GROUND-WATER QUALITY AND AVAILABILITY IN GEORGIA FOR 1986

by

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GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
GEORGIA GEOLOGIC SURVEY

CIRCULAR 12C

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INTRODUCTION

PURPOSE

This circular is the third of a continuing series of annual summaries of ground-water quality and availability in the State, to be used by the Georgia Environmental Protection Division (EPD) to direct its ground-water management activities. EPD is the principal State agency responsible for management of ground-water quality and allocation. These management activities include issuing permits for large ground-water withdrawals, wastewater discharges, sanitary landfills, and facilities that treat, store, and/or dispose of hazardous materials, as well as monitoring potential sources of ground-water pollution and ambient ground-water conditions.

For this report, ground-water quality data were derived from the State's Ground-Water Monitoring Network, maintained by the Georgia Geologic Survey Branch of EPD. Ground-water use data were taken from the State's Water Use Program, a cooperative project of the Georgia Geologic Survey and the U.S. Geological Survey. This summary was prepared through the Georgia Ground-Water Management Program, a project of EPD, funded in part by a grant from the U.S. Environmental Protection Agency to coordinate ground-water related management activities throughout the State.

Ground-water levels are monitored through a cooperative project of the Georgia Geologic Survey and the U.S. Geological Survey. Water level trends are summarized annually as Open-File Reports of the U.S. Geological Survey.

HYDROGEOLOGIC PROVINCES OF GEORGIA

Three hydrogeologic provinces, defined by general properties of the outcrop geology, occur within the State: the Coastal Plain Province of south Georgia, the Piedmont/Blue Ridge Province occupying most of north Georgia, and the Valley and Ridge/Cumberland Plateau Province of northwest Georgia. Ground-water flow in the Coastal Plain Province is primarily controlled by the connected intergranular pores of the host rocks and solution enlarged voids. In the Piedmont/Blue Ridge Province, joints and fractures are the primary controls of ground-water flow. Permeable features of the Valley and Ridge/Cumberland Plateau Province are principally joints, fractures, and solution voids but intergranular porosities are also important.

Georgia's Coastal Plain Province is underlain by a wedge of loosely consolidated sediments that gently dip and thicken to the south and east. The oldest outcropping sedimentary formations (Cretaceous age) are exposed along the Fall Line, the northern limit of the Coastal Plain Province. Successively younger formations occur at the surface to the south and east. Ground-water flow generally follows the direction of dip of the formations.

Horizontal and vertical changes in lithology and ground-water quality limit the extent of aquifers in the Coastal Plain Province. Most recharge occurs in the outcrop areas of permeable rock units. Where the units are overlain by impermeable layers in down-dip areas (to the south and east), aquifer systems become confined. Seven general, confined aquifer systems are present. The Cretaceous and Jacksonian aquifer systems (primarily sands) are used within a 35-mile wide band that lies adjacent to the Fall Line. Southwest Georgia relies on three vertically stacked aquifers (sands and limestones) for

drinking-water supplies: the Providence, Clayton, and Claiborne aquifer systems. A large area of south-central and southeast Georgia is served by the Floridan aquifer system (mainly limestone). The Miocene aquifer system (sands and limestones) is the principal 'shallow' unconfined aquifer system occurring in the broad area underlain by the Floridan aquifer system. It becomes confined in the coastal counties and locally in the Grady-Thomas-Brooks-Lowndes Counties area.

Crystalline rocks of metamorphic and igneous origin (primarily of Paleozoic age) occur in the Piedmont/Blue Ridge Province. The principal water-bearing features are rock joints and fractures and soil/saprolite horizons. Thick soils and saprolites are often important as the 'reservoir' to the ground-water systems. General ground-water flow is directed from local highlands towards discharge areas along streams. However, during prolonged dry periods or in the vicinity of heavy pumpage, ground-water flow directions may be reversed in the lower areas of a basin.

The Valley and Ridge/Cumberland Plateau Province is underlain by consolidated sedimentary formations of Paleozoic age. Dolostones and limestones of the Knox Group, where they occur in the axes of broad valleys, are the principal aquifers. Ground-water and surface-water systems are locally closely interconnected. However, the greater permeabilities of these thick carbonate sections permit development of larger aquifer systems than in the Piedmont/Blue Ridge Province.

GROUND-WATER OCCURRENCE

Ground-water quality is suitable for domestic use throughout the State. Iron and manganese are the only common contaminants that occur in concentrations exceeding drinking water standards in ground waters that are being used for consumption. These two naturally occurring materials are readily removed during the treatment process.

No areally extensive occurrences of polluted or excessively contaminated ground waters are known from north Georgia. Waters containing high total dissolved solids levels (salt water) are present in the deepest aquifers underlying most of south Georgia and the Floridan aquifer system along the coast. Shallower aquifers, with acceptable water quality, are present almost everywhere.

Both ground-water quality and availability are restricted in the Gulf Trough area of south Georgia. The Gulf Trough is a linear hydrogeologic anomaly that extends from southwest Decatur County through north Tattnall County. Naturally occurring ground-water contaminants associated with the Gulf Trough include barium, total dissolved solids, and radionuclides. These contaminants can be eliminated from drinking water by proper well construction (i.e. casing off certain geologic horizons) or treatment.

EPD has identified two critical use areas in which increased withdrawals could affect ground-water quality in the south Georgia Coastal Plain. Further withdrawals for agricultural irrigation in the Dougherty Plain and adjacent Sand Hills area of southwest Georgia will potentially increase hydraulic gradients through the vadose zone. Agricultural chemicals may not be effectively attenuated because of increased ground-water flow rates. Ground-water withdrawals for municipal and industrial use in the coastal counties locally have created large cones

of depression in the potentiometric surface of the Floridan aquifer system. These cones of depression increase the potential for contamination from deeply buried brines as well as ocean water. Both areas are being closely monitored by EPD, each having a dense network of monitoring wells. Ground-water quality monitoring by EPD in the Dougherty Plain has not detected any traces of pesticides. Except for a small area on the Brunswick Peninsula, where upconing apparently has been ongoing for several decades, EPD's monitoring shows no evidence of further salt-water upconing or encroachment in coastal Georgia.

GROUND-WATER USE IN GEORGIA, 1986

INTRODUCTION

In 1985, total water withdrawals in Georgia were 5446 million gallons per day (Mgal/d), of which 1005 Mgal/d was ground water. The data received as of Fall 1987 indicate that ground-water use was 1215 Mgal/d in 1986. Approximately 90 percent of the ground water used was withdrawn from the Coastal Plain Province. The Floridan aquifer system supplied 64 percent of all of the ground water used.

Ground-water withdrawals increased approximately 21 percent between 1985 and 1986. The greater use was largely due to a 60 percent increase in irrigation ground-water use (Figure 2-1). During the first seven months in 1986, rainfall in Georgia was approximately 13 inches below normal (about 40 percent below average). The immediate effects of the drought were increased withdrawals, less runoff, and less recharge to the aquifers. Lake levels and stream flows were lowered significantly and ground-water levels dropped, sometimes to record lows.

Water use can be categorized by type of user. The following water-use categories are discussed in this report:

- Public supply
- Self-supplied industrial and mining
- Irrigation
- Self-suplied domestic
- Self-supplied commercial
- Livestock
- Thermoelectric and nuclear power generation

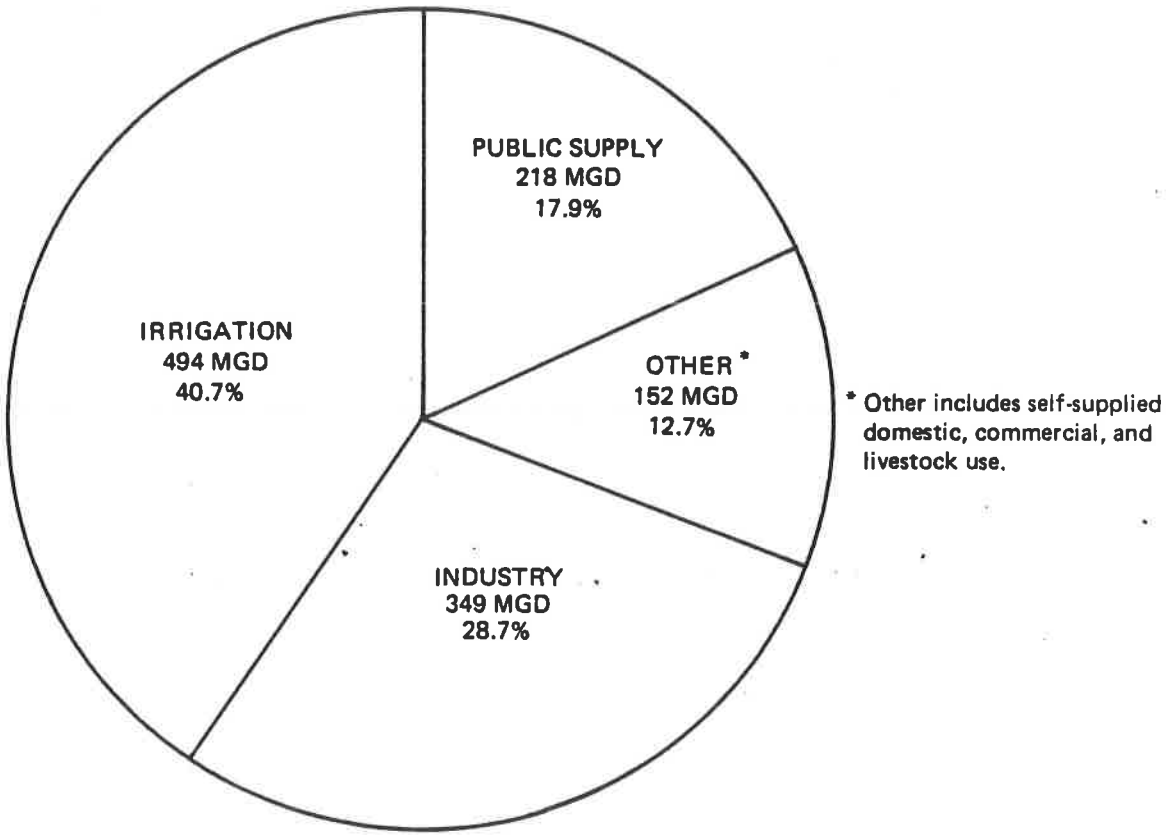


Figure 2-1.—Ground-Water Use by Categories, 1986

Data for industrial and water-supply estimates are collected annually from various offices of EPD. For this report, most of the non-agricultural ground-water use was calculated from withdrawal amounts reported by permitted users to the Water Resources Management Branch of EPD. The irrigation estimates were based mainly on the Cooperative Extension Service's 1986 irrigation survey. Estimates for withdrawals by non-permitted users (such as livestock and self-supplied households) were based on user surveys, population figures, and previous studies by the Georgia Water Use Program. The Georgia Water Use Program, a cooperative project of the Georgia Geologic Survey and the U.S. Geological Survey, has estimated withdrawals for all water-use categories for 1985 (see Turlington, Fanning, and Doonan, 1987). For the present report, some water-use data were unavailable for 1986; therefore, 1985 estimates are shown for domestic, commercial, and livestock use.

GROUND-WATER USE FOR PUBLIC SUPPLY

In 1985, total water withdrawn by public suppliers in Georgia was 836 Mgal/d, 25 percent of which was ground water. This estimate includes water used by large permitted county and municipal water systems and by smaller systems such as mobile home parks, trailer parks, and subdivisions (serving 25 or more people). Estimations of 1986 water use are based on 1986 withdrawals by permitted systems and 1985 estimates for small systems. Ground-water used for public supply was approximately 218 Mgal/d in 1986, a 6 percent increase since 1985. Water use for public supply has continued to increase, corresponding to increases in Georgia's population.

GROUND-WATER USE FOR INDUSTRY AND MINING

Self-supplied industries and mines used an estimated 349 Mgal/d of ground water in 1986. For 1985, they used 339 Mgal/d, which was 52 percent of the total industrial withdrawals (ground and surface water). Industries withdrew less ground water in 1986 than in 1980 (397 Mgal/d), partly because of conservation efforts.

Approximately 96 percent of the ground water used by industry was withdrawn from the Coastal Plain Province. The Floridan aquifer system supplied 72 percent of the water used by self-supplied industries. The industry types that used the most ground water in 1985 are paper production (124 Mgal/d), chemicals production (106 Mgal/d), and mining/-mineral production (70 Mgal/d) (Figure 2-2).

GROUND-WATER USE FOR IRRIGATION

Irrigation is the largest consumer of water in the State. In 1986, 41 percent of all ground water withdrawals were used for irrigation. Total irrigation use in 1986 was estimated to be 720 Mgal/d, of which 69 percent was ground water. Irrigation ground-water use increased 60 percent, from 309 to 494 Mgal/d, between 1985 and 1986. Irrigation use has fluctuated with rainfall but overall it has increased dramatically since 1975 (Figure 2-3). The number of high-capacity systems, such as center pivots, was almost nine times greater in 1986 than in 1975.

The University of Georgia's Cooperative Extension Service periodically compiles information on crops irrigated, acreage, water sources, and other data by surveying their county agents. The 1986 irrigation survey was the main data source used for estimating irrigation water use. The 1985 irrigation estimates were based on the 1984 irrigation survey.

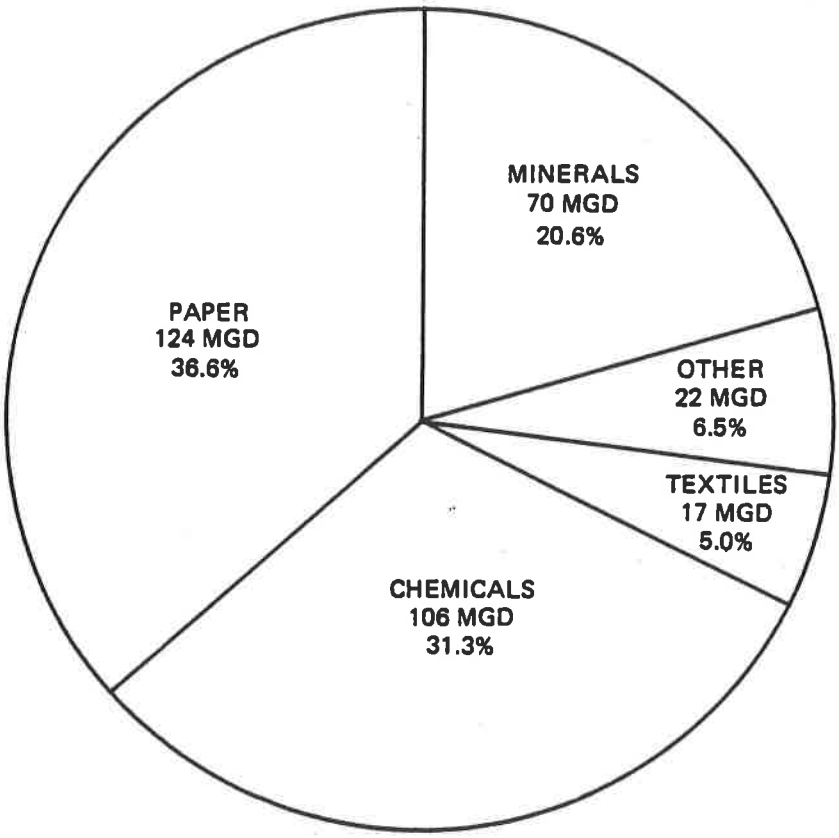


Figure 2-2.—Ground-Water Withdrawal by Industries in Georgia, 1985

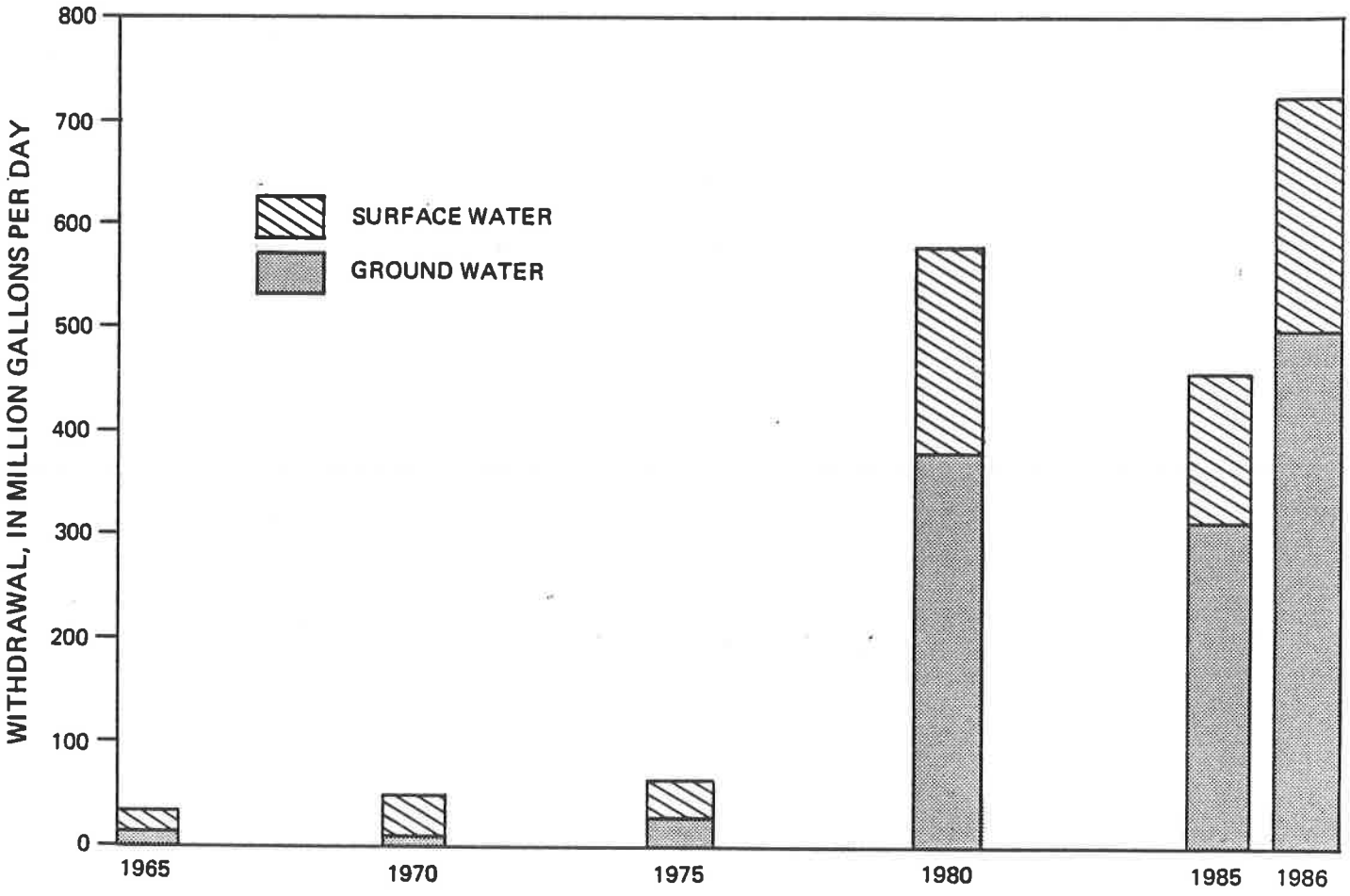


Figure 2-3.—Irrigation Water Use in Georgia, 1965-1986

Each year, farmers who pump more than 3,000,000 gallons per month are required to report irrigation water use to EPD. The Georgia Irrigation Reporting System is presently the only source of annual site-specific water-use data for irrigation systems. The number of reports returned for 1986 slightly increased since 1985, but many farmers still did not comply with the reporting requirements. The data produced from the irrigation reporting program have been insufficient for estimating water use, so other data sources must also be used.

OTHER WATER-USE CATEGORIES

Self-supplied domestic use, water used for normal household purposes, is estimated to be 99 Mgal/d for 1985. Virtually all self-supplied domestic use is supplied from wells and springs, so that amount also equals total ground water used for rural domestic purposes. A survey of residential water use in subdivisions of the Athens, Georgia, vicinity showed that average per capita domestic use was 75 gallons per day (gpd). The 1985 domestic-use estimate is equal to the self-supplied population multiplied by 75 gpd. Estimates for 1986 are not available but the domestic use was probably similar to that in 1985.

Commercial users include restaurants, hotels, retail stores and other businesses, government and military facilities, prisons, schools, hospitals, recreational facilities, and others. Self-supplied commercial users withdrew approximately 28 Mgal/d in 1985; 22 Mgal/d (88 percent) of that was ground water. Most commercial users obtain their water from public water systems rather than withdraw it directly. The self-supplied commercial withdrawal is only 16 percent of the total commercial use (from all sources).

Thermoelectric power generation is the largest use category in Georgia, but only a very small amount of the water used is ground water. In 1985, an estimated 3323 Mgal/d of surface water was used for cooling in thermoelectric and nuclear power plants. Ground water is primarily used for boiler make-up water and sanitary supply in the power plants. Ground-water use for such purposes totaled 5 Mgal/d in 1985 and 6 Mgal/d in 1986.

GROUND-WATER QUALITY IN GEORGIA, 1986

GEORGIA GROUND-WATER MONITORING NETWORK

The Ground-Water Monitoring Network is maintained by the Georgia Geologic Survey as an element of the State's Ground-Water Management Program. Ambient ground-water quality monitoring serves to detect new point sources of ground-water pollution in a timely manner and to assess the cumulative effect of non-point sources such as agricultural pesticides. Chemical analyses are available for water samples collected during 1986 from one hundred twenty-five wells and three springs. These sample stations represent all seven major aquifer systems of the Coastal Plain Province and unconfined ground-water systems of the Piedmont/Blue Ridge Province and the Valley and Ridge/Cumberland Plateau Province (refer to Table 3-1).

Monitoring stations are located in three critical areas:

(a) recharge areas of the State's primary aquifers,
(b) other areas of potential pollution related to regional activities (agricultural and industrial areas), and
(c) areas of significant ground-water use.

The majority of Monitoring Network sampling stations are municipal and industrial wells that have reliable well construction data. In specific areas where the State's aquifers are recognized to be susceptible to contamination or pollution (for example, the Dougherty Plain of southwest Georgia and the State's coastal area), monitoring wells maintained jointly by the Georgia Geologic Survey and the U.S. Geological Survey also are used. Because these wells are completed in specific permeable zones of an aquifer, analyses from several of these wells can be used to assess ambient quality of water throughout an aquifer.

AQUIFER SYSTEM	NUMBER OF MONITORING STATIONS	PRIMARY STRATIGRAPHIC EQUIVALENTS	AGE OF AQUIFER FORMATIONS
Miocene	4	Screven Formation and Hawthorne Group	Miocene
Floridan	49	Suwannee Formation, Ocala Group, Bug Island Formation, and Gulf Hammock Formation	Oligocene to Mid Eocene
Jacksonian	6	Barnwell Group	Upper Eocene
Claiborne	7	Tallahatta Formation	Mid Eocene
Clayton	8	Clayton Formation	Paleocene
Providence	4	Providence Sand	Upper Cretaceous
Cretaceous	20	Ripley Formation, Cusseta Sand, Blufftown Formation, Eutaw Formation, and Tuscaloosa Formation	Upper Cretaceous
Piedmont	17	Unconfined aquifers	Predominately Paleozoic
Blue Ridge	4	Unconfined aquifers	Predominately Paleozoic
Valley and Ridge/ Cumberland Plateau	9	Unconfined aquifers	Paleozoic

Table 3-1: Georgia Ground-Water Monitoring Network, 1986

Ground water from all monitoring stations is tested for parameters included in the Monitoring Network's standard analysis: pH, specific conductivity, chlorides, sulfates, nitrite/nitrates, twelve common pesticide and industrial organic compounds, and thirty additional metals (refer to Table 3-2). Where regional land-use activities have the potential to affect ground-water quality in the vicinity of a monitoring station, additional parameters are tested. These additional chemical screens are listed in the Appendix. The significance of the parameters of a basic water quality analysis are summarized in Table 3-3.

Sampling procedures are adapted from techniques of the U.S. Geological Survey and the U.S. Environmental Protection Agency. All analyses, except for some contracted organics screens, are performed by EPD laboratories. Data for the Ground-Water Monitoring Network are constantly updated in the U.S. Environmental Protection Agency's STORET computer data management system.

Parameter		Drinking Water Standard (Where Applicable)
pH		--
Spec. Cond.	umho/cm	--
Chloride	mg/L	250
Sulfate	mg.SO_4/L	250
Nitrates	mg.N/L	10
ORGANIC SCREEN #2		
Dicofol	ug/L	--
Endrin	ug/L	0.2
Lindane	ug/L	4
Methoxychlor	ug/L	100
PCB's	ug/L	--
Permethrin	ug/L	--
Toxaphene	ug/L	5
ORGANIC SCREEN #4		
2,4-D	ug/L	100
Acifluorfen	ug/L	--
Chloramben	ug/L	--
Silvex	ug/L	10
Trichlorfon	ug/L	--
ICP SCREEN		
Calcium	mg/L	--
Magnesium	mg/L	--
Potassium	mg/L	--
Sodium	mg/L	--

Parameter		Drinking Water Standard (Where Applicable)
ICP SCREEN, Cont.		
Aluminum	ug/L	--
Antimony	ug/L	--
Arsenic	ug/L	50
Barium	ug/l	1,000
Beryllium	ug/L	--
Bismuth	ug/L	--
Cadmium	ug/L	10
Chromium	ug/L	50
Cobalt	ug/L	--
Copper	ug/L	1,000
Gold	ug/L	--
Iron	ug/L	300
Lead	ug/L	50
Manganese	ug/L	50
Molybdenum	ug/L	--
Nickel	ug/L	--
Selenium	ug/L	10
Silver	ug/L	50
Strontium	ug/L	--
Thallium	ug/L	--
Tin	ug/L	--
Titanium	ug/L	--
Vanadium	ug/L	--
Yttrium	ug/L	--
Zinc	ug/L	5,000
Zirconium	ug/L	--

Table 3-2: Standard Water Quality Analysis of the Ground-Water Monitoring Network - Drinking Water Standards from the Georgia Rules for Safe Drinking Water

umho/cm = micromhos/centimeter, mg/l= milligrams/liter (parts per million), ug/L = micrograms/liter (parts per billion)

PARAMETER	SIGNIFICANCE
pH (Hydrogen-ion concentration)	pH is a measure of the concentration of the hydrogen ion. Values of pH less than 7.0 denote acidity and values greater than 7.0 indicate alkalinity. Corrosiveness of water generally increases with decreasing pH. However, excessively alkaline waters may also attack metals. A pH range between 6.0 and 8.5 is considered acceptable.
Calcium and magnesium	Calcium and magnesium cause most of the hardness of water. Hard water consumes soap before a lather will form and forms scale in boilers, water heaters, and pipes. Hardness is reported in terms of equivalent calcium carbonate. The hardness of a water can be estimated by multiplying the parts per million of calcium by 2.5 and that of magnesium by 4.1.
Sodium and potassium	Sodium and potassium have little effect on the use of water for most domestic purposes. Large amounts give a salty taste when combined with chloride. A high sodium ratio may limit the use of water for irrigation.
Iron and manganese	More than 300 parts per billion stains objects red, reddish brown, or black. Larger quantities cause unpleasant taste and favor growth of iron bacteria but do not endanger health.
Sulfate	Sulfate in hard water increases the formation of scale in boilers. In large amounts, sulfate in combination with other ions imparts a bitter taste to water. Concentrations above 250 parts per million may have a laxative effect, but 500 parts per million is considered safe.
Chloride	Chloride salts in excess of 100 parts per million give a salty taste to water. Large quantities make the water corrosive. Water that contains excessive amounts of chloride is not suitable for irrigation. It is recommended that chloride content should not exceed 250 parts per million.
Nitrate	Concentrations much greater than the local average may suggest pollution. Excessive amounts of nitrate in drinking or formula water of infants may cause a type of methemoglobinemia ("blue babies"). Nitrate nitrogen in concentrations greater than 10 parts per million is considered to be a health hazard.

Water Class	Hardness (ppm)
Soft	Less than 60
Moderately Hard	60 to 120
Hard	121 to 180
Very Hard	More than 180

Table 3-3: The Significance of Parameters of a Basic Water Quality Analysis (Wait, 1960).

CRETACEOUS AQUIFER SYSTEM

The Cretaceous aquifer system is a complex group of interconnected aquifers consisting of upper Cretaceous age sands of the Coastal Plain Province. These sands form an extensive western outcrop/recharge area immediately south of the Fall Line. Outcrops are restricted to valley bottoms in the northeast Coastal Plain. Six distinct members of the aquifer system that are recognized west of the Ocmulgee River (Pollard and Vorhis, 1980) merge into two members to the east (Clarke, Brooks, and Faye, 1985). The Cretaceous aquifer system supplies ground water for a 35-mile-wide band paralleling the Fall Line. Aquifer sands thicken southward from the Fall Line, where they crop out against crystalline Piedmont rocks, to a sequence of sand and clay approximately 2,000 feet thick at the limit of the main aquifer use area, twenty miles south of the aquifer outcrop.

For the Ground-Water Monitoring Network, water quality samples were collected from twenty wells that were completed in the Cretaceous aquifer system. The water of seven wells was sampled twice. Most of these wells were located within or near aquifer outcrop areas.

Ground waters of the Cretaceous aquifer system are generally corrosive. Most wells yielded acidic water with a pH range of 4.2 to 6.6. However, water samples from three deep wells located near the Chattahoochee River and two downdip wells located in Burke County were basic with pH measurements from 7.6 to 9.1. Calcium and magnesium concentrations were typical of soft waters. Levels were generally below 3 parts per million but ranged up to twenty-six parts per million. Sodium and potassium concentrations were below 6 parts per million in all acidic water samples. Elevated sodium levels in the basic waters, up to eighty-five parts per million, would severely limit the use of these waters for crop irrigation.

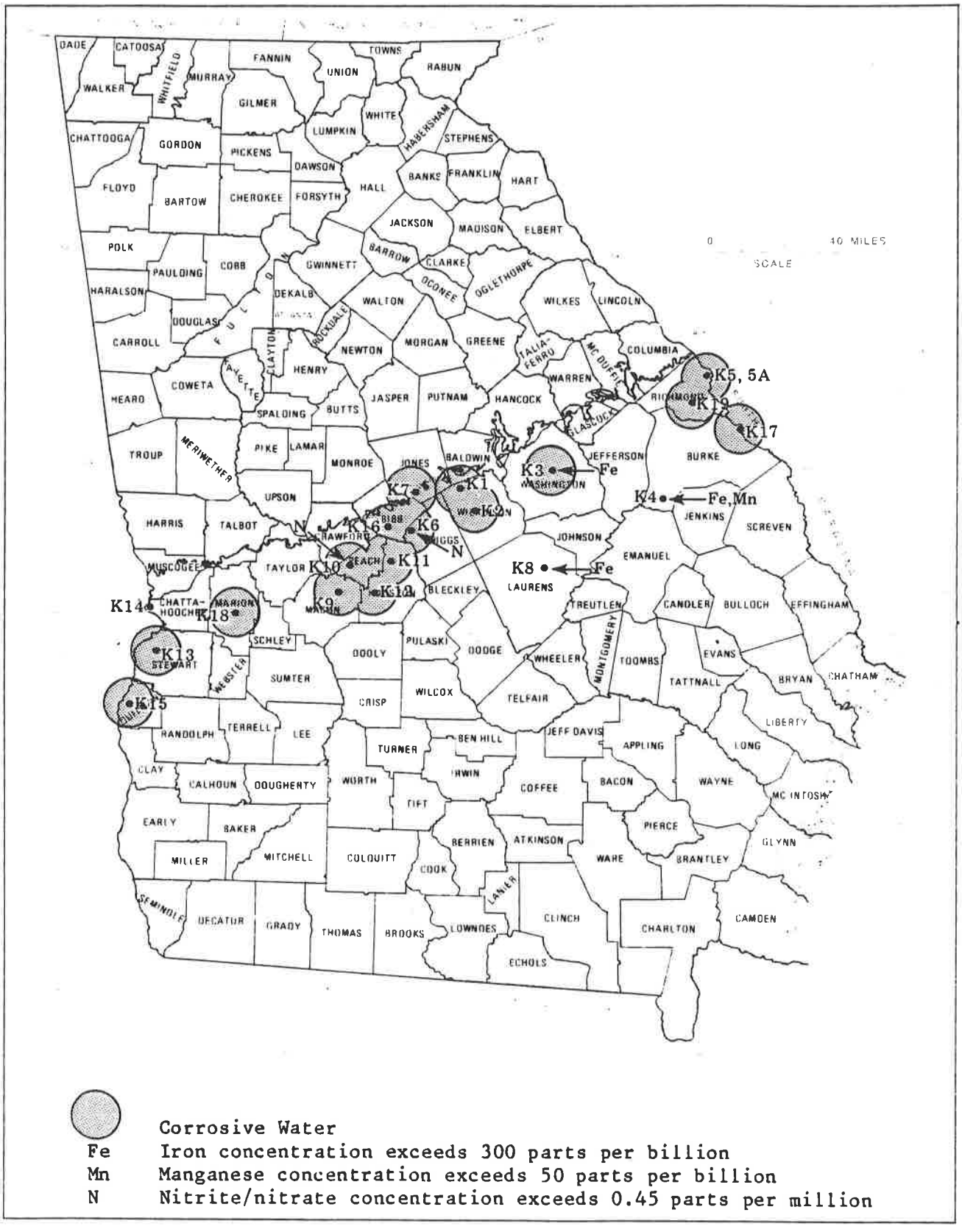


Figure 3.1.—Water Quality of the Cretaceous Aquifer System.

Iron concentrations exceeded drinking water standards in ground water from three wells. Manganese levels were elevated in only one sample. Aluminum and zinc, in minor concentrations well below drinking water standards, were other common metallic cations.

Chloride and sulfate levels remained uniformly low in all samples. However, chloride concentrations have increased slightly in most wells of the outcrop area over the last three years. This trend appears to be related to a general decrease in pH of the same waters. Nitrite/nitrates, in trace concentrations, were common in water from most of the aquifer outcrop wells. Nitrite/nitrate levels in the water samples varied little from those of previous years.

Halomethane compounds were detected in a sample collected from a Warner Robins (Houston County) municipal well. These compounds are derived as breakdown products of typical chlorine-treated water. A later sample, carefully collected to avoid treated water, confirmed that the ground water did not contain any detectable levels of halomethanes.

PROVIDENCE, CLAYTON, AND CLAIBORNE AQUIFER SYSTEMS

A large area of southwest Georgia is dependent upon three vertically stacked aquifer systems: the Providence (sands), Clayton (limestones), and Claiborne (sands). These aquifer systems crop out in a band extending through Quitman and Clay Counties, along the Chattahoochee River, northeast to Houston County. Both the limited size and steep slopes of the outcrop areas restrict recharge to the aquifer systems. Near the down-dip limit of the aquifer use area, sixty miles to the south, wells can be developed in the aquifer systems up to 1,200 feet deep.

The Providence aquifer system is developed in the uppermost Cretaceous age sands and coquina limestones of the southwest Coastal Plain Province (Clarke, Faye, and Brooks, 1983). These permeable sediments vary in thickness from less than forty feet to over three hundred feet in down-dip areas of the aquifer system. Where the lower confining unit becomes discontinuous to the east and to the south, the Providence aquifer system merges with other interconnected aquifers of the Cretaceous aquifer system.

Four wells that produce water from the Providence aquifer system were used for the Monitoring Network. Multiple water samples were collected from only one well. These wells yield samples representing water quality in outcrop, shallow confined, and deep confined areas of the aquifer system.

Water of the Providence aquifer system is generally non-corrosive. Values of pH ranged from 6.4 in water of the aquifer outcrop area to 9.1 in water of the farthest down-dip area. Calcium and magnesium concentrations were between 7 and forty-one parts per million, suggestive of soft to moderately hard waters. Sodium and potassium levels varied with pH, between 5 and eighty-five parts per million. The concentrations of sodium in the water from the two wells of the shallow confined area were excessive for general agricultural use.

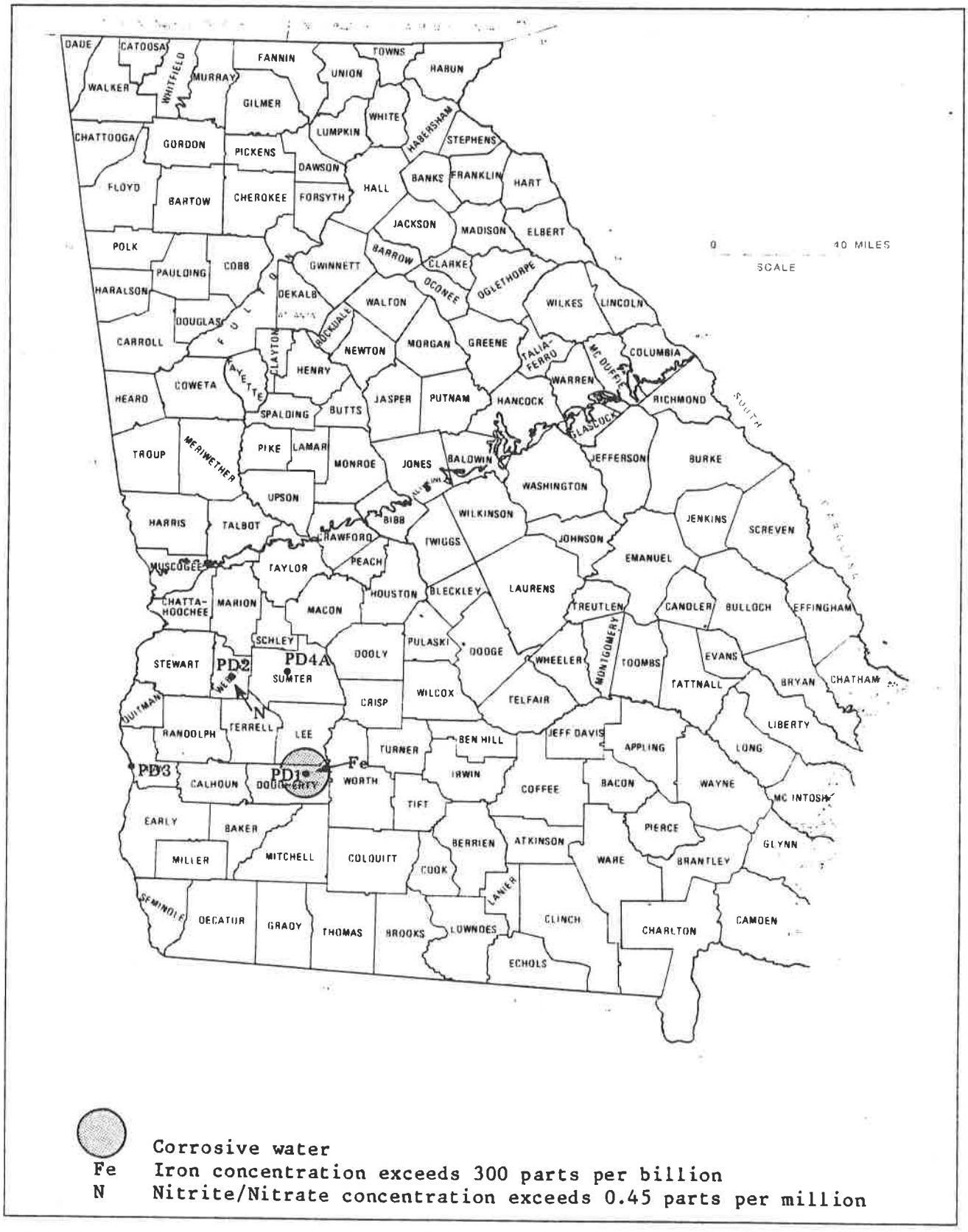


Figure 3.2.__ Water quality of the Providence Aquifer System.

Iron levels were acceptable for domestic use in water from the three farthest up-dip wells. Manganese concentrations were within drinking water standards in all samples. Zinc, in trace concentrations, was the only other common metal cation.

Chloride and sulfate concentrations were uniformly low in all samples. Nitrite/nitrates were present in detectable levels only in water from the one aquifer outcrop area well. Halomethanes also were detected in samples of the same well. These compounds are an artifact of chlorine-treated water and are not indicative of ground-water quality.

The Clayton aquifer system predominately consists of the middle limestone unit of the Paleocene age Clayton Formation (McFadden and Perriello, 1983). Thickness of the aquifer system increases from less than ten feet in north Crisp County and fifty feet in outcrop areas to locally over three hundred fifty feet in the down-dip area.

Water quality of the Clayton aquifer system was monitored by seven wells throughout the up-dip confined area and in one well of the down-dip area. Water of two up-dip wells and the one down-dip well was sampled twice.

All samples from the Clayton aquifer system were non-corrosive. The range of pH measurements was 7.4 to 8.2. In the up-dip areas, all waters were hard with calcium and magnesium concentrations between forty and fifty-seven parts per million. Sodium and potassium levels were below ten parts per million.

Water samples from the down-dip area well were soft. Calcium and magnesium levels were below fifteen parts per million. Sodium and potassium concentrations were elevated to forty-two parts per million. Only water of the one down-dip well contained sodium levels that would limit its use for crop irrigation.

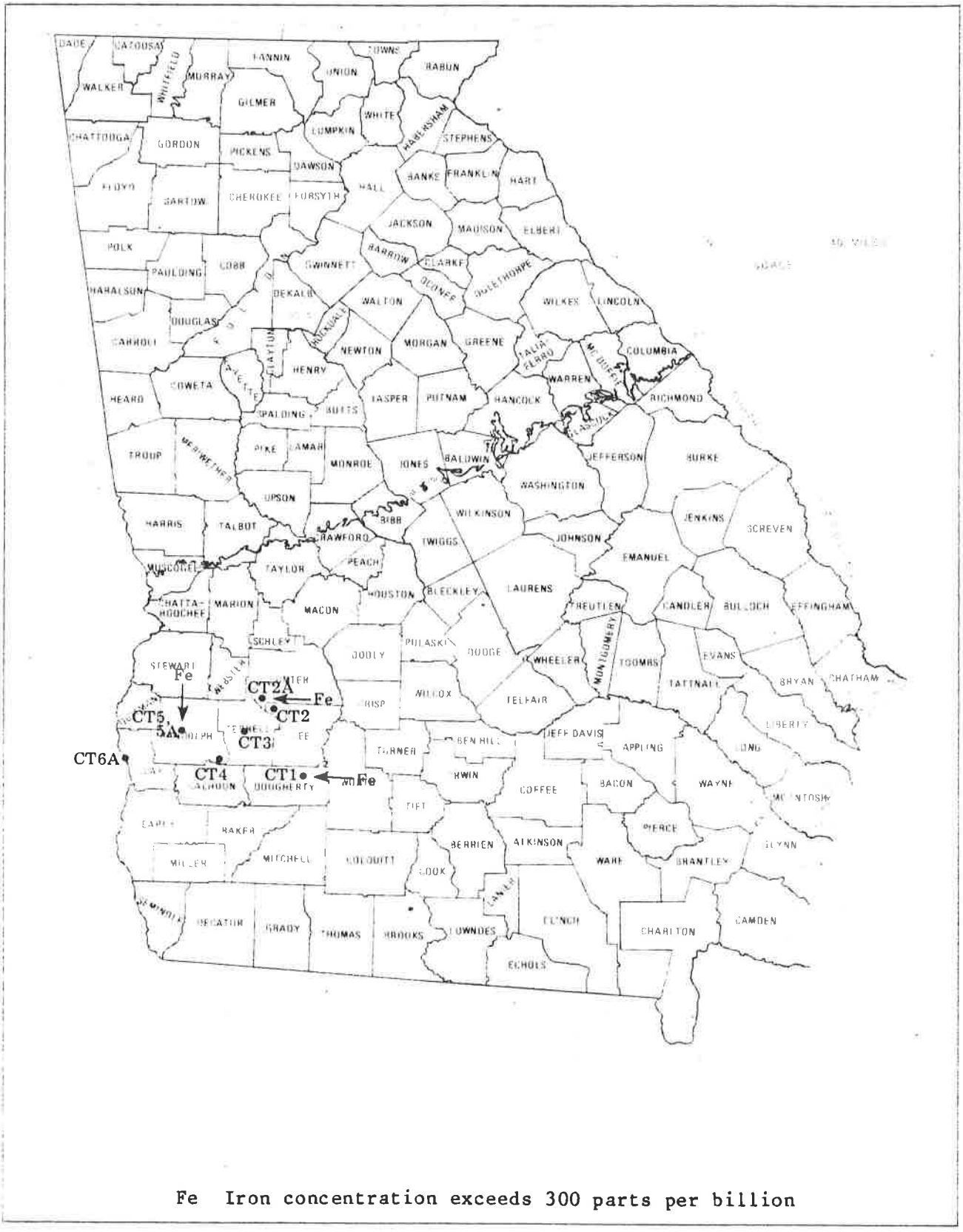


Figure 3.3.—Water Quality of the Clayton Aquifer System.

Iron exceeded acceptable levels for domestic use in water of three up-dip area wells and the one down-dip area well. Manganese and zinc, in minor concentrations, were common metal cations. Chloride and sulfate levels were uniformly low in all samples. Nitrite/nitrates were not detected in waters of the Clayton aquifer system.

The Claiborne aquifer system is generally developed in permeable sands of the middle Eocene age Tallahatta Formation (McFadden and Perriello, 1983). Thicknesses vary widely, between one hundred and three hundred feet, throughout the shallow confined and down-dip areas.

Water samples of the Claiborne aquifer system were collected from seven wells. Three wells represent aquifer outcrop areas. The other four wells are completed in shallow confined areas.

In the aquifer outcrop area, waters are acidic and corrosive. The range of pH values was 4.2 to 5.6. Calcium and magnesium concentrations varied from 2 to 7 parts per million and were typical of soft waters. Sodium and potassium levels were less than 7 parts per million.

Waters of the shallow confined areas are basic and non-corrosive. Measurements of pH varied from 7.3 to 7.8. Calcium and magnesium concentrations were between forty-one and fifty-eight parts per million, suggestive of moderately hard to hard waters. Sodium and potassium levels ranged up to twenty-two parts per million. These levels would not restrict general agricultural use.

Iron and/or manganese concentrations exceeded drinking water standards in water from all three aquifer outcrop area wells and from one down-dip area well. Aluminum and zinc were other common metallic cations. Yttrium and cobalt were detected in trace concentrations in wells of the aquifer outcrop area.

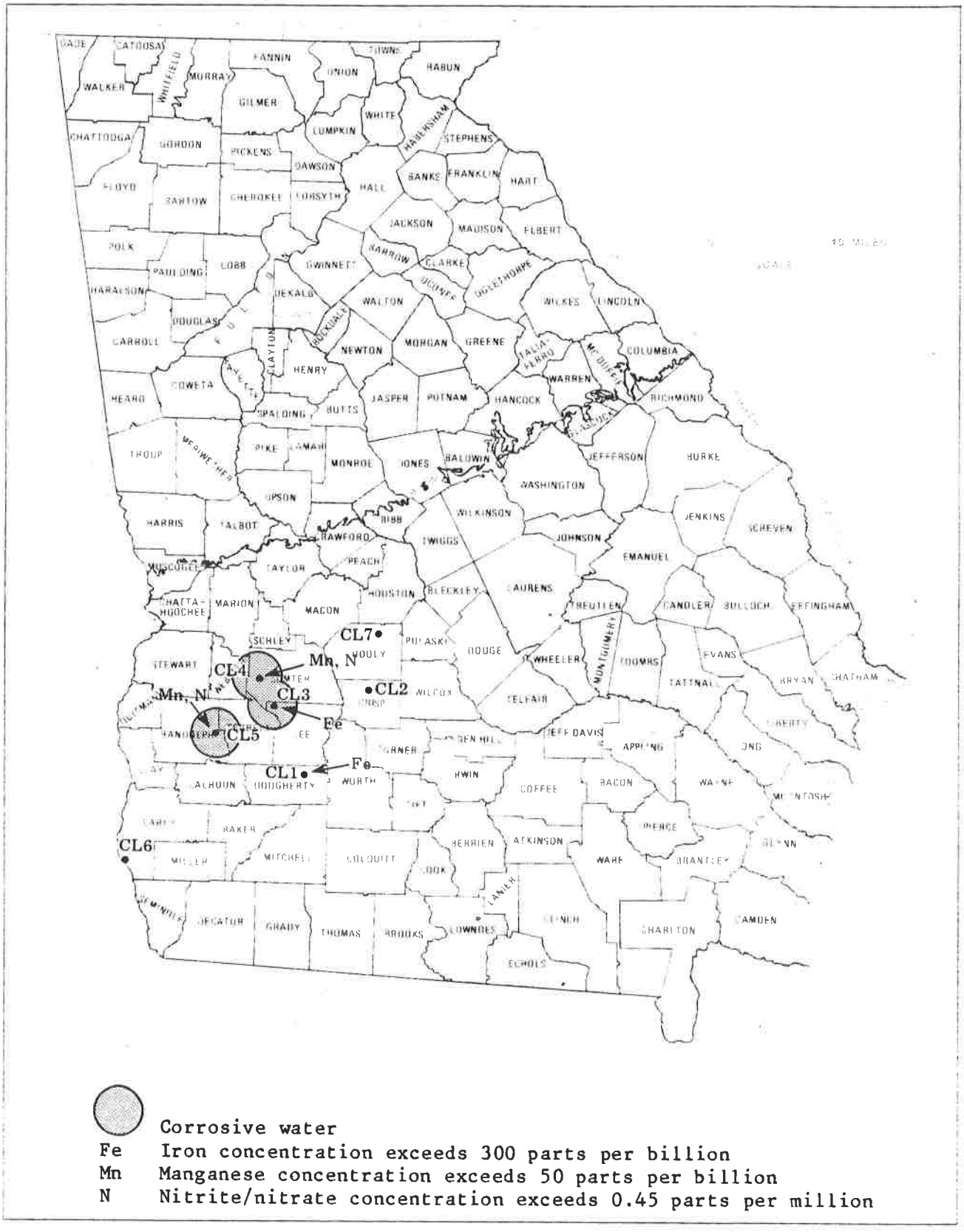


Figure 3.4. Water Quality of the Claiborne Aquifer System.

Chloride and sulfate levels were uniformly low in all samples. Nitrite/nitrates were present in detectable levels in two aquifer outcrop wells and in one down-dip well. The concentration was significantly increased in water of the one outcrop area well monitored in the previous year.

Volatile organic compounds were detected in samples collected in January and March from the well of the down-dip confined area at Albany (Dougherty County). Follow-up samples collected in August did not contain detectable levels of the compounds.

JACKSONIAN AQUIFER SYSTEM

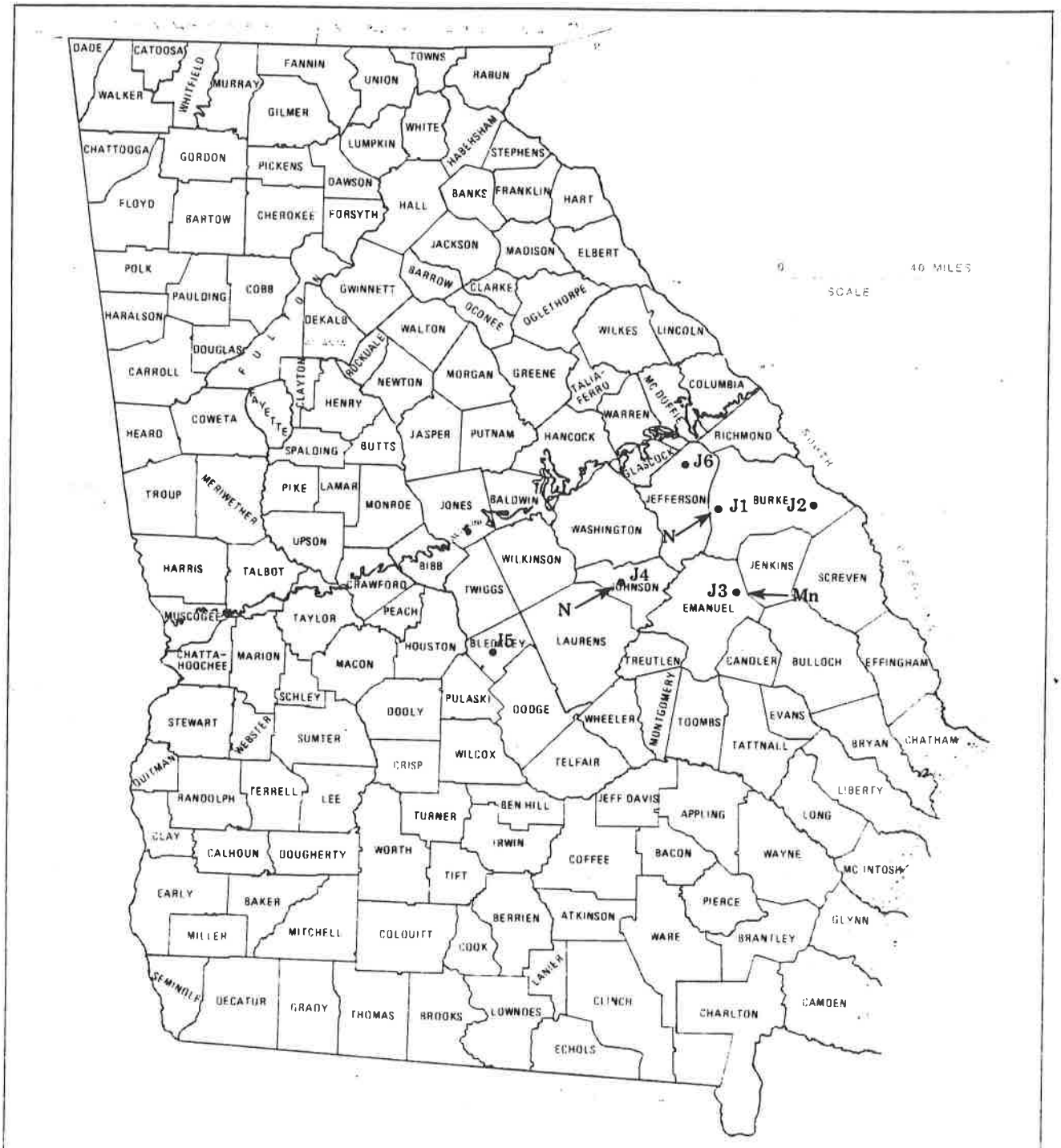
The Jacksonian aquifer system consists of Eocene age sands of the Barnwell Group (Vincent, 1982). Sands and clays of the Barnwell Group crop out over a large area in the northeast corner of the Coastal Plain Province. Water-bearing sands of the Jacksonian aquifer system are relatively thin, ranging from ten to fifty feet thick. Because the aquifer sands grade into finer grained silts and clays to the south, aquifer use is generally restricted to the aquifer outcrop area and areas less than ten miles to the south.

Six wells that are completed in the Jacksonian aquifer system were used for the Monitoring Network. Water quality samples were collected twice from each of four aquifer outcrop area wells and once from two down-dip area wells.

All water samples from the Jacksonian aquifer system were non-corrosive. The range of pH measurements of the water samples was 6.5 to 7.8. Calcium and magnesium concentrations of these samples varied from twenty-five to sixty-six parts per million and were characteristic of moderately hard to hard waters. Sodium and potassium levels were less than eleven parts per million in all samples and were acceptable for all general water uses.

Iron and zinc, in concentrations suitable for domestic use, were the common metallic cations. Manganese levels exceeded drinking water standards in a sample from one down-dip well.

Chloride and sulfate concentrations were low in all water samples. Nitrite/nitrates were detected in water from two of the aquifer outcrop area wells. Concentrations remained elevated, but well below drinking-water standards, in the Vidette (Burke County) public well.



Mn Manganese concentration exceeds 50 parts per billion
N Nitrite/nitrate concentration exceeds 0.45 parts per million

Figure 3.5.—Water Quality of the Jacksonian Aquifer System.

FLORIDAN AQUIFER SYSTEM

The Floridan aquifer system, formerly known as the Principal Artesian aquifer system, is primarily developed in Eocene and Oligocene age limestones that underlie most of the Coastal Plain Province (Crews and Huddlestun, 1984). These limestones crop out in a large karst area of southwest Georgia included in the Dougherty Plain and along strike to the northeast. In the west, significant recharge to the aquifer system occurs in the Dougherty Plain. Recharge in the east is derived primarily from leakage from the Jacksonian aquifer system. The Floridan aquifer system is a major source of ground water for much of the aquifer outcrop area and throughout the down-dip area to the south and east. Ground-water quality and quantity are locally limited in the Gulf Trough, a linear hydrologic feature that extends from southwest Decatur County through north Tattnall County. From its up-dip limit, defined in the east by clays of the Barnwell Group, the aquifer thickens to over 700 feet in coastal Georgia.

Water quality was monitored in forty-nine wells distributed throughout the Floridan aquifer system. Mutiple water quality samples were collected from fourteen of these wells.

All water samples collected from the Floridan aquifer system were non-corrosive. The pH measurements ranged from 7.0 to 7.9. Most calcium and magnesium concentrations were typical of moderately hard to hard waters. Concentrations generally varied between twenty-eight and fifty-eight parts per million. Sodium and potassium concentrations were typically less than twenty parts per million. Calcium, magnesium, and sodium levels were elevated in coastal area municipal and monitoring wells and the Folkston (Charlton County) municipal well. Sodium concentrations in four of the coastal area wells were excessive for some crop irrigation use.

Approximate axis of the Gulf Trough

Ba Barium concentration exceeds 1,000 parts per billion

Fe Iron concentration exceeds 300 parts per billion

Mn Manganese concentration exceeds 50 parts per billion

N Nitrite/nitrate concentration exceeds 0.45 parts per million

VOC Volatile organic compounds detected

Figure 3.6.—Water Quality of the Floridan Aquifer System.

Iron, manganese, zinc, and aluminum are common metal cations of Floridan aquifer system waters. Drinking water standards were exceeded for iron in water samples from only two deep coastal area monitoring wells and for manganese in water from only two municipal wells, Metter (Candler County) and McRae (Telfair County). Barium concentrations exceeded drinking water standards in samples from one municipal well in Fitzgerald (Ben Hill County), located along the Gulf Trough.

Chloride levels were typically below ten parts per million but were elevated up to seventy-seven parts per million in the coastal area. Sulfate concentrations were commonly less than ten parts per million north of the Gulf Trough, but increased from twenty-seven to one hundred ninety-eight parts per million south of the Gulf Trough.

Nitrite/nitrates were limited to samples collected from wells located north of the Gulf Trough. Concentrations were elevated in aquifer outcrop areas and the municipal wells of Mount Vernon (Montgomery County) and Vidalia (Toombs County), associated with phosphatic zones of the north flank of the Gulf Trough. Nitrite/nitrate levels were highest, up to seven parts per million, in southeast Lee County.

Volatile organic compounds continued to be detected in samples from one monitoring well in Albany (Dougherty County). Additional testing has indicated that the pollutants are locally present in shallow zones of the Floridan aquifer system in the metropolitan area, but do not threaten any wells used as drinking water sources. These occurrences are continuing to be monitored by EPD.

MIOCENE AQUIFER SYSTEM

A broad band of the southern, central, and northeastern Coastal Plain Province is within the outcrop area of the Miocene age Screven Formation and Hawthorne Group. Thin permeable sands and limestones within this section form the Miocene aquifer system (Crews, 1984). Areas of confinement exist along the coast and locally in the Grady-Thomas-Brooks-Lowndes Counties area where younger sediments overlap the Miocene. The Miocene aquifer system is used as a source of ground water for domestic supplies throughout the outcrop and down-dip confined areas.

Water quality of the Miocene aquifer system was monitored in four wells. One well, in the coastal confined area, was sampled twice. In the outcrop area, waters were basic with pH's of 7.1 and 7.9. Calcium and magnesium concentrations ranged from twenty-three to thirty-seven parts per million and were typical of moderately hard waters. Samples from the coastal confined area were also basic. The values of pH were 7.6 and 7.7. Calcium and magnesium concentrations were elevated to seventy-eight parts per million, which were indicative of hard waters. A sample from the southern confined area was corrosive with a pH of 4.7. The calcium and magnesium concentrations were correspondingly low, at 3 parts per million, and well within the range of soft water. Sodium and potassium concentrations were low in all waters but slightly elevated, up to twenty-five parts per million, in samples from the coastal confined area. The levels of sodium in these samples were acceptable for all general water uses.

Iron and manganese exceeded levels for domestic use only in water from the aquifer outcrop area well located in Bulloch County. Zinc and aluminum, in concentrations well below drinking water standards, were the only other common metallic cations.

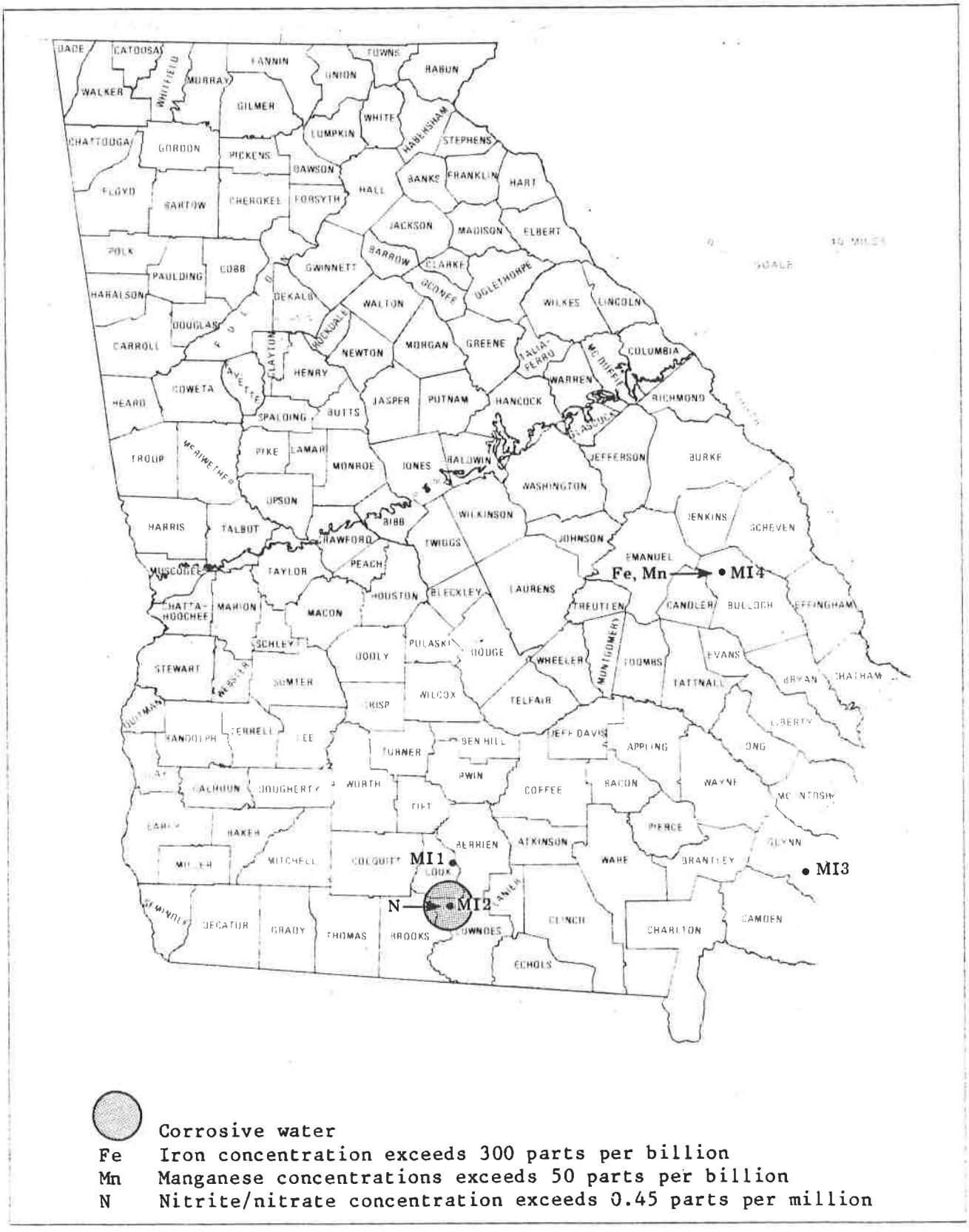


Figure 3.7.— Water Quality of the Miocene Aquifer System.

Chloride and sulfate levels were low in all waters. The highest concentrations, at fifty-three to sixty-four parts per million, were measured in samples from the coastal confined area. Nitrite/nitrates were detected only in water of the south confined area. This concentration of two parts per million is well below drinking water standards but represents an increase from the previous year.

PIEDMONT/BLUE RIDGE UNCONFINED AQUIFERS

Georgia's Piedmont and Blue Ridge Physiographic Provinces are underlaid by metamorphic and igneous rocks that are predominately of Paleozoic age. Soil and saprolite horizons and openings along joints and fractures are the major water-bearing features. Both high-angle and near-horizontal joints and fractures have been shown to be important to water yield in wells developed in crystalline rock (Cressler, Thurmond, and Hester, 1983).

Four wells of the Blue Ridge Province and seventeen wells of the Piedmont Province were used for the Monitoring Network. Of these, nineteen were high-yield municipal and industrial wells. In the metropolitan Atlanta area, a domestic well and a water-level monitoring well also were included. All of these wells were completed in crystalline rock.

Water samples from the Piedmont/Blue Ridge unconfined aquifers were generally non-corrosive. The range of values of pH was 4.8 to 7.7. Calcium and magnesium levels were typical of soft to moderately hard waters. Sodium and potassium concentrations were below twenty-five parts per million in all samples and would not limit the water for general agricultural use.

Iron and/or manganese levels were elevated above drinking water standards in water from one-half of the wells. Zinc and aluminum were common metal cations that were present in minor concentrations.

Chloride and sulfate levels were uniformly low in all water samples. Nitrite/nitrates, in acceptable concentrations for consumption, were detected in water from thirteen of the wells. An increase in nitrite/nitrate levels was detected in water from an industrial well in Meriwether County.

A phthalate compound, a common industrial plasticizing agent, was present in samples from a water-level monitoring well of the metro-Atlanta (Fulton County) area. Detectable levels of a volatile organic compound occurred in an unused municipal well of Conyers (Rockdale County). Current drinking water supplies in both areas were not compromised.

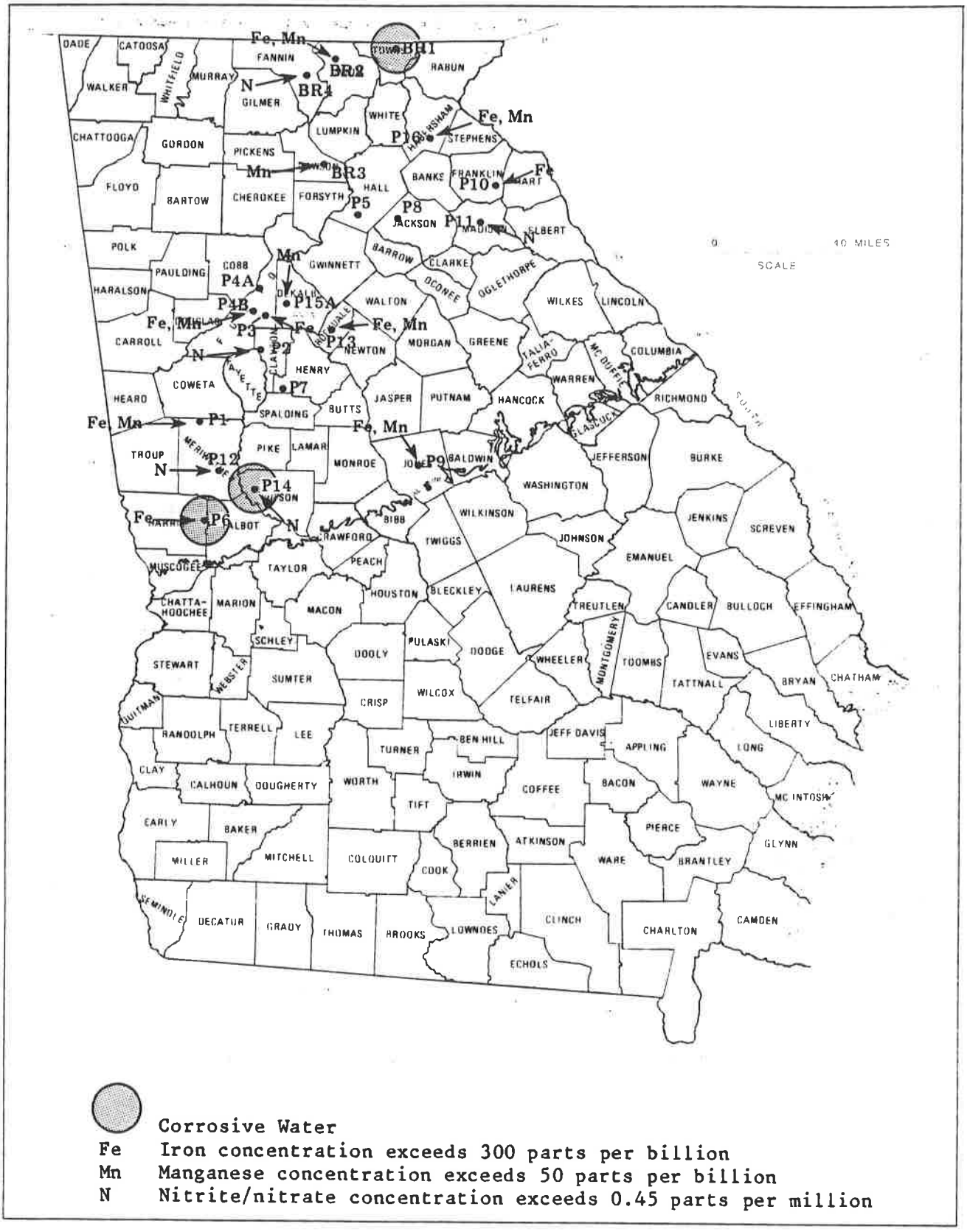


Figure 3.8.—Water Quality of the Piedmont/Blue Ridge Unconfined Aquifers.

VALLEY AND RIDGE UNCONFINED AQUIFERS

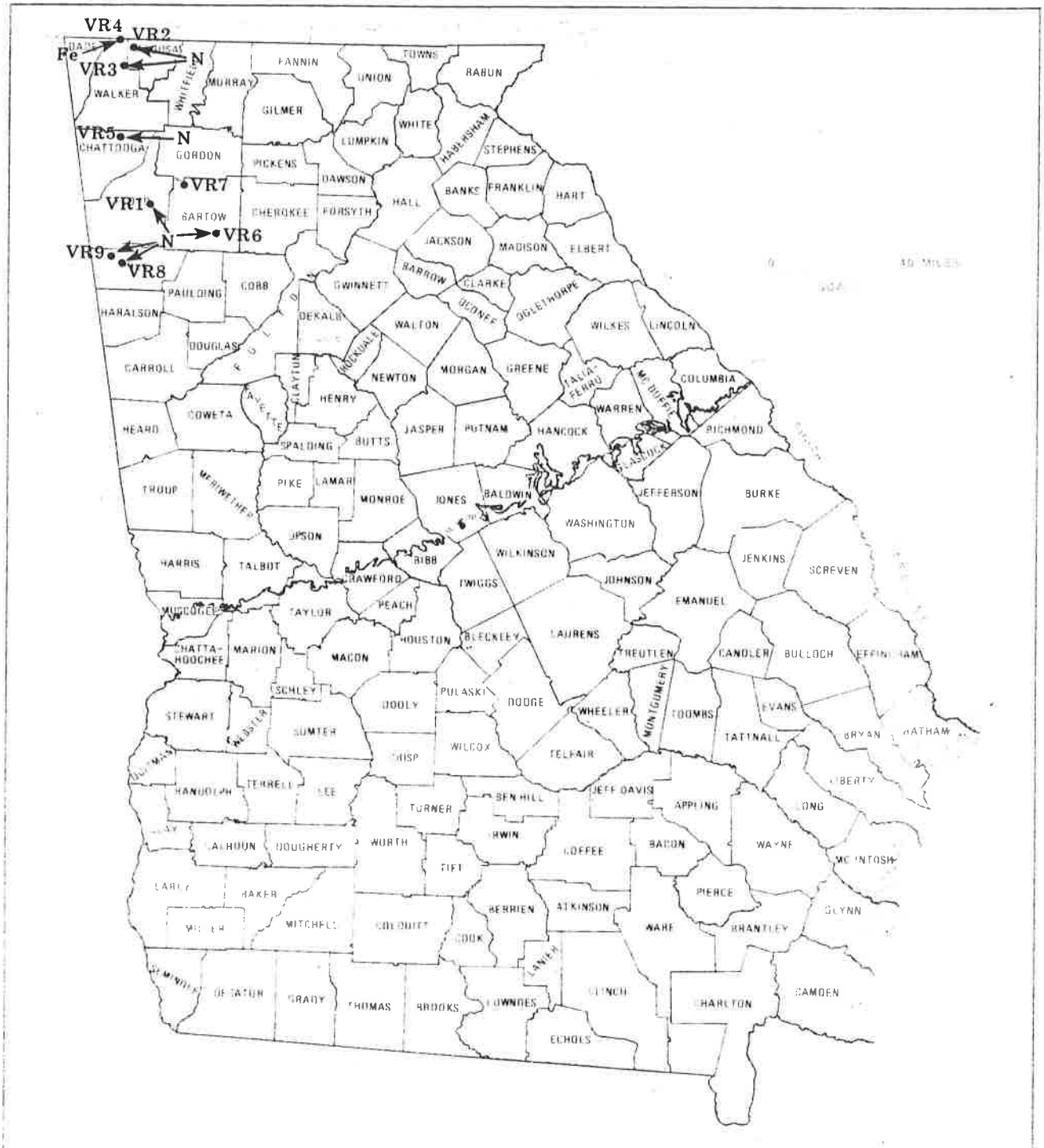
Low yield unconfined aquifers are present in soils and saprolite across most of the Valley and Ridge Province. However, wells and springs suitable for municipal supplies generally are restricted to the outcrop areas of dolostones and limestones where they occur in valley bottoms. In the province, most large ground-water withdrawals are derived from dolostones and limestones of the Cambro-Ordovician age Knox Group.

Water quality of the Valley and Ridge unconfined aquifers was monitored in six wells and three springs. Four of these wells and all three springs produced water from Knox Group carbonates. Multiple samples were collected from one well and one spring.

Excluding the Missionary Ridge area of Catoosa and Walker Counties, water quality from the Valley and Ridge unconfined aquifers was uniform. Waters were non-corrosive with a pH range of 7.0 to 7.9. Calcium and magnesium levels were indicative of hard waters. Sodium and potassium concentrations were less than 7 parts per million and would not limit general water uses. Iron and manganese levels were generally below detection limits.

Waters of the two wells of the Missionary Ridge area were relatively mineralized. The levels of calcium, magnesium, sodium, iron, and manganese were significantly elevated.

Chloride and sulfate levels were low in all samples but were slightly elevated in water of the Missionary Ridge area. Concentrations increased slightly in water of six of the monitoring stations. Nitrite/nitrates were detected in waters from five of the six wells and all three springs in concentrations up to 3 parts per million. Little change was apparent in nitrite/nitrate levels from the previous year.



Fe Iron concentration exceeds 300 parts per billion
N Nitrite/nitrate concentration exceeds 0.45 parts per million

Figure 3.9.—Water Quality of the Valley and Ridge Unconfined Aquifers.

SUMMARY

Analyses of the Ground-Water Monitoring Network for 1986 indicate ground-water quality remained good-to-excellent across the State. Iron and manganese were the only common contaminants that exceeded drinking water standards. These occurrences were typical of waters of the Clayton and Claiborne aquifer systems of the southwest Coastal Plain and the unconfined aquifer systems of the north Georgia Piedmont and Blue Ridge Provinces.

Nitrite/nitrates were detected in waters of several unconfined aquifer systems. Concentrations were suitable for domestic use in all water quality samples that have been collected for the Monitoring Network. However, nitrite/nitrate levels have risen somewhat in waters of the Floridan aquifer system in the outcrop area around Albany (Dougherty County).

A general increase is apparent in the acidity of waters of the Cretaceous aquifer system of the northern Coastal Plain. These waters are among the most corrosive of the State currently being used for domestic consumption. This type of widespread degradation is suggestive of non-point source pollution.

Synthetic organic pollutants were detected in water-level monitoring wells of Albany (Dougherty County) and Atlanta (Fulton County) and an unused municipal well in Conyers (Rockdale County). None of these occurrences threaten currently used drinking water supply wells.

REFERENCES CITED

Clarke, J.S., Brooks, R., and Faye, R.E., 1985, Hydrogeology of the Dublin and Midville Aquifer Systems of East-Central Georgia: Georgia Geologic Survey Information Circular 74, 62 p.

Clarke, J.S., Faye, R.E., and Brooks, R., 1983, Hydrogeology of the Providence Aquifer of Southwest Georgia: Georgia Geologic Survey Hydrologic Atlas 11, 5 pl.

Clarke, J.S., Longsworth, S.A., Joiner, C.N., Peck, M.F., McFadden, K.W., and Milby, B.J., 1987, Ground-Water Data for Georgia, 1986: U.S. Geological Survey Open File Report 87-376, 177 p.

Cressler, C.W., Thurmond, C.J., and Hester, W.G., 1983, Ground Water in the Greater Atlanta Region, Georgia: Georgia Geologic Survey Information Circular 63, 144 p.

Crews,P.A., 1984, Geologic Sections of the Miocene and Pliocene-to-Recent Aquifer Systems, in Arora, R., editor, Hydrogeologic Evaluation for Underground Injection Control in the Coastal Plain of Georgia: Georgia Geologic Survey Hydrologic Atlas 10, 41 pl.

Crews, P.A., and Huddlestun, P.F., 1984, Geologic Sections of the Principal Artesian Aquifer System, in Arora, R., editor, Hydrogeologic Evaluation for Underground Injection Control in the Coastal Plain of Georgia: Georgia Geologic Survey Hydrologic Atlas 10, 41 pl.

Environmental Protection Division, 1983, Rules for Safe Drinking Water, Chapter 391-3-5, Revised August 1983, Georgia Department of Natural Resources, 67 p.

McFadden, S.S., and Perriello, P.D., 1983, Hydrogeology of the Clayton and Claiborne Aquifers in Southwestern Georgia: Georgia Geologic Survey Information Circular 55, 59 p.

National Oceanic and Atmospheric Administration, 1987, Climatological Data Annual Summary: Georgia 1986, Volume 90, Number 13

Pierce, R.R., Barber, N.L., and Stiles, H.R., 1982, Water Use in Georgia by County, for 1980: Georgia Geologic Survey Information Circular 59, 180 p.

Pollard, L.D. and Vorhis, R.C., 1980, The Geohydrology of the Cretaceous Aquifer System in Georgia: Georgia Geologic Survey Hydrologic Atlas 3, 5 pl.

Turlington, M.C., Fanning, J.L., and Doonan, G.A., 1987, Water Use in Georgia by County for 1985: Georgia Geologic Survey Information Circular 81, 109 p.

Vincent, H.R., 1982, Geohydrology of the Jacksonian Aquifer in Central and East Central Georgia: Georgia Geologic Survey Hydrologic Atlas 8, 3 pl.

Wait, R.L., 1960, Source and Quality of Ground Water in Southwestern Georgia, Georgia Geologic Survey Information Circular 18, 74 p.

Appendix

APPENDIX: ANALYSES OF SAMPLES COLLECTED DURING 1986 FOR THE GEORGIA GROUND-WATER MONITORING NETWORK

All water quality samples that are collected for the Georgia Ground-Water Monitoring Network are subjected to a Standard Analysis which includes tests for five 'indicator' parameters, twelve common pesticide and industrial chemicals, and thirty metals. Analyses for additional parameters may be included for samples that are collected from an area where a possibility of ground-water pollution exists due to regional activities. These optional screens include tests for agricultural chemicals, coal tar creosote, phenols and anilines, and volatile organic compounds (refer to Tables A-1 through A-4). Because parameters other than the five 'indicators' and eight of the metals of the Standard Analysis were detected very rarely, other parameters are listed in the appendix only when they were detected.

For this appendix, the following abbreviations are used:

SU = standard units,

mg/L = milligrams per liter (parts per million),

ug/L = micrograms per liter (parts per billion), and

umho/cm = micromhos per centimeter.

Parameter	Detection Limit	
pH	---	SU
Spec. Cond.	1.0	umho/cm
Chloride	0.1	mg/L
Sulfate	2.0	mg/L
NO_2+NO_3	0.02	mg/L
ORGANIC SCREEN #2		
Dicofol	0.10	ug/L
Endrin	0.03	ug/L
Lindane	0.008	ug/L
Methoxyclor	0.30	ug/L
PCB's	0.60	ug/L
Permethrin	0.30	ug/L
Toxaphene	1.20	ug/l
ORGANIC SCREEN #4		
2,4-D	5.2	ug/L
Acifluorfen	1.0	ug/L
Chloramben	0.2	ug/L
Silvex	0.1	ug/L
Trichlorfon	2.0	ug/L
ICP METAL SCREEN		
Calcium	0.0	mg/L
Magnesium	0.0	mg/L
Sodium	0.0	mg/L
Potassium	0.5	mg/L

Parameter	Detection Limit	
ICP METAL SCREEN, Cont.		
Silver	10	ug/L
Aluminum	50	ug/L
Arsenic	50	ug/L
Gold	25	ug/L
Barium	10	ug/L
Beryllium	10	ug/L
Bismuth	50	ug/L
Cadmium	10	ug/L
Cobalt	10	ug/L
Chromium	10	ug/L
Copper	10	ug/L
Iron	10	ug/L
Manganese	10	ug/L
Molybdenum	10	ug/L
Nickel	25	ug/L
Lead	25	ug/L
Antimony	50	ug/L
Selenium	3	ug/L
Tin	50	ug/L
Strontium	10	ug/L
Titanium	10	ug/L
Thallium	50	ug/L
Vanadium	10	ug/L
Yttrium	10	ug/L
Zinc	10	ug/L
Zirconium	10	ug/L

Table A-1: Standard Water Quality Analysis: Indicator Parameters, Organic Screens #2 and #4, and ICP Metal Screen

Parameter	Detection Limit		Parameter	Detection Limit	
Cyanide	0.05	ug/L	Mercury	0.5	ug/L
			ORGANIC SCREEN #1		
Alachlor	3.00	ug/L	Malathion	1.40	ug/L
Atrazine	0.44	ug/L	Metolachlor	2.40	ug/L
Azodrin	1.00	ug/L	Metribuzin	1.25	ug/L
Chloropyrifos	0.80	ug/L	Mevinphos	1.40	ug/L
Cynazine	1.00	ug/L	Napropamide	0.81	ug/L
Dasanit	0.60	ug/L	Parathion (E)	0.08	ug/L
DCPA	0.01	ug/L	Parathion (M)	0.10	ug/L
Demeton	1.00	ug/L	Pebulate	1.81	ug/L
Diazinon	1.00	ug/L	Pendimethalin	1.80	ug/L
Dimethoate	0.50	ug/L	Phorate	1.00	ug/L
Disyton	1.00	ug/L	Profluralin	2.00	ug/L
Eptam	1.70	ug/L	Simazine	1.25	ug/L
Ethoprop	0.50	ug/L	Sutan	1.25	ug/L
Fluchloralin	15.0	ug/L	Terbufos	3.00	ug/L
Fonophos	0.50	ug/L	Trifluralin	2.00	ug/L
Guthion	2.00	ug/L	Vernam	0.56	ug/L
Isopropalin	2.00	ug/L			
			ORGANIC SCREEN #3		
Dinoseb	0.10	ug/L			
			ORGANIC SCREEN #5		
Carbaryl	10.0	ug/L	Linuron	0.06	ug/L
Carbofuran	2.0	ug/L	Methomyl	0.03	ug/L
Diuron	0.03	ug/L	Monuron	0.04	ug/L
Fluometuron	0.08	ug/l	Temik	0.20	ug/L
			ORGANIC SCREEN #7		
EDB	1	ug/L			

Table A-2: Additional Water Quality Analyses:
Cyanide, Mercury, and Organic Screens 1, 3, 5, and 7

ORGANIC SCREEN #8

Parameter	Detection Limit
Napthalene	10 ug/L
2-Chloronaphthalene	10 ug/L
Acenaphthylene	10 ug/L
Acenaphthene	10 ug/L
Fluorene	10 ug/L
Phenanthrene	10 ug/L
Anthracene	10 ug/L
Fluoranthene	10 ug/L
Pyrene	10 ug/L
Benzo(a)anthracene	100 ug/L
Benzo(b)fluoranthene	100 ug/L
Benzo(k)fluoranthene	100 ug/L
Benzo(a)pyrene	100 ug/L
Indeno(1,2,3-cd)pyrene	100 ug/L
Benzo(ghi)perylene	100 ug/L

ORGANIC SCREEN #9

Parameter	Detection Limit
Anilene	10 ug/L
2-Chlorophenol	10 ug/L
2-Nitrophenol	10 ug/L
Phenol	10 ug/L
2,4-Dimethylphenol	10 ug/L
2,3-Dichlorophenol	10 ug/L
2,4,6-Trichlorophenol	10 ug/L
Parachlorometa cresol	10 ug/L
2,4-Dinitrophenol	100 ug/L
4,6-Dinitro-o-cresol	50 ug/L
Pentachlorophenol	25 ug/L
4-Nitrophenol	25 ug/L

Table A-3: Additional Water Quality Analyses: Organic Screens 8 and 9

ORGANIC SCREEN #10

Parameter	Detection Limit
Methyl chloride	1 ug/L
Trichlorofluoromethane	1 ug/L
1,1-Dichloroethylene	1 ug/L
1,1-Dichloroethane	1 ug/L
1,2-Trans-dichloroethylene	1 ug/L
Chloroform	1 ug/L
1,2-Dichloroethane	1 ug/L
1,1,1-Trichloroethane	1 ug/L
Carbon tetrachloride	1 ug/L
Dichlorobromomethane	1 ug/L
1,2-Dichloropropane	1 ug/L
Trans-1,3-dichloropropene	1 ug/L
Trichloroethylene	1 ug/L
Benzene	1 ug/L
Chlorodibromomethane	1 ug/L
1,1,2-Trichloroethane	1 ug/L
Cis-1,3-dichloropropene	1 ug/L
Bromoform	1 ug/L
1,2,2,2-Tetrachloroethane	1 ug/L
Tetrachloroethylene	1 ug/L
Toluene	1 ug/L
Chlorobenzene	1 ug/L
Ethylbenzene	1 ug/L
Acetone	50 ug/L
Methyl ethyl ketone	25 ug/L
Carbon disulfide	1 ug/L
Vinyl chloride	1 ug/L
Isopropyl acetate	1 ug/L
2-Hexanone	1 ug/L
Methyl isobutyl ketone	1 ug/L
Styrene	1 ug/L
Xylene	1 ug/L

Table A-4: Additional Water Quality Analyses: Organic Screen 10

WATER QUALITY ANALYSES FOR THE CRETACEOUS AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-K1 6/05/86 Englehard Kaolin Well #2, Wilkinson Co.	4.7	0.80	0.20	1.5	0.9	ND	ND	4.0	ND	0.22	ND	ND	22	Al = 30 ug/L
GWN-K2 6/05/86 Irwinton Well #2, Wilkinson Co.	4.5	1.10	0.30	1.4	0.5	40	ND	4.0	4.0	0.20	ND	ND	27	Al = 67 ug/L, Cu = 25 ug/L, Zn = 12 ug/L (10)
GWN-K3 4/10/86 Sandersville Well #7B, Washington Co.	5.8	14.20	1.30	1.9	0.7	480	32	3.0	7.0	ND	22	53	97	(1, 5, 10)
GWN-K4 6/03/86 Midville Exp. Sta. Test Well #1, Burke Co.	7.3	11.10	2.10	9.7	5.7	3890	220	2.0	15.0	ND	1410	175	133	Al = 40 ug/L, Zn = 66 ug/L (1, 3, 5, 10)
GWN-K5 9/10/86 Richmond Co. Water Plant #2, Well 101	5.7	0.30	0.20	1.2	0.5	12	ND	2.0	ND	0.22	ND	ND	37	Zn = 23 ug/L (Hg, 8, 9)
GWN-K5A 4/09/86 Richmond Co. Water Plant #2, Well #103	4.7	0.26	0.16	0.9	ND	ND	ND	2.0	ND	0.12	ND	ND	11	(Hg, 8, 9)

WATER QUALITY ANALYSES FOR THE CRETACEOUS AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-K6 6/05/86 Huber Corporation Well #4, Twiggs Co.	5.8	8.00	0.60	2.0	ND	22	ND	3.0	4.0	0.54	12	26	55	Al = 28 ug/L, Zn = 50 ug/L (CN)
GWN-K7 6/05/86 Jones Co. Well #4	5.3	1.60	0.30	1.3	ND	ND	ND	4.0	ND	0.14	12	ND	20	
GWN-K8 1/22/86 Laurens Park Mill Well #4, Laurens Co.	6.6	24.90	1.20	1.9	3.2	3760	45	6.5	7.5	ND	77	115	163	(1, 5, 10)
GWN-K9 6/05/86 Marshallville Well #1, Macon Co.	4.2	1.00	0.20	1.0	0.5	195	ND	2.0	7.0	ND	ND	ND	37	Al = 240 ug/L (1, 5, 10)
GWN-K10 1/21/86 Fort Valley Well #1, Peach Co.	4.9	2.60	0.50	2.5	ND	18	ND	9.5	ND	1.06	ND	ND	28	Al = 21 ug/L, Zn = 62 ug/L (10)
GWN-K10 6/05/86 same as above	4.9	1.10	0.40	2.8	0.6	ND	ND	6.0	ND	1.10	ND	ND	30	Al = 21 ug/L (10)

WATER QUALITY ANALYSES FOR THE CRETACEOUS AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-K11 1/21/86 Warner Robins Well #1A, Houston Co.	6.1	0.60	0.20	1.0	ND	34	ND	14.5	ND	0.22	ND	ND	53	Cu = 11 ug/L, Zn = 33 ug/L (10)
		Chloroform = 26 ug/L, Dichlorobromomethane = 3 ug/L												
GWN-K11 6/05/86 same as above	4.7	0.50	0.20	0.9	ND	15	ND	2.0	ND	0.18	ND	ND	15	Cu = 15 ug/L (10)
GWN-K12 1/21/86 Perry, Holiday Inn Well, Houston Co.	4.4	1.30	0.30	1.1	ND	170	11	7.0	2.5	ND	ND	ND	40	Al = 300 ug/L, Zn = 59 ug/L (1, 5, 10)
GWN-K12 6/05/86 same as above	4.2	1.30	0.20	1.1	0.7	200	12	3.0	9.0	ND	ND	ND	43	Al = 380 ug/L, Zn = 54 ug/L (1, 5, 10)
GWN-K13 3/04/86 Omaha Well #1, Stewart Co.	8.9	2.20	0.03	46.3	0.5	33	ND	8.0	ND	ND	ND	41	191	Zn = 34 ug/L (1, 3, 5)
GWN-K13 11/21/86 same as above	8.8	2.40	0.04	52.4	ND	ND	ND	2.6	11.1	ND	ND	44	233	(1, 3, 5)
GWN-K14 3/10/86 Fort Benning Test Well, Chattahoochee Co.	7.8	12.00	0.20	24.3	3.5	535	13	7.9	9.0	ND	16	210	163	Al = 37 ug/L, Zn = 24 ug/L

WATER QUALITY ANALYSES FOR THE CRETACEOUS AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-K14 12/16/86 Fort Benning Test Well, Chattahoochee Co.	7.6	12.30	0.10	24.2	2.5	145	10	7.8	8.0	ND	15	215	165	
GWN-K15 3/04/86 Georgetown Well #2, Quitman Co.	9.1	0.80	0.03	85.4	ND	60	ND	6.0	ND	ND	ND	18	325	Al = 75 ug/L (10)
GWN-K15 11/21/86 same as above	9.0	0.80	0.02	81.9	0.5	ND	ND	11.4	3.4	0.04	ND	15	344	Al = 32 ug/L (10)
GWN-K16 1/21/86 Packaging Corp. of America, N. Well, Bibb Co.	5.2	0.50	0.20	3.6	ND	ND	ND	4.0	ND	0.36	ND	ND	24	Cu = 12 ug/L (10)
GWN-K16 6/05/86 same as above	5.0	0.40	0.20	3.5	ND	26	ND	2.0	ND	0.33	ND	ND	25	Cu = 18 ug/L (10)
GWN-K17A 4/09/86 East Burke Co. Well #2	7.9	2.30	0.46	37.1	1.7	27	ND	2.0	ND	ND	17	36	170	Al = 42 ug/L (Hg, 1, 3, 5, 8, 9, 10)
GWN-K18 3/04/86 Buena Vista Well #3, Marion Co.	5.0	0.90	0.30	1.0	ND	51	ND	1.0	ND	0.09	ND	ND	25	Al = 47 ug/L (10)

WATER QUALITY ANALYSES FOR THE CRETACEOUS AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-K19 9/10/86 Hephzibah Murphy Street Well, Richmond Co.	5.5	0.80	0.40	2.6	ND	38	ND	5.0	ND	0.06	ND	ND	20	Al = 30 ug/L (10)

WATER QUALITY ANALYSES FOR THE PROVIDENCE AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PD1 10/21/86 Dougherty Co. Test Well #10	9.1	7.50	0.60	85.0	1.5	430	ND	5.6	2.0	ND	ND	87	361	Al = 440 ug/L, Zn = 11 ug/L
GWN-PD2 3/05/86 Preston Well #1, Webster Co.	6.4	11.60	0.70	1.3	0.9	15	ND	3.0	ND	0.64	23	17	86	Zn = 21 ug/L, (1, 3, 5, 10)
Chloroform = 3.0 ug/L, Dichlorobromomethane = 1.0 ug/L, Dibromochloromethane = 1.0 ug/L														
GWN-PD3 4/17/86 Fort Gaines Well #2, Clay Co.	8.3	5.80	1.00	77.3	1.3	18	ND	12.0	7.5	ND	ND	100	365	
GWN-PD3 11/21/86 same as above	8.1	6.00	1.10	82.1	1.0	16	ND	9.8	10.5	ND	ND	100	366	
GWN-PD4A 4/14/86 Americus Well #3, Sumter Co.	7.2	38.50	2.20	2.4	2.4	84	26	3.0	15.0	ND	ND	200	233	(1, 3, 5, 10)

WATER QUALITY ANALYSES OF THE CLAYTON AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-CT1 6/19/86 Turner City Monitoring Well, Dougherty Co.	7.4	10.20	4.50	39.0	3.1	1010	29	2.9	12.0	ND	ND	255	264	(10)
GWN-CT1 10/20/86 same as above	7.8	10.40	5.10	39.2	2.9	845	24	2.0	11.0	ND	ND	260	251	
GWN-CT2 1/07/86 Pete Long Farm Test Well 1, Lee Co.	8.2	42.20	2.70	7.1	2.1	85	ND	3.1	8.1	ND	17	665	207	Al = 64 ug/L, Zn = 10 ug/L (1, 3, 5)
GWN-CT2A 10/28/86 Burton Thomas Well, Sumter Co.	7.9	40.30	3.00	5.2	1.3	725	ND	1.5	17.0	ND	ND	265	243	Zn = 155 ug/L (1, 3, 5)
GWN-CT3 1/09/86 Dawson, Crawford Street Well, Terrell Co.	7.8	36.40	4.10	6.6	1.8	31	ND	3.1	12.8	ND	ND	415	234	(1, 3, 5, 10)
GWN-CT3 10/28/86 same as above	7.9	38.2	4.40	6.7	1.6	29	ND	2.0	10.0	ND	ND	425	250	(1, 3, 5, 10)

WATER QUALITY ANALYSES OF THE CLAYTON AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-CT4 6/17/86 C.T. Martin Farm Test Well 2, Randolph Co.	7.5	41.10	2.90	4.8	1.6	62	ND	2.0	10.0	ND	11	275	256	(1, 3, 5, 10)
GWN-CT4 10/27/86 same as above	7.8	41.00	3.30	4.6	1.5	69	ND	1.5	9.0	ND	10	275	250	Zn = 15 ug/L (1, 3, 5)
GWN-CT5 3/11/86 Cuthbert Monitoring Well, Randolph Co.	7.5	52.40	3.60	1.7	0.9	430	30	3.0	19.0	ND	14	145	288	(1, 3, 5, 10)
GWN-CT5A 10/27/86 Cuthbert Well, Randolph Co.	7.7	52.90	3.60	1.5	1.3	365	28	2.6	11.0	ND	14	145	293	(1, 3, 5, 10)
GWN-CT6A 11/21/86 Sandy Creek Park Well, Clay Co.	7.8	40.90	1.10	1.6	0.7	235	ND	2.6	11.0	ND	12	60	211	Zn = 23 ug/L (1, 3, 5)

WATER QUALITY ANALYSES FOR THE CLAIBORNE AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-CL1 1/06/86 Dougherty Co. Test Well #5	7.4	49.70	8.50	9.1	2.5	635	13	3.1	3.2	ND	ND	375	316	Zn = 24 ug/L (8, 9, 10)
						Tetrachloroethylene = 8.5 ug/L								
GWN-CL1 3/12/86 same as above	7.5	48.10	8.30	9.0	2.7	730	ND	4.0	3.0	ND	ND	365	325	(8, 9, 10)
			Trichloroethylene = 2.0 ug/L, Tetrachloroethylene = 0.5 ug/L											
GWN-CL1 8/05/86 same as above	7.3	51.70	7.80	8.8	2.9	565	15	6.9	5.0	ND	ND	360	351	
GWN-CL1 10/21/86 same as above	7.6	50.20	8.50	8.7	2.8	685	13	7.1	3.0	ND	ND	360	341	Al = 86 ug/L, Cu = 14 ug/L, Zn = 100 ug/L
GWN-CL2 4/14/86 Unadilla Well #3, Dooly Co.	7.4	40.10	0.60	1.2	ND	12	ND	2.0	21.0	0.17	12	115	210	(1, 3, 5)
GWN-CL2 10/20/86 same as above	7.5	40.10	0.70	1.5	ND	405	ND	1.8	7.0	0.17	13	115	210	(1, 3, 5)
GWN-CL3 1/07/86 Pete Long Farm Test Well 2, Lee Co.	5.4	1.40	0.35	1.3	ND	855	24	3.1	ND	ND	ND	15	20	(1, 3, 5)
GWN-CL3 10/28/86 same as above	5.6	1.40	0.30	1.3	ND	875	21	2.6	ND	ND	ND	14	21	(1, 3, 5)

WATER QUALITY ANALYSES FOR THE CLAIBORNE AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-CL4 3/05/86 Plains Well #3, Sumter Co.	4.9	2.00	1.40	4.3	0.9	20	53	7.0	ND	3.42	19	15	58	Al = 42 ug/L, Cu = 39 ug/L, Y = 13 ug/L, Zn = 28 ug/L (1, 3, 5, 10)
GWN-CL5 6/20/86 Shellman Well #2, Randolph Co.	4.2	4.20	2.30	3.1	3.2	ND	375	10.7	ND	5.86	53	34	104	Al = 240 ug/L, Co = 19 ug/L, Cu = 10 ug/L, Y = 53 ug/L
GWN-CL5 10/27/86 same as above	4.5	4.40	2.60	3.4	3.0	42	375	11.7	ND	6.80	53	35	107	Al = 230 ug/L, Co = 14 ug/L, Y = 50 ug/L Zn = 50 ug/L
GWN-CL6 4/17/86 Georgia Tubing Company Well, Early Co.	7.8	35.60	8.10	17.8	3.3	67	ND	5.0	ND	ND	ND	425	299	(1, 3, 5)
GWN-CL6 11/21/86 same as above	7.8	36.30	8.60	19.0	3.2	78	ND	2.6	3.7	ND	ND	440	304	(1, 3, 5)
GWN-CL7 3/05/86 Cordele 2nd Street Well, Crisp Co.	7.6	48.30	1.70	2.0	0.8	31	ND	2.0	7.0	ND	ND	280	239	(10)

WATER QUALITY ANALYSES FOR THE JACKSONIAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-J1 4/10/86 Vidette Well #1, Burke Co.	7.5	55.50	0.93	3.9	0.6	ND	ND	9.9	ND	2.50	48	30	302	Zn = 30 ug/L (1, 3, 5)
GWN-J1 9/11/86 same as above	7.5	61.10	1.00	4.0	ND	25	ND	9.0	ND	1.92	51	32	305	Zn = 48 ug/L (1, 3, 5)
GWN-J2 4/10/86 Girard Elementary School Well, Burke Co.	7.6	42.70	1.30	3.5	1.5	ND	ND	5.0	ND	ND	ND	90	248	Zn = 38 ug/L (1, 3, 5, 10)
GWN-J2 9/11/86 same as above		47.30	1.30	2.3	0.8	36	ND				ND	100		Zn = 24 ug/L (1, 3, 5, 10)
GWN-J3 1/22/86 J.W. Black Well, Emanuel Co.	7.7	31.40	5.70	9.7	1.0	85	120	10.0	ND	ND	690	285	240	Zn = 10 ug/L (1, 5, 10)
GWN-J4 1/22/86 Wrightsville Well #4, Johnson Co.	7.5	43.00	1.90	2.8	1.1	ND	ND	6.0	4.0	0.20	19	165	232	Zn = 11 ug/L (1, 5)

WATER QUALITY ANALYSES FOR THE JACKSONIAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-J4 6/03/86 Wrightsville Well #4, Johnson Co.	7.8	50.10	1.90	2.5	1.4	165	ND	4.0	8.0	0.59	35	150	272	Al = 78 ug/L, Zn = 110 ug/L (1, 5)
GWN-J5 6/04/86 Cochran Well #3, Bleckley Co.	7.6	63.60	2.50	2.9	2.1	225	26	3.0	17.0	ND	ND	220	353	(1, 3, 5, 10)
GWN-J6 4/10/86 Wrens Well #4, Jefferson Co.	6.5	24.10	1.00	1.6	0.7	245	14	3.0	7.0	ND	13	90	141	(1, 5, 10)
GWN-J6 9/10/86 same as above	6.7	26.10	1.00	1.8	ND	220	14	2.5	8.0	ND	13	93	139	Al = 21 ug/L, Zn = 42 ug/L (1, 5, 10)

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA1 5/06/86 Thunderbolt Well #1, Chatham Co.	7.8	26.10	9.60	16.2	3.0	ND	ND	16.0	8.0	ND	11	395	259	Al = 16 ug/L, Zn = 14 ug/L
GWN-PA2 5/06/86 Savannah Well #13, Chatham Co.	7.8	24.20	8.40	14.3	2.8	20	ND	10.0	8.0	ND	11	330	234	Zn = 54 ug/L (8, 9)
GWN-PA3 5/06/86 Layne Atlantic Company Well, Chatham Co.	7.9	28.60	7.70	8.7	2.4	125	ND	6.0	8.0	ND	20	300	230	(8, 9)
GWN-PA4 5/06/86 Tybee Island Well #1, Chatham Co.	7.8	33.80	27.00	56.0	5.3	ND	ND	48.0	145.0	ND	ND	1360	636	Al = 46 ug/L
GWN-PA5A 12/19/86 Interstate Paper Corporation Well #2, Liberty Co.	7.8	25.90	15.10	17.1	3.1	31	ND	6.8	37.4	ND	30	440	296	

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA6 12/19/86 Hinesville Well #5, Liberty Co.	7.8	23.30	12.40	15.3	2.6	ND	ND	5.3	27.3	ND	22	365	252	Zn = 12 ug/L
GWN-PA7 12/19/86 Darien New Well, McIntosh Co.	7.8	46.10	28.60	24.8	2.0	160	ND	21.4	74.8	ND	54	745	297	
GWN-PA8 12/19/86 ITT-Rayonier, Inc. Well #4, Wayne Co.	7.9	31.70	17.60	17.8	2.6	17	ND	8.2	52.0	ND	72	560	343	Zn = 10 ug/L
GWN-PA9A 5/07/86 Brunswick Pulp and Paper (South) Test Well #1, Glynn Co.	7.9	71.00	54.50	110.0	3.7	1470	12	220.0	255.0	ND	98	1020	1300	(8, 9)
GWN-PA9B 5/07/86 Brunswick Pulp and Paper (South) Test Well #2, Glynn Co.	7.7	44.10	26.90	13.7	2.4	31	ND	24.0	105.0	ND	45	430	450	Zn = 15 ug/L (8, 9)
GWN-PA9B 12/18/86 same as above	7.7	42.70	25.80	14.3	1.9	28	ND	14.1	104.0	ND	45	425	442	Zn = 18 ug/L (8, 9)

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA9C 5/07/86 Miller Ball Park Test Well 25, Glynn Co.	7.5	136.00	95.30	575.0	9.3	625	ND*	1000	400.0	ND	65	2250	3900	(8, 9)
GWN-PA9C 12/19/86 same as above	7.7	96.50	61.90	367.0	7.8	375	ND	675.0	299.2	ND	56	1600	2590	Zn = 17 ug/L (8, 9)
GWN-PA10B 12/18/86 Gilman Paper Company Well #11, Camden Co.	7.5	72.40	39.00	49.0	2.6	51	ND	76.7	198.4	ND	36	750	842	Zn = 10 ug/L
GWN-PA11B 12/18/86 St. Marys Well #3, Camden Co.	7.5	72.30	35.70	25.0	2.2	25	ND	34.0	192.0	ND	39	655	678	(1, 5)
GWN-PA12 12/17/86 Folkston Well #3, Charlton Co.	7.9	68.40	30.10	23.2	2.4	67	ND	29.6	144.0	ND	32	545	624	
GWN-PA13 12/17/86 Waycross Well #3 Ware Co.	7.8	40.10	17.10	16.5	1.9	15	ND	13.6	54.6	ND	70	345	376	(8, 9)

* Detection limit = 50 ug/L

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA14 1/23/86 Statesboro Well #7, Bulloch Co.	7.8	30.40	4.90	6.2	0.9	66	35	4.0	7.0	ND	35	190	210	
GWN-PA15 1/23/86 King Finishing Company Fire Pump Well, Screven Co.	7.7	24.70	8.40	7.7	3.9	20	ND	10.0	6.0	ND	ND	410	220	
GWN-PA16 1/22/86 Millen Well #1, Jenkins Co.	7.7	40.10	2.80	4.3	2.1	14	30	11.0	9.0	ND	ND	185	244	(1, 5)
GWN-PA16 6/03/86 same as above	7.8	40.50	2.80	3.4	2.5	20	27	3.0	8.0	ND	ND	190	245	(1, 5)
GWN-PA16 9/11/86 same as above		44.00	2.90	4.5	1.8	33	32			ND	ND	190		Zn = 37 ug/L (1, 5)
GWN-PA17 1/22/86 Swainsboro Well #7, Emanuel Co.	7.5	41.80	2.00	3.0	0.7	17	ND	9.0	ND	0.04	160	170	233	Zn = 14 ug/L
GWN-PA17 6/03/86 same as above	7.7	45.30	2.10	3.0	1.2	ND	ND	5.0	ND	0.03	170	180	253	

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA18 1/23/86 Metter Well #2, Candler Co.	7.8	27.70	3.20	9.3	1.7	ND	55	10.0	3.5	ND	24	240	202	Al = 26 ug/L, Zn = 46 ug/L
GWN-PA19 2/24/86 Douglas Well #4, Coffee Co.	7.6	46.80	19.20	10.1	1.7	34	27	9.0	68.0	ND	55	470	376	
GWN-PA20 2/25/86 Lakeland Well #2, Lanier Co.	7.6	43.20	16.00	4.5	1.0	45	ND	3.0	54.0	ND	27	190	334	(10)
GWN-PA20 7/29/86 same as above	7.5	45.20	16.80	5.2	0.8	18	ND	3.9	58.0	ND	30	195	372	(10)
GWN-PA21 2/25/86 Valdosta Well #1, Lowndes Co.	7.5	32.80	4.30	3.0	ND	ND	ND	5.3	34.0	ND	42	53	219	Zn = 10 ug/L, (1, 5, 8, 9, 10)
GWN-PA21 7/29/86 same as above	7.1	54.70	3.60	4.9	0.6	21	ND	6.9	58.0	ND	65	78	326	(1, 5, 8, 9, 10)
GWN-PA24 2/26/86 Bainbridge Well #1, Decatur Co.	7.8	37.80	3.40	1.7	ND	ND	ND	4.0	ND	1.08	ND	37	199	(1, 3, 5, 10)

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA25 4/17/86 Donalsonville East 7th Street Well, Seminole Co.	7.5	53.10	0.60	3.3	ND	ND	ND	5.0	ND	1.38	ND	25	267	Cu = 80 ug/L, Zn = 20 ug/L (CN, 1, 3, 5, 10)
GWN-PA26 4/17/86 Colquitt Well #3, Miller Co.	7.5	42.70	0.50	1.8	ND	ND	ND	3.0	ND	1.46	ND	18	208	(1, 3, 5, 10)
GWN-PA27 2/26/86 Camilla New Well, Mitchell Co.	7.7	43.90	1.20	1.6	ND	ND	ND	2.0	ND	0.30	10	38	209	(1, 3, 5, 8, 9, 1(
GWN-PA27 7/30/86 same as above	7.7	43.70	1.20	1.7	ND	ND	ND	3.0	ND	0.30	10	38	235	(1, 3, 5, 8, 9, 10
GWN-PA28 2/26/86 Moultrie Well #1, Colquitt Co.	7.8	37.10	20.80	26.7	4.4	ND	ND	10.0	92.0	ND	ND	2100	439	
GWN-PA29 2/25/86 Adel Well #6, Cook Co.	7.6	46.10	16.40	3.6	1.0	54	28	4.0	7.0	ND	13	325	346	(CN, 1, 5, 10)
GWN-PA29 7/29/86 same as above	7.8	47.20	6.60	3.8	0.8	55	30	3.9	63.0	ND	13	310	371	(CN, 1, 5, 10)

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA30 2/25/86 Nashville Mills Well #2, Berrien Co.	7.7	41.00	15.90	4.7	1.1	13	ND	5.0	50.0	ND	52	230	320	Zn = 48 ug/L
GWN-PA30 7/29/86 same as above	7.8	41.20	16.50	5.1	1.1	17	ND	4.9	60.0	ND	53	230	362	
GWN-PA31 2/27/86 Tifton Well #6, Tift Co.	7.9	43.80	8.60	2.4	0.9	ND	ND	2.0	ND	ND	65	265	246	Al = 40 ug/L, Zn = 40 ug/L
GWN-PA32 2/24/86 Ocilla Well #3, Irwin Co.	7.7	35.10	5.10	2.1	0.6	140	28	2.0	ND	ND	78	155	193	
GWN-PA33 2/24/86 Fitzgerald Well C, Ben Hill Co.	7.8	23.90	8.70	2.8	0.9	20	16	2.0	ND	ND	2180	270	173	Al = 30 ug/L, Zn = 100 ug/L (10)
GWN-PA34 6/04/86 McRae Well #1, Telfair Co.	7.8	47.60	9.90	4.7	2.1	180	100	8.0	16.0	ND	260	705	327	Al = 35 ug/L, Zn = 60 ug/L
GWN-PA35 6/04/86 Mt. Vernon New Well, Montgomery Co.	7.9	26.80	12.70	5.6	4.6	58	28	4.0	9.0	2.45	89	470	265	

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA36 6/04/86 Vidalia Well #1, Toombs Co.	7.8	27.30	5.20	10.7	3.2	29	37	5.0	7.0	4.20	145	355	227	(CN)
GWN-PA37 7/28/86 Holland Farm Well, Laurens Co.	7.1	45.50	0.60	2.5	ND	32	ND	3.9	ND	1.53	12	23	244	Al = 21 ug/L
GWN-PA38 7/28/86 Eastman Well #4, Dodge Co.	7.6	49.30	1.70	2.2	1.0	14	ND	3.0	5.0	0.23	110	130	269	(1, 3, 5, 10)
GWN-PA39 2/27/86 Sylvester Well #1, Worth Co.	7.5	48.70	7.40	3.2	1.2	11	ND	2.0	ND	0.03	195	365	263	Zn = 24 ug/L (1, 3, 5, 10)
GWN-PA39 7/30/86 same as above	7.6	47.20	6.60	3.8	0.8	ND	ND	3.9	ND	ND	205	355	297	(1, 3, 5, 10)
GWN-PA40 4/15/86 Merck and Company, Inc. Well #8, Dougherty Co.	7.5	51.40	1.00	2.0	ND	ND	ND	4.0	ND	1.32	14	49	263	(CN)
GWN-PA40 10/21/86 same as above	7.7	50.70	1.20	2.4	ND	17	ND	3.6	ND	1.05	16	51	267	Al = 49 ug/L, Zn = 60 ug/L (CN)

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	1.0	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA41 1/09/86	7.0	105.00	2.90	19.5	2.4	32	ND	20.4	26.3	1.62	45	82	559	(1, 3, 5, 10)
Dougherty Co. Test Well 13	1,1 Dichloroethylene = 2.4 ug/L, Trichloroethylene = 1.0 ug/L, Tetrachloroethylene = 2.8 ug/L													
GWN-PA41 8/05/86 same as above	7.2	98.80	2.30	18.2	2.1	70	11	16.9	20.0	3.40	40	83	592	Al = 130 ug/L
GWN-PA41 11/13/86 same as above	7.3	92.00	2.30	17.9	1.2	16	ND	17.9	12.5	3.83	38	92	542	(CN, 1, 3, 5, 10)
	1,2-Trans-dichloroethylene = 3.3 ug/L, Tetrachloroethylene = 2.8 ug/L													
GWN-PA42 4/14/86 Garrett Farm Observation Well #4, Lee Co.	7.0	27.20	0.40	2.3	ND	14	ND	8.0	ND	3.15	ND	13	169	(CN)
GWN-PA42 10/22/86 same as above	7.3	30.80	0.50	2.5	ND	ND	ND	6.6	2.0	3.08	ND	14	178	(CN)
GWN-PA43 2/26/86 Newton Well #1, Baker Co.	7.7	43.60	0.90	2.2	0.5	ND	ND	3.0	ND	1.20	ND	39	207	(1, 3, 5, 10)
GWN-PA43 7/30/86 same as above	7.8	43.20	1.00	2.5	ND	ND	ND	3.9	ND	1.47	ND	43	240	(1, 3, 5, 10)

WATER QUALITY ANALYSES FOR THE FLORIDAN AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L				ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-PA44 2/27/86 Sycamore Well #2, Turner Co.	7.7	31.60	4.30	2.1	0.8	ND	ND	2.0	ND	0.13	140	285	174	(1, 3, 5, 10)
GWN-PA45 2/24/86 Abbeville Well #2, Wilcox Co.	7.5	51.70	3.80	2.0	1.9	38	ND	2.0	7.0	0.07	14	220	268	Al = 27 ug/L, Zn = 41 ug/L (1, 3, 5, 10)
GWN-PA46B 3/05/86 Casey Tyson Well, Crisp Co.	7.6	44.00	0.70	2.0	ND	28	ND	40.0	ND	1.20	27	34	213	Zn = 135 ug/L (1, 3, 5, 10)
GWN-PA47 6/19/86 Haley Farms Test Well #19, Lee Co.	7.5	53.40	1.20	2.3	ND	ND	ND	6.8	4.0	3.75	17	87	301	(1, 3, 5, 10)
GWN-PA47A 10/22/86 Haley Farms' Irrigation Well, Lee Co.	7.5	68.20	1.40	2.4	0.5	ND	ND	10.7	2.0	7.15	17	65	363	(1, 3, 5, 10)
GWN-PA48 6/18/86 (Harvey) Test Well #1, Early Co.	7.5	45.90	0.60	2.1	ND	17	ND	4.9	4.0	1.12	ND	23	246	Al = 72 ug/L, Zn = 85 ug/L (1, 3, 5, 10)

WATER QUALITY ANALYSES FOR THE MIOCENE AQUIFER SYSTEM

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-MI1 2/25/86 McMillan Well, Cook Co.	7.7	21.80	13.20	6.3	1.5	ND	59	2.0	5.0	ND	28	120	219	Zn = 79 ug/L (CN, 1, 5, 10)
GWN-MI1 7/29/86 same as above	7.9	22.70	13.90	6.8	1.3	ND	26	3.9	5.0	ND	20	120	250	Zn = 78 ug/L (CN, 1, 5, 10)
GWN-MI2 2/25/86 Boutwell Well, Lowndes Co.	4.7	1.80	0.90	4.8	0.6	50	ND	7.0	ND	2.20	13	10	49	Al = 92 ug/L, Cu = 10 ug/L, Zn = 58 ug/L (1, 5, 8, 9, 10)
GWN-MI3 5/06/86 Coffin Park Test Well #3, Glynn Co.	7.7	66.50	11.40	20.2	4.4	68	13	18.0	35.0	ND	10	440	476	(10)
GWN-MI3 12/19/86 same as above	7.6	66.10	11.40	21.1	3.8	91	14	19.9	44.0	ND	11	445	469	(10)
GWN-MI4 5/05/86 Hopeulikit Test Well #2, Bulloch Co.	7.1	17.20	5.40	5.9	1.9	630	105	3.0	7.0	ND	75	90	140	Al = 120 ug/L, Zn = 75 ug/L

WATER QUALITY ANALYSES FOR THE BLUE RIDGE UNCONFINED AQUIFER SYSTEMS

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-BR1 5/13/86 Hiawassee Well #6, Towns Co.	5.9	3.30	1.10	2.1	1.5	40	13	2.9	5.0	0.41	25	26	45	Zn = 76 ug/L (10)
GWN-BR2 5/13/86 Blairsville Well #7, Union Co.	7.0	14.90	1.40	6.6	2.3	4950	64	3.9	14.0	0.07	ND	70	125	Zn = 10 ug/L
GWN-BR3 5/13/86 Dawsonville, Shoal Hole Park Well, Dawson Co.	7.7	23.80	2.30	12.8	2.5	200	105	2.0	12.0	ND	ND	215	190	Zn = 14 ug/L
GWN-BR4 5/13/86 Morganton Old Well, Fannin Co.	6.2	10.10	2.30	7.2	2.2	16	ND	2.9	ND	1.86	ND	100	119	Zn = 190 ug/L (CN, 10)

WATER QUALITY ANALYSES FOR THE PIEDMONT UNCONFINED AQUIFER SYSTEMS

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-P1 8/27/86 Luthersville New Well, Meriwether Co.	6.5	7.20	2.30	9.6	2.7	2700	56	10.0	15.0	ND	ND	92	111	Zn = 30 ug/L
GWN-P2 4/03/86 Riverdale Delta Drive Well, Clayton Co.	6.2	9.40	1.30	9.4	1.4	ND	19	5.0	ND	1.23	29	74	102	Zn = 11 ug/L (10)
GWN-P2 9/16/86 same as above	6.7	10.00	1.30	9.8	1.4	695	45	3.9	2.0	1.08	30	74	108	Al = 88 ug/L, Zn = 13 ug/L (10)
GWN-P3 4/02/86 Fort McPherson Monitoring Well, Fulton Co.	6.7	8.40	2.20	8.5	2.4	1090	45	4.0	6.0	ND	12	68	107	Al = 130 ug/L, Zn = 26 ug/L (8, 9, 10)
				Bis(2-Ethyl Hexyl) Phthalate = 84.0 ug/L										
GWN-P3 10/09/86 same as above	7.0	9.00	2.50	9.1	3.3	1450	46	1.5	4.0	ND	12	70	105	Al = 185 ug/L, Ti = 18 ug/L (8, 9, 10)
				Bis(2-Ethyl Hexyl) Phthalate = 23.0 ug/L										

WATER QUALITY ANALYSES FOR THE PIEDMONT UNCONFINED AQUIFER SYSTEMS

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-P4A 4/03/86 Sonoco Products Well, Fulton Co.	7.1	7.30	1.10	3.3	1.1	64	ND	6.0	7.0	0.34	ND	25	74	Al = 26 ug/L, Zn = 23 ug/L (8, 9, 10)
		Chloroform = 26.0 ug/L, Dichlorobromomethane = 3.0 ug/L												
GWN-P4B 9/16/86 Barton Brands of Georgia, Inc. Well, Fulton Co.	6.6	17.30	3.30	22.1	2.6	315	1310	19.1	6.0	0.39	75	265	226	(8, 9, 10)
GWN-P5 5/14/86 Flowery Branch Well #1, Hall Co.	6.9	24.10	4.00	1.7	1.7	ND	ND	2.0	ND	0.39	30	93	164	(10)
GWN-P6 3/10/86 Talbot Co. Oak Mountain Well	4.8	0.80	0.30	1.2	1.7	1270	24	2.0	2.0	0.16	15	ND	19	Al = 55 ug/L
GWN-P7 8/27/86 Hampton Well #6, Henry Co.	6.7	11.90	4.80	7.4	1.5	65	ND	2.5	6.0	0.23	44	66	148	(10)
GWN-P8 5/14/86 Wayne Poultry Company Well #4, Jackson Co.	7.0	24.40	7.90	8.7	1.5	ND	ND	3.9	4.0	0.24	ND	70	216	

WATER QUALITY ANALYSES FOR THE PIEDMONT UNCONFINED AQUIFER SYSTEMS

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-P9 6/05/86 Gray Well #4, Jones Co.	6.4	14.30	7.80	12.0	3.9	1190	185	9.0	31.0	ND	37	110	206	Zn = 17 ug/L (10)
GWN-P10 5/14/86 Franklin Springs Well #2, Franklin Co.	6.6	7.80	2.60	5.6	2.7	6650	45	3.9	15.0	ND	45	ND	101	Zn = 20 ug/L
GWN-P11 5/14/86 Danielsville Well #1, Madison Co.	6.3	5.40	2.40	5.5	1.6	300	ND	2.9	3.0	0.61	10	32	79	
GWN-P12 8/27/86 Nabisco Company Well #1, Meriwether Co.	6.4	11.40	2.70	13.2	3.4	22	ND	12.5	9.0	3.65	47	82	155	Cu = 15 ug/L, Zn = 34 ug/L
GWN-P13 8/27/86 Conyers Rosser Street Well, Rockdale Co.	7.5	24.30	1.40	10.7	1.7	1410	80	4.0	17.0	ND	ND	65	191	Al = 380 ug/L, Mo = 25 ug/L, Ti = 55 ug/L, Zn = 125 ug/L (10)

Tetrachloroethylene = 6.5 ug/L

WATER QUALITY ANALYSES FOR THE PIEDMONT UNCONFINED AQUIFER SYSTEMS

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-P14 8/27/86 Upson Co., Sunset Village Well	5.3	0.60	0.20	1.5	1.6	11	ND	2.0	ND	0.52	27	ND	18	Zn = 47 ug/L
GWN-P15A 4/03/86 Sanford Well, Dekalb Co.	7.2	16.60	4.20	7.4	4.4	235	65	6.0	7.0	0.20	56	88	164	Zn = 67 ug/L (10)
GWN-P15A 9/16/86 same as above	7.4	16.90	4.20	7.4	4.6	470	85	5.9	6.0	ND	60	88	166	Zn = 26 ug/L (10)
GWN-P16 5/14/86 Demorest Double Springs Road Well, Habersham Co.	7.0	18.50	1.10	14.2	1.8	1670	155	3.9	12.0	ND	ND	145	179	Zn = 315 ug/L (10)

WATER QUALITY ANALYSES FOR THE VALLEY AND RIDGE UNCONFINED AQUIFER SYSTEMS

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-VR1 8/06/86 Floyd Co. Kingston Road Well	7.9	24.60	12.80	1.0	ND	ND	ND	3.0	ND	0.52	ND	15	237	(10)
GWN-VR2 2/12/86 Tri County Hosp. Cooling Tower Well, Catoosa Co.	7.0	78.50	30.00	28.9	1.1	ND	ND	56.9	16.5	0.39	37	105	627	(10)
GWN-VR2 8/05/86 same as above	7.4	73.90	22.70	28.8	1.0	61	46	61.5	16.0	0.81	32	84	709	Al = 21 ug/L (10)
GWN-VR3 2/12/86 Chickamauga Crawfish Spring, Walker Co.	7.6	31.40	13.90	1.2	0.6	ND	ND	1.5	2.5	0.61	72	25	235	(10)
GWN-VR3 8/05/86 same as above	7.7	29.80	12.20	0.9	0.5	ND	ND	2.0	ND	0.65	74	23	253	Zn = 18 ug/L (10)
GWN-VR4 8/05/86 Standard Coosa-Thatcher Company Well #2, Walker Co.	7.6	81.80	17.70	33.3	3.7	415	50	27.8	62.0	ND	130	900	716	

WATER QUALITY ANALYSES FOR THE VALLEY AND RIDGE UNCONFINED AQUIFER SYSTEMS

PARAMETERS	pH	Ca	Mg	Na	K	Fe	Mn	Cl	SO_4	NO_2+ NO_3	Ba	Sr	Spec. Cond.	OTHER METALS DETECTED/ (OTHER SCREENS TESTED)
UNITS	SU	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L	$mgSO_4$/L	mgN/L	ug/L	ug/L	umho/cm	
DETECTION LIMITS	--	0.00	0.00	0.0	0.5	10	10	0.1	2.0	0.02	10	10	--	
Well ID# Date														
GWN-VR5 8/06/86 Chattooga Co. Well #4	7.4	68.60	3.20	5.0	1.1	ND	ND	10.9	ND	3.35	95	165	398	Zn = 45 ug/L (10)
GWN-VR6 8/05/86 Chemical Products Corporation East Well, Bartow Co.	7.9	26.60	14.00	3.8	1.0	ND	ND	6.9	5.0	0.68	795	230	264	
GWN-VR7 8/05/86 Adairsville Lewis Spring, Bartow Co.	7.8	28.30	12.50	0.7	0.7	ND	ND	3.0	5.0	0.30	33	26	252	(10)
GWN-VR8 8/06/86 Cedartown Spring, Polk Co.	7.6	31.10	13.10	1.1	ND	19	ND	3.0	5.0	0.61	12	20	266	(10)
GWN-VR9 8/06/86 Polk Co. Well #2	7.8	33.90	11.50	1.1	ND	37	ND	4.0	5.0	0.82	10	23	267	Al = 115 ug/L, Zn = 19 ug/L

For convenience in selecting our reports from your bookshelves, they are color-keyed across the spine by subject as follows:

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Dk. Purple	Piedmont and Blue Ridge mapping and structural geology
Maroon	Coastal Plain mapping and stratigraphy
Lt. Green	Paleontology
Lt. Blue	Coastal Zone studies
Dk. Green	Geochemical and geophysical studies
Dk. Blue	Hydrology
Olive	Economic geology
	Mining directory
Yellow	Environmental studies
	Engineering studies
Dk. Orange	Bibliographies and lists of publications
Brown	Petroleum and natural gas
Black	Field trip guidebooks
Dk. Brown	Collections of papers

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Editor: Patricia Allgood

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