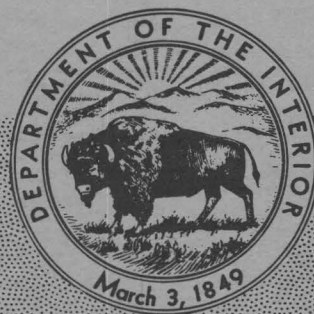


GEOLOGICAL SURVEY CIRCULAR 269



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

PROPERTY OF
U. S. GEOLOGICAL SURVEY,
PUBLIC INQUIRIES OFFICE
SAN FRANCISCO, CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR

Douglas McKay, Secretary

GEOLOGICAL SURVEY

W. E. Wrather, Director

GEOLOGICAL SURVEY CIRCULAR 269

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

By E. W. Lohr, F. H. Pauszek, J. G. Connor, W. L. Lamar, and E. F. McCarren

Washington, D. C., 1953

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

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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 SOUTH ATLANTIC STATES, 1952

By E. W. Lohr, F. H. Pauszek, J. G. Connor,
W. L. Lamar, and E. F. McCarren

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 also is 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 seventh of the series and includes data for the States of Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia, and the District of Columbia. (See fig. 1). The report gives the population (1950) of the city, the population supplied, ownership, sources and treatment of supplies, storage facilities for both raw and finished waters, and chemical analyses of the water for a total of 162 of the larger cities in the states of the South Atlantic group. 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 Delaware were compiled by E. F. McCarren, chemist, Philadelphia, Pa.; in Florida by Eugene Brown, chemist, Ocala, Fla.; in Georgia, North Carolina, and South Carolina by F. H. Pauszek, district chemist, Raleigh, N. C.; in Maryland and the District of Columbia by E. W. Lohr; in Virginia by J. G. Connor, district chemist, Charlottesville, Va.; and in West Virginia by P. N. Brown, chemist, under the supervision of W. L. Lamar, district chemist, Columbus, Ohio. Review and final assembly of the data were made by E. W. Lohr in the Washington office under the direction of S. K. Love, Chief, Quality of Water Branch.

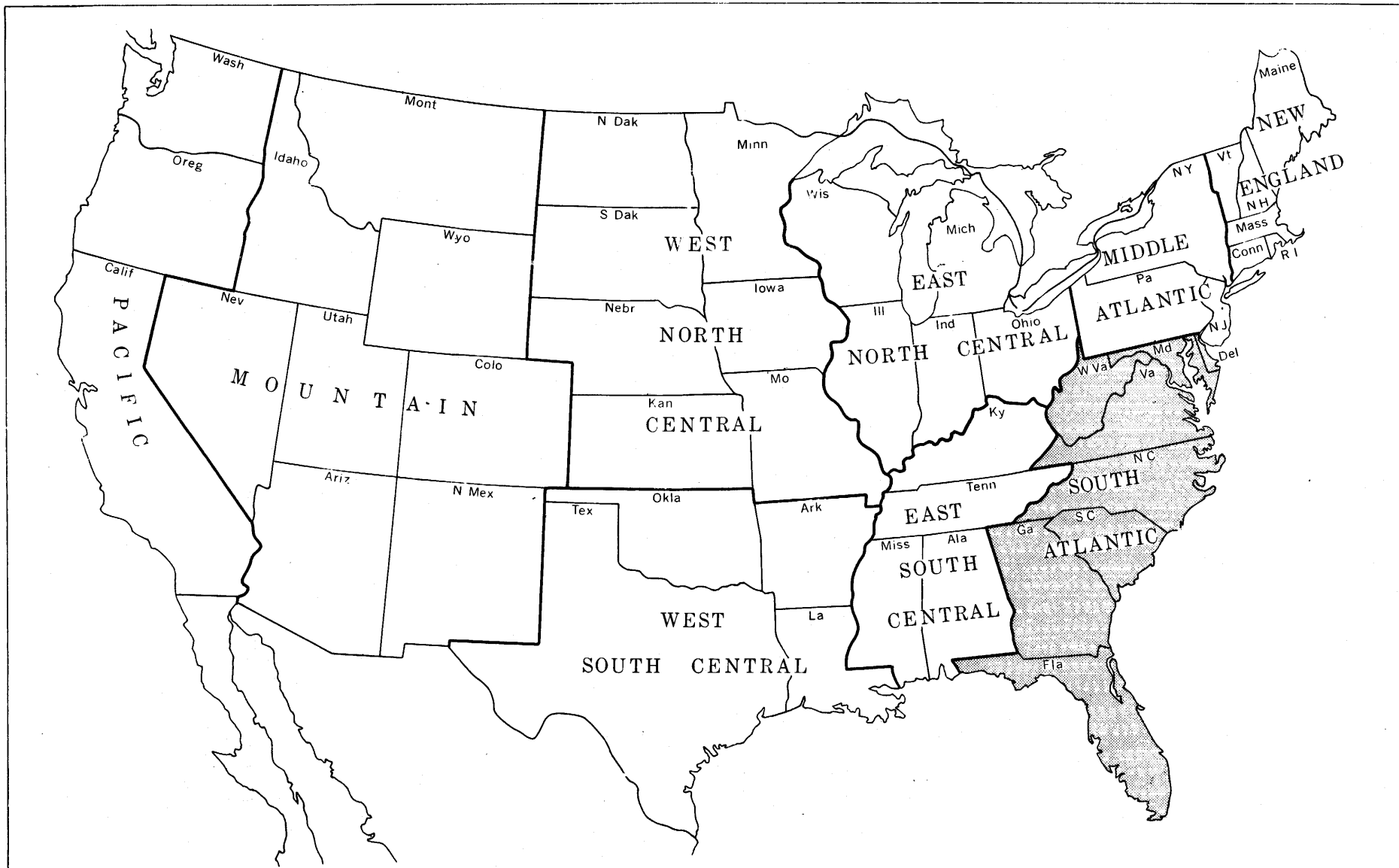


Figure 1. -Map of the United States showing sections covered by the nine circulars on the Industrial Utility of Public Water Supplies of the United States, 1952. The shaded portion represents the section of the country covered by this circular.

BELLEFONT
(Population, 1,472)

Ownership: Wilmington Suburban Water Co. ; supplies also Bellevue, Claymont, Gwinhurst, Holly Oak, Silverside, and other communities in New Castle County. Total population supplied, about 18,000.

Source: Bellevue Quarry (largely spring fed) about 75 percent of the supply. The remaining 25 percent of the supply is furnished by the Delaware Water Co. and Chester Municipal Authority.

Treatment: Wilmington Suburban Water Co. supply: prechlorination, coagulation with alum, sedimentation, rapid sand filtration, postchlorination, and adjustment of pH with lime.

Rated capacity of treatment plant: 1,440,000 gpd.

Raw-water storage: 100,000,000 gal. (Bellevue quarry).

Finished-water storage: 600,000 gal.

The treatment plant is at Bellevue.

ANALYSES

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

	Raw water ^a	Finished water (city tap)		Raw water ^a	Finished water (city tap)
Silica (SiO ₂)	--	9.9	Hardness as CaCO ₃ :		
Iron (Fe)	--	.24	Total	22	70
Manganese (Mn)	--	--	Noncarbonate.....	9	25
Calcium (Ca)	--	22			
Magnesium (Mg).....	--	3.8	Color	20	10
Sodium (Na)	--	5.3	pH	6.4	8.0
Potassium (K)	--	2.2	Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	16	35	25 C.)	103	197
Sulfate (SO ₄)	20	24	Turbidity	--	--
Chloride (Cl)	6.0	12	Temperature (F.)...	50	54
Fluoride (F)	--	.2	Date of collection...	May 24, 1951	May 24, 1951
Nitrate (NO ₃)	1.4	1.4			
Dissolved solids.....	--	122			

^a Bellevue Quarry.

DELAWARE

DOVER
(Population, 6,223)

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

Total population supplied, about 6,700.

Source: 3 deep wells (1 to 3) 208, 231, and 222 ft deep; 1 ("A") open well. The deep wells are at the power plant, on Division Street, and on Dover Street, respectively, and are reported to yield 505, 650, and 657 gpm.

Treatment: None.

Storage: Tank, 100,000 gal.

ANALYSES

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

	Well 1, Power Plant	Well 2, Division Street	Well 3, Dover St.	Well "A", Open well	City tap sample
Silica (SiO ₂)	--	--	--	--	35
Iron (Fe)	--	--	--	--	.08
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	--	--	--	--	33
Magnesium (Mg)	--	--	--	--	5.0
Sodium (Na)	--	--	--	--	14
Potassium (K)	--	--	--	--	2.9
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	157	153	153	153	153
Sulfate (SO ₄)	6.6	8.9	7.5	7.8	8.0
Chloride (Cl)	3.4	3.4	2.8	3.4	3.0
Fluoride (F)	--	--	--	--	.1
Nitrate (NO ₃) .....	.4	.5	.4	.5	.6
Dissolved solids	--	--	--	--	191
Hardness as CaCO ₃ :					
Total	100	101	108	102	103
Noncarbonate	0	0	0	0	0
Color	5	5	8	5	7
pH	8.0	8.1	8.0	8.0	8.0
Specific conductance (micromhos at 25 C.)	259	254	252	261	263
Turbidity	--	--	--	--	--
Temperature (F.)	60	58	61	68	64
Date of collection	Apr. 25, 1951	Apr. 25, 1951	Apr. 25, 1951	Apr. 25, 1951	Apr. 25, 1951
Depth (feet)	208	231	222	--	--
Diameter (inches)	12	12	16-10	--	--
Date drilled	1926	1938	1948	--	--
Percent of supply	--	--	--	--	--

MILFORD
(Population, 5,179)

Ownership: Municipal.

Source: 3 deep wells (1 to 3) 150, 150, and 220 ft deep. Well 3 is reported to yield 346 gpm.

Treatment: Aeration and chlorination.

Rated capacity of treatment plant: 500,000 gpd.

Raw-water storage: None.

Finished-water storage: 250,000 gal.

ANALYSES

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

	Well 1	Well 3	Finished water ^a
Silica (SiO ₂)	--	55	36
Iron (Fe)	--	.13	.27
Manganese (Mn)	--	.01	--
Calcium (Ca)	--	48	46
Magnesium (Mg)	--	6.9	6.6
Sodium (Na)	--	6.4	5.6
Potassium (K)	--	2.5	2.9
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	189	192	187
Sulfate (SO ₄)	2.4	2.0	2.9
Chloride (Cl)	2.8	3.4	2.9
Fluoride (F)	--	.1	.0
Nitrate (NO ₃) .....	.5	.0	.3
Dissolved solids	--	217	216
Hardness as CaCO ₃ :			
Total	140	148	142
Noncarbonate	0	0	0
Color	2	2	4
pH	7.9	7.9	8.1
Specific conductance (micromhos at 25 C.)	298	296	301
Turbidity	--	--	--
Temperature (F.)	60	--	57
Date of collection	Apr. 20, 1951	Dec. 12, 1951	Apr. 20, 1951

^a Well 2 out of operation at time of sampling.

DELAWARE

NEWARK
(Population, 6,731)

Ownership: Municipal.

Source: 4 wells (1, 4, 5, 7) 72, 62, 70, and 64 ft deep; yield reported to be 146, 160, 200, and 300 gpm.

Treatment: Chlorination.

Rated capacity of treatment plant: 1,296,000 gpd.

Raw-water storage: 150,000 gal.

Finished-water storage: 752,000 gal.

ANALYSES

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

	Well 1	Well 4	Well 5	Well 7	Finished water (city tap)
Silica (SiO ₂)	--	--	--	--	13
Iron (Fe)	--	--	--	--	.61
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	--	--	--	--	6.8
Magnesium (Mg)	--	--	--	--	4.3
Sodium (Na)	--	--	--	--	7.6
Potassium (K)	--	--	--	--	1.1
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	9	10	14	13	11
Sulfate (SO ₄)	5.8	5.9	7.8	10	8.2
Chloride (Cl)	12	12	12	16	15
Fluoride (F)	--	--	--	--	.1
Nitrate (NO ₃)	19	20	13	20	16
Dissolved solids	--	--	--	--	95
Hardness as CaCO ₃ :					
Total	30	32	31	34	35
Noncarbonate	23	24	20	23	26
Color	5	5	5	5	3
pH	5.9	5.8	6.5	6.0	6.8
Specific conductance (micromhos at 25 C.)	114	113	111	144	136
Turbidity	--	--	--	--	--
Temperature (F.)	56	58	58	56	57
Date of collection	Apr. 26, 1951	Apr. 26, 1951	Apr. 26, 1951	Apr. 26, 1951	Apr. 26, 1951
Depth (feet)	72	62	70	64	
Diameter (inches)	6	10	10	16	
Date drilled	1906	1920	1920	1931	
Percent of supply	--	--	--	--	

NEW CASTLE
(Population, 5,396)

Ownership: Municipal.

Source: 3 interconnected wells (Cd1, Cd2, Cd3) each 24 ft deep and 3 infiltration galleries which drain into the wells. Water from well Cd1 flows by gravity through an infiltration gallery to well Cd2; water from well Cd2 flows by gravity to well Cd3, which also receives the combined flow of water from the other two infiltration galleries. Wells Cd1 and Cd2 furnish 50 percent of the supply; well Cd3 with the combined flow of the 2 galleries furnish 50 percent of the supply.

Treatment: Aeration, coagulation with alum, sedimentation, rapid (pressure) filtration, and chlorination.

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

Raw-water storage: 645,000 gal.

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

ANALYSES

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

	Well Cd1	Well Cd2	Infiltration galleries ^a	Finished water
Silica (SiO ₂)	--	--	--	16
Iron (Fe).....	--	--	--	.40
Manganese (Mn)	--	--	--	--
Calcium (Ca)	--	--	--	28
Magnesium (Mg)	--	--	--	18
Sodium (Na).....	--	--	--	80
Potassium (K)	--	--	--	3.9
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	13	12	43	52
Sulfate (SO ₄)	23	16	100	49
Chloride (Cl).....	12	9.8	240	162
Fluoride (F)	--	--	--	.0
Nitrate (NO ₃)	7.8	8.8	1.6	4.1
Dissolved solids	--	--	--	445
Hardness as CaCO ₃ :				
Total	38	29	161	144
Noncarbonate	27	19	126	101
Color.....	5	5	10	3
pH.....	6.2	6.3	6.5	7.7
Specific conductance (micromhos at 25 C.)	138	114	1,000	716
Turbidity	--	--	--	--
Temperature (F.)	57	56	58	56
Date of collection	Apr. 26, 1951	Apr. 26, 1951	Apr. 26, 1951	Apr. 26, 1951
Depth (feet)	24	24		
Diameter (feet)	12	12		
Date drilled	--	--		
Percent of supply	--	--		

^a Sample from the combined flow from the two galleries flowing into well Cd3.

DELAWARE

SEAFORD
(Population, 3,087)

Ownership: Municipal.

Source: 8 wells: 5 wells, each 80 ft deep; 2 wells, each 40 ft deep; 1 well, 73 ft deep. The wells are pumped in groups of 5, 3, and 1 wells by 3 pumping units, Standby, Power Plant, and Spruce St., respectively.

Treatment: Adjustment of pH with lime.

Rated capacity of treatment plant: 2,016,000 gpd.

Raw-water storage: None.

Finished-water storage: 300,000 gal.

ANALYSES

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

	5 wells	2 wells	1 well Spruce St.	Finished water (city tap)
Silica (SiO ₂)	--	--	--	14
Iron (Fe).....	--	--	--	.07
Manganese (Mn)	--	--	--	--
Calcium (Ca)	--	--	--	5.3
Magnesium (Mg)	--	--	--	3.0
Sodium (Na).....	--	--	--	5.9
Potassium (K)	--	--	--	2.6
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	7	20	5	6
Sulfate (SO ₄)	7.8	8.7	5.1	7.7
Chloride (Cl)	9.8	11	8.2	9.0
Fluoride (F)	--	--	--	.1
Nitrate (NO ₃)	23	23	19	22
Dissolved solids	--	--	--	89
Hardness as CaCO ₃ :				
Total	23	26	20	24
Noncarbonate	17	9.6	16	21
Color.....	4	2	2	2
pH	5.8	6.2	5.4	5.5
Specific conductance (micromhos at 25 C.)	114	124	96.1	109
Turbidity	--	--	--	--
Temperature (F.)	59	58	57	68
Date of collection	Apr. 20, 1951	Apr. 20, 1951	Apr. 20, 1951	Apr. 20, 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.....	6	7	5	5.7	--	--	34	38	32	0	--	--
Finished water...	--	--	--	7.0	--	--	--	--	--	--	--	--

WILMINGTON
(Population, 110,356)

Ownership: Municipal; supplies also about 13,500 people outside the city limits.

Total population supplied, about 123,900.

Source: Brandywine Creek.

Treatment: Porter plant: sedimentation, slow sand filtration, and chlorination.

Walnut St. plant: Coagulation with alum and lime, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plants: Porter plant, 12,000,000 gpd; Walnut St. plant, 20,000,000 gpd.

Raw-water storage: Hoopes Reservoir, 2,235,000,000 gal.

Finished-water storage: Cool Spring Reservoir, 40,000,000 gal; Rodney St. Reservoir, 7,000,000 gal; clear well, 6,000,000 gal; Rockford Tower, 500,000 gal; Monroe Park tank and Faulk Road tank, each 100,000 gal.

In normal operation, water from Brandywine Creek is pumped to Hoopes Reservoir, which serves as a reserve supply in the event of periods of low flow in the Creek. Water is also taken directly from the Creek to the rapid sand filter plant, from which point a portion of the raw water is lifted to the Porter sedimentation reservoir which serves the Porter slow sand filter plant. The finished water from the Porter treatment plant is used in the high service lines. The Walnut Street plant supplies the low service lines.

ANALYSES

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

	Brandywine Creek		Finished water (city tap)
	Raw water ^a	Raw water	
Silica (SiO ₂)	12	12	12
Iron (Fe) .....	.08	.08	.10
Manganese (Mn)	--	--	--
Calcium (Ca)	14	11	12
Magnesium (Mg)	5.2	4.5	4.4
Sodium (Na)	--	--	5.4
Potassium (K)	--	--	1.0
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	41	38	27
Sulfate (SO ₄)	22	17	28
Chloride (Cl)	6.5	4.8	6.0
Fluoride (F) .....	.1	.1	.0
Nitrate (NO ₃)	5.7	5.7	3.9
Dissolved solids	103	89	89
Hardness as CaCO ₃ :			
Total	56	46	48
Noncarbonate	23	15	26
Color	20	5	3
pH	6.5	6.8	7.1
Specific conductance (micromhos at 25 C.)	158	131	137
Turbidity	--	--	--
Temperature (F.)	36	64	60
Date of collection	Oct. 1948, Apr. 1951	May 31, 1950	Apr. 25, 1951

^a Average of analyses of 30 monthly samples.

WILMINGTON--Continued

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.....	35	49	10	7.2	8.4	6.9	--	--	--	40	800	8
Finished water...	27	40	3	6.5	6.9	5.3	52	62	40	0	0	0

WASHINGTON
(Population, 802,178)

Ownership: Department of the Army and the District of Columbia; also supplies Arlington County, Virginia; part of Fairfax County, Virginia; the City of Falls Church, Virginia; and a small area in Montgomery County, Maryland. Total population supplied, about 1,000,000.

Source: Potomac River. Emergency supply, connections to the extent of 9.2 mgd to the treated supply of the Washington Suburban Sanitary District. (See Hyattsville, Maryland.)

Treatment: Dalecarlia Plant: Prechlorination, coagulation with alum, sedimentation, rapid sand filtration, postchlorination or dechlorination as may be necessary, chlorine dioxide when necessary for control of tastes and odors, and addition of lime for adjustment of pH. McMillan Plant: Addition of chlorine and alum at the Dalecarlia Plant. The water then flows by gravity to the Georgetown Reservoir, 2 miles to the southeast, part of which is constructed to serve as a sedimentation basin. The water then flows by gravity through the Washington Tunnel to the McMillan Reservoir near the center of the District where further settling takes place; and slow sand filtration. The remainder of the treatment is the same as at the Dalecarlia Plant.

Rated capacity of treatment plants: Dalecarlia Plant, 100,000,000 gpd; McMillan Plant, 125,000,000 gpd.

Raw-water storage: 560,000,000 gal (30 percent available). The three reservoirs, Dalecarlia, Georgetown, and McMillan serve as storage reservoirs for unfiltered water.

Finished-water storage: Clear-water basins, 47,700,000 gal; ground-surface reservoirs, 67,200,000 gal; elevated tanks, 2,740,000 gal.

The water system of the District has two components, the supply division and the distribution system. The supply division comprised of the collection and purification systems is under the control of the Department of the Army and is operated by the Washington District Office of the Corps of Engineers. The distribution system is owned and operated by the District of Columbia.

The diversion dam and the raw-water intake are located at Great Falls, Montgomery County, Maryland, about 10 miles from the District line. The raw water flows by gravity through two conduits into the forebay of the Dalecarlia Reservoir at the District line, from which it is lifted into Dalecarlia Reservoir. This reservoir serves not only as storage reservoir but also as a plain sedimentation basin, from which the water flows by gravity to the treatment plants.

Arlington County, Falls Church, and areas in Fairfax County are served principally with water from the Dalecarlia Plant.

DISTRICT OF COLUMBIA

WASHINGTON--Continued

ANALYSES

(Analyses, in parts per million, by Dalecarlia Laboratory, Washington, D. C.)

	Raw water ^a	Finished water ^b		Finished water ^c (city tap)
		Dalecarlia Plant	McMillan Plant	
Silica (SiO ₂)	5.5	5.6	5.5	6.6
Iron (Fe).....	.05	.05	.03	.00
Manganese (Mn)	--	--	--	--
Calcium (Ca)	25	30	28	31
Magnesium (Mg)	5.2	6.0	5.4	6.1
Sodium (Na).....	6.1	4.0	3.5	8.0
Potassium (K)				
Carbonate (CO ₃)	--	--	--	0
Bicarbonate (HCO ₃).....	71	71	64	79
Sulfate (SO ₄)	32	38	38	39
Chloride (Cl).....	3.8	5.1	5.1	7.0
Fluoride (F)	--	--	--	^d 1.0
Nitrate (NO ₃)	1.0	1.0	1.0	2.6
Dissolved solids	139	154	149	156
Hardness as CaCO ₃ :				
Total	84	99	93	102
Noncarbonate	26	41	40	38
Color.....	--	--	--	3
pH.....	7.7	7.7	7.5	7.5
Specific conductance (micromhos at 25 C.)	--	--	--	236
Turbidity	--	--	--	--
Temperature (F.)	55	57	57	--
Date of collection.....	1950	1950	1950	June 30, 1952

Regular determinations at treatment plants, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Turbidity July 1948 to July 1949		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	59	82	41	7.7	7.9	7.5	84	114	70	69	165	21
Dalecarlia Plant Finished water .	58	79	40	7.7	7.8	7.6	99	127	79	.05	.30	.00
McMillan Plant Finished water..	62	74	37	7.5	7.8	7.3	93	120	77	0	0	0

^a Average of monthly analyses of composites of daily samples, Dalecarlia Reservoir outlet.^b Average of monthly analyses of composites of daily samples.^c Analysis by U. S. Geological Survey.^d Fluoridation of supply was begun June 23, 1952.

BRADENTON
(Population, 13,604)

Ownership: Municipal.

Source: Lake Ward (Braden River).

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

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

Raw-water storage: Lake Ward.

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

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	7.8	Hardness as CaCO ₃ :	
Iron (Fe) .....	.03	Total	113
Manganese (Mn) .....	.00	Noncarbonate	79
Calcium (Ca)	29	Color	0
Magnesium (Mg)	10	pH	7.3
Sodium (Na)	61	Specific conductance	
Potassium (K)	2.5	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	555
Bicarbonate (HCO ₃)	42	Turbidity .....	.4
Sulfate (SO ₄)	48	Temperature (F.).....	--
Chloride (Cl)	116	Date of collection	Jan. 19,
Fluoride (F) .....	.2		1952
Nitrate (NO ₃)	4.0		
Dissolved solids	308		

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.....	42	58	30	7.0	7.2	6.8	67	91	43	--	--	--
Finished water...	25	31	17	8.8	9.0	8.6	91	111	74	--	--	--

CLEARWATER
(Population, 15,581)

Ownership: Municipal.

Source: 11 wells (7, 8, 11 to 13, 16, 18, 19, and 21 to 23) ranging in depth from 135 to 296 ft (depth not reported for wells 7 and 8).

Treatment: Partial aeration.

Storage: --

Analyses of samples from all of the wells indicate that the chloride content of the water from the wells ranged from 16 to 153 ppm.

ANALYSES

Analyses, in parts per million, by Black Laboratory, Inc., Gainesville, Fla.

	Well 7	Well 11	Well 16	Well 19 ^a	Well 21
Silica (SiO ₂)	17	21	14	24	18
Iron (Fe) .....	.01	.14	.03	.05	.13
Manganese (Mn)	--	--	--	.00	--
Calcium (Ca)	67	55	61	61	53
Magnesium (Mg)	8.1	6.1	7.3	9.7	4.9
Sodium (Na)	38	4.7	7.1	34	13
Potassium (K) .....				.9	
Carbonate (CO ₃)	--	--	--	0	--
Bicarbonate (HCO ₃)	189	183	194	182	170
Sulfate (SO ₄)	0	0	0	3.0	0
Chloride (Cl)	91	16	27	80	29
Fluoride (F) .....	.2	.2	.2	.3	.2
Nitrate (NO ₃)	--	--	--	.6	--
Dissolved solids	359	219	261	336	232
Hardness as CaCO ₃ :					
Total	200	163	182	192	153
Noncarbonate	46	13	23	43	13
Color	6	4	2	5	6
pH	7.6	7.5	7.5	7.5	7.6
Specific conductance (micromhos at 25 C.)	--	--	--	550	--
Turbidity .....	.6	.2	.4	8.2	1.0
Temperature (F.)	--	--	--	--	--
Date of collection	Mar. 14, 1950	Mar. 14, 1950	Mar. 14, 1950	Nov. 22, 1951	Mar. 14, 1950
Depth (feet)	--	206	135	215	296
Diameter (inches)	--	--	--	10	--
Date drilled	1924	--	1938	1941	1943
Percent of supply	--	--	--	--	--

^a Analyzed by U. S. Geological Survey.

CORAL GABLES
(Population, 19,837)

Ownership: Supplied by Miami. (See Miami.) Population supplied, outside the city limits, about 21,200. Total population supplied, about 41,000.

DAYTONA BEACH
(Population, 30, 187)

Ownership: Municipal; also supplies about 6,000 people outside the city limits, and a transient population of about 25,000. Total population supplied, about 61,000.

Source: 26 wells ranging in depth from 165 to 220 ft.

Treatment: Softening with lime and soda ash, coagulation with alum, sedimentation, recarbonation, rapid sand filtration, and chlorination.

Rated capacity of treatment plants: Two plants: one, 4,000,000 gpd; the other, 1,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 2,850,000 gal.

ANALYSES

(Analyses, in parts per million, by Black Laboratory, Inc., Gainesville, Fla.)

	Raw water (composite)	Finished water (composite)	Finished water ^a (composite)
Silica (SiO ₂)	17	22	--
Iron (Fe) .....	.10	.01	.05
Manganese (Mn)	--	--	--
Calcium (Ca)	105	11	--
Magnesium (Mg).....	20	14	--
Sodium (Na).....	59	75	69
Potassium (K)	--	9	7
Carbonate (CO ₃)	338	46	57
Bicarbonate (HCO ₃).....	.0	13	15
Sulfate (SO ₄).....	139	140	112
Chloride (Cl) .....	.1	.1	.2
Fluoride (F)	--	--	.4
Nitrate (NO ₃)	618	314	--
Dissolved solids			
Hardness as CaCO ₃ :			
Total	345	85	82
Noncarbonate	68	47	24
Color	--	--	15
pH.....	7.6	8.9	8.7
Specific conductance (micromhos at 25 C.).....	--	--	491
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	Mar. 15, 1950	Mar. 15, 1950	Jan. 1952

^a Analysis by U. S. Geological Survey.

FORT LAUDERDALE
(Population, 36,328)

Ownership: Municipal; supplies about 4,500 people outside the city limits, and also about 50,000 seasonal visitors. Total maximum population supplied, about 91,000.

Source: 18 wells ranging in depth from 130 to 185 ft.

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

Rated capacity of treatment plant: 14,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 3,750,000 gal.

ANALYSES

(Analyses, in parts per million, by Black Laboratory, Inc., Gainesville, Fla.)

	Raw water ^a (composite)	Finished water ^a (composite)	Finished water ^b (composite)
Silica (SiO ₂)	22	9.1	--
Iron (Fe)	1.6	.13	.10
Manganese (Mn)	--	--	--
Calcium (Ca)	92	23	--
Magnesium (Mg).....	2.3	1.6	--
Sodium (Na).....	8.6	3.0	12
Potassium (K)			
Carbonate (CO ₃)	--	5	7
Bicarbonate (HCO ₃).....	287	39	36
Sulfate (SO ₄).....	.1	.1	10
Chloride (Cl)	16	21	23
Fluoride (F)	--	--	.2
Nitrate (NO ₃)	--	--	.2
Dissolved solids	314	130	--
Hardness as CaCO ₃ :			
Total	239	64	56
Noncarbonate	4	23	18
Color	59	22	29
pH	7.7	9.4	8.9
Specific conductance (micromhos at 25 C.).....	--	--	169
Turbidity	3	1	--
Temperature (F.)	--	--	--
Date of collection	Feb. 8, 1950	Feb. 8, 1950	Nov. 23, 1951

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.....	250	--	--	7.4	--	--	260	--	--	0	0	0
Finished water...	40	--	--	9.6	--	--	53	--	--	--	--	--

^a Wells 1 through 12.

^b 18 wells. Analysis by U. S. Geological Survey.

GAINESVILLE
(Population, 26,861)

Ownership: Municipal; also supplies the University of Florida.

Source: 4 wells (1 to 4) 365, 407, 421, and 464 ft deep.

Treatment: Aeration, prechlorination, coagulation with alum, softening with lime and soda ash, sedimentation, recarbonation, fluoridation, and rapid sand filtration.

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

Raw-water storage: None.

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

The fluoride content of the raw water is about 0.3 ppm. The fluoride content of the treated water is maintained at about 0.7 ppm from May 1 through October, and about 0.9 ppm from November 1 to May.

ANALYSES

(Analyses, in parts per million, by Black Laboratory, Inc., Gainesville, Fla.)

	Well 1	Well 4	Finished water (composite)
Silica (SiO ₂)	20	21	17
Iron (Fe) .....	.10	.03	.0
Manganese (Mn)	--	--	--
Calcium (Ca)	51	55	17
Magnesium (Mg)	13	13	3.6
Sodium (Na)	11	3.8	22
Potassium (K)	}	}	}
Carbonate (CO ₃)			
Bicarbonate (HCO ₃)	200	210	58
Sulfate (SO ₄)	30	13	43
Chloride (Cl)	7	9	9
Fluoride (F)	--	.2	.3
Nitrate (NO ₃)	--	--	--
Dissolved solids	246	248	140
Hardness as CaCO ₃ :			
Total	181	191	57
Noncarbonate	17	19	10
Color	25	7	0
pH	7.6	7.8	8.5
Specific conductance (micromhos at 25 C.)	--	--	--
Turbidity	--	.2	.2
Temperature (F.)	--	--	--
Date of collection	Mar. 13, 1948	July 26, 1949	Jan. 19, 1948

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	180	--	--	7.8	--	--	200	--	--	--	--	--
Finished water	55	--	--	8.4	--	--	65	--	--	--	--	--

FLORIDA

HIALEAH

(Population, 19,676)

Ownership: Supplied by Miami. (See Miami.)

HOLLYWOOD

(Population, 14,351)

Ownership: Municipal. Population supplied, highly variable, in winter months, about 35,000; in summer, about 21,000.

Source: 5 wells (1 to 5). Wells 1, 2, and 4 are each 85 ft deep. (Depths not reported for wells 3 and 5).

Treatment: Zeolite softening, chlorination, stabilization, and chlorination.

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

Raw-water storage: 515,000 gal.

Finished-water storage: 2,000,000 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)	--	--	Hardness as CaCO ₃ :		
Iron (Fe) .....	.08	.06	Total	273	86
Manganese (Mn)	--	--	Noncarbonate.....	22	0
Calcium (Ca)	102	30			
Magnesium (Mg).....	4.4	2.7	Color	25	19
Sodium (Na)	31	116	pH	6.8	6.7
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	306	300	25 C.)	632	620
Sulfate (SO ₄)	28	35	Turbidity	--	--
Chloride (Cl)	42	40	Temperature (F.)...	--	--
Fluoride (F) .....	.1	.0	Date of collection...	Mar. 29,	Mar.29,
Nitrate (NO ₃) .....	.7	.3		1948	1948
Dissolved solids.....	359	372			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Tempera- ture (°F.)		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	225	--	--	7.2	--	--	266	--	--	56	--	--
Finished water...	--	140	87	7.2	--	--	--	--	--	60	--	--

^a Composite.

JACKSONVILLE
(Population, 204,517)

Ownership: Municipal; supplies also about 20,000 people outside the city limits.

Total population supplied, about 224,500.

Source: 44 artesian wells most of which range in depth from about 1,000 to about 1,300 ft.

Treatment: Aeration at reservoirs, and chlorination.

Storage: Ground reservoirs, 18,000,000 gal; elevated tanks, 3,000,000 gal.

All of the wells yield water of similar chemical composition. Hydrogen sulfide (H_2S) in quantities of 1.5 to 2.5 ppm is present in all the well supplies. The fluoride content is reported to be 0.6 to 0.7 ppm.

ANALYSES

(Analyses, in parts per million, by Department of Chemistry, University of Fla.)

	Well 15 ^a	Well 33	Well 38	Well 49	Finished water ^b (city tap)
Silica (SiO_2)	20	23	24	22	--
Iron (Fe) .....	.08	--	.0	.0	.0
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	67	70	76	75	67
Magnesium (Mg)	27	24	29	28	26
Sodium (Na)	11	12	9.7	8.7	14
Potassium (K)					
Carbonate (CO_3)	--	--	--	--	--
Bicarbonate (HCO_3)	150	179	166	173	163
Sulfate (SO_4)	155	135	175	161	137
Chloride (Cl)	12	8	8	8	20
Fluoride (F)	--	--	--	--	--
Nitrate (NO_3) .....	.3	--	--	--	--
Dissolved solids	384	392	491	439	461
Hardness as $CaCO_3$:					
Total	278	276	310	300	274
Noncarbonate	155	126	172	160	140
Color	--	--	--	--	--
pH	--	7.6	7.5	7.6	7.4
Specific conductance (micromhos at 25 C.)	--	--	--	--	--
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of collection	Oct. 31, 1941	May 20, 1950	May 20, 1950	May 20, 1950	May 12, 1949
Depth (feet)	1,034	1,064	1,283	1,365	
Diameter (inches)	12	10	10	12	
Date drilled	--	--	--	--	
Percent of supply	--	--	--	--	

^a Analysis by U. S. Geological Survey.

^b Analysis by Fla. State Board of Health, Tallahassee, Fla.

FLORIDA

KEY WEST
(Population, 26,433)

Ownership: U. S. Navy; also supplies about 5,000 people outside the city limits, and other communities on the Florida Keys. Total population supplied, about 35,000.

Source: 4 wells (1 to 4) 62, 62, 48, and 53 ft deep. The wells are located at Florida City and the water is piped to Key West, a distance of 127 miles.

Treatment: Softening with lime, sedimentation, filtration, and chlorination.

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

Raw-water storage: None.

Finished-water storage: 300,000 gal.

ANALYSIS

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

	Wells, Finished water (composite)		Wells, Finished water (composite)
Silica (SiO ₂)	3.3	Hardness as CaCO ₃ :	
Iron (Fe) .....	.12	Total	60
Manganese (Mn) .....	.00	Noncarbonate	10
Calcium (Ca)	21		
Magnesium (Mg)	1.8	Color	2
Sodium (Na)	6.3	pH	8.1
Potassium (K) .....	.5	Specific conductance	
Carbonate (CO ₃)	0	(micromhos at	
Bicarbonate (HCO ₃)	61	25 C.).....	150
Sulfate (SO ₄)	6.5	Turbidity .....	.1
Chloride (Cl)	10	Temperature (F.).....	--
Fluoride (F) .....	.1	Date of collection	Jan. 30,
Nitrate (NO ₃) .....	.2		1952
Dissolved solids	85		

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.....	180	185	170	7.4	7.4	7.4	180	185	170	0	0	0
Finished water...	86	115	65	8.4	8.4	8.4	76	100	54	0	0	0

LAKELAND
(Population, 30,851)

Ownership: Municipal; supplies also about 5,000 people outside the city limits.

Total population supplied, about 35,900.

Source: 7 deep wells (1 to 7). The depths of wells 1 to 5 are reported to be 741, 846, 1,201, 683, and 828 ft. The yield of well 5 is reported to be 4,500 gpm.

Wells 1 and 2 are used in emergencies.

Treatment: Aeration and chlorination.

Rated capacity of treatment plant: --

Raw-water storage: 800,000 gal.

Finished-water storage: 750,000 gal.

ANALYSES

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

	Well 3 ^a	Well 4 ^b	Well 5
Silica (SiO ₂)	22	--	19
Iron (Fe) .....	.16	.05	.02
Manganese (Mn)	--	--	--
Calcium (Ca)	91	54	54
Magnesium (Mg)	21	18	16
Sodium (Na)	7.4	8.8	6.8
Potassium (K)			1.0
Carbonate (CO ₃)	--	--	0
Bicarbonate (HCO ₃)	250	266	242
Sulfate (SO ₄)	100	0	2.0
Chloride (Cl)	15	7	10
Fluoride (F)	--	--	.4
Nitrate (NO ₃)	--	--	.2
Dissolved solids	425	245	236
Hardness as CaCO ₃ :			
Total	314	209	201
Noncarbonate	109	0	2
Color	--	12	10
pH	--	7.2	7.2
Specific conductance (micromhos at 25 C.)	--	--	393
Turbidity	--	--	7.0
Temperature (F.)	--	--	80
Date of collection	Feb. 18, 1935	Mar. 18, 1946	Nov. 24, 1951
Depth (feet)	1,201	683	828
Diameter (inches)	18	--	24
Date drilled	1926	--	1945
Percent of supply	--	--	--

^a Analysis by Southern Analytical Laboratory.

^b Analysis by Florida State Board of Health, Jacksonville, Fla.

MIAMI
(Population, 249,276)

Ownership: Municipal; also supplies Coral Gables, El Portal, Hialeah, Miami Beach, Miami Shores, Miami Springs, Surfside, and other communities.

Total population supplied, about 350,000.

Source: 22 wells (1 to 8, 11 to 24) 62 to 110 ft deep serving the Hialeah Plant, and 4 wells (1 to 4) 98 to 101 ft deep serving the Southwest Plant.

Treatment: Hialeah Plant: Softening with lime, sedimentation, recarbonation, rapid sand filtration, chlorination, and fluoridation. Southwest Plant: Softening with lime, sedimentation, and chlorination.

Rated capacity of treatment plants: Hialeah Plant, 60,000,000 gpd; Southwest Plant, 40,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 24,000,000 gal.

The Southwest supply system is under development. Ultimately it is to provide 80,000,000 gpd from the new well field located about 1 mile west of the County Hospital at Kindall and 4 miles west of the Southwest treatment plant at Gallo-way Road and Seaboard Airline Railroad, which is $6\frac{1}{2}$ miles from the southwest section of Miami. The treatment for the water will be similar to that given at the Hialeah plant.

The water from the wells of both fields is similar in chemical composition.

ANALYSES

(Analyses, in parts per million, by City of Miami Water Department)

	Well 1, Hialeah Plant	Well 24, Hialeah Plant	Well 2, South- west Field	Raw water (composite)	Finished water (composite)
Silica (SiO ₂)	6.8	10	4.8	9.0	9.0
Iron (Fe)	1.7	1.2	.62	.9	.02
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	93	89	95	98	25
Magnesium (Mg)	4.9	4.4	2.9	7.1	4.0
Sodium (Na)	13	8.3	3.2	17	27
Potassium (K)					
Carbonate (CO ₃)					
Bicarbonate (HCO ₃)	255	278	264	268	49
Sulfate (SO ₄)	39	7.4	18	37	40
Chloride (Cl)	22	16	15	35	35
Fluoride (F)	--	--	--	--	^a 2.2
Nitrate (NO ₃)	--	--	--	2.2	2.2
Dissolved solids	330	310	275	350	190
Hardness as CaCO ₃ :					
Total	252	240	249	274	79
Noncarbonate	43	12	32	56	34
Color	--	--	--	80	23
pH	7.3	7.2	7.2	7.3	8.7
Specific conductance (micromhos at 25 C.)	--	--	--	--	--
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of analysis	1946	1951	1951	November, 1948	November, 1948

^a From partial analysis, July 27, 1951. A fluoride content of about 0.8 ppm in the finished water is maintained throughout the year.

MIAMI--Continued

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.....	220	230	215	7.3	--	7.2	260	265	250	0.1	--	--
Finished water...	43	52	36	8.8	9.2	8.4	85	100	80	.1	--	--

MIAMI BEACH
(Population, 46,282)

Ownership: Supplied by Miami. (See Miami.)

ORLANDO
(Population, 52,367)

Ownership: Municipal; also supplies about 17,000 people outside the city limits.
Total population supplied, about 69,000.

Source: Lake Underhill, Lake Ivanhoe, and 1 well 908 ft deep. Well water is pumped into Lake Underhill to maintain the water level of the lake. Lake water is then pumped to the treatment plant.

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

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

Raw-water storage: 737,000,000 gal.

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

ANALYSES

(Analyses, in parts per million, by Black Laboratory, Inc., Gainesville, Fla.)

	Lake Underhill	Lake Ivanhoe	Well 1	Finished water (composite)
Silica (SiO ₂)	1.4	1.8	5.7	4.0
Iron (Fe).....	.05	.01	.01	.06
Manganese (Mn)	--	--	--	--
Calcium (Ca)	27	13	30	39
Magnesium (Mg)	3.2	.8	7.4	6.3
Sodium (Na).....	12	18	11	20
Potassium (K)				
Carbonate (CO ₃)	--	--	--	--
Bicarbonate (HCO ₃).....	102	44	132	93
Sulfate (SO ₄)	6.5	9.7	4.2	60
Chloride (Cl).....	12	21	12	20
Fluoride (F)	--	--	.1	.1
Nitrate (NO ₃)	--	--	--	--
Dissolved solids	125	100	135	180
Hardness as CaCO ₃ :				
Total	81	36	105	123
Noncarbonate	0	0	0	47
Color.....	--	--	14	--
pH.....	7.4	7.3	8.8	7.3
Specific conductance (micromhos at 25 C.)	--	--	--	--
Turbidity	--	--	--	--
Temperature (F.)	--	--	--	--
Date of collection	Dec. 15, 1947	Dec. 15, 1947	Apr. 21, 1948	Feb. 1, 1951

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.....	95	99	74	8.4	8.8	7.6	98	105	86	2.0	2.7	1.4
Finished water...	80	87	57	8.4	8.5	8.1	105	115	95	.5	.5	.5

PANAMA CITY
(Population, 25,814)

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

Total population supplied, about 26,300.

Source: 2 well fields: Millville, 4 wells (1 to 4) 80 to 130 ft deep; St. Andrews, 7 wells, each 600 ft deep.

Treatment: Millville plant: Softening with lime, sedimentation, recarbonation, filtration, and chlorination. St. Andrews: Chlorination only.

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

Raw-water storage: St. Andrews water, 1,000,000 gal.

Finished-water storage: Millville water: 3 elevated tanks, 100,000 gal each; clear wells, 400,000 gal.

ANALYSES

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

	Finished water ^a	Finished water ^b		Finished water ^a	Finished water ^b
Silica (SiO ₂)	8.5	17	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.12	Total	106	211
Manganese (Mn) .....	.00	.00	Noncarbonate.....	16	20
Calcium (Ca)	39	45	Color	2	1
Magnesium (Mg).....	2.1	24	pH	8.0	7.6
Sodium (Na)	8.2	26	Specific conductance		
Potassium (K)	1.2	2.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	249	505
Bicarbonate (HCO ₃)	110	233	Turbidity .....	.5	.3
Sulfate (SO ₄)	12	12	Temperature (F.)...	--	--
Chloride (Cl)	14	49	Date of collection...	Feb. 15, 1952	Jan. 31, 1952
Fluoride (F) .....	.0	.3			
Nitrate (NO ₃) .....	.6	.5			
Dissolved solids.....	147	287			

^a Composite, Millville well field.

^b Composite, St. Andrews well field.

PENSACOLA
(Population, 43,479)

Ownership: Municipal; total population supplied, about 48,000.

Source: 6 wells: Main Plant wells (6 to 9) 245, 240, 169, and 252 ft deep; West Plant well, 226 ft deep; East Plant well, 260 ft deep.

Treatment: Aeration, pH control, and chlorination.

Rated capacity of plants: 19,440,000 gpd.

Raw-water storage: 1,600,000 gal.

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

ANALYSIS

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

	Finished water ^a		Finished water ^a
Silica (SiO ₂)	9.0	Hardness as CaCO ₃ :	
Iron (Fe) .....	.0	Total	20
Manganese (Mn) .....	.00	Noncarbonate	11
Calcium (Ca)	5.0	Color	2
Magnesium (Mg)	1.8	pH	7.1
Sodium (Na)	7.2	Specific conductance	
Potassium (K) .....	.6	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	87.0
Bicarbonate (HCO ₃)	11	Turbidity	3.0
Sulfate (SO ₄)	5.8	Temperature (F.).....	--
Chloride (Cl)	9.8	Date of collection	Jan. 5,
Fluoride (F) .....	.0		1952
Nitrate (NO ₃)	8.5		
Dissolved solids	56		
Depth (feet)			245, 252
Diameter (inches)			30, 16
Date drilled			1940, 1945
Percent of supply			--

^a Composite, wells 6 and 9.

ST. PETERSBURG
(Population, 96,738)

Ownership: Municipal; supplies also Gulport, Pinellas Park, Bay Pines Hospital, and other consumers. Total population regularly supplied, about 110,000. Population supplied during winter tourist season may reach a peak total of 275,000.

Source: 14 wells ranging in depth from 300 to 350 ft located near Cosme in northwest part of Hillsborough County. Emergency supplies from Mirror Lake (Plant) and Crescent Lake (Plant).

Treatment: Softening with lime, coagulation with ferric sulfate, sedimentation, rapid sand filtration, and chlorination.

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

Raw-water storage: None.

Finished-water storage: 330,000 gal.

Analyses of samples from all of the wells indicate that the wells yield water of about the same composition.

ANALYSES

(Analyses, in parts per million, by Black Laboratory, Inc., Gainesville, Fla.)

	Well 1C	Well 5	Well 7A	Raw water ^a	Finished water ^a
Silica (SiO ₂)	14	16	16	14	11
Iron (Fe)	--	--	.10	.10	.04
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	68	76	80	68	38
Magnesium (Mg)	2.9	4.1	4.9	2.5	2.5
Sodium (Na)	4.0	4.5	3.6	5.5	3.4
Potassium (K)					
Carbonate (CO ₃)	--	--	--	--	--
Bicarbonate (HCO ₃)	216	244	256	221	109
Sulfate (SO ₄)	--	1.5	4.3	1	8.8
Chloride (Cl)	9	10	9	7	10
Fluoride (F) .....	.2	.2	.2	0	0
Nitrate (NO ₃)	--	--	--	--	--
Dissolved solids	218	245	264	221	149
Hardness as CaCO ₃ :					
Total	182	206	220	180	105
Noncarbonate	5	6	10	0	16
Color	--	--	--	10	4
pH	7.7	7.6	7.5	7.5	7.8
Specific conductance (micromhos at 25 C.)	--	--	--	--	--
Turbidity	--	--	--	1	.8
Temperature (F.)	--	--	--	--	--
Date of collection	Aug. 24, 1950	Aug. 24, 1950	Aug. 24, 1950	May 21, 1949	May 21, 1949
Depth (feet)	300	350	300		
Diameter (inches)	--	--	--		
Date drilled	1941	1930	1943		
Percent of supply	--	--	--		

^a Composite.

ST. PETERSBURG--Continued

Regular determinations at treatment plant, 1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Temperature (°F.)		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	186	196	191	7.3	7.4	7.2	183	192	180	76	76	76
Finished water...	88	100	186	7.8	8.0	7.6	92	99	88	79	82	76

SANFORD

(Population, 11,935)

Ownership: Municipal; also supplies about 1,000 people outside the city limits.

Total population supplied, about 12,900.

Source: 7 wells (1 to 7) 135, 80, 135, 135, 135, and 180 ft deep.

Treatment: Aeration, and chlorination.

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

Finished-water storage: 200,000 gal.

ANALYSES

(Analyses, in parts per million, by Louis C. Herring & Co.)

	Well 1	Well 3	Well 6	Finished water ^a
Silica (SiO ₂)	7.2	6.8	7.4	10
Iron (Fe).....	1.6	1.2	1.8	.24
Manganese (Mn)	--	--	--	.00
Calcium (Ca).....	50	44	43	46
Magnesium (Mg)	9.1	9.0	8.3	8.7
Sodium (Na).....	37	36	29	29
Potassium (K)				1.6
Carbonate (CO ₃)				0
Bicarbonate (HCO ₃).....	180	168	161	162
Sulfate (SO ₄)	7.3	6.3	6.3	7
Chloride (Cl).....	62	56	46	55
Fluoride (F)	--	--	--	.1
Nitrate (NO ₃)	1.2	1.2	1.2	.6
Dissolved solids	275	245	238	246
Hardness as CaCO ₃ :				
Total	162	147	141	151
Noncarbonate	15	9	10	18
Color.....	--	--	--	2
pH.....	7.6	7.7	7.7	7.6
Specific conductance (micromhos at 25 C.)	--	--	--	430
Turbidity	--	--	--	.3
Temperature (F.)	--	--	--	--
Date of analysis.	Aug. 8, 1950	Aug. 8, 1950	Aug. 8, 1950	Feb. 7, 1952
Depth (feet)	135	135	135	80 to 180
Diameter (inches)	8	8	8	8
Date drilled	--	--	--	--
Percent of supply	--	--	--	--

^a Composite, wells 1 to 7. Analysis by U. S. Geological Survey.

FLORIDA
SARASOTA
(Population, 18,896)

Ownership: Municipal.

Source: 16 deep wells in 5 well fields: Plant well field, 5 wells (1 to 5) 640 to 758 ft deep; Northeast well field, 4 wells (1 to 4) each 600 ft deep; Northwest well field, 3 wells (1 to 3) 350, 580, and 570 ft deep; Payne Terminal wells (1 and 2) 529 and 475 ft deep; St. Armands Key wells (1 and 2) 340 and 400 ft deep. The Plant well field is pumped by means of gasoline power and can be used in case of electric power failure.

Treatment: Softening with zeolite (both pressure and gravity type softeners, sea water regenerated).

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

Raw-water storage: 950,000 gal.

Finished-water storage: 1,935,000 gal.

Partial analyses of samples from all of the wells indicate that the water is of similar chemical composition. The St. Armands Key wells yield water that is lower in dissolved solids and hardness than that from the other wells. The Plant well field yields water with the highest dissolved solids.

ANALYSES

(Analyses, in parts per million, by Black Laboratory, Inc., Gainesville, Fla.)

	Northwest well field		Well 1 ^a	Finished water ^b
	Well 1	Well 3		
Silica (SiO ₂)	23	24	30	24
Iron (Fe).....	--	--	--	.56
Manganese (Mn)	--	--	--	.00
Calcium (Ca)	220	196	73	14
Magnesium (Mg)	106	151	43	.3
Sodium (Na).....	90	57	52	530
Potassium (K)				
Carbonate (CO ₃)	--	--	--	16
Bicarbonate (HCO ₃).....	146	149	193	0
Sulfate (SO ₄)	809	824	216	161
Chloride (Cl).....	156	180	64	817
Fluoride (F)	--	--	--	168
Nitrate (NO ₃)	--	--	--	1.5
Dissolved solids	--	--	--	.5
Hardness as CaCO ₃ :	^c 1,480	^c 1,500	^c 573	^c 1,650
Total	985	1,110	359	36
Noncarbonate	866	988	201	0
Color.....	--	--	--	2
pH.....	7.5	7.4	7.6	7.5
Specific conductance (micromhos at 25 C.)	--	--	--	2,420
Turbidity	--	--	--	.4
Temperature (F.)	--	--	--	--
Date of analysis	Dec. 11, 1950	Dec. 11, 1950	Dec. 11, 1950	Feb. 12, 1952
Depth (feet)	350	570	340	
Diameter (inches)	--	--	--	
Date drilled	1950	1950	1950	
Percent of supply	--	--	--	

^a St. Armands Key well field.

^b Composite, wells 1, 2, 3, and 4, Plant well field; wells 1 and 2 North well field; well 2, West well. Analysis by U. S. Geological Survey.

^c Sum of determined constituents.

FLORIDA

SARASOTA--Continued

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.....	140	145	136	7.8	7.9	7.6	1060	1120	985	--	--	--
Finished water...	140	150	136	8.0	8.2	7.9	45	55	36	--	--	--

TALLAHASSEE
(Population, 27, 237)

Ownership: Municipal; supplies also about 7, 500 people outside the city limits.
Source: 9 wells (1 to 9). Wells 1 and 2 are obsolete; 3 and 4, for emergency use only. The depths of wells 5 to 9 are reported to be 246, 414, 400, 427, and 350 ft, respectively. (Wells 10 and 11 were under construction at the time of obtaining well data).

Treatment: Chlorination and fluoridation.^a

Storage: 1 ground reservoir, 400,000 gal; 2 elevated tanks, 400,000 and 500,000 gal.

ANALYSES

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

	Wells 8 and 9 ^b	Well 9 ^c		Wells 8 and 9 ^b	Well 9 ^c
Silica (SiO ₂)	14	8	Hardness as CaCO ₃ : Total Noncarbonate.....	152	124
Iron (Fe) .....	.00	.02		10	4
Manganese (Mn) .....	.00	.00	Color..... pH..... Specific conductance (micromhos at 25 C.)..... Turbidity..... Temperature (F.)... Date of collection... Jan. 4, 1952	2	10
Calcium (Ca)	41	36		7.8	7.8
Magnesium (Mg).....	12	8.3			
Sodium (Na)	3.0	} 7.8			
Potassium (K) .....	.2				
Carbonate (CO ₃)	0	--			
Bicarbonate (HCO ₃)	173	146		287	0
Sulfate (SO ₄)	6.5	5.4		2.4	--
Chloride (Cl)	5.4	10	--	--	
Fluoride (F) .....	.1	--			
Nitrate (NO ₃) .....	.9	1.8			
Dissolved solids.....	164	173			
Depth (feet)				427, 350	350
Diameter (inches)				--	--
Date drilled				1946	1946
Percent of supply				--	--

^a Fluoridation was begun about Mar. 1, 1952

^b Composite. Collected from distribution system. Not fluoridated.

^c Analysis by Pittsburgh Testing Laboratory, Pittsburgh, Pa.

TAMPA
(Population, 124,681)

Ownership: Municipal; supplies also about 50,000 people outside the city limits.

Total population supplied, about 175,000.

Source: Hillsborough River, 97 percent of supply; wells, 3 percent.

Treatment: The treatment varies from mainly color removal with alum during wet seasons to lime softening during dry seasons when the use of well water increases and the hardness of the river water increases.

Rated capacity of treatment plant: 30,000,000 gpd.

Raw-water storage: None.

Finished-water storage: 5,200,000 gal.

The composition of the river water varies considerably throughout the year.

ANALYSES

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

	Finished water	Finished water		Finished water	Finished water
Silica (SiO ₂)	5.3	--	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.15	Total	91	72
Manganese (Mn) .....	.0	--	Noncarbonate.....	34	43
Calcium (Ca)	29	--			
Magnesium (Mg).....	4.5	--	Color.....	2	30
Sodium (Na)	4.9	7.7	pH.....	7.5	7.5
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	69	35	25 C.).....	203	192
Sulfate (SO ₄)	21	37	Turbidity.....	--	--
Chloride (Cl)	16	15	Temperature (F.)...	--	--
Fluoride (F) .....	.1	.2	Date of collection...	Mar. 11, 1949	Nov. 9, 1951
Nitrate (NO ₃) .....	.4	.3			
Dissolved solids.....	123	--			

Regular determinations at treatment plant, 1950-1951

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Color		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	89	130	46	7.3	8.3	6.8	111	144	60	96	190	30
Finished water...	59	96	34	8.3	8.7	7.8	115	160	58	16	25	8

WEST PALM BEACH
(Population, 43,162)

Ownership: West Palm Beach Water Company; supplies also Palm Beach. Total population supplied, about 47,000.

Source: Clear Lake and Lake Mangonea (Loxahatchee Marsh).

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

Rated capacity of treatment plant: 26,000,000 gpd.

Raw-water storage: 2,100,000,000 gal.

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

At certain periods of the year, well water having an alkalinity of 120 ppm is added to the raw-water in amounts varying between 3 to 10 percent of the total to increase the alkalinity of the raw water. The wells are considered as an adjunct to the treatment plant rather than as an auxiliary supply.

ANALYSES

(Analyses, in parts per million, by So. Analytical Laboratory, Jacksonville)

	Raw water	Finished water	Finished water ^a
Silica (SiO ₂)	2.2	1.6	--
Iron (Fe) .....	.56	.10	.05
Manganese (Mn)	--	--	--
Calcium (Ca)	27	35	--
Magnesium (Mg).....	2.6	2.2	--
Sodium (Na).....	11	32	3.7
Potassium (K)			
Carbonate (CO ₃)			
Bicarbonate (HCO ₃).....	61	61	26
Sulfate (SO ₄).....	12	65	23
Chloride (Cl)	28	34	16
Fluoride (F) .....	.5	--	.1
Nitrate (NO ₃)	--	--	.3
Dissolved solids	173	225	--
Hardness as CaCO ₃ :			
Total	80	96	60
Noncarbonate	30	46	39
Color	25	2	5
pH.....	7.7	7.9	8.1
Specific conductance (micromhos at 25 C.).....	--	--	155
Turbidity	18	5	--
Temperature (F.)	--	--	--
Date of collection	June 21, 1949	June 21, 1949	Nov. 21, 1951

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Color		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	34	66	16	7.6	8.5	6.8	56	82	29	71	95	35
Finished water...	22	40	14	8.5	9.7	7.1	76	93	49	6	20	3

^a Analysis by U. S. Geological Survey.

ALBANY
(Population, 31,155)

Ownership: Municipal; also supplies suburban areas and Turner Air Force Base.
Total population supplied, about 37,000.

Source: 7 deep wells (6 to 12). (Wells 7 and 8 under repair and not in use as of Feb. 2, 1952). The depths of wells 6, 9, 10, 11, 12 are 955, 795, 868, 915, and 725 ft, respectively; yields reported to be 1,500, 1,669, 1,248, 1,250 and 1,175 gpm.

Treatment: Chlorination at wells.

Raw-water storage: None.

Finished-water storage: 3 reservoirs, 310,000, 244,000, and 998,000 gal; 2 elevated tanks, 500,000 gal each.

ANALYSES

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

	Well 11 (raw water)	Finished water ^a	Well 9 (finished water)
Silica (SiO ₂)	26	26	32
Iron (Fe) .....	.11	.10	.11
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	26	30	32
Magnesium (Mg).....	7.7	6.5	6.5
Sodium (Na).....	28	33	24
Potassium (K).....	0	0	0
Carbonate (CO ₃).....	173	191	176
Bicarbonate (HCO ₃).....	11	10	8.6
Sulfate (SO ₄).....	2.9	4.4	3.2
Chloride (Cl) .....	.2	.3	.2
Fluoride (F) .....	.3	.2	.2
Nitrate (NO ₃)	188	202	194
Dissolved solids	96	102	107
Hardness as CaCO ₃ :	0	0	0
Total			
Noncarbonate			
Color	2	8	1
pH	8.0	7.8	7.8
Specific conductance (micromhos at 25 C.).....	295	325	297
Turbidity	0	0	1
Temperature (F.)	73	69	72
Date of collection	Dec. 1, 1951	Dec. 1, 1951	Dec. 1, 1951
Depth (feet)	915		795
Diameter (inches)	20		20
Date drilled	1950		1947
Percent of supply	--		--

^a Mixed water from wells 7, 8, and 10.

GEORGIA

AMERICUS
(Population, 11,389)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 11,400.

Source: 5 wells (1 to 5) 259, 168, 635, 635, and 450 ft deep.

Treatment: Chlorination.

Raw-water storage: None.

Finished-water storage: 4 reservoirs, 422,000 gal; elevated tank, 350,000 gal.

ANALYSES

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

	Well 1	Well 2	Well 4 (finished water)
Silica (SiO ₂)	28	50	62
Iron (Fe) .....	.18	.36	.38
Manganese (Mn)	--	--	.03
Calcium (Ca)	46	30	27
Magnesium (Mg).....	4.5	3.1	3.0
Sodium (Na).....	3.4	3.3	2.0
Potassium (K)	3.4	3.0	
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃).....	152	96	85
Sulfate (SO ₄).....	16	14	9.2
Chloride (Cl)	2.0	2.0	3.2
Fluoride (F) .....	.0	.0	.1
Nitrate (NO ₃) .....	.1	.1	.1
Dissolved solids	177	155	154
Hardness as CaCO ₃ :			
Total	133	88	80
Noncarbonate	9	9	10
Color	--	--	1
pH.....	--	--	7.7
Specific conductance (micromhos at 25 C.).....	--	--	169
Turbidity	--	--	0
Temperature (F.)	67	--	72
Date of collection	Jan. 21, 1938	Jan. 21, 1938	Dec. 1, 1951
Depth (feet)	259	168	635
Diameter (inches)	12	10	12
Date drilled	1927	1914	1947
Percent of supply	--	--	--

ATHENS

(Population, 28,180)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 32,000.

Source: Oconee River and/or Sandy Creek.

Treatment: Prechlorination, ammoniation, coagulation with alum and lime, carbon for taste and odor control, sedimentation, fluoridation, rapid sand filtration, and adjustment of pH with lime.

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

Raw-water storage: Reservoir, 100,000,000 gal.

Finished-water storage: 2 clear wells, 500,000 and 750,000 gal; 2 elevated tanks, 750,000 and 250,000 gal.

The intake on the Oconee River is adjacent to the treatment plant in the north section of the city. Water is pumped from the river directly to the treatment plant. The intake on Sandy Creek is about $\frac{1}{2}$ mile north of the city. Normally, creek water is pumped to a 100,000,000 gal raw-water reservoir, thence to the treatment plant.

ANALYSES

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

	Oconee River (raw water)	Sandy Creek (raw water)	Finished water ^a	Finished water ^b
Silica (SiO ₂)	15	14	12	14
Iron (Fe).....	.05	.05	.10	.06
Manganese (Mn)	--	.00	.00	.03
Calcium (Ca)	3.9	3.6	8.8	13
Magnesium (Mg)	1.8	1.3	1.4	1.6
Sodium (Na).....	3.8	4.2	3.9	4.4
Potassium (K)	1.2			
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	25	21	22	30
Sulfate (SO ₄)	2.9	2.1	13	17
Chloride (Cl).....	2.1	2.4	3.0	3.2
Fluoride (F) .....	.1	.1	.0	.6
Nitrate (NO ₃) .....	.3	.5	.4	.4
Dissolved solids	43	40	55	73
Hardness as CaCO ₃ :				
Total	17	14	28	39
Noncarbonate	0	0	10	14
Color.....	6	3	2	3
pH.....	--	6.6	6.8	8.2
Specific conductance (micromhos at 25 C.)	--	42.6	79.4	107
Turbidity.....	--	--	--	--
Temperature (F.)	--	--	--	--
Date of collection.....	Nov. 15, 1940	Mar. 1, 1951	Mar. 1, 1951	July 31, 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.....	14	18	10	6.6	6.7	6.5	--	--	--	20	25	15
Finished water...	20	26	15	8.3	8.3	8.2	--	--	--	0	0	0

^a Sandy Creek.

^b Mixed sample, Sandy Creek and Oconee River.

ATLANTA
(Population, 331,314)

Ownership: Municipal; also supplies suburban areas, the cities of Forest Park, Hapeville, Marietta, Smyrna, and communities in Cobb, DeKalb, and Fulton counties. Total population supplied, about 550,000.

Source: Chattahoochee River.

Treatment: Coagulation with alum and bleaching clay, chlorination, ammoniation, activated carbon, sedimentation, rapid sand filtration, and adjustment of pH with lime. Copper sulphate is used for the control of algae.

Rated capacity of treatment plant: 70,000,000 gpd.

Raw-water storage: Reservoirs, 500,000,000 gal.

Finished-water storage: Clear water well, 10,000,000 gal; standpipe, 500,000 gal; elevated tank, 2,000,000 gal.

The intake is about 7 miles northwest of the center of the city and about 4 miles from the treatment plant. The water is pumped from the river to the raw-water reservoirs from which it flows to the treatment plant. The finished water is pumped into the distribution system and to elevated storage.

ANALYSES

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

	Raw water	Finished water	Finished water
Silica (SiO ₂)	10	9.6	11
Iron (Fe) .....	.14	.05	.05
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	2.8	5.8	6.2
Magnesium (Mg).....	1.0	1.0	1.1
Sodium (Na).....	3.3	2.1	3.6
Potassium (K)	0	0	0
Carbonate (CO ₃)	16	17	15
Bicarbonate (HCO ₃).....	2.1	4.2	6.5
Sulfate (SO ₄).....	1.9	3.0	5.4
Chloride (Cl) .....	.0	.0	.0
Fluoride (F) .....	.3	.6	1.4
Nitrate (NO ₃)	33	40	48
Dissolved solids	11	19	20
Hardness as CaCO ₃ :	0	5	8
Total			
Noncarbonate			
Color	4	2	2
pH.....	6.9	7.3	6.9
Specific conductance (micromhos at 25 C.).....	35.4	56.3	63.0
Turbidity	--	--	--
Temperature (F.)	--	--	57
Date of collection	Mar. 3, 1951	Mar. 5, 1951	Dec. 18, 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.....	12	14	10	6.9	7.2	6.5	10	11	8	26	150	7
Finished water...	16	17	14	8.7	8.9	8.5	19	23	18	.10	.30	.10

AUGUSTA
(Population, 71, 508)

Ownership: Municipal; also supplies suburban areas. Total population supplied, about 110,000.

Source: Savannah River. The intake is 3 miles north of the city.

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

Rated capacity of treatment plant: 21,000,000 gpd.

Raw-water storage: 2 reservoirs, 60,000,000 gal each.

Finished-water storage: 2 clear wells, 3,000,000 and 1,000,000 gal; elevated tank, 500,000 gal; standpipe, 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)	12	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.10	.03	Total	13	20
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	5
Calcium (Ca)	3.0	5.8			
Magnesium (Mg).....	1.3	1.3	Color	8	3
Sodium (Na)	3.6	4.0	pH	6.9	7.0
Potassium (K)	0	0	Specific conductance		
Carbonate (CO ₃)	17	18	(micromhos at		
Bicarbonate (HCO ₃)	2.8	8.8	25 C.).....	44.2	62.7
Sulfate (SO ₄)	2.6	3.1	Turbidity	--	--
Chloride (Cl) .....	.0	.0	Temperature (F.)...	--	--
Fluoride (F) .....	.3	.3	Date of collection...	Apr. 7, 1951	Apr. 7, 1951
Nitrate (NO ₃)	37	46			
Dissolved solids.....					

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.....	16	17	15	7.2	7.3	7.0	--	--	--	66	150	25
Finished water...	15	16	14	7.5	7.2	7.2	--	--	--	1	1	1

BRUNSWICK
(Population, 17,954)

Ownership: Peoples Water Service Company of Georgia; also supplies suburban areas. Total population supplied, about 22,000.

Source: 4 wells (1 to 4) 1,027, 1,000, 1,000, and 750 ft deep. The wells flow, but wells 1, 3, and 4 are equipped with turbine pumps.

Treatment: Chlorination.

Raw-water storage: 3 reservoirs, 200,000, 100,000, and 100,000 gal.

Finished-water storage: None.

ANALYSES

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

	Well 3 (raw water)	Well 4 (raw water)	Wells 1 and 2 (finished water)
Silica (SiO ₂)	36	37	41
Iron (Fe) .....	.18	.10	.06
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	39	40	102
Magnesium (Mg).....	24	24	67
Sodium (Na).....	12	12	108
Potassium (K)	0	0	0
Carbonate (CO ₃)	143	143	142
Bicarbonate (HCO ₃).....	78	79	376
Sulfate (SO ₄).....	15	17	181
Chloride (Cl) .....	.6	.5	.7
Fluoride (F) .....	.2	.0	.2
Nitrate (NO ₃)	283	290	1,000
Dissolved solids			
Hardness as CaCO ₃ :			
Total	196	198	530
Noncarbonate	79	81	414
Color	3	2	8
pH	7.3	7.4	7.3
Specific conductance (micromhos at 25 C.).....	430	436	1,450
Turbidity	0	1	0
Temperature (F.)	75	76	80
Date of collection	Dec. 4, 1951	Dec. 4, 1951	Dec. 4, 1951
Depth (feet)	1,000	750	
Diameter (inches)	18-12	8	
Date drilled	1944	1945	
Percent of supply	--	--	

CEDARTOWN
(Population, 9,470)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 10,250.

Source: Spring.

Treatment: Chlorination.

Raw-water storage: 2 standpipes, 185,000 and 1,575,000 gal.

Finished-water storage: None.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	9.1	Hardness as CaCO ₃ :	
Iron (Fe) .....	.02	Total	139
Manganese (Mn) .....	.00	Noncarbonate	8
Calcium (Ca)	31	Color	2
Magnesium (Mg)	15	pH	7.3
Sodium (Na) .....	.7	Specific conductance	
Potassium (K)		(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	253
Bicarbonate (HCO ₃)	160	Turbidity	0
Sulfate (SO ₄)	3.5	Temperature (F.).....	62
Chloride (Cl)	2.8	Date of collection	Dec. 29,
Fluoride (F) .....	.2		1951
Nitrate (NO ₃)	1.7		
Dissolved solids	144		

COLLEGE PARK
(Population, 14,535)

Ownership: Municipal.

Source: Supplied by East Point. (See East Point.)

COLUMBUS
(Population, 79,611)

Ownership: Municipal; also supplies Bealwood, Bibb City, and suburban districts.

Total population supplied, about 120,000.

Source: Chattahoochee River.

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

Rated capacity of treatment plant: 18,000,000 gpd.

Raw-water storage: Reservoir, 30,000,000 gal.

Finished-water storage: 3 clear wells, 3,000,000, 2,500,000, and 250,000 gal;
3 elevated tanks, 1,000,000 gal.

The treatment plant is about 4 miles north of the center of the city near the intake in the river. The water is pumped from the river into a raw-water reservoir from which it flows to the treatment plant.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	10	8.9	Hardness as CaCO ₃ :		
Iron (Fe) .....	.09	.03	Total	12	25
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	8
Calcium (Ca)	3.0	7.8	Color.....	7	3
Magnesium (Mg).....	1.1	1.3	pH.....	6.6	7.5
Sodium (Na)	4.7	6.2	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	45.6	88.2
Bicarbonate (HCO ₃)	16	21	Turbidity	--	--
Sulfate (SO ₄)	3.8	11	Temperature (F.)...	--	--
Chloride (Cl)	2.9	5.8	Date of collection...	July 7,	July 31,
Fluoride (F) .....	.1	.2		1951	1951
Nitrate (NO ₃)	1.1	1.2			
Dissolved solids.....	40	55			

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.....	14	16	8	7.0	7.5	6.8	15	22	8	35	185	5
Finished water...	14	22	12	8.2	8.8	7.9	18	21	14	0	0	0

CORDELE
(Population, 9,462)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 9,500.

Source: 3 wells (1 to 3) 396, 735, and 540 ft deep. The yield of well 1 is reported to be 900 gpm; of well 3, 1,000 gpm; of well 2, not reported.

Treatment: Chlorination.

Raw-water storage: None.

Finished-water storage: Reservoir, 250,000 gal; standpipe, 250,000 gal.

ANALYSES

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

	Well 1	Well 1	Well 3 (raw water)	Wells 1, 2, 3 (finished water)
Silica (SiO ₂)	13	13	32	31
Iron (Fe).....	.01	--	.06	.09
Manganese (Mn)	--	--	.00	.00
Calcium (Ca)	44	--	52	52
Magnesium (Mg)	1.5	--	2.4	2.4
Sodium (Na).....	3.4	--	2.5	--
Potassium (K) .....	.5	--		
Carbonate (CO ₃)	--	0	0	0
Bicarbonate (HCO ₃).....	135	134	163	160
Sulfate (SO ₄)	1.4	--	7.5	7.0
Chloride (Cl).....	4.8	--	2.4	.9
Fluoride (F) .....	.0	--	.1	.0
Nitrate (NO ₃)	3.2	--	.0	.0
Dissolved solids	142	--	184	180
Hardness as CaCO ₃ :				
Total	116	117	140	140
Noncarbonate	5	7	6	8
Color.....	--	--	1	3
pH	--	7.8	7.5	7.3
Specific conductance (micromhos at 25 C.)	--	243	271	269
Turbidity	--	--	0	1
Temperature (F.)	--	62	70	63
Date of collection.....	Jan. 21, 1938	Dec. 1, 1951	Dec. 1, 1951	Dec. 1, 1951
Depth (feet)	396	396	540	
Diameter (inches)	8	8	26-10	
Date drilled	1900	1900	1948	
Percent of supply	--	--	--	

DALTON
(Population, 15,968)

Ownership: Municipal; also supplies suburban areas. Total population supplied, about 19,000.

Source: Mill Creek. The intake is at the treatment plant about 1.4 miles north-west of the center of the city.

Treatment: Softening with lime, coagulation with ferric sulfate or alum, sedimentation, rapid sand filtration, and chlorination.

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

Raw-water storage: None.

Finished-water storage: Clear well, 200,000 gal; 2 elevated tanks, 2,000,000, and 750,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	9.2	8.5	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.01	Total	118	69
Manganese (Mn) .....	.00	.00	Noncarbonate.....	3	6
Calcium (Ca)	33	14	Color	4	3
Magnesium (Mg).....	8.6	8.2	pH	7.3	8.6
Sodium (Na)	1.6	1.7	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	7	25 C.).....	225	145
Bicarbonate (HCO ₃)	140	62	Turbidity	1	1
Sulfate (SO ₄)	2.5	7.9	Temperature (F.)...	47	50
Chloride (Cl)	2.0	2.4	Date of collection...	Nov. 29, 1951	Nov. 29, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃) .....	.9	.9			
Dissolved solids.....	130	80			

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.....	100	125	10	7.1	7.3	6.5	100	140	12	50	5000	10
Finished water...	50	65	20	8.6	9.1	8.2	50	65	2.0	--	--	--

DECATUR
(Population, 21,635)

Ownership: DeKalb County Water System; supplies Decatur and suburban areas, Avondale, Chamblee, Doraville, and a large number of consumers in DeKalb County. Total population supplied, about 93,000.

Source: Chattahoochee River. The intake is at Holcombe Bridge about 22 miles north of Decatur.

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

Rated capacity of treatment plant: 16,000,000 gpd.

Raw-water storage: Reservoir, 75,000,000 gal.

Finished-water storage: Clear well, 1,500,000 gal; 2 clear wells, 400,000 gal (owned by Decatur, leased by county); 3 elevated tanks, 1,000,000, 500,000, and 85,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	12	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.03	Total	12	19
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	5
Calcium (Ca)	3.0	5.8	Color	9	2
Magnesium (Mg).....	1.1	1.2	pH	6.8	6.9
Sodium (Na)	4.1	3.4	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	56.4	58.1
Bicarbonate (HCO ₃)	15	18	Turbidity	16	1
Sulfate (SO ₄)	3.6	5.6	Temperature (F.)...	50	51
Chloride (Cl)	2.9	3.2	Date of collection...	Nov. 27, 1951	Nov. 27, 1951
Fluoride (F) .....	.2	.6			
Nitrate (NO ₃) .....	.2	.2			
Dissolved solids.....	42	40			

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.....	--	--	--	--	--	--	--	--	--	--	--	--
Finished water...	20	23	19	8.0	8.5	7.8	30	--	--	38	--	--

DUBLIN
(Population, 10,232)

Ownership: Municipal; also supplies Veterans Hospital. Total population supplied, about 11,000.

Source: 4 wells (1 to 4) 290, 290, 490, and 650 ft deep. The wells are all flowing wells. The yield of well 4 is reported to be 350 gpm.

Treatment: Aeration, ammoniation, softening with lime, chlorination, sedimentation, recarbonation, and rapid sand filtration.

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

Raw-water storage: None.

Finished-water storage: Clear well, 500,000 gal; 2 elevated tanks, 63,000, and 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)	21	21	Hardness as CaCO ₃ :		
Iron (Fe) .....	.81	.04	Total	170	53
Manganese (Mn) .....	.00	.00	Noncarbonate.....	13	12
Calcium (Ca)	63	17	Color	4	4
Magnesium (Mg).....	3.1	2.6	pH	7.1	7.5
Sodium (Na)	2.9	4.1	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	333	130
Bicarbonate (HCO ₃)	191	50	Turbidity	0	1
Sulfate (SO ₄)	15	15	Temperature (F.)...	67	64
Chloride (Cl)	2.4	3.5	Date of collection...	Nov. 30, 1951	Nov. 30, 1951
Fluoride (F) .....	.2	.1			
Nitrate (NO ₃) .....	.1	.4			
Dissolved solids.....	207	92			

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.....	175	186	162	7.2	7.2	7.2	176	180	174	--	--	--
Finished water...	54	77	40	8.5	8.6	8.4	66	88	58	--	--	--

EAST POINT
(Population, 21,080)

Ownership: Municipal; also supplies College Park and suburban areas. Total population supplied, about 38,000.

Source: Sweetwater Creek. The intake is about 12 miles west of East Point.

Treatment: Prechlorination, ammoniation, coagulation with alum, sedimentation, rapid sand filtration, chlorine dioxide, and adjustment of pH with lime.

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

Raw-water storage: Reservoir, 10,000,000 gal. (An additional reservoir of 47,000,000 gal capacity is being constructed).

Finished-water storage: Clear well, 750,000 gal; 2 elevated tanks, 500,000 gal each; 1 elevated tank (in College Park).

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	19	18	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.03	Total	19	35
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	7
Calcium (Ca)	4.9	11	Color	12	3
Magnesium (Mg).....	1.7	1.9	pH	7.3	8.6
Sodium (Na)	6.1	5.7	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	8	25 C.)	79.1	96.6
Bicarbonate (HCO ₃)	24	18	Turbidity	8	1
Sulfate (SO ₄)	6.3	11	Temperature (F.)...	50	51
Chloride (Cl)	3.9	5.0	Date of collection...	Nov. 28, 1951	Nov. 28, 1951
Fluoride (F) .....	.2	.3			
Nitrate (NO ₃) .....	.3	.2			
Dissolved solids.....	59	70			

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.....	17	28	13	6.9	7.3	6.7	16	20	14	60	320	10
Finished water...	24	30	20	8.7	9.2	8.4	29	30	26	.2	.5	0

GAINESVILLE
(Population, 11,936)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 18,000.

Source: Chattahoochee River (75 percent of supply); Crier Creek and Peeler Branch (25 percent of supply). The intake on Chattahoochee River is about 3.4 miles northeast of the center of the city.

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

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

Raw-water storage: Impounding reservoir about 3,000,000 gal.

Finished-water storage: Clear well, 480,000 gal; 2 standpipes, 300,000 and 210,000 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)	11	10	Hardness as CaCO ₃ :		
Iron (Fe) .....	.04	.03	Total	9	12
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	4
Calcium (Ca)	2.2	3.6	Color	15	5
Magnesium (Mg).....	.8	.8	pH	6.4	6.5
Sodium (Na)	3.4	3.0	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	28.4	44.5
Bicarbonate (HCO ₃)	15	10	Turbidity	2	3
Sulfate (SO ₄)	1.3	5.7	Temperature (F.)...	--	53
Chloride (Cl)	1.5	3.1	Date of collection...	Nov. 27, 1951	Nov. 27, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃) .....	.4	.1			
Dissolved solids.....	28	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.....	10	12	8	6.9	7.2	6.8	20	25	16	120	500	30
Finished water...	11	13	9	6.9	7.1	6.8	25	28	18	1	1	1

^a Chattahoochee River 75 percent; Crier Creek and Peeler Branch 25 percent.

GRIFFIN
(Population, 13,982)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 20,000.

Source: Flint River. The intake is about 10 miles northwest of the city.

Treatment: Prechlorination during fall and winter months, coagulation with alum, activated carbon, sedimentation, rapid sand filtration, chlorination, and adjustment of pH with lime.

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

Raw-water storage: None.

Finished-water storage: 2 clear wells, 1,500,000 and 3,000,000 gal; 2 elevated tanks, 275,000 and 300,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	20	19	Hardness as CaCO₃:		
Iron (Fe) .....	.18	.03	Total	15	35
Manganese (Mn) .....	.00	.00	Noncarbonate	0	5
Calcium (Ca)	3.5	11			
Magnesium (Mg)	1.6	1.8	Color	32	3
Sodium (Na)	6.9	6.1	pH	6.9	8.0
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	26	36	25 C.)	60.6	103
Sulfate (SO ₄)	2.5	9.8	Turbidity	4	1
Chloride (Cl)	3.6	5.4	Temperature (F.) ...	--	55
Fluoride (F) .....	.4	.3	Date of collection ...	Nov. 30, 1951	Nov. 30, 1951
Nitrate (NO ₃) .....	.4	.1			
Dissolved solids	53	75			

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	28	13	6.8	7.0	6.5	18	21	16	35	700	20
Finished water...	27	36	19	8.0	8.4	7.8	28	32	26	.15	.20	.10

LAGRANGE
(Population, 25,025)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 25,500.

Source: Chattahoochee River. The intake in the river is about 3.5 miles west of the city.

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

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

Raw-water storage: Reservoir, 12,000,000 gal.

Finished-water storage: Clear well, 1,000,000 gal; elevated tank, 1,000,000 gal; standpipe, 300,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	14	13	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.02	Total	16	28
Manganese (Mn) .....	.00	.00	Noncarbonate.....	3	8
Calcium (Ca)	4.2	9.2	Color	17	1
Magnesium (Mg).....	1.3	1.3	pH	6.9	8.8
Sodium (Na)	5.4	5.8	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	5	25 C.).....	60.0	88.8
Bicarbonate (HCO ₃)	16	15	Turbidity	10	1
Sulfate (SO ₄)	4.6	10	Temperature (F.)...	52	53
Chloride (Cl)	5.6	6.0	Date of collection...	Nov. 29, 1951	Nov. 29, 1951
Fluoride (F) .....	.3	.2			
Nitrate (NO ₃)	1.1	1.1			
Dissolved solids.....	48	60			

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.....	15	20	8	6.8	7.2	6.4	20	--	--	--	300	10
Finished water...	28	30	26	8.7	9.0	8.4	28	--	--	--	5	.5

MACON
(Population, 70,252)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 100,000.

Source: Ocmulgee River. The intake in the river is about 3 miles north of the center of the city.

Treatment: Coagulation with alum, ammoniation, chlorination, activated carbon at times, sedimentation, rapid sand filtration, postchlorination, and final adjustment of pH with lime.

Rated capacity of treatment plant: 12,000,000 gal.

Raw-water storage: None.

Finished-water storage: Clear well, 275,000 gal; 2 reservoirs, 1,500,000 and 3,000,000 gal; 2 standpipes, 200,000 and 1,000,000 gal.

ANALYSES

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

	Raw water ^a	Raw water	Finished water
Silica (SiO ₂)	12	9.6	12
Iron (Fe) .....	.06	.04	.03
Manganese (Mn)	--	.00	.00
Calcium (Ca)	3.6	3.4	10
Magnesium (Mg).....	1.6	1.5	1.6
Sodium (Na).....	4.6	5.6	4.9
Potassium (K)	1.6		
Carbonate (CO ₃)	--	0	0
Bicarbonate (HCO ₃).....	22	21	25
Sulfate (SO ₄).....	3.9	3.3	14
Chloride (Cl)	2.9	3.6	4.5
Fluoride (F) .....	.0	.2	.1
Nitrate (NO ₃)	1.0	.7	.7
Dissolved solids	44	42	64
Hardness as CaCO ₃ :			
Total	16	15	32
Noncarbonate	--	0	11
Color	9	4	3
pH.....	--	7.0	7.2
Specific conductance (micromhos at 25 C.).....	--	55.5	98.2
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	1937-38	Apr. 26, 1951	Apr. 26, 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.....	15	16	15	7.4	7.2	7.2	--	--	--	--	35	18
Finished water...	25	26	24	8.5	8.6	7.4	--	--	--	0	0	0

^a Average of 36 analyses of 10-day composites of daily samples, May 1, 1937, to Apr. 30, 1938. (U. S. Geol. Survey Water Supply Paper 889-E. 1944)

MARIETTA
(Population, 20,687)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 20,700.

Source: Finished water from City of Atlanta, 2/3 of supply; 21 wells, 1/3 of supply. The wells range in depth from 259 to 910 ft and are reported to yield a total of 567 gpm.

Treatment: Well water: none.

Storage: 2 reservoirs, 243,000 and 1,000,000 gal; 2 standpipes, 500,000 gal each.

ANALYSES

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

	Well 8 ^a	Well 18 ^a	Well 21 ^a	Well 25 ^a	Wells ^b
Silica (SiO ₂)	19	34	27	22	33
Iron (Fe) .....	.10	.09	.50	.43	.06
Manganese (Mn)	--	--	--	--	.00
Calcium (Ca)	6.0	32	10	9.8	16
Magnesium (Mg)	3.6	10	3.3	3.9	8.7
Sodium (Na)	3.1	15	5.4	12	4.5
Potassium (K)	1.5	3.1	2.2	1.8	
Carbonate (CO ₃)	--	--	--	--	0
Bicarbonate (HCO ₃)	31	103	40	33	73
Sulfate (SO ₄)	3.0	25	16	3.4	8.0
Chloride (Cl)	4.0	16	1.8	15	7.4
Fluoride (F) .....	.0	.0	.0	.0	.0
Nitrate (NO ₃)	2.5	28	.2	20	8.4
Dissolved solids	59	226	88	119	123
Hardness as CaCO ₃ :					
Total	30	121	39	40	76
Noncarbonate	4	37	6	13	16
Color	--	--	--	--	2
pH	--	--	--	--	6.9
Specific conductance (micromhos at 25 C.)	--	--	--	--	180
Turbidity	--	--	--	--	1
Temperature (F.)	63	62	62	62	62
Date of collection	Apr. 22, 1938	Apr. 22, 1938	Apr. 22, 1938	Apr. 22, 1938	Nov. 28, 1951
Depth (feet)	272	910	382	297	
Diameter (inches)	10	10	10	10	
Date drilled	--	1927	1928	1937	
Percent of supply	--	--	--	--	

^a U. S. Geol. Water Supply Paper 912. 1942

^b Composite sample of water from wells 1, 3, 5, and 8.

MOULTRIE
(Population, 11,639)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 17,600.

Source: 3 wells (1 to 3) 750, 825, and 752 ft deep. The yield of wells 2 and 3 is reported to be 1,350 and 831 gpm respectively.

Treatment: Chlorination.

Raw-water storage: None.

Finished-water storage: 2 reservoirs, 250,000 gal each; 2 elevated tanks, 150,000 and 500,000 gal.

ANALYSES

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

	Well 2 (raw water)	Well 3 (finished water)		Well 2 (raw water)	Well 3 (finished water)
Silica (SiO ₂)	26	24	Hardness as CaCO ₃ :		
Iron (Fe) .....	.05	.07	Total	113	391
Manganese (Mn) .....	.00	.00	Noncarbonate.....	4	283
Calcium (Ca)	24	86	Color	2	7
Magnesium (Mg).....	13	43	pH	7.7	7.2
Sodium (Na)	26	34	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃).....	0	0	25 C.).....	333	859
Bicarbonate (HCO ₃)	134	132	Turbidity	0	1
Sulfate (SO ₄)	48	329	Temperature (F.)...	74	70
Chloride (Cl)	6.6	8.6	Date of collection...	Dec. 2, 1951	Dec. 2, 1951
Fluoride (F) .....	.6	.9			
Nitrate (NO ₃) .....	.1	.4			
Dissolved solids.....	210	635			
Depth (feet)				825	752
Diameter (inches).....				12	16
Date drilled				1943	1948-49
Percent of supply				--	--

NEWNAN
(Population, 8,218)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 10,000.

Source: 4 springs 80 percent of supply; 5 wells (1, 2, 4 to 6) 400, 806, 350, 350, and 350 ft deep, 20 percent of supply.

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

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

Raw-water storage: Reservoir, 130,000,000 gal.

Finished-water storage: 2 clear wells, 250,000 and 1,250,000 gal; elevated tank, 500,000 gal; standpipe, 300,000 gal.

ANALYSES

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

	Raw water ^a	Raw water ^b	Finished water ^c
Silica (SiO ₂)	11	25	12
Iron (Fe) .....	.45	.03	.03
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	4.4	17	17
Magnesium (Mg)	1.4	1.4	1.4
Sodium (Na)	4.3	9.0	5.5
Potassium (K)	0	0	15
Carbonate (CO ₃)	21	43	12
Bicarbonate (HCO ₃)	2.5	27	14
Sulfate (SO ₄)	3.5	2.4	6.8
Chloride (Cl) .....	.2	.2	.4
Fluoride (F) .....	.9	.6	.2
Nitrate (NO ₃)	41	105	82
Dissolved solids	17	48	48
Hardness as CaCO ₃ :	0	13	13
Total			
Noncarbonate			
Color	5	1	3
pH	6.6	7.0	9.4
Specific conductance (micromhos at 25 C.)	53.4	144	123
Turbidity	1	1	1
Temperature (F.)	54	--	55
Date of collection	Nov. 29, 1951	Nov. 29, 1951	Nov. 29, 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	15	18	13	7.0	7.2	6.8	--	--	--	40	60	20
Finished water	22	28	16	8.4	8.8	8.0	36	46	26	.05	1	0

^a From 4 springs.

^b Mixed sample from wells 4, 5, and 6.

^c From 4 springs (80 percent), and wells (20 percent).

ROME
(Population, 29,615)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 35,000.

Source: Oostanaula River. The intake is 2 miles north of the center of the city.

Treatment: Coagulation with alum, chlorination, ammoniation, carbon, sedimentation, rapid sand filtration, and adjustment of pH with lime.

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

Raw-water storage: None.

Finished-water storage: Clear well, 1,000,000 gal; reservoir, 3,000,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	5.4	5.2	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.03	Total	21	39
Manganese (Mn) .....	.00	.00	Noncarbonate.....	1	12
Calcium (Ca)	6.3	13	Color	7	4
Magnesium (Mg).....	1.4	1.7	pH	6.3	6.9
Sodium (Na)	2.5	3.2	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	52.0	99.2
Bicarbonate (HCO ₃)	25	33	Turbidity	--	--
Sulfate (SO ₄)	3.0	14	Temperature (F.)...	--	--
Chloride (Cl)	1.6	3.0	Date of collection...	Apr. 23, 1951	Apr. 23, 1951
Fluoride (F) .....	.2	.1			
Nitrate (NO ₃) .....	.5	.3			
Dissolved solids.....	37	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.....	39	48	32	7.1	7.3	6.9	42	52	18	153	297	36
Finished water...	46	58	39	8.1	8.2	8.1	52	60	22	.1	.1	.1

SAVANNAH
(Population, 119,638)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 120,000.

Source: 5 Artesian wells (5, 7 to 10) 60 percent of supply; Abercorn Creek 40 percent of supply. The intake in the creek is about 15 miles north of the city. The wells are 82, 56, 68, 59 and 62 ft deep; the yield is reported to be 3,470, 2,800, 3,200, 3,470, and 1,400 gpm, respectively.

Treatment: Coagulation with alum, lime, and clay, sedimentation, rapid sand filtration, chlorination, and adjustment of pH with lime.

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

Raw-water storage: None.

Finished-water storage: 2 clear wells, 500,000 gal each; elevated tank, 4,000,000 gal; reservoir, 2,000,000 gal.

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)	13	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.10	.17	Total	18	36
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	8
Calcium (Ca)	5.2	12			
Magnesium (Mg).....	1.3	1.5	Color	22	7
Sodium (Na)	5.6	5.7	pH	6.5	7.1
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	26	34	25 C.).....	59.1	108
Sulfate (SO ₄)	3.5	13	Turbidity	--	--
Chloride (Cl)	3.1	4.8	Temperature (F.)...	--	--
Fluoride (F) .....	.2	.0	Date of collection...	June 4,	June 4,
Nitrate (NO ₃) .....	.8	.4		1951	1951
Dissolved solids.....	48	67			

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.....	18	26	10	6.6	7.2	6.0	19	26	12	70	125	15
Finished water...	23	32	15	7.9	8.9	6.9	37	53	21	2.5	5	0

^a From Abercorn Creek.

^b From wells and Abercorn Creek.

THOMASVILLE
(Population, 14,424)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 14,800.

Source: 4 wells (2 to 5) 300, 550, 305, and 400 ft deep; yield reported to be 600, 1,200, 1,000, and 1,300 gpm respectively.

Treatment: Aeration, prechlorination, softening with lime and soda ash, coagulation with alum, bleaching clay, sedimentation, recarbonation, and rapid sand filtration.

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

Raw-water storage: None.

Finished-water storage: Reservoir, 500,000 gal; elevated tank, 300,000 gal.

ANALYSES

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

	Well 5 (raw water)	Finished water ^a		Well 5 (raw water)	Finished water ^a
Silica (SiO ₂)	24	16	Hardness as CaCO ₃ :		
Iron (Fe) .....	.07	.02	Total	208	94
Manganese (Mn) .....	.00	.00	Noncarbonate.....	79	49
Calcium (Ca)	47	23	Color	1	1
Magnesium (Mg).....	22	8.9	pH	7.9	9.2
Sodium (Na)	6.9	20	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	19	25 C.).....	416	289
Bicarbonate (HCO ₃)	157	16	Turbidity	0	0
Sulfate (SO ₄)	79	77	Temperature (F.)...	71	71
Chloride (Cl)	7.6	8.8	Date of collection...	Dec. 2, 1951	Dec. 2, 1951
Fluoride (F) .....	.4	.4			
Nitrate (NO ₃) .....	.1	.1			
Dissolved solids.....	271	182			
Depth (feet)				400	
Diameter (inches)				16	
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.....	130	130	130	7.5	7.5	7.5	200	200	200	0	0	0
Finished water...	32	47	27	8.9	9.6	8.4	85	110	75	0	0	0

^a From wells 3 and 4.

VALDOSTA
(Population, 20,046)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 23,000.

Source: 3 wells (3, 4, Pendleton Park). The depths of wells 3 and 4 (Plant well) are 409 ft and 380 ft, respectively.

Treatment: Aeration, chlorination, Nalco, lime.

Rated capacity of treatment plant: None.

Raw-water storage: None.

Finished-water storage: 2 reservoirs, 250,000 and 1,000,000 gal; 3 elevated tanks, 100,000, 400,000. and 500,000 gal.

ANALYSES

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

	Well 3		Well 4 (finished water)	Finished water ^a
Silica (SiO ₂)	15	23	16	28
Iron (Fe).....	.01	--	.12	.13
Manganese (Mn)	--	--	.00	.00
Calcium (Ca)	32	--	35	24
Magnesium (Mg)	4.4	--	5.0	8.4
Sodium (Na).....	2.3	--	1.6	.3
Potassium (K)	1.0	--		
Carbonate (CO ₃)	--	0	0	0
Bicarbonate (HCO ₃).....	78	80	78	107
Sulfate (SO ₄)	30	26	27	4.1
Chloride (Cl).....	3.8	--	13	1.2
Fluoride (F) .....	.2	--	.3	.5
Nitrate (NO ₃) .....	.3	--	.3	.1
Dissolved solids	136	--	143	128
Hardness as CaCO ₃ :				
Total	98	101	108	94
Noncarbonate	34	--	44	7
Color.....	--	--	20	5
pH.....	--	7.4	7.3	7.9
Specific conductance (micromhos at 25 C.)	--	218	220	187
Turbidity.....	--	--	1	1
Temperature (F.)	72	68	68	68
Date of collection.....	Sept. 30, 1941	Dec. 2, 1951	Dec. 2, 1951	Dec. 2, 1951
Depth (feet)	409	409	380	--
Diameter (inches)	15	15	15	--
Date drilled	1923	1923	1946	1949
Percent of supply	--	--	--	--

^a Pendleton Park Well.

WAYCROSS
(Population, 18,899)

Ownership: Municipal; also supplies suburban districts.

Source: 2 wells (1 and 2) in Legion Park and at pumping plant 700 and 703 ft deep.

The yield of wells is reported to be 1,700 and 2,000 gpm.

Treatment: Chlorination.

Raw-water storage: Reservoir, 798,830 gal.

Finished-water storage: Standpipe, 281,000 gal.

ANALYSES

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

	Well 1	Well 2 (finished water)		Well 1	Well 2 (finished water)
Silica (SiO ₂)	46	43	Hardness as CaCO ₃ :		
Iron (Fe) .....	.21	.11	Total	142	172
Manganese (Mn)	--	.00	Noncarbonate.....	--	42
Calcium (Ca)	34	41			
Magnesium (Mg).....	14	17	Color	--	2
Sodium (Na)	16	16	pH	--	7.6
Potassium (K)	2.4		Specific conductance		
Carbonate (CO ₃)	--	0	(micromhos at		
Bicarbonate (HCO ₃)	159	159	25 C.)	--	394
Sulfate (SO ₄)	29	48	Turbidity	--	0
Chloride (Cl)	14	18	Temperature (F.)...	74	76
Fluoride (F) .....	.4	.5	Date of collection...	May 28,	Dec. 3,
Nitrate (NO ₃) .....	.2	.1		1941	1951
Dissolved solids.....	224	258			
Depth (feet)				658	703
Diameter (inches)				12	12-10
Date drilled				1893	1904
Percent of supply				--	--

ANNAPOLIS
(Population, 10,047)

Ownership: Municipal; supplies Dreams Landing, Eastport, Forest Hills, Germantown, Homewood, Wardour and West Annapolis. Total population supplied, about 28,000.

Source: Broad Creek and other small streams (impounded), 74 percent of supply; 4 wells (1, 2, 5, and 6) 26 percent of supply. The wells are 270, 250, 248, and 242 ft deep respectively. Well number 1 is used very little. The surface water is used regularly, and the wells are used only to supplement this supply when necessary.

Treatment: Lime, aeration, coagulation with alum, sedimentation, rapid sand filtration, chlorination, and the addition of lime to adjust the pH to about 8.6. When the well water is used it is mixed with the surface water before treatment is begun.

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

Raw-water storage: 80,000,000 gal.

Finished-water storage: Basin, 500,000 gal; standpipe, 1,750,000 gal.

The wells are used during the summer and during the peak demand furnish about one half of the supply. Most of this is furnished by wells 5 and 6. During the year 1950 only well 5 was used. It is not possible at the present time to sample the individual well supplies.

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)	10	11	Hardness as CaCO ₃ :		
Iron (Fe) .....	.01	.0	Total	10	36
Manganese (Mn) .....	.00	.00	Noncarbonate.....	5	20
Calcium (Ca)	2.4	12	Color	5	2
Magnesium (Mg).....	1.0	1.5	pH	6.3	7.6
Sodium (Na)	1.4	2.0	Specific conductance		
Potassium (K)	1.5	1.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	42.9	95.7
Bicarbonate (HCO ₃)	6	20	Turbidity	1.0	.9
Sulfate (SO ₄)	6.0	16	Temperature (F.)...	--	--
Chloride (Cl)	3.5	6.6	Date of collection...	Mar.20,	Mar.20,
Fluoride (F) .....	.0	.0		1951	1951
Nitrate (NO ₃)	1.1	.3			
Dissolved solids.....	35	63			

^aImpounding Reservoir

^bSurface supplies, only

BALTIMORE
(Population, 949, 708)

Ownership: Municipal; supplies a large population in the Metropolitan District of Baltimore County. Total population supplied, about 1, 163, 000.

Source: Gunpowder River impounded in Lock Raven Reservoir. North Branch of Patapsco River, (to be tapped about the middle of 1951 adding about 40, 000, 000 gpd to the present supply), auxiliary supply.

Treatment: Plain sedimentation, prechlorination to 0.5 ppm of free available chlorine through filters, coagulation with alum, sedimentation, rapid sand filtration, and adjustment of pH to 7.8 with lime.

Rated capacity of treatment plant: 240, 000, 000 gpd.

Raw-water storage: 43, 000, 000, 000 gal.

Finished-water storage: Filtered water reservoirs, elevated tanks, standpipes.
Total 773, 500, 000 gal.

The Metropolitan District of Baltimore County borders Baltimore City on the west, north, and east and the water supply for the District is obtained from the city supply. After the distribution system is installed, it is turned over to the city for maintenance and operation and forms an integral part of the city system. It is proposed to construct eventually an impounding dam on the North Branch of Patapsco River and another treatment plant.

ANALYSES

(Analyses, in parts per million, by Monte Bello Laboratory, Baltimore, Maryland)

	Raw water ^a	Finished water ^b		Raw water ^a	Finished water ^b
Silica (SiO ₂)	12	6.0	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.01	Total	39	50
Manganese (Mn) .....	.00	.00	Noncarbonate.....	6	10
Calcium (Ca)	10	14			
Magnesium (Mg).....	3.5	4.0	Color	6	--
Sodium (Na)	2.3	4.3	pH	7.0	8.0
Potassium (K)	1.5		Specific conductance		
Carbonate (CO ₃)	0	--	(micromhos at		
Bicarbonate (HCO ₃)	41	49	25 C.).....	103	--
Sulfate (SO ₄)	7.0	11	Turbidity	1.2	.1
Chloride (Cl)	3.2	6.2	Temperature (F.)...	--	--
Fluoride (F) .....	.0	.1	Date of collection...	Apr. 18,	1950
Nitrate (NO ₃)	3.8	.3		1951	
Dissolved solids.....	63	81			

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.....	37	44	33	7.2	7.4	6.8	40	46	37	5	30	3
Finished water...	40	52	35	8.0	8.4	7.3	52	63	45	.1	.2	.1

^a Reservoir. Analysis by U. S. Geological Survey.

^b Averages of analyses of monthly composites of daily samples.

MARYLAND

COLLEGE PARK
(Population, 11,170)

Ownership: Supplied by Washington Suburban Sanitary Commission. (See Hyattsville.)

CUMBERLAND
(Population, 37,679)

Ownership: Municipal; (Evitts Creek Water Company) supplies also Cresaptown and La Vale, Maryland; Ridgeley and Wiley Ford, West Virginia. Total population supplied, about 42,100.

Source: Evitts Creek impounded in two lakes, Lake Gordon and Koon Lake.

Treatment: Coagulation with alum, sedimentation, rapid (anthrafilt) filtration, chlorination, and ammoniation.

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

Raw-water storage: Koon Lake, 2,300,000,000 gal; Lake Gordon 1,330,000,000 gal.

Finished-water storage: Fort Hill reservoir, 3,750,000 gal; Ridgedale reservoir, 7,500,000 gal.

The treatment plant is located at Koon Lake about 8 miles northeast of the city.

The finished water flows by gravity through two 36-in. reinforced concrete conduits from the treatment plant to the finished water reservoirs, thence to the distribution system.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	3.9	4.2	Hardness as CaCO ₃ :		
Iron (Fe) .....	.0	.02	Total	20	36
Manganese (Mn)	--	--	Noncarbonate.....	0	0
Calcium (Ca)	4.7	9.9	Color	6	5
Magnesium (Mg).....	2.1	2.8	pH	7.6	7.2
Sodium (Na)	17	20	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	118	158
Bicarbonate (HCO ₃)	48	65	Turbidity	9	4
Sulfate (SO ₄)	12	20	Temperature (F.)...	38	--
Chloride (Cl)	1.9	3.0	Date of collection...	Mar. 5, 1951	Mar. 5, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃)	2.1	2.2			
Dissolved solids.....	69	93			

FREDERICK
(Population, 18,142)

Ownership: Municipal; a small population is supplied outside the city limits.

Total population supplied, about 18,200.

Source: Tuscarora and Fishing Creeks about 84 percent of supply; Linganore Creek, about 16 percent of supply. Fishing Creek (impounded) is the main source of supply. Linganore Creek water is used to supplement the regular supply at times of peak load or when necessary.

Treatment: Main supply: Chlorination and ammoniation. Linganore Creek water: coagulation with alum and lime, carbon, breakpoint chlorination, sedimentation, rapid sand filtration, and postchlorination.

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

Raw-water storage: Fishing creek reservoir, 77,000,000 gal.

Finished-water storage: Clear wells and elevated tanks, 1,000,000 gal.

Fishing Creek reservoir is located about 10 miles northwest of the city, above the village of Mountain Dale. The water from Tuscarora Creek reservoir enters the conduit from Fishing Creek reservoir near Yellow Springs. Thus the water from these two sources is mixed before entering the city. The treatment plant for the Linganore Creek supply is about 3.5 miles east of the city.

ANALYSES

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

	Fishing Creek reservoir (raw water)	Fishing Creek	Finished water Linganore Creek
Silica (SiO ₂)	3.0	0.6	5.7
Iron (Fe) .....	.01	.00	.01
Manganese (Mn)	--	--	--
Calcium (Ca) .....	.5	.7	11
Magnesium (Mg) .....	.1	.2	3.4
Sodium (Na)	2.6	2.1	6.8
Potassium (K) .....	.3		
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	3.5	4	26
Sulfate (SO ₄)	2.4	1.5	20
Chloride (Cl)	1.4	1.5	6.2
Fluoride (F) .....	.0	.0	.1
Nitrate (NO ₃) .....	.1	.2	6.5
Dissolved solids	12	12	78
Hardness as CaCO ₃ :			
Total	2	3	41
Noncarbonate	0	0	20
Color	3	8	3
pH	6.1	5.7	7.0
Specific conductance (micromhos at 25 C.)	14.5	14.5	131
Turbidity	1	--	2
Temperature (F.)	--	60	--
Date of collection	Mar. 6, 1951	Oct. 16, 1951	Mar. 6, 1951

Regular determinations at treatment plant, 1950a

	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	46	61	17	7.1	8.6	6.9	52	66	39	15	1000	5
Finished water ...	34	45	23	6.6	7.0	6.2	53	68	44	5	5	5

^aLinganore Creek.

HAGERSTOWN
(Population, 32,260)

Ownership: Municipal; supplies also Williamsport, Funkstown, Smithburg, and a number of people outside the city limits. Total population supplied, about 45,000.

Source: Potomac River, 2/3 of supply; mountain supply consisting of Raven Rock and Warner Hollow Creeks, impounded, 1/3 of supply.

Treatment: Potomac River supply: Plain sedimentation, prechlorination, coagulation with alum, occasionally activated carbon, sedimentation, rapid sand filtration, addition of lime for adjustment of pH. Mountain supply: Chlorination.

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

Raw-water storage: Potomac River supply: 2 settling basins, 5,000,000 gal each. Mountain supply: reservoir, 120,000,000 gal.

Finished-water storage: Equalizing reservoirs and elevated tanks, 11,500,000 gal.

The two sources of supply are interconnected so that the consumers may be furnished with river, mountain streams, or the mixed water. There is considerable variation in composition of the water from both supplies throughout the year, but the water of the mountain supply is low in mineral content and hardness at all times.

Fluoridation with sodium silicofluoride was begun Nov. 20, 1951 of the Mountain supply and Dec. 4, 1951 of the Potomac River supply. An average content of about 1.1 ppm of fluoride is maintained in the supplies.

ANALYSES

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

	Potomac River (raw water)	Potomac River (finished water)	Mountain Supply (city tap)
Silica (SiO ₂)	4.8	5.4	10
Iron (Fe) .....	.03	.01	.07
Manganese (Mn)	--	--	--
Calcium (Ca)	11	17	3.8
Magnesium (Mg).....	5.0	3.8	1.9
Sodium (Na).....	13	15	4.8
Potassium (K)		1.1	
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃).....	42	45	13
Sulfate (SO ₄).....	35	44	9.2
Chloride (Cl)	2.9	4.8	4.0
Fluoride (F) .....	.0	.0	.2
Nitrate (NO ₃)	1.5	1.6	1.6
Dissolved solids	97	116	45
Hardness as CaCO ₃ :			
Total	48	58	17
Noncarbonate	14	21	7
Color	6	3	4
pH	7.3	7.8	7.0
Specific conductance (micromhos at 25 C.).....	161	193	59.5
Turbidity	9	2	5
Temperature (F.)	--	--	--
Date of collection	Mar. 6, 1951	Mar. 6, 1951	Mar. 6, 1951

HAGERSTOWN--Continued

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
Potomac River Raw water	65	100	20	7.3	7.6	6.6	80	130	25	20	1600	6
Potomac River Finished water .	65	100	10	7.7	8.2	7.2	85	140	30	5	10	.2
Mt. Supply Raw water	15	25	10	6.5	6.9	6.3	20	25	5	8	15	5

HYATTSVILLE
(Population, 12,300)

Ownership: Washington Suburban Sanitary Commission, a public body incorporated by the Maryland General Assembly, serving metropolitan areas of about 200 square miles in Montgomery and Prince Georges Counties. Supplies Bethesda, Bladensburg, Brentwood, Capitol Heights, Chevy Chase, College Park, Colmar Manor, Fairmount Heights, Gaithersburg, Mount Rainier, Riverdale, Silver Spring, Takoma Park, Wheaton and other communities. Total population supplied, about 280,000.

Source: Patuxent River and the Northwest Branch of the Anacostia River, both impounded. Water from the Patuxent River can be pumped into the Northwest Branch of the Anacostia River when needed.

Treatment: (Both plants): Prechlorination, coagulation with alum (and lime or sodium aluminate at times), sedimentation, rapid sand filtration, postchlorination or dechlorination as may be necessary, and addition of lime for adjustment of pH.

Rated capacity of treatment plants: Burnt Mills Plant (N. W. Branch of Anacostia River), 10,000,000 gpd; Willis School Plant (Patuxent River), 26,700,000 gpd.

Raw-water storage: Northwest Branch Anacostia River reservoir, 50,000,000 gal; Patuxent River reservoir, 6,118,000,000 gal.

Finished-water storage: Reservoirs, standpipes and elevated tanks for both high and low service, 38,175,000 gal.

The Northwest Branch of Anacostia River is the main source of supply for the high service area chiefly in Montgomery County. The dam impounding the river and the Burnt Mills treatment plant are located on Colesville Road near Silver Spring, Montgomery County. During dry seasons when the flow of the Northwest Branch is inadequate, water from the Patuxent River is pumped into the Northwest Branch from the Mink Hollow Pumping station near Ashton, about 10 miles above the Burnt Mills treatment plant. High service connections to the supply of District of Columbia total 6,000,000 gpd in case of emergency.

The source of supply for the low service is the Patuxent River, impounded by the Brighton Dam 14 miles north of the northernmost tip of Washington. The water is pumped from the river at the Rocky Gorge pumping station 13 miles below the dam to the Willis School treatment plant 2 miles west of Laurel, Prince Georges County. The finished water flows by gravity to the low service area. Connections in cases of emergency to the supply of the District of Columbia to this service area total 3,200,000 gpd.

The treated supplies of the two sources are further interconnected so that most of the capacity available for the high service in one zone is also available for the low service in the other zone.

HYATTSVILLE--Continued

ANALYSES

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

	Patuxent River		Finished water ^c
	Raw water ^a	Finished water ^b	
Silica (SiO ₂)	9.7	8.9	14
Iron (Fe) .....	.02	.09	.01
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	4.0	8.8	10
Magnesium (Mg)	1.1	1.6	1.7
Sodium (Na)	2.6	2.9	4.6
Potassium (K)	1.2	1.1	.9
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	15	18	26
Sulfate (SO ₄)	4.0	8.5	10
Chloride (Cl)	3.2	7.2	7.8
Fluoride (F) .....	.0	.0	.0
Nitrate (NO ₃)	1.9	2.4	1.2
Dissolved solids	37	56	68
Hardness as CaCO ₃ :			
Total	14	29	32
Noncarbonate	2	14	11
Color	2	4	2
pH	6.8	7.4	7.4
Specific conductance (micromhos at 25 C.)	54.6	84.9	102
Turbidity .....	.9	1.0	.5
Temperature (F.)	--	--	--
Date of collection	Apr. 9, 1951	Apr. 9, 1951	Apr. 9, 1951

Regular determinations at treatment plant, 1950^d

	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	14	22	8	7.0	7.4	6.0	18	25	15	60	6000	10
Finished water	19	25	12	8.0	8.7	7.0	33	50	28	.20	1.30	.10
Raw water ^e	20	26	10	6.9	7.6	6.1	22	35	16	70	4000	10
Finished water ^e	24	33	10	8.0	8.7	6.8	39	52	31	.23	1.60	.10

^a At Willis School treatment plant.^b City tap, Hyattsville.^c N. W. Branch Anacostia River, at Burnt Mills treatment plant.^d Willis School treatment plant.^e Burnt Mills treatment plant.

MOUNT RAINIER
(Population, 10,989)

Ownership: Supplied by Washington Suburban Sanitary Commision. (See Hyattsville.)

SALISBURY
(Population, 15,141)

Ownership: Municipal.

Source: Ten wells (1 to 10) 58, 57, 43, 48, 61, 65, 62, 66, 60, and 60 ft deep.

Emergency supply, Schumacher Pond. All the wells are equipped with turbine pumps except wells 1 and 3 which are suction lift. Wells 1 to 5 are reported to yield a total of about 2,000 gpm. Wells 2, 9, and 10 furnished the greater part of the supply during the winter of 1950-51.

Treatment: Aeration (coke beds), addition of lime to raise pH, chlorination, and ammoniation.

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

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

Finished-water storage: 2 elevated tanks, 200,000 and 300,000 gal; 1 standpipe, 85,000 gal.

The wells are in the city park area and are operated by remote control (except wells 9 and 10 not equipped at present) and pump to the reservoir at the treatment plant. All of the wells are not pumped at the same time, and none continuously. Enough wells are used to take care of daily requirements.

ANALYSES

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

	Well 2 (raw water)	Well 10 (raw water)	Wells 2, 4, 5, 7, 8 (finished water)
Silica (SiO ₂)	19	18	19
Iron (Fe)	1.0	.02	.35
Manganese (Mn) .....	.05	.00	.01
Calcium (Ca)	4.6	2.9	7.0
Magnesium (Mg).....	1.4	.5	.6
Sodium (Na).....	7.8	9.7	10
Potassium (K)	1.9		
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃).....	12	13	22
Sulfate (SO ₄).....	3.2	3.5	2.0
Chloride (Cl)	7.5	6.8	9.0
Fluoride (F) .....	.1	.0	.0
Nitrate (NO ₃)	13	8.0	12
Dissolved solids	70	60	81
Hardness as CaCO ₃ :			
Total	17	9	20
Noncarbonate	7	0	2
Color	0	2	3
pH.....	5.9	6.3	7.1
Specific conductance (micromhos at 25 C.).....	83.4	73.0	104
Turbidity	--	2	11
Temperature (F.)	--	--	--
Date of collection	Mar. 3, 1948	Mar. 19, 1951	Mar. 19, 1951
Depth (feet)	57	60	
Diameter (inches)	24	18	
Date drilled	1925	1949	
Percent of supply	--	--	

ALBEMARLE
(Population, 11, 798)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 12,300.

Source: Yadkin River. The intake is about 7 miles northwest of Badin.

Treatment: Coagulation with alum, soda ash, chlorination, Calgon, aeration, sedimentation, and rapid sand filtration.

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

Raw-water storage: 1 reservoir, 30,000,000 gal.

Finished-water storage: 2 concrete reservoirs, each 1,000,000 gal; elevated tank, 100,000 gal; standpipe, 500,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	11	9.7	Hardness as CaCO ₃ :		
Iron (Fe) .....	.09	.05	Total	18	19
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	0
Calcium (Ca)	4.4	4.9	Color	3	4
Magnesium (Mg)	1.7	1.7	pH	7.0	.6.9
Sodium (Na)	5.8	16	Specific conductance		
Potassium (K)	0	0	(micromhos at		
Carbonate (CO ₃)	25	32	25 C.)	63.8	118
Bicarbonate (HCO ₃)	4.4	20	Turbidity	--	--
Sulfate (SO ₄)	3.2	4.8	Temperature (F.)...	--	--
Chloride (Cl) .....	.2	.1	Date of collection...	May 6,	May 6,
Fluoride (F) .....	.7	.4		1951	1951
Nitrate (NO ₃)	46	78			
Dissolved solids.....					

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	22	18	7.0	7.1	6.9	20	22	18	20	400	5
Finished water...	22	24	20	6.8	6.9	6.8	20	22	18	0	0	0

ASHEVILLE
(Population, 53,000)

Ownership: Municipal; also supplies a number of communities in the Buncombe County Water System. Total population supplied, about 73,000.

Source: Beetree Creek (impounded) and Right and Left Forks of the North Fork of the Swannanoa River (impounded). The intakes are about 12 miles east of the city.

Treatment: Chlorination.

Raw-water storage: Beetree Reservoir, 500,000,000 gal.

Finished-water storage: Beaucatcher Reservoir, 5,000,000 gal; White Fawn Reservoir, 11,300,000 gal; Standpipe, 300,000 gal.

ANALYSES

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

	Beetree Reservoir ^a	Beetree Reservoir ^b	North Fork Swannanoa River ^a	North Fork Swannanoa River ^b
Silica (SiO ₂)	8.3	7.4	5.6	6.2
Iron (Fe).....	.02	.02	.03	.04
Manganese (Mn).....	.00	.00	.00	.00
Calcium (Ca)	1.8	1.6	1.0	1.6
Magnesium (Mg) .....	.7	.8	.4	.3
Sodium (Na).....	2.3	1.1	2.4	1.7
Potassium (K)				
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	7	6	4	7
Sulfate (SO ₄)	2.9	2.6	2.8	1.5
Chloride (Cl).....	2.5	1.2	1.9	1.1
Fluoride (F) .....	.0	.0	.0	.0
Nitrate (NO ₃) .....	.1	.4	.6	.2
Dissolved solids	22	20	17	16
Hardness as CaCO ₃ :				
Total	7	7	4	5
Noncarbonate	2	2	1	0
Color.....	3	3	3	4
pH.....	5.8	6.2	5.9	6.7
Specific conductance (micromhos at 25 C.)	24.0	24.6	15.2	14.0
Turbidity	--	--	--	--
Temperature (F.)	--	--	--	--
Date of collection.....	Apr. 12, 1950	Apr. 12, 1950	Mar. 28, 1950	Mar. 28, 1950

^aFinished water.

^bRaw water.

BURLINGTON
(Population, 24,560)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 25,000.

Source: Stony Creek impounded. The raw water intake is located 3 miles north of the treatment plant.

Treatment: Coagulation with alum and lime, activated carbon, sedimentation, rapid sand filtration, break-point chlorination, and final adjustment of pH with lime.

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

Raw-water storage: Impounding reservoir, 500,000,000 gal; reservoir at treatment plant, 1,750,000 gal.

Finished-water storage: Clear well, 465,000 gal; 3 elevated tanks, 1,500,000, 100,000, and 100,000 gal.

The treatment plant is in the city.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	16	15	Hardness as CaCO ₃ :		
Iron (Fe) .....	.16	.04	Total	34	59
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	12
Calcium (Ca)	7.8	18	Color	8	3
Magnesium (Mg)	3.6	3.5	pH	6.8	7.3
Sodium (Na)	5.1	4.9	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	93.8	147
Bicarbonate (HCO ₃)	45	58	Turbidity	--	--
Sulfate (SO ₄)	3.4	16	Temperature (F.)...	--	--
Chloride (Cl)	3.1	3.8	Date of collection...	Sept. 23, 1950	Sept. 23, 1950
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃) .....	.4	.2			
Dissolved solids.....	67	95			

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.....	35	57	16	7.0	7.4	6.6	39	56	20	91	850	30
Finished water...	40	55	13	8.2	8.8	6.8	58	78	38	0	0	0

CHARLOTTE
(Population, 134,042)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 167,000.

Source: Catawba River. The intake is about 8 miles northwest of treatment plant.

Treatment: Aeration, coagulation with alum, carbon, primary chlorination, sedimentation, rapid sand filtration, final pH adjustment with hydrated lime, secondary chlorination, ammoniation, and fluoridation with sodium fluoride.

Rated capacity of treatment plant: 24,600,000 gpd.

Raw-water storage: 2 reservoirs, estimated capacity 45,000,000 gal, each.

Finished-water storage: 3 clear wells, 2,875,000, 2,875,000, and 5,750,000 gal; 4 elevated tanks, 1,000,000, 1,000,000, 500,000, and 500,000 gal.

The treatment plant is about 2 miles northwest of center of city. The water is pumped from the Catawba River to raw-water storage; then flows by gravity through the treatment plant to clear water wells; then is pumped to distribution system and elevated storage tanks.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	12	11	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.02	Total	14	22
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	2
Calcium (Ca)	3.6	6.9	Color	13	2
Magnesium (Mg).....	1.2	1.2	pH	7.2	8.5
Sodium (Na)	3.6	4.9	Specific conductance		
Potassium (K)	0	3	(micromhos at		
Carbonate (CO ₃)	19	18	25 C.).....	40.5	75.4
Bicarbonate (HCO ₃)	2.7	5.1	Turbidity	--	--
Sulfate (SO ₄)	2.2	3.2	Temperature (F.)...	--	--
Chloride (Cl) .....	.1	1.2	Date of collection...	Mar. 2,	Mar. 3,
Fluoride (F) .....	.2	.2		1950	1950
Nitrate (NO ₃)					
Dissolved solids.....	35	45			

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.....	15	17	13	7.1	7.8	6.9	12	16	9	8.1	38	2
Finished water...	19	23	16	8.6	8.8	8.2	20	24	17	.06	.03	0

CONCORD
(Population, 16,486)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 20,000.

Source: Cold Water Creek impounded in Lake Fisher. Lake Concord, fed by a number of springs, serves as auxiliary or emergency supply.

Treatment: Coagulation with alum, ammoniation, chlorination, activated carbon, sedimentation, rapid sand filtration, Calgon, lime, postchlorination, and final adjustment of pH with lime.

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

Raw-water storage: Lake Fisher and Lake Concord 1,100,000,000, and 450,000,000 gal, respectively.

Finished-water storage: Clear well, 2,000,000 gal; 2 elevated tanks, 500,000 and 1,000,000 gal; at old plant, 1,500,000 gal.

The raw water intake is about 5 miles north of the treatment plant which is north of the city in Wil-Mar Park section.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	6.6	4.7	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.05	Total	34	41
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	8
Calcium (Ca)	8.0	11	Color	7	7
Magnesium (Mg).....	3.4	3.3	pH	6.7	6.7
Sodium (Na)	4.7	5.6	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	94.0	116
Bicarbonate (HCO ₃)	41	40	Turbidity	--	--
Sulfate (SO ₄)	5.1	13	Temperature (F.)...	--	--
Chloride (Cl)	3.1	4.5	Date of collection...	Aug. 15,	Aug. 15,
Fluoride (F) .....	.2	.1		1950	1950
Nitrate (NO ₃) .....	.4	.4			
Dissolved solids.....	56	69			

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.....	32	36	18	7.2	7.5	6.9	35	41	30	18	40	10
Finished water...	26	35	21	7.0	7.6	6.8	43	47	38	--	--	--

DURHAM
(Population 71,311)

Ownership: Municipal; total population supplied, about 73,500.

Source: Flat River impounded in Lake Michie, about 15 miles northwest of the city.

Treatment: Slight aeration, breakpoint chlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, and final adjustment of pH with lime. Activated carbon used occasionally for taste and odor control.

Rated capacity of treatment plant: 15,560,000 gpd.

Raw-water storage: Impounding reservoir, 4,500,000,000 gal.

Finished-water storage: 5 clear wells, 4,500,000 gal; 1 elevated tank, 1,500,000 gal; 1 elevated reservoir, 3,000,000 gal.

The treatment plant is 3 miles northwest of the center of Durham. Treatment plant capacity can be increased satisfactorily to an additional 5,530,000 gpd.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	13	14	Hardness as CaCO ₃ :		
Iron (Fe) .....	.04	.05	Total	20	41
Manganese (Mn) .....	.00	.00	Noncarbonate.....	2	18
Calcium (Ca)	4.8	13	Color	13	4
Magnesium (Mg).....	2.0	2.0	pH	7.2	8.7
Sodium (Na)	5.3	5.7	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	3	25 C.).....	65.2	114
Bicarbonate (HCO ₃)	22	21	Turbidity	--	--
Sulfate (SO ₄)	5.7	20	Temperature (F.)...	--	--
Chloride (Cl)	5.1	7.0	Date of collection...	Feb. 27, 1950	Feb. 27, 1950
Fluoride (F) .....	.1	.0			
Nitrate (NO ₃) .....	.3	.2			
Dissolved solids.....	50	77			

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.....	16	20	13	6.9	7.1	6.7	17	20	14	19	45	7.0
Finished water...	27	33	23	9.0	9.1	9.0	44	51	38	.30	.40	.18

ELIZABETH CITY
(Population, 12, 685)

Ownership: Municipal; also supplies suburban district. Total population supplied about 15,000.

Source: Well field of 200 wells, all 30 feet deep, 30 percent of supply; 3 wells, (1 to 3) each 80 ft deep, 20 percent of supply. The yield of the shallow wells is reported to be from 2 to 5 gpm, and of the deep wells, 200, 200, and 90 gpm, respectively.

Treatment: Lime (softening), coagulation with alum, sedimentation, rapid sand filtration, and chlorination.

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

Raw-water storage: 1 reservoir, 3,000,000 gal.

Finished-water storage: 1 clear well, 1,000,000 gal; 1 elevated tank, 500,000 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)	41	33	Hardness as CaCO₃:		
Iron (Fe)	8.1	.77	Total	182	123
Manganese (Mn) .....	.00	.00	Noncarbonate.....	12	35
Calcium (Ca)	45	28			
Magnesium (Mg).....	17	13	Color	23	8
Sodium (Na)	63	69	pH	6.7	8.3
Potassium (K)	0	7	Specific conductance		
Carbonate (CO ₃)	208	93	(micromhos at		
Bicarbonate (HCO ₃)	29	48	25 C.).....	638	564
Sulfate (SO ₄)	83	95	Turbidity	1.8	2.0
Chloride (Cl) .....	.2	.2	Temperature (F.)...	68	71
Fluoride (F) .....	.6	.3	Date of collection...	Aug. 31,	Aug. 31,
Nitrate (NO ₃)	405	352		1951	1951
Dissolved solids.....					

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.....	115	180	98	7.0	7.2	7.0	140	186	110	--	--	--
Finished water...	65	98	58	9.4	9.6	9.0	113	130	90	--	--	--

^a Composite, mixed sample.

NORTH CAROLINA

FAYETTEVILLE
(Population, 34,715)

Ownership: Municipal; also supplies other suburban districts. Total population supplied, about 50,000.

Source: Little Cross Creek impounded in Bonnie Doone, Kornbow, and Glenville Lakes. Intake on east bank of Glenville Lake about 200 ft west of treatment plant.

Treatment: Aeration at times; primary lime, prechlorination, coagulation with alum, mechanical mixing, sedimentation, activated carbon at times, rapid sand filtration, postchlorination, Calgon, adjustment of pH with lime, ammoniation and final chlorination.

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

Raw-water storage: 3 impounding reservoirs: Bonnie Doone, 90,000,000; Kornbow, 125,000,000; Glenville, 100,000,000 gal.

Finished-water storage: 1 clear well, 1,500,000 gal; 2 elevated tanks, each 1,000,000 gal.

The treatment plant is about 1 mile from center of city on Filter Plant Drive.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	3.4	4.1	Hardness as CaCO ₃ :		
Iron (Fe) .....	.08	.08	Total	7	31
Manganese (Mn) .....	.00	.00	Noncarbonate.....	2	16
Calcium (Ca)	1.6	11	Color	8	3
Magnesium (Mg).....	.8	.9	pH	5.6	6.5
Sodium (Na)	2.3	2.2	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	32.6	79.7
Bicarbonate (HCO ₃)	6	18	Turbidity	--	--
Sulfate (SO ₄)	2.2	10	Temperature (F.)...	--	--
Chloride (Cl)	3.2	7.5	Date of collection...	June 20, 1950	June 20, 1950
Fluoride (F) .....	.0	.0			
Nitrate (NO ₃) .....	.7	.1			
Dissolved solids.....	22	53			

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.....	4	5	3	6.0	6.1	5.9	6	6	6	20	40	10
Finished water...	12	15	8	7.1	7.2	7.0	30	32	28	0	0	0

GASTONIA
(Population, 23, 069)

Ownership: Municipal; also supplies Lowell, Dallas and other suburban districts.
Total population supplied, about 48, 200.

Source: Long Creek impounded in Rankin Lake. The raw-water intake is about 3 miles north of city.

Treatment: Prechlorination, coagulation with alum, activated carbon (Nuchar), sedimentation, rapid sand filtration, postchlorination, Calgon, and lime.

Rated capacity of treatment plant: 4, 800, 000 gpd.

Raw-water storage: Impounding reservoir, about 250, 000, 000 gal.

Finished-water storage: 1 clear well 3, 200, 000 gal; 2 elevated tanks 1, 000, 000 and 300, 000 gal.

The treatment plant is almost in the center of the city.

ANALYSES

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

	Raw water.	Finished water		Raw water	Finished water
Silica (SiO ₂)	17	15	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.09	Total	22	28
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	6
Calcium (Ca)	5.4	7.4	Color	7	5
Magnesium (Mg).....	2.1	2.2	pH	7.0	7.0
Sodium (Na)	4.0	4.3	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	66.2	81.6
Bicarbonate (HCO ₃)	31	26	Turbidity	--	--
Sulfate (SO ₄)	1.9	8.4	Temperature (F.)...	--	--
Chloride (Cl)	2.2	4.5	Date of collection...	July 4,	July 4,
Fluoride (F) .....	.1	.2		1951	1951
Nitrate (NO ₃) .....	.2	.0			
Dissolved solids.....	50	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.....	26	28	24	7.2	7.4	7.0	28	32	24	20	75	10
Finished water...	27	29	22	7.2	7.5	6.9	28	32	24	.5	1.5	0

GOLDSBORO
(Population, 21,454)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 25,000.

Source: Little River. The intake is about 300 yd northeast of the treatment plant.

Treatment: Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, postchlorination, and final adjustment of pH with lime

Rated capacity of treatment plant: 2,250,000 gpd.

Raw-water storage: None.

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

The treatment plant is 2 miles northwest of Goldsboro on the south bank of Little River.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	13	14	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.06	Total	12	40
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	20
Calcium (Ca)	2.8	14	Color	17	3
Magnesium (Mg).....	1.2	1.3	pH	6.6	6.9
Sodium (Na)	5.1	5.8	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	51.2	120
Bicarbonate (HCO ₃)	16	25	Turbidity	--	--
Sulfate (SO ₄)	3.5	21	Temperature (F.)...	--	--
Chloride (Cl)	4.2	7.2	Date of collection...	Aug. 12,	Aug. 12,
Fluoride (F) .....	.0	.0		1950	1950
Nitrate (NO ₃) .....	.5	.4			
Dissolved solids.....	50	86			

GREENSBORO
(Population, 74,389)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 90,000.

Source: Reedy Fork Creek (50 percent of supply), Horsepen Creek (30 percent of supply), Brush Creek (20 percent of supply) impounded in Lake Brandt. The intake is $6\frac{1}{2}$ miles from the treatment plant.

Treatment: Prechlorination (at intermediate point on supply line to inhibit algae growth), coagulation with alum, sedimentation, rapid sand filtration, pH adjustment with lime, and postchlorination.

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

Raw-water storage: Reservoir, 20,000,000 gal, Lake Brandt, 800,000,000 gal.

Finished-water storage: 2 clear wells, 3,000,000 and 18,000,000 gal. 3 elevated tanks, 200,000; 500,000, and 1,500,000 gal.

The treatment plant is in the north central section of the city.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	16	16	Hardness as CaCO ₃ :		
Iron (Fe) .....	.07	.05	Total	25	40
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	8
Calcium (Ca)	6.1	12	Color	6	2
Magnesium (Mg).....	2.4	3.5	pH	7.2	8.4
Sodium (Na)	5.1	4.3	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	2	25 C.).....	70.4	104
Bicarbonate (HCO ₃)	34	35	Turbidity	--	--
Sulfate (SO ₄)	3.5	9.5	Temperature (F.)...	--	--
Chloride (Cl)	2.8	4.9	Date of collection...	Mar. 7, 1950	Mar. 7, 1950
Fluoride (F) .....	.2	.2			
Nitrate (NO ₃) .....	.2	.2			
Dissolved solids.....	54	70			

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.....	30	36	26	7.0	7.5	6.7	24	46	17	62	160	30
Finished water...	36	43	30	8.6	9.2	7.3	33	64	23	0	0	0

GREENVILLE
(Population, 16,724)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 17,000.

Source: Tar River.

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

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

Raw-water storage: None.

Finished-water storage: 2 clear wells, 300,000 gal each; 3 elevated tanks, 300,000 gal each.

The treatment plant is in the city near Tar River.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	12	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.11	.03	Total	23	41
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	16
Calcium (Ca)	5.9	13			
Magnesium (Mg).....	2.0	2.1	Color	13	4
Sodium (Na)	6.5	7.0	pH	6.7	7.3
Potassium (K)	0	0	Specific conductance		
Carbonate (CO ₃)	28	31	(micromhos at		
Bicarbonate (HCO ₃)	5.4	20	25 C.).....	80.7	124
Sulfate (SO ₄)	5.4	6.4	Turbidity	--	--
Chloride (Cl) .....	.2	.2	Temperature (F.)...	--	--
Fluoride (F) .....	.4	.6	Date of collection...	Aug. 24, 1950	Aug. 24, 1950
Nitrate (NO ₃)	58	79			
Dissolved solids.....					

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.....	10	16	13	6.8	7.0	6.3	34	46	29	--	460	16
Finished water...	27	36	16	8.0	8.6	6.7	47	57	37	--	--	--

HENDERSON
(Population, 10, 996)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 14,500.

Source: Fox Pond impounding reservoir for East Sandy Creek. Intake is about $1\frac{1}{2}$ miles south of the city. Rowland Lake, auxiliary or emergency supply.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, chlorination, Calgon, and adjustment of pH with soda ash.

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

Raw-water storage: Impounding reservoir, 40,000,000 gal (estimated).

Finished-water storage: 1 clear well, 750,000 gal; 1 standpipe, 172,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	12	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.08	.08	Total	11	29
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	17
Calcium (Ca)	2.8	9.8			
Magnesium (Mg).....	.9	1.0	Color	8	2
Sodium (Na)	5.9	6.0	pH	6.4	7.2
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	13	14	25 C.)	52.5	98.0
Sulfate (SO ₄)	3.9	16	Turbidity	--	--
Chloride (Cl)	5.1	8.6	Temperature (F.)...	--	--
Fluoride (F) .....	.2	.2	Date of collection...	Jan. 18, 1951	Jan. 18, 1951
Nitrate (NO ₃)	1.4	.9			
Dissolved solids.....	43	66			

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.....	12	14	8	6.7	7.0	6.3	10	13	6	15	100	10
Finished water...	27	30	2.5	7.5	7.8	7.0	13	14	12	0	1	0

HICKORY
(Population, 14,755)

Ownership: Municipal; also supplies Longview, Brookford, Windy City area, and suburban districts. Total population supplied, about 20,000.

Source: Catawba River impounded in Lake Hickory. The intake is 1,500 ft west of the treatment plant.

Treatment: Coagulation with alum, chlorination, sedimentation, rapid sand filtration, and final adjustment of pH to about 8.5 by addition of lime.

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

Raw-water storage: Lake Hickory, 32,440,000,000 gal.

Finished-water storage: 1 clear well, 500,000 gal; 1 elevated tank, 1,000,000 gal; 2 standpipes, 250,000 gal each.

The treatment plant is 2 miles northwest of center of the city.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	11	9.8	Hardness as CaCO₃:		
Iron (Fe) .....	.07	.07	Total	14	26
Manganese (Mn) .....	.12	.08	Noncarbonate.....	0	3
Calcium (Ca)	3.5	8.2			
Magnesium (Mg).....	1.4	1.4	Color	3	3
Sodium (Na)	3.6	3.3	pH	6.4	6.9
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	20	28	25 C.)	44.9	70.2
Sulfate (SO ₄)	1.9	5.5	Turbidity	--	--
Chloride (Cl)	2.2	3.0	Temperature (F.)...	--	--
Fluoride (F) .....	.1	.1	Date of collection...	Aug. 15,	Aug. 15,
Nitrate (NO ₃) .....	.6	.3		1950	1950
Dissolved solids.....	34	48			

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.....	10	12	9	6.7	6.8	6.6	12	15	11	30	60	25
Finished water...	27	30	24	8.6	8.8	8.3	23	29	21	0	0	0

HIGH POINT
(Population, 39, 973)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 42,500.

Source: Deep River impounded. The intake on Deep River is $4\frac{1}{2}$ miles northeast of treatment plant, which is 1 mile east of the city.

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

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

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

Finished-water storage: 1 clear well, 3,000,000 gal; 1 elevated tank, 1,000,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	19	18	Hardness as CaCO ₃ :		
Iron (Fe) .....	.13	.04	Total	27	42
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	10
Calcium (Ca)	6.1	12	Color	5	4
Magnesium (Mg).....	2.8	3.0	pH	7.1	7.3
Sodium (Na)	7.3	5.6	Specific conductance		
Potassium (K)	7.3	5.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	82.3	115
Bicarbonate (HCO ₃)	38	39	Turbidity	--	--
Sulfate (SO ₄)	5.6	15	Temperature (F.)...	--	--
Chloride (Cl)	3.6	4.8	Date of collection...	Mar. 17, 1950	Mar. 17, 1950
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃) .....	.3	.0			
Dissolved solids.....	64	79			

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.....	29	38	22	6.9	7.3	6.7	30	32	28	88	350	40
Finished water...	34	48	26	7.5	8.8	6.8	48	52	42	--	--	--

KANNAPOLIS
(Population, 28,448)

Ownership: Cannon Mills; also supplies suburban districts. Total population supplied, about 33,000.

Source: Buffalo Creek impounded for the regular supply. Coddle Creek serves as an auxiliary supply. The intake at the dam is about $1\frac{1}{2}$ miles west of Kannapolis.

Treatment: Domestic: Prechlorination, coagulation with alum, sedimentation, carbon, rapid sand filtration, ammoniation, postchlorination, and soda ash.
Industrial: Prechlorination, coagulation with alum, sedimentation, carbon, rapid sand filtration, and soda ash.

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

Raw-water storage: Impounding reservoir, 1,250,000,000 gal.

Finished-water storage: Drinking water system: 2 elevated tanks, 250,000 gal each; 2 clear wells, 100,000 and 75,000 gal. Industrial and sprinkler system: 1 open reservoir, 9,800,000; 2 standpipes, 250,000 gal each; 4 elevated tanks, 250,000, 100,000, 100,000, and 75,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	12	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.01	.02	Total	19	18
Manganese (Mn)	--	--	Noncarbonate.....	0	0
Calcium (Ca)	4.8	4.8	Color	3	2
Magnesium (Mg).....	1.6	1.5	pH.....	6.3	6.8
Sodium (Na)	7.2	18	Specific conductance		
Potassium (K)	0	0	(micromhos at		
Carbonate (CO ₃)			25 C.).....	63.1	121
Bicarbonate (HCO ₃)	29	43	Turbidity	1.3	.0
Sulfate (SO ₄)	4.9	11	Temperature (F.)...	--	--
Chloride (Cl)	3.1	6.5	Date of collection...	Sept. 11, 1951	Sept. 11, 1951
Fluoride (F) .....	.3	.3			
Nitrate (NO ₃) .....	.4	.1			
Dissolved solids.....	49	76			

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.....	23	28	20	7.0	7.3	6.6	16	19	14	6.7	26	2.0
Finished water...	30	40	18	7.1	7.9	6.3	21	60	14	.07	.30	.05

KINSTON
(Population, 18,336)

Ownership: Municipal; also supplies suburban districts. Total population supplied, 22,000.

Source: 4 wells (1 to 4) 361, 369, 365, and 552 ft deep; 3 artesian wells (Hillcrest group) 350 to 390 ft deep. The yield of the four wells is reported to be 900, 690, 460, 900 gpm. The flow of the artesian group is 150 gpm.

Treatment: The water from wells 1 to 4 is chlorinated before entering the distribution system. Water from the Hillcrest wells flows into a reservoir and is then pumped into the distribution system.

Finished-water storage: 2 reservoirs, 1,000,000 and 250,000 gal; 1 elevated tank, 500,000 gal.

ANALYSES

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

	Well 1	Well 2	Well 3	Well 4	Hillcrest Group 3 Wells
Silica (SiO ₂)	13	11	11	9.8	15
Iron (Fe) .....	.05	.05	.07	.04	.08
Manganese (Mn) .....	.00	.00	.00	.00	.00
Calcium (Ca)	7.6	5.6	1.6	6.4	15
Magnesium (Mg)	2.7	2.7	1.6	2.9	7.2
Sodium (Na)	40	40	48	47	24
Potassium (K)					
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	127	123	120	145	136
Sulfate (SO ₄)	3.1	2.6	3.2	1.4	2.9
Chloride (Cl)	6.0	5.8	8.0	6.0	3.5
Fluoride (F) .....	.2	.1	.3	.3	.1
Nitrate (NO ₃) .....	.3	.1	.4	.1	.5
Dissolved solids	138	132	136	151	139
Hardness as CaCO ₃ :					
Total	30	25	11	28	67
Noncarbonate	0	0	0	0	0
Color	3	2	7	12	2
pH	7.7	7.9	7.7	7.7	7.5
Specific conductance (micromhos at 25 C.)	227	220	225	252	236
Turbidity	--	--	--	--	--
Temperature (F.)	--	--	--	--	--
Date of collection	Feb. 19, 1951	Feb. 19, 1951	Feb. 19, 1951	Feb. 19, 1951	Feb. 19, 1951
Depth (feet)	361	369	365	552	350-390
Diameter (inches)	38-24-18	26-18-8	18-8	20-10	3
Date drilled	1926	1937	1945	1949	--
Percent of supply	--	--	--	--	--

LEXINGTON
(Population, 13,571)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 16,062.

Source: The Abbotts Creek intake is about 4 miles northeast of the city. Leonard Creek impounded in Leonard Lake is used as an auxiliary or emergency supply.

Treatment: Prechlorination, alum, air-mix, flocculation, sedimentation, rapid sand filtration, postchlorination (if required), final adjustment of pH with lime.

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

Raw-water storage: Leonard Lake, 365,000,000 gal.

Finished-water storage: At plant, 1,000,000 gal; 1 elevated tank, 1,000,000 gal; 1 standpipe, 350,000 gal.

The treatment plant is located 4.1 miles northeast of Lexington on the Greensboro Road.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	24	23	Hardness as CaCO ₃ :		
Iron (Fe) .....	.34	.34	Total	33	42
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	3
Calcium (Ca)	7.8	12	Color	4	3
Magnesium (Mg).....	3.2	2.9	pH	6.8	6.9
Sodium (Na)	8.2	9.2	Specific conductance		
Potassium (K)	0	0	(micromhos at		
Carbonate (CO ₃)	45	47	25 C.).....	102	131
Bicarbonate (HCO ₃)	3.3	11	Turbidity	--	--
Sulfate (SO ₄)	7.0	8.2	Temperature (F.)...	--	--
Chloride (Cl) .....	.1	.1	Date of collection...	Nov. 22, 1950	Nov. 22, 1950
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃)	76	92			
Dissolved solids.....					

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.....	28	32	25	7.1	7.5	6.8	28	30	25	50	3000	18
Finished water...	36	42	24	8.4	8.6	8.4	36	40	32	--	--	--

MONROE
(Population, 10, 140)

Ownership: Municipal; also supplies Wingate, Marshville and other suburban districts. Total population supplied, about 12,600.

Source: Richardson Creek impounded in Lake Lee. The intake at Lake is 2 miles east of treatment plant, which is in the city.

Treatment: Prechlorination, coagulation with alum, lime, activated carbon (Nuchar), sedimentation, rapid sand filtration, and postchlorination.

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

Raw-water storage: 450,000,000 gal.

Finished-water storage: 2 clear wells, 420,000 and 540,000 gal; 4 elevated tanks, 165,000, 500,000, 135,000 and 50,000 gal.

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) .....	.06	.06	Total	23	40
Manganese (Mn) .....	.00	.00	Noncarbonate.....	7	21
Calcium (Ca)	5.4	12	Color	12	3
Magnesium (Mg)	2.3	2.4	pH	6.8	7.4
Sodium (Na)	5.7	6.0	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	80.3	122
Bicarbonate (HCO ₃)	19	23	Turbidity	--	--
Sulfate (SO ₄)	6.8	18	Temperature (F.)...	--	--
Chloride (Cl)	8.0	10	Date of collection...	Jan. 8, 1951	Jan. 8, 1951
Fluoride (F) .....	.1	.3			
Nitrate (NO ₃)	1.3	.5			
Dissolved solids.....	50	70			

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.....	24	32	20	6.7	7.0	6.3	28	31	25	150	961	34
Finished water...	30	38	24	7.1	7.2	7.0	47	53	42	0	0	0

NEW BERN
(Population 15, 812)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 17,380.

Source: 8 wells (1 to 8) 90 to 115 ft deep. The total yield of the wells is reported to be 2,100 gpm.

Treatment: Zeolite softening, ammoniation, and chlorination.

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

Raw-water storage: None.

Finished-water storage: 1 reservoir, 300,000 gal; 1 elevated tank, 100,000 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)	16	17	Hardness as CaCO ₃ :		
Iron (Fe)	1.5	.18	Total	195	66
Manganese (Mn) .....	.00	.00	Noncarbonate.....	20	0
Calcium (Ca)	75	25			
Magnesium (Mg).....	1.8	.9	Color	18	3
Sodium (Na)	4.5	67	pH	7.0	7.4
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	213	219	25 C.)	418	411
Sulfate (SO ₄)	19	15	Turbidity	1	0
Chloride (Cl)	7.0	12	Temperature (F.)...	60	60
Fluoride (F) .....	.0	.0	Date of collection...	Aug. 30, 1951	Aug. 30, 1951
Nitrate (NO ₃) .....	.1	.1			
Dissolved solids.....	233	244			

^a Mixed sample from 8 wells.

RALEIGH
(Population, 65,679)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 70,000.

Source: Walnut Creek impounded in Lakes Raleigh and Johnson. Swift Creek impounded by mill dam, auxiliary supply (used extensively during periods of drought).

Treatment: Coagulation with alum, ammoniation (ammonium sulfate), prechlorination, sedimentation, activated carbon, rapid sand filtration, adjustment of pH with lime, and postchlorination.

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

Raw-water storage: Lake Raleigh, 150,000,000 gal; Lake Johnson, 500,000,000 gal; Swift Creek impounded, 20,000,000 gal.

Finished-water storage: 2 clear wells, 2,000,000 and 2,400,000 gal; 3 elevated tanks, 100,000; 600,000; 750,000 gal.

The treatment plant is on the old Fayetteville Road 1 mile south 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)	8.9	13	Hardness as CaCO ₃ :		
Iron (Fe) .....	.16	.04	Total	12	30
Manganese (Mn) ....	.00	.00	Noncarbonate.....	0	5
Calcium (Ca)	2.8	9.8			
Magnesium (Mg).....	1.3	1.4	Color.....	7	5
Sodium (Na)	5.0	5.1	pH.....	7.1	9.1
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	6	(micromhos at		
Bicarbonate (HCO ₃)	19	19	25 C.).....	47.6	99.5
Sulfate (SO ₄)	2.5	8.7	Turbidity.....	--	--
Chloride (Cl)	3.4	4.8	Temperature (F.)...	--	--
Fluoride (F) .....	.1	.0	Date of collection...	Apr. 20, 1950	Apr. 20, 1950
Nitrate (NO ₃) .....	.1	.0			
Dissolved solids.....	35	61			

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.....	14	34	8.8	7.0	8.3	6.3	--	--	--	11	115	4.0
Finished water...	27	39	0.9	9.2	9.5	8.4	--	--	--	.18	.75	.0

^a Walnut Creek.

REIDSVILLE
(Population, 11,708)

Ownership: Municipal; also supplies other suburban districts. Total population supplied, about 16,000.

Source: Troublesome Creek. The intake is about 3 miles southwest of treatment plant.

Treatment: Aeration (air-mix), coagulation with alum, sedimentation, rapid sand filtration, postchlorination, and adjustment of pH with soda ash.

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

Raw-water storage: None.

Finished-water storage: 1 clear well, 1,000,000 gal; 1 standpipe, 790,000 gal; 2 elevated tanks, 500,000 and 75,000 gal.

The treatment plant is 3 miles west of the center of the city. The capacity of treatment plant is to be increased to 3,000,000 gpd by 1953. Prechlorination and fluoridation will begin in 1953.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	18	18	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.24	Total	19	20
Manganese (Mn) .....	.00	.07	Noncarbonate.....	0	0
Calcium (Ca)	4.4	4.8	Color	2	4
Magnesium (Mg).....	1.9	2.0	pH	7.3	7.4
Sodium (Na)	2.8	11	Specific conductance		
Potassium (K)	0	0	(micromhos at		
Carbonate (CO ₃)	23	32	25 C.).....	57.2	108
Bicarbonate (HCO ₃)	1.8	12	Turbidity	--	--
Sulfate (SO ₄)	2.5	3.5	Temperature (F.)...	--	--
Chloride (Cl) .....	.2	.2	Date of collection...	Nov. 30, 1950	Nov. 30, 1950
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃)	48	74			
Dissolved solids.....					

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	32	18	6.8	7.1	6.5	18	19	17	33	400	5
Finished water...	36	48	22	8.1	8.6	7.6	18	19	17	<1	<1	<1

ROCKY MOUNT
(Population, 27,697)

Ownership: Municipal; also supplies suburban districts. Total population supplied about 36,000.

Source: Tar River. The intake is about 400 ft west of treatment plant, which is at the edge of the city.

Treatment: Coagulation with alum and lime, carbon, sedimentation, rapid sand filtration, chlorination, Calgon, ammoniation, and adjustment of pH with lime.

Rated capacity of treatment plant: 6,750,000 gpd.

Raw-water storage: None.

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

The river was at high stage and more turbid than usual at the time of the collection of the samples, and the samples are not typical of average conditions.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	11	16	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.04	Total	18	46
Manganese (Mn) .....	.00	.00	Noncarbonate.....	3	23
Calcium (Ca)	4.2	15			
Magnesium (Mg).....	1.8	2.0	Color	33	3
Sodium (Na)	3.2	5.4	pH	6.6	7.4
Potassium (K)	0	0	Specific conductance		
Carbonate (CO ₃)	18	28	(micromhos at		
Bicarbonate (HCO ₃)	5.1	26	25 C.).....	57.3	129
Sulfate (SO ₄)	3.1	4.8	Turbidity	--	--
Chloride (Cl) .....	.0	.1	Temperature (F.)...	--	--
Fluoride (F) .....	.5	.5	Date of collection...	June 7,	June 7,
Nitrate (NO ₃)	51	86		1950	1950
Dissolved solids.....					

SALISBURY
(Population, 20, 102)

Ownership: Municipal; also supplies Spencer and East Spencer and other suburban districts. Total population supplied, about 26,600.

Source: Yadkin River. Grant Creek is used in extreme emergency. The intake is at the junction of Yadkin and South Yadkin Rivers about 8 miles from the treatment plant which is on Kerr Street in the city.

Treatment: Prechlorination at raw water reservoir and at plant (breakpoint), coagulation with alum, sedimentation, rapid sand filtration, and adjustment of pH with lime.

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

Raw-water storage: Reservoir (near river), 8,000,000 gal.

Finished-water storage: 2 clear wells, 750,000 and 1,000,000 gal; 2 elevated tanks, 1,000,000 and 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)	12	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.05	.03	Total	13	35
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	12
Calcium (Ca)	3.2	12	Color.....	4	6
Magnesium (Mg).....	1.3	1.3	pH.....	7.1	8.4
Sodium (Na)	3.7	3.4	Specific conductance		
Potassium (K)	0	1	(micromhos at		
Carbonate (CO ₃)	18	27	25 C.).....	55.8	91.5
Bicarbonate (HCO ₃)	2.7	12	Turbidity.....	--	--
Sulfate (SO ₄)	2.2	4.2	Temperature (F.)...	--	--
Chloride (Cl) .....	.1	.1	Date of collection...	June 8, 1950	June 8, 1950
Fluoride (F) .....	.5	.4			
Nitrate (NO ₃)	35	61			
Dissolved solids.....					

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.....	15	16	14	7.0	7.2	6.9	16	--	--	133	291	36
Finished water...	23	26	19	8.4	8.9	7.7	30	--	--	0	0	0

SANFORD
(Population, 10,013)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 10,400.

Source: Partridge Creek impounded in 2 lake reservoirs near treatment plant; Lick Creek impounded in Lake William.

Treatment: Prechlorination, coagulation with lime and alum, sedimentation, rapid sand filtration, postchlorination, Calgon, and final adjustment of pH with lime.

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

Raw-water storage: 3 lake reservoirs about 18,000,000, 75,000,000 and 35,000,000 gal.

Finished-water storage: 1 clear well, 350,000 gal; 1 standpipe, 250,000 gal; 1 elevated tank, 75,000 gal.

Lake William is about 8 miles southeast of the center of town. Water is pumped from Lake William into Partridge Creek, which is impounded in reservoirs at the treatment plant.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	13	13	Hardness as CaCO ₃ :		
Iron (Fe) .....	.37	.22	Total	13	27
Manganese (Mn) .....	.00	.03	Noncarbonate.....	0	9
Calcium (Ca)	3.0	8.6	Color	5	4
Magnesium (Mg)	1.3	1.3	pH	6.7	7.5
Sodium (Na)	4.4	4.9	Specific conductance		
Potassium (K)	0	0	(micromhos at		
Carbonate (CO ₃)	17	22	25 C.)	44.9	85.2
Bicarbonate (HCO ₃)	2.2	9.5	Turbidity	--	--
Sulfate (SO ₄)	3.9	5.8	Temperature (F.)...	--	--
Chloride (Cl) .....	.1	.4	Date of collection...	Jan. 11, 1951	Jan. 11, 1951
Fluoride (F) .....	.5	.2			
Nitrate (NO ₃)	41	59			
Dissolved solids.....					

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.....	12	18	7	6.4	6.9	5.9	11	14	8	30	1500	8
Finished water...	19	26	9	7.7	9.0	6.4	34	52	24	0	0	0

SHELBY
(Population, 15,508)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 16,000.

Source: First Broad River. The intake is on the River about 0.2 mile northwest of treatment plant, which is about $1\frac{1}{4}$ miles northwest of the center of the city.

Treatment: Copper sulfate, prechlorination, coagulation with alum and lime, ammoniation, carbon, sedimentation, rapid sand filtration, postchlorination, and final adjustment of pH with lime.

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

Raw-water storage: 2 reservoirs, 8,500,000 and 5,000,000 gal.

Finished-water storage: 1 clear well, 2,000,000 gal; 2 elevated tanks, each 500,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	22	11	Hardness as CaCO ₃ :		
Iron (Fe) .....	.04	.04	Total	15	25
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	0
Calcium (Ca)	3.8	8.1	Color.....	4	3
Magnesium (Mg).....	1.3	1.1	pH.....	7.4	8.5
Sodium (Na)	7.4	8.5	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	3	25 C.).....	63.5	92.9
Bicarbonate (HCO ₃)	28	24	Turbidity.....	--	--
Sulfate (SO ₄)	3.1	12	Temperature (F.)...	--	--
Chloride (Cl)	3.0	4.0	Date of collection...	Aug. 14,	Aug. 14,
Fluoride (F) .....	.1	.1		1950	1950
Nitrate (NO ₃) .....	.4	.1			
Dissolved solids.....	60	61			

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	11	--	7.4	6.9	--	--	--	--	330	15
Finished water...	--	25	16	8.8	9.1	8.8	--	--	--	0	0	0

STATESVILLE
(Population, 16,901)

Ownership: Municipal: also supplies suburban districts. Total population supplied, about 18,600.

Source: Fourth Creek, Morrison Creek, emergency supply. The intake is about 1,600 ft north of the treatment plant, which is approximately 2 miles north of the city.

Treatment: Prechlorination, coagulation with alum and lime, activated carbon (if needed), sedimentation, rapid sand filtration, postchlorination (if needed), Calgon, and adjustment of pH with lime.

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

Raw-water storage: None.

Finished-water storage: 1 elevated tank 1,000,000 gal; clear well, 1,100,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	20	18	Hardness as CaCO ₃ :		
Iron (Fe) .....	.07	.07	Total	23	36
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	9
Calcium (Ca)	5.2	10	Color	4	3
Magnesium (Mg).....	2.5	2.6	pH	7.1	7.2
Sodium (Na)	4.6	5.0	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	66.8	99.9
Bicarbonate (HCO ₃)	34	32	Turbidity	--	--
Sulfate (SO ₄)	1.9	14	Temperature (F.)...	--	--
Chloride (Cl)	2.1	3.4	Date of collection...	Mar. 27, 1951	Mar. 27, 1951
Fluoride (F) .....	.1	.3			
Nitrate (NO ₃) .....	.2	.2			
Dissolved solids.....	53	70			

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.....	28	29	27	7.1	7.2	6.9	--	--	--	37	2000	20
Finished water...	28	29	27	7.1	7.2	6.9	40	42	39	.1	2.0	0

THOMASVILLE
(Population, 11,154)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 14,500.
 Source: Abbotts Creek. The intake is $4\frac{1}{4}$ miles northwest of the treatment plant, which is $1\frac{1}{2}$ miles west of the center of the city on U. S. Highway 70.
 Treatment: Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, postchlorination at times, and adjustment of pH with lime.
 Rated capacity of treatment plant: 1,500,000 gpd.
 Raw-water storage: None.
 Finished-water storage: 1 clear well, 480,000 gal; 1 elevated tank, 1,000,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	24	23	Hardness as CaCO ₃ :		
Iron (Fe) .....	.09	.12	Total	33	54
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	15
Calcium (Ca)	7.6	17	Color.....	4	4
Magnesium (Mg).....	3.5	2.9	pH.....	6.8	7.0
Sodium (Na)	8.6	8.0	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	105	155
Bicarbonate (HCO ₃)	45	48	Turbidity	--	--
Sulfate (SO ₄)	3.3	17	Temperature (F.)...	--	--
Chloride (Cl)	7.8	10	Date of collection...	Nov. 22, 1950	Nov. 22, 1950
Fluoride (F) .....	.2	.2			
Nitrate (NO ₃) .....	.2	.1			
Dissolved solids.....	77	107			

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.....	34	39	26	7.1	7.3	6.9	--	--	--	210	1093	138
Finished water...	38	45	28	8.1	8.9	7.2	--	--	--	--	--	--

WILSON
(Population, 23, 010)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 24, 000.

Source: Contentnea Creek, 75 percent of supply; Toisnot Swamp (Creek), 25 percent. The intake on Contentnea Creek is about 4 miles southwest of treatment plant and the intake on Toisnot Swamp is about 0.5 mile east.

Treatment: Prechlorination, coagulation with alum, lime (if necessary), sedimentation, rapid sand filtration, ammoniation, Calgon, postchlorination, and adjustment of pH with lime.

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

Raw-water storage: None.

Finished-water storage: 1 reservoir, 2, 000, 000 gal; 1 elevated tank, 1, 000, 000 gal.

During dry periods, Toisnot Swamp (Creek) may furnish about 35 percent of the total raw-water supply. Plans are under way for increasing the treatment plant capacity to 6, 000, 000 gpd.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	7.6	8.3	Hardness as CaCO₃:		
Iron (Fe) .....	.21	.06	Total	10	41
Manganese (Mn) .....	.00	.00	Noncarbonate	0	13
Calcium (Ca)	2.3	14			
Magnesium (Mg)	1.1	1.4	Color	28	4
Sodium (Na)	5.6	13	pH	6.7	7.9
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	15	34	25 C.)	48.1	155
Sulfate (SO ₄)	2.9	30	Turbidity	--	--
Chloride (Cl)	4.9	6.5	Temperature (F.) ...	--	--
Fluoride (F) .....	.0	.1	Date of collection ...	June 14,	June 14,
Nitrate (NO ₃) .....	.3	.8		1950	1950
Dissolved solids	40	92			

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	16	24	12	6.8	7.2	6.4	20	38	10	5	300	0
Finished water...	26	30	16	8.2	9.2	7.2	36	54	20	0	0	0

WILMINGTON
(Population, 45, 043)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 48, 500.

Source: Cape Fear River. Northeast Cape Fear River and Toomers Creek auxiliary or emergency supplies (neither used in last five years). The intake is approximately 30 miles north of Wilmington at Kings Bluff.

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

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

Raw-water storage: None.

Finished-water storage: 2 reservoirs, 4, 000, 000 and 1, 000, 000 gal; 2 elevated tanks, 500, 000 and 146, 000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	7.4	6.1	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.05	Total	17	34
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	9
Calcium (Ca)	4.2	11	Color	9	3
Magnesium (Mg).....	1.5	1.7	pH	7.1	7.8
Sodium (Na)	9.2	9.1	Specific conductance		
Potassium (K)	0	0	(micromhos at		
Carbonate (CO ₃)	25	31	25 C.).....	74.2	116
Bicarbonate (HCO ₃)	6.2	17	Turbidity	--	--
Sulfate (SO ₄)	6.6	7.6	Temperature (F.)...	--	--
Chloride (Cl) .....	.1	.1	Date of collection...	Mar. 20,	Mar. 20,
Fluoride (F) .....	.3	.2		1950	1950
Nitrate (NO ₃)	48	68			
Dissolved solids.....					

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.....	19	28	10	6.9	7.3	6.3	23	28	16	60	140	20
Finished water...	28	34	21	8.0	8.9	6.9	42	50	30	0	0	0

WINSTON-SALEM
(Population, 87,811)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 100,000.

Source: Salem and Walker Creeks impounded in Salem Lake. The Yadkin River serves as an auxiliary or emergency supply, furnishing an additional 25,000,000 gpd. The intake on Salem Lake is 2 miles east of the treatment plant which is about $2\frac{1}{2}$ miles northeast of the center of the city.

Treatment: Prechlorination, coagulation with alum, sedimentation, rapid sand filtration, postchlorination, fluoridation, Calgon for corrosion control, and adjustment of pH with lime.

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

Raw-water storage: Salem Lake, 1,250,000,000 gal.

Finished-water storage: 3 clear wells, 2,000,000 gal each; 3 elevated tanks, 1,000,000, 200,000, and 50,000 gal.

ANALYSES

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

	Salem and Walker Creeks		Yadkin River
	Raw water	Finished water	(raw water)
Silica (SiO ₂)	12	12	10
Iron (Fe) .....	.02	.03	.06
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	4.3	11	3.4
Magnesium (Mg)	1.6	1.7	.9
Sodium (Na)	3.9	3.3	3.3
Potassium (K)			
Carbonate (CO ₃)	0	7	0
Bicarbonate (HCO ₃)	21	16	15
Sulfate (SO ₄)	4.1	9.5	3.0
Chloride (Cl)	2.8	4.6	2.2
Fluoride (F) .....	.1	^a .0	.2
Nitrate (NO ₃) .....	.3	.7	.4
Dissolved solids	39	58	32
Hardness as CaCO ₃ :			
Total	17	34	12
Noncarbonate	0	10	0
Color	9	2	12
pH	7.5	9.0	6.4
Specific conductance (micromhos at 25 C.)	54.2	87.2	40.1
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	Feb. 24, 1950	Feb. 24, 1950	Feb. 1, 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	18	39	8	7.5	9.0	6.8	20	34	10	17	475	3
Finished water	25	41	15	9.2	9.9	6.9	42	68	23	.09	1.7	.05

^a The supply was not being fluoridated at the time of the collection of the sample. Fluoridation was begun later.

AIKEN
(Population, 7,083)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 8,500.

Source: Springs about 6.5 miles north of the city.

Treatment: Chlorination and lime.

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

Raw-water storage: None.

Finished-water storage: Two standpipes, 200,000 and 600,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	5.9	5.4	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.03	Total	4	11
Manganese (Mn) .....	.00	.00	Noncarbonate.....	1	1
Calcium (Ca) .....	.8	4.0	Color.....	7	3
Magnesium (Mg).....	.4	.3	pH	5.2	6.0
Sodium (Na)	2.8	3.3	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)			25 C.).....	29.6	38.3
Bicarbonate (HCO ₃)	0	0	Turbidity	--	--
Sulfate (SO ₄) .....	.7	1.6	Temperature (F.)...	66	64
Chloride (Cl)	2.6	2.6	Date of collection...	Mar. 5, 1951	Mar. 5, 1951
Fluoride (F) .....	.0	.0			
Nitrate (NO ₃)	3.5	3.0			
Dissolved solids.....	23	30			

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.....	0	--	--	4.8	5.2	4.6	2.0	--	--	0	--	--
Finished water...	20	--	--	7.0	--	--	20	--	--	0	--	--

ANDERSON
(Population, 19,770)

Ownership: Duke Power Company. Also supplies suburban districts. Total population supplied, about 25,000.

Source: Rocky River, 75 percent of supply; Bailey Creek, 25 percent of supply.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, chlorination, and adjustment of pH with soda ash.

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

Raw-water storage: None.

Finished-water storage: 1 clear well, 40,000 gal; 1 standpipe, 198,000 gal; 2 elevated tanks, 500,000 gal each; 2 reservoirs, 1,327,000 and 155,000 gal.

ANALYSES

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

	Rocky River Raw water	Bailey Creek Raw water	Finished water (city tap)
Silica (SiO ₂)	17	16	16
Iron (Fe) .....	.11	.06	.05
Manganese (Mn) .....	.00	.00	.06
Calcium (Ca)	2.2	2.2	5.8
Magnesium (Mg) .....	.8	.8	1.5
Sodium (Na)	8.0	8.5	8.5
Potassium (K)			
Carbonate (CO ₃)			
Bicarbonate (HCO ₃)	22	21	27
Sulfate (SO ₄)	3.0	5.0	12
Chloride (Cl)	2.8	2.5	2.4
Fluoride (F) .....	.1	.1	.1
Nitrate (NO ₃)	1.0	1.4	1.0
Dissolved solids	48	46	62
Hardness as CaCO ₃ :			
Total	9	9	21
Noncarbonate	0	0	0
Color	27	6	7
pH	7.0	6.6	6.6
Specific conductance (micromhos at 25 C.)	53.6	52.8	84.2
Turbidity	--	--	--
Temperature (F.)	51	52	45
Date of collection	Feb. 13, 1951	Feb. 13, 1951	Feb. 13, 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	19	19	19	6.8	6.9	6.7	--	--	--	77	1,500	25
Finished water...	23	23	23	7.6	7.7	7.5	22	22	22	0	0	0

BEAUFORT
(Population, 5,081)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 9,350.

Source: 5 wells (1 to 5) 120, 87, 65, 65, and 65 ft deep; yield reported to be 350, 350, 250, 250, and 400 gpm.

Treatment: Zeolite softening, chlorination at times.

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

Raw-water storage: None.

Finished-water storage: 1 elevated tank, 100,000 gal; 1 standpipe, 126,000 gal.

ANALYSIS

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

	Finished ^a water		Finished ^a water
Silica (SiO ₂)	9.4	Hardness as CaCO ₃ :	
Iron (Fe) .....	.54	Total	107
Manganese (Mn) .....	.00	Noncarbonate	26
Calcium (Ca)	40		
Magnesium (Mg)	1.7	Color	4
Sodium (Na)	16	pH	7.0
Potassium (K)	0	Specific conductance	
Carbonate (CO ₃)	98	(micromhos at	
Bicarbonate (HCO ₃)	31	25 C.).....	294
Sulfate (SO ₄)	20	Turbidity	1
Chloride (Cl) .....	.2	Temperature (F.).....	64
Fluoride (F) .....	.3	Date of collection	Dec. 12,
Nitrate (NO ₃)	171		1951
Dissolved solids			

^a From wells 2, 3, and 5.

BENNETTSVILLE
(Population, 5,140)

Ownership: Municipal; supplies also suburban districts. Total population supplied, about 6,000.

Source: 2 deep wells 300 and 350 ft deep; 1 well field of 8 wells each 60 ft deep; and 1 well field of 5 wells each 60 ft deep.

Treatment: Adjustment of pH with soda ash.

Rated capacity of treatment plant: 756,000 gpd.

Raw-water storage: None.

Finished-water storage: 1 clear well, 300,000 gal; 1 elevated tank, 100,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	10	10	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.06	Total	9	9
Manganese (Mn) .....	.00	.02	Noncarbonate.....	4	0
Calcium (Ca)	1.3	1.6			
Magnesium (Mg).....	1.4	1.3	Color.....	3	3
Sodium (Na)	14	28	pH.....	5.3	6.6
Potassium (K)			Specific conductance		
Carbonate (CO ₃)			(micromhos at		
Bicarbonate (HCO ₃)	6	46	25 C.).....	96.9	150
Sulfate (SO ₄)	2.8	1.8	Turbidity.....	1	1
Chloride (Cl)	14	14	Temperature (F.)...	65	55
Fluoride (F) .....	.1	.0	Date of collection...	Dec. 17,	Dec. 17,
Nitrate (NO ₃)	15	14		1951	1951
Dissolved solids.....	64	93			

CAMDEN
(Population, 6,986)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 8,000.

Source: Little Pine Tree Creek. The intake is about 3 miles east of the city.

Treatment: Prechlorination, coagulation with alum, sedimentation, rapid sand filtration, postchlorination, addition of Calgon, and adjustment of pH with soda ash.

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

Raw-water storage: None.

Finished-water storage: one clear well 65,000 gal; 1 reservoir, 450,000 gal; 1 standpipe, 235,000 gal; 1 elevated tank, 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)	5.3	4.8	Hardness as CaCO ₃ :		
Iron (Fe) .....	.06	.02	Total	3	4
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	0
Calcium (Ca) .....	.6	1.0			
Magnesium (Mg).....	.3	.3	Color	45	7
Sodium (Na)	2.6	14	pH	5.4	6.2
Potassium (K)			Specific conductance		
Carbonate (CO ₃)			(micromhos at		
Bicarbonate (HCO ₃)	0	0	25 C.)	21.2	73.1
Sulfate (SO ₄)	2.1	8.9	Turbidity	--	--
Chloride (Cl)	2.2	5.2	Temperature (F.)...	--	--
Fluoride (F) .....	.1	.1	Date of collection...	Mar. 8,	Mar. 8,
Nitrate (NO ₃) .....	.4	.3		1951	1951
Dissolved solids.....	27	45			

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.....	4	5	4	6.2	6	5.5	4	4	4	65	70	--
Finished water...	19	22	16	7	7	7	5	5	5	5	5	5

CHARLESTON
(Population, 70,174)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 120,000.

Source: Edisto River 99 percent of supply; Goose Creek impounded in Goose Creek Reservoir 1 percent of supply.

Treatment: Prechlorination, coagulation with alum and sodium aluminate, addition of copper sulfate and activated carbon (Nuchar) occasionally, sedimentation, rapid sand filtration, postchlorination, and addition of caustic soda.

Rated capacity of treatment plant: 22,000,000 gpd.

Raw-water storage: Goose Creek storage reservoir, 2,780,000,000 gal.

Finished-water storage: 2 ground reservoirs, 2,000,000 and 350,000 gal; 4 elevated tanks, 2,000,000, 250,000, 200,000, 75,000 gal.

Water from the Edisto River flows by gravity through a tunnel aqueduct direct to pumping station or to Goose Creek as desired.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	5.1	3.3	Hardness as CaCO ₃ :		
Iron (Fe) .....	.22	.02	Total	20	21
Manganese (Mn) .....	.00	.00	Noncarbonate.....	1	2
Calcium (Ca)	6.8	6.8			
Magnesium (Mg).....	.8	.9	Color.....	54	2
Sodium (Na)	4.1	15	pH.....	6.1	6.4
Potassium (K)			Specific conductance		
Carbonate (CO ₃)			(micromhos at		
Bicarbonate (HCO ₃)	0	0	25 C.).....	60.1	119
Sulfate (SO ₄)	23	23	Turbidity	--	--
Chloride (Cl)	5.6	8.0	Temperature (F.)...	--	--
Fluoride (F) .....	.0	.1	Date of collection...	Apr. 26, 1951	Apr. 26, 1951
Nitrate (NO ₃) .....	.6	.1			
Dissolved solids.....	46	68			

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.....	10	17	5	6.6	7.1	6.0	--	--	--	81	180	50
Finished water...	17	27	12	8.4	9.2	7.6	--	--	--	6	30	2

CHESTER
(Population, 6,893)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 8,000.

Source: Sandy River impounded. The intake is about 2.5 miles west of the city.

Treatment: Prechlorination, coagulation with alum, sedimentation, rapid sand filtration, and adjustment of pH with soda ash.

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

Raw-water storage: Impounding reservoir, 534,000,000 gal.

Finished-water storage: 2 reservoirs, 500,000, 267,000 gal; 2 elevated tanks, 250,000 and 150,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	20	18	Hardness as CaCO ₃ :		
Iron (Fe) .....	.07	.05	Total	25	26
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	0
Calcium (Ca)	5.4	5.8	Color.....	5	4
Magnesium (Mg).....	2.7	2.9	pH.....	6.4	6.6
Sodium (Na)	7.6	25	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	91.3	176
Bicarbonate (HCO ₃)	35	65	Turbidity.....	--	--
Sulfate (SO ₄)	3.4	20	Temperature (F.)...	--	--
Chloride (Cl)	5.2	8.6	Date of collection...	Mar. 9, 1951	Mar. 8, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃)	1.4	.0			
Dissolved solids.....	65	112			

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.....	24	32	17	6.8	7.4	6.0	--	--	--	150	4,000	100
Finished water...	46	42	40	8.4	8.4	8.4	12	16	10	0	0	0

CLINTON
(Population, 7,168)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 4,580. Private systems supply the remaining population of the city.

Source: Duncan Creek. The intake is about 5 miles northeast of the city.

Treatment: Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, and adjustment of pH with soda ash.

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

Raw-water storage: 2 reservoirs, 600,000 and 625,000 gal.

Finished-water storage: 1 clear well, 250,000 gal; 2 elevated tanks, 250,000 and 100,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	23	23	Hardness as CaCO ₃ :		
Iron (Fe) .....	.05	.03	Total	16	21
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	0
Calcium (Ca)	4.1	5.6	Color	9	4
Magnesium (Mg).....	1.5	1.6	pH	7.1	7.4
Sodium (Na)	6.0	14	Specific conductance		
Potassium (K)	0	0	(micromhos at		
Carbonate (CO ₃)	25	37	25 C.).....	61.2	114
Bicarbonate (HCO ₃)	3.0	15	Turbidity	24	1
Sulfate (SO ₄)	3.4	3.9	Temperature (F.)...	43	43
Chloride (Cl) .....	.2	.1	Date of collection...	Dec. 20,	Dec. 20,
Fluoride (F) .....	.5	.3		1951	1951
Nitrate (NO ₃)	57	84			
Dissolved solids.....					

COLUMBIA
(Population, 86,914)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 102,000.

Source: Congaree River.

Treatment: Coagulation with alum and lime, prechlorination (breakpoint), sedimentation, rapid sand filtration, and adjustment of pH with lime.

Rated capacity of treatment plant: 18,000,000 gpd.

Raw-water storage: 40,000,000 gal.

Finished-water storage: 2 clear water reservoirs, 2,800,000 and 3,000,000 gal; 1 standpipe, 375,000 gal; 1 elevated tank, 1,500,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	14	12	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.03	Total	22	29
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	3
Calcium (Ca)	6.0	8.5			
Magnesium (Mg).....	1.6	1.9	Color.....	2	3
Sodium (Na)	7.7	6.9	pH.....	6.5	6.6
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	34	32	25 C.).....	71.5	97.1
Sulfate (SO ₄)	4.0	10	Turbidity	--	--
Chloride (Cl)	4.0	4.9	Temperature (F.)...	--	--
Fluoride (F) .....	.1	.1	Date of collection...	Mar. 9, 1951	Mar. 9, 1951
Nitrate (NO ₃) .....	.5	.3			
Dissolved solids.....	55	63			

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.....	23	28	16	7.0	7.3	6.8	--	--	--	75	370	25
Finished water...	24	29	18	8.4	8.9	7.2	33	42	24	--	--	--

CONWAY
(Population, 6,073)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 8,000.

Source: 10 wells: Park Well and Hill Well, 438 and 406 ft deep; 3 artesian wells at plant 400 ft deep; 3 artesian wells in cemetery, 210 ft deep; 2 artesian wells on 1st Avenue, 290 and 286 ft deep. The wells are flowing except the first two named.

Treatment: None.

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

Storage: Reservoirs, 400,000 gal; 1 elevated tank, 100,000 gal.

ANALYSES

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

	Park Well	Hill Well	3 wells at plant
Silica (SiO ₂)	15	12	15
Iron (Fe) .....	.05	.16	.04
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	2.6	2.8	2.3
Magnesium (Mg) .....	.8	1.3	1.1
Sodium (Na)	264	245	254
Potassium (K)			
Carbonate (CO ₃)	22	14	24
Bicarbonate (HCO ₃)	540	568	542
Sulfate (SO ₄) .....	.9	1.2	1.0
Chloride (Cl)	67	31	47
Fluoride (F)	3.5	4.2	3.8
Nitrate (NO ₃) .....	.5	.4	.4
Dissolved solids	647	601	620
Hardness as CaCO ₃ :			
Total	10	12	10
Noncarbonate	0	0	0
Color	13	12	14
pH	8.2	8.1	8.3
Specific conductance (micromhos at 25 C.)	1,070	974	1,010
Turbidity	1	1	1
Temperature (F.)	69	69	60
Date of collection	Dec. 19, 1951	Dec. 19, 1951	Dec. 19, 1951
Depth (feet)	438	406	400
Diameter (inches)	8	8	10
Date drilled	1936	1946	1918
Percent of supply	--	--	--

DARLINGTON
(Population, 6,619)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 7,600.

Source: 4 wells (1 to 4) 315, 317, 570, and 450 ft deep; yield reported to be 300, 400, 100, 530 gpm. Well 4 is for emergency use.

Treatment: Adjustment of pH with lime.

Rated capacity of treatment plant: 800,000 gpd.

Raw-water storage: None.

Finished-water storage: Reservoir, 300,000 gal; 1 elevated tank, 90,000 gal.

ANALYSES

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

	Well 1 (raw water)	Finished water ^a		Well 1 (raw water)	Finished water ^a
Silica (SiO ₂)	11	11	Hardness as CaCO ₃ :		
Iron (Fe) .....	.84	.66	Total	5	37
Manganese (Mn) .....	.00	.00	Noncarbonate.....	3	7
Calcium (Ca)	1.0	12	Color	1	4
Magnesium (Mg) .....	.7	1.7	pH	5.1	7.2
Sodium (Na)	4.4	2.0	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)			25 C.)	31.6	83.5
Bicarbonate (HCO ₃)	3	36	Turbidity	0	2
Sulfate (SO ₄)	9.8	9.1	Temperature (F.)...	66	59
Chloride (Cl)	1.2	1.5	Date of collection...	Dec. 18, 1951	Dec. 18, 1951
Fluoride (F) .....	.2	.1			
Nitrate (NO ₃) .....	.0	.1			
Dissolved solids.....	30	56			

^a Wells 1 and 2.

EASLEY
(Population, 6,316)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 8,400.

Source: Burdine Creek (70 percent of supply): Maddog Branch (30 percent of supply). The intake on Burdine Creek is 3 miles northeast of the city; on Maddog Branch, about 1 mile northeast of the city.

Treatment: Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, adjustment of pH with soda ash, (sodium metaphosphate and ammonia occasionally).

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

Raw-water storage: None.

Finished-water storage: Clear well, 900,000 gal; 3 elevated tanks, 500,000, 200,000, and 60,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	11	10	Hardness as CaCO₃:		
Iron (Fe) .....	.06	.04	Total	10	14
Manganese (Mn) .....	.00	.00	Noncarbonate.....	2	0
Calcium (Ca)	2.8	4.4			
Magnesium (Mg).....	.7	.7	Color	5	2
Sodium (Na)	2.3	7.3	pH	6.8	7.2
Potassium (K)			Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	10	18	25 C.).....	31.2	65.9
Sulfate (SO ₄)	2.0	8.1	Turbidity	30	1
Chloride (Cl)	2.1	3.5	Temperature (F.)...	44	46
Fluoride (F) .....	.2	.2	Date of collection...	Dec. 20,	Dec. 20,
Nitrate (NO ₃)	1.5	1.3		1951	1951
Dissolved solids.....	28	45			

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.....	14	17	10	6.3	6.9	5.7	--	--	--	30	1,000	25
Finished water...	22	27	--	7.3	7.4	7	16	20	14	5	5	5

SOUTH CAROLINA

FLORENCE
(Population, 22,513)

Ownership: Municipal; also supplies suburban areas. Total population supplied, about 25,000.

Source: 5 wells (6, 9 to 12) 735, 728, 768, 740, and 758 ft deep; yield reported to be 860, 300, 740, 820, and 920 gpm.

Treatment: Aeration, filtration (iron and CO₂ removal), pH adjustment, and chlorination.

Rated capacity of treatment plant: 4,896,000 gpd.

Raw-water storage: None.

Finished-water storage: 2 ground reservoirs, 1,400,000 gal; 3 elevated tanks, 100,000, 500,000, and 300,000 gal.

ANALYSES

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

	Well 6 (raw water)	Well 12 (raw water)	Wells 6, 9, 10, 11 (finished water)
Silica (SiO)	31	18	21
Iron (Fe)	3.4	1.2	.14
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	7.6	2.1	12
Magnesium (Mg)	2.6	1.5	2.7
Sodium (Na)	12	17	31
Potassium (K)			
Carbonate (CO ₃)		0	0
Bicarbonate (HCO ₃)	19	27	85
Sulfate (SO ₄)	9.8	8.5	10
Chloride (Cl)	20	12	20
Fluoride (F) .....	.3	.1	.2
Nitrate (NO ₃) .....	.0	.0	.1
Dissolved solids	96	71	140
Hardness as CaCO ₃ :			
Total	30	11	41
Noncarbonate	14	0	0
Color	3	4	2
pH	5.8	6.2	7.2
Specific conductance (micromhos at 25 C.)	129	106	228
Turbidity	0	0	0
Temperature (F.)	67	69	69
Date of collection	Dec. 18, 1951	Dec. 18, 1951	Dec. 18, 1951
Depth (feet)	735	785	
Diameter (inches)	18	20	
Date drilled	Nov., 1930	July, 1950	
Percent of supply	--	--	

GAFFNEY
(Population, 8,123)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 11,000.

Source: Cherokee Creek.

Treatment: Coagulation with alum and lime, activated carbon, sedimentation, rapid sand filtration, chlorination, Calgon, and adjustment of pH with lime.

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

Raw-water storage: 2,000,000 gal.

Finished-water storage: 2 clear wells, 450,000 and 100,000 gal; 1 standpipe, 500,000 gal; 1 elevated tank, 500,000 gal.

The treatment plant is on the creek 3.5 miles from the city.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	11	10	Hardness as CaCO ₃ :		
Iron (Fe) .....	.07	.04	Total	11	15
Manganese (Mn) .....	.0	.07	Noncarbonate.....	0	4
Calcium (Ca)	2.4	4.0			
Magnesium (Mg).....	1.2	1.2	Color	7	6
Sodium (Na)	4.1	3.4	pH	6.0	6.3
Potassium (K)	0	0	Specific conductance		
Carbonate (CO ₃)	15	14	(micromhos at		
Bicarbonate (HCO ₃)	2.4	5.8	25 C.)	41.7	52.4
Sulfate (SO ₄)	3.0	3.1	Turbidity	--	--
Chloride (Cl) .....	.0	.0	Temperature (F.)...	54	46
Fluoride (F)	1.0	.7	Date of collection...	Feb. 14, 1951	Feb. 14, 1951
Nitrate (NO ₃)	33	37			
Dissolved solids.....					

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.....	9	10	7	6.7	7.1	6.5	--	--	--	75	375	30
Finished water...	12	14	10	7.3	7.5	7.1	21	26	18	--	--	--

GEORGETOWN
(Population, 6,004)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 8,500.

Source: 5 wells (1 to 5) 650, 850, 850, 925, and 800 ft deep; yield reported to be 190, 210, 150, 200, and 400 gpm.

Treatment: Chlorination.

Raw-water storage: A reservoir, 230,000 gal.

Finished-water storage: 1 standpipe, 146,000 gal.

Water from well 1 and 2 is pumped into a reservoir and is chlorinated when pumped from this to the distribution system.

ANALYSES

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

	Wells 1 and 2 (raw water)	Well 3 (raw water)	Well 4 (raw water)			
Silica (SiO ₂)	13	12	14			
Iron (Fe) .....	.13	.17	.12			
Manganese (Mn) .....	.00	.00	.00			
Calcium (Ca)	2.1	2.0	2.4			
Magnesium (Mg).....	.6	.9	.7			
Sodium (Na).....	}	}	}			
Potassium (K)				215	219	246
Carbonate (CO ₃)				26	20	17
Bicarbonate (HCO ₃).....				467	463	528
Sulfate (SO ₄).....				1.4	3.0	2.1
Chloride (Cl)				32	46	54
Fluoride (F) .....				.9	1.1	1.1
Nitrate (NO ₃)				1.1	.8	.8
Dissolved solids				522	536	599
Hardness as CaCO ₃ :						
Total				8	9	9
Noncarbonate				0	0	0
Color				5	4	3
pH.....				8.5	8.3	8.4
Specific conductance (micromhos at 25 C.).....				356	878	982
Turbidity				0	1	1
Temperature (F.)				--	76	--
Date of collection				Dec. 19, 1951	Dec. 19, 1951	Dec. 19, 1951
Depth (feet)	650,	850	925			
Diameter (inches)	8,	8	8			
Date drilled	1899,	1932	1947			
Percent of supply	--	--	--			

GREENVILLE
(Population, 58,161)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 135,000.

Source: Mountain streams, impounded.

Treatment: Chlorination, ammoniation, and soda-ash at Plant 1. Additional chlorination and ammoniation at Plants 2 and 3.

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

Raw-water storage: Impounding reservoir about 9,500,000,000 gal.

Finished-water storage: 1 reservoir, 22,000,000 gal; 2 standpipes, 1,220,000 and 460,000 gal.

Table Rock Reservoir is about 22.8 miles from the city limits. Plant 1 is about 1,000 feet from the reservoir. Water from Table Rock reservoir is treated at Plant 1, flows to two equalizing reservoirs, No. 3, 19.3 miles east of Table Rock Reservoir and No. 6, 16.7 miles southeast of Table Rock Reservoir. From these reservoirs, water flows through two separate lines to chemical plants 2 and 3 for additional treatment with ammonia and chlorine before entering the distribution system and standpipes.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water	
Silica (SiO ₂)	7.8	9.2	Hardness as CaCO ₃ :			
Iron (Fe) .....	.03	.09	Total	4	4
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	0
Calcium (Ca) .....	.9	1.1	Color	6	9
Magnesium (Mg).....	.4	.3		pH	6.2	6.6
Sodium (Na)	2.9	7.0		Specific conductance		
Potassium (K)				(micromhos at		
Carbonate (CO ₃)	0	0		25 C.).....	18.0	45.0
Bicarbonate (HCO ₃)	8	18	Turbidity	--	--	
Sulfate (SO ₄)	1.8	1.8	Temperature (F.)...	43	54	
Chloride (Cl)	1.0	1.5	Date of collection...	Feb. 16,	Feb. 16,	
Fluoride (F) .....	.1	.1		1951	1951
Nitrate (NO ₃) .....	.2	.4			
Dissolved solids.....	17	30				

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.....	5	6	4	6.9	7.2	6.6	1	1	1	0	0	0
Finished water...	15	17	13	8.4	8.5	8.3	1	1	1	0	0	0

GREENWOOD
(Population, 13,806)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 18,000.

Source: Coronoco Creek impounded in two lakes (1 percent of supply); Saluda River impounded in Lake Greenwood (99 percent of supply). The intake for Coronoco Creek water is 5 miles east of the city, and the intake in Lake Greenwood is about 10 miles east-northeast of the city.

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

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

Raw-water storage: Impounding lakes for Coronoco Creek 75,000,000 gal; reservoir 10,000,000. Lake Greenwood exceeds 1,000,000,000 gal.

Finished-water storage: Clear wells, 1,125,000 gal; 1 elevated tank, 300,000 gal. (Additional facilities under construction).

ANALYSES

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

	Raw water ^a	Finished water		Raw water ^a	Finished water
Silica (SiO ₂)	13	13	Hardness as CaCO ₃ :		
Iron (Fe) .....	.12	.29	Total	8	19
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	0
Calcium (Ca)	2.0	6.0	Color	45	7
Magnesium (Mg).....	.8	1.0	pH	6.8	6.8
Sodium (Na)	9.1	7.9	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)			25 C.)	72.1	76.4
Bicarbonate (HCO ₃)	22	27	Turbidity	--	--
Sulfate (SO ₄)	3.4	7.3	Temperature (F.)...	46	66
Chloride (Cl)	3.9	4.2	Date of collection...	Feb. 16,	Feb. 16,
Fluoride (F) .....	.1	.1		1951	1951
Nitrate (NO ₃) .....	.8	.5			
Dissolved solids.....	47	53			

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	24	18	7.2	7.3	6.9	17	--	--	45	55	25
Finished water...	22	26	18	7.9	8.4	7.7	20	22	--	--	--	--

^a Lake Greenwood.

GREER
(Population, 5,050)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 10,100.

Source: South Tyger River, 90 percent of supply; enclosed springs, 10 percent of supply. The intake on South Tyger River is about 2.5 miles northeast of the city.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, chlorination, Calgon and lime for adjustment of pH. Water from springs: chlorination only.

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

Raw-water storage: Reservoir, 2,500,000 gal.

Finished-water storage: Clear well, 625,000 gal; elevated tank, 500,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	11	12	Hardness as CaCO₃:		
Iron (Fe) .....	.06	.04	Total	9	22
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	8
Calcium (Ca)	2.3	7.5	Color	5	1
Magnesium (Mg).....	.9	.9	pH	6.9	7.0
Sodium (Na)	4.1	3.6	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	35.0	70.3
Bicarbonate (HCO ₃)	14	17	Turbidity	28	1
Sulfate (SO ₄)	2.6	10	Temperature (F.)...	43	43
Chloride (Cl)	2.5	3.0	Date of collection...	Dec. 20,	Dec. 20,
Fluoride (F) .....	.1	.4		1951	1951
Nitrate (NO ₃) .....	.5	.8			
Dissolved solids.....	32	51			

HARTSVILLE
(Population, 5,658)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 11,000.

Source: 12 wells: 2 Layne wells (old well at plant, new well at center of town) 240 and 375 ft deep; 2 wells at plant about 180 ft deep; 4 wells at plant, 160 to 180 ft deep; 4 wells drilled inside of the four last named wells to a depth of 220 ft. The yield of the Layne wells is reported to be 814 and 800 gpm. The Layne well at the plant is used all of the time. The other wells of low yield, pump into a reservoir and are used for an auxiliary or emergency supply.

Treatment: Calgon, caustic soda for adjustment of pH.

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

Raw-water storage: Reservoir, 500,000 gal.

Finished-water storage: 2 elevated tanks, 300,000 and 75,000 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)	8.7	8.9	Hardness as CaCO₃		
Iron (Fe) .....	.14	.18	Total	3	3
Manganese (Mn) .....	.00	.00	Noncarbonate.....	1	0
Calcium (Ca) .....	.7	.8	Color	1	2
Magnesium (Mg).....	.3	.3	pH	5.1	6.7
Sodium (Na)	1.5	11	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)			25 C.).....	16.8	49.9
Bicarbonate (HCO ₃)	0	0	Turbidity	0	0
Sulfate (SO ₄)	3	25	Temperature (F.)...	65	64
Sulfate (SO ₄)	1.6	1.9	Date of collection...	Jan. 10, 1952	Jan. 10, 1952
Chloride (Cl)	1.6	2.0			
Fluoride (F) .....	.0	.3			
Nitrate (NO) .....	.0	.0			
Dissolved solids.....	17	37			
Depth (feet)				240	240
Diameter (inches).....				20	20
Date drilled				1941	1941
Percent of supply				--	--

^a Layne well at plant.

LAURENS
(Population, 8, 658)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 11,000.

Source: Little River 50 percent of supply; Rabon Creek 50 percent of supply.

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

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

Raw-water storage: 2 impounding reservoirs, 5,100,000 gal.

Finished-water storage: Clear well, 500,000 gal; 3 elevated tanks, 375,000 gal.

ANALYSES

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

	Little River (raw water)	Rabon Creek (raw water)	Little River (finished water)
Silica (SiO ₂)	19	18	19
Iron (Fe) .....	.04	.08	.03
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	3.8	4.3	11
Magnesium (Mg)	1.5	1.4	1.6
Sodium (Na)	5.8	6.1	6.3
Potassium (K)			
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	25	27	30
Sulfate (SO ₄)	2.7	2.3	15
Chloride (Cl)	3.0	3.1	4.9
Fluoride (F) .....	.1	.1	.1
Nitrate (NO ₃) .....	.5	.8	.6
Dissolved solids	52	52	74
Hardness as CaCO ₃ :			
Total	16	16	34
Noncarbonate	0	0	9
Color	6	7	3
pH	7.1	7.2	6.8
Specific conductance (micromhos at 25 C.)	62.7	60.4	104
Turbidity	--	--	--
Temperature (F.)	60	61	62
Date of collection	Mar. 9, 1951	Mar. 9, 1951	Mar. 9, 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	24	30	20	6.6	7.0	6.2	--	--	--	38	159	14
Finished water...	24	32	22	7.6	7.8	7.2	--	--	--	<3	--	--

MARION
(Population, 6,834)

Ownership: Municipal.

Source: 5 wells (1, 3 to 6) 200, 81, 150, 378, and 190 ft deep; yield reported to be 100, 80, 180, 300, and 200 gpm.

Treatment: None.

Storage: Reservoir, 240,000 gal; elevated tank, 150,000 gal.

ANALYSES

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

	Wells (composite sample)	Well 3	Well 5
Silica (SiO ₂)	36	40	38
Iron (Fe) .....	.24	.83	.26
Manganese (Mn) .....	.00	.00	.00
Calcium (Ca)	5.7	2.2	2.0
Magnesium (Mg) .....	.7	.9	.9
Sodium (Na)	44	43	43
Potassium (K)			
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	115	115	109
Sulfate (SO ₄)	7.5	1.3	3.3
Chloride (Cl)	6.8	3.9	6.0
Fluoride (F) .....	.5	.5	.7
Nitrate (NO ₃) .....	.1	.1	.0
Dissolved solids	162	149	147
Hardness as CaCO ₃ :			
Total	17	9	9
Noncarbonate	0	0	0
Color	9	4	13
pH	7.4	7.2	7.2
Specific conductance (micromhos at 25 C.)	217	196	193
Turbidity	1	1	--
Temperature (F.)	61	66	70
Date of collection	Dec. 18, 1951	Dec. 18, 1951	Feb. 1, 1950
Depth (feet)	--	81	378
Diameter (inches)	--	8	10
Date drilled	--	--	1948
Percent of supply	--	--	--

NEWBERRY
(Population, 7, 546)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 8, 500.

Source: Bush River. The intake on Bush River is about 2.8 miles southwest of the city.

Treatment: Coagulation with alum, chlorination, ammoniation, rapid sand filtration, and adjustment of pH with lime.

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

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

Finished-water storage: 3 clear wells, 1,000,000 gal; 2 elevated tanks, 150,000 gal each.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	26	25	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.03	Total	32	54
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	7
Calcium (Ca)	7.5	16	Color	43	7
Magnesium (Mg).....	3.3	3.4	pH	6.8	7.7
Sodium (Na)	8.9	9.2	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	108	156
Bicarbonate (HCO ₃)	47	57	Turbidity	--	--
Sulfate (SO ₄)	3.8	16	Temperature (F.)...	--	--
Chloride (Cl)	6.0	6.9	Date of collection...	Feb. 21,	Feb. 21,
Fluoride (F) .....	.1	.1		1951	1951
Nitrate (NO ₃) .....	.5	.6			
Dissolved solids.....	80	109			

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.....	45	50	40	7.2	7.4	7.0	80	100	60	20	200	10
Finished water...	45	50	40	8.2	8.4	8.0	80	100	60	5	8	3

ORANGEBURG
(Population, 15,322)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 16,000.

Source: North Fork Edisto River. The intake on North Fork Edisto River is within the city limits.

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

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

Raw-water storage: None.

Finished-water storage: 2 clear wells, 750,000 gal; 3 elevated tanks, 150,000, 250,000, and 50,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	4.7	1.4	Hardness as CaCO₃:		
Iron (Fe) .....	.12	.03	Total	9	27
Manganese (Mn) .....	.00	.00	Noncarbonate	1	13
Calcium (Ca)	2.4	10	Color	22	2
Magnesium (Mg) .....	.7	.6	pH	5.8	6.4
Sodium (Na)	3.3	3.1	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	30.2	77.8
Bicarbonate (HCO ₃)	10	18	Turbidity	--	--
Sulfate (SO ₄)	2.1	8.7	Temperature (F.) ...	--	--
Chloride (Cl)	3.6	7.2	Date of collection ...	Mar. 6, 1951	Mar. 6, 1951
Fluoride (F) .....	.1	.0			
Nitrate (NO ₃) .....	.4	.1			
Dissolved solids	27	50			

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Temperature (°F.)		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water	5	--	--	5.8	--	--	--	--	--	48	59	35
Finished water...	13	--	--	8.7	--	--	40	55	28	--	--	--

ROCK HILL
(Population, 24, 502)

Ownership: Municipal; also supplies suburban districts. Total population supplied, about 27,000.

Source: Catawba River. The intake in the river is about 5 miles north of the city.

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

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

Raw-water storage: None.

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

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	12	9.6	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.02	Total	14	13
Manganese (Mn) .....	.00	.05	Noncarbonate.....	0	0
Calcium (Ca)	3.4	3.2			
Magnesium (Mg).....	1.4	1.3	Color.....	3	3
Sodium (Na)	5.9	12	pH.....	6.7	6.7
Potassium (K)			Specific conductance		
Carborate (CO ₃)			(micromhos at		
Bicarbonate (HCO ₃)	0	0	25 C.).....	58.2	83.8
Sulfate (SO ₄)	4.9	9.5	Turbidity.....	--	--
Chloride (Cl)	3.2	3.5	Temperature (F.)...	46	44
Fluoride (F) .....	.1	.1	Date of collection...	Feb. 14,	Feb. 14,
Nitrate (NO ₃) .....	.9	.5		1951	1951
Dissolved solids.....	42	54			

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.....	18	22	16	6.8	7.0	6.5	14	16	12	25	500	20
Finished water...	28	32	26	8.3	8.5	8.1	14	16	12	1	1	1

SPARTANBURG
(Population, 36,795)

Ownership: Municipal; also supplies suburban areas. Total population supplied, about 60,000.

Source: South Pacolet River impounded. The intake is about 13 miles north of the city.

Treatment: Coagulation with alum and lime, sedimentation, rapid sand filtration, chlorination, adjustment of pH with soda-ash, and addition of phosphate for corrosion control.

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

Raw-water storage: Impounding reservoir, 879,000,000 gal.

Finished-water storage: Clear well, 1,000,000 gal; 2 reservoirs, 6,000,000 gal; elevated tank, 1,500,000 gal. Additional facilities: at Camp Croft 1 stand-pipe, 2,300,000 gal; at Camp Wadsworth 1 reservoir, 216,000 gal.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	12	11	Hardness as CaCO ₃ :		
Iron (Fe) .....	.04	.04	Total	18	18
Manganese (Mn) .....	.00	.00	Noncarbonate.....	6	5
Calcium (Ca)	5.7	5.6	Color.....	3	7
Magnesium (Mg).....	.9	1.0	pH	6.5	6.3
Sodium (Na) .....	.6	4.9	Specific conductance		
Potassium (K)			(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	35.1	64.6
Bicarbonate (HCO ₃)	15	16	Turbidity	--	--
Sulfate (SO ₄)	2.9	10	Temperature (F.)...	41	43
Chloride (Cl)	2.2	3.1	Date of collection...	Feb. 16, 1951	Feb. 16, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃) .....	.7	.6			
Dissolved solids.....	34	46			

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.....	10	14	8	6.6	7.0	6.1	0.8	--	--	100	500	20
Finished water...	16	14	18	7.2	7.3	7.1	1.0	--	--	2.5	1.0	5.0

SUMTER
(Population, 20,185)

Ownership: Municipal.

Source: 7 wells: 4 deep wells (1 to 4) 625, 625, 625, and 615 ft deep; 1 battery of 3 shallow wells. The yield of the deep wells is reported to be 1,400, 1,580, 1,000 and 1,650 gpm, and of the battery of 3 shallow wells, 550 gpm.

Treatment: Water from wells 2 and 3 treated with calgon; water from shallow wells, not treated.

Raw-water storage: None.

Finished-water storage: Standpipe, 335,000 gal; elevated tank, 100,000 gal; reservoir, 1,000,000 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)	13	11	Hardness as CaCO ₃ :		
Iron (Fe)	2.1	.62	Total	5	7
Manganese (Mn) .....	.00	.00	Noncarbonate.....	2	2
Calcium (Ca)	1.0	1.4			
Magnesium (Mg).....	.5	.9	Color	1	1
Sodium (Na)	4.4	6.5	pH	5.2	5.6
Potassium (K)			Specific conductance		
Carbonate (CO ₃)			(micromhos at		
Bicarbonate (HCO ₃)	0	0	25 C.).....	33.1	47.5
Sulfate (SO ₄)	7.5	6.3	Turbidity	1	1
Chloride (Cl)	2.6	4.5	Temperature (F.)...	--	--
Fluoride (F) .....	.1	.1	Date of collection...	Dec. 19,	Dec. 19,
Nitrate (NO ₃) .....	.0	4.1		1951	1951
Dissolved solids.....	30	37			

^a Mixed water from wells 2, 3, and 3 shallow wells.

UNION
(Population, 9,730)

Ownership: Municipal; also supplies suburban areas. Total population supplied, about 11,000.

Source: Broad River 50 percent of supply; Big Browns Creek and Unnamed Creek 50 percent of supply. The intake on Broad River is about 9 miles north of the city.

Treatment: Coagulation with alum, soda-ash, chlorination, sedimentation, rapid sand filtration, and ammoniation.

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

Raw-water storage: Impounding reservoirs, 65,000,000 gal.

Finished-water storage: 2 clear wells, 500,000 and 275,000 gal; standpipe, 250,000; 1 elevated tank, 400,000 gal.

ANALYSES

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

	Broad River (raw water)	Big Browns Creek (raw water)	Unnamed Creek (raw water)	Broad River (finished) water)
Silica (SiO ₂)	15	20	19	15
Iron (Fe).....	.04	.25	.08	.05
Manganese (Mn) .....	.00	.00	.00	.00
Calcium (Ca)	4.6	3.8	3.6	4.0
Magnesium (Mg)	1.5	1.5	1.4	1.5
Sodium (Na).....	5.3	6.3	5.6	16
Potassium (K)				
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	25	27	24	39
Sulfate (SO ₄)	3.1	1.6	2.1	12
Chloride (Cl).....	3.2	3.2	3.0	3.9
Fluoride (F) .....	.1	.2	.2	.1
Nitrate (NO ₃) .....	.9	.6	.4	.4
Dissolved solids	46	51	47	72
Hardness as CaCO ₃ :				
Total	18	16	15	16
Noncarbonate	0	0	0	0
Color.....	16	27	7	3
pH.....	6.7	6.4	6.6	7.3
Specific conductance (micromhos at 25 C.)	60.8	58.6	56.0	109
Turbidity	--	--	--	--
Temperature (F.)	59	68	70	58
Date of collection.....	Mar. 8, 1951	Mar. 8, 1951	Mar. 8, 1951	Mar. 8, 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.....	22	20	22	7.2	7.4	6.8	--	--	--	80	300	80
Finished water...	30	32	30	7	7.4	7.2	14	14	14	--	--	--

ALEXANDRIA
(Population, 61,787)

Ownership: Alexandria Water Co. and Virginia Water Co., which distributes water in Fairfax County (both controlled by the American Water Works Co. Inc., Philadelphia, Pa.). Supplies also suburban districts and communities in Fairfax County. Total population supplied, about 76,000.

Source: Occoquan Creek impounded. Auxiliary supply, 3 wells of total capacity of 1,000,000 gpd. The well supply is used during summer months.

Treatment: Prechlorination, coagulation with alum and lime, activated carbon as required, sedimentation, rapid sand filtration, postchlorination as required, and adjustment of pH.

Rated capacity of treatment plant: 8,800,000 gpd.

Raw-water storage: 1,750,000,000 gal.

Finished-water storage: Clear wells, 400,000 gal; underground reservoir, 700,000 gal; open reservoir, 16,000,000 gal; other facilities, 3,300,000 gal.

The intake dam on Occoquan Creek and the treatment plant are about 20 miles south of the city. This dam which is about 1,800 ft upstream from tidewater impounds about 55,000,000 gal. Another impounding dam about 7 miles above tidewater impounds an estimated 1.5 to 2.0 billion gal. The raw water is pumped through a 30 in. main to the treatment plant about $\frac{1}{2}$ mile distant on a hill at an elevation of about 245 ft. Finished water is pumped through high service pumps to Alexandria, the intervening area, distribution, and storage. The water of Occoquan Creek is subject to rather sudden changes in quality. At times of heavy rains, turbidity changes are rapid and large. Color removal is always a problem.

ANALYSIS

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

	Finished water (city tap)		Finished water (city tap)
Silica (SiO ₂)	9.5	Hardness as CaCO ₃ :	
Iron (Fe) .....	.09	Total	43
Manganese (Mn) .....	.19	Noncarbonate	17
Calcium (Ca)	14		
Magnesium (Mg)	2.4	Color	2
Sodium (Na)	4.0	pH	7.9
Potassium (K) .....	.9	Specific conductance	
Carbonate (CO ₃)	0	(micromhos at	
Bicarbonate (HCO ₃)	34	25 C.).....	121
Sulfate (SO ₄)	19	Turbidity .....	.6
Chloride (Cl)	4.2	Temperature (F.).....	--
Fluoride (F) .....	.0	Date of collection	May 18,
Nitrate (NO ₃) .....	.6		1951
Dissolved solids	74		

Regular determinations at treatment plant, Jan. 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.....	24	26	22	7.1	7.3	7.0	--	--	--	29	50	16
Finished water...	29	32	22	8.4	8.7	7.9	--	--	--	--	--	--

ARLINGTON COUNTY
(Population, 135,449)

Ownership: The distribution system is owned and operated by Arlington County.

Finished water is purchased from Washington, D. C. Supplies also the city of Falls Church, and areas in Fairfax County through Falls Church. Total population supplied, about 158,000.

Source: Potomac River. Finished water from the Dalecarlia treatment plant.
(See Washington, D. C.)

Finished-water storage: 3 ground reservoirs, 4 elevated tanks; total, 10,500,000 gal.

BRISTOL
(Population, 15,954)

Ownership: Municipal; also supplies suburban population of about 500. Total population supplied, about 16,500.

Source: Clear Creek (50 percent of supply); Preston Spring (35 percent of supply); and Mumpower Springs (15 percent of supply).

Treatment: Partial softening with lime, coagulation with copperas (and alum at times of high turbidity), sedimentation, rapid sand filtration, and chlorination.

Spring supplies: chlorination.

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

Raw-water storage: 5,000,000 gal.

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

The city of Bristol is served by two supply systems. Clear Creek and Preston Spring supply one system (low service) and Mumpower Springs the other (high service). Preston Spring is about 6.5 miles northwest of the city. Water from Preston Spring is diverted to the treatment plant for the creek supply which is located near the spring. Chlorinated water from the spring and finished water from the treatment plant flow by gravity in a single pipe line to the city to low service lines. Mumpower Springs (several springs) are about 4 miles north of the city. Water from the springs is collected in an open reservoir about $\frac{1}{4}$ mile below the springs, from which it flows by gravity to the city to high service lines. Chlorine is applied in the gravity line a short distance below the reservoir.

There is an 8 in. pipe line connecting the water supply system of Bristol, Tennessee with the supply system of Bristol, Virginia which can be used in emergencies.

BRISTOL--Continued

ANALYSES

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

	Clear Creek (raw water)	Preston Spring (raw water)	Finished water ^a	Finished water ^b
Silica (SiO ₂)	3.6	1.8	4.0	2.0
Iron (Fe).....	.06	.02	.02	.02
Manganese (Mn)	--	--	--	--
Calcium (Ca)	50	57	33	40
Magnesium (Mg)	21	22	21	19
Sodium (Na).....	.7	.8	.7	.6
Potassium (K)	1.2	1.5	1.4	1.3
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	233	245	166	208
Sulfate (SO ₄)	21	30	26	6.5
Chloride (Cl).....	1.0	1.4	2.4	2.8
Fluoride (F) .....	.2	.2	.2	.2
Nitrate (NO ₃)	2.9	6.6	4.5	.8
Dissolved solids	235	271	198	194
Hardness as CaCO ₃ :				
Total	211	233	169	178
Noncarbonate	20	32	33	7
Color.....	0	0	0	0
pH.....	8.3	8.0	8.0	8.2
Specific conductance (micromhos at 25 C.)	384	430	310	321
Turbidity	10	0	.5	0
Temperature (F.)	65	63	65	61
Date of collection	Sept. 12, 1951	Sept. 12, 1951	Sept. 12, 1951	Sept. 12, 1951

Regular determinations at treatment plant, 1950

	Alkalinity as CaCO ₃ (ppm)			pH			Hardness as CaCO ₃ (ppm)			Tempera- ture (°F.)		
	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min
Raw water.....	150	196	44	8.2	8.4	8.0	230	244	218	55	68	32
Finished water...	41	58	15	9.2	9.6	8.9	120	170	82	--	--	--

^a Clear Creek and Preston Spring.^b Mumpower Springs.

CHARLOTTESVILLE

(Population, 25,969)

Ownership: Municipal; also supplies about 2,600 people outside the city limits.

Total population supplied, about 28,600.

Source: Moormans River 90 percent of supply; Ragged Mt. reservoir 10 percent of supply.

Treatment: Prechlorination, coagulation with alum and lime, sedimentation, slow sand filtration, postchlorination, addition of sodium phosphate, and fluoridation with sodium silicofluoride. Copper sulphate for the control of algae.

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

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

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

The filter plant is located in Charlottesville, on Reservoir Mt., western edge of town. Water is piped from Moormans River Dam to the filter plant. The pipe line passes Ragged Mt. Reservoir and excess water from Moormans River is diverted, and stored in the Ragged Mt. Reservoir which also receives water from Ragged Mt. watershed. Water from Ragged Mt. Reservoir is used to balance the water needs.

ANALYSES

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

	Ragged Mt. Reservoir (raw water)	Moormans River (raw water)	Moormans River (raw water)	Finished water
Silica (SiO ₂)	7.8	10	8.3	7.8
Iron (Fe).....	.02	.05	.28	.20
Manganese (Mn)	--	--	--	--
Calcium (Ca)	3.4	3.5	2.1	2.6
Magnesium (Mg)	1.1	1.5	1.0	.9
Sodium (Na).....	3.1	1.8	2.9	3.0
Potassium (K)				
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	18	19	12	11
Sulfate (SO ₄)	1.9	2.2	2.7	3.0
Chloride (Cl).....	1.8	.5	1.9	3.0
Fluoride (F) .....	.1	.1	.1	^a 1.0
Nitrate (NO ₃) .....	.1	.1	.1	.1
Dissolved solids	29	34	24	22
Hardness as CaCO ₃ :				
Total	13	15	9	10
Noncarbonate	0	0	0	1
Color.....	5	5	17	4
pH.....	6.4	6.5	7.2	6.9
Specific conductance (micromhos at 25 C.)	52.8	55.2	25.7	27.3
Turbidity	--	--	--	--
Temperature (F.)	--	--	--	--
Date of collection.....	Aug. 27, 1948	Aug. 27, 1948	Mar. 22, 1951	Mar. 22, 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.....	10	18	4	6.3	6.3	6.2	8	10	6	18	20	10
Finished water...	14	16	12	6.6	7.0	6.5	15	16	14	3	5	1

^a Average of several determinations, 1952.

DANVILLE
(Population, 35,066)

Ownership: Municipal; also supplies suburban population of about 800. Total population supplied, about 35,900.

Source: Dan River.

Treatment: Coagulation with alum and lime, activated carbon, aeration (spray), chlorination, sedimentation, rapid sand filtration, postchlorination, ammoniation, and adjustment of pH with soda ash.

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

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

Finished-water storage: 9,000,000 gal.

The treatment plant is on the north edge of the city near the cotton mills. The intake is in the reservoir about 100 yards above the impounding dam of the River-side and Dan River Cotton Mills.

ANALYSES

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

	Raw water	Raw water	Finished water
Silica (SiO ₂)	13	12	13
Iron (Fe) .....	.01	--	.02
Manganese (Mn)	--	--	--
Calcium (Ca)	4.0	--	11
Magnesium (Mg)	1.6	--	2.0
Sodium (Na)	4.5	2.7	4.2
Potassium (K)	0	1.3	1.4
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	23	31	37
Sulfate (SO ₄)	4.0	3	8.6
Chloride (Cl)	2.0	2.1	5.2
Fluoride (F) .....	.1	.1	.1
Nitrate (NO ₃) .....	.4	.6	.2
Dissolved solids	47	--	69
Hardness as CaCO ₃ :			
Total	17	23	36
Noncarbonate	0	0	5
Color	4	25	0
pH	7.0	7.3	7.7
Specific conductance (micromhos at 25 C.)	--	60.3	97.0
Turbidity	--	4.0	.5
Temperature (F.)	--	75	73
Date of collection	July 21, 1947	Sept. 11, 1951	Sept. 11, 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	22	30	12	7.0	7.3	6.6	--	--	--	1.2	4.0	.2
Finished water	30	40	21	8.7	9.4	8.3	--	--	--	.3	1.8	.1

FALLS CHURCH
(Population, 7,535)

Ownership: Distribution system, municipal. The city purchases its water from Arlington County. Supplies about 15,000 people in Fairfax County. Total population supplied, about 22,500.

Source: Potomac River. Finished water from Dalecarlia treatment plant, Washington, D. C. through Arlington County. Emergency supply: 2 wells (4, 6) 430 and 748 ft deep; yield reported to be 40 and 35 gpm respectively; two standby 6 in. connections to Arlington County distribution system in case of interruption of service in main line. (See Washington, D. C.)

Finished-water storage: 2 elevated tanks; 2 stand pipes. Total, 2,000,000 gal.

FREDRICKSBURG
(Population, 12,158)

Ownership: Municipal; also supplies a suburban population of about 2,000. Total population supplied, about 14,200.

Source: Rappahannock River.

Treatment: Primary sedimentation with alum, breakpoint chlorination, coagulation with alum, sedimentation, rapid (anthrafilt) filtration, and adjustment of pH with soda ash.

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

Raw-water storage: 24,000,000 gal.

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

Raw water is obtained from a canal that runs by the treatment plant. This canal, and the dam that partially impounds the Rappahannock River, is owned by the Va. Electric & Power Co. Water from the canal is run into the storage basin and from there is pumped to the treatment plant.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	7.8	8.2	Hardness as CaCO₃:		
Iron (Fe) .....	.12	.05	Total	20	20
Manganese (Mn)	--	--	Noncarbonate	0	0
Calcium (Ca)	5.0	5.1	Color	6	1
Magnesium (Mg)	1.8	1.7	pH	6.8	7.6
Sodium (Na)	3.4	17	Specific conductance		
Potassium (K)	1.1	1.1	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.)	56.9	116
Bicarbonate (HCO ₃)	27	53	Turbidity	25	1.0
Sulfate (SO ₄)	2.4	7.7	Temperature (F.) ...	76	75
Chloride (Cl)	2.5	4.9	Date of collection ...	Sept. 13, 1951	Sept. 13, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃) .....	.3	.1			
Dissolved solids	40	75			

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	28	12	7.0	7.3	6.4	--	--	--	64	300	15
Finished water...	36	50	29	6.7	8.9	6.4	--	--	--	.7	1.5	.5

HARRISONBURG
(Population, 10,810)

Ownership: Municipal; also supplies about 1,000 people outside the city limits.

Total population supplied, about 11,800.

Source: Riven Rock Spring (natural flow of Dry River and underflow of Dry River).

Treatment: Chlorination.

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

Raw-water storage: None.

Finished-water storage: 21,000,000 gal.

The basin of Dry River is in the George Washington National Forest. The intake works are about 13 miles west of the city. The underflow in the valley of the river is trapped in a gallery by extending the intake dam underground across the valley floor for a distance of 900 ft to a rock cliff on one side of the valley. The underground dam rests on bedrock. Water from the intake works is conducted through a 14 in. pipe line to the chlorinating plant about $\frac{1}{4}$ mile below the intake dam. The chlorinated water is piped to the distribution system and concrete storage reservoirs in the city through two interconnected parallel pipe lines. The supply is by gravity throughout.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	5.3	6.0	Hardness as CaCO ₃ :		
Iron (Fe) .....	.07	.05	Total	7	8
Manganese (Mn)	--	--	Noncarbonate.....	1	2
Calcium (Ca)	1.4	1.4	Color	10	5
Magnesium (Mg).....	.9	1.0	pH	6.5	6.4
Sodium (Na)	1.0	1.0	Specific conductance		
Potassium (K) .....	.6	.7	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	23.6	25.0
Bicarbonate (HCO ₃)	8	7	Turbidity	0	0
Sulfate (SO ₄)	3.6	3.7	Temperature (F.)...	61	61
Chloride (Cl)	1.0	1.8	Date of collection...	Sept. 12,	Sept. 12,
Fluoride (F) .....	.0	.0		1951	1951
Nitrate (NO ₃) .....	.1	.1			
Dissolved solids.....	18	18			

HOPEWELL
(Population, 10,219)

Ownership: Old Dominion Water Corp; also supplies about 5,000 people outside the city limits, and the population in Camp Lee, Prison Camp, and Bland sanitary Dist. Total known population supplied, about 15,200.

Source: Appomattox River.

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

Rated capacity of treatment plant: 30,000,000 gpd.

Raw-water storage: --

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

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	5.5	5.7	Hardness as CaCO ₃ :		
Iron (Fe) .....	.23	.05	Total	56	65
Manganese (Mn)	--	--	Noncarbonate.....	17	29
Calcium (Ca)	16	20	Color	25	3
Magnesium (Mg).....	4.0	3.7	pH	7.1	7.4
Sodium (Na)	21	17	Specific conductance		
Potassium (K)	1.8	1.8	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	213	217
Bicarbonate (HCO ₃)	48	44	Turbidity	25	1.0
Sulfate (SO ₄)	47	52	Temperature (F.)...	--	--
Chloride (Cl)	8.6	9.4	Date of collection...	Sept. 7, 1951	Sept. 7, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃)	1.5	1.1			
Dissolved solids.....	138	140			

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.....	--	35	18	--	--	--	--	--	--	--	350	30
Finished water...	--	35	24	--	7.4	7.0	--	60	30	--	--	--

LYNCHBURG
(Population, 47,727)

Ownership: Municipal; also supplies a population of about 7,000 people outside the city limits, including Madison Heights Sanitary District in Amherst County.

Total population supplied, about 55,000.

Source: Pedlar River impounded in Pedlar Lake about 23 miles northwest of the city. Auxiliary or emergency supply, James River.

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

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

Raw-water storage: 600,000,000 gal.

Finished-water storage: 9,000,000 gal.

Water from Pedlar Lake flows by gravity through a 36 in. cast iron pipe to the treatment plant in the southwest section of the city. Finished water is stored in College Hill reservoir, Clay Street reservoir, and Fort Hill standpipe. Distribution is by gravity flow.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	13	13	Hardness as CaCO ₃ :		
Iron (Fe) .....	.04	.05	Total	14	15
Manganese (Mn)	--	--	Noncarbonate.....	0	2
Calcium (Ca)	3.1	2.9	Color.....	6	3
Magnesium (Mg).....	1.5	1.9	pH	7.0	7.4
Sodium (Na)	2.2	3.2	Specific conductance		
Potassium (K) .....	.8	.8	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	36.7	43.4
Bicarbonate (HCO ₃)	19	16	Turbidity	7.0	0
Sulfate (SO ₄)	1.4	5.2	Temperature (F.)...	66	66
Chloride (Cl)	1.2	1.8	Date of collection...	Sept. 11, 1951	Sept. 11, 1951
Fluoride (F) .....	.1	.6			
Nitrate (NO ₃) .....	.6	.3			
Dissolved solids.....	36	39			

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.....	11	14	9	6.5	6.9	6.2	--	--	--	9	32	5
Finished water...	9	10	8	6.3	6.6	6.0	--	--	--	0	0	0

MARTINSVILLE
(Population, 17,251)

Ownership: Municipal; also supplies about 1,000 people in suburban areas. Total population supplied, about 18,300.

Source: Beaver Creek 60 percent of supply; Jones Creek 40 percent of supply.

Treatment: Prechlorination, coagulation with lime and alum, activated carbon, sedimentation, rapid sand filtration, postchlorination, and adjustment of pH with lime.

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

Raw-water storage: 500,000 gal.

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

ANALYSES

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

	Beaver Creek (raw water)	Jones Creek (raw water)	Finished water
Silica (SiO ₂)	20	19	18
Iron (Fe) .....	.82	.46	.13
Manganese (Mn)	--	--	--
Calcium (Ca)	5.5	6.0	12
Magnesium (Mg).....	2.5	1.7	2.5
Sodium (Na).....	3.5	3.2	3.5
Potassium (K)	1.3	1.0	1.1
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃).....	34	28	42
Sulfate (SO ₄).....	1.4	3.5	9.7
Chloride (Cl)	2.9	1.4	3.0
Fluoride (F) .....	.2	.1	.1
Nitrate (NO ₃) .....	.3	.3	.1
Dissolved solids	66	55	76
Hardness as CaCO ₃ :			
Total	24	22	40
Noncarbonate	0	0	6
Color	35	30	0
pH.....	6.9	7.3	8.2
Specific conductance (micromhos at 25 C.).....	65.7	49.8	98.4
Turbidity	5.0	15	.5
Temperature (F.)	65	64	68
Date of collection	Sept. 11, 1951	Sept. 11, 1951	Sept. 11, 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.....	21	29	11	6.9	7.1	6.6	--	--	--	70	2000	20
Finished water...	19	27	11	6.7	6.9	6.0	--	--	--	0.5	0.5	0.5

NEWPORT NEWS
(Population, 42,358)

Ownership: Municipal; also supplies Hampton, Hilton, Phoebus, and other communities in Elizabeth City, Warwick and York Counties. Total population supplied, about 150,000.

Source: Chickahominy River 42 percent of supply; Lee Hall and Harwood Mill reservoirs 58 percent of supply. Skiffs Creek can be used in emergencies.

Treatment: Prechlorination, aeration, coagulation with alum, addition of carbon, chlorination, sedimentation, rapid sand filtration, postchlorination, and adjustment of pH with lime.

Rated capacity of treatment plants: 2 Lee Hall Reservoir plants: 8,000,000 gpd, and 6,000,000 mgd. Harwood Mill Reservoir plant: 6,000,000 mgd.

Raw-water storage: 1,754,000,000 gal.

Finished-water storage: Lee Hall underground reservoir, 3,500,000 gal; concrete reservoir (in Newport News), 3,500,000 gal; 2 elevated tanks, 1,000,000 and 100,000 gal.

Lee Hall and Harwood Mill reservoirs store the headwaters of Warwick and Poquoson rivers, respectively. Water from the Chickahominy River is discharged from a 32 mile 18 in. pipeline into Harwood Mill reservoir. Combined waters from the Harwood Mill Reservoir are discharged into the Lee Hall Reservoir.

ANALYSES

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

	Raw water ^a	Raw water ^b	Lee Hall Reservoir (raw water)	Finished water ^c
Silica (SiO ₂)	2.1	6.1	12	4.7
Iron (Fe).....	--	--	.04	.02
Manganese (Mn)	--	--	--	--
Calcium (Ca)	--	--	33	25
Magnesium (Mg)	--	--	1.3	1.4
Sodium (Na).....	3.8	3.7	4.7	4.3
Potassium (K)	1.1	1.1	.9	1.0
Carbonate (CO ₃)	0	0	0	0
Bicarbonate (HCO ₃).....	21	54	104	59
Sulfate (SO ₄)	11	6	2.1	15
Chloride (Cl).....	4.6	5.4	8.0	12
Fluoride (F) .....	.2	.2	.1	.1
Nitrate (NO ₃) .....	.8	.6	1.3	.1
Dissolved solids	--	--	129	110
Hardness as CaCO ₃ :				
Total	23	53	88	68
Noncarbonate	6	9	2	20
Color.....	15	10	10	5
pH.....	6.9	7.1	7.2	7.5
Specific conductance (micromhos at 25 C.)	66.9	173	191	164
Turbidity	3.0	2.5	2.5	.5
Temperature (F.)	74	77	78	78
Date of collection.....	Sept. 5, 1951	Sept. 5, 1951	Sept. 4, 1951	Sept. 4, 1951

^a Chickahominy River.

^b Harwood Mill Reservoir.

^c Supply System.

NEWPORT NEWS--Continued

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.....	57	63	52	7.6	7.7	7.5	--	--	--	2.2	2.3	2.0
Finished water...	53	59	49	8.0	8.0	7.9	93	113	73	.5	.5	.5

NORFOLK

(Population, 213, 513)

Ownership: Municipal; also supplies Portlock, South Norfolk, Virginia Beach, other communities, suburban areas, and an unknown number of Army and Navy personnel. Total population supplied, about 300,000.

Source: Two systems of impounding reservoirs (lakes): Lake Smith system comprised of a chain of reservoirs known as Lake Wright, Lake Taylor, Little Creek, Lake Lawson, Lake Smith and North Landing Lake about 5 miles north-east of the city, and for the most part in Princess Anne County; and Lake Prince system comprised of Lake Prince on Exchange Creek and Lake Burnt Mills, a subsidiary reservoir, in Nansemond County about 18 miles from the city. Auxiliary or emergency supply, Nottoway and Blackwater Rivers.

Treatment: (Both plants) prechlorination, coagulation with alum and lime, addition of activated carbon, bleaching clay when needed, sedimentation, rapid sand filtration, postchlorination, and adjustment of pH with lime.

Rated capacity of treatment plants: Moores Bridges plant, 24,000,000 gpd; 37th Street plant, 24,000,000 gpd.

Raw-water storage: 9,700,000,000 gal.

Finished-water storage: 20,000,000 gal.

Water from the Lake Smith supply system is treated at the Moores Bridges treatment plant located at the southern end of Lake Wright. Water from Lake Prince and Lake Burnt Mills is conducted in two parallel mains, interconnected at intervals, to the 37th Street treatment plant in Norfolk, where it is treated. The two parallel mains are also connected by a 48 in. concrete main to the Moores Bridges treatment plant, so that with this arrangement each of the three mains can deliver water to either plant.

NORFOLK--Continued

ANALYSES

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

	Raw water a	Raw water b	Raw water c	Raw water d	Raw water e
Silica (SiO ₂)	6.0	4.4	4.5	1.5	3.7
Iron (Fe)	--	.02	--	--	.04
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	--	13	--	--	11
Magnesium (Mg)	--	5.3	--	--	1.4
Sodium (Na)	10	18	3.9	3.2	4.1
Potassium (K)	1.8	2.6	1.3	1.2	1.3
Carbonate (CO ₃)	0	0	0	0	0
Bicarbonate (HCO ₃)	41	54	40	13	35
Sulfate (SO ₄)	26	15	4.0	6.0	4.7
Chloride (Cl)	13	25	6.5	6.9	6.4
Fluoride (F) .....	.1	.2	.1	.0	.2
Nitrate (NO ₃)	3.2	2.5	.6	.4	.8
Dissolved solids	--	129	--	--	60
Hardness as CaCO ₃ :					
Total	49	54	38	16	33
Noncarbonate	15	10	5	5	4
Color	40	7	10	8	8
pH	7.1	6.8	7.4	7.0	6.7
Specific conductance (micromhos at 25 C.)	143	208	96.0	52.5	91.0
Turbidity	--	15	--	--	5.0
Temperature (F.)	--	--	--	--	--
Date of collection	Sept. 6, 1951	Sept. 5, 1951	Sept. 6, 1951	Sept. 6, 1951	Sept. 5, 1951

	Finished water f	Finished water g		Finished water f	Finished water g
Silica (SiO ₂)	3.7	3.9	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.02	Total	76	71
Manganese (Mn)	--	--	Noncarbonate	35	27
Calcium (Ca)	26	26	Color	5	3
Magnesium (Mg)	2.6	1.6	pH	7.7	8.1
Sodium (Na)	7.7	4.1	Specific conductance (micromhos at		
Potassium (K)	1.7	1.2	25 C.)	205	169
Carbonate (CO ₃)	0	0	Turbidity .....	.5	.5
Bicarbonate (HCO ₃)	49	54	Temperature (F.)...	72	70
Sulfate (SO ₄)	22	19	Date of collection...	Sept. 5, 1951	Sept. 5, 1951
Chloride (Cl)	23	14			
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃) .....	.1	.2			
Dissolved solids	134	111			

a North Landing Lake.

b Smith Lake System.

c Lake Prince.

d Lake Burnt Mills.

e Lake Prince and Lake Burnt Mills.

f From Moores Bridges treatment plant.

g From 37th Street treatment plant.

NORFOLK--Continued

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 ^a	33	38	22	7.4	8.2	7.1	--	--	--	15	30	11
Finished water ^a	37	44	29	8.0	8.4	6.9	78	94	66	.73	.98	.43
Raw water ^b	27	39	18	6.8	7.2	6.6	33	46	20	6.2	7.9	4.7
Finished water ^b	35	54	25	8.3	8.5	8.2	61	90	46	.5	1.0	.4

^a Moores Bridges Plant.^b 37th Street Plant.

PETERSBURG
(Population, 35,054)

Ownership: Municipal; also supplies suburban areas, other communities, and Fort Lee part of the time. Total population supplied, about 70,000.

Source: Appomattox River (through power canal owned by the Va. Electric & Power Co.). Emergency supply, Wilcox Lake (Lieutenant Run impounded).

Treatment: Plain sedimentation, prechlorination, coagulation with alum and lime, sedimentation, addition of carbon, rapid sand filtration, postchlorination, and adjustment of pH with lime.

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

Raw-water storage: 5,000,000 gal.

Finished-water storage: 3,240,000 gal.

The intake on the power canal is about 3 miles from the treatment plant, located within the city limits. Under normal operation conditions the flow of the water from the canal to the treatment plant is by gravity, but when the consumption exceeds a specified volume pumping becomes necessary. The city has prior right to 10,000,000 gpd.

PETERSBURG--Continued

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	19	15	Hardness as CaCO ₃ :		
Iron (Fe) .....	.25	.05	Total	22	46
Manganese (Mn) .....	.00	.00	Noncarbonate.....	0	17
Calcium (Ca)	4.9	14	Color	6	5
Magnesium (Mg).....	2.4	2.6	pH	7.0	8.0
Sodium (Na)	3.7	3.2	Specific conductance		
Potassium (K)	1.7	1.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	62.7	115
Bicarbonate (HCO ₃)	27	35	Turbidity	5.0	1.0
Sulfate (SO ₄)	4.2	19	Temperature (F.)...	--	--
Chloride (Cl)	3.1	5.5	Date of collection...	Sept. 7, 1951	Sept. 7, 1951
Fluoride (F) .....	.1	.1			
Nitrate (NO ₃) .....	.2	.1			
Dissolved solids.....	66	85			

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	33	23	7.1	7.3	7.1	--	--	--	28	35	6
Finished water...	27	37	26	8.8	9.0	8.7	44	48	42	2	3	1

PORTSMOUTH
(Population, 80,039)

Ownership: Municipal; also supplies a population of about 50,000 in Norfolk Co., and 20,000 in the city of Suffolk and Nansemond Co. Total population supplied, about 150,000.

Source: Lake Kilby 66 percent of supply; Lake Cahoon 34 percent of supply.

Emergency supply, Nottoway River.

Treatment: Prechlorination, coagulation with lime and alum, sedimentation, activated carbon, rapid sand filtration, and addition of polyphosphate (Calgon) for corrosion control.

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

Raw-water storage: 2,450,000,000 gal.

Finished-water storage: 11,000,000 gal.

Lake Kilby is located just west of the corporate limits of Suffolk; Lake Cahoon is about 2 miles north of Lake Kilby in Nansemond County. Water is piped from Lake Cahoon to the treatment plant at the eastern end of Lake Kilby where the water from both sources is treated.

ANALYSES

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

	Lake Kilby (raw water)	Lake Cahoon (raw water)	Finished water
Silica (SiO ₂)	4.0	3.7	3.4
Iron (Fe) .....	.14	.04	.03
Manganese (Mn)	--	--	--
Calcium (Ca)	5.9	5.2	14
Magnesium (Mg)	1.7	1.7	1.4
Sodium (Na)	6.1	4.7	5.3
Potassium (K)	1.2	1.0	1.1
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	17	18	22
Sulfate (SO ₄)	7.0	5.2	15
Chloride (Cl)	10	7.5	14
Fluoride (F) .....	.3	.3	.0
Nitrate (NO ₃) .....	.7	.4	.1
Dissolved solids	60	49	80
Hardness as CaCO ₃ :			
Total	22	20	41
Noncarbonate	8	5	23
Color	33	15	3
pH	6.3	6.7	7.1
Specific conductance (micromhos at 25 C.)	77.7	64.5	118
Turbidity	10	15	1.0
Temperature (F.)	69	71	71
Date of collection	Sept. 6, 1951	Sept. 6, 1951	Sept. 6, 1951

Regular determinations at treatment plant, 1949

	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	9	13	6	6.1	6.4	6.0	--	--	--	9	29	3
Finished water	16	24	10	7.1	8.4	6.5	28	32	25	0	0	0

PULASKI
(Population, 9, 202)

Ownership: Municipal; also supplies about 1,000 people outside the city limits.

Total population supplied, about 10,200.

Source: Lake (impounded mountain stream) 97 percent of supply; Wardens Spring 3 percent of supply.

Treatment: Filtration and chlorination.

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

Raw-water storage: 304,000,000 gal.

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

The Lake is about 5 miles west of town; Wardens Spring is about $1\frac{1}{2}$ miles east of town.

ANALYSES

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

	Lake (raw water)	Finished water (city tap)		Lake (raw water)	Finished water (city tap)
Silica (SiO ₂)	4.8	5.8	Hardness as CaCO ₃ :		
Iron (Fe) .....	.02	.27	Total	15	16
Manganese (Mn)	--	--	Noncarbonate.....	3	4
Calcium (Ca)	3.3	3.4			
Magnesium (Mg).....	1.6	1.8	Color	2	18
Sodium (Na)	1.3	1.4	pH	6.9	6.8
Potassium (K) .....	.9	.7	Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	15	15	25 C.).....	39.4	37.5
Sulfate (SO ₄)	4.2	3.9	Turbidity	10	1.0
Chloride (Cl)	1.5	2.5	Temperature (F.)...	68	65
Fluoride (F) .....	.0	.0	Date of collection...	Sept. 12,	Sept. 12,
Nitrate (NO ₃)	1.3	.1		1951	1951
Dissolved solids.....	30	30			

Regular determinations at treatment plant, 1952

	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	9	7	6.3	6.7	6.3	12	12	11	2	2	1
Finished water...	15	15	15	8.6	8.8	8.6	22	22	22	0	0	0

RICHMOND
(Population, 230,310)

Ownership: Municipal; also supplies a population of about 20,000 outside the city limits. Total population supplied, about 250,000.

Source: James River. Gravity flow.

Treatment: Prechlorination, coagulation with alum (in summer) or ferrous sulfate (in winter), sedimentation, activated carbon, rapid sand filtration, post-chlorination, ammoniation, adjustment of pH with lime, and addition of copper sulfate.

Rated capacity of treatment plant: 66,000,000 gpd.

Raw-water storage: 170,000,000 gal.

Finished-water storage: 58,000,000 gal.

The treatment plant is on Douglasdale Road on the southwest edge of the city.

ANALYSES

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

	Raw water ^a	Finished water		Raw water ^a	Finished water
Silica (SiO ₂)	7.5	8.5	Hardness as CaCO ₃ :		
Iron (Fe) .....	.03	.02	Total	73	76
Manganese (Mn)	--	--	Noncarbonate.....	26	47
Calcium (Ca)	21	23	Color	20	3
Magnesium (Mg).....	5.1	4.6	pH	7.2	8.1
Sodium (Na)	12	9.9	Specific conductance		
Potassium (K)	1.8	1.6	(micromhos at		
Carbonate (CO ₃)	0	0	25 C.).....	202	215
Bicarbonate (HCO ₃)	58	36	Turbidity	--	.5
Sulfate (SO ₄)	37	48	Temperature (F.)...	--	77
Chloride (Cl)	10	14	Date of collection...	Sept.1-30,	Sept. 3,
Fluoride (F) .....	.1	.1		1951	1951
Nitrate (NO ₃) .....	.6	.1			
Dissolved solids.....	133	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	39	60	15	7.5	8.2	6.7	--	--	--	30	250	5
Finished water...	30	48	12	8.8	9.3	8.4	65	80	50	.1	.2	.1

^a Composite of daily samples from the James River for the period Sept. 1 to 30, 1951.

ROANOKE
(Population, 91,921)

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

Total population supplied, about 92,200.

Source: Impounding reservoirs (Carvin's Cove 40 percent, Beaver Creek and Falling Creek 15 percent), 55 percent of supply; Crystal Springs, 45 percent of supply.

Treatment: Carvin's Cove plant: Coagulation with ferric sulfate, aeration, lime, sedimentation, rapid sand filtration, chlorination, and ammoniation. Falling Creek plant: coagulation with alum, sedimentation, pressure filtration, addition of lime and polyphosphate (Calgon). Crystal Springs water: chlorination. Rated capacity of treatment plant: Carvin's Cove plant, 6,000,000 gpd; Falling Creek plant, 1,500,000 gpd.

Raw-water storage: Carvin's Cove reservoir, 6,470,000,000 gal; Beaver Creek and Falling Creek reservoirs, 550,000,000 gal.

Finished-water storage: Carvin's Cove clear wells, 2,000,000 gal; Mill Mt. reservoir, 2,000,000 gal; City Farm reservoir, 2,000,000 gal; Carroll Avenue standpipe, 2,000,000 gal; smaller elevated tanks and reservoirs, 3,000,000 gal.

Crystal Springs is within the city limits on the western slope of Mill Mountain, about $1\frac{1}{2}$ miles from the center of the city. Carvin's Cove Reservoir is about 8 miles north of the city; Beaver Creek and Falling Creek reservoirs are about 7 miles northeast of the city.

Carvin's Cove treatment plant is about 3,000 ft south of the impounding dam and the water flows to the treatment plant by gravity. Falling Creek treatment plant which treats water from both Beaver Creek and Falling Creek reservoirs is a short distance below Falling Creek dam.

The four principal finished-water storage reservoirs are strategically located in four sections of the city to aid in correcting unequal pressures due to over 200 ft differences in elevations in different sections of the city. Finished water from Carvin's Cove plant is conducted to both Mill Mt. reservoir which floats on the system and to other storage reservoirs in the city. Finished water from Falling Creek plant is served principally in the southeastern part of the city.

ROANOKE--Continued

ANALYSES

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

	Crystal Springs (raw water)	Carvin's Cove and Falling Cr. (raw water)	Finished water (composite)
Silica (SiO ₂)	11	5.4	10
Iron (Fe) .....	.02	.04	.04
Manganese (Mn)	--	--	--
Calcium (Ca)	27	3.7	15
Magnesium (Mg)	15	1.9	7.6
Sodium (Na)	1.2	1.0	1.9
Potassium (K) .....	.5	.5	.4
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	151	18	82
Sulfate (SO ₄)	2.5	3.0	3.0
Chloride (Cl)	1.0	1.5	2.2
Fluoride (F) .....	.0	.1	.1
Nitrate (NO ₃)	1.3	.8	.6
Dissolved solids	127	28	86
Hardness as CaCO ₃ :			
Total	129	17	69
Noncarbonate	5	2	2
Color	1	3	2
pH	7.7	6.9	7.7
Specific conductance (micromhos at 25 C.)	228	39.4	139
Turbidity	--	--	--
Temperature (F.)	62	57	--
Date of collection	Sept. 13, 1951	Sept. 13, 1951	Sept. 13, 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 ^a	130	133	125	7.5	7.6	7.4	133	137	128	.3	.4	.2
Finished water ^a	130	133	125	7.5	7.6	7.4	133	137	128	.3	.4	.2
Raw water ^b	16	18	10	6.3	6.7	5.9	15	20	13	2.2	6.0	1.0
Finished water ^b	12	15	9	9.5	9.6	9.1	42	45	35	.2	.5	.1
Raw water ^c	14	16	13	7.2	7.3	7.1	17	18	16	2.2	6.0	1.0
Finished water ^c	14	17	13	7.0	7.1	6.9	18	20	17	.7	1.2	.6

^a Crystal Springs.^b Carvin's Cove.^c Falling Creek.

SOUTH NORFOLK
(Population, 10,434)

Ownership: Supplied by Norfolk. (See Norfolk.)

STAUNTON
(Population, 19,927)

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

Total population supplied, about 20,200.

Source: North River impounded. Auxiliary or emergency supply, Gardner's Spring about 3 miles west of the city.

Treatment: Prechlorination and addition of lime at N. River intake; coagulation with alum and silica (silicate + sulfuric acid), lime, sedimentation, rapid sand filtration, and postchlorination.

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

Raw-water storage: 125,000,000 gal.

Finished-water storage: 7,000,000 gal.

The North River is impounded near Stokesville, about 35 miles northwest of Staunton. The water from the reservoir flows through a cast-iron pipe to the treatment plant, on Two-mile Hill about 2 miles west of the city. Finished water flows into the distribution system and to storage in the city.

ANALYSES

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

	Gardner's Spring (raw water)	North River (raw water)	Finished water
Silica (SiO ₂)	--	4.1	5.4
Iron (Fe)	--	.04	.02
Manganese (Mn)	--	--	--
Calcium (Ca)	--	1.6	10
Magnesium (Mg)	--	.9	.9
Sodium (Na)	--	.8	1.7
Potassium (K)	--	.6	.7
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	294	8.0	25
Sulfate (SO ₄)	4	2.8	12
Chloride (Cl)	--	.8	1.2
Fluoride (F)	--	.0	.0
Nitrate (NO ₃)	2.8	.2	.1
Dissolved solids	--	20	52
Hardness as CaCO ₃ :			
Total	270	8	29
Noncarbonate	29	1	8
Color	--	7	3
pH	7.4	6.5	7.4
Specific conductance (micromhos at 25 C.)	428	21.1	71.3
Turbidity	--	4	.5
Temperature (F.)	65	72	69
Date of collection	Sept. 11, 1951	Sept. 11, 1951	Sept. 11, 1951

STAUNTON--Continued

Regular determinations at treatment plant, Feb. to July, 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.....	14	28	0	7.8	8.2	7.4	16	20	10	3.2	6.9	1.1
Finished water...	22	28	10	8.4	9.0	7.6	28	32	22	.6	1.1	.2

SUFFOLK
(Population, 12,339)

Ownership: Supplied by Portsmouth. (See Portsmouth.)

WAYNESBORO
(Population, 12,357)

Ownership: Municipal; also supplies a small number of people outside the city limits. Total population supplied, about 12,400.

Source: Coyners Spring about 3 miles west of the city.

Treatment: Chlorination at the spring.

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

Raw-water storage: None.

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

The chlorinated water is pumped from the pump house adjacent to the spring basin to a 2,000,000 gal underground concrete reservoir, about 3/4 mile southwest of the city, from which distribution to the city mains is by gravity.

ANALYSES

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

	Raw water	Finished water		Raw water	Finished water
Silica (SiO ₂)	10	10	Hardness as CaCO ₃ :		
Iron (Fe) .....	.04	.04	Total	86	86
Manganese (Mn)	--	--	Noncarbonate.....	8	8
Calcium (Ca)	19	19			
Magnesium (Mg).....	9.5	9.5	Color	5	2
Sodium (Na) .....	.7	.7	pH	7.6	7.6
Potassium (K)	1.2	1.2	Specific conductance		
Carbonate (CO ₃)	0	0	(micromhos at		
Bicarbonate (HCO ₃)	96	96	25 C.)	170	170
Sulfate (SO ₄)	9.5	9.4	Turbidity	0	0
Chloride (Cl) .....	.6	1.0	Temperature (F.)...	57	57
Fluoride (F) .....	.1	.1	Date of collection...	Sept.11, 1951	Sept.11, 1951
Nitrate (NO ₃) .....	.7	.9			
Dissolved solids.....	96	96			

WINCHESTER
(Population, 13,841)

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

Total population supplied, about 15,800.

Source: Four limestone springs: Shawnee, Rouss, Fay's, and Old Town. Shawnee Spring is in the southeast part of the city; Rouss Spring, the main source of supply, about 1 mile southeast of the center of the city; Fay's Spring, 3 miles northeast of the city; and Old Town Spring, at the northwest side of the city.

Treatment: Superchlorination and dechlorination. Shawnee Spring water: coagulation with alum, sedimentation, rapid sand filtration, and chlorination.

Rated capacity of treatment plant: (Shawnee Spring plant only) 1,000,000 gpd.

Raw-water storage: None.

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

Finished water from the spring basins is pumped into the distribution system and to storage.

ANALYSES

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

	Shawnee Spring (raw water)	Rouss Spring (raw water)	Fay's Spring (raw water)	Old Town Spring (raw water)	Finished water (city hall tap)
Silica (SiO ₂)	--	--	--	--	11
Iron (Fe)	--	--	--	--	.04
Manganese (Mn)	--	--	--	--	--
Calcium (Ca)	--	--	--	--	87
Magnesium (Mg)	--	--	--	--	19
Sodium (Na)	--	--	--	--	3.4
Potassium (K)	--	--	--	--	1.9
Carbonate (CO ₃)	0	0	0	0	6
Bicarbonate (HCO ₃)	387	368	322	272	310
Sulfate (SO ₄)	34	15	18	14	22
Chloride (Cl)	--	--	--	--	6.5
Fluoride (F)	--	--	--	--	.1
Nitrate (NO ₃)	8.8	8.6	8.6	6.3	9.8
Dissolved solids	--	--	--	--	358
Hardness as CaCO ₃ :					
Total	424	332	328	316	295
Noncarbonate	107	30	62	93	31
Color	--	--	--	--	4
pH	7.3	7.5	7.5	7.3	7.3
Specific conductance (micromhos at 25 C.)	770	534	534	501	541
Turbidity	--	--	--	--	1.0
Temperature (F.)	58	58	61	57	66
Date of collection	Sept. 12, 1951	Sept. 12, 1951	Sept. 12, 1951	Sept. 12, 1951	Sept. 12, 1951

BECKLEY
(Population, 19,397)

Ownership: Municipal; supplies also Mabscott, Sophia, and about 11,800 people outside the city limits. Total population supplied, about 34,300.

Source: Glade Creek, impounded.

Treatment: Aeration, prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, postchlorination, ammoniation, addition of Calgon for corrosion control.

Rated capacity of treatment plant: 2,300,000 gpd.

Raw-water storage: 565,000,000 gal.

Finished-water storage: 3,835,000 gal.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	3.3	Hardness as CaCO ₃ :	
Iron (Fe) .....	.11	Total	30
Manganese (Mn) .....	.00	Noncarbonate	22
Calcium (Ca)	8.6	Color	2
Magnesium (Mg)	2.1	pH	6.8
Sodium (Na)	1.3	Specific conductance	
Potassium (K)	1.6	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	83.5
Bicarbonate (HCO ₃)	10	Turbidity	--
Sulfate (SO ₄)	19	Temperature (F.).....	--
Chloride (Cl)	5.2	Date of collection	Nov. 28,
Fluoride (F) .....	.4		1951
Nitrate (NO ₃) .....	.3		
Dissolved solids	52		

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	14	3	6.3	7.1	6.1	16	22	8	--	60	0.1
Finished water...	12	20	5	7.4	9.6	5.9	34	48	14	--	0	0

BLUEFIELD
(Population, 21,506)

Ownership: West Virginia Water Service Company; supplies also about 2,000 people outside the city limits. Total population supplied, about 23,500.

Source: 22 springs and surface run-off feeding 2 reservoirs impounded by Ada Dam and Horton Dam. Auxiliary supply from Beaver Pond and Bailey Springs.

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

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

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

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

ANALYSIS

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

	Finished water ^a		Finished water ^a
Silica (SiO ₂)	6.6	Hardness as CaCO ₃ :	
Iron (Fe) .....	.42	Total	112
Manganese (Mn) .....	.00	Noncarbonate	5
Calcium (Ca)	31		
Magnesium (Mg)	8.2	Color	2
Sodium (Na)	1.7	pH	7.6
Potassium (K) .....	.7	Specific conductance	
Carbonate (CO ₃)	0	(micromhos at	
Bicarbonate (HCO ₃)	129	25 C.).....	217
Sulfate (SO ₄)	7.2	Turbidity	--
Chloride (Cl)	2.5	Temperature (F.).....	--
Fluoride (F) .....	.2	Date of collection	Nov. 30,
Nitrate (NO ₃)	1.4		1951
Dissolved solids	124		

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.....	105	114	14	7.4	7.5	7.2	102	130	80	<1	50	0
Finished water...	95	110	76	7.1	7.3	7.0	97	124	74	0	0	0

^a All sources.

WEST VIRGINIA

CHARLESTON
(Population, 73,501)

Ownership: West Virginia Water Service Company; supplies also South Charleston, and about 13,900 people outside the city limits. The system is interconnected with Belle, Nitro, and St. Albans. Total population supplied, about 104,000.

Source: Elk River.

Treatment: Anhydrous ammonia, carbon, coagulation with alum and at times lime, aeration at times by air diffusion, chlorination beyond break-point, sedimentation, rapid sand filtration, and final adjustment of pH with lime.

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

Raw-water storage: None..

Finished-water storage: 8,850,000 gal.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	4.4	Hardness as CaCO ₃ :	
Iron (Fe) .....	.10	Total	32
Manganese (Mn) .....	.00	Noncarbonate	17
Calcium (Ca)	9.6	Color	0
Magnesium (Mg)	2.0	pH	7.4
Sodium (Na)	2.3	Specific conductance	
Potassium (K)	1.7	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	89.4
Bicarbonate (HCO ₃)	19	Turbidity	--
Sulfate (SO ₄)	15	Temperature (F.).....	--
Chloride (Cl)	6.2	Date of collection	Dec: 27,
Fluoride (F) .....	.0		1951
Nitrate (NO ₃)	1.8		
Dissolved solids	52		

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.....	14	25	8	6.5	6.9	6.1	23	42	14	56	1000	1
Finished water...	21	36	13	9.0	9.6	8.4	37	60	22	>0	0	>0

CLARKSBURG
(Population, 32,014)

Ownership: Municipal; supplies also Nutter Fort, Stonewood, Summit Park, and about 1,490 people outside the city limits. Total population supplied, about 38,400.

Source: West Fork River impounded by a series of low dams.

Treatment: Coagulation with alum and lime, activated carbon, adjustment of pH to about 8.3 with lime, sedimentation, rapid sand filtration, postchlorination at times, softening by cation exchange at times.

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

Raw-water storage: 440,000,000 gal

Finished-water storage: 3,064,000 gal.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	4.1	Hardness as CaCO ₃ :	
Iron (Fe) .....	.20	Total	140
Manganese (Mn) .....	.00	Noncarbonate	116
Calcium (Ca)	44	Color	2
Magnesium (Mg)	7.5	pH	7.6
Sodium (Na)	4.0	Specific conductance	
Potassium (K)	3.0	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	316
Bicarbonate (HCO ₃)	30	Turbidity	--
Sulfate (SO ₄)	119	Temperature (F.).....	--
Chloride (Cl)	3.2	Date of collection	Dec. 31,
Fluoride (F) .....	.0		1951
Nitrate (NO ₃)	2.4		
Dissolved solids	210		

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.....	21	41	5	6.7	7.2	6.5	87	265	47	71	1900	5
Finished water...	31	48	28	8.2	9.1	6.7	98	208	38	0	0	0

ELKINS
(Population, 9, 121)

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

Total population supplied, about 9, 600.

Source: Tygart River.

Treatment: Prechlorination, coagulation with alum and lime, activated carbon at times, sedimentation, rapid sand filtration, postchlorination, and final adjustment of pH with lime.

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

Raw-water storage: None.

Finished-water storage: 1, 350, 000 gal.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	3.2	Hardness as CaCO ₃ :	
Iron (Fe) .....	.03	Total	45
Manganese (Mn) .....	.00	Noncarbonate	19
Calcium (Ca)	14	Color	1
Magnesium (Mg)	2.2	pH	7.1
Sodium (Na)	1.5	Specific conductance	
Potassium (K)	1.2	(micromhos at	
Carbonate (CO ₃)	0	25 C.)	108
Bicarbonate (HCO ₃)	30	Turbidity	--
Sulfate (SO ₄)	22	Temperature (F.)	--
Chloride (Cl)	2.8	Date of collection	Nov. 23,
Fluoride (F) .....	.1		1951
Nitrate (NO ₃) .....	.9		
Dissolved solids	64		

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	24	14	7.1	7.3	6.8	--	--	--	--	--	--
Finished water...	29	30	26	8.2	8.3	8.2	--	--	--	--	--	--

FAIRMONT
(Population, 29,346)

Ownership: Municipal; supplies also Barrackville, Rivesville, and about 2,000 people outside the city limits. Total population supplied, about 33,700.

Source: Tygart River.

Treatment: Coagulation with alum and soda ash, prechlorination, sedimentation, rapid sand filtration, postchlorination, and addition of Calgon for corrosion control.

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

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

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

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) .....	.20	Total	23
Manganese (Mn) .....	.14	Noncarbonate	12
Calcium (Ca)	7.2		
Magnesium (Mg)	1.2	Color	2
Sodium (Na)	7.9	pH	7.3
Potassium (K)	2.0	Specific conductance	
Carbonate (CO ₃)	0	(micromhos at	
Bicarbonate (HCO ₃)	13	25 C.).....	96.6
Sulfate (SO ₄)	27	Turbidity	--
Chloride (Cl)	1.5	Temperature (F.).....	--
Fluoride (F) .....	.0	Date of collection	Dec. 27,
Nitrate (NO ₃)	1.9		1951
Dissolved solids	58		

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.....	1.7	3.0	2.18	6.0	6.6	4.9	30	80	18	27	160	4
Finished water...	9.9	24	6.0	7.1	8.5	6.9	30	78	18	0	0	0

^a Acidic.

HUNTINGTON
(Population, 86,353)

Ownership: Huntington Water Corporation; supplies also Barboursville, Chesapeake (Ohio), and about 30,000 people outside the city limits. Total population supplied, about 120,000.

Source: Ohio River.

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

Rated capacity of treatment plant: 15,000,000 gpd.

Raw-water storage: None.

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

ANALYSES

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

	Finished water ^a	Finished water		Finished water ^a	Finished water
Silica (SiO ₂)	4.9	5.0	Hardness as CaCO ₃ :		
Iron (Fe) .....	.13	.12	Total	188	72
Manganese (Mn) .....	.91	.00	Noncarbonate.....	152	50
Calcium (Ca)	56	22	Color	1	0
Magnesium (Mg).....	12	3.9	pH	7.5	9.2
Sodium (Na)	38	5.8	Specific conductance		
Potassium (K)	3.6	1.3	(micromhos at		
Carbonate (CO ₃)	0	5	25 C.).....	558	200
Bicarbonate (HCO ₃)	45	15	Turbidity	--	--
Sulfate (SO ₄)	160	53	Temperature (F.)...	--	--
Chloride (Cl)	52	10	Date of collection...	Nov. 27, 1951	Mar. 27, 1952
Fluoride (F) .....	.4	.1			
Nitrate (NO ₃)	3.4	2.2			
Dissolved solids.....	362	116			

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	53	13	7.1	7.4	6.5	--	--	--	--	600	15
Finished water...	30	50	20	8.4	8.4	7.9	70	134	28	--	0	0

^a River at low stage at time of collection of sample.

MARTINSBURG
(Population, 15, f21)

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

Total population supplied, about 15,700.

Source: Limestone spring. Auxiliary supply from spring-fed limestone quarry.

Treatment: Chlorination.

Raw-water storage: 200,000,000 gal (auxiliary supply).

Finished-water storage: 3,750,000 gal.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	11	Hardness as CaCO ₃ :	
Iron (Fe) .....	.19	Total	264
Manganese (Mn) .....	.00	Noncarbonate	31
Calcium (Ca)	80		
Magnesium (Mg)	16	Color	0
Sodium (Na)	1.6	pH	7.5
Potassium (K)	1.8	Specific conductance	
Carbonate (CO ₃)	0	(micromhos at	
Bicarbonate (HCO ₃)	286	25 C.).....	468
Sulfate (SO ₄)	18	Turbidity	--
Chloride (Cl)	3.5	Temperature (F.).....	--
Fluoride (F) .....	.1	Date of collection	Feb. 27,
Nitrate (NO ₃)	14		1952
Dissolved solids	279		

MORGANTOWN
(Population, 25,525)

Ownership: Municipal; supplies also Star City, Westover, and about 8,000 people outside the city limits. Total population supplied, about 39,000.

Source: Monongahela River, 75 percent of supply; Tibbs Run, impounded, 25 percent of supply.

Treatment: Monongahela River supply: coagulation with alum and lime, activated carbon, sedimentation, rapid sand filtration, zeolite softening, and chlorination. Tibbs Run supply: addition of lime, and chlorination.

Rated capacity of treatment plant: 3,800,000 gpd.

Raw-water storage: 35,000,000 gal.

Finished-water storage: 2,600,000 gal.

ANALYSES

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

	Finished water (Monongahela River)	Finished water (Tibbs Run, impounded)	Filter effluent (Monongahela River)
Silica (SiO ₂)	3.7	4.1	3.7
Iron (Fe) .....	.12	.13	.12
Manganese (Mn) .....	.00	.00	.04
Calcium (Ca)	30	7.0	41
Magnesium (Mg)	4.9	1.2	7.1
Sodium (Na)	33	1.2	10
Potassium (K)	2.0	1.7	2.2
Carbonate (CO ₃)	0	0	0
Bicarbonate (HCO ₃)	19	13	17
Sulfate (SO ₄)	140	13	135
Chloride (Cl)	7.5	2.5	3.2
Fluoride (F) .....	.1	.1	.1
Nitrate (NO ₃)	2.4	.4	2.4
Dissolved solids	237	39	222
Hardness as CaCO ₃ :			
Total	94	22	132
Noncarbonate	79	12	118
Color	0	5	1
pH	8.5	7.2	8.1
Specific conductance (micromhos at 25 C.)	371	60.1	339
Turbidity	--	--	--
Temperature (F.)	--	--	--
Date of collection	Jan. 1, 1952	Jan. 1, 1952	Jan. 1, 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	--	6	-13	--	--	--	92	205	42	40	400	5
Finished water ^a	12	16	10	9.0	9.4	8.8	64	166	42	0	5	0
Finished water ^b	13	20	9	9.0	9.4	8.8	28	34	24	0	0	0

^a Monongahela River.

^b Tibbs Run.

MOUNDSVILLE
(Population, 14, 772)

Ownership: Municipal.

Source: 3 wells (4 to 6), 69, 69, and 70 ft deep, yield reported to be 400, 400, and 725 gpm. Emergency supply from Well 3.

Treatment: Chlorination. Emergency supply treated with polyphosphate (Calgon) for manganese control.

Raw-water storage: None.

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

ANALYSIS

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

	Finished water ^a		Finished water ^a
Silica (SiO ₂)	11	Hardness as CaCO ₃ :	
Iron (Fe) .....	.12	Total	274
Manganese (Mn) .....	.02	Noncarbonate	197
Calcium (Ca)	87	Color	0
Magnesium (Mg)	14	pH	7.3
Sodium (Na)	23	Specific conductance	
Potassium (K)	2.6	(micromhos at	
Carbonate (CO ₃)	0	25 C.)	611
Bicarbonate (HCO ₃)	95	Turbidity	--
Sulfate (SO ₄)	213	Temperature (F.)	--
Chloride (Cl)	21	Date of collection	Dec. 11,
Fluoride (F) .....	.1		1951
Nitrate (NO ₃)	2.2		
Dissolved solids	445		

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	--	--	--	--	--	--	--	--	--	--	--	--
Finished water...	82	100	66	7.2	7.3	7.0	227	276	168	--	--	--

^a Composite, wells 5 and 6.

NITRO
(Population, 3,314)

Ownership: West Virginia Water Service Company; supplies also Dunbar, and about 11,500 people outside the city limits. The system is interconnected with Belle, Charleston, and St. Albans. Total population supplied, about 22,800.

Source: Kanawha River.

Treatment: Aeration, prechlorination, coagulation with alum, activated carbon, sedimentation, rapid sand filtration, adjustment of pH with lime, and post-chlorination.

Rated capacity of treatment plant: 36,000,000 gpd

Raw-water storage: None.

Finished-water storage: 1,800,000 gal.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	5.6	Hardness as CaCO ₃ :	
Iron (Fe) .....	.04	Total	50
Manganese (Mn) .....	.00	Noncarbonate	31
Calcium (Ca)	16	Color	0
Magnesium (Mg)	2.7	pH	7.3
Sodium (Na)	3.7	Specific conductance	
Potassium (K)	1.7	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	137
Bicarbonate (HCO ₃)	24	Turbidity	--
Sulfate (SO ₄)	25	Temperature (F.).....	--
Chloride (Cl)	9.0	Date of collection	Dec. 27,
Fluoride (F) .....	.0		1951
Nitrate (NO ₃)	2.2		
Dissolved solids	80		

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.....	34	66	15	7.2	7.6	6.3	55	112	24	27	180	5
Finished water...	30	55	14	9.0	9.2	8.5	68	128	36	70	70	70

PARKERSBURG
(Population, 40,492)

Ownership: Municipal; supplies also about 5,000 people outside the city limits.

Total population supplied, about 45,500.

Source: 3 wells (Ranney collectors 1 to 3), 57, 56, and 54 ft deep, yield reported to be 2,500, 2,000, and 2,500 gpm. Emergency supply from Ohio River.

Treatment: Prechlorination, aeration, coagulation with lime, sedimentation, rapid sand filtration, addition of polyphosphate (Calgon), and postchlorination.

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

Raw-water storage: None.

Finished-water storage: 7,500,000 gal.

ANALYSIS

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

	Finished water ^a		Finished water ^a
Silica (SiO ₂)	13	Hardness as CaCO ₃ :	
Iron (Fe) .....	.04	Total	216
Manganese (Mn) .....	.12	Noncarbonate	142
Calcium (Ca)	64	Color	0
Magnesium (Mg)	14	pH	8.1
Sodium (Na)	29	Specific conductance	
Potassium (K)	1.3	(micromhos at	
Carbonate (CO ₃)	7	25 C.).....	554
Bicarbonate (HCO ₃)	78	Turbidity	--
Sulfate (SO ₄)	145	Temperature (F.).....	--
Chloride (Cl)	39	Date of collection	Jan. 7,
Fluoride (F) .....	.2		1952
Nitrate (NO ₃)	2.4		
Dissolved solids	366		

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.....	71	75	69	6.6	6.7	6.5	159	173	151	--	--	--
Finished water...	82	86	81	8.4	8.6	8.2	167	178	157	--	--	--

^a Composite, collectors 1 and 3.

ST. ALBANS
(Population, 9,870)

Ownership: West Virginia Water Service Company; supplies also about 8,500 people outside St. Albans. The system is interconnected with Belle, Charleston, and Nitro. Total population supplied, about 18,400.

Source: Coal River.

Treatment: Prechlorination, coagulation with alum and lime, sedimentation, rapid sand filtration, adjustment of pH with lime, postchlorination. Aeration and activated carbon at times.

Rated capacity of treatment plant: 1,600,000 gpd.

Raw-water storage: None.

Finished-water storage: 300,000 gal.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	6.6	Hardness as CaCO ₃ :	
Iron (Fe) .....	.05	Total	51
Manganese (Mn) .....	.00	Noncarbonate	37
Calcium (Ca)	14	Color	0
Magnesium (Mg)	3.9	pH	7.4
Sodium (Na)	4.5	Specific conductance	
Potassium (K)	2.6	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	147
Bicarbonate (HCO ₃)	17	Turbidity	--
Sulfate (SO ₄)	40	Temperature (F.).....	--
Chloride (Cl)	4.8	Date of collection	Dec. 27,
Fluoride (F) .....	.0		1951
Nitrate (NO ₃)	1.9		
Dissolved solids	86		

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	58	10	6.8	7.3	6.3	50	100	24	61	1200	.8
Finished water...	25	62	15	9.0	9.4	8.2	62	110	32	0	0	0

SOUTH CHARLESTON
(Population, 16,686)

Ownership: West Virginia Water Service Company.

Source: From Nitro and Charleston.

Treatment: (See Nitro and Charleston.)

WEIRTON
(Population, 24, 005)

Ownership: Municipal.

Source: Ohio River.

Treatment: Aeration, coagulation with lime and ferrous sulfate at times, super-chlorination, activated carbon at times, fluoridation with sodium silicofluoride, sedimentation, rapid sand filtration, and chlorine dioxide.

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

Raw-water storage: None.

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

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	4.4	Hardness as CaCO ₃ :	
Iron (Fe) .....	.21	Total	100
Manganese (Mn) .....	.00	Noncarbonate	81
Calcium (Ca)	33	Color	0
Magnesium (Mg)	4.4	pH	8.6
Sodium (Na)	14	Specific conductance	
Potassium (K)	2.6	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	289
Bicarbonate (HCO ₃)	24	Turbidity	--
Sulfate (SO ₄)	77	Temperature (F.).....	--
Chloride (Cl)	22	Date of collection	Dec. 12,
Fluoride (F)	1.6		1951
Nitrate (NO ₃)	2.0		
Dissolved solids	180		

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	22	0	6.7	7.2	5.3	112	205	60	120	1100	30
Finished water...	26	32	12	9.5	9.6	9.2	125	188	68	0	0	0

WHEELING
(Population, 58,891)

Ownership: Municipal; supplies also Bethlehem, Triadelphia, and about 3,600 people outside the city limits. Total population supplied, about 64,400.

Source: Ohio River.

Treatment: Aeration, superchlorination, coagulation with alum and ferrous sulfate, sedimentation, rapid sand filtration, chlorination, chlorine dioxide, adjustment of pH with caustic soda, and flouridation with sodium silicofluoride.

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

Raw-water storage: None.

Finished-water storage: 11,500,000 gal.

ANALYSIS

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

	Finished water		Finished water
Silica (SiO ₂)	5.2	Hardness as CaCO ₃ :	
Iron (Fe) .....	.06	Total	128
Manganese (Mn) .....	.00	Noncarbonate	105
Calcium (Ca)	40	Color	1
Magnesium (Mg)	7.0	pH	7.8
Sodium (Na)	14	Specific conductance	
Potassium (K)	2.4	(micromhos at	
Carbonate (CO ₃)	0	25 C.).....	345
Bicarbonate (HCO ₃)	29	Turbidity	--
Sulfate (SO ₄)	104	Temperature (F.).....	--
Chloride (Cl)	22	Date of collection	Dec. 11,
Fluoride (F) .....	.6		1951
Nitrate (NO ₃)	1.9		
Dissolved solids	224		

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.....	10	24	4	6.6	7.5	5.5	111	192	52	80	800	20
Finished water...	22	43	14	9.0	9.8	8.1	141	228	84	0	0	0