GROUND-WATER RESOURCES OF THE SOUTH METROPOLITAN ATLANTA REGION, GEORGIA

by
John S. Clarke and Michael F. Peck
U.S. Department of the Interior
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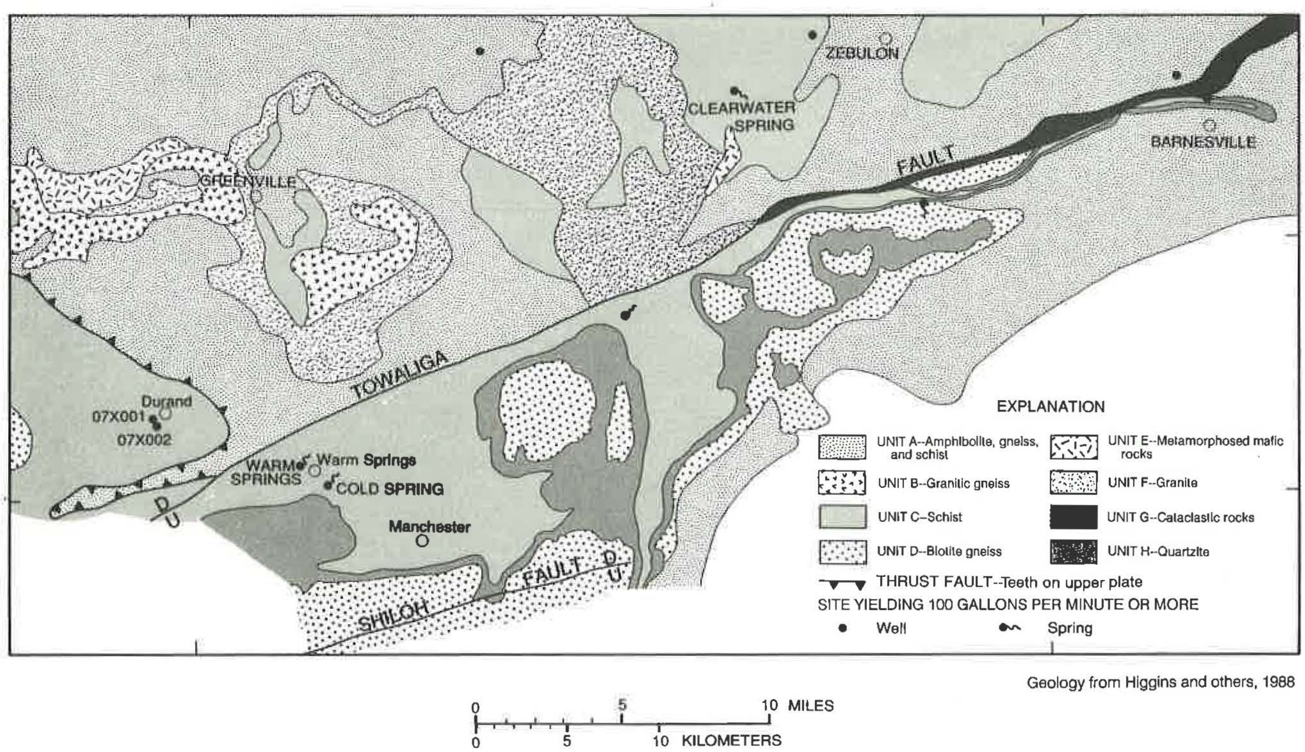

Geology from Higgins and others, 1988

DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
GEORGIA GEOLOGIC SURVEY

INFORMATION CIRCULAR 88

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Prepared in cooperation with the

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

GEORGIA DEPARTMENT OF NATURAL RESOURCES
Joe D. Tanner, Commissioner

ENVIRONMENTAL PROTECTION DIVISION
Harold F. Reheis, Assistant Director

GEORGIA GEOLOGIC SURVEY
William H. McLemore, State Geologist

Atlanta, Georgia

1991

INFORMATION CIRCULAR 88

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[Plate is in pocket]

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Multiply	by	to obtain
	Length	
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
gallon (gal)	3.785	liter (L)
	0.003785	cubic meter (m^3)
	Flow	
gallon per minute (gal/min)	0.06309	liter per second (L/s)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)
	43.81	liter per second (L/s)
inch per year (in/yr)	25.4	millimeter per year (mm/yr)
gallon per day (gal/d)	3.785	liter per day (L/d)
cubic foot per day (ft^3/d)	0.02832	cubic meter per day (m^3/d)

CONVERSION FACTORS, ABBREVIATIONS, DEFINITIONS, AND VERTICAL DATUM

Multiply	by	to obtain
	Hydraulic conductivity	
foot per day (ft/d)	0.3048	meter per day (m/d)
	Specific capacity	
gallon per minute per foot [(gal/min)/ft]	0.2070	liter per second per meter [(L/s)/m]

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F = 1.8\ (°C) - 32$$

Additional abbreviations

μg/L = micrograms per liter
mg/L = milligrams per liter
μS/cm at 25°C = microsiemen per centimeter at 25 degrees Celsius

Sea level:--In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "Sea Level Datum of 1929."

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ABSTRACT

Ground-water resources of the nine-county south metropolitan Atlanta region were evaluated in response to an increased demand for water supplies and concern that existing surface-water supplies may not be able to meet future supply demands. Previous investigations have suggested that crystalline rock in the study area has low permeability and can not sustain well yields suitable for public supply. However, the reported yield for 406 wells drilled into crystalline rock units in this area ranged from less than 1 to about 700 gallons per minute, and averaged 43 gallons per minute. The reported flow from 13 springs ranged from 0.5 to 679 gallons per minute. The yield of 43 wells and flow from five springs was reported to exceed 100 gallons per minute. Most of the high-yielding wells and springs were near contact zones between rocks of contrasting lithologic and weathering properties. The high-yielding wells and springs are located in a variety of topographic settings: hillsides, upland draws, and hilltops were most prevalent.

The study area, which includes Henry, Fayette, Coweta, Spalding, Lamar, Pike, Meriwether, Upson and Talbot Counties, is within the Piedmont physiographic province except for the southernmost part of Talbot County, which is in the Coastal Plain physiographic province. In the Piedmont, ground-water storage occurs in joints, fractures and other secondary openings in the bedrock, and in pore spaces in the regolith. The most favorable geologic settings for siting high-yielding wells are along contact zones between rocks of contrasting lithology and permeability, major zones of fracturing such as the Towaliga and Auchumpkee fault zones, and other numerous shear and microbreccia zones.

Although most wells in the study area are from 101 to 300 feet deep, the highest average yields were obtained from wells 51 to 100 feet deep, and 301 to 500 feet deep. Of the wells inventoried, the average diameter of well casing was largest for wells located on hills and ridges, possibly indicating a preference for such topographic locations by cities and industrial users who typically develop larger diameter wells than do domestic users. Generally, for a given depth range or well diameter, the highest yielding wells were obtained in draws and valleys, followed by hills and ridges and slopes and flats.

In 1985, wells and springs supplied about 16 million gallons per day or 37 percent of the total water withdrawn in the area. Average recharge to the aquifers in the upper Flint River basin, which constitutes 66 percent of the area, was estimated to be about 575 million gallons per day. Ground-water recharge in this basin ranged from 414 million gallons per day during an average dry year, to 771 million gallons per day during an average wet year. During the severe drought of 1954, the estimated recharge was 70 million gallons per day.

Ground water in the study area generally is suitable for most uses. With the exception of local occurences of excessive iron, fluoride, and manganese, concentrations of total and/or dissolved constituents generally meets State and Federal drinking water standards. Ground-water quality may be affected by the presence of radionuclides associated with the decay of uranium found in igneous and metamorphic rocks.

INTRODUCTION

The south Metropolitan Atlanta region (south metro region) of the Piedmont physiographic province is undergoing rapid population growth. As the population grows, the demand for water supplies in the region will increase. Most municipal and industrial supplies in the south metro region are derived from surface-water sources, but expected increases in the demand for water are causing concern that the surface-water resources may not be able to meet the demand.

Ground water in the area may offer a potential source of water to supplement the available surface-water resources. Ground water in the Piedmont is contained in openings in the otherwise impermeable crystalline bedrock, and in the overlying semi-consolidated to unconsolidated material. Until recently, ground-water yields in the Piedmont were considered too small to provide substantial amounts of water for municipal and industrial supply. A study by Cressler and others (1983), however, showed that large supplies of ground water may be obtained from a variety of geologic and topographic settings in the greater Atlanta region--the area north of and including the northern part of the south metro region. More recent work by the Georgia Geologic Survey (Brackett and others, 1990a) has located high-yielding wells in a number of communities in the Piedmont.

To determine the development potential of ground water in the south metro region, the U.S. Geological Survey (USGS), in cooperation with the U.S. Army Corps of Engineers, Savannah District, and the Georgia Department of Natural Resources, Environmental Protection Division (EPD), Georgia Geologic Survey (GGS), conducted a study of the ground-water resources in the area during 1988-89.

Purpose and Scope

This report provides a general evaluation of the ground-water resources of the south metro region and their development potential. The evaluation describes existing ground-water supplies in the region, including domestic, agricultural, municipal, and industrial wells and springs; their yield; hydrogeologic and topographic setting; construction specifications; and quality of water. Although this report gives a general overview of hydrogeologic conditions favorable for attaining high-yielding wells in the area, more detailed studies to better define local hydrogeologic conditions would be necessary to locate actual drilling sites.

The study area (fig. 1) includes the upper Flint River basin and, with the exception of extreme southern Talbot County in the Coastal Plain, lies within the Piedmont physiographic province. The 2,808 mi^2 study area includes Fayette, Henry, Spalding, Coweta, Pike, Upson, Meriwether, Talbot, and Lamar Counties.

Methods

Prior to this study, data and information on the geology, hydrology, and water quality of aquifers in the south metro region were insufficient for a thorough evaluation of the ground-water resources. For this reason, an extensive file search and field inventory of wells were conducted to collect additional data and information in the region. These data were used to demonstrate the yield potential of aquifers in the region.

Files of well drillers, municipalities, county tax offices, county health departments, the USGS, the GGS, and EPD were searched and reviewed for pertinent information. Well data obtained from these sources were plotted on 7 1/2-minute topographic quadrangle maps and locations were verified by USGS personnel in the field.

As new sites were field inventoried, data were entered into the U.S. Geological Survey's Ground-Water Site Inventory (GWSI) system, a computerized system for ground-water data storage and retrieval. At each new well site, the following data were obtained, where available.

(1) well construction specifications,
(2) well yield or spring discharge,
(3) static and pumping water levels,
(4) water use,
(5) quality of water,
(6) topographic setting,
(7) soil thickness,
(8) depths of water-bearing zones and their characteristics, and
(9) depth and character of lithologic changes.

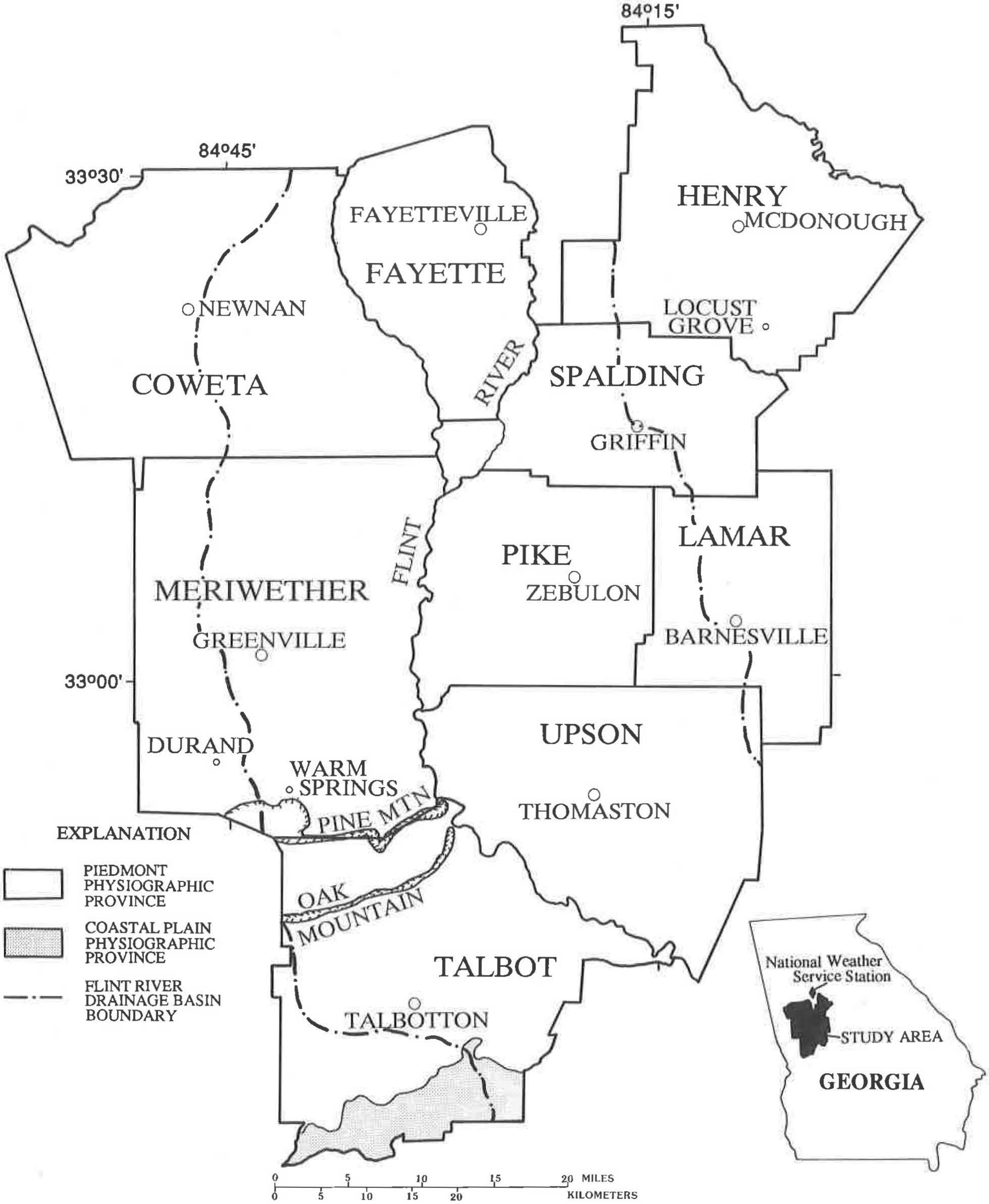


Figure 1.--Location of study area, physiographic provinces, and the Flint River Basin.

This inventory resulted in the addition of 201 well sites and 12 springs to the existing data base of 280 wells and 1 spring.

Previous Studies

The ground-water resources in the northern half of the south metro region, which includes Coweta, Henry, Fayette, and Spalding Counties, were described in a report on the ground water resources in the greater Atlanta region by Cressler and others (1983). Their report assessed the quantity and chemical quality of ground water in the region, and discussed methods for locating high-yielding wells throughout the region. In Lamar County, Gorday (1989) assessed the availability and chemical quality of ground water, and investigated siting techniques for high-yielding wells.

Hewett and Crickmay (1937) described geohydrologic controls on the warm springs of Georgia and presented a geologic map of the Warm Springs area. White (1965) described bauxite deposits and the geology of the Warm Springs district of Meriwether County. Reinhardt and others (1984) discussed evidence for Cenozoic tectonism in the southwest Georgia Piedmont near Warm Springs.

Schamel and others (1980) described the geology of the Pine Mountain Window and adjacent terranes in Georgia and Alabama in a fieldtrip guidebook. Clarke (1952) described and mapped the geology and mineral resources of the Thomaston 15-minute quadrangle, which includes parts of Upson, Talbot, Pike, and Lamar Counties.

Higgins and others (1988) described the structure, stratigraphy, tectonostratigraphy, and evolution of the southernmost part of the Appalachian orogen, which included all of the south metro region; and revised, adopted, and simplified the stratigraphic nomenclature of the region.

Well and Spring Numbering System

Wells and springs in this report are numbered according to a system based on the USGS index to topographic maps of Georgia. Each 7 1/2-minute topographic quadrangle in Georgia has been given a number and letter designation begining at the southwest corner of the State, and increase numerically eastward. The letters progress alphabetically northward. Because the alphabet contains fewer letters than there are quadrangles, those in the northern part of the State are designated by double letters, AA follows Z, and so forth. The letters "I", "O", "II", and "OO" are not used. Wells and springs inventoried in each quadrangle are numbered consecutively, beginning with 1. Thus, the fourth well scheduled in the 11AA quadrangle is designated 11AA04. Locations of wells and springs in the study area are shown in plate 1.

Acknowledgements

The authors extend their appreciation to the many well owners, drillers, city clerks, and managers of municipal and industrial waterworks who readily furnished information about wells. In particular, the writers wish to thank Mrs. Hoyt W. Waller of Waller Drilling Co., Griffin, Ga., and Mr. James Breakey and Mr. Mike Smith of Middle Georgia Water Systems Inc., Zebulon, Ga.

DESCRIPTION OF THE STUDY AREA

Geologic Setting

Previous investigators have divided the various igneous and metamorphic rock units of the south metro region into more than 40 named formations and unnamed mappable units that range in thickness from less than 10 ft to possibly more than 10,000 ft (Cressler and others, 1983, p. 7). Regional tectonic stresses have warped the rocks into complex and refolded folds that have been injected by younger igneous plutons and dikes and broken by faults (Cressler and others, 1983, p. 7). The rocks are characterized by several distinct regions that are separated from each other by thrust faults (Higgins and others, 1988). A generalized geologic map of the area is shown in plate 1.

The Towaliga and Auchumpkee are major fault zones that cut across the southern part of the south metro region. The Towaliga is a normal fault that dips to the northwest and extends for at least 125 mi across Georgia and Alabama (Clarke, 1952, p. 72). In the study area, the fault cuts across central Lamar and southern Meriwether and Pike

Counties, and is marked by a discontinuous zone of mylonite, blastomylonite, button schist, and mylonite gneiss as much as 1 mi wide (Higgins and others, 1988, p. 23). The Auchumpkee fault of Higgins and others (1988, p. 67), crosses north-central Talbot and south-central Upson Counties in the southern part of the study area. The Auchumpkee is a thrust fault that locally coincides with what has been mapped previously as the Goat Rock fault (Clarke, 1952, p. 73). The fault is marked by a zone 1 to 2 mi wide that is characterized throughout its length by sheared rocks, mylonite, ultramylonite, and blastomylonite. The area north of the Towaliga fault is characterized by metamorphic rocks intruded by granite subsequent to metamorphism. Rocks in the area between the Towaliga and Auchumpkee faults consist chiefly of schist, gneiss, and quartzite that were intruded by granite and charnockite (Higgins, 1988). South of the Auchumpkee fault, the principal rocks are hornblende-biotite granite and biotite-oligoclase gneiss and epidote-amphibolite gneiss (Clarke, 1952, p. 6). Other major faults in the south metro region include the Shiloh fault (Schamel and Bauer, 1980; Sears and others, 1981), a normal fault cutting across northern Talbot County, and the Warm Springs fault (Christopher and others, 1980), a normal fault in southern Meriwether County.

Hydrologic Setting

Average annual precipitation in the south metro region for the period 1941-70 ranged from less than 48 in. in eastern Lamar County to more than 52 in. in Talbot, and parts of Meriwether, Coweta, and Fayette Counties (Carter and Stiles, 1983). Maximum rainfall generally occurs during the winter and midsummer. Average annual runoff for the same period ranged from less than 16 in. in Spalding and eastern Lamar and Fayette Counties, to more than 24 in. in southeastern Talbot County, which lies within the Coastal Plain physiographic province (Carter and Stiles, 1983).

Ground-water recharge rates in the upper Flint River basin were estimated by Faye and Mayer (1990) using a hydrograph separation technique for the Flint River near Culloden stream gage site (site 02347500, plate 1). The upper Flint River basin lies in the Piedmont, and covers an area of about 1,850 mi^2, or about 66 percent of the study area. Although ground-water contribution from outside the river's drainage basin through faults, fracture systems, or contact zones transecting the basin boundary is possible, it is likely that the largest percentage of recharge is derived from precipitation within the basin. The estimated mean annual ground-water recharge rate in the Flint River basin is about 6.5 in/yr (575 Mgal/d), but is higher during wet years and lower during dry years (Faye and Mayer, 1990).

Average wet and dry years were determined by examining streamflow records for 1911-87. During an average dry year (1941), the recharge rate was about 4.7 in/yr (415 Mgal/d); whereas, during an average wet year (1949), the recharge rate was about 8.8 in/yr (770 Mgal/d). During extreme droughts, the recharge rate is well below the average. During the severe drought of 1954, ground-water recharge was estimated to be only about 0.8 in/yr (70 Mgal/d).

Differences in recharge rates during wet and dry years determine the relative amounts of water available from the regolith and from deeper fracture systems for baseflow to streams and yield to wells. During wet years, the regolith is more saturated, and there is more water in ground-water storage. During dry years, however, the regolith is less saturated or is completely dry, and ground-water storage largely is limited to fracture systems in the bedrock. Thus, recharge during the severe drought of 1954 (0.8 in/yr), probably did little to recharge the regolith, but primarily contributed to storage in deep fracture systems within the drainage basin.

Although the amount of recharge exceeds current ground-water withdrawals in the basin (16 Mgal/d), only a small percentage of the estimated annual recharge can be economically recovered by wells. The actual amount that can be recovered will depend on utilization of systematic water-prospecting techniques to locate sites favorable for the development of high-yielding wells.

Water Use

Water-use data for the south metro region were compiled from Turlington and others (1987) (table 1, fig. 2). In the study area, approximately 43.3 Mgal/d was withdrawn from surface- and ground-water sources during 1985. Of this total, about 63 percent (27 Mgal/d) was from surface-water sources and 37 percent (16 Mgal/d) was from ground-water sources.

Table 1.--*Water use in the study area, 1985*

[Data from Turlington and others, 1987]

County and source	Withdrawals, in million gallons per day					
	Public supply	Domestic and commercial	Industry and mining	Irrigation	Livestock	Totals
Coweta County						
Ground water	0.38	2.03	0.03	0.02	0.00	2.46
Surface water	3.08	0.00	.53	.04	.12	3.77
County totals	3.46	2.03	.56	.06	.12	6.23
Fayette County						
Ground water	.27	.76	.01	.02	.00	1.06
Surface water	.43	.00	.00	.06	.07	.56
County totals	.70	.76	.01	.08	.07	1.62
Henry County						
Ground water	.21	1.46	.00	.00	.01	1.68
Surface water	3.25	.00	.00	.25	.10	3.60
County totals	3.46	1.46	.00	.25	.11	5.28
Lamar County						
Ground water	.01	.50	.00	.06	.55	1.12
Surface water	1.68	.00	.00	.24	.64	2.56
County totals	1.69	.50	.00	.30	1.19	3.68
Meriwether County						
Ground water	.36	.91	.35	.00	.81	2.43
Surface water	.98	.00	.00	.08	.96	2.02
County totals	1.34	.91	.35	.08	1.77	4.45
Pike County						
Ground water	.16	.53	.00	.13	.11	.93
Surface water	.12	.00	.00	.14	.19	.45
County totals	.28	.53	.00	.27	.30	1.38
Spalding County						
Ground water	0.08	1.47	0.00	0.00	0.01	1.56
Surface water	5.45	.00	.00	.25	.08	5.78
County totals	5.53	1.47	.00	.25	.09	7.34
Talbot County						
Ground water	.11	.34	.00	.06	1.14	1.65
Surface water	.00	.00	.00	.04	1.19	1.23
County totals	.11	.34	.00	.10	2.33	2.88
Upson County						
Ground water	.14	.80	.01	.27	2.06	3.28
Surface water	1.79	.00	2.97	.31	2.09	7.16
County totals	1.93	.80	2.98	.58	4.15	10.44
Ground water totals, all counties	**1.72**	**8.80**	**.40**	**.56**	**4.69**	**16.17**
Surface water totals, all counties	**16.78**	**.00**	**3.50**	**1.41**	**5.44**	**27.13**

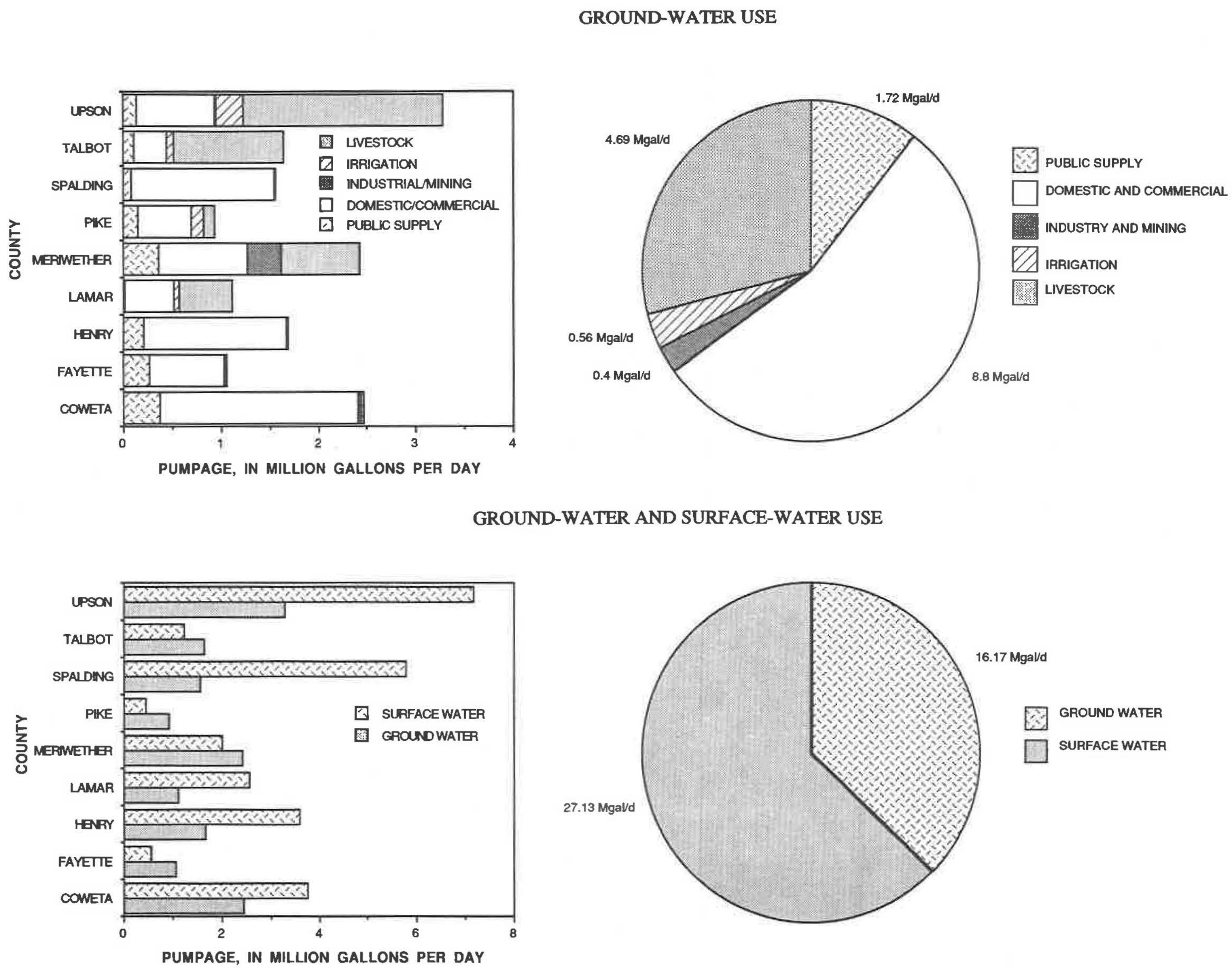


Figure 2.--Water use in the south metropolitan Atlanta region, 1985.

Of the 16 Mgal/d withdrawn from ground-water sources in 1985, 54 percent was for domestic and commercial uses, 29 percent was for livestock, 11 percent was for public supply, 3.5 percent was for irrigation, and 2.5 percent was for industrial and mining uses. In 1985, Upson County used the most ground water (3.28 Mgal/d or 20 percent) in the nine-county study area. Almost all the ground water in the study area is obtained from wells, except where a few municipalities are withdrawing water from large springs. See tables 1 and 2 and figure 2 for a complete summary of source and use for 1985.

Table 2.--*Ground-water use by cities and towns in the study area, 1985*

[Data from Turlington and others, 1987]

County	City or town	Source	Daily water use (million gallons per day)
Coweta	Grantville	well	0.08
	Moreland	well	.02
	Turin	well	.03
Fayette	Brooks	well	.03
Henry	Hampton	well	.08
	McDonough	well	.03
Meriwether	Greenville	well	.11
	Lone Oak	well	.05
	Luthersville	well	.04
	Warm Springs	spring	.10
Pike	Concord	spring	.06
	Meansville	well	.03
	Molena	well	.03
	Williamson	well	.04
Spalding	Orchard Hill	well	.01
Talbot	Geneva	well	.02
	Junction City	well	.01
	Talbotton	well	.08
Upson	Yatesville	well	.04

GROUND-WATER RESOURCES

Ground water in the Piedmont part of the study area, which includes all but the southern part of Talbot County, occurs primarily in the regolith and in areas where secondary permeability has developed along geologic discontinuities in the otherwise impermeable crystalline bedrock. Regolith is the semi-consolidated to unconsolidated material that occurs as a layer on top of the bedrock. The regolith is composed of soil, saprolite (weathered rock), stream alluvium, colluvium, and other surficial deposits. The availability of water in the Coastal Plain part of the study area (extreme southern Talbot County) is similar to that in the Piedmont to the north, because the Coastal Plain sediments in this area, like the regolith, are comparatively thin and overlie crystalline rocks.

Hydrogeologic Units

Many of the rock units in the south metro region exhibit similar physical properties and yield comparable quantities of water and similar chemical quality. On the basis of these similarities, Cressler and others (1983) grouped rock units of the Greater Atlanta region, which includes the northern half of the study area, into nine principal hydrogeologic units (plate 1). These hydrogeologic units consist of

(1) unit A (amphibolite, gneiss, and schist),
(2) unit B (granitic gneiss),
(3) unit C (schist),
(4) unit D (biotite gneiss),
(5) unit E (mafic rocks),
(6) unit F (granite),
(7) unit G (cataclastic rocks),
(8) unit H (quartzite), and
(9) unit J (metamorphosed carbonate rocks).

During the current study, these units were extended throughout the Piedmont part of the south metro region, and all Coastal Plain sediments were grouped into a single unit (K). Thus, a total of 10 hydrogeologic units (units A-K) were included as a part of this study. These hydrogeologic units, as described by Higgins and others (1988); Georgia Geologic Survey (1976); and Cressler and others (1983), are shown in plate 1.

Ancient alluvial-fan, landslide, and debris-flow deposits are present in the Pine Mountain area (H.W. Markewich, U.S. Geological Survey, written commun., 1989). These deposits occur along the mountainous ridges, have thick weathering and soil profiles, and probably are from early Pleistocene to late Miocene in age. The alluvial fan deposits may serve as a source of water supply due to their relatively high permeability. The deposits consist of stacked fining-upward sequences of cobble-gravel to medium sand, that range in thickness from several inches to greater than 50 ft (H.W. Markewich, U.S. Geological Survey, written commun., 1989). The alluvial fans occur along numerous quartzite ridges (unit H, plate 2) and have been identified along north-, east-, and south-facing slopes.

Alluvial deposits along the Flint River and its tributaries also may serve as sources of ground water. Alluvium along the Flint River terraces in the Pine Mountain area generally is less than 20 ft thick (much of the alluvium is 8 to 10 ft thick), and commonly consists of a fining-upward sequence of coarse sand and pebble gravel, to medium and fine sand and no gravel (H.W. Markewich, U.S. Geological Survey, written commun., 1989). Alluvial deposits along tributaries of the Flint River commonly are from 2 to 5 ft thick, and channel deposits are up to 15 ft thick.

Sediments of the Coastal Plain in southern Talbot County consist of layers of sand, gravel, and clay that attain a maximum thickness of at least 260 ft, the depth penetrated by well 10U006 at Junction City (appendix A). The sediments generally strike from east to west and dip southward. The sediments overlie igneous and metamorphic basement rocks that are a subsurface extension of the rocks of the Piedmont province. In parts of the Piedmont part of the study area, erosional remnants of Coastal Plain sediments are present. The largest and most northern of these erosional remnants is located north of Pine Mountain near Warm Springs in Meriwether County. In this area, about 30 mi north of the inner margin of the Coastal Plain, sediments of Paleocene age have been isolated from correlative Coastal Plain deposits by high-angle reverse faults and subsequent erosion (Reinhardt and others, 1984, p. 1, 176).

Ground-Water Levels

Ground-water levels in the south metro region are influenced primaily by changes in precipitation, evapotranspiration, and local pumping. Water-level fluctuations in the shallow regolith are shown by the hydrograph for well 11AA01 (Georgia Experiment Station) near Griffin in Spalding County (fig. 3). The ground-water level in the 30-ft deep well is affected mainly by precipitation and evapotranspiration as can be seen by comparing the hydrograph with the rainfall graph in figure 3. Rainfall in the area generally is heavy in the winter and midsummer and relatively light in spring and fall. The ground-water level shows a rapid rise with the onset of late winter rains and reduced evapotranspiration, and generally attains the highest level for the year in March or April. Heavy rainfall in midsummer results in small rises in the water level, but much of this rainfall is lost to evapotranspiration and runoff. The water level in the regolith declines in the spring and early fall owing to increases in evapotranspiration and decreases in rainfall, and the annual low generally occurs in October or November. Three droughts during the 1980's resulted in lower-than-normal water level in the fall of 1981, in the fall of 1986, and in the summer of 1988 (fig. 3).

Ground-Water Availability

In the Piedmont province, ground water occurs in joints, fractures, and other secondarily formed openings in the bedrock, and in pore spaces in the regolith. In this area, the ground-water reservoirs are recharged by water flowing directly into openings in the exposed rock or by seeping through the regolith. The quantity of water that can be withdrawn from wells depends on the amount of available recharge, the thickness of saturated regolith (available storage), and the extent to which openings in the rock are interconnected with the regolith. The size, spacing, and interconnection of openings vary from one rock type to another. Generally, the largest and most interconnected openings occur in hard, brittle rocks such as quartzite and metagraywacke, and in carbonate rocks such as marble (Cressler and others, 1983, p. 9).

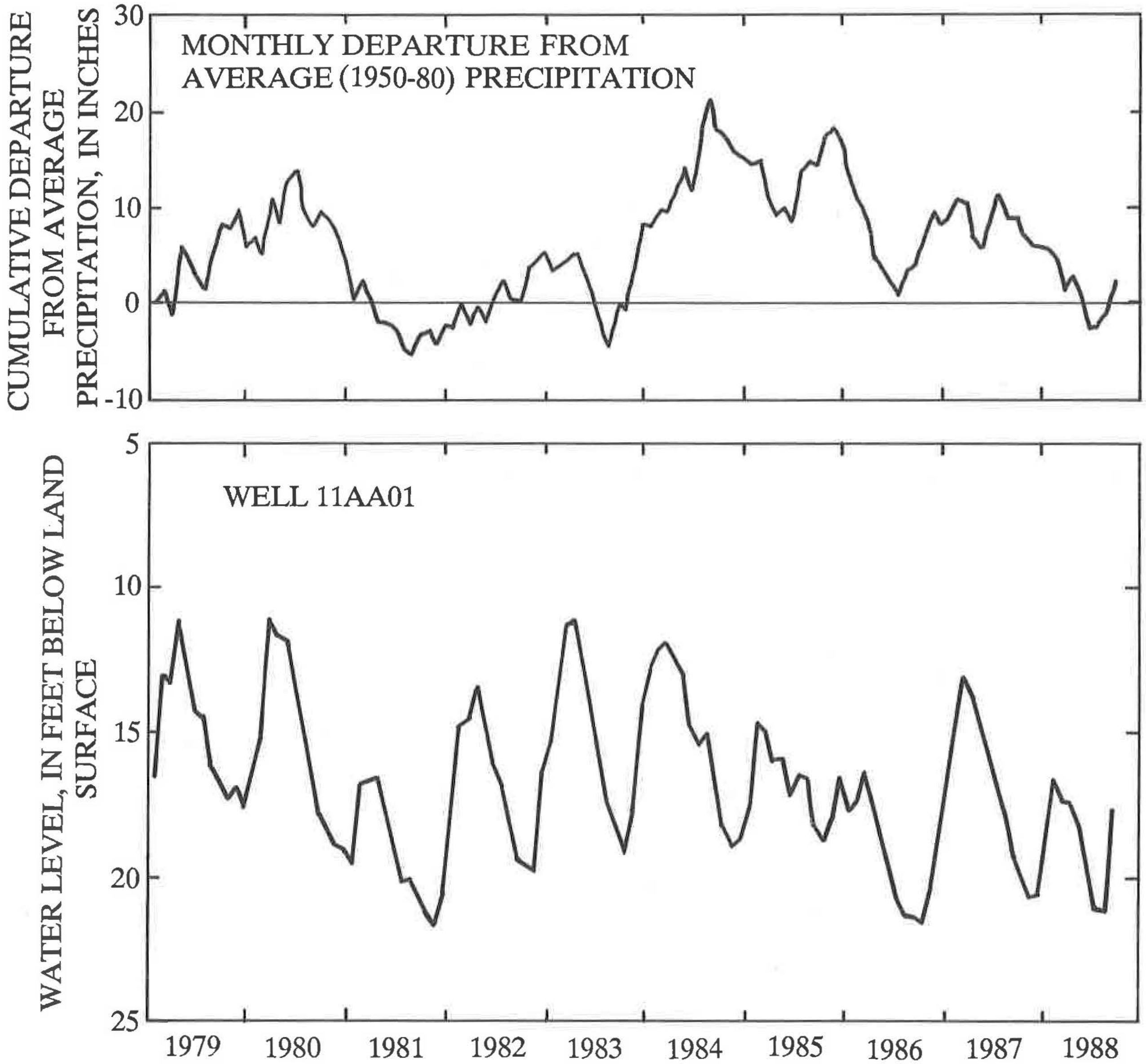


Figure 3.--Cumulative departure from the long-term average of precipitation at the National Weather Service Station Atlanta WSO AP and periodic water levels at well 11AA01, Spalding County, 1979-88.

Cressler and others (1983) described the factors that influence the availability of ground water in the greater Atlanta region, which includes the northernmost counties of the south metro region (Coweta, Fayette, Spalding, and Henry). They concluded that high-yielding wells may be found near certain structural, stratigraphic, and topographic features that are associated with increased permeability of the rock. These features include (1) contact zones between rock units of contrasting character, (2) contact zones within multilayered rock units, (3) fault zones, (4) stress relief fractures, and (5) shear zones. Other features, such as rock type, depth of weathering, saturated thickness of the regolith, and topographic setting, also are factors that influence the availability of water from wells. Similar observations were made by Brackett and others (1990a). The present study determined that many of the above features were factors influencing well yield throughout the Piedmont part of the south metro region. Thus, numerous locations may be favorable for the development of high-yielding wells.

There are more than 4,000 mi of contact zones between rocks of contrasting lithologies in the south metro region that may favor greater permeability of the rock. Greater permeability along such contacts results from differential weathering of the contrasting rock types. For example, along a contact between a foliated schist unit and a granite gneiss unit, water flowing along the foliation of the schist unit (oriented toward the contact) would travel until it was obstructed by the lower permeability gneiss unit. Here, water would travel along the contact to reach a lower potential head. The flow of water along this contact could result in chemical weathering of the rock units and enhanced permeability. The most productive contacts generally are ones in which a resistant rock is overlain by a rapidly weathering rock. Where the rocks overlying the resistant rock are foliated, have a high feldspar content, differ mineralogically, and occupy a topographic position favorable to recharge (Cressler and others, 1983, p. 11), higher yields to wells are possible. Cressler and others (1983, p. 43), stated that potentially permeable contact zones between rocks of contrasting character occur wherever units B, D, and F are in contact with units A, C, and E and locally with unit G. In addition, they stated that some contact zones between unit C and units E, H, and G also may be permeable. These contact zones are shown on plate 1. As more detailed geologic maps become available, better definition of potentially permeable contact zones in the area will be possible.

Cressler and others (1983, p. 15) stated that high well yields also are available from areas where faults bring into contact two or more rock types that respond differently to weathering, much the same as occurs in permeable contact zones. Their study (1983) concluded that the largest yields generally are available from faults that involve both resistant rocks, such as massive gneiss or granite (units B and F) and less resistant rocks, such as feldspathic schist (unit C). The Towaliga fault and Auchumpkee fault are major fault zones that cut across the southern part of the south metro region. Although fractures produced by movement of the faults typically have been healed by mineralization and are no longer fully open (Clarke, 1952, p. 73), shearing and mixing of rock types along the fault plane may result in increased permeability.

In parts of the south metro region, there are shear zones and microbreccia zones that may be associated with increased permeability of the rock. This increased permeability occurs where the sheared rock is in contact with native rock producing a zone of contrasting weathering properties. Cressler and others (1983, p. 37) reported that some of the highest yields in the greater Atlanta region (100 gal/min to more than 200 gal/min) were found near shear zones, including some in Spalding County. These zones of crushed, angular rock are the result of stresses that cause contiguous parts of a rock body to slide relative to each other in a direction parallel to their plane of contact. The sheared rock consists of flinty crush rock and sheared native rock. In the south metro region, shear zones are prominent south of the Auchumpkee fault in rock unit D (plate 1). Flinty crush rock associated with shearing occurs in unit G west and southwest of Talbotton in Talbot County. Microbreccia zones are indicated on plate 1 as rock unit G in northwestern Spalding County, in southeastern Fayette County, and in northwestern Talbot County.

Well yields and factors affecting yields

The reported yield for 406 wells ranged from less than 1 to 700 gal/min, and averaged 43 gal/min. Many of the well sites in the south metro region were located for convenience, *i.e.*, near towns, manufacturing plants, homes, and so forth, and without regard to hydrologic well-site selection criteria. It is likely that greater well yields could be obtained by following proper well-siting techniques. For a complete discussion of well-siting criteria as related to topography, the reader is referred to LeGrand (1967) and Cressler and others (1983).

The relations among well yield, well-construction characteristics, water-bearing unit, and topographic setting were evaluated based on information from 481 wells (table 3; appendix A). Statistics for hydrogeologic units E, G, H, J, and K are not listed because fewer than 15 well records were available for each of the units. Information for these units were, however, included in the summary statistics. To evaluate the influence of topographic setting on well yield, data for wells were grouped into three topographic categories that corresponded to those used in Daniel's (1987) statistical analysis of well data in the North Carolina Piedmont and Blue Ridge: draws and valleys, hills and ridges, and slopes and flats.

Construction and yield characteristics varied over the study area based on differences in topographic setting and geologic unit. A graphical summary of selected site and well characteristics for the south metro region is shown in figure 4. The average well in the data base had a total depth of 288 ft, had 6.5 in. casing to a depth of 70 ft, and yielded 43 gal/min. As would be expected, average values of land-surface altitude, well depth, and depth to water were greatest for wells located on hills and ridges, and lowest for wells in draws and valleys. In the study area, depth of casing is an approximation of the thickness of regolith. Although the thickness of regolith would be expected to be greater for wells located on hills and ridges, the depth of casing (thickness of regolith) averaged about 70 ft for each of the three topographic settings. The saturated thickness of regolith can be estimated for a well by subtracting the depth to water from the casing depth. The average saturated thickness was greatest for wells located in draws and valleys (59 ft), and least for

Table 3.--*Summary of well data in the study area*

	Yield (gallons per minute)			Total depth (feet)			Casing depth (feet)		
Hydrogeologic unit	Range	Average	Number of wells	Range	Average	Number of wells	Range	Average	Number of wells
A--Amphibolite-gneiss-schist	0.0-200	40	230	30-780	297	246	6-446	71	201
B--Granitic gneiss	1-200	48	58	85-675	247	59	8-140	54	45
C--Schist	1.5-700	76	31	31-745	307	33	19-205	80	32
D--Biotite gneiss	6-100	30	23	67-547	295	30	7-160	77	25
F--Granite	2.5-150	24	34	26-605	277	38	17-121	27	33
All wells[1]	0.0-700	43	406	26-780	288	441	6-446	70	360

[1]Includes units A, B, C, D, E, F, G, H, J, and K

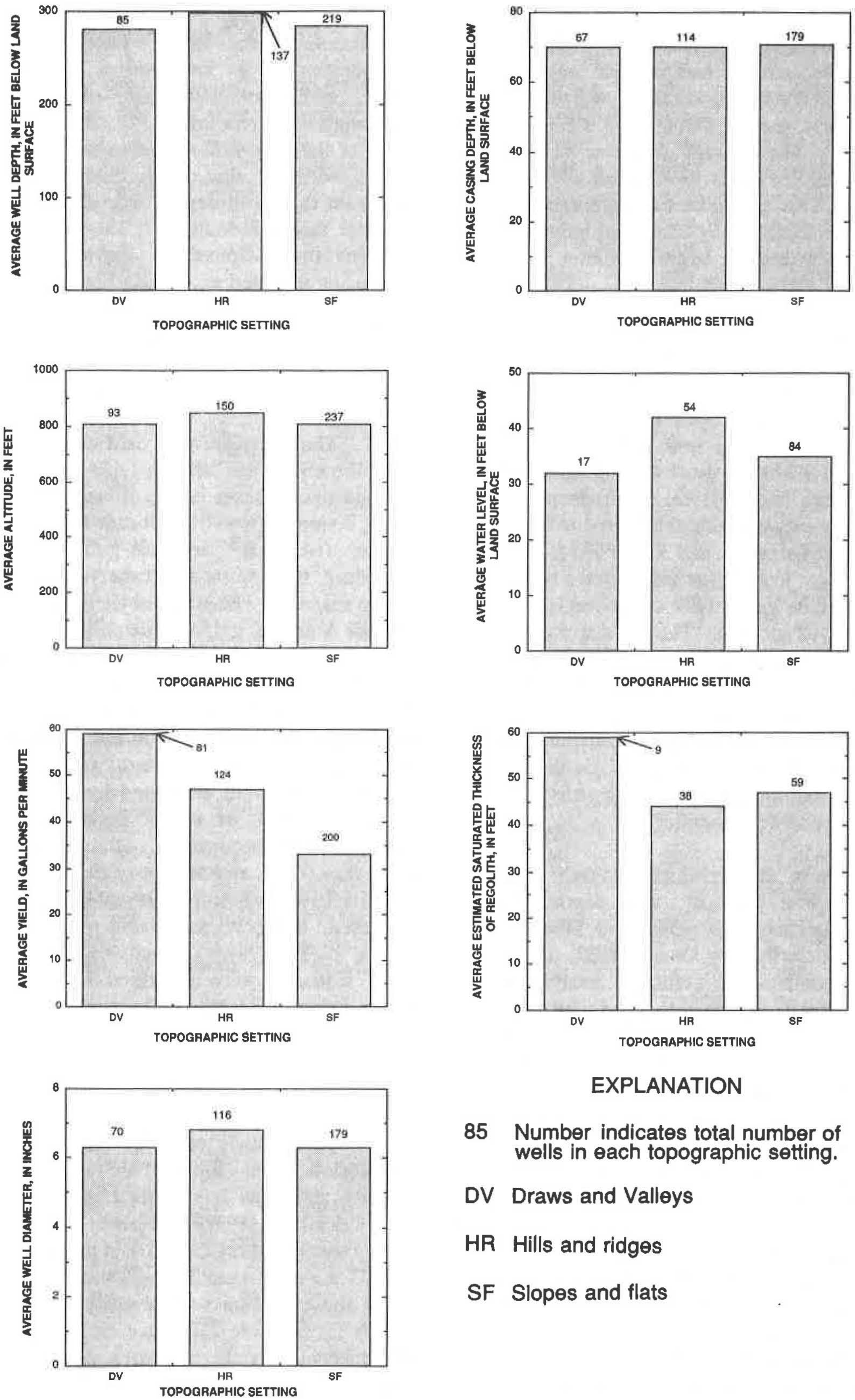


Figure 4.--Topographic setting and selected well and site characteristics in the south metropolitan Atlanta region.

wells located on hills and ridges (44 ft). Although each topographic setting had similar regolith thickness, the saturated thickness in draws and valleys (59 ft) was greater owing to a shallower depth to water. The average diameter of well casing was largest for wells located on hills and ridges (6.8 in.). This may reflect a preference for such topographic locations by cities and industrial users who usually develop larger diameter wells than do domestic users.

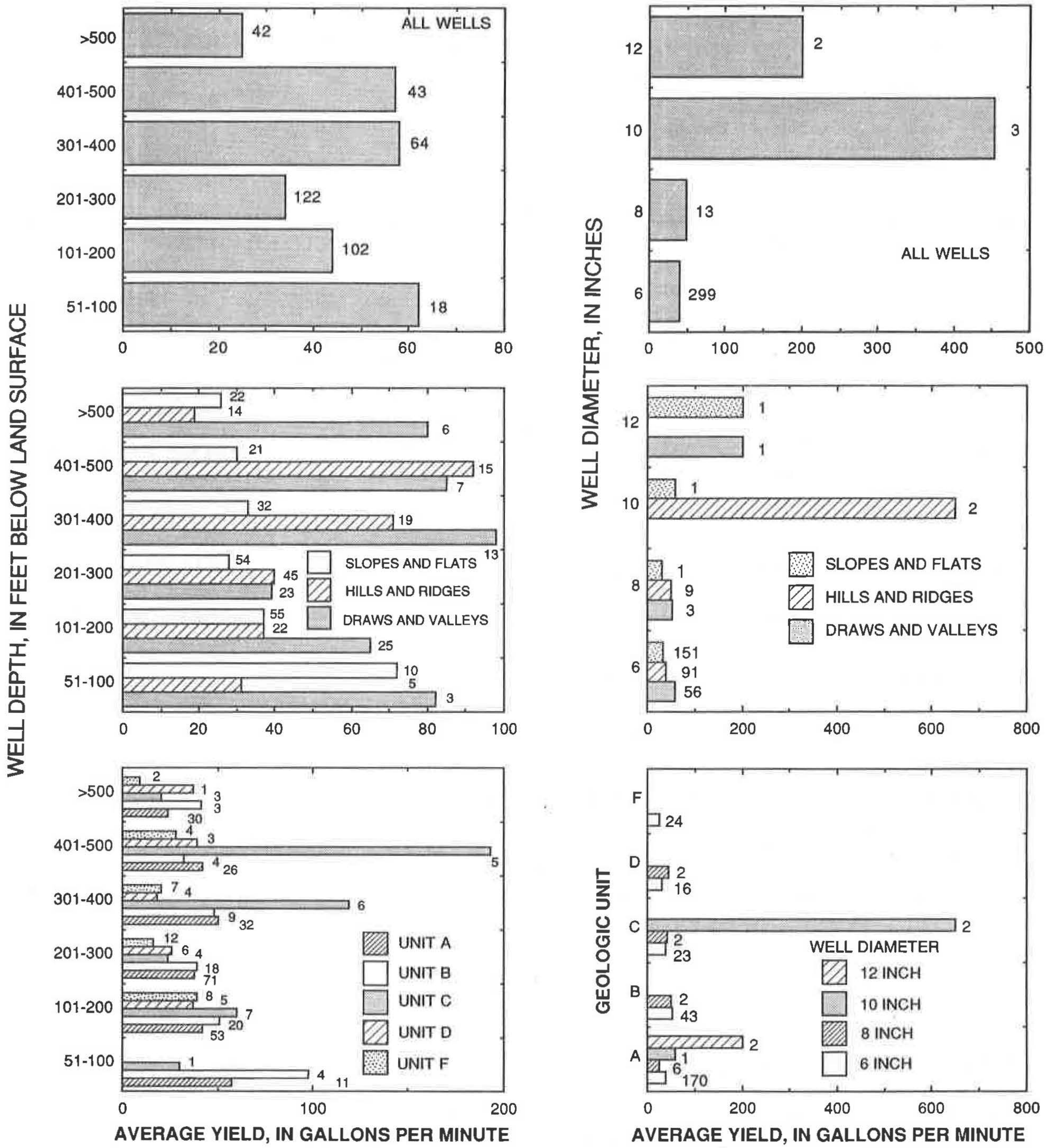
The relations among well yield, well diameter, and well depth for the various topographic settings and geologic units were compared by using bar graphs showing average yield for various ranges of well depth and well diameter (fig. 5). Although most wells in the south metro region were from 101 to 300 ft deep, the highest average yields were obtained from wells 51 to 100 ft deep (62 gal/min), and 301 to 500 ft deep (57 gal/min). Most wells in the south metro region were cased with 6 in. casing (299 wells) and had an average yield of 40 gal/min. The highest average yields were obtained from 10-in. diameter wells (453 gal/min). Generally, for a given depth range or well diameter, the highest yielding wells were obtained in draws and valleys, followed by hills and ridges and slopes and flats. Hydrogeologic units B and C generally had the largest yielding wells for a given depth range or well diameter.

To remove the variation in well yield attributed to differences in well depth and diameter, calculations were performed following the procedures described by Daniel (1987, p. 41). Daniel (1987) conducted a statistical analysis of 6,200 wells to identify factors associated with high-yielding wells in the Piedmont and Blue Ridge of North Carolina. His study used a least squares regression analysis in which yield and yield-per-foot of well depth were treated as dependent variables to be explained in terms of well depth and well diameter. A similar analysis was applied to 484 wells in the south metro region, in which well yield was explained in terms of well depth, well diameter, altitude of land surface, and well volume. The regression analysis was made to produce the most significant regression models based on groupings of all wells, topographic setting, and geologic unit. The resulting models are listed in table 4. The regression coefficient R^2 in table 4 is an indicator of the fit of a regression model to the variations in the data. For example, an R^2 of 0.95 indicates that 95 percent of the variation of the data may be explained by the regression model. Similarly, the amount of change in R^2 resulting from the incorporation of an independent variable into a model, gives an indication of the relative signficance of that variable. For example, a change in R^2 of 0.23 for well diameter and 0.01 for well depth indicates that well diameter is more significant than well depth. For each model, well diameter and well depth were the most significant variables (as indicated by the change in R^2) influencing reported well yield. For the 10 geologic units, only the models for units A and C are listed in table 4 because R^2 values for each of the other units were less than 0.001, and were, thus, considered statistically insignificant.

The average well yield was adjusted by using the equations listed in table 4, and by using the data base average values of well depth (288 ft), casing diameter (6.46 in.), altitude (820 ft) and well volume (64.12 ft^3 or 480 gal). Using this procedure, the adjusted average yield for all wells was 53 gal/min. The adjusted yield was 32 gal/min for unit A and 56 gal/min for unit C. The highest adjusted yields were found in draws and valleys (54 gal/min); slopes and flats and hills and ridges had the same average yield (37 gal/min). Higher well yields near hills and ridges in the Greater Atlanta region (including the northern part of the south metro region), were attributed by Cressler (1983) to be the result of nearly horizontal fractures. These fractures occur mainly at depths of 150 ft to more than 600 ft, and are not revealed by structural and stratigraphic features normally associated with increased bedrock permeability (Cressler and others, 1983, p. 26). Six wells tapping these low-angle fractures were identified by Cressler and others (1983, p. 24-25) in Coweta, Fayette, Henry, and Spalding Counties.

Springs

In the study area, 13 major springs were inventoried from topographic maps, historical records, and from a published report by Hewett and Crickmay (1937). Hewett and Crickmay (1937) conducted an extensive study of the springs in a 32 mi^2 area near Pine Mountain. Data from 13 of these springs were evaluated in this study (1990) to determine if any correlations could be made between yield and rock unit, topographic setting, and water temperature (table 5, plates 1 and 2). Most of the springs occur near contact zones between units A and H (four springs) and between units C and H (three springs), and within unit A (three springs) (plate 1). One spring



Number at end of bar indicates total number of wells in each category.

Figure 5.--Average yield and selected well and site characteristics in the south metropolitan Atlanta region.

Table 4.--*Regression models for well groupings in the study area*

[Independent variables: TD, well depth in feet; DIA, well diameter in inches; VOL, well volume in cubic feet; ALT, land surface altitude in feet. R^2, coefficient of determination]

Group	Number of values	Independent variables	Change in R^2 Variable	Change in R^2 Model	Regression model
All wells	309	TD	0.000	0.2256	Yield = -0.152178 (TD) + 18.6116 (DIA) + 0.600898 (VOL) - 0.00553663 (ALT) - 57.3247
		DIA	.226		
		VOL	.009		
		ALT	.000		
Wells located in draws and valleys	57	TD	.009	.1558	Yield = -.235638 (TD) - 30.0033 (DIA) + 1.09589 (VOL) -0.151751 (ALT) + 369.904
		DIA	.069		
		VOL	.043		
		ALT	.095		
Wells located on hills and ridges	99	TD	.015	.6040	Yield = -0.984676 (TD) - 67.4724 (DIA) + 4.68029 (VOL) + 0.0783363 (ALT) + 392.29
		DIA	.407		
		VOL	.194		
		ALT	.005		
Wells located on slopes and flats	151	TD	.035	.1861	Yield = -0.157991 (TD) - 2.96015 (DIA) + 0.530056 (VOL) + 0.0505922 (ALT) + 26.5582
		DIA	.143		
		VOL	.013		
		ALT	.016		
Wells tapping unit A	177	TD	.008	.2656	Yield = -0.221068 (TD) - 21.7362 (DIA) + 0.914495 (VOL) + 0.14387 (ALT) + 59.9007
		DIA	.148		
		VOL	.049		
		ALT	.076		
Wells tapping unit C	21	TD	.038	.9182	Yield = -1.14025 (TD) - 62.184 (DIA) + 5.46151 (VOL) -0.204655 (ALT) + 604.331
		DIA	.705		
		VOL	.154		
		ALT	.037		

was within unit D, one was within unit C, and one was near the contact between units C and G. The 13 springs were located in three topographic settings; upland draw (six springs) was the most prevalent topographic setting. Five of the springs were located near the northern base of Pine Mountain; one was located near the southern base of Oak Mountain (plate 1). During the period 1933-35, the 13 springs had discharge rates that ranged from 0.5 to 679 gal/min, and water temperatures that ranged from 16.6 to 31.2°C. Hewett and Crickmay (1937, p. 4) classified springs having water temperatures higher than 18.8°C as "warm" and those having water temperatures lower than 18.8°C as "cold". Seven of the 13 springs inventoried had water temperatures greater than 18.8°C, and thus were classified as warm springs.

Occurrence of high-yielding wells and springs

High-yielding wells and springs are herein defined as those having yields greater than or equal to 100 gal/min. Forty-three high-yielding wells and five high-yielding springs were inventoried in the south metro region (tables 5, 6; plate 1).

The high-yielding wells had reported yields from 100 to 700 gal/min, ranged in depth from 85 to 550 ft, and were cased with 14 to 300 ft of casing. Most of the wells were drilled near contact zones between rocks of contrasting lithologic and weathering properties (24 wells), and within rock unit A (14 wells). The high-yielding wells were located in a variety of topographic settings; hillsides (14 wells), upland draws (14 wells), and hilltops (12 wells) were the most prevalent. With the exception of well 12Y009 in Lamar County, all the high-yielding wells were located north of the Towaliga fault. This study (1991) found no high-yielding wells in Talbot or Upson Counties.

The highest yielding wells were in southwestern Meriwether County near Durand. Reported yields from wells 07X001 and 07X002 were 600 and 700 gal/min, respectively (table 6), which are among the highest reported yields in the entire Piedmont province of Georgia. The wells supply an industrial user and are located on a hilltop within unit C, about 2 mi northwest of the Towaliga fault (plate 1). A geologic map by Higgins and others (1988, plate 2) indicates that the two wells are located on the underriding plate of a thrust fault. This fault has thrust interlayered amphibolite, gneiss, and schist of Unit A over schist of unit C (plate 1). It is likely that fracturing and differential weathering associated with this thrust fault and the nearby Towaliga fault has resulted in increased permeability in the area and the higher well yield. Well 07X001 is 400 ft deep and is cased with 10-in. steel casing to a depth of 78 ft. In August 1975, the well was pumped at a rate of 600 gal/min for 6 hours, producing a drawdown of 90 ft, which resulted in a specific capacity of 6.7 (gal/min)/ft. Well 07X002 is 475 ft deep and is cased with 10-in. steel casing to a depth of 88 ft. The well was pumped at a rate of 700 gal/min for 6 hours in July 1975, producing a drawdown of 85 ft, which resulted in a specific capacity of 8.2 (gal/min)/ft. Although the two wells may supply higher yields, water demand at the industrial site requires only 60,000 gal/d, or an average of 42 gal/min. The wells have been pumped nearly continuously (24 hours per day) at that combined rate with no reported decrease in yield since 1975.

Wells 08Y002 and 09Y005, also in Meriwether County, had reported yields of 110 and 100 gal/min, respectively. Well 08Y002, located northwest of Greenville, was drilled in an upland draw into unit A to a depth of 325 ft and was cased to an unknown depth. After 3 hours of pumping at a rate of 110 gal/min, the drawdown stabilized at 162 ft, resulting in a specific capacity of 0.68 (gal/min)/ft. Well 09Y005, at Gay, was drilled on a hillside into unit A, to a depth of 385 ft, and is cased to a depth of 75 ft. The well sustained a yield of 100 gal/min during a 24-hour test in 1988.

The five high-yielding springs had discharges ranging from 125 to 679 gal/min during the period 1933-35 (table 5). With the exception of Cold Spring (08X007) and Clearwater Spring (10Y014), all the high-yielding springs were classified warm. One of the high-yielding springs was located near the contact between units A and H, three were located near the contact between units C and H, and one was located within unit C (plate 1). The springs were located in valleys (two springs), hillsides (two springs), and upland draws (one spring). With the exception of Clearwater Spring (10Y014), each of the high-yielding springs were south of the Towaliga fault.

The two highest yielding springs in the study area occur in southwestern Meriwether County on the north side of Pine Mountain at the town of Warm Springs, near the contact between units C and H (plate 1). Hewett and Crickmay (1937, p. 7-12) reported that Warm Springs (08X008) discharged from 596 gal/min in February 1935 to 679 gal/min in August 1934, and Cold Spring (08X007) discharged from 238 gal/min in March 1935 to 451 gal/min in March 1934.

Warm Springs has several openings, one of which is a large fissure in quartzite from which about 200 gal/min flows (Hewett and Crickmay, 1937, p. 5). The discharge rate of the spring is affected by precipitation, and has a 6- to 7-week lag between rainfall in the area and a corresponding increase in the discharge of the spring (Hewett and Crickmay, 1937, p. 32). The spring is recharged by precipitation on Pine Mountain, where water enters the ground-water system along the contact between the Hollis Quartzite (unit C) and the Woodland Gneiss (unit D), and flows to a depth of about

3,800 ft (Hewett and Crickmay, 1937). At this depth, the flow of water is bounded by the Towaliga fault and is diverted to land surface along the contact between the Hollis Quartzite (unit C) and the Manchester Schist (unit H). Rose (1990) made an analysis of the carbon-14 activity of water from Warm Springs and estimated the age of the water to be 3,620 (±102) years and estimated the flow rate to be about 10 ft/yr.

The temperature of water from Warm Springs was the highest recorded in the study area, and ranged from 30.6°C to 31.2°C during the period 1933-35 (Hewett and Crickmay, 1937). The relatively high temperature of water from the spring was attributed to the heating of the water as it percolated deeply into the rock along the contact between units H and D. The temperature of the water at Cold Spring, which is about 1 mi from Warm Springs, ranged from 17.4°C to 18.3°C during November 1933. Water from this spring has a lower temperature because it does not penetrate as deeply into the rock as does water from Warm Springs, and thus is not heated by the higher temperature of the rocks at depth.

Well-perfomance tests

Long-term well performance tests provide information on the ability of wells to sustain high yields for extended periods without drawing the water level below the pump intake. In addition, the rate of water-level recovery after pump shutdown reflects the efficiency of recharge to the fracture system(s) that supplies the well. Thus, the rate of recovery is indicative of the amount of time that a well can maintain a certain yield. Well-performance tests were conducted by the GGS in five wells in the south metro region as part of their evaluation of the ground-water resources of the Piedmont and Blue Ridge provinces (Brackett and others, 1990a; 1990b). The following discussion summarizes results of those tests.

Well 13AA06 at Locust Grove, Henry County, was tested by the GGS in July 1987 (Brackett and others, 1990a). The well was drilled to a total depth of 500 ft and was cased with 63 ft of 6-in. casing (appendix A). Two primary production zones were encountered during drilling--one at 109 ft that yielded about 5 gal/min, and one at 152 ft that yielded about 100 gal/min. The upper production zone was a contact between rock layers and the lower production zone was either a joint or a fault in the rock. The well was pumped for 24 hours at rates ranging from 180 to 300 gal/min so that drawdown was maintained at about 67 percent of the available drawdown to the top of the deepest production zone. During the test, fluctuations in yield at this drawdown level were monitored. A pumping rate of 300 gal/min was maintained for about 8 hours, after which the pumping rate quickly dropped to 220 gal/min. The yield continued to decline slowly for 5 hours before stabilizing at about 180 gal/min for an additional 11 hours at which time the pump was shut off. After pump shutdown, the water level recovered about 18 percent within an hour and was fully recovered within 24 hours.

Well 08BB20 at Shoal Creek, Coweta County was tested by the GGS in August 1987 (Brackett and others, 1990a). The 225-ft deep well was cased with 21 ft of 6-in. casing and taps two primary production zones--one at 100 ft that yielded 8 gal/min, and one at 218 ft that yielded 150 gal/min. Two tests were run in the well during August 1987. During the first test, the well was pumped for 5 hours at 150 gal/min, resulting in a drawdown of 140 ft, or 63 percent of the available drawdown above the deepest production zone. Drawdown had not stabilized after 5 hours and the drawdown curve continued to be steep, resulting in the test being discontinued. During the second test, the well was pumped at 100 gal/min for 24 hours, resulting in a drawdown of 143 ft, which was 65 percent of the available drawdown above the 218-ft production zone. Drawdown at that pumping rate was nearly stable. After pump shutdown, the water level in the well recovered about 24 percent within an hour, and was 96 percent recovered 24 hours after pump shutdown.

Three wells at Barnesville, Lamar County were tested by the GGS in August 1988 (W.M. Steele, Georgia Geologic Survey, written commun., 1989). Well 12Y015 was drilled to a depth of 600 ft and cased to 24 ft with 8-in. casing. Although specific water-bearing zones were not delineated during testing, caliper and acoustic televiewer logs indicate that there are numerous openings in the rock (fractures or bedding planes) at depths of 37 to 70 ft, 110 to 165 ft, and 370 to 383 ft. Pumping the well at a rate of 60 gal/min produced a drawdown of 193 ft, which was below the two uppermost intervals of openings in the well (37 to 70 ft and 110 to 165 ft), but above the deepest interval (370 to 383 ft). Drawdown in the well was nearly stable after 24 hours of pumping, and

Table 5.--*Summary of spring data in the study area*

[gal/min, gallons per minute; °C, degrees Celsius; --, no data available;
Topographic setting: V, Valley; S, Hillside; W, Upland draw]

Spring number	Spring name	Yield (gal/min)	Date measured	Temperature (°C)	Date measured	Topo-graphic setting	Remarks
Meriwether County							
07X004	White Sulphur Spring	0.65	1933	16.6	12-08-1933	V	Within unit A. Underlain by Carolina gneiss. Spring has four openings.
		1.62	1933	17.3	06-14-1935		
08W007	Parkman Spring	75	12-10-1933	24.8	12-10-1933	V	Within unit A. Spring has one opening which is presently under a lake.
08X007	Cold Spring	451	03-24-1934	17.4	11-30-1933	V	Near contact between units C and H. Spring has four openings.
		238	03- -1935	18.3	11-30-1933		
08X008	Warm Springs	678.6	08-24-1934	30.6	--	S	Near contact between units C and H. Spring has several openings, main opening is a large fissure in quartzite.
		595.5	02-17-1935	31.2	--		
09W008	Brown Spring	15	12- -1933	20.5	12-08-1933	W	Near contact between units A and H. Spring has three openings, some gas bubbles appear in the water.
		30	12- -1934	20.0	06-14-1935		
09W009	Chalybeate Spring	12	1933	18.5	12-08-1930	W	Near contact between units A and H. Analyses show high levels of dissolved solids, silica, and iron. Spring has four openings.
		24	1933	18.2	06-14-1935		
Pike County							
10Y014	Clearwater Spring	125	08-22-1958	18.0	10-22-1958	W	Within unit C. Associated with a tourmaline-bearing pegmatite. Called Concord Spring by Hewett and Crickmay (1937).
11Y017	Lifsey Spring	83	06-15-1935	25.8	06-15-1930	W	Near contact between units C and G. Spring occurs in the Towaliga fault zone. Bubbles of gas are present in the water. Spring has several openings.
11Y018	Taylor Spring	385	06-15-1935	23.7	06-15-1935	V	Near contact between units C and H. Spring has several openings and bubbles of gas are given off by the largest source.
Spalding County							
11AA19	Hammonds Spring	15	10-11-1988	--	--	W	Within unit D. Yield reported by owner. Spring has never gone dry.
Talbot County							
08W006	Oak Mountian Spring	.54	12-08-1933	17.1	12-08-1933	W	Within unit A. Spring underlain by Manchester schist. Water has elevated levels of iron. Spring has one opening.
		.94	12-08-1933	t			
Upson County							
10X011	Thundering Spring	380	06-12-1935	23.4	03-23-1934	S	Near contact between units A and H. Spring has four openings with a large amount of gas bubbles rising from the water.
		23.2	06-12-1935				
10X012	Barker Spring	30	11- -1933	23.0	03-23-1934	S	Near contact between units A and H. Spring occurs near a ridge of Hollis quartzite. The spring has several sources with gas bubbles rising from them.
		23.4	06-12-1935				

Table 6.--*Summary of data for high-yielding wells in the study area*

[gal/min, gallons per minute; --, no data available; S, Hillside; V, Valley; H, Hilltop; W, Upland draw; F, Flat]

Grid number	Well name	Yield (gal/min)	Depth of well (feet)	Casing depth (feet)	Casing diameter (inches)	Topo-graphic setting	Remarks
Coweta County							
06AA02	Sue Rickenbacker	100	90	23	6	W	Near contact between units A and E
06BB09	Plant Yates	115	307	43	6	W	Near contact between units B and G
06BB10	Do.	100	146	42	6	S	Near contact between units B and G
07AA10	City of Newnan	100	350	--	--	W	Within unit A
07AA11	Do.	100	350	--	--	S	Within unit A
07AA16	Holiday Inn	100	223	68	6	H	Near contact between units A and B
07BB02	F.L. Schronder	150	255	65	6	H	Within unit A
07BB11	G.C. Watkins	100	212	30	6	S	Within unit A
07BB15	Bpoe-Elks-Club	124	265	72	6	W	Within unit A
08BB20	Shoal Creek, Ga.	100	225	21	6	V	Within unit A
08CC04	W.H. Johnston	150	125	33.5	6	S	Near contact between units A and F
Fayette County							
09BB06	H.D. Sowell	150	210	62	6	H	Within unit A
09BB15	Marnell Mobile Home Park	125	400	87	6	W	Within unit A
09BB16	C.B. Pyke	120	148	--	--	H	Near contact between units A and B
10AA05	E.N. Gray	120	145	45	6	S	Near contact between units B and D
10AA09	John Crews	200	175	--	--	V	Near contact between units A, E, and H
10BB11	C.C. Rogers Construction Company	100	85	60	6	S	Within unit A
10CC01	W.T. Turner	150	85	42	6	S	Within unit B
10CC03	J & S Water Company	100	122	22	6	W	Near contact between units B and E
10CC06	Allgood Construction Company	100	123	93	6	V	Near contact between units A and E
10CC07	T.J. Busey	150	96	58	6	S	Near contact between units A and E
10CC08	Dix Leon Subdivision	110	96	49	6	S	Near contact between units B and E
Henry County							
11BB15	Frank Ritchie	200	415	14	6	H	Near contact between units A and C
12BB05	Selmans Dairy	100	105	55	6	H	Near contact between units A and C
12BB12	Southern Railroad	200	550	300	12	S	Near contact between units A and C
12BB13	McDonough, Ga	200	500	280	12	W	Within unit A
12CC14	Hugo Kirk	150	146	126	6	W	Near contact between units B and D
12CC20	Morgan Auto Parts	100	220	59	6	H	Near contact between units B, C, and D
12CC24	J.B. Gleaton	100	146	17	6	S	Within unit A
12CC26	Safari Motor Inn	100	300	38	6	H	Near contact between units A and D
12DD01	Frank Stokes	200	368	38	6	S	Within Unit B
13AA01	Six Star Mobile Home Village	100	258	102	6	W	Near contact between units A and C
13AA06	Locust Grove, Ga.	180	500	63	6	W	Near contact between units A and C
Lamar County							
12Y001	Milner School	105	263	87	6	H	Within unit A
12Y005	Liz Acres Subdivision	100	165	--	--	S	Near contact between units A and G
12Y009	Barnesville	300	400	30	6	W	Near contact between units C and H
Meriwether County							
07X001	Georgia Pacific Durand No.1	600	400	78	10	H	Within unit C
07X002	Georgia Pacific Durand No.2	700	475	88	10	H	Within unit C
08Y002	Mead (shallow well)	110	325	--	6	W	Within unit A
09Y005	City of Gay, Ga. No.2	100	385	75	6.25	S	Within unit A
Pike County							
10Y004	The Ceaders Golf Course	125	165	74	6	W	Within unit C
11Z003	Williamson, Ga., 1	214	400	95	8	H	Near contact between units C and J
Spalding County							
12AA02	Arnold McIntire	100	130	24	--	W	Near contact between units A and F

recovered relatively rapidly. The water level had recovered 84 percent one hour after shutdown, and was 98 percent recovered 8 hours after shutdown.

Well 12Y016 at Barnesville was drilled to a depth of 400 ft and cased to 47 ft with 8-in. casing. Specific water-bearing zones were not delineated in this well during drilling. Openings in the rock were indicated on caliper and acoustic televiewer logs at numerous depths in the well, particularly in the intervals 75 to 78 ft, 82 to 88 ft, 122 to 129 ft, 135 to 144 ft, 164 ft, 172 ft, 229 ft, 254 to 259 ft, 270 to 271 ft, 367 ft, and 395 to 397 ft. At a pumping rate of 75 gal/min, the drawdown was 190 ft, which was below the six uppermost openings, but above the five lowermost openings. Drawdown was stable after 24 hours of pumping and the well recovered rapidly following pump shutdown (W.M Steele, Georgia Geologic Survey, written commun., 1989). One hour after pump shutdown, the water level had recovered 98 percent.

Well 12Y017 at Barnesville was drilled to a depth of 405 ft and cased to an unknown depth. Specific water-bearing zones were not delineated during drilling of the well. Caliper and acoustic televiewer logs indicate the presence of openings in the rock at depths of 152 ft, 255 to 256 ft, 264 ft, 338 ft, 347 to 348 ft, 362 to 363 ft, and 396 ft. At a pumping rate of 40 gal/min, the drawdown was 175 ft, which was below the uppermost opening (152 ft) but above the remaining six openings. Drawdown was stable after 24 hours of pumping and the well recovered rapidly (W.M. Steele, Georgia Geologic Survey, written commun., 1989). An hour after pump shutdown the water level had recovered 99 percent.

The five well-performance tests indicate that (1) the wells were capable of sustaining their respective test yields for periods of 24 hours without exceeding the available drawdown, and (2) water levels in four of the five wells were almost fully recovered within 24 hours of pump shutdown; the fifth well recovered about 96 percent. These factors indicate that the wells probably are capable of sustaining their respective test yields under hydrologic conditions similar to those at the time of the tests. It is important to note that yields from the wells may vary seasonally, and that the tests reflect the climatic and hydrologic conditions at the time of the tests. Generally, yields are lower during dry periods, and higher during wet periods. Other conditions, such as interference from nearby pumping wells or the diversion of surface drainage and subsequent loss of recharge may lower the yield of a well.

Water Quality

Ground-water-quality data for the study area are scarce. Of the 54 water-quality analyses included in this report, 23 are from wells in Lamar County (table 7, in the pocket of this report). The water samples were collected during the period from 1958-88 and were analyzed by different laboratories, including those of the USGS, EPD, and two private firms (table 7). Information concerning these wells and water-quality data are stored in the USGS's National Water Information System (NWIS).

Ground water in the south metro region generally is a calcium magnesium sodium bicarbonate type water that is low in dissolved solids and suitable for most uses. Hardness commonly ranges from soft to hard, and pH commonly ranges from 4.8 to 8.3. With the exception of iron, fluoride, and manganese, concentrations of total and/or dissolved constituents generally do not exceed State and Federal Drinking Water Standards (Georgia Department of Natural Resources, 1977; U.S. Environmental Protection Agency, 1986). A summary of selected water-quality constituents is shown in figure 6. The boxplots in figure 6 show that ground water in the south metro region has low median concentrations of dissolved solids (83 mg/L), total iron (100 μg/L), and total manganese (17 μg/L).

Although the median concentration of total iron (100 μg/L) does not exceed the recommended State drinking-water standard of 300 μg/L (Georgia Department of Natural Resources, 1977), eight wells had concentrations exceeding the standard, seven of which occur in rock unit A and one of which occurs in rock unit D. Six of the eight wells are in Lamar County, where a maximum total iron concentration of 43,000 μg/L was detected in water from well 12Y011. High concentrations of iron may be due to local mineralized zones, contamination from surface water, or from iron fixing bacteria (Cressler and others, 1983).

Although the median concentration of manganese did not exceed the State drinking-water standard of 50 μg/L, six wells had concentrations exceeding the standard, four of which are in Lamar County. Five of the wells were drilled in water-

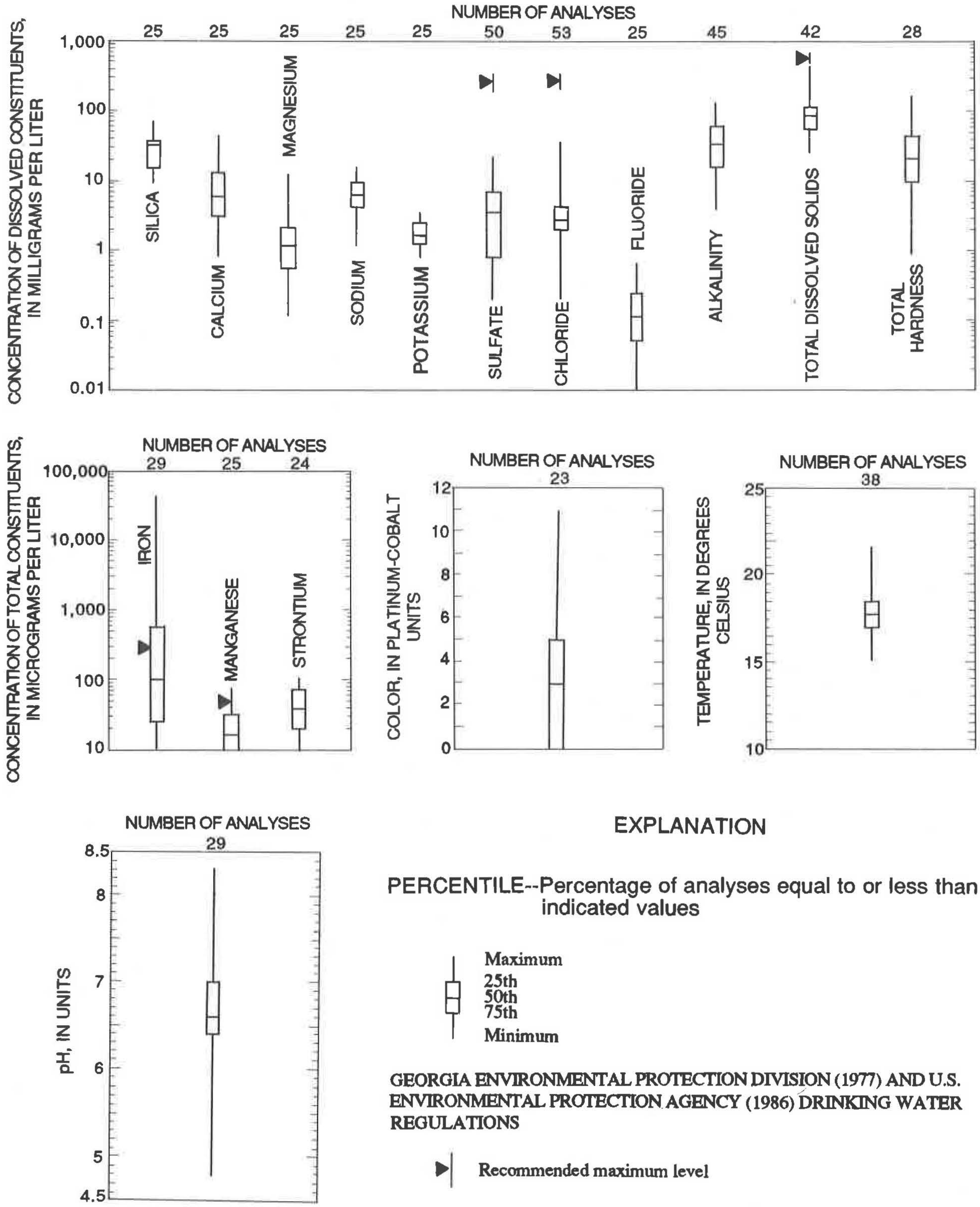


Figure 6.--Boxplots of selected chemical constituents in ground water in the south metropolitan Atlanta region.

bearing unit A and one well was drilled into water-bearing unit J.

The quality of ground water in the south metro region also may be affected by the presence of certain radionuclides such as radium and radon gas associated with the decay of uranium found in certain igneous and metamorphic rocks. Although there are few available analyses on activities of radium and other radionuclides in ground water in the area, the presence of igneous and metamorphic rocks indicates that their occurrence is likely. Presently (1990), there are no established standards regulating radon levels in drinking water. The drinking water standard for gross alpha particle activity is 15 pico curies per liter (ρci/L) (Georgia Department of Natural Resources, 1977; U.S. Environmental Protection Agency, 1986).

Radon was detected in 13 wells in Henry County, and two wells in Spalding County in a recent reconnaissance study by Dyar (1988). Activities ranged from 40 ρci/L (in bored wells) to 4,500 qci/L (in drilled wells). Coker and Olive (1989) reported the range, average, and median activities of radionuclides in ground water from an unspecified number of wells in Spalding and northern Pike Counties (their sampling cell 8). Radon activities ranged from 1,811.1 ρci/L to 12,556.2 ρci/L, had a median activity of 2,947.3 ρci/L, and an average activity of 4,676.1 ρci/L. Coker and Olive (1989) also reported values of gross alpha and total radium. Gross alpha activities ranged from 0.1 to 48.1 ρci/L, had a median value of 0.9 ρci/L, and averaged 6.2 ρci/L, indicating that water from some wells was in excess of the State and Federal drinking water standard of 15 ρci/L (Georgia Department of Natural Resources 1977; U.S. Environmental Protection Agency, 1986). Activities of combined radium-226 and radium-228 ranged from 0.1 to 39.5 ρci/L, had a median value of 0.9 ρci/L, and averaged 5.4 ρci/L. The State and Federal drinking water standard for activity of combined radium-226 and radium-228 is 5 ρci/L (Georgia Department of Natural Resources, 1977; U.S. Environmental Protection Agency, 1986), indicating that the activity in some wells was above the drinking water standard.

SUMMARY AND CONCLUSIONS

Wells and springs supplied about 16 Mgal/d, or 37 percent of the total water withdrawn in the south Metropolitan Atlanta region in 1985. Of the total ground-water withdrawn, 54 percent was for domestic and commercial uses, 29 percent was for livestock, 11 percent was for public supply, 3.5 percent was for irrigation, and 2.5 percent was for industrial and mining uses.

Ground-water recharge to the upper Flint River basin, which includes about 66 percent of the study area, was estimated using a hydrograph separation technique, and averaged 6.5 in/yr (575 Mgal/d). Although ground-water contribution from outside the drainage basin may be possible, it is probable that most of the recharge is derived from precipitation within the basin. During an average dry year (1941), the recharge rate was about 4.7 in/yr (415 Mgal/d); whereas, during an average wet year (1949), the recharge rate was about 8.8 in/yr (770 Mgal/d). Although the amount of recharge exceeds current ground-water withdrawals in the basin, only a small percentage of the estimated annual recharge can be economically recovered by wells. The actual amount that can be recovered will depend on utilization of systematic water-prospecting techniques to locate sites favorable for the development of high-yielding wells.

The south metro region is within the Piedmont physiographic province, except for the southernmost part of Talbot County, which is in the Coastal Plain province. Previous investigators have divided the various rock units of the area into more than 40 named formations and unnamed mappable units. For convenience, these units were grouped into 10 principal hydrogeologic units (1) unit A consists of amphibolite, gneiss and schist, (2) unit B consists of granitic gneiss, (3) unit C consists of schist, (4) unit D consists of biotite gneiss, (5) unit E consists of mafic rocks, (6) unit F consists of granite, (7) unit G consists of cataclastic rocks, (8) unit H consists of quartzite, (9) unit J consists of carbonate rocks, and (10) unit K consists of Coastal Plain sediments.

Certain structural, stratigraphic, and topographic features that are associated with increased permeability of the rock were noted as factors influencing well yield throughout the Piedmont part of the south metro region. These factors include (1) more than 4,000 mi of contact zones between rocks of contrasting lithologies in the south metro region could favor increased permeability of the rock in these zones; (2) the Towaliga and Auchumpkee faults are major fault zones that cut across the southern part of the area;

(3) in parts of the area, shear zones and microbreccia zones often are associated with increased permeability of the rock.

Data from 481 wells and 13 springs were compiled during this study. The reported yield for the 480 wells ranged from less than 1 to 700 gal/min, and averaged 43 gal/min. The reported flow from 13 springs ranged from less than 1 to 679 gal/min. The yield of 43 wells and flow from five springs was reported to exceed 100 gal/min. Most of the high-yielding wells and springs were near contact zones between rocks of contrasting lithologic and weathering properties. The high-yielding wells and springs were located in a variety of topographic settings. The most prevalent were hillsides, upland draws, and hilltops. Many of the well sites in the south metro region were located for convenience and without regard to hydrologic well-site selection criteria. It is probable that more high-yielding wells may be obtained using proper well-siting techniques.

Long-term pumping tests were conducted by the Georgia Geologic Survey in five wells in the south metro region. Wells at Locust Grove, Henry County, and Shoal Creek, Coweta County had sustained yields of 180 gal/min and 100 gal/min, respectively, for 24 hours. Three wells at Barnesville, Lamar County had sustained yields of 60, 75, and 40 gal/min for 24 hours. Test results indicated that (1) the wells were capable of sustaining their respective test yields for periods of 24 hours without exceeding the available drawdown, and (2) water levels in four of the five wells fully recovered within 24 hours of pump shutdown; the fifth well recovered about 96 percent. These factors indicate that the wells probably are capable of sustaining their respective test yields under hydrologic conditions similar to those at the time of the tests. It is important to note that yields from the wells can vary seasonally, and that the tests reflect the climatic and hydrologic conditions at the time of the tests. Generally, yields are lower during dry periods, and higher during wet periods. Other conditions, such as interference from nearby pumping wells or the diversion of surface drainage and subsequent loss of recharge may lower the yield of a well.

Ground water in the south metro region generally is suitable for most uses. With the exception of local occurrences of excessive iron, fluoride, and manganese, concentrations of total and/or dissolved constituents generally do not exceed State or Federal safe drinking water standards. Ground-water quality may be affected by the presence of radionuclides associated with the decay of uranium found in igneous and metamorphic rocks. A reconnaissance study in 1988 indicated the presence of radon gas in 13 wells in Henry County and two wells in Spalding County. Activities ranged from 40 ρci/L (in bored wells) to 4,500 ρci/L (in drilled wells). Presently, there are no established standards regulating radon levels in drinking water. Another study in Spalding and northern Pike Counties found activities of gross alpha and combined radium-226 and radium-228 in some wells that were in excess of State and Federal drinking water standards.

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APPENDIX A.--*Record of wells*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
<u>Coweta County</u>												
06AA01 T.S. Powers	33°20'18" 84°58'47"	840	F	Virginia	1957	161	64	6	B	45	--	--
06AA02 Sue Rickenbacker	33°19'44" 84°55'12"	780	W	Adams-Massey	1977	90	23	6	A	100	--	--
06BB01 H.R. Meadows	33°24'09" 84°56'28"	740	V	Virginia	1969	105	35	6	B	30	--	--
06BB02 N.J. Wallace	33°23'08" 84°53'33"	840	W	Virginia	1975	145	69	6	B	50	--	--
06BB03 Western High School	33°23'23" 84°53'20"	870	H	Virginia	1950	231	116	6	A	18	--	--
06BB04 Western High School	33°23'24" 84°53'21"	870	H	Virginia	1973	550	99	6	A	2.50	--	--
06BB05 Jay Aver	33°23'37" 84°53'28"	840	W	Virginia	1977	120	40	6	A	50	--	--
06BB06 M.C. Barber	33°25'21" 84°54'19"	780	S	Waller	1977	205	--	--	B	25	--	--
06BB07 Mable Stovall	33°24'43" 84°53'19"	790	V	Virginia	1964	205	--	--	A	30	--	--
06BB08 Plant Yates	33°27'57" 84°54'04"	760	H	Weisner	1971	378	34	6	G	50	--	--
06BB09 Plant Yates	33°27'43" 84°53'59"	740	W	Virginia	1965	307	43	6	G	115	--	--
06BB10 Plant Yates	33°27'40" 84°53'41"	760	S	Virginia	1971	146	42	6	B	100	--	--
06BB16 A.L. Allen	33°26'44" 84°53'00"	812	H	--	--	132	--	--	A	--	26	1958
07AA01 Erle W. Fanning	33°16'52" 84°50'53"	860	S	Weisner	1967	490	50	6	A	60	--	--
07AA02 Moreland School	33°17'00" 84°46'06"	940	H	Virginia	1941	228	83	6	A	55	--	--
07AA03 Moreland School	33°17'03" 84°46'06"	940	H	Virginia	1967	458	66	6	A	40	--	--
07AA04 Westside School	33°22'27" 84°49'48"	860	H	Virginia	1954	302	113	6	A	65	--	--
07AA05 Roy E. Knox	33°22'12" 84°49'37"	880	S	Virginia	1958	136	19	[illegible]	A	50	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Coweta County--Continued												
07AA07 Unity Baptist Church	33°21'34" 84°49'34"	900	H	Virginia	1963	155	46	6	A	25	--	--
07AA08 City of Newnan	33°21'16" 84°48'52"	810	V	Hughes Spec	1910	400	--	--	A	90	--	--
07AA09 City of Newnan	33°21'16" 84°48'48"	825	V	Hughes Spec	1914	350	--	--	A	75	--	--
07AA10 City of Newnan	33°21'09" 84°48'47"	850	W	Hughes Spec	1914	350	--	--	A	100	--	--
07AA11 City of Newnan	33°21'08" 84°48'43"	880	S	Hughes Spec	1914	350	--	--	A	100	--	--
07AA12 J.B. Peniston	33°21'43" 84°48'12"	950	H	Virginia	1957	450	98	6	A	50	--	--
07AA13 Coweta County Airport	33°18'46" 84°46'24"	940	H	Virginia	1966	205	77	6	A	35	--	--
07AA14 Airport Spur Service	33°19'07" 84°46'39"	960	H	Virginia	1972	370	94	6	A	75	--	--
07AA15 Standard Oil Company	33°19'33" 84°46'44"	980	H	Virginia	1972	248	69	6	A	50	--	--
07AA16 Holiday Inn	33°19'41" 84°46'48"	970	H	Weisner	1968	223	68	6	A	100	--	--
07AA17 William Banks	33°20'36" 84°47'03"	930	S	Virginia	1969	435	95	6	A	50	--	--
07AA18 E. Newman Water Company	33°21'08" 84°46'53"	960	H	Virginia	1973	510	78	6	A	24	--	--
07AA19 E. Newnan School	33°21'17" 84°46'40"	920	H	Virginia	1954	401	78	6	A	21	--	--
07AA20 Hanson & Parrott	33°21'26" 84°46'04"	950	W	Virginia	1974	140	30	6	A	75	--	--
07AA21 McDowell Brothers 2	33°21'47" 84°50'19"	810	H	Adams-Massey	1975	217	65	6	A	60	--	--
07AA22 McDowell Brothers	33°21'52" 84°50'10"	800	V	Adams-Massey	1974	247	78	6	A	20	--	--
07BB01 Mike Edwards	33°22'42" 84°52'14"	810	W	Virginia	1978	120	27	6	A	40	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
<u>Coweta County--Continued</u>												
07BB02 Fred L. Schronder	33°23'17" 84°49'45"	940	H	Virginia	1973	255	65	6	A	150	--	--
07BB03 J.W. Hughie	33°23'19" 84°49'41"	890	W	Virginia	1977	320	70	6	A	50	--	--
07BB06 Arnall Mills	33°26'02" 84°52'03"	750	V	Virginia	1953	675	--	--	B	69	--	--
07BB07 Arnco Mills	33°25'01" 84°51'17"	850	H	Virginia	1927	360	--	--	A	40	--	--
07BB11 G.C. Watkins	33°24'58" 84°48'54"	830	S	Virginia	1974	212	30	6	A	100	--	--
07BB12 Windsor Estates	33°25'44" 84°49'07"	915	H	Waller	1977	323	--	--	A	40	--	--
07BB13 Jerry Windom	33°25'44" 84°48'41"	900	H	Waller	1977	390	--	--	A	75	--	--
07BB14 Northside School	33°25'23" 84°47'47"	940	H	Virginia	1951	288	44	6	A	36	--	--
07BB15 BPOE-Elks-Club	33°23'51" 84°47'49"	910	W	Virginia	1959	265	72	6	A	124	--	--
07BB16 Newnan House Motel	33°24'08" 84°47'30"	900	S	Virginia	1975	270	71	6	A	80	--	--
07BB17 City of Newnan	33°24'11" 84°47'04"	830	V	Virginia	1974	371	28	6	A	63	--	--
07BB18 V.J. Bruner	33°24'28" 84°46'51"	880	S	Virginia	1974	225	78	6	A	50	--	--
07BB19 Thomas W. Parker	33°24'25" 84°46'51"	870	S	Virginia	1976	205	64	6	A	30	--	--
07BB20 J.W. Ozmore	33°24'33" 84°46'42"	880	S	Virginia	1972	265	69	6	A	30	--	--
07BB21 J.W. Ozmore	33°24'34" 84°46'40"	875	V	Virginia	1963	220	96	6	A	20	--	--
07BB22 J.W. Ozmore	33°24'37" 84°46'45"	910	S	Virginia	1963	220	53	6	C	20	--	--
07BB24 Newnan Country Club	33°25'09" 84°46'36"	950	H	Virginia	1948	500	124	6	C	60	--	--
07BB25 J.W. Rainwater	33°25'37" 84°45'38"	940	W	Virginia	1969	206	101	6	B	33	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Coweta County--Continued												
07BB26 Kenneth Denney	33°28'38" 84°50'23"	770	S	Virginia	1965	304	6	6	A	32	--	--
07BB27 Roscoe Coalson	33°27'16" 84°49'19"	900	H	Virginia	1958	192	44	6	A	37	--	--
07ZO02 City of Grantville	33°14'02" 84°50'13"	850	W	Virginia	1956	600	57	6	A	80	--	--
07ZO05 City of Grantville	33°14'09" 84°49'50"	880	S	Virginia	1962	650	47	6	A	27	--	--
07ZO06 Grantville (1971)	33°13'55" 84°49'52"	870	H	Virginia	1971	700	101	6	A	0	--	--
08BB20 Shoal Creek	33°24'16" 84°38'33"	810	V	Adams-Massey	1987	225	21	6	A	100	--	--
08CC04 W.H. Johnston	33°30'09" 84°40'10"	1,014	S	Virginia	1965	125	33.5	6	F	150	6	08-11-65
09AA01 Senoia Georgia 2	33°17'56" 84°33'16"	857	S	Virginia	1947	459	107	10	A	58	--	--
Fayette County												
09AA10 Falcon Field Airport	33°21'34" 84°34'10"	810	S	Waller	1971	264	--	---	A	25	--	--
09BB01 Joel Cowan	33°23'07" 84°34'58"	840	H	Virginia	1959	126	--	---	A	39	--	--
09BB02 Peachtree City	33°24'03" 84°34'54"	800	W	Virginia	1960	400	117	8	B	90	--	--
09BB03 Gould E. Bernard	33°23'00" 84°32'07"	820	S	Virginia	1977	225	113	6	A	30	--	--
09BB04 Larry S. Moseley	33°23'02" 84°32'01"	800	S	Virginia	1978	185	100	6	A	75	--	--
09BB05 Harry G. Labar	33°24'52" 84°32'14"	930	W	Virginia	1976	125	60	6	A	40	--	--
09BB06 Harold D. Sowell	33°26'04" 84°32'41"	960	H	Virginia	1972	210	62	6	A	150	--	--
09BB07 W.R. Weinmeister	33°25'05" 84°30'13"	840	H	Virginia	1970	210	47	6	A	45	--	--
09BB08 Andrew F. Gonczi	33°26'53" 84°34'41"	890	W	Weisner	1974	290	73	6	A	70	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Fayette County--Continued												
09BB09 City of Tyrone	33°28'18" 84°35'53"	990	H	Virginia	1965	700	64	6	A	32	--	--
09BB10 Triple Creek Farm	33°27'13" 84°33'18"	940	W	Virginia	1971	86	29	6	A	75	--	--
09BB11 Triple Creek Farm	33°27'01" 84°33'13"	900	W	Virginia	1971	446	446	6	A	0.50	--	--
09BB12 Triple Creek Farm	33°26'58" 84°33'08"	900	W	Virginia	1977	185	8	6	A	15	--	--
09BB13 R.H. Arnall	33°27'03" 84°33'11"	910	W	Weisner	965	100	--	--	A	70	--	--
09BB14 Raymond Conn	33°27'22" 84°32'25"	960	S	Weisner	1966	173	19	6	A	20	--	--
09BB15 Marnel Mobile Home Park	33°26'33" 84°31'38"	930	W	Virginia	1977	400	87	6	A	125	--	--
09BB16 Charles B. Pyke	33°29'44" 84°32'52"	960	H	Weisner	1973	148	--	--	A	120	--	--
09BB17 W.B. Elder	33°29'43" 84°32'44"	950	H	Virginia	1958	100	42	6	A	30	--	--
09BB18 Hershel A. Bennefield	33°27'46" 84°30'03"	860	H	Virginia	1970	283	21	6	A	30	--	--
09BB20 University Builders	33°29'55" 84°33'56"	1,000	H	Virginia	1976	245	76	6	B	6	--	--
09BB23 Carl J. Moore	33°29'59" 84°33'51"	950	W	Virginia	1977	220	37	6	B	40	--	--
09CC01 Universal Builders	33°30'12" 84°33'57"	945	S	Virginia	1977	255	29	6	B	80	--	--
09CC12 Universal Builders	33°30'05" 84°33'52"	950	S	Virginia	1976	300	55	6	B	1	--	--
09CC13 Universal Builders	33°30'06" 84°33'50"	920	S	--	1977	340	23	6	B	1.50	--	--
09CC15 H.R. Cole	33°30'04" 84°33'59"	955	S	Virginia	1979	230	--	--	B	15	--	--
09CC16 Landmark Mobile Home Park	33°31'36" 84°33'48"	940	S	Virginia	1976	505	78	6	A	60	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Fayette County--Continued												
09CC17 Landmark Mobile Home Park	33°31'23" 84°33'50"	930	S	Virginia	1975	325	82	6	A	88	--	--
09CC18 Landmark Mobile Home Park	33°31'28" 84°33'48"	930	S	Virginia	1975	405	50	6	A	30	--	--
09CC19 Bill Babb	33°31'47" 84°30'46"	990	S	Weisner	1962	72	36	6	A	25	--	--
09CC20 A.E. Coleman	33°31'32" 84°30'10"	000	H	Virginia	1966	143	46	6	A	25	--	--
10AA01 E.A. Ballard	33°22'05" 84°25'56"	875	H	Holland	--	73	70	6	E	15	20	1962
10AA02 City of Brooks	33°17'22" 84°27'35"	860	H	Virginia	1966	555	30	6	B	48	--	--
10AA03 Vernon Woods	33°17'43" 84°27'25"	830	S	Weisner	1965	85	72	6	B	30	--	--
10AA04 Robert Fisher	33°17'24" 84°25'57"	760	S	Waller	1974	230	--	--	A	25	--	--
10AA05 E. Neal Gray	33°18'59" 84°28'35"	800	S	Weisner	1972	145	45	6	B	120	--	--
10AA06 F.W. Spence	33°22'02" 84°27'12"	880	V	Weisner	1976	150	68	6	A	15	--	--
10AA08 Antioch Baptist Church	33°20'50" 84°25'34"	825	S	Virginia	1972	265	--	--	B	30	--	--
10AA09 John Crews	33°18'37" 84°23'40"	750	V	Waller	1976	175	--	--	A	200	--	--
10AA10 Robert V. Morris	33°21'07" 84°26'53"	900	S	Waller	1972	204	--	--	E	30	--	--
10AA13 Eugene Weatherip	33°15'29" 84°27'56"	835	S	Virginia	1966	222	85	6	A	60	--	--
10AA23 Mask Gay 1	33°17'26" 84°27'35"	840	H	--	1947	135	30	8	B	10	15	1947
10BB01 Warren Young, Jr.	33°23'30" 84°28'49"	840	W	Weisner	1977	429	89	6	F	40	--	--
10BB02 H.F. Modelevsky	33°24'34" 84°29'29"	820	S	Weisner	1972	171	114	6	A	25	--	--

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Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Fayette County--Continued												
10BB03 Rolling Meadows Subdivision	33°24'43" 84°29'17"	840	W	Weisner	1973	148	102	6	A	75	--	--
10BB04 Charles E. Watkins	33°25'24" 84°26'27"	885	W	Waller	1977	455	--	--	A	30	--	--
10BB05 Webb W. Mask, Jr.	33°23'22" 84°25'29"	890	H	Virginia	1962	200	95	6	A	36	--	--
10BB06 Ralph Wofford	33°22'36" 84°25'05"	880	H	Virginia	1973	245	120	6	A	20	--	--
10BB07 A.C. Eubanks, Jr.	33°24'13" 84°24'35"	800	V	Virginia	1967	205	--	--	A	40	--	--
10BB08 G.C. Gable	33°25'52" 84°25'22"	840	S	Weisner	1969	197	140	6	B	35	--	--
10BB09 Barbara Scott	33°26'18" 84°26'26"	940	H	Weisner	1967	172	23	6	D	60	--	--
10BB10 Simpson Provision Co.	33°27'04" 84°27'20"	920	S	Virginia	1956	175	113	6	D	45	--	--
10BB11 C.C. Rogers Construction Co.	33°28'08" 84°28'11"	860	S	Virginia	1966	85	60	6	A	100	--	--
10BB12 Phillips Concrete Co.	33°29'50" 84°27'00"	820	S	Virginia	1967	140	41	6	E	40	--	--
10BB13 Phillips Concrete Co.	33°29'55" 84°26'58"	810	V	Virginia	1972	110	26	6	B	15	--	--
10BB14 Charles Phillips	33°29'47" 84°27'10"	840	S	Virginia	1974	390	47	6	B	23	--	--
10BB15 John M. Ellis, Jr.	33°27'34" 84°26'16"	900	S	Virginia	1961	227	78	6	A	55	--	--
10BB16 G.L. Cannon	33°27'51" 84°25'55"	880	S	Virginia	1964	194	101	6	A	53	--	--
10BB17 Charles W. Cook	33°26'23" 84°25'10"	830	S	Askew	1978	205	60	6	B	25	--	--
10BB18 A.O. Bailey	33°26'15" 84°25'00"	850	H	Waller	1976	155	--	--	B	35	--	--
10BB19 Landis Walker	33°29'08" 84°24'44"	820	W	Virginia	1974	400	33	6	A	65	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Fayette County--Continued												
10BB20 H.D. Thames, Jr.	33°27'39" 84°23'22"	800	W	Virginia	1972	200	116	6	B	75	--	--
10BB21 Bob Anderson	33°22'34" 84°29'40"	845	S	Waller	1977	180	--	--	B	30	--	--
10CC01 Walter T. Turner	33°30'28" 84°29'47"	915	S	Virginia	1966	85	42	6	B	150	--	--
10CC02 Charles Reagan	33°30'38" 84°29'21"	970	H	Waller	1978	355	--	--	B	25	--	--
10CC03 J & S Water Company	33°30'40" 84°28'36"	900	W	Weisner	1973	122	22	6	B	100	--	--
10CC04 J & S Water Company	33°30'37" 84°28'32"	900	V	Weisner	1973	147	22	6	E	25	--	--
10CC05 J & S Water Company	33°30'41" 84°28'31"	895	V	Weisner	1978	172	45	6	E	60	--	--
10CC06 Allgood Construction Company	33°30'36" 84°27'04"	815	V	Weisner	1978	123	93	6	E	100	--	--
10CC07 T.J. Busey	33°31'40" 84°26'17"	860	S	--	1971	96	58	6	A	150	--	--
10CC08 Dix Leon Subdivision	33°32'34" 84°27'14"	900	S	Weisner	1974	96	49	6	B	110	--	--
10CC09 Joe Potts	33°32'08" 84°27'04"	905	S	Weisner	1971	83	64	6	E	60	--	--
10CC10 H.L. Newton	33°32'27" 84°26'20"	845	W	Weisner	1968	273	8	6	B	50	--	--
Henry County												
11AA03 John C. Walters, III	33°22'30" 84°17'05"	820	S	Virginia	1962	210	77	6	A	54	--	--
11BB05 Atlanta International Raceway	33°23'03" 84°19'02"	825	H	Virginia	1959	500	124	6	A	50	--	--
11BB07 Hampton, Georgia (1940)	33°23'08" 84°17'09"	865	W	Virginia	1940	300	--	8	A	35	--	--
11BB08 City of Hampton	33°23'10" 84°17'18"	860	W	Virginia	1940	300	--	8	A	35	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Henry County--Continued												
11BB09 City of Hampton	33°23'18" 84°16'50"	850	S	Virginia	1951	340	30	8	A	30	--	--
11BB10 Hampton, Georgia (1960)	33°22'42" 84°18'16"	820	S	Virginia	1960	160	93	6	A	60	--	--
11BB11 Hampton, Georgia (1970)	33°22'41" 84°18'16"	830	S	Virginia	1970	400	70	6	A	60	--	--
11BB12 Hampton, Georgia (1973)	33°23'26" 84°16'32"	820	W	Virginia	1973	700	138	6	A	27	--	--
11BB13 Talmadge Development Corporation	33°25'10" 84°19'09"	890	H	Virginia	1953	286	23	6	A	30	--	--
11BB15 Frank Ritchie	33°26'06" 84°17'44"	970	H	Askew-Morris	1978	415	14	6	A	200	--	--
11BB21 Walter B. Spivey	33°29'36" 84°16'53"	828	S	Virginia	1973	185	40	6	B	43	--	--
11BB22 Wilbur E. Adams	33°29'44" 84°16'58"	835	S	Virginia	1970	145	--	--	B	25	--	--
11CC16 Louis P. Filoso	33°34'54" 84°15'47"	800	S	Virginia	1960	110	12	6	A	40	--	--
12AA01 Rocking A Farm	33°21'38" 84°09'54"	840	S	Virginia	1956	214	70	6	A	30	--	--
12BB01 Ted Fausel	33°23'44" 84°14'26"	810	S	Virginia	1957	165	21	6	A	20	--	--
12BB02 Ted Fausel	33°23'49" 84°14'37"	840	H	Virginia	1960	265	42	6	A	25	--	--
12BB03 Ted Fausel	33°24'16" 84°14'09"	870	H	Virginia	1968	300	88	6	A	41	--	--
12BB04 Pete Beshear	33°25'05" 84°12'10"	860	W	Askew-Morris	1973	255	--	--	A	20	--	--
12BB05 Selmans Dairy	33°24'16" 84°10'22"	880	H	Virginia	1967	105	55	6	A	100	--	--
12BB06 H.C. Allen	33°24'17" 84°08'28"	890	H	Virginia	1954	204	--	--	A	30	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
<u>Henry County--Continued</u>												
12BB07 George Meikel	33°28'02" 84°13'22"	820	W	Waller	1973	105	--	--	A	75	--	--
12BB08 KOA Campground	33°28'45" 84°13'22"	880	S	Virginia	1970	425	42	6	A	50	--	--
12BB09 Trav-L Park	33°29'03" 84°13'27"	860	S	Virginia	1971	66	46	6	A	34	--	--
12BB10 Paul H. Smith	33°29'33" 84°09'05"	860	S	Waller	1973	280	--	--	C	25	--	--
12BB11 George Sorrow	33°29'59" 84°09'02"	840	S	Waller	1978	305	--	--	C	20	--	--
12BB12 Southern Railroad (McDonough)	33°25'33" 84°08'55"	875	S	Southern Railroad	1910	550	300	12	A	200	130	10- -58
12BB13 McDonough, Georgia (stand-by well)	33°27'14" 84°09'06"	792	W	Virginia	1938	500	280	12	A	200	50	10- 58
12CC08 Wade C. Hinton	33°32'49" 84°11'13"	790	S	Virginia	1962	386	36	6	B	24	--	--
12CC09 R.S. Swanson	33°32'57" 84°10'59"	740	S	Waller	1964	194	--	--	B	40	--	--
12CC10 W.F. Jones, Jr.	33°33'27" 84°10'07"	800	H	Virginia	1968	143	28	6	A	60	--	--
12CC11 Walter D. Cook	33°34'40" 84°12'40"	810	S	Virginia	1967	305	53	6	B	36	--	--
12CC12 Clarence Sheppard	33°34'33" 84°11'38"	750	S	Waller	1973	205	--	--	D	20	--	--
12CC14 Hugo Kirk	33°37'22" 84°12'01"	815	W	Ward	1972	146	126	6	B	150	--	--
12CC15 Gerald Culbreath	33°36'49" 84°11'21"	800	S	Virginia	1973	130	7	6	D	20	--	--
12CC16 John W. Moody	33°37'11" 84°11'08"	765	S	Waller	1978	185	--	--	D	40	--	--
12CC17 Howard W. Stephens	33°36'35" 84°10'13"	900	S	Virginia	1960	144	26	6	B	48	--	--
12CC18 H.L. Luther	33°35'29" 84°09'30"	865	S	Waller	1974	145	--	--	B	50	--	--

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Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Henry County--Continued												
12CC19 Leonard Harding	33°35'37" 84°09'46"	820	V	Holder	1978	130	43	6	B	25	--	--
12CC20 Morgan Auto Parts	33°32'39" 84°11'23"	820	H	Virginia	1978	220	59	6	B	100	--	--
12CC21 Ozias Baptist Church	33°32'33" 84°08'19"	790	S	Virginia	1967	167	35	6	A	60	--	--
12CC22 Leroy Berry, Jr.	33°31'57" 84°08'02"	700	S	Waller	1975	305	6	--	A	20	--	--
12CC23 Harry Cook	33°31'25" 84°08'26"	710	S	Waller	1973	205	--	--	A	25	--	--
12CC24 J.B. Gleaton	33°30'50" 84°10'02"	740	S	Virginia	1970	146	17	6	A	100	--	--
12CC26 Safari Motor Inn	33°30'21" 84°14'04"	860	H	Virginia	1972	300	38	6	D	100	--	--
12DD01 Frank Stokes	33°37'57" 84°12'11"	817	S	Holder	1972	368	38	6	B	200	--	--
12DD02 L.W. Baity	33°38'31" 84°12'14"	800	S	Ward	1972	86	45	6	A	60	--	--
12DD03 William Wehunt	33°38'10" 84°11'14"	790	V	Askew-Morris	1978	225	84	6	D	30	--	--
12DD04 Norman Barnes	33°38'21" 84°11'11"	785	S	Virginia	1964	260	90	6	A	20	--	--
12DD06 M.W. Buttrill	33°38'23" 84°10'59"	770	W	Virginia	1973	370	76	6	A	30	--	--
13AA01 Six Star Mobile Home Village	33°20'06" 84°07'06"	780	W	Virginia	1971	258	102	6	A	100	--	--
13AA02 S.H. Gardner, Jr.	33°21'43" 84°07'18"	860	H	Virginia	1959	126	73	6	A	40	--	--
13AA03 S.H. Gardener, Jr.	33°22'04" 84°07'12"	870	H	Virginia	1966	170	43	6	A	50	--	--
13AA04 S. Royce Cox	33°21'10" 84°03'13"	700	W	Virginia	1966	167	60	6	C	30	--	--
13AA06 City of Locust Grove	33°21'30" 84°06'13"	90	W	Virginia	1987	500	63	6	C	180	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Henry County--Continued												
13BB01 W.R. Price	33°26'17" 84°07'15"	830	S	Virginia	1967	325	71	6	A	30	--	--
13BB02 Peggy Patrick	33°26'16" 84°07'09"	840	H	Virginia	1968	221	49	6	A	36	--	--
13BB03 Zack B. Hinton	33°27'16" 84°07'13"	790	S	Virginia	1968	185	70	6	A	32	--	--
Lamar County												
12X003 Jim Graham	32°59'30" 84°10'22"	775	S	Waller	1978	230	34	6	B	35	--	--
12X004 George Click	32°59'39" 84°11'34"	800	W	Bedsole	1984	--	--	--	A	4	--	--
12X005 Harry Poole, No. 3	32°59'55" 84°12'20"	845	W	Virginia	1985	465	7	6	A	1	--	--
12Y001 Milner School	33°07'02" 84°11'58"	840	H	Virginia	1945	263	87	6	A	105	17	1945
12Y003 Barnesville Community Park	33°05'01" 84°10'19"	700	W	--	1971	395	96	6	A	61	--	--
12Y004 Kendalls Mobile Home Park	33°07'09" 84°10'35"	773	W	Waller	1900	124	65	6	A	--	--	--
12Y005 Liz Acres Subdivision	33°04'53" 84°10'25"	710	S	Virginia	1946	165	--	--	A	100	--	--
12Y006 Maude Wilson	33°06'56" 84°12'02"	833	H	Virginia	1951	241	62	6	A	50	20	01- -51
12Y007 J.J. Darden	33°07'08" 84°11'44"	845	H	Virginia	1945	225	86	8	A	15	40	12- -45
12Y008 Milner	33°07'00" 84°11'48"	845	H	Virginia	1965	600	90	8	A	23.7	--	--
12Y009 Barnesville	33°04'11" 84°09'22"	740	W	--	1908	400	30	6	C	300	--	--
12Y010 McGaha	33°03'52" 84°07'54"	920	S	Virginia	1951	--	34	6	C	18	--	--
12Y011 Major Andrews	33°03'40" 84°11'16"	805	H	Virginia	1948	154	95	6	A	25	36	04- -48

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Lamar County--Continued												
12Y012 B. Loyd Woodall	33°04'57" 84°10'23"	712	S	Virginia	1946	260	147	6	A	--	40	11- -46
12Y013 DR. S.B. Taylor	33°02'22" 84°14'47"	750	S	Virginia	1943	328	56	6	A	5	--	--
12Y014 E.J. Stocks	33°03'54" 84°08'04"	910	S	Virginia	1943	116	56	6	C	13.5	34	09- -43
12Y015 Barnesville 1	33°04'19" 84°11'20"	705	V	Middle Georgia	1900	600	24	8	G	--	--	--
12Y017 Barnesville 3	33°04'24" 84°09'28"	703	W	Mid-Georgia	1988	405	--	--	G	--	--	----
12Y018 Ruth Martin	33°06'38" 84°12'24"	825	H	Virginia	1950	--	32	6	A	20	--	--
12Y019 341 Mobile Home Park	33°01'11" 84°08'01"	840	W	Waller	1967	--	150	6	A	25	--	--
12Y020 Triple H Farms	33°04'39" 84°13'17"	835	H	Waller	1981	--	--	--	A	5	--	--
12Y021 Mrs. Fred Hand	33°05'34" 84°07'35"	705	H	--	--	--	--	--	G	6	--	--
12Y022 William Lovejoy	33°02'17" 84°12'03"	815	H	Waller	1981	305	46	6	A	3	--	--
12Y023 W.A. Rowell	33°07'21" 84°14'35"	805	S	Middle Georgia	1981	--	35	6	C	10	--	--
12Y024 Rex Copeland	33°05'43" 84°14'52"	800	H	--	--	285	--	--	A	25	--	--
12Y025 Ponderosa Inn No.1	33°00'09" 84°11'33"	865	H	Adams Carrol	1961	87	30	6	A	23	--	--
12Y026 Ponderosa Inn No.2	33°00'09" 84°11'34"	865	H	Middle Georgia	1977	405	35	6	A	35	--	--
12Y027 Donnie Wallace	33°05'34" 84°10'46"	785	S	Interstate D	1984	425	19	6	A	50	--	--
12Y028 B. Donahoe	33°03'56" 84°10'51"	780	S	Aqua	1974	125	--	--	A	15	--	--
12Y029 Tom Bodkins	33°04'55" 84°07'52"	765	S	Virginia	1984	325	85	6	A	15	--	--
12Y030 C.B. Cole	33°03'04" 84°14'46"	805	S	Askew-Morris	1971	165	--	--	G	5	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Lamar County--Continued												
12Y031 Charles Jones	33°01'58" 84°09'39"	830	V	Askew-Morris 1977	--	68	6	A	25	--	--	
12Y032 Donald Royal	33°01'56" 84°09'39"	820	V	Virginia 1900	--	--	--	A	4	--	--	
12Y033 William Key	33°06'35" 84°13'30"	780	S	Bedsole 1985	180	40	6	A	12	--	--	
12Y034 H.S. Turner	33°01'33" 84°09'19"	812	S	Virginia 1968	210	201	6	A	15	21	1968	
12Y035 Milton Prichett	33°03'14" 84°11'21"	790	S	Askew-Morris 1974	465	11	6	A	12	--	--	
12Y036 Harry Poole No.1	33°00'05" 84°12'11"	855	H	Virginia 1985	705	30	6	A	1.5	--	--	
12Y037 Harry Poole No.2	33°00'01" 84°12'17"	845	W	Virginia 1985	605	58	6	A	4	--	--	
12Y038 Harry Poole No.4	33°00'23" 84°12'12"	790	S	Virginia 1985	625	20	6	A	25	--	--	
12Y039 Marion Underwood	33°01'49" 84°10'53"	825	S	Virginia 1956	265	42	6	A	--	--	--	
12Y040 Carl Sawyer	33°03'56" 84°13'27"	735	S	Waller 1966	165	--	--	A	10	--	--	
12Y041 Dale Vaughn	33°05'00" 84°08'11"	790	S	Waller 1986	345	50	6	A	2.5	--	--	
12Y042 Mount Pleasant Baptist Church	33°01'11" 84°14'39"	735	H	Middle Georgia	1986	265	100	6	A	12	--	
12Y043 Tony Mark Turner	33°00'23" 84°11'56"	825	H	Askew-Morris 1986	245	--	--	A	8	--	--	
12Y044 Triple H Farms No. 2	33°04'39" 84°13'15"	795	H	-- --	725	--	--	A	0	--	--	
12Y045 Herman Davis	33°07'14" 84°11'20"	829	S	Virginia 1951	180	77	6	A	30	2012-	-51	
12Z001 Dixie Pipeline Company	33°08'58" 84°12'29"	852	H	-- 1966	31	30	24	C	--	--	--	
12Z003 U.S. Engineers	33°09'13" 84°12'34"	862	H	Virginia 1942	375	120	8	C	53	35	1942	

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
<u>**Lamar County--Continued**</u>												
12Z004 U.S. Engineers No. 2	33°09'04" 84°12'30"	860	H	Virginia	1942	76	28	8	C	30	--	--
12Z005 Sarah Lemmons	33°10'20" 84°12'27"	885	H	Askew-Morris	1986	230	104	6	C	25	--	--
12Z006 Dan Faulkerson	33°09'28" 84°08'32"	745	S	--	--	175	--	--	A	25	--	--
13X001 W.C. Huddgins	32°58'03" 84°06'47"	799	S	Virginia	1956	144	85	6	A	8	22	1956
13X002 Roger Legg No. 1	32°58'50" 84°06'46"	785	S	Waller	1979	525	--	6	A	0	--	--
13X003 Roger Legg No. 2	33°58'49" 84°06'46"	785	S	--	--	205	--	--	30	--	--	--
13Y001 Paul Milner	33°05'49" 84°05'51"	725	S	Waller	1963	187	95	6	A	7	--	--
13Y002 J.E. Trice	33°04'54" 84°02'59"	760	H	Virginia	1944	100	34	6	A	--	--	--
13Y003 E.C. Milner	33°02'57" 84°05'34"	827	S	Virginia	1951	509	--	---	A	0	--	--
13Y004 Paul Milner	33°04'51" 84°06'05"	783	H	Virginia	1950	148	104	6	A	5	34	11- 50
13Y005 E. Cain Milner	33°02'57" 84°05'34"	825	S	Virginia	1950	355	19	6	A	--	--	--
13Y006 Jerry Hayes	33°05'06" 84°05'25"	715	S	Waller	1981	205	25	6	A	10	--	--
13Y007 Vernon Hineline	33°02'58" 84°05'34"	825	S	Askew-Morris	1971	780	18	6	A	0	--	--
13Y008 Billy Weaver	33°02'43" 84°06'39"	735	W	Bedsole	1979	294	20	6	A	3.5	--	--
13Y009 Jeff Baker	33°03'23" 84°03'46"	755	W	Morgan	1900	430	--	--	A	20	--	--
13Y010 Joseph Bush	33°01'54" 84°06'38"	730	S	Waller	1967	104	--	--	A	5	--	--
13Y011 Robert Paris	33°04'25" 84°04'14"	810	H	Waller	1986	285	--	--	A	15	--	--
13Z001 Crystal Springs Park	33°09'24" 84°05'17"	765	H	Askew-Morris	1900	205	70	6	A	45	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Lamar County--Continued												
13Z002 J.F. Edwards	33°09'13" 84°06'24"	765	H	Virginia	1951	157	64	6	A	12	31	10- -51
13Z003 United Pentacostal Church	33°10'24" 84°05'02"	680	S	Waller	1979	260	80	6	F	40	--	--
13Z004 Jellystone Park	33°10'02" 84°02'34"	735	H	Virginia	1970	505	57	6	F	15	--	--
13Z005 Jellystone Park	33°10'10" 84°02'39"	770	S	Virginia	1970	455	52	6	F	45	--	--
13Z006 Billie Sue Bean	33°11'33" 84°07'08"	660	W	Askew-Morris	1986	105	--	--	C	50	--	--
Meriwether County												
07X001 Georgia Pacific Durand No. 1	32°54'55" 84°46'23"	820	H	Waller	1975	400	78	10	C	600	--	--
07X002 Georgia Pacific Durand No. 2	32°54'52" 84°46'22"	820	H	Waller	1975	475	88	10	C	700	--	--
07Y001 Georgia Forrest Commission Lookout Tower	33°01'49" 84°45'23"	970	H	--	1900	310	--	6	F	--	47.11	09-20-88
07Y002 Gerald Fowler (Bored Well)	33°05'42" 84°46'33"	91	0H	--	1900	36	36	22	A	--	25.13	09-15-88
07Y003 Gerald Fowler (Drilled Well)	33°05'43" 84°46'34"	905	H	Dixie Well	1986	400	75	--	A	4.5	26.04	09-15-88
07Y004 Second Street Training Center (Main)	33°03'09" 84°45'12"	870	S	--	1900	300	--	6	A	--	12.04	09-27-88
07Z011 William L. Hartley	33°08'38" 84°45'06"	930	H	Middle Georgia	1987	205	54	6	A	15	--	--
07Z012 City of Lone Oak	33°10'19" 84°49'00"	855	H	--	1900	--	--	--	A	--	--	--
07ZO10 W.L. Branham	33°13'18" 84°46'30"	890	S	Virginia	1973	150	47	6	C	30	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Meriwether County--Continued												
08W001 Doug Nelson	32°52'21" 84°38'20"	865	S	Middle Georgia	1986	125	19	6	C	70	14.79	09-20-88
08X001 G.S. Lawrence	32°58'09" 84°42'18"	906	H	Robinson	1958	196	35	6	F	8	39	01-01-58
08X002 Bud Phillips	32°57'08" 84°42'37"	860	S	Waller	1988	205	94	6	A	25	25.06	08-11-88
08X003 Charles Hudson No. 1	32°55'07" 84°38'05"	895	H	Middle Georgia	1987	305	39	6	C	1.5	14.34	09-13-88
08X004 Charles Hudson No. 2	32°55'12" 84°38'20"	900	H	--	1900	400	--	6	C	--	--	--
08X005 Robert Daniel	32°53'48" 84°38'05"	938	S	Middle Georgia	1987	205	205	6	C	24	--	--
08Y001 Mead (unused well)	33°07'01" 84°43'50"	845	H	Dixie Well	1900	--	--	8	A	--	98.3	09-01-88
08Y002 Mead (shallow well)	33°07'06" 84°43'49"	825	W	Dixie Well	1900	325	--	6	A	110	56.95	09-01-88
08Y003 Mead (deep well)	33°07'06" 84°43'49"	825	W	Dixie Well	1900	405	32	8	A	--	41.76	09-01-88
08Y004 Tidwell Nurseries	33°03'02" 84°44'01"	840	S	--	1900	--	--	6	A	--	49.62	09-15-88
08Y005 Tidwell Nurseries (Highway WE)	33°03'00" 84°44'05"	835	S	--	--	--	--	--	A	--	18.38	09-15-88
08Y006 City of Greenville No. 1	33°01'41" 84°42'08"	770	F	Dixie Well	1981	405	51	6	A	75	87.18	09-15-88
08Y007 City of Greenville No. 2	33°02'07" 84°42'41"	800	G	Champion	1982	--	--	6	A	90	33.09	09-15-88
08Y008 Second Street Training Center (Lake)	33°02'58" 84°44'59"	880	W	Virginia	1900	180	--	6	B	--	5.14	09-27-88
08Y009 Mead Coated Board (Highway)	33°02'50" 84°43'41"	850	H	--	--	--	--	--	F	--	33.35	09-2088
08Z001 Don Windom	33°09'28" 84°40'50"	900	H	Middle Georgia	1986	455	142	6	A	--	55.04	08-30-88

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Meriwether County--Continued												
08Z002 Robert H. Smith	33°08'40" 84°44'07"	865	S	Waller	1987	185	155	6	A	10	--	--
08Z003 Dennis Driver	33°09'12" 84°38'31"	930	H	Middle Georgia	1986	280	54	6	A	20	--	--
08Z004 John Barge	33°08'26" 84°41'26"	830	S	Middle Georgia	1987	155	46	6	A	35	--	--
08Z005 Calvin Kimbrough	33°09'22" 84°39'51"	910	H	Middle Georgia	1986	280	88	6	A	10	--	--
08Z006 Sewing Plant Well	33°11'47" 84°44'34"	910	H	--	--	--	--	--	A	--	36.49	09-20-88
08Z007 City of Luthersville	33°12'44" 84°44'38"	920	S	Virginia	1981	600	132	6	A	--	45.81	09-20-88
08Z008 Luthersville Methodist Church	33°12'46" 84°44'51"	938	S	Virginia	1951	184	118	6	A	8	30.	09- -51
08Z009 City of Luthersville	33°12'28" 84°44'48"	930	S	--	1900	--	--	6	A	--	29.04	09-20-88
09X001 Nabisco Plant Well No. 1	32°58'42" 84°35'01"	765	W	Virginia	1946	289	92	10	A	--	--	--
09Y001 Gay & Keith	33°05'19" 84°34'27"	800	H	Virginia	1925	98	58	6	A	55	15.0	10-20-60
09Y005 City of Gay, Georgia No. 2	33°05'51" 84°34'52"	825	S	Virginia	1988	385	75	6.25	A	100	21.90	09-20-88
09Y006 City of Gay, Georgia No. 1	33°05'47" 84°34'51"	810	S	Virginia	1988	605	100	6.25	A	38	16.13	09-20-88
09Y007 Ben Pugh	33°00'29" 84°37'04"	818	H	Waller	1982	205	90	6	F	15	25	1987
09Z001 Ronnie Heard	33°10'39" 84°34'58"	785	H	Middle Georgia	1987	430	34	6	F	20	66.03	08-30-88
09Z002 Mrs. Mable Garner	33°10'43" 84°37'26"	810	S	Middle Georgia	1986	280	56	6	A	8	28.95	08-30-88
09Z003 Terry Cawley	33°07'54" 84°35'22"	775	H	Middle Georgia	1987	305	119	6	A	7	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Meriwether County--Continued												
09Z004 A.K. McDonald (trailer park)	33°09'55" 84°32'19"	790	S	Waller	1986	445	54	6	F	5	44.48	09-22-88
09Z005 A.K. McDonald (bored well)	33°09'59" 84°32'19"	790	S	--	1900	26	26	26	F	--	18.46	09-22-88
09Z006 Guy Pope	33°10'20" 84°31'38"	755	S	Waller	1986	185	35	6	F	50	--	--
09Z007 Alvin Parks	33°08'56" 84°32'21"	760	S	Middle Georgia	1986	305	--	--	F	8	--	--
09Z008 F.H. Weaver	33°08'54" 84°35'24"	778	V	Virginia	1987	700	--	---	A	12	28.40	09-22-88
Pike County												
09Y003 David Heard	33°04'10" 84°31'19"	735	S	Waller	1988	385	84	6	F	4	28.49	06-29-88
09Y004 Barbara and Larry Scott	33°06'44" 84°30'06"	727	S	Middle Georgia	1987	255	--	--	F	10	17.89	07-19-88
10X002 King Mountain Fish Hatchery	32°59'51" 84°23'35"	890	S	Waller	1968	244	--	6	D	6	21.17	06-29-88
10X003 King Mountain Fish Hatchery	32°59'52" 84°23'23"	890	W	Waller	1970	250	--	6	H	--	-2.50	1970
10Y001 City of Molena No. 1	33°00'37" 84°30'00"	750	W	Virginia	1900	--	--	6	F	--	9.88	06-23-88
10Y002 City of Molena No. 2	33°00'37" 84°29'58"	740	W	Virginia	1900	--	--	6	F	--	14.66	06-23-88
10Y004 The Ceaders Golf Course	33°06'14" 84°23'13"	795	W	Waller	1981	165	74	6	C	125	26.25	06-21-88
10Y005 Daryl Winkler	33°01'31" 84°27'28"	765	S	Waller	1900	--	--	6	F	--	27.13	06-23-88
10Y006 Todd Pilkenton	33°00'22" 84°27'27"	760	H	Waller	1986	505	92	6	A	10	45.32	06-23-88

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Pike County--Continued												
10Y007 Tim Doolittle	33°00'03" 84°23'19"	1,000	S	Waller	1988	325	110	6	H	12	--	--
10Y008 Mr. Wayne Pilkinton	33°00'24" 84°27'26"	745	S	Waller	1986	205	60	6	A	40	15.20	06-23-88
10Y009 Home Nursery	33°06'22" 84°24'47"	860	S	Waller	1982	545	93	6	C	50	32.26	06-21-88
10Y010 Home Nursery	33°06'23" 84°25'00"	860	S	Waller	1988	485	93	6	C	25	38	05-20-81
10Y011 Home Nursery	33°06'18" 84°24'54"	770	S	Waller	1900	220	86	6	C	--	21.36	06-21-88
10Y012 Hardin deep well	33°03'57" 84°22'37"	845	S	--	--	220	--	--	C	--	29.20	07-26-88
10Y013 Gary Gene Bates	33°02'53" 84°23'53"	825	S	Middle Georgia	1987	--	115	6	C	15	--	--
10Z002 J.H. Gregg	33°09'50" 84°27'40"	844	S	Waller	1961	268	21	8	F	--	30	1961
10Z004 Peach State Airport	33°10'55" 84°22'31"	920	H	Waller	1900	--	--	36	C	--	29.07	06-21-88
10Z005 Eddie Gravitt	33°09'23" 84°25'15"	825	W	Waller	1987	145	95	6	F	20	--	--
10Z006 University of Georgia-Bledsole Farm Experiment Station	33°10'29" 84°24'26"	865	S	Virginia	1971	260	--	6	F	25	12.02	06-29-88
10Z007 C.E. Sword (Charno Farm)	33°10'25" 84°27'19"	840	S	Waller	1969	125	42	6	F	15	21.72	06-29-88
10Z008 Bill Amerson	33°11'21" 84°22'42"	905	H	Middle Georgia	1988	330	48	6	C	30	39.13	07-11-88
10Z009 James Eubanks (house)	33°09'41" 84°25'30"	850	S	Middle Georgia	1988	255	115	6	F	15	17.23	07-11-88
10Z010 Jackie and Pete Stevens	33°10'41" 84°25'08"	863	S	Middle Georgia	1988	230	43	6	F	--	20.05	07-11-88
10Z011 Mike Stephens	33°10'46" 84°25'07"	862	S	Middle Georgia	1987	205	--	--	F	22	31.25	07-11-88

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Pike County--Continued												
10Z012 Charles and Laurie Nichols	33°10'15" 84°24'32"	879	S	Middle Georgia	1986	155	76	6	F	15	--	--
10Z013 J.B. Malone	33°10'38" 84°24'55"	845	H	Middle Georgia	1987	230	70	6	F	14	--	--
10Z014 L.H. Gayton	33°07'32" 84°29'19"	800	H	Middle Georgia	1986	--	--	6	C	25	--	--
10Z015 Lowell and Reatha Gibson	33°07'58" 84°27'48"	805	S	Middle Georgia	1986	--	121	6	F	30	--	--
10Z016 Woodrow Gardner	33°08'00" 84°27'49"	819	S	--	1978	--	--	--	F	--	--	--
10Z017 Peter Denison	33°08'34" 84°23'03"	930	S	Middle Georgia	1986	--	115	6	C	8	--	--
10Z018 Gene Dabbs	33°07'32" 84°23'08"	850	S	Middle Georgia	1987	305	133	6	C	8	--	--
10Z019 Grover Anderson	33°11'39" 84°26'04"	798	S	Middle Georgia	1986	605	40	6	F	2.50	20.92	07-19-88
11Y001 City of Zebulon 1	33°06'06" 84°21'37"	765	S	Middle Georgia	1986	505	34	6	A	20	--	--
11Y002 City of Zebulon 2	33°06'03" 84°21'37"	765	S	Middle Georgia	1986	530	56	6	A	10	--	--
11Y003 City of Zebulon 3	33°06'05" 84°21'36"	770	S	Middle Georgia	1986	510	109	6	A	25	--	--
11Y004 City of Zebulon 4	33°06'08" 84°21'39"	750	S	Middle Georgia	1986	405	35	6	A	25	--	--
11Y005 City of Zebulon 5	33°06'04" 84°21'40"	740	S	Middle Georgia	1950	250	--	6	A	18	--	--
11Y006 Meansville, Georgia 2	33°02'56" 84°19'03"	810	H	Virginia	1978	300	161	6	A	--	5.61	06-21-88
11Y007 Meansville, Georgia (Depot)	33°02'55" 84°18'22"	790	H	Virginia	1900	360	--	6	A	--	19.68	06-21-88
11Y008 Pine Mountain Service Station	33°02'33" 84°20'36"	845	W	Waller	1986	205	110	6	A	30	20.30	06-22-88

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Pike County--Continued												
11Y009 Middle Georgia Nursery	33°02'23" 84°19'59"	870	H	Waller	1987	505	154	6	A	15	19.51	06-21-88
11Y010 Frank Kirby	33°04'58" 84°18'37"	821	S	Middle Georgia	1986	555	72	6	C	6	27.86	07-21-88
11Y011 John and Rita Towery	33°01'04" 84°19'50"	835	S	Middle Georgia	1986	230	110	6	D	15	23.41	07-26-88
11Y012 Walter E. Dunn No. 3	33°00'58" 84°20'50"	888	S	Middle Georgia	1988	255	100	6	H	30	59.89	07-26-88
11Y013 Walter E. Dunn No. 2	33°00'58" 84°20'51"	883	S	Middle Georgia	1980	--	--	--	H	7	--	--
11Y014 Walter E. Dunn No.1	33°00'59" 84°20'51"	881	S	--	1968	180	--	--	H	--	25.63	07-26-88
11Y015 Walter E. Dunn No. 4	33°01'00" 84°20'53"	870	S	Middle Georgia	1988	600	--	--	H	--	12.43	07-26-88
11Y016 Oscar Story	33°01'08" 84°20'45"	865	S	Middle Georgia	1986	467	160	6	D	50	--	--
11Z002 E. Sanders	33°11'12" 84°17'28"	840	S	Virginia	1961	119	67	6	A	3	19	09- -61
11Z003 Williamson Georgia 1	33°11'05" 84°21'40"	920	H	Virginia	1965	400	95	8	J	214	25	1965
11Z004 Mr. David Madden Smith, Jr.	33°08'23" 84°19'19"	865	W	Waller	1986	205	120	6	A	10	22.30	06-21-88
11Z006 Interstate Drilling Co.	33°10'31" 84°16'04"	840	W	Interstate	1981	395	60	6	C	--	28.90	06-22-88
11Z007 Pal-O-Mine Horse Farms	33°11'16" 84°21'11"	920	S	Askew-Morris	1987	305	--	6	J	--	12.64	06-22-88
11Z008 Peach State Airport	33°10'54" 84°22'29"	920	S	Waller	1983	745	107	6	C	3	95.85	06-21-88
11Z009 Blaine McElfresh	33°10'15" 84°18'25"	875	S	Waller	1987	285	34	6	A	50	40	12-21-87
11Z010 Bob Pelchat	33°10'35" 84°18'50"	910	H	Waller	1987	505	64	--	A	1.50	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
<u>Spalding County</u>												
11Z011 Whittaker	33°10'36" 84°19'16"	905	H	--	1983	200	--	--	A	--	38.87	07-21-88
11Z012 Phil Johnson	33°11'18" 84°18'04"	870	S	Middle Georgia	1987	230	37	6	A	--	--	--
10AA14 W.L. English	33°16'29" 84°24'36"	810	S	Waller	1983	425	38	--	D	--	--	--
10AA15 Floyd Comeaux	33°16'33" 84°24'41"	820	H	Waller	1983	265	45	--	D	12	32.36	10-11-88
10AA16 Joe Nix	33°16'44" 84°24'41"	820	H	Waller	1984	365	50	--	D	--	18.50	10-10-88
10AA17 Jim Compton	33°15'18" 84°23'56"	810	S	Askew-Morris	1978	285	91	6	D	--	--	--
10AA18 Ralph Josey	33°15'29" 84°24'09"	760	S	Waller	1988	205	70	--	D	25	33	08-29-88
10AA19 Charles Barton	33°15'47" 84°22'31"	860	S	Waller	1988	465	50	--	F	--	--	--
10AA20 George Danner	33°16'14" 84°23'33"	770	S	Waller	1984	345	88	--	D	8	--	--
10AA21 Helen Beck	33°19'02" 84°22'56"	785	S	Waller	1984	455	17	--	A	4	39.22	10-17-88
10AA22 Aubrey Carter	33°15'07" 84°26'56"	775	S	Waller	1985	305	70	6	F	10	--	--
10Z001 C.M. Anderson	33°14'29" 84°23'01"	845	S	Hill Brothers	1951	124	40	6	F	5	5	1951
10Z020 Maria Marrero	33°13'00" 84°22'35"	870	S	Waller	1985	305	--	--	F	50	--	--
10Z021 Lynda Pitillo	33°12'55" 84°23'02"	865	H	Waller	1986	305	37	--	F	6	--	--
10Z022 Edward J. Warden	33°12'12" 84°29'04"	755	S	Waller	1986	145	72	--	F	50	43.69	10-11-88
10Z023 Hanson Boyle	33°13'03" 84°22'32"	890	S	Waller	1986	265	46	--	F	5	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
<u>Spalding County--Continued</u>												
11AA01 University of Georgia Experiment Station	33°15'54" 84°16'56"	950	H	--	1943	30	--	--	A	--	--	--
11AA02 Georgia Jamboree	33°20'28" 84°17'51"	935	S	Copeland	1953	200	60	6	C	--	--	--
11AA05 Bobby Harris	33°17'03" 84°21'27"	805	S	Waller	1988	225	85	--	A	15	40.84	10-18-88
11AA06 Harvey Watkins	33°20'13" 84°19'05"	920	H	Waller	1986	445	90	6	A	12	--	--
11AA07 John Yates	33°19'06" 84°19'05"	860	S	Waller	1986	265	72	6	D	12	28.70	10-11-88
11AA08 Sewage Plant (Griffin)	33°15'30" 84°22'26"	760	S	Waller	1986	345	30	6	F	20	33.72	10-05-88
11AA09 Jimmy Jordan	33°18'10" 84°18'49"	860	S	Waller	1984	605	140	6	A	1.50	--	--
11AA10 James McPhearson	33°20'05" 84°20'29"	902	H	Waller	1985	265	21	6	D	10	--	--
11AA11 Eugene Roland	33°20'06" 84°19'50"	890	S	Waller	1983	260	49	6	A	25	--	--
11AA14 Randy Lomax	33°17'33" 84°22'29"	790	S	Waller	1988	205	56	6	E	50	--	--
11AA16 Carey Well No. 1	33°20'05" 84°19'04"	920	S	Waller	1969	344	--	6	A	--	34.55	10-13-88
11AA17 Carey Well No. 2	33°20'07" 84°19'04"	925	S	Waller	1970	164	--	6	A	--	36.83	10-13-88
11AA18 Carey Well No. 3	33°19'59" 84°18'56"	915	S	Waller	1988	505	--	6	A	3.50	28.08	10-13-88
11Z013 Joyce Steeley	33°12'57" 84°22'26"	840	W	Waller	1986	205	52	--	F	10	--	--
11Z014 Jack Prewitt	33°13'10" 84°22'30"	890	H	Waller	1986	285	70	6	F	15	--	--
11Z015 Rudy Ledbetter	33°13'01" 84°22'26"	860	S	Waller	1986	205	92	6	F	7.50	--	--
11Z016 Andrew Buchanan	33°13'11" 84°21'51"	910	H	Waller	1984	205	17	--	F	20	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Spalding County--Continued												
11Z017 Thomas Slagle	33°13'02" 84°21'10"	910	S	Waller	1983	365	58	--	F	40	52.83	10-11-88
12AA02 Arnold McIntire	33°16'40" 84°13'00"	799	W	Waller	1983	130	24	---	A	100	--	--
12AA03 Douglas Penley	33°16'39" 84°09'47"	730	W	Waller	1983	230	90	--	A	30	60	05-09-83
12AA04 Elaine Boyd	33°16'42" 84°09'48"	740	S	Waller	1986	305	80	--	A	7	--	--
12AA05 Vernon Payne	33°16'51" 84°11'33"	775	W	Waller	1988	225	20	6	H	5	27.86	10- -88
12AA06 Donnie Sanders	33°16'49" 84°11'00"	765	S	Waller	1985	245	40	6	H	20	20.43	10-13-88
12AA07 Hugh W. Richmond	33°16'34" 84°10'52"	760	S	Waller	1982	485	48	6	A	3	22.82	1988
12AA08 Henery Sims	33°19'01" 84°09'53"	695	S	Waller	1983	385	35	--	A	--	--	--
12AA09 Carey Sampler	33°18'31" 84°13'05"	720	S	Waller	1983	180	23	--	A	10	--	--
12AA10 Tom Landrum No 1	33°17'43" 84°09'32"	775	H	Waller	1986	205	89	6	A	40	23.49	11-02-88
12AA11 Tom Landrum No. 2	33°17'44" 84°09'31"	775	H	Waller	--	650	--	--	A	--	25.91	11-02-88
12AA12 Mrs. McCrarry	33°16'01" 84°10'04"	750	S	Waller	1988	445	23	--	A	5	--	--
12Z002 R.H. Swint	33°11'09" 84°12'37"	870	H	Virginia	1946	360	125	8	A	17	20	01-17-63
12Z007 Donald Woods	33°11'44" 84°13'23"	815	S	Waller	1984	425	132	--	C	3	43.10	10-13-88
12Z008 Ray Cody	33°11'44" 84°13'26"	815	S	Waller	1984	425	155	--	C	--	38.01	10-13-88
12Z009 Victor Turner	33°10'49" 84°08'05"	720	S	Waller	1983	265	53	--	A	5	25.17	10-13-88
12Z010 Pat Bethune	33°11'56" 84°08'19"	730	W	Waller	1985	205	53	--	H	10	--	--

APPENDIX A.--*Record of wells–Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Spalding County--Continued												
12Z011 D.W. Brown	33°13'04" 84°10'09"	800	S	Waller	1985	185	--	6	H	24	46.80	10-31-88
12Z012 Fred Eckhardt	33°13'25" 84°09'43"	750	S	Waller	1983	545	153	6	H	5	--	--
13AA07 Roger Rowe	33°17'21" 84°07'00"	750	H	Waller	1986	225	57	--	A	30	--	--
13Z007 I.S. Bailey	33°14'52" 84°07'19"	740	H	Virginia	1967	180	66	6	A	--	25	11-02-88
Talbot County												
08W002 Oak Mountain Well No. 1	32°45'44" 84°41'20"	980	H	Virginia	1900	250	--	6	D		22.22	11-03-88
08W003 Oak Mountain Well No. 1a	32°45'43" 84°41'20"	980	H	--	--	--	--	--	D	--	--	--
08W004 Oak Mountain Well No. 1b	32°45'43" 84°41'19"	1,000	H	--	--	--	--	--	D	--	10.56	11-03-88
08W005 Oak Mountain Well No. 2	32°45'33" 84°41'25"	835	W	--	--	250	--	--	H	80	34.16	11-03-88
09U001 Geneva School 2	32°34'26" 84°34'04"	570	H	Layne-Atlantic	1954	9	--	--	K	--	77.90	01-27-1975
09U003 M.M. Cook & Son	32°34'33" 84°32'02"	553.50	S	Barence	1946	84	81	6	K	--	30	01-01-61
09U004 Talbot County Well No. 2	32°32'14" 84°35'04"	485	S	Bonanza	1987	--	--	--	K	--	--	--
09U005 Talbot County Well No. 1	32°31'31" 84°35'42"	380	S	Bonanza	1900	--	--	--	K	--	74.48	10-26-88
09U006 Talbot County Well No. 3	32°32'32" 84°34'13"	455	W	--	--	--	--	--	K	--	99.45	10-26-88
09U007 Geneva, Georgia No. 1	32°34'26" 84°34'03"	570	H	Virginia	1975	132	--	6	K	38	73.69	10-24-88

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Talbot County-Continued												
09V001 Talbotton, Georgia 2	32°40'34" 84°32'54"	710	H	Adams-Massey	1948	547	140	6	D	37	80	10- -58
09V003 Talbotton, Georgia 3	32°40'38" 84°32'55"	665	S	Adams-Massey	1958	04	315	140	D	25	22.87	10-20-88
09V004 Talbotton, Georgia 4	32°40'41" 84°32'42"	685	S	--	1900	190	--	6	D	20	21.61	10-20-88
09V005 George Jordan	32°41'27" 84°34'51"	600	S	Greene	1987	425	92	6	A	4	26.87	11-01-87
09V006 Mrs. Houston Payne	32°39'42" 84°36'10"	645	S	Middle Georgia	1981	205	--	6	A	10	30.23	10-26-88
09V007 City of Talbotton No. 7	32°40'48" 84°33'44"	590	S	--	--	505	--	--	A	59	33.87	10-20-88
09V008 Roger Montgomery	32°40'23" 84°37'05"	650	S	Bonanza	1986	80	40	4	A	5	26.48	11-03-88
09V009 Jordon Farms (drilled)	32°38'30" 84°32'45"	790	S	--	--	--	--	--	D	--	38.74	11-01-88
09V010 Jordon Farms (bored well)	32°38'30" 84°32'45"	790	S	--	--	--	--	--	D	--	45.30	11-01-88
09W001 Woodland, Georgia	32°47'22" 84°33'39"	777	H	Virginia	1936	270	44	8	D	30	16	01- -36
09W002 Woodland, Georgia (1956)	32°47'24" 84°33'39"	840	H	Virginia	1956	500	130	8	D	--	156.38	11-01-88
09W003 Woodland, Georgia 1	32°47'24" 84°33'36"	840	H	Virginia	1961	500	130	8	D	60	162.15	11-01-88
09W004 Woodland, Georgia (New No. 2)	32°47'07" 84°33'31"	750	H	Virginia	1900	--	--	--	H	--	32.69	11-01-88
09W005 J. Humphries	32°47'07" 84°31'32"	720	S	Waller	1984	180	120	6	A	50	--	--
09W006 Shirley Pike	32°48'59" 84°34'50"	765	S	Middle Georgia	1988	305	116	6	D	6	32.78	11-01-88
10U004 Junction City No. 1	32°36'10" 84°27'41"	690	H	Virginia	1974	600	267	6	K	60	155	07-29-74

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Talbot County--Continued												
10U005 Junction City No. 2	32°35'59" 84°27'30"	595	S	Virginia	1984	600	--	6	K	20	--	--
10U006 Junction City (unused)	32°36'12" 84°27'42"	675	S	Virginia	1974	500	252	6	K	60	257.58	11-03-88
10V001 George T. New	32°38'32" 84°27'30"	740	S	Middle Georgia	1983	405	87	6	D	8	21.15	11-01-88
11V001 Mr. Bickley	32°42'46" 84°21'33"	530	S	Middle Georgia	1968	67	672	6	D	--	18.43	11-03-88
Upson County												
10W001 William Gibby (former)	32°51'56" 84°25'19"	730	H	Waller	1986	465	64	6	B	30	17.20	09-06-88
10X004 Steve Collins	32°55'20" 84°24'55"	800	H	Waller	1988	165	92	6	A	50	19.89	08-25-88
10X005 Ken Hand	32°55'57" 84°24'33"	305	F	Waller	1986	305	245	6	H	30	--	--
10X006 Mrs. Doris Wood	32°54'12" 84°24'27"	765	S	--	1900	--	--	6	A	--	25.29	06-23-88
10X007 John Rievierre	32°55'26" 84°25'35"	865	S	Middle Georgia	1987	200	180	6	A	20	14.38	09-06-88
10X008 Henry Taunton	32°57'19" 84°26'02"	1,010	S	Middle Georgia	1985	155	117	6	H	20	--	--
10X009 Sunset Village Well	32°54'49" 84°25'42"	805	S	--	--	--	--	--	A	--	--	--
11W001 James Watson	32°49'36" 84°18'30"	645	H	Waller	1986	205	60	6	A	3	--	--
11W002 Hester Boyt	32°50'11" 84°15'08"	610	H	--	1961	160	--	6	A	--	--	--
11W003 Ronnie Linda Riggins	32°50'01" 84°15'06"	570	H	Middle Georgia	1986	165	39	6	G	20	--	--
11X001 Charles Maddox	32°54'02" 84°15'26"	745	H	Middle Georgia	1988	480	45	6	B	90	100.95	08-25-88
11X002 Robert Strickland	32°55'33" 84°19'22"	690	S	Middle Georgia	1988	155	43	6	A	25	--	--

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Upson County--Continued												
11X003 Wallace Joiner	32°59'14" 84°19'03"	782	S	Virginia	1988	600	60	6	A	8.50	22.60	08-23-88
11X004 Paul Ruffin	32°58'01" 84°22'00"	760	W	Waller	1986	625	30	6	A	2.50	--	--
11X005 Robert E. Trice	32°54'04" 84°16'52"	682	S	Middle Georgia	1986	250	120	6	B	20	--	--
11X006 C.O. Huckaby	32°58'43" 84°18'54"	710	S	Waller	1986	205	70	6	A	10	--	--
11X007 John Hortman	32°56'15" 84°17'24"	750	S	Waller	1986	505	55	6	B	6	--	--
11X008 Elmer Jones	32°57'24" 84°19'40"	810	H	Waller	1986	145	53	6	A	25	--	--
11X009 John Radcliff	32°57'28" 84°19'42"	810	H	Middle Georgia	1987	305	86	6	A	20	49.40	08-23-88
11X010 Bait and Tackle Shop	32°52'33" 84°21'35"	750	H	Middle Georgia	1988	205	45	6	B	15	61.93	08-11-88
11X011 Grande Mondi Subdivision	32°56'15" 84°22'00"	755	S	Waller	1988	485	20	6	A	3	25.13	08-12-88
12V002 J.V. Dean	32°44'29" 84°13'09"	467	S	Virginia	1936	390	47	6	D	--	75	1936
12W001 Earnest Wilder	32°45'22" 84°12'54"	460	S	Middle Georgia	1986	355	25	6	D	35	--	--
12X001 Yatesville, Georgia	32°54'28" 84°08'54"	761	H	Virginia	1959	204	59	6	B	90	--	--
12X002 Yatesville School	32°54'38" 84°08'52"	771	W	Virginia	1954	175	30	6	B	90	--	--
12X006 Resthaven Poultry Farm	32°55'56" 84°11'10"	750	W	Waller	1987	225	40	6	B	75	14.84	08-25-88
12X007 Rockridge Poultry No. 1	32°54'56" 84°12'44"	650	S	Waller	1979	--	--	--	B	--	51.20	08-25-88
12X008 Rockridge Poultry No. 3	32°54'48" 84°12'36"	690	S	Waller	1988	325	70	6	B	15	24.70	08-25-88

APPENDIX A.--*Record of wells--Continued*

[gal/min, gallons per minute. Topographic setting: F, flat; H, hilltop; S, hillside; V, valley; W, upland draw. --, no data. Hydrogeologic units are defined at the end of table]

Well number and name	Latitude and longitude	Altitude of land surface (feet)	Topo-graphic setting	Driller	Year drilled	Depth of well (feet)	Casing depth (feet)	Casing diameter (feet)	Hydro-geologic unit	Yield (gal/min)	Water level (feet)	Date measured
Upson County--Continued												
12X009 Rockridge Poultry No. 2	32°55'01" 84°12'13"	725	H	Waller	1987	445	28	6	B	4	--	--
12X010 Strickland Poultry No. 1	32°55'07" 84°11'56"	745	H	Waller	1980	355	--	--	B	20	54.12	08-25-88
12X011 Strickland Poultry No. 2	32°55'09" 84°11'49"	735	H	Waller	1980	455	--	--	B	3	22.86	08-25-88
12X012 Copeland Milner	32°59'22" 84°07'55"	805	H	Virginia	1961	112	25	6	B	1.50	--	--
12X013 Charles E. Fitch	32°57'24" 84°08'56"	760	H	Waller	1987	265	96	6	B	30	27.04	08-31-88

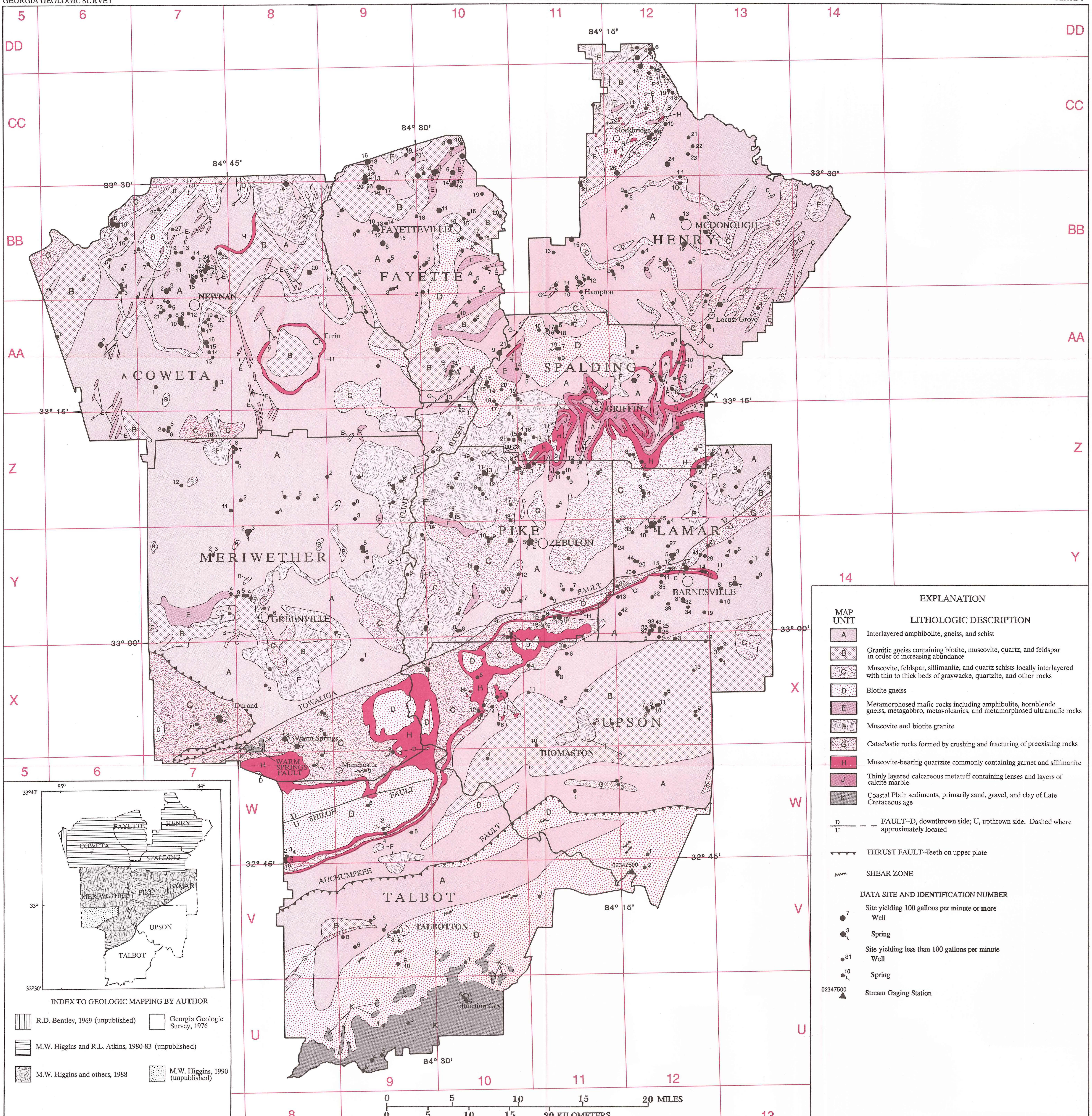
Hydrogeologic units

[modified from Cressler and others, 1983]

Unit	Lithologic description
A	Interlayered amphibolite, gneiss, and schist.
B	Granitic gneiss containing biotite, muscovite, quartz, and feldspar in order of increasing abundance.
C	Muscovite, feldspar, sillimanite, and quartz schists locally interlayered with thin to thick beds of graywacke, quartzite, and other rocks.
D	Biotite gneiss.
E	Metamorphosed maphic rocks including amphibolite, hornblende gneiss, metagabbro, metavolcanics, and metamorphosed ultramafic rocks.
F	Muscovite and biotite granite.
G	Cataclastic rocks formed by crushing and fracturing of preexisting rocks.
H	Muscovite-geologic quartzite commonly containing garnet and sillimanite.
J	Thinly layered calcareous metatuff containing lenses and layers of calcite marble.
K	Coastal Plain sediments, primarilly sand, gravel, and clay of Late Cretaceous age.

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
GEORGIA GEOLOGIC SURVEY

Prepared in cooperation with the
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
U.S. ARMY CORPS OF ENGINEERS



Cartography by Barbara J. Milby

HYDROGEOLOGIC UNITS AND LOCATIONS OF WELLS AND SPRINGS IN THE SOUTH METROPOLITAN ATLANTA REGION, GEORGIA

Table 7.--*Physical and chemical characteristics of ground water*

[Analyses by U.S. Geological Survey, except where noted. Constituent concentration: T, total; D, Dissolved. Constituents: SiO_2, Silica; Ca, Calcium; Mg, Magnesium; Na, Sodium; K, Potassium; HCO_3, Bicarbonate; $CaCO_3$, Calcium carbonate; SO_4, Sulfate; Cl, Chloride; F, Fluoride; NO_3, Nitrate; CO_2, Carbon dioxide; Fe, iron; Mn, Manganese; Sr, Strontium. --, No data available. ND, Not detected]

Site number	Date sampled	SiO_2 T (mg/L)	SiO_2 D (mg/L)	Ca T (mg/L)	Ca D (mg/L)	Mg T (mg/L)	Mg D (mg/L)	Na T (mg/L)	Na D (mg/L)	K T (mg/L)	K D (mg/L)	HCO_3 D (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	SO_4 D (mg/L)	Cl D (mg/L)	F T (mg/L)	F D (mg/L)	NO_3 T (mg/L)	NO_3 D (mg/L)	CO_2 D (mg/L)	Fe T (µg/L)	Fe D (µg/L)	Mn T (µg/L)	Mn D (µg/L)	Sr T (µg/L)	Sr D (µg/L)	Dissolved Solids (mg/L) Residue at 180°C	Hardness as $CaCO_3$ (mg/L) Total	Hardness as $CaCO_3$ (mg/L) Non-carbonate	Specific con-ductance	pH (units)	Temper-ature in degrees Celsius	Color in platinum cobalt units
Coweta County																																	
06BB16	11/20/64	-	36	-	3.2	-	0.2	-	6.4	-	1.3	37	30	ND	1.4	-	ND	-	1.2	12	200	-	-	-	-	-	-	9	ND	76	6.7	16.5	-
07BB24	02/23/62	-	34	-	5.6	-	1.5	-	5	-	1.8	36	30	0.4	1.5	-	ND	-	0.32	5.8	-	-	-	-	-	-	68	20	ND	61	7	18	2
08CC04	03/03/66	-	9.9	-	1.6	-	.6	-	1.5	-	1.2	13	11	ND	1.2	-	ND	-	.36	8.3	-	-	-	-	-	-	-	6	ND	30	6.4	-	0
09AA01	10/21/58	-	32	-	24	-	4.4	-	11	-	2.8	44	36	13	25	-	0.1	-	4.3	22	-	-	-	-	-	-	182	78	42	236	6.5	18.5	3
Fayette County																																	
09BB02	06/12/72	-	38	-	5.2	-	1.1	-	6.4	-	1.3	32	26	.8	1.2	-	.1	0.41	-	13	-	30	-	ND	-	200	72	18	ND	65	6.6	17.5	0
10AA01	12/02/64	-	39	-	8.8	-	5.4	-	4.6	-	0.8	57	47	.2	2.5	-	ND	-	1	14	-	-	-	-	-	-	-	44	ND	112	6.8	15.5	-
10AA23	01/18/63	-	14	-	6.8	-	.5	-	1.2	-	1.6	20	16	5.2	2	-	.2	-	ND	10	-	-	-	-	-	-	38	19	2	53	6.5	20.5	0
Henry County																																	
[1]11BB11	08/27/86	-	-	11.9	-	4.8	-	7.4	-	1.5	-	-	-	6	2.5	-	-	-	-	-	65	-	-	-	66	-	-	-	-	[2]148	6.7	-	-
12BB12	06/07/72	-	9.8	-	3.8	-	1.2	-	16	-	1.9	34	28	7.2	5	-	.1	2	-	2.7	-	10	-	ND	-	100	64	15	ND	110	7.3	19.5	0
12BB13	10/14/58	-	22	-	18	-	2.4	-	7.6	-	1.5	52	43	20	3.5	-	.4	-	.36	8.3	-	-	-	-	-	-	98	55	ND	146	7	21.5	2
Lamar County																																	
[1]12X003	02/19/86	40.6	-	20.7	-	1.2	-	13.3	-	2.5	-	[2]90.3	74.5	<2	2	0.7	-	-	-	-	26	-	18	-	80	-	120	-	-	[2]194	7.85	18.7	-
[1]12X004	02/10/86	19.2	-	5.9	-	0.7	-	3	-	1.4	-	[2]43.9	35.9	3	1.9	.1	-	-	-	-	43	-	14	-	16	-	52	-	-	[2]88	6.76	17.1	-
12Y001	10/22/58	-	48	-	8.4	-	2.2	-	11	-	3	41	34	11	9.5	-	.3	-	.02	26	-	-	-	-	-	-	116	30	ND	[2]127	6.4	-	5
[1]12Y010	01/16/86	35.3	-	15.6	-	.8	-	10.9	-	1.1	-	[2]61	50	4	4.5	2.9	-	-	-	-	<10	-	29	-	39	-	100	-	-	-	-	-	-
[1]12Y011	01/30/86	46.6	-	4.1	-	.5	-	4.7	-	2	-	[2]29.3	24	<2	4	.3	-	-	-	-	43,200	-	71	-	22	-	168	-	-	[2]88	6.65	18.4	-
[1]12Y013	01/30/86	31.2	-	17.1	-	1.1	-	14.4	-	1.2	-	[2]73.2	89.2	4	10	.9	-	-	-	-	<10	-	22	-	42	-	116	-	-	[2]195	7.48	17.7	-
[1]12Y018	02/19/86	12.3	-	2	-	1.9	-	3.8	-	3.8	-	[2]68.3	83.2	<2	7	<.1	-	-	-	-	<10	-	57	-	28	-	56	-	-	[2]88	5.04	18	-
[1]12Y020	02/19/86	13.9	-	1.1	-	.6	-	2.3	-	1.1	-	[2]7.3	8.9	7	3	<.1	-	-	-	-	25	-	11	-	10	-	32	-	-	[2]42	5.8	17.7	-
[1]12Y021	03/06/86	35.7	-	22.9	-	2.2	-	11	-	1.4	-	[2]105	128	6	2	2.9	-	-	-	-	<10	-	10	-	95	-	128	-	-	[2]190	8.31	16.8	-
[1]12Y024	02/19/86	28.9	-	5	-	1	-	5.4	-	1.8	-	[2]26.8	32.6	5	3	.2	-	-	-	-	22	-	<10	-	31	-	72	-	-	[2]75	6.85	18.5	-
[1]12Y027	01/30/86	43.4	-	13.9	-	2	-	8.5	-	2.3	-	[2]68.3	56	7	2.5	.6	-	-	-	-	1,120	-	78	-	70	-	104	-	-	[2]145	7.12	16.6	-
[1]12Y028	01/16/86	40.8	-	8.8	-	2	-	6.8	-	3	-	[2]48.8	59.5	4	4	1.4	-	-	-	-	195	-	<10	-	37	-	80	-	-	[2]118	7.25	17.4	-
[1]12Y030	01/30/86	12	-	7.6	-	4.3	-	1.2	-	1.4	-	[2]48.8	59.5	<2	2	<.1	-	-	-	-	165	-	<10	-	13	-	56	-	-	[2]105	6.47	17.4	-
[1]12Y031	01/30/86	38.5	-	18.2	-	2.8	-	8.8	-	1.6	-	[2]73.2	60	9	2.5	.7	-	-	-	-	105	-	35	-	75	-	108	-	-	[2]178	7.79	18.9	-
[1]12Y032	01/30/86	35.7	-	4	-	1.2	-	4.7	-	1.8	-	[2]19.5	15.9	2	3	.3	-	-	-	-	720	-	14	-	16	-	64	-	-	[2]85	7.7	17.1	-
[1]12Y033	01/16/86	56.2	-	7.9	-	1.2	-	8.3	-	2	-	[2]51.2	-	13	3	.5	-	-	-	-	2,850	-	76	-	35	-	108	-	-	[2]125	6.66	17.2	-
[1]12Y035	01/16/86	38.3	-	3	-	1.7	-	7.8	-	2.6	-	[2]78.1	64	4	3	.2	-	-	-	-	1,930	-	17	-	48	-	96	-	-	[2]153	7.63	17.7	-
[1]12Y039	02/10/86	30.1	-	16.8	-	.5	-	12.7	-	1.7	-	[2]80.5	66	5	2.4	.7	-	-	-	-	48	-	<10	-	93	-	96	-	-	[2]150	8.26	17.5	-
[1]12Y040	02/10/86	15.7	-	2.2	-	.5	-	2.8	-	2.2	-	[2]9.8	8	3	3.4	<.1	-	-	-	-	95	-	<10	-	18	-	32	-	-	[2]47	5.71	17.6	-
13X001	01/17/62	-	17	-	0.8	-	.2	-	1.6	-	2.7	9	7	.4	.2	-	.3	-	.29	14	-	-	-	-	-	-	26	-	-	25	6	16.5	.0
13Y001	02/19/86	31.2	-	1.7	-	1.8	-	4.9	-	2.9	-	14.6	11.9	10	3	.2	-	-	-	-	78	-	<10	-	35	-	68	-	-	[2]90	6.15	17.8	-
13Y009	01/16/86	44.9	-	4.1	-	1	-	6.1	-	1.6	-	[2]24.4	20	4	3	.4	-	-	-	-	95	-	<10	-	<10	-	76	-	-	[2]77	6.45	17.9	-
13Y010	02/10/86	30.1	-	1.2	-	3	-	3.2	-	2.7	-	[2]14.6	11.9	3	1.9	.1	-	-	-	-	600	-	<10	-	<10	-	44	-	-	[2]69	6.2	17.6	-
Meriwether County																																	
08X001	11/20/64	-	25	-	27	-	.4	-	16	-	1.6	116	95	6.4	2.3	-	.6	-	.02	2.3	-	-	-	-	-	-	-	69	ND	205	7.9	16.5	-
[3]08Y006	08/31/81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	400	-	-	-	8.2	-	-
[1]08Z007	08/27/86	-	-	7.2	-	2.3	-	9.6	-	2.7	-	-	-	15	10	-	-	-	-	-	2,700	-	56	-	92	-	-	-	-	[2]111	6.5	-	-
[1]09X001	08/27/86	-	-	11.4	-	2.7	-	13.2	-	3.4	-	-	-	9	12.5	-	-	-	-	-	22	-	-	-	82	-	-	-	-	[2]155	6.4	-	-
09Y001	10/20/60	-	34	-	6	-	1.1	-	6.3	-	1.4	32	26	ND	3	-	.1	-	0.88	20	-	-	-	-	-	-	87	20	ND	68	6.4	18.5	9
[4]09Y005	04/21/88	-	-	-	-	-	-	5.7	-	-	-	-	[2]16	-	1.9	<.2	-	1.1	-	-	<40	-	<20	-	-	-	86	10	-	-	6.8	-	<5
[4]09Y006	03/03/88	-	-	-	-	-	-	7.2	-	-	-	-	[2]25	-	2.9	1.4	-	<.3	-	-	100	-	<20	-	-	-	110	24	-	-	6.5	-	<5
Pike County																																	
10Z002	01/25/65	-	9.7	-	4	-	1.9	-	6.9	-	1.4	5	4	.8	7.2	-	.2	-	5	8	-	-	-	-	-	-	-	18	14	81	6	18	5
11Z002	01/17/63	-	28	-	2.8	-	.2	-	7.6	-	1	24	26	.4	2.2	-	.1	-	.81	6.1	-	-	-	-	-	-	51	8	ND	55	6.8	-	0
11Z003	06/13/72	-	40	-	7.5	-	1.7	-	4.7	-	2.8	32	20	13	1.8	-	.5	ND	-	10	-	4,100	-	190	-	120	91	26	ND	95	6.7	19.5	-
Spalding County																																	
10Z001	01/25/65	-	43	-	12	-	1.2	-	9	-	3.5	62	51	ND	2.5	-	.2	-	.47	9.9	-	-	-	-	-	-	-	35	ND	114	7	15	5
11AA02	10/21/58	-	24	-	3.2	-	.6	-	3.1	-	1.1	21	17	ND	1.8	-	ND	-	.5	13	-	-	-	-	-	-	49	10	ND	45	6.4	-	3
12Z002	01/17/63	-	24	-	6	-	2.2	-	3.5	-	1.7	32	26	3.2	2.2	-	.1	-	.27	16	-	-	-	-	-	-	56	24	ND	69	6.5	18	0
Talbot County																																	
[1]08W002	03/10/86	-	-	0.8	-	.3	-	1.2	-	1.7	-	-	-	2	2	-	-	-	-	-	1,270	-	24	-	-	-	-	-	-	[2]19	[2]4.8	-	-
09U003	10/19/60	-	15	-	1	-	.1	-	2.3	-	1.9	5	4	.4	4.5	-	ND	-	ND	50	-	-	-	-	-	-	39	3	ND	26	5.2	19	11
09V001	10/21/58	-	36	-	45	-	12	-	9.9	-	2.6	130	107	4	33	-	.1	-	5.4	10	-	-	-	-	-	-	260	162	56	393	7.3	19.5	3
09W001	05/02/66	-	33	-	23	-	2.1	-	9	-	1.9	94	77	3.2	2	-	.2	-	ND	12	-	-	-	-	-	-	-	66	ND	156	7.1	-	5
Upson County																																	
[1]10X009	08/27/86	-	-	.6	-	.2	-	1.5	-	1.6	-	-	-	-	2	-	-	-	-	-	11	-	-	-	-	-	-	-	-	[2]18	[2]5.3	-	-
12V002	01/10/63	-	68	-	8.8	-	1.5	-	17	-	.8	50	41	.8	16	-	.2	-	1.3	32	-	-	-	-	-	-	141	28	ND	135	6.4	-	.0
12X001	06/13/72	-	11	-	1.8	-	1.1	-	6.5	-	2.4	5	4	.8	6	-	.1	3.2	-	25	-	10	-	30	-	180	51	0.9	5	65	5.5	19	.0
12X002	10/22/58	-	42	-	14	-	2.2	-	7.6	-	1.9	64	52	8	4	-	.3	-	0.07	10	-	-	-	-	-	-	119	44	ND	135	7	-	4

1/ Analysis by Georgia Department of Natural Resources, Environmental Protection Division, Atlanta, Ga.
2/ Laboratory measurement.
3/ Analysis by Chem-Am, Inc., LaGrange, Ga.
4/ Analysis by Law and Company, Tucker, Ga.