--	--	--	--	2.5
Carbonate (CO ₃)	--	--	--	--	0
Bicarbonate (HCO ₃)	188	226	194	180	192
Sulfate (SO ₄)	--	--	--	--	47
Chloride (Cl)	4.0	6.0	4.0	3.5	4.5
Fluoride (F)	--	--	--	--	.3
Nitrate (NO ₃)	--	--	--	--	.2
Dissolved solids	201	214	202	230	244
Hardness as CaCO ₃ :					
Total	116	52	128	102	124
Noncarbonate	0	0	0	0	0
Color	--	--	--	--	0
pH	--	--	--	--	7.8
Specific conductance (micromhos at 25 C.)	394	411	396	408	390
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of collection	May 1, 1951	May 1, 1951	May 1, 1951	May 1, 1951	May 1, 1951
Depth (feet)	620-763	638	750	732	
Diameter (inches)	8-10 $\frac{3}{4}$	10 $\frac{3}{4}$	10 $\frac{3}{4}$	10 $\frac{3}{4}$	
Date drilled	--	--	--	1950	
Percent of supply	--	--	--	--	

OKLAHOMA

SHAWNEE (Population, 22,948)

Ownership: Municipal.

Source: South Deer Creek impounded in Shawnee City Lake.

Treatment: Coagulation with alum and lime, sedimentation, carbon at times, rapid sand filtration, and chlorination. Copper sulfate is used for algae control when necessary.

Rated capacity of treatment plant: 4,500,000 gpd.

Raw-water storage: 7,700,000,000 gal.

Finished-water storage: 5,250,000 gal.

The treatment plant is at the southwest edge of the city limits.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	4.3	Hardness as CaCO ₃ :	
Iron (Fe) .....	.11	Total	74
Manganese (Mn)	--	Noncarbonate	24
Calcium (Ca)	19	Color	10
Magnesium (Mg)	6.5	pH	7.3
Sodium (Na)	9.0	Specific conductance	
Potassium (K)	2.3	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	185
Bicarbonate (HCO ₃)	61	Turbidity	--
Sulfate (SO ₄)	25	Temperature (F.).....	--
Chloride (Cl)	11	Date of collection	May 1, 1951
Fluoride (F) .....	.4		
Nitrate (NO ₃) .....	.8		
Dissolved solids	108		

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	--	--	--	--	--	--	--	--	--	140	175	120
Finished water...	65	74	58	--	--	--	78	90	68	--	--	--

OKLAHOMA

STILLWATER (Population, 20,238)

Ownership: Oklahoma A. & M. College; supplies about 1,800 people outside the city limits. Total population supplied, about 22,000.

Source: Lake Carl Blackwell, approximately 10 miles west of Stillwater. Emergency supply, Boomer Lake, just north of the city limits.

Treatment: Coagulation with ferrous sulfate, softening with excess lime, sedimentation, recarbonation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 4,000,000 gpd.

Raw-water storage: 17,968,000,000 gal.

Finished-water storage: 450,000 gal.

The treatment plant is approximately 1 mile west of the College.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	2.9	2.3	Hardness as CaCO ₃ :		
Iron (Fe) .....	.36	.02	Total	133	60
Manganese (Mn)	--	--	Noncarbonate.....	3	21
Calcium (Ca)	32	14	Color	--	5
Magnesium (Mg)	13	6.0	pH	8.0	9.8
Sodium (Na)	17	18	Specific conductance		
Potassium (K)	4.7	4.3	(micromhos at		
Carbonate (CO ₃)	0	13	25 C.)	321	221
Bicarbonate (HCO ₃)	159	21	Turbidity	--	--
Sulfate (SO ₄)	15	26	Temperature (F.)...	54	47
Chloride (Cl)	20	26	Date of collection...	Jan. 12, 1951	Dec. 20, 1950
Fluoride (F)	--	.3			
Nitrate (NO ₃) .....	.8	.7			
Dissolved solids.....	199	121			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	131	146	104	8.2	8.6	7.9	124	155	113	39	105	25
Finished water...	128	150	90	8.5	9.6	6.2	75	142	36	--	--	--

OKLAHOMA

TULSA (Population, 182,740)

Ownership: Municipal; supplies Skiatook, Sperry, Turley, and other consumers outside the city limits. Total population supplied, about 220,000. The city also supplies raw water to Owasso and Spavinaw.

Source: Spavinaw Creek impounded in Spavinaw Lake about 70 miles northeast of Tulsa.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 40,000,000 gpd.

Raw-water storage: 10,326,000,000 gal.

Finished-water storage: 27,500,000 gal.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	4.3	Hardness as CaCO ₃ :	
Iron (Fe) .....	.0	Total	91
Manganese (Mn)	--	Noncarbonate	7
Calcium (Ca)	34	Color	5
Magnesium (Mg)	1.4	pH	7.7
Sodium (Na)	2.3	Specific conductance	
Potassium (K)	1.1	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	191
Bicarbonate (HCO ₃)	102	Turbidity	--
Sulfate (SO ₄)	6.1	Temperature (F.).....	--
Chloride (Cl)	5.8	Date of collection	May 26, 1951
Fluoride (F) .....	.1		
Nitrate (NO ₃)	1.4		
Dissolved solids	114		

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	88	92	85	8.0	8.2	7.8	--	--	--	16	61	6
Finished water...	85	89	80	7.6	7.7	7.5	93	94	93	.2	1.3	.1

TEXAS

ABILENE

(Population, 45,570)

Ownership: Municipal.

Source: 3 lakes. Lake Abilene, approximately $19\frac{1}{2}$ miles southwest of Abilene on Elm Creek, about 25 percent of the supply; Lake Kirby, 4 miles south of Abilene on Cedar Creek, about 25 percent of the supply; Lake Fort Phantom Hill, 12 miles north of Abilene in Jones County, on Elm Creek, 50 percent of supply.

Treatment: Lake Abilene and North Second Street (Fort Phantom Hill) plants: prechlorination, coagulation with alum, sedimentation, rapid sand filtration, and postchlorination. Lake Kirby plant: prechlorination, coagulation with alum, sedimentation, and postchlorination.

Rated capacity of treatment plants: Lake Abilene, 4,000,000 gpd; Lake Kirby, 4,000,000 gpd; North Second Street, 8,000,000 gpd.

Raw-water storage: 1 earthen reservoir, 20,000,000 gal; Lake capacities: Abilene, 3,250,000,000 gal; Kirby, 3,000,000,000 gal; Fort Phantom Hill, 25,000,000,000 gal.

Finished-water storage: 2 elevated tanks, 500,000 gal each; 3 standpipes, 85,000, 250,000, and 250,000 gal; clear wells: Lake Abilene plant, 600,000 gal; Lake Kirby plant, 500,000 gal; and North Second Street plant, 2,000,000 gal.

Except in emergencies Lake Fort Phantom Hill supply is used throughout the year. Lake Abilene and Lake Kirby are used primarily in the summer months when demands are high.

Water from Lake Abilene flows by gravity to a 20,000,000 gal earthen tank, from whence it flows by gravity to the treatment plant, $7\frac{1}{2}$ miles south of Abilene on Buffalo Gap Road. The finished water is pumped to the city and into the distribution system and elevated storage.

Water from Lake Kirby flows by gravity to the treatment plant, 1 mile south of Abilene. The finished water is pumped into the distribution system and elevated storage.

Water from Lake Fort Phantom Hill is pumped to the treatment plant on North Second Street and Cottonwood Street. The finished water is pumped into the distribution system and elevated storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	L. Abilene (raw water)	L. Kirby (raw water)	Lake Fort Phantom Hill ^a	Lake Fort Phantom Hill ^a	Finished water (city tap)
Silica (SiO ₂)	9.6	5.5	6.0	1.2	0.8
Iron (Fe)	--	--	--	.05	.09
Manganese (Mn)	--	--	--	.00	.00
Calcium (Ca)	51	44	46	40	40
Magnesium (Mg)	15	12	19	23	23
Sodium (Na)	9.3	13	52	57	61
Potassium (K)	5.1	4.9	8.5	8.0	6.8
Carbonate (CO ₃)	9	12	12	0	0
Bicarbonate (HCO ₃)	192	178	198	236	234
Sulfate (SO ₄)	21	11	52	40	46
Chloride (Cl)	15	9.0	56	65	66
Fluoride (F) .....	.2	1.0	.2	.3	.3
Nitrate (NO ₃) .....	.0	.5	.2	.2	.0
Dissolved solids	234	209	360	362	361
Hardness as CaCO ₃ :					
Total	189	159	193	194	194
Noncarbonate	17	0	10	1	3
Color	--	--	--	15	10
pH	--	--	--	7.8	7.3
Specific conductance (micromhos at 25 C.)	407	390	622	642	640
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of collection	Apr. 18, 1946	Apr. 18, 1946	Apr. 19, 1946	Jan. 18, 1952	Jan. 18, 1952

Regular determinations at treatment plant, 1951^b

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water	190	230	165	--	--	--	--	--	--	--	--	--
Finished water...	185	220	160	8.2	8.4	7.7	--	--	--	--	--	--

^aRaw water.^bAverage of all three plants.

TEXAS

ALICE
(Population, 16,449)

Ownership: Municipal; supplies also about 300 people outside the city limits.

Total population supplied, about 16,750.

Source: 7 wells (1 to 5, 11, and 12), 2,068 (plugged 992 ft), 622, 647, 550, 900, 864, and 889 ft deep. The yield of the wells is reported to range from 110 to 430 gpm. The wells are pumped individually.

Treatment: Periodic chlorination (for example, during floods in the area). Each well is equipped with a chlorinating unit.

Raw-water storage: None.

Finished-water storage: 2,500,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1 (raw water)	Well 2 (raw water)	Well 3 (raw water)	Well 4 (raw water)	Well 5 (raw water)
Silica (SiO ₂)	29	22	18	25	18
Iron (Fe) .....	.02	.03	.05	.05	.04
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	23	20	43	42	30
Magnesium (Mg)	8.8	8.1	23	22	17
Sodium (Na)	333	290	398	313	317
Potassium (K)	11	9.9	12	11	10
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	345	353	315	362	358
Sulfate (SO ₄)	196	117	165	115	128
Chloride (Cl)	237	214	448	325	289
Fluoride (F)	1.0	.9	.9	2.1	1.2
Nitrate (NO ₃)	11	12	22	12	12
Dissolved solids	1,030	876	1,290	1,090	1,020
Hardness as CaCO ₃ :					
Total	94	84	202	196	145
Noncarbonate	0	0	0	0	0
Color	--	--	--	--	--
pH	7.2	7.4	7.4	7.4	7.8
Specific conductance (micromhos at 25 C.)	1,880	1,630	2,480	2,070	1,740
Turbidity	--	--	--	--	--
Temperature (F.)	86	85	82	81	--
Date of collection	Mar. 5, 1945	Mar. 5, 1945	Mar. 5, 1945	Mar. 5, 1945	Sept. 27, 1945
Depth (feet)	1,076	622	647	550	900
Diameter (inches)	16-8	5	10	10	16-8
Date drilled	1928	1938	1940	1944	1945
Percent of supply	--	--	--	--	--

TEXAS

AMARILLO (Population, 74,246)

Ownership: Municipal.

Source: 47 wells in several well fields southwest of the city of Amarillo in the northern section of Randall County. Palo Duro Field: 10 wells (1 to 10), each 200 ft deep, with a reported average yield of 657 gpm; Greely: 7 wells (1 to 7), 264 to 313 ft deep, with a reported average yield of 951 gpm; Bush: 6 wells (one unnumbered, and 1 to 5), 239 to 305 ft deep, with a reported average yield of 955 gpm; McDonald: 6 wells (1 to 6), 270 to 336 ft deep and each reported to yield 750 gpm; Bassett: 2 wells (1 and 2), 265 and 280 ft deep, and each reported to yield 750 gpm; Brinkman: 1 well (1), 277 ft deep and reported to yield 700 gpm; West-Tex: 6 wells (1 to 6), 260 to 300 ft deep, with a reported average yield of about 1,200 gpm; Sec 98: 1 well (3), 273 ft deep and reported to yield 98 gpm. (Data for the remaining 8 wells, not reported)

Treatment: Chlorination.

Rated capacity of transmission plant: 23,300,000 gpd.

Raw-water storage: None.

Finished-water storage: 3 ground storage reservoirs, 5,000,000 gal, each; 3 elevated tanks, 1,000,000 gal, each; 1 elevated tank, 500,000 gal.

The wells are pumped individually to the transmission plant. The water is chlorinated at the transmission plant prior to going into the distribution system.

The analyses selected are reasonably representative of the water furnished by the wells.

ANALYSES (Analyses, in parts per million, by U. S. Geological Survey)

	Palo Duro Well 1	Palo Duro Well 6	Greely Well 1	Bush Well 1	McDonald Well 1
Silica (SiO ₂)	61	65	80	67	66
Iron (Fe) .....	.02	.04	.0	.0	.06
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	58	32	32	58	35
Magnesium (Mg)	62	39	43	26	35
Sodium (Na)	36	37	25	24	28
Potassium (K)	4.2	4.0	8.0	6.0	3.8
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	440	320	328	288	298
Sulfate (SO ₄)	84	35	34	50	26
Chloride (Cl)	16	12	7.0	9.0	10
Fluoride (F)	3.6	3.2	3.2	2.4	3.2
Nitrate (NO ₃)	3.8	3.2	2.8	3.5	3.8
Dissolved solids	545	388	397	388	358
Hardness as CaCO ₃ :					
Total	400	240	257	252	232
Noncarbonate	39	0	0	16	0
Color	--	--	--	--	--
pH	7.6	7.8	7.6	7.4	7.7
Specific conductance (micromhos at 25 C.)	799	586	584	534	529
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of collection	Dec. 11, 1947	Dec. 11, 1947	June 23, 1948	June 23, 1948	Dec. 11, 1947
Depth (feet)	200	200	313	296	270
Diameter (inches)	10	10	16	16	18
Date drilled	1927	1927	1944	1943	1929
Percent of supply	--	--	--	--	--

TEXAS

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	West-Tex Well 1		West-Tex Well 1
Silica (SiO ₂)	65	Hardness as CaCO ₃ :	
Iron (Fe) .....	.08	Total	233
Manganese (Mn)	--	Noncarbonate	0
Calcium (Ca)	39	Color	--
Magnesium (Mg)	33	pH	7.8
Sodium (Na)	26	Specific conductance	
Potassium (K)	4.8	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	549
Bicarbonate (HCO ₃)	296	Turbidity	--
Sulfate (SO ₄)	37	Temperature (F.).....	64
Chloride (Cl)	7.0	Date of collection	June 18, 1951
Fluoride (F)	2.4		
Nitrate (NO ₃)	1.8		
Dissolved solids	362		
Depth (feet)			270
Diameter (inches)			16
Date drilled			1948
Percent of supply			--

TEXAS

AUSTIN
(Population, 132,459)

Ownership: Municipal; the city furnishes about 18,000 people outside the city limits. Total population supplied, about 150,500.

Source: Colorado River.

Treatment: Coagulation with iron salts (ferrous sulfate), softening with lime, ammoniation, chlorination, sedimentation, and rapid sand filtration.

Rated capacity of treatment plant: 32,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 1 ground reservoir, 10,000,000 gal; 1 underground reservoir, 2,000,000 gal; clear well, 4,000,000 gal.

The water is pumped from the river to the treatment plant, located nearby within the city limits. The finished water is pumped to the distribution system and storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Colorado River (raw water) ^a	Raw water	Finished water
Silica (SiO ₂)	11	12	5.4
Iron (Fe)	--	.03	.00
Manganese (Mn)	--	.00	.00
Calcium (Ca)	41	40	11
Magnesium (Mg).....	14	16	14
Sodium (Na).....	34	44	47
Potassium (K)		3.6	.8
Carbonate (CO ₃)	0	0	20
Bicarbonate (HCO ₃).....	162	154	17
Sulfate (SO ₄).....	30	39	41
Chloride (Cl)	48	67	68
Fluoride (F) .....	.2	.3	.3
Nitrate (NO ₃)	1.4	.8	.2
Dissolved solids	270	297	220
Hardness as CaCO ₃ :			
Total	160	166	85
Noncarbonate	27	40	38
Color	--	0	5
pH	--	8.0	9.7
Specific conductance (micromhos at 25 C.).....	464	529	412
Turbidity	--	0	--
Temperature (F.)	--	--	68
Date of collection	--	Sept. 4-30, 1951	Feb. 29, 1952

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	134	153	130	8.0	8.4	7.6	161	168	156	14	900	10
Finished water...	46	51	41	9.9	10.3	9.7	71	78	68	2	2	2

^a Weighted average of analyses of 10-day composites of daily samples for the water year October 1949 to September 1950.

TEXAS

BAYTOWN
(Population, 22, 983)

Ownership: Municipal; also supplies the town of Cedar Bayou. Total population supplied, about 24,500.

Source: 6 wells (Baytown 1 to 6), 410, 448, 485, (depth not reported), 563, and 468 ft deep. The yield of the wells is reported to be 900, 1,000, 650, 750, 585, and 200 gpm. Emergency supplies can be obtained from the supply of the Humble Oil and Refining Co.

Treatment: Chlorination at the wells.

Raw-water storage: --

Finished-water: 880,000 gal.

The wells are pumped individually into ground storage tanks, from which the water is pumped into the distribution system. Overhead storage tanks for pressure equalization are "floated" on the distribution system.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Baytown Well 1 (raw water)		Baytown Well 1 (raw water)
Silica (SiO ₂)	26	Hardness as CaCO ₃ :	
Iron (Fe) .....	.29	Total	40
Manganese (Mn) .....	.00	Noncarbonate	0
Calcium (Ca)	10	Color	10
Magnesium (Mg)	3.5	pH	7.6
Sodium (Na)	271	Specific conductance	
Potassium (K) .....	.8	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	1,270
Bicarbonate (HCO ₃)	461	Turbidity	--
Sulfate (SO ₄) .....	.2	Temperature (F.).....	--
Chloride (Cl)	174	Date of collection	Nov. 27, 1951
Fluoride (F)	1.2		
Nitrate (NO ₃) .....	.0		
Dissolved solids	733		
Depth (feet)			410
Diameter (inches)			13-6 5/8
Date drilled			1942
Percent of supply			--

TEXAS

BEAUMONT
(Population, 94,014)

Ownership: Municipal.

Source: Neches River. The water is diverted by open canal from three intakes, 2-1/3, 4-3/4, and 13-1/4 miles upstream from Beaumont.

Treatment: Aeration, coagulation with alum, chlorination, sedimentation, rapid sand filtration, and final adjustment of pH with lime.

Rated capacity of treatment plant: 20,000,000 gpd.

Raw-water storage: --

Finished-water storage: Ground reservoir and elevated tanks, 7,500,000 gal.

There is some variation in the composition of the water throughout the year. The analyses of the raw water at Evadale, about 20 miles upstream from Beaumont, are essentially representative of the raw water diverted for the supply.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Neches River at Evadale (raw water) ^a	Neches River at Evadale (raw water) ^b	Finished water
Silica (SiO ₂)	16	27	17
Iron (Fe)	--	.57	.06
Manganese (Mn)	--	--	.00
Calcium (Ca)	6.6	12	21
Magnesium (Mg)	3.6	4.6	3.3
Sodium (Na)	11	39	41
Potassium (K) .....		.4	1.6
Carbonate (CO ₃)		0	0
Bicarbonate (HCO ₃)	20	66	46
Sulfate (SO ₄)	12	8.8	35
Chloride (Cl)	18	50	60
Fluoride (F) .....	.0	.3	.1
Nitrate (NO ₃) .....	.9	.8	.2
Dissolved solids	96	174	212
Hardness as CaCO ₃ :			
Total	31	49	66
Noncarbonate	15	0	28
Color	--	60	10
pH	--	7.0	7.0
Specific conductance (micromhos at 25 C.)	115	295	360
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	1950 water year	Sept. 1-13, 15- 20, 1951	Nov. 27, 1951

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water	25	60	7	6.7	7.8	6.3	40	60	20	35	350	14
Finished water...	30	60	20	8.4	9.0	8.3	60	80	55	.35	1	0

^a Weighted average of analyses of 10-day composites of daily samples for the water year October 1949, to September 1950.

^b Composite of daily samples Sept. 1-13, 15-20, 1951.

TEXAS

BIG SPRING
(Population, 17,286)

Ownership: Municipal; supplies also about 3,000 persons outside the city limits, and the Big Spring Air Force Base. Total population supplied, in excess of 20,300.

Source: 26 wells in 4 well fields, about 50 percent of supply; Powell Lake, capacity 1,461 acre-ft, on Powell Branch Creek 12 miles southwest of Big Spring, about 50 percent of the supply. Well fields: City Park: 2 wells, 273 and 283 ft deep, 2.8 miles south of the City Hall; O'Barr: 7 wells, 125 to 255 ft deep, 22 miles south of the city in Glasscock County; Section 17: 10 wells, 121 to 260 ft deep, about 3 miles southwest of the City Hall; Section 33: 7 wells, 223 to 316 ft deep, about 5.7 miles southeast of the City Hall. Auxiliary or emergency supply, Moss Lake on Moss Ranch Creek.

Treatment: Surface water: coagulation with alum, sedimentation, rapid sand filtration, and chlorination. Wells: chlorination.

Rated capacity of treatment plant: 1,500,000 gpd.

Raw-water storage: None.

Finished-water storage: 4 reservoirs, three, 1,000,000 gal each, and one, 200,000 gal; 1 elevated tank, 200,000 gal.

The water is pumped from Powell Lake to the treatment plant in Big Spring. The finished water from the treatment plant is pumped into one of the reservoirs. The wells pump as a unit in each well field to a chlorinator station at City Park, where the water is chlorinated. The water from the chlorinator station and the treatment plant is pumped into the reservoir containing the smallest amount of water at the time. The water is pumped from the reservoirs into the distribution system and elevated tank.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	City Park Field well 4	O'Barr Field well 1	O'Barr Field well 4	Section 17 well 9	Section 33 well 54
Silica (SiO ₂)	15	15	23	17	16
Iron (Fe) .....	.04	.04	.08	.04	.06
Manganese (Mn)	--	--	.00	--	--
Calcium (Ca)	100	94	70	94	88
Magnesium (Mg)	10	20	13	4.6	8.3
Sodium (Na)	28	11	33	6.2	19
Potassium (K)	5.8	4.8	.8	4.0	4.7
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	294	318	251	268	244
Sulfate (SO ₄)	46	29	30	19	35
Chloride (Cl)	44	36	38	20	40
Fluoride (F)	1.0	.6	1.0	.0	1.2
Nitrate (NO ₃)	5.7	5.0	6.6	5.3	5.8
Dissolved solids	409	369	358	302	326
Hardness as CaCO ₃ :					
Total	290	316	228	254	254
Noncarbonate	50	56	22	34	54
Color	--	--	0	--	--
pH	7.2	7.2	7.4	7.1	7.2
Specific conductance (micromhos at 25 C.)	690	644	604	506	558
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of collection	Aug. 21, 1947	Aug. 22, 1947	Apr. 29, 1952	Aug. 22, 1947	Aug. 22, 1947

TEXAS

	City Park Field well 4	O'Barr Field well 1	O'Barr Field well 4	Section 17 well 9	Section 33 well 54
Depth (feet)	283	129	255	121	303
Diameter (inches).....	12	12	12	6	10-8
Date drilled	1926	1943	1944	1926	1984
Percent of supply	--	--	--	--	--

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Moss Lake (raw water)	Powell Lake (raw water)	Finished water ^a
Silica (SiO ₂)	--	7.1	19
Iron (Fe)	--	.10	.0
Manganese (Mn)	--	--	--
Calcium (Ca)	30	32	78
Magnesium (Mg).....	2.1	4.1	11
Sodium (Na).....	3.5	12	30
Potassium (K)		3.5	.4
Carbonate (CO ₃)	0	8	0
Bicarbonate (HCO ₃).....	105	116	275
Sulfate (SO ₄).....	2	3.8	31
Chloride (Cl)	2.0	10	30
Fluoride (F)	--	.2	.6
Nitrate (NO ₃) .....	.2	.0	5.0
Dissolved solids	114	130	346
Hardness as CaCO ₃ :			
Total	84	97	240
Noncarbonate	0	0	14
Color	--	--	0
pH.....	--	--	7.5
Specific conductance (micromhos at 25 C.).....	--	225	587
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	Aug. 9, 1945	Aug. 21, 1947	Mar. 29, 1952

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	106	124	72	8.1	8.5	7.6	--	--	--	67	300	25
Finished water...	99	120	72	7.9	8.1	7.7	--	--	--	--	--	--

^aReservoir, composite sample.

TEXAS

BORGER
(Population 18,059)

Ownership: Phillips Petroleum Co.

Source: 8 wells (1 to 8), 410, 384, 371, 376, 495, 535, 403, and 459 ft deep, at the Plains Water Station in Carson County 13 miles southwest of Borger. The yield of the wells is reported to range from 700 to 800 gpm.

Treatment: None.

Storage: 10,000 gal.

The Phillips Petroleum Co. pumps the water from the well field through two 12-in. lines to the city limits from which point it is distributed by the city.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Wells (composite)		Wells (composite)
Silica (SiO ₂)	28	Hardness as CaCO ₃ :	
Iron (Fe) .....	.04	Total	197
Manganese (Mn)	--	Noncarbonate	0
Calcium (Ca)	46	Color	--
Magnesium (Mg)	20	pH	8.0
Sodium (Na)	24	Specific conductance	
Potassium (K)	7.6	(micromhos at	
Carbonate (CO ₃)	22	25 C.).....	444
Bicarbonate (HCO ₃)	204	Turbidity	--
Sulfate (SO ₄)	24	Temperature (F.).....	--
Chloride (Cl)	18	Date of collection	Nov. 14, 1947
Fluoride (F) .....	.4		
Nitrate (NO ₃)	3.5		
Dissolved solids	294		

TEXAS

BROWNSVILLE
(Population, 36,066)

Ownership: Municipal; supplies also about 400 people outside the city limits.

Total population supplied, about 36,500. City also supplies Port of Brownsville, Carthage Hydrocal Plant, and International Airport outside the city limits.

Source: Rio Grande.

Treatment: (Both plants) Plain sedimentation, aeration (spray), prechlorination, coagulation with alum and lime, sedimentation, activated carbon at times for odor and taste control, rapid sand filtration, and postchlorination. Use of copper sulfate at times in reservoir.

Rated capacity of treatment plants: Plant 1: 5,000,000 gpd; plant 2: 4,000,000 gpd.

Raw-water storage: Reservoir, 180 acres, average depth, 8 ft.

Finished-water storage: 3,150,000 gal.

The raw water source is the same for both treatment plants. The water for plant 2 flows through a concrete lined canal to the plant. There is considerable variation in the composition of the raw water throughout the year.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water (Plant 2)		Finished water (Plant 2)
Silica (SiO ₂)	13	Hardness as CaCO ₃ :	
Iron (Fe) .....	.09	Total	266
Manganese (Mn) .....	.00	Noncarbonate	153
Calcium (Ca)	72	Color	10
Magnesium (Mg)	21	pH	7.4
Sodium (Na)	126	Specific conductance	
Potassium (K)		(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	1,100
Bicarbonate (HCO ₃)	138	Turbidity	--
Sulfate (SO ₄)	184	Temperature (F.).....	--
Chloride (Cl)	165	Date of collection	Oct. 22, 1951
Fluoride (F) .....	.6		
Nitrate (NO ₃)	2.0		
Dissolved solids	652		

Regular determinations at treatment plant, 1950^a

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	144	220	90	8.1	8.3	7.9	279	480	130	126	450	40
Finished water...	142	212	82	7.9	7.9	7.7	282	410	140	0	0	0

Regular determinations at treatment plant, 1950^b

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	151	214	90	7.9	8.0	7.5	303	470	180	66	140	25
Finished water...	148	204	86	7.7	7.8	7.3	294	450	150	0	0	0

^aPlant 1.

^bPlant 2.

TEXAS

BROWNWOOD
(Population, 20, 181)

Ownership: Municipal and Brown County Water Improvement District; supplies also about 5,000 persons outside the city limits. Total population supplied, about 25,200.

Source: Pecan Bayou and Jim Ned Creek impounded in Lake Brownwood (capacity 137,300 acre-ft to emergency spillway), 9 miles north of Brownwood.

Treatment: Coagulation with alum, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 8,000,000 gpd.

Raw-water storage: 2 reservoirs, approximately 9,800,000 and 6,500,000 gal.

Finished-water storage: 4 ground storage tanks: two 1,000,000 gal each; 500,000, and 250,000 gal.

The water from Lake Brownwood flows approximately 7 miles through an open canal to the larger of the storage reservoirs; from this reservoir to the smaller one, and then to the treatment plant. The finished water is pumped to two 1,000,000 gal ground storage tanks. From this point the city is responsible for the distribution of the water. It flows by gravity from the two 1,000,000 gal tanks into the distribution system and the two smaller ground storage tanks.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Raw water	Finished water
Silica (SiO ₂)	7.0	--	3.0
Iron (Fe) .....	.0	--	.05
Manganese (Mn)	--	--	.00
Calcium (Ca)	38	--	40
Magnesium (Mg)	7.0	--	5.5
Sodium (Na)	20	--	11
Potassium (K)	11	--	1.2
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	132	127	130
Sulfate (SO ₄)	17	--	12
Chloride (Cl)	37	21	23
Fluoride (F) .....	.1	--	.1
Nitrate (NO ₃) .....	.2	--	.2
Dissolved solids	195	--	170
Hardness as CaCO ₃ :			
Total	124	113	122
Noncarbonate	15	9	16
Color	--	10	5
pH	8.0	8.2	7.8
Specific conductance (micromhos at 25 C.)	358	293	302
Turbidity	--	--	--
Temperature (F.)	--	70	--
Date of collection	Sept. 21, 1948	May 2, 1952	Jan. 17, 1952

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water	102	110	98	8.1	8.4	8.0	134	150	120	25	170	12
Finished water	100	108	96	7.5	7.7	7.2	131	146	120	.3	2	.2

TEXAS

BRYAN
(Population, 18,102)

Ownership: Municipal; also supplies about 150 people outside the city limits.

Total population supplied, about 18,250.

Source: 8 wells (1 to 8), about $3\frac{1}{2}$ miles northwest of the city limits. Auxiliary or emergency supply can be obtained from A & M College, College Station, Tex.

The wells are 557, 523, 498, 677, 584, 499, 536, and 554 ft deep, respectively, and are reported to yield 261, 315, 346, 424, 582, 510, 402, and 402 gpm.

Treatment: Aeration (air diffusion) and chlorination.

Rated capacity of pumping plant: 3,600,000 gpd.

Raw-water storage: Underground reservoir, 500,000 gal.

Finished-water storage: Underground reservoir, 3,000,000 gal; elevated tank, 400,000 gal.

The wells are pumped individually into an underground reservoir at the well field, the water being aerated as it enters the reservoir, chlorinated as it leaves the reservoir to be pumped to a larger underground reservoir in the city where it is pumped into the distribution system and elevated tanks.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 3 (raw water)	Well 4 (raw water)	Well 5 (raw water)	Finished water (city tap)
Silica (SiO ₂)	16	15	19	17
Iron (Fe).....	.05	.25	.10	.12
Manganese (Mn)	--	--	--	.00
Calcium (Ca)	1.5	2.1	1.7	.4
Magnesium (Mg) .....	.2	.5	.2	.3
Sodium (Na).....	71	192	69	71
Potassium (K)				
Carbonate (CO ₃)				
Bicarbonate (HCO ₃).....	163	392	137	152
Sulfate (SO ₄)	2.4	1.6	1.5	.1
Chloride (Cl).....	16	45	16	22
Fluoride (F) .....	.2	.3	.0	.0
Nitrate (NO ₃) .....	.0	.2	.0	.2
Dissolved solids	188	474	184	181
Hardness as CaCO ₃ :				
Total	5	7	5	2
Noncarbonate	0	0	0	0
Color.....	--	--	--	20
pH.....	8.2	8.2	8.1	7.7
Specific conductance (micromhos at 25 C.)	--	--	280	298
Turbidity	--	--	--	--
Temperature (F.)	--	79	--	--
Date of collection	Nov. 10, 1942	Nov. 10, 1942	Aug. 23, 1943	Oct. 22, 1951
Depth (feet)	498	677	584	
Diameter (inches)	16-8 5/8	16-8 5/8	16-8 5/8	
Date drilled	1939	1939	1943	
Percent of supply	--	--	--	

TEXAS

CLEBURNE
(Population, 17,600)

Ownership: Municipal; supplies also about 800 persons outside the city limits.

Total population supplied, about 18,400.

Source: 7 wells (1, and 3 to 8), 1,100, 950, 935, 1,274, 1,206, 1,250, and 1,258 ft deep. Wells 1, 3, 4, and 6 are at pumping plant, about 200 yd from the City Hall; well 5, on North Cranberry St; well 7, on West Henderson St; and well 8, on Huron and Ramsey Sts.

Treatment: Filtration through sand traps and chlorination.

Raw-water storage: None.

Finished-water storage: 1 underground reservoir, 1,250,000 gal; 2 elevated tanks, 500,000 and 110,000 gal.

The wells pump into sand traps; the water flows by gravity through the sand traps to clear wells where it is chlorinated, and from which it is pumped into the distribution system, elevated tanks, and underground reservoir. Wells 5, 7, and 8 operate individually; wells 1, 3, 4, and 6 operate as a unit, the water being pumped to a common sand trap and chlorinator.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Wells (raw water) ^a	Well 3 (raw water)	Well 4 (raw water)	Well 6 (raw water)
Silica (SiO ₂)	17	13	14	14
Iron (Fe).....	.01	.02	.01	.0
Manganese (Mn) .....	.00	--	.00	--
Calcium (Ca)	2.2	2.3	1.8	1.8
Magnesium (Mg)	1.1	1.2	1.2	1.1
Sodium (Na).....	231	231	231	222
Potassium (K)	--	6.4	1.2	14
Carbonate (CO ₃)	6	26	3	24
Bicarbonate (HCO ₃).....	400	361	410	370
Sulfate (SO ₄)	106	102	109	104
Chloride (Cl).....	39	52	34	39
Fluoride (F)	1.0	.3	1.1	1.2
Nitrate (NO ₃)	1.8	.0	1.5	1.5
Dissolved solids	606	599	602	613
Hardness as CaCO ₃ :				
Total	10	10	10	9
Noncarbonate	0	0	0	0
Color.....	0	--	0	--
pH.....	8.5	8.8	8.3	8.6
Specific conductance (micromhos at 25 C.)	983	--	983	979
Turbidity	--	--	--	--
Temperature (F.)	80	--	80	79
Date of collection	Feb. 28, 1952	Feb. 11, 1943	Feb. 28, 1952	Mar. 7, 1949
Depth (feet)	--	950	935	1,206
Diameter (inches)	--	8	8 $\frac{1}{4}$ -6	22-8 5/8
Date drilled	--	1913	1940	1941
Percent of supply	--	--	--	--

^aComposite sample, wells 1, 4, and 6.

TEXAS

CORPUS CHRISTI (Population, 108,287)

Ownership: Municipal; supplies also about 15,000 persons outside the city limits, and the town of Clarkwood. Total population supplied, about 123,600.

Source: Nueces River impounded in Lake Corpus Christi near Mathis, Tex., about 35 miles from Corpus Christi. Water is fed from the storage reservoir to a low water reservoir at Calallen, Tex. by the Nueces River. Wells are used as an auxiliary or emergency supply. The wells are pumped individually into the Nueces River, the water flowing down the river into Lake Corpus Christi.

Treatment: Prechlorination, partial softening with lime, primary sedimentation, primary coagulation with alum, sedimentation, secondary coagulation with alum, sedimentation, fluoridation with sodium fluoride, aeration, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 45,000,000 gpd.

Raw-water storage: Lake Corpus Christi, 35,000 acre-ft (approximate).

Finished-water storage: 2 underground reservoirs, 10,000,000 gal. each; elevated tanks, 18,750,000 gal.

The water is pumped from the low water reservoir to the treatment plant at Calallen which is 16 miles from Corpus Christi. The finished water is pumped, in part, directly to the distribution system and elevated tanks, and part to two underground reservoirs in Corpus Christi.

There is some variation in the chemical character of the water throughout the year. The dissolved solids for the period October 1947, to September 1950 ranged from a maximum of 548 ppm to a minimum of 175 ppm.

TEXAS

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Nueces R. near Mathis (raw water) ^a	Nueces R. near Mathis (raw water)	Finished water (city tap)	Well (raw water) ^b
Silica (SiO ₂)	22	22	15	30
Iron (Fe).....	--	.00	.00	.19
Manganese (Mn)	--	.00	.00	--
Calcium (Ca)	44	40	38	3.6
Magnesium (Mg)	5.3	3.6	4.5	.7
Sodium (Na).....	42	35	58	244
Potassium (K)		7.6	9.2	2.0
Carbonate (CO ₃)		0	0	0
Bicarbonate (HCO ₃).....	168	142	94	504
Sulfate (SO ₄)	31	34	70	65
Chloride (Cl).....	39	30	69	44
Fluoride (F) .....	.2	.3	1.2	.6
Nitrate (NO ₃)	1.3	3.0	.2	.0
Dissolved solids	280	251	319	675
Hardness as CaCO ₃ :				
Total	132	115	114	12
Noncarbonate	0	0	36	0
Color.....	--	25	10	--
pH.....	--	7.6	7.2	8.1
Specific conductance (micromhos at 25 C.)	452	383	530	1,010
Turbidity	--	0	--	--
Temperature (F.)	--	--	--	138
Date of collection.....	Oct. 1949, to Sept. 1950	Oct. 1-31, 1951	Nov. 21, 1951	Mar. 14, 1951

Regular determinations at treatment plant, 1951^c

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	179	198	158	8.1	8.6	8.0	168	190	120	40	75	24
Finished water...	132	138	104	7.8	8.0	7.4	135	162	106	--	--	--

^aWeighted average of analyses of 10-day composites of daily samples for the water year October 1949, to September 1950.

^bAt Campbellton (one of emergency wells) owned by Lower Nueces River Water Supply District. Depth of well, 4, 130 ft.

^cMonth of January.

CORSICANA
(Population, 19,211)

Ownership: Municipal; supplies also about 220 persons outside the city limits.

Total population supplied, about 19,400.

Source: Elm Creek impounded in Lake Halbert, approximately $13\frac{1}{2}$ miles southeast of Corsicana, about 63 percent of the supply; Chambers Creek, intake approximately 150 ft south of bridge on State Highway 31, about 37 percent of the supply.

Treatment: Aeration (cascades), prechlorination, coagulation with alum and lime and soda ash at times, sedimentation, rapid sand filtration, and postchlorination. Use at times of activated carbon for odor and taste control.

Rated capacity of treatment plant: 3,000,000 gpd.

Raw-water storage: Lake Halbert (capacity, 7,000 acre-ft).

Finished-water storage: 1 underground reservoir, 370,000 gal; 2 elevated tanks, 400,000 and 200,000 gal.

Water is pumped from Chambers Creek into Lake Halbert, and is used approximately 9 months of the year when demand is greatest. From Lake Halbert the water flows by gravity to the treatment plant, just below the dam. The finished water is pumped to the distribution system and to the elevated tanks.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Lake Halbert (raw water)	Chambers Creek (raw water)	Finished water
Silica (SiO ₂)	8.8	15	2.4
Iron (Fe) .....	.01	.12	.01
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	60	43	62
Magnesium (Mg).....	13	3.3	11
Sodium (Na).....	46	64	47
Potassium (K) .....	.8	.4	2.8
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃).....	141	133	121
Sulfate (SO ₄).....	141	88	150
Chloride (Cl)	29	41	36
Fluoride (F)	1.0	.7	1.0
Nitrate (NO ₃)	2.0	3.0	.5
Dissolved solids	387	358	384
Hardness as CaCO ₃ :			
Total	203	121	200
Noncarbonate	88	12	100
Color	10	15	0
pH.....	7.6	7.4	7.6
Specific conductance (micromhos at 25 C.).....	602	534	617
Turbidity	--	--	--
Temperature (F.)	53	53	53
Date of collection	Feb. 28, 1952	Feb. 28, 1952	Feb. 28, 1952

TEXAS

DALLAS (Population, 434,462)

- Ownership:** Municipal; supplies also about 3,000 persons outside the city limits, Arcadia Park, and Cockrell Hill. Total population supplied, about 442,900.
- Source:** Lake Dallas, about 30 miles north-northwest of Dallas in Denton County on Elm Fork Trinity River, furnishes approximately 99 percent of the supply; 6 wells, 1,260 to 2,690 ft deep, located at various points within the city limits furnishes approximately 1 percent of supply. Auxiliary or emergency supplies can be obtained from White Rock Lake and Bachman Lake.
- Treatment:** Bachman Plant: softening with lime, addition of activated carbon for odor and taste control, coagulation with iron salts (ferric sulfate), sedimentation, rapid sand filtration, chlorination, and ammoniation. Elm Fork Plant: softening with lime, addition of activated carbon for odor and taste control, primary coagulation, primary sedimentation, secondary coagulation, secondary sedimentation, rapid sand filtration, chlorination, and ammoniation. Wells, chlorination.
- Rated capacity of treatment plants:** Bachman Plant, 100,000,000 gpd; Elm Fork Plant, 96,000,000 gpd.
- Raw-water storage:** Lake Dallas (capacity, 194,000 acre-ft).
- Finished-water storage:** 2 ground storage tanks, 14,000,000 and 21,000,000 gal; elevated tanks, 4,000,000, 2,000,000, two 1,000,000 gal each, 500,000, 200,000, and 50,000 gal; clear wells: Elm Fork Plant, 14,000,000 gal; Bachman Plant, 10,000,000 gal.
- Released water from Lake Dallas** flows down the Elm Fork Trinity River through the city of Dallas. The intake to the Elm Fork plant is located on the river directly west of the treatment plant at Carrollton, Tex. The water is pumped to the treatment plant, flows through the treatment plant and is pumped to the north city limits of Dallas. At the city limits part of the water is diverted to the north section of Dallas, supplying that area. The water that is not diverted flows to, and enters, the distribution system from the Bachman Treatment Plant which supplies that area of Dallas south of the plant.
- The intake to the Bachman Plant** is located on the Elm Fork Trinity River southwest of the Bachman Treatment Plant. The water flows by gravity from the river to the treatment plant, through the plant, and is pumped into the distribution system and storage.
- The wells are pumped individually.** The water is chlorinated at the well and is pumped directly into the distribution system and elevated tanks. The well supply will be abandoned, except well 39, as soon as those areas now served by the wells can be connected to the Dallas system.

TEXAS

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 39 (raw water)	Raw water	Finished water	
			Bachman Plant	Elm Fork Plant
Silica (SiO ₂)	22	6.0	6.4	4.8
Iron (Fe).....	.02	.01	.01	.01
Manganese (Mn) .....	.00	.00	.00	.00
Calcium (Ca)	6.0	54	19	19
Magnesium (Mg)	2.2	6.3	4.4	4.4
Sodium (Na).....	385	35	35	35
Potassium (K) .....	.8	.4	1.2	1.6
Carbonate (CO ₃)	0	0	9	13
Bicarbonate (HCO ₃).....	542	169	20	14
Sulfate (SO ₄)	259	35	49	47
Chloride (Cl).....	95	43	46	45
Fluoride (F)	1.8	.3	.3	.3
Nitrate (NO ₃) .....	.5	.8	.5	.5
Dissolved solids	1,040	277	186	183
Hardness as CaCO ₃ .				
Total	24	161	66	66
Noncarbonate	0	22	34	32
Color.....	0	0	--	--
pH.....	8.2	7.9	9.3	9.6
Specific conductance (micromhos at 25 C.)	1,650	481	334	329
Turbidity	--	--	--	--
Temperature (F.)	112	54	53	52
Date of collection.....	Mar. 27, 1952	Mar. 29, 1952	Mar. 29, 1952	Mar. 29, 1952
Depth (feet)	2,690			
Diameter (inches).....	18-8			
Date drilled	1938			
Percent of supply	--			

Regular determinations at treatment plant, 1951^a

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	143	197	78	8.1	8.5	7.2	159	232	78	118	2250	17
Finished water...	39	63	25	10.4	10.8	10.0	67	137	44	.27	2.0	0.0

^aBachman Plant.

TEXAS

DEL RIO (Population, 14, 211)

Ownership: Municipal.

Source: San Felipe Spring, in northeastern Del Rio on municipal golf course grounds, 0.3 mile north of U. S. Highway 90.

Treatment: Chlorination.

Raw-water storage: None.

Finished-water storage: 2 elevated tanks, 1,000,000 gal each.

The water is pumped directly from the spring into the distribution system and elevated tanks. It is chlorinated at the pumps.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	San Felipe Spring (raw water)		San Felipe Spring (raw water)
Silica (SiO ₂)	14	Hardness as CaCO ₃ :	
Iron (Fe) .....	.0	Total	218
Manganese (Mn) .....	.00	Noncarbonate	12
Calcium (Ca)	74		
Magnesium (Mg)	8.1	Color	0
Sodium (Na)	6.0	pH	7.6
Potassium (K) .....	.0	Specific conductance	
Carbonate (CO ₃)	0	(micromhos at	
Bicarbonate (HCO ₃)	251	25 C.).....	448
Sulfate (SO ₄)	5.8	Turbidity	--
Chloride (Cl)	9.2	Temperature (F.).....	--
Fluoride (F) .....	.2	Date of collection	Mar.26,1952
Nitrate (NO ₃)	7.2		
Dissolved solids	254		

TEXAS

DENISON (Population, 17,504)

Ownership: Municipal; supplies also about 3,500 persons outside the city limits.

Total population supplied, about 21,000.

Source: Lake Randall, approximately $4\frac{1}{2}$ miles northwest of Denison on Shawnee Creek, furnishes 100 percent of the supply except in emergencies. Auxiliary or emergency supply, Lake Texoma.

Treatment: Prechlorination, coagulation with ferric sulfate, softening with lime, ammoniation, sedimentation, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 4,000,000 gpd.

Raw-water storage: Lake Randall (capacity, 5,400 acre-ft).

Finished-water storage: 1 elevated tank, 1,000,000 gal; clear well, 750,000 gal.

The water is pumped from Lake Randall to the treatment plant. The finished water from the plant is pumped into the distribution system and elevated storage tank at the north city limits.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	3.5	3.2	Hardness as CaCO ₃ :		
Iron (Fe) .....	.01	.0	Total	144	68
Manganese (Mn) .....	.00	.00	Noncarbonate.....	24	10
Calcium (Ca)	47	19	Color	5	5
Magnesium (Mg).....	6.5	4.9	pH	7.5	7.4
Sodium (Na)	13	14	Specific conductance		
Potassium (K)	1.2	1.2	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	333	217
Bicarbonate (HCO ₃)	146	70	Turbidity	--	--
Sulfate (SO ₄)	23	29	Temperature (F.)...	--	--
Chloride (Cl)	23	18	Date of collection...	Feb. 15,	Feb. 15,
Fluoride (F) .....	.3	.2		1952	1952
Nitrate (NO ₃) .....	.2	.5			
Dissolved solids.....	193	123			

Regular determinations at treatment plant^a

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Temperature		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	--	--	--	7.4	--	--	82	--	--	--	72	38
Finished water...	--	--	--	8.6	--	--	71	--	--	--	68	45

^aAverage of analyses made by State Health Department over a period of many years.

TEXAS

DENTON (Population, 21,372)

Ownership: Municipal; supplies also about 200 persons outside the city limits.

Total population supplied, about 21,600.

Source: 9 wells (3 to 11), 1,160, 1,134, 1,140, 1,027, 1,153, 1,209, 1,218, 1,202, and 1,009 ft deep. The yield of the wells is reported to range from 325 to 480 gpm. Wells 3 to 6 are at various points within the city limits. The remaining wells are 1 to 2 miles east of the city limits.

Treatment: Chlorination.

Raw-water storage: None.

Finished-water storage: 1 ground reservoir, 1,000,000 gal; 6 ground storage tanks: four, 100,000 gal each and two, 50,000 gal each; 3 elevated tanks, 2,000,000, 360,000, and 250,000 gal.

The wells are pumped individually, the water being chlorinated at each well except that from wells 3 and 4, which is chlorinated as the water is pumped into storage. The water from all of the wells is first pumped into storage from which it is pumped into the distribution system.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 3 (raw water)	Well 4 (raw water)	Well 5 ^a	Well 7 (raw water)	Well 9 (raw water)
Silica (SiO ₂)	13	12	21	10	12
Iron (Fe)	--	--	.01	--	--
Manganese (Mn)	--	--	.00	--	--
Calcium (Ca)	2.2	2.4	1.4	2.0	.8
Magnesium (Mg)	1.0	1.2	.9	.9	.7
Sodium (Na)	227	235	193 1.6	187	229
Potassium (K)					
Carbonate (CO ₃)	31	35	14	20	41
Bicarbonate (HCO ₃)	336	390	339	294	314
Sulfate (SO ₄)	121	106	90	102	130
Chloride (Cl)	33	23	21	23	28
Fluoride (F)	--	--	.3	--	--
Nitrate (NO ₃)	3.0	1.2	.0	1.2	1.8
Dissolved solids	610	635	518	506	604
Hardness as CaCO ₃ :					
Total	10	11	7	8	5
Noncarbonate	0	0	0	0	0
Color	--	--	0	--	--
pH	--	--	8.6	--	--
Specific conductance (micromhos at 25 C.)	956	989	830	804	954
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	78	--	--
Date of collection	Dec. 3, 1948	Dec. 3, 1948	Mar. 26, 1952	Dec. 3, 1948	Dec. 3, 1948
Depth (feet)	1,160	1,134	1,140	1,153	1,218
Diameter (inches)	10 $\frac{3}{4}$ -8 $\frac{3}{4}$	13-10	10 $\frac{3}{4}$ -8 $\frac{3}{4}$	13 5/8	13 3/8
Date drilled	1926	1934	1940	1945	1947
Percent of supply	--	--	--	--	--

^aChlorinated water.

TEXAS

EL PASO
(Population, 130,485)

Ownership: Municipal; supplies also about 1,000 people in the Sunrise Acres addition outside the city limits, and Fort Bliss with standby fire line. Total population supplied, about 131,500.

Source: 19 wells in 4 well fields: Mesa (north of Fort Bliss), Montana (Central El Paso), Downtown (southwest El Paso, near the Rio Grande), shallow well field (at surface water treatment plant along canal); and the Rio Grande. The wells furnish approximately 46 percent of the total supply. The shallow wells are about 50 ft deep, and the deeper wells range in depth from 425 to 1,055 ft.

Treatment: Well water: chlorination at the wells; surface supply: screening, grit removal, prechlorination, aeration by forced air, primary settling, coagulation with alum or ferric sulfate, softening with lime (and soda ash at times), activated carbon for taste and odor control as required, settling, reflocculation, settling, recarbonation, chlorination, and rapid sand filtration.

Rated capacity of treatment plant: 19,700,000 gpd for well water; 15,000,000 gpd for river water.

Raw-water storage: --

Finished-water storage: 7 ground reservoirs, 70,000,000 gal; elevated tank, 50,000 gal.

The water from the Rio Grande is brought to the treatment plant by canal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Mesa Well Field (composite)	Montana Field Well 4	Downtown Field Well 14	Rio Grande (finished water)
Silica (SiO ₂)	39	34	34	21
Iron (Fe).....	.0	--	--	.06
Manganese (Mn)	--	--	--	--
Calcium (Ca)	32	49	26	32
Magnesium (Mg)	13	18	10	16
Sodium (Na).....	88	173	138	197
Potassium (K)				4.0
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	189	160	170	45
Sulfate (SO ₄)	68	58	70	292
Chloride (Cl).....	63	268	139	175
Fluoride (F)	1.1	.7	--	.5
Nitrate (NO ₃)	7.5	1.0	.0	.0
Dissolved solids	405	688	503	788
Hardness as CaCO ₃ :				
Total	134	196	106	146
Noncarbonate	0	66	0	109
Color.....	5	--	--	--
pH.....	7.9	7.6	7.9	7.3
Specific conductance (micromhos at 25 C.)	665	1,250	867	1,270
Turbidity	--	--	--	--
Temperature (F.)	--	--	--	--
Date of collection.....	Apr. 9, 1951	May 31, 1950	June 13, 1951	June 13, 1951

TEXAS

	Mesa Well Field (composite)	Montana Field Well 4	Downtown Field Well 14	Rio Grande (finished water)
Depth (feet)	--	882	703	
Diameter (inches)	--	24	36	
Date drilled	--	1924	1937	
Percent of supply	--	--	--	

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	216	258	182	--	--	--	345	414	290	--	--	--
Finished water...	46	68	33	--	--	--	159	215	135	--	--	--

FORT WORTH
(Population, 278, 778)

Ownership: Municipal; supplies about 500 people outside the city limits. Total population supplied, about 279,300. There are several private water companies which supply areas within the city and in the suburbs. The two largest suppliers are the Worth Water Co., which supplies a population of about 2,000, and the Texas Water Co.

Source: 3 lakes: Lake Worth, Eagle Mountain Lake, and Lake Bridgeport, on West Fork Trinity River, about 9 miles west of Fort Worth, about 18 miles northwest of Fort Worth, and about 4 miles northwest of Bridgeport, respectively.

Treatment: Aeration (spray), coagulation with alum and lime, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: 79,000,000 gpd.

Raw-water storage: Lake Worth, capacity, 28,660 acre-ft; Eagle Mountain Lake, capacity, 211,000 acre-ft; Lake Bridgeport, capacity, 292,000 acre-ft.

Finished-water storage: 2 underground reservoirs, 5,000,000 and 4,500,000 gal; 8 elevated tanks: two 1,000,000 gal each, three 500,000 gal each, one 2,000,000 gal, one 1,500,000 gal, and one 100,000 gal; 1 standpipe, 330,000 gal; and clear wells, 10,000,000 gal.

The three lakes are in series, Lake Bridgeport spilling into Eagle Mountain Lake and Eagle Mountain Lake spilling into Lake Worth. Valves are maintained at the dams of each of the upper lakes allowing water to flow when necessary down the West Fork Trinity River into Lake Worth. The intake is at Lake Worth dam, the water flowing by gravity to the treatment plant. The finished water is pumped from the clear wells into the distribution system, elevated tanks, and underground reservoirs.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Lake Worth (raw water)	Eagle Mt. Lake (raw water)	Finished water	Well ^a (chlorinated)
Silica (SiO ₂)	5.6	5.6	4.4	13
Iron (Fe).....	.05	.01	.01	.18
Manganese (Mn) .....	.00	.00	.00	--
Calcium (Ca)	43	40	45	2.0
Magnesium (Mg)	7.8	7.3	7.7	.9
Sodium (Na).....	18	17	19	313
Potassium (K) .....	.8	1.2	1.6	8.4
Carbonate (CO ₃)	0	0	0	14
Bicarbonate (HCO ₃).....	161	151	158	502
Sulfate (SO ₄)	17	15	22	156
Chloride (Cl).....	23	21	25	68
Fluoride (F) .....	.4	.3	.3	1.8
Nitrate (NO ₃) .....	.2	.5	.5	1.8
Dissolved solids	197	182	203	817
Hardness as CaCO ₃ :				
Total	139	130	144	8
Noncarbonate	7	6	14	0
Color.....	--	5	--	--
pH.....	7.9	7.7	7.6	8.5
Specific conductance (micromhos at 25 C.)	363	335	374	1,350
Turbidity	--	--	--	--
Temperature (F.)	52	62	--	76
Date of collection.....	Mar. 31, 1952	Apr. 2, 1952	Mar. 27, 1952	June 9, 1949
Depth (feet)				1,000
Diameter (inches)				--
Date drilled				1947
Percent of supply				--

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	120	128	112	8.2	8.4	7.9	123	132	101	24	37	10
Finished water...	117	123	113	7.8	8.2	7.5	130	136	107	0	0	0

^aTexas Water Co.

TEXAS

GALVESTON (Population, 66,568)

Ownership: Municipal; supplies also about 5,300 persons outside the city limits.

Total population supplied, about 71,900.

Source: 13 wells (1 to 13), in and extending north and south of Alta Loma, approximately 20 miles northwest of the city of Galveston. Well 14 has not been connected with the system. The depths of the wells range from 764 to 888 ft.

Wells 9 to 13 are pumped continuously and wells 1, 2, 6, and 7 are usually pumped. Additional demand is met by placing wells 3, 4, 5, and 8 in service.

Treatment: Chlorination and addition of polyphosphate at the Alta Loma pumping plant for scaling and corrosion control. Rechlorination at 59th and 30th Streets pumping plants upon pumping into the distribution system.

Rated capacity of pumping plant (Alta Loma): 18,000,000 gpd.

Raw-water storage: --

Finished-water storage: 3 reservoirs, 1,763,000, 1,777,000, and 3,812,000 gal; 2 reservoirs, 2,994,000 gal each; 2 reservoirs, 2,752,000 gal each; 2 reservoirs, 3,416,000 gal each; and 1 standpipe, 625,000 gal.

The water is pumped from the wells, as a unit, to the pumping station at Alta Loma, where additional head is obtained to pump the water under Galveston Bay to Galveston Island to two pumping stations, at 59th Street and 30th Street, from which the water is pumped into the storage reservoirs, standpipe, and the distribution system.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1 (raw water)	Well 8 (raw water)	Well 9 (raw water)	Well 13 (raw water)	Finished water
Silica (SiO ₂)	--	--	28	--	31
Iron (Fe)	--	--	--	--	.00
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	22	54	17	17	30
Magnesium (Mg)	4.4	11	7.5	5.6	9.7
Sodium (Na)	308	545	257	245	351
Potassium (K)					
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	338	338	339	348	336
Sulfate (SO ₄)	2	2	2.1	2	1.0
Chloride (Cl)	328	770	250	220	422
Fluoride (F)	--	--	--	--	.9
Nitrate (NO ₃)	--	--	.2	.5	3.5
Dissolved solids	853	1,550	729	659	1,010
Hardness as CaCO ₃ :					
Total	73	180	74	66	115
Noncarbonate	0	0	0	0	0
Color	--	--	--	--	--
pH	--	--	7.9	--	8.0
Specific conductance (micromhos at 25 C.)	1,570	2,870	1,320	1,170	1,830
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of collection	Jul. 11, 1947	Jul. 11, 1947	May 9, 1949	Nov. 10, 1947	May 11, 1951
Depth (feet)	840	884	764	810	
Diameter (inches)	12	20	18 5/8	18 5/8	
Date drilled	1914	1935	1942	1942	
Percent of supply	--	--	--	--	

TEXAS

GRAND PRAIRIE (Population, 14,594)

Ownership: Municipal; supplies also about 200 persons outside the city limits.

Total population supplied, about 14,800.

Source: 8 wells: 2 wells (5 and 14), Northwest Third Street, 345 and 2,077 ft deep; 3 wells (6, 7, and 12), Davis Street, 430, 2,065, and 412 ft deep; 3 wells (8, 10, and 13), Dallas Street, 2,026, 283, and 2,047 ft deep. The yield of the wells is reported to range from 50 to 600 gpm.

Treatment: Chlorination.

Raw-water storage: None.

Finished-water storage: 1 underground reservoir, 100,000 gal; 3 ground reservoirs, 300,000 gal, and two 100,000 gal each; 3 elevated tanks, 500,000, 100,000, and 50,000 gal.

The wells are pumped individually and chlorinated by groups. The water from wells 5 and 14 is chlorinated in the water line leading to the reservoirs; that from wells 6, 7, 8, 10, 12, and 13 is chlorinated as it discharges into the ground storage reservoirs. The water is pumped from the ground reservoirs into the distribution system and elevated tanks.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 6	Well 8	Well 13
Silica (SiO ₂)	12	16	16
Iron (Fe) .....	.08	.11	.05
Manganese (Mn)	--	--	.00
Calcium (Ca)	1.0	3.7	2.2
Magnesium (Mg).....	.5	.9	1.0
Sodium (Na).....	247	319	318
Potassium (K)			
Carbonate (CO ₃)	7	29	10
Bicarbonate (HCO ₃).....	505	485	515
Sulfate (SO ₄).....	84	131	138
Chloride (Cl)	19	83	82
Fluoride (F)	--	1.9	1.8
Nitrate (NO ₃)	2.5	2.0	1.8
Dissolved solids	637	816	836
Hardness as CaCO ₃ :			
Total	4	12	10
Noncarbonate	0	0	0
Color	--	--	0
pH.....	8.6	8.7	8.4
Specific conductance (micromhos at 25 C.).....	1,020	1,350	1,350
Turbidity	--	--	--
Temperature (F.)	--	--	91
Date of collection	June 16, 1949	June 23, 1943	Mar. 28, 1952
Depth (feet)	430	2,026	2,047
Diameter (inches)	10-7	10	13-5/8 to 10
Date drilled	1942	1942	1946
Percent of supply	--	--	--

TEXAS

GREENVILLE
(Population, 14,727)

Ownership: Municipal; supplies also Aidis Heights, Mineral Heights, Peniel, and Reavilon. Total population supplied, about 17,400. The city also furnishes Major Airfield.

Source: 4 reservoirs, (1 to 4), north of city supplied with water from the Sabine River.

Treatment: Coagulation with alum and lime, sedimentation, and chlorination. Copper sulfate, at times, for algae control.

Rated capacity of treatment plant: 6,000,000 gpd.

Raw-water storage: Reservoirs (1 to 4), 36,000,000, 52,000,000, 136,000,000, and 1,076,539,000 gal, respectively.

Finished-water storage: Elevated tank, 172,000 gal.

Water is diverted from the Sabine River into a canal by means of a low water diversion dam, approximately 2 miles upstream from the reservoirs. The water flows by gravity through the canal into the system of reservoirs and into the treatment plant. The finished water is pumped into the distribution system and elevated tank.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Reser- voir 2 ^a	Finished water		Reser- voir 2 ^a	Finished water
Silica (SiO ₂)	2.4	0.8	Hardness as CaCO ₃ :		
Iron (Fe) .....	.08	.03	Total	122	137
Manganese (Mn) .....	.00	.00	Noncarbonate.....	5	27
Calcium (Ca)	38	44	Color	10	10
Magnesium (Mg).....	6.5	6.5	pH	7.9	7.4
Sodium (Na)	21	22	Specific conductance		
Potassium (K) .....	.8	.4	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	347	370
Bicarbonate (HCO ₃)	142	134	Turbidity	--	--
Sulfate (SO ₄)	32	49	Temperature (F.)...	55	56
Chloride (Cl)	13	15	Date of collection...	Mar. 25, 1952	Mar. 25, 1952
Fluoride (F) .....	.3	.3			
Nitrate (NO ₃) .....	.0	.0			
Dissolved solids.....	205	213			

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	--	--	--	8.2	8.2	8.0	--	--	--	--	--	--
Finished water...	--	--	--	8.2	8.4	7.4	--	--	--	--	--	--

^a Raw water.

TEXAS

HARLINGEN (Population, 23, 229)

Ownership: Municipal; supplies about 1,300 persons outside the city limits. Total population supplied, about 24,500.

Source: Rio Grande.

Treatment: Plain sedimentation, periodic use of activated carbon for taste and odor control, periodic use of copper sulfate (in reservoir) for control of algae, aeration (spray), prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, and postchlorination. The same treatment is used at both plants.

Rated capacity of treatment plants: City Plant, 4,000,000 gpd. Airport Plant, 2,700,000 gpd.

Raw-water storage: Reservoir, 55,000,000 gal.

Finished-water storage: 1,400,000 gal.

The water is pumped from the Rio Grande into a canal connected with the reservoir at the treatment plants. The finished water from the plants is pumped into a common reservoir from which it is pumped into the distribution system and elevated tanks. There is considerable variation in the composition of the water throughout the year.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Finished water	Reservoir (raw water)	Finished water
Silica (SiO ₂)	10	11	9.0
Iron (Fe) .....	.07	.0	.0
Manganese (Mn)	--	.00	.00
Calcium (Ca)	64	92	95
Magnesium (Mg)	22	33	33
Sodium (Na)	122	202	203
Potassium (K)	4.0	2.8	2.8
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	122	149	138
Sulfate (SO ₄)	186	274	289
Chloride (Cl)	158	284	286
Fluoride (F) .....	.5	.8	.8
Nitrate (NO ₃) .....	.5	.5	.2
Dissolved solids	628	1,000	1,020
Hardness as CaCO ₃ :			
Total	250	365	372
Noncarbonate	150	243	260
Color	--	5	5
pH	7.4	8.0	8.0
Specific conductance (micromhos at 25 C.)	1,060	1,640	1,670
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	June 7, 1951	Feb. 11, 1952	Feb. 11, 1952

14098

TEXAS

HOUSTON (Population, 596, 163)

Ownership: Municipal; supplies also about 3,800 persons outside the city limits.

Total population supplied, about 600,000.

Source: 68 wells. Fifty-one wells are in seven well fields in the older section of the city. Seventeen wells are in ten areas recently annexed by the city; these wells supply only about 5,000,000 gpd. The depths of the wells range from 544 to 2,580 ft, and the reported yield from 125 to 2,360 gpm. The average yield (data on 61 wells) is 1,462 gpm.

Treatment: Chlorination.

Raw-water storage: None.

Finished-water storage: Total, 51,000,000 gal. Ground storage tanks at the following pumping plants: Central, 19,000,000 gal; East End, 3,200,000 gal; Heights, 3,750,000 gal; Northeast, 3,200,000 gal; Scott Street, 2,000,000 gal; South End, 2,000,000 gal; Southwest, 6,000,000 gal. Elevated tanks throughout the city, 11,850,000 gal.

The wells are pumped individually. The water is pumped to ground storage tanks (being chlorinated before entering the tanks) from which it is pumped into the distribution system and elevated tanks. Each field is a system within itself, however, all of the systems are interconnected.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	South End well 7	Scott St. well 4	South Park well 2	Southwest well 5	Central well C-20
Silica (SiO ₂)	16	17	21	22	16
Iron (Fe) .....	.0	.0	.05	--	.15
Manganese (Mn) .....	.00	.00	.00	--	--
Calcium (Ca)	7.2	12	37	18	12
Magnesium (Mg)	2.5	3.6	7.4	4.5	4.9
Sodium (Na)	147	139	64	113	152
Potassium (K) .....	.4	.4	1.6		2.4
Carbonate (CO ₃)	0	0	0	18	0
Bicarbonate (HCO ₃)	328	317	246	250	340
Sulfate (SO ₄)	2.6	5.6	15	7.0	3.1
Chloride (Cl)	51	56	34	47	71
Fluoride (F) .....	.8	.8	.3	--	1.0
Nitrate (NO ₃) .....	.0	.0	.5	.2	.0
Dissolved solids	392	388	298	346	433
Hardness as CaCO ₃ :					
Total	28	45	123	64	50
Noncarbonate	0	0	0	0	0
Color	10	10	10	--	--
pH	8.0	7.8	7.9	--	7.7
Specific conductance (micromhos at 25 C.)	651	660	509	597	734
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	84
Date of collection	Feb. 11, 1952	Feb. 11, 1952	Feb. 11, 1952	Feb. 8, 1949	Mar. 26, 1949
Depth (feet)	1,932	1,756	853	1,401	1,940
Diameter (inches)	24-12 $\frac{3}{4}$	24-12 $\frac{1}{2}$	8	24-12 $\frac{3}{4}$	24-12 $\frac{3}{4}$
Date drilled	1944	1931	1949	1945	1949
Percent of supply	--	--	--	--	--

TEXAS

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	East End well 4	Northeast well 9	Heights well 10	Irvington well	Garden Oaks well 3
Silica (SiO ₂)	18	20	22	20	22
Iron (Fe) .....	.17	.15	.18	.0	.0
Manganese (Mn)	--	--	--	.00	.00
Calcium (Ca)	5.3	11	28	36	36
Magnesium (Mg)	1.5	3.0	8.0	10	8.9
Sodium (Na)	219	153	102	52	64
Potassium (K)	6.8	8.4	2.8	.4	.4
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	420	314	289	218	238
Sulfate (SO ₄)	1.1	12	9.8	12	11
Chloride (Cl)	109	80	57	37	43
Fluoride (F)	1.8	.8	.6	.1	.3
Nitrate (NO ₃) .....	.0	.0	.0	.0	.0
Dissolved solids	576	441	383	270	297
Hardness as CaCO ₃ :					
Total	19	40	103	131	126
Noncarbonate	0	0	0	0	0
Color	--	--	0	10	10
pH	8.0	7.9	7.5	7.7	7.6
Specific conductance (micromhos at 25 C.)	1,000	741	661	475	515
Turbidity	--	--	--	--	--
Temperature (F.)	96	85	80	--	--
Date of collection	June 27, 1949	Apr. 21, 1950	July 23, 1949	Feb. 11, 1952	Feb. 11, 1952
Depth (feet)	2,530	1,940	1,880	1,070	1,100
Diameter (inches)	24-12 ³ / ₄	24-12 ³ / ₄	24-12 ³ / ₄	10 ³ / ₄ -7	--
Date drilled	1948	1949	1949	1947	1945
Percent of supply	--	--	--	--	--

TEXAS

KINGSVILLE (Population, 16,898)

Ownership: Municipal; supplies also about 300 persons outside the city limits.

Total population supplied, about 17,200.

Source: 6 wells. Wells 2 and 5 are at the City Hall, well 4 is 2 blocks east of City Hall, wells 6 and 7 are on 12th Street, and well 8 is on 14th Street. The wells pump directly into the distribution system and elevated tanks.

Treatment: Chlorination at each well. Batch chlorination on elevated tanks when filled.

Raw-water storage: None.

Finished-water storage: Elevated tanks, 2,000,000 gal.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 2	Well 4	Well 5
Silica (SiO ₂)	14	11	17
Iron (Fe) .....	.02	.02	.03
Manganese (Mn)	--	--	--
Calcium (Ca)	22	24	21
Magnesium (Mg)	8.6	9.6	7.5
Sodium (Na)	305	317	308
Potassium (K)	14	0	12
Carbonate (CO ₃)	15	0	6
Bicarbonate (HCO ₃)	277	304	303
Sulfate (SO ₄)	162	163	162
Chloride (Cl)	242	255	235
Fluoride (F) .....	.9	.4	.5
Nitrate (NO ₃)	9.0	12	9.2
Dissolved solids	956	959	951
Hardness as CaCO ₃ :			
Total	90	100	84
Noncarbonate	0	0	0
Color	--	--	--
pH	--	8.2	--
Specific conductance (micromhos at 25 C.)	1,580	--	1,560
Turbidity	--	--	--
Temperature (F.)	85	--	85
Date of collection	Mar. 16, 1945	Feb. 5, 1943	Mar. 16, 1945
Depth (feet)	730	725	737
Diameter (inches)	12	8	16-8
Date drilled	1935	1939	1943
Percent of supply	--	--	--

TEXAS

LAREDO
(Population, 51,910)

Ownership: Municipal.

Source: Rio Grande.

Treatment: Aeration (spray), prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 7,500,000 gpd.

Raw-water storage: None.

Finished-water storage: 2 ground reservoirs, 2,000,000 and 2,200,000 gal; 1 underground reservoir, 375,000 gal.

The water is pumped from the Rio Grande to the treatment plant. The finished water is pumped into the three storage reservoirs, from which it is pumped into the distribution system.

There is considerable variation in the composition of the raw water throughout the year.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	13	9.6	Hardness as CaCO ₃ :		
Iron (Fe) .....	.0	.01	Total	322	328
Manganese (Mn) .....	.00	.00	Noncarbonate.....	204	216
Calcium (Ca)	75	77	Color.....	0	0
Magnesium (Mg).....	33	33	pH.....	8.0	7.7
Sodium (Na)	165	159	Specific conductance		
Potassium (K) .....	.4	.8	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	1,380	1,390
Bicarbonate (HCO ₃)	144	136	Turbidity	--	--
Sulfate (SO ₄)	248	256	Temperature (F.)...	76	77
Chloride (Cl)	215	218	Date of collection...	Apr. 21,	Apr. 21,
Fluoride (F) .....	.9	.8		1952	1952
Nitrate (NO ₃) .....	.8	.8			
Dissolved solids.....	849	845			

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	127	152	59	8.1	8.3	7.7	270	390	96	700	10800	35
Finished water...	114	144	47	7.7	8.2	7.3	270	400	105	0	2	0

TEXAS

LONGVIEW
(Population, 24, 502)

Ownership: Municipal; supplies also about 400 persons outside the city limits, and community of Greggton. Total population supplied, about 27, 100.

Source: Lake Cherokee, approximately 8 miles southeast of the city on Cherokee Bayou. Auxiliary or emergency supply, Big Sandy Creek (diversion dam near Big Sandy, Upshur County, Tex.).

Treatment: Prechlorination, aeration (spray), coagulation with alum, activated carbon for odor and taste control, sedimentation, addition of lime for pH control, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 10, 000, 000 gpd.

Raw-water storage: 2 surface reservoirs, 11, 000, 000 and 2, 000, 000 gal.

Finished-water storage: 2 surface reservoirs, 2, 000, 000 and 500, 000 gal; 2 elevated tanks, 1, 000, 000 and 150, 000 gal; 2 elevated tanks, 200, 000 gal each.

The water is pumped, intake approximately $2\frac{1}{2}$ miles upstream from the impounding dam, to the treatment plant about 1 mile outside the city limits. The finished water is pumped into town to 1, 000, 000 gal elevated tank and then into the distribution system and storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Lake Cherokee (raw water)	Lake Cherokee (raw water)	Finished water
Silica (SiO ₂)	6.0	7.8	8.2
Iron (Fe) .....	.48	.70	.03
Manganese (Mn) .....	.0	.00	.00
Calcium (Ca)	6.8	3.5	12
Magnesium (Mg)	3.3	2.3	3.7
Sodium (Na)	6.0	8.7	5.0
Potassium (K)	6.0		
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	25	14	20
Sulfate (SO ₄)	16	13	23
Chloride (Cl)	8.5	7.8	14
Fluoride (F) .....	.0	.2	.1
Nitrate (NO ₃) .....	.0	.5	.5
Dissolved solids	68	73	92
Hardness as CaCO ₃ :			
Total	30	18	45
Noncarbonate	10	7	29
Color	30	20	15
pH	6.8	6.6	7.2
Specific conductance (micromhos at 25 C.)	109	81	134
Turbidity	--	--	--
Temperature (F.)	--	57	57
Date of collection	June 4, 1949	Feb. 27, 1952	Feb. 27, 1952

TEXAS

LUBBOCK (Population, 71, 747)

Ownership: Municipal.

Source: 64 wells. Wells 1 to 19 are located at separate points in the city and the remaining wells in 2 well fields: one field of 30 wells in an area directly northwest of the city; the other of 15 wells in an area directly northeast of the city. Wells 1 to 3 are 98, 300, and 210 ft deep; the remaining wells (depths reported for 56) range from 106 to 158 ft deep. The average yield of the wells (yields reported for 59) is 498 gpm.

Treatment: Chlorination.

Rated capacity of pumping plant: 40, 000, 000 gpd.

Raw-water storage: None.

Finished-water storage: 19, 000, 000 gal.

The wells are pumped in groups to ground storage reservoirs; from these reservoirs the water is pumped to a booster station where it is pumped into the distribution system.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1	Well 2	Well 3	Well 4	Well 13
Silica (SiO ₂)	--	52	--	--	--
Iron (Fe)	--	.02	--	--	--
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	78	57	63	48	76
Magnesium (Mg)	96	65	63	57	94
Sodium (Na)	160	79	76	69	166
Potassium (K)		23			
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	423	318	316	331	345
Sulfate (SO ₄)	379	169	165	139	421
Chloride (Cl)	126	110	98	62	146
Fluoride (F)	3.2	5.4	3.4	--	3.2
Nitrate (NO ₃)	11	7.5	4.1	.8	1.5
Dissolved solids	1,200	746	738	628	1,200
Hardness as CaCO ₃ :					
Total	589	410	416	354	576
Noncarbonate	242	150	157	83	294
Color	--	--	--	--	--
pH	--	8.1	--	--	--
Specific conductance (micromhos at 25 C.)	--	1,130	--	--	--
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of collection	Sept. 22, 1944	Feb. 15, 1944	Sept. 22, 1944	Oct. 2, 1944	Sept. 22, 1944
Depth (feet)	98	300	210	156	150
Diameter (inches)	24	24	24	24	22-18
Date drilled	1925	1917	1925	1928	1939
Percent of supply	--	--	--	--	--

TEXAS

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 15	Well 16	Well 19	Well 31
Silica (SiO ₂)	55	--	64	49
Iron (Fe).....	.0	--	.06	.01
Manganese (Mn) .....	.00	--	--	.00
Calcium (Ca)	59	45	69	49
Magnesium (Mg)	57	58	80	40
Sodium (Na).....	115	} 59	150	{ 53
Potassium (K)	12			
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	368	249	317	304
Sulfate (SO ₄)	227	120	272	85
Chloride (Cl).....	68	98	190	43
Fluoride (F)	2.8	3.5	4.1	2.0
Nitrate (NO ₃)	2.5	2.8	5.1	4.5
Dissolved solids	780	619	1,030	494
Hardness as CaCO ₃ :				
Total	382	351	501	287
Noncarbonate	80	147	241	38
Color.....	--	--	--	--
pH	7.5	--	7.5	8.3
Specific conductance (micromhos at 25 C.)	1,180	--	1,580	766
Turbidity	--	--	--	--
Temperature (F.)	--	--	--	--
Date of collection	Nov. 10, 1951	Sept. 25, 1944	Feb. 15, 1945	Nov. 10, 1951
Depth (feet)	135	135	145	141
Diameter (inches)	22-18	22-18	22-18	18
Date drilled	1940	1941	1945	1947
Percent of supply	--	--	--	--

TEXAS

LUFKIN
(Population, 15, 135)

Ownership: Municipal.

Source: 3 wells (3, 5, and 6), 1, 168, 1, 175, and 1, 175 ft deep, about $4\frac{1}{2}$ miles north of the city limits; auxiliary supply, 1 well (4), 66 ft deep, and 650 acre-ft lake (small streams impounded), about 2 miles north of the city limits. The yield of the wells is reported to be 640, 850, and 900 gpm. The auxiliary well is reported to yield 375 gpm.

Treatment: Aeration (trays) and chlorination.

Rated capacity of pumping plant: 3, 500, 000 gpd.

Raw-water storage: --

Finished-water storage: 2 elevated tanks and surface reservoirs, 1, 200, 000 gal.

The wells are pumped individually or in groups as needed, aerated at the well, chlorinated before entering the station reservoirs about 2 miles from the city's north limits. The water is pumped from the station reservoirs into 2 elevated tanks located in the city, then to the distribution system.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 3 (raw water)	Well 5 (raw water)	Well 6 (raw water)	Well 4 (raw water)
Silica (SiO ₂)	17	19	18	58
Iron (Fe).....	. 17	--	--	1. 4
Manganese (Mn) .....	.00	--	--	--
Calcium (Ca) .....	. 5	1. 7	. 2	7. 9
Magnesium (Mg) .....	. 2	. 7	. 5	3. 7
Sodium (Na).....	134	150	142	26
Potassium (K)	1. 2			
Carbonate (CO ₃)	0	9	7	0
Bicarbonate (HCO ₃).....	244	260	244	55
Sulfate (SO ₄)	68	79	79	6. 5
Chloride (Cl).....	13	17	13	32
Fluoride (F) .....	. 2	--	--	. 0
Nitrate (NO ₃) .....	. 2	. 2	. 0	. 2
Dissolved solids	357	406	385	181
Hardness as CaCO ₃ :				
Total	2	7	2	35
Noncarbonate	0	0	0	0
Color.....	15	--	--	--
pH	8. 3	8. 8	8. 7	6. 2
Specific conductance (micromhos at 25 C.)	565	665	625	204
Turbidity	--	--	--	--
Temperature (F.)	--	--	--	66
Date of collection	Nov. 28, 1951	June 23, 1949	June 23, 1949	Oct. 4, 1944
Depth (feet)	1, 168	1, 175	1, 221	66
Diameter (inches).....	16-10	18-10	18-10	24-16
Date drilled	1939	1946	1948	1944
Percent of supply	--	--	--	--

TEXAS

MCALLEN
(Population, 20,067)

Ownership: Municipal.

Source: Rio Grande.

Treatment: Chlorination, aeration (trays), coagulation with alum, addition of lime for pH control, sedimentation, rapid sand filtration. Copper sulfate is used at times for algae control.

Rated capacity of treatment plant: 4,200,000 gpd.

Raw-water storage: Earthen reservoir, 10,500,000 gal.

Finished-water storage: 1 underground reservoir, 500,000 gal; 3 above-ground storage tanks, 900,000 gal.

There is considerable variation in the composition of the raw water throughout the year.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	--	16	Hardness as CaCO ₃ :		
Iron (Fe)	--	13	Total	288	290
Manganese (Mn)	--	--	Noncarbonate.....	158	180
Calcium (Ca)	86	88	Color.....	--	--
Magnesium (Mg).....	18	17	pH.....	--	7.4
Sodium (Na)	88	88	Specific conductance		
Potassium (K)		7.4	(micromhos at		
Carbonate (CO ₃)	16	0	25 C.).....	--	971
Bicarbonate (HCO ₃)	126	134	Turbidity	--	--
Sulfate (SO ₄)	190	212	Temperature (F.)...	--	--
Chloride (Cl)	106	111	Date of collection...	Aug. 7,	Aug. 7,
Fluoride (F)	--	.8		1945	1945
Nitrate (NO ₃)	2.5	2.2			
Dissolved solids.....	650	634			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	143	160	130	8.3	8.4	8.2	315	410	180	150	230	120
Finished water...	118	140	100	7.8	7.8	7.7	316	350	240	--	10	0

TEXAS

MARSHALL
(Population, 22,327)

Ownership: Municipal; supplies also about 100 persons outside the city limits.

Total population, about 22,400.

Source: Caddo Lake (Cypress Creek impounded). The intake is approximately 14 miles northeast of Marshall, in Grayson County. Fifteen wells previously used as municipal water supply could be used in an emergency (no pumping facilities at present at the well locations).

Treatment: Aeration (spray), prechlorination, coagulation with alum, fluoridation with sodium fluoride, activated carbon for odor and taste control, sedimentation, rapid sand filtration, postchlorination, and addition of lime for pH control.

Rated capacity of treatment plant: 4,000,000 gpd.

Raw-water storage: 1 ground reservoir, 11,500,000 gal.

Finished-water storage: 2 ground steel tanks, 400,000 gal each; 3 elevated tanks, 500,000, 160,000, and 300,000 gal.

The water flows by gravity to the pumping station approximately 300 yd from the intake on Caddo Lake. The water is pumped to the ground reservoir, from which it flows by gravity to the treatment plant. The finished water flows from the treatment plant to two steel tanks, from which it is pumped to the distribution system and elevated tanks.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	15	15	Hardness as CaCO ₃ :		
Iron (Fe) .....	.76	.0	Total	31	57
Manganese (Mn) .....	.00	.00	Noncarbonate.....	18	42
Calcium (Ca)	6.9	18	Color.....	25	10
Magnesium (Mg).....	3.4	3.0	pH.....	6.4	6.7
Sodium (Na)	17	19	Specific conductance		
Potassium (K)	3.6	1.2	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	168	239
Bicarbonate (HCO ₃)	16	18	Turbidity	--	--
Sulfate (SO ₄)	20	33	Temperature (F.)...	54	55
Chloride (Cl)	27	34	Date of collection...	Feb. 26, 1952	Feb. 26, 1952
Fluoride (F) .....	.3	1.0			
Nitrate (NO ₃) .....	.5	.0			
Dissolved solids.....	127	160			

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	25	48	8	7.0	8.5	6.6	--	--	--	--	--	--
Finished water...	30	55	10	8.6	9.0	8.0	--	--	--	--	--	--

TEXAS

MIDLAND
(Population, 21, 713)

Ownership: Municipal.

Source: 35 wells in 3 well fields: Cole Park Field, 14 wells, 102 to 145 ft deep, 3 miles southeast of the city limits; Rosedale Field, 9 wells, 109 to 147 ft deep, 1½ miles southeast of the city limits; Wadley Field, 12 wells, 125 to 185 ft deep (depths for 7 wells reported), half a mile northeast of the city limits.

Treatment: Chlorination.

Rated capacity of pumping plants: 12, 000, 000 gpd.

Raw-water storage: 4 ground tanks, 1, 000, 000, 300, 000 gal, and two 180, 000 gal each.

Finished-water storage: 2 reservoirs, 2, 225, 000 and 500, 000 gal; 1 elevated tank, 300, 000 gal.

The wells are pumped individually. The water is pumped to ground storage tanks at the well fields. It is chlorinated as it is pumped from the storage tanks to the city into the distribution system and storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	City Park Field Well 1	Rosedale Field Well 8	Wadley Field Well 7	Wadley Field Well 8	Wadley Field Well L-12
Silica (SiO ₂)	68	67	65	61	70
Iron (Fe) .....	.03	.02	--	--	--
Manganese (Mn) .....	.00	.00	--	--	--
Calcium (Ca)	242	151	81	83	79
Magnesium (Mg)	156	108	62	28	56
Sodium (Na)	387	211	135	75	122
Potassium (K)	10	8.4			
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	255	235	204	230	214
Sulfate (SO ₄)	814	610	295	97	237
Chloride (Cl)	698	300	192	135	188
Fluoride (F)	3.6	4.0	--	--	--
Nitrate (NO ₃)	28	8.2	6.6	7.5	6.1
Dissolved solids	2, 790	1, 680	985	650	903
Hardness as CaCO ₃ :					
Total	1, 250	820	457	322	428
Noncarbonate	1, 040	628	290	134	252
Color	0	0	--	--	--
pH	7.3	7.5	7.7	7.9	7.6
Specific conductance (micromhos at 25 C.)	3, 870	2, 360	1, 470	944	1, 360
Turbidity	--	--	--	--	--
Temperature (F.)	69	70	--	--	--
Date of collection	Apr. 30, 1952	Apr. 30, 1952	Sept. 20, 1949	Sept. 20, 1949	Sept. 20, 1949
Depth (feet)	110	147	160	148	--
Diameter (inches)	20	16	12	12	12
Date drilled	1927	1941	1948	1948	1948
Percent of supply	--	--	--	--	--

TEXAS

ODESSA
(Population, 29,495)

Ownership: Municipal; supplies also about 2,000 persons outside the city limits.

Total population supplied, about 31,500.

Source: 74 wells in one area extending from 1 mile north to 7 miles north of the city limits. The depth of the wells ranges from 120 to 207 ft and averages 164 ft. The yield of wells is reported to range from 35 to 300 gpm and averages 164 gpm.

Treatment: Chlorination.

Rated capacity of pumping plants: 19,950,000 gpd.

Raw-water storage: None.

Finished-water storage: 6 reservoirs, 440,000 gal each; 5 ground storage tanks, 500,000, 440,000, 300,000, 100,000, and 65,000 gal; 3 elevated tanks, two 500,000 gal each and one 100,000 gal.

The wells are pumped individually. The water flows from the wells to the North Pump Station, at the well field, into 6 reservoirs. It is chlorinated as it enters the reservoirs. The water is pumped from the field reservoirs to ground storage tanks in Odessa from which it is pumped into the distribution system and elevated tanks.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 2	Well 28	Well 44	Well 66	Finished water (city tap)
Silica (SiO ₂)	38	32	44	37	33
Iron (Fe) .....	.10	.15	.05	--	.05
Manganese (Mn)	--	--	--	--	.00
Calcium (Ca)	132	72	66	68	74
Magnesium (Mg)	34	17	14	13	12
Sodium (Na)	81	37	25	27	52
Potassium (K)	4.8	1.6	3.6		2.4
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	186	214	220	229	213
Sulfate (SO ₄)	255	72	44	46	70
Chloride (Cl)	155	42	26	24	57
Fluoride (F)	1.4	1.8	2.0	--	1.6
Nitrate (NO ₃)	14	17	12	14	14
Dissolved solids	877	406	364	342	442
Hardness as CaCO ₃ :					
Total	470	250	222	223	234
Noncarbonate	317	74	42	36	60
Color	--	--	--	--	0
pH	7.5	7.7	7.7	8.0	7.8
Specific conductance (micromhos at 25 C.)	1,280	644	568	562	717
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	69	--	73
Date of collection	Sept. 22, 1948	Sept. 22, 1948	Sept. 22, 1948	Jul. 8, 1949	Apr. 29, 1952
Depth (feet)	150	150	175	196	
Diameter (inches)	10	10	16-10 ³ / ₄	16-10 ³ / ₄	
Date drilled	1944	1946	1948	1949	
Percent of supply	--	--	--	--	

TEXAS

ORANGE
(Population, 21, 174)

Ownership: Gulf States Utilities Co. ; also supplies approximately 5, 800 persons outside the city limits. Total population supplied, about 27, 000.

Source: 5 wells (1, 2, 4 to 6), 687, 688, 738, 749, and 745 ft deep, within the city limits. The yield of the wells is reported to be 550, 2, 400, 750, 1, 000, and 2, 100 gpm.

Treatment: Chlorination and ammoniation at point of discharge of water from wells into ground reservoir.

Raw-water storage: None.

Finished-water storage: 680, 000 gal. One elevated tank, 500, 000 gal, floats on the system in form of a surge tank.

The wells are pumped by electric motors individually or in group as demand requires, the water flowing to 1 ground reservoir, from which it is pumped into the distribution system. Analyses made by the State Board of Health Laboratories show very small variation in the chemical composition of the water over a period of the last 25 years.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 5 (raw water)	Finished water		Well 5 (raw water)	Finished water
Silica (SiO ₂)	48	42	Hardness as CaCO ₃ :		
Iron (Fe) .....	.34	.39	Total	30	28
Manganese (Mn)	--	.00	Noncarbonate.....	0	0
Calcium (Ca)	8.6	7.0	Color	--	15
Magnesium (Mg).....	2.0	2.5	pH	--	7.3
Sodium (Na)	105	{108	Specific conductance	--	532
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)		
Bicarbonate (HCO ₃)	198	193	Turbidity	--	--
Sulfate (SO ₄)	1.6	.5	Temperature (F.)...	--	--
Chloride (Cl)	67	71	Date of collection...	Apr. 12,	Nov. 27,
Fluoride (F)	--	.4		1941	1951
Nitrate (NO ₃) .....	.3	1.5			
Dissolved solids.....	335	334			
Depth (feet)				749	
Diameter (inches)				16-8½	
Date drilled				1941	
Percent of supply				--	

TEXAS

PAMPA (Population, 16,583)

Ownership: Municipal.

Source: 8 wells: 5 wells (1 to 5-south), 450, 450, 411, 412, and 411 ft deep, south of city; 3 wells (1-north, 3-north, and 4-north), 395, 412, and 414 ft deep, north of the city.

Treatment: Chlorination.

Raw-water storage: 630,000 gal.

Finished-water storage: 3,570,000 gal ground storage; 525,000 gal overhead storage.

The wells are pumped individually to 2 central collecting points, 1 north of the city and the other south. The water is chlorinated, and pumped by booster pumps into the distribution system and storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water ^a	Finished water ^b		Raw water ^a	Finished water ^b
Silica (SiO ₂)	12	31	Hardness as CaCO ₃ :		
Iron (Fe) .....	.16	.16	Total	258	196
Manganese (Mn)	--	--	Noncarbonate.....	70	0
Calcium (Ca)	59	42	Color	--	--
Magnesium (Mg)	27	22	pH	7.4	7.8
Sodium (Na)	117	30	Specific conductance		
Potassium (K)	12	2.8	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	1,060	526
Bicarbonate (HCO ₃)	230	254	Turbidity	--	--
Sulfate (SO ₄)	141	21	Temperature (F.)...	--	--
Chloride (Cl)	132	26	Date of collection...	Nov. 20,	June 6,
Fluoride (F)	1.2	.9		1947	1951
Nitrate (NO ₃)	4.0	4.8			
Dissolved solids.....	638	293			

^aComposite sample wells 1 and 2-south and wells 1, 3, and 4-north.

^bComposite sample wells 3, 4, and 5-south.

TEXAS

PARIS
(Population, 21,643)

Ownership: Municipal; supplies also about 300 persons outside the city limits.

Total population supplied, about 21,900.

Source: Pine Creek impounded in Lake Crook, about 4 miles north of Paris. Auxiliary or emergency supply, Lake Gibbons on Pine Creek, about 5 miles upstream from Lake Crook.

Treatment: Prechlorination, aeration (cascades), coagulation with alum, sedimentation, rapid sand filtration, postchlorination, and addition of lime for pH control. Use of activated carbon at times for odor and taste control.

Rated capacity of treatment plant: City treatment plant (formerly Camp Maxie), 4,000,000 gpd; Old treatment plant, 3,200,000 gpd.

Raw-water storage: Lake Crook, capacity, 10,800 acre-ft (1936).

Finished-water storage: 2 underground reservoirs, 600,000 and 300,000 gal; 1 elevated tank, 500,000 gal; 1 standpipe, 300,000 gal.

Since 1948, when the city acquired the treatment plant at Camp Maxie, only that treatment plant has been in use.

The water flows by gravity from the lake, intake at dam of Lake Crook approximately 500 ft from the treatment plant, to the treatment plant. The finished water from the plant is pumped into 2 underground storage tanks, from which it is pumped into town, into the distribution system and elevated tanks.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	9.6	2.2	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.05	Total	43	83
Manganese (Mn) .....	.00	.00	Noncarbonate.....	10	46
Calcium (Ca)	13	30	Color	60	0
Magnesium (Mg).....	2.6	1.9	pH	6.8	7.5
Sodium (Na)	8.7	5.2	Specific conductance		
Potassium (K)	1.6	2.4	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	115	219
Bicarbonate (HCO ₃)	41	45	Turbidity	--	--
Sulfate (SO ₄)	15	48	Temperature (F.)...	57	55
Chloride (Cl)	4.0	6.8	Date of collection...	Mar. 25, 1952	Mar. 25, 1952
Fluoride (F) .....	.3	.3			
Nitrate (NO ₃)	1.0	.5			
Dissolved solids.....	^a 77	140			

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	23	25	22	7.3	7.5	7.3	43	44	41	85	190	50
Finished water...	36	40	33	7.9	8.1	7.7	81	84	80	.5	.5	.5

^aSum of determined constituents.

TEXAS

PASADENA
(Population, 22,483)

Ownership: Municipal; also supplies approximately 100 persons outside the city limits. Total population supplied, about 22,600.

Source: 5 wells (4 to 8), 1,203, 580, 1,565, 1,264, and 1,262 ft deep.

Treatment: Chlorination at the wells.

Raw-water storage: None.

Finished-water storage: Ground reservoir and elevated tank, 2,000,000 gal.

The wells are pumped individually into ground storage tanks. From the storage tanks the water is pumped into the distribution system. Overhead storage tanks, used also in controlling pressure, are "floated" on the distribution system.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 4 ^a	Well 8 ^a		Well 4 ^a	Well 8 ^a
Silica (SiO ₂)	16	18	Hardness as CaCO ₃ :		
Iron (Fe) .....	.32	.01	Total	21	39
Manganese (Mn)	--	.00	Noncarbonate.....	0	0
Calcium (Ca)	6.3	11	Color.....	--	--
Magnesium (Mg).....	1.3	2.8	pH.....	8.6	7.9
Sodium (Na)	134	{121	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	28	0	25 C.).....	595	576
Bicarbonate (HCO ₃)	240	276	Turbidity.....	--	--
Sulfate (SO ₄)	11	12	Temperature (F.)...	--	--
Chloride (Cl)	40	46	Date of collection...	Sept. 10,	Nov. 20,
Fluoride (F) .....	.8	.6		1943	1951
Nitrate (NO ₃) .....	.0	.2			
Dissolved solids.....	349	348			
Depth (feet)				1,203	1,262
Diameter (inches).....				18 $\frac{3}{4}$ -11 $\frac{3}{4}$	12-8
Date drilled				1943	1950
Percent of supply				--	--

^a Raw water.

TEXAS

PLAINVIEW
(Population, 14,044)

Ownership: Municipal; supplies also about 500 persons outside the city limits.

Total population supplied, about 14,500.

Source: 5 wells (1 to 5), within the city limits. Wells 1 to 3 are each 301 ft deep; well 5, 305 ft; depth not reported for well 4.

Treatment: None.

Storage: Ground storage reservoir, 750,000 gal; 3 elevated storage tanks, 500,000 gal.

The wells are pumped individually and directly into the ground reservoir and elevated tanks from which the water is distributed.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 1	Well 5		Well 1	Well 5
Silica (SiO ₂)	60	60	Hardness as CaCO ₃ :		
Iron (Fe) .....	.0	.0	Total	262	235
Manganese (Mn)	--	.00	Noncarbonate.....	0	0
Calcium (Ca)	44	38	Color	--	--
Magnesium (Mg).....	37	34	pH	7.4	7.8
Sodium (Na)	28	45	Specific conductance		
Potassium (K)	8.5	4.0	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	594	622
Bicarbonate (HCO ₃)	329	335	Turbidity	--	--
Sulfate (SO ₄)	28	26	Temperature (F.)...	64	64
Chloride (Cl)	18	22	Date of collection...	Feb. 28,	Nov. 13,
Fluoride (F)	3.6	2.8		1945	1951
Nitrate (NO ₃)	1.2	2.5			
Dissolved solids.....	379	394			
Depth (feet)				301	305
Diameter (inches)				18	16
Date drilled				1937	1948
Percent of supply				--	--

TEXAS

PORT ARTHUR
(Population, 57,530)

Ownership: Municipal; supplies also approximately 10,000 persons outside the city limits, in addition to the towns of Griffing Park, Lakeview, Pear Ridge, and Sabine Pass. Total population supplied, about 75,100.

Source: Neches River. The intake is about 15 miles upstream from Beaumont, Jefferson County, and the water is diverted by open canal to the treatment plant.

Treatment: Coagulation with alum, followed by addition of lime and soda ash for corrosion control, chlorination, sedimentation, and rapid sand filtration.

Rated capacity of treatment plant: 11,000,000 gpd.

Raw-water storage: Earthen reservoir, 200,000,000 gal.

Finished-water storage: Ground reservoir and elevated tanks, 4,100,000 gal.

There is some variation in the composition of the raw water throughout the year. For raw water analyses of Neches River, see Beaumont.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water (city tap)		Finished water (city tap)
Silica (SiO ₂)	13	Hardness as CaCO ₃ :	
Iron (Fe)	1.1	Total	45
Manganese (Mn) .....	.00	Noncarbonate	0
Calcium (Ca)	10	Color	10
Magnesium (Mg)	4.9	pH	7.3
Sodium (Na)	55	Specific conductance	
Potassium (K)	1.2	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	348
Bicarbonate (HCO ₃)	70	Turbidity	--
Sulfate (SO ₄)	44	Temperature (F.).....	--
Chloride (Cl)	44	Date of collection	Nov. 28,
Fluoride (F) .....	.1		1951
Nitrate (NO ₃) .....	.2		
Dissolved solids	211		

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	20	30	10	7.5	8.3	6.0	45	51	35	20	200	10
Finished water...	45	60	35	8.3	8.7	8.0	50	60	40	2	2	2

TEXAS

SAN ANGELO (Population, 52,093)

Ownership: Municipal; supplies also Goodfellow Air Force Base.

Source: Lake Nasworthy, on South Concho River, 6 miles southwest of the City Hall.

Treatment: Prechlorination, coagulation with alum, sedimentation, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 12,500,000 gpd.

Raw-water storage: Lake Nasworthy, capacity 11,000 acre-ft.

Finished-water storage: 2 elevated tanks, 250,000 gal each; 1 ground reservoir, 650,000 gal; clear wells, 5,500,000 gal.

The water is released from Lake Nasworthy and flows down the Concho River to the treatment plant in San Angelo. The finished water from the plant is pumped into the distribution system and storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	11	13	Hardness as CaCO₃:		
Iron (Fe) .....	.37	.10	Total	219	200
Manganese (Mn)	--	--	Noncarbonate.....	32	46
Calcium (Ca)	55	49	Color.....	--	--
Magnesium (Mg).....	20	19	pH.....	7.5	7.6
Sodium (Na)	43	64	Specific conductance		
Potassium (K)	7.0		(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	626	629
Bicarbonate (HCO ₃)	228	188	Turbidity.....	--	--
Sulfate (SO ₄)	29	36	Temperature (F.)...	--	--
Chloride (Cl)	74	104	Date of collection...	Aug. 18, 1947	Oct. 17, 1951
Fluoride (F) .....	.6	.3			
Nitrate (NO ₃) .....	.0	.5			
Dissolved solids.....	348	350			

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	200	246	156	8.2	8.5	7.8	--	--	--	9	50	5
Finished water...	190	236	132	7.9	8.1	7.0	230	266	190	.8	1.0	.5

TEXAS

SAN ANTONIO (Population, 408,442)

Ownership: Municipal; supplies also Alamo Heights, Olmos Park, Terrell Hills, and Brooks Air Force Base. Total population supplied, about 420,000.

Source: 66 wells: 41 wells in 6 well fields, and 25 wells at various points throughout the city. Well Stations (Fields): Brackenridge, 13 wells, 900 ft deep (average); Market Street, 12 wells, 880 to 936 ft deep; Mission, 10 wells, 1,400 ft deep (average); and the following stations: Artesia Road, Lady of the Lake Garden, and Woodlawn Hills 2 wells each. The depth of the wells at the last named stations and the remaining wells ranges from 600 to 1,333 ft.

Treatment: Chlorination at the major stations and some of the scattered outlying stations. The outlying stations that are not chlorinated are pumped only when the demand requires.

Rated capacity of pumping plants: 247,500,000 gpd.

Raw-water storage: None.

Finished-water storage: 7 elevated tanks, one 2,500,000 gal, one 1,500,000 gal, two 1,000,000 gal each, one 250,000 gal, one 80,000 gal, and one 50,000 gal; 1 standpipe, 37,500 gal.

The wells at the Market Street, Brackenridge, Mission, and Artesia Road Stations pump as a unit; all other wells are pumped individually. The water is pumped directly into the distribution system and storage. The Artesia Road, Market Street, and Mission Stations serve the southern part of the city. The Brackenridge station and most of the scattered outlying wells serve the northern part of the city.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Mission Station well 9	Artesia Rd. well (raw water)	Basse Rd. well (raw water)	Bracken- ridge, 13 wells ^a	Wells (finished water) ^b
Silica (SiO ₂)	17	24	16	14	12
Iron (Fe) .....	.01	.00	.12	.00	.01
Manganese (Mn) .....	.00	--	--	.00	.00
Calcium (Ca)	65	50	50	62	63
Magnesium (Mg)	19	14	17	17	16
Sodium (Na)	10	13	5.2	7.1	7.9
Potassium (K)	1.6	.4	.8	1.2	2.0
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	238	176	190	244	240
Sulfate (SO ₄)	35	35	32	15	17
Chloride (Cl)	18	19	13	12	14
Fluoride (F) .....	.3	.4	.3	.2	.2
Nitrate (NO ₃)	5.0	2.5	3.5	5.4	3.0
Dissolved solids	296	244	246	259	268
Hardness as CaCO ₃ :					
Total	240	182	195	225	223
Noncarbonate	45	38	39	25	26
Color	0	--	--	0	0
pH	7.6	7.9	7.8	7.6	7.5
Specific conductance (micromhos at 25 C.)	498	425	490	449	453
Turbidity	0	--	--	0	--
Temperature (F.)	81	--	--	78	--
Date of collection	May 14, 1952	Dec. 13, 1948	June 21, 1950	May 14, 1952	Mar. 14, 1952

^a Finished water.

^b Composite sample, Market Street, Mission Park, and Artesia well fields.

TEXAS

SAN BENITO
(Population, 13, 271)

Ownership: Municipal; supplies also about 400 people outside the city limits.

Total population supplied, about 13, 700.

Source: Rio Grande. Connecting canal to San Benito.

Treatment: Prechlorination, aeration (cascades), coagulation with alum and lime, pH control, sedimentation, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 1, 500, 000 gpd.

Raw-water storage: Raw water stored in Resaca de los Fresnos.

Finished-water storage: 325, 000 gal.

There is considerable variation in the composition of the raw water throughout the year.

ANALYSIS

(Analysis, in parts per million, by U. S. Geological Survey)

	Finished water		Finished water
Silica (SiO ₂)	10	Hardness as CaCO ₃ :	
Iron (Fe) .....	.02	Total	248
Manganese (Mn)	--	Noncarbonate	155
Calcium (Ca)	65	Color	--
Magnesium (Mg)	21	pH	7.7
Sodium (Na)	101	Specific conductance	
Potassium (K)	4.0	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	955
Bicarbonate (HCO ₃)	114	Turbidity	--
Sulfate (SO ₄)	164	Temperature (F.).....	--
Chloride (Cl)	132	Date of collection	June 7, 1951
Fluoride (F) .....	.5		
Nitrate (NO ₃) .....	.5		
Dissolved solids	552		

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	125	137	113	8.0	8.1	7.9	--	--	--	134	183	112
Finished water...	113	125	103	7.8	8.0	7.6	--	--	--	--	--	--

TEXAS

SHERMAN (Population, 20, 150)

Ownership: Municipal; supplies also about 3, 500 persons outside the city limits.

Total population supplied, about 23, 650.

Source: 11 wells: 7 wells (1 to 4, 6 to 8), on West Birge Street; 2 wells (3 and 9), on West McGee Street, in the northwest section of Sherman; 2 wells, on South East Street, in southeast section of Sherman. Seven of the wells range in depth from 708 to 912 ft; four, from 2, 140 to 2, 257 ft. The yield of the wells (data for 8 wells) is reported to range from 175 to 543 gpm.

Treatment: Chlorination.

Raw-water storage: 2 underground reservoirs, 1, 400, 000 and 50, 000 gal.

Finished-water storage: 1 underground reservoir, 50, 000 gal; 1 elevated tank, 750, 000 gal; 1 standpipe, 300, 000 gal.

The wells are pumped individually into the underground reservoirs, from which the water is pumped into the distribution system and storage, being chlorinated as it leaves the reservoirs. The wells in the northwest section, Fairview Pump Station, Woodbine wells 3, 4, 6, 7, 8, and 9, and Fairview Pump Station Trinity wells 1, 2, and 3 are pumped into a 1, 400, 000 gal reservoir. The water from the wells in the southeast section, South Plant Woodbine well 1, and South Plant Trinity well 1, is pumped into a 50, 000 gal reservoir.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Trinity well 1 (raw water) ^a	Trinity well 3 (raw water) ^a	Woodbine well 9 (raw water) ^a
Silica (SiO ₂)	16	16	14
Iron (Fe) .....	.01	.01	.16
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	2.6	2.8	.2
Magnesium (Mg)	1.2	1.8	.5
Sodium (Na)	337	365	109
Potassium (K) .....	.8	--	2.0
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	461	468	248
Sulfate (SO ₄)	110	107	21
Chloride (Cl)	168	215	8.8
Fluoride (F) .....	.6	.7	.6
Nitrate (NO ₃)	1.2	1.8	1.0
Dissolved solids	859	942	284
Hardness as CaCO ₃ :			
Total	12	14	3
Noncarbonate	0	0	0
Color	5	5	5
pH	8.3	8.3	7.8
Specific conductance (micromhos at 25 C.)	1, 450	1, 610	459
Turbidity	--	--	--
Temperature (F.)	91	91	78
Date of collection	Feb. 15, 1952	Feb. 15, 1952	Feb. 15, 1952
Depth (feet)	2, 140	2, 169	912
Diameter (inches)	10-8	13½-6½	--
Date drilled	1921	1944	1949
Percent of supply	--	--	--

^aFairview Pump Station.

SWEETWATER
(Population, 13, 619)

Ownership: Municipal; also supplies Robe, Longworth, and about 500 persons outside the city limits. Total population supplied, about 15,300.

Source: Lake Sweetwater on Bitter Creek, about 8 miles southeast of the city, two-thirds of the supply; Lake Trammel on Sweetwater Creek, about 8 miles southwest of the city, one-third of the supply.

Treatment: Prechlorination, aeration (cascades), coagulation with alum, sedimentation, rapid sand filtration, postchlorination, and fluoridation with sodium fluoride.

Rated capacity of treatment plant: 3,000,000 gpd.

Raw-water storage: Lake Sweetwater, capacity 4,500,000,000 gal; Lake Trammel, capacity 1,800,000,000 gal.

Finished-water storage: 1 elevated tank, 750,000 gal; 1 standpipe, 280,000 gal; clear well, 250,000 gal.

The water from Lake Sweetwater is pumped to the treatment plant; that from Lake Trammel flows by gravity to the treatment plant. The finished water from the plant is pumped into the distribution system and elevated storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Lake Trammel (raw water)	Lake Sweetwater (raw water)	Finished water (composite)
Silica (SiO ₂)	7.6	3.0	7.2
Iron (Fe) .....	.05	.07	.05
Manganese (Mn)	--	.00	.00
Calcium (Ca)	52	59	64
Magnesium (Mg)	6.8	13	14
Sodium (Na)	7.8	13	14
Potassium (K)		3.6	3.6
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	164	197	224
Sulfate (SO ₄)	16	41	36
Chloride (Cl)	16	20	17
Fluoride (F) .....	.0	.0	.9
Nitrate (NO ₃)	1.0	.0	.5
Dissolved solids	193	270	278
Hardness as CaCO ₃ :			
Total	158	201	217
Noncarbonate	23	39	34
Color	--	10	10
pH	7.6	7.7	7.6
Specific conductance (micromhos at 25 C.)	338	453	472
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	July 2, 1946	Jan. 18, 1952	Jan. 18, 1952

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water	175	185	160	7.6	8.0	7.4	200	220	129	25	1000	20
Finished water	170	180	155	7.6	8.0	7.4	200	220	129	.0	.0	.0

TEMPLE
(Population, 25,467)

Ownership: Municipal; supplies also about 400 persons outside the city limits and McGloskey Hospital. Total population supplied, about 27,500.

Source: Lake on Leon River, below highway bridge on U. S. Highway 81; and 5 wells (1 to 5), 1,238, 1,260, 1,268, 2,136, and 1,460 ft deep. Wells 1, 2, and 3 are at the treatment plant; well 4 on Nugent Avenue, and well 5 at the city airport. The yield of the wells is reported to be 900, 900, 900, 1,000, and 150 gpm.

Treatment: Surface water and water from wells 1, 2, and 3: prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, postchlorination, and fluoridation with sodium fluoride. Water from well 4: aeration and chlorination. Water from well 5: chlorination.

Rated capacity of treatment plant: 7,000,000 gpd.

Raw-water storage: Lake, capacity 921 acre-ft.

Finished-water storage: 2 underground reservoirs, 8,000,000 and 25,000 gal; 2 elevated tanks, 500,000 gal each.

The water from the lake and wells 1, 2, and 3 is pumped to the treatment plant.

The finished water from the plant is pumped approximately 6 miles to the city to the underground reservoir, from which it is pumped into the distribution system and elevated tanks. The water from well 4 is pumped into an underground reservoir, being aerated as it enters the reservoir and chlorinated as it is pumped from the reservoir into the distribution system. Well 5 is a separate unit supplying only the city airport.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Lake (raw water)	Well 2 (raw water)	Lake (finished water)
Silica (SiO ₂)	12	14	8.8
Iron (Fe) .....	.04	.01	.02
Manganese (Mn)	--	.00	.00
Calcium (Ca)	47	6.8	12
Magnesium (Mg).....	12	4.0	5.2
Sodium (Na).....	181	438	48
Potassium (K)	4.4	.4	1.2
Carbonate (CO ₃)	0	0	6
Bicarbonate (HCO ₃).....	307	442	34
Sulfate (SO ₄).....	79	221	46
Chloride (Cl)	162	268	50
Fluoride (F) .....	.5	2.2	.3
Nitrate (NO ₃)	2.0	3.5	1.0
Dissolved solids	681	1,180	197
Hardness as CaCO ₃ :			
Total	167	34	51
Noncarbonate	0	0	14
Color	--	0	5
pH.....	8.0	8.0	9.0
Specific conductance (micromhos at 25 C.).....	--	1,970	- 348
Turbidity	--	--	--
Temperature (F.)	--	86	--
Date of collection	Apr. 23, 1943	Feb. 29, 1952	Oct. 22, 1951

TEXARKANA

(Population, 8,878; total population of Texarkana, Tex. and Texarkana, Ark., 24,753)

Ownership: Municipal; supplies also suburban areas. Total population supplied; about 42,628.

Source: 3 well fields and 1 impounding reservoir: Arkansas Station, 22 wells ranging in depth from 40 ft to 50 ft; Texas Station, 12 wells ranging in depth from 40 ft to 50 ft; Bringle Station (used for emergency), 6 wells each about 37 ft deep; and Bringle Lake (Clear Creek impounded).

Treatment: Wells: aeration, alkali for adjustment of pH, and chlorination. Lake: prechlorination, coagulation with lime and alum, sedimentation, rapid sand filtration, postchlorination, and carbonation at times.

Rated capacity of treatment plant: 3,075,000 gpd.

Raw-water storage: --

Finished-water storage: 4,000,000 gal.

The Arkansas Station well field is near East 9th St. and Jefferson Ave.; Texas Station is about 1 mile west of Texarkana; Bringle Station, 6 miles northwest of Texarkana; and the impounding reservoir, at Bringle Station well field.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Bringle Lake ^a	Arkansas Station		Texas Station ^b	Bringle Station ^b
		(raw water)	(finished water)		
Silica (SiO ₂)	5.1	38	36	26	36
Iron (Fe) .....	.03	.48	.19	.01	.11
Manganese (Mn)	--	.05	.01	--	--
Calcium (Ca)	9.3	7.6	17	2.4	16
Magnesium (Mg)	2.7	5.1	5.6	1.2	4.4
Sodium (Na)	5.5	19	20	7.4	19
Potassium (K)	4.2	2.5	2.6	2.5	2.8
Carbonate (CO ₃)	0	0	16	0	0
Bicarbonate (HCO ₃)	34	31	18	10	55
Sulfate (SO ₄)	3.0	5.6	5.7	3.0	2.0
Chloride (Cl)	14	33	36	8.0	37
Fluoride (F) .....	.2	.1	.1	.0	.2
Nitrate (NO ₃) .....	.5	12	13	9.4	2.5
Dissolved solids	68	151	176	71	149
Hardness as CaCO ₃ :					
Total	34	40	65	11	58
Noncarbonate	6	14	24	3	13
Color	--	5	8	--	--
pH	6.6	5.8	9.1	5.6	6.6
Specific conductance (micromhos at 25 C.)	115	199	235	64.0	220
Turbidity	--	2	4	--	--
Temperature (F.)	--	66	65	--	--
Date of collection	Sept. 22, 1943	Dec. 4, 1951	Dec. 4, 1951	Sept. 22, 1943	Sept. 22, 1943

^aRaw water.

^bFinished water.

TEXAS CITY
(Population, 16, 620)

Ownership: Community Public Service Co.

Source: 5 wells (3 to 7), 783, 772, 764, 778, and 763 ft deep, in the city. The yield of the wells is reported to be 190, 440, 500, 350, and 500 gpm.

Treatment: Chlorination.

Raw-water storage: 1 underground reservoir, 620,000 gal.

Finished-water storage: 2 elevated tanks, 250,000 and 100,000 gal.

The wells are pumped individually into connecting lines to the reservoir at the pumping plant. The water is pumped from the reservoir to the distribution system and elevated tanks, being chlorinated immediately before entering the distribution system.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 6 (raw water)	Finished water ^a		Well 6 (raw water)	Finished water ^a
Silica (SiO ₂)	19	16	Hardness as CaCO₃:		
Iron (Fe) .....	.15	.19	Total	33	24
Manganese (Mn)	--	.00	Noncarbonate.....	0	0
Calcium (Ca)	8.0	5.9	Color.....	--	10
Magnesium (Mg).....	3.1	2.3	pH.....	7.8	7.5
Sodium (Na)	310	307	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	1,460	1,370
Bicarbonate (HCO ₃)	366	463	Turbidity.....	--	--
Sulfate (SO ₄)	2.0	.1	Temperature (F.)...	--	--
Chloride (Cl)	285	219	Date of collection...	Oct. 8, 1944	Nov. 19, 1951
Fluoride (F)	1.0	1.1			
Nitrate (NO ₃) .....	.5	.0			
Dissolved solids.....	834	784			
Depth (feet)				778	
Diameter (inches).....				20-10 $\frac{3}{4}$	
Date drilled				1944	
Percent of supply				--	

^aCity tap.

TEXAS

TYLER (Population, 38,968)

Ownership: Municipal; supplies also about 180 persons outside the city limits.

Total population supplied, about 39,150.

Source: Lake Tyler, approximately 12 miles southeast of the city, off U. S. Highway 64 on Prairie Creek. Auxiliary or emergency supply, Bellwood Lake approximately 4 miles southwest of the city on Indian Creek, and 7 wells (2 to 8) at various points within the city limits. The depth of wells is reported to be 1,064, 1,057, 1,026, 1,037, 1,036, 1,075, and 1,144 ft, and the average yield is 681 gpm. The city expects to use the auxiliary supply during summer months of each year.

Treatment: Surface-water supply: prechlorination, aeration, coagulation with alum and lime, sedimentation, rapid sand filtration, postchlorination, and addition of lime for pH control. Well 4: aeration, coagulation with lime, pressure filtration, and chlorination. Wells 2, 3, 5, 6, 7, and 8: chlorination at each well.

Rated capacity of treatment plant: Lake Tyler plant: 10,500,000 gpd. Lake Bellwood plant: 3,000,000 gpd.

Raw-water storage: Lake Tyler, capacity 42,500 acre-ft. Lake Bellwood, --.

Finished-water storage: 1 underground reservoir, 2,500,000 gal; 2 standpipes, 1,500,000 and 750,000 gal; 1 elevated tank, 500,000 gal.

The water is pumped from Lake Tyler, intake approximately $2\frac{1}{2}$ miles from Whitehouse Dam, to the treatment plant approximately $1\frac{1}{2}$ miles southeast of Tyler. The water is prechlorinated at the pumping plant before being pumped to the treatment plant. The water flows through the treatment plant into an underground reservoir from which it is pumped to the distribution system and elevated storage. Wells 2, 3, 5, 6, 7, and 8 are pumped directly into the distribution system. Well 4 is pumped to a small treatment plant at the well, from which the finished water is pumped into the distribution system. The flow pattern of the water from Bellwood Lake to the distribution system is similar to that of Lake Tyler.

TEXAS
ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Bellwood Lake (raw water)	Lake Tyler (raw water)	Lake Tyler (finished water)
Silica (SiO ₂)	8.6	4.0	3.5
Iron (Fe) .....	.04	.03	.05
Manganese (Mn)	--	.00	.00
Calcium (Ca)	5.2	9.0	21
Magnesium (Mg).....	2.0	4.6	4.6
Sodium (Na).....	4.5	10	11
Potassium (K)	2.8		1.2
Carbonate (CO ₃)	0	0	2
Bicarbonate (HCO ₃).....	20	46	61
Sulfate (SO ₄).....	2	7.3	19
Chloride (Cl)	9.0	12	17
Fluoride (F)	1.0	.3	.1
Nitrate (NO ₃) .....	.8	.5	.0
Dissolved solids	56	92	132
Hardness as CaCO ₃ :			
Total	21	41	71
Noncarbonate	5	4	18
Color	--	15	10
pH	7.0	6.8	8.6
Specific conductance (micromhos at 25 C.).....	85	138	200
Turbidity	--	--	--
Temperature (F.)	92	56	58
Date of collection	July 26, 1943	Feb. 27, 1952	Feb. 27, 1952

Regular determinations at treatment plant ^a

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	18	19	17	7.0	7.0	7.0	--	--	--	--	--	--
Finished water...	28	33	24	8.5	8.9	8.2	--	--	--	--	--	--

^a Bellwood Lake, Jan. 1 to Nov. 28, 1951.

TEXAS
ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 2 (raw water)	Well 4 (raw water)	Well 6 (raw water)
Silica (SiO ₂)	11	14	14
Iron (Fe) .....	.01	3.5	.28
Manganese (Mn)	--	--	--
Calcium (Ca)	8.4	28	68
Magnesium (Mg).....	1.7	4.5	4.1
Sodium (Na).....	29	53	131
Potassium (K)	4.0	6.8	8.7
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃).....	94	93	110
Sulfate (SO ₄).....	8.3	61	176
Chloride (Cl)	6.0	50	148
Fluoride (F) .....	.4	1.0	.0
Nitrate (NO ₃) .....	.0	.2	.0
Dissolved solids	115	276	610
Hardness as CaCO ₃ .			
Total	28	88	186
Noncarbonate	0	12	96
Color	--	--	--
pH.....	8.1	7.2	7.5
Specific conductance (micromhos at 25 C.).....	187	482	1,050
Turbidity	--	--	--
Temperature (F.)	--	79	78
Date of collection	Aug. 3, 1943	July 27, 1943	Sept. 9, 1944
Depth (feet)	1,064	1,026	1,036
Diameter (inches)	16-8 5/8	13 3/8-6 5/8	--
Date drilled	1937	1938	1944
Percent of supply	--	--	--

UNIVERSITY PARK
(Population, 24,275)

Ownership: See Highland Park.

TEXAS

VICTORIA
(Population, 16, 126)

Ownership: Municipal.

Source: 7 wells (5 to 10, 12), 612, 365, 412, 414, 604, 1,012, and 751 ft deep, within 400 ft of pumping station 1 and near west city limits on Pine Street.

The yield of the wells is reported to be 402, 500, 731, 430, 603, 1,000, and 1,350 gpm.

Treatment: Aeration (by forced air at plant 1; sprays at plant 2).

Raw-water storage: --

Finished-water storage: 1 reservoir, 1,000,000 gal; 2 elevated tanks, 300,000 and 500,000 gal; 2 ground storage tanks, 300,000 gal.

The wells are pumped individually to one or the other of two central pumping plants (No. 1 plant at the end of West Station Street; No. 2 plant on Pine Street). The water at plant No. 1 flows through a sand trap to the aeration chamber before entering the ground storage tank, from which it is pumped into the distribution system. The water at plant No. 2 is aerated before entering the ground storage tank, from which it is pumped into the distribution system.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 5 (raw water)	Well 6 (raw water)	Well 8 (raw water)	Well 10 (raw water)	Finished water (city tap)
Silica (SiO ₂)	21	26	26	23	22
Iron (Fe)	4.7	3.0	7.9	.97	.03
Manganese (Mn)	--	--	--	--	.00
Calcium (Ca)	34	36	36	18	28
Magnesium (Mg)	11	11	12	6.9	10
Sodium (Na)	146	152	134	221	148
Potassium (K)	7.9	6.4	3.9	6.6	2.0
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	402	386	366	348	366
Sulfate (SO ₄)	14	10	3.0	37	2.7
Chloride (Cl)	80	102	93	168	91
Fluoride (F) .....	.4	.6	.6	.6	.3
Nitrate (NO ₃) .....	.0	.0	.0	.0	.0
Dissolved solids	505	527	495	656	488
Hardness as CaCO ₃ :					
Total	130	135	140	74	111
Noncarbonate	0	0	0	0	0
Color	--	--	--	--	10
pH	7.0	7.2	7.4	7.5	7.6
Specific conductance (micromhos at 25 C.)	868	900	836	1,130	816
Turbidity	--	--	--	--	--
Temperature (F.)	--	74	75	82	--
Date of collection	Apr. 20, 1945	Apr. 2, 1945	Apr. 20, 1945	Apr. 20, 1945	Dec. 12, 1951
Depth (feet)	612	365	414	1,012	
Diameter (inches)	12½-10	16-8½	10¾-8	16-8 5/8	
Date drilled	1934	1938	1941	1942	
Percent of supply	--	--	--	--	

TEXAS

WACO
(Population, 84,706)

Ownership: Municipal; supplies also about 6,000 people outside the city limits, and Beverly Hills. Total population supplied, about 91,400. Texas Water Co.; supplies about 6,300 of the total population.

Source: Municipal: Lake Waco, approximately $7\frac{1}{2}$ miles northwest of the city on the Bosque River; 2 wells (1 and 2), 1,600 and 1,540 ft deep, at the municipal airport used solely for the maintenance of the airport. Texas Water Co.: 2 wells (1 and 2), 2,160 and 2,200 ft deep, which pump directly into the distribution system.

Treatment: Lake water: prechlorination, coagulation with alum, activated carbon for odor and taste control, sedimentation, rapid sand filtration, and postchlorination. Well water: chlorination.

Rated capacity of treatment plant: 20,000,000 gpd.

Raw-water storage: 1 ground reservoir, 1,000,000 gal.

Finished-water storage: 2 ground reservoirs, 6,000,000 and 5,000,000 gal; clear well, 3,500,000 gal; 2 elevated tanks, 750,000 and 250,000 gal.

The water from Lake Waco flows by gravity, intake at the lake spillway, approximately $5\frac{1}{2}$ miles to the ground reservoir at the treatment plant. The finished water from the treatment plant and clear well is pumped into the distribution system and storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Lake Waco (raw water)	Lake Waco (raw water)	Finished water	Airport well 1 (raw water)	Texas Water Co. well 1 (raw water)
Silica (SiO ₂)	7.6	6.2	4.9	16	20
Iron (Fe) .....	.06	.04	.01	.05	.01
Manganese (Mn)	--	.00	.00	--	.00
Calcium (Ca)	70	50	52	2.0	3.2
Magnesium (Mg)	11	6.6	6.3	1.3	1.3
Sodium (Na)	30	15	15	240	248
Potassium (K) .....	.6	--	.4	4.8	2.8
Carbonate (CO ₃)	39	0	0	26	0
Bicarbonate (HCO ₃)	137	164	152	386	432
Sulfate (SO ₄)	52	30	41	108	124
Chloride (Cl)	33	14	15	44	47
Fluoride (F) .....	.8	.3	.2	1.0	1.1
Nitrate (NO ₃)	5.9	.5	.2	1.2	1.0
Dissolved solids	335	225	225	627	664
Hardness as CaCO ₃ :					
Total	220	152	156	10	14
Noncarbonate	42	18	31	0	0
Color	--	10	15	--	0
pH	--	7.6	7.3	8.5	8.2
Specific conductance (micromhos at 25 C.)	--	367	376	1,000	1,060
Turbidity	--	--	--	--	--
Temperature (F.)	--	56	61	94	91
Date of collection	Jan. 8, 1943	Feb. 29, 1952	Feb. 29, 1952	Mar. 31, 1949	Feb. 29, 1952
Depth (feet)				1,600	2,160
Diameter (inches)				$8\frac{1}{2}$ - $6\frac{1}{2}$	10-7
Date drilled				1942	1945
Percent of supply				--	--

TEXAS

WEST UNIVERSITY PLACE
(Population, 17,074)

Ownership: Municipal; supplies about 100 persons outside the city limits. Total population supplied, about 17,200.

Source: 4 wells (3 to 6), 768, 1,183, 1,673, and 2,026 ft deep.

Treatment: Chlorination at the wells.

Raw-water storage: None.

Finished-water storage: Ground storage tanks and elevated tanks, 1,000,000 gal.

The wells are pumped individually into separate ground storage tanks. From the storage tanks the water is pumped into the distribution system. Overhead storage tanks, for pressure equalization, float on the distribution system.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Well 3 (raw water)	Well 4 (raw water)	Well 5 (raw water)	Well 6 (finished water)
Silica (SiO ₂)	18	18	--	20
Iron (Fe).....	.04	.09	--	.08
Manganese (Mn)	--	--	--	.00
Calcium (Ca)	18	22	10	12
Magnesium (Mg)	5.1	6.2	3.3	3.8
Sodium (Na).....	98	93	114	151
Potassium (K)				
Carbonate (CO ₃)	0	0	6	0
Bicarbonate (HCO ₃).....	265	265	268	326
Sulfate (SO ₄)	9.8	6.0	8	7.7
Chloride (Cl).....	36	41	34	66
Fluoride (F) .....	.4	.4	--	1.6
Nitrate (NO ₃) .....	.0	.0	--	.2
Dissolved solids	317	324	^a 307	418
Hardness as CaCO ₃ :				
Total	66	80	38	46
Noncarbonate	0	0	0	0
Color.....	--	--	--	10
pH.....	8.1	8.0	--	7.7
Specific conductance (micromhos at 25 C.)	547	550	--	698
Turbidity	--	--	--	--
Temperature (F.)	--	--	--	--
Date of collection	Sept. 17, 1943	Sept. 16, 1943	Jan. 31, 1942	Nov. 20, 1951
Depth (feet)	768	1,183	1,673	2,026
Diameter (inches)	13½-6¾	16-8½	20-12½	20-12¾
Date drilled	1938	1939	1941	1949
Percent of supply	--	--	--	--

^aSum of determined constituents.

TEXAS

WICHITA FALLS (Population, 68,042)

Ownership: Municipal; supplies also Holliday, and Sheppard Air Force Base.

Total population supplied, about 98,000.

Source: Lake Kickapoo, maximum capacity 220,000 acre-ft, on North Fork Little Wichita River, 8.2 miles south of Mankins and 9.2 miles northwest of Archer City, Archer County. Auxiliary or emergency supply, Lake Wichita on Holliday Creek, 6 miles southwest of Wichita Falls.

Treatment: Prechlorination, coagulation with iron salts, softening with lime, sedimentation, rapid sand filtration, and postchlorination.

Rated capacity of treatment plant: 21,000,000 gpd.

Raw-water storage: 45,000,000 gal.

Finished-water storage: 2 underground reservoirs, 2,500,000 gal each; 2 elevated tanks, 1,000,000 and 500,000 gal.

The water is pumped from Lake Kickapoo to the treatment plant. The finished water from the treatment plant is pumped into the distribution system and storage.

ANALYSES

(Analyses, in parts per million, by U. S. Geological Survey)

	Lake Kickapoo (raw water)	Finished water	Lake Wichita (raw water)
Silica (SiO ₂)	4.3	3.6	8.6
Iron (Fe) .....	.0	.0	.03
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	33	13	120
Magnesium (Mg)	11	8.5	36
Sodium (Na)	25	26	304
Potassium (K) .....	.8		
Carbonate (CO ₃)	0	8	0
Bicarbonate (HCO ₃)	176	77	104
Sulfate (SO ₄)	8.4	15	239
Chloride (Cl)	18	21	552
Fluoride (F) .....	.5	.6	.2
Nitrate (NO ₃) .....	.5	.5	1.5
Dissolved solids	197	141	1,310
Hardness as CaCO ₃ :			
Total	128	67	448
Noncarbonate	0	0	362
Color	10	10	0
pH	7.9	9.0	7.4
Specific conductance (micromhos at 25 C.)	335	244	2,440
Turbidity	20	10	--
Temperature (F.)	--	--	--
Date of collection	Feb. 20, 1952	Jan. 11, 1952	Mar. 24, 1952

