GROUND-WATER QUALITY IN GEORGIA FOR 1999

John C. Donahue

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
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ATLANTA
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CIRCULAR 12-O

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CHAPTER 1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This report, covering the calendar year 1999, is the fifteenth in a series of summaries discussing the chemical quality of ground water in Georgia. These summaries are among the tools used by the Georgia Environmental Protection Division (EPD) to assess trends in the quality of the State's ground-water resources. EPD is the State organization with regulatory responsibility for maintaining and, where possible, improving ground-water quality and availability. EPD has implemented a comprehensive statewide ground-water management policy of anti-degradation (EPD, 1991; 1998). Five components constitute EPD's ground-water quality assessment program:

1. The Georgia Ground-Water Monitoring Network. The Geologic Survey Branch of EPD maintains this program, which is designed to evaluate the ambient ground-water quality of nine aquifer systems throughout the State of Georgia. The data collected from sampling of the Ground-Water Monitoring Network form the basis for this report.

2. Sampling of public drinking water wells as part of the Safe Drinking Water Program (Water Resources Management Branch). This program provides data on the quality of ground water that the residents of Georgia are using.

3. Special studies addressing specific water quality issues. A survey of nitrite /nitrate levels in shallow wells located throughout the State of Georgia (Shellenberger, et al., 1996; Stuart, et al., 1995) and the operation of a Pesticide Monitoring Network, currently conducted jointly by the Geologic Survey Branch and the Georgia Department of Agriculture (GDA) (Tolford, 1999), are examples of these types of studies.

4. Ground-water sampling at environmental facilities such as municipal solid waste landfills, RCRA facilities, and sludge disposal facilities. The primary agencies responsible for monitoring these facilities are EPD's Land Protection, Water Protection, and Hazardous Waste Management Branches.

5. The development of a wellhead protection program (WHP), which is designed to protect the area surrounding a municipal drinking water well from contaminants. The U.S. Environmental Protection Agency (EPA) approved Georgia's WHP Plan on September 30, 1992. The WHP Plan became a part of the Georgia Safe Drinking Water Rules, effective July 1, 1993. The protection of public water supply wells from contaminants is important not only for maintaining ground-water quality, but also for ensuring that public water supplies meet health standards.

Analyses of water samples collected for the Georgia Ground-Water Monitoring Network during calendar year 1999 and from previous years form the database for this summary. The Georgia Ground-Water Monitoring Network comprises 128 wells and springs. All stations are generally sampled on an annual basis. Testing for most stations is restricted to volatile organic compounds and nitrate/nitrite. Stations showing recent pollution or contamination may be subject to confirmatory sampling on a basis more frequent than annual. During calendar year 1999, EPD personnel collected 123 samples from 114 wells and 7 springs. A review of the calendar year 1999 data and comparison of these data with those for samples collected as early as 1984 indicate that ground-water quality at most of the 128 sampling sites generally has changed little and remains excellent.

1.2 FACTORS AFFECTING CHEMICAL GROUND-WATER QUALITY

The chemical quality of ground water drawn for sampling is the result of complex physical, chemical, and biological processes. Among the more significant controls are the chemical quality of the water entering the ground-water flow system, the reactions of infiltrating water with the soils and rocks that are encountered, and the effects of the well-and-pump system.

Most water enters the ground-water system in upland recharge areas. Water seeps through interconnected pores and joints in the soils and rocks until discharged to a surface-water body (e.g., stream, river, lake, or ocean). The initial water chemistry, the amount of recharge, and the attenuation capacity of soils have a strong influence on the quality of ground water in recharge areas. Chemical interactions between the water and the aquifer host rocks have an increasing significance with longer underground residence times. As a result, ground water from discharge areas tends to be more highly mineralized than ground water in recharge areas.

The well-and-pump system can also have a strong influence on the quality of the well water. Well casings, through compositional breakdown, can contribute metals (e.g., iron from steel casings) and organic compounds (e.g., tetrahydrofuran from PVC pipe cement) to the water. Pumps often aerate the water being discharged. An improperly constructed well can present a conduit that allows local pollutants to enter the ground-water flow system.

1.3 HYDROGEOLOGIC PROVINCES OF GEORGIA

This report defines three hydrogeologic provinces in Georgia by their general geologic and hydrologic characteristics (Figure 1-1). These provinces consist of:

1. the Coastal Plain Province of south Georgia;
2. the Piedmont/Blue Ridge Province, which includes all but the

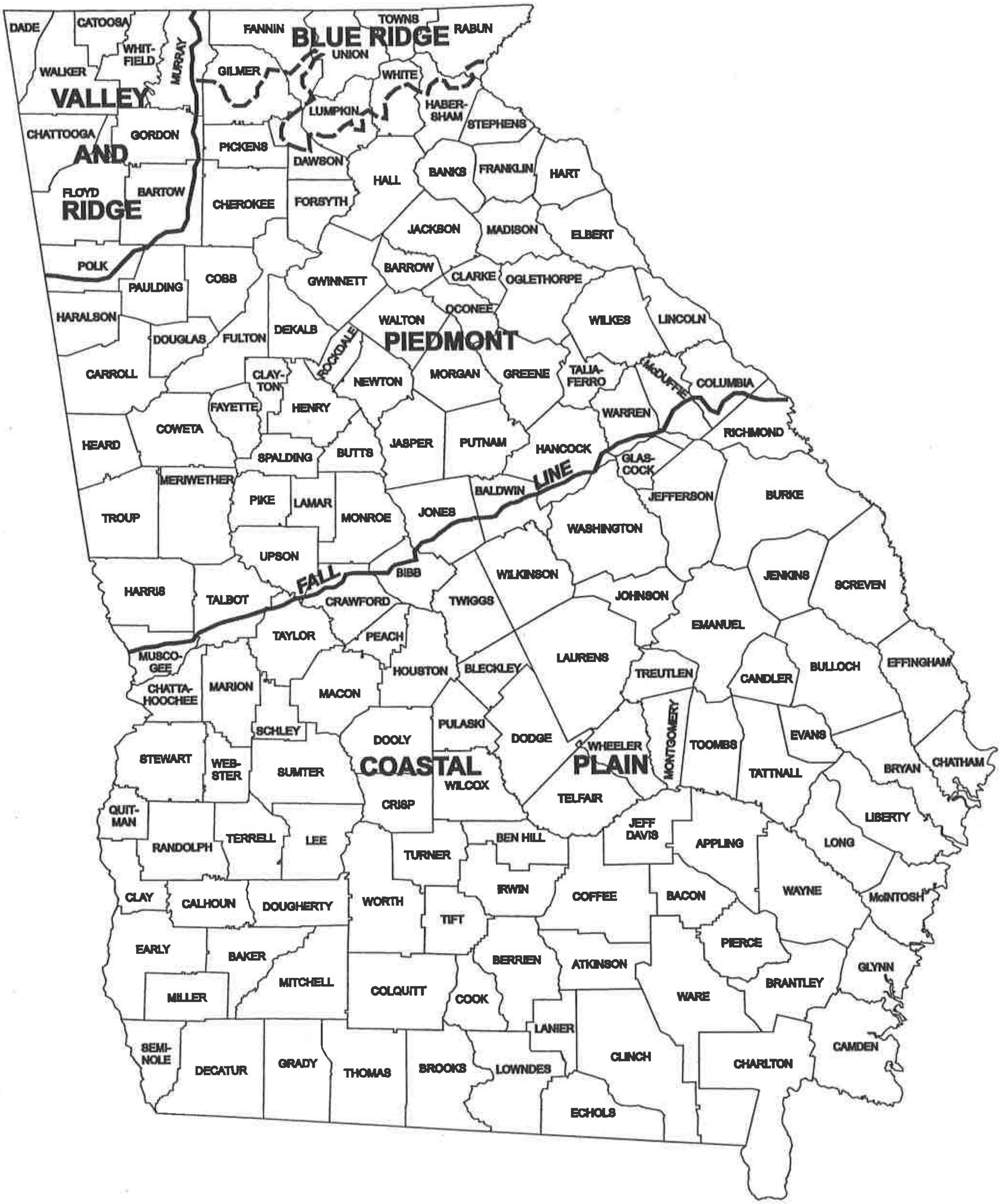


Figure 1-1. - The Hydrogeologic Provinces of Georgia.

northwest corner of north Georgia; and

3. the Valley and Ridge Province of northwest Georgia.

1.3.1 Coastal Plain Province

Georgia's Coastal Plain Province generally comprises a wedge of loosely consolidated sediments that gently dip and thicken to the south and southeast. Ground water in the Coastal Plain Province flows through interconnected pore space between grains in the host rocks and through solution-enlarged voids.

The oldest outcropping sedimentary formations (Cretaceous) are exposed along the Fall Line, which is the northern limit of the Coastal Plain Province. Successively younger formations occur at the surface to the south and southeast.

The Coastal Plain contains Georgia's major confined (artesian) aquifers. Confined aquifers are those in which a layer of impermeable material (i.e., clay or shale) holds the top of the water column below the level to which it would normally rise. Water enters the aquifers in their up-dip outcrop areas, where the more permeable sediments of the aquifer tend to be exposed. Many Coastal Plain aquifers are unconfined in their up-dip outcrop areas, but become confined in down-dip areas to the southeast, where they are overlain by successively younger rock formations. Ground-water flow through confined Coastal Plain aquifers is generally to the south and southeast, in the direction of the dip of the rocks.

The sediments forming the seven major aquifers in the Coastal Plain range in age from Cretaceous to Miocene. Horizontal and vertical changes in the permeability of the rock units that form these aquifers determine the thickness and extent of the aquifers. Several aquifers may be present in a single geographic area, forming a vertical "stack".

The Cretaceous and Jacksonian aquifer systems (primarily sands) are a common source of drinking water within a 35-mile wide band that lies adjacent to and south of the Fall Line. Southwestern Georgia relies on four vertically stacked aquifers (sands and carbonates) for drinking-water supplies: the Providence, Clayton, Claiborne and Floridan aquifer systems. The Floridan aquifer system (primarily carbonates) serves most of south-central and southeastern Georgia. The Miocene aquifer system (primarily sands) is the principal "shallow" unconfined aquifer system occupying much of the same broad area underlain by the Floridan aquifer system. It becomes confined in the coastal counties and locally in the Grady, Thomas, Brooks and Lowndes County area of south Georgia.

1.3.2 Piedmont/Blue Ridge Province

Crystalline rocks of metamorphic and igneous origin (primarily Precambrian and Paleozoic in age) underlie the Piedmont and Blue Ridge Provinces. These two provinces differ geologically but are discussed together here because they share common hydrologic properties. The principal water-bearing features are fractures, compositional layers, and other geologic discontinuities in the rock, as well as intergranular porosity in the overlying soil and saprolite horizons. Thick soils and saprolites are often important as the "reservoir" that supplies water to the water-bearing fracture and joint systems. Ground water typically flows from local highlands toward discharge areas along streams. However, during prolonged dry periods or in areas of heavy pumpage, surface water may flow from the streams into the ground-water systems.

1.3.3 Valley and Ridge Province

Consolidated Paleozoic sedimentary formations characterize the Valley and Ridge Province. The principal permeable features of the Valley and Ridge Province are fractures and solution voids; intergranular porosity also is important in some places. Locally, ground-water and surface-water systems closely interconnect. Dolostones and limestones of the Knox Group are the principal aquifers where they occur in the axes of broad valleys. The greater hydraulic conductivities of the thick carbonate sections in this Province, in part due to solution-enlarged joints, permit development of higher yielding wells than in the Piedmont and Blue Ridge Province.

1.4 REGIONAL GROUND-WATER PROBLEMS

Data from ground-water investigations in Georgia, including those from the Ground-Water Monitoring Network, indicate that virtually all of Georgia has shallow ground water sufficient for domestic supply. Iron, aluminum, and manganese are the only constituents that occur routinely in concentrations exceeding drinking-water standards. These metals are naturally occurring and do not pose a health risk. Iron and manganese can cause reddish to brownish stains on objects.

Only a few occurrences of polluted or contaminated ground waters are known from North Georgia (see Section 4). Aquifers in the outcrop areas of Cretaceous sediments south of the Fall Line typically yield acidic water that may require treatment. The acidity occurs naturally and results both from the inability of the sandy aquifer sediments to neutralize acidic rainwater and from biologically influenced acid-producing reactions between infiltrating water and soils and sediments. Nitrite/nitrate concentrations in shallow ground water from the farm belt of southern Georgia are usually within drinking-water standards, but are somewhat higher than levels found in other areas of the State.

Besides the karst plain area (Dougherty Plain) in southwest Georgia, the Floridan aquifer system contains two other areas of naturally-occurring reduced ground-water quality. The first is the area of the Gulf Trough, a narrow, linear geological feature extending from southwestern Decatur County through central Bulloch County. Here, ground water is typically high in total dissolved solids and contains elevated levels of barium, sulfate, and radionuclides. The second is the coastal area of Georgia, where influx of water with high dissolved solids contents presents problems. In the Brunswick area, ground-water withdrawal from the upper Floridan results in up-coning of water with high dissolved solids contents from deeper parts of the aquifer. In the Savannah region, a cone of depression caused by pumping in and around Savannah induces saline ground water to flow down-gradient from the Port Royal Sound area of South Carolina toward Savannah.

CHAPTER 2 GEORGIA GROUND-WATER MONITORING NETWORK

2.1 MONITORING STATIONS

Stations of the calendar year 1999 Ground-Water Monitoring Network are situated in the seven major aquifers and aquifer systems of the Coastal Plain Province and in the unconfined ground-water systems of the Piedmont and Blue Ridge Provinces and of the Valley and Ridge Province (Table 2-1). Monitoring stations are located in three critical settings:

1. areas of surface recharge;
2. areas of potential pollution related to regional activities (e.g., agricultural and industrial areas); and
3. areas of significant ground-water use.

Most of the monitoring stations are municipal, industrial, and domestic wells that have reliable well-construction data. The Monitoring Network also includes monitoring wells in specific areas where the State's aquifers are recognized to be especially susceptible to contamination or pollution (e.g., the Dougherty Plain of southwestern Georgia and the State's coastal area).

2.2 USES AND LIMITATIONS

Regular sampling of wells and springs of the Ground-Water Monitoring Network permits analysis of ground-water quality with respect to location (spatial trends) and with respect to the time of sample collection (temporal trends). Spatial trends are useful for assessing the effects of the geologic framework of the aquifer and regional land-use activities on ground-water quality. Temporal trends permit an assessment of the effects of rainfall and drought periods on ground-water quantity and quality. Both trends are useful for the detection of non-point source pollution. Non-point source pollution arises from broad-scale phenomena such as acid rain deposition and application of agricultural chemicals on crop lands.

It should be noted that the data of the Ground-Water Monitoring Network represent water quality in only limited areas of Georgia. Monitoring water quality at 128 sites located throughout Georgia provides an indication of ground-water quality at the locality sampled and at the horizon corresponding to the screened interval in the well or to the head of the spring at each station in the Monitoring Network. Caution should be exercised in drawing strict conclusions and applying any results reported in this study to ground waters that are not being monitored.

Stations of the Ground-Water Monitoring Network intentionally are located away from known point sources of pollution. The wells provide baseline data on ambient water

Table 2-1. Georgia Ground-Water Monitoring Network, Calendar Year 1999.

AQUIFER SYSTEM	NUMBER OF MONITORING STATIONS VISITED & SAMPLES TAKEN, 1999	PRIMARY STRATIGRAPHIC EQUIVALENTS	AGE OF AQUIFER FORMATIONS
Cretaceous	17 stations (17 samples)	Ripley Formation, Cusseta Sand, Blufftown Formation, Eutaw Formation, Tuscaloosa Formation, Steel Creek Formation, Gaillard Formation, Pio Nono Formation	Late Cretaceous
Providence	2 stations (2 samples)	Providence Sand	Late Cretaceous
Clayton	5 stations (6 samples)	Clayton Formation	Paleocene
Claiborne	5 stations (5 samples)	Claiborne Group	Middle Eocene
Jacksonian	8 stations (8 samples)	Barnwell Group	Late Eocene
Floridan	49 stations (49 samples)	Predominantly Suwannee Limestone and Ocala Group	Predominantly Middle Eocene to Oligocene
Miocene	8 stations (9 samples)	Predominantly Altamaha Formation and Hawthorne Group	Miocene-Recent
Piedmont/Blue Ridge	18 stations (18 samples)	Various igneous and metamorphic complexes	Predominately Paleozoic and Precambrian
Valley and Ridge	9 stations (9 samples)	Shady Dolomite, Knox Group, and Chickamauga Group	Paleozoic: Cambrian and Ordovician

quality in Georgia. EPD requires other forms of ground-water monitoring for activities that may result in point source pollution (e.g., landfills, hazardous waste facilities and land application sites) through its environmental facilities permit programs.

Ground-water quality changes gradually and predictably in the areally extensive aquifers of the Coastal Plain Province. The Monitoring Network allows for some definition of the chemical processes occurring in large confined aquifers. Unconfined aquifers in northern Georgia and the surface recharge areas of southern Georgia are of comparatively small areal extent and more open to interactions with land-use activities. The wide spacing of monitoring stations does not permit equal characterization of water-quality processes in these settings. The quality of water from monitoring wells completed in unconfined aquifers represents only the general nature of ground water in the vicinity of the monitoring wells. Ground water in the recharge areas of the Coastal Plain aquifers is the future drinking-water resource for down-flow areas. Monitoring wells in these recharge areas, in effect, constitute an early warning system for potential future water quality problems in confined portions of the Coastal Plain aquifers.

2.3 ANALYSES

Analyses are available for 123 water samples collected during calendar year 1999 from 121 stations (114 wells and 7 springs). In 1984, the first year of the Ground-Water Monitoring Network, hydrogeologists sampled water from 39 wells in the Piedmont/Blue Ridge and Coastal Plain Provinces. Since 1984, the Ground-Water Monitoring Network has been expanded through addition of further wells and springs to cover all three hydrogeologic provinces, with most of the monitoring performed in the Coastal Plain.

Ground water from all monitoring stations is tested for nitrate/nitrite and volatile organic compounds (VOCs) including methyl-tert-butyl ether (MTBE). Testing for metals and select anions that are subject to Primary Maximum Contaminant Levels (MCLs) continues for stations that have shown past contamination by these substances. Before collecting a sample, EPD personnel also observe and record certain field parameters -- pH, electrical conductivity, dissolved oxygen, and temperature -- using field instruments. This Circular reports the pH, conductivity, and the chemical analysis results. Files at the Geologic Survey Branch contain the records of all the field parameter measurements and chemical analyses.

The Drinking Water Program of the EPD's Water Resources Management Branch has established MCLs for certain parameters included in the analyses done on Ground-Water Monitoring Network samples (EPD, 1997). Primary MCLs pertain to parameters that may have adverse effects on human health when their values are exceeded. Secondary MCLs pertain to parameters that may give drinking water objectionable, though not health-threatening, properties that may cause persons served by public water systems to cease its use. Foul odor and unpleasant taste are examples of such properties. MCLs apply only to treated water offered for public consumption; nevertheless, they are useful guidelines for evaluating the quality of untreated (raw) water. Tables A-1 and A-2 in the Appendix list the Primary and Secondary MCLs for Ground Water Monitoring Network parameters.

Most of the wells originally on the Monitoring Network had in-place pumps. Using such pumps to purge the wells and collect samples reduces the potential for cross-contamination of wells. For those wells that lacked in-place pumps, EPD personnel used portable pumps for purging and sampling. In recent years, however, all wells that lacked in-place pumps were dropped from the Monitoring Network, except for a flowing well tapping the lower Floridan, GWN-PA9C.

Sampling procedures are adapted from techniques used by the USGS and the EPA. Hydrogeologists purge the wells (three to five times the volume of the water column in the well) before the collection of a sample to reduce the influence of the well, pump and distribution system on water quality. Municipal, industrial, and domestic wells typically require approximately 30 to 45 minutes of purging before sample collection.

During purging, a manifold captures flow at the pump system discharge point before the water is exposed to the atmosphere and conducts it past the field instrument probes, while EPD personnel observe (and record) the field parameters. With increased purging time, typical trends for field parameters include a lowering of pH, dissolved oxygen content, and conductivity, and a transition toward the mean annual air temperature. The hydraulic flow characteristics of unconfined aquifers, the depth of withdrawal, and pump effects may alter these trends.

Samples are collected once the field parameters stabilize or otherwise indicate that the effects of the well have been minimized. EPD personnel fill the sample bottles and then promptly place them on ice to preserve the water quality. The personnel next transport the samples to the laboratories for analysis on or before the Friday of the week in which they were collected.

CHAPTER 3 GROUND-WATER QUALITY IN GEORGIA

3.1 OVERVIEW

Georgia's nine major aquifers and aquifer systems are grouped into three hydrogeologic provinces for the purposes of this report.

The Coastal Plain Province comprises seven major aquifers or aquifer systems that are restricted to specific regions and depths within the province (Figure 3-1). These major aquifer systems commonly incorporate smaller aquifers that are locally confined. Ground-Water Monitoring Network wells in the Coastal Plain aquifers are generally located in three settings:

1. Recharge (or outcrop) areas that are located in regions that are geologically up-dip and generally to the north of confined portions of these aquifers.

2. Up-dip, confined areas that are located in regions that are proximal to the recharge areas, yet are confined by overlying geologic formations. These areas are generally south to southeast of the recharge areas.

3. Down-dip, confined areas, located to the south and southeast in the deeper, confined portions of the aquifers distal to the recharge areas.

Small-scale, localized ground-water flow patterns characterize the two hydrogeologic provinces of north Georgia, the Piedmont/Blue Ridge Province and the Valley and Ridge Province. Deep regional flow systems are unknown in northern Georgia. Geologic discontinuities (such as fractures) and compositional changes within the aquifer generally control ground-water flow in the Piedmont/Blue Ridge Province. Local topographic features, such as hills and valleys, influence ground-water flow patterns. Many of the factors controlling ground-water flow in the Piedmont/Blue Ridge Province also apply in the Valley and Ridge Province. The Valley and Ridge Province additionally possesses widespread karst features, which significantly enhance porosity and permeability in localized areas and exert a strong influence on local ground-water flow patterns.

3.2 CRETACEOUS AQUIFER SYSTEM

The Cretaceous aquifer system is a complexly interconnected group of aquifer subsystems developed in the Late Cretaceous sands of the Coastal Plain Province. These sands crop out in an extensive recharge area immediately south of the Fall Line in west and central Georgia (Figure 3-2). Overlying Tertiary sediments restrict Cretaceous outcrops to valley bottoms in parts of the northeastern Coastal Plain. Five distinct

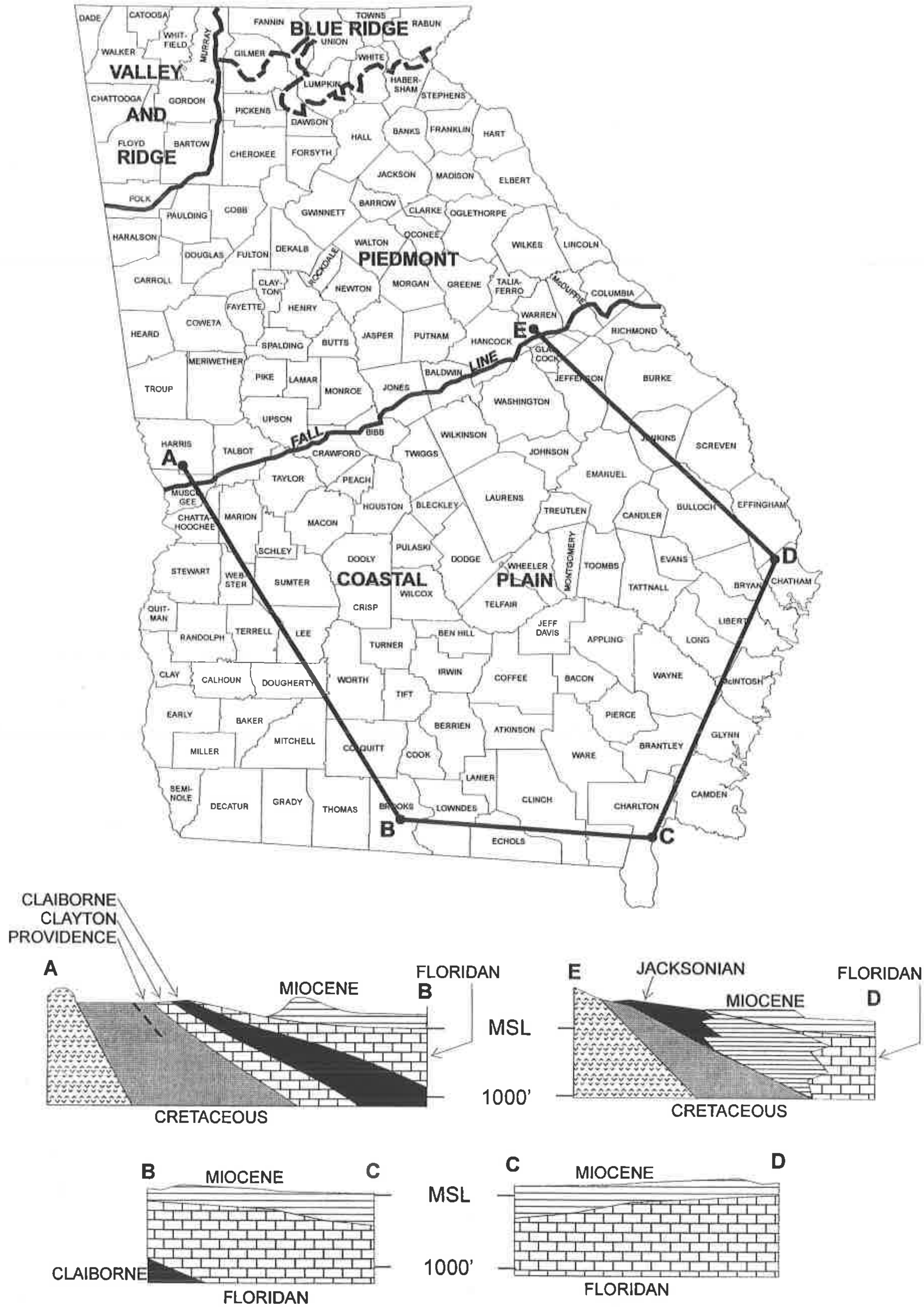


Figure 3-1. - The Seven Major Aquifer Systems of the Coastal Plain Province.

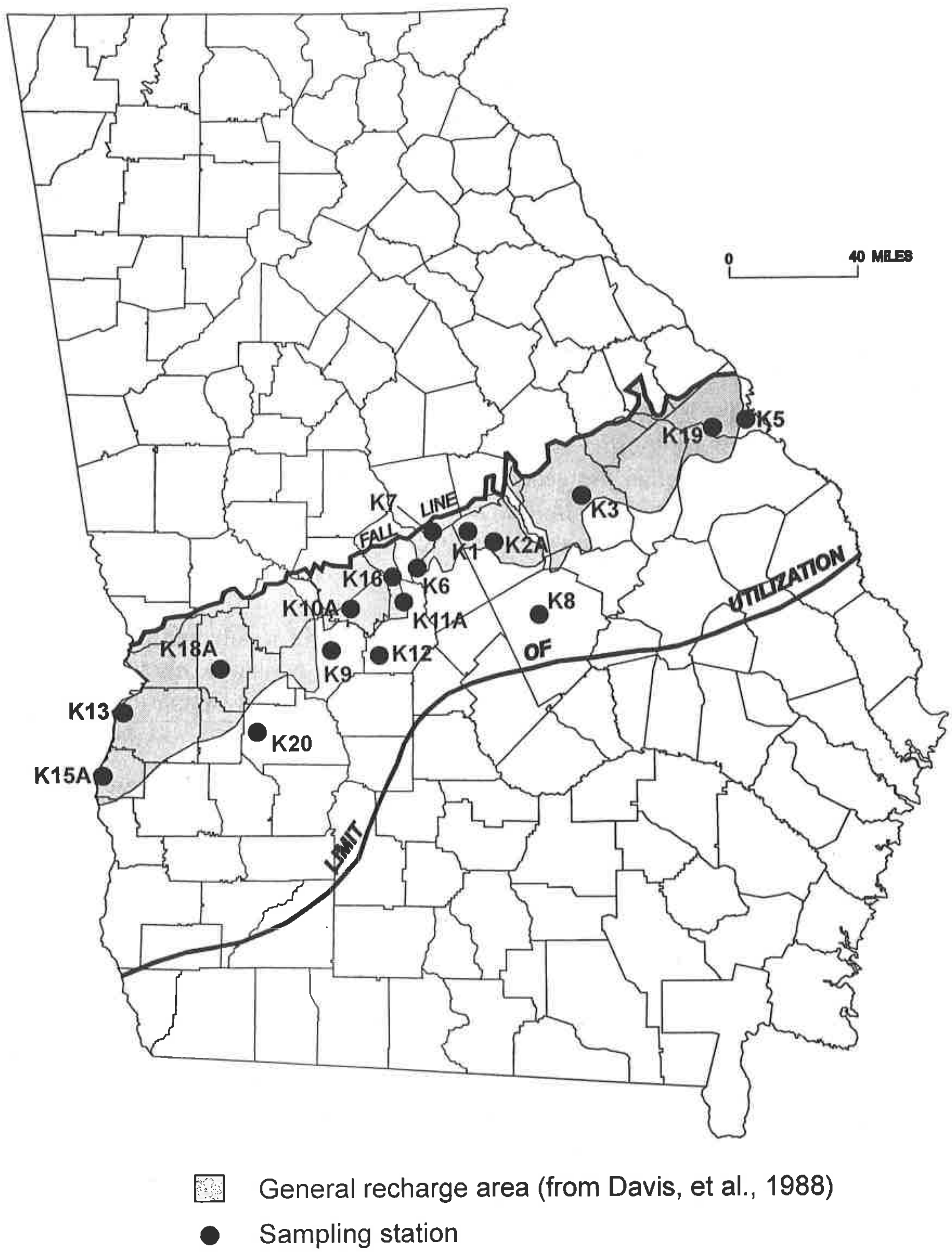


Figure 3-2. - Locations of Stations Monitoring the Cretaceous Aquifer System.

subsystems of the Cretaceous aquifer system, including the Providence aquifer system, are recognized west of the Ocmulgee River (Pollard and Vorhis, 1980). These merge into three subsystems to the east (Clarke, et al., 1985; Huddlestun and Summerour, 1996). Aquifer sands thicken south-ward from the Fall Line, from where they pinch out against crystalline Piedmont rocks, to a sequence of sand and clay approximately 2,000 feet thick at the southern limits of the main aquifer-use area (limit of utilization, Figure 3-2). Vertical leakage from overlying members of the aquifer system provides significant recharge in down-dip areas.

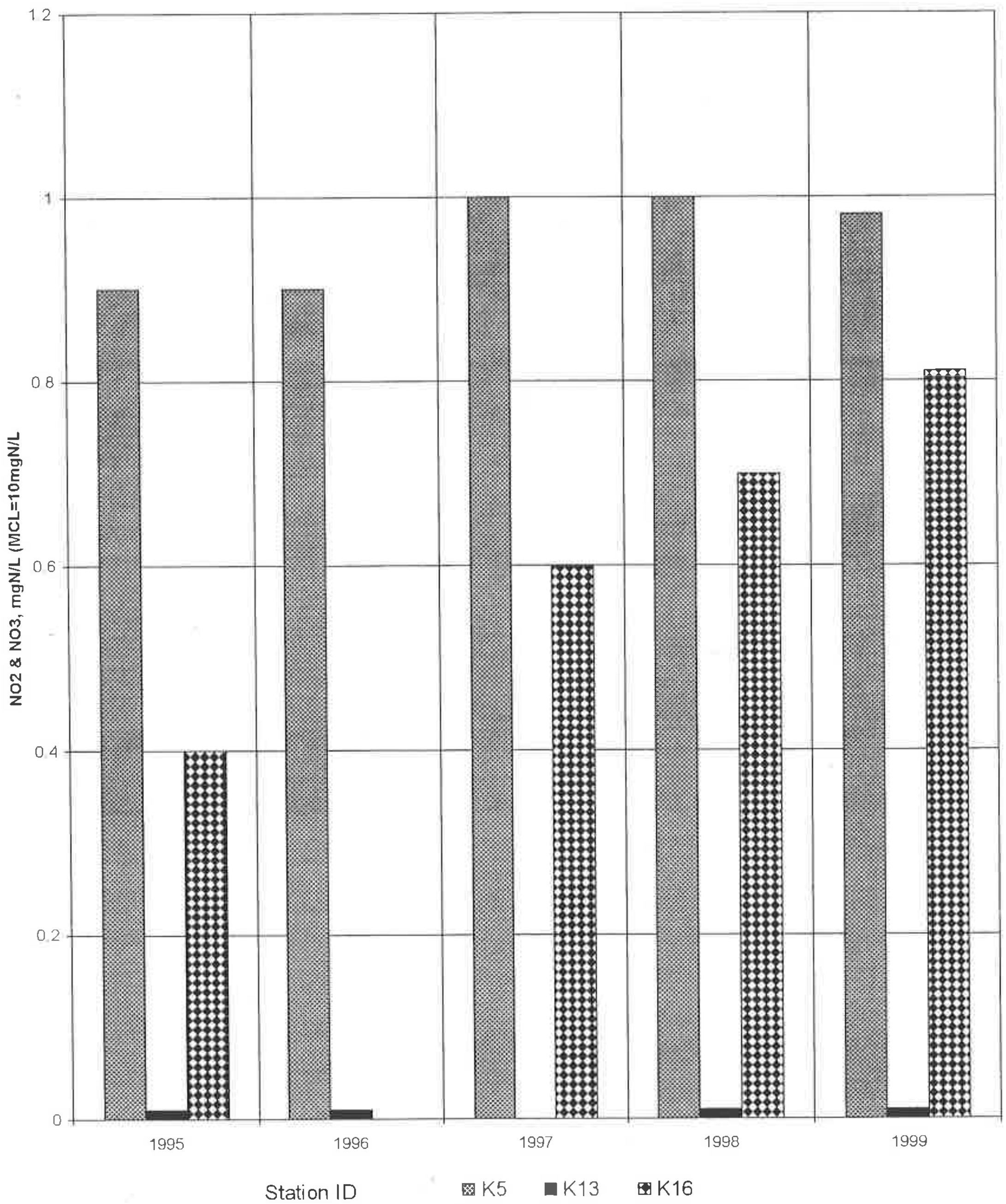
EPD collected 17 samples from 17 wells in calendar year 1999 to monitor the water quality of the Cretaceous aquifer system, exclusive of the Providence aquifer system (Figure 3-2). Table A-3 in the Appendix lists the analytical results for samples collected from the Cretaceous aquifer system. Four of the sampled wells, GWN-K8, GWN-K9, GWN-K12, and GWN-K20 are located away from the Cretaceous outcrop and recharge area, while the remainder lie within the general recharge area. The pHs of the sampled waters ranged from 4.03 to 9.32, with the majority (14) being acidic. Electrical conductivities ranged from 16 to 243 microsiemenses (uS), with the lowest occurring in waters from recharge area wells.

Water samples from all 17 wells received testing for nitrite/nitrate and for volatile organic compounds (VOCs). Twelve wells yielded samples with detectable nitrate/ nitrite, with the highest concentration, 0.98 ppm as nitrogen, occurring in a sample from well GWN-K5. Figure 3-3 shows trends in levels of nitrate/nitrite (reported as parts per million [ppm] nitrogen) for selected wells.

Two wells, both located in industrial settings, yielded samples containing VOCs. Well GWN-K1 yielded a sample containing trichloroethylene (3.2 ppb) and 1,1-dichloroethylene (0.5 ppb), and well GWN-K5 gave a sample containing trichloroethylene (0.62 ppb). All VOC concentrations are below primary MCLs. For well GWN-K1, regular testing for VOCs did not begin until 1999. Before that year, VOC testing had been done twice, with one occasion finding low-level pollution by trichloroethylene and 1,2-dichloroethylene and the other finding none. Well GWN-K5 has been subjected to regular testing for semi-volatile organic compounds (SVOCs) between 1984 and 1997 inclusive but has seen regular testing for VOCs only since 1993. Several prior instances of low-level pollution by phthalate derivatives (SVOCs) have occurred but none by VOCs.

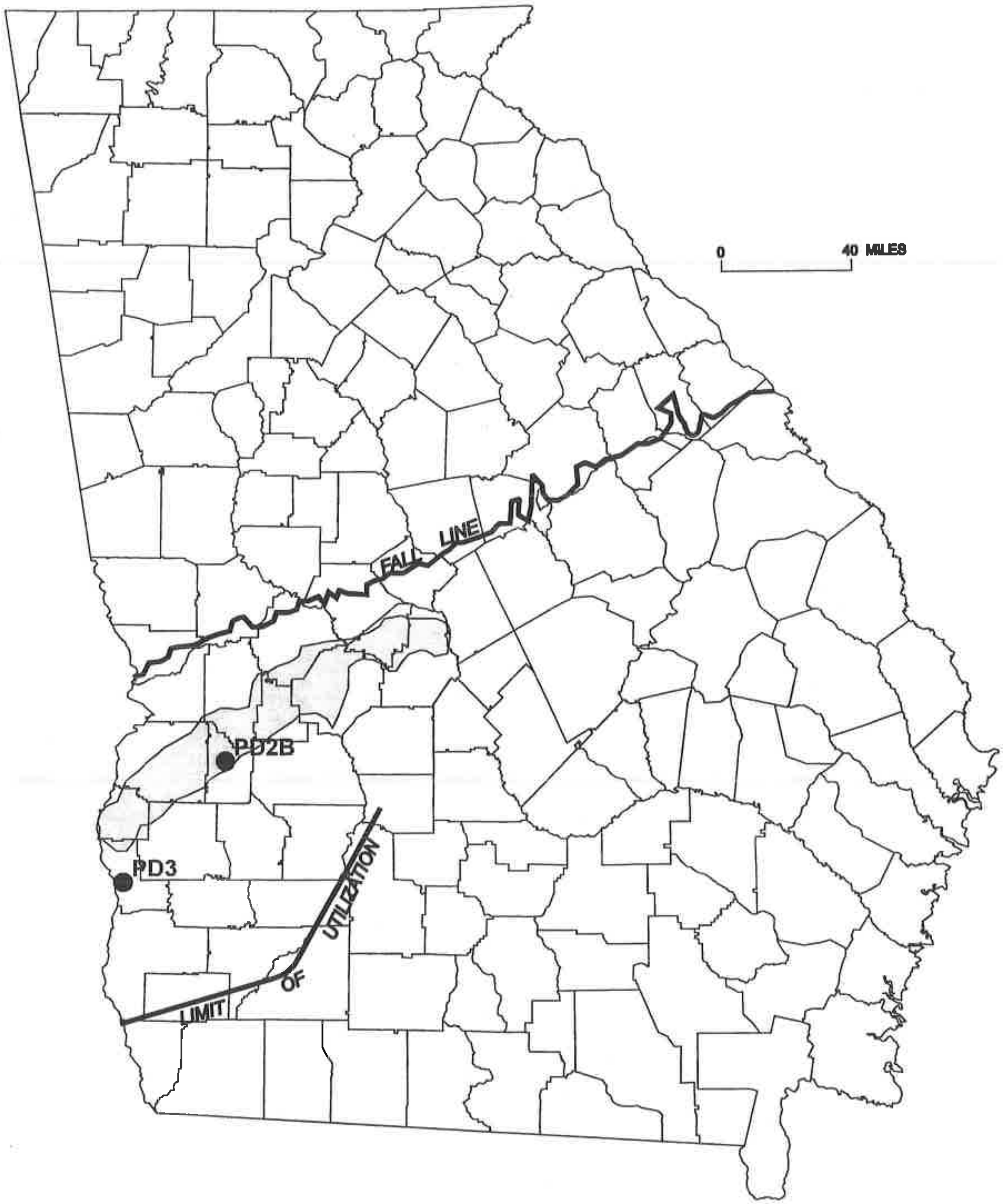
3.3 PROVIDENCE AQUIFER SYSTEM

Sand and coquinoid limestones of the Late Cretaceous Providence Formation comprise the Providence aquifer system of southwestern Georgia. Outcrops of the aquifer system extend from northern Clay and Quitman Counties through eastern Houston County (Figure 3-4). At its up-dip extent, the aquifer system thickens both to the east and to the west of a broad area adjacent to the Flint River. The aquifer system also generally



Nitrate/nitrite levels below the detection limit are assigned a value of 0.01 ppm. A missing bar indicates that samples were not collected for that year.

Figure 3-3. - Nitrate/Nitrite Concentrations for Selected Wells in the Cretaceous Aquifer System.



General recharge area (from Davis, et al., 1988)

Sampling station

Figure 3-4. - Locations of Stations Monitoring the Providence Aquifer System.

thickens downdip, with an area where the thickness exceeds 300 feet existing in Pulaski County and an area of similar thickness indicated in the Baker/Calhoun/Early county region (Clarke, et al., 1983). Figure 3-4 also shows the down-dip limit of the area in which the aquifer system is utilized.

The permeable Providence Formation-Clayton Formation interval forms a single aquifer in the up-dip areas (Long, 1989) and to the east of the Flint River (Clarke, et al., 1983). This same interval is recognized as the Dublin aquifer system to the east of the Ocmulgee River (Clarke, et al., 1985). Outcrop areas and adjacent covered areas to the east of the Flint River, where the aquifer is overlain by permeable sand units, are surface recharge areas. The Chattahoochee River forms the western discharge boundary for this flow system in Georgia.

EPD sampled two wells drawing from Providence aquifer system in calendar year 1999. Well GWN-PD2B, a recharge area well, yielded acidic water with a low electrical conductivity and a detectable nitrate/nitrite content. Well GWN-PD3, a down-dip well, yielded basic water with a moderate electrical conductivity and no detectable nitrate/nitrite. No VOCs were found in the samples from either well. Analysis results are given in Table A-4 in the Appendix

3.4 CLAYTON AQUIFER SYSTEM

The Clayton aquifer system of southwestern Georgia is developed mainly in the middle limestone unit of the Paleocene Clayton Formation. Limestones and calcareous sands of the Clayton aquifer system crop out in a narrow belt extending from northeastern Clay County to southwestern Schley County (Figure 3-5). Aquifer thickness varies, ranging from 50 feet near outcrop areas to 265 feet in southeastern Mitchell County (Clarke, et al., 1984). Both the Flint River, to the east, and the Chattahoochee River, to the west, are areas of discharge for the aquifer system in its up-dip extent. Leakage from the underlying Providence aquifer system and from permeable units in the overlying Wilcox confining zone provides significant recharge in down-dip areas (Clarke, et al., 1984). The Clayton and Providence Formations merge to form a single aquifer unit in up-dip areas (Long, 1989) as well as east of the Flint River (Clarke, et al., 1983). West of the Flint River and down dip, the Clayton/Providence confining zone, a silt and clay-bearing interval, confines the aquifer below (McFadden and Perriello, 1983). In the area east of the Ocmulgee River, the combination of these two aquifers is referred to as the Dublin aquifer system (Clarke, et al., 1985). Figure 3-5 also shows the down-dip limit of the area in which the aquifer system is used.

During calendar year 1999, EPD collected six water samples from five wells to monitor the water quality in the Clayton aquifer system (Figure 3-5). Three wells (GWN-CT5A, GWN-CT7A, GWN-CT8) are located in or near the recharge area, with the latter two wells being less than 100 feet deep. Wells GWN-CT2A and GWN-CT3 were used to sample the downdip portion of the aquifer system.

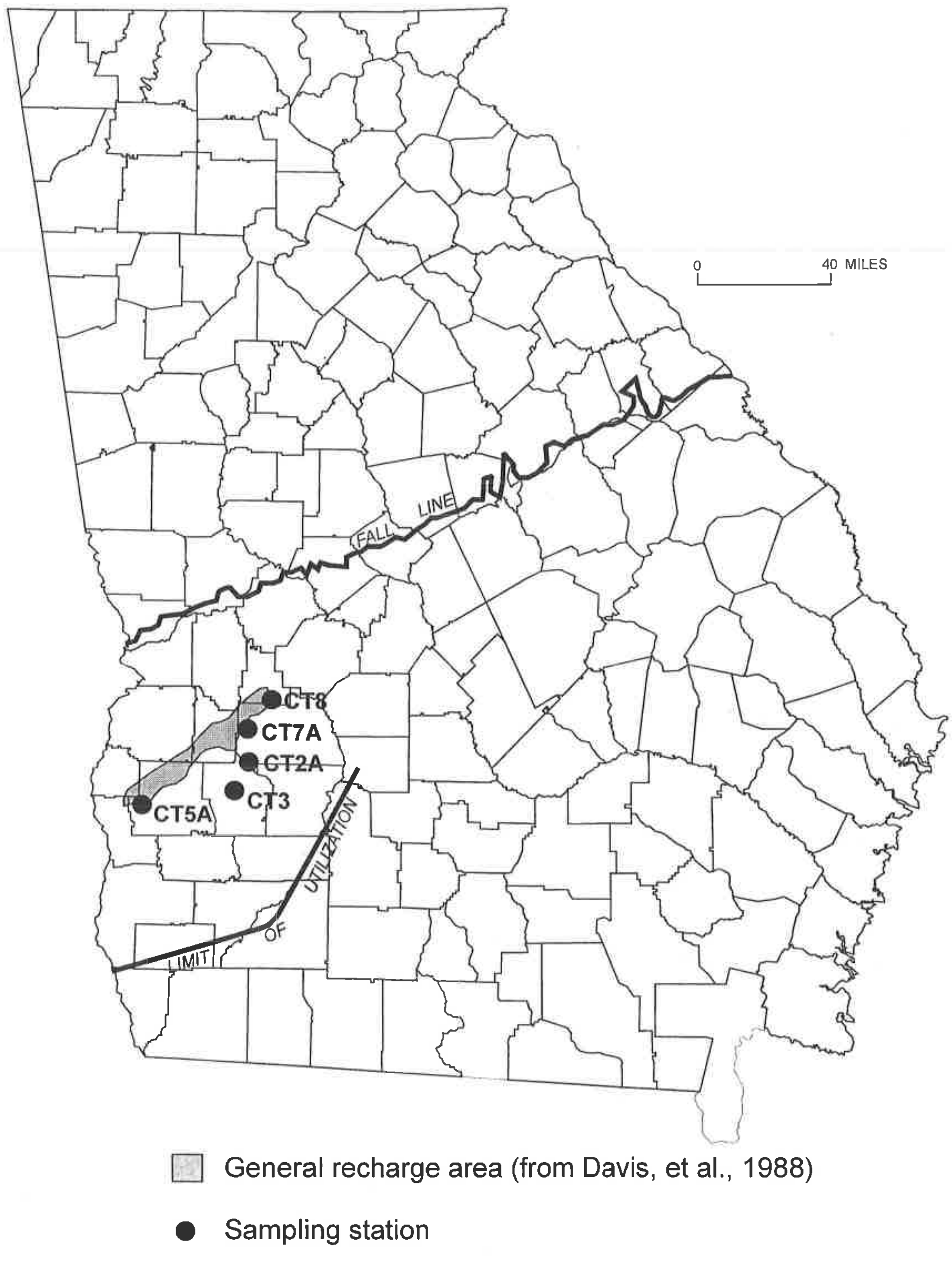


Figure 3-5. - Locations of Stations Monitoring the Clayton Aquifer System.

The pH of the waters from the Clayton wells ranged from acidic to slightly basic. The samples were analyzed for VOCs and nitrate/nitrite. The two shallow recharge area wells yielded waters with the lower electrical conductivities. Nitrate/nitrite levels were higher in the samples from the two shallow recharge area wells, one of these (GWN-CT7A) yielding a sample with a considerably elevated nitrate/nitrite concentration (7.4 ppm as N). The well is located near an animal enclosure. Figure 3-6 shows trends in nitrate/nitrite concentrations for selected wells in the Clayton aquifer system. No VOCs were detected in any of the samples. Table A-5 in the Appendix lists analyses for water samples from the Clayton wells.

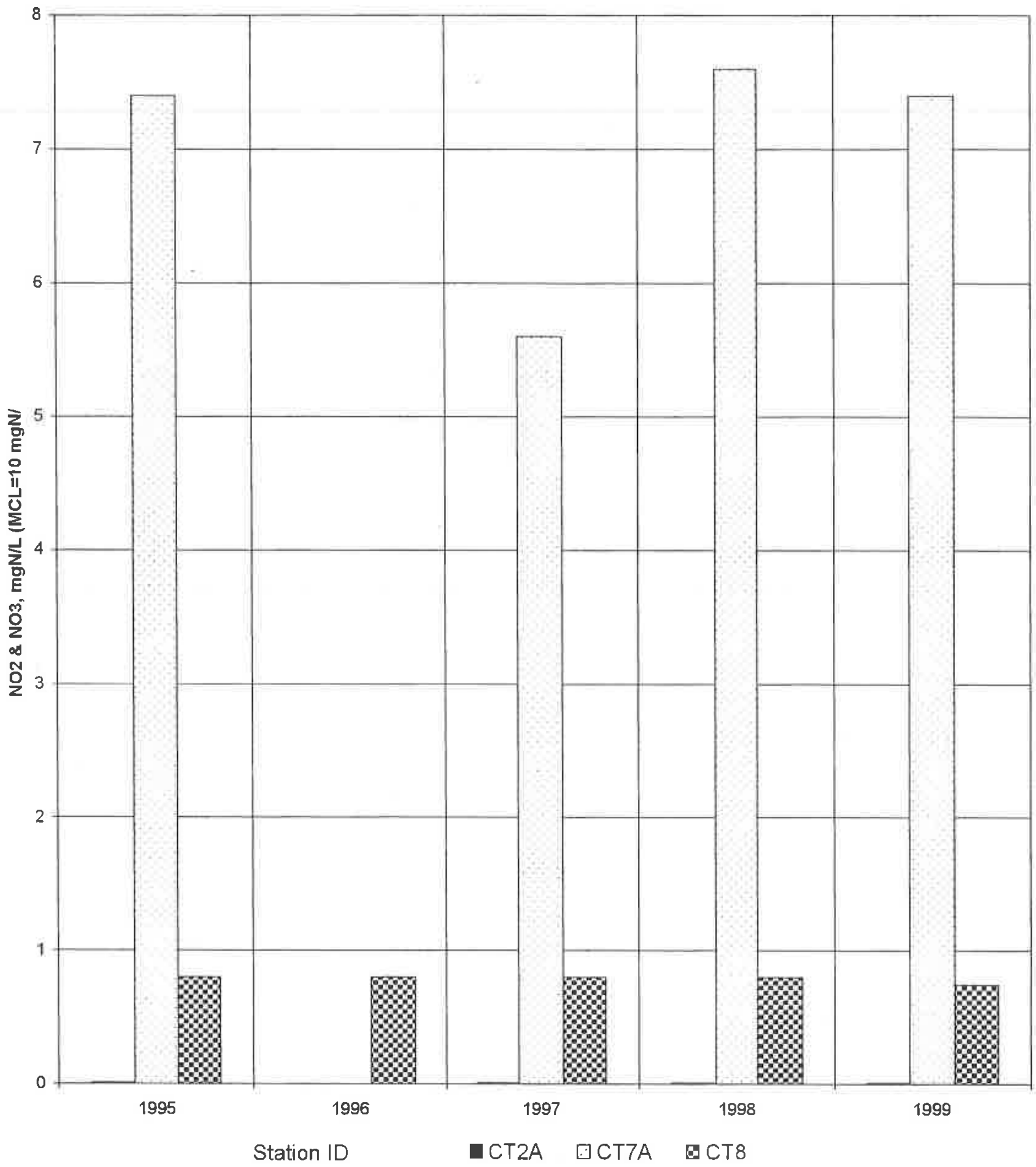
3.5 CLAIBORNE AQUIFER SYSTEM

The Claiborne aquifer system is developed primarily in the sandy units in the middle and lower portions of the Middle Eocene Claiborne Group of southwestern Georgia. Claiborne Group sands crop out in a belt extending from northern Early County through western Dooly County. Recharge to the aquifer system occurs both as direct infiltration of precipitation in the recharge area and as leakage from the overlying Floridan aquifer system (Hicks, et al., 1981; Gorday, et al., 1997). Discharge boundaries of the aquifer system are the Ocmulgee River, to the east, and the Chattahoochee River, to the west. The aquifer is more than 350 feet thick near its down-dip limit of utilization (Figure 3-7) (Tuohy, 1984).

The aquifer generally thickens from the outcrop area toward the southeast. The clay-rich upper portion of the Claiborne Group, the Lisbon Formation, acts as a confining layer and separates the aquifer from the overlying Floridan aquifer (McFadden and Perriello, 1983; Long, 1989; Huddlestun and Summerour, 1996). The lower water-bearing parts of the group had been correlated to the Tallahatta Formation (e.g., McFadden and Perriello, 1983; Long, 1989; Clarke et al., 1996) or, more recently, have been divided into two formations, the upper one termed the Still Branch Sand and the lower one correlated to the Congaree Formation (Huddlestun and Summerour, 1996). The permeable lower units are included in the Gordon aquifer system east of the Ocmulgee River (Brooks, et al., 1985).

During calendar year 1999, EPD personnel drew five samples from five wells to monitor the water quality of the Claiborne aquifer system. Wells GWN-CL2, GWN-CL4A, and GWN-CL8 lie within or near the recharge area, and, wells GWN-CL6 and GWN-CL9 tap the down-dip portion of the aquifer system, near the limit of utilization.

Two of the recharge area wells yielded acidic water, while one recharge area well and the two down-dip wells yielded basic water. All samples were analyzed for VOCs and none were detected. All samples were also analyzed for nitrate/nitrite, which was detected in two of the recharge area samples. Figure 3-8 shows trends in nitrate/nitrite concentrations for selected wells, and, Table A-6 in the Appendix gives the analytical results for the Claiborne wells.



Nitrate/nitrite levels below the detection limit are assigned a value of 0.01 ppm. A missing bar indicates that samples were not collected for that year.

Figure 3-6. - Nitrate/Nitrite Concentrations for Selected Wells in the Clayton Aquifer System.

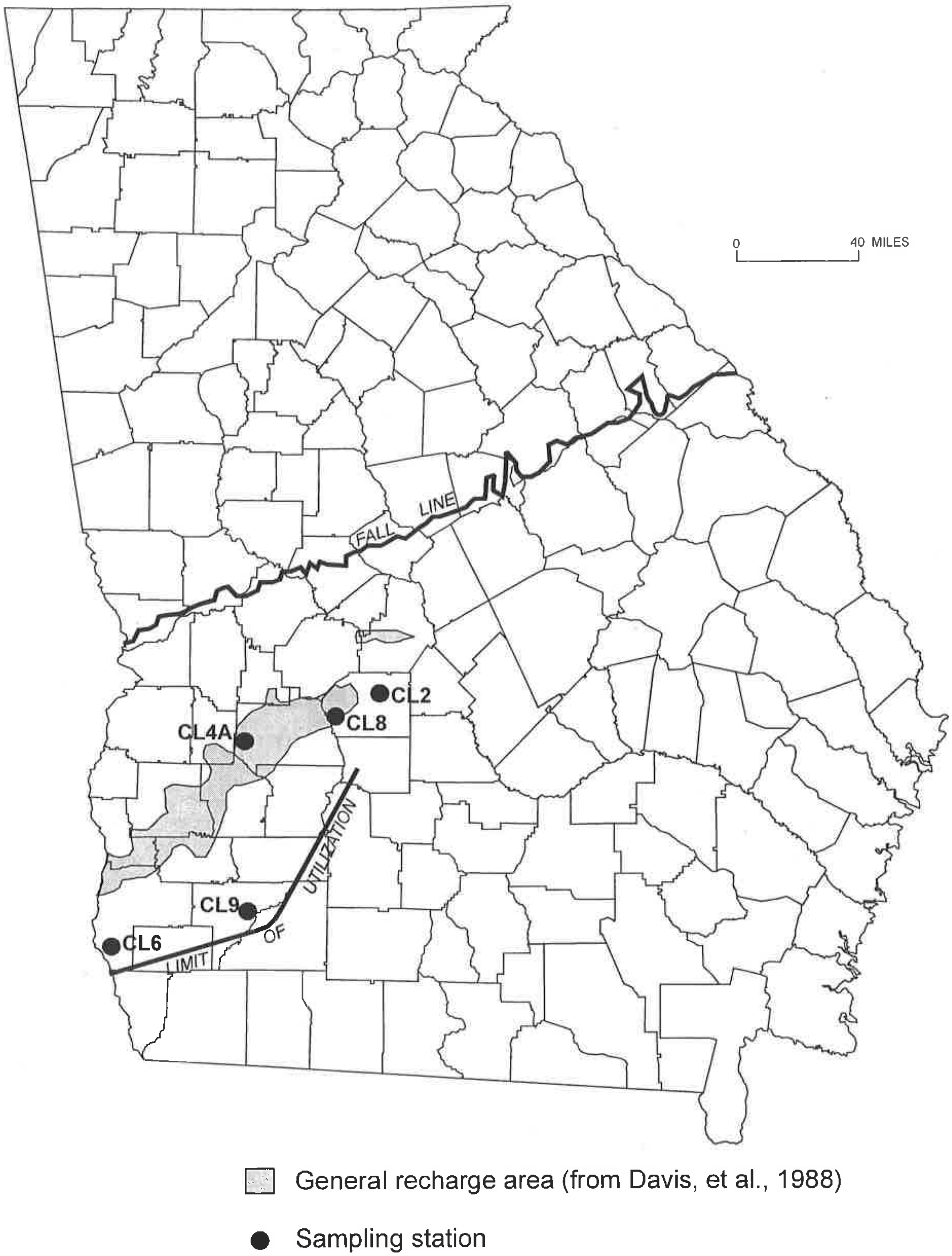
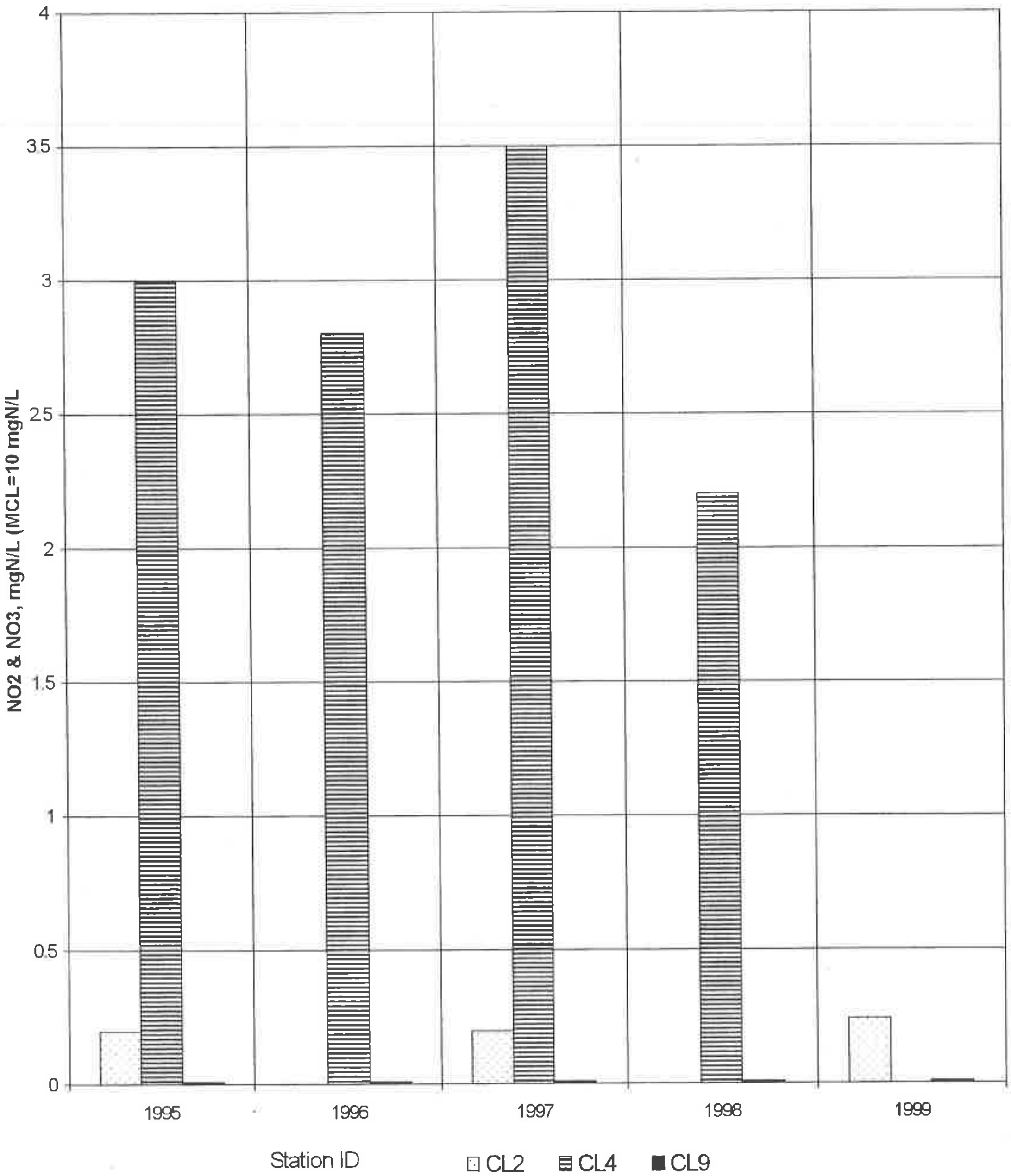


Figure 3-7. - Locations of Stations Monitoring the Claiborne Aquifer System.



Nitrate/nitrite levels below the detection limit are assigned a value of 0.01 ppm. A missing bar indicates that samples were not collected for that year.

Figure 3-8. - Nitrate/Nitrite Concentrations for Selected Wells in the Claiborne Aquifer System.

3.6 JACKSONIAN AQUIFER SYSTEM

The Jacksonian aquifer system of central and east-central Georgia comprises predominantly sands of the Eocene Barnwell Group, though, locally, isolated limestone bodies are important. Barnwell Group outcrops extend from Macon and Peach Counties eastward to Burke and Richmond Counties (Figure 3-9). Aquifer sands form a northern clastic facies of the Barnwell Group; the sands grade southward into less permeable silts and clays of a transition facies (Vincent, 1982). The water-bearing sands are relatively thin, ranging from ten to fifty feet in thickness. Limestones equivalent to the Barnwell Group form a southern carbonate facies and are included in the Floridan aquifer system. The Savannah River and Ocmulgee River are eastern and western discharge boundaries respectively for the up-dip flow system of the Jacksonian aquifer system. The Jacksonian aquifer system is equivalent to the Upper Three Runs aquifer as used in Summerour et al. (1994).

EPD monitored the water quality of the Jacksonian aquifer system in calendar year 1999 by taking eight samples from eight wells (Figure 3-9). Six wells are in the clastic facies (one, GWN-J2A, drawing from an isolated limestone body), and, two wells (GWN-J3 and GWN-J5) are in the transition facies. The pH of the sampled water ranged from 4.80 to 7.81. Conductivity measurements are available for seven wells (GWN-J5 excepted because of instrument malfunction) and were lowest for two shallow up-dip clastic facies wells GWN-J7 and GWN-J8. Table A-7 in the Appendix lists the analytical results for all the Jacksonian aquifer wells sampled.

All samples received tests for nitrate/nitrite and for VOCs. No VOC's were detected. Nitrate/nitrite concentrations ranged from undetectable to 7.5 ppm as N. The considerably elevated nitrate/nitrite level of 7.5 ppm as N occurred in the sample from well GWN-J8, which is located near a row crop field. The well has had a history of yielding high nitrate/nitrite water samples. Figure 3-10 depicts trends in nitrite/nitrate concentrations for selected wells. The sample from well GWN-J8, a domestic well, was analyzed for beryllium, because of occasional past findings, and 4.8 ppb beryllium was detected (above the primary MCL of 4 ppb). The source of the beryllium remains unknown.

3.7 FLORIDAN AQUIFER SYSTEM

The Floridan aquifer system consists predominantly of Eocene and Oligocene limestones and dolostones that underlie most of the Coastal Plain Province. The aquifer is a major source of ground water for much of its outcrop area and throughout its down-dip extent to the south and east.

The upper water-bearing units of the Floridan are the Eocene Ocala Group and the Oligocene Suwanee Limestone (Crews and Huddlestun, 1984). These limestones crop out in the Dougherty Plain (a karstic area in southwestern Georgia) and in adjacent areas

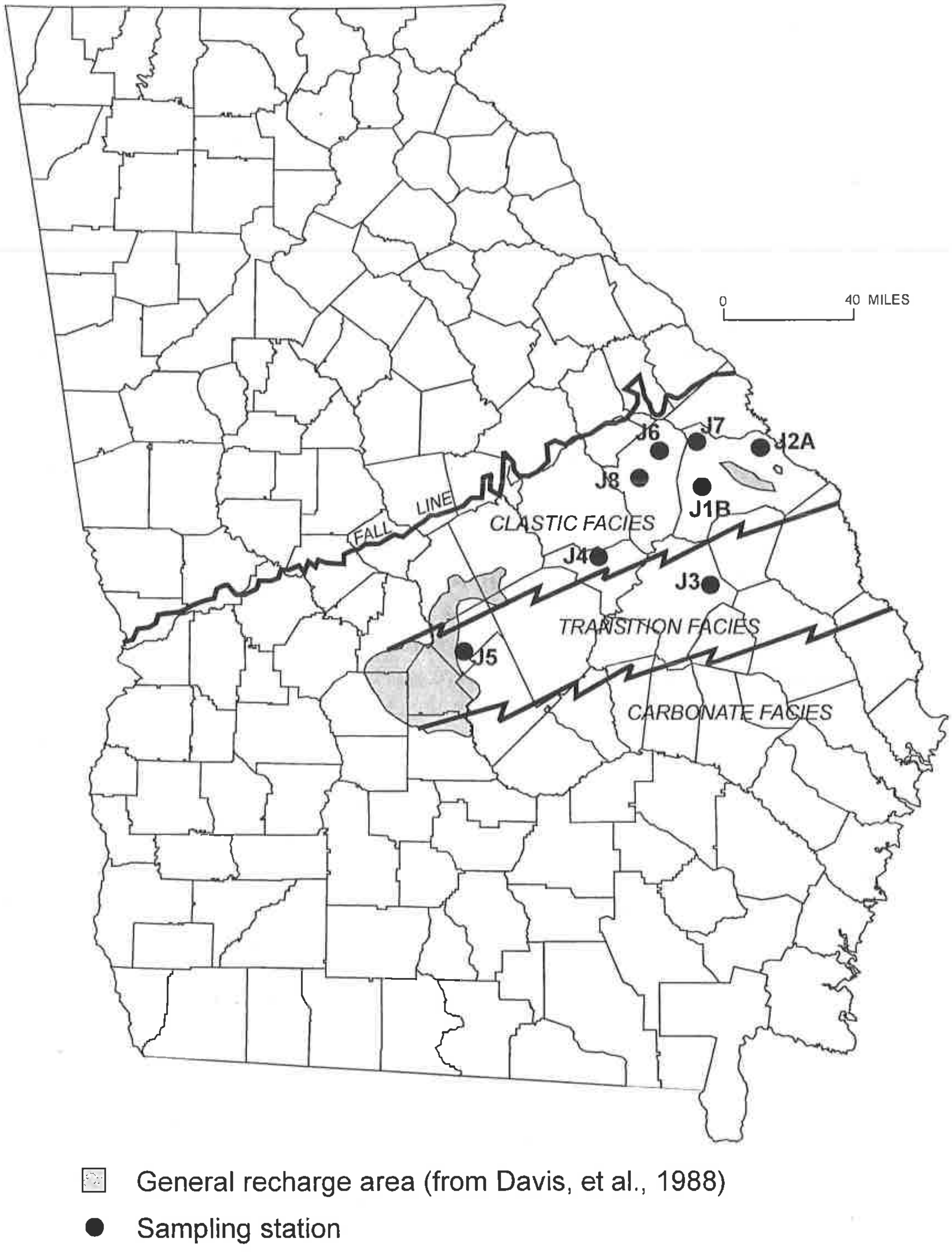
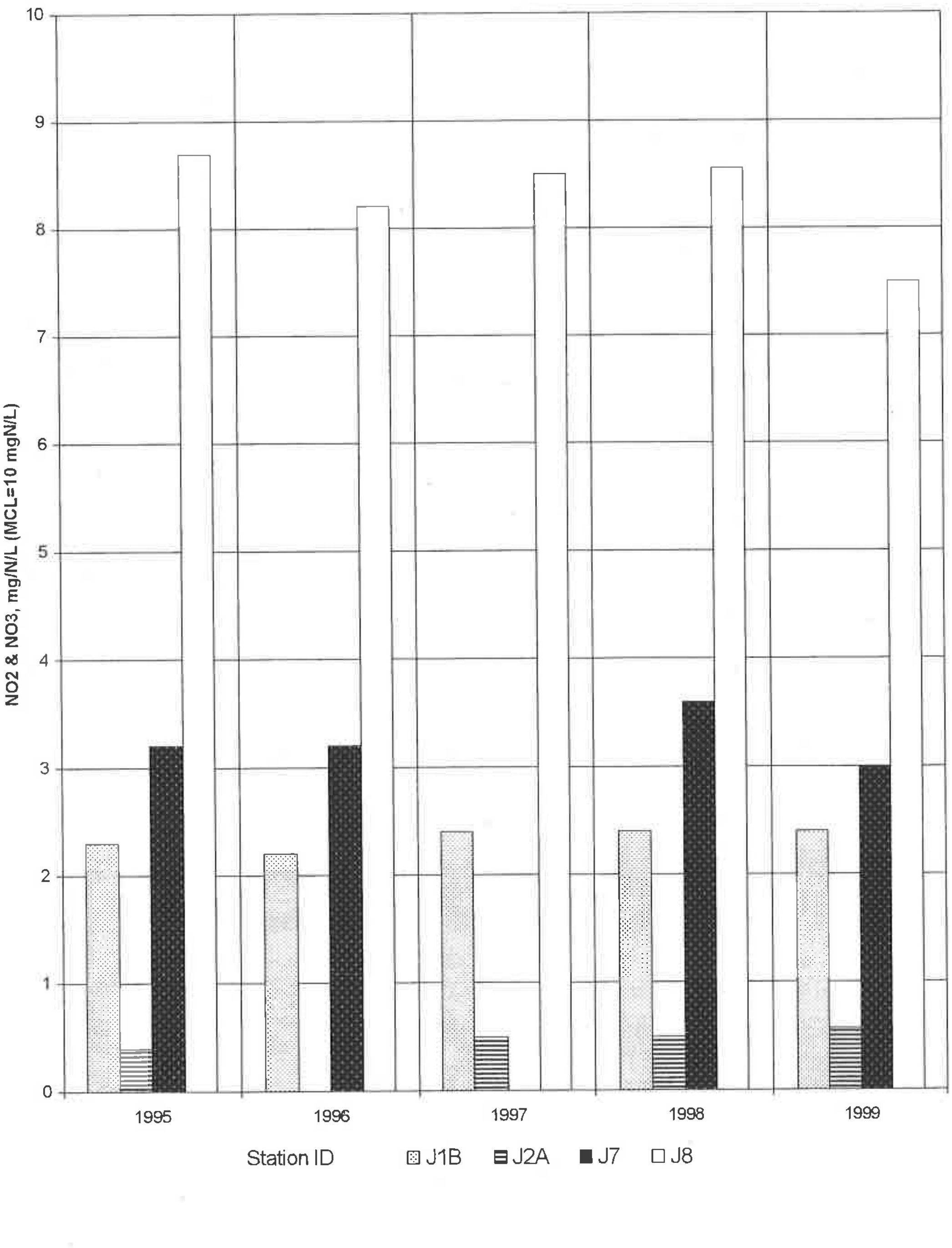


Figure 3-9. - Locations of Stations Monitoring the Jacksonian Aquifer System.



A missing bar indicates that samples were not collected for that year.

Figure 3-10. - Nitrate/Nitrite Concentrations for Selected Wells in the Jacksonian Aquifer System.

along a strike to the northeast. In Camden and Wayne counties the Oligocene unit is absent, and the upper part of the Floridan is restricted to units of Eocene age (Clarke, et al., 1990). The lower portion of the Floridan consists mainly of dolomitic limestone of middle and early Eocene age and pelletal, vuggy, dolomitic limestone of Paleocene age but extends into the late Cretaceous in Glynn County. The lower Floridan is deeply buried and not widely used, except in several municipal and industrial wells in the Savannah area (Clarke, et al., 1990). From its up-dip limit, defined in the east by clays of the Barnwell Group, the aquifer thickens to well over 700 feet in coastal Georgia. A dense limestone facies along the trend of the Gulf Trough locally limits ground-water quality and availability (Kellam and Gorday, 1990). The Gulf Trough is a linear depositional feature in the Coastal Plain that extends from southwestern Decatur County through central Bulloch County.

A ground-water divide separates a smaller southwestward flow regime in the Floridan aquifer system in the Dougherty Plain from the larger southeastward flow regime in the remainder of Georgia. Rainfall infiltration in outcrop areas and downward leakage from extensive surficial residuum recharge the Dougherty Plain flow system (Hayes, et al., 1983). The main body of the Floridan aquifer system, to the east, is recharged by leakage from the Jacksonian aquifer system and by rainfall infiltration in outcrop areas and in areas where overlying strata are thin. Significant recharge also occurs in the area of Brooks, Echols and Lowndes counties, where the Withlacoochee River and numerous sinkholes breach upper confining beds (Krause, 1979).

During calendar year 1999, EPD collected 49 samples from 49 wells in the Floridan aquifer system (Figure 3-11). All samples underwent testing for nitrate/nitrite and for VOCs. The pH values for all sampled waters were basic. Conductivities ranged from 165 uS to 1275 uS. Most of the wells yielding water with higher conductivity are deeper ones located along the coast. Table A-8 in the Appendix lists the analytical results for the Floridan wells.

Three wells yielded samples with low-level pollution by VOCs: GWN-PA17, GWN-PA30A, and GWN-PA33A. The offending substance in each case was chloroform, which may result from the reflux of treated (chlorinated) water back into the well bore. In each case, the concentration was less than one percent of the primary MCL for trihalomethanes (100 ppb).

Nitrate/nitrite concentrations ranged from undetectable to 4.5 ppm as nitrogen. With one exception, the wells yielding water with the highest nitrate/nitrate contents are located in the Dougherty Plain. Figure 3-12 shows trends in nitrate concentrations for selected Floridan wells.

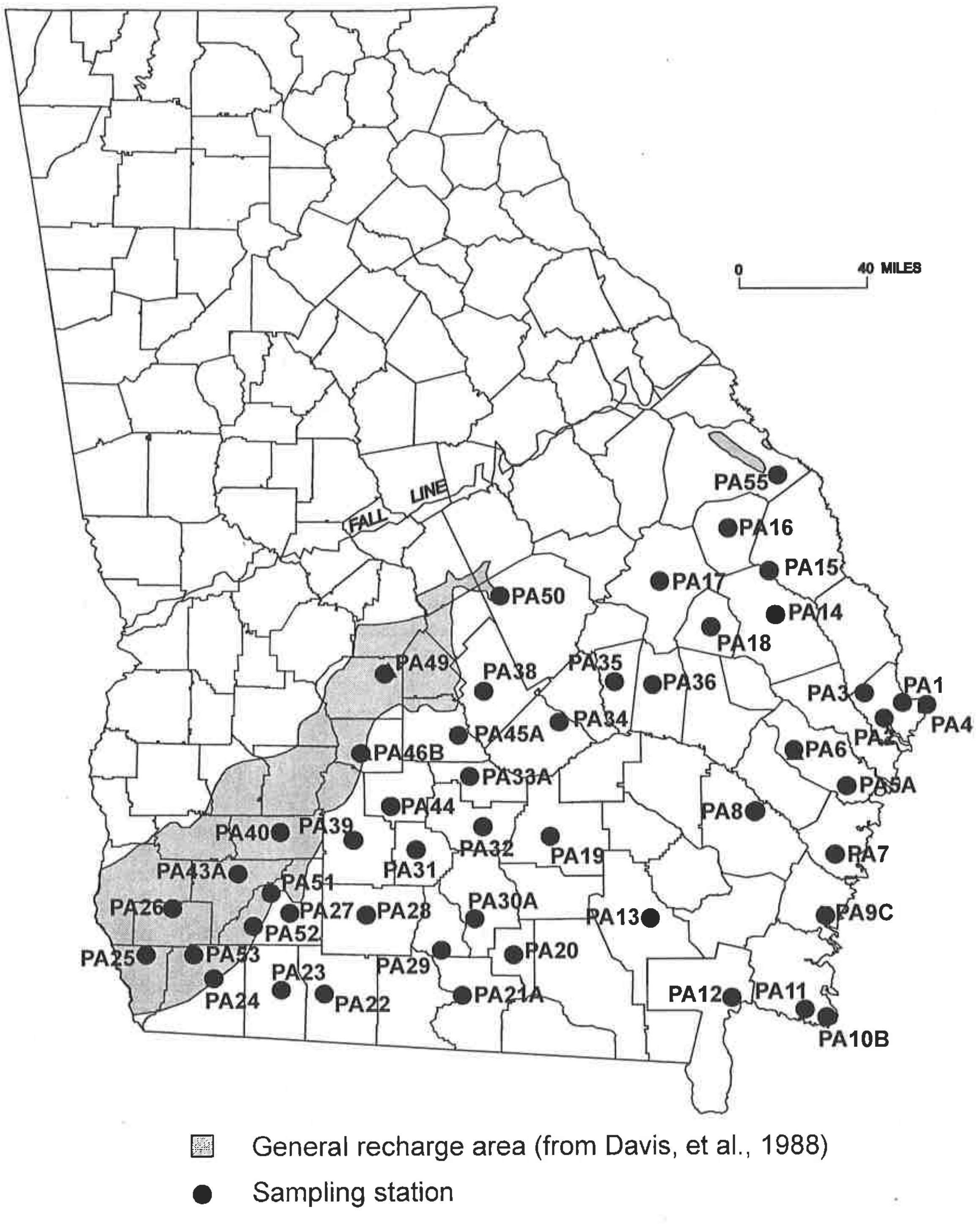
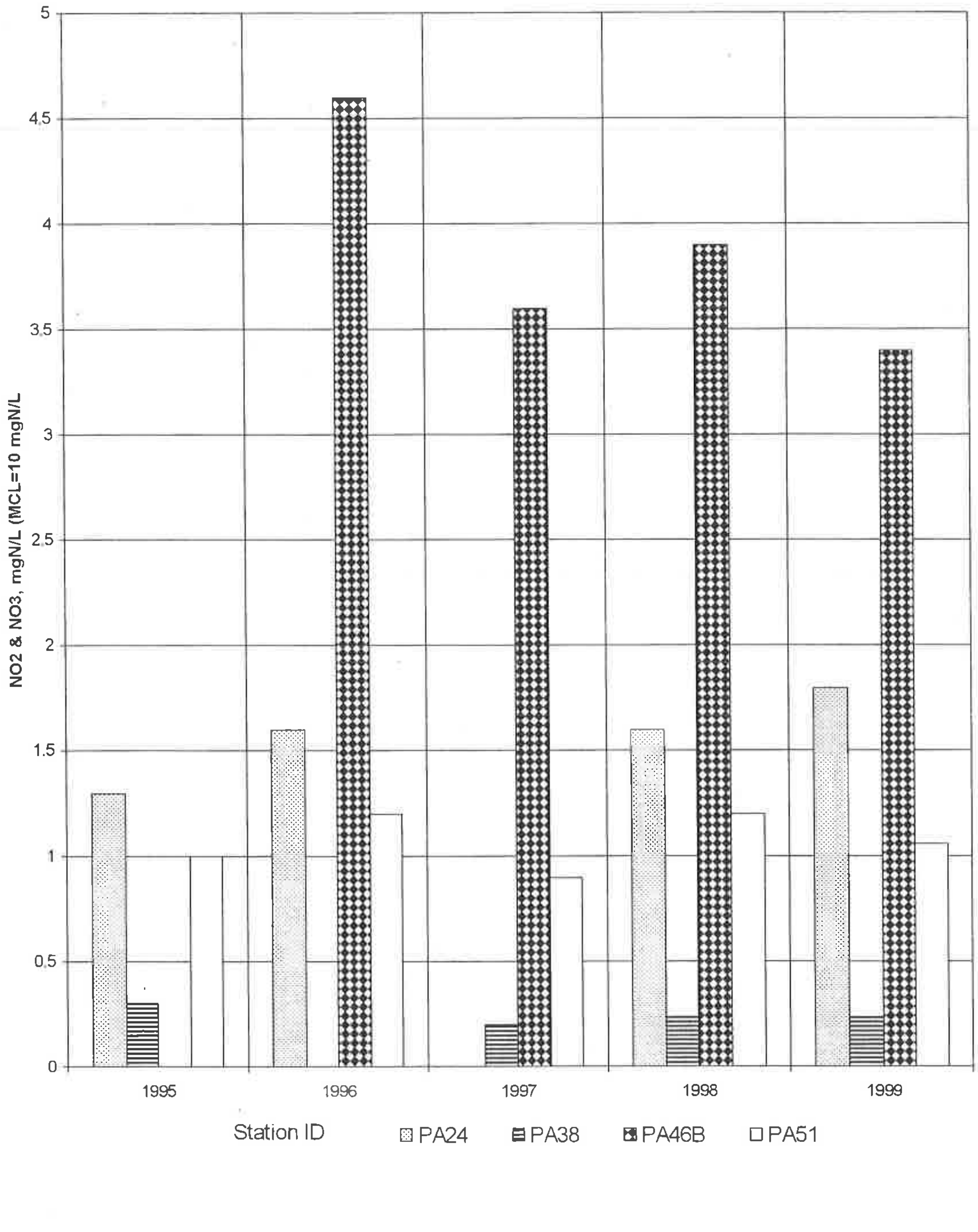


Figure 3-11. - Locations of Stations Monitoring the Floridan Aquifer System.



A missing bar indicates that samples were not available for that year.

Figure 3-12. - Nitrate/Nitrite Concentrations for Selected Wells in the Floridan Aquifer System.

Much of south-central and southeastern Georgia lies within outcrop areas of the Miocene Altamaha Formation and Hawthorne Group. Discontinuous lens-shaped bodies of sand, 50 to 80 feet thick, are the main permeable units. Miocene clays and sandy clays are thickest, more than 500 feet, in Wayne County (Watson, 1982).

Areas of confinement exist in the coastal counties. Leakage from overlying surface aquifers into the Miocene aquifer system and, in some areas, from the underlying Floridan aquifer system is significant in the coastal counties (Watson, 1982). Here, two principal aquifer units are present (Joiner, et al., 1988). Clarke (et. al., 1990) use the names upper and lower Brunswick aquifers to refer to these two sandy aquifer units.

EPD collected nine water samples from eight wells to monitor the water quality in the Miocene aquifer system (Figure 3-13). The pH of the samples ranged from 4.27 to 7.89, with six stations producing acidic water. Conductivities ranged from 90 uS to 251 uS. Table A-9 in the Appendix lists the analytical results for Miocene samples.

Nitrate/nitrite data are available for eight samples from eight wells. Concentrations ranged from undetected to 15 ppm as nitrogen. Only one well, GWN-MI15, a domestic well, produced a sample with a concentration in excess of the primary MCL. However, three other wells, GWN-MI5, GWN-MI7, and GWN-MI9A, gave samples with nitrate/nitrite concentrations that were elevated or could be considered so. All three wells are shallow domestic-type wells. Wells GWN-MI7, GWN-MI9A, and GWN-MI15 lie near row crop fields. Figure 3-14 illustrates trends in nitrate/nitrite concentrations for selected wells drawing from the Miocene aquifer system.

VOC data are available for all nine samples. The sample from well GWN-MI7 contained chloroform at a level of 0.88 ppb, considerably below the primary MCL of 100 ppb for total trihalomethanes. No other samples contained detectable VOCs. The January 19 sample from well GWN-MI10B was a follow-up to a 1998 sample in which benzene in excess of the primary MCL had been detected.

3.9 PIEDMONT/BLUE RIDGE UNCONFINED AQUIFERS

Georgia's Piedmont and Blue Ridge Physiographic Provinces are developed on metamorphic and igneous rocks that are predominantly Precambrian and Paleozoic in age. Soil and saprolite horizons, compositional layers, and openings along fractures and joints in the rocks are the major water-bearing features. Fracture density and interconnection provide the primary controls on the rate of water flow into wells completed in crystalline rocks. The permeability and thickness of soils and saprolite horizons determine the amount of well yield that can be sustained.

EPD collected eighteen samples from fifteen wells and three springs to monitor water quality in the Piedmont/Blue Ridge unconfined aquifers. Figure 3-15 shows the

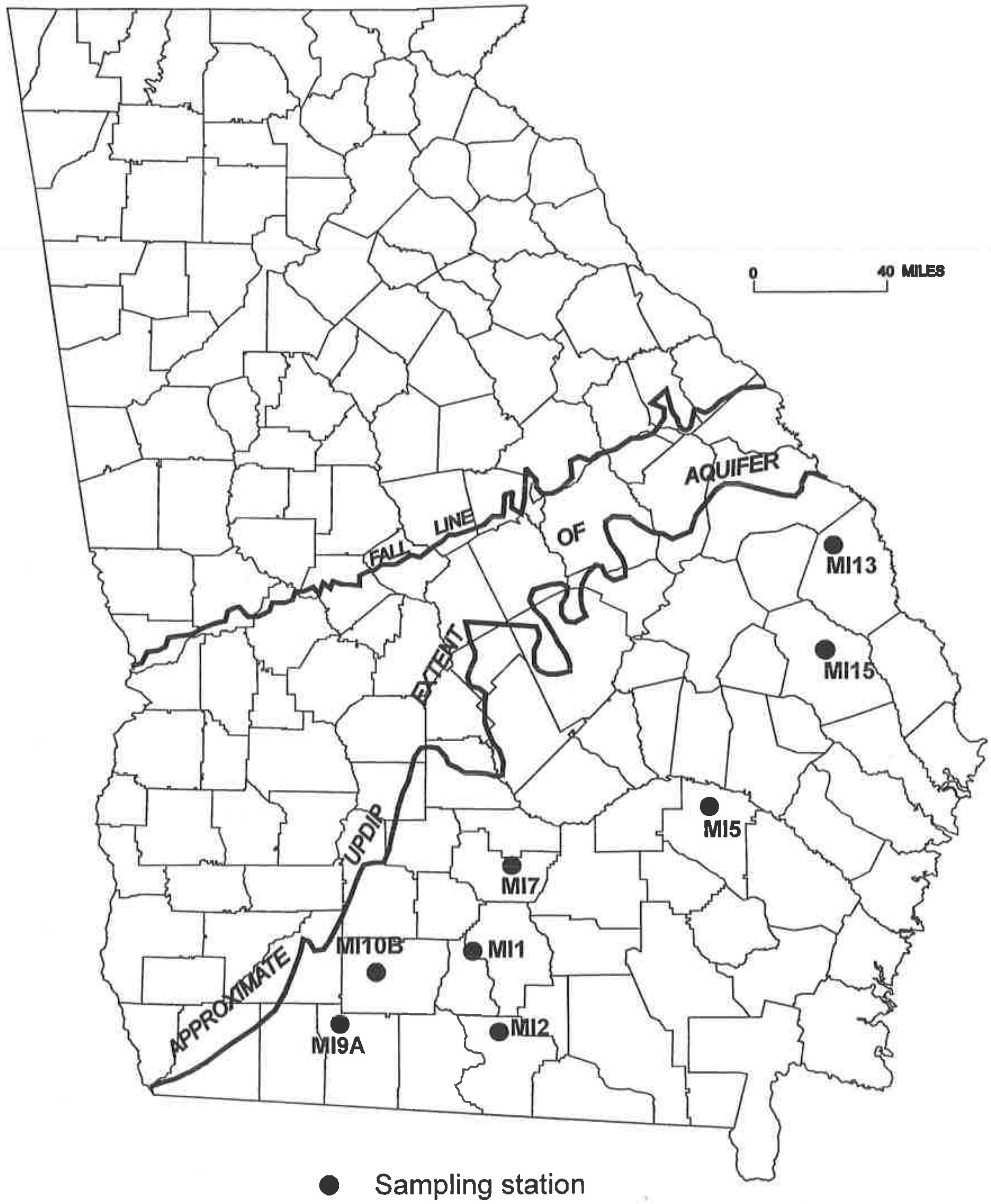
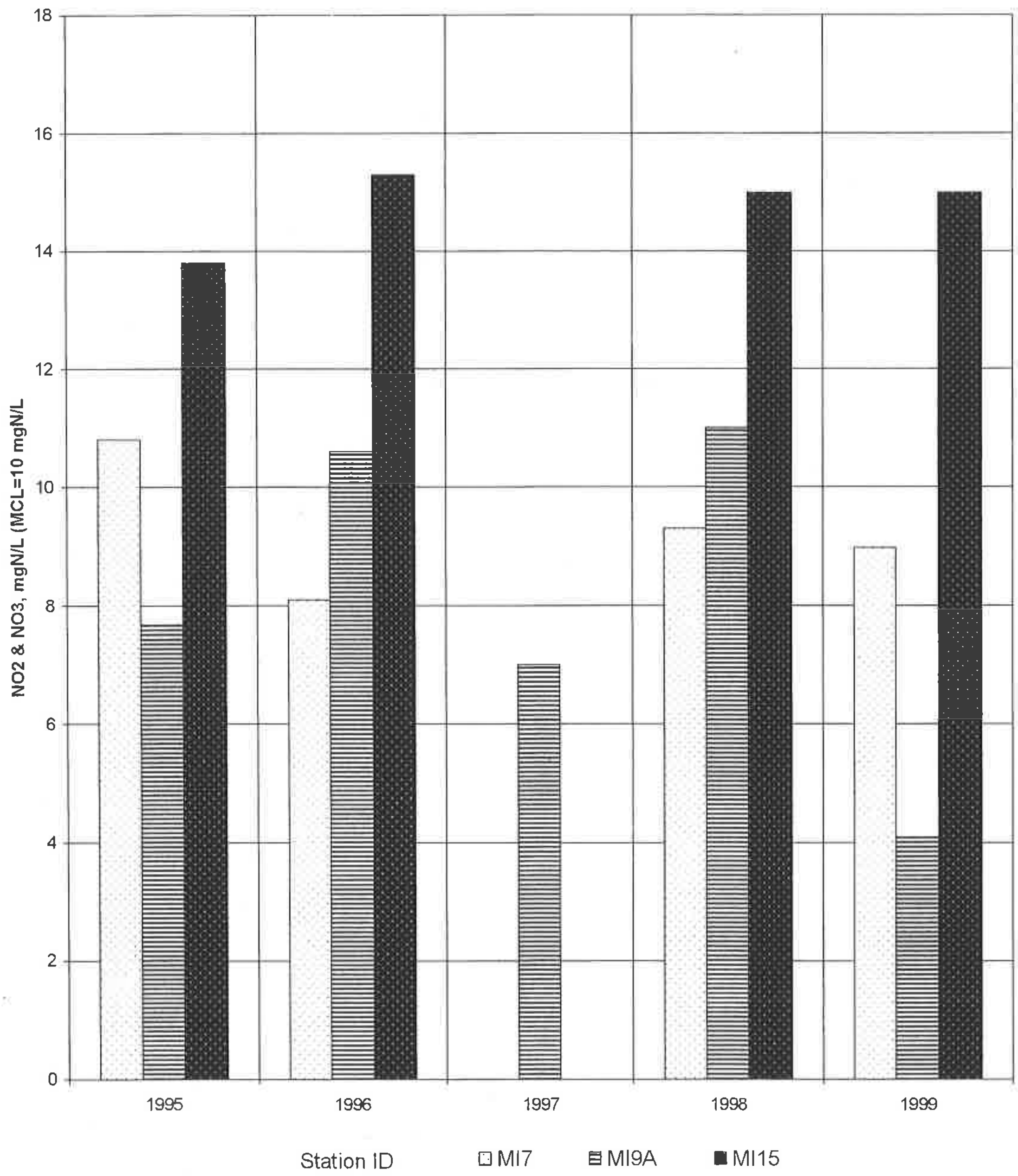


Figure 3-13. - Locations of Stations Monitoring the Miocene Aquifer System.



A missing bar indicates that samples were not collected for that year.

Figure 3-14. - Nitrate/Nitrite Concentrations for Selected Wells in the Miocene Aquifer System.

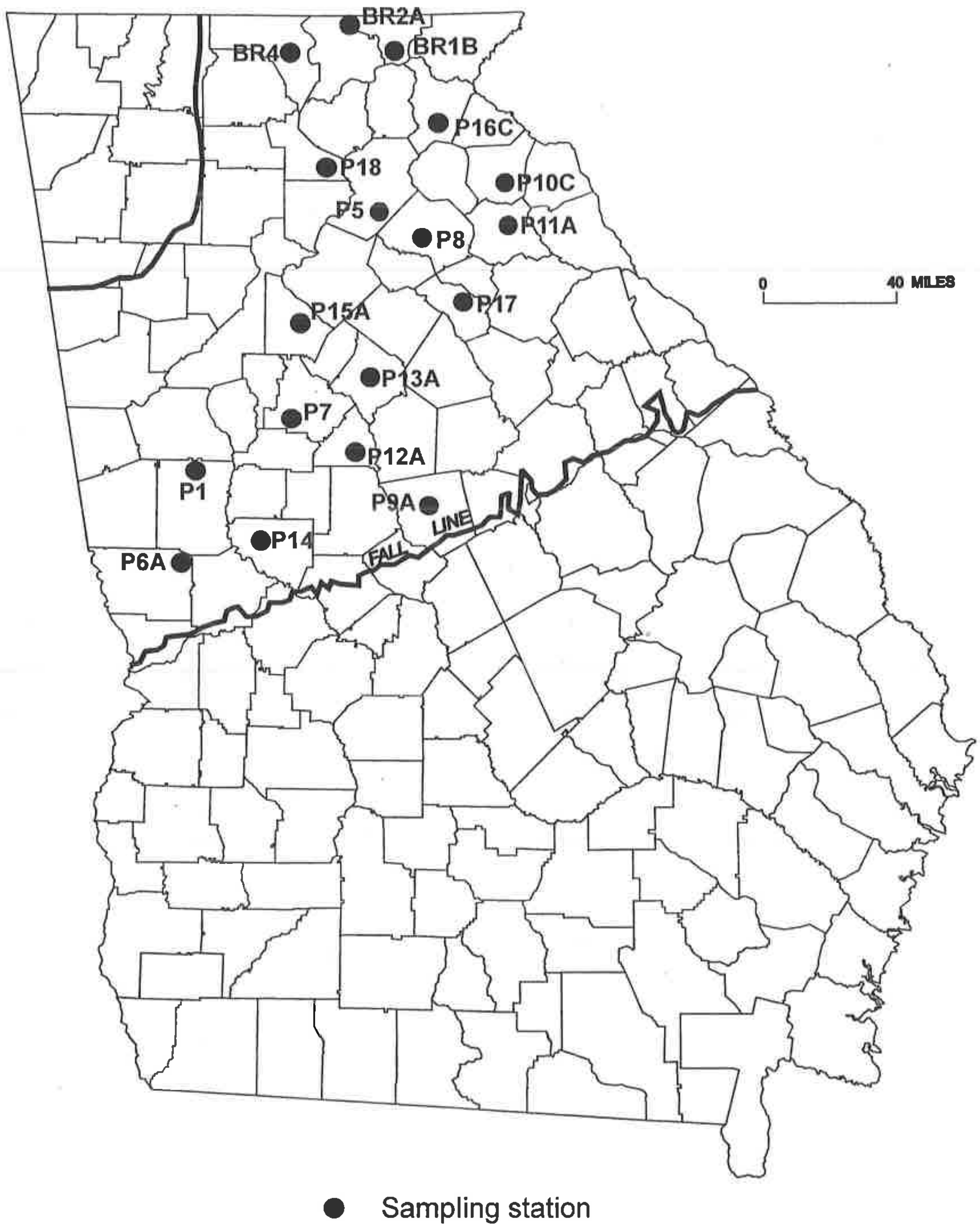


Figure 3-15. - Locations of Stations Monitoring the Piedmont/Blue Ridge Unconfined Aquifers.

locations of the monitoring stations. The pH of the water samples ranged from 5.01 to 7.81, with the majority of the stations yielding slightly acidic water. Conductivities ranged from 19 uS to 396 uS.

All samples were tested for nitrate/nitrite and for VOCs. Because of its history of giving samples with high fluoride concentrations, the sample from station GWN-P12A received testing for inorganic anions besides nitrate/nitrite. Likewise, two now-abandoned wells in the Franklin Springs well field had previously yielded samples containing detectable beryllium, thus the sample from the New #9 Well, GWN-P10C, underwent testing for that metal. An analytical summary for the Piedmont/Blue Ridge sampling stations is in Appendix Table A-10.

Nitrate/nitrite concentrations ranged from undetectable to 1.5 ppm as nitrogen (the primary MCL is 10 ppm as nitrogen). Figures 3-16 and 3-17 show nitrite/nitrate concentrations in selected stations from the Piedmont and Blue Ridge sectors, respectively.

Samples from two wells and one spring contained VOCs. Methyl tert-butyl ether (MTBE) occurred in samples from two wells, GWN-P1 and GWN-P15A. Chloroform was present in the sample from spring GWN-P13A, at a level considerably below the primary MCL (100 ppb total trihalomethanes). Trichloroethylene was present in the sample from well GWN-P1, and, 1,2-Dichloroethane occurred in the sample from well GWN-P15A. Neither compound exceeded the primary MCLs of 5 ppb for each, although the trichloroethylene in the GWN-P1 sample was elevated. All of the stations producing samples with VOCs are located in or near built-up areas.

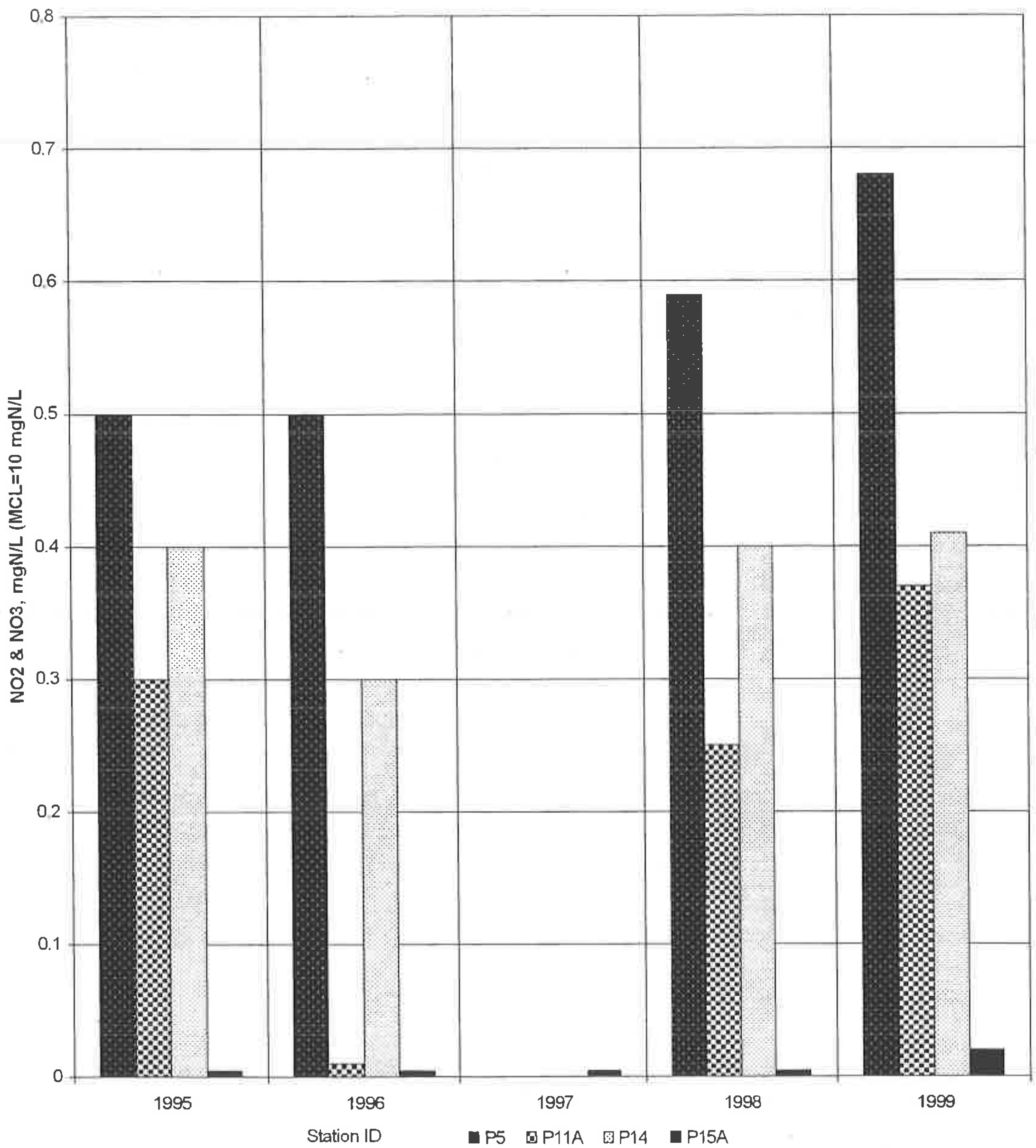
The fluoride content of the sample from spring GWN-P12A exceeded the primary MCL of 4 ppm. The sample from well GWN-P10C contained no detectable beryllium. The source of the fluoride in spring GWN-P12A is almost certainly natural.

3.10 VALLEY AND RIDGE UNCONFINED AQUIFERS

Soil and residuum form low-yield unconfined aquifers across most of the Valley and Ridge Province of northwestern Georgia. Valley bottoms underlain by dolostones and limestones of the Cambro-Ordovician Knox Group are the locations of most higher-yielding wells and springs that are suitable for municipal supplies.

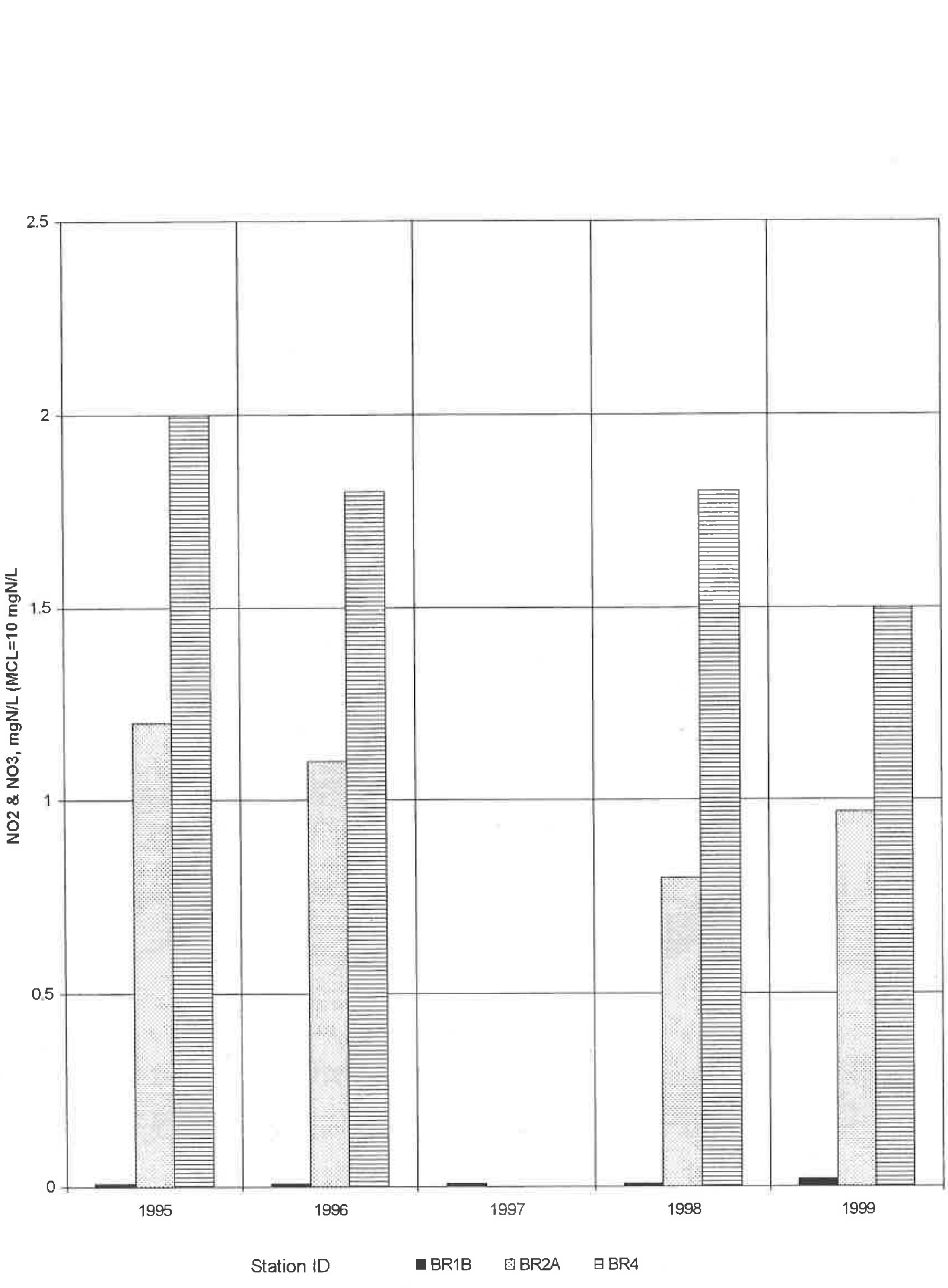
Five wells and four springs were used to monitor the water quality in the Valley and Ridge unconfined aquifers (Figure 3-18). Three of the wells and all four springs produced water from Knox Group carbonates. Of the remaining wells, well GWN-VR4 derives water from the Ordovician Chickamauga Group, while well GWN-VR6 taps the Cambrian Shady Dolomite.

Sample pHs were all basic, ranging from 7.19 to 7.85. Conductivities ranged from 190 uS to 485 uS. All samples were tested for nitrate/nitrite and for VOCs.



Nitrate/nitrite levels below the detection limit are assigned a value of 0.005 ppm. A missing bar indicates that samples were not collected for that year.

Figure 3-16. - Nitrate/Nitrite Concentrations for Selected Wells in the Piedmont/Blue Ridge Unconfined Aquifer System: Piedmont Sector.



Nitrate/nitrite levels below the detection limit are assigned a value of 0.007 ppm. A missing bar indicates that samples were not collected for that year.

Figure 3-17. - Nitrate/Nitrite Concentrations for Selected Wells in the Piedmont/Blue Ridge Unconfined Aquifer System: Blue Ridge Sector.

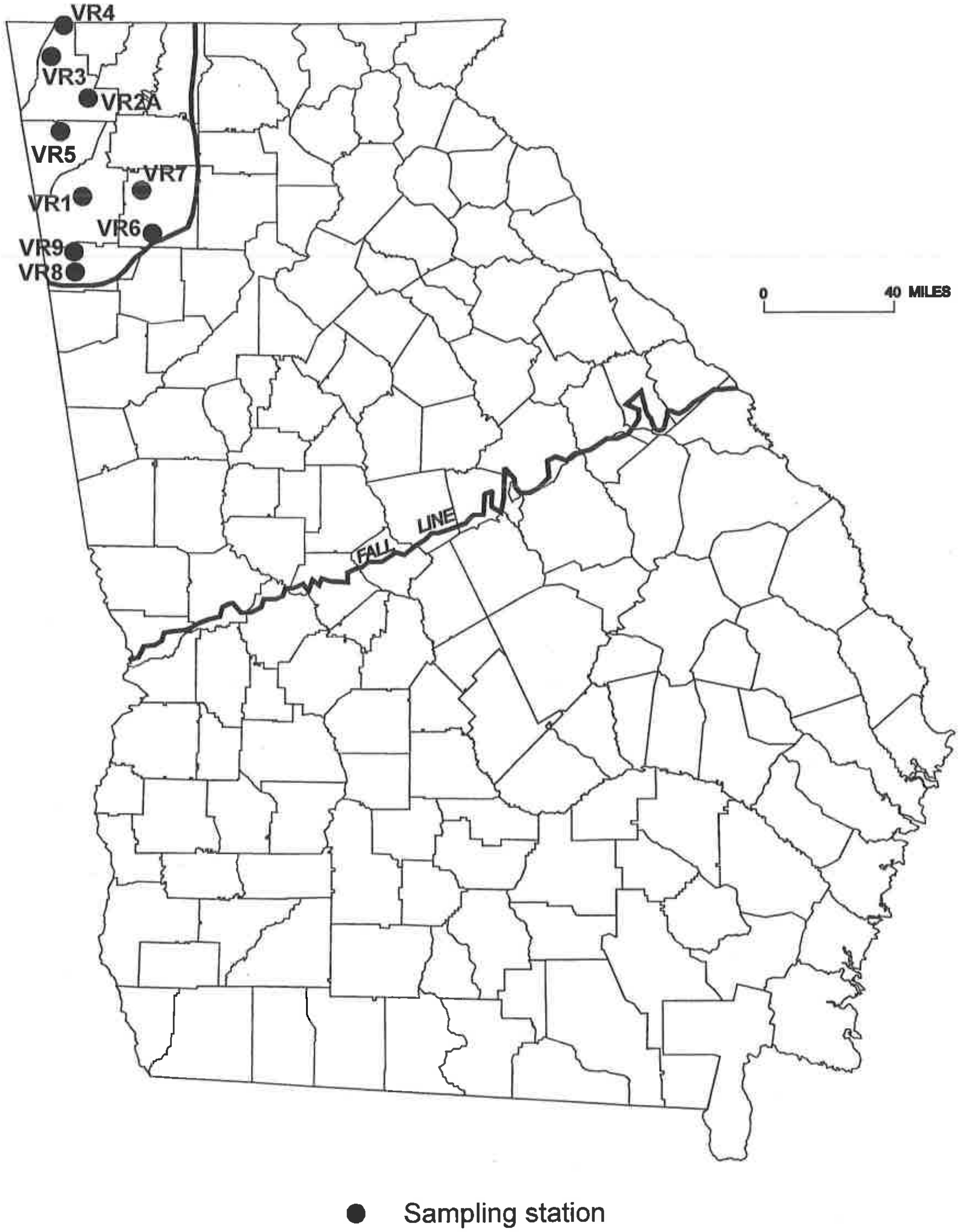
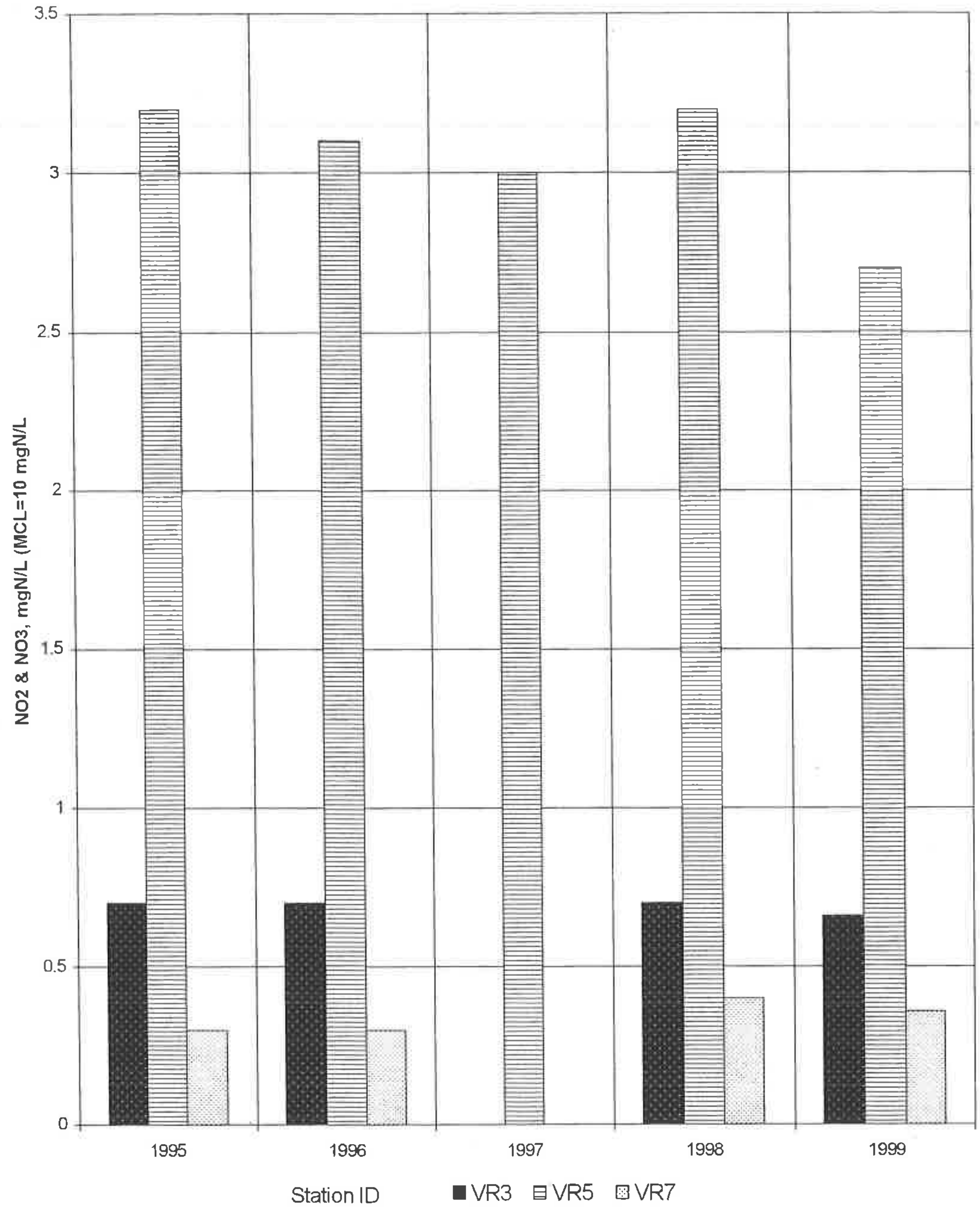


Figure 3-18. - Locations of Stations Monitoring the Valley and Ridge Unconfined Aquifers.

Nitrate/nitrite ranged from undetected to 2.7 ppm as nitrogen. Figure 3-19 shows nitrite/nitrate levels for selected sampling stations in the Valley and Ridge aquifers. VOCs were present in samples from three stations. One of these, spring GWN-VR2A, gave a sample containing a low level ofchloroform, which probably formed from the reflux of chlorinated water from the treatment house back into the spring pool. Another, well GWN-VR6, gave a sample containing chloroform, 1,1-dichloroethylene, 1,1,1-trichloroethane, and tetrachloroethylene. The well is located in an industrial area. The third, spring GWN-VR8, located near a commercial area, gave a sample containing benzene and MTBE. The spring has intermittently experienced contamination from motor fuel components in the past. None of the volatile organic compounds exceeded the primary MCLs. Appendix Table A-11 presents the analytical summary for the wells and springs located in the Valley and Ridge unconfined aquifers.



A missing bar indicates that samples were not collected for that year.

Figure 3-19. - Nitrate/Nitrite Concentrations for Selected Wells and Springs in the Valley and Ridge Unconfined Aquifers.

CHAPTER 4 SUMMARY AND CONCLUSIONS

EPD personnel collected 123 raw water samples from 114 wells and seven springs on the Ground-Water Monitoring Network during calendar year 1999 for inorganic and organic analysis. These wells and springs monitor the water quality of nine aquifer systems in Georgia:

- Cretaceous aquifer system
- Providence aquifer system
- Clayton aquifer system
- Claiborne aquifer system
- Jacksonian aquifer system
- Floridan aquifer system
- Miocene aquifer system
- Piedmont/Blue Ridge unconfined aquifers
- Valley and Ridge unconfined aquifers

Comparisons of analyses of water samples collected during calendar year 1999 were made with analyses for the Ground-Water Monitoring Network dating back to 1984, permitting the recognition of temporal trends. Table 4-1 lists the contaminants and pollutants detected at the stations of the Ground-Water Monitoring Network during 1999. Although isolated water quality problems existed at specific localities, the quality of water from most of the Ground-Water Monitoring Network stations remains excellent.

Nitrate/nitrite is the most common substance(s) present in ground water in Georgia that can have adverse health effects. One well (GWN-MI15), a shallow domestic well tapping the Miocene aquifer system and located near a row crop field, yielded a water sample with a nitrite/nitrate concentration exceeding the primary MCL of 10 ppm as nitrogen (Table 4-1). (The owner of the well received notification about the excess nitrate/nitrite, and all well owners receive copies of the analytical results.) Samples from three other wells (GWN-CT7A, GWN-J8, and GWN-MI7) also had nitrate/nitrite levels that were elevated though not greater than the primary MCL. All three are shallow domestic-type wells, with two being located near row crop fields and the third located near a livestock enclosure.

Spatial and temporal limitations of the Ground-Water Monitoring Network preclude the identification of the exact sources of the increasing levels of nitrogen compounds in some of Georgia's ground water. Nitrite/nitrate originates in ground water from direct sources and through oxidation of other forms of dissolved nitrogen, deriving from both natural and manmade sources. The most common sources of manmade dissolved nitrogen in Georgia usually consist of septic systems, agricultural wastes, and storage or application of fertilizers (Robertson, et. al., 1993). Dissolved nitrogen also is present in rainwater and can be derived from terrestrial vegetation and volatilization of

Table 4-1. Pollution and Contamination Incidents, Calendar Year 1999.

Station	Contaminant/Pollutant	Primary MCL
GWN-K1	C_2HCl_3=3.2ppb 1,1- $C_2H_2Cl_2$=0.5ppb	C_2HCl_3=5ppb 1,1- $C_2H_2Cl_2$=7ppb
GWN-K5	C_2HCl_3=0.62ppb	C_2HCl_3=5ppb
GWN-J8	Be=4.8ppb	Be=4ppb
GWN-MI7	$CHCl_3$=0.88ppb	trihalomethanes=100ppb
GWN-MI15	NO_x=15ppm as N	NO_x=10ppm as N
GWN-PA17	$CHCl_3$=0.51ppb	trihalomethanes=100ppb
GWN-PA30A	$CHCl_3$=0.59ppb	trihalomethanes=100ppb
GWN-PA33A	$CHCl_3$=0.7ppb	trihalomethanes=100ppb
GWN-P1	C_2HCl_3=4.8ppb MTBE=5.6ppb	C_2HCl_3=5ppb
GWN-P12A	F=5.0ppm	F=4ppm
GWN-P13A	$CHCl_3$=0.70ppb	trihalomethanes=100ppb
GWN-P15A	1,2-$C_2H_4Cl_2$=0.65ppb MTBE=0.93ppb	1,2-$C_2H_4Cl_2$=5ppb
GWN-VR2A	$CHCl_3$=1.1ppb	trihalomethanes=100ppb
GWN-VR6	1,2- $C_2H_2Cl_2$=3.1ppb 1,1,1-$C_2H_3Cl_3$=0.68ppb C_2Cl_4=3.4ppb $CHCl_3$=1.2ppb	1,2- $C_2H_2Cl_2$=7ppb 1,1,1-$C_2H_3Cl_3$=200ppb C_2Cl_4=5ppb trihalomethanes=100ppb
GWN-VR8	C_6H_6=0.51ppb MTBE=1.2ppb	C_6H_6=5ppb

Notes:

NO_x = Nitrate/Nitrite
MTBE = Methyl-tert-butyl Ether

fertilizers (Drever, 1988). The conversion of other nitrogen species to nitrate occurs in aerobic environments such as recharge areas. Anaerobic conditions in ground water, which commonly develop along the flow path of ground water, foster the denitrification process. However, the lack of denitrifying bacteria in ground water may inhibit this process (Freeze and Cherry, 1979).

Volatile organic compounds were detected in samples from twelve stations. MTBE was detected in samples from two wells (GWN-P1 and GWN-P15A) and one spring (GWN-VR8). Benzene was also reported in the sample from the spring. All three of these stations are located in or near built-up areas, and the spring has experienced intermittent low-level pollution by motor fuel components in the past. Samples from five wells and two springs contained low levels of the trihalomethane, chloroform. For wells GWN-PA17, GWN-PA30A, and GWN-PA33A and for spring GWN-VR2A, the chloroform probably originated from the reflux of chlorinated water down the well bores or into the spring pool. The chlorine in the water then reacts with naturally-occurring dissolved organic matter to form the chloroform. For the domestic well GWN-MI7, the chloroform probably formed in the same way, with the chlorine supplied by bleach recently used to disinfect the well. For spring GWN-P13A and well GWN-VR6, the reason for the presence of chloroform is not clear. Samples from five wells were contaminated with chlorinated ethane and ethylene compounds at levels less than primary MCL's. Three of the wells (GWN-K1, GWN-K5, GWN-VR6) are located in industrial settings. The remaining ones (GWN-P1 and GWN-P15A) are located in or near built-up areas.

Beryllium exceeded the primary MCL in the sample from well GWN-J8, and fluoride exceeded the primary MCL in the sample from spring GWN-P12A. Well GWN-J8 is a domestic water well located in the Coastal Plain, which has intermittently yielded samples with excessive beryllium in the past. Spring GWN-P12A is located on the Piedmont and has always given samples containing excessive fluoride. A sign placed near the spring advises against consuming the water. The sources of the beryllium and the fluoride are both almost certainly natural.

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APPENDIX

Laboratory Data

LABORATORY DATA

The standard testing regimen for all samples collected for the Ground-Water Monitoring Network consisted of laboratory analyses for volatile organic compounds and nitrate/nitrite and of field measurements of pH and electrical conductivity. Tests were carried out at three stations for additional substances which are subject to primary MCL's and had histories of occurrence at these stations. Beryllium was the metal of interest at two stations and the anion fluoride at a third.

EPA has set forth a series of (serially numbered) analytical methods officially recognized as suitable for environmental purposes. The EPD laboratory cites EPA method numbers along with analysis results, and Tables A-1 and A-2 list the method numbers appropriate to the various analytes.

Tables A-3 through A-11 regularly list results for the following parameters: pH, conductivity, nitrate/nitrite, trihalomethanes, MTBE, benzene, toluene, ethyl benzene, and total xylenes. Other VOC's are listed if detected. Results for two stations also list beryllium; and, for one station, substances amenable to EPA method 300.0, which includes fluoride, are listed. The abbreviation "ppm", where used in a nitrate/nitrite entry in these tables, is understood to mean milligrams per liter as nitrogen.

For this appendix, the following abbreviations are used:

su	= standard units
mg/L	= milligrams per liter (parts per million)
ppm	= parts per million
mg/L as N	= milligrams per liter (parts per million), as nitrogen
ug/L	= micrograms per liter (parts per billion)
ppb	= parts per billion
uS	= microsiemenses
nd	= not detected
--	= not analyzed

Note:

The detection limit for the same substance can vary among different laboratories and can vary for a single laboratory if a sample is diluted to lower the concentration of interfering substances, or if the array of standards used to develop the detection limit is revised.

Table A-1. Standard Water Quality Analyses: Anions, Volatile Organic Compounds, and Other Parameters.

ANIONS			
Parameter	**Test Method**	**Method Detection Limit**	**Primary Maximum Contaminant Level**
Nitrate/Nitrite (NOx)	EPA 353.2	0.02 mg/L as N	10 mg/L as N

VOLATILE ORGANIC COMPOUNDS			
Parameter	**Type of Test**	**Practical Quantitation Limit**	**Primary Maximum Contaminant Level**
Vinyl Chloride	EPA 524.2	0.5 ug/L	2.0 ug/L
1,1-Dichloroethylene	EPA 524.2	0.5 ug/L	7.0 ug/L
Dichloromethane	EPA 524.2	0.5 ug/L	5.0 ug/L
Trans-1,2-Dichloroethylene	EPA 524.2	0.5 ug/L	100 ug/L
Cis-1,2-Dichloroethylene	EPA 524.2	0.5 ug/L	70.0 ug/L
1,1,1-Trichloroethane	EPA 524.2	0.5 ug/L	200 ug/L
Carbon Tetrachloride	EPA 524.2	0.5 ug/L	5.0 ug/L
Benzene	EPA 524.2	0.5 ug/L	5.0 ug/L
1,2-Dichloroethane	EPA 524.2	0.5 ug/L	5.0 ug/L
Trichloroethylene	EPA 524.2	0.5 ug/L	5.0 ug/L
1,2-Dichloropropane	EPA 524.2	0.5 ug/L	5.0 ug/L
Toluene	EPA 524.2	0.5 ug/L	1000 ug/L
1,1,2-Trichloroethane	EPA 524.2	0.5 ug/L	5.0 ug/L
Tetrachloroethylene	EPA 524.2	0.5 ug/L	5.0 ug/L
Chlorobenzene	EPA 524.2	0.5 ug/L	100 ug/L
Ethylbenzene	EPA 524.2	0.5 ug/L	700 ug/L
Total Xylenes	EPA 524.2	0.5 ug/L	10,000 ug/L

Table A-1 (Continued). Standard Water Quality Analyses: Anions, Volatile Organic Compounds, and Other Parameters.

VOLATILE ORGANIC COMPOUNDS			
Parameter	**Type of Test**	**Practical Quantitation Limit**	**Primary Maximum Contaminant Level**
Styrene	EPA 524.2	0.5 ug/L	100 ug/L
1,4-Dichlorobenzene (P)	EPA 524.2	0.5 ug/L	75.0 ug/L
1,2-Dichlorobenzene (O)	EPA 524.2	0.5 ug/L	600 ug/L
1,2,4-Trichlorobenzene	EPA 524.2	0.5 ug/L	70.0 ug/L
Dichlorodifluoro-methane	EPA 524.2	0.5 ug/L	None
Chloromethane	EPA 524.2	0.5 ug/L	None
Bromomethane	EPA 524.2	0.5 ug/L	None
Chloroethane	EPA 524.2	0.5 ug/L	None
Trichlorofluoro-methane	EPA 524.2	0.5 ug/L	None
1,1-Dichloroethane	EPA 524.2	0.5 ug/L	None
2,2-Dichloropropane	EPA 524.2	0.5 ug/L	None
Bromochloro-methane	EPA 524.2	0.5 ug/L	None
Chloroform	EPA 524.2	0.5 ug/L	100 ug/L*
1,1-Dichloropropylene	EPA 524.2	0.5 ug/L	None
Dibromomethane	EPA 524.2	0.5 ug/L	None
Bromodichloro-methane	EPA 524.2	0.5 ug/L	100 ug/L*
Cis-1,3-Dichloropropylene	EPA 524.2	0.5 ug/L	None
Trans-1,3-Dichloropropylene	EPA 524.2	0.5 ug/L	None
1,3-Dichloropropane	EPA 524.2	0.5 ug/L	None
Dibromochloro-methane	EPA 524.2	0.5 ug/L	100 ug/L*

Table A-1 (Continued). Standard Water Quality Analyses: Anions, Volatile Organic Compounds, and Other Parameters.

VOLATILE ORGANIC COMPOUNDS			
Parameter	**Type of Test**	**Practical Quantitation Limit**	**Primary Maximum Contaminant Level**
1,2-Dibromoethane	EPA 524.2	0.5 ug/L	None
1,1,1,2-Tetrachloroethane	EPA 524.2	0.5 ug/L	None
Bromoform	EPA 524.2	0.5 ug/L	100 ug/L*
Isopropylbenzene	EPA 524.2	0.5 ug/L	None
1,1,2,2,-Tetra-chloroethane	EPA 524.2	0.5 ug/L	None
Bromobenzene	EPA 524.2	0.5 ug/L	None
1,2,3-Trichloropropane	EPA 524.2	0.5 ug/L	None
N-Propylbenzene	EPA 524.2	0.5 ug/L	None
2-Chlorotoluene	EPA 524.2	0.5 ug/L	None
1,3,5-Trimethylbenzene	EPA 524.2	0.5 ug/L	None
4-Chlorotoluene	EPA 524.2	0.5 ug/L	None
Tert-Butylbenzene	EPA 524.2	0.5 ug/L	None
1,2,4-Trimethylbenzene	EPA 524.2	0.5 ug/L	None
Sec-Butylbenzene	EPA 524.2	0.5 ug/L	None
P-Isopropyltoluene	EPA 524.2	0.5 ug/L	None
1,3-Dichlorobenzene (M)	EPA 524.2	0.5 ug/L	None
N-Butylbenzene	EPA 524.2	0.5 ug/L	None
1,2-Dibromo-3-Chloropropane	EPA 524.2	0.5 ug/L	0.2 ug/L
Hexachlorobutadi-ene	EPA 524.2	0.5 ug/L	None
Naphthalene	EPA 524.2	0.5 ug/L	None

Table A-1 (Continued). Standard Water Quality Analyses: Anions, Volatile Organic Compounds, and Other Parameters.

VOLATILE ORGANIC COMPOUNDS			
Parameter	**Type of Test**	**Practical Quantitation Limit**	**Primary Maximum Contaminant Level**
1,2,3-Trichlorobenzene	EPA 524.2	0.5 ug/L	None
Methyl Tert-butyl Ether	EPA 524.2	0.5 ug/L	None

OTHER PARAMETERS**		
Parameter	**Units**	**Maximum Contaminant Level**
pH	0.01 SU	None
Conductivity	1.0 uS	None

Notes:

Detection limits for analyses are Practical Quantitation Limits (PQLs) except for the NOx test, for which a Method Detection Limit (MDL) is used.

Primary MCL's from Georgia Rules for Safe Drinking Water, October 1997 edition (EPD, 1997).

* Indicates a trihalomethane compound. The primary MCL for total trihalomethanes is 100 ug/L.

**pH and conductivity are measured in the field (see Chapter 2).

Table A-2. Optional Water Quality Analyses: Metals and Anions.

METALS			
Parameter	**Test Method**	**Practical Quantitation Limit**	**Max.Contaminant Level**
Beryllium (Be)	EPA 210.2	2 ug/L	4 ug/L$_1$

ANIONS			
Parameter	**Test Method**	**Method Detection Limit**	**Max.Contaminant Level**
Bromide (Br)	EPA 300.0	0.1 mg/L	None
Chloride (Cl)	EPA 300.0	0.1 mg/L	250 mg/L$_2$
Sulfate (SO_4)	EPA 300.0	2.0 mg/L	250 mg/L$_2$
Fluoride (F)	EPA 300.0	0.1 mg/L	4.0 mg/L$_1$, 2.0 mg/L$_2$

Notes:

Detection limits for anions analyses are Method Detection Limits (MDLs). The detection limit for beryllium is a Practical Quantitation Limit (PQL).

MCL's from Georgia Rules for Safe Drinking Water, October 1997 edition (EPD, 1997):

$_1$=Primary Maximum Contaminant Level (MCL).
$_2$=Secondary MCL.

Table A-3. 1999 Ground-Water Quality Analyses of the Cretaceous Aquifer System.

GWN-K1		
Well Name:	Englehard Kaolin Company #2	
County:	Wilkinson	
Date Sampled:	03/24/1999	
Nitrate/Nitrite	0.28	ppm
pH	4.68	su
conductivity	57	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds		
Trichloroethylene	3.2	ppb
1,1-Dichloroethylene	0.5	ppb
Other		

GWN-K2A		
Well Name:	Irwinton #303	
County:	Wilkinson	
Date Sampled:	03/24/1999	
Nitrate/Nitrite	0.06	ppm
pH	5.82	su
conductivity	90	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K3		
Well Name:	Sandersville #7B	
County:	Washington	
Date Sampled:	06/16/1999	
Nitrate/Nitrite	0.02	ppm
pH	6.06	su
conductivity	92	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K5		
Well Name:	Richmond County #101	
County:	Richmond	
Date Sampled:	12/09/1999	
Nitrate/Nitrite	0.98	ppm
pH	4.82	su
conductivity	19	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds		
Trichloroethylene	0.62	ppb
Other		

GWN-K6		
Well Name:	J.M. Huber #6	
County:	Twiggs	
Date Sampled:	03/24/1999	
Nitrate/Nitrite	0.03	ppm
pH	5.50	su
conductivity	41	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K7		
Well Name:	Jones County #4	
County:	Jones	
Date Sampled:	03/24/1999	
Nitrate/Nitrite	0.14	ppm
pH	5.22	su
conductivity	19	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-3 (Continued). 1999 Ground-Water Quality Analyses of the Cretaceous Aquifer System.

GWN-K8		
Well Name:		
County:	Laurens	
Date Sampled:	12/08/1999	
Nitrate/Nitrite	0.10	ppm
pH	6.79	su
conductivity	243	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K9		
Well Name:	Marshallville #1	
County:	Macon	
Date Sampled:	04/14/1999	
Nitrate/Nitrite	nd	ppm
pH	4.03	su
conductivity	--	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K10A		
Well Name:	Fort Valley #5	
County:	Peach	
Date Sampled:	11/23/1999	
Nitrate/Nitrite	0.47	ppm
pH	4.80	su
conductivity	17	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K11A		
Well Name:	Warner Robins #2	
County:	Houston	
Date Sampled:	01/08/1999	
Nitrate/Nitrite	0.80	ppm
pH	4.88	su
conductivity	20	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K12		
Well Name:	Perry/Holiday Inn Well	
County:	Houston	
Date Sampled:	11/23/1999	
Nitrate/Nitrite	nd	ppm
pH	4.04	su
conductivity	48	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K13		
Well Name:	Omaha #1	
County:	Stewart	
Date Sampled:	04/28/1999	
Nitrate/Nitrite	nd	ppm
pH	9.20	su
conductivity	205	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-3 (Continued). 1999 Ground-Water Quality Analyses of the Cretaceous Aquifer System.

GWN-K15A		
Well Name:	Georgetown #3	
County:	Quitman	
Date Sampled:	04/28/1999	
Nitritate/Nitrite	nd	ppm
pH	9.32	su
conductivity	226	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K16		
Well Name:	Pactiv, Inc. North Well	
County:	Bibb	
Date Sampled:	11/23/1999	
Nitritate/Nitrite	0.81	ppm
pH	5.36	su
conductivity	28	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K18A		
Well Name:	Buena Vista #6	
County:	Marion	
Date Sampled:	06/17/1999	
Nitritate/Nitrite	0.14	ppm
pH	4.78	su
conductivity	19	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K19		
Well Name:	Hephzibah/Murphy St. Well	
County:	Richmond	
Date Sampled:	12/09/1999	
Nitritate/Nitrite	0.08	ppm
pH	4.84	su
conductivity	16	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-K20		
Well Name:	Plains #7	
County:	Sumter	
Date Sampled:	06/17/1999	
Nitritate/Nitrite	nd	ppm
pH	7.94	su
conductivity	90	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-4. 1999 Ground-Water Quality Analyses of the Providence Aquifer System.

GWN-PD2B		
Well Name:	Preston #4	
County:	Webster	
Date Sampled:	06/17/1999	
Nitritate/Nitrite	1.0	ppm
pH	5.68	su
conductivity	35	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PD3		
Well Name:	Fort Gaines #2	
County:	Clay	
Date Sampled:	04/28/1999	
Nitritate/Nitrite	nd	ppm
pH	8.61	su
conductivity	311	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-5. 1999 Ground-Water Quality Analyses of the Clayton Aquifer System.

GWN-CT2A		
Well Name:	Burton Thomas house well	
County:	Sumter	
Date Sampled:	11/17/1999	
Nitrate/Nitrite	nd	ppm
pH	7.80	su
conductivity	311	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-CT3		
Well Name:	Dawson/ Crawford St. Well	
County:	Terrell	
Date Sampled:	01/29/1999	
Nitrate/Nitrite	0.02	ppm
pH	7.64	su
conductivity	235	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-CT3		
Well Name:	Dawson/ Crawford St. Well	
County:	Terrell	
Date Sampled:	11/17/1999	
Nitrate/Nitrite	nd	ppm
pH	7.72	su
conductivity	371	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-CT5A		
Well Name:	Cuthbert #3	
County:	Randolph	
Date Sampled:	11/18/1999	
Nitrate/Nitrite	nd	ppm
pH	7.75	su
conductivity	250	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-CT7A		
Well Name:	St. John farm well	
County:	Sumter	
Date Sampled:	11/17/1999	
Nitrate/Nitrite	7.4	ppm
pH	4.41	su
conductivity	104	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-CT8		
Well Name:	Weathersby house well	
County:	Schley	
Date Sampled:	11/16/1999	
Nitrate/Nitrite	0.75	ppm
pH	4.81	su
conductivity	22	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-6. 1999 Ground-Water Quality Analyses of the Claiborne Aquifer System.

GWN-CL2			
Well Name:	Unadilla #3		
County:	Dooly		
Date Sampled:	04/14/1999		
Nitrate/Nitrite		0.24	ppm
pH		7.47	su
conductivity		--	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-CL4A			
Well Name:	Plains #5		
County:	Sumter		
Date Sampled:	11/17/1999		
Nitrate/Nitrite		3.0	ppm
pH		4.65	su
conductivity		68	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-CL6			
Well Name:	Georgia Tubing Central Supply Well		
County:	Early		
Date Sampled:	04/28/1999		
Nitrate/Nitrite		nd	ppm
pH		7.83	su
conductivity		262	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-CL8			
Well Name:	Flint River Nursery Office Well		
County:	Dooly		
Date Sampled:	04/14/1999		
Nitrate/Nitrite		nd	ppm
pH		6.12	su
conductivity		--	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-CL9			
Well Name:	Newton #3		
County:	Baker		
Date Sampled:	11/18/1999		
Nitrate/Nitrite		nd	ppm
pH		7.93	su
conductivity		274	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

Table A-7. 1999 Ground-Water Quality Analyses of the Jacksonian Aquifer System.

GWN-J1B		
Well Name:	Quick house well	
County:	Burke	
Date Sampled:	11/11/1999	
Nitrate/Nitrite	2.4	ppm
pH	7.31	su
conductivity	233	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-J2A		
Well Name:	Oakwood Village Mob. Home Park #2	
County:	Burke	
Date Sampled:	12/09/1999	
Nitrate/Nitrite	0.57	ppm
pH	7.28	su
conductivity	215	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-J3		
Well Name:	J.W. Black house well	
County:	Emanuel	
Date Sampled:	11/11/1999	
Nitrate/Nitrite	nd	ppm
pH	7.81	su
conductivity	219	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-J4		
Well Name:	Wrightsville #4	
County:	Johnson	
Date Sampled:	02/17/1999	
Nitrate/Nitrite	0.15	ppm
pH	7.57	su
conductivity	233	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-J5		
Well Name:	Cochran #3	
County:	Bleckley	
Date Sampled:	04/14/1999	
Nitrate/Nitrite	nd	ppm
pH	7.40	su
conductivity	--	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-J6		
Well Name:	Wrens #3	
County:	Jefferson	
Date Sampled:	06/16/1999	
Nitrate/Nitrite	0.02	ppm
pH	6.70	su
conductivity	144	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-7 (Continued). 1999 Ground-Water Quality Analyses of the Jacksonian Aquifer System.

GWN-J7			
Well Name:	Templeton livestock well		
County:	Burke		
Date Sampled:	12/09/1999		
Nitrate/Nitrite		3.0	ppm
pH		4.80	su
conductivity		50	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-J8			
Well Name:	Kahn house well		
County:	Jefferson		
Date Sampled:	12/10/1999		
Nitrate/Nitrite		7.5	ppm
pH		4.80	su
conductivity		98	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other: Be		4.8	ppb

Table A-8. 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA1		
Well Name:	Thunderbolt #1	
County:	Chatham	
Date Sampled:	12/14/1999	
Nitrate/Nitrite	nd	ppm
pH	7.95	su
conductivity	340	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA2		
Well Name:	Savannah #13	
County:	Chatham	
Date Sampled:	12/14/1999	
Nitrate/Nitrite	nd	ppm
pH	8.00	su
conductivity	240	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA3		
Well Name:	Grist Equipment Co. shop well	
County:	Chatham	
Date Sampled:	12/14/1999	
Nitrate/Nitrite	nd	ppm
pH	7.92	su
conductivity	229	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA4		
Well Name:	Tybee #1	
County:	Chatham	
Date Sampled:	06/16/1999	
Nitrate/Nitrite	nd	ppm
pH	7.88	su
conductivity	556	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA5A		
Well Name:	Interstate Paper #2	
County:	Liberty	
Date Sampled:	02/23/1999	
Nitrate/Nitrite	nd	ppm
pH	8.03	su
conductivity	338	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA6		
Well Name:	Hinesville #5	
County:	Liberty	
Date Sampled:	02/23/1999	
Nitrate/Nitrite	nd	ppm
pH	7.30	su
conductivity	289	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-8 (Continued). 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA7		
Well Name:	Darien New South Well	
County:	McIntosh	
Date Sampled:	02/23/1999	
Nitrate/Nitrite	nd	ppm
pH	7.89	su
conductivity	629	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA8 1 PROOF		
Well Name:	ITT Rayonnier #4D	
County:	Wayne	
Date Sampled:	02/23/1999	
Nitrate/Nitrite	nd	ppm
pH	7.93	su
conductivity	390	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA9C		
Well Name:	Miller Ball Park TW 25	
County:	Glynn	
Date Sampled:	02/24/1999	
Nitrate/Nitrite	nd	ppm
pH	8.46	su
conductivity	510	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA10B		
Well Name:	Gilman Paper #11	
County:	Camden	
Date Sampled:	02/24/1999	
Nitrate/Nitrite	nd	ppm
pH	7.50	su
conductivity	1275	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other: sulfur dioxide (tentatively identified)	1	ppb

GWN-PA11		
Well Name:	St. Marys #2	
County:	Camden	
Date Sampled:	02/24/1999	
Nitrate/Nitrite	nd	ppm
pH	7.48	su
conductivity	793	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other: sulfur dioxide (tentatively identified)	3.6	ppb

GWN-PA12		
Well Name:	Folkston #3	
County:	Charlton	
Date Sampled:	02/24/1999	
Nitrate/Nitrite	nd	ppm
pH	7.60	su
conductivity	745	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-8 (Continued). 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA13		
Well Name:	Waycross #3	
County:	Ware	
Date Sampled:	02/24/1999	
Nitrate/Nitrite	nd	ppm
pH	7.67	su
conductivity	435	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA14		
Well Name:	Statesboro #7	
County:	Bulloch	
Date Sampled:	12/15/1999	
Nitrate/Nitrite	nd	ppm
pH	7.79	su
conductivity	243	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA15		
Well Name:	King Finishing Division Fire Well	
County:	Screven	
Date Sampled:	12/15/1999	
Nitrate/Nitrite	nd	ppm
pH	8.07	su
conductivity	247	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA16		
Well Name:	Millen #1	
County:	Jenkins	
Date Sampled:	02/17/1999	
Nitrate/Nitrite	nd	ppm
pH	7.62	su
conductivity	255	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA17		
Well Name:	Swainsboro #7	
County:	Emanuel	
Date Sampled:	02/17/1999	
Nitrate/Nitrite	0.03	ppm
pH	7.51	su
conductivity	208	uS
Trihalomethanes: chloroform	0.51	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA18		
Well Name:	Metter #2	
County:	Candler	
Date Sampled:	02/17/1999	
Nitrate/Nitrite	nd	ppm
pH	7.92	su
conductivity	203	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-8 (Continued). 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA19		
Well Name:	Douglas #4	
County:	Coffee	
Date Sampled:	01/06/1999	
Nitrate/Nitrite	nd	ppm
pH	7.77	su
conductivity	420	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA20		
Well Name:	Lakeland #2	
County:	Lanier	
Date Sampled:	01/06/1999	
Nitrate/Nitrite	nd	ppm
pH	7.84	su
conductivity	368	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA21A		
Well Name:	Valdosta New #4	
County:	Lowndes	
Date Sampled:	01/06/1999	
Nitrate/Nitrite	nd	ppm
pH	8.05	su
conductivity	239	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA22		
Well Name:	Thomasville #6	
County:	Thomas	
Date Sampled:	01/07/1999	
Nitrate/Nitrite	0.14	ppm
pH	7.72	su
conductivity	382	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA23		
Well Name:	Cairo #8	
County:	Grady	
Date Sampled:	01/07/1999	
Nitrate/Nitrite	nd	ppm
pH	7.75	su
conductivity	353	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA24		
Well Name:	Bainbridge #1	
County:	Decatur	
Date Sampled:	01/28/1999	
Nitrate/Nitrite	1.80	ppm
pH	7.82	su
conductivity	201	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-8 (Continued). 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA25		
Well Name:	Donalsonville /7th St. Well	
County:	Seminole	
Date Sampled:	01/28/1999	
Nitrate/Nitrite	1.63	ppm
pH	7.49	su
conductivity	254	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA26		
Well Name:	Colquitt #3	
County:	Miller	
Date Sampled:	01/28/1999	
Nitrate/Nitrite	1.75	ppm
pH	7.54	su
conductivity	205	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA27		
Well Name:	Camilla/Industrial Park Well	
County:	Mitchell	
Date Sampled:	01/07/1999	
Nitrate/Nitrite	0.43	ppm
pH	7.67	su
conductivity	229	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA28		
Well Name:	Moultrie #1	
County:	Colquitt	
Date Sampled:	01/07/1999	
Nitrate/Nitrite	nd	ppm
pH	7.92	su
conductivity	496	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA29		
Well Name:	Adel #6	
County:	Cook	
Date Sampled:	04/15/1999	
Nitrate/Nitrite	nd	ppm
pH	7.70	su
conductivity	--	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA30A		
Well Name:	Amoco/Nashville Mills #1	
County:	Berrien	
Date Sampled:	01/06/1999	
Nitrate/Nitrite	nd	ppm
pH	7.79	su
conductivity	362	uS
Trihalomethanes: chloroform	0.59	ppb
Methyl tert-butyl ether	--	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-8 (Continued). 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA31			
Well Name:	Tifton #6		
County:	Tift		
Date Sampled:	01/27/1999		
Nitrate/Nitrite		nd	ppm
pH		7.49	su
conductivity		258	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA32			
Well Name:	Ocilla #3		
County:	Irwin		
Date Sampled:	01/27/1999		
Nitrate/Nitrite		0.02	ppm
pH		7.77	su
conductivity		192	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA33A			
Well Name:	Fitzgerald #G		
County:	Ben Hill		
Date Sampled:	01/27/1999		
Nitrate/Nitrite		0.04	ppm
pH		7.75	su
conductivity		194	uS
Trihalomethanes: chloroform		0.7	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA34			
Well Name:	McRae #2 (Telfair Ave.)		
County:	Telfair		
Date Sampled:	11/10/1999		
Nitrate/Nitrite		nd	ppm
pH		7.43	su
conductivity		318	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA35			
Well Name:	Mt. Vernon New Well		
County:	Montgomery		
Date Sampled:	11/10/1999		
Nitrate/Nitrite		nd	ppm
pH		7.76	su
conductivity		246	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA36			
Well Name:	Vidalia #1		
County:	Toombs		
Date Sampled:	11/10/1999		
Nitrate/Nitrite		nd	ppm
pH		7.86	su
conductivity		213	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

Table A-8 (Continued). 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA38		
Well Name:	Eastman #4	
County:	Dodge	
Date Sampled:	11/10/1999	
Nitritate/Nitrite	0.24	ppm
pH	7.66	su
conductivity	216	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA39		
Well Name:	Sylvester #1	
County:	Worth	
Date Sampled:	01/27/1999	
Nitritate/Nitrite	0.03	ppm
pH	7.28	su
conductivity	272	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA40		
Well Name:	Merck #8	
County:	Dougherty	
Date Sampled:	05/18/1999	
Nitritate/Nitrite	2.0	ppm
pH	7.42	su
conductivity	288	uS
Trihalomethanes:	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA43A		
Well Name:	Pineland Fish Farm office well	
County:	Baker	
Date Sampled:	04/29/1999	
Nitritate/Nitrite	3.0	ppm
pH	7.70	su
conductivity	266	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA44		
Well Name:	Sycamore #2	
County:	Turner	
Date Sampled:	02/18/1999	
Nitritate/Nitrite	0.15	ppm
pH	7.90	su
conductivity	165	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-PA45A		
Well Name:	Abbeville #1	
County:	Wilcox	
Date Sampled:	02/18/1999	
Nitritate/Nitrite	0.42	ppm
pH	7.74	su
conductivity	233	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-8 (Continued). 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA46B			
Well Name:	Wenona Mobile Home Park Well		
County:	Crisp		
Date Sampled:	02/17/1999		
Nitritate/Nitrite		3.4	ppm
pH		7.72	su
conductivity		219	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA49			
Well Name:	Harmony Church Well		
County:	Dooly		
Date Sampled:	01/26/1999		
Nitritate/Nitrite		1.63	ppm
pH		7.74	su
conductivity		176	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA50			
Well Name:	Reynolds house well		
County:	Laurens		
Date Sampled:	12/08/1999		
Nitritate/Nitrite		1.3	ppm
pH		7.47	su
conductivity		289	uS
Trihalomethanes:		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA51			
Well Name:	Adams house well		
County:	Mitchell		
Date Sampled:	01/28/1999		
Nitritate/Nitrite		1.06	ppm
pH		7.60	su
conductivity		216	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA52			
Well Name:	Simmons house well		
County:	Mitchell		
Date Sampled:	04/29/1999		
Nitritate/Nitrite		3.5	ppm
pH		7.91	su
conductivity		199	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-PA53			
Well Name:	Cato house well		
County:	Decatur		
Date Sampled:	04/29/1999		
Nitritate/Nitrite		4.5	ppm
pH		7.90	su
conductivity		207	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

Table A-8 (Continued). 1999 Ground-Water Quality Analyses of the Floridan Aquifer System.

GWN-PA55			
Well Name:	Holland house well		
County:	Burke		
Date Sampled:	12/08/1999		
Nitritate/Nitrite		0.05	ppm
pH		7.58	su
conductivity		251	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

Table A-9. 1999 Ground-Water Quality Analyses of the Miocene Aquifer System.

GWN-MI1		
Well Name:	McMillan house well	
County:	Cook	
Date Sampled:	12/16/1999	
Nitritate/Nitrite	0.10	ppm
pH	7.89	su
conductivity	224	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-MI2		
Well Name:	Boutwell house well	
County:	Lowndes	
Date Sampled:	04/15/1999	
Nitritate/Nitrite	0.14	ppm
pH	5.70	su
conductivity	--	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-MI5		
Well Name:	Carter house well	
County:	Appling	
Date Sampled:	02/25/1999	
Nitritate/Nitrite	4.0	ppm
pH	5.29	su
conductivity	90	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-MI7		
Well Name:	Chaudoin house well	
County:	Irwin	
Date Sampled:	12/15/1999	
Nitritate/Nitrite	9.0	ppm
pH	4.27	su
conductivity	122	uS
Trihalomethanes: Chloroform	0.88	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-MI9A		
Well Name:	Murphy garden well	
County:	Thomas	
Date Sampled:	11/18/1999	
Nitritate/Nitrite	4.1	ppm
pH	6.95	su
conductivity	170	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-MI10B		
Well Name:	Calhoun house well	
County:	Colquitt	
Date Sampled:	01/19/1999	
Nitritate/Nitrite	0.20	ppm
pH	6.63	su
conductivity	122	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-9 (Continued). 1999 Ground-Water Quality Analyses of the Miocene Aquifer System.

GWN-MI10B		
Well Name:	Calhoun house well	
County:	Colquitt	
Date Sampled:	11/18/1999	
Nitritate/Nitrite	--	ppm
pH	6.65	su
conductivity	123	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-MI13		
Well Name:	Coastal Empire Camp (old Taylor place) well	
County:	Screven	
Date Sampled:	03/25/1999	
Nitritate/Nitrite	nd	ppm
pH	7.55	su
conductivity	251	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-MI15		
Well Name:	Aldrich house well	
County:	Bulloch	
Date Sampled:	11/11/1999	
Nitritate/Nitrite	15	ppm
pH	4.46	su
conductivity	151	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-10. 1999 Ground-Water Quality Analyses of the Piedmont/Blue Ridge Aquifer System.

GWN-BR1B			
Well Name:	Young Harris New Well		
County:	Towns		
Date Sampled:	10/14/1999		
Nitritate/Nitrite		0.02	ppm
pH		7.81	su
conductivity		100	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-BR2A			
Well Name:	Notla Water Authority #3		
County:	Union		
Date Sampled:	10/14/1999		
Nitritate/Nitrite		0.97	ppm
pH		5.68	su
conductivity		44	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-BR4			
Well Name:	Morganton Old Well		
County:	Fannin		
Date Sampled:	10/14/1999		
Nitritate/Nitrite		1.5	ppm
pH		6.38	su
conductivity		86	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-P1			
Well Name:	Luthersville New Well		
County:	Meriwether		
Date Sampled:	05/19/1999		
Nitritate/Nitrite		0.04	ppm
pH		6.01	su
conductivity		118	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		5.6	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds Trichloroethylene		4.8	ppb
Other			

GWN-P5			
Well Name:	Flowery Branch #1		
County:	Hall		
Date Sampled:	12/22/1999		
Nitritate/Nitrite		0.68	ppm
pH		6.74	su
conductivity		150	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

GWN-P6A			
Well Name:	Shiloh #1		
County:	Harris		
Date Sampled:	05/19/1999		
Nitritate/Nitrite		nd	ppm
pH		7.46	su
conductivity		129	uS
Trihalomethanes		nd	ppb
Methyl tert-butyl ether		nd	ppb
Benzene		nd	ppb
Toluene		nd	ppb
Ethylbenzene		nd	ppb
Total Xylenes		nd	ppb
Other Volatile Organic Compounds		nd	ppb
Other			

Table A-10 (Continued). 1999 Ground-Water Quality Analyses of the Piedmont/Blue Ridge Aquifer System.

GWN-P7		
Well Name:	Hampton #6	
County:	Henry	
Date Sampled:	05/19/1999	
Nitritate/Nitrite	0.25	ppm
pH	6.34	su
conductivity	130	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-P8		
Well Name:	Wayne Farms #4	
County:	Jackson	
Date Sampled:	12/22/1999	
Nitritate/Nitrite	0.37	ppm
pH	6.72	su
conductivity	230	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-P9A		
Well Name:	Gray #3	
County:	Jones	
Date Sampled:	05/27/1999	
Nitritate/Nitrite	0.09	ppm
pH	6.48	su
conductivity	396	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-P10C		
Well Name:	Franklin Springs New #9	
County:	Franklin	
Date Sampled:	12/22/1999	
Nitritate/Nitrite	0.03	ppm
pH	6.43	su
conductivity	147	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other: Be	nd	ppb

GWN-P11A		
Well Name:	Danielsville #2	
County:	Madison	
Date Sampled:	12/22/1999	
Nitritate/Nitrite	0.37	ppm
pH	6.38	su
conductivity	126	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-P12A		
Well Name:	Indian Spring	
County:	Butts	
Date Sampled:	05/27/1999	
Nitritate/Nitrite	nd	ppm
pH	7.06	su
conductivity	256	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		
Fluoride	5	ppm
Chloride	11	ppm
Sulfate	28	ppm

Table A-10 (Continued). 1999 Ground-Water Quality Analyses of the Piedmont/Blue Ridge Aquifer System.

GWN-P13A		
Well Name:	Academy Spring/Covington	
County:	Newton	
Date Sampled:	05/27/1999	
Nitritate/Nitrite	0.60	ppm
pH	5.90	su
conductivity	67	uS
Trihalomethanes: Chloroform	0.7	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-P14		
Well Name:	Upson County/Sunset Village Well	
County:	Upson	
Date Sampled:	05/19/1999	
Nitritate/Nitrite	0.41	ppm
pH	5.01	su
conductivity	19	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-P15A		
Well Name:	Bolton garden well	
County:	DeKalb	
Date Sampled:	05/27/1999	
Nitritate/Nitrite	0.02	ppm
pH	6.99	su
conductivity	182	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	0.93	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds 1,2-Dichloroethane	0.65	ppb
Other		

GWN-P16C		
Well Name:	Mt. Airy #4	
County:	Habersham	
Date Sampled:	10/15/1999	
Nitritate/Nitrite	0.20	ppm
pH	6.33	su
conductivity	35	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-P17		
Well Name:	Oconee County/New Hillcrest Well	
County:	Oconee	
Date Sampled:	12/21/1999	
Nitritate/Nitrite	nd	ppm
pH	7.27	su
conductivity	185	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-P18		
Well Name:	Dawsonville City Spring	
County:	Dawson	
Date Sampled:	10/14/1999	
Nitritate/Nitrite	1.40	ppm
pH	5.54	su
conductivity	47	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

Table A-11. 1999 Ground-Water Quality Analyses of the Valley and Ridge Aquifer System.

GWN-VR1		
Well Name:	Floyd County/Kingston Road Well	
County:	Floyd	
Date Sampled:	06/10/1999	
Nitritate/Nitrite	0.66	ppm
pH	7.63	su
conductivity	190	uS
Trihalomethanes:	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-VR2A		
Well Name:	LaFayettee/Lower Big Spring	
County:	Walker	
Date Sampled:	06/23/1999	
Nitritate/Nitrite	1.61	ppm
pH	7.20	su
conductivity	255	uS
Trihalomethanes: Chloroform	1.1	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-VR3		
Well Name:	Crawfish Spring/Chickamauga	
County:	Walker	
Date Sampled:	10/21/1999	
Nitritate/Nitrite	0.66	ppm
pH	7.62	su
conductivity	213	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-VR4		
Well Name:	Coats American #4	
County:	Walker	
Date Sampled:	10/21/1999	
Nitritate/Nitrite	nd	ppm
pH	7.38	su
conductivity	485	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-VR5		
Well Name:	Chattooga County #4	
County:	Chattooga	
Date Sampled:	10/21/1999	
Nitritate/Nitrite	2.7	ppm
pH	7.19	su
conductivity	345	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-VR6		
Well Name:	Chemical Products East Well	
County:	Bartow	
Date Sampled:	06/10/1999	
Nitritate/Nitrite	0.92	ppm
pH	7.42	su
conductivity	217	uS
Trihalomethanes: Chloroform	1.2	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds:		
1,1-Dichloroethylene	3.1	ppb
1,1,1-Tricloroethane	0.68	ppb
Tetrachloroethylene	3.4	ppb
Other		

Table A-11 (Continued). 1999 Ground-Water Quality Analyses of the Valley and Ridge Aquifer System.

GWN-VR7		
Well Name:	Adairsville/Lewis Spring	
County:	Bartow	
Date Sampled:	10/21/1999	
Nitritate/Nitrite	0.36	ppm
pH	7.71	su
conductivity	197	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-VR8		
Well Name:	Cedartown Spring	
County:	Polk	
Date Sampled:	06/10/1999	
Nitritate/Nitrite	0.62	ppm
pH	7.75	su
conductivity	210	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	1.2	ppb
Benzene	0.51	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		

GWN-VR9		
Well Name:	Polk County #2	
County:	Polk	
Date Sampled:	06/10/1999	
Nitritate/Nitrite	0.80	ppm
pH	7.85	su
conductivity	211	uS
Trihalomethanes	nd	ppb
Methyl tert-butyl ether	nd	ppb
Benzene	nd	ppb
Toluene	nd	ppb
Ethylbenzene	nd	ppb
Total Xylenes	nd	ppb
Other Volatile Organic Compounds	nd	ppb
Other		