Chapter 2 Environmental Description

Chapter 2 describes the existing environmental conditions at the Vogtle Electric Generating Plant (VEGP) site, the site vicinity and the region. The environmental descriptions provide sufficient detail to identify those environmental resources that have the potential to be affected by the construction, operation, or decommissioning of the new units. The chapter is divided into nine sections:

- Site Location (Section 2.1)
- Land (Section 2.2)
- Water (Section 2.3)
- Ecology (Section 2.4)
- Socioeconomics (Section 2.5)
- Geology (Section 2.6)
- Meteorology, Air Quality, and Noise (Section 2.7)
- Related Federal and Other Project Activities (Section 2.8)
- Existing Plant Site Characteristics, Design Parameters, and Site Interface Values (Section 2.9)

The following descriptions should help the reader understand the scope of the discussion:

- VEGP site – the 3,169 acre site as described in the Unit 1 and Unit 2 licenses
- New plant (VEGP Units 3 and 4) footprint – the approximately 500 acres within the VEGP site that will encompass the construction and operation of the new nuclear units
- Vicinity – the area within approximately the 6- or 10-mile (depending on the issue) radius around the VEGP site
- Region – the area within approximately the 50-mile radius around the VEGP site

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2.1 Site Location

SNC proposes to construct and operate two Westinghouse AP1000 reactors at VEGP in Burke County, Georgia. The two AP1000 reactors will be referred to as VEGP Units 3 and 4.

The proposed early site permit (ESP) is for the existing 3,169-acre VEGP site. VEGP Units 3 and 4 and supporting infrastructure will be sited in the area delineated in Figure 2.1-1. The centerline of VEGP Units 3 and 4 will be approximately 2,100 feet west and 400 feet south of the center of the existing Unit 2 containment building. Unit 4 containment will be approximately 800 feet west of Unit 3 containment.

The coordinates of the center of the containment buildings for VEGP Units 3 and 4 are given below in State Plane and Universal Transverse Mercator (UTM) coordinates:

Unit		Georgia East Coordinates (NAD27)	UTM (NAD83)
3	N	1,142,600	3,667,166.728
	E	621,800	428,315.413
4	N	1,142,600	3,667,169.439
	E	621,000	428,071.651

The 3,169-acre VEGP site is located on a Coastal Plain bluff on the southwest side of the Savannah River in eastern Burke County. The site and its exclusion area boundary (EAB) are generally bounded by River Road, Hancock Landing Road, and approximately 1.7 miles of the Savannah River (River Miles 150.0 to 151.7). The site is approximately 30 river miles above the U.S. 301 highway bridge and directly across the river from the Department of Energy's Savannah River Site (Barnwell County, South Carolina). The site is approximately 15 miles east north east of Waynesboro, Georgia and 26 miles southeast of Augusta, Georgia, the nearest population center (i.e., having more than 25,000 residents) (Figure 2.1-2). It is also about 136 miles from Savannah, Georgia and 150 river miles from the mouth of the Savannah River.

Access to the site is from River Road via U.S. Route 25, and Georgia Routes 56, 80, 24 or 23 (Figure 2.1-3). Barge access is available from the Savannah River which is navigable to a point upstream of VEGP. A railroad spur runs to the site from the Norfolk Southern Savannah-to-Augusta track.

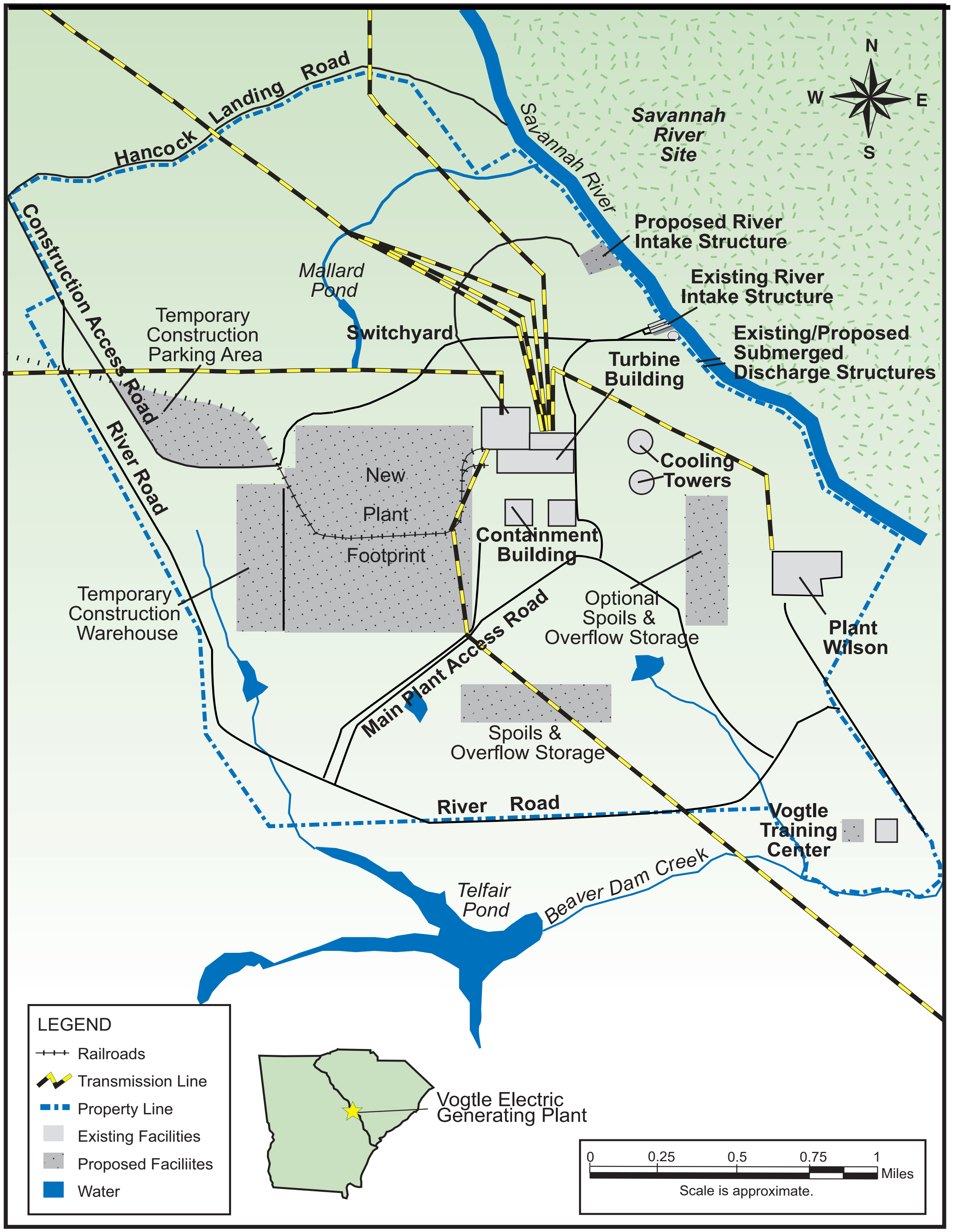

Figure 2.1-1 VEGP Site and Proposed New Plant Footprint

Figure 2.1-2 50-Mile Region

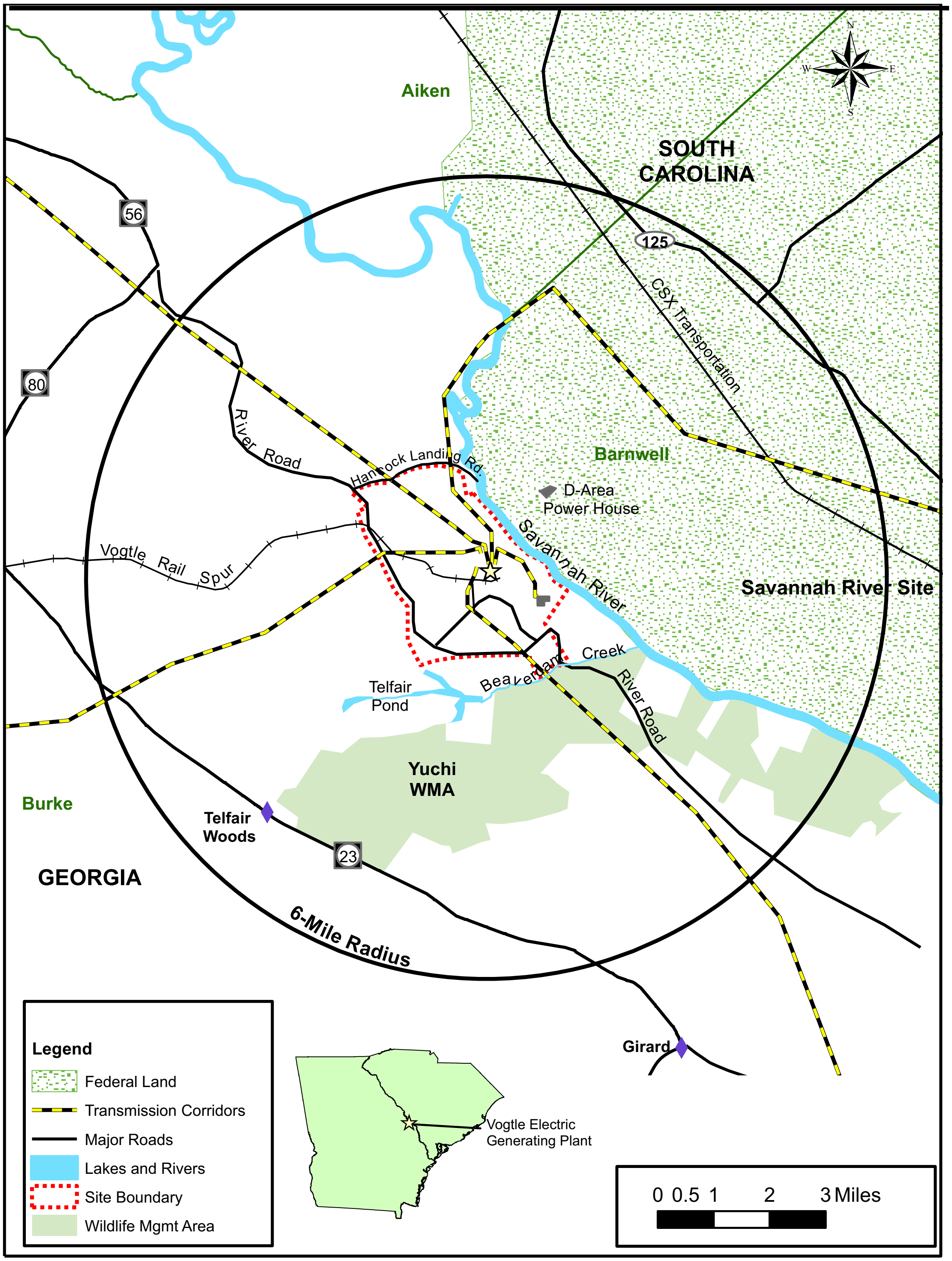

Figure 2.1-3 6-Mile Vicinity

2.2 Land

This section describes the land characteristics of the VEGP site and the vicinity, transmission corridors and offsite areas, and the region.

2.2.1 The Site and Vicinity

2.2.1.1 The Site

The 3,169-acre VEGP site is bounded by the Savannah River on the east, Hancock Landing Road on the north and River Road on the west and south (Figure 2.1-1). Georgia Power Company (GPC), Oglethorpe Power Corporation (OPC), Municipal Electric Authority of Georgia, and the City of Dalton, a municipality in the State of Georgia, doing business by and through the Water, Light and Sinking Fund Board of Commissioners (Dalton Utilities) own the VEGP Units 1 and 2 and most of the site property. Also on the VEGP site is the GPC-owned 354 MWe Plant Wilson facility composed of six oil-fueled combustion turbines. GPC provides support and direction for land management activities for the VEGP site property. Southern Nuclear Operating Company (SNC) is the Nuclear Regulatory Commission (NRC) licensed operator for VEGP Units 1 and 2 and manages and controls access to the site.

GPC developed a land management plan to ensure compliance with environmental regulations and permits and implemented a program with emphasis on forestry and wildlife. The plan also considers the needs of plant security, project management, construction, and power generation. The plan went into effect in January 1983 and is periodically updated. The plan dedicates undeveloped areas of the site to managing natural longleaf pine, and maintaining the existing hardwood communities. Slash pine and cover crops were used to revegetate parts of the original VEGP Units 1 and 2 construction site. **(GPC 1985)**

The 3,169-acre site includes land developed for industrial use, previously disturbed land and undeveloped land. The existing VEGP Units 1 and 2 and auxiliary facilities, including the Vogtle Training Center, Plant Wilson, construction facilities, and transmission rights-of-way occupy about 800 acres. Areas on the site that have been previously disturbed, including the proposed VEGP Units 3 and 4 footprint, have been revegetated with a mix of planted pines and old field vegetation. Much of the site is wooded. Figure 2.2-1 illustrates the U.S. Geological Survey (USGS) land use classifications on the VEGP site. Section 2.4.1.1 provides a description of the undeveloped portion of the site.

Several water bodies and streams exist on the site or border the site. Beaverdam Creek which drains Telfair Pond (located south of VEGP) is a major stream that borders the VEGP site south of the Vogtle Training Center. Several drainages drain from VEGP property to Beaver Dam Creek (Figure 2.1-3). A second, small stream drains north out of Mallard Pond, north of the proposed new plant footprint. Both ponds are impounded blackwater creeks **(GPC 1985).** Several borrow pits and two sediment retention basins constructed to control storm water runoff are on site. The sediment retention basins south of the industrial area are permanent ponds and will be used to support management of stormwater from the new Unit 3 and 4 construction area.

Most of the VEGP site property lies outside the 500-year floodplain. The Savannah River 100-year floodplain ranges from approximately 100 to 800 feet wide at the VEGP site **(FEMA 1989)**. The floodplain is separated from the rest of the VEGP site by steep bluffs along virtually all of the VEGP site river shoreline. The Savannah River is not designated a wild and scenic river **(**16 USC 1271 – 1287; **NPS No Date)**.

In 1993, the VEGP site was designated as a Certified Wildlife Habitat by the Wildlife Habitat Council, a non-profit, Washington D.C.-based wildlife organization. The certification considered the wildlife enhancement work performed after original construction and a new plan developed in the early 1990's.

No railroads, transmission corridors (other than those owned and operated by GPC), natural gas pipelines, or major waterways traverse the VEGP site. Several communication facilities are on GPC property. West of the facility is the Vogtle Fiberoptic Site (the old Microwave Site). Fiberoptic fiber from offsite comes into VEGP through this building. The fiber to Augusta exits the building to the south on poles to the 150 kV line near River Road. The fiber that goes south goes underground to the 500 kV line tower just to the southwest of the building. The fiber into the facility leaves the building underground east-southeast to the Security duct. The tower is home to the antennas for the NOAA transmitter, the Emergency Alert Siren Radio, and a variety of radios for the emergency notification network. Southwest of the facility are two meteorological towers which are discussed in detail in Section 6.4. Southeast of the plant is the Motorola iDEN (Integrated Digital Enhanced Network) tower, a SouthernLinc (Southern Company communications) site but the tower is owned by Global Signal Inc. (formerly Pinnacle Towers Inc.). The tower at Plant Wilson has an antenna for the Georgia Department of Natural Resources and antenna for the Emergency Alert Siren Radio in South Carolina. Access to the VEGP site is primarily through a VEGP-owned and maintained road off River Road.

No prime farmland soils occur on the VEGP site **(USDA 1986)**. Burke County is developing zonin regulations, but the VEGP site currently is not zoned.

2.2.1.2 The Vicinity

The VEGP site is in the Coastal Plain, approximately 25 miles east of the Piedmont Province **(GPC 1972)**. The topography of the vicinity consists of low rolling hills with elevations ranging from 80 feet to 280 feet above mean sea level **(GPC 1985)**.

The Georgia side of the Savannah River within 6 miles of the VEGP site is primarily rural undeveloped land with a few homes and small farms. Figure 2.2-2 identifies USGS land use classifications in the vicinity of VEGP. The crossroads community of Telfair Woods is approximately 5 miles southwest of VEGP (Figure 2.1-3). Girard (population 230) is approximately 8 miles to the south. A small, privately-owned airstrip, known as Rhodes Air Ranch, is located just north of the site boundary.

Much of the undeveloped land in the vicinity is sandhill-upland pine or oak-hickory hardwood communities. GPC provides access to the Savannah River via a concrete boat ramp, along with parking and a recreational area with picnic tables at its boat landing, immediately downstream of the VEGP property. The 7,000-acre Yuchi Wildlife Management Area (WMA) managed by Georgia Department of Natural Resources (DNR) is adjacent to VEGP property. Hunting, fishing, and primitive camping are allowed on the Yuchi WMA. No other recreation areas are within 6 miles of the VEGP site. No mineral deposits or mines occur in Burke County **(USGS 2003a)**. Forty-five percent of the soils in Burke County are classified as prime farmland **(USDA 1986)**. Forty-one percent of Burke County was farmland in 2002 **(NASS no date; Georgia.gov 2005)**. Of that 41 percent, 48 percent was in cropland, 42 percent was in woodland 6 percent was pasture and 4 percent was other uses. The largest money crops in the county are cotton and cottonseed, and milk and other dairy products from cows **(NASS no date)**. Burke County is revising its comprehensive plan, and has indicated zoning classifications will be established. Burke County currently does not have zoning classifications.

The Savannah River Site (SRS), a U.S. Department of Energy facility with restricted access, is directly across the Savannah River from VEGP. SRS has two industrial areas which are no longer active and have undergone remediation and one fossil-fueled power plant within the 6-mile radius. The remainder of the SRS within the 6-mile radius is river swamp, bottomland hardwood or upland pine-hardwood communities. The U.S. Forest Service maintains pine plantations on SRS land that is not industrial. Barnwell County, South Carolina has no mineral deposits or mines **(USGS 2003b)**.

2.2.2 Transmission Corridors and Offsite Areas

2.2.2.1 Existing Corridors

The existing transmission system supporting VEGP Units 1 and 2 has two 50 kV lines and four 230 kV lines in four corridors. There is an additional 230 kV line to the Wilson Station. The Wilson connection provides offsite power in case of emergency.

The two 500 kV transmission lines (Scherer and Thalmann) run in separate corridors, and the four 230 kV lines (Goshen [black], Goshen [white], Augusta Newsprint, and SCE&G), generally run in two additional corridors. The Plant Wilson line connects the Wilson Plant switchyard to the VEGP switchyard and is totally within the owners' property, and thus is not further discussed in this section. Figure 2.2-3 depicts the existing transmission system. The figure also shows major highway crossings and historically or environmentally significant areas. Table 2.2-1 provides information on land use along the corridors. Each corridor is described as follows:

Scherer – This corridor runs generally westward to Plant Scherer, north of Macon, Georgia. Built in 1986, it is 154 miles long and is mostly 150 feet wide, but up to 400 feet wide in some locations. The terrain is flat to rolling.

Thalmann – Running 159 miles to the south, this 150-foot-wide corridor connects VEGP to the West McIntosh substation near Plant McIntosh, just north of Savannah, Georgia then continues to its termination at the Thalmann substation near Brunswick. The VEGP Final Environmental Statement (FES) **(NRC 1985)** examined the entire 159 miles of transmission line, however, today, the VEGP line terminates at West McIntosh. Data for the entire Thalmann corridor are provided in Table 2.2-1. This line is also known as the McIntosh line.

South Augusta – This corridor contains three 230-kV transmission lines that run north to the Goshen and Augusta Newsprint substations. The Goshen substation (2 lines) is approximately 19 corridor miles from VEGP, and the corridor is 275 feet wide. The Augusta Newsprint substation is approximately 20 corridor miles from VEGP. Augusta Newsprint shares the South Augusta corridor with the Goshen lines for approximately 17 miles. From that point to its termination at the substation it is 100 to 125 feet wide. The Augusta Newsprint line was built in 1983 and the Goshen lines were built in 1986. The terrain is generally flat.

SCE&G – Built in 1986, this corridor runs north and east for 4.5 miles to cross the Savannah River and then an additional 17 miles to a substation operated by South Carolina Electric and Gas. The corridor in South Carolina is 100 feet wide and the 4.5-mile Georgia segment is 125 feet wide. The part of the corridor in South Carolina is wholly contained on the SRS. The terrain is mostly flat.

2.2.2.2 Proposed Transmission Corridor

The existing transmission corridors to the VEGP site will support generation from existing Units 1 and 2 as well as the new Units 3 and 4. GPC and SNC estimate one additional 500 kV line will be required to distribute the additional generation. The proposed new switchyard will contain an extra 500 KV bay to support an additional 500 KV line for potential future expansion. The final route of the new transmission line has not been determined. Initially, SNC developed a bounding analysis based on the known end point and counties the line will traverse. SNC evaluated the proposed new corridor route through Burke, Jefferson, McDuffie and Warren Counties. Land use in these counties is presented in Table 2.2-2 and Figure 2.2-4. The impact analysis is addressed at a county level in Section 4.1.2. GPC recently completed a study of the proposed route macro-corridor for this transmission line to provide detailed information to support the NRC NEPA analysis. This study (**Photo Science 2007**), was developed in early 2007 to identify potential corridors for the proposed transmission line relative to existing land uses and habitats, including special land use classifications (e.g., National or State Parks, military reservations, floodplains, wetlands), and previously-confirmed cultural resources and threatened or endangered species. The study also examined corridor route alternatives in general, based on the attributes of the identified corridors. Corridors are defined as transmission line routes of variable widths though a larger land area (study area) between VEGP and the end point of the transmission line. The term right-of-way refers to a precisely described routing of a transmission line, such as an easement of specific width; whereas a "corridor" is a more general route of sufficient width to contain the eventual right-of-way. The macro-corridor study utilized an established process and techniques for identification of corridors supported by computerized, state-of-the-art data analysis and mapping. The study defined a macro-corridor that varies from less than one mile to a little over three miles in width over the more than 50-mile length of the corridor. GPC then prepared a study of route alternatives using the EPRI-GTC Transmission Line Siting Methodology **(EPRI 2006)** to develop options for final line routing based on environmental, social, and cultural impacts. Additional detailed analysis will be conducted by a GPC team that will evaluate each alternate route within the corridor and ultimately select the preferred route.

The EPRI-GTC Transmission Line Siting Methodology incorporates a computer-based methodology developed by the Electric Power Research Institute (EPRI) and Georgia Transmission Corporation (GTC). It is used as a tool to evaluate the suitability of individual land tracts (grid cells) based on land use types for locating transmission facilities. Based on analysis of a large area between and in the vicinity of the endpoints of a line, a macro-corridor and study area are developed. By evaluating more detailed information about the grid cells within the study area, alternate corridors are identified. The EPRI-GTC method is objective, comprehensive, and consistent. It allows the utility to consider vast amounts of information and to quantitatively consider stakeholder input to develop the alternate corridors that ultimately lead to selection of the preferred corridor.

2.2.2.3 Land Use Issues

Land use along the existing corridors is presented in Table 2.2-1. The table breaks the Thalmann corridor into two segments (VEGP-West McIntosh and West McIntosh-Thalmann) to facilitate an understanding of how the proposed action will affect existing transmission corridors.

Special land uses along these corridors include the following as depicted on Figure 2.2-3:

- 17.1 miles on the SRS, which has restricted public access except along South Carolina Highway 125, which the transmission line crosses
- 4.4 miles of Oconee National Forest, northeast of Plant Scherer
- Ebenezer Creek Swamp crossed by the VEGP-West McIntosh line near its termination. Although privately owned, Ebenezer Creek Swamp is designated as a National Natural Landmark. It is part of the 29,000-acre Savannah National Wildlife Refuge. The State of Georgia has designated 7 miles of Ebenezer Creek as a Georgia Scenic River (Georgia Code Chapter 12, Section 12-5-352). Appendix J of the VEGP Units 1 and 2 FES identifies this crossing as receiving attention by the U.S. Fish and Wildlife Service (USFWS), which provided recommendations on crossing the swamp. GPC implemented special construction practices to protect the swamp and has procedures that specifically address corridor and

transmission line maintenance in this swamp, in accordance with the VEGP Environmental Protection Plan.

- Francis Plantation in Washington County, crossed by the VEGP-Scherer transmission corridor. The current VEGP Units 1 and 2 Environmental Protection Plan specifies that vegetation trimming in the Plantation shall be performed manually.
- A Georgia Power Company Transmission Bulletin identifies 196 cultural properties on existing Vogtle transmission lines and provides specifications for protecting these sites based on the Cultural Resources Plan approved by the Georgia State Historic Preservation Officer.

Land use associated with the proposed 500 kV Vogtle-Thompson line is discussed in detail in the macro-Corridor Report (**Photo Science 2007**).

2.2.3 The Region

All or parts of 28 counties (12 in South Carolina and 16 in Georgia) are within 50 miles of the VEGP site (Figure 2.1-2). The 50-mile radius is bordered by interstates on all sides; I-16 from Atlanta to Savannah lies to the southwest, I-95 lies to the east, I-26 from Columbia to Charleston, SC, lies to the northeast and I-20 from Atlanta to Columbia, is to the northwest. Only I-20 actually has any mileage within the 50-mile radius. Additional major transportation infrastructure within the region is discussed in Section 2.5.2.2.

This section focuses on three Georgia counties as the region of impact for the construction and operation of new units at VEGP - Burke, Columbia and Richmond - where 79 percent of current VEGP employees reside (see Section 2.5.1). Most land use changes will be due to increases in tax revenues associated with new units at VEGP, which will be limited to the county where the site is located (Burke), or population changes in counties where the greatest number of construction or operations employees will live (Burke, Richmond, and Columbia).

The State of Georgia mandates that cities and counties have comprehensive land use plans, and Burke, Richmond and Columbia Counties have such plans. Table 2.2-3 shows a breakdown of land use type and area in those counties.

Burke County

Burke County has the second largest land area of any county in Georgia. The predominant land uses are agriculture and forestry (76 percent of the unincorporated area in the county in 1990). Fifteen percent of the county is classified as preferential agriculture, and thus bound by covenant to remain agricultural for a given time. Less than 1 percent of the land was classified as industrial or commercial in 1990. The only major park, recreation area or conservation area is the Yuchi Wildlife Management Area, owned by the Georgia DNR. **(Burke County 1991)**

In 2002, Burke County had 494 farms; 176 produced cattle (up from 157 in 1997), 18 had hogs. Very few farms had poultry. In 2002, 248 had harvested cropland: 54 farms produced cotton (down from 66 in 1997), 36 produced soybeans (down from 73 in 1997), and 50 produced peanuts (down from 56 in 1997). **(USDA 2004)**

Columbia County

Sixteen percent of the total land in Columbia County is non-forestry farmland. Crops include corn, soybeans, and wheat. Commodities include forestry, dairy, beef, and greenhouse production (nursery plants). Harvested crops and livestock production have been steadily decreasing. In 1992 the county reported 3,046 acres of harvested cropland. By 1997, harvested cropland had decreased to 2,292 acres. In 1992, 5,400 head of cattle were reported. In 1997, that number had declined to 4,600 head. **(Columbia County 2000)**

Currently 140,500 acres (76 percent) of Columbia County is forested. The forest industry owns 31,600 acres and timber is the highest-valued commodity in the county. **(Columbia County 2000)**

Major parks, recreation and conservation areas in Columbia County include a portion of Clarks Hill Lake, the Augusta Canal, Mistletoe State Park, Heggie's Rock, and Stallings Island. The county is developing a greenway system. Clarks Hill Lake (known as S. Strom Thurmond Lake in South Carolina) is a 70,000 acre U.S. Army Corps of Engineers reservoir on the Savannah River. It provides recreation, wildlife refuges and conservation, flood prevention and drinking water to Georgia and South Carolina. Heggie's Rock is near Appling and is one of Georgia's 12 natural landmarks. It is home to many endangered plant and animal species and is owned by The Nature Conservancy. Stallings Island is in the Savannah River and is thought to be the earliest Colonial settlement in the county. It is on the National Register of Historic Places. **(Columbia County 2000)**

Richmond County

Seven percent of Richmond County was non-forestry farmland in 1997. Crops include corn, soybeans, and peanuts. Commodities include forestry, dairy and beef production, and ornamental horticulture. Harvested cropland increased by 16 percent between 1992 and 1997. **(ARC 2004)**

Currently 121,000 acres (58 percent) of Richmond County is forested. Fifty-six thousand acres are owned by private individuals, 39,000 acres are owned by the Federal government (Fort Gordon), and 17,000 acres by the forest products industry. **(ARC 2004)**

Major parks, recreation and conservation areas in Richmond County include the Savannah River, the Augusta Canal, Phinizy Swamp WMA and Nature Park, Merry Brickyard Ponds, and Spirit Creek Education Forest. Phinizy Swamp WMA is a 1,500-acre, state-owned cypress wetland approximately 2 miles from downtown Augusta. Phinizy Swamp Nature Park is an 1,100-acre park south of Phinizy Swamp WMA. It is owned by the City of Augusta. Merry Brickyard Ponds are clay strip pits that have filled with water and evolved into nationally recognized waterfowl habitat. **(ARC 2004)**

There are no Native American tribal land use plans for areas within the region.

Table 2.2-1 Land Use Along Existing Transmission Corridors

Corridor	Land Use Categories			
	Agricultural	Forest	Industrial	Residential
VEGP-Scherer				
Percent	29	63	<1	<1
Area (acres)	1,041	2,299	21.5	34.5
VEGP-Thalmann				
VEGP-West McIntosh				
Percent	32	29	0	0
Area (acres)	397	362	0	0
West McIntosh-Thalmann[1]				
Percent	5	68	<1	3
Area (acres)	74.8	1,113	13.4	53.7
VEGP-South Augusta				
Percent	14	75	<1	2.8
Area (acres)	92.5	494	0.62	18.2
VEGP-SCE&G				
Percent	4	69	0	0
Area (acres)	11.4	188	0	0

Source: EPA 1994
[1] Provided to be consistent with the VEGP license renewal application.

Table 2.2-2 Land Use as Percent in Burke, Jefferson, McDuffie and Warren Counties

County	Land Use Categories					
	Agricultural	Forest	Water	Wetland	Barren	Urban[1]
Burke	46	43	<1	9	1	<1
Jefferson	40	48	<1	10	<1	1
McDuffie	16	78	3	<1	<1	3
Warren	22	76	<1	<1	<1	1

Source: EPA 1994
[1] Includes residential, commercial, industrial, transportation, communication, utilities, and other urban or built-up land.

Table 2.2-3 Land Use in Acres in Burke, Columbia and Richmond Counties

Land Uses	Burke County[1] (1990)	Columbia County[2] (2000)	Richmond County[3] (2003)
Residential	25,767	43,172	54,328
Commercial	731	2,416	5,772
Industrial	201	2,211	9,402
Transportation/ Communications/ Utilities	No data	7,671	11,893
Public/Institutional	9,254	4,322	52,890
Parks/Open Space/ Conservation	No data	10,304	5,903
Agriculture/Forestry/ Undeveloped	440,307 (includes open space)	126,727	70,020

1 **Burke County 1991**, Table 6-1
2 **Columbia County 2000**, Table L-1
3 **ARC 2004**, Table L-1

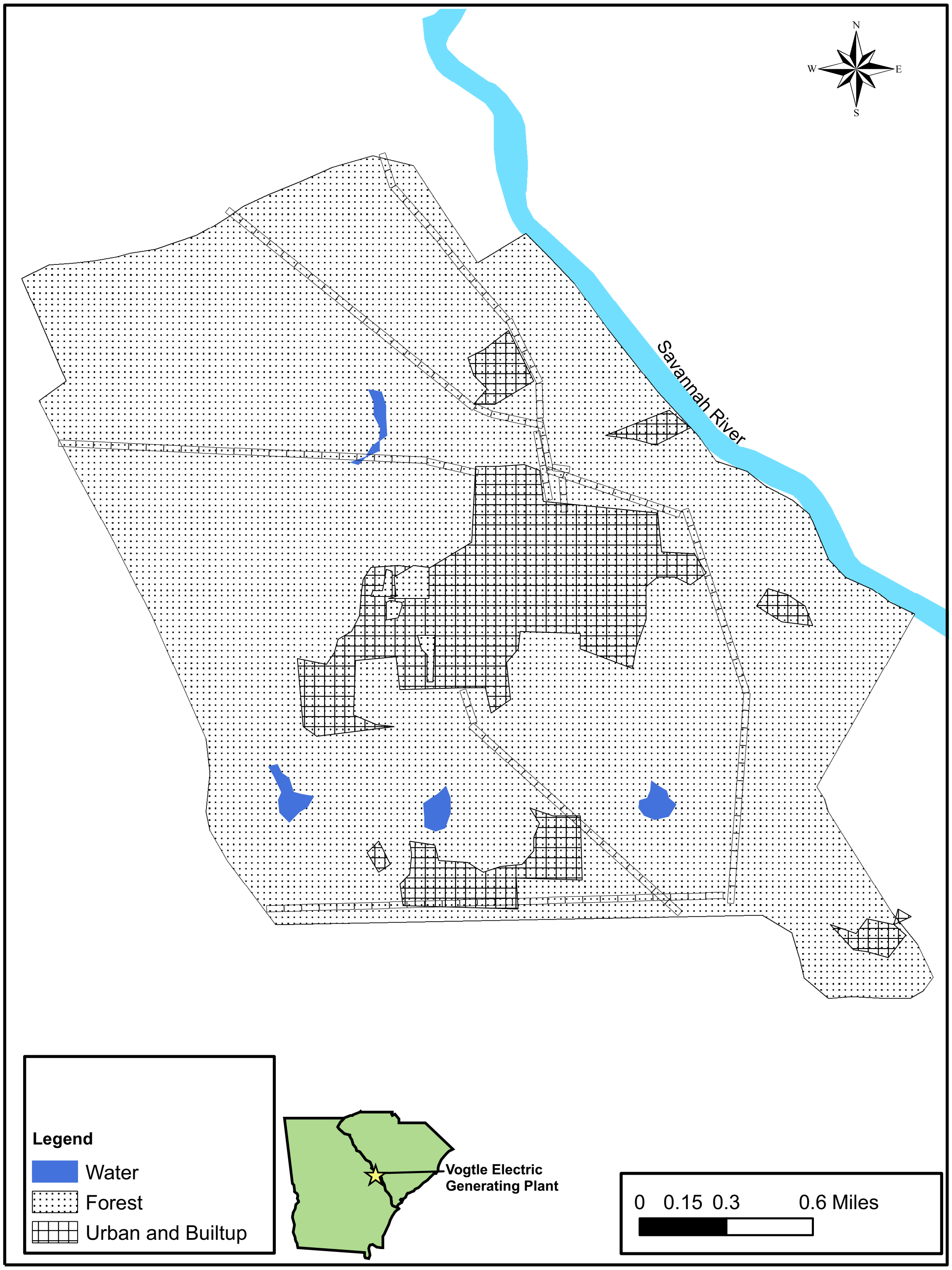

Figure 2.2-1 USGS Land Use Classifications at VEGP Site

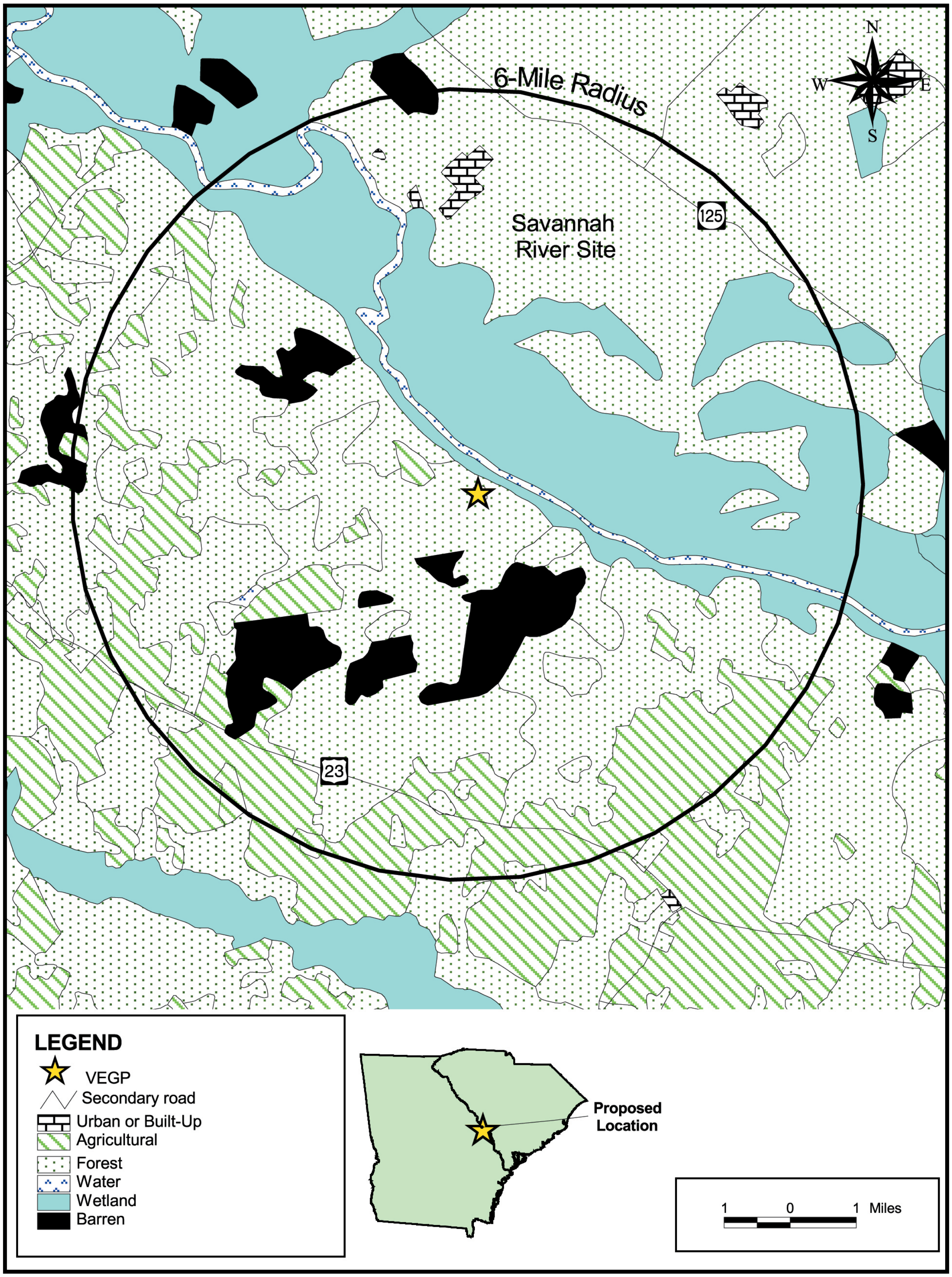

Figure 2.2-2 USGS Land Use Classifications in the Vicinity of the VEGP Site

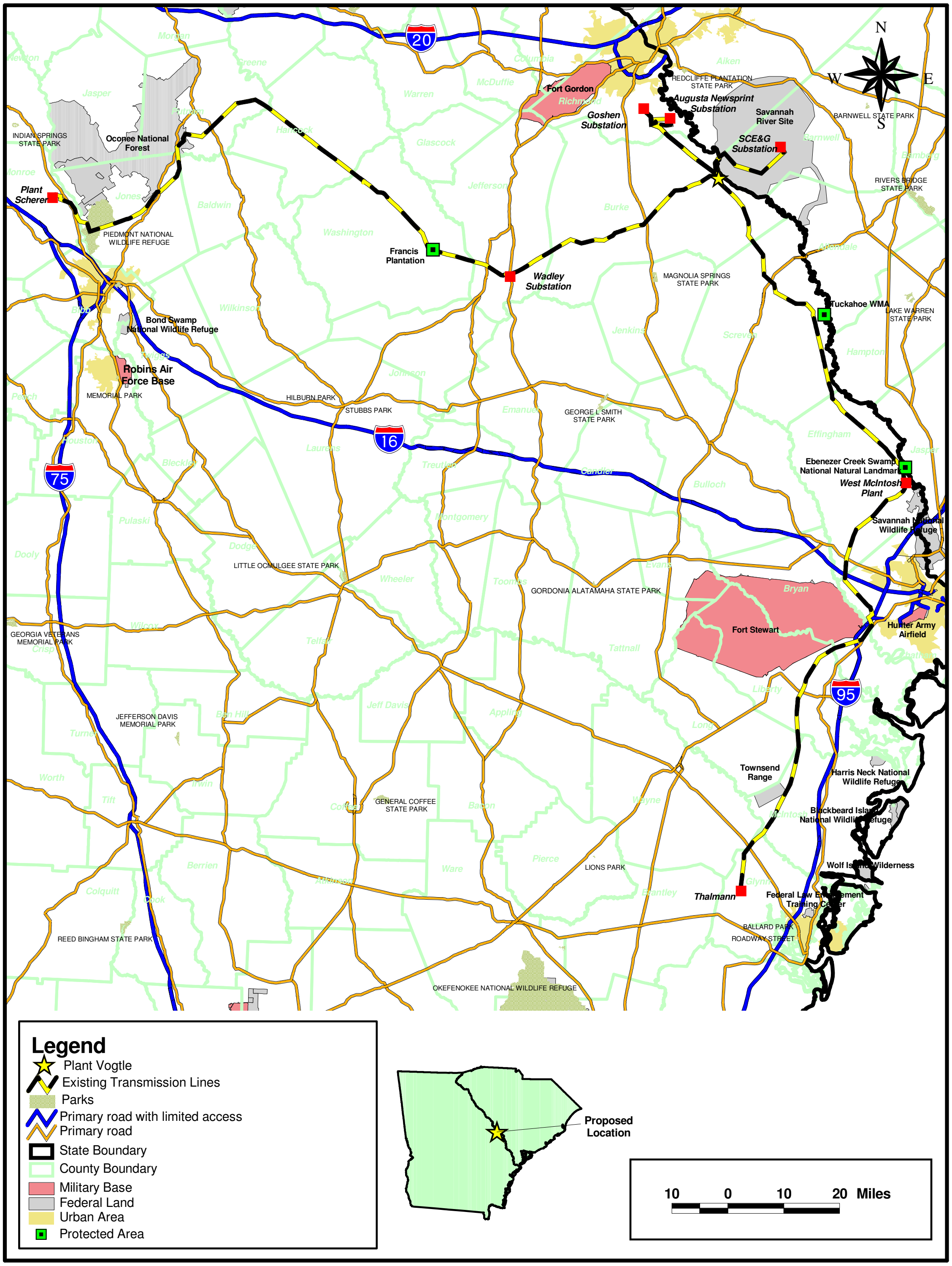

Figure 2.2-3 Existing Transmission System

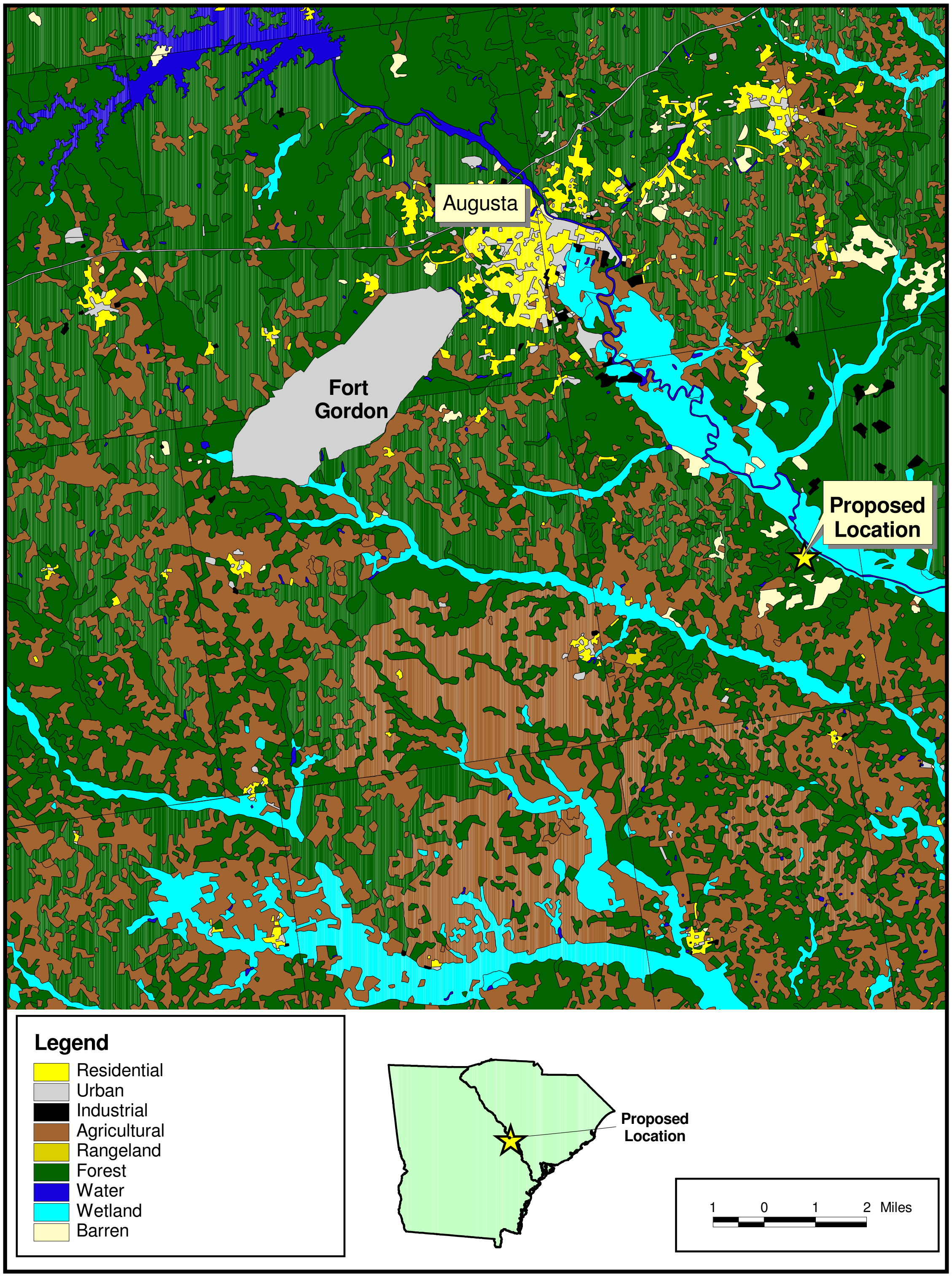

Figure 2.2-4 Land use in Proposed Corridor

Section 2.2 References

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2.3 Water

This section describes the physical and hydrological characteristics of the VEGP site and surrounding region that could affect or be affected by the construction and operation of two new AP1000 units at the VEGP site. The new units will be referred to as VEGP Units 3 and 4. The potential construction and operational impacts of the project on near- and far-field water resources are discussed in Chapters 4 and 5, respectively.

The 3,169-acre VEGP site is located high on a coastal plain bluff on the west bank of the Savannah River in eastern Burke County Georgia. The new AP1000 units will be located approximately 220 feet above mean sea level (msl). This site is located at River Mile 151; approximately 30 river miles upstream of the U.S. Highway 301 Bridge and directly across the river from the Department of Energy's Savannah River Site (Barnwell, South Carolina). It is approximately 26 miles southeast of Augusta, Georgia.

2.3.1 Hydrology

This section describes surface water bodies and groundwater resources that could be affected by the construction and operation of VEGP Units 3 and 4. The site-specific and regional data on the physical and hydrologic characteristics of these water resources are summarized in the following sections.

2.3.1.1 Surface Water Resources

The watershed of the Savannah River extends into the mountains of North Carolina, South Carolina, and Georgia near Ellicott Rock, the point where the borders of those three states meet. The river system drains a basin of 10,577 sq mi, divided between the three states as follows **(SR 2006)**:

- 4,581 sq mi in South Carolina
- 5,821 sq mi in Georgia
- 175 sq mi in North Carolina

Within the three states, the Savannah River basin includes portions of 44 counties and two major metropolitan centers, Augusta and Savannah. The lower 50-mi reach of the river is tidally influenced **(USACE 1996)**.

The Savannah River watershed and sub-basins, as delineated by the National Weather Service **(NWS 2005)** and further subdivided by USGS Hydrologic Unit Code (HUC-12) sub-basins **(USGS 2006f)**, are shown in Figure 2.3.1-1. The drainage areas of the NWS sub-basins are given in Table 2.3.1-1.

The watershed crosses through three distinct physiographic provinces: the Mountain, Piedmont, and Coastal Plain. The Mountain and Piedmont provinces are within the Appalachian Mountain range, with the border between them extending from northeast to southwest, crossing the

Tallulah River at Tallulah Falls. The Fall Line, or division between the Piedmont province and the Coastal Plain province, also crosses the basin in a generally northeast to southwest direction, near Augusta, Georgia **(USACE 1996)**.

Watershed elevations range from 5,030 ft msl at Little Bald Peak in North Carolina, to sea level at Savannah. The approximate range of elevations for each physiographic region is **(USACE 1996)**:

- 5,030 to 1,800 ft msl within the Mountain province
- 1,800 to 500 ft msl within the Piedmont province
- 500 to 0 ft msl within the Coastal Plain province

The Savannah River, together with certain of its tributaries, forms the border between the states of Georgia and South Carolina. The confluence of the Seneca and Tugaloo rivers, formerly known as “The Forks” but now inundated by Hartwell Lake, marks the upstream end of the Savannah River. The length of the Savannah River from The Forks to its mouth on the Atlantic Ocean is about 312 mi **(USACE 1996)**.

The following principal streams make up the Savannah River stream system **(USACE 1996)**:

- The Tallulah and Chatooga Rivers combine to form the Tugaloo River at River Mile 358.1
- Twelve Mile Creek and the Keowee River join to form the Seneca River at River Mile 338.5.
- The Tugaloo and Seneca rivers join to form the Savannah River proper at River Mile 312.1, at the point known as The Forks.

The entire 312-mi length of the Savannah River is regulated by a series of three U.S. Army Corps of Engineers (USACE) multipurpose projects, forming a chain along the Georgia–South Carolina border 120 mi long. The three lakes, from upstream to downstream, are:

- Hartwell Lake and Dam, with 2,550,000 acre-feet of gross storage
- Richard B. Russell Lake and Dam, with 1,026,000 acre-feet of gross storage
- J. Strom Thurmond (also known as Clarks Hill) Lake and Dam, with 2,510,000 acre-feet of gross storage

Of the 6,144 sq mi drainage basin above Thurmond Dam, 3,244 sq mi (53 percent) are between Thurmond and Russell Dams, 812 sq mi (13 percent) are between Russell and Hartwell Dams, and 2,088 sq mi (34 percent) are above the Hartwell Dam **(USACE 1996)**. Table 2.3.1-2 is a list of key natural and man-made landmarks along the Savannah River with the distance in river miles upstream of the mouth of Savannah Harbor noted.

The climate in the upper Savannah River watershed is classified as temperate, with generally mild winters and long summers. The basin is protected by the Blue Ridge Mountains from the extremes of winter continental weather experienced in the adjacent Tennessee Valley. The annual mean temperature for the basin is 60°F. January, which is usually the coldest month of the year, frequently has night temperatures of 20°F or lower. July and August, the hottest months of the year, have many days with temperatures over 90°F. In the lower section of the basin, the winters are milder and the summer temperatures higher **(USACE 1996)**.

There are generally two periods of maximum rainfall in the upper basin: February–March and July–August, although heavy rainfall has occurred in practically every month. The mean annual precipitation decreases from 83.5 in. at the upper end of the watershed, near Highlands, North Carolina, down to 49.2 in. at Savannah, Georgia **(USACE 1996)**.

2.3.1.1.1 USGS Topographic Maps

USGS seven-and-one-half-minute topographic maps are available for the entire Savannah River watershed. The river miles upstream of the mouth of the Savannah River are marked off along the stream centerline on each of the quadrangles photo-revised in 1989.

Figure 2.3.1-2 provides an index map showing an identification number and the outline of each USGS quadrangle superimposed on a line map of the Savannah River watershed. The name and map identification number of each quadrangle is listed with its reference coordinates (latitude and longitude of the lower right hand corner of the quadrangle) in Table 2.3.1-3, ordered from upper left to lower right throughout the coverage area.

2.3.1.1.2 Local Site Drainage

The VEGP site is bordered on the east by the Savannah River and by Beaverdam Creek to the south. The Savannah River Plant Site (SRS) is located directly across the river to the east.

Local drainage is shown in Figure 2.3.1-3, which was developed from the Shell Bluff Landing, Girard NW, Alexander, and Girard USGS quadrangle sheets (see Figure 2.3.1-2 and Table 2.3.1-3). The site is on a high, steep bluff on the west bank of the Savannah River. State Road 23 (River Road) runs roughly parallel to the river, about 4 miles from the VEGP site. It runs along the ridge line that separates local drainage running northeast to the river from runoff draining generally to the southwest.

An unnamed, highly incised creek drains the area of the site north of River Road into the Savannah River just upstream of the site, at the point denominated Hancock Landing on the USGS quadrangle Shell Bluff Landing.

To the west, the site is drained by the Red Branch and Daniels Branch, which join with Beaverdam Creek just upstream of Telfair Pond, south of the site. Beaverdam Creek intercepts three streams draining runoff from north of State Road 23 before it reaches the site. The names, estimated channel lengths, and slopes of the natural channels draining the VEGP site area are provided in Table 2.3.1-4.

2.3.1.1.3 Savannah River Flow Series Data

The USGS maintains stream flow records for nine stream gages on the Savannah River between River Miles 288.9 and 60.9, upstream and downstream of the VEGP site. A tenth gage was recently installed at the VEGP intake at Waynesboro, Georgia (Gage 21973269), but the period of record is too short to support statistical analysis. The location, datum elevation, upstream drainage area, start and stop date, and number of flow records for each of the ten gages are presented in Table 2.3.1-5.

As indicated in Table 2.3.1-5, the nearest USGS gage upstream of the VEGP site with a significant period of record is Gage 2197320, near Jackson, South Carolina (5.9 River Miles upstream); the nearest gage downstream of the VEGP site is Gage 2197500 at Burtons Ferry near Millhaven, Georgia (about 39 River Miles downstream of the site). While the Jackson gage is less than 6 mi upstream of the site, the record length for Gage 2197000, at Augusta, Georgia (48.7 River Miles upstream) is much longer, making it desirable to evaluate all three sets of records.

A number of statistics are presented in this section for flow data on these three gages to facilitate the evaluation of the water supply and flood hazard characteristics of the site, including:

- Average daily and monthly flow series
- Low flow series
- Historic flooding and analytical annual peak flood frequencies

After 1952, flows on the Savannah River at the three gage sites, were impacted by regulation from upstream reservoirs: J. Strom Thurmond (a.k.a. Clarks Hill) Lake and Dam in 1952, Hartwell Lake and Dam in 1961, and Richard B. Russell Lake and Dam in 1984 **(USACE 1996)**. The records for the Augusta, Georgia and Burtons Ferry gages include regulated and unregulated periods. The entire length of record for the Jackson, South Carolina, gage occurs after closure of upstream dams and is, in that sense, homogenous. In this subsection, stream flow statistics for each of the gages is presented as necessary for both the regulated and the unregulated period, as detailed in the text.

2.3.1.1.3.1 Annual Average Daily and Mean Daily Flow Series

Table 2.3.1-6 **(USGS 2006c)** presents the mean daily flow for each day of the year for the Savannah River at Augusta, Georgia, based on the entire 98-year gage record, without respect to upstream regulation after 1952.

Table 2.3.1-7 **(USGS 2006d)** presents the mean daily flow for each day of the year for the Savannah River near Jackson, South Carolina, based on the entire 31-year (regulated) gage record.

Table 2.3.1-8 **(USGS 2006g)** presents the mean daily flow for each day of the year for the Savannah River at Burtons Ferry, near Millhaven, Georgia, based on the entire 52-year gage record, without respect to upstream regulation after 1952.

The mean daily flow series for each of these gages are plotted together in Figure 2.3.1-4. For all sites, the mean daily flow exhibits a strong seasonality, with higher mean flows in the winter season and lower mean flows in the summer.

Additionally, the figure gives a qualitative indication of the impact of upstream regulation on flow: daily mean values at Jackson, South Carolina, are based on a fully regulated period of record, while the daily mean values for the Augusta and Burtons Ferry gages are based on periods of record that include substantial periods prior to the completion of the upstream dams; as a consequence, these gages show a substantially higher mean daily flow in the winter season compared with the Jackson mean flows based on records during the regulated period only. Taking mean daily flows for only the unregulated period of record exacerbates this difference.

In addition to the mean daily flows for each day of the year, the USGS publishes statistics on the annual mean flow, which provide a lumped annual statistic masking all seasonality.

Table 2.3.1-9 **(USGS 2006c; USGS 2006g)** presents the annual mean stream flow for the periods of record at Augusta, Georgia, and Burtons Ferry. Data are not presented for the Jackson, South Carolina and Waynesboro, Georgia (VEGP intake) gages because of insufficient record length.

2.3.1.1.3.2 Monthly Flow Series

Table 2.3.1-10 **(USGS 2006d)** presents mean daily discharges by month for the Savannah River at Jackson, South Carolina, for the period of record between 1971 and 2002. A number of “holes” in the USGS series occur where a sufficient number of daily readings were not available to make meaningful monthly averages.

Table 2.3.1-11 **(USGS 2006c)** presents mean daily discharges by month for the Savannah River at Augusta, Georgia, upstream of the VEGP site, for the period of record between 1883 and 2003.

Table 2.3.1-12 **(USGS 2006g)** presents mean daily discharges by month for the Savannah River at Burtons Ferry, near Millhaven, Georgia, downstream of the VEGP site, for the period of record between 1939 and 2003.

Mean daily flows for the Jackson, Augusta, and Burtons Ferry gage sites for each month are provided in Table 2.3.1-13.

Figure 2.3.1-5 provides a plot of the seasonal variation in mean daily flows for each month on the Savannah River between Augusta, Georgia, for the full-period and regulated periods, and Jackson, South Carolina, for the full, regulated period. It can be inferred from the plot that the operation of the upstream dams has had a significant impact on the mean daily flow for each month in the period from January to May, inclusively.

2.3.1.1.3.3 Low Flow Series

Flow duration curves are developed by ranking the recorded mean daily flows for the period of record to estimate the percentage of days that a flow of a given value is equaled or exceeded. Flow duration curves for the Savannah River at Augusta, Georgia, for the entire period of record (1883 to 2003) and the period after closure of the three upstream dams (1984 to 2003) are presented in Figure 2.3.1-6. As would be expected, the curves indicate that regulation has increased minimum daily flows and has reduced maximum daily flow on the Savannah River downstream.

The n-day low flow for a stream is the mean flow measured during the n consecutive days of lowest flow during any given year. It is customary to group the mean daily flow data into low-flow years (defined from April 1 to March 31 in North America) to prevent splitting the low-flow season into two parts for each year. The 7-day, 10-year low flow statistic, 7Q10, is an estimate of the lowest mean flow that would be experienced during a consecutive 7-day period with an average recurrence interval of 10 years, and is used as an indicator of low flow conditions during drought periods **(McMahon and Mein 1986)**.

Table 2.3.1-14 shows the 3-, 7-, 10-, 30-, 60-, 90-, 183-, and 365-day mean low flows for each year of record for the Savannah River gage at Augusta (Gage 2197000) as determined from the daily flow data for the low-flow years between 1986 and 2003, the available period of continuous upstream regulation, using the USGS program SWSTAT **(USGS 1994)**.

The 7-day low flow data for each complete low-flow year in the regulated period was used to estimate 7-day low flow frequency based on a Log-Pearson Type III (LP3) distribution, from which the 7Q10 low flow parameter is estimated as 3,828 cfs (see Table 2.3.1-15). The assumption of an LP3 distribution provides a good fit of the calculated 7-day low flows, as indicated in Figure 2.3.1-7.

2.3.1.1.3.4 Historic Flooding and Annual Peak Flood Frequencies

Table 2.3.1-16 **(USGS 2006c)** provides the date, stage elevation, and annual peak discharge for the entire period of record for USGS Gage 02197000 on the Savannah River at Augusta, Georgia, approximately 48.7 River Miles upstream of the VEGP site. The annual peak floods include estimated values from historic floods reported in 1796, 1840, 1852, 1864, and 1865.

The maximum annual peak flood discharge for the period of record is 350,000 cfs, from the storm of October 2, 1929. The storm of January 17, 1796, estimated from reported stages using slope-conveyance methods, is the oldest event used to extend the record length. The estimated value of the peak flow for this storm ranges between 280,000 cfs for a reported stage of 38 ft **(USGS 2006c)** and 360,000 cfs for a reported maximum flood stage of 40 ft **(USGS 1990a)**. This puts the maximum flood elevation of the Savannah River at Augusta, Georgia, for the historic period between 134.6 and 136.6 ft msl, based on an El. 96.58 ft msl for the Augusta, Georgia, stream gage datum (see Table 2.3.1-5).

After 1952, annual peaks on the Savannah River at Augusta, Georgia, are attenuated by regulation from upstream reservoirs: J. Strom Thurmond (a.k.a. Clarks Hill) Lake and Dam in 1952, Hartwell Lake and Dam in 1961, and Richard B. Russell Lake and Dam in 1984 **(USACE 1996)**. This attenuation of floods is shown in Figure 2.3.1-8 **(USGS 1990a)**, which is based on the historic record from 1796 to 1985.

Annual peak flood frequency curves for regulated and unregulated conditions for the Savannah River at Augusta, Georgia, were developed for the period between 1796 and 1985 and are presented in Figure 2.3.1-9 **(USGS 1990a)**. Unregulated annual peak discharge values for the period after 1952 and regulated annual peak discharge values for the years previous to 1952 were generated by modeling reservoir operation based on the stage-storage-discharge characteristics reported for the three projects, using the 1990 operating rule set for the entire period **(USGS 1990a)**.

Figure 2.3.1-9 clearly shows the convergence of the regulated and unregulated annual flood frequency plots as discharge increases. On the left-hand side of the graph, for the 80 percent chance-of-exceedence event (a return period of 1.25 years), the unregulated peak discharge exceeds the regulated peak by a factor of about 2.14; on the left-hand side, for the 0.2 percent chance-of-exceedence event (a return period of 500 years), the unregulated peak discharge exceeds the regulated peak by a factor of about 1.29. On this basis, regulation would not be expected to significantly affect the probable maximum flood on the Savannah River downstream of Augusta, provided that the upstream dams do not fail.

2.3.1.1.4 Dams and Reservoirs

There are a number of water control structures on the Savannah River and its major tributaries, as identified in **USGS (1990a)** and **USACE (1996)**. Table 2.3.1-17 presents a list of these structures with hydraulic design information for each project and identification of its location with respect to the VEGP site.

Three projects operated by the Corps of Engineers upstream of the VEGP site have a significant influence on the discharge of the Savannah River:

- Hartwell Lake and Dam, with 2,550,000 acre-feet of gross storage
- Richard Russell Lake and Dam, with 1,026,000 acre-feet of gross storage
- J. Strom Thurmond Lake and Dam, with 2,510,000 acre-feet of gross storage

The authorized water management goals of the three-dam, multiuse project are specified for normal operation, flood operation, and drought condition operation in the Corps Water Control Plan as follows:

- For normal conditions, the operation policy is designed to maximize the public benefits of hydroelectric power, flood damage reduction, recreation, fish and wildlife, water supply, and water quality **(USACE 1996)**.
- Under flood conditions, the water management objective is to operate the reservoir system to minimize flooding downstream by timing turbine discharge, gate openings, and spillway discharge as required.
- For drought conditions, the water management objectives of the project are:
  - To prevent draw-down of lake levels below the bottom of the conservation pool
  - To make use of most of the available storage in the lake during the drought-of-record
  - To maintain hydroelectric plant capacity throughout the drought
  - To minimize adverse impacts to recreation during the recreation season (generally considered from May 1 through Labor Day)

The Corps also operates the New Savannah Bluff Lock and Dam, 36.8 River Miles upstream of the VEGP site. This project has very little impact on flows at the site, due to its run-of-river status and negligible storage volume **(USACE 1996)**.

The four projects are described briefly in the following paragraphs **(USACE 1996)**.

The Hartwell Lake and Dam is located at River Mile 288.9, 7 mi east of Hartwell, Georgia, and 138 River Miles upstream of the VEGP site. The top of the conservation pool is set at El. 660 ft msl. At this level, the reservoir extends 49 mi up the Tugaloo River in Georgia and 45 mi up the Seneca and Keowee rivers in South Carolina. The shoreline at El. 660 ft msl is about 962 mi long, excluding island areas. The project became operational in 1965.

The reservoir has a total storage capacity of 2,550,000 acre-feet below El. 660 ft msl, and 293,000 acre-feet of flood control storage between El. 660 ft msl and El. 665 ft msl. The dam consists of a concrete gravity section, which is 1,900 ft long and rises about 204 ft above the streambed, and two earth embankment sections extending to high ground on the Georgia and South Carolina shores of the river, for a total length of 17,880 ft.

The Richard B. Russell Lake and Dam is located at River Mile 259.1 in Elbert County, Georgia, and Abbeville County, South Carolina, 108.2 River Miles upstream of the VEGP site. The dam is 18 mi southwest of Elberton, Georgia; 4 mi southwest of Calhoun Falls, South Carolina; and 40 mi northeast of Athens, Georgia. Operation of the project began in 1985.

The top of the conservation pool is set at El. 475 ft msl, at which elevation the reservoir has a total storage volume of about 1,026,000 acre-feet and a useable storage capacity of 126,800 acre-feet. The flood control pool provides about 140,000 acre-feet of additional storage between elevations 475 and 480 ft msl.

The dam consists of a concrete gravity section, which is 1,883.5 ft long, and two earth embankment sections, 2,180 ft long in Georgia and 460 ft long in South Carolina. A concrete overflow spillway section is located in what was formerly the stream channel. It has an ogee-shaped crest controlled by 10 tainter gates.

The J. Strom Thurmond Lake and Dam (also known as the Clarks Hill Lake and Dam) is at River Mile 221.6 on the Savannah River, 22 mi upstream of Augusta, Georgia, and 70.7 River Miles upstream of the VEGP site. The project became operational in 1952. The reservoir at the top of the flood control pool, El. 335 ft msl, has an area of 78,500 acres. At El. 330 ft msl, the top of the conservation pool, the reservoir extends about 40 mi up the Savannah River and about 30 mi up the Little River in Georgia and has about 1,050 mi of shoreline, excluding island areas.

The reservoir has a total storage capacity of 2,510,000 acre-feet below El. 330 ft msl, with an additional 390,000 acre-feet of flood control storage between El. 330 ft msl and El. 335 ft msl. The dam consists of a concrete gravity section, which is 2282 feet long, and two earth embankment sections extending to high ground on the Georgia and South Carolina shores, with at total length of 5680 feet,

The New Savannah Bluff Lock and Dam is at River Mile 187.7, 36.8 river miles upstream of the VEGP site. The structure is located on the Savannah River about 13 mi below Augusta. It is a concrete dam 360 ft long containing five vertical-lift crest control gates. The lock chamber, located on the Georgia side of the river, is 56 ft by 360 ft and is closed by miter gates. The lift is 15 ft. The normal pool elevation is about 115.0 ft msl. The dam was originally constructed to provide a lock to support navigation to Augusta, Georgia. Currently it is used primarily to re-regulate upstream releases for downstream water supply withdrawals.

In 2000, the Savannah District Corps of Engineers issued a Disposition Study under Section 216 of the Flood Control Act of 1970 to examine the current uses of the New Savannah Bluff Lock and Dam and recommend disposition for the future. The study concluded that the only feasible option was to remove the dam. This result was met with vehement opposition by property owners, water supply, recreational interests and in 2005 a decision was made to repair the lock chamber and keep the dam in service. This decision has no significant impact on existing or proposed units at VEGP.

2.3.1.1.5 Estimated Erosion Characteristics

Bank erosion caused by wave action has been measured in the reservoirs upstream of the VEGP site **(Hoke 2000)**, but no references to measurements of river cross-sections to assess bank erosion along the middle reaches of the Savannah River or at the site were found in the literature.

A number of meanders are a feature of the plan-form of the middle reaches of the Savannah River, but the river near the site has a relatively straight and stable reach extending approximately from River Mile 143 to River Mile 152. A comparison of river bank-lines along this reach between 1965 and 1989, obtained from USGS topographic maps **(USGS 1989a; USGS**

1989b; USGS 1989d) and topographic maps used for VEGP Units 1 and 2 shows a nearly unchanged river plan-form.

Hale and Jackson (2003) describe how dredging for navigation has altered the hydrology and geomorphology of the Savannah River over the past century. They present a table of 40 cut-offs constructed on the lower Savannah River between 1889 and 1962 that had the cumulative effect of reducing stream length by a total of 26.5 miles. Each of these cut-offs will have had some impact on local channel conditions and sediment transport due to change in bed slope.

According to their table, the 4,350-foot Cox Point cut-off at River Mile 153.2 (about 2.3 miles upstream of the Vogtle site) was completed in 1959. The cutoff is visible on the Shell Bluff Landing 1:24,000-scale USGS topographic map.

It can be inferred from the alignment of the channel shown on the map, which is based on aerial photography from 1965 with photorevisons from 1989, that the stability of the Savannah River channel section at the VEGP site does not appear to have been adversely affected by the cut-off, as would be expected for the relatively short length of the cut-off and the mild gradient of the reach.

In general, channel straightening of the type affected by the Cox Point cutoff will cause a local reduction in water level and an increase in velocity, so that the small creeks that are tributary to the reach may experience increased gradients causing scour and head cutting **(USDOT, 1977)**. No evidence of such impacts is noticeable at the scale of the available mapping, however.

2.3.1.1.6 Sediment Transport Rates

A search of the literature shows that there have been a number of studies of sediment transport on the Savannah River within the piedmont physiographic region, resulting from requirements to establish Total Maximum Daily Loads for the E.P.A. **(**i.e. **EPA 1999, Keyes and Radcliffe, 2002, Freshley, 2003)**. There have also been a number of studies of sedimentation in Savannah Harbor **(Goodrich, Way, and Liu 2003; Semmes et al 2003; Phillips and Slattery 2006)**. Sedimentation rates resulting from these studies, where available, are not directly applicable at the study site within the coastal plain physiographic region because of the different bed slopes and stream power typical of each physiographic region.

There have been very few studies of sedimentation on the Savannah River near the site because sedimentation has not been considered a critical environmental issue in the coastal plain below the Corps's three-dam reservoir project, where the Vogtle site is located. According to the Savannah District of the U.S. Army Corps of Engineers **(USACE 1996)**:

The problem of sediment in the Savannah River Basin has been greatly reduced since the early 1900's by the conversion of much former cropland to silviculture and pasture. Cotton farming, considered a highly erosive land use, has greatly declined during this century in central Georgia and western South Carolina. The combination of agricultural decline, transition of cropland to timber and pasture, and widespread implementation of soil conservation practices have resulted in lessened stream sediment loads. Deposits of silt in the reservoirs and channel retrogression below the dams are not major problems.

Duncan and EuDaly (2003) discuss the possibility that the reduced variation in discharge downstream of the dams since closure has lead to accumulations of silt with an adverse impact on fish habitats in the shoals, but they present no measurements or quantitative estimates of sedimentation rates.

2.3.1.1.6.1 Suspended Load Transport Rates

Table 2.3.1-24 summarizes the availability of water quality data for the USGS gages on the Savannah River. There is no bed-load measurement information, and, of the 23 gage stations listed as having water quality data, only 2 have data on suspended load transport rates and only the gage at Clyo is in the coastal plain reach **(USGS 2006h)**.

While water quality data for the Savannah River at Clyo, Georgia (2198500) includes entries from 1938 to the present, only 97 records of suspended sediment load measurement between 1974 and 1983 are reported (as time-weighted daily mean values).

These data points are listed in Table 2.3.1-25 and are plotted in Figure 2.3.1-28 against the average daily discharge recorded for those days. There is only a slight correlation between average daily discharge in cubic feet per second and suspended sediment load in tons per day, so the suspended load data time series cannot be extended with much reliability.

There are gages on the Savannah River nearer to the site than Clyo for which turbidity measurements are available, offering the possibility of estimating suspended sediment loads from a correlation with turbidity measurements, but no statistically significant relation was discerned between turbidity measurements and average daily suspended sediment discharge for these data sets.

The 97 reported measurements of daily suspended sediment loads were sorted to permit the calculation of monthly statistics, as summarized in Table 2.3.1-26 and plotted in Figure 2.3.1-28. The data shows some seasonality, but because the relationship between discharge and suspended load is not strong, the seasonality is not pronounced.

Based on the assumption that the suspended sediment load at Clyo is not significantly different from the load at the Vogtle site, 90 miles upstream, the monthly average suspended load at the site will range between 200 and 1,600 tons per day with a 95 percent probability.

2.3.1.1.6.2 Bed Load Sediment Transport Rates

No bed-load sediment transport measurements have been reported for any reach of the Savannah River and cannot be easily estimated as a fraction of the suspended load because the portion of sediment that moves as bed load varies widely between rivers and on the same river over time **(Keyes & Radcliffe 2002)**. However, to obtain an order-of-magnitude estimate, the globally averaged ratio of suspended load to bed load sediment flux for rivers of 9:1 reported by Syvitski et al. (2003) can be used. For the suspended load range of 320 to 880 tons per year calculated from the data at Clyo, Georgia, this would indicate a range for bed load transport of between about 35 and 100 tons per day.

2.3.1.2 Groundwater Resources

The VEGP site lies within the Coastal Plain Physiographic Province. The site is underlain by approximately 1,000 ft of Coastal Plain sediments. The hydrogeologic conditions within the Coastal Plain sediments can be summarized as permeable coarse-grained materials separated by less-permeable fine-grained materials, resulting in a multiple aquifer system.

2.3.1.2.1 Regional Hydrogeology

The region within a 200-mi radius around the VEGP site encompasses parts of four physiographic provinces. These include, from northwest to southeast, the Valley and Ridge, Blue Ridge, Piedmont, and Coastal Plain Physiographic Provinces. Several major aquifers or aquifer systems are present within these physiographic provinces. Figure 2.3.1-10 illustrates the extent of these major aquifers or aquifer systems at the land surface. The VEGP site and associated groundwater are located within the Coastal Plain Physiographic Province. However, groundwater within the other provinces is discussed below to provide a complete picture of regional hydrogeologic conditions.

The Valley and Ridge Physiographic Province lies about 180 mi northwest of the VEGP site. Aquifers underlying the Valley and Ridge province occur within Paleozoic-age folded and faulted sedimentary rock. The sedimentary strata consist predominantly of sandstone, shale, and limestone, with minor amounts of dolomite, conglomerate, chert, and coal. The carbonate and sandstone layers form the principal aquifers in the province. Typical well yields are from 10 gpm in sandstone formations to 10 to 50 gpm within the limestone units. Locally high yields, equal to 100 gpm or greater, are possible within highly fractured strata or solution cavities. Localized weathered rock and alluvium can provide lesser, but adequate, groundwater yields for domestic use. **(Miller 1990)**

The Piedmont and Blue Ridge Physiographic Provinces are hydrologically similar in nature. Both provinces are composed primarily of metamorphic and igneous rocks. Surface materials in the Blue Ridge Province consist mainly of thin residual soils, alluvium, and colluvium. Surface materials in the Piedmont Province consist generally of more deeply weathered residual soils (saprolite) and alluvium. Groundwater occurs both in the fractured portions of bedrock and within the saprolite and alluvium material. Well yields generally depend on the local fracture density and fracture connectivity of the bedrock and range from a few to 30 gpm. Localized groundwater well yields of 100 gpm or greater are possible. **(Miller 1990)**

The majority of Georgia's groundwater use occurs in the Coastal Plain Physiographic Province. The Coastal Plain sediments are thin, less than 200 ft thick, along the western boundary of the province (where they terminate at the contact with the Piedmont province, the Fall Line) and thicken to over 4,000 ft in an eastern-to-southeastern direction. The sediments range in age from Holocene to Cretaceous and overlie crystalline igneous and metamorphic bedrock, which is an eastward extension of the Piedmont province **(Miller 1990)**.

Groundwater in the Coastal Plain is withdrawn from both unconfined, shallow aquifer systems and deeper, confined aquifer systems. These aquifers are recharged principally from their outcrop area along the western boundary of the province near the Fall Line and from localized infiltration of precipitation within the province. Precipitation migrates downward and laterally through the unconsolidated surficial materials and discharges to nearby streams and low areas or percolates downward into the deeper unconsolidated and consolidated material. The thickness and areal extent of the Coastal Plain sediments result in a storage capacity for groundwater that exceeds that of any other physiographic provinces in Georgia **(Miller 1990)**.

2.3.1.2.1.1 Conceptual Model Description

The conceptual hydrogeological model for the VEGP site was developed using site-specific data acquired to support the ESP application, information and data included in the VEGP Updated Final Safety Analysis Report (UFSAR), U.S Geological Survey studies, and Georgia Geologic Survey studies.

As discussed above, the VEGP site is located in the Coastal Plain physiographic province. Coastal Plain sediments comprise three aquifer systems consisting of seven aquifers that are separated hydraulically by confining units. As presented by Clarke and West (1997), the aquifer systems are, in descending order: (1) the Floridan aquifer system, which consists of the Upper Three Runs and Gordon aquifers in sediments of Eocene age; (2) the Dublin aquifer system, consisting of the Millers Pond, upper Dublin, and lower Dublin of Paleocene-Late Cretaceous age; and (3) the Midville aquifer system, consisting of the upper Midville and lower Midville aquifers in sediments of Late Cretaceous age. Note that nomenclature used by the U.S. Geological Survey **(Clarke and West 1997)** for geologic and hydrogeologic units differs from that used in this ESP application. In this ESP application, the Water Table aquifer comprises the Upper Three Runs aquifer, the Tertiary sand aquifer comprises the Gordon aquifer, and the Cretaceous aquifer comprises the Dublin and Midville aquifers. Figure 2.3.1-11 and Figure 4 of Clarke and West (1997) provide additional details.

The Upper Three Runs aquifer is the shallowest aquifer and is unconfined-to-semi-confined throughout most of the area. Groundwater levels in the Upper Three Runs aquifer respond to a local flow system and are affected mostly by topography and climate. Groundwater flow in the deeper, Gordon aquifer and Dublin and Midville aquifer systems is characterized by local flow near outcrop areas to the northwest, changing to intermediate flow and then regional flow downdip (southeastward) as the aquifers become more deeply buried. Water levels in these deeper aquifers show a pronounced response to topography and climate in the vicinity of outcrops that diminishes southeastward where the aquifer is more deeply buried. Stream stage and pumpage affect groundwater levels in these deeper aquifers to varying degrees throughout the area. **(Clarke and West 1997)**

The geologic characteristics of the Savannah River alluvial valley substantially control the configuration of potentiometric surfaces, groundwater flow directions, and stream-aquifer relations. Data from 18 shallow borings **(Leeth and Nagle 1996)** indicate incision into each aquifer by the paleo Savannah River and subsequent infill by permeable alluvium have resulted in direct hydraulic connection between the aquifers and the Savannah River along various parts of its reach. This hydraulic connection may be the cause of large groundwater discharge to the river near Jackson, South Carolina, as evidenced by stream baseflow and potentiometric measurements, where the Gordon aquifer is in contact with Savannah River alluvium, and also the cause of lows or depressions in potentiometric surfaces of confined aquifers that are in contact with the alluvium. Groundwater in these aquifers flows toward the depressions. The influence of the river diminishes downstream where the aquifers become deeply buried beneath the river channel, and where upstream and downstream groundwater flow is possibly separated by a water divide or “saddle.” Water-level data indicate that saddle features probably exist in the Gordon aquifer and Dublin aquifer system, with the groundwater divide occurring just downstream of the VEGP site, and also might be present in the Midville aquifer system. **(Clarke and West 1997)**.

Basin-wide potentiometric-surface maps for the unconfined Upper Three Runs aquifer and confined Gordon, Dublin, and Midville aquifer systems have been prepared using historical data **(Clarke and West 1997)** and numerical simulation **(Cherry 2006)**. Detailed discussions of these maps are provided in the cited references. Data from observation wells installed and monitored for an 18-month period at the VEGP site have also been used to develop potentiometric-surface maps on a more highly resolved, site-specific basis. These maps are discussed in detail in Section 2.3.1.2.3. The groundwater flow directions inferred from these maps are generally consistent with the larger-scale maps produced by Clarke and West (1997) and Cherry (2006), i.e., groundwater flow in the Upper Three Runs (Water Table) aquifer generally conforms with surface topography, while that in the confined Gordon (Tertiary) aquifer is toward the Savannah River.

Recharge to the Upper Three Runs (Water Table) aquifer is almost exclusively by precipitation, while discharge is primarily to local drainages. Recharge to the confined Gordon, Dublin, and

Midville (Tertiary and Cretaceous) aquifers occurs primarily by direct infiltration of rainfall in their outcrop areas northwest of the VEGP site that are generally parallel to the Fall Line (the boundary between the Coastal Plain and Piedmont physiographic provinces). Because the permeable alluvium of the Savannah River valley allows for direct hydraulic connection between aquifers and the Savannah River, the river serves as the major discharge area for the confined aquifers in hydraulic connection with the river valley alluvium. Potentiometric maps presented by Clarke and West (1997) indicate groundwater discharge from the confined Gordon, Dublin, and Midville aquifers to the Savannah River. For the shallower Gordon confined aquifer, groundwater flow directions are generally perpendicular to the river reach. In the case of the deeper Dublin and Midville aquifers, there are upriver components to the groundwater flow directions that depend on where the paleo river channel has breached confining units. Clarke and West (1997) provide a detailed discussion of this phenomenon.

Although a water budget for the VEGP site has not been quantified, recharge and discharge rates have been estimated on a basin-wide basis by other investigators. Clarke and West (1997) estimated groundwater discharge to the Savannah River based on the net gain in stream discharge for local, intermediate, and regional groundwater flow systems and for different hydrologic conditions. Groundwater discharge ranged from 910 ft^3/s during a drought year (1941) to 1,670 ft^3/s during a wet year (1949), and averaged 1,220 ft^3/s. Of the average discharge, the local flow system contributed an estimated 560 ft^3/s and the intermediate and regional flow systems contributed an estimated 660 ft^3/s. Clarke and West (1997) approximated the long-term average recharge by weighting these values according to drainage area, and estimated the average groundwater recharge in the Savannah River basin to be 14.5 in., of which 6.8 in. is to the local flow system, 5.8 in. is to the intermediate flow system, and 1.9 in. is to the regional flow system. Mean-annual precipitation in the basin ranges from 44 to 48 in. Cherry (2006) presents simulated water budgets for different hydrologic conditions using a numerical model for groundwater flow near the Savannah River Site, Georgia, and South Carolina. Estimates of inflow or outflow across lateral boundaries, recharge, discharge, groundwater pumpage, and vertical flow upward and downward across confining units are obtained from the numerical model.

2.3.1.2.1.2 Tritium in Unconfined and Confined Aquifers

Several investigators have documented the presence of tritium in groundwater in eastern Burke County, Georgia. These investigations include those of Summerour et al. (1994), Summerour et al. (1998), and Georgia Department of Natural Resources (DNR) (2004). Descriptions of the data resulting from these investigations and associated conclusions are summarized below.

Summerour et al. (1994) reports the results of seven sub-investigations conducted to determine any possible threat to public health due to tritium in eastern Burke County. These sub-investigations included: (1) sampling and analyzing 109 domestic and public water wells; (2) performing baseflow studies to measure tritium abundance in local springs and creeks; (3)

installing and sampling 15 new groundwater monitoring wells at six cluster sites in eastern Burke County; (4) defining the local lithostratigraphic and hydrostratigraphic framework using core sample analyses, field mapping, and literature; (5) characterizing the hydrologic characteristics of the unconfined Upper Three Runs aquifer, the Gordon aquitard, and the confined Gordon aquifer using data from aquifer tests; (6) characterizing the geochemical characteristics of the Upper Three Runs and Gordon aquifers using analyses of water samples from public, private, and monitoring wells; and (7) conducting a seismic refraction survey of the Savannah River channel to evaluate the extension of the Pen Branch fault into the channel of the Savannah River and investigate the thickness of the river alluvium, the possible breaching of aquitards, and the correlation of seismic stratigraphic sequences with the local stratigraphy. The main conclusions resulting from this study are as follows:

- There is no evidence of a public health threat due to tritium pollution of aquifers in Burke County.
- There is widespread evidence of tritium in the water table aquifer in eastern Burke County, at levels well below the maximum concentration level (MCL) standard for drinking water set by the United States Environmental Protection Agency.
- There is no evidence of regional tritium pollution of the Gordon aquifer in eastern Burke County.
- Existing data do not fully resolve the issue of the tritium occurrence in water table aquifer. However, the investigation shows that some pathways are more likely than others and suggests specific pathway models for future investigations.

Follow-on, Phase II sub-investigations were conducted by the Georgia Geological Survey, results of which are reported by Summerour et al. (1998). The Phase II sub-investigations, conducted in eastern Burke County, recommended the following: (1) continued monitoring of tritium in the unconfined aquifer; (2) conducting high-resolution tritium analyses of groundwater in confined aquifers; (3) investigating the vertical distribution of tritium in the vadose zone; (4) investigating the vertical distribution of tritium in the unconfined aquifer; (5) completing a seismic survey across the projected location of the Pen Branch fault into Georgia; (6) investigating well construction in the public water supply well in which tritium was first discovered in Burke County groundwater; and (7) revising the lithostratigraphy and hydrostratigraphy of Burke County. Conclusions resulting from these sub-investigations, pertinent to the VEGP site, are summarized below.

- Tritium concentrations in the unconfined aquifer are declining. This decline in tritium concentration is probably due to a combination of radioactive decay, dilution by untritiated groundwater, and recharge by untritiated (or low tritium) rainwater.
- Very low, but measurable, levels of tritium are present in all of the confined aquifers. Because the water in these aquifers is very old (11,000 to 32,000 years) compared with the half-life of tritium (12.35 years), there should be no tritium present within the confined aquifers. The

tritium in these deep aquifers is believed to be due to cross contamination during drilling and well installation or to cross-contamination sampling. There is insufficient evidence to distinguish between these alternatives.

- Tritium is not uniformly distributed with depth in either the unsaturated (vadose) zone or in the unconfined aquifer. Within the vadose zone, tritium concentrations generally increase with increasing depth. Within the unconfined aquifer, tritium concentrations increase with increasing depth but then rapidly drop to below the detection limit in the basal units of the unconfined aquifer. Vertical tritium variations observed in the unsaturated zone and the upper part of the unconfined aquifer may represent a historical record of tritium influx into the water table aquifer.
- A seismic reflection survey across the projected location of the Pen Branch fault identified a series of 13 high-angle faults along approximately 4,550 ft of a 7,620-ft seismic line. The entire series of faults is considered to represent an extension of the Pen Branch fault zone into Georgia from South Carolina. Figure 23 of Summerour et al. (1998) shows the locations of the seismic survey line and the projected location of the Pen Branch fault. All 13 faults affect the basement rock and project upwards into the overlying Cretaceous-age sediments. None of these faults appear to have disturbed the Gordon aquitard, which isolates the unconfined aquifer from underlying confined aquifers. The seismic profile also shows other numerous minor fractures or faults within the Cretaceous and Tertiary Coastal Plain sediments. Summerour et al. (1998) indicate that while these minor fractures may cut the lower Midville, upper Midville, lower Dublin, upper Dublin, and Millers Pond aquitards, it is unclear whether the fractures also cut the Gordon aquitard (Lisbon Formation). The effect of the Pen Branch fault zone and other minor faults on groundwater flow patterns and pathways was not resolved in this investigation.
- The preponderance of evidence indicates that the primary pathway for tritium into the Upper Three Runs aquifer is through recharge of the aquifer by tritiated rainfall related to atmospheric tritium releases at the Savannah River Site. A possible secondary pathway for tritium is suggested by the presence of very low levels of tritium in all confined aquifers in Burke County.

More recently, the Georgia DNR (2004) reported tritium sampling results for the 2000–2002 period from monitoring wells and public water-supply wells located in the Savannah River Site/ Vogtle Electric Generating Plant area. Georgia DNR (2004) concludes that no significant tritium contamination has been positively identified in any confined aquifers in Georgia, based on monitoring well data. On the other hand, it notes that extensive tritium contamination was present in groundwater in the relatively shallow (up to 200 ft deep) Upper Three Runs aquifer during the 2000–2002 period, with tritium concentrations averaging less than 1,000 pCi/l, which is well below the drinking water MCL of 20,000 pCi/l established by EPA. Georgia DNR (2004) indicates that contamination appears to be concentrated primarily within the Savannah River Site's downwind footprint, suggesting a possible connection with airborne (or rain-borne) tritium from the Savannah River Site.

Based on the results of the investigations described above, it is likely that tritium is present in the Upper Three Runs (Water Table) aquifer at the VEGP site, given that tritium has been detected in adjacent monitoring wells and springs and creeks. The source of the tritium is most likely associated with atmospheric releases of tritium from the Savannah River Site because the VEGP site falls within the downwind footprint of the Savannah River Site and is in an area where elevated levels of tritium have been detected in the rainfall. The same investigations suggest the possibility of very low, but measurable, levels of tritium in the deeper, confined aquifers underlying the VEGP site. Possible sources of tritium in the confined aquifers of Burke County, Georgia, include cross contamination from well drilling, installation and during sampling.

2.3.1.2.1.3 Trans-River Flow

The potential for trans-river flow in the vicinity of the Savannah River Site and VEGP site has been discussed by Clarke and West (1997). Trans-river flow is a term that describes a condition under which groundwater originating on one side of a river migrates beneath the river floodplain to the other side of the river. Although some groundwater could discharge into the river floodplain on the opposite side of the river from its point of origin, such flow would likely be discharged to the river because flow in the alluvium is toward the river. Potentiometric-surface maps developed by Clarke and West (1997) for the Upper Three Runs aquifer and Gordon aquifers do not indicate the possible occurrence of trans-river flow. However, flow lines on potentiometric-surface maps of the confined Dublin and Midville aquifer systems do suggest the possible occurrence of trans-river flow for a short distance into the Savannah River alluvial valley. The possible occurrence of trans-river flow in the Dublin aquifer system also is suggested by the chemical and isotopic composition of water from the Brighams Landing well-cluster site in Georgia. Clarke and West (1997) suggest that the potential for trans-river flow may be facilitated by groundwater withdrawal, particularly at pumping centers located near the Savannah River. Pumped wells on one side of the river could intercept groundwater that originates on the other side. For this to occur, pumping would need to be sufficient to reverse the hydraulic gradient away from the river and towards the pumping center.

Numerical simulation techniques have been used to further evaluate areas of previously documented trans-river flow on the Georgia side of the Savannah River **(Clarke and West 1998; Cherry 2006)**. At such areas, local head gradients might allow the migration of contaminants from the Savannah River Site into the underlying aquifers and beneath the Savannah River into Georgia. Cherry (2006) identified the area near Flowery Gap Landing (covering about 1 mi^2) as an area of potential trans-river discharge. Backward particle tracking analysis was conducted to better quantify trans-river flow. Between 29 and 37 percent of the particles released in this area backtracked to recharge areas on the Savannah River Site (trans-river flow), depending on the scenario being evaluated. Of the particles exhibiting trans-river flow, the median time-of-travel ranged from 366 to 507 years. For the worst-case scenario evaluated (deactivation of Savannah River Site production wells), the median time-of-travel decreased to about 370 years, with a shortest time-of-travel period of about 80 years.

While the potential for trans-river flow exists, it is likely that such flow would be quickly discharged to the river because flow in the river alluvium is toward the river. Also, any tritiated water originating from the Savannah River Site and participating in trans-river flow would undergo significant radioactive decay, considering its 12.35-year half-life, relative to even the worst-case 80-year time-of-travel. Furthermore, pumping of the current makeup water wells for VEGP Units 1 and 2 does not appear to have intercepted groundwater originating from the other side of the river, based on the particle tracking results presented **by Cherry (2006). It** is also unlikely that pumping the additional water needed to supply VEGP Units 3 and 4 would be sufficient to reverse that hydraulic gradient and cause groundwater originating from South Carolina to be drawn any further into Georgia, given the high transmissivities of the confined Tertiary and Cretaceous aquifers. Therefore, trans-river flow does not appear to be a mechanism that would contribute to the contamination of aquifers underlying the VEGP site.

2.3.1.2.1.4 The Location and Role of the Pen Branch Fault

There is no evidence to suggest that the potential for groundwater leakage between the Upper Three runs (Water Table) aquifer and Gordon (Tertiary sand) aquifer in the vicinity of the Pen Branch fault exists at the VEGP site. SSAR Section 2.5.1.2.4 describes previous investigations of the Pen Branch fault and the site subsurface investigation of the fault that was conducted for the ESP application. Results of this investigation, which included seismic reflection and refraction surveys, clearly document that the Pen Branch fault strikes northeast and dips southeast beneath the VEGP site. SSAR Figure 2.5.1-42 shows the vertical projection of the Pen Branch fault from the top of basement rock in relation to VEGP Units 3 and 4. The plan projection of the intersection of the Pen Branch fault with the top of basement rock is located beneath or slightly southeast of the antiformal hinge at the top of the monocline in the Blue Bluff Marl (SSAR Figure 2.5.1-39). Because of its spatial association with the Pen Branch fault, it is likely that this monocline feature is the result of reverse or reverse-oblique slip on the Pen Branch fault. The seismic survey data further indicate that the fault terminates in the Cretaceous Coastal Plain deposits and overlying Tertiary deposits, including those comprising the Gordon (Tertiary sand) aquifer, Gordon aquitard (Blue Bluff Marl), and Upper Three Runs (Water Table) aquifer, are not considered to be affected by the Pen Branch fault. This result is consistent with that of Summerour et al. (1998), who reported that none of the faults identified in their seismic surveys appear to have disturbed the Gordon aquitard (Blue Bluff Marl), which isolates the unconfined aquifer from underlying confined aquifers.

Based on the results and discussion presented above, the Pen Branch fault has not affected the Tertiary age deposits at the VEGP site and would be neither a barrier nor a conduit for groundwater transport in these deposits. Insufficient data is available to determine if the fault would be a barrier or conduit in the deeper, Cretaceous deposits that have been affected by the fault.

2.3.1.2.2 Local Hydrogeology

The VEGP site lies within the Coastal Plain Physiographic Province. The site is located approximately 40 mi southeast of the Fall Line, the northwestern boundary of the Coastal Plain province, and is adjacent to the Savannah River. Geologic conditions beneath the VEGP site generally consist of about 1000 ft of Coastal Plain sediments with underlying Triassic Basin rock southeast of the Pen Branch fault and Paleozoic crystalline rock northwest of this fault.

The Savannah River lies along the northeast border of the VEGP site and influences the local hydrogeologic conditions within the site area. This local hydrogeology discussion is restricted to the VEGP site vicinity (approximate radius of 5 mi) south of the Savannah River.

Geotechnical and hydrogeological investigations performed for this ESP application provide information on the VEGP site from the Triassic Basin rock to the ground surface. Results from these investigations indicate that there are three aquifers underlying the VEGP site, the Cretaceous, Tertiary, and Water Table (or Upper Three Runs), all of which belong to the Southeastern Coastal Plain aquifer system. Although present regionally, the Surficial aquifer system, consisting of Miocene (Hawthorne Formation) through Quaternary deposits, is not continuous over Burke County or the VEGP site **(Miller 1990)**.

The lower aquifer at the VEGP site overlies the bedrock and is comprised of Cretaceous-age sediments. Locally, this aquifer system is known as the Cretaceous aquifer. The sediments include sands, gravels, and clays of the Cape Fear Formation, Pio-Nono Formation and associated unnamed sands, Gaillard Formation, Black Creek Formation, and Steel Creek Formation. The middle aquifer is made up of Tertiary-age sediments occurring over the Cretaceous-age sediments described above. The middle aquifer system is locally known as the Tertiary aquifer. It consists primarily of the permeable sands of the Still Branch and Congaree Formations. The relatively impermeable clays and silts of the Snapp and Black Mingo Formations overlie and confine the Cretaceous aquifer, while the clays and clayey sands of the Lisbon Formation overlie and confine the Tertiary aquifer**.** The upper aquifer is unconfined and is comprised of Tertiary-age sands, clays, and silts of the Barnwell Formation, which overlie the relatively impermeable Lisbon Formation. This aquifer is known locally as the Water Table aquifer or Upper Three Runs aquifer. A hydrostratigraphic section showing geologic units, confining units, and aquifers for the VEGP site and surrounding areas is shown in Figure 2.3.1-11. Further discussion of the aquifers underlying the VEGP site and surrounding area is provided below.

Cretaceous Aquifer

The Cretaceous aquifer locally comprises the Cape Fear Formation, Pio-Nono Formation/ unnamed sands, Gaillard Formation/Black Creek Formation, and Steel Creek Formation. These formations generally consist of fluvial and estuarine deposits of cross-bedded quartzitic sand and gravel interbedded with silt and clay. The coarse-grained sediments are mostly unconsolidated and are generally permeable, while the fine-grained sediments are partially consolidated and are generally impermeable. In addition to the varying lithology, the formation also exhibits lateral facies changes, on-lap and off-lap relationships, and discontinuous lenses **(Huddlestun and Summerour 1996)**. The elevations, thicknesses, and descriptions of these geologic formations, as determined from VEGP geotechnical boring B-1003, are summarized below:

- The basal Cape Fear Formation overlies the Triassic Dunbarton Basin bedrock, which is of Paleozoic age and consists of alternating mudstone, sandstone, and breccia. Boring B-1003 encountered top of bedrock at an elevation of approximately -826 ft msl and was advanced an additional 289 ft to elevation of -1,115 ft msl. The Cape Fear Formation consists of interbedded sands, silts, clays, and gravels. The formation is approximately 191 ft thick, with the top of the formation being at El. -635 ft msl.
- The Pio-Nono Formation and other unnamed sands overlie the Cape Fear Formation. This formation consists of sand, silt, and clay. The formation is approximately 60 ft thick, while the top of the formation is at approximately El. -575 ft msl.
- The undifferentiated Gaillard Formation and Black Creek Formation overlie the Pio-Nono Formation and unnamed sands. Most of the formation consists of sand with silt and clay, and layers of gravel. The deposit is approximately 211 ft thick, with the top of the formation being at approximately El. -364 ft msl.
- The Steel Creek Formation overlies the undifferentiated Gaillard Formation and Black Creek Formation. It consists mainly of sand with clay and silt. The formation is approximately 110 ft thick; the top of the formation is at approximately El. -254 ft msl.

The Cretaceous aquifer system has not been extensively developed, primarily because the shallower Tertiary system is adequate for most groundwater needs and is available for use throughout the region. Quantitative data from the limited number of test and production wells in the Cretaceous strata, and inferred data from geologic and stratigraphic studies, indicate clearly that the Cretaceous aquifer system is highly capable of yielding large quantities of good quality groundwater.

Recharge to the Cretaceous aquifer system is primarily by direct infiltration of rainfall in its outcrop area, located north of the VEGP site in a 10- to 30-mile-wide belt extending from Augusta, Georgia, northeastward across South Carolina to near the state line separating North and South Carolina. In the outcrop areas, precipitation penetrates the Cretaceous sediments. Groundwater in the outcrop areas is under water table conditions, but as it moves progressively downdip, it becomes confined beneath the overlying Snapp and Black Mingo Formations in the vicinity of the VEGP site. Hence, the Cretaceous aquifer system is under confined conditions for most of its areal extent. Discharge of the Cretaceous aquifer system is primarily from subaqueous exposures of the aquifer that are presumed to occur along the Continental Shelf. Other discharge sources are to the Savannah River and by pumping.

Tertiary Aquifer

The most productive aquifer at the VEGP site consists of the Congaree and Still Branch Formations, which are hydraulically connected and are referred to as the Tertiary sand aquifer. The overlying Lisbon Formation, containing the Blue Bluff Marl, acts as a confining layer. The elevations, thicknesses, and descriptions of geologic formations comprising the Tertiary aquifer, as encountered in boring B-1003, are described below.

- The Black Mingo and Snapp Formations constitute a semi-confining hydrogeologic unit under the VEGP site that separates the underlying Cretaceous aquifer from the overlying Tertiary sand aquifer as they dip to the southeast. The Paleocene-age Black Mingo Formation is approximately 39 ft thick and consists of sand, clay, and silt. The top of the formation is at approximately El. -215 ft msl. The Snapp Formation overlies the Black Mingo Formation and consists of sand, clay and silt, and includes a basal gravel layer. The stratum is also Paleocene in age. The formation is approximately 107 ft thick. The top of the formation is at approximately El. -108 ft msl.
- Above the Snapp is the Eocene-age Congaree Formation. The Congaree Formation has a thickness of about 115 ft and consists primarily of sand with clay and silt, and a basal gravel layer. The top of the formation is at an elevation of approximately 7.3 ft msl. The overlying Still Branch and Bennock Millpond Sands Formation consist of sand, clay, and silt and has a weak carbonate component. The formation thickness is approximately 67 ft, with the top of the formation being approximately El. 74 ft msl.
- The Lisbon Formation overlies the Tertiary sediments is the Lisbon Formation. The Lisbon Formation is Eocene in age and is comprised of sand, clay, and silt with interbedded layers of fossiliferous limestone. The Lisbon Formation contains a marl known as the Blue Bluff Member (Blue Bluff Marl). The Lisbon Formation also contains the McBean Limestone Member, a fossiliferous limestone layer. The formation has a thickness of approximately 63 ft, and the top of the formation is at approximately El. 137 feet msl. This formation separates the confined and unconfined aquifer systems beneath the VEGP site.

  VEGP Units 1 and 2 UFSAR Section 2.5.1.2.2.2.1.1 states that the Blue Bluff marl is a distinct unit that is relatively constant in thickness over many square miles, although variable in lithology. Contours of the upper and lower surfaces, as well as an isopach map of the marl in the vicinity of the plant, are shown on drawings AX6DD352, AX6DD371, and AX6DD372 of the UFSAR. These drawings indicate the Blue Bluff Marl to be continuous over the entire VEGP site. On the VEGP site, the ESP subsurface investigation (SSAR Appendix 2.5A) determined that the Blue Bluff Marl ranges in thickness from 63 to 95 ft at three locations where the stratum was fully penetrated, with an average thickness of 76 ft and a median thickness of 69 ft.

Recharge to the Tertiary aquifer is primarily by infiltration of rainfall in its outcrop area, which is a belt 20 to 60 miles wide extending northeastward across central Georgia and into portions of Alabama to the west and South Carolina to the east. Discharge from the Tertiary aquifer occurs from pumping, from natural springs in areas where topography is lower than the piezometric level of the aquifer, and from subaqueous outcrops that are presumed to occur offshore. Discharge also occurs to the Savannah River where the river has completely eroded the Blue Bluff Marl confining layer allowing discharge from the aquifer to the river.

Water Table Aquifer

The uppermost aquifer at the VEGP site is unconfined and consists of the Barnwell Group, including the discontinuous deposits of the Utley limestone, as well as Quaternary deposits along adjacent stream channels. The saturated interval within the Barnwell Group is commonly referred to as the Water Table aquifer (also known as the Upper Three Runs aquifer) and is the first water-bearing zone encountered beneath the VEGP site. The descriptions of the Barnwell Group were determined from VEGP ESP geotechnical and hydrogeological borings and are described below.

- The basal Utley Limestone Member of the Barnwell Group consists of sand, clay, and silt with carbonate-rich layers. The stratum is discontinuous across the VEGP site and was not encountered in several of the borings. To assess its degree of discontinuity, borings logged for the hydrogeological and geotechnical investigations have been examined for the presence/absence of the Utley limestone. Logs for these borings are included in SSAR Appendices 2.4A and 2.5A. In completing this assessment, effort was made to eliminate spatial bias. Therefore, only one boring log was considered when there were adjacent borings from OW-series well pairs, or adjacent B- and OW-series borings. The results are summarized in Table 2.3.1-27.

  The data presented in Table 2.3.1-27 indicates that the Utley limestone is absent in 8 out of 18 borings, or 44 percent of the borings. Spatial trends in the presence/absence of the Utley limestone indicate that the unit tends to be present in the power block area for VEGP Units 3 and 4 and the area to the north toward Mallard Pond. The Utley limestone tends to be absent in the cooling tower area for VEGP Units 3 and 4 and the area to the south. These results are consistent with the Utley limestone isopachs presented in the UFSAR for VEGP Units 1 and 2 (Drawing No. AX6DD376). These isopachs indicate that the limestone increases in thickness to a maximum of about 80 ft and then decreases in thickness to 10 ft or less along a profile extending from the power block to Mallard Pond, with the long axis of this unit trending in a northeast-southwest direction.

- Overlying the Utley limestone are undifferentiated sands, clays, and silts. The thickness of the group is variable with a range of approximately 14 to 119 ft. The top of the group ranges from approximately El. 205 to 264 ft msl. At boring B-1003, the formation is approximately 48 ft thick with the top of the formation being at an elevation of approximately 223 ft msl.

Recharge to the Water Table aquifer is almost exclusively by infiltration of rainfall. The presence of porous surface sands and the moderate topographic relief in the VEGP site area suggest that a significant fraction of the precipitation either infiltrates the ground or is lost to the atmosphere by evapotranspiration. Discharge is to localized drainages and wells.

2.3.1.2.3 Observation Well Data

Data from a combination of new wells installed for the ESP application and existing VEGP site wells were used to develop the groundwater elevation contour maps. The new wells, designated OW-1001 through OW-1015, were installed in May and June 2005. (One of the wells, OW-1001, had very little change in groundwater levels and is not included in the analysis. A replacement well, OW-1001A, was installed in October 2005.) Ten of the new wells are screened in the Water Table aquifer and five are screened in the confined Tertiary aquifer system below the Blue Bluff Marl. No wells were installed into the deeper Cretaceous aquifer. Existing wells 142 and 179, remaining from the pre-construction monitoring network for VEGP Units 1 and 2, are screened in the Water Table aquifer. Existing wells with identifications beginning with the number 8 were installed between 1979 and 1985 to monitor construction dewatering of VEGP Units 1 and 2. These wells are screened in either the Water Table or Tertiary aquifers. Existing wells with an LT designation were installed in 1985 as part of post-construction monitoring activities and screened in the Water Table aquifer.

Observation well OW-1001A was installed at the site in October 2005 to replace OW-1001. Observation well OW-1001 was replaced because, following a period of groundwater level monitoring from June to September 2005, the groundwater level data from this well was considered invalid. This is discussed in more detail in the following section. Observation well OW-1001A was the only new “A” well installed at the site for the ESP application. Observation well OW-1001A should not be confused with the borings or drill logs contained in SSAR Appendix 2.4A that also use the suffix “A.” The confusion arises because the boring or drill logs contained in SSAR Appendix 2.4A are labeled “OW” (for Observation Well) as opposed to “B” (for Boring log) or “D” (for Drill log). A summary of borings or holes drilled at the site to accommodate installation of the new observation wells is provided in Table 2.3.1-28.

Groundwater level elevations in OW-1001 measured between the period June 2005 and November 2006 (groundwater level data continues to be collected in wells OW-1001 and OW-1001A for observation purposes) range from about 114 to 118 ft msl, with a seasonal fluctuation of about 4.4 ft. These groundwater levels and seasonal fluctuations are not consistent with the groundwater levels and seasonal fluctuations of groundwater levels in the Water Table aquifer and suggest that the screened portion of the well is not in good hydraulic communication with the Water Table aquifer. Review of the boring log, daily field log, well development log, and in situ hydraulic conductivity test results for the well indicate that either the formation material adjacent to the well was adversely affected by well construction or that the well was inadvertently installed in the confining unit underlying the formation material. Observation well OW-1001A was installed to replace well OW-1001, as discussed above. The construction log for OW-1001A contained in SSAR Appendix 2.5A (report Appendix D) indicates that the screened portion of the well ranges in elevation from 146.13 to 136.13 ft msl, while groundwater level elevations for the 17-month monitoring period range from 135.91 to 135.99 ft msl. These groundwater level data reveal that groundwater levels in the well are close to or below the bottom of the screened interval of the well, indicating no hydraulic communication with the Water Table aquifer. Groundwater data obtained from OW-1001 and OW-1001A are considered invalid and are not used in the following groundwater evaluations.

Monthly water levels in the observation wells were measured to characterize seasonal trends in groundwater levels and flow directions for the VEGP site. Monthly monitoring of these wells began in June 2005 and is continuing. An 18-month data set representing June 2005 through November 2006 is used for this ESP application. In addition, longer-term data is available for some of the existing wells completed in the Water Table and Tertiary aquifers, which are used to characterize historic trends.

The locations of VEGP site observation wells that are being monitored are shown in Figure 2.3.1-12. Table 2.3.1-18 lists the observation wells currently being used to monitor the Water Table aquifer, while Table 2.3.1-19 lists the observation wells currently being used to monitor the Tertiary aquifer.

The following groundwater piezometric surface trend discussion is based on the information presented in Figures 2.3.1-30 through 2.3.1-35, Figures 2.4.12-16 through 2.4.12-21, Figures 2.3.1-23 through 2.3.1-27, and Tables 2.3.1-18 and 2.3.1-19.

Water Table Aquifer

Groundwater level data for the Water Table aquifer available for 1979 through 2006 is provided in Figure 2.3.1-30. Also shown on this figure is annual precipitation measured at three climate stations close to the VEGP site, which includes the Augusta WSO Airport, Waynesboro 2 NE, and Milen 4N climate stations. Precipitation data was obtained from the South Carolina Department of Natural Resources website **(SC DNR 2007).** In addition, the Palmer Drought Severity Index (PDSI) and Palmer Hydrological Drought Index (PHDI) are plotted on Figure 2.3.1-31 for the same period. The PDSI attempts to measure the duration and intensity of the long-term cumulative meteorological drought and wet conditions. The PDHI is another long-term drought index intended to measure the hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.). PDSI and PHDI data were obtained from the National Climatic Data Center website **(NCDC 2007).** These indices provide an indication of the severity of a wet or dry spell. The indices generally range from +6 to –6, with negative values denoting dry spells and positive values denoting wet spells. Values of +0.5 to –0.5 indicate normal conditions.

Figure 2.3.1-30 shows that for the period 1979 to 1984, groundwater level elevations in the Water Table aquifer were affected (lowered) by construction dewatering of the power block excavation for VEGP Units 1 and 2 that was in effect from June 1976 to March 1983. Groundwater levels for subsequent years exhibit variability in response to meteorological conditions. The magnitude of the variability can be estimated using data from the wells having the longest period of record, which include wells 802A, 805A, 808, LT-7A, LT-12, and LT-13. Table 2.3.1-29 summarizes the minimum and maximum water levels recorded at each of these wells. These results indicate a 5-to-8-ft range in water levels over the 17-year period of record for these wells. Inspection of the long-term hydrographs for wells 802A, 805A, 808, LT-7A, LT-12, and LT-13 in conjunction with the drought severity indices for the same period indicates that groundwater levels in the Water Table aquifer generally correlate with the PDSI and PDHI. Water levels tend to remain unchanged when the drought severity indices remain near normal (±1). During drought periods when the PDSI or PDHI index falls to –2 or below, groundwater levels tend to decline. Conversely, during wet periods when the PDSI or PDHI increases to +2 or more, groundwater levels tend to rise. Increases or decreases in the drought indices would be associated with the increases or decreases in the rate of recharge of the Water Table aquifer. Because of the relatively large depth to the water table (at least 60 ft), prolonged wet or dry periods on the order of a year in duration are apparently required to affect the recharge to the water table at these depths.

Groundwater data from June 2005 to November 2006 for the Water Table aquifer is summarized in Table 2.1.1-18 and shown in Figure 2.3.1-32. Groundwater elevations for this 18-month monitoring period range from about 133 to 165 ft msl, with seasonal fluctuations averaging about 1 ft. This data exhibits very little variability because the recharge during this period was evidently relatively constant. Comparison of historical groundwater level elevations with precipitation events and other meteorological indices over a longer period of time suggest that persistent and significant wet weather is required to elicit significant water table response, as discussed above. The annual precipitation, the PDSI, and the PDHI for 2004 to 2006 have been relatively stable and near normal values. Due to the absence of any upward or downward trends in these indices, it is expected that groundwater elevations in the Water Table aquifer would be relatively steady over this period.

The groundwater elevation data summarized in Table 2.3.1-18 were used to develop quarterly groundwater surface elevation contour maps for the Water Table aquifer. These maps are presented in Figures 2.3.1-16 through 2.3.1-20 and Figure 2.3.1-33 for June 2005 through November 2006. Note that a contour map for November 2006 was developed because no groundwater level data was available for September and October 2006. Note that October 2005 data, as opposed to September 2005 data, were used to develop the contour map for the second quarter so that data from replacement well OW-1001A, installed in October 2005, could be incorporated. For each quarter, the spatial trend in the piezometric surface is similar, with elevations ranging from a high of approximately El. 165 ft msl in the vicinity of well OW-1013 to a low of less than El. 135 ft msl at well OW-1005. The groundwater surface contour maps indicate that horizontal groundwater flow across the VEGP site is in a north-northwest direction toward Mallard Pond (also known as Mathes Pond). This surface water feature is a local discharge point for the shallow groundwater flowing beneath the VEGP site. The horizontal hydraulic gradient across the site for the Water Table aquifer is relatively consistent between the five figures and is approximately 0.014 ft/ft.

Tertiary Aquifer

Historical groundwater elevations from 1971 through 1985 for Tertiary aquifer wells 27 and 29 are provided in Figure 2.3.1-21.

Recent groundwater elevation data from June 2005 to November 2006 for the Tertiary aquifer is summarized in Table 2.3.1-19 and shown in Figure 2.3.1-34. Groundwater elevations for this 18-month monitoring period range from about 82 to 128 ft msl. Elevations are relatively constant from June to August 2005. In most cases, the piezometric head of the aquifer declines from August 2005 through November 2005. The elevations begin to rebound in December 2006, continuing through February 2006. The lowering of the piezometric surface is likely in response to a decrease in precipitation. October and November are the months with the lowest precipitation during the year for this area. Well 27 shows a higher degree of variability than the others and is likely influenced by its proximity to the river.

The groundwater elevation data summarized in Table 2.3.1-19 were used to develop piezometric surface maps for the Tertiary aquifer. The Tertiary aquifer piezometric surface is presented in Figures 2.3.1-23 through 2.3.1-27 and Figure 2.3.1-35 for June 2005 through November 2006. The piezometric surfaces for the Tertiary aquifer show a relatively consistent flow pattern. In general, the groundwater in this aquifer unit shows an east-to-northeast flow pattern, toward the Savannah River. Head elevations range from approximately El. 125 ft msl in the western portion of the VEGP site to less than El. 100 ft msl in the vicinity of the bluff next to the Savannah River flood plain. The elevation of the piezometric head at the bluff and that of the Savannah River flood plain suggest groundwater is discharging to the Savannah River. The piezometric elevations in the Tertiary aquifer decreased at least 1.5 ft across the VEGP site in December 2005, reflecting the seasonal decrease in precipitation.

The horizontal hydraulic gradient across the site for the Tertiary aquifer is relatively consistent among the five figures and is approximately 0.006 ft/ft. In the center of the VEGP site, there is a downward head difference of approximately 50 ft between the Water Table aquifer and the Tertiary aquifer, suggesting hydraulic separation of the two aquifers. The Blue Bluff Marl confining unit that separates the aquifer systems has an average thickness of about 70 ft at the VEGP site.

Cretaceous Aquifer

At the VEGP site, both the Cretaceous and the Tertiary aquifers are considered confined beneath the Blue Bluff Marl but are in apparent hydraulic connection with each other. At some distance downdip of the VEGP site, the Cretaceous aquifer becomes hydraulically separated from the Tertiary aquifer. This separation is believed to be due to facies changes in the intervening clays and silts of the Snapp and Black Mingo formations becoming relatively impermeable. The point at which this occurs is not well defined but it is believed to be a few miles downdip (south) of the site.

The regional direction of the groundwater flow in the Cretaceous (and the Tertiary) aquifer system is south-by-southeast at a hydraulic gradient of approximately 6 to 20 ft/mi (0.001 to 0.004 ft/ft) **(Siple 1967)**. From the vicinity of the Fall Line to a point expected to be a few miles south of the site, the Savannah River has downcut through the Blue Bluff Marl confining layer and into the underlying strata. The Savannah River channel cut allows both the Cretaceous and the Tertiary aquifers to discharge to the riverbed, resulting in a localized hydraulic (groundwater) sink. The aquifer flow directions in the vicinity of the river cut are affected by the hydraulic sink and do not follow regional trends.

2.3.1.2.4 Hydrogeologic Properties and Groundwater Travel Time

Slug tests were performed in the new groundwater observation wells installed in connection with the ESP application to determine in situ hydraulic conductivity values for the Water Table and Tertiary aquifers. Table 2.3.1-20 summarizes the test results. Soil samples collected from selected geotechnical and hydrogeological borings were submitted for laboratory tests to determine grain size, moisture content, and specific gravity, results from which are included in Tables 2.3.1-21 through 2.3.1-23. Similar data are available for the adjacent VEGP Units 1 and 2 site. The hydrogeological properties of the Water Table aquifer, Lisbon Formation (Blue Bluff Marl) confining unit, Tertiary aquifer, and Cretaceous aquifer at the VEGP site are discussed below.

Water Table Aquifer

In the vicinity of the VEGP site, the basal unit of the Barnwell Group, the Utley limestone member, is capable of transmitting groundwater but is of limited areal and vertical extent. In addition, the horizontal and vertical hydraulic conductivity of the saturated clays, silts, and sands within the Barnwell Group varies considerably, due to variable clay content.

The hydraulic conductivity of the Water Table aquifer within the vicinity of the VEGP site was measured previously by both in situ and laboratory testing methods during site characterization investigations for VEGP Units 1 and 2. In situ hydraulic conductivity values for the Barnwell Group sands, silts, and clays were found to range between 200 and 267 ft/yr (0.5 to 0.7 ft/day). Laboratory values varied considerably beyond the range of the in situ tests from 9.8 to 302 fy/yr (0.03 to 0.8 ft/day). Well pumping tests conducted in the Utley limestone resulted in hydraulic conductivities ranging from 3,250 to 125,400 ft/yr (9 to 343 ft/day), while falling and constant head tests suggested lower values, ranging from 96 to 5,800 ft/yr (0.3 to 16 ft/day). These results indicate the possibility of localized, highly permeable zones in the Utley limestone. Laboratory porosity values for the Barnwell Group sands, silts, and clays were found to range from 34 to 61 percent, with a mean value of 44 percent.

Hydraulic conductivities were determined for the VEGP Units 3 and 4 site as part of the ESP investigation. Slug test results for the Water Table aquifer range from 0.12 to 2.65 ft/day, with a geometric mean of 0.41 ft/day (Table 2.3.1-20). Table 2.3.1-21 summarizes the laboratory test results for geotechnical samples of the Barnwell Formation, which were at depths ranging from El. 108 to 248 ft msl. Sand and clay make up the majority of samples, with some gravel present. Measured moisture contents, by weight, range from 4 to 93 percent and have a median value of about 25 percent. Specific gravity analysis was performed only for the samples collected from the observation well borings. Values range between 2.59 to 2.75 and have a median value of 2.66. Using the median moisture content of 25 percent and a value of 2.66 for the specific gravity, the void ratio is estimated to be about 0.67. A total porosity of 40 percent is calculated from this void ratio **(Craig 1994),** and an effective porosity of about 32 percent is estimated based on 80 percent of the total porosity **(de Marsily 1986)**. The specific yield for the Water Table aquifer was not determined; however, an estimate of this value taken from published literature for similar aquifer materials indicates that it may be in the range of 0.20 to 0.33 **(McWhorter and Sunada 1977)**.

The groundwater travel time in the Water Table aquifer was calculated from the ESP site to the projected discharge point (Mallard Pond). A horizontal hydraulic gradient of 0.014 ft/ft was estimated using the maximum water level observed at OW-1009 (163.03 ft msl), the minimum water level observed at OW-1005 (132.53 ft msl), and the distance between the two observation wells of about 2,200 ft. A hydraulic conductivity value of 0.5 ft/day was used, which is considered to be a representative hydraulic conductivity value for the Barnwell Formation, which includes the Utley limestone. Using this hydraulic conductivity of 0.5 ft and an effective porosity of 32 percent, an average horizontal groundwater velocity of 0.02 ft/day was calculated **(Heath 1998).** Using a distance of approximately 2,450 ft from center of the power block area for the new AP1000 units to the closest point of Mallard Pond, the groundwater travel time from the power block area to Mallard Pond is estimated to be about 336 years.

The geotechnical boring logs contained in SSAR Appendix 2.5A, which report some occurrences of water loss during drilling through the Utley limestone, and high hydraulic conductivity test results for the Utley limestone obtained during site investigations for VEGP Units 1 and 2 indicate the possibility of localized highly permeable zones in the Utley limestone. These zones could act as preferential pathways for groundwater flow if there was an accidental liquid release of effluents to the groundwater at the VEGP site.

As described in SSAR Section 2.5.4.5, construction of the new Units 3 and 4 will require a substantial amount of excavation and backfill. The excavation will be necessary to completely remove the sands, silt, clays, and Utley limestone of the Barnwell Group. Total excavation depth to the Blue Bluff Marl bearing stratum is expected to range from approximately 80 to 90 ft below existing grade. Backfilling will be performed from the top of the Blue Bluff Marl to the bottom of the containment and auxiliary buildings at a depth of about 40 ft below final grade. Filling will continue up around these structures to final grade. The fill will primarily consist of granular materials, selected from portions of the excavated sands and from other available borrow sources. Following the guidelines used during construction of VEGP Units 1 and 2, structural fill will be a sandy or silty sand material with no more than 25 percent of the particle sizes smaller than the No. 200 sieve. This structural fill will be compacted to a minimum of 97 percent of the maximum dry density.

Excavating existing soils and replacing these soils with structural fill will alter the hydrogeologic characteristics of the subsurface materials within the footprint of VEGP Units 3 and 4. In situ hydraulic testing of fill material for VEGP Units 1 and 2 indicates a hydraulic conductivity range of 480 ft/yr (1.3 ft/day) to 1,220 ft/yr (3.3 ft/day), based on data included in UFSAR Table 2.4.12-15. Values for Units 3 and 4 are expected to be similar because the borrow sources and compaction criteria for the fill will be the same. Compared with the hydraulic conductivities for the Water Table aquifer, as described above, it can be seen that the hydraulic conductivity of the fill is generally higher than that of the in situ soils.

Development of VEGP Units 3 and 4 will also increase the impervious area across the VEGP site where power generation and associated facilities are constructed. Storm water management facilities (e.g., catch basins, storm sewers) will be used to convey runoff from precipitation offsite. The increased impervious area and use of storm water management facilities will tend to reduce the recharge to the Water Table aquifer in areas affected by Unit 3 and 4 construction.

Construction of VEGP Units 3 and 4 will entail the placement of relatively large and impermeable structures below grade. The base elevations of the major structures (containment and auxiliary buildings) will be at about El. 180.5 ft msl. This elevation is at least 20 ft above the water table. Because these structures will not extend below the water table, they will not affect the hydrogeologic characteristics of the underlying saturated zone.

Lisbon Formation (Blue Bluff Marl) Confining Unit

The hydraulic conductivity of the marl layer is very low, and it effectively confines the aquifer underlying it. It is considered a barrier to vertical groundwater movement. In situ permeability tests (packer tests) were performed in the marl during site characterization investigations for VEGP Units 1 and 2. In 90 percent of the intervals tested, no measurable water inflow occurred. Laboratory permeability tests were also conducted on core samples collected from the marl. Laboratory measurements ranged from 0.0052 to 8.8 ft/yr (1.4×10^{-5} to 2.4×10^{-2} ft/day) with a geometric mean of 1.3×10^{-3} ft/day, indicating the marl is nearly impermeable. Porosity values ranged from 24 to 62 percent, with a mean value of 48 percent.

Geotechnical laboratory results for the Lisbon Formation (Blue Bluff Marl) confining unit are summarized in Table 2.3.1-22 for the VEGP site. Soil samples were collected between El. 51 and 135 ft msl. The samples consist of gravel, sand, and clay. Moisture contents range from 13.5 to 67 percent, with porosities of 25 to 59 percent. Using the median moisture content of 29 percent from geotechnical laboratory results and an assumed specific gravity of 2.65, the void ratio of the confining unit is estimated to be 77 percent. Based on the void ratio value, total porosity is calculated to be 44 percent. The effective porosity of the Lisbon Formation was estimated using Figure 2.17 of de Marsily (1986). This figure plots total and effective porosity as a function of grain size. To estimate the effective porosity for the Lisbon Formation (Blue Bluff Marl), the ratio of effective to total porosity determined from Figure 2.17 was applied to the site-specific total porosity value for the VEGP site. Using the median D50 value of 0.24 mm as a representative grain size (Table 2.3.1-22), a ratio of effective to total porosity of about 0.8 was determined. Multiplying the median total porosity of 0.44 by this ratio yields an effective porosity of 0.35.

The effective porosity was also estimated as the difference between the total porosity and the residual water content, as given by Equation 4.4 of Yu et al. (1993). Grain size distribution data indicate that most of the Lisbon Formation samples can be classified as a silty sand (SM) or clayey sand (SC). The residual water content for SM or SC soils obtained from Carsel and Parrish (1988) using equivalent USDA-SCS soil textural classifications, ranges from 0.07 to 0.10. The effective porosity would then range from 0.34 to 0.37. This result indicates that the 0.35 value for effective porosity is representative of the Lisbon Formation.

Tertiary Aquifer

Hydraulic conductivities determined from Tertiary aquifer slug tests range from 0.35 to 2.1 ft/day, with a geometric mean of 0.83 ft/day (Table 2.3.1-20). These results are consistent with those for the VEGP Units 1 and 2 site for which the geometric mean was determined to be 0.51 ft/day. The laboratory results from the selected geotechnical samples collected in the Tertiary aquifer are presented in Table 2.3.1-23. Sample elevations range from El. -273 ft msl to 69 ft msl, with the samples consisting mainly of sand and fine particles, with some gravel. Moisture content ranges from 19 to 41 percent, with specific gravity values varying from 2.62 to 2.69. Using the median moisture content of 24 percent and a value of 2.67 for the specific gravity, the void ratio of the Tertiary aquifer is estimated to be about 0.64. A total porosity of 39 percent is calculated from this void ratio **(Craig 1994),** and an effective porosity of about 31 percent is estimated based on 80 percent of the total porosity **(de Marsily 1986)**. The storage coefficient for the Tertiary aquifer alone was not determined; however, previous tests of wells completed in the combined Cretaceous/Tertiary aquifers suggest that a value on the order of 10^{-4} would be a reasonable estimate (see below).

The horizontal hydraulic gradient of the Tertiary aquifer is approximately 0.005 ft/ft, based on the maximum water level observed at well OW-1008 (127.99 ft msl), the minimum water level observed at well 27 (81.5 ft msl), and the distance between the two observation wells of about 8,700 ft. The average horizontal groundwater velocity was calculated at 0.013 ft/day using a hydraulic conductivity of 0.83 ft/day, a hydraulic gradient of 0.005 ft/ft, and an effective porosity of 31 percent **(Heath 1998).** Using a distance of 5,600 ft from center of the power block area for the new AP1000 units to the closest point of the Savannah River, the groundwater travel time from the power block area to the Savannah River in the Tertiary aquifer is estimated to be about 1,180 years.

Cretaceous Aquifer

Two makeup water wells (designated as MU-1 and MU-2A) for VEGP Units 1 and 2 were reported to be capable of supplying water at 2,000 gal./min and 1,000 gal./min, respectively. The water is withdrawn from the combined Cretaceous/Tertiary aquifers. Pumping tests were conducted at these wells in 1977. Transmissivity values ranged between 110,400 to 130,900 gallons per day per foot (gpd/ft). A storage coefficient was calculated at 1.07×10^{-4}.

A pumping test was also conducted in a Cretaceous aquifer test well identified as TW-1 during site characterization activities for VEGP Units 1 and 2. A transmissivity value of 158,000 gpd/ft was calculated as an average value for the aquifer. The storage coefficient ranged between 3.3×10^{-4} and 2.1×10^{-4}, indicating the aquifer is effectively under confined conditions.

Vertical hydraulic conductivities were estimated assuming that the anisotropy ratio between the vertical and horizontal directions is 1:3, based on measured horizontal and vertical hydraulic conductivities for sandstone deposits **(Freeze and Cherry 1979)**. The vertical hydraulic conductivities for the Water Table aquifer, Lisbon Formation confining unit, and Tertiary aquifer are estimated to be 0.14, 0.00045, and 0.28 ft/day, respectively.

2.3.1.2.5 Summary

The VEGP site lies within the Coastal Plain Physiographic Province. Geologic conditions beneath the VEGP site generally consist of about 1000 ft of Coastal Plain sediments with underlying Paleozoic sedimentary Triassic sediments and Paleozoic crystalline rock Groundwater at the site occurs in three aquifers that are part of the Southeastern Coastal Plain aquifer system. The lower (Cretaceous) aquifer is comprised of Cretaceous-age sediments, while the middle (Tertiary) aquifer is comprised of Tertiary-age sediments. Both are under confined conditions. The upper (Water Table) aquifer, comprised of Tertiary-age sediments, is unconfined. Recharge to the Cretaceous and Tertiary aquifers occurs in their outcrop areas north of the VEGP site. These aquifers discharge to the Savannah River and to subaqueous outcrops along the Continental Shelf. Recharge to the Water Table aquifer occurs by infiltration of precipitation. Discharge is to localized drainage and stream incisions.

Observation wells completed in the Water Table and Tertiary aquifers were used to develop piezometric contour maps and hydraulic gradients. Hydrogeologic properties of these aquifers were determined by laboratory testing of soil samples and by in situ testing. Piezometric contour maps for the Water Table aquifer indicate that groundwater flow across the VEGP site is northward towards Mallard Pond, which serves as a discharge area. The groundwater travel time from the center of the VEGP site to Mallard Pond is estimated to be about,336 years. Piezometric contour maps for the Tertiary aquifer show groundwater flow across the VEGP site to be in the east-to-northeast direction toward the Savannah River, which serves as a discharge area. The groundwater travel time in the Tertiary aquifer, from the center of the VEGP site to the Savannah River, is estimated to be about 1,180 years. The Water Table and Tertiary aquifers are separated by a very low permeability stratum known as the Lisbon formation. Observation well data suggest that there is little to no hydraulic connectivity between the Water Table and Tertiary aquifers. No sole-source aquifers have been designated within the VEGP site region.

Table 2.3.1-1 Savannah River Sub-basins and Drainage Areas Above VEGP

NWS Subbasin		NWS Subbasin Name	Drainage Area, mi^2	
No.	**I.D.**		**upstream of site (1)**	**downstream of site (2)**
1	TIGG1	Burton Dam, GA	122.3	0.0
2	JCSS1	Jocassee Dam, SC	157.7	0.0
3	KEOS1	Keowee Dam, SC	288.0	0.0
4	HRTG1	Hartwell Dam, GA	1544.7	0.0
5	RBRS1	R.B. Russell Dam	738.2	0.0
6	CARG1	Carlton Bridge, GA	760.6	0.0
7	CHDS1UP	Clark Hill - Thurmon Dam (upstream)	665.9	0.0
8	CHDS1	Clark Hill Dam	1847.7	0.0
9	MODS1	Modoc, S.C.	539.9	0.0
10	AGTG1	Steven Creek Dam, GA	454.8	0.0
11	AGSG1	Augusta 5th Street	77.1	0.0
12	AUGG1	Augusta/Butler Creek	273.6	0.0
13	JACS1	Jackson, S.C.	651.2	0.0
14	BFYG1	Burton's Ferry, GA	182.5	293.4
15	BRIG1	Millhaven, GA	0.0	646.2
16	CLYG1	Clyo, GA	0.0	634.7
Estimated Savannah River drainage area at site			**8304.2**	

1) Based on data from Southeast River Flood Forecasting Center, Atlanta, GA. (NWS 2005)
2) As estimated from HUC-12 shapefiles

Table 2.3.1-2 River Miles for Key Landmarks Along the Savannah River

Land Mark	River Mile *
Confluence of White Water & Toxaway Rivers	368.6
Confluence of Tallulah & Chatooga (forming the Tugaloo)	358.1
Confluence of the Keowee & Twelve Mile Creek (forming Seneca River)	338.5
Confluence of the Senaca & Tugaloo Rivers (forming the Savannah)	312.1
Hartwell Dam (USGS gage 02187250)	288.9
Iva gage (USGS gage 02187500)	280.4
Confluence of Broad River	269.6
Calhoun Falls (USGS gage 02189000)	263.6
Richard B. Russell Dam (USGS gage 02189004)	259.1
Conflence of Little River	223.4
J. Strom Thurmond Dam (USGS gage 02194500)	221.6
Confluence of Stevens Creek	208.1
Augusta City Dam	207.0
Augusta, GA at Fifth Street gage site (02197000)	199.6
Horse Creek at mouth	197.4
New Savannah Bluff Lock and Dam	187.7
Shell Bluff Landing, Georgia	161.9
Jackson, SC gage (02197320)	156.8
Vogtle Electric Generating Plant	150.9
Burtons Ferry Gage (02197500)	118.7
Confluence of Brier Creek	102.5
Clyo gage (02198500)	60.9
Ebenezer Landing, Georgia	48.1
Houlihan Bridge (U.S. Highway 17)	21.6
City of Savannah, GA at Bull Street	14.4
Mouth of the Savannah River	0.0

* River miles measured from the mouth of Savannah Harbor, as reported by USACE 1996.

Source: Adapted from USACE 1996

Table 2.3.1-3 USGS 7.5-Minute Quadrangles for Savannah River Watershed

Map ID	7.5-minute Quadsheet Name	State	N. Latitude	W. Longitude
1	Tuckasegee	NC	35 ° 15 ' 00 "	83 ° 00 ' 00 "
2	Sam Knob	NC	35 ° 15 ' 00 "	82 ° 52 ' 30 "
3	Wayah Bald	NC	35 ° 07 ' 30 "	83 ° 30 ' 00 "
4	Glenville	NC	35 ° 07 ' 30 "	83 ° 07 ' 30 "
5	Big Ridge	NC	35 ° 07 ' 30 "	83 ° 00 ' 00 "
6	Lake Toxaway	NC	35 ° 07 ' 30 "	82 ° 52 ' 30 "
7	Rosman	NC	35 ° 07 ' 30 "	82 ° 45 ' 00 "
8	Rainbow Springs	NC	35 ° 00 ' 00 "	83 ° 30 ' 00 "
9	Prentiss	NC	35 ° 00 ' 00 "	83 ° 22 ' 30 "
10	Scaly Mountain	NC	35 ° 00 ' 00 "	83 ° 15 ' 00 "
11	Highlands	NC	35 ° 00 ' 00 "	83 ° 07 ' 30 "
12	Cashiers	NC	35 ° 00 ' 00 "	83 ° 00 ' 00 "
13	Reid	NC	35 ° 00 ' 00 "	82 ° 52 ' 30 "
14	Eastatoe Gap	NC	35 ° 00 ' 00 "	82 ° 45 ' 00 "
15	Table Rock	SC	35 ° 00 ' 00 "	82 ° 37 ' 30 "
16	Macedonia	GA	34 ° 52 ' 30 "	83 ° 37 ' 30 "
17	Hightower Bald	GA	34 ° 52 ' 30 "	83 ° 30 ' 00 "
18	Dillard	GA	34 ° 52 ' 30 "	83 ° 22 ' 30 "
19	Rabun Bald	GA	34 ° 52 ' 30 "	83 ° 15 ' 00 "
20	Satolah	GA	34 ° 52 ' 30 "	83 ° 07 ' 30 "
21	Tamassee	SC	34 ° 52 ' 30 "	83 ° 00 ' 00 "
22	Salem	SC	34 ° 52 ' 30 "	82 ° 52 ' 30 "
23	Sunset	SC	34 ° 52 ' 30 "	82 ° 45 ' 00 "
24	Pickens	SC	34 ° 52 ' 30 "	82 ° 37 ' 30 "
25	Dacusville	SC	34 ° 52 ' 30 "	82 ° 30 ' 00 "
26	Tray Mountain	GA	34 ° 45 ' 00 "	83 ° 37 ' 30 "
27	Lake Burton	GA	34 ° 45 ' 00 "	83 ° 30 ' 00 "
28	Tiger	GA	34 ° 45 ' 00 "	83 ° 22 ' 30 "
29	Rainy Mountain	GA	34 ° 45 ' 00 "	83 ° 15 ' 00 "
30	Whetstone	SC	34 ° 45 ' 00 "	83 ° 07 ' 30 "
31	Walhalla	SC	34 ° 45 ' 00 "	83 ° 00 ' 00 "
32	Old Pickens	SC	34 ° 45 ' 00 "	82 ° 52 ' 30 "
33	Six Mile	SC	34 ° 45 ' 00 "	82 ° 45 ' 00 "
34	Liberty	SC	34 ° 45 ' 00 "	82 ° 37 ' 30 "
35	Easley	SC	34 ° 45 ' 00 "	82 ° 30 ' 00 "
36	Greenville	SC	34 ° 45 ' 00 "	82 ° 22 ' 30 "
37	Clarkesville NE	GA	34 ° 37 ' 30 "	83 ° 30 ' 00 "
38	Tallulah Falls	GA	34 ° 37 ' 30 "	83 ° 22 ' 30 "
39	Tugaloo Lake	GA	34 ° 37 ' 30 "	83 ° 15 ' 00 "
40	Holly Springs	SC	34 ° 37 ' 30 "	83 ° 07 ' 30 "
41	Westminster	SC	34 ° 37 ' 30 "	83 ° 00 ' 00 "
42	Seneca	SC	34 ° 37 ' 30 "	82 ° 52 ' 30 "
43	Clemson	SC	34 ° 37 ' 30 "	82 ° 45 ' 00 "
44	Five Forks	SC	34 ° 37 ' 30 "	82 ° 37 ' 30 "
45	Piercetown	SC	34 ° 37 ' 30 "	82 ° 30 ' 00 "
46	Pelzer	SC	34 ° 37 ' 30 "	82 ° 22 ' 30 "
47	Clarkesville	GA	34 ° 30 ' 00 "	83 ° 30 ' 00 "
48	Ayersville	GA	34 ° 30 ' 00 "	83 ° 22 ' 30 "
49	Toccoa	GA	34 ° 30 ' 00 "	83 ° 15 ' 00 "
50	Avalon	GA	34 ° 30 ' 00 "	83 ° 07 ' 30 "
51	Oakway	SC	34 ° 30 ' 00 "	83 ° 00 ' 00 "
52	Fair Play	SC	34 ° 30 ' 00 "	82 ° 52 ' 30 "
53	La France	SC	34 ° 30 ' 00 "	82 ° 45 ' 00 "
54	Anderson North	SC	34 ° 30 ' 00 "	82 ° 37 ' 30 "
55	Belton West	SC	34 ° 30 ' 00 "	82 ° 30 ' 00 "
56	Belton East	SC	34 ° 30 ' 00 "	82 ° 22 ' 30 "
57	Lula	GA	34 ° 22 ' 30 "	83 ° 37 ' 30 "
58	Baldwin	GA	34 ° 22 ' 30 "	83 ° 30 ' 00 "
59	Lake Russell	GA	34 ° 22 ' 30 "	83 ° 22 ' 30 "
60	Red Hill	GA	34 ° 22 ' 30 "	83 ° 15 ' 00 "

Table 2.3.1-3 (cont.) USGS 7.5-Minute Quadrangles for Savannah River Watershed

Map ID	7.5-minute Quadsheet Name	State	N. Latitude	W. Longitude
61	Martin	GA	34 ° 22 ' 30 "	83 ° 07 ' 30 "
62	Lavonia	GA	34 ° 22 ' 30 "	83 ° 00 ' 00 "
63	Reed Creek	GA	34 ° 22 ' 30 "	82 ° 52 ' 30 "
64	Hartwell NE	SC	34 ° 22 ' 30 "	82 ° 45 ' 00 "
65	Anderson South	SC	34 ° 22 ' 30 "	82 ° 37 ' 30 "
66	Saylors Crossroads	SC	34 ° 22 ' 30 "	82 ° 30 ' 00 "
67	Honea Path	SC	34 ° 22 ' 30 "	82 ° 22 ' 30 "
68	Ware Shoals West	SC	34 ° 22 ' 30 "	82 ° 15 ' 00 "
69	Gillsville	GA	34 ° 15 ' 00 "	83 ° 37 ' 30 "
70	Maysville	GA	34 ° 15 ' 00 "	83 ° 30 ' 00 "
71	Homer	GA	34 ° 15 ' 00 "	83 ° 22 ' 30 "
72	Ashland	GA	34 ° 15 ' 00 "	83 ° 15 ' 00 "
73	Carnesville	GA	34 ° 15 ' 00 "	83 ° 07 ' 30 "
74	Royston	GA	34 ° 15 ' 00 "	83 ° 00 ' 00 "
75	Hartwell	GA	34 ° 15 ' 00 "	82 ° 52 ' 30 "
76	Hartwell Dam	GA	34 ° 15 ' 00 "	82 ° 45 ' 00 "
77	Iva	SC	34 ° 15 ' 00 "	82 ° 37 ' 30 "
78	Antreville	SC	34 ° 15 ' 00 "	82 ° 30 ' 00 "
79	Due West	SC	34 ° 15 ' 00 "	82 ° 22 ' 30 "
80	Shoals Junction	SC	34 ° 15 ' 00 "	82 ° 15 ' 00 "
81	Cokesbury	SC	34 ° 15 ' 00 "	82 ° 07 ' 30 "
82	Waterloo	SC	34 ° 15 ' 00 "	82 ° 00 ' 00 "
83	Apple Valley	GA	34 ° 07 ' 30 "	83 ° 30 ' 00 "
84	Commerce	GA	34 ° 07 ' 30 "	83 ° 22 ' 30 "
85	Ila	GA	34 ° 07 ' 30 "	83 ° 15 ' 00 "
86	Danielsville North	GA	34 ° 07 ' 30 "	83 ° 07 ' 30 "
87	Bowman	GA	34 ° 07 ' 30 "	83 ° 00 ' 00 "
88	Dewy Rose	GA	34 ° 07 ' 30 "	82 ° 52 ' 30 "
89	Rock Branch	GA	34 ° 07 ' 30 "	82 ° 45 ' 00 "
90	Lowndesville	SC	34 ° 07 ' 30 "	82 ° 37 ' 30 "
91	Latimer	SC	34 ° 07 ' 30 "	82 ° 30 ' 00 "
92	Abbeville West	SC	34 ° 07 ' 30 "	82 ° 22 ' 30 "
93	Abbeville East	SC	34 ° 07 ' 30 "	82 ° 15 ' 00 "
94	Greenwood	SC	34 ° 07 ' 30 "	82 ° 07 ' 30 "
95	Ninety Six	SC	34 ° 07 ' 30 "	82 ° 00 ' 00 "
96	Dyson	SC	34 ° 07 ' 30 "	81 ° 52 ' 30 "
97	Nicholson	GA	34 ° 00 ' 00 "	83 ° 22 ' 30 "
98	Hull	GA	34 ° 00 ' 00 "	83 ° 15 ' 00 "
99	Danielsville South	GA	34 ° 00 ' 00 "	83 ° 07 ' 30 "
100	Carlton	GA	34 ° 00 ' 00 "	83 ° 00 ' 00 "
101	Elberton West	GA	34 ° 00 ' 00 "	82 ° 52 ' 30 "
102	Elberton East	GA	34 ° 00 ' 00 "	82 ° 45 ' 00 "
103	Heardmont	GA	34 ° 00 ' 00 "	82 ° 37 ' 30 "
104	Calhoun Falls	SC	34 ° 00 ' 00 "	82 ° 30 ' 00 "
105	Calhoun Creek	SC	34 ° 00 ' 00 "	82 ° 22 ' 30 "
106	Verdery	SC	34 ° 00 ' 00 "	82 ° 15 ' 00 "
107	Bradley	SC	34 ° 00 ' 00 "	82 ° 07 ' 30 "
108	Kirksey	SC	34 ° 00 ' 00 "	82 ° 00 ' 00 "
109	Good Hope	SC	34 ° 00 ' 00 "	81 ° 52 ' 30 "
110	Saluda North	SC	34 ° 00 ' 00 "	81 ° 45 ' 00 "
111	Athens East	GA	33 ° 52 ' 30 "	83 ° 15 ' 00 "
112	Crawford	GA	33 ° 52 ' 30 "	83 ° 07 ' 30 "
113	Sandy Cross	GA	33 ° 52 ' 30 "	83 ° 00 ' 00 "
114	Vesta	GA	33 ° 52 ' 30 "	82 ° 52 ' 30 "
115	Jacksons Crossroads	GA	33 ° 52 ' 30 "	82 ° 45 ' 00 "
116	Broad	GA	33 ° 52 ' 30 "	82 ° 37 ' 30 "
117	Chennault	GA	33 ° 52 ' 30 "	82 ° 30 ' 00 "
118	Willington	SC	33 ° 52 ' 30 "	82 ° 22 ' 30 "
119	McCormick	SC	33 ° 52 ' 30 "	82 ° 15 ' 00 "
120	Winterseat	SC	33 ° 52 ' 30 "	82 ° 07 ' 30 "

Table 2.3.1-3 (cont.) USGS 7.5-Minute Quadrangles for Savannah River Watershed

Map ID	7.5-minute Quadsheet Name	State	N. Latitude	W. Longitude
121	Limestone	SC	33 ° 52 ' 30 "	82 ° 00 ' 00 "
122	Owdoms	SC	33 ° 52 ' 30 "	81 ° 52 ' 30 "
123	Saluda South	SC	33 ° 52 ' 30 "	81 ° 45 ' 00 "
124	Maxeys	GA	33 ° 45 ' 00 "	83 ° 07 ' 30 "
125	Lexington	GA	33 ° 45 ' 00 "	83 ° 00 ' 00 "
126	Rayle	GA	33 ° 45 ' 00 "	82 ° 52 ' 30 "
127	Celeste	GA	33 ° 45 ' 00 "	82 ° 45 ' 00 "
128	Tignall	GA	33 ° 45 ' 00 "	82 ° 37 ' 30 "
129	Metasville	GA	33 ° 45 ' 00 "	82 ° 30 ' 00 "
130	Lincolnton	GA	33 ° 45 ' 00 "	82 ° 22 ' 30 "
131	Plum Branch	SC	33 ° 45 ' 00 "	82 ° 15 ' 00 "
132	Parksville	SC	33 ° 45 ' 00 "	82 ° 07 ' 30 "
133	Red Hill	SC	33 ° 45 ' 00 "	82 ° 00 ' 00 "
134	Edgefield	SC	33 ° 45 ' 00 "	81 ° 52 ' 30 "
135	Johnston	SC	33 ° 45 ' 00 "	81 ° 45 ' 00 "
136	Penfield	GA	33 ° 37 ' 30 "	83 ° 07 ' 30 "
137	Woodville	GA	33 ° 37 ' 30 "	83 ° 00 ' 00 "
138	Philomath	GA	33 ° 37 ' 30 "	82 ° 52 ' 30 "
139	Washington West	GA	33 ° 37 ' 30 "	82 ° 45 ' 00 "
140	Washington East	GA	33 ° 37 ' 30 "	82 ° 37 ' 30 "
141	Aonia	GA	33 ° 37 ' 30 "	82 ° 30 ' 00 "
142	Woodlawn	GA	33 ° 37 ' 30 "	82 ° 22 ' 30 "
143	Leah	GA	33 ° 37 ' 30 "	82 ° 15 ' 00 "
144	Clarks Hill	SC	33 ° 37 ' 30 "	82 ° 07 ' 30 "
145	Colliers	SC	33 ° 37 ' 30 "	82 ° 00 ' 00 "
146	Ropers Crossroads	SC	33 ° 37 ' 30 "	81 ° 52 ' 30 "
147	Trenton	SC	33 ° 37 ' 30 "	81 ° 45 ' 00 "
148	Aiken NW	SC	33 ° 37 ' 30 "	81 ° 37 ' 30 "
149	Union Point	GA	33 ° 30 ' 00 "	83 ° 00 ' 00 "
150	Crawfordville	GA	33 ° 30 ' 00 "	82 ° 52 ' 30 "
151	Sharon	GA	33 ° 30 ' 00 "	82 ° 45 ' 00 "
152	Cadley	GA	33 ° 30 ' 00 "	82 ° 37 ' 30 "
153	Wrightsboro	GA	33 ° 30 ' 00 "	82 ° 30 ' 00 "
154	Winfield	GA	33 ° 30 ' 00 "	82 ° 22 ' 30 "
155	Appling	GA	33 ° 30 ' 00 "	82 ° 15 ' 00 "
156	Evans	GA	33 ° 30 ' 00 "	82 ° 07 ' 30 "
157	Martinez	GA	33 ° 30 ' 00 "	82 ° 00 ' 00 "
158	North Augusta	SC	33 ° 30 ' 00 "	81 ° 52 ' 30 "
159	Graniteville	SC	33 ° 30 ' 00 "	81 ° 45 ' 00 "
160	Aiken	SC	33 ° 30 ' 00 "	81 ° 37 ' 30 "
161	Oakwood	SC	33 ° 30 ' 00 "	81 ° 30 ' 00 "
162	Sparta NE	GA	33 ° 22 ' 30 "	82 ° 45 ' 00 "
163	Warrenton	GA	33 ° 22 ' 30 "	82 ° 37 ' 30 "
164	Thomson West	GA	33 ° 22 ' 30 "	82 ° 30 ' 00 "
165	Thomson East	GA	33 ° 22 ' 30 "	82 ° 22 ' 30 "
166	Harlem	GA	33 ° 22 ' 30 "	82 ° 15 ' 00 "
167	Grovetown	GA	33 ° 22 ' 30 "	82 ° 07 ' 30 "
168	Augusta West	GA	33 ° 22 ' 30 "	82 ° 00 ' 00 "
169	Augusta East	GA	33 ° 22 ' 30 "	81 ° 52 ' 30 "
170	Hollow Creek	SC	33 ° 22 ' 30 "	81 ° 45 ' 00 "
171	New Ellenton	SC	33 ° 22 ' 30 "	81 ° 37 ' 30 "
172	Windsor	SC	33 ° 22 ' 30 "	81 ° 30 ' 00 "
173	Williston	SC	33 ° 22 ' 30 "	81 ° 22 ' 30 "
174	Bastonville	GA	33 ° 15 ' 00 "	82 ° 30 ' 00 "
175	Bowdens Pond	GA	33 ° 15 ' 00 "	82 ° 22 ' 30 "
176	Avondale	GA	33 ° 15 ' 00 "	82 ° 15 ' 00 "
177	Blythe	GA	33 ° 15 ' 00 "	82 ° 07 ' 30 "
178	Hephzibah	GA	33 ° 15 ' 00 "	82 ° 00 ' 00 "
179	Mechanic Hill	GA	33 ° 15 ' 00 "	81 ° 52 ' 30 "
180	Jackson	SC	33 ° 15 ' 00 "	81 ° 45 ' 00 "

Table 2.3.1-3 (cont.) USGS 7.5-Minute Quadrangles for Savannah River Watershed

Map ID	7.5-minute Quadsheet Name	State	N. Latitude	W. Longitude
181	New Ellenton SW	SC	33 ° 15 ' 00 "	81 ° 37 ' 30 "
182	New Ellenton SE	SC	33 ° 15 ' 00 "	81 ° 30 ' 00 "
183	Long Branch	SC	33 ° 15 ' 00 "	81 ° 22 ' 30 "
184	Wrens	GA	33 ° 07 ' 30 "	82 ° 22 ' 30 "
185	Matthews	GA	33 ° 07 ' 30 "	82 ° 15 ' 00 "
186	Keysville	GA	33 ° 07 ' 30 "	82 ° 07 ' 30 "
187	Storys Millpond	GA	33 ° 07 ' 30 "	82 ° 00 ' 00 "
188	McBean	GA	33 ° 07 ' 30 "	81 ° 52 ' 30 "
189	Shell Bluff Landing	GA	33 ° 07 ' 30 "	81 ° 45 ' 00 "
190	Girard NW	SC	33 ° 07 ' 30 "	81 ° 37 ' 30 "
191	Girard NE	SC	33 ° 07 ' 30 "	81 ° 30 ' 00 "
192	Snelling	SC	33 ° 07 ' 30 "	81 ° 22 ' 30 "
193	Barnwell	SC	33 ° 07 ' 30 "	81 ° 15 ' 00 "
194	Kellys Pond	GA	33 ° 00 ' 00 "	82 ° 15 ' 00 "
195	Gough	GA	33 ° 00 ' 00 "	82 ° 07 ' 30 "
196	Waynesboro	GA	33 ° 00 ' 00 "	82 ° 00 ' 00 "
197	Idlewood	GA	33 ° 00 ' 00 "	81 ° 52 ' 30 "
198	Alexander	GA	33 ° 00 ' 00 "	81 ° 45 ' 00 "
199	Girard	GA	33 ° 00 ' 00 "	81 ° 37 ' 30 "
200	Millett	SC	33 ° 00 ' 00 "	81 ° 30 ' 00 "
201	Martin	SC	33 ° 00 ' 00 "	81 ° 22 ' 30 "
202	Allendale	SC	33 ° 00 ' 00 "	81 ° 15 ' 00 "
203	Bellevue	GA	32 ° 52 ' 30 "	82 ° 00 ' 00 "
204	Perkins	GA	32 ° 52 ' 30 "	81 ° 52 ' 30 "
205	Sardis	GA	32 ° 52 ' 30 "	81 ° 45 ' 00 "
206	Hilltonia	GA	32 ° 52 ' 30 "	81 ° 37 ' 30 "
207	Burtons Ferry Landing	GA	32 ° 52 ' 30 "	81 ° 30 ' 00 "
208	Bull Pond	SC	32 ° 52 ' 30 "	81 ° 22 ' 30 "
209	Barton	SC	32 ° 52 ' 30 "	81 ° 15 ' 00 "
210	Bay Branch	GA	32 ° 45 ' 00 "	81 ° 45 ' 00 "
211	Sylvania North	GA	32 ° 45 ' 00 "	81 ° 37 ' 30 "
212	Jacksonboro Bridge	GA	32 ° 45 ' 00 "	81 ° 30 ' 00 "
213	Brier Creek Landing	GA	32 ° 45 ' 00 "	81 ° 22 ' 30 "
214	Solomons Crossroads	SC	32 ° 45 ' 00 "	81 ° 15 ' 00 "
215	Sylvania South	GA	32 ° 37 ' 30 "	81 ° 37 ' 30 "
216	Hunters	GA	32 ° 37 ' 30 "	81 ° 30 ' 00 "
217	Blue Springs Landing	GA	32 ° 37 ' 30 "	81 ° 22 ' 30 "
218	Shirley	SC	32 ° 37 ' 30 "	81 ° 15 ' 00 "
219	Furman	SC	32 ° 37 ' 30 "	81 ° 07 ' 30 "
220	Oliver	GA	32 ° 30 ' 00 "	81 ° 30 ' 00 "
221	Kildare	GA	32 ° 30 ' 00 "	81 ° 22 ' 30 "
222	Brighton	SC	32 ° 30 ' 00 "	81 ° 15 ' 00 "
223	Pineland	SC	32 ° 30 ' 00 "	81 ° 07 ' 30 "
224	Springfield North	GA	32 ° 22 ' 30 "	81 ° 15 ' 00 "
225	Hardeeville NW	SC	32 ° 22 ' 30 "	81 ° 07 ' 30 "

Source: Compiled from Data, ESRI 2004

Table 2.3.1-4 Approximate Lengths and Slopes of Local Streams

Map ID	Stream Identification	Approximate length, ft *	Upstream Elevation	Outfall Elevation	Approximate Slope
1	Unnamed creek at Hancock Landing to the Savannah River	7,000	163	85	0.0111
2	Unnamed tributary to Daniels Branch to Daniels Branch	6,000	190	105	0.0142
3	Red Branch to Daniels Branch	10,500	235	115	0.0114
4	Daniels Branch D/S of embankment dam to confluence with Red Br.	5,500	140	115	0.0045
5	Unnamed tributary to Beaverdam Creek	8,500	235	87	0.0174
6	Beaverdam Creek to Telfair Pond	13,500	100	85	0.0011
7	Beaverdam Creek, D/S of Telfair Pond to Savannah River	21,000	190	105	0.0040

* from outfall to end of longest tributary

Table 2.3.1-5 USGS Gage Data for the Savannah River

USGS Gage ID	Location on Savannah River	River Mile *	Coordinates		Gage datum, ft MSL **	Area drained, mi^2	Average daily flow series			Annual Peak flow series		
							Start	End	No.	Qp start	Qp end	No.
2187252	below Hartwell Lake nr Hartwell, GA	288.9	34°21'15" N,	82°48'55" W	470.00	2,090	10/1/1984	9/30/1999	4,502	1/21/1985	8/24/1999	15
2187500	near Iva, SC	280.4	34°15'20" N,	82°44'42" W	432.26	2,231	10/1/1950	9/30/1981	11,323	10/8/1949	7/24/1981	32
2189000	near Calhoun Falls, SC	263.6	34°04'15" N,	82°38'30" W	363.53	2,876	10/1/1896	9/30/1979	17,044	4/5/1897	3/28/1980	82
2195000	near Clarks Hill, SC	NR	33°38'40" N,	82°12'05" W	182.69	6,150	5/14/1940	6/30/1954	5,161	--	--	0
2196484	near North Augusta, SC	207.0	33°33'06" N,	82°02'19" W	150.00	7,150	10/1/1988	9/30/2002	5,113	9/21/1989	3/4/2002	13
2197000	at Augusta, GA	199.6	33°22'25" N,	81°56'35" W	96.58	7,508	10/1/1883	9/30/2003	35,793	1/17/1796	6/14/2004	133
2197320	near Jackson, SC	156.8	33°13'01" N,	81°46'04" W	77.00	8,110	10/1/1971	9/30/2002	10,733	1/21/1972	3/5/2002	30
2197500	at Burtons Ferry Bridge nr Millhaven, GA	118.7	32°56'20" N,	81°30'10" W	52.42	8,650	10/1/1939	9/30/2003	18,993	10/1/1929	3/21/2003	53
2198500	near Clyo, GA	60.9	32°31'41" N,	81°16'08" W	13.39	9,850	10/1/1929	9/30/2003	25,567	1/24/1925	3/3/2004	80

* River miles measured from the mouth of Savannah Harbor, as reported by USACE 1996.
** NGVD 1929

Source: Adapted from USGS 2006a

Table 2.3.1-6 Mean Daily Flows on the Savannah River at Augusta, Georgia

Day of month	Mean of daily mean values for this day for 98 years of record[1], in ft^3/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	10790	11320	17390	16289	10680	8129	7708	8359	8281	7717	5987	8172
2	11380	11860	15900	16230	10950	8078	8381	8139	8205	10460	6316	7694
3	11360	11960	14110	17210	10570	8107	7871	8541	7546	10080	6574	7651
4	12460	12860	13420	15820	10130	7917	7126	8446	7586	8478	6847	8232
5	13170	13380	14440	14099	9711	7943	7085	7901	7451	7249	6990	8680
6	12130	13339	14920	15170	9621	8233	7356	8065	7634	7143	6782	8617
7	11860	13850	15029	15920	9875	8760	7357	8125	7709	6793	6303	8444
8	12600	15250	15910	15740	10160	8985	7993	7921	7986	6526	6310	8281
9	12650	15590	16410	15490	10140	8532	8653	8440	7689	6696	6763	8289
10	12080	15459	16070	15120	10110	8316	8541	8329	8819	7243	6846	8670
11	11550	15330	14549	14560	9318	8103	7732	7352	9687	7243	6650	8512
12	11790	15190	13940	13650	8830	8026	7387	7287	7867	7047	6635	8372
13	12240	14620	14520	12780	8648	8111	7342	7680	6671	7058	6901	8580
14	11610	14330	14940	12730	8600	8570	7788	8807	6223	6582	7357	8793
15	11200	14090	14690	13110	8388	8829	7669	9442	6372	6121	7344	9559
16	10860	13469	15490	13619	8393	9036	7872	9381	6331	5916	7227	10260
17	11570	13880	15880	13450	8369	8825	7699	9570	6543	6188	7475	9995
18	12350	15020	14779	12270	7988	8540	7635	9034	7583	6975	7398	9486
19	13900	15020	13869	11650	7629	8056	7612	8447	7598	6931	7311	9025
20	15450	14170	14490	11670	8318	7589	7735	8776	6913	6854	7297	8854
21	14820	14130	15780	11620	9137	7369	7393	8078	6540	7215	6879	9797
22	12730	15110	16450	11370	9283	7657	7171	7790	6591	7233	6834	9845
23	11580	14790	16189	10830	9216	7228	6961	7473	6438	7373	6792	9854
24	11800	14010	16550	10380	8788	7318	6879	7321	6270	7584	7131	9289
25	11990	13780	15960	10060	8499	8373	7196	7213	6418	7035	7296	9232
26	12190	13880	15079	10500	7805	8399	7623	7367	6989	6491	7352	9595
27	11760	14160	15370	10500	7795	7699	7499	7301	8905	6709	7551	10100
28	11260	16089	15380	10190	7904	7406	7428	7615	8902	6778	7584	10090
29	11310	11980	15300	9767	7866	7209	7655	8207	7516	6342	7950	10160
30	11450		16800	10480	7794	7598	8445	8447	7140	6319	8448	11020
31	11250		16920		7823		8962	8352		6173		11100
1 -- Available period of record may be less than value shown for certain days of the year												

Source: USGS 2006c

Table 2.3.1-7 Mean Daily Flows on the Savannah River near Jackson, South Carolina

Day of month	Mean of daily mean values for this day for 31 years of record[1], in ft^3/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	8843	10990	10650	11520	9351	8778	8337	7511	7725	7052	7188	8115
2	9091	11140	11050	10540	8757	8383	7974	7581	7334	7079	7167	8850
3	9807	11920	11320	10560	8860	7941	7691	7778	7141	7541	7088	8730
4	9931	11990	11470	10660	8858	8393	7922	7877	7433	7708	7193	8524
5	9759	11430	12559	10900	9146	8316	7743	7420	7791	7885	7261	8674
6	9677	11560	12140	11150	8650	8323	8097	7441	7891	7779	7233	8840
7	9407	11650	12040	10630	8578	8328	8102	7409	7778	7589	7218	8908
8	9032	11730	12160	10290	7630	8169	7924	7463	7395	7581	7141	9053
9	9086	11620	12240	10180	7377	8247	7316	7566	7322	7791	7225	9121
10	9402	11830	12020	10470	8088	7944	7700	7752	7428	7937	7354	8978
11	9922	11430	11100	10920	7937	8374	7524	7465	7247	7994	7435	9219
12	10540	11980	11480	10510	8381	8175	7107	7766	7042	7991	7510	9271
13	10800	12060	11790	10360	8695	8682	7079	7695	7059	7850	7542	9356
14	10870	11850	11920	9937	8551	8554	7042	7798	7047	7693	7745	9084
15	10640	11930	11740	9614	8096	8441	7183	7859	7299	7367	8222	9007
16	10430	11840	11510	10490	8221	8061	7270	7835	7208	7330	8354	9235
17	10510	10920	11570	10510	8368	7730	7478	7945	7015	7739	7940	9326
18	10770	10540	11340	10150	8784	7774	7583	8110	6855	7308	7681	9248
19	11290	11110	10750	9529	9375	7715	7551	8038	6841	7717	7734	9064
20	11480	10840	10560	9320	8814	7670	7688	7437	6826	7695	7644	9841
21	11260	10200	10800	9484	8461	8276	7558	7482	6702	7905	7584	9628
22	11430	10260	10990	9388	8173	8800	7393	7431	7010	7758	7739	9536
23	11580	10760	10220	9379	8739	8878	7469	7361	7161	7848	8381	9469
24	11300	11080	9758	9780	9255	8404	7360	7312	7366	8257	8387	9350
25	11240	11250	10010	9456	9503	8230	7209	7335	7141	8340	8529	9362
26	10980	11090	11160	9380	9236	8154	7234	7284	7216	8108	8117	9653
27	10900	11380	11150	9780	9021	8113	7057	7332	7115	7974	7992	9524
28	11230	10990	10860	9542	8956	8240	6866	7430	6977	8022	7863	9155
29	10720	10540	11550	9237	9177	8481	6835	8035	7106	7759	8077	8781
30	10850		11950	9728	9396	8469	7195	7984	7017	7360	8527	8777
31	10870		11900		9236		7465	7957		7160		8816

1 -- Available period of record may be less than value shown for certain days of the year.

Source: USGS 2006d

Table 2.3.1-8 Mean Daily Flows on the Savannah River at Burtons Ferry

Day of month	Mean of daily mean values for this day for 52 years of record[1], in ft³/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	11640	11900	14530	16120	11670	8270	7836	7533	8094	6845	7130	8937
2	11370	12130	14499	16080	11890	8214	7980	7644	8149	6871	7009	9615
3	11430	12170	14549	15980	11930	8037	8060	7695	8228	6858	7056	9981
4	11910	12180	14720	15720	12160	7935	8041	7682	8357	6918	7115	9803
5	11980	12120	14829	15609	12410	7801	8040	7712	8495	6889	7252	9366
6	11760	11810	14840	15400	12360	7713	7950	7830	8406	6957	7376	9141
7	11410	11680	14850	15070	12120	7718	8050	7961	8309	6954	7402	8978
8	11230	11920	15160	14779	11940	7653	8087	8053	8129	6974	7470	8855
9	11120	12310	15659	14430	11780	7742	8060	8098	7913	7054	7448	8950
10	11510	12609	15920	14140	11660	7946	8133	8123	7887	7166	7363	9013
11	12070	12860	16480	14090	11650	8173	8250	8114	7852	7272	7351	9081
12	12220	13239	17170	14560	11620	8339	8346	7986	7718	7372	7425	9075
13	11970	13650	17390	15040	11490	8564	8400	7962	7743	7492	7330	9058
14	11700	14110	17120	15230	11300	8704	8333	7931	7677	7566	7299	9178
15	11650	14480	16650	15129	11110	8718	8310	7944	7562	7597	7443	9410
16	11760	14530	16310	14729	10880	8806	8327	8556	7498	7674	7685	9572
17	11740	14440	16120	14490	10610	8694	8304	9731	7277	7613	7674	9626
18	11730	14249	16050	14430	10290	8511	8376	10130	7150	7411	7548	9686
19	11840	14120	15900	14420	10050	8397	8615	9983	7060	7316	7639	9708
20	12220	14060	15790	14260	9678	8231	8642	9682	7006	7304	7758	9599
21	12680	14099	15960	14120	9302	8082	8769	9205	6937	7412	7778	9540
22	13339	14640	16260	13710	9030	8146	8665	8847	6899	7499	7781	9636
23	14080	15359	16460	13280	8872	8375	8532	8534	7032	7498	7776	9637
24	14240	15750	17200	13100	8857	8257	8510	8351	7109	7566	7873	9662
25	13940	15480	18060	12920	9013	7987	8231	8309	7194	7657	8028	9821
26	13410	15070	18340	12420	8956	8036	8057	8310	7155	7856	8088	10070
27	12910	14810	18150	12020	8702	8025	7911	8290	7161	8068	8070	10410
28	12400	14690	17620	11750	8601	7838	7647	8208	6929	8098	8036	10550
29	11770	15150	16870	11520	8470	7682	7516	8102	6723	8005	8162	10850
30	11450		16350	11510	8421	7723	7498	8116	6761	7699	8371	11320
31	11560		16180		8327		7573	8088		7339		11660
1 -- Available period of record may be less than value shown for certain days of the year												

Source: USGS 2006g

Table 2.3.1-9 Annual Mean Daily Flows on the Savannah River at Augusta, Georgia, and at Burtons Ferry Near Millhaven, Georgia

Year	Annual mean streamflow, in ft^3/s		Year	Annual mean streamflow, in ft^3/s		Year	Annual mean streamflow, in ft^3/s		Year	Annual mean streamflow, in ft^3/s	
	Augusta	Burtons F.		Augusta	Burtons F.		Augusta	Burtons F.		Augusta	Burtons F.
1884	10,630	--	**1931**	6,806	--	**1955**	5,367	5,974	**1979**	11,710	--
1885	9,642	--	**1932**	11,990	--	**1956**	5,550	6,309	**1980**	11,670	--
1886	12,620	--	**1933**	7,461	--	**1957**	7,645	8,312	**1981**	5,921	--
1887	9,718	--	**1934**	8,112	--	**1958**	10,300	11,040	**1982**	7,409	--
1888	16,780	--	**1935**	7,492	--	**1959**	8,569	9,748	**1983**	10,990	--
1889	12,700	--	**1936**	17,100	--	**1960**	11,110	13,110	**1984**	11,220	12,760
1890	8,665	--	**1937**	12,800	--	**1961**	9,349	10,910	**1985**	6,556	7,167
1891	14,050	--	**1938**	7,671	--	**1962**	8,746	10,580	**1986**	5,803	6,175
1896	7,802	--	**1939**	9,298	--	**1963**	10,020	11,140	**1987**	8,203	8,955
1897	9,730	--	**1940**	8,898	9,607	**1964**	18,530	20,500	**1988**	4,888	5,367
1898	9,894	--	**1941**	6,765	7,546	**1965**	10,800	12,780	**1989**	7,153	7,966
1899	11,270	--	**1942**	8,982	10,010	**1966**	9,398	11,180	**1990**	10,630	11,860
1900	12,310	--	**1943**	10,820	12,490	**1967**	9,152	10,570	**1991**	10,010	11,670
1901	16,430	--	**1944**	10,360	11,750	**1968**	8,281	9,624	**1992**	10,510	11,860
1902	12,290	--	**1945**	7,930	8,301	**1969**	9,821	10,950	**1993**	12,160	14,449
1903	13,530	--	**1946**	11,070	12,470	**1970**	6,967	12,350	**1994**	10,220	11,800
1904	5,528	--	**1947**	10,360	11,770	**1971**	9,479	--	**1995**	11,340	12,770
1905	8,676	--	**1948**	14,099	15,640	**1972**	9,957	--	**1996**	10,120	11,440
1906	15,840	--	**1949**	13,890	15,459	**1973**	12,740	--	**1997**	9,270	10,440
1925	7,892	--	**1950**	7,691	8,764	**1974**	9,840	--	**1998**	13,669	16,020
1926	7,743	--	**1951**	6,222	7,010	**1975**	13,590	--	**1999**	5,409	6,320
1927	6,219	--	**1952**	8,221	9,328	**1976**	12,290	--	**2000**	4,729	5,451
1928	11,210	--	**1953**	7,372	8,622	**1977**	10,320	--	**2001**	4,827	5,772
1929	21,130	--	**1954**	6,944	7,382	**1978**	9,336	--	**2002**	4,419	5,168

Source: USGS 2006c; USGS 2006g

Table 2.3.1-10 Mean Monthly Stream Flow on the Savannah River near Jackson, South Carolina

YEAR	Monthly mean streamflow, in ft^3/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1971	*	*	*	*	*	*	*	*	*	6,973	7,280	13,969
1972	*	16,350	8,499	7,641	9,220	9,777	9,149	7,106	6,868	6,682	6,765	11,710
1973	14,810	18,670		*	11,180		9,275	8,005	6,852	6,695	6,692	8,437
1974	16,960	*	9,538	*	8,120	7,244	7,295	8,364	7,554	7,206	7,250	7,406
1975	12,839	*	*	*	13,930	9,854	8,653	7,502	8,194	11,750	14,570	13,590
1976	13,230	11,640	*	*	*	*	*	7,396	7,692	9,382	9,967	*
1977	14,870	9,364	13,760	*	8,704	7,573	7,368	7,276	7,133	7,249	12,910	13,020
1978	*	*	11,110	8,677	13,289	9,101	6,879	6,830	6,524	6,180	6,461	6,387
1979	6,737	*	*	*	*	16,820	8,685	8,529	7,794	8,745	11,460	12,550
1980	*	*	*	*	11,090	13,030	7,822	7,242	7,073	6,927	7,208	6,655
1981	6,803	7,836	6,898	6,641	5,679	6,710	5,465	5,689	5,656	5,071	4,563	5,734
1982	10,120	11,570	8,308	8,070	6,393	5,926	5,900	5,959	6,669	6,714	6,016	8,753
1983	14,779	*	*		9,075	10,500	6,951	6,627	6,701	6,136	5,798	9,127
1984	12,950	14,240	*	14,560	*	8,859	8,265	*	7,655	6,500	6,451	6,084
1985	6,482	13,260	7,478	6,283	5,568	5,351	5,820	5,725	5,486	6,521	6,876	6,694
1986	7,601	7,170	6,904	5,750	5,403	5,739	5,869	6,354	5,555	4,859	4,582	5,986
1987	9,399	11,590	*	11,010	5,896	5,434	6,221	8,941	9,859	7,552	6,455	5,816
1988	6,160	6,193	5,728	5,461	4,720	4,560	4,530	4,628	5,423	5,487	4,958	4,750
1989	5,162	5,833	6,983	6,701	5,123	5,334	6,739	5,978	8,670	14,280	6,924	16,880
1990	11,380	*	*	9,043	11,950	6,817	6,401	8,358	7,180	*	7,105	7,033
1991	8,097	10,170	*	13,160	*	9,750	11,430	16,510	7,645	6,621	7,560	7,410
1992	8,793	8,283	12,910	10,080	5,990	8,673	7,509	8,723	7,806	12,630	*	*
1993	*	*	*	*	9,660	8,632	7,620	7,573	6,437	6,147	6,498	6,624
1994	8,413	8,672	10,990	10,070	6,594	7,270	*	*	11,270	*	12,860	15,430
1995	15,210	*	*	8,012	6,330	6,937	7,422	9,027	10,630	11,290	*	14,140
1996	9,469	*	*	11,820	9,943	10,710	7,407	8,096	8,050	8,769	5,634	7,684
1997	11,790	14,850	*	11,160	11,490	9,784	8,263	9,418	6,090	7,312	7,570	12,210
1998	*	*	*	*	*	8,659	7,476	7,018	8,901	7,826	7,416	6,787
1999	7,096	9,446	7,075	6,901	5,789	5,672	6,427	6,761	6,528	5,088	4,600	4,583
2000	6,505	5,637	5,746	4,883	4,680	4,990	4,901	5,659	6,342	5,041	4,956	5,128
2001	5,531	5,637	8,030	5,830	4,837	5,968	5,169	5,094	4,763	4,659	4,744	5,000
2002	5,110	5,306	5,355	5,185	4,575	4,388	4,441	4,462	4,711	*	*	*
Mean of monthly stream flows	9,858	10,090	8,457	8,426	7,893	7,933	7,080	7,409	7,216	7,458	7,315	8,813

* inidcates a month for which no value is reported by the USGS due to insufficient number of daily readings for meaningful average

Source: USGS 2006d

Table 2.3.1-11 Mean Monthly Stream Flow on the Savannah River at Augusta, Georgia

YEAR	Monthly mean streamflow, in ft^3/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1883										2,611	3,901	4,263
1884	10,570	13,300	33,180	18,100	6,536	14,979	8,337	4,618	2,698	2,370	2,903	9,979
1885	21,820	15,800	8,516	5,878	7,036	6,463	3,888	3,929	7,793	11,730	11,970	11,270
1886	23,720	9,367	13,100	21,560	19,570	16,580	19,230	7,259	5,363	3,283	5,261	6,784
1887	6,128	13,080	9,900	5,387	4,645	6,398	12,450	35,030	4,957	5,570	4,305	8,510
1888	16,940	19,880	24,650	14,740	13,790	8,493	5,256	6,097	47,850	12,250	19,510	12,850
1889	26,570	30,840	15,830	10,650	6,219	7,451	10,750	15,509	9,469	4,975	10,060	5,443
1890	5,137	9,023	12,340	7,661	9,608	5,491	8,192	6,002	8,249	19,540	5,429	7,080
1891	14,660	34,300	43,060	17,650	8,755	8,647	6,534	13,669	5,622	3,520	5,951	7,591
1896	11,260	16,820	7,005	5,298	4,907	3,951	16,800	3,431	3,403	2,792	7,904	10,290
1897	9,167	24,470	20,200	18,630	7,516	5,538	7,301	8,177	4,100	3,741	3,857	5,265
1898	6,519	4,929	6,298	11,710	4,415	3,574	11,160	13,440	21,490	14,520	10,130	10,300
1899	16,020	34,870	24,790	14,380	7,638	6,090	5,145	5,128	5,554	5,608	4,808	7,045
1900	7,262	26,240	18,330	20,090	9,265	22,700	9,589	5,775	6,197	6,681	7,432	9,705
1901	14,280	16,560	15,140	25,380	15,340	19,570	8,979	26,260	20,570	9,170	7,547	18,570
1902	11,690	27,600	36,000	13,460	8,394	7,487	5,525	5,843	7,460	6,423	5,850	12,700
1903	10,590	39,560	32,930	19,900	10,040	17,280	7,275	8,195	5,316	4,179	4,979	4,405
1904	5,585	9,206	8,579	5,512	4,292	4,088	3,769	11,700	3,795	2,079	3,015	4,772
1905	7,073	18,780	7,274	5,416	9,759	4,704	12,609	7,745	4,218	3,916	3,789	19,270
1906	28,670	10,650	23,290	10,760	8,022	16,100	19,480	16,180	19,620	18,140	8,824	9,576
1925	40,410	10,240	8,892	7,369	5,211	3,258	3,001	1,706	1,453	2,656	5,757	4,540
1926	12,960	16,330	11,920	11,930	3,985	3,434	4,958	6,858	3,992	3,118	5,437	8,611
1927	5,840	10,400	10,340	5,845	3,427	5,613	9,276	3,569	2,727	2,625	3,121	12,010
1928	6,566	9,379	9,545	13,289	13,339	8,328	10,060	29,970	14,470	7,495	6,317	5,538
1929	8,176	22,690	52,440	14,870	20,670	10,350	8,318	5,870	35,850	42,170	16,990	15,110
1930	13,400	12,010	12,010	8,906	7,296	5,588	4,806	3,645	4,511	3,348	7,627	8,795
1931	9,933	6,967	8,287	10,780	9,360	3,794	4,720	4,304	2,501	2,399	2,614	15,790
1932	20,430	17,890	12,260	9,640	7,203	10,600	4,157	9,261	3,409	11,020	10,510	27,389
1933	14,860	19,910	9,088	8,305	6,966	5,020	5,124	4,611	5,284	3,385	3,580	4,355
1934	5,286	6,111	15,430	7,816	8,017	15,900	6,368	5,920	4,748	10,580	4,387	6,586
1935	11,620	8,819	12,130	10,510	6,963	4,361	6,805	6,899	6,247	2,923	7,043	5,656
1936	40,960	23,470	16,640	58,700	7,889	5,766	4,322	6,857	4,024	18,750	5,770	12,620
1937	31,619	23,180	13,610	18,320	13,710	7,244	5,518	8,195	6,793	13,270	6,245	6,427
1938	6,468	4,812	8,597	19,680	6,218	8,517	13,919	7,191	3,978	3,010	4,387	5,190
1939	6,503	25,090	22,400	10,740	8,399	6,032	5,860	11,830	4,927	3,412	3,192	4,304
1940	8,433	13,890	10,150	8,762	4,497	4,436	4,571	27,130	8,205	2,682	6,602	7,500
1941	8,308	5,188	10,730	7,052	3,615	6,138	15,870	5,322	2,735	2,325	2,673	10,800
1942	7,382	13,650	26,590	8,490	8,897	5,832	5,784	7,266	5,046	4,072	4,472	10,360
1943	26,329	14,670	19,380	14,610	8,975	6,725	13,619	6,219	4,932	3,662	4,528	6,157
1944	10,460	18,720	33,670	20,620	9,586	5,936	4,745	4,493	3,701	3,953	4,066	4,671
1945	5,802	13,400	9,961	12,720	6,855	4,507	5,182	5,008	7,770	3,897	4,527	15,989
1946	26,179	21,370	16,560	15,740	13,080	7,316	5,522	5,368	3,906	7,506	5,844	5,093
1947	21,560	8,909	16,070	14,610	6,030	5,870	4,366	4,336	3,248	4,887	20,450	13,969
1948	11,310	29,049	24,120	17,220	8,419	6,631	10,330	8,349	6,834	4,791	21,250	21,670
1949	17,920	25,140	12,860	14,549	18,670	11,900	14,190	11,800	13,080	9,557	9,393	8,433
1950	9,481	8,759	11,570	7,607	5,907	7,448	6,916	4,358	8,250	8,541	5,165	8,319
1951	6,581	7,451	9,764	11,440	6,580	5,963	4,570	3,464	3,389	2,728	4,196	8,662
1952	8,654	5,842	29,080	21,820	6,782	4,342	3,627	3,889	3,332	3,385	4,017	3,751
1953	4,084	5,889	11,390	6,460	15,150	5,778	5,750	5,696	7,231	7,171	6,498	7,115
1954	7,247	7,269	9,420	11,460	7,306	6,575	6,230	5,677	5,584	5,818	5,846	4,982
1955	4,600	5,278	5,767	7,119	5,804	5,227	5,205	5,225	4,995	4,976	5,076	5,150
1956	4,418	4,861	5,668	6,171	6,031	5,425	5,266	5,547	6,189	5,437	5,622	5,961
1957	6,105	5,988	6,772	8,225	9,802	6,138	6,143	6,171	6,452	7,347	9,310	13,130
1958	12,780	14,030	15,120	23,520	12,260	6,609	8,796	7,835	5,879	5,722	5,675	5,763
1959	6,026	7,395	7,322	6,721	5,780	13,060	6,613	7,070	8,559	12,680	12,400	9,298
1960	15,070	28,480	18,660	18,020	9,029	6,267	6,414	7,344	6,538	6,514	5,867	5,943
1961	6,198	9,951	11,980	21,770	7,425	6,783	8,840	7,700	7,835	5,679	5,537	12,700
1962	14,960	9,978	13,180	15,420	7,963	8,189	5,676	5,992	6,050	5,960	5,852	5,865

Table 2.3.1-11 (cont.) Mean Monthly Stream Flow on the Savannah River at Augusta, Georgia

YEAR	Monthly mean streamflow, in ft³/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1963	9,178	9,885	18,450	7,675	14,900	10,090	11,220	7,875	7,488	6,559	6,826	9,818
1964	16,360	16,720	27,510	43,850	27,050	7,143	10,970	11,900	14,480	17,740	10,950	17,670
1965	17,610	10,120	17,450	16,370	9,574	12,760	7,652	9,027	7,959	7,057	6,958	7,060
1966	8,783	13,610	23,610	7,201	10,480	9,031	6,830	6,731	6,896	6,478	6,478	6,795
1967	8,718	8,439	9,228	6,870	7,036	14,440	8,713	8,625	8,740	6,286	7,593	15,100
1968	18,440	7,175	7,199	7,554	7,620	9,607	7,366	7,500	6,808	6,649	6,834	6,469
1969	10,210	13,590	11,350	20,800	13,680	7,370	6,942	7,128	7,177	6,602	6,586	6,867
1970	6,945	7,093	8,552	8,093	6,582	6,548	7,059	6,889	6,562	6,460	6,283	6,536
1971	7,151	7,314	21,580	8,658	9,374	7,339	7,248	8,471	7,306	7,198	7,504	14,160
1972	19,250	16,160	8,569	7,737	9,347	10,390	8,429	7,129	7,078	6,581	6,385	12,550
1973	15,260	19,080	18,180	25,620	11,030	22,830	7,906	7,469	6,344	6,076	6,153	7,845
1974	16,160	22,350	8,762	13,900	7,865	7,093	7,302	8,181	7,238	6,451	6,814	7,044
1975	12,170	18,140	28,490	21,380	13,430	9,235	8,231	7,546	7,882	11,100	13,139	12,680
1976	12,250	10,410	16,750	12,600	11,120	16,940	13,200	7,379	7,612	8,880	9,583	20,530
1977	13,210	8,924	13,020	20,180	8,396	7,745	7,612	7,235	6,909	7,045	11,940	11,610
1978	16,300	17,990	9,746	8,012	12,070	8,532	7,082	6,833	6,694	6,470	6,435	6,452
1979	6,821	11,040	18,690	24,720	11,800	14,449	7,629	7,778	7,317	8,491	10,800	11,300
1980	13,160	12,520	23,610	26,750	10,610	11,590	7,720	7,196	7,094	6,535	6,916	6,560
1981	6,670	7,211	6,390	6,179	5,691	6,203	5,587	5,667	5,840	5,294	4,624	5,794
1982	9,346	11,620	7,779	8,098	6,104	5,985	5,931	5,988	6,855	6,697	5,975	8,855
1983	13,780	17,210	17,230	26,210	8,244	9,724	6,489	6,573	6,467	6,067	5,534	9,062
1984	12,780	14,160	19,060	14,190	17,040	8,252	8,120	15,570	7,367	6,239	6,014	5,789
1985	6,252	12,360	7,050	6,133	5,515	5,256	5,715	5,678	5,575	6,581	6,636	6,402
1986	7,461	6,609	6,534	5,557	5,479	5,834	5,954	6,092	5,516	4,514	4,561	5,546
1987	8,365	10,660	15,290	9,937	5,639	5,353	6,136	8,671	9,440	7,036	6,284	5,804
1988	5,998	6,082	5,637	5,172	4,476	4,271	4,219	4,320	4,847	4,939	4,442	4,305
1989	4,734	5,290	6,149	5,794	4,672	4,810	6,001	5,541	7,814	13,150	5,977	15,590
1990	10,120	21,640	25,100	7,892	11,580	6,450	6,546	8,340	6,825	10,580	6,433	6,596
1991	7,422	9,371	12,310	11,570	16,830	9,222	10,900	14,810	6,983	6,353	7,201	6,881
1992	7,825	7,483	12,030	8,722	5,664	8,098	6,524	8,050	7,050	11,240	15,880	27,270
1993	30,240	22,920	22,910	19,040	8,241	7,644	6,938	6,885	5,553	5,223	5,363	5,657
1994	7,362	7,544	9,658	8,775	5,779	7,576	12,050	15,820	9,531	13,460	11,280	13,450
1995	13,930	19,020	18,980	7,388	5,897	6,127	6,843	8,000	9,342	9,907	18,610	12,630
1996	9,627	24,210	23,460	9,290	7,935	8,307	5,220	6,047	6,986	8,204	5,455	7,270
1997	10,640	13,860	14,960	9,127	9,117	8,644	7,325	8,489	5,306	6,430	6,491	11,050
1998	21,530	30,600	24,960	22,460	19,020	7,571	6,768	6,522	7,651	6,566	6,183	5,535
1999	5,669	7,711	5,704	5,620	4,735	4,878	5,499	6,173	5,812	4,764	4,288	4,239
2000	5,921	4,882	5,014	4,371	4,089	4,269	4,359	5,180	5,661	4,387	4,196	4,416
2001	4,853	4,908	7,038	4,764	4,037	5,160	4,564	4,589	4,284	4,436	4,527	4,749
2002	4,690	4,774	4,687	4,641	4,250	4,139	4,246	4,204	4,318	3,973	4,304	4,824
2003	4,126	5,548	17,820	13,660	19,060	14,199	16,850	10,420	5,514			
Mean of monthly stream flows	12,100	14,120	15,370	13,080	8,979	8,098	7,669	8,168	7,413	7,115	7,038	9,170
Mean from 1984 to 2003	9,477	11,982	13,218	9,205	8,453	6,803	7,039	7,970	6,569	7,262	7,059	8,316

Source: USGS 2006c

Table 2.3.1-12 Mean Monthly Stream Flow on the Savannah River at Burtons Ferry Near Millhaven, Georgia

YEAR	Monthly mean streamflow, in ft^3/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1939										4,182	3,807	4,792
1940	9,086	14,790	10,680	9,345	5,114	5,071	5,078	28,040	9,677	3,573	6,783	8,139
1941	9,548	6,139	9,687	9,919	4,192	5,262	19,400	6,375	3,597	2,984	3,284	9,764
1942	11,030	14,670	28,120	11,900	9,450	7,007	6,498	7,473	5,739	4,945	5,249	8,129
1943	27,530	21,820	21,240	16,320	10,740	7,371	15,380	7,433	5,931	4,566	5,540	6,401
1944	12,630	18,780	33,880	25,430	13,270	6,894	5,651	5,308	4,576	4,602	4,332	5,919
1945	6,787	12,290	11,690	10,270	11,840	5,172	5,405	6,006	8,201	4,877	5,024	12,300
1946	33,190	22,330	16,690	19,180	14,099	8,167	6,172	5,966	4,574	8,020	6,210	5,573
1947	21,510	10,480	17,680	16,660	7,625	7,618	5,541	5,497	4,479	5,954	22,070	16,130
1948	12,860	30,440	26,710	21,570	9,045	8,674	10,430	9,177	7,979	6,818	12,150	32,410
1949	21,650	26,870	14,970	15,759	20,630	13,050	15,050	12,100	16,100	10,510	10,470	9,305
1950	11,070	10,450	12,580	9,574	6,944	8,663	7,730	5,608	8,917	8,696	6,109	8,939
1951	7,864	8,425	10,550	12,730	7,483	6,615	5,233	4,147	3,861	3,598	5,094	8,658
1952	9,916	7,315	28,710	26,620	8,169	4,705	4,178	4,628	4,091	4,074	4,813	4,677
1953	5,649	7,137	13,350	8,969	16,640	6,878	6,571	6,314	8,058	7,910	7,320	8,412
1954	8,609	8,011	9,425	12,670	7,786	6,591	6,422	5,844	5,742	5,880	6,198	5,524
1955	5,594	6,256	6,401	8,094	6,331	5,648	5,604	5,629	5,523	5,233	5,578	5,859
1956	5,067	6,192	7,342	7,745	7,098	5,941	5,531	5,890	6,665	5,842	5,887	6,528
1957	6,522	6,820	7,753	8,958	10,450	7,000	6,497	6,433	7,137	8,660	8,769	14,560
1958	13,660	15,270	16,660	24,310	13,980	7,559	9,066	8,178	5,881	5,810	6,080	6,394
1959	6,972	9,057	8,823	7,846	6,365	13,990	7,128	7,198	9,130	14,240	15,650	10,760
1960	15,609	32,429	24,520	23,490	11,250	7,593	7,534	8,249	7,261	7,252	6,478	6,685
1961	7,255	9,672	16,130	24,200	10,900	7,413	10,650	8,817	9,717	6,181	6,540	13,440
1962	18,760	11,860	17,820	18,270	9,399	9,320	6,808	6,866	6,834	6,812	7,032	7,275
1963	10,640	11,920	17,980	10,670	15,480	10,130	13,260	8,787	8,462	7,695	7,566	10,890
1964	17,850	20,040	27,080	46,240	29,980	8,418	11,140	13,310	20,010	20,150	14,240	17,700
1965	21,180	12,770	19,010	21,870	11,770	13,640	9,797	10,580	8,836	8,121	7,934	7,940
1966	10,130	13,289	30,180	9,741	12,850	11,030	8,041	7,988	7,776	7,530	7,543	7,920
1967	10,460	9,752	11,230	8,155	8,282	15,960	10,530	9,677	10,580	7,252	8,632	16,320
1968	22,200	10,070	8,643	8,535	8,479	10,500	8,075	8,093	7,524	7,459	7,937	7,870
1969	10,500	17,050	12,709	18,970	17,910	8,366	7,751	7,910	8,092	7,342	7,433	7,864
1970	7,954	8,308	9,695	10,070	7,660	7,457	7,685	7,794	7,268			
1982										7,158	6,356	8,959
1983	15,609	19,670	20,720	29,540	9,621	10,460	7,268	6,929	7,027	6,408	6,150	9,597
1984	13,780	14,950	23,540	15,580	21,300	9,361	8,470	17,810	7,924	6,848	6,770	6,551
1985	6,987	13,719	7,813	6,530	5,873	5,779	6,156	6,098	5,658	6,413	7,681	7,830
1986	8,158	8,178	7,887	5,915	5,481	5,953	5,649	6,153	5,558	4,657	4,529	6,087
1987	9,893	11,700	17,780	11,650	6,246	5,639	6,298	8,660	9,573	7,495	6,596	6,117
1988	6,502	6,516	6,089	5,886	4,994	4,856	4,510	4,484	5,469	5,336	4,981	4,839
1989	5,419	5,785	7,108	6,855	5,053	5,296	6,717	5,694	8,867	14,800	6,450	17,200
1990	11,560	20,770	30,240	10,620	12,310	7,526	6,788	8,535	7,623	12,690	7,136	6,860
1991	8,217	10,760	14,929	14,560	19,830	10,210	11,810	19,220	8,322	6,619	7,845	7,503
1992	9,016	8,560	13,230	11,120	6,385	9,812	8,122	9,026	7,731	13,210	14,380	31,390
1993	35,290	28,220	27,389	26,000	9,788	8,379	7,016	6,858	6,259	5,993	6,632	6,627
1994	8,378	9,021	11,290	10,420	6,387	6,717	15,709	16,010	12,420	15,509	13,010	16,260
1995	16,550	19,080	24,640	8,388	6,253	7,288	7,138	8,834	10,290	10,780	18,210	16,150
1996	9,575	26,379	25,450	13,630	9,622	10,380	6,764	7,482	7,518	8,511	5,336	7,262
1997	11,510	14,610	19,350	10,360	11,250	9,212	7,737	8,795	5,654	6,932	7,497	12,500
1998	24,510	33,880	31,310	27,200	24,420	8,671	7,436	6,903	8,613	7,375	6,929	6,350
1999	6,745	9,690	6,946	6,653	5,536	5,325	6,420	6,431	6,418	5,685	5,119	5,148
2000	7,143	6,080	6,029	4,849	4,514	4,786	4,718	5,268	6,258	5,096	5,205	5,480
2001	5,961	5,806	7,900	6,501	5,319	6,313	5,645	5,445	5,256	4,935	4,984	5,204
2002	5,517	5,870	5,687	5,734	4,881	4,700	4,746	4,718	4,573	4,577	5,197	5,868
2003	5,224	6,419	18,730	16,410	19,140	19,110	19,510	13,320	7,211			
Mean monthly flow	12,131	13,584	16,192	14,202	10,489	8,144	8,163	8,346	7,547	7,381	7,591	9,670
Mean from 1984 to 2003	10,797	13,300	15,667	11,243	9,729	7,766	7,868	8,787	7,360	8,077	7,605	9,538

Source: USGS 2006g

Table 2.3.1-13 Average Daily Flows by Month for Three Gages on the Savannah River for Entire Record Length and Common Period of Complete Regulation

	Augusta 1884-2003	Augusta 1984-2002	Jackson 1971-2002	Jackson 1984-2002	Burtons Ferry 1939-2003	Burtons Ferry 1984-2002
Jan	12,101	9,759	9,858	8,538	12,131	10,304
Feb	14,122	12,320	10,086	9,021	13,584	14,202
Mar	15,370	12,975	8,457	7,720	16,192	16,227
Apr	13,077	8,971	8,426	8,583	14,202	11,081
May	8,979	7,894	7,893	6,784	10,489	10,104
Jun	8,098	6,414	7,933	7,028	8,144	8,421
Jul	7,669	6,522	7,081	6,773	8,163	7,790
Aug	8,168	7,841	7,409	7,549	8,346	7,466
Sep	7,413	6,624	7,216	7,316	7,547	6,866
Oct	7,115	7,262	7,458	7,536	7,381	6,736
Nov	7,038	7,059	7,315	6,574	7,591	7,310
Dec	9,170	8,316	8,813	8,132	9,670	7,995

Table 2.3.1-14 N-Day Low Flow Values for the Savannah River at Augusta, Georgia

Year	N-day Low Flow Values from SWSTAT for USGS Gage 02197000							
	3-day	7-day	10-day	30-day	60-day	90-day	183-day	365-day
1885	2060. 11	2160. 9	2230. 9	2330. 6	2430. 4	2620. 4	4780. 17	9670. 51
1886	2510. 22	2710. 21	2890. 22	3710. 26	3810. 23	4140. 21	5820. 38	9700. 53
1887	3050. 32	3080. 28	3150. 27	3230. 19	3520. 15	4420. 27	5580. 34	11100. 68
1888	2890. 27	3050. 27	3160. 28	3840. 30	4720. 41	4780. 32	8550. 83	12200. 80
1889	3530. 36	4070. 45	4460. 52	5100. 53	5430. 49	6180. 68	14900. 94	17700. 94
1890	3960. 50	4010. 43	4120. 44	4780. 48	5200. 45	5960. 58	7100. 67	8910. 43
1891	2890. 28	3110. 29	3550. 33	4300. 42	6210. 74	6370. 70	7540. 77	14000. 87
1897	2070. 13	2210. 10	2300. 10	2580. 7	3100. 9	3130. 7	5540. 31	9310. 47
1898	2350. 20	2440. 14	2560. 16	3330. 21	3550. 17	3740. 17	4720. 15	6830. 19
1899	2340. 19	2420. 13	2510. 13	3150. 17	3620. 18	5210. 41	10800. 91	14600. 89
1900	2800. 24	3000. 25	3140. 26	3770. 29	4570. 37	4880. 37	5300. 24	9320. 48
1901	4040. 52	4110. 47	4370. 50	4810. 49	5590. 54	6070. 62	7500. 75	11900. 76
1902	5750. 80	6400. 89	7210. 93	7530. 95	7700. 94	9280. 94	14000. 93	18800. 95
1903	3920. 48	4280. 52	4450. 51	4870. 50	5650. 56	5790. 52	6330. 49	12800. 85
1904	3630. 38	3640. 35	3660. 35	4150. 37	4380. 34	4440. 28	5190. 23	8600. 35
1905	1740. 6	1880. 3	1850. 3	2060. 2	2420. 3	2780. 6	4670. 14	6270. 12
1906	2860. 26	3020. 26	3090. 24	3550. 22	3740. 22	3880. 18	6170. 44	11200. 69
1926	1140. 1	1170. 1	1180. 1	1300. 1	1510. 1	1640. 1	2850. 1	6290. 13
1927	1720. 5	1960. 5	1900. 4	2680. 10	2940. 7	3430. 9	4240. 6	6550. 15
1928	1220. 2	1360. 2	1420. 2	2100. 3	2440. 5	2620. 5	4420. 9	6130. 9
1929	4160. 53	5060. 64	4950. 61	5470. 63	5790. 63	6410. 71	9380. 88	16000. 91
1930	3980. 51	4210. 50	4220. 47	5110. 55	6140. 73	7470. 89	15900. 95	17300. 93
1931	2120. 14	2540. 17	2530. 15	2900. 13	3730. 21	3650. 13	4630. 12	6640. 17
1932	1420. 3	1920. 4	2010. 6	2170. 4	2360. 2	2500. 2	3370. 2	8880. 42
1933	2040. 10	2360. 11	2340. 11	3150. 16	3990. 24	5530. 45	6730. 59	11400. 70
1934	2230. 16	2640. 18	2610. 17	2980. 14	3330. 13	3500. 12	4380. 8	6130. 8
1935	2840. 25	3620. 34	3460. 32	4220. 40	4940. 42	5660. 47	6330. 50	8580. 34
1936	1930. 8	2500. 16	2470. 12	2840. 11	3640. 19	4790. 34	5480. 29	11500. 71
1937	2920. 29	3150. 30	3280. 30	4020. 33	5020. 43	5100. 40	7610. 80	16000. 90
1938	3610. 37	3770. 38	3820. 38	4690. 47	5130. 44	5780. 51	7020. 64	8820. 41
1939	2180. 15	2680. 19	2630. 18	2890. 12	3280. 11	3690. 15	5020. 20	10400. 59
1940	2270. 17	2860. 23	2860. 20	3080. 15	3150. 10	3480. 11	5500. 30	7500. 22
1941	1980. 9	2110. 8	2200. 8	2670. 9	3290. 12	4150. 22	5850. 39	8260. 29
1942	1690. 4	2010. 6	1980. 5	2300. 5	2470. 6	2540. 3	5160. 22	8680. 37
1943	2930. 30	3000. 24	3090. 25	3730. 27	4080. 28	4440. 29	5400. 28	10100. 56
1944	3130. 34	3340. 32	3350. 31	3560. 23	4060. 26	4020. 19	5810. 37	10900. 66
1945	2960. 31	3260. 31	3270. 29	3560. 24	3680. 20	3700. 16	4280. 7	7520. 23
1946	2540. 23	2850. 22	3070. 23	3770. 28	4120. 30	4650. 30	5110. 21	10800. 63
1947	2060. 12	2490. 15	2880. 21	3630. 25	4010. 25	4670. 31	5550. 32	9680. 52
1948	2280. 18	2400. 12	2510. 14	3190. 18	3530. 16	3670. 14	4750. 16	11800. 72
1949	3630. 39	4090. 46	4340. 49	4650. 46	5740. 61	6120. 66	7510. 76	13400. 86
1950	6030. 85	6380. 88	6340. 87	7150. 92	8110. 95	8630. 93	9240. 86	11800. 74
1951	3200. 35	3470. 33	3590. 34	4250. 41	5620. 55	5930. 55	6280. 48	7190. 21
1952	1830. 7	2090. 7	2100. 7	2620. 8	2970. 8	3150. 8	4030. 4	7850. 26
1953	2420. 21	2680. 20	2740. 19	3270. 20	3330. 14	3440. 10	3660. 3	6340. 14
1954	4350. 57	5240. 66	5530. 71	5680. 69	5700. 59	5740. 50	6350. 51	7580. 24
1955	4210. 54	4240. 51	4300. 48	4440. 45	4680. 40	4920. 38	5340. 25	6260. 11
1956	3730. 41	4180. 49	4180. 46	4350. 44	4590. 38	4780. 33	4900. 19	5310. 5
1957	4800. 63	4830. 59	4840. 56	5260. 58	5320. 48	5390. 43	5570. 33	5880. 7
1958	5170. 69	5690. 75	5670. 74	6010. 76	6080. 70	6120. 65	6520. 52	9540. 50
1959	5390. 75	5550. 73	5580. 73	5650. 67	5680. 57	5690. 49	6050. 42	8560. 33
1960	5360. 74	5400. 71	5420. 69	5690. 70	6120. 71	6890. 83	7940. 82	11900. 77

Table 2.3.1-14 (cont.) N-Day Low Flow Values for the Savannah River at Augusta, Georgia

Year	N-day Low Flow Values from SWSTAT for USGS Gage 02197000							
	3-day	7-day	10-day	30-day	60-day	90-day	183-day	365-day
1961	5260. 72	5660. 74	5690. 75	5850. 74	5880. 65	5990. 61	6240. 47	8320. 30
1962	4860. 64	5110. 65	5140. 64	5370. 61	5520. 51	5630. 46	7020. 65	10200. 58
1963	5240. 71	5380. 70	5410. 68	5640. 66	5780. 62	5830. 54	5890. 40	8700. 38
1964	5530. 77	5810. 78	5810. 77	6440. 85	6650. 86	6850. 82	7860. 81	11800. 75
1965	6710. 93	6840. 93	6930. 92	7020. 91	7480. 92	9330. 95	12100. 92	17300. 92
1966	6350. 91	6610. 90	6600. 88	6840. 87	6920. 87	6960. 84	7580. 78	10800. 64
1967	6180. 88	6250. 85	6300. 86	6450. 86	6470. 80	6530. 74	6690. 57	7770. 25
1968	5880. 83	6020. 80	6020. 79	6270. 79	6330. 77	7320. 88	8730. 84	9710. 54
1969	5850. 82	6010. 79	6110. 80	6390. 82	6510. 84	6550. 75	6790. 60	8430. 32
1970	6070. 87	6170. 82	6260. 84	6420. 84	6500. 82	6650. 78	6840. 61	8810. 40
1971	5450. 76	5760. 77	5760. 76	5840. 73	6250. 76	6290. 69	6580. 54	8110. 28
1972	5980. 84	6340. 87	6750. 91	7000. 90	7140. 89	7230. 87	7490. 74	10100. 57
1973	5800. 81	6030. 81	6130. 81	6250. 78	6360. 78	6520. 73	7590. 79	10600. 61
1974	5600. 78	5750. 76	5920. 78	6000. 75	6050. 69	6160. 67	6930. 62	12300. 81
1975	6040. 86	6240. 84	6190. 83	6370. 81	6510. 83	6620. 76	7140. 71	10900. 65
1976	6910. 95	7330. 95	7390. 95	7470. 94	7670. 93	7810. 91	9350. 87	11900. 78
1977	6740. 94	7240. 94	7230. 94	7300. 93	7470. 91	7950. 92	9990. 90	11900. 79
1978	6620. 92	6770. 92	6750. 90	6870. 88	6930. 88	6990. 85	7370. 72	11000. 67
1979	6200. 89	6300. 86	6290. 85	6390. 83	6430. 79	6440. 72	6600. 55	8760. 39
1980	6310. 90	6740. 91	6710. 89	6980. 89	7470. 90	7560. 90	8890. 85	12700. 84
1981	5680. 79	6180. 83	6180. 82	6300. 80	6570. 85	6630. 77	6710. 58	9250. 46
1982	3060. 33	3750. 36	3740. 36	4200. 39	4670. 39	5010. 39	5360. 26	6600. 16
1983	5070. 68	5470. 72	5540. 72	5840. 72	5900. 67	5940. 56	6240. 46	9020. 45
1984	4860. 65	5030. 62	5130. 63	5370. 60	5730. 60	5970. 60	6640. 56	10800. 62
1985	5330. 73	5380. 69	5450. 70	5720. 71	5870. 64	5950. 57	7080. 66	9500. 49
1986	4870. 66	5030. 63	5060. 62	5160. 56	5310. 47	5460. 44	5640. 35	6170. 10
1987	3830. 45	3940. 41	4000. 41	4140. 35	4480. 35	4820. 35	5360. 27	6930. 20
1988	4610. 62	4760. 58	4820. 55	5080. 52	5480. 50	5660. 48	6140. 43	6810. 18
1989	3880. 47	3940. 42	4000. 42	4150. 36	4220. 32	4270. 24	4500. 11	4760. 2
1990	3870. 46	4140. 48	4140. 45	4320. 43	4520. 36	4850. 36	5760. 36	10500. 60
1991	4470. 60	4880. 60	4930. 59	5420. 62	6250. 75	6690. 80	7480. 73	8370. 31
1992	4220. 55	4530. 54	4950. 60	6170. 77	6480. 81	6660. 79	7120. 69	9850. 55
1993	4950. 67	5300. 67	5340. 66	5660. 68	6130. 72	6730. 81	7120. 68	14500. 88
1994	4410. 59	4600. 56	4590. 53	4940. 51	5220. 46	5300. 42	5920. 41	7910. 27
1995	4560. 61	5020. 61	5220. 65	5580. 64	5880. 66	7050. 86	9830. 89	12500. 83
1996	5210. 70	5310. 68	5370. 67	5630. 65	5920. 68	5970. 59	7130. 70	11800. 73
1997	3810. 43	4480. 53	4700. 54	5100. 54	5560. 53	6070. 63	6530. 53	8650. 36
1998	4340. 56	4540. 55	4880. 58	5310. 59	5690. 58	6090. 64	6970. 63	12300. 82
1999	4400. 58	4750. 57	4860. 57	5260. 57	5550. 52	5790. 53	6210. 45	8930. 44
2000	3950. 49	4060. 44	4090. 43	4180. 38	4260. 33	4390. 25	4820. 18	5150. 4
2001	3680. 40	3750. 37	3800. 37	4040. 34	4080. 27	4200. 23	4640. 13	4810. 3
2002	3740. 42	3780. 39	3870. 39	3960. 32	4130. 31	4390. 26	4480. 10	4600. 1
2003	3820. 44	3840. 40	3870. 40	3920. 31	4120. 29	4130. 20	4170. 5	5550. 6

Table 2.3.1-15 SWSTAT Output for Log Pearson Frequency Analysis of 7-Day Low Flows on the Savannah River at Augusta, Georgia

```
                Log-Pearson Type III Statistics
                           SWSTAT 4.1
                  (based on USGS Program A193)

  Notice -- Use of Log-Pearson Type III or Pearson-Type III
            distributions are for preliminary computations.
            User is responsible for assessment and
            interpretation.


               SAVANNAH RIVER AT AUGUSTA, GA
                   April  1 - start of season
                   March 31 - end of season
                1986 - 2003 - time period
                  7-day low - parameter
                         18 - non-zero values
                          0 - zero values
                          0 - negative values (ignored)

       5025.714    3935.714    4758.571    3940.000    4138.571
       4884.286    4531.429    5304.286    4600.000    5020.000
       5307.143    4477.143    4540.000    4752.857    4057.143
       3745.714    3775.714    3844.286


  The following 7 statistics are based on non-zero values:

  Mean (logs)                                    3.648
  Variance (logs)                                0.003
  Standard Deviation (logs)                      0.051
  Skewness (logs)                               -0.075
  Standard Error of Skewness (logs)              0.536
  Serial Correlation Coefficient (logs)          0.339
  Coefficient of Variation (logs)                0.014


       Non-exceedance     Recurrence       Parameter
        Probability        Interval          Value
        -----------       ----------       ---------
             0.0100          100.00         3369.406
             0.0200           50.00         3484.674
             0.0500           20.00         3663.468
             0.1000           10.00         3828.398
             0.2000            5.00         4035.955
             0.3333            3.00         4235.952
             0.5000            2.00         4457.744
             0.8000            1.25         4913.406
             0.9000            1.11         5165.582
             0.9600            1.04         5445.413
             0.9800            1.02         5632.292
```

Table 2.3.1-16 Annual Peak Discharges on the Savannah River at Augusta, Georgia

Water Year	Date	Gage Height (feet)	Peak discharge (cfs)	Water Year	Date	Gage Height (feet)	Peak discharge (cfs)
1796	Jan. 17, 1796	38	280,000 (2)	1937	Jan. 04, 1937	30.1	91,400
1840	May 28, 1840	37.5	260,000 (2)	1938	Oct. 21, 1937	30.1	91,400
1852	Aug. 29, 1852	36.8	230,000 (2)	1939	Mar. 02, 1939	24.1	90,900
1864	Jan. 01, 1864	34	160,000 (2)	1940	Aug. 15, 1940	29.4	239,000
1865	Jan. 11, 1865	36.4	220,000 (2)	1941	Jul. 08, 1941	22.89	53,300
1876	Dec. 30, 1875	28.6	86,400	1942	Mar. 23, 1942	24.56	105,000
1877	Apr. 14, 1877	31.4	119,000	1943	Jan. 20, 1943	25.1	117,000
1878	Nov. 23, 1877	23.5	51,500	1944	Mar. 22, 1944	25.53	128,000
1879	Aug. 03, 1879	22	44,000	1945	Apr. 27, 1945	23.16	64,000
1880	Dec. 16, 1879	30.1	102,000	1946	Jan. 09, 1946	24.43	97,200
1881	Mar. 18, 1881	32.2	130,000	1947	Jan. 22, 1947	23.97	86,000
1882	Sep. 12, 1882	29.3	93,300	1948	Feb. 10, 1948	23.9	83,200
1883	Jan. 22, 1883	30.8	111,000	1949	Nov. 30, 1948	26.61	154,000
1884	Apr. 16, 1884	28	81,000	1950	Oct. 09, 1949	20.1	32,500
1885	Jan. 26, 1885	27.5	77,000	1951	Oct. 22, 1950	22.32	46,300
1886	May 21, 1886	32.5	135,000	1952	Mar. 06, 1952	21.53	39,300 (5)
1887	Jul. 31, 1887	34.5	173,000	1953	May 8, 1953	20.8	35,200 (6)
1888	Sep. 11, 1888	38.7	303,000	1954	Mar. 30, 1954	17.39	25,500 (6)
1889	Feb. 19, 1889	33.3	149,000	1955	Apr. 15, 1955	16.77	23,900 (6)
1890	Feb. 27, 1890	22.9	48,500	1956	Apr. 12, 1956	14.7	18,600 (6)
1891	Mar. 10, 1891	35.5	197,000	1957	May 7, 1957	14.08	18,000 (6)
1892	Jan. 20, 1892	32.8	140,000	1958	Apr. 18, 1958	22.91	66,300 (6)
1893	Feb. 14, 1893	25	60,000	1959	Jun. 08, 1959	18.65	28,500 (6)
1894	Aug. 07, 1894	24	54,000	1960	Feb. 14, 1960	20.58	34,900 (6)
1895	Jan. 11, 1895	30.4	106,000	1961	Apr. 02, 1961	20.56	34,800 (6)
1896	Jul. 10, 1896	30.5	107,000	1962	Jan. 09, 1962	20.09	32,500 (6)
1897	Apr. 06, 1897	29.3	93,300	1963	Mar. 23, 1963	19.52	31,300 (6)
1898	Sep. 02, 1898	31.3	117,000	1964	Apr. 09, 1964	24.16	87,100 (6)
1899	Feb. 08, 1899	31	113,000	1965	Dec. 27, 1964	20.62	34,600 (6)
1900	Feb. 15, 1900	32.7	138,000	1966	Mar. 06, 1966	21.5	39,300 (6)
1901	Apr. 04, 1901	31.8	124,000	1967	Aug. 25, 1967	18.1	26,500 (6)
1902	Mar. 01, 1902	34.6	175,000	1968	Jan. 12, 1968	20.94	35,900 (6)
1903	Feb. 09, 1903	33.2	147,000	1969	Apr. 21, 1969	22.24	45,600 (6)
1904	Aug. 10, 1904	25.5	63,000	1970	Apr. 01, 1970	17.68	25,200 (6)
1905	Feb. 14, 1905	25.8	64,800	1971	Mar. 05, 1971	23.3	63,900 (6)
1906	Jan. 05, 1906	29.6	96,600	1972	Jan. 20, 1972	20.36	33,700 (6)
1907	Oct. 05, 1906	23.6	52,000	1973	Apr. 08, 1973	21.63	40,200 (6)
1908	Aug. 27, 1908	38.8	307,000	1974	Feb. 23, 1974	20.13	32,900 (6)
1909	Jun. 05, 1909	28.7	87,300	1975	Mar. 25, 1975	22.24	45,600 (6)
1910	Mar. 02, 1910	26.4	69,800	1976	Jun. 05, 1976	20.27	33,300 (6)
1911	Apr. 14, 1911	19.1	32,800	1977	Apr. 07, 1977	20.5	34,200 (6)
1912	Mar. 17, 1912	36.8	234,000	1978	Jan. 26, 1978	21.98	43,100 (6)
1913	Mar. 16, 1913	35.1	156,000	1979	Feb. 27, 1979	21.13	37,300 (6)
1914	Dec. 31, 1913	24.3	48,000	1980	Mar. 31, 1980	22.33	47,200 (6)
1915	Jan. 20, 1915	28.2	61,000	1981	Feb. 12, 1981	14.7	17,700 (6)
1916	Feb. 03, 1916	31	82,400	1982	Jan. 02, 1982	19.39	30,700 (6)
1917	Mar. 06, 1917	29.2	68,000	1983	Apr. 10, 1983	23.21	66,100 (6)
1918	Jan. 30, 1918	25.5	45,500	1984	May 05, 1984	20.35	34,000 (6)
1919	Dec. 24, 1918	35	128,000	1985	Feb. 07, 1985	17.89	25,700 (6)
1920	Dec. 11, 1919	35.4	133,000	1986	Oct. 03, 1985	15.74	21,000 (6)
1921	Feb. 11, 1921	35.1	129,000	1987	Mar. 06, 1987	18.98	29,200 (6)
1922	Feb. 16, 1922	32	92,000	1988	Feb. 05, 1988	10.61	13,600 (6)
1923	Feb. 28, 1923	28	59,700	1989	Sep. 22, 1989	15.33	20,200 (6)

Table 2.3.1-16 (cont.) Annual Peak Discharges on the Savannah River at Augusta, Georgia

Water Year	Date	Gage Height (feet)	Peak discharge (cfs)	Water Year	Date	Gage Height (feet)	Peak discharge (cfs)
1924	Sep. 22, 1924	28	59,700	1990	Feb. 27, 1990	20.69	35,300 (6)
1925	Jan. 20, 1925	36.5	150,000	1991	Oct. 13, 1990	22.8	59,200 (6)
1926	Jan. 20, 1926	27.3	55,300	1992	Mar. 27, 1992	16.29	22,100 (6)
1927	Dec. 30, 1926	24	39,000	1993	Jan. 14, 1993	21.81	45,100 (6)
1928	Aug. 17, 1928	40.4	226,000	1994	Jul. 01, 1994	21.4	40,700 (6)
1929	Sep. 27, 1929	46.3	343,000	1995	Feb. 19, 1995	20.28	33,600 (6)
1930	Oct. 02, 1929	45.1	350,000	1996	Feb. 05, 1996	20.48	34,400 (6)
1931	Nov. 17, 1930	19.9	26,100	1997	Mar. 10, 1997	18.11	26,300 (6)
1932	Jan. 09, 1932	30.4	93,800	1998	Feb. 07, 1998	21.63	43,000 (6)
1933	Oct. 18, 1932	30.3	92,600	1999	Feb. 02, 1999	14.72	19,000 (6)
1934	Mar. 05, 1934	28.5	73,200	2000	Jan. 25, 2000	13.25	16,800 (6)
1935	Mar. 14, 1935	27.4	63,700	2002	Mar. 04, 2002	7.14	8,510 (6)
1936	Apr. 08, 1936	41.2	258,000	2003	May 24, 2003	20.42	31,600 (6)
				2004	Jun. 14, 2004	13.82	17,600 (6)

2 -- Discharge is an Estimate
5 -- Discharge affected to unknown degree by Regulation or Diversion
6 -- Discharge affected by Regulation or Diversion

Source: USGS 2006c

Table 2.3.1-17 Inventory of Savannah River Watershed Water Control Structures

Name of Dam or Reservoir	Owner or Operator	Stream	Savannah River Mile	Distance U/S of Vogtle Site	Drainage Area above dam (sq. mi.)	Storage, in thousands of acre-feet	Normal Pool Elev, ft MSL	Spillway Crest Elevation, ft. MSL	Top of Dam Elevation, ft. MSL	Generator Capacity, MW
New Savannah Bluff Lock & Dam	USACE	Savannah River	187.7	36.8	7,508	RoR	115.0	n/a	n/a	n/a
Stevens Creek	SC Electric & Gas	Savannah River	208.1	57.2	7,173	11	n/a	n/a	n/a	19.2
J. Strom Thurmond Lake & Dam	USACE	Savannah River	221.6	70.7	6,144	2,510	335.0	300	351	280
Richard B. Russell Lake & Dam	USACE	Savannah River	259.1	108.2	2,900	1,020	475.0	436	495	300
Hartwell Lake & Dam	USACE	Savannah River	288.9	138.0	2,088	2,550	660.0	630	679	330
Yonah Dam	GA Power Company	Tugaloo-Chatooga	340.0	189.1	470	10.2	744.2	742	757	22.5
Keowee Lake & Dam	Duke Power Company	Senaca-Keowee	341.0	190.1	439	940	800.0	765	815	157.5
Tugaloo Lake & Dam	GA Power Company	Tugaloo	343.1	192.2	464	43.2	891.5	885	905	45
Tallulah Falls Dam	GA Power Company	Tallulah River	346.7	195.8	186	2.46	1,500.0	1493	1514	72
Mathis Lake & Dam	GA Power Company	Tallulah River	353.4	202.5	151	31.4	1,689.6	1681	1704	16
Jocassee Lake & Dam	Duke Power Company	Senaca-Keowee	357.0	206.1	148	1,100	1,110.0	1077	1125	612
Nacoochee Dam	GA Power Company	Tallulah River	362.1	211.2	136	8.2	1,752.5	1753	1765	4.8
Little River Lake & Dam	Duke Power Company	Senaca-Keowee	366.0	215.1	439	940	800.0	765	815	
Burton Lake & Dam	GA Power Company	Tallulah River	366.4	215.5	118	108	1,866.6	1860	1873	6.1

Source: Compiled from USACE 1996

Table 2.3.1-18 Monthly Groundwater Level Elevations in the Water Table Aquifer

Well No.	Groundwater Level Elevation (ft msl)																	
	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06
142	154.37	154.38	154.49	154.64	154.75	154.69	154.60	154.71	154.78	154.71	154.63	154.55	154.48	154.41	154.36	0.00	0.00	154.16
179	147.42	148.40	148.42	148.72	148.69	148.75	148.52	148.61	148.64	148.72	148.66	148.76	148.78	148.56	148.75	0.00	0.00	148.79
802A	157.88	157.86	158.07	158.23	158.29	158.34	158.28	158.28	158.39	158.23	158.17	158.09	157.99	157.91	157.89	0.00	0.00	157.56
803A	159.98	159.91	160.15	160.32	160.39	160.48	160.39	160.37	160.48	160.45	160.30	160.20	160.12	159.96	159.88	0.00	0.00	159.64
804	163.73	163.62	163.92	164.10	164.21	164.23	164.05	164.08	164.23	164.30	164.11	163.99	163.88	163.69	163.69	0.00	0.00	162.84
805A	158.53	158.57	158.84	158.98	159.09	159.09	159.05	158.94	158.92	158.98	158.82	158.82	158.63	158.53	158.45	0.00	0.00	158.19
806B	155.62	155.65	155.78	155.90	155.96	155.98	155.88	155.97	155.98	156.03	155.85	155.78	155.73	155.68	155.62	0.00	0.00	155.42
808	158.88	159.14	159.42	159.55	159.49	159.37	159.15	159.04	159.19	159.15	158.99	158.53	158.80	158.72	158.65	0.00	0.00	158.40
809	152.78	152.70	152.75	152.89	152.98	152.97	152.98	153.10	153.22	153.18	153.05	153.02	153.00	152.88	152.86	0.00	0.00	152.71
LT-1B	154.92	154.82	155.01	155.16	155.18	155.22	155.06	155.18	155.52	155.28	155.18	155.15	154.95	154.95	154.95	0.00	0.00	154.78
LT-7A	154.39	154.15	154.33	154.46	154.48	154.46	154.31	154.57	154.83	154.59	154.57	154.50	154.41	154.30	154.34	0.00	0.00	154.25
LT-12	158.21	157.90	158.07	158.22	158.31	158.28	158.21	158.53	158.66	158.48	158.54	158.48	158.23	158.19	158.18	0.00	0.00	158.11
LT-13	156.10	155.92	156.13	156.30	156.32	156.37	156.23	156.36	156.66	156.35	156.32	156.32	156.23	156.08	156.14	0.00	0.00	155.93
OW-1003	155.94	155.89	156.06	156.29	156.24	156.36	156.26	156.34	156.37	156.43	156.32	157.24	156.16	156.03	155.98	0.00	0.00	155.90
OW-1005	132.95	132.73	132.88	133.01	132.67	132.65	132.53	132.74	133.04	133.12	133.14	133.20	133.12	132.94	132.84	0.00	0.00	132.50
OW-1006	147.66	147.48	147.57	147.60	147.49	147.20	147.18	147.41	147.40	147.37	147.35	147.12	147.05	146.88	146.80	0.00	0.00	146.47
OW-1007	151.82	151.72	151.78	151.63	151.45	151.15	151.05	151.41	151.49	151.45	151.22	151.11	150.99	150.76	150.53	0.00	0.00	150.08
OW-1009	162.38	162.40	162.71	162.90	163.01	163.03	162.87	162.93	163.01	163.01	162.89	162.79	162.65	162.50	162.44	0.00	0.00	162.17
OW-1010	163.06	163.26	163.59	163.77	163.81	163.78	163.62	163.60	163.63	163.57	163.44	163.29	163.09	162.91	162.84	0.00	0.00	162.51
OW-1012	161.83	161.93	162.07	162.06	161.98	161.80	161.71	161.82	161.86	161.80	161.68	161.53	161.37	161.22	161.00	0.00	0.00	160.49
OW-1013	164.95	165.00	165.29	165.47	165.48	165.42	165.21	165.29	165.46	165.31	165.23	165.11	164.96	164.79	164.68	0.00	0.00	164.25
OW-1015	159.63	159.58	159.78	159.90	159.96	159.96	159.82	159.81	159.79	159.89	159.75	159.66	159.58	159.45	159.35	0.00	0.00	159.06

Notes:

Groundwater level data for the period between June 2005 and February 2006 provided Request For Information (RFI) Number 25144-000-GRI-GEX-00027, SNC ALWR ESP Project. **(Bechtel Power Corporation, March 2006).**

Groundwater level data for the period between March 2006 and June 2006 provided Request For Information (RFI) Number 25144-000-GRI-GEX-00038, SNC ALWR ESP Project. **(Bechtel Power Corporation, June 2006).**

Groundwater level data for the period between July 2006 and November 2006 provided Request For Information (RFI) Number 25144-000-GRI-GEX-00039, SNC ALWR ESP Project **(Bechtel Power Corporation, November 2006).**

Table 2.3.1-19 Monthly Groundwater Level Elevations in the Tertiary Aquifer

Well No.	Groundwater Level Elevation (ft msl)																	
	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06
27	91.50	89.96	91.63	83.96	82.13	88.24	82.57	84.62	85.77	84.49	83.42	83.08	83.03	84.54	84.73	0.00	0.00	81.50
29	98.88	97.80	98.33	93.17	91.86	91.89	92.59	93.97	94.19	93.63	93.05	92.16	91.76	91.86	91.44	0.00	0.00	89.97
850A	105.27	104.68	104.76	101.04	100.03	99.91	100.70	101.86	101.69	101.48	101.14	100.07	99.63	99.23	98.57	0.00	0.00	97.56
851A	114.54	114.40	114.02	111.59	111.38	110.60	112.34	112.32	112.43	112.42	112.23	111.08	110.36	109.31	108.00	0.00	0.00	107.77
852	114.71	114.49	114.00	111.88	111.09	111.21	111.88	113.06	113.51	113.14	112.82	111.74	110.38	108.78	107.20	0.00	0.00	108.35
853	108.60	108.17	107.98	104.51	103.64	103.45	104.18	105.32	105.14	104.97	104.65	103.58	103.15	102.57	101.86	0.00	0.00	101.13
854	107.06	106.88	106.65	103.37	102.38	102.23	102.38	104.13	103.85	103.73	103.45	102.31	101.86	101.31	100.57	0.00	0.00	99.87
855	102.63	101.74	102.00	97.22	96.08	96.21	96.85	98.43	98.48	98.15	97.53	96.75	95.93	95.85	94.96	0.00	0.00	94.12
856	114.07	113.94	113.49	111.37	110.57	110.63	111.31	112.52	112.46	112.39	112.07	111.21	109.94	108.36	106.75	0.00	0.00	107.75
OW-1002	120.76	120.61	120.04	118.65	117.81	117.71	118.44	119.36	119.63	119.64	119.43	118.37	117.65	116.45	114.48	0.00	0.00	114.77
OW-1004	108.27	108.14	108.01	105.06	104.05	103.75	104.51	105.56	105.38	105.28	105.12	103.88	103.54	102.81	102.06	0.00	0.00	101.26
OW-1008	126.06	127.99	125.09	124.24	123.49	123.51	124.19	125.10	125.46	125.54	125.21	124.33	123.42	122.18	119.64	0.00	0.00	120.42
OW-1011	122.50	122.38	121.49	120.37	119.59	119.73	120.46	121.41	121.64	121.70	121.48	120.47	119.37	117.67	115.35	0.00	0.00	116.59
OW-1014	111.18	111.00	110.74	108.34	107.34	107.11	107.81	108.87	108.73	108.75	108.66	107.41	106.94	105.98	104.86	0.00	0.00	104.44

Notes:

Groundwater level data for the period between June 2005 and February 2006 provided Request For Information (RFI) Number 25144-000-GRI-GEX-00027, SNC ALWR ESP Project. **(Bechtel Power Corporation, March 2006).**

Groundwater level data for the period between March 2006 and June 2006 provided Request For Information (RFI) Number 25144-000-GRI-GEX-00038, SNC ALWR ESP Project. **(Bechtel Power Corporation, June 2006).**

Groundwater level data for the period between July 2006 and November 2006 provided Request For Information (RFI) Number 25144-000-GRI-GEX-00039, SNC ALWR ESP Project. **(Bechtel Power Corporation, November 2006).**

Table 2.3.1-20 Hydraulic Conductivity Values

Observation Well No.	Depth Test Interval	Aquifer	Material	Hydraulic Conductivity	
	(ft)			(cm/sec)	(ft/day)
OW-1003	72 - 91	Water Table	Reddish brown silty SAND (SM) with Light tan silty SAND with Tan and grey clayey COQUINA.	4.4E-05	0.12
OW-1005	143 - 169	Water Table	Pale yellow, silty SAND, calcareous (SM), fine-coarse-grained with shell pieces.	1.1E-04	0.32
OW-1006	113 - 136	Water Table	Very light tan silty SAND (SM) with light gray COQUINA, unconsolidated (OW-1006A). Tan sandy and shelly CLAY (CH), saturated with light tan, fine-coarse grained SAND with shell (SW) (OW-1006).	4.8E-04	1.4
OW-1007	99 - 120	Water Table	Tan fine-grained silty SAND (SM), saturated with very light tan silty SAND (SM) becoming shelly with light olive grey CLAY (CH).	9.3E-04	2.65
OW-1009	81 - 98	Water Table	Very light tan silty SAND (SM) with Tan limestone shell hash, very light tan silty SAND (SM) WITH “Brown silty CLAY.	4.0E-04	1.1
OW-1010	70 - 92	Water Table	Tan poorly graded SAND with silt (SP-SM) with brownish yellow clayey silty SAND (SC-SM), soft with white SHELL HASH.	6.4E-05	0.18
OW-1012	71 - 94	Water Table	Brown SAND, fine-to-medium-grained with pale yellow silt (SM) with Pale olive silt (ML) with pale yellow SILT, micaceous (ML).	1.4E-04	0.39
OW-1013	81 - 104	Water Table	Tan fine-to-medium-grained SAND (SP-SM) with tan or clay tubes or bioturbation with light olive tan calcareous silty fine grained-grained SAND (SP-SM) with light olive tan calcareous CLAY (CL), wet but not saturated.	1.3E-04	0.38
OW-1015	90 - 120	Water Table	Grayish white, fine-to-medium-grained SAND (SP) saturated with very light tan poorly graded SAND with silt (SP-SM) with tan shelly (coarse) fine to medium grained clayey SAND (SC).	1.5E-04	0.44

Table 2.3.1-20 (cont.) Hydraulic Conductivity Values

Observation Well No.	Depth Test Interval	Aquifer	Material	Hydraulic Conductivity	
	(ft)			(cm/sec)	(ft/day)
OW-1002	216 - 237	Tertiary	Light greenish gray fine- to medium- grained silty, glauconitic SAND with gray clay layer (SM).	3.2E-04	0.9
OW-1004	150 - 187	Tertiary	Fine- to medium- grained dark gray SAND with organics, wet, poorly graded with silt (SP-SM).	1.3E-04	0.35
OW-1008	226 - 247	Tertiary	Gray, fine SAND (SW) with light gray fine sand (SM).	7.5E-04	2.1
OW-1011	197 - 218	Tertiary	Dark bluish-gray silty fine- to medium- grained SAND, very moist with gray, poorly graded sand with silt (SP-SM) with silty gravelly sand with fossils, shark teeth with gray medium- to coarse-grained SAND.	3.8E-04	1.1
OW-1014	179 - 197	Tertiary	Dark gray silty SAND (SM-SP), high organic content, saturated with light gray fine quartz SAND (SP), silty SAND (SM) and dark gray Sandy SILT (ML).	1.9E-04	0.54
			Geometric Mean Water Table Aquifer	1.75E-04	0.5
			Geometric Mean Tertiary Aquifer	2.95E-04	0.83

Note.
Hydraulic conductivity values provided in SSAR Appendix 2.5A (report Appendix D)
Material descriptions from the borings logs provided in SSAR Appendix 2.4A (report Appendix E)

Table 2.3.1-21 Summary of Laboratory Test Results on Grain Size, Moisture Content, and Specific Gravity for the Barnwell Formation

Borehole / Well No.	Sample Elevation	Grain Size Distribution			Moisture Content	Specific Gravity
		Gravel	Sand	Clay/Silt		
	(ft msl)	(%)	(%)	(%)	(%)	
OW-1003	144.5	0.0	65.1	34.9	ND	2.69
OW-1003	139.5	31.1	50.0	18.4	ND	2.68
OW-1005	115.9	8.9	57.0	34.1	ND	2.63
OW-1005	110.9	18.2	47.6	34.3	ND	2.61
OW-1006	113.6	7.0	61.1	31.9	ND	2.67
OW-1006	108.6	3.6	74.4	22.0	ND	2.59
OW-1007	113.4	0.0	85.0	15.0	ND	2.65
OW-1007	108.4	0.0	85.0	18.1	ND	2.66
OW-1009	135.9	2.7	74.6	22.7	ND	2.61
OW-1009	130.9	34.7	45.9	19.2	ND	2.75
OW-1010	143.4	0.0	89.3	10.7	ND	2.67
OW-1010	138.4	0.0	63.5	36.5	ND	2.63
OW-1012	131.9	0.0	76.1	23.9	ND	2.66
OW-1012	126.9	0.0	14.1	85.9	ND	2.66
OW-1013	132.9	0.0	91.1	8.9	ND	2.65
OW-1013	122.9	0.0	91.1	8.9	ND	2.65
OW-1015	126.9	0.0	97.7	2.8	ND	2.63
OW-1015	125.4	0.0	93.2	6.8	ND	2.67
B-1002	214.3	6.6	84.0	9.4	6.2	ND
B-1002	203.5	0.0	62.9	37.1	24.4	ND
B-1002	193.5	0.0	75.1	24.9	31.8	ND
B-1002	188.5	0.0	68.4	31.6	58.8	ND
B-1002	168.5	0.0	89.5	10.5	42.9	ND
B-1002	158.5	0.0	92.8	7.2	29.3	ND
B-1002	148.5	0.4	89.6	10.0	24.5	ND
B-1002	138.5	0.0	93.9	6.1	27.6	ND
B-1003	208.2	0.0	79.1	20.9	13.4	ND
B-1003	185.2	0.0	70.2	29.8	42.1	ND
B-1003	168.2	52.2	34.4	13.4	17.5	ND
B-1003	148.2	0.0	91.8	8.2	32.3	ND
B-1004	240.8	0.0	75.6	24.4	13.8	ND
B-1004	237.8	0.7	76.2	23.1	14.5	ND
B-1004	226.3	0.2	84.9	14.9	18.5	ND
B-1004	206.3	0.0	40.0	60.0	46.2	ND
B-1004	196.3	0.0	59.0	41.0	62.9	ND
B-1004	181.3	10.5	69.6	19.9	24.1	ND

Table 2.3.1-21 (cont.) Summary of Laboratory Test Results on Grain Size, Moisture Content, and Specific Gravity for the Barnwell Formation

Borehole / Well No.	Sample Elevation	Grain Size Distribution			Moisture Content	Specific Gravity
		Gravel	Sand	Clay/Silt		
	(ft msl)	(%)	(%)	(%)	(%)	
B-1004	166.3	0.0	88.5	11.5	28.8	ND
B-1004	126.3	48.6	32.2	19.2	19.7	ND
B-1006	248.5	0.0	92.7	7.3	3.8	ND
B-1006	222.5	0.1	73.8	26.1	19.7	ND
B-1006	197.5	0.0	41.7	58.3	92.8	ND
B-1006	187.5	0.1	96.8	3.1	25.4	ND
B-1006	167.5	0.0	84.3	15.7	51.9	ND
B-1006	147.5	30.7	47.8	21.5	22.0	ND
B-1010	211.1	0.0	92.2	7.8	5.7	ND
B-1010	185.1	0.0	83.0	17.0	18.9	ND
B-1010	160.1	0.0	86.7	13.3	27.3	ND
				Median	25	2.66

Note.
ND – Not Determined
OW-series data are provided in SSAR Appendix 2.4A
B-series data are provided in SSAR Appendix 2.5A
Moisture content is by weight percent.

Table 2.3.1-22 Summary of Laboratory Test Results on Grain Size, Moisture Content, and Porosity for the Lisbon Formation

Borehole / Well No.	Sample Elevation	Grain Size Distribution			Moisture Content	D50	Porosity
		Gravel	Sand	Clay/Silt			
	(ft msl)	(%)	(%)	(%)	(%)	(mm)	
B-1002	130.0	49.4	21.7	28.9	52.1	3.49	0.59
B-1002	118.5	22.9	41.2	35.9	56.5	0.26	0.56
B-1002	108.5	12.8	53.4	33.8	25.5	0.21	0.36
B-1002	98.5	53.7	21.8	24.5	13.5	7.52	0.25
B-1002	88.5	26.3	49.4	24.3	28.6	0.87	0.45
B-1003	135.2	16.5	50.1	33.4	67.4	0.43	ND
B-1003	130.2	1.6	57.8	40.6	30.6	0.14	0.46
B-1003	118.5	1.2	67.1	31.7	40.6	0.27	0.52
B-1003	101.5	11.7	45.8	42.5	28.0	0.12	0.42
B-1003	81.5	7.3	58.5	34.2	25.9	0.15	0.39
B-1004	105.8	1.0	52.7	46.3	44.6	0.10	0.56
B-1004	96.3	0.7	57.6	41.7	30.1	0.15	0.45
B-1004	86.3	38.0	29.8	32.2	25.1	0.49	0.43
B-1004	72.8	20.9	37.4	41.7	20.8	0.12	0.38
B-1004	61.3	34.9	41.3	23.8	29.0	0.85	0.44
B-1004	51.3	5.2	60.3	34.5	26.2	0.18	0.39
				Median	29	0.24	0.44

Note.
ND – Not Determined
B-series data are provided in SSAR Appendix 2.5A
Moisture content is by weight percent.
Porosity calculated assuming specific gravity of 2.65.

Table 2.3.1-23 Summary of Laboratory Test Results on Grain Size, Moisture Content, and Specific Gravity for the Still Branch And Congaree Formations

Borehole / Well No.	Sample Elevation	Grain Size Distribution			Moisture Content	Specific Gravity
		Gravel	Sand	Clay/Silt		
	(ft msl)	(%)	(%)	(%)	(%)	
OW-1002	8.9	0.2	79.6	20.2	ND	2.65
OW-1002	-9.6	0.0	1.4	90.6	ND	2.62
OW-1004	69.4	0.1	89.7	10.2	ND	2.69
OW-1004	64.4	0.0	93.4	6.6	ND	2.67
OW-1008	-11.9	0.0	83.2	16.8	ND	2.69
OW-1008	-21.9	2.2	67.9	20.3	ND	2.68
OW-1011	12.3	0.0	88.9	10.8	ND	2.67
OW-1011	-2.7	4.5	89.6	5.9	ND	2.66
OW-1014	37.4	0.0	87.8	12.2	ND	2.69
OW-1014	32.4	0.0	89.6	10.4	ND	2.66
B-1002	68.5	20.0	40.6	39.4	23.3	ND
B-1002	33.5	0.0	93.4	6.6	40.7	ND
B-1002	-16.5	3.1	84.6	12.3	18.5	ND
B-1003	57.5	0.0	94.6	5.4	23.6	ND
B-1003	37.5	0.9	82.7	16.4	32.3	ND
B-1003	17.5	1.4	77.2	21.4	39.3	ND
B-1003	-17.5	0.0	89.1	10.9	23.2	ND
B-1003	-57.5	0.3	85.5	14.2	23.2	ND
B-1003	-92.5	70.7	26.0	3.3	32.7	ND
B-1003	-127.5	0.0	21.5	78.5	21.3	ND
B-1003	-177.5	0.3	83.9	15.8	18.9	ND
B-1003	-227.5	0.0	84.1	15.9	28.6	ND
B-1003	-273.5	0.0	86.8	13.2	26.4	ND
				Median	24.0	2.67

Note.
ND – Not Determined
OW-series data are provided in SSAR Appendix 2.4A
B-series data are provided in SSAR Appendix 2.5A
Moisture content is by weight percent.

Table 2.3.1-24 Availability of USGS Water Quality Data for the Savannah River

USGS Site Number	Site Name	From	To	Count	suspended sediment data available
2187303	SAVANNAH RIVER AT GA 181 NEAR MONTEVIDEO, GA.	1/10/2002	12/11/2002	22	turbidity only
2187500	SAVANNAH RIVER NEAR IVA,S.C.	5/24/1957	11/14/1985	138	suspended solids, residue
2189000	SAVANNAH RIVER NEAR CALHOUN FALLS, S. C.	3/29/1956	7/10/1974	63	turbidity only
21964839	SAVANNAH RIVER NEAR MARTINEZ, GA	7/24/1990	2/16/1994	44	none
2196560	SAVANNAH RIVER (AUGUSTA INTAKE) NR AUGUSTA, GA.	10/12/1970	10/12/1970	1	none
2196650	SAVANNAH R NR BEECH ISLAND, S. C.	12/10/1971	7/12/1972	5	none
2196670	SAVANNAH RIVER JEFFERSON DAVIS BR, AT AUGUSTA, GA.	1/14/2002	12/16/2002	20	residue
2196671	SAVANNAH RIVER (US 1) AT AUGUSTA, GA.	1/28/1997	8/13/1998	18	turbidity, residue
2196993	SAVANNAH RIVER ABOVE LOCK AND DAM AT AUGUSTA, GA.	1/14/2002	12/16/2002	20	turbidity, residue
2197000	SAVANNAH RIVER AT AUGUSTA, GA	7/24/1990	7/20/1998	62	turbidity, residue
					turbidity
2197065	SAVANNAH RIVER BELOW SPIRIT CREEK, NEAR AUGUSTA,GA	7/23/1990	8/9/2005	243	turbidity, residue
2197320	SAVANNAH R. NR JACKSON, SC	10/3/1972	6/27/1974	23	turbidity
2197375	SAVANNAH RIVER AT STONY BLUFF LANDING, GA.	11/3/1937	12/17/2002	83	turbidity, residue
2197500	SAVANNAH R AT BURTONS FERRY BR NR MILLHAVEN, GA	10/19/1993	2/15/1994	5	turbidity
2198500	SAVANNAH RIVER NEAR CLYO, GA	5/1/1938	7/8/2003	771	suspended solids, residue
2198920	SAVANNAH RIVER AT GA 25, AT PORT WENTWORTH, GA	5/2/1958	8/10/2005	101	turbidity, residue
2198975	SAVANNAH RIVER AT SAVANNAH, GA	1/16/2002	12/2/2004	63	turbidity, residue
219897991	SAVANNAH RIVER AT FORT JACKSON, NEAR SAVANNAH, GA	1/17/2002	12/2/2004	63	turbidity, residue
219897992	SAVANNAH RIVER AT SOUTH CHANNEL,NEAR SAVANNAH, GA	1/17/2002	12/2/2004	63	turbidity
219897996	SAVANNAH RIVER AT FIELDS CUT, NEAR SAVANNAH, GA	1/17/2002	12/2/2004	63	turbidity, residue
219897998	SAVANNAH RIVER NEAR FORT PULASKI, GA	1/17/2002	12/2/2004	63	turbidity, residue
2198980	SAVANNAH RIVER AT FORT PULASKI, GA	3/7/1960	3/8/1960	3	residue

Table 2.3.1-25 Suspended Sediment Loads and Average Daily Flows for the Savannah River at Clyo, Georgia

Date	Average daily flow, cfs	Suspended sediment discharge, tons per day
1/17/1974	19800	1970
2/14/1974	26300	2120
3/21/1974	10100	1270
4/26/1974	13300	1450
5/22/1974	9190	1350
8/1/1974	7810	522
8/30/1974	9040	731
9/26/1974	7620	518
10/23/1974	7480	850
11/22/1974	8300	627
12/18/1974	8700	353
1/17/1975	14600	3150
2/21/1975	23500	771
3/13/1975	23200	643
4/17/1975	38700	847
5/8/1975	14500	1170
6/19/1975	11400	948
7/17/1975	12800	1170
8/13/1975	9700	627
9/11/1975	9020	497
10/16/1975	9940	485
11/12/1975	16200	797
12/18/1975	15400	994
1/14/1976	15900	926
2/12/1976	18600	492
3/17/1976	13000	1120
4/14/1976	22200	754
5/12/1976	8070	367
6/9/1976	21200	592
7/14/1976	18000	544
8/11/1976	8400	530
9/14/1976	8230	152
10/6/1976	8900	301
11/4/1976	9200	400
12/2/1976	15900	1350
1/12/1977	19100	363
2/10/1977	11700	57
3/9/1977	14700	591
4/7/1977	24300	643
5/5/1977	11400	745
6/2/1977	7820	484
7/13/1977	7320	332
8/10/1977	8090	440
9/14/1977	7590	326
10/20/1977	7050	266
11/17/1977	13700	769
12/7/1977	15700	899
1/11/1978	11100	366
2/8/1978	28600	318
3/8/1978	11600	469
4/5/1978	10300	609
5/3/1978	9670	342
6/7/1978	10300	72
7/6/1978	7220	660
8/9/1978	7870	170
9/7/1978	8850	337
10/4/1978	6880	15
11/2/1978	6690	54
12/6/1978	7460	200
1/4/1979	7710	166
2/7/1979	8370	386
4/4/1979	16800	544
5/2/1979	35200	762
6/7/1979	18800	1260
7/19/1979	7840	462
8/23/1979	7760	251
9/6/1979	11400	400
10/4/1979	11600	345
11/9/1979	9040	243
12/14/1979	16600	538
1/10/1980	8640	140
2/6/1980	24700	603
3/6/1980	12400	439
4/2/1980	51600	1570
5/7/1980	12000	758
6/11/1980	17500	950
7/2/1980	9030	24
8/6/1980	6480	273
9/4/1980	6120	234
10/8/1980	7950	372
11/21/1980	8770	309
12/9/1980	7820	233
1/8/1981	7870	214
2/4/1981	7850	148
4/16/1981	7380	278
5/5/1981	6350	223
6/3/1981	7510	734
7/9/1981	6180	67
8/26/1981	6870	149
9/3/1981	6450	313
11/4/1981	5430	147
1/6/1982	15200	1070
3/3/1982	18500	549
5/13/1982	6660	215
7/13/1982	6680	332
9/2/1982	6250	284
2/8/1983	19300	1060

Table 2.3.1-26 Calculation of Monthly Statistics for Suspended Sediment Load at Clyo, Georgia

	January samples	tons/day	February samples	tons/day	March samples	tons/day	April samples	tons/day	May samples	tons/day	June samples	tons/day
	1/17/1974	1970	2/14/1974	2120	3/21/1974	1270	4/26/1974	1450	5/22/1974	1350	6/19/1975	948
	1/17/1975	3150	2/21/1975	771	3/13/1975	643	4/17/1975	847	5/8/1975	1170	6/9/1976	592
	1/14/1976	926	2/12/1976	492	3/17/1976	1120	4/14/1976	754	5/12/1976	367	6/2/1977	484
	1/12/1977	363	2/10/1977	57	3/9/1977	591	4/7/1977	643	5/5/1977	745	6/7/1978	72
	1/11/1978	366	2/8/1978	318	3/8/1978	469	4/5/1978	609	5/3/1978	342	6/7/1979	1260
	1/4/1979	166	2/7/1979	386	3/6/1980	439	4/4/1979	544	5/2/1979	762	6/11/1980	950
	1/10/1980	140	2/6/1980	603	3/3/1982	549	4/2/1980	1570	5/7/1980	758	6/3/1981	734
	1/8/1981	214	2/4/1981	148			4/16/1981	278	5/5/1981	223		
	1/6/1982	1070	2/8/1983	1060					5/13/1982	215		
Samp size		9		9		7		8		9		7
Avg		929.4		661.7		725.9		836.9		659.1		720.0
Std Dev		1024.1		627.8		330.7		448.5		409.2		384.9
C.I., 95%, α = .05		**669.0**		**410.2**		**245.0**		**310.8**		**267.3**		**285.1**
C.I., 50%, α = .50		**230.2**		**141.2**		**84.3**		**107.0**		**92.0**		**98.1**

	July samples	tons/day	August samples	tons/day	September samples	tons/day	October samples	tons/day	November samples	tons/day	December samples	tons/day
	7/17/1975	1170	8/1/1974	522	9/26/1974	518	10/23/1974	850	11/22/1974	627	12/18/1974	353
	7/14/1976	544	8/30/1974	731	9/11/1975	497	10/16/1975	485	11/12/1975	797	12/18/1975	994
	7/13/1977	332	8/13/1975	627	9/14/1976	152	10/6/1976	301	11/4/1976	400	12/2/1976	1350
	7/6/1978	660	8/11/1976	530	9/14/1977	326	10/20/1977	266	11/17/1977	769	12/7/1977	899
	7/19/1979	462	8/10/1977	440	9/7/1978	337	10/4/1978	15	11/2/1978	54	12/6/1978	200
	7/2/1980	24	8/9/1978	170	9/6/1979	400	10/4/1979	345	11/9/1979	243	12/14/1979	538
	7/9/1981	67	8/23/1979	251	9/4/1980	234	10/8/1980	372	11/21/1980	309	12/9/1980	233
	7/13/1982	332	8/6/1980	273	9/3/1981	313			11/4/1981	147		
			8/26/1981	149	9/2/1982	284						
Samp size		8		9		9		7		8		7
Avg		448.9		410.3		340.1		376.3		418.3		652.4
Std Dev		364.0		208.5		117.6		253.5		282.7		437.3
C.I., 95%, α = .05		**252.2**		**136.2**		**76.8**		**187.8**		**195.9**		**324.0**
C.I., 50%, α = .50		**86.8**		**46.9**		**26.4**		**64.6**		**67.4**		**111.5**

Table 2.3.1-27 Presence of Utley Limestone in the VEGP ESP Site Borings

Boring	Northing	Easting	Utley Limestone
B-1001	1,142,661.92	620,220.42	Present
B-1002	1,142,998.52	620,985.47	Absent
B-1003	1,142,974.36	621,889.85	Present
B-1004	1,142,985.41	620,131.44	Present
B-1005	1,143,991.57	620,155.35	Present
B-1006	1,143,810.26	621,342.90	Absent
B-1007	1,142,662.29	621,120.13	Present
B-1008	1,142,670.93	621,996.15	Present
B-1009	1,141,000.54	620,361.26	Absent
B-1010	1,141,000.12	621,279.68	Absent
B-1011	1,143,741.13	622,378.01	Present
B-1013	1,140,976.08	622,272.50	Absent
OW-1006	1,143,817.85	619,179.75	Present
OW-1008	1,142,347.94	619,306.69	Present
OW-1009	1,141,891.65	620,888.61	Present
OW-1012	1,139,969.50	621,045.92	Absent
OW-1013	1,140,805.40	621,715.03	Absent
OW-1015	1,140,550.58	623,086.32	Absent

Note.
B-series data are provided in SSAR Appendix 2.5A
OW-series data are provided in SSAR Appendix 2.4A

Table 2.3.1-28 Summary of Holes Drilled at the Site for the Installation of Observation Wells

Boring / Drill Log No.	Drilling Method	Drill Dates		Sampled Depth		Drilled Depth Below the GS	Boring "Abandoned" or "Well" Installed
		Start	End	From (ft)	To (ft)	(ft)	
OW-1001A	3.25" HSA	25-May	25-May	No sampling		100	Abandoned
OW-1001	4.25" HSA	24-May	29-May	113.5	140	140	Well
OW-1002A	3.25" HSA	24-May	25-May	0	108.5	108.5	Abandoned
OW-1002	Rotosonic	2-Jun	6-Jun	87	237	237	Well
OW-1003A	3.25" HSA	24-May	24-May	0	90	90	Abandoned
OW-1003	4.25" HSA	25-May	25-May	No sampling		90.5	Well
OW-1004	Rotosonic	3-Jun	11-Jun	87	187	187	Well
OW-1005A	3.25" HSA	31-May	31-May	0	75	75	Abandoned
OW-1005	4.25" HSA	2-Jun	7-Jun	68.5	170	170	Well
OW-1006A	4.25" HSA	3-Jun	4-Jun	0	125	125	Abandoned
OW-1006	4.25" HSA	9-Jun	14-Jun	118.5	135	135	Well
OW-1007	4.25" HSA	4-Jun	7-Jun	98.5	122	122	Well
OW-1008A	3.25" HSA	26-May	26-May	0	107.5	105	Well OW-1008
OW-1008	Rotosonic	31 May	1-Jun	108	247	247	Well
OW-1009	4.25" HSA	24-May	27-May	0	100	100	Well
OW-1010	4.25" HSA	1-Jun	1-Jun	0	93.5	93.5	Well
OW-1011	Rotosonic	11-Jun	12-Jun	87	217	217	Well
OW-1012	4.25" HSA	31-May	1-Jun	0	93.6	93.6	Well
OW-1013	4.25" HSA	9-Jun	10-Jun	0	103.5	103.5	Well
OW-1014	Rotosonic	11-Jun	11-Jun	97	197.4	197.4	Well
OW-1015	4.25" HSA	30-May	3-Jun	0	120	120	Well

Note.

Borings OW-1001A, OW-1002A, OW-1003A, and OW-1005A were abandoned due to the use of 3.25-in hollow stem auger, which would not adequately accommodate well installation.

Boring OW-1006A was abandoned due to the of shortage hollow stem auger flights.

Boring OW-1008A is the upper portion of boring OW-1008 and was not abandoned. The "A" is designated to show that the upper portion of this boring was drilled using 3.25-in hollow-stem augers while the lower portion was drilled using the rotosonic drilling method.

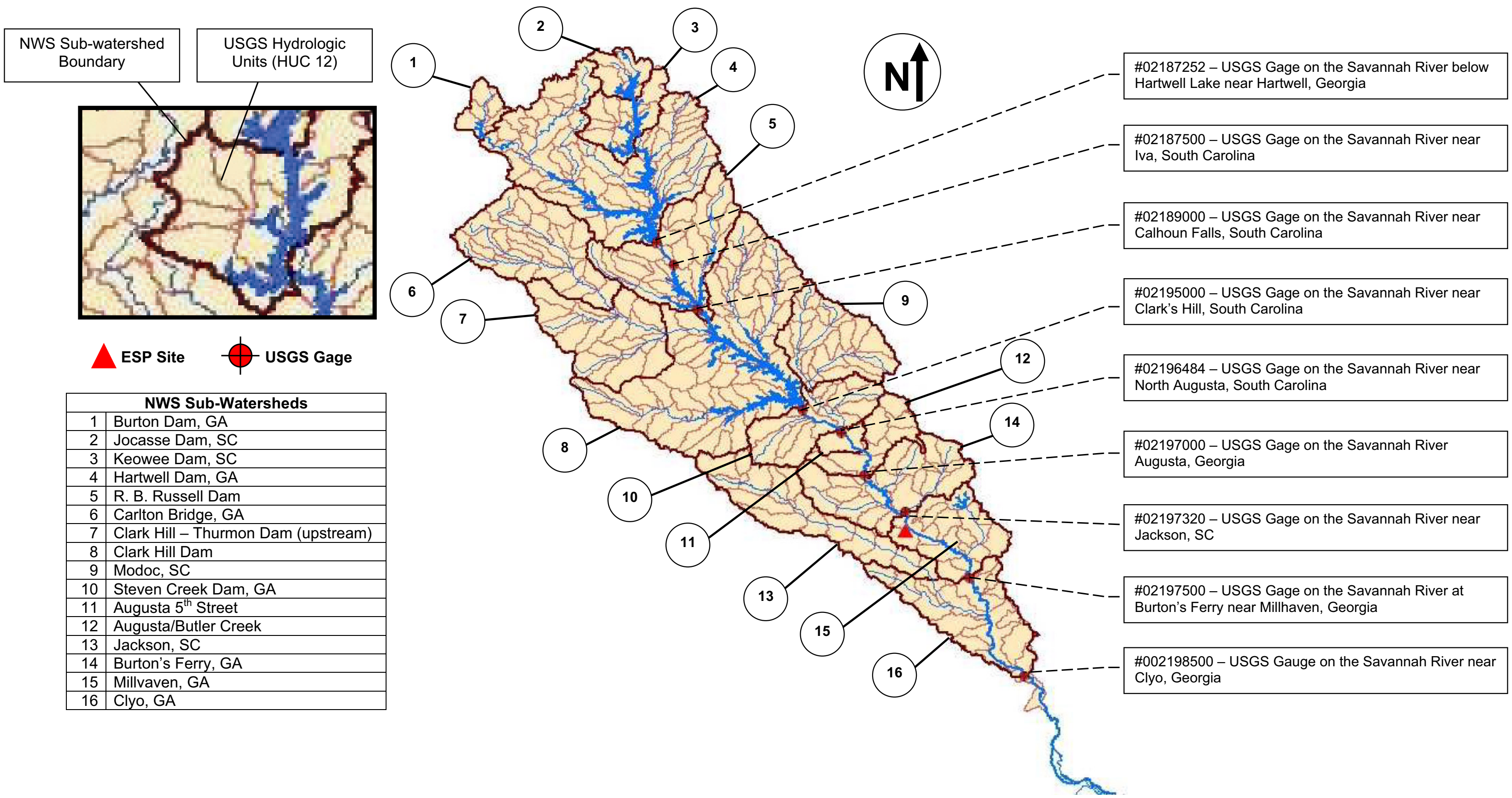
Boring log OW-1003 contained in SSAR Appendix 2.4A (report Appendix E) should read OW-1003A.

The drilling method for boring OW-1006 is assumed to be 4.25" HSA (not described in SSAR Appendix 2.4A (report Appendix E)).

Table 2.3.1-29 Minimum and Maximum Water Levels Recorded at Observation Wells 802A, 805A, 808, LT-7A, LT-12, and LT-13.

Observation Well	Minimum Water Level Elevation (ft msl)	Date	Maximum Water Level Elevation (ft msl)	Date
802A	156.1	5-Dec-02	160.8	17-Jun-99
805A	156.9	5-Dec-02	162.5	17-Jun-99
808	155.0	12-Jun-01	160.6	9-Dec-03
LT7A	152.0	30-Jun-85	159.6	19-Feb-86
LT12	155.8	10-Mar-03	162.4	26-Feb-86
LT13	154.3	10-Mar-03	159.0	1-Feb-88

Note:
Water level data provided in SSAR Table 2.4.12-15.



NWS Sub-Watersheds	
1	Burton Dam, GA
2	Jocasse Dam, SC
3	Keowee Dam, SC
4	Hartwell Dam, GA
5	R. B. Russell Dam
6	Carlton Bridge, GA
7	Clark Hill – Thurmon Dam (upstream)
8	Clark Hill Dam
9	Modoc, SC
10	Steven Creek Dam, GA
11	Augusta 5th Street
12	Augusta/Butler Creek
13	Jackson, SC
14	Burton's Ferry, GA
15	Millvaven, GA
16	Clyo, GA

Figure 2.3.1-1 Savannah River Watershed and HUCs (No Scale)

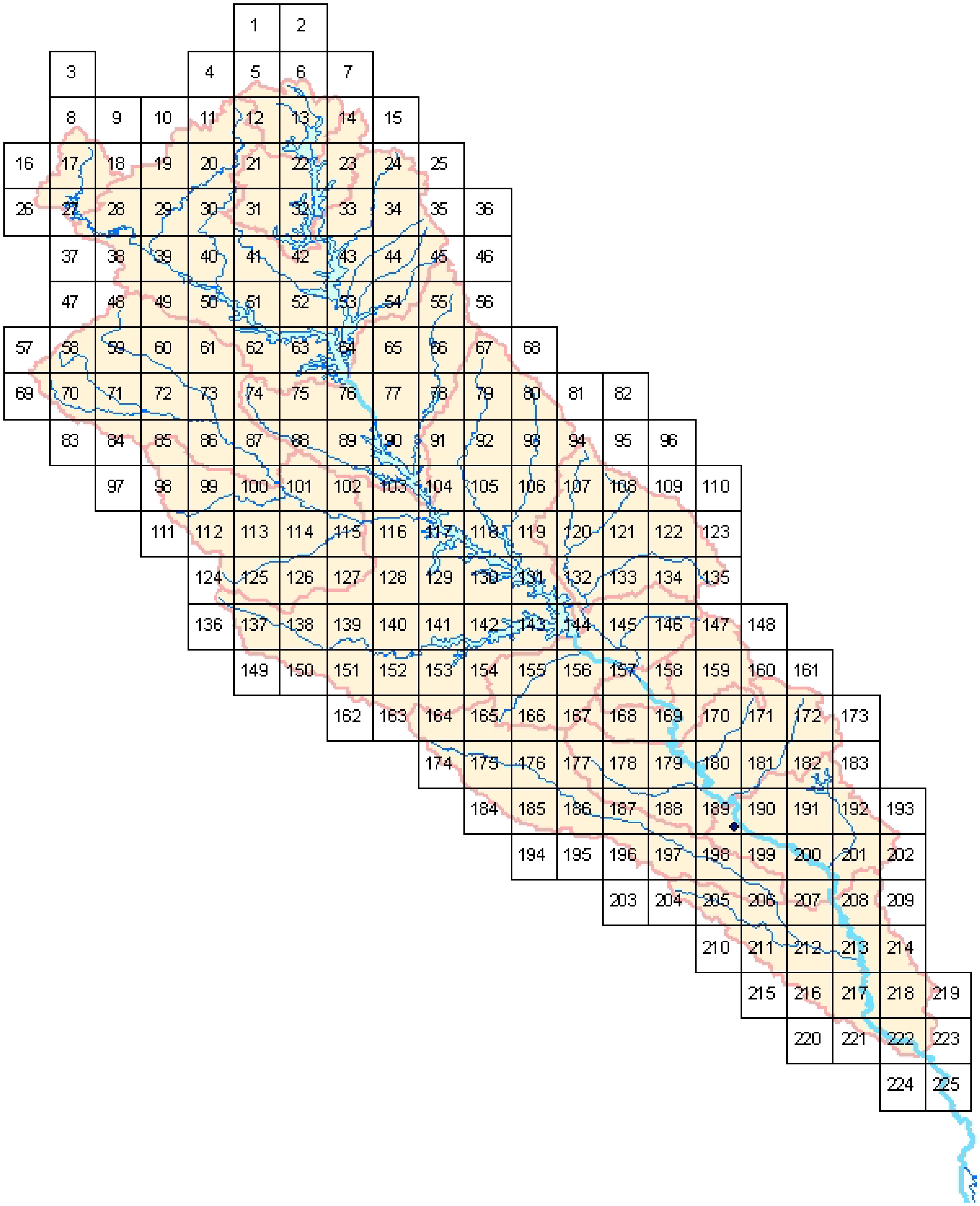
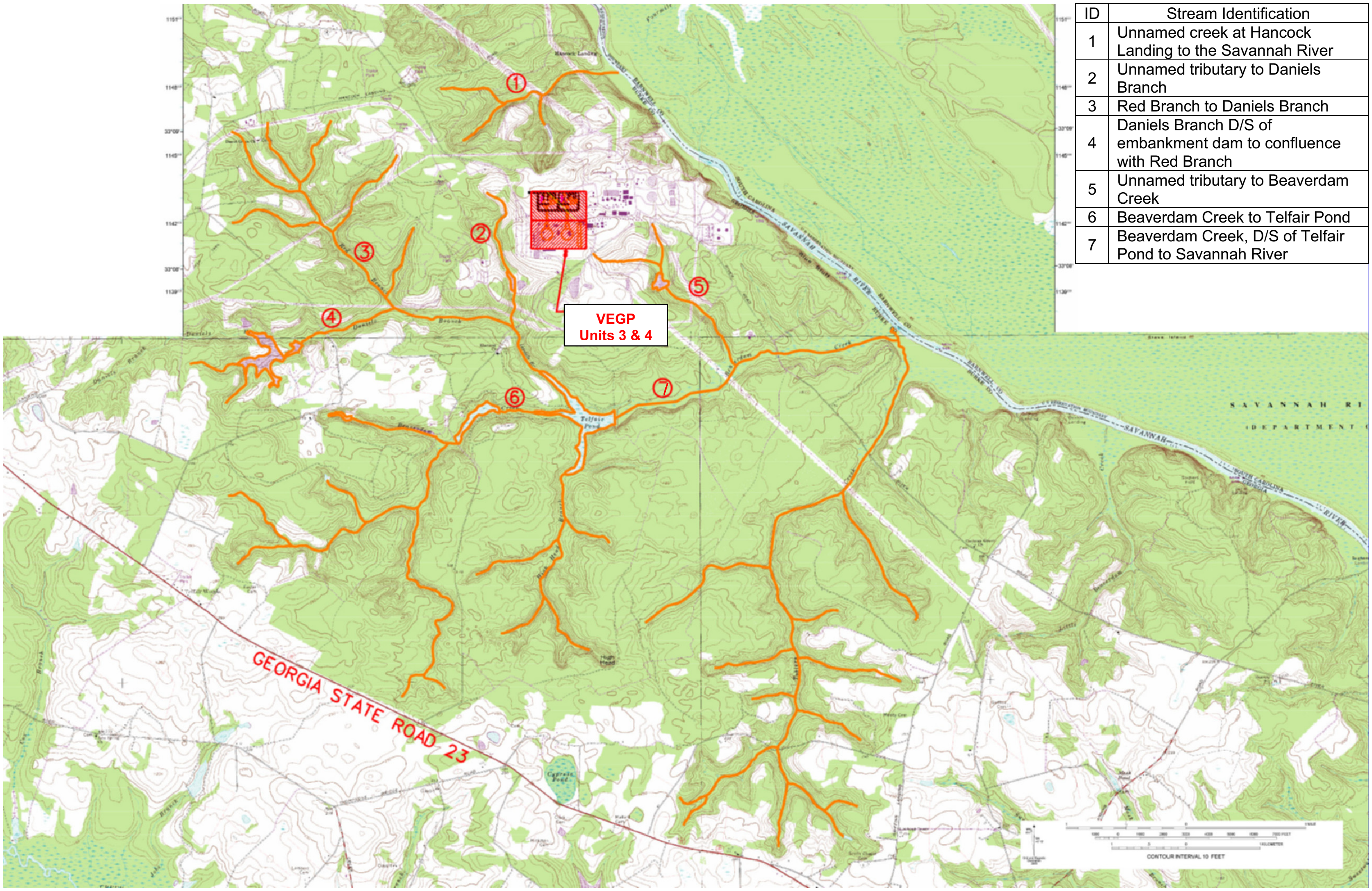


Figure 2.3.1-2 USGS 7.5-Minute Quadrangle Coverage for Savannah River Watershed



ID	Stream Identification
1	Unnamed creek at Hancock Landing to the Savannah River
2	Unnamed tributary to Daniels Branch
3	Red Branch to Daniels Branch
4	Daniels Branch D/S of embankment dam to confluence with Red Branch
5	Unnamed tributary to Beaverdam Creek
6	Beaverdam Creek to Telfair Pond
7	Beaverdam Creek, D/S of Telfair Pond to Savannah River

Figure 2.3.1-3 Local Area Drainage Map

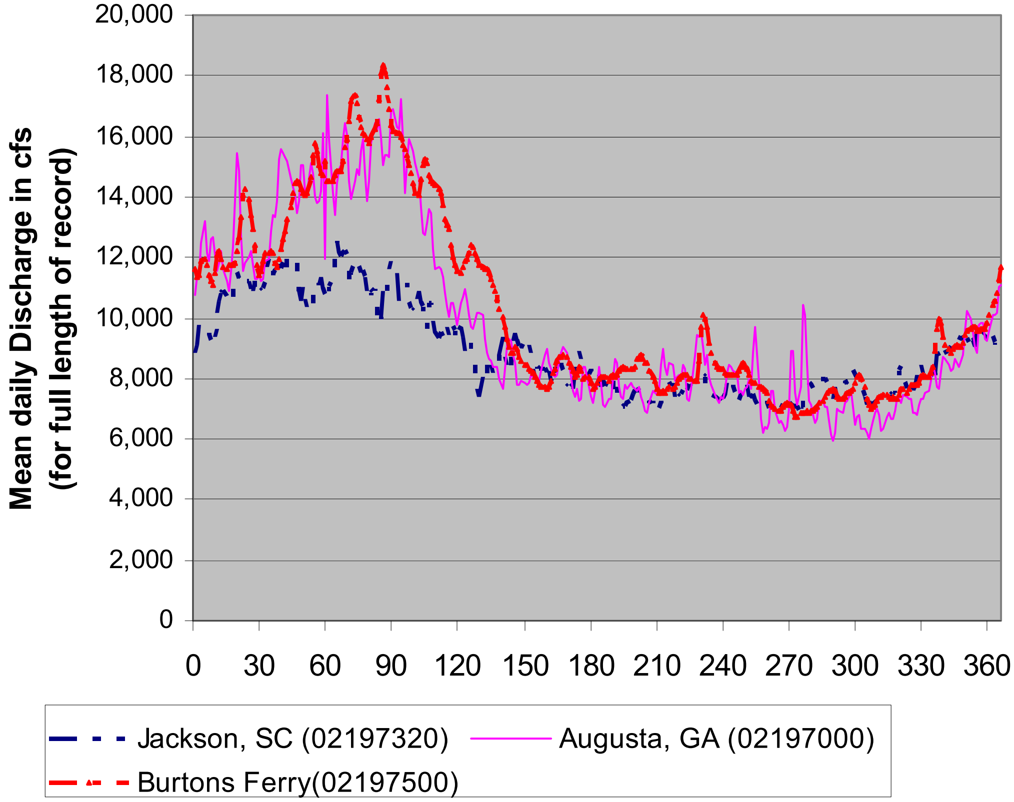


Figure 2.3.1-4 Mean Daily Discharge on the Savannah River at Augusta, Georgia; Jackson, South Carolina; and Burtons Ferry for Entire Period of Record

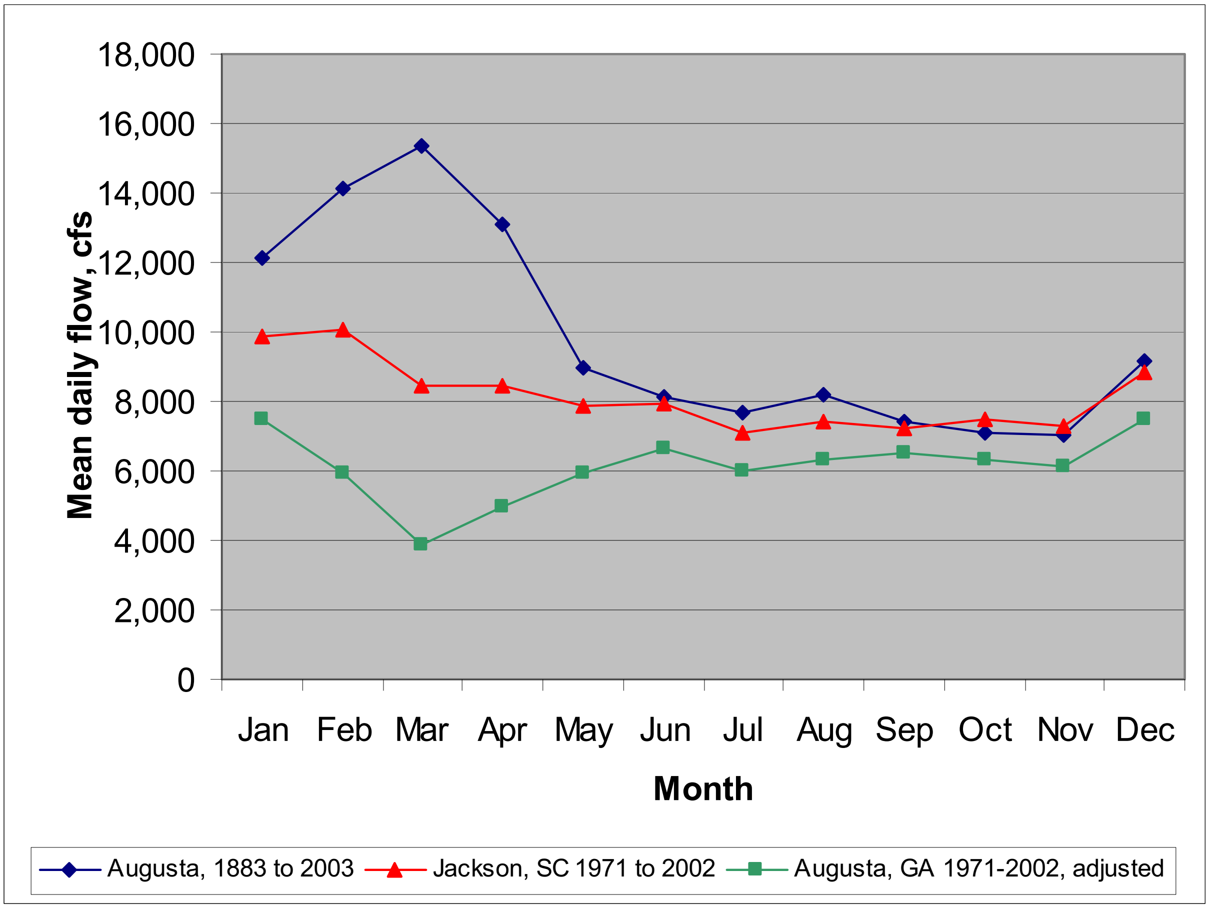


Figure 2.3.1-5 Full-Period and Adjusted Mean Discharges for Each Month on the Savannah River at Augusta, Georgia, and Jackson, South Carolina

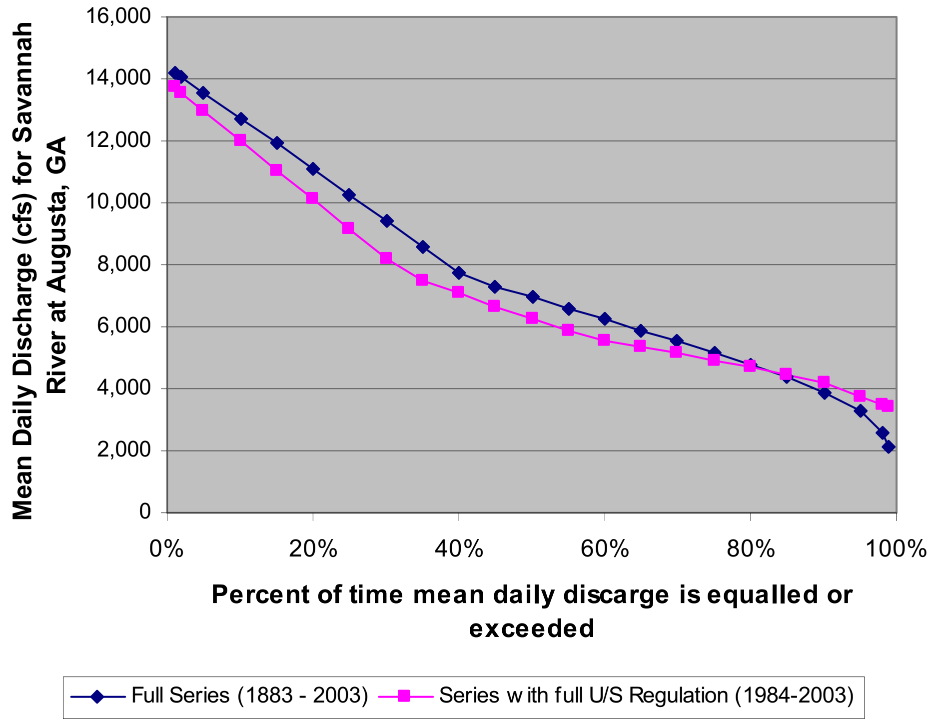


Figure 2.3.1-6 Flow-Duration Curves for the Savannah River at Augusta, Georgia, for Unregulated and Regulated Periods

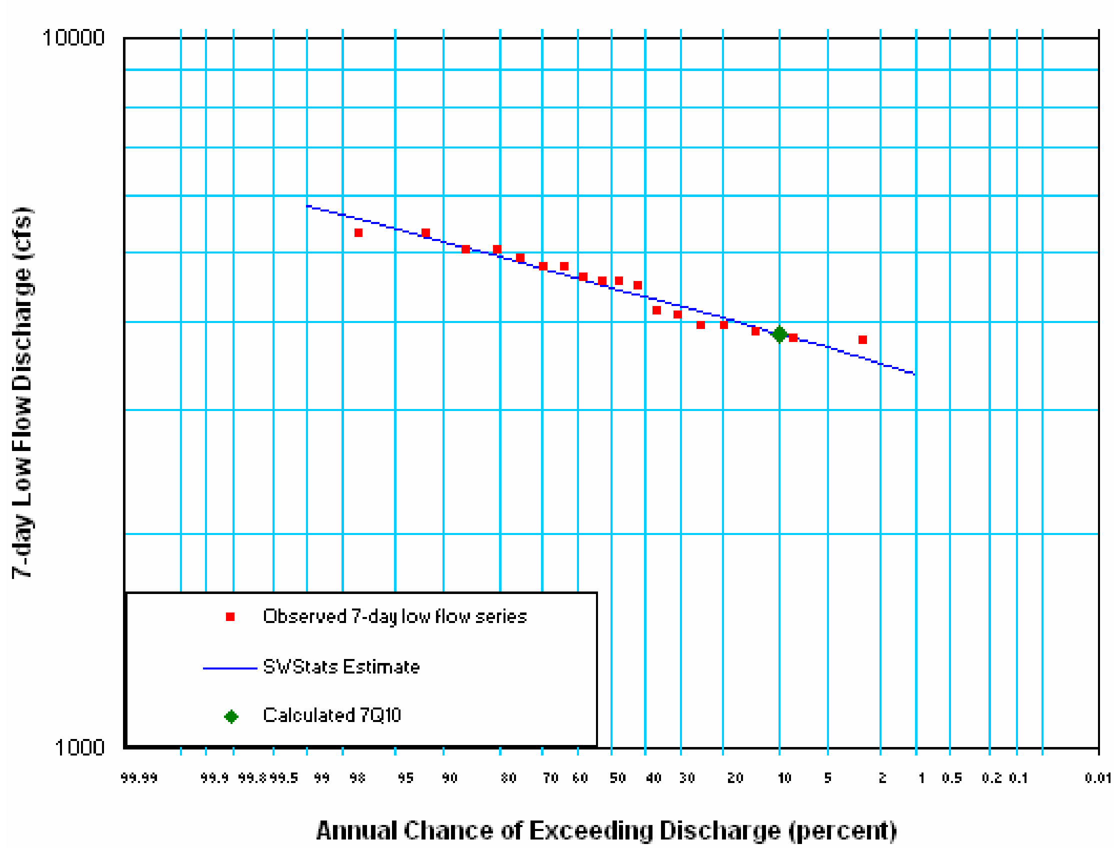
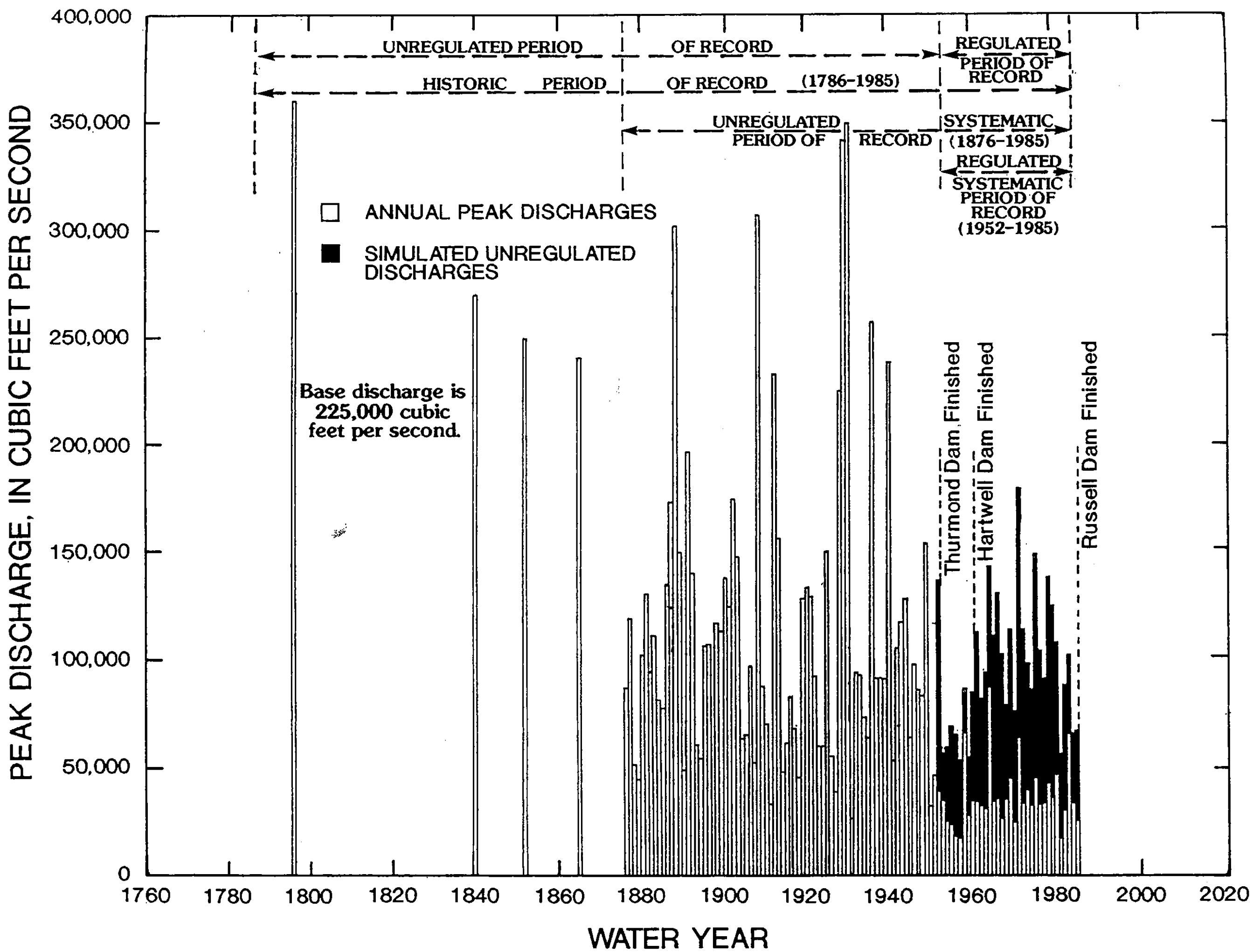
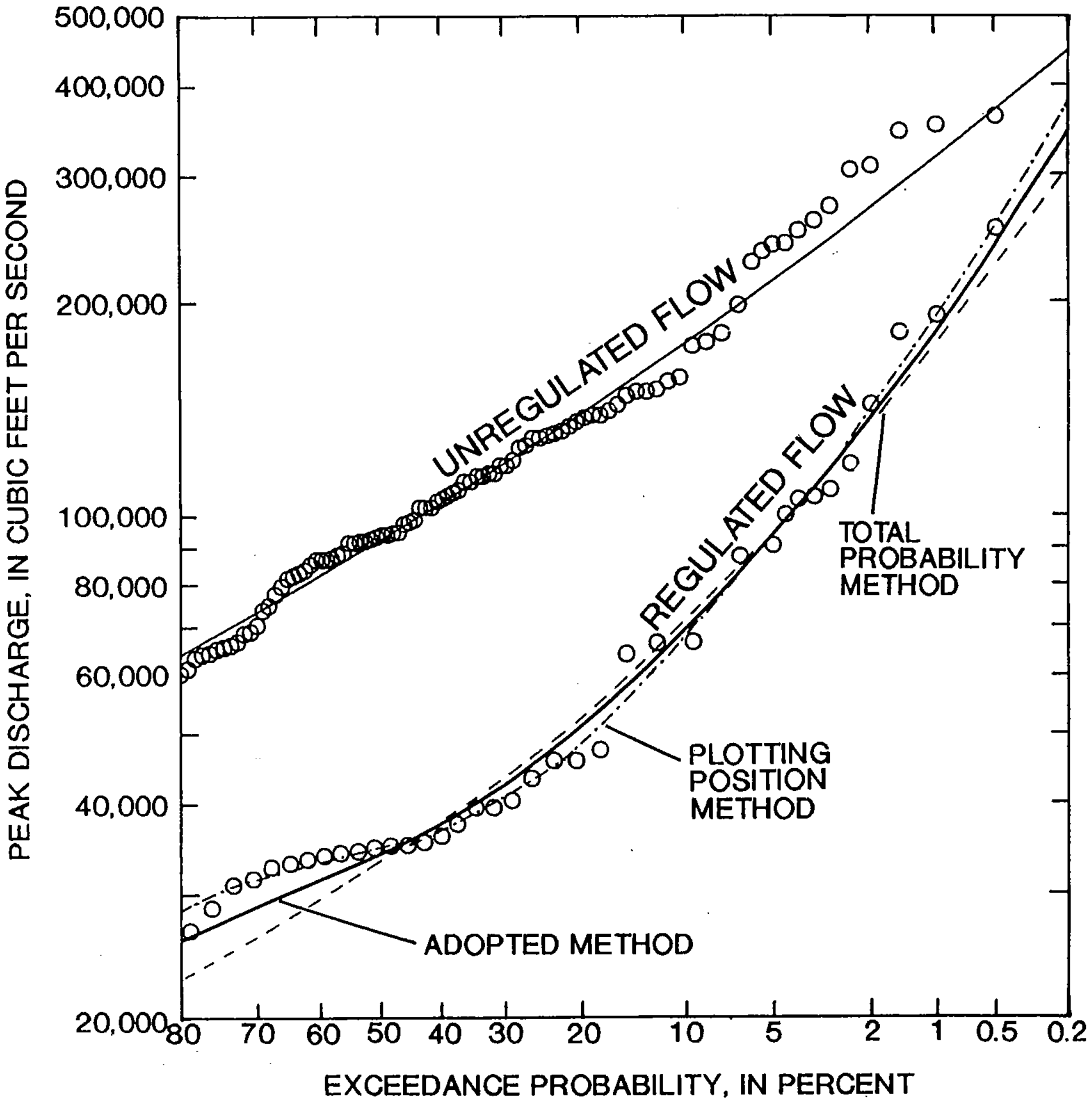


Figure 2.3.1-7 Log-Pearson III Frequency Plot of 7-Day Low-Flow for Regulated Period on the Savannah River at Augusta, Georgia



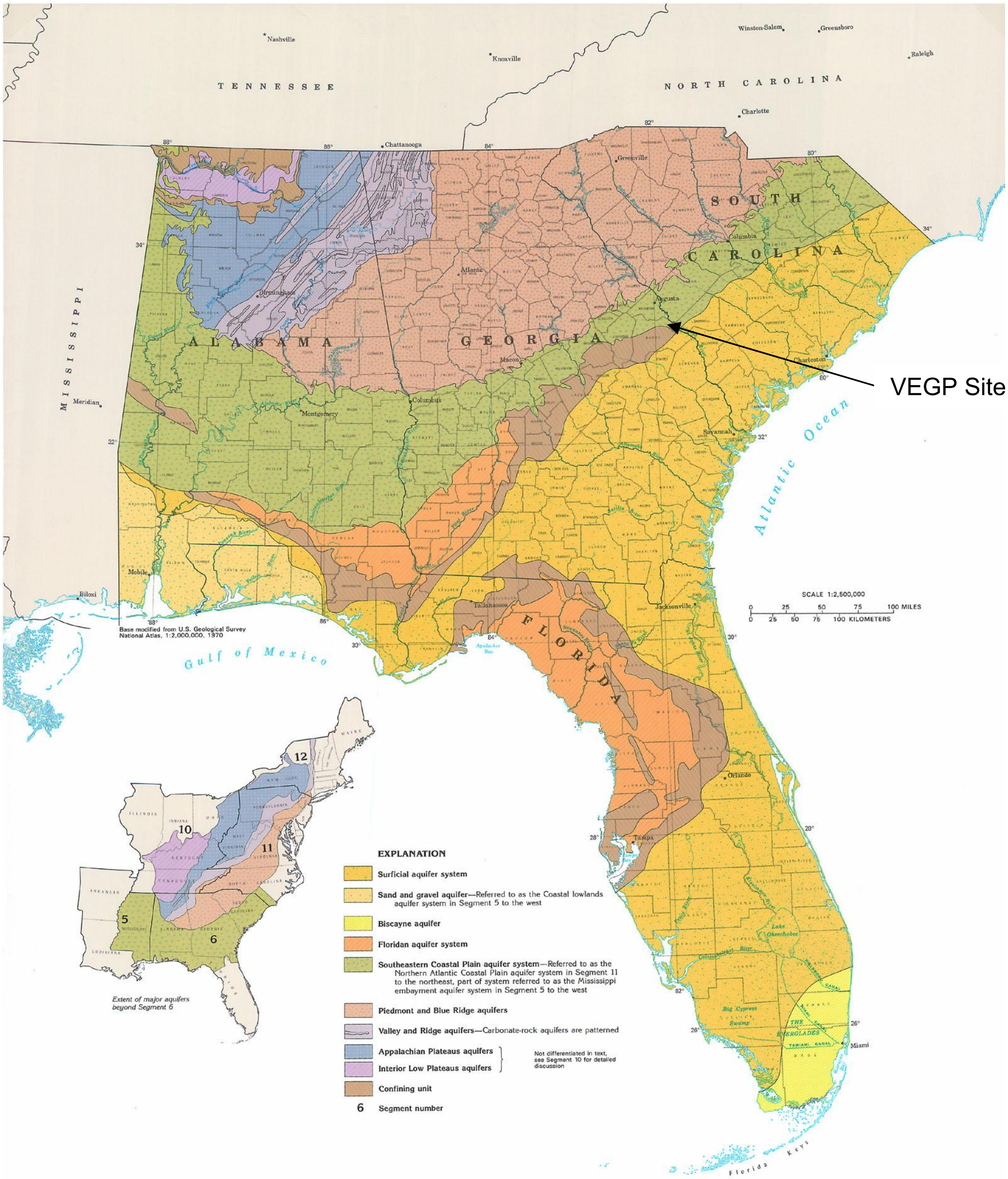
Source: Figure 2 from USGS 1990

Figure 2.3.1-8 Unregulated and Regulated Peak Discharge Values for the Savannah River at Augusta, Georgia (02197000)



Source: Figure 35 from USGS 1990

Figure 2.3.1-9 Unregulated and Regulated Annual Peak Discharge Frequency Curves for the Savannah River at Augusta, Georgia



Source: Figure 3 from Miller 1990

Figure 2.3.1-10 Extent of Major Aquifers or Aquifer Systems at the Land Surface in the VEGP Site Region

GEOLOGIC TIME		SNC ESP NOMENCLATURE		
PERIOD	SERIES	GEOLOGIC UNIT	HYDROGEOLOGIC UNIT	REGIONAL HYDROGEOLOGIC UNIT
TERTIARY	Eocene	Barnwell Gr.	Water Table aquifer	Southeastern Coastal Plain Aquifer System
		Lisbon Fm. / Blue Bluff Mbr.	Confining unit	
		Still Branch Fm. Congaree Fm.	Tertiary sand aquifer	
	Paleocene	Snapp Fm. Black Mingo Fm.	Semi-confining unit	
Cretaceous		Steel Creek Fm.	Cretaceous aquifer	
		Gaillard Fm. / Black Creek Fm.		
		Pio-Nono Fm. / unnamed sands		
		Cape Fear Fm.		

Notes: Geologic unit naming convention **(Huddlestun and Summerour 1996; Falls and Prowell 2001)**
Regional hydrogeologic unit naming convention **(Miller 1990)**

Figure 2.3.1-11 Schematic Hydrostratigraphic Classification for the VEGP Site

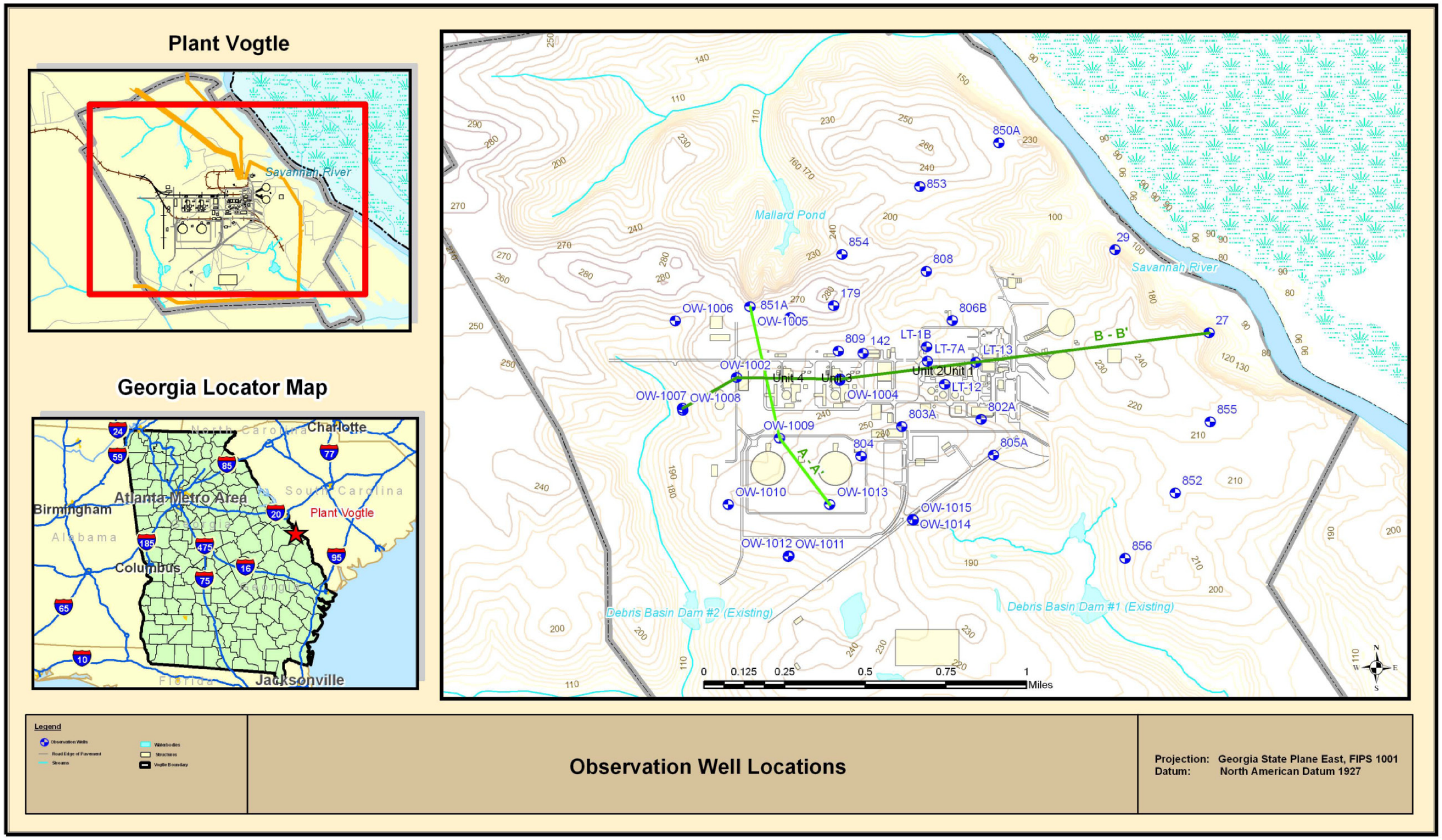


Figure 2.3.1-12 Observation Well Locations

Figure 2.3.1-13 Deleted in Revision 2

Figure 2.3.1-14 Deleted in Revision 2

Figure 2.3.1-15 Deleted in Revision 2

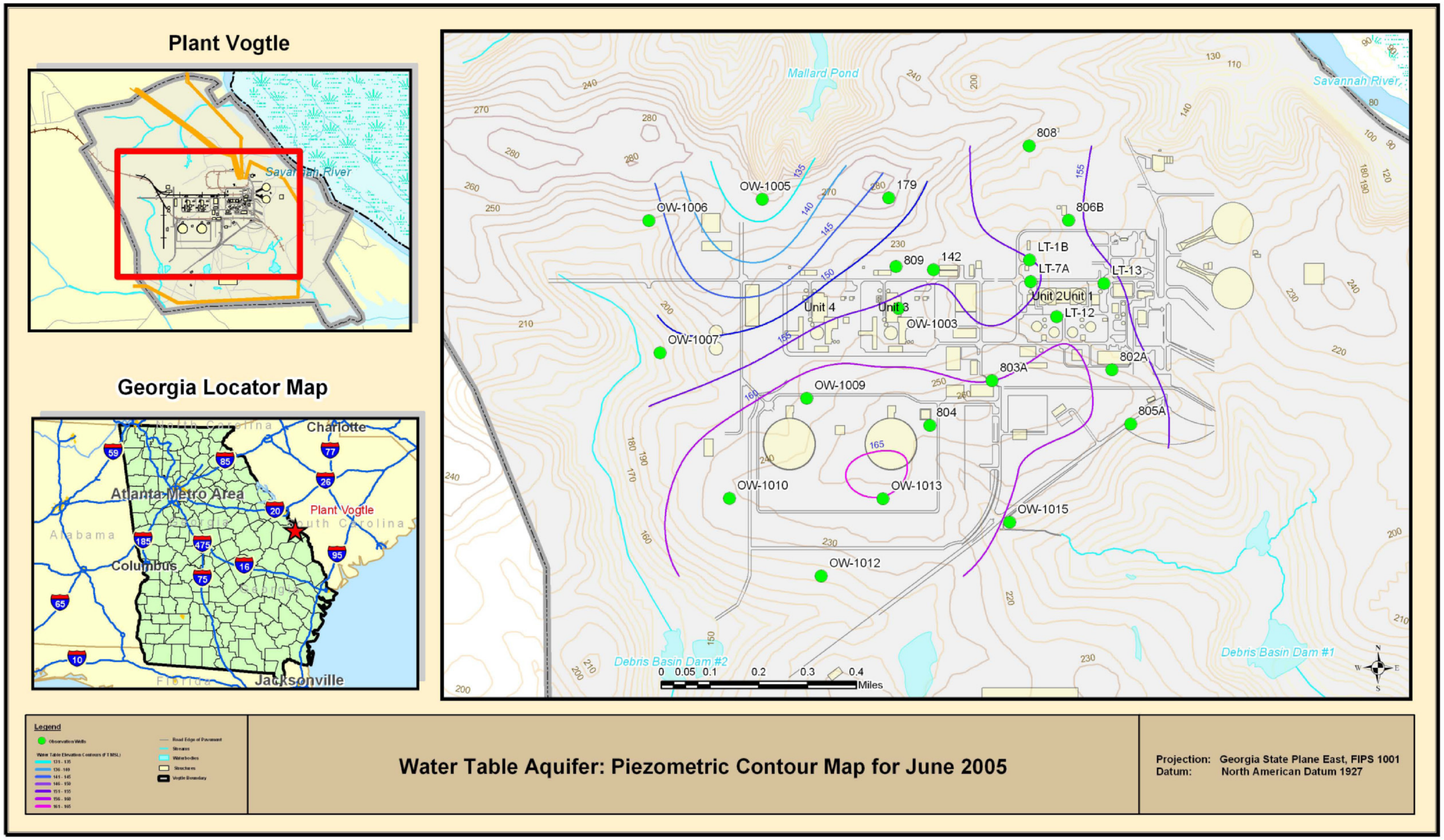


Figure 2.3.1-16 Water Table Aquifer: Piezometric Contour Map for June 2005

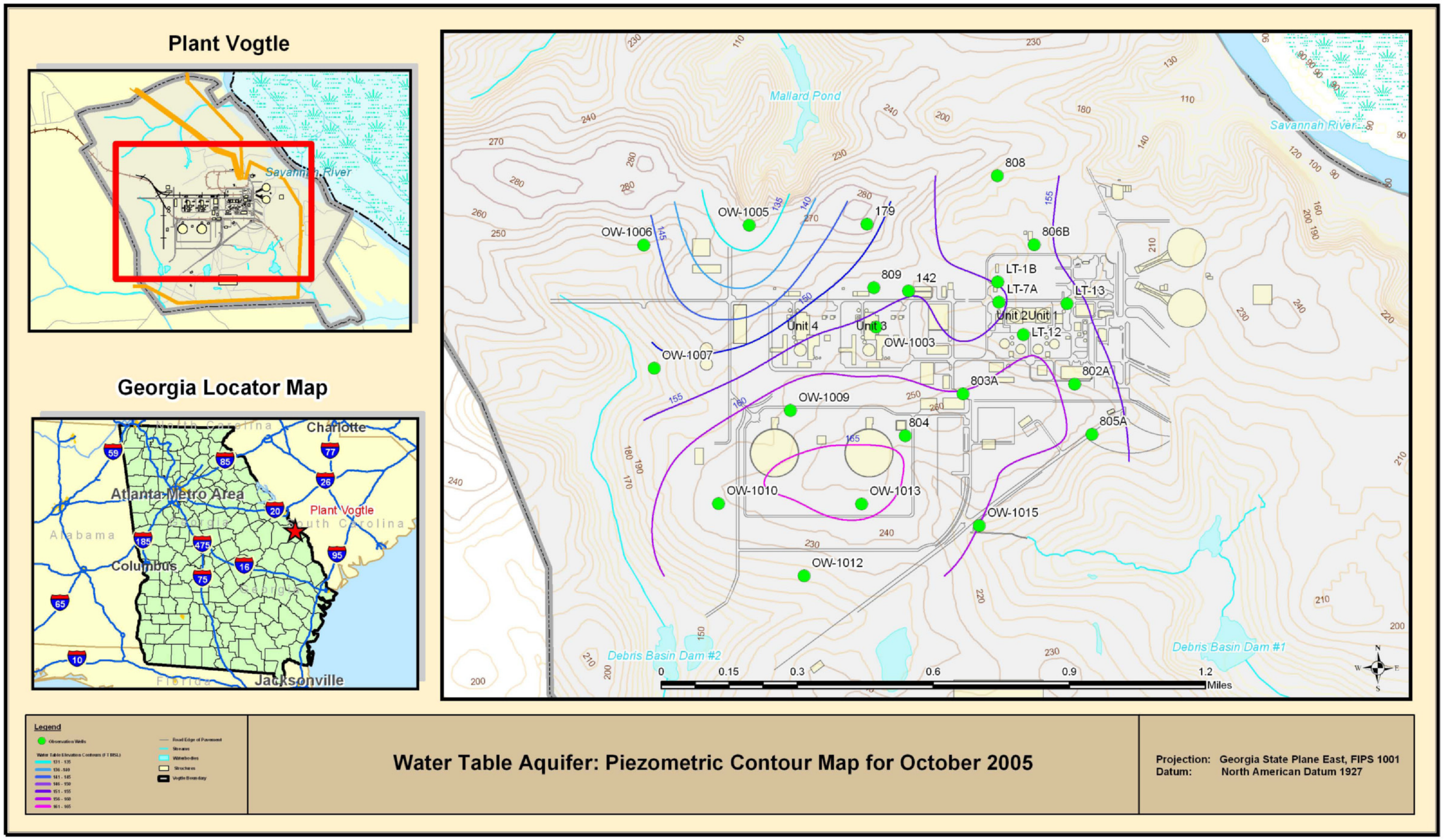


Figure 2.3.1-17 Water Table Aquifer: Piezometric Contour Map for October 2005

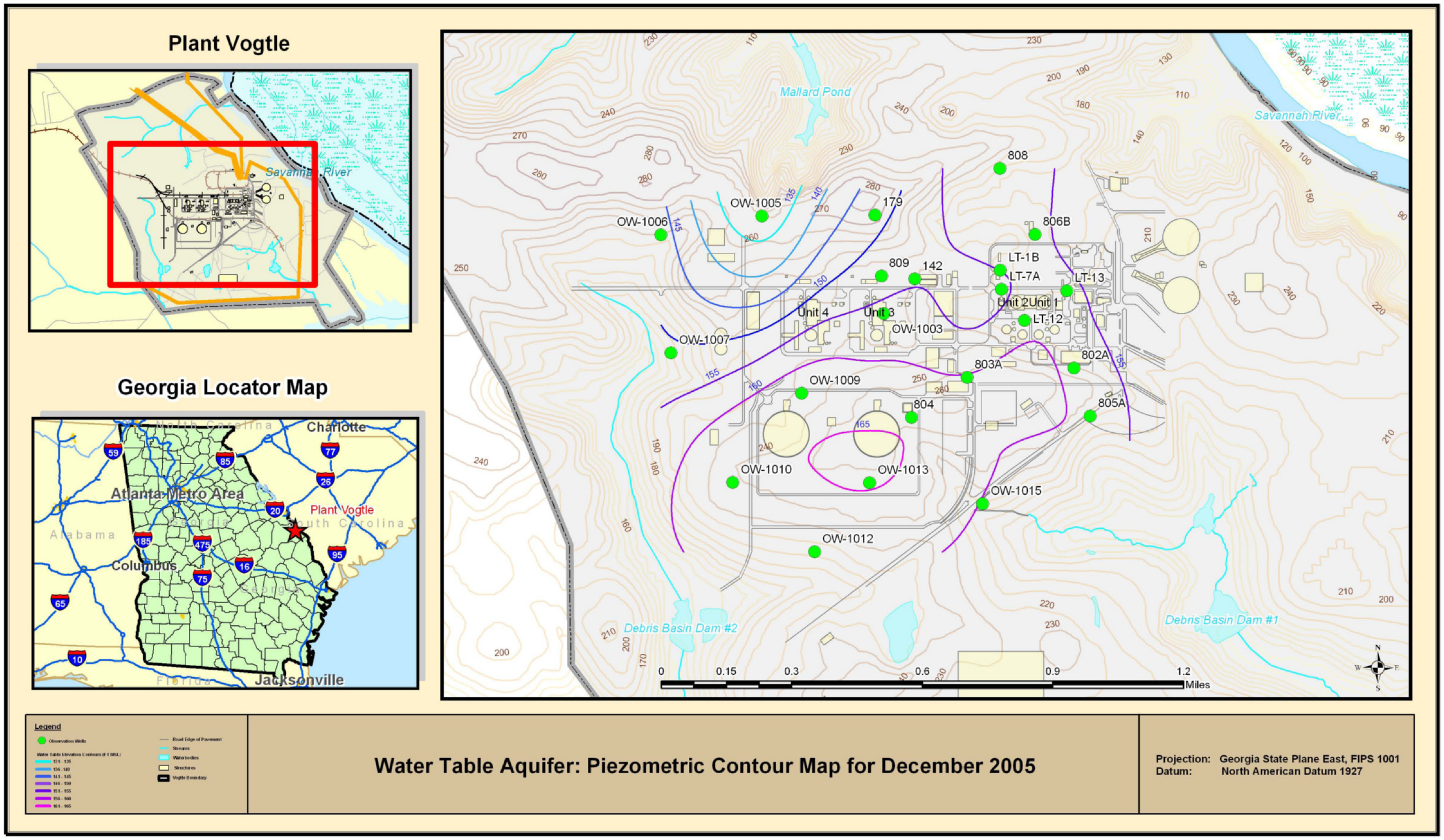


Figure 2.3.1-18 Water Table Aquifer: Piezometric Contour Map for December 2005

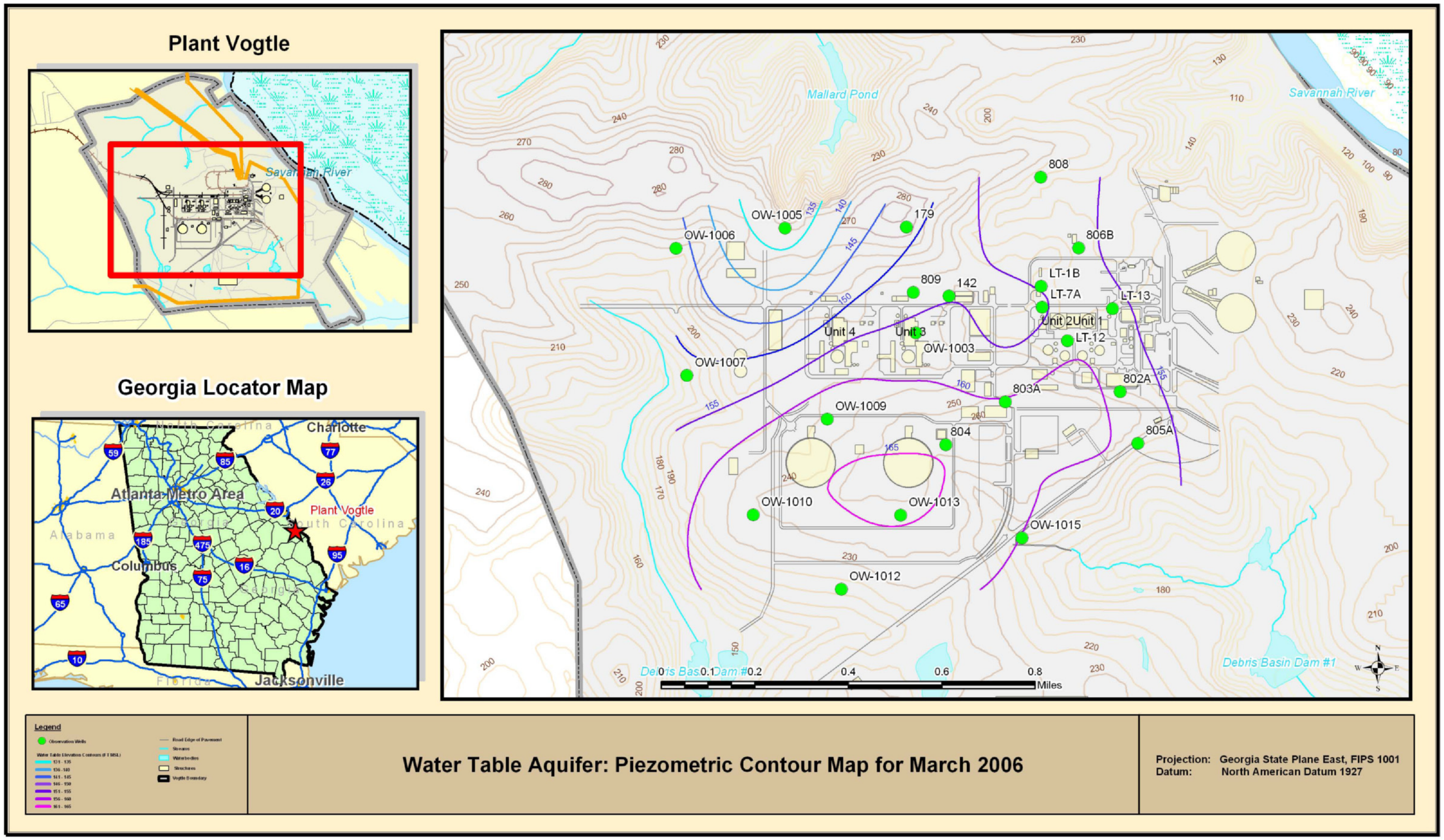


Figure 2.3.1-19 Water Table Aquifer: Piezometric Contour Map for March 2006

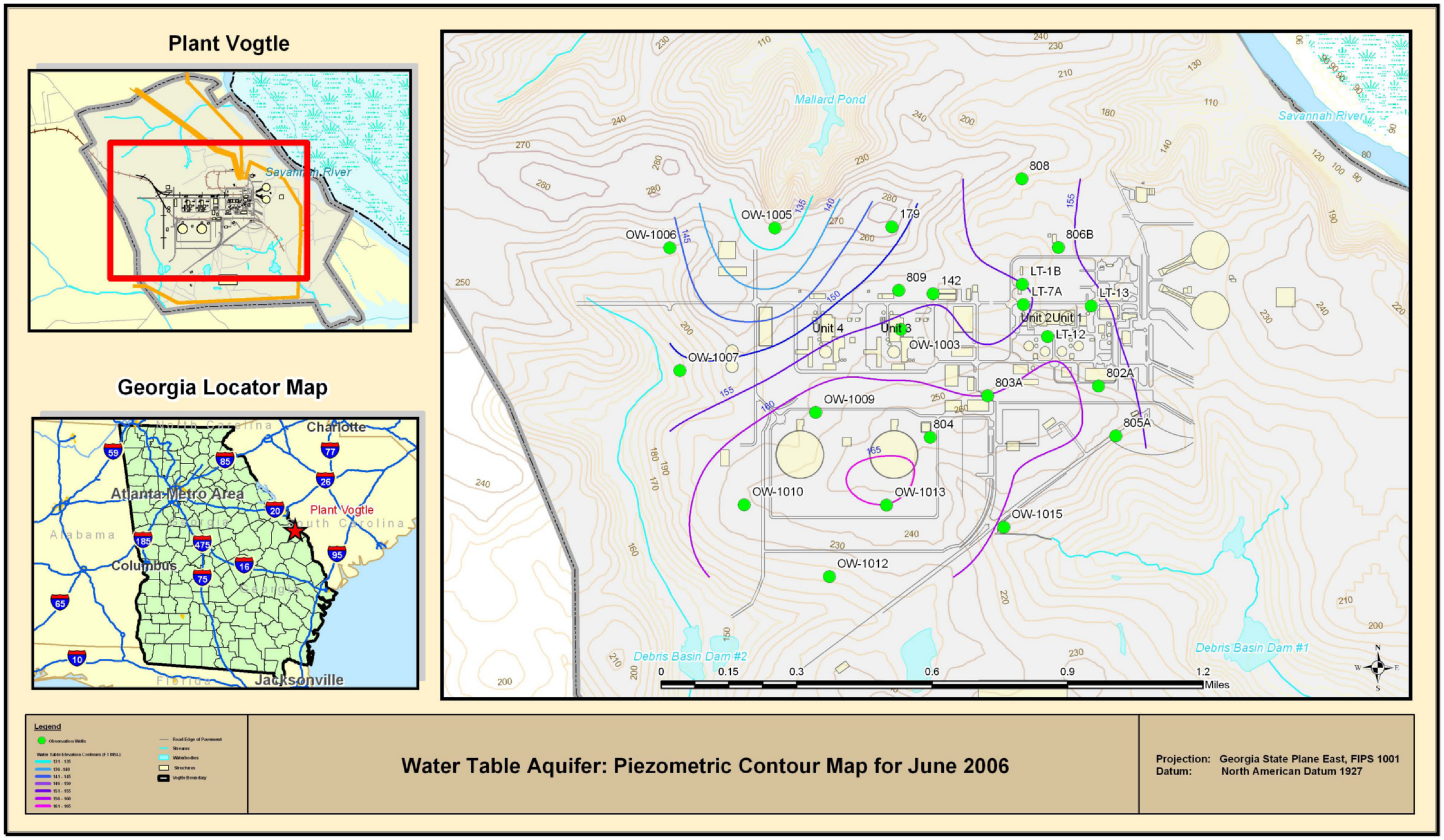


Figure 2.3.1-20 Water Table Aquifer: Piezometric Contour Map for June 2006

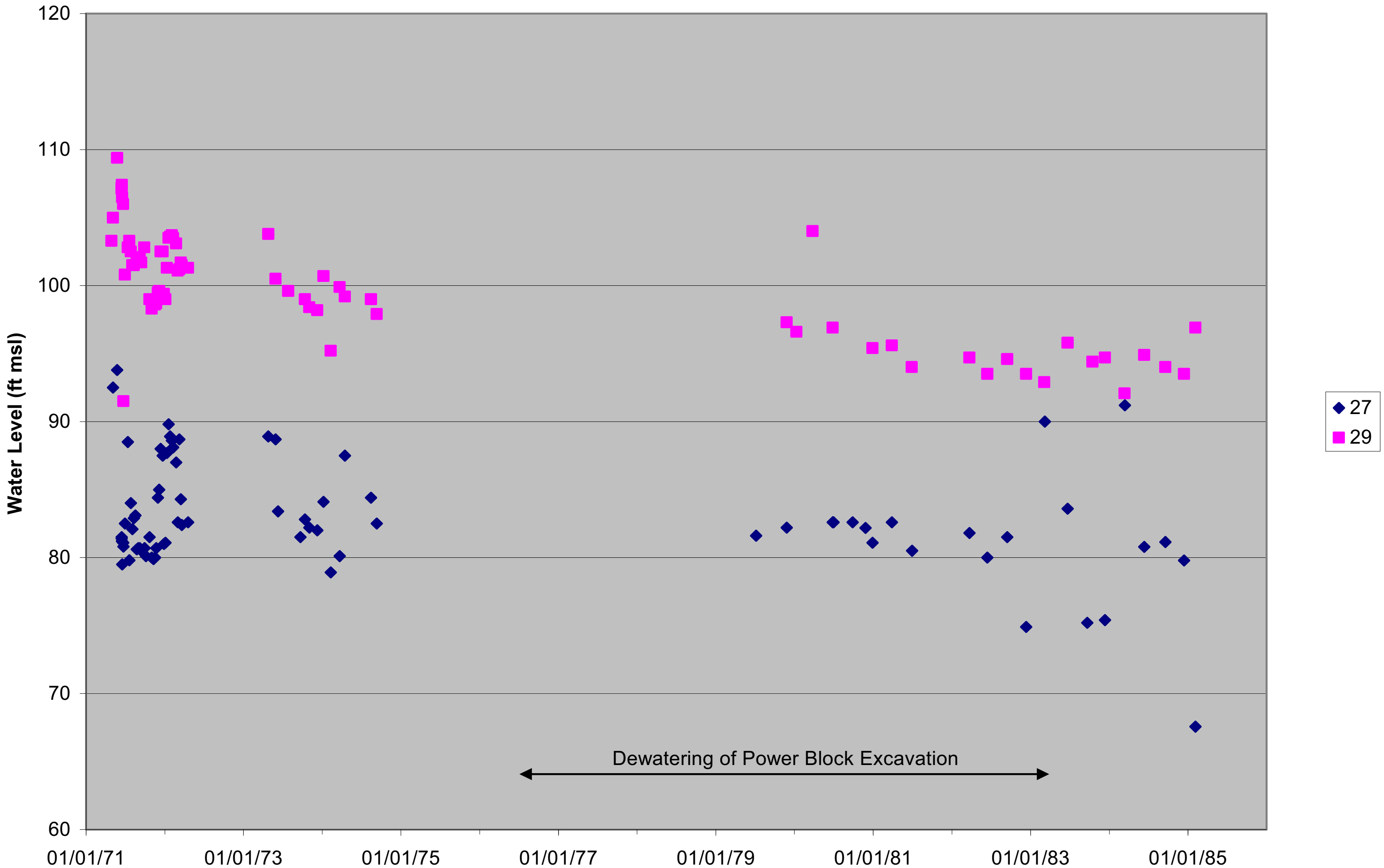


Figure 2.3.1-21 Tertiary Aquifer: 1971–1985 Hydrographs

Figure 2.3.1-22 Deleted in Revision 2